7W AC/DC-DC CONVERTER

SAW07S Series one is SHINHOM to provide customers with a small package form of high-performance module power supply, this series of power supply with AC and DC dual wide voltage input, built-in lightning and surge protection circuit, built-in pulse group attenuator, built-in differential mode, common mode filter, efficiency up to 88% (full series synchronous rectification) and less than 0.1W ultra-low no-load power consumption and other advantages. The power supply adopts vacuum potting package to prevent dust and moisture. This series of power supplies compiles with EN55032 Class B Electromagnetic compatibility (EMC) characteristics and Class I isolation levels (safety regulations), and typical circuits can paes certification tests.

FEATURES:

- Global range of AC/DC Input
- High efficiency, high power density
- Stabilized output voltage, low ripple noise
- Small size: 28*37*19mm
- Protection type: overload protection/Short circuit protection/overheat protection
- Built-in EMC circuit compiles with EN55032 Class BClass II isolation level (safety regulations)
- Standby low power consumption, green environmental protection
- No need for peripheral circuit design, PCB welded plastic shell natural cooling

APPLICATION:

- Industrial electrical equipment
- Mechanical equipment
- Industrial automation equipment
- Handheld electronic device
- Wireless network
- Telecommunications/data communications
- Instrument and meter
- Intelligent field

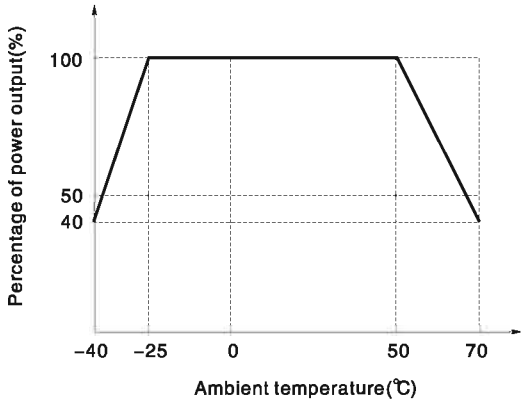
ELECTRICAL CHARACTERISTICS:

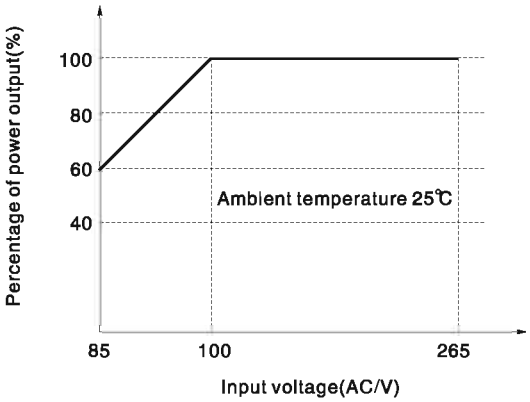
Part No.	Input						Output						Ripple and noise			
	Voltage range	Current @110V	Current @220V	Power factor	Start-up time	Attenuation rate	DC Volage	Rated current	Rated power	Efficiency (Typ)	Voltage accuracy	load regulation	20M bandwidth/ripple		200M bandwidth/noise	
													Typ	Max	Typ	Max
SAW07S-28S05	85-265Vac 100-375Vdc 50/60Hz	<100mA	<70mA	<0.58	<300ms	1-4KV >30dB	5V	1400mA	7W	82%	±1%	±1%	20mV	40mV	40mV	70mV
SAW07S-28S06							6V	1160mA		82%		±1%	20mV	46mV	40mV	70mV
SAW07S-28S09							9V	780mA		82%		±1%	20mV	46mV	40mV	70mV
SAW07S-28S12							12V	580mA		84%		±0.8%	20mV	30mV	45mV	70mV
SAW07S-28S15							15V	480mA		84%		±0.8%	20mV	30mV	45mV	70mV
SAW07S-28S20							20V	350mA		84%		±0.8%	40mV	70mV	46mV	85mV
SAW07S-28S24							24V	290mA		84%		±0.4%	40mV	70mV	46mV	85mV
Notes	1.Unless otherwise specified, all specifications are tested at input voltage 220VAC, full load, and ambient temperature of 25℃ 2.The recommended power is 20% to 70% of the rated power of the module (at @25℃)															

PRODUCT CHARACTERISTICS:

Item	Working condition
Switching frequency	85KHz
Short circuit protection	Long-term short circuit, self-recovery
Overload protection	>Load150%, recoverable
Overheat protection	The surface temperature of the module is 100 ℃ (±4℃), and it is protected from ovarheating
HI-Pot	Input-Output 3000VAC /1min (withstand voltage test is limit damage test, can not be tested multiple times)
Operating temperature	-40-70℃ (Refer to temperature & Derating curve for details)
weight	39g(±2g)
Case Size	28*37*19mm
Case material	High temperature resistant plastic housing
Cooling mode	Natural cooling
Safety level	Class Ⅱ
Notes	Unless otherwise specified, all specifications are tested at input voltage 220VAC, full load, and ambient temperature of 25℃

ELECTRICAL CHARACTERISTICS:

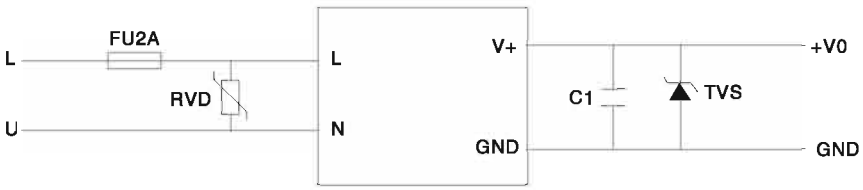




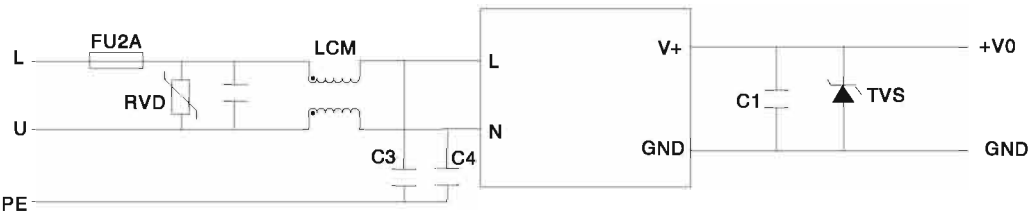
1. When the input voltage ranges from 85V to 100VAC, Converter must be derated
2. Ambient temperature < -25℃, or ambient temperature > When the temperature is 50℃, Converter must be derated
3. This product is suitable for use in a natural air-cooled environment. If it is needed in a sealed environment, it is necessary to consider the power usage of the module comprehensively.

APPLICATION CIRCUIT:

Typical application circuit



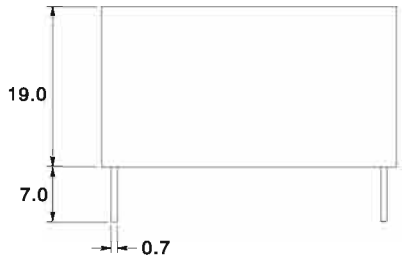
EMC enhanced recommendation circuit

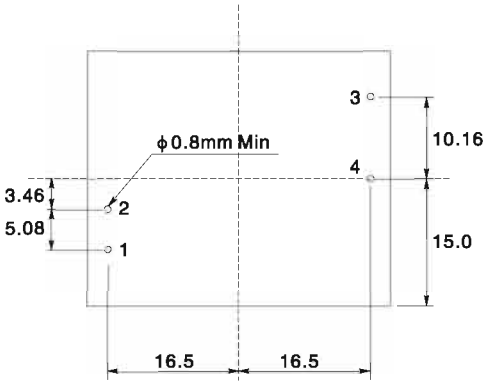


Part No.	FUSE	RVD	C2	LCM	C3,C4	C1	TVS
SAW07S-28S05	1A/250VAC	14D431K	0.33uF 275VAC	UU9.8 60mH	222M 250V	CBB capacitor 104/50V	5V: P6KE6.8A 12V: P6KE15A 24V: P6KE28A
SAW07S-28S06							
SAW07S-28S09							
SAW07S-28S12							
SAW07S-28S15							
SAW07S-28S20							
SAW07S-28S24							

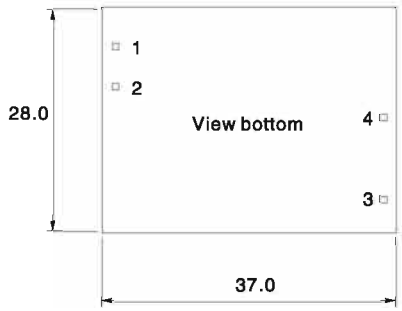
1. SAW07S series module has built-in EMC circuit, can directly pass the certification test. If you need to use in a complex power supply environment, need refer to the technical manual to build a peripheral EMC enhanced circuit, otherwise the product has the risk of damage.
2. FUSE is the input fuse. Select a slow-break fuse that has safety certification. For details, see the recommended value in the technical manual.
   (Note: If the rated current value of the fuse is too large, it can not play a protective role, and if it is too small, it is easy to cause misfuse due to the input capacitor charging when starting.)
3. MOV is a varistor, which protects the surge voltage of the product input. It is recommended to refer to the corresponding technical manual parameters for the selection of varistor specifications.
4. C1 is a CBB capacitor, which removes high-frequency noise, and the recommended value is 104/50V.

SIZE AND PIN MODE:





Recommended pad



Pin mode	
Pin	
1	AC(V)
2	AC(L)
3	V0+
4	V0–

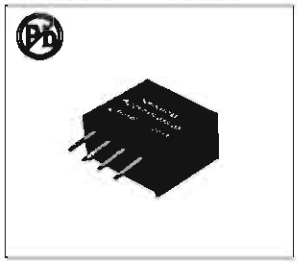
DC-DC CONVERTER

Fixed Input voltage Part No.	Input Voltage(V)	Output Power(W)	Output Voltege(V)	Output mode	Packaging	Dimension	Shell Meterial	Isolation Voltage(V)	Page Number
HDCL01S	2.97-3.63, 4.5-5.5, 10.8-13.2, 13.5-16.5, 21.6-26.4	1	3.3, 5, 9, 12, 15, 25, ±5, ±9, ±12, ±15	1	SIP4	11.60x6.00x10.20	plastic	1500	03
HDC01S HDCE01S		1		1,2	SIP6,SIP7	19.60x6.00x9.60		1500,3000	04/05
HDC02S HDCE02S		2		1,2	SIP6,SIP7	19.65x7.05x10.16		1500,3000	06/07
HDC01M		1		1	SMD8	13.70x11.00x6.95		1500	08
HDCF01S		1		1	SIP7	19.65x7.05x10.16		6000	09
HDCG01S HDCG02S		1~2		1,2	SIP7	19.50x9.80x12.50		6000	10/11
HDCQ01S		1		2	SIP7	19.50x9.80x12.50		6000	12
HDCI01S HDCI02S		1~2		1	SIP8	19.60x6.00x9.60 19.65x7.05x10.16		1500	13/14
Wide Input voltage Part No.	**Input Voltage(V)**	**Output Power(W)**	**Output Voltage(V)**	**Output mode**	**Packaging**	**Dimension**	**Shell Material**	**Isolation Voltage(V)**	**Page Number**
WDC78-500	32(max)	1.5~7.5		1	SIP3	11.60x7.55x10.16	plastic		15
WDC78-1000	36(max)	2.5~15		1	SIP3	11.60x7.55x10.16			16
WDCW02S WDCV02S	4.5-9, 9-18, 18-36, 36-75, 4.5-18, 9-36, 18-75	2	3.3, 5, 12, 15, 24, ±5, ±12, ±15	1,2	SIP6	17.00x9.00x12.00		1500	17/18
WDCW03S WDCV03S		3		1,2					19/20
WDC01S WDCV01S		1		1,2	SIP8	22.00x9.50x12.00			21/22
WDC03S WDCV03S		2.5~3		1,2					23/24
WDCE03S WDCVE03S		3		1,2				3000	25/26
WDC06S WDCV06S		6		1,2				1500	27/28
WDC10S WDCV10S		10		1,2					29/30
WDC03N WDCV03N		3		1,2	DIP18	23.80x13.70x10.20	aluminum alloy		31/32
WDC06N WDCV06N		6		1,2					33/34
WDC10N WDCV10N		10		1,2					35/36
WDC03P WDCV03P		3		1,2	DIP24	32.00x20.00x12.00			37/38
WDC06P WDCV06P		6		1,2					39/40
WDC10P WDCV10P		10		1,2					41/42
WDC06Q WDCV06Q		6		1,2	1*1	25.40x25.40x12.00			43/44
WDC10Q WDCV10Q		10		1,2					45/46
WDC15Q WDCV15Q		15		1,2					47/48
WDC20Q WDCV20Q		20		1,2					49/50
WDC30R WDC40R		30/40		1,2	2*1	50.80x25.40x12.00			51
WDCV30R		30		1					52

DC-DC CONVERTER PIN DEFINITION

Vin	+Input
GND	Input grounding
+V0	+Output
COM	Output grounding
-V0	-Output
CTRL	Pins that switch the converter
CASE	Pins that link the metal housing
CS	Capacitors can be externally connected
Trim	Output voltage regulation
-S	Represents the remote compensation of the output voltage (connected to the output ground)
+S	Represents the output voltage remote compensation (connect the output positive terminal)
NC	Nonfunctional Pins
No Pin	No Pins
HV	High Voltaga

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP4
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 89%
Meet a criterion:International standard pin mode

APPLICATION:

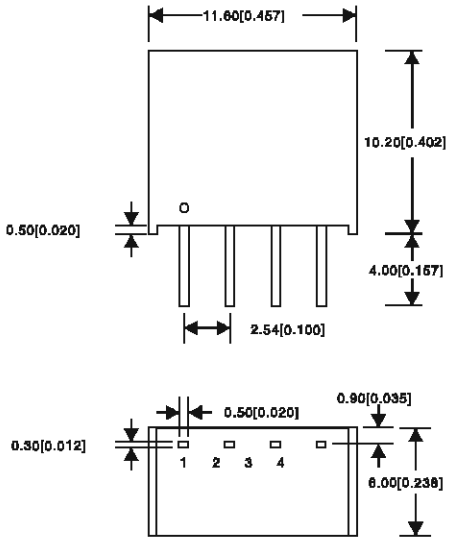
Electric power,
Industrial control
communication,
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCL01S-03S03	3.3 (2.97-3.63)	3.3	0	303	82	4000
HDCL01S-03S05		5	0	200	83	4000
HDCL01S-03S09		9	0	111	84	2000
HDCL01S-03S12		12	0	84	85	1000
HDCL01S-05S03	5 (4.5-5.5)	3.3	0	303	83	4000
HDCL01S-05S05		5	0	200	86	4000
HDCL01S-05S09		9	0	111	86	2000
HDCL01S-05S12		12	0	84	88	1000
HDCL01S-05S15		15	0	67	88	880
HDCL01S-05S24		24	0	42	89	560
HDCL01S-12S03	12 (10.8-13.2)	3.3	0	303	84	4000
HDCL01S-12S05		5	0	200	86	4000
HDCL01S-12S09		9	0	111	87	2000

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCL01S-12S12	12 (10.8-13.2)	12	0	84	87	1000
HDCL01S-12S15		15	0	67	88	880
HDCL01S-12S24		24	0	42	89	560
HDCL01S-15S05	15 (13.5-16.5)	5	0	200	85	4000
HDCL01S-15S12		12	0	84	89	1000
HDCL01S-15S15		15	0	67	89	880
HDCL01S-24S03	24 (21.6-26.4)	3.3	0	303	84	4000
HDCL01S-24S05		5	0	200	87	4000
HDCL01S-24S09		9	0	111	86	2000
HDCL01S-24S12		12	0	84	88	1000
HDCL01S-24S15		15	0	67	88	880
HDCL01S-24S24		24	0	42	89	560

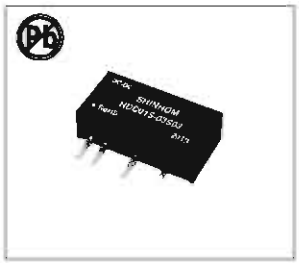
PHYSICAL CHARACTERISTICS:



Pin	Definition
1	GND
2	Vin
3	-Vo
4	+Vo

NC:Cannot be connected to any external circuit
Dimensions:In mm
Terminal diameter tolerance: ±0.10[±0.004]
Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1600VDC
Efficiency:The maximum efficiency can reach 89%
Meet a criterion:International standard pin mode

APPLICATION:

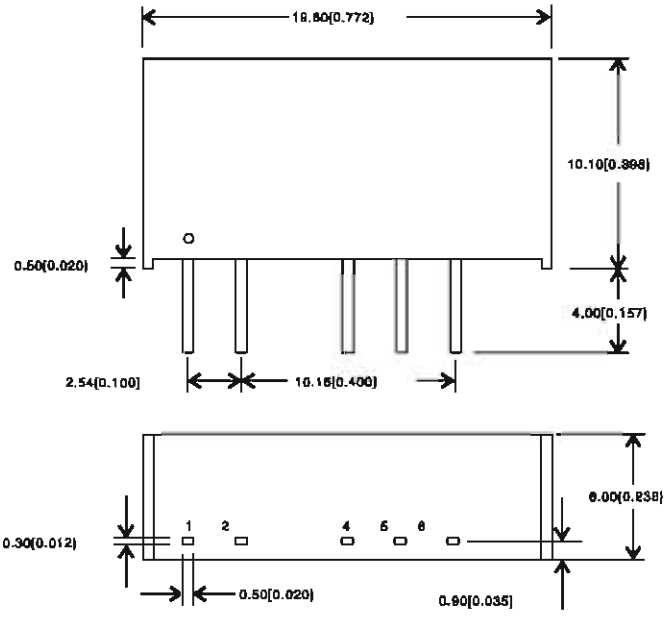
Electric power,
Industrial control
communication,
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC01S-03S03	3.3 (2.97-3.63)	3.3	0	303	82	4000
HDC01S-03S05		5	0	200	83	4000
HDC01S-03S09		9	0	111	84	2000
HDC01S-03S12		12	0	84	85	1000
HDC01S-05S03	5 (4.5-5.5)	3.3	0	303	83	4000
HDC01S-05S05		5	0	200	86	4000
HDC01S-05S09		9	0	111	88	2000
HDC01S-05S12		12	0	84	88	1000
HDC01S-05S15		15	0	67	88	680
HDC01S-05S24		24	0	42	89	560
HDC01S-05D05		±5	0	±100	86	#2000
HDC01S-05D09		±9	0	±56	86	#1000
HDC01S-05D12		±12	0	±42	88	#560
HDC01S-05D15		±15	0	±34	88	#220
HDC01S-12S03	12 (10.8-13.2)	3.3	0	303	84	4000
HDC01S-12S05		5	0	200	86	4000
HDC01S-12S09		9	0	111	87	2000
HDC01S-12S12		12	0	84	87	1000

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC01S-12S15	12 (10.8-13.2)	15	0	67	88	680
HDC01S-12S24		24	0	42	89	560
HDC01S-12D03		±3.3	0	±152	84	#2000
HDC01S-12D05		±5	0	±100	86	#2000
HDC01S-12D09		±9	0	±56	87	#1000
HDC01S-12D12		±12	0	±42	87	#560
HDC01S-12D15		±15	0	±34	88	#220
HDC01S-24S03	24 (21.6-26.4)	3.3	0	303	84	4000
HDC01S-24S05		5	0	200	87	4000
HDC01S-24S09		9	0	111	88	2000
HDC01S-24S12		12	0	84	88	1000
HDC01S-24S15		15	0	67	88	680
HDC01S-24S24		24	0	42	89	560
HDC01S-24D05		±5	0	±100	87	#2000
HDC01S-24D09		±9	0	±56	88	#1000
HDC01S-24D12		±12	0	±42	88	#560
HDC01S-24D15		±15	0	±34	88	#220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
4	-Vo	-Vo
5	No Pin	COM
6	+Vo	+Vo

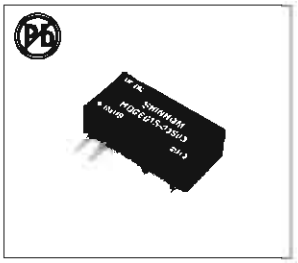
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Operating Temperature:-40℃ - 105℃
Isolation Voltage:3000VDC
Efficiency:The maximum efficiency can reach 89%
Meet a criterion:International standard pin mode

APPLICATION:

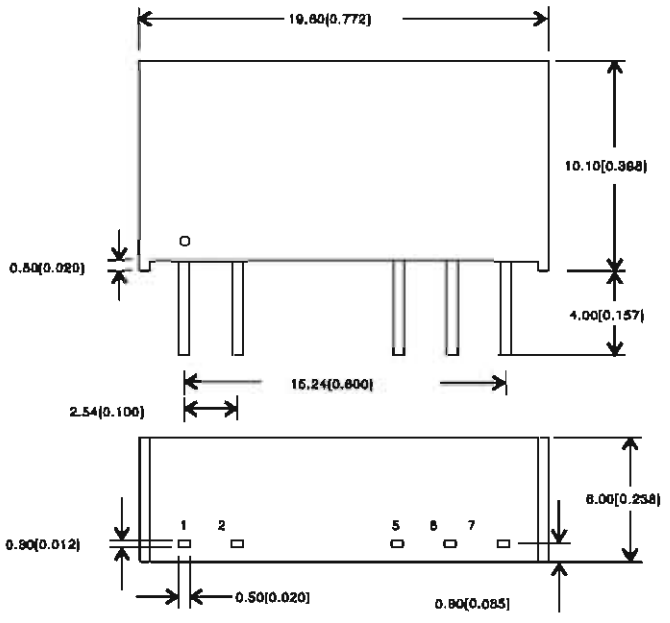
Electric power,
Industrial control
communication,
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE01S-03S03	3.3 (2.97-3.63)	3.3	0	303	82	4000
HDCE01S-03S05		5	0	200	83	4000
HDCE01S-03S09		9	0	111	84	2000
HDCE01S-03S12		12	0	84	85	1000
HDCE01S-05S03	5 (4.5-5.5)	3.3	0	303	83	4000
HDCE01S-05S05		5	0	200	86	4000
HDCE01S-05S09		9	0	111	86	2000
HDCE01S-05S12		12	0	84	88	1000
HDCE01S-05S15		15	0	67	88	680
HDCE01S-05S24		24	0	42	89	560
HDCE01S-05D05		±5	0	±100	86	#2000
HDCE01S-05D09		±9	0	±56	86	#1000
HDCE01S-05D12		±12	0	±42	88	#560
HDCE01S-05D15		±15	0	±34	88	#220
HDCE01S-12S03	12 (10.8-13.2)	3.3	0	303	84	4000
HDCE01S-12S05		5	0	200	86	4000
HDCE01S-12S09		9	0	111	87	2000
HDCE01S-12S12		12	0	84	87	1000

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE01S-12S15	12 (10.8-13.2)	15	0	67	88	680
HDCE01S-12S24		24	0	42	89	560
HDCE01S-12D03		±3.3	0	±152	84	#2000
HDCE01S-12D05		±5	0	±100	86	#2000
HDCE01S-12D09		±9	0	±56	87	#1000
HDCE01S-12D12		±12	0	±42	87	#560
HDCE01S-12D15		±15	0	±34	88	#220
HDCE01S-24S03	24 (21.6-26.4)	3.3	0	303	84	4000
HDCE01S-24S05		5	0	200	87	4000
HDCE01S-24S09		9	0	111	88	2000
HDCE01S-24S12		12	0	84	88	1000
HDCE01S-24S15		15	0	67	88	680
HDCE01S-24S24		24	0	42	89	560
HDCE01S-24D05		±5	0	±100	87	#2000
HDCE01S-24D09		±9	0	±56	88	#1000
HDCE01S-24D12		±12	0	±42	88	#560
HDCE01S-24D15		±15	0	±34	88	#220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
5	-Vo	-Vo
6	No Pin	COM
7	+Vo	+Vo

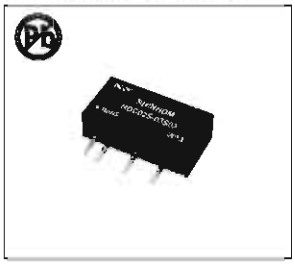
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 90%
Meet a criterion:International standard pin mode

APPLICATION:

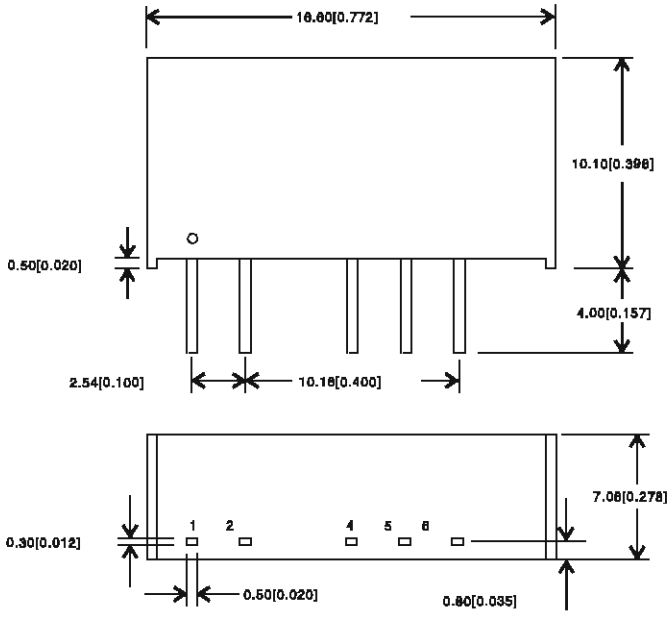
Electric power,
Industrial control
communication,
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC02S-03S03	3.3 (2.97-3.63)	3.3	0	400	82	2400
HDC02S-03S05		5	0	400	83	2400
HDC02S-03S09		9	0	222	84	1000
HDC02S-03S12		12	0	167	85	820
HDC02S-05S03	5 (4.8-5.5)	3.3	0	400	83	2400
HDC02S-05S05		5	0	400	85	2400
HDC02S-05S09		9	0	222	85	1000
HDC02S-05S12		12	0	167	86	820
HDC02S-05S15		15	0	133	87	680
HDC02S-05S24		24	0	83	88	560
HDC02S-05D03		±3.3	0	±303	83	#1000
HDC02S-05D05		±5	0	±200	85	#1000
HDC02S-05D09		±9	0	±111	85	#560
HDC02S-05D12		±12	0	±83	86	#560
HDC02S-05D15		±15	0	±67	87	#220
HDC02S-12S03	12 (10.8-13.2)	3.3	0	400	84	2400
HDC02S-12S05		5	0	400	85	2400
HDC02S-12S09		9	0	222	86	1000
HDC02S-12S12		12	0	167	87	820

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC02S-12S15	12 (10.8-13.2)	15	0	133	88	680
HDC02S-12S24		24	0	83	89	560
HDC02S-12D03		±3.3	0	±303	84	#1000
HDC02S-12D05		±5	0	±200	85	#1000
HDC02S-12D09		±9	0	±111	86	#560
HDC02S-12D12		±12	0	±83	87	#560
HDC02S-12D15		±15	0	±67	88	#220
HDC02S-24S03	24 (21.8-26.4)	3.3	0	400	84	2400
HDC02S-24S05		5	0	400	86	2400
HDC02S-24S09		9	0	222	87	1000
HDC02S-24S12		12	0	167	88	820
HDC02S-24S15		15	0	133	89	680
HDC02S-24S24		24	0	83	90	560
HDC02S-24D03		±3.3	0	±303	84	#1000
HDC02S-24D05		±5	0	±200	86	#1000
HDC02S-24D09		±9	0	±111	87	#560
HDC02S-24D12		±12	0	±83	88	#560
HDC02S-24D15		±15	0	±67	89	#220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
4	-Vo	-Vo
5	No Pin	COM
6	+Vo	+Vo

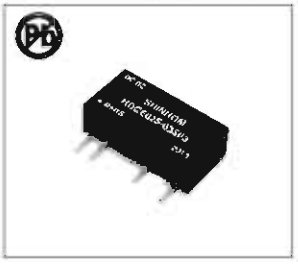
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Operating Temperature:-40℃ - 105℃
Isolation Voltage:3000VDC
Efficiency:The maximum efficiency can reach 90%
Meet a criterion:International standard pin mode

APPLICATION:

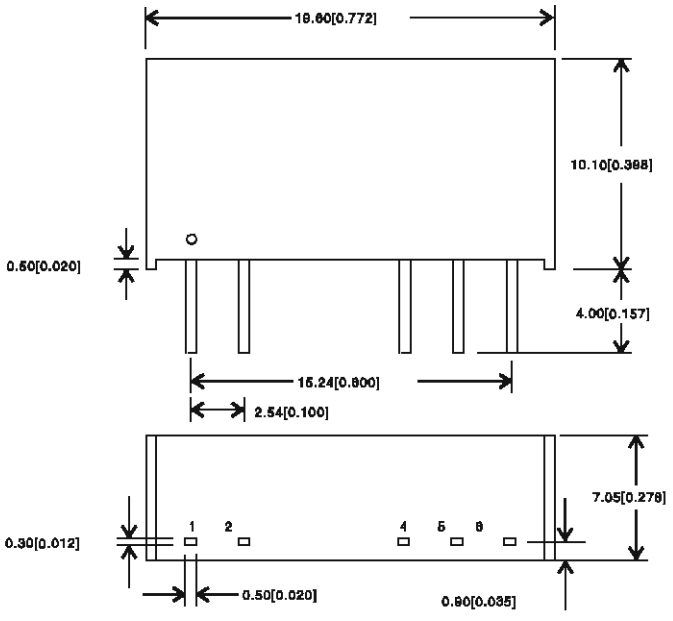
Electric power,
Industrial control
communication,
IoT
Automobile
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE02S-03S03	3.3 (2.97-3.63)	3.3	0	400	82	2400
HDCE02S-03S05		5	0	400	83	2400
HDCE02S-03S09		9	0	222	84	1000
HDCE02S-03S12		12	0	167	85	820
HDCE02S-05S03	5 (4.5-5.5)	3.3	0	400	83	2400
HDCE02S-05S05		5	0	400	85	2400
HDCE02S-05S09		9	0	222	85	1000
HDCE02S-05S12		12	0	167	86	820
HDCE02S-05S15		15	0	133	87	680
HDCE02S-05S24		24	0	83	88	560
HDCE02S-05D03		±3.3	0	±303	83	#1000
HDCE02S-05D05		±5	0	±200	85	#1000
HDCE02S-05D09		±9	0	±111	85	#560
HDCE02S-05D12		±12	0	±83	86	#560
HDCE02S-05D15		±15	0	±67	87	#220
HDCE02S-12S03	12 (10.8-13.2)	3.3	0	400	84	2400
HDCE02S-12S05		5	0	400	85	2400
HDCE02S-12S09		9	0	222	86	1000
HDCE02S-12S12		12	0	167	87	820

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE02S-12S15	12 (10.8-13.2)	15	0	133	88	680
HDCE02S-12S24		24	0	83	89	560
HDCE02S-12D03		±3.3	0	±303	84	#1000
HDCE02S-12D05		±5	0	±200	85	#1000
HDCE02S-12D09		±9	0	±111	86	#560
HDCE02S-12D12		±12	0	±83	87	#560
HDCE02S-12D15		±15	0	±67	88	#220
HDCE02S-24S03	24 (21.6-26.4)	3.3	0	400	84	2400
HDCE02S-24S05		5	0	400	86	2400
HDCE02S-24S09		9	0	222	87	1000
HDCE02S-24S12		12	0	167	88	820
HDCE02S-24S15		15	0	133	89	680
HDCE02S-24S24		24	0	83	90	560
HDCE02S-24D03		±3.3	0	±303	84	#1000
HDCE02S-24D05		±5	0	±200	86	#1000
HDCE02S-24D09		±9	0	±111	87	#560
HDCE02S-24D12		±12	0	±83	88	#560
HDCE02S-24D15		±15	0	±67	89	#220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
5	-Vo	-Vo
6	No Pin	COM
7	+Vo	+Vo

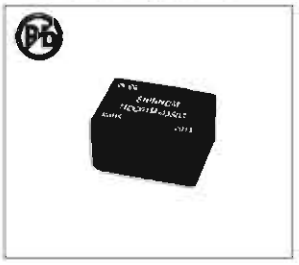
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

1W DC-DC CONVERTER



FEATURES:

Packaging: SMD8
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 88%
Meet a criterion:International standard pin mode

APPLICATION:

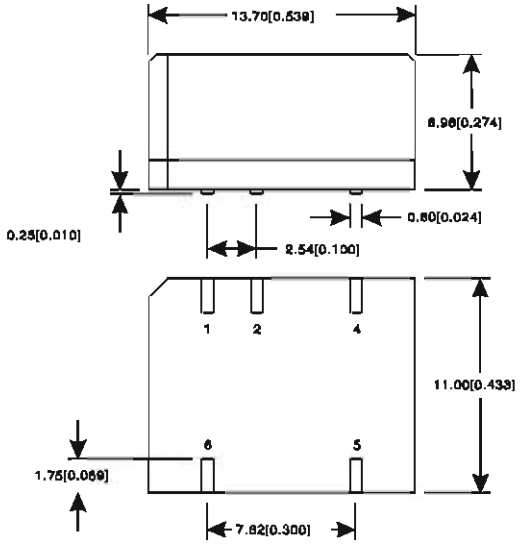
Electric power,
Industrial control
communication,
IoT
Automobile
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDQ01M-03S03	3.3 (2.97-3.63)	3.3	0	303	80	3000
HDC01M-03S05		5	0	200	82	3000
HDC01M-03S09		9	0	111	83	1200
HDQ01M-03S12		12	0	84	84	820
HDC01M-05S03	5 (4.5-5.5)	3.3	0	303	82	3000
HDC01M-05S05		5	0	200	85	3000
HDQ01M-05S09		9	0	111	86	1200
HDC01M-05S12		12	0	84	86	820
HDC01M-05S15		15	0	67	86	680
HDQ01M-05S24		24	0	42	87	390
HDC01M-12S03	12 (10.8-13.2)	3.3	0	303	82	3000
HDC01M-12S05		5	0	200	85	3000
HDQ01M-12S09		9	0	111	86	1200

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDQ01M-12S12	12 (10.8-13.2)	12	0	84	88	820
HDC01M-12S15		15	0	67	88	680
HDQ01M-12S24		24	0	42	88	390
HDC01M-15S05	15 (13.5-16.5)	5	0	200	88	3000
HDQ01M-15S12		12	0	84	87	820
HDC01M-15S15		15	0	67	88	680
HDQ01M-24S03	24 (21.6-26.4)	3.3	0	303	82	3000
HDC01M-24S05		5	0	200	85	3000
HDQ01M-24S09		9	0	111	88	1200
HDC01M-24S12		12	0	84	87	820
HDQ01M-24S15		15	0	67	87	680
HDC01M-24S24		24	0	42	88	390

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	GND
2	Vin
4	-Vo
5	+Vo
8	NC

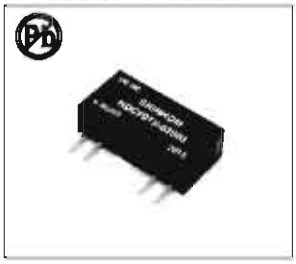
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances:±0.50(±0.020)

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Operating Temperature:-40℃ - 85℃
Isolation Voltage:4200VAC or 6000VDC
Efficiency:The maximum efficiency can reach 85%
Meet a criterion:International standard pin mode

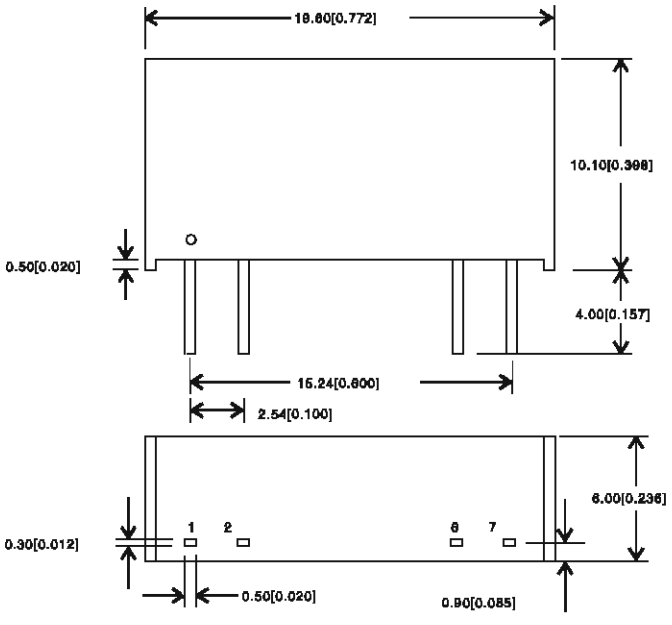
APPLICATION:

IGBT drive
SIC drive

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
HDCF01S-03S03	3.3 (2.97-3.63)	3.3	303	79	4000
HDCF01S-03S05		5	200	81	4000
HDCF01S-03S12		12	84	82	1000
HDCF01S-05S03	5 (4.5-5.5)	3.3	303	80	4000
HDCF01S-05S05		5	200	84	4000
HDCF01S-05S12		12	84	85	1000
HDCF01S-05S15		15	67	85	680
HDCF01S-12S03	12 (10.8-13.2)	3.3	303	82	4000
HDCF01S-12S05		5	200	85	4000
HDCF01S-24S03	24 (21.6-26.4)	3.3	303	81	4000
HDCF01S-24S05		5	200	85	4000

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
6	-Vo
7	+Vo

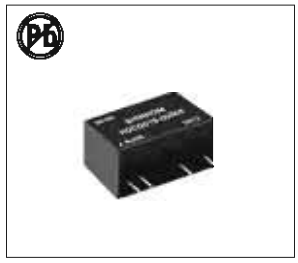
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Opereting Temperature:-40℃ - 85℃
Isolation Voltage:4200VAC or 6000VDC
Efficiency:The maximum efficiency can reach 81%
Meet a criterion:Meet safety medical certification

APPLICATION:

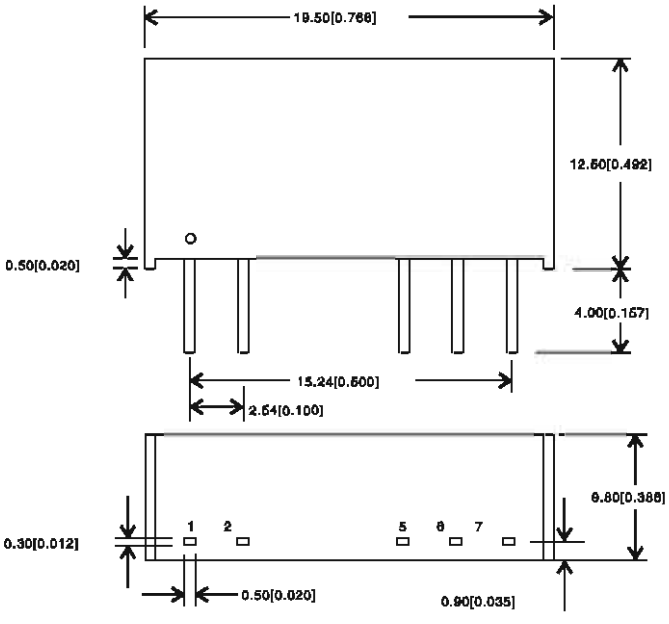
Armarium

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCG01S-05S05	5 (4.5-5.5)	5	4	200	79	220
HDCG01S-05S12		12	1.68	84	80	
HDCG01S-05S15		15	1.36	68	81	
HDCG01S-05D05		±5	±2	±100	79	#100
HDCG01S-05D12		±12	±1	±40	80	
HDCG01S-05D15		±15	±1	±35	81	
HDCG01S-12S05	12 (10.8-13.2)	5	4	200	79	220
HDCG01S-12S12		12	1.68	84	81	
HDCG01S-12S15		15	1.36	68	79	
HDCG01S-12D05		±5	±2	±100	79	#100
HDCG01S-12D12		±12	±1	±40	81	

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCG01S-12D15	12(10.8-13.2)	±15	±1	±35	79	#100
HDCG01S-15S05	15 (13.5-16.5)	5	20	200	79	220
HDCG01S-15D05		±5	±10	±100	80	#100
HDCG01S-15D15		±15	±4	±33	81	
HDCG01S-24S05	24 (21.6-26.4)	5	4	200	76	220
HDCG01S-24S12		12	1.68	84	79	
HDCG01S-24S15		15	1.36	68	79	
HDCG01S-24D05		±5	±2	±100	76	#100
HDCG01S-24D12		±12	±1	±40	79	
HDCG01S-24D15		±15	±1	±35	79	

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
5	-Vo	-Vo
6	No Pin	No Pin
7	+Vo	+Vo

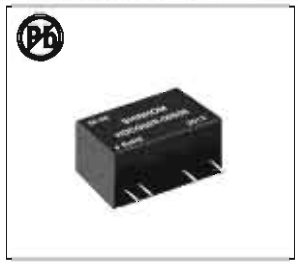
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Operating Temperature:-40℃ - 85℃
Isolation Voltage:4200VAC or 6000VDC
Efficiency:The maximum efficiency can reach 83%
Meet a criterion:Meet safety medical certification

APPLICATION:

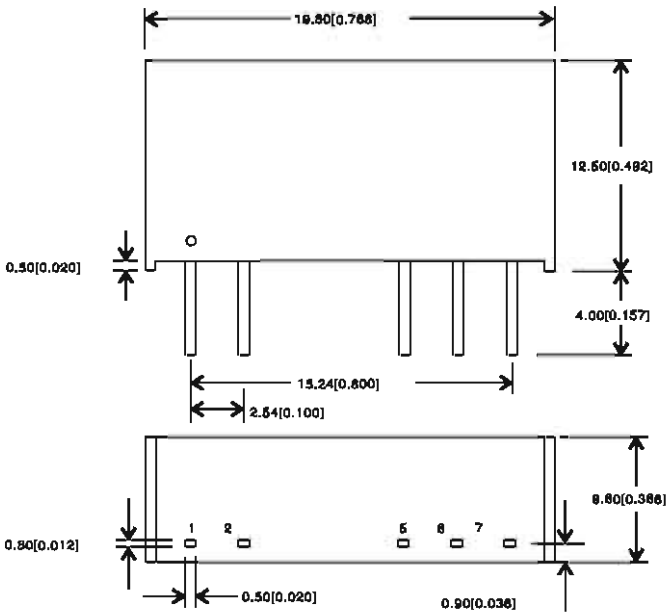
Armarium

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCG028-05S05	5 (4.5-5.5)	5	8	400	80	220
HDCG028-05S12		12	4	168	82	
HDCG028-05S15		15	3	136	82	
HDCG028-05D05		±5	±4	±200	81	#100
HDCG028-05D12		±12	±2	±80	82	
HDCG028-05D15		±15	±2	±70	82	
HDCG028-12S05	12 (10.8-13.2)	5	8	400	81	220
HDCG028-12S12		12	4	168	83	
HDCG028-12S15		15	3	136	80	

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCG028-12D05	12 (10.8-13.2)	±5	±4	±200	81	#100
HDCG028-12D12		±12	±2	±80	83	
HDCG028-12D15		±15	±2	±70	80	
HDCG028-24S05	24 (21.6-26.4)	5	8	400	80	220
HDCG028-24S12		12	4	168	82	
HDCG028-24S15		15	3	136	81	
HDCG028-24D05		±5	±4	±200	80	#100
HDCG028-24D12		±12	±2	±80	82	
HDCG028-24D15		±15	±2	±70	81	

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
5	-Vo	-Vo
6	No Pin	No Pin
7	+Vo	+Vo

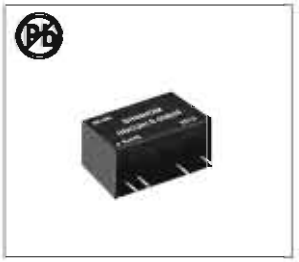
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP7
Operating Temparatura:-40℃ – 105℃
Iaolation Voltage:3500VAC/6000VDC
Efficiency:Tha maximum efficiency can reach 80%
Meet a criterion:Meet safety medical certification

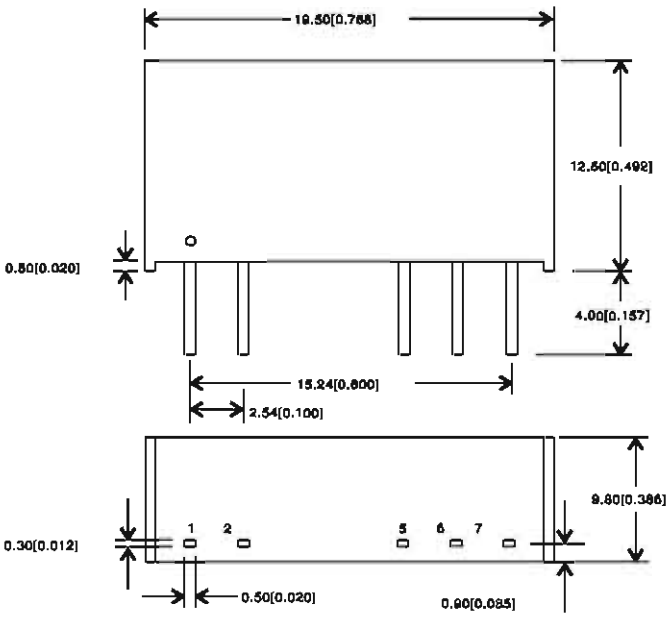
APPLICATION:

Sic MOS FET Driver specific power supply

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCQ01S-05D2005	5 (4.5-5.5)	+20/-5		+80/-40	80	#100/100
HDCQ01S-12D1503	12 (10.8-13.2)	+15/-3.5		+111/-111	80	#220/220
HDCQ01S-12D2004		+20/-4		+100/-100	80	#220/220
HDCQ01S-12D2005		+20/-5		+100/-100	80	#220/220
HDCQ01S-15D1504	15 (13.5-16.5)	+15/-4		+100/-100	80	#220/220
HDCQ01S-15D1803		+18/-3		+100/-100	80	#220/220
HDCQ01S-15D2004		+20/-4		+100/-100	80	#220/220
HDCQ01S-15D2005		+20/-5		+100/-100	80	#220/220
HDCQ01S-24D2004	24 (21.6-26.4)	+20/-4		+100/-100	80	#220/220

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
5	-Vo
6	COM
7	+Vo

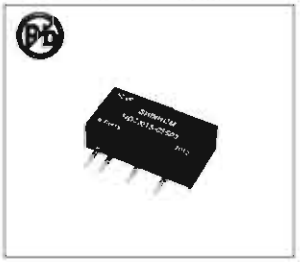
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances:±0.50(±0.020)

1W DC-DC CONVERTER



FEATURES:

Peckeging: SIP6
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 82%
Meet a criterion:International standard pin mode

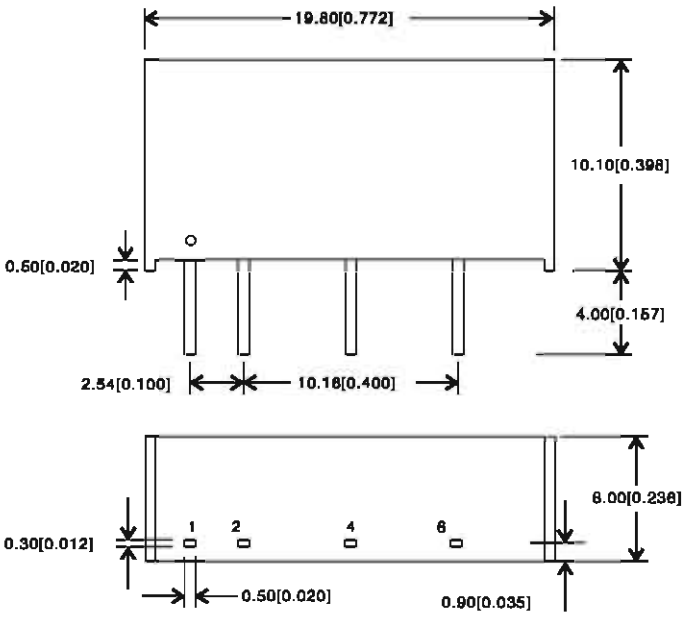
APPLICATION:

Electric Power,Industrial Control

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)	
HDCI01S-05S03	5 (4.5-5.5)	3.3	0	250	82
HDCI01S-05S05		5	0	200	82
HDCI01S-05S12		12	0	84	82
HDCI01S-05S15		15	0	67	82
HDCI01S-05S24		24	0	41	82
HDCI01S-12S03	12 (11.4-12.8)	3.3	0	250	78
HDCI01S-12S05		5	0	200	82
HDCI01S-24S03	24 (21.6-26.4)	3.3	0	250	77
HDCI01S-24S05		5	0	200	82

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
4	-Vo
6	+Vo

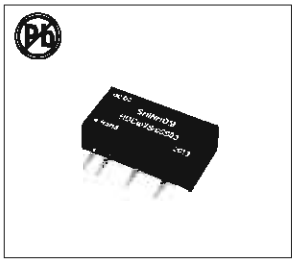
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unramarked tolerances:±0.50[±0.020]

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
Operating Temperature:-40℃ - 105℃
Isolation Voltage:1500VDC
Efficiency: The maximum efficiency can reach 82%
Meet a critarion: International standard pin mode

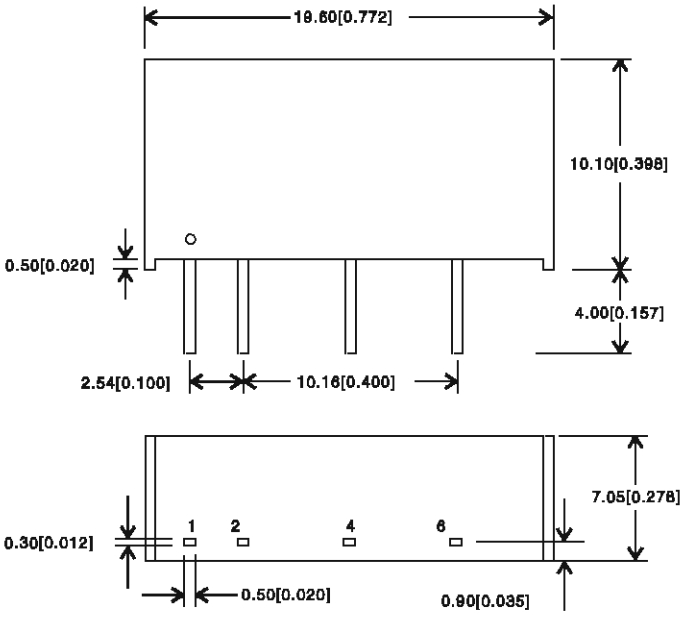
APPLICATION:

Electric power
Industrial control
Communication
IoT
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (%,Typ)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)	
HDCI02S-05S03	5 (4.5-6.5)	3.3	0	400	82
HDCI02S-05S05		5	0	400	82
HDCI02S-05S12		12	0	168	82
HDCI02S-12S03	12 (10.8-13.2)	3.3	0	400	76
HDCI02S-12S05		5	0	400	82
HDCI02S-24S03	24 (21.6-26.4)	3.3	0	400	77
HDCI02S-24S05		5	0	400	82

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
4	-Vo
6	+Vo

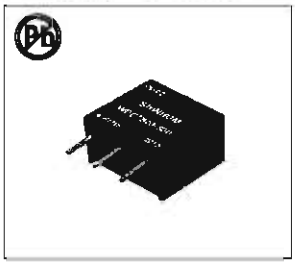
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

1.5W~7.5W DC-DC CONVERTER



FEATURES:

Packaging: SIP3
Operating Temperature:-40℃ - 85℃
Negative output support
Efficiency:The maximum efficiency can reach 95%
Input short-circuit protection

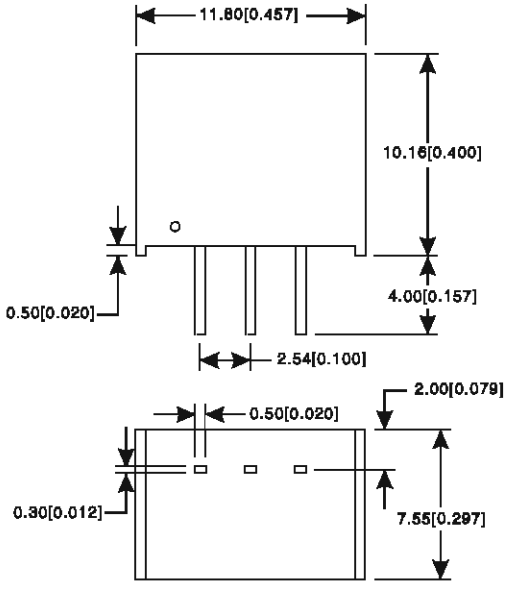
APPLICATION:

Electric power
Industrial control
Communication
IoT
Rail transit
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)		Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Vin Min	Vin max	
WDC7803-500	24 (4.75-36)	3.3	500	86	80	660
WDC7805-500	24 (8.5-36)	5	500	90	84	680
	12 (7-31)	-5	-300	80	81	330
WDC7809-500	24 (12-36)	9	500	93	90	680
WDC7812-500	24 (15-36)	12	500	94	91	680
	12 (6-24)	-12	-150	84	85	330
WDC7815-500	24 (19-36)	15	500	95	93	660
	12 (8-21)	-15	-150	85	87	330

PHYSICAL CHARACTERISTICS:



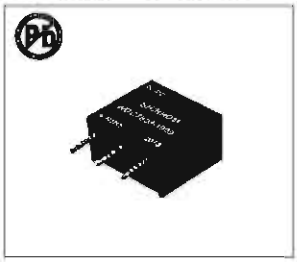
Pin	Definition
1	Vin
2	GND
3	+Vo

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

2.5W~15W DC-DC CONVERTER



FEATURES:

Packaging: SIP3
Operating Temperature:-40℃ – 85℃
Full voltage stabilized output
Efficiency:The maximum efficiency can reach 86%
With output short circuit

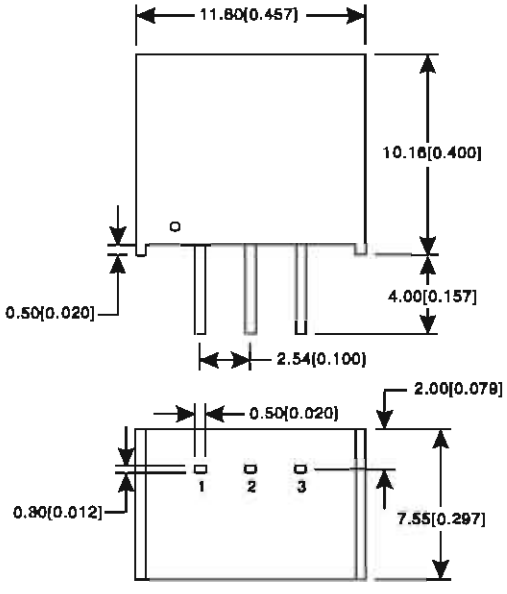
APPLICATION:

Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)		Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Vin Min	Vin max	
WDC7803-1000	24 (6-36)	3.3	1000	90	81	660
WDC7805-1000	24 (6-36)	5	1000	93	88	660
	12 (8-27)	-5	-500	86	82	330
WDC7809-1000	24 (13-26)	9	1000	95	90	660
WDC7812-1000	24 (16-36)	12	1000	96	93	660
	12 (8-20)	-12	-300	89	88	330
WDC7815-1000	24 (20-36)	15	1000	96	94	660
	12 (8-16)	-15	-300	89	89	330

PHYSICAL CHARACTERISTICS:



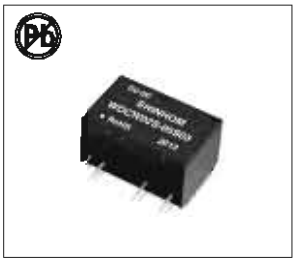
Pin	Definition
1	Vin
2	GND
3	+Vo

Dimensions:In mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
2:1 Wide input voltage range
Operating Temperature:-40℃ - 65℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 85%
With output short circuit, over current, over voltage protection

APPLICATION:

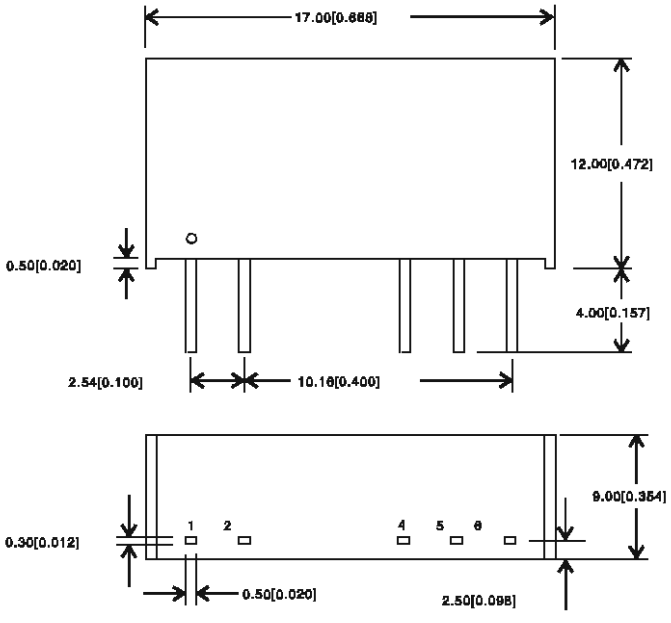
Electric powar
Industrial control
Communication
Inatrumant & apparatua
Rail tranait

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCW02S-05S03	5 (4.5-9)	3.3	600	0	120/200	80	1800
WDCW02S-05S05		5	400	0	120/200	82	2200
WDCW02S-05S12		12	167	0	150/200	85	660
WDCW02S-05S15		15	133	0	150/200	84	470
WDCW02S-05D12		±12	±83	0	150/200	83	#470
WDCW02S-05D15		±15	±67	0	150/200	81	#330
WDCW02S-12S03	12 (9-18)	3.3	600	0	120/200	80	2700
WDCW02S-12S05		5	400	0	120/200	83	2200
WDCW02S-12S12		12	167	0	150/200	84	680
WDCW02S-12S15		15	133	0	150/200	84	470
WDCW02S-12D12		±12	±83	0	150/200	83	#470
WDCW02S-12D15		±15	±67	0	150/200	81	#330

Part Number	Input Voltage(VDC	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCW02S-24S03	24 (18-36)	3.3	600	0	120/200	78	2700
WDCW02S-24S05		5	400	0	120/200	80	2200
WDCW02S-24S12		12	167	0	150/200	82	680
WDCW02S-24S15		15	133	0	150/200	82	470
WDCW02S-24D12		±12	±83	0	150/200	82	#470
WDCW02S-24D15		±15	±67	0	150/200	80	#330
WDCW02S-48S03	48 (36-75)	3.3	600	0	120/200	78	2700
WDCW02S-48S05		5	400	0	120/200	80	2200
WDCW02S-48S12		12	167	0	150/200	82	680
WDCW02S-48S15		15	133	0	150/200	82	470
WDCW02S-48D12		±12	±83	0	150/200	81	#470
WDCW02S-48D15		±15	±67	0	150/200	80	#330

PHYSICAL CHARACTERISTICS:



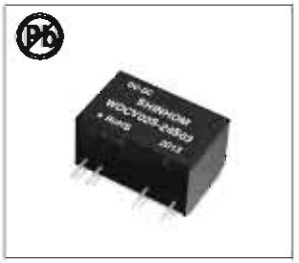
Pin	Single output	Dual output
1	GND	GNO
2	Vin	Vin
4	+Vo	+Vo
5	No Pin	COM
6	-Vo	-Vo

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

2W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 83%
With output short circuit, over current, over voltage protection

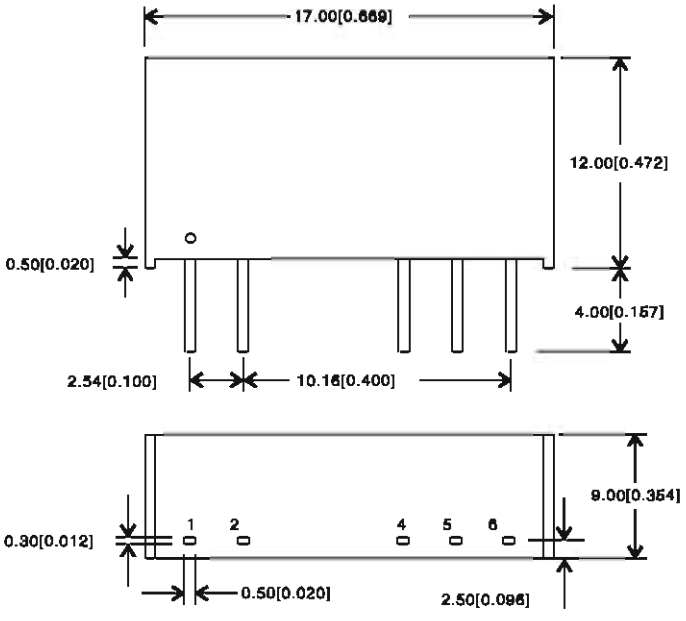
APPLICATION:

Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCV02S-24S03	24 (9-36)	3.3	3.3	600	120/200	77	1760
WDCV02S-24S05		5	5	400	120/200	80	1000
WDCV02S-24S12		12	12	167	150/200	83	170
WDCV02S-24S15		15	15	133	150/200	82	110
WDCV02S-24D12		±12	±12	±83	150/200	81	#100
WDCV02S-24D15		±15	±15	±67	150/200	80	#47
WDCV02S-48S03	48 (36-75)	3.3	3.3	600	120/200	76	1760
WDCV02S-48S05		5	5	400	120/200	79	1000
WDCV02S-48S12		12	12	167	150/200	82	170
WDCV02S-48S15		15	15	133	150/200	81	110
WDCV02S-48D12		±12	±12	±83	150/200	81	#100
WDCV02S-48D15		±15	±15	±67	150/200	79	#47

PHYSICAL CHARACTERISTICS:



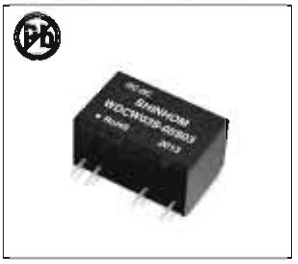
Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
4	+Vo	+Vo
5	No Pin	COM
6	-Vo	-Vo

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 66%
With input undervoltage, output overcurrent,
short circuit, over voltage protection

APPLICATION:

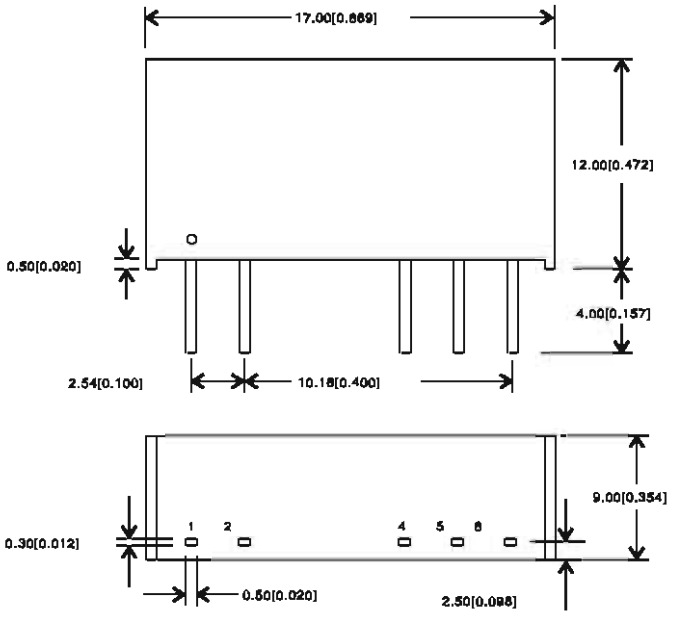
Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCW03S-05S3	5 (4.5-9)	3.3	800	38	120/200	79	1800
WDCW03S-05S5		5	600	30	120/200	82	2200
WDCW03S-05S12		12	250	13	150/200	85	680
WDCW03S-05S15		15	200	10	150/200	85	470
WDCW03S-05D12		±12	±130	±6	150/200	83	#470
WDCW03S-05D15		±15	±100	±5	150/200	82	#330
WDCW03S-12S3	12 (9-18)	3.3	800	38	120/200	82	2700
WDCW03S-12S5		5	600	30	120/200	83	2200
WDCW03S-12S12		12	250	13	150/200	88	680
WDCW03S-12S15		15	200	10	150/200	88	470
WDCW03S-12D12		±12	±130	±6	150/200	84	#470
WDCW03S-12D15		±15	±100	±5	150/200	83	#330

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCW03S-24S3	24 (18-36)	3.3	800	38	120/200	80	2700
WDCW03S-24S5		5	600	30	120/200	82	2200
WDCW03S-24S12		12	250	13	150/200	85	680
WDCW03S-24S15		15	200	10	150/200	85	470
WDCW03S-24D12		±12	±130	±6	150/200	83	#470
WDCW03S-24D15		±15	±100	±5	150/200	83	#380
WDCW03S-48S3	48 (36-75)	3.3	800	38	120/200	78	2700
WDCW03S-48S5		5	600	30	120/200	80	2200
WDCW03S-48S12		12	250	13	150/200	85	680
WDCW03S-48S15		15	200	10	150/200	85	470
WDCW03S-48D12		±12	±130	±6	150/200	82	#470
WDCW03S-48D15		±15	±100	±5	150/200	82	#330

PHYSICAL CHARACTERISTICS:



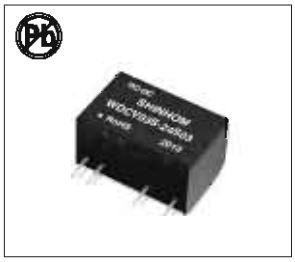
Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
4	+Vo	+Vo
5	No Pin	COM
6	-Vo	-Vo

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: SIP6
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
Efficiency:The maximum efficiency can reach 83%
With output short circuit, over current, over voltage protection

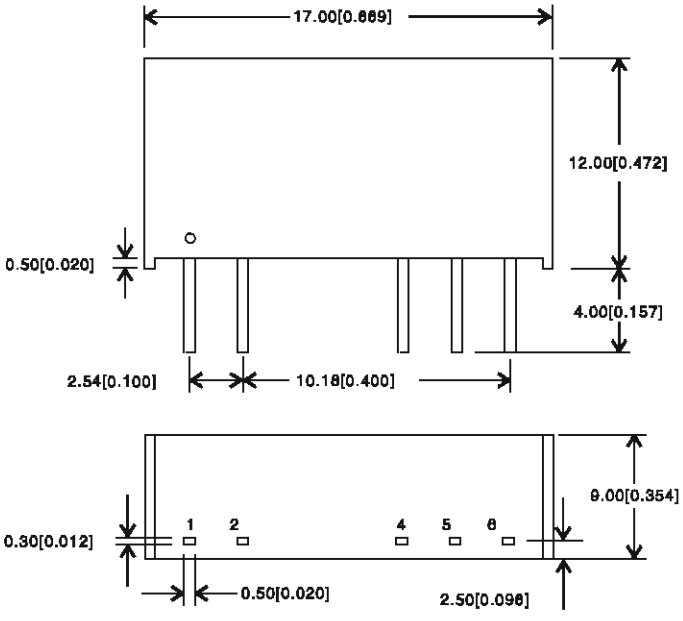
APPLICATION:

Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCV03S-24S03	24 (9-36)	3.3	800	38	120/200	78	1760
WDCV03S-24S05		5	600	30	120/200	81	1000
WDCV03S-24S12		12	250	13	150/200	85	170
WDCV03S-24S15		15	200	10	150/200	84	110
WDCV03S-24D12		±12	±130	±6	150/200	82	#100
WDCV03S-24D15		±15	±100	±5	150/200	82	#47
WDCV03S-48S03	48 (38-75)	3.3	600	38	120/200	77	1780
WDCV03S-48S05		5	800	30	120/200	80	1000
WDCV03S-48S12		12	250	13	150/200	83	170
WDCV03S-48S15		15	200	10	150/200	83	110
WDCV03S-48D12		±12	±130	±8	150/200	81	#100
WDCV03S-48D15		±15	±100	±5	150/200	81	#47

PHYSICAL CHARACTERISTICS:



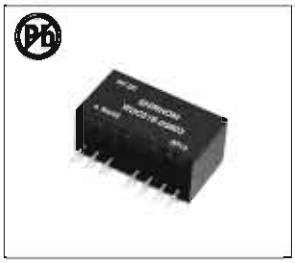
Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
4	+Vo	+Vo
5	No Pin	COM
6	-Vo	-Vo

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
2:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
Low Ripple Noise
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

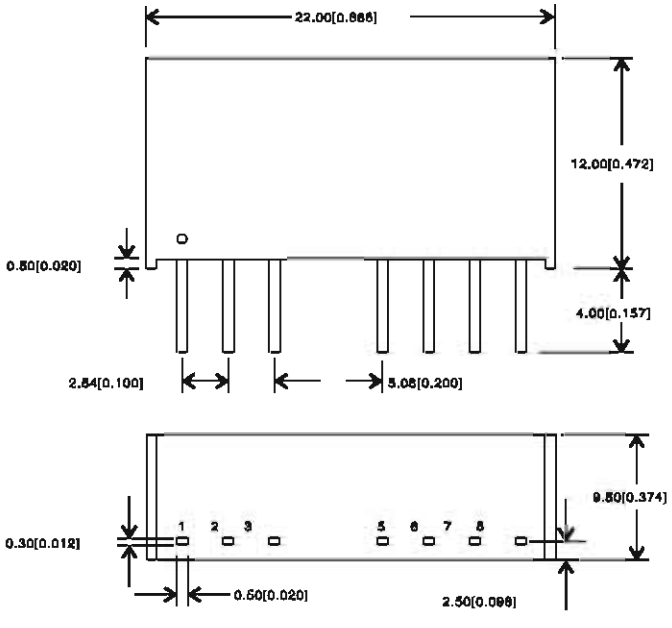
Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC01B-05S03	5 (4.5-9)	3.3	303	15	70/100	65/68	1800
WDC01B-05S05		5	200	10		71/73	2200
WDC01B-05S12		12	83	4		75/77	680
WDC01B-05S15		15	67	3		72/74	470
WDC01B-05S24		24	42	2		74/76	330
WDC01B-05D05		±5	±100	±5		72/74	#1000
WDC01B-05D12		±12	±42	±2		75/77	#470
WDC01B-05D15		±15	±33	±2		75/77	#330
WDC01B-12S03	12 (9-18)	3.3	303	15	100/150	73/75	2700
WDC01B-12S05		5	200	10		74/76	2200
WDC01B-12S09		9	111	6		75/78	1000
WDC01B-12S12		12	83	4		80/82	680
WDC01B-12S15		15	67	3		81/83	470
WDC01B-12S24		24	42	2		79/81	330
WDC01B-12D05		±5	±100	±5		75/78	#1000
WDC01B-12D12		±12	±42	±2		77/79	#470

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC01B-12D15	12(9-18)	±15	±33	±2	100/150	76/80	#330
WDC01B-24S03	24 (18-36)	3.3	303	15	70/100	72/74	2700
WDC01B-24S05		5	200	10		79/81	2200
WDC01B-24S12		12	83	4		81/83	680
WDC01B-24S15		15	67	3		81/83	470
WDC01B-24S24		24	42	2		81/83	330
WDC01B-24D05		±5	±100	±5		77/79	#1000
WDC01B-24D12		±12	±42	±2		81/83	#470
WDC01B-24D15	48 (36-75)	±15	±33	±2	100/150	81/83	#330
WDC01B-48S03		3.3	303	15		73/75	2700
WDC01B-48S05		5	200	10		74/76	2200
WDC01B-48S12		12	83	4		76/80	680
WDC01B-48S15		15	67	3		82/84	470
WDC01B-48D05		±5	±100	±5		77/79	#1000
WDC01B-48D12		±12	±42	±2		80/82	#470
WDC01B-48D15		±15	±33	±2		80/82	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

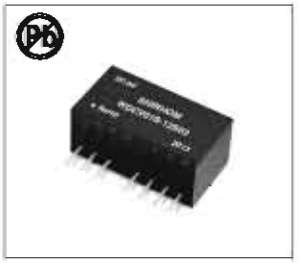
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

1W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Iaolation Voltage:1500VDC
Low Ripple Noise
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

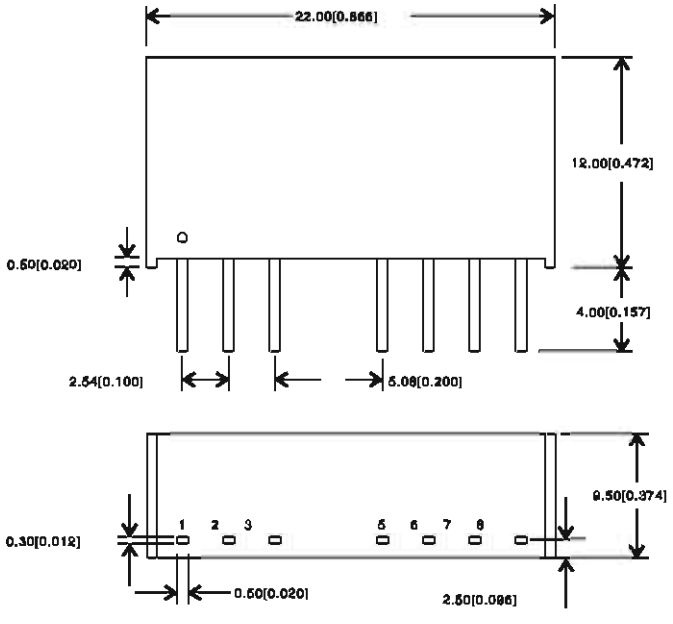
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCV01S-12S03	12 (4.5-18)	3.3	303	15	100/150	73/75	2700
WDCV01S-12S05		5	200	10	100/150	74/76	2200
WDCV01S-12S09		9	111	8	100/150	78/80	1000
WDCV01S-12S12		12	83	4	100/150	80/82	680
WDCV01S-12S15		15	67	3	100/150	81/83	470
WDCV01S-12S24		24	42	2	100/150	79/81	330
WDCV01S-12D05		±5	±100	±5	100/150	76/78	#1000
WDCV01S-12D12		±12	±42	±2	100/150	77/79	#470
WDCV01S-12D15		±15	±33	±2	100/150	78/80	#330
WDCV01S-24S03	24 (9-36)	3.3	303	15	70/100	82/74	2700
WDCV01S-24S05		5	200	10	70/100	79/81	2200
WDCV01S-24S12		12	83	4	70/100	87/83	680

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCV01S-24S15	24 (9-36)	15	67	3	70/100	81/83	470
WDCV01S-24S24		24	42	2		81/83	330
WDCV01S-24D05		±5	±100	±5		77/79	#1000
WDCV01S-24D12		±12	±42	±2		81/83	#470
WDCV01S-24D15		±15	±33	±2		81/83	#330
WDCV01S-48S03	48 (18-75)	3.3	303	15	100/150	78/75	2700
WDCV01S-48S05		5	200	10		74/76	2200
WDCV01S-48S12		12	83	4		78/80	680
WDCV01S-48S15		15	67	3		82/84	470
WDCV01S-48D05		±5	±100	±5		77/79	#1000
WDCV01S-48D12		±12	±42	±2		80/82	#470
WDCV01S-48D15		±15	±33	±2		80/82	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances:±0.50(±0.020)

2.5~3W DC-DC CONVERTER

FEATURES:

Packaging: SIP8
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 84%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

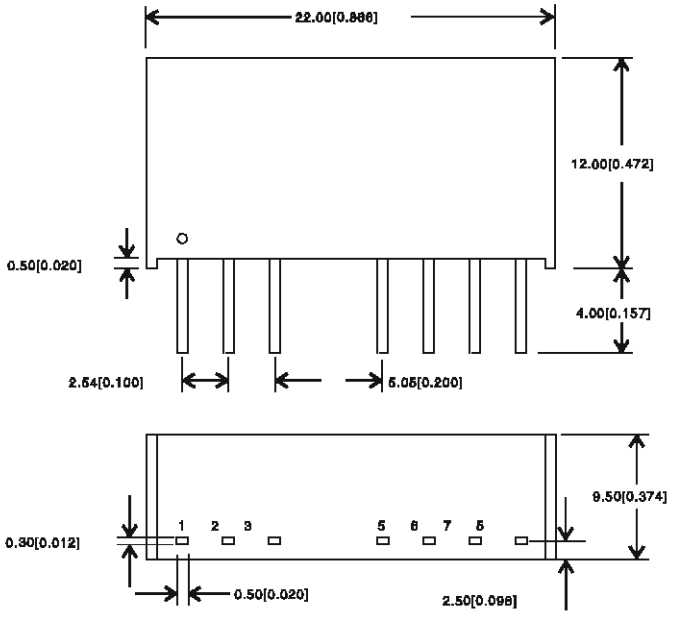
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC03S-05S03	5 (4.5-9)	3.3	758	38	40/75	68	1800
WDC03S-05S05		5	500	25		73	2200
WDC03S-05S12		12	208	10		77	680
WDC03S-05S15		15	167	8		74	470
WDC03S-05S24		24	104	5		78	330
WDC03S-05D05		±5	±300	±13		74	#1000
WDC03S-05D12		±12	±104	±5		77	#470
WDC03S-05D15		±15	±83	±4		77	#330
WDC03S-05D24		±24	±52	±6		78	#220
WDC03S-12S03	12 (9-18)	3.3	758	38		75	2700
WDC03S-12S05		5	600	30		78	2200
WDC03S-12S12		12	250	13	70/100	82	980
WDC03S-12S15		15	200	10		83	470
WDC03S-12S24		24	125	6	100/150	81	330
WDC03S-12D05		±5	±300	±15	40/75	78	#1000
WDC03S-12D12		±12	±125	±6		79	#470
WDC03S-12D15		±15	±100	±5		80	#330

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC03S-24S03	24 (18-36)	3.3	758	38		74	2700
WDC03S-24S05		5	600	30		81	2200
WDC03S-24S12		12	250	18		83	680
WDC03S-24S15		15	200	10	100/150	83	470
WDC03S-24S24		24	125	8		83	330
WDC03S-24D05		±5	±300	±15	40/75	79	#1000
WDC03S-24D12		±12	±126	±8		83	#470
WDC03S-24D15		±15	±100	±5		83	#330
WDC03S-48S03	48 (36-75)	3.3	758	38	100/150	75	2700
WDC03S-48S05		5	600	30	40/75	76	2200
WDC03S-48S12		12	250	15		80	680
WDC03S-48S15		15	200	10	40/75	84	470
WDC03S-48S24		24	125	6	70/100	82	330
WDC03S-48D05		±5	±300	±15	100/150	79	#1000
WDC03S-48D12		±12	±125	±8	40/75	52	#470
WDC03S-48D15		±15	±100	±5		82	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

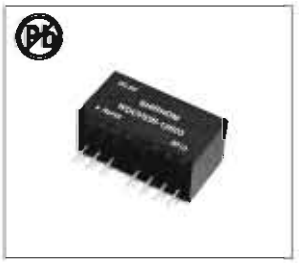
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

3W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 81%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

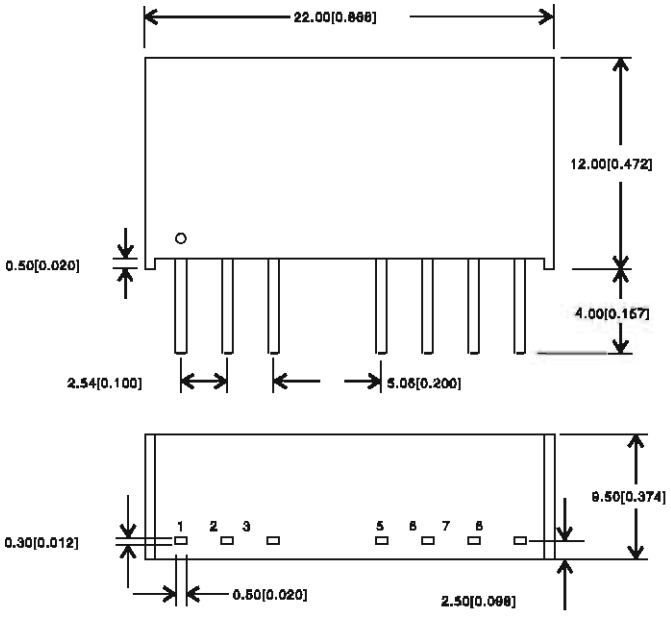
Electric power
Industrial control
Communication
IoT
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
WDCV03S-12S03	12 (4.5-18)	3.3	700	74	1780
WDCV03S-12S05		5	600	76	1000
WDCV03S-12S12		12	250	80	170
WDCV03S-12S15		15	200	80	110
WDCV03S-12D05		±5	±300	80	#470
WDCV03S-12D12		±12	±125	80	#100
WDCV03S-12D15		±15	±100	80	#47
WDCV03S-24S03	24 (9-36)	3.3	700	75	1780
WDCV03S-24S05		5	600	80	1000
WDCV03S-24S12		12	250	81	170
WDCV03S-24S15		15	200	81	110

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
WDCV03S-24D05	24 (9-36)	±5	±300	78	#470
WDCV03S-24D12		±12	±125	80	#100
WDCV03S-24D15		±15	±100	81	#47
WDCV03S-48S03	48 (18-75)	3.3	700	74	1780
WDCV03S-48S05		5	600	78	1000
WDCV03S-48S12		12	250	78	170
WDCV03S-48S15		15	200	76	110
WDCV03S-48D05		±5	±600	78	#470
WDCV03S-48D12		±12	±125	78	#100
WDCV03S-48D15		±15	±100	80	#47

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

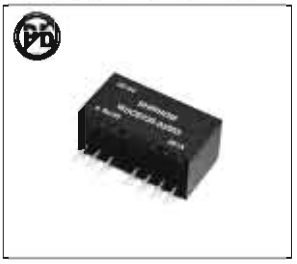
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

3W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:3000VDC
The maximum efficiency can reach 84%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

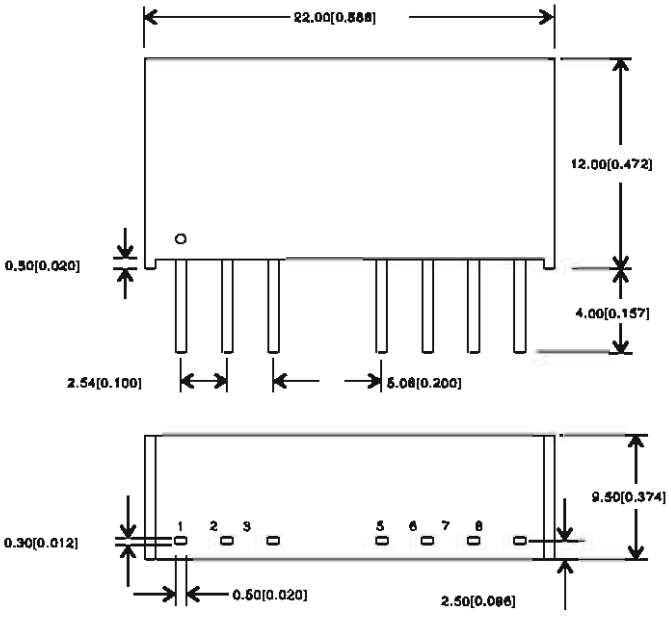
Electric power
Industrial control
Communication
IoT
Automobile
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCE03S-05S03	5 (4.5-9)	3.3	758	38	40/75	68	1800
WDCE03S-05S05		5	600	25		73	2200
WDCE03S-05S12		12	250	10		77	680
WDCE03S-05S15		15	167	8		74	470
WDCE03S-05S24		24	104	5		78	330
WDCE03S-05D05		±5	±300	±13		74	#1000
WDCE03S-05D12		±12	±104	±5		77	#470
WDCE03S-05D15		±15	±83	±4		77	#330
WDCE03S-05D24		±24	±52	±3		76	#220
WDCE03S-12S03	12 (9-18)	3.3	758	38		75	2700
WDCE03S-12S05		5	600	30		78	2200
WDCE03S-12S12		12	250	13	70/100	82	680
WDCE03S-12S15		15	200	10		83	470
WDCE03S-12S24		24	125	6	100/150	81	330
WDCE03S-12D05		±5	±300	±15	40/75	78	#1000
WDCE03S-12D12		±12	±125	±6		79	#470
WDCE03S-12D15		±15	±100	±5		80	#330

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDCE03S-24S03	24 (18-36)	3.3	758	38	40/75	74	2700
WDCE03S-24S05		5	600	30		81	2200
WDCE03S-24S12		12	250	13		83	680
WDCE03S-24S15		15	200	10	100/150	83	470
WDCE03S-24S24		24	125	6		83	330
WDCE03S-24D05		±5	±300	±15	40/75	79	#1000
WDCE03S-24D12		±12	±125	±6		83	#470
WDCE03S-24D15		±15	±100	±5		83	#330
WDCE03S-48S03	48 (36-75)	3.3	758	38	100/150	75	2700
WDCE03S-48S05		5	600	30	40/75	78	2200
WDCE03S-48S12		12	250	13		80	680
WDCE03S-48S15		15	200	10	40/75	84	470
WDCE03S-48S24		24	125	6	70/100	82	330
WDCE03S-48D05		±5	±300	±15	100/150	79	#1000
WDCE03S-48D12		±12	±125	±6	40/75	82	#470
WDCE03S-48D15		±15	±100	±5		82	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

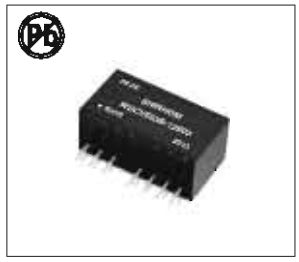
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerance: ±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:3000VDC
The maximum efficiency can reach 81%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

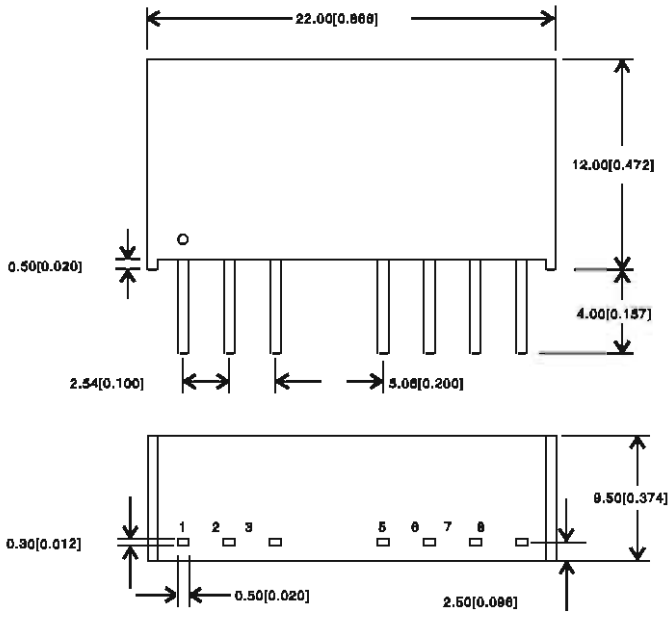
Electric power
Industrial control
Communication
IoT
Automobile
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
WDCVE03S-12S03	12 (4.5-18)	3.3	700	74	1760
WDCVE03S-12S05		5	600	78	1000
WDCVE03S-12S12		12	250	80	170
WDCVE03S-12S15		15	200	80	110
WDCVE03S-12D05		±5	±300	80	#470
WDCVE03S-12D12		±12	±125	80	#100
WDCVE03S-12D15		±15	±100	80	#47
WDCVE03S-24S03	24 (9-36)	3.3	700	75	1760
WDCVE03S-24S05		5	600	80	1000
WDCVE03S-24S12		12	250	81	170
WDCVE03S-24S15		15	200	81	110

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
WDCVE03S-24D05	24 (9-36)	±5	±300	79	#470
WDCVE03S-24D12		±12	±125	80	#100
WDCVE03S-24D15		±15	±100	81	#47
WDCVE03S-48S03	48 (18-75)	3.3	700	74	1760
WDCVE03S-48S05		5	600	76	1000
WDCVE03S-48S12		12	250	76	170
WDCVE03S-48S15		15	200	76	110
WDCVE03S-48D05		±5	±300	76	#470
WDCVE03S-48D12		±12	±125	76	#100
WDCVE03S-48D15		±15	±100	80	#47

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

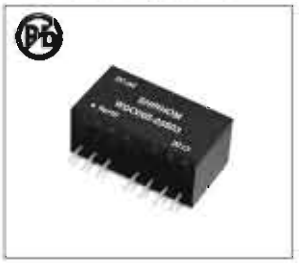
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1600VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

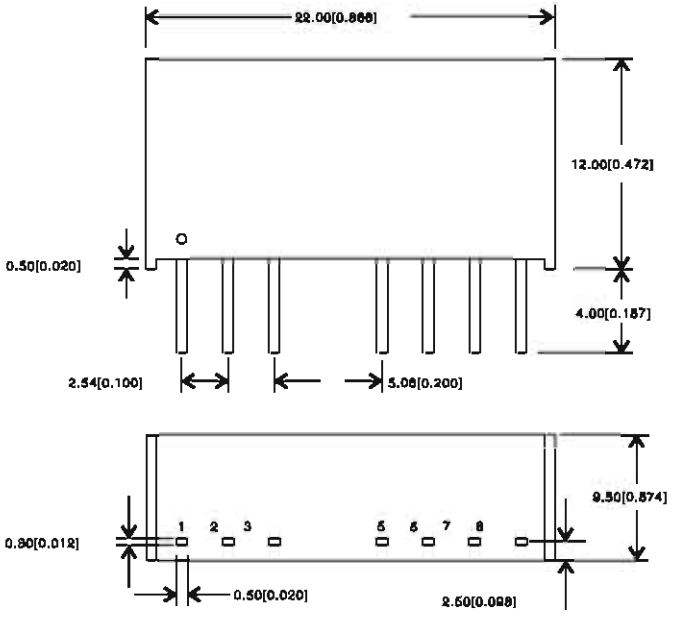
Electric power
Industrial control
Communication
IoT
Automobile
Rail tranait

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06S-05S03	5 (4.5-9)	12	3.3	1350/0	75	1800
WDC06S-05S05			5	1200/0	79	1000
WDC06S-05S09			9	667/0	81	470
WDC06S-05S12			12	500/0	83	470
WDC06S-05S15			15	400/0	83	220
WDC06S-05S24			24	250/0	84	100
WDC06S-12S03	12 (9-18)	20	3.3	1350/0	77	1800
WDC06S-12S05			5	1200/0	81	1000
WDC06S-12S09			9	667/0	83	470
WDC06S-12S12			12	500/0	85	470
WDC06S-12S15			15	400/0	85	220
WDC06S-12S24			24	250/0	86	100

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06S-24S03	24 (18-36)	40	3.3	1350/0	79	1800
WDC06S-24S05			5	1200/0	83	1000
WDC06S-24S09			9	667/0	85	470
WDC06S-24S12			12	500/0	87	470
WDC06S-24S15			15	400/0	88	220
WDC06S-24S24			24	250/0	88	100
WDC06S-48S03	48 (36-75)	80	3.3	1350/0	79	1800
WDC06S-48S05			5	1200/0	84	1000
WDC06S-48S09			9	667/0	85	470
WDC06S-48S12			12	500/0	87	470
WDC06S-48S15			15	400/0	86	220
WDC06S-48S24			24	250/0	88	100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

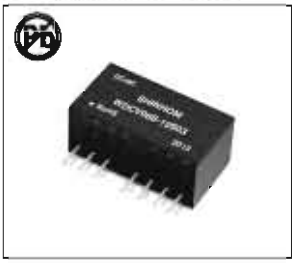
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
4:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

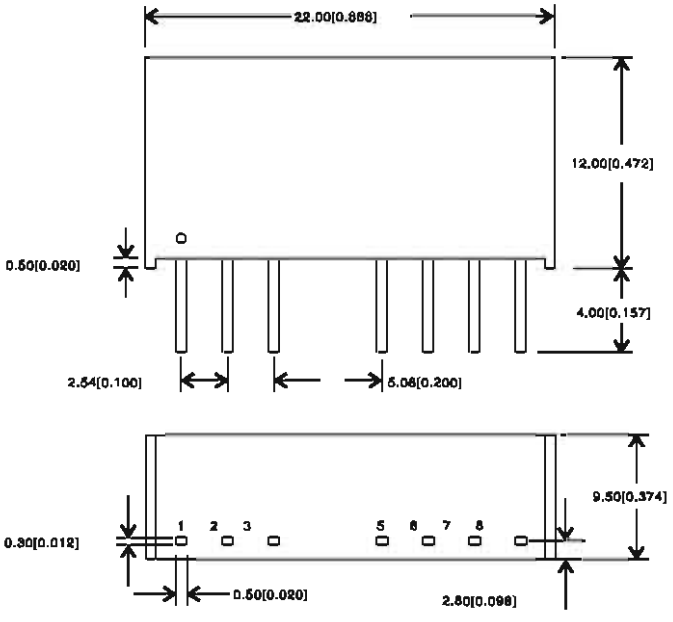
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06S-12S03	12 (4.5-18)	25	3.3	1350/0	75	1800
WDCV06S-12S05			5	1200/0	79	1000
WDCV06S-12S09			9	667/0	81	470
WDCV06S-12S12			12	500/0	83	470
WDCV06S-12S15			15	400/0	84	220
WDCV06S-12S24			24	250/0	82	100
WDCV06S-12D05			±5	±600/0	77	#470
WDCV06S-12D09			±9	±333/0	81	#220
WDCV06S-12D12			±12	±250/0	81	#120
WDCV06S-12D15			±15	±200/0	83	#100
WDCV06S-12D24			±24	±125/0	82	#68
WDCV06S-24S03	24 (9-36)	40	3.3	1350/0	78	1800
WDCV06S-24S05			5	1200/0	82	1000
WDCV06S-24S09			9	667/0	84	470
WDCV06S-24S12			12	500/0	86	470
WDCV06S-24S15			15	400/0	87	220
WDCV06S-24S24			24	250/0	85	100

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06S-24D05	24 (9-36)	40	±5	±600/0	80	#470
WDCV06S-24D09			±9	±333/0	83	#220
WDCV06S-24D12			±12	±250/0	83	#120
WDCV06S-24D15			±15	±200/0	83	#100
WDCV06S-24D24			±24	±125/0	82	#68
WDCV06S-48S03	48 (18-75)	80	3.3	1350/0	79	1800
WDCV06S-48S05			5	1200/0	83	1000
WDCV06S-48S09			9	667/0	86	470
WDCV06S-48S12			12	500/0	87	470
WDCV06S-48S15			15	400/0	88	220
WDCV06S-48S24			24	250/0	86	100
WDCV06S-48D05			±5	±600/0	81	#470
WDCV06S-48D09			±9	±333/0	84	#220
WDCV06S-48D12			±12	±250/0	84	#120
WDCV06S-48D15			±15	±200/0	84	#100
WDCV06S-48D24			±24	±125/0	88	#68

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

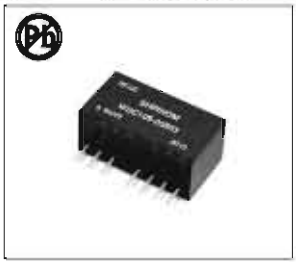
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
2:1 Wide input voltage renge
Operating Temperature:-40℃ - 85℃
Iaolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

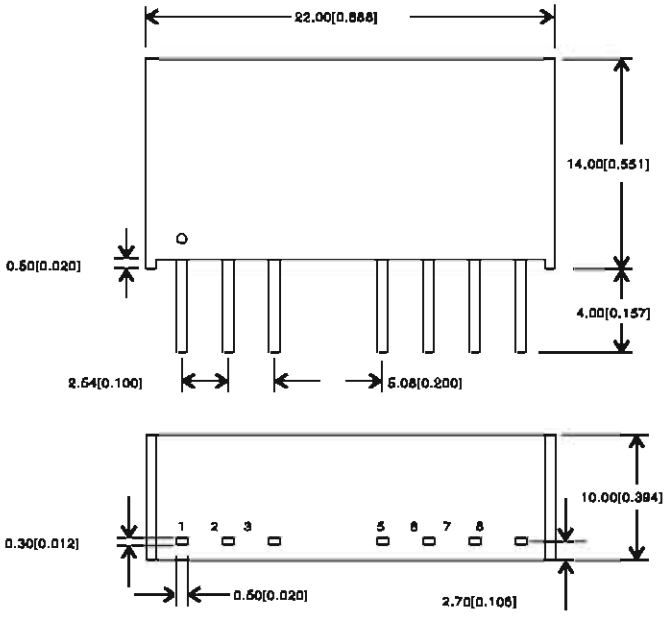
Electric power
Industrial control
Communication
IoT
Automobile
Rail tranait

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10S-05S03	5 (4.5-9)	12	3.3	2400/0	79	2200
WDC10S-05S05			5	2000/0	82	2200
WDC10S-05S09			9	1111/0	83	680
WDC10S-05S12			12	833/0	83	470
WDC10S-05S15			15	667/0	84	330
WDC10S-05S24			24	417/0	85	220
WDC10S-12S03	12 (9-18)	20	3.3	2400/0	83	2200
WDC10S-12S05			5	2000/0	86	2200
WDC10S-12S09			9	1111/0	86	680

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10S-12S12	12 (9-18)	20	12	833/0	86	470
WDC10S-12S15			15	667/0	86	330
WDC10S-12S24			24	417/0	86	220
WDC10S-24S03	24 (18-36)	40	3.3	2400/0	86	2200
WDC10S-24S05			5	2000/0	86	2200
WDC10S-24S09			9	1111/0	86	680
WDC10S-24S12			12	833/0	86	470
WDC10S-24S15			15	667/0	86	330
WDC10S-24S24			24	417/0	86	220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

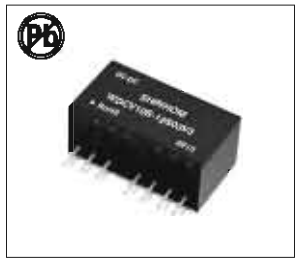
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER



FEATURES:

Packaging: SIP8
4:1 Wide input voltage renge
Opereting Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, ahort circuit, over voltaga protection

APPLICATION:

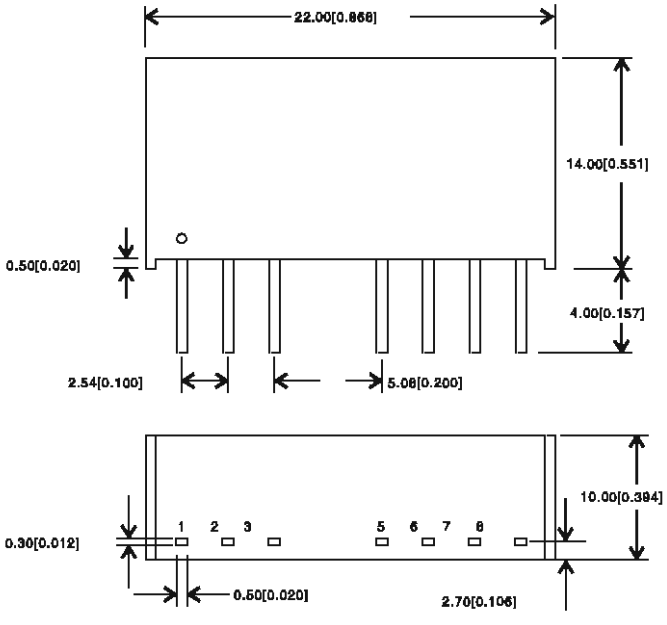
Electric power
Industrial control
Communication
IoT
Automobile
Rail transit

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10S-12S03V3	12 (4.5-18)	25	3.3	2400/0	80	1200
WDCV10S-12S05V3			5	2000/0	81	1000
WDCV10S-12S12V3			12	833/0	83	470
WDCV10S-12S15V3			15	667/0	84	330
WDCV10S-12S24V3			24	416/0	86	100
WDCV10S-12D05V3			±5	±1000/0	81	#1000
WDCV10S-12D12V3			±12	±416/0	83	#470
WDCV10S-12D15V3			±15	±333/0	84	#330
WDCV10S-24S03V3	24 (9-36)	40	3.3	2400/0	80	1200
WDCV10S-24S05V3			5	2000/0	82	1000
WDCV10S-24S12V3			12	833/0	84	470
WDCV10S-24S15V3			15	667/0	84	330

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10S-12S03V3	24 (9-36)	40	24	416/0	86	100
WDCV10S-12S05V3			±5	±1000/0	81	#1000
WDCV10S-12S12V3			±12	±416/0	83	#470
WDCV10S-12S15V3			±15	±333/0	84	#330
WDCV10S-12S24V3	48 (18-75)	80	3.3	2400/0	83	1200
WDCV10S-12D05V3			8	2000/0	83	1000
WDCV10S-12D12V3			12	833/0	84	470
WDCV10S-12D15V3			15	667/0	84	330
WDCV10S-24S03V3			24	416/0	87	100
WDCV10S-24S05V3			±5	±1000/0	83	#1000
WDCV10S-24S12V3			±12	±416/0	84	#470
WDCV10S-24S15V3			±15	±333/0	84	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	-Vo	COM
8	NC	-Vo

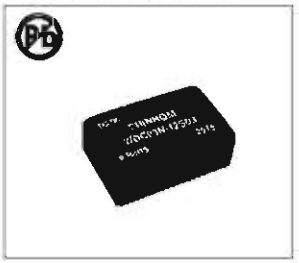
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: DIP16
2:1 Wide input voltage range
Operating Temparatura:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 80%
With input undervoltage, output overcurrent, short circuit, over voltage protection

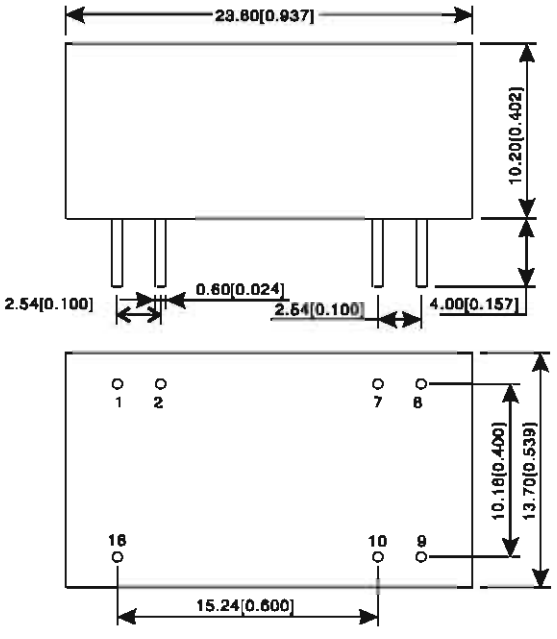
APPLICATION:

Electric powar
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA)Max	No-load current(mA)Max		
WDC03N-12S03	12 (9-18)	3.3	600/0	278	30	73/75	220
WDC03N-12S05		5	600/0	314		76/78	220
WDC03N-12S12		12	250/0	314		78/80	47
WDC03N-12S15		15	200/0	314		78/80	47
WDC03N-12S24		24	125/0	314		78/80	47
WDC03N-12D05		±5	±300/0	314		75/77	#47
WDC03N-12D12		±12	±125/0	314		78/80	#47
WDC03N-12D15		±15	±100/0	314		78/80	#47
WDC03N-24S03	24 (18-36)	3.3	600/0	140	80	73/75	220
WDC03N-24S05		5	600/0	156		76/78	220
WDC03N-24S12		12	250/0	156		78/80	47
WDC03N-24S15		15	200/0	156		78/80	47
WDC03N-24S24		24	125/0	156		78/80	47
WDC03N-24D05		±5	±300/0	#156		75/77	#47
WDC03N-24D12		±12	±125/0	#156		78/80	#47
WDC03N-24D15		±15	±100/0	#156		78/80	#47

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	NO PIN	NO PIN
7	NC	NC
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
16	Vin	Vin

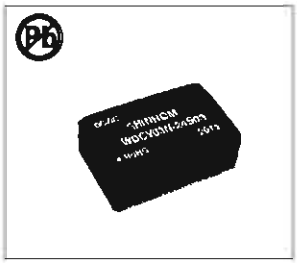
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: DIP16
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 80%
With input undervoltage, output overcurrent, short circuit, over voltage protection

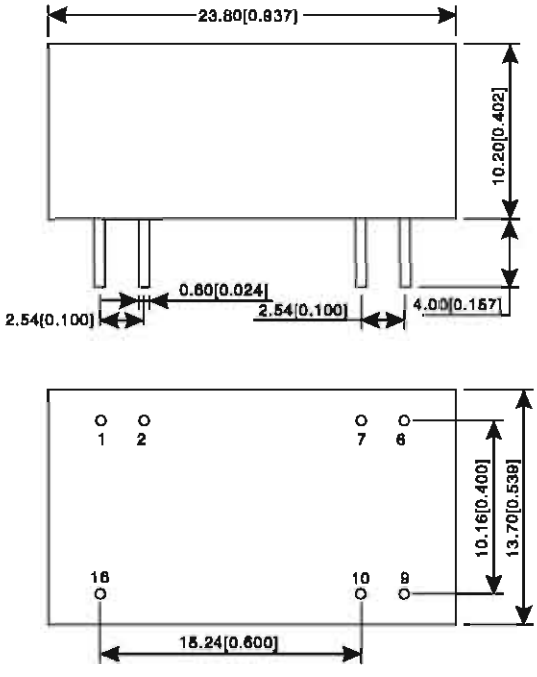
APPLICATION:

Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA)Max	No-load current(mA)Max		
WDCV03N-24S03	24 (9-36)	3.3	600/0	110	30	73/75	220
WDCV03N-24S05		5	600/0	160		76/78	220
WDCV03N-24S12		12	250/0	158		78/80	47
WDCV03N-24S15		15	200/0	158		78/80	47
WDCV03N-24S24		24	125/0	158		78/80	47
WDCV03N-24D05		±5	±300/0	162		75/77	#47
WDCV03N-24D12		±12	±125/0	156		78/80	#47
WDCV03N-24D15		±15	±100/0	156		78/80	#47
WDCV03N-48S03	48 (18-75)	3.3	600/0	55	20	73/75	220
WDCV03N-48S05		5	600/0	68		76/78	220
WDCV03N-48S12		12	250/0	78		78/80	47
WDCV03N-48S15		15	200/0	76		78/80	47
WDCV03N-48S24		24	125/0	78		78/80	47
WDCV03N-48D05		±5	±300/0	81		75/77	#47
WDCV03N-48D12		±12	±125/0	78		78/80	#47
WDCV03N-48D15		±15	±100/0	78		78/80	#47

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Ctrl	Ctrl
7	NC	NC
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
16	Vin	Vin

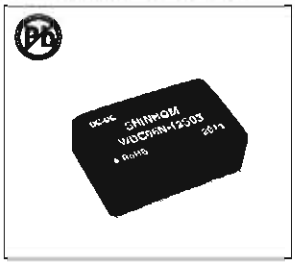
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: DIP16
2:1 Wide input voltage range
Operating Temperature:-40℃ - 86℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

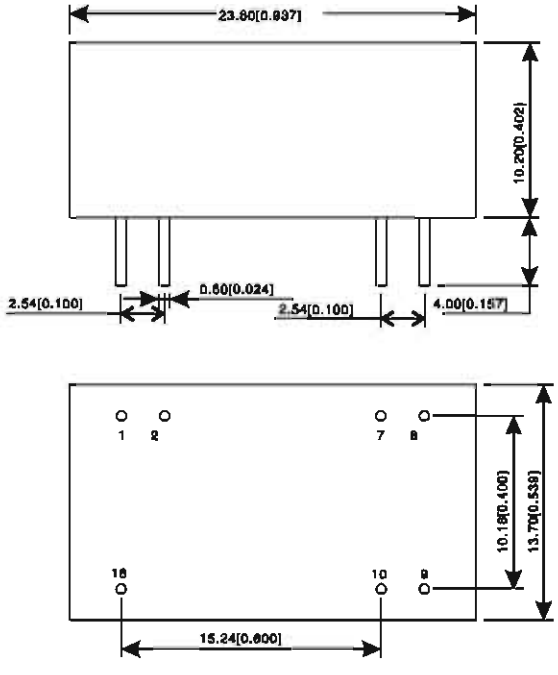
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA) Max	No-load current(mA) Max		
WDC06N-12S03	12 (9-18)	3.3	1500/0	264	10	76/80	680
WDC06N-12S05		5	1200/0	305		81/83	680
WDC06N-12S12		12	500/0	291		85/87	330
WDC06N-12S15		15	400/0	291		85/86	330
WDC06N-12S24		24	250/0	287		86/88	150
WDC06N-12D05		±5	±500/0	305		80/82	#330
WDC06N-12D12		±12	±250/0	291		85/87	#150
WDC06N-12D15		±15	±200/0	287		85/87	#150
WDC06N-24S03	24 (18-36)	3.3	1800/0	132	7	75/80	680
WDC06N-24S05		5	1200/0	152		81/83	680
WDC06N-24S12		12	500/0	145		85/87	330
WDC06N-24S15		15	400/0	145		85/88	330

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA) Max	No-load current(mA) Max		
WDC06N-24S24	24 (18-36)	24	250/0	144	7	86/88	150
WDC06N-24D05		±5	±500/0	152		80/82	#330
WDC06N-24D12		±12	±250/0	144		85/87	#150
WDC06N-24D15		±15	±200/0	144		85/87	#150
WDC06N-48S03	48 (36-75)	3.3	1500/0	129	6	76/80	680
WDC06N-48S05		5	1200/0	151		81/83	680
WDC06N-48S12		12	500/0	144		85/87	330
WDC06N-48S15		15	400/0	142		86/86	330
WDC06N-48S24		24	250/0	142		86/88	150
WDC06N-48D05		±5	±500/0	151		81/83	#330
WDC06N-48D12		±12	±250/0	144		85/87	#150
WDC06N-48D15		±15	±200/0	144		85/87	#150

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	NO PIN	NO PIN
7	NC	NC
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
16	Vin	Vin

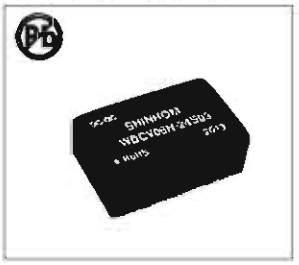
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: DIP16
4:1 Wide input voltage range
Operating Temperature:-40℃ - 88℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 87%
With input undervoltage, output overcurrent, short circuit, over voltage protection

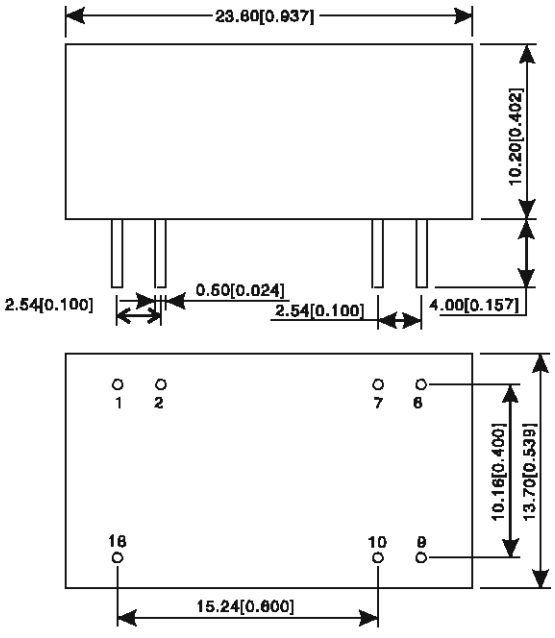
APPLICATION:

Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Current Max/Min(mA)	Voltage (VDC)	Full-load current(mA)Max	No-load current(mA)Max		
WDCV06N-24S03	24 (9-36)	3.3	1500/0	264	8	76/78	680
WDCV06N-24S05		5	1200/0	305		80/82	680
WDCV06N-24S12		12	500/0	291		84/86	330
WDCV06N-24S15		15	400/0	291		84/86	330
WDCV06N-24S24		24	250/0	287		85/87	150
WDCV06N-24D05		±5	±500/0	305		80/82	#330
WDCV06N-24D12		±12	±250/0	291		84/86	#150
WDCV06N-24D15		±15	±200/0	287		85/87	#150
WDCV06N-48S03	48 (18-75)	3.3	1500/0	132	8	76/78	680
WDCV06N-48S05		5	1200/0	152		80/82	680
WDCV06N-48S12		12	500/0	145		84/86	330
WDCV06N-48S15		15	400/0	148		84/86	330
WDCV06N-48S24		24	250/0	144		85/87	150
WDCV06N-48D05		±5	±500/0	152		80/82	#330
WDCV06N-48D12		±12	±250/0	144		85/87	#150
WDCV06N-48D15		±15	±200/0	144		85/87	#150

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	NO PIN	NO PIN
7	NC	NC
6	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
16	Vin	Vin

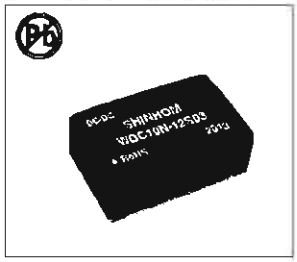
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER



FEATURES:

Packaging: DIP16
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, ahort circuit, over voltage protection

APPLICATION:

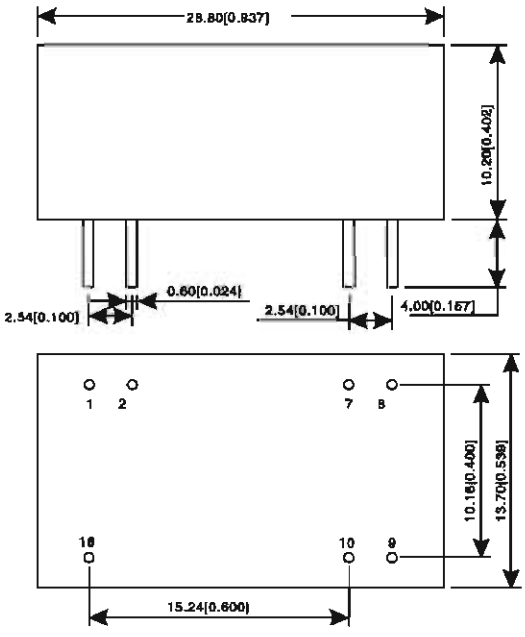
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA) Max	No-load current(mA) Max		
WDC10N-12S03	12 (9-18)	3.3	2400/0	940	20	77/79	2600
WDC10N-12S05		5	2000/0	1016		81/82	1300
WDC10N-12S12		12	833/0	988		84/86	560
WDC10N-12S15		15	667/0	957		85/87	560
WDC10N-12S24		24	416/0	956		85/87	200
WDC10N-12D05		±5	±1000/0	1016		81/82	#560
WDC10N-12D12		±12	±416/0	987		84/86	#390
WDC10N-12D15		±15	±333/0	988		84/86	#200
WDC10N-24S03	24 (18-36)	3.3	2400/0	464	10	76/80	2600
WDC10N-24S05		5	2000/0	502		81/83	1300
WDC10N-24S12		12	833/0	479		85/87	560
WDC10N-24S15		15	667/0	478		85/85	560

Part Number	Input Voltage(VDC	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	Full-load current(mA) Max	No-load current(mA) Max		
WDC10N-24S24	24 (18-36)	24	416/0	478	10	85/85	200
WDC10N-24D05		±5	±1000/0	502		81/83	#560
WDC10N-24D12		±12	±416/0	476		85/87	#390
WDC10N-24D15		±15	±333/0	478		85/87	#200
WDC10N-48S03	48 (36-75)	3.3	2400/0	232	8	78/80	2600
WDC10N-48S05		5	2000/0	251		81/83	1300
WDC10N-48S12		12	833/0	239		85/87	560
WDC10N-48S15		15	667/0	237		85/85	560
WDC10N-48S24		24	416/0	236		85/85	200
WDC10N-48D05		±5	±1000/0	251		81/83	#560
WDC10N-48D12		±12	±416/0	239		85/87	#390
WDC10N-48D15		±15	±333/0	238		85/87	#200

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	NO PIN	NO PIN
7	NC	NC
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
16	Vin	Vin

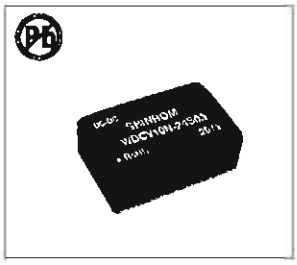
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance:±0.10(±0.004)

Unremarked tolerances:±0.50(±0.020)

10W DC-DC CONVERTER



FEATURES:

Packaging: DIP18
2:1 Wide input voltage range
Operating Temperature:-40℃ - 88℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

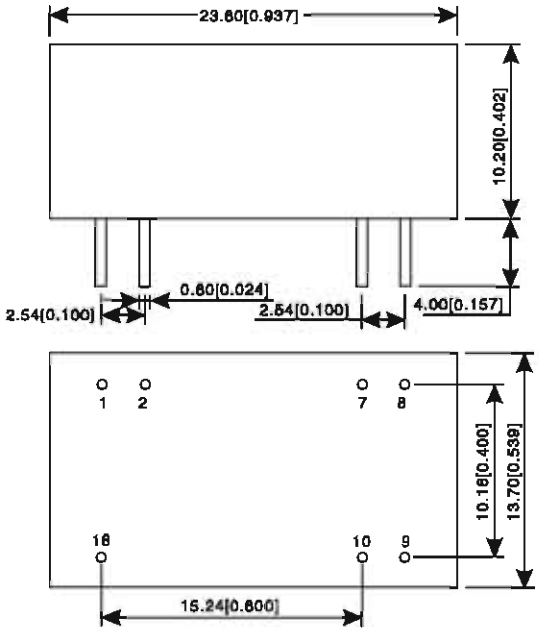
APPLICATION:

Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Input Current		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Current Max/Min(mA)	Voltage (VDC)	Full-load current(mA)Max	No-load current(mA)Max		
WDCV10N-24S03	24 (9-36)	3.3	2700	464	10	78/80	2600
WDCV10N-24S05		5	2000	502		81/83	1300
WDCV10N-24S12		12	833	478		85/87	560
WDCV10N-24S15		15	666	473		86/88	560
WDCV10N-24S24		24	416	473		86/88	200
WDCV10N-24D05		±5	±1000/0	502		81/83	#560
WDCV10N-24D12		±12	±416	476		85/87	#390
WDCV10N-24D15		±15	±333	478		84/87	#200
WDCV10N-48S03	48 (18-75)	3.3	2700	232	8	78/80	2600
WDCV10N-48S05		5	2000	251		81/83	1300
WDCV10N-48S12		12	833	239		85/87	560
WDCV10N-48S15		15	666	237		86/88	560
WDCV10N-48S24		24	416	236		86/86	200
WDCV10N-48D05		±5	±1000/0	251		81/83	#560
WDCV10N-48D12		±12	±416	239		85/87	#390
WDCV10N-48D15		±15	±333	239		85/87	#200

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	NO PIN	NO PIN
7	NC	NC
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
18	Vin	Vin

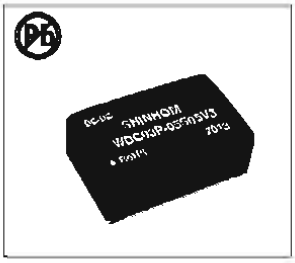
NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances:±0.50[±0.020]

3W DC-DC CONVERTER



FEATURES:

Packaging: DIP24
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 86%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

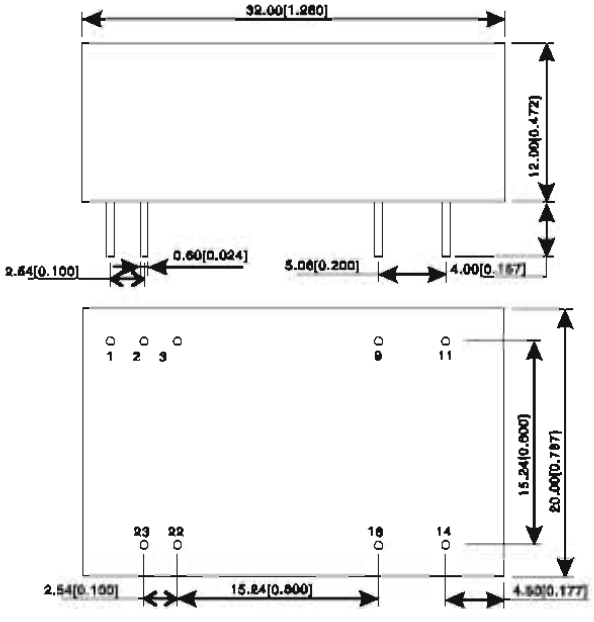
Electric power
Industrial control
Medical

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC03P-05S05V3	5 (4.5-9)	11	5	600/30	74	4700
WDC03P-05S12V3			12	250/12	77	2700
WDC03P-05S15V3			15	200/10	77	2200
WDC03P-05D05V3			±5	±300/±15	76	#2200
WDC03P-05D12V3			±12	±125/±6	78	#1800
WDC03P-05D15V3			±15	±100/±5	78	#1000
WDC03P-12S03V3	12 (9-18)	20	3.3	909/46	74	4700
WDC03P-12S05V3			5	600/30	81	4700
WDC03P-12S12V3			12	250/12	88	2700
WDC03P-12S15V3			15	200/10	82	2200
WDC03P-12S24V3			24	125/6	88	1800
WDC03P-12D05V3			±5	±300/±15	81	#2200
WDC03P-12D09V3			±9	±166/±8	84	#2000
WDC03P-12D12V3			±12	±125/±6	84	#1800
WDC03P-12D15V3			±15	±100/±5	85	#1000
WDC03P-24S03V3	24(18-36)	40	3.3	909±46	78	4700

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC03P-24S05V3	24 (18-36)	40	5	600/30	81	4700
WDC03P-24S09V3			9	333/16	81	2700
WDC03P-24S12V3			12	250/12	86	2700
WDC03P-24S15V3			15	200/10	86	2200
WDC03P-24S24V3			24	125/6	85	1800
WDC03P-24D05V3			±5	±300/±15	82	#2200
WDC03P-24D12V3			±12	±125/±6	84	#1800
WDC03P-24D15V3			±15	±100/±5	84	#1000
WDC03P-48S03V3	48 (36-75)	60	3.3	909/46	78	4700
WDC03P-48S05V3			5	600/30	82	4700
WDC03P-48S12V3			12	250/12	86	2700
WDC03P-48S15V3			15	200/10	86	2200
WDC03P-48D05V3			±5	±300/±15	82	#2200
WDC03P-48D12V3			±12	±125/±6	84	#1800
WDC03P-48D15V3			±15	±100/±5	85	#1000

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	NO PIN	NO PIN
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

3W DC-DC CONVERTER

FEATURES:

Packaging: DIP24
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

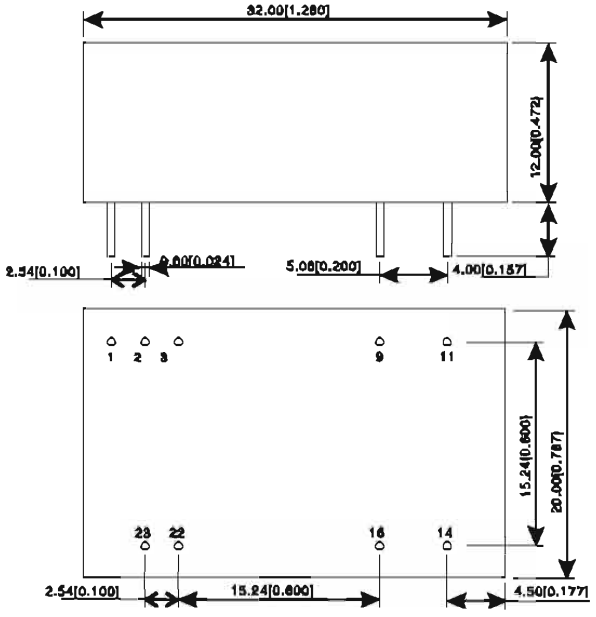
Electric power
Industrial control
Medical

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV03P-12S03V3	12 (4.5-18)	25	3.3	909/46	75	2700
WDCV03P-12S05V3			5	600/30	47	2200
WDCV03P-12S12V3			12	250/12	78	680
WDCV03P-12S15V3			15	200/10	77	680
WDCV03P-12S24V3			24	125/6	78	470
WDCV03P-12D05V3			±5	±300/±15	78	#1000
WDCV03P-12D12V3			±12	±125/±6	78	#330
WDCV03P-12D15V3			±15	±100/±5	78	#220
WDCV03P-24S03V3	24 (9-36)	40	3.3	909/46	75	2700
WDCV03P-24S05V3			5	600/30	80	2200
WDCV03P-24S12V3			12	250/12	81	680
WDCV03P-24S15V3			15	200/10	82	680

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV03P-24D24V3	24 (9-36)	40	24	125/6	82	470
WDCV03P-24D05V3			±5	±300/±15	80	#1000
WDCV03P-24D12V3			±12	±125/±6	81	#330
WDCV03P-24D15V3			±15	±100/±5	82	#220
WDCV03P-48S03V3	48 (18-75)	80	3.3	909/46	78	2700
WDCV03P-48S05V3			5	600/30	78	2200
WDCV03P-48S12V3			12	250/12	82	680
WDCV03P-48S15V3			15	200/10	83	680
WDCV03P-48S24V3			24	125/6	81	470
WDCV03P-48D05V3			±5	±300/±15	79	#1000
WDCV03P-48D12V3			±12	±125/±6	82	#330
WDCV03P-48D15V3			±15	±100/±5	83	#220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	NO PIN	NO PIN
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

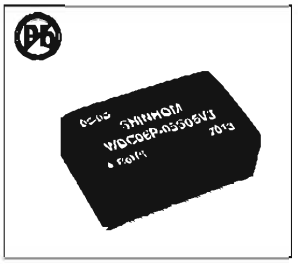
NO:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: DIP24
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

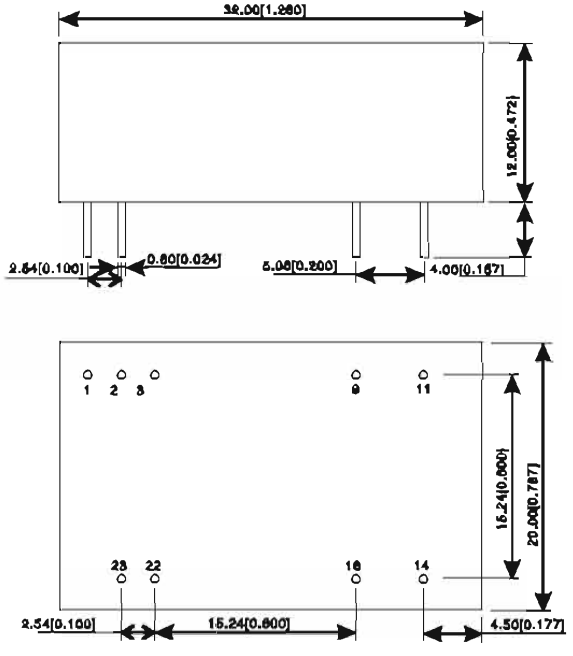
Electric power
Industrial control
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06P-05S05V3	5 (4.5-9)	12	5	1200/0	78	1000
WDC06P-05S12V3			12	500/0	84	470
WDC06P-05S15V3			15	400/0	84	220
WDC06P-05S24V3			24	250/0	84	100
WDC06P-05D05V3			±5	±600/0	78	#1000
WDC06P-05D12V3			±12	±250/0	84	#470
WDC06P-05D15V3			±15	±200/0	84	#220
WDC06P-05D24V3			±24	±125/0	84	#100
WDC06P-12S03V3	12 (9-18)	40	3.3	1500/0	75	1600
WDC06P-12S05V3			5	1200/0	80	1000
WDC06P-12S12V3			12	500/0	84	470
WDC06P-12S15V3			15	400/0	85	220
WDC06P-12S24V3			24	250/0	85	100
WDC06P-12D05V3			±5	±600/0	80	#680
WDC06P-12D12V3			±12	±250/0	84	#330
WDC06P-12D15V3			±15	±200/0	85	#220
WDC06P-12D24V3			±24	±125/0	84	#100
WDC06P-24S03V3	24(18-36)	20	3.3	1500/0	78	1600

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06P-24S05V3	24 (18-36)	40	5	1200/0	82	1000
WDC06P-24S12V3			12	500/0	85	470
WDC06P-24S15V3			15	400/0	86	220
WDC06P-24S24V3			24	250/0	86	100
WDC06P-24D05V3			±5	±600/0	83	#680
WDC06P-24D12V3			±12	±250/0	86	#330
WDC06P-24D15V3			±15	±200/0	87	#220
WDC06P-24D24V3			±24	±125/0	85	#100
WDC06P-48S03V3	48 (36-75)	80	3.3	1500/0	79	1600
WDC06P-48S05V3			5	1200/0	83	1000
WDC06P-48S12V3			12	500/0	87	470
WDC06P-48S15V3			15	400/0	88	220
WDC06P-48S24V3			24	250/0	87	100
WDC06P-48D05V3			±5	±600/0	83	#680
WDC06P-48D12V3			±12	±250/0	87	#330
WDC06P-48D15V3			±15	±200/0	85	#220
WDC06P-48D24V3			±24	±125/0	85	#100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	NO PIN	NO PIN
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

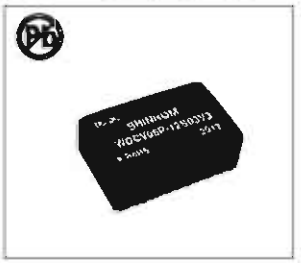
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ± 0.10[± 0.004]

Unremarked tolerance: ± 0.50[± 0.020]

6W DC-DC CONVERTER



FEATURES:

Packaging: DIP24
4:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

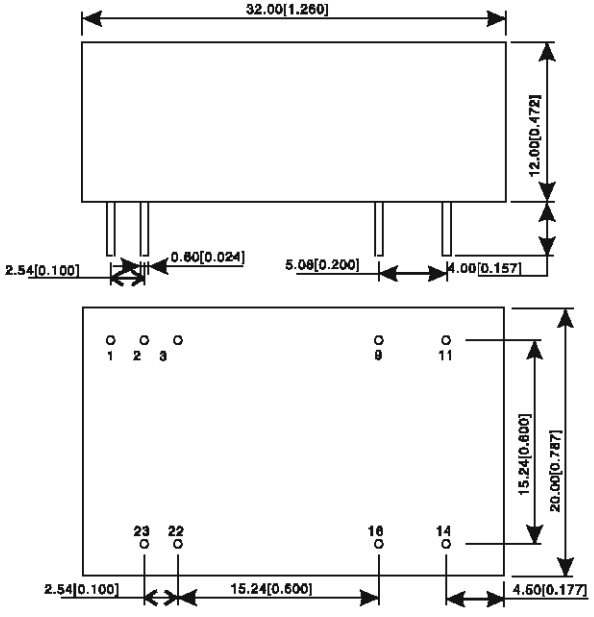
Electric power
Industrial control
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06P-12S03V3	12 (4.5-18)	25	3.3	1500/0	78	1800
WDCV06P-12S05V3			5	1200/0	82	1000
WDCV06P-12S09V3			9	667/0	84	680
WDCV06P-12S12V3			12	500/0	85	470
WDCV06P-12S15V3			15	400/0	86	220
WDCV06P-12S24V3			24	250/0	87	100
WDCV06P-12D05V3			±5	±600/0	82	#470
WDCV06P-12D12V3			±12	±250/0	86	#100
WDCV06P-12D15V3			±15	±200/0	86	#100
WDCV06P-12D24V3			±24	±125/0	85	#100
WDCV06P-24S03V3	24 (9-36)	40	3.3	1500/0	79	1800
WDCV06P-24S05V3			5	1200/0	83	1000
WDCV06P-24S09V3			9	667/0	85	680
WDCV06P-24S12V3			12	500/0	87	470

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06P-24S15V3	24 (9-36)	40	15	400/0	87	220
WDCV06P-24S24V3			24	250/0	88	100
WDCV06P-24D05V3			±5	±600/0	83	#470
WDCV06P-24D12V3			±12	±250/0	87	#100
WDCV06P-24D15V3			±15	±200/0	87	#100
WDCV06P-24D24V3			±24	±125/0	87	#100
WDCV06P-48S03V3	48 (18-75)	80	3.3	1500/0	79	1800
WDCV06P-48S05V3			5	1200/0	83	1000
WDCV06P-48S12V3			12	500/0	87	470
WDCV06P-48S15V3			15	400/0	88	220
WDCV06P-48S24V3			24	250/0	88	100
WDCV06P-48D05V3			±5	±600/0	83	#470
WDCV06P-48D12V3			±12	±250/0	87	#100
WDCV06P-48D15V3			±15	±200/0	88	#100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	NO PIN	NO PIN
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

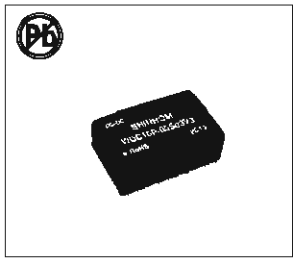
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ± 0.10(± 0.004)

Unremarked tolerances: ± 0.50(± 0.020)

10W DC-DC CONVERTER



FEATURES:

Packaging: DIP24
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

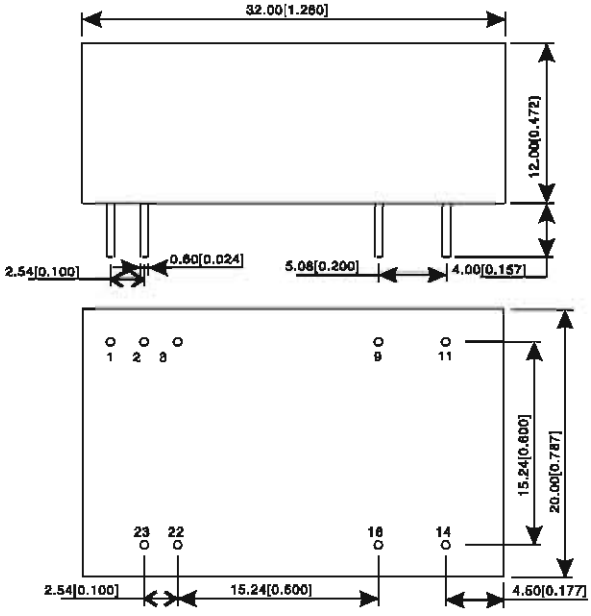
Electric power
Industrial control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10P-05S03V3	5 (4.5-9)	12	3.3	2400/0	83	1200
WDC10P-05S05V3			5	2000/0	84	1000
WDC10P-05S12V3			12	833/0	85	471
WDC10P-05S15V3			15	667/0	85	330
WDC10P-05S24V3			24	416/0	87	100
WDC10P-05D05V3			±5	±1000/0	82	#1000
WDC10P-05D12V3			±12	±416/0	86	#470
WDC10P-05D15V3			±15	±333/0	87	#330
WDC10P-12S03V3	12 (9-18)	20	3.3	2400/0	87	1200
WDC10P-12S05V3			5	2000/0	87	1000
WDC10P-12S12V3			12	833/0	87	470
WDC10P-12S15V3			15	667/0	87	330
WDC10P-12S24V3			24	416/0	88	100
WDC10P-12D05V3			±5	±1000/0	83	#1000
WDC10P-12D12V3			±12	±416/0	87	#470
WDC10P-12D15V3			±15	±333/0	87	#330

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10P-24S03V3	24 (18-36)	40	3.3	2400/0	87	1200
WDC10P-24S05V3			5	2000/0	88	1000
WDC10P-24S12V3			12	833/0	87	470
WDC10P-24S15V3			15	667/0	87	330
WDC10P-24S24V3			24	416/0	88	100
WDC10P-24D05V3			±5	±1000/0	83	#1000
WDC10P-24D12V3			±12	±416/0	87	#470
WDC10P-24D15V3			±15	±333/0	87	#330
WDC10P-48S03V3	48 (36-75)	80	3.3	2400/0	97	1200
WDC10P-48S05V3			5	2000/0	88	1000
WDC10P-48S12V3			12	833/0	87	470
WDC10P-48S15V3			15	667/0	87	330
WDC10P-48S24V3			24	416/0	88	100
WDC10P-48D05V3			±5	±1000/0	83	#1000
WDC10P-48D12V3			±12	±416/0	87	#470
WDC10P-48D15V3			±15	±333/0	87	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	CTRL	CTRL
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

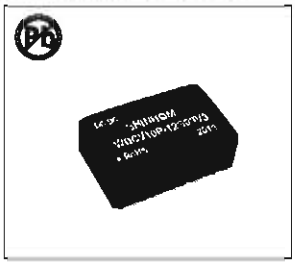
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER



FEATURES:

Packaging: DIP24
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
Isolation Voltage:1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

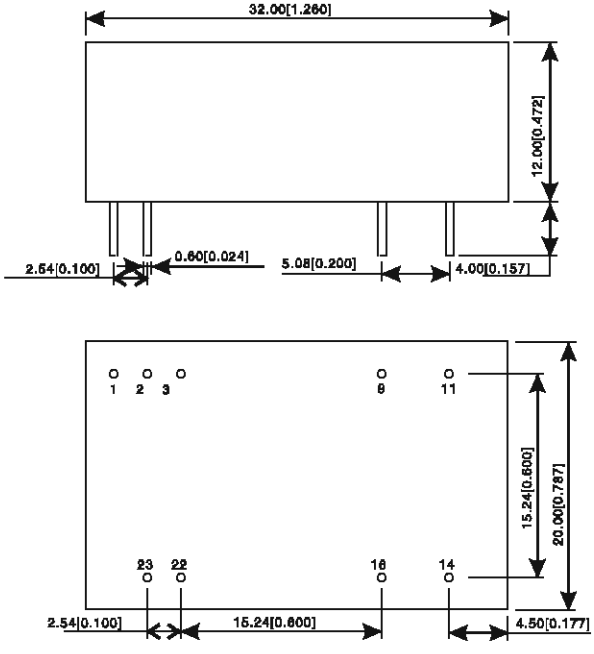
Electric power
Industriel control
Communication
IoT
Automobile

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10P-12S03V3	12 (4.6-16)	25	3.3	2400/0	83	1200
WDCV10P-12S05V3			5	2000/0	84	1000
WDCV10P-12S12V3			12	833/0	86	470
WDCV10P-12S15V3			15	667/0	87	330
WDCV10P-12S24V3			24	416/0	88	100
WDCV10P-12D05V3			±5	±1000/0	83	#1000
WDCV10P-12D12V3			±12	±416/0	86	#470
WDCV10P-12D15V3			±15	±333/0	87	#330
WDCV10P-24S03V3	24 (9-36)	40	3.3	2400/0	87	1200
WDCV10P-24S05V3			5	2000/0	88	1000
WDCV10P-24S12V3			12	833/0	87	470
WDCV10P-24S15V3			15	667/0	87	330

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10P-12S03V3	24 (9-36)	40	24	416/0	88	100
WDCV10P-12S05V3			±5	±1000/0	83	#1000
WDCV10P-12S12V3			±12	±416/0	87	#470
WDCV10P-12S15V3			±15	±333/0	87	#330
WDCV10P-12S24V3	48 (18-75)	80	3.3	2400/0	88	1200
WDCV10P-12D05V3			5	2000/0	87	1000
WDCV10P-12D12V3			12	833/0	87	470
WDCV10P-12D15V3			15	667/0	87	330
WDCV10P-24S03V3			24	416/0	88	100
WDCV10P-24S05V3			±5	±1000/0	83	#1000
WDCV10P-24S12V3			±12	±416/0	87	#470
WDCV10P-24S15V3			±15	±333/0	87	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	CTRL	CTRL
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

6W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 88%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

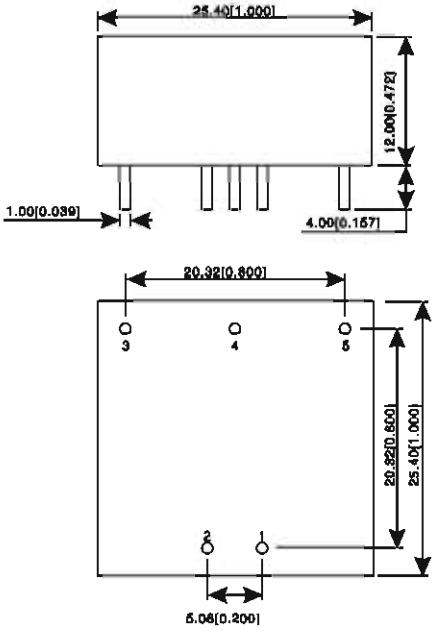
Electric power
Industrial control
Communication
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06Q-05S05V3	5 (4.5-9)	12	5	1200/0	79	1000
WDC06Q-05S12V3			12	500/0	83	470
WDC06Q-05D05V3			±5	±600/0	79	#470
WDC06Q-05D12V3			±12	±250/0	83	#100
WDC06Q-05D15V3			±15	±200/0	81	#100
WDC06Q-12S05V3	12 (9-18)	20	5	1200/0	81	1000
WDC06Q-12S12V3			12	500/0	85	470
WDC06Q-12D05V3			±5	±600/0	81	#470
WDC06Q-12D12V3			±12	±250/0	85	#100
WDC06Q-12D15V3			±15	±200/0	83	#100
WDC06Q-24S03V3	24 (18-36)	40	3.3	1500/0	77	1500
WDC06Q-24S05V3			5	1200/0	82	1000

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC06Q-12S09V3	24 (18-36)	40	9	667/0	85	470
WDC06Q-12S05V3			12	500/0	85	470
WDC06Q-12S12V3			15	400/0	88	220
WDC06Q-12S15V3			24	250/0	85	100
WDC06Q-12S24V3			±5	±600/0	88	#470
WDC06Q-12D05V3			±12	±250/0	87	#100
WDC06Q-12D12V3			±15	±200/0	87	#100
WDC06Q-12D15V3	48 (36-75)	60	3.3	1500/0	79	1500
WDC06Q-24S03V3			5	1200/0	83	1000
WDC06Q-24S05V3			12	500/0	87	470
WDC06Q-24S12V3			15	400/0	88	220
WDC06Q-24S15V3			24	250/0	88	100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	NO PIN	COM
5	-Vo	-Vo

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

6W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 88%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

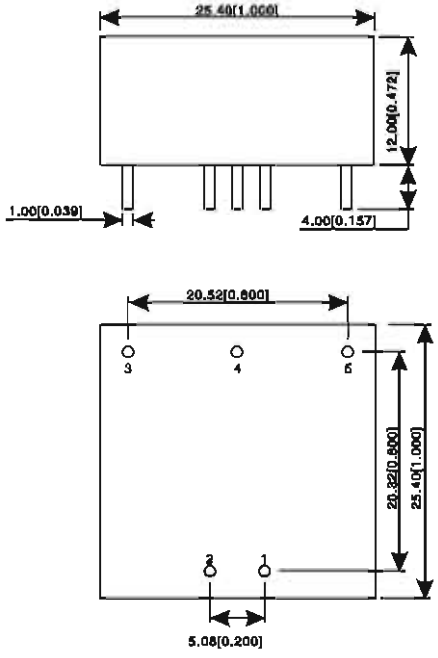
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06Q-12S03V3	12 (4.5-18)	28	3.3	1500/0	78	1800
WDCV06Q-12S05V3			5	1200/0	82	1000
WDCV06Q-12S09V3			9	667/0	84	680
WDCV06Q-12S12V3			12	500/0	86	470
WDCV06Q-12S15V3			15	400/0	86	220
WDCV06Q-12S24V3			24	250/0	87	100
WDCV06Q-12D05V3			±5	±600/0	82	#470
WDCV06Q-12D12V3			±12	±250/0	86	#100
WDCV06Q-12D15V3			±15	±200/0	86	#100
WDCV06Q-12D24V3			±24	±125/0	88	#100
WDCV06Q-24S03V3	24 (8-38)	40	3.3	1500/0	79	1800
WDCV06Q-24S05V3			5	1200/0	83	1000
WDCV06Q-24S09V3			9	667/0	85	680
WDCV06Q-24S12V3			12	500/0	87	470

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV06Q-24S15V3	24 (9-36)	40	15	400/0	87	220
WDCV06Q-24S24V3			24	250/0	88	100
WDCV06Q-24D05V3			±5	±600/0	88	#470
WDCV06Q-24D12V3			±12	±250/0	87	#100
WDCV06Q-24D15V3			±15	±200/0	87	#100
WDCV06Q-24D24V3			±24	±125/0	87	#100
WDCV06Q-48S03V3	48 (18-75)	80	3.3	1600/0	79	1800
WDCV06Q-48S05V3			5	1200/0	83	1000
WDCV06Q-48S12V3			12	500/0	87	470
WDCV06Q-48S15V3			15	400/0	88	220
WDCV06Q-48S24V3			24	250/0	88	100
WDCV06Q-48D05V3			±5	±600/0	83	#470
WDCV06Q-48D12V3			±12	±250/0	87	#100
WDCV06Q-48D15V3			±15	±200/0	88	#100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	NO PIN	COM
5	-Vo	-Vo

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
2:1 Wide input voltage range
Operating Temperature:-40℃ – 85℃
The maximum efficiency can reach 88%
Isolation Voltage:1500VDC
With input undervoltege, output overcurrent, short circuit, over voltage protection

APPLICATION:

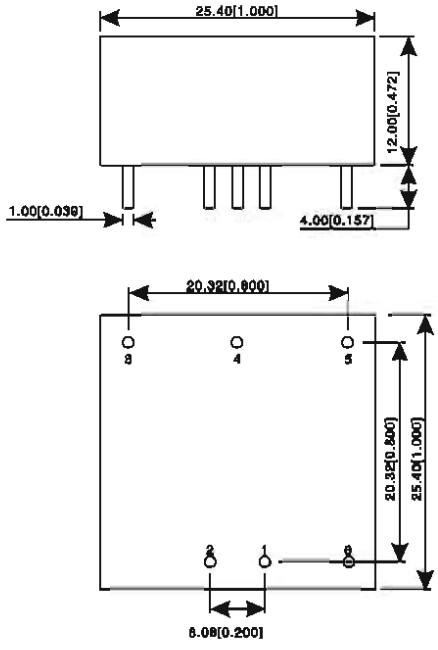
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Reling	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10Q-05S05V3	5 (4.5–9)	12	5	2000/0	85	470
WDC10Q-05S12V3			12	834/0	83	470
WDC10Q-05S15V3			15	667/0	84	330
WDC10Q-05S24V3			24	417/0	83	100
WDC10Q-05D05V3			±5	±1000/0	78	#1000
WDC10Q-05D12V3			±12	±417/0	83	#470
WDC10Q-05D15V3			±15	±334/0	84	#330
WDC10Q-05D24V3			±24	±208/0	83	#100
WDC10Q-12S05V3	12(8–18)	20	5	2000/0	83	2200

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Reling	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10Q-24S05V3	24 (18–36)	40	5	2000/0	83	2200
WDC10Q-24S12V3			12	834/0	87	470
WDC10Q-24S15V3			15	667/0	88	330
WDC10Q-24S24V3			24	417/0	83	100
WDC10Q-48S03V3	48 (36–75)	60	3.3	2400/0	79	2200
WDC10Q-48S05V3			5	2000/0	83	2200
WDC10Q-48S12V3			12	833/0	87	470
WDC10Q-48S15V3			15	667/0	87	330
WDC10Q-48S24V3			24	416/0	83	100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	NO PIN	COM
5	-Vo	-Vo
6	Ctrl	Ctrl

NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

10W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
4:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 88%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

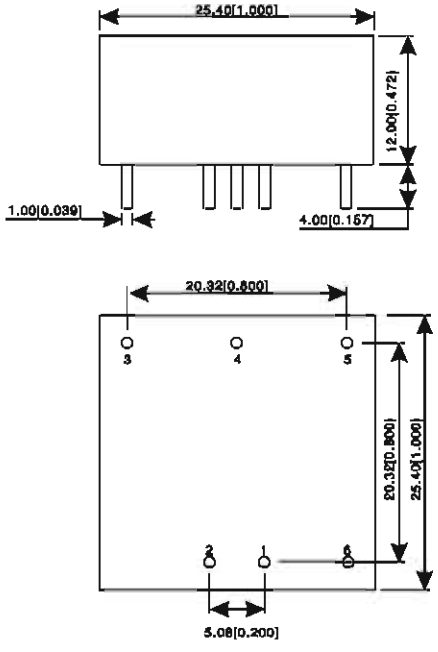
Electric power
Industrial control
Communication
Instrumants & Apparatua
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10Q-12S03V3	12 (4.5-18)	25	3.3	2400/0	77	2200
WDCV10Q-12S05V3			5	2000/0	82	2200
WDCV10Q-12S09V3			9	1111/0	84	680
WDCV10Q-12S12V3			12	833/0	85	470
WDCV10Q-12S15V3			15	667/0	85	330
WDCV10Q-12S24V3			24	416/0	87	100
WDCV10Q-12D05V3			±5	±1000/0	82	#1000
WDCV10Q-12D09V3			±9	±555/0	85	#680
WDCV10Q-12D12V3			±12	±416/0	86	#470
WDCV10Q-12D15V3			±15	±333/0	86	#330
WDCV10Q-12D24V3			±24	±208/0	86	#100
WDCV10Q-24S03V3	24 (9-36)	40	3.3	2400/0	78	2200
WDCV10Q-24S05V3			5	2000/0	83	2200
WDCV10Q-24S09V3			9	1111/0	85	680
WDCV10Q-24S12V3			12	833/0	86	470
WDCV10Q-24S15V3			15	667/0	86	330

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV10Q-24S24V3	24 (9-36)	40	24	416/0	86	100
WDCV10Q-24D05V3			±5	±1000/0	83	#1000
WDCV10Q-24D09V3			±9	±555/0	86	#680
WDCV10Q-24D12V3			±12	±416/0	87	#470
WDCV10Q-24D15V3			±15	±333/0	87	#330
WDCV10Q-24D24V3			±24	±208/0	87	#100
WDCV10Q-48S03V3	48 (18-75)	80	3.3	2400/0	79	2200
WDCV10Q-48S05V3			5	2000/0	83	2200
WDCV10Q-48S12V3			12	833/0	87	470
WDCV10Q-48S15V3			15	667/0	87	330
WDCV10Q-48S24V3			24	416/0	86	100
WDCV10Q-48D05V3			±5	±1000/0	83	#1000
WDCV10Q-48D12V3			±12	±416/0	87	#470
WDCV10Q-48D15V3			±15	±333/0	87	#330
WDCV10Q-48D24V3			±24	±208/0	87	#100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	NO PIN	COM
5	-Vo	-Vo
6	Ctrl	Ctrl

NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

15W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
2:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 91%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

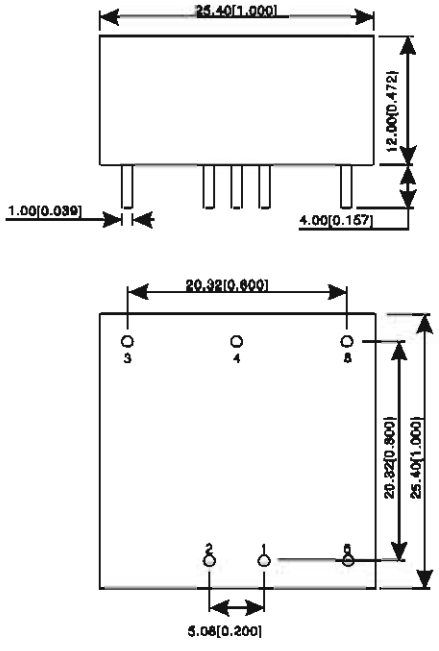
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC15Q-12S03V3	12 (9-18)	20	3.3	4000/0	88	4700
WDC15Q-12S05V3			5	3000/0	90	4700
WDC15Q-12S12V3			12	1250/0	90	1000
WDC15Q-12S15V3			15	1000/0	91	820
WDC15Q-12S24V3			24	625/0	91	270
WDC15Q-24S03V3	24 (18-36)	40	3.3	4000/0	88	4700
WDC15Q-24S05V3			5	3000/0	90	4700
WDC15Q-24S12V3			12	1250/0	90	1000

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC15Q-24S15V3	12 (18-36)	40	15	1000/0	91	820
WDC15Q-24S24V3			24	625/0	91	270
WDC15Q-48S03V3	48 (36-75)	80	3.3	4000/0	88	4700
WDC15Q-48S05V3			5	3000/0	90	4700
WDC15Q-48S12V3			12	1250/0	91	1000
WDC15Q-48S15V3			15	1000/0	91	820
WDC15Q-48S24V3			24	625/0	91	270

PHYSICAL CHARACTERISTICS:



Pin	Single output
1	GND
2	Vin
3	+Vo
4	Trim
5	-Vo
6	Ctrl

NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10(±0.004)

Unremarked tolerances: ±0.50(±0.020)

15W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
4:1 Wide input voltage range
Operating Temperature:-40℃ – 85℃
The maximum efficiency can reach 91%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

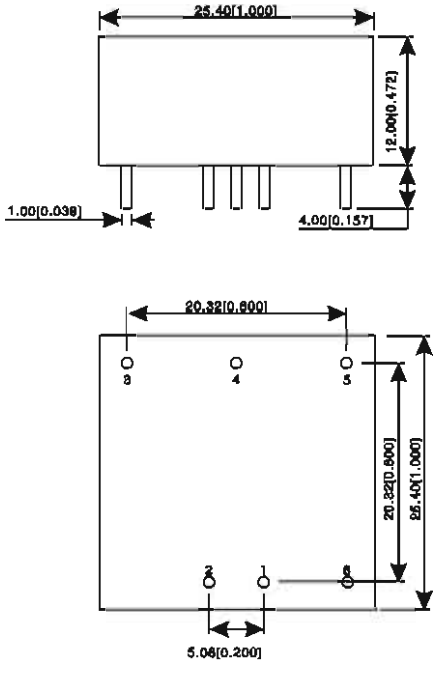
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV15Q-24S03V3	24 (9-36)	40	3.3	4000/0	88	4700
WDCV15Q-24S05V3			5	3000/0	90	4700
WDCV15Q-24S12V3			12	1250/0	90	1000
WDCV15Q-24S15V3			15	1000/0	91	820
WDCV15Q-24S24V3			24	625/0	91	270
WDCV15Q-24D05V3			±5	±1500/0	87	#1500
WDCV15Q-24D12V3			±12	±625/0	90	#470
WDCV15Q-24D15V3			±15	±500/0	90	#330
WDCV15Q-24D24V3			±24	±312/0	89	#200

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV15Q-48S03V3	48 (18-75)	80	3.3	4000/0	88	4700
WDCV15Q-48S05V3			5	3000/0	90	4700
WDCV15Q-48S12V3			12	1250/0	91	1000
WDCV15Q-48S15V3			15	1000/0	91	820
WDCV15Q-48S24V3			24	625/0	91	270
WDCV15Q-48D05V3			±5	±1500/0	86	#1500
WDCV15Q-48D12V3			±12	±625/0	89	#470
WDCV15Q-48D15V3			±15	±500/0	89	#330
WDCV15Q-48D24V3			±24	±312/0	90	#200

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	NO PIN	COM
5	-Vo	-Vo
8	Ctrl	Ctrl

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

20W DC-DC CONVERTER

FEATURES:

Packaging: 1" X 1"
2:1 Wide Input voltage range
Operating Temperature:-40℃ – 85℃
The maximum efficiency can reach 90%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

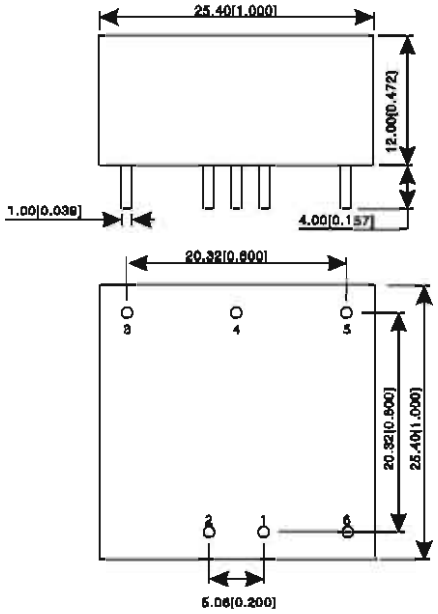
Electric power
Industrial control
Communication
Instruments & Apperatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC20Q-12D15	12 (9-18)	20	±15	±667/0	87	#625
WDC20Q-12D24			±24	±417/0	88	#220
WDC20Q-12S03	24 (18-36)	40	3.3	5000/0	86	10000
WDC20Q-12S05			5	4000/0	90	10000
WDC20Q-12S09			9	2222/0	87	4700
WDC20Q-12S12			12	1667/0	87	1800
WDC20Q-12S15			15	1333/0	88	1000
WDC20Q-12S24			24	834/0	88	500
WDC20Q-12D05			±5	±2000/0	84	#4800
WDC20Q-12D09			±9	±1111/0	86	#1000
WDC20Q-12D12			±12	±834/0	86	#800

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC20Q-24D15	24 (18-36)	40	±15	±667/0	88	#625
WDC20Q-24D24			±24	±417/0	88	#500
WDC20Q-48S03	48 (36-75)	80	3.3	5000/0	88	10000
WDC20Q-48S05			5	4000/0	90	10000
WDC20Q-48S09			9	2222/0	89	4700
WDC20Q-48S12			12	1667/0	89	1800
WDC20Q-48S15			15	1333/0	90	1000
WDC20Q-48S24			24	834/0	90	500
WDC20Q-48D05			±5	±2000/0	88	#4800
WDC20Q-48D12			±12	±834/0	88	#800
WDC20Q-48D15			±15	±667/0	89	#625

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	Trim	Com
5	-Vo	-Vo
6	Ctrl	Ctrl

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmarked tolerances: ±0.50(±0.020)

20W DC-DC CONVERTER

FEATURES:

Packaging: 1"X 1"
4:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 90%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

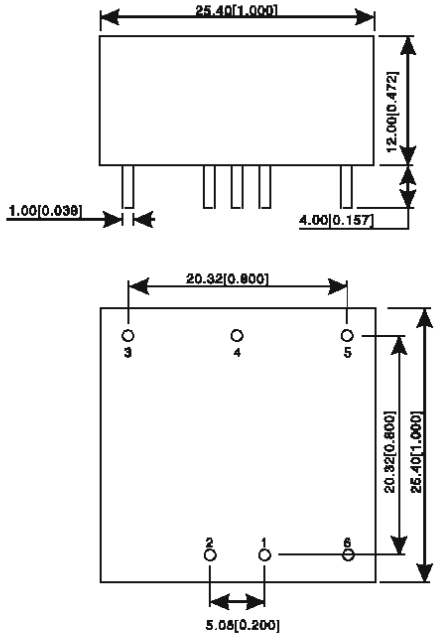
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV20Q-24S03	24 (9-36)	40	3.3	5000/0	86	10000
WDCV20Q-24S05			5	4000/0	88	10000
WDCV20Q-24S09			9	2222/0	89	4700
WDCV20Q-24S12			12	1667/0	89	1600
WDCV20Q-24S15			15	1333/0	90	1000
WDCV20Q-24S24			24	834/0	90	500
WDCV20Q-24D05			±5	±2000/0	86	#4800
WDCV20Q-24D09			±9	±1111/0	85	#1000
WDCV20Q-24D12			±12	±834/0	88	#600
WDCV20Q-24D15			±15	±667/0	88	#625

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV20Q-48S03	48 (18-75)	80	3.3	5000/0	86	10000
WDCV20Q-48S05			5	4000/0	86	10000
WDCV20Q-48S09			9	2222/0	89	4700
WDCV20Q-48S12			12	1667/0	87	1600
WDCV20Q-48S15			15	1333/0	90	1000
WDCV20Q-48S24			24	834/0	88	500
WDCV20Q-48D05			±5	±2000/0	88	#4800
WDCV20Q-48D12			±12	±834/0	88	#600
WDCV20Q-48D15			±15	±667/0	89	#625

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	Trim	Com
5	-Vo	-Vo
6	Ctrl	Ctrl

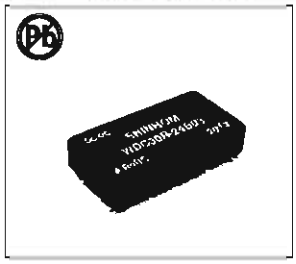
NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmarked tolerances: ±0.50(±0.020)

30~40W DC-DC CONVERTER



FEATURES:

Packaging: 2" X 1"
4:1 Wide Input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 90%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

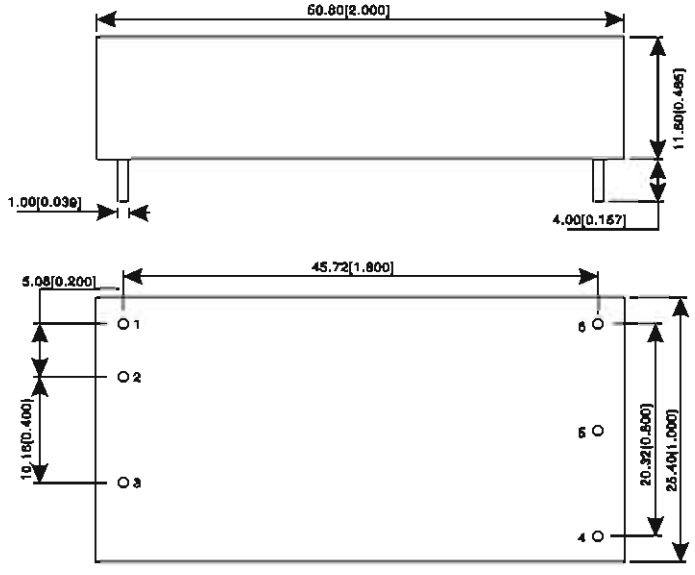
Electric power
Industrial control
Communication
Instruments & Apperatus
Rail traffic

ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC30R-24S03	24 (18-36)	40	3.3	6000/0	85	10000
WDC30R-24S05			5	6000/0	88	10000
WDC30R-24S09			9	3333/0	88	4700
WDC30R-24S12			12	2500/0	88	2700
WDC30R-24S15			15	2000/0	90	1680
WDC30R-24S24			24	1250/0	90	680
WDC30R-48S03	48 (36-75)	60	3.3	9000/0	86	10000
WDC30R-48S05			5	6000/0	86	10000
WDC30R-48S12			12	2500/0	88	2700
WDC30R-48S15			15	2000/0	89	1680
WDC30R-48S24			24	1250/0	89	680

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC40R-24S05	24 (18-36)	40	5	6000/0	88	10000
WDC40R-24S12			12	3333/0	90	2700
WDC40R-24S15			15	2667/0	91	1680
WDC40R-24S24			24	1667/0	91	680
WDC40R-48S12	48 (36-75)	60	12	3333/0	90	2700
WDC40R-48S15			15	2667/0	91	1680
WDC40R-48S24			24	1667/0	91	680

PHYSICAL CHARACTERISTICS:



Pin	Single output
1	Vin
2	GND
3	CTRL
4	Trim
5	-Vo
6	+Vo

NC:Cannot be connected to any external circuit

Dimensions:In mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ±0.50[±0.020]

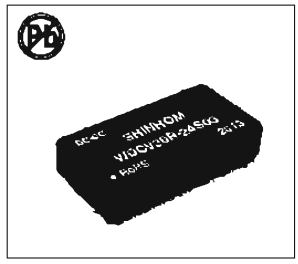
30W DC-DC CONVERTER

FEATURES:

Packaging: 2" X 1"
4:1 Wide input voltage range
Operating Temperature:-40℃ - 85℃
The maximum efficiency can reach 90%
Isolation Voltage:1500VDC
With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic

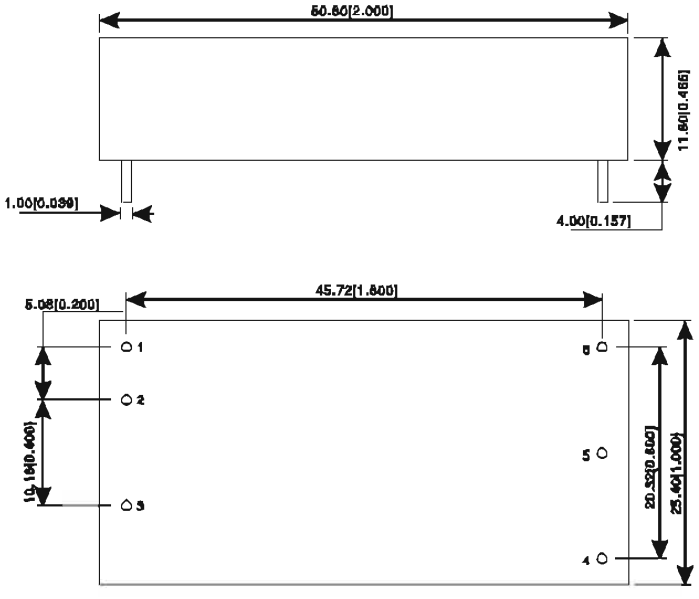


ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV30R-24S03	24 (9-36)	40	3.3	6000/0	85	10000
WDCV30R-24S05			5	6000/0	88	10000
WDCV30R-24S09			9	3333/0	88	4700
WDCV30R-24S12			12	2500/0	90	2700
WDCV30R-24S15			15	2000/0	90	1680
WDCV30R-24S24			24	1250/0	90	680
WDCV30R-24D05			±5	±3000/0	86	#2000
WDCV30R-24D12			±12	±1250/0	89	#1250
WDCV30R-24D15			±15	±1000/0	89	#680

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (%,Typ)	Capacitive Load,Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV30R-24D24	24 (9-36)	40	±24	±625/0	88	#470
WDCV30R-48S03	48 (18-75)	50	3.3	6000/0	86	10000
WDCV30R-48S05			5	6000/0	87	10000
WDCV30R-48S12			12	2500/0	88	2700
WDCV30R-48S15			15	2000/0	89	1680
WDCV30R-48S24			24	1250/0	87	680
WDCV30R-48D05			±5	±3000/0	86	#2000
WDCV30R-48D12			±12	±1250/0	89	#1250
WDCV30R-48D15			±15	±1000/0	89	#680

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
3	CTRL	CTRL
4	Trim	-Vo
5	-Vo	COM
6	+Vo	+Vo

NC:Cannot be connected to any external circuit

Dimensions:in mm

Terminal diameter tolerance: ±0.10[±0.004]

Unremarked tolerances: ± 0.50[±0.020]

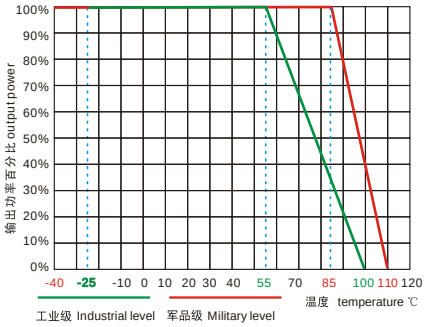
HDC10-12S05 Series

SHINHOM
www.shinhom.com

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range
- ⊙ 转换效率(典型80%) Typical Efficiency 80%
- ⊙ 开关频率 Switching frequency：300KHz±30KHz
- ⊙ 长期短路保护，自动恢复 Short circuit protection,,Self-furbish
- ⊙ 输入与输出高隔离Input-output isolate
- ⊙ PCB 板上直插式安装Board in-line type installs
- ⊙ 金属外壳，输出纹波低 Metal case，Low Output Ripple

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃，Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc Input voltage	10	12	33	W
遥控端 Rremote ON/OFF	无遥控端 Non No remote control terminal			
输入欠压保护 Input undervoltage protection	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection, Self -furbish			

输出特性 Output

输出电压精度 Voltage accuracy		Vo	±1.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo	±0.2%
负载效应 Load regulation	20%~100%额定负载(Rated load)	Vo	±0.5%
纹波及噪声 Ripple and noise	20MHz BM 满载(Full load) Vo≤5.0V,≤50mVp-p；Vo≥48V,≤180mVp-p； Other,≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃 25% of the nominal load step	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	无调节端 Non No adjustment terminal	
启动延迟时间 Start delay time	典型值 Tpical value		

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input, Full load	Vo≤5.0V,80% 典型(Typical)	Vo>5.0V, 82%典型(Typical)
开关频率 Switchingfrequency		300KHz 典型 (Typical)	最大 (max) 250KHz
工作温度 Operatingtemperature	自由空气对流 Free air		-25℃~+55℃
储存温度 Storage temperagure			-40℃~+105℃
最大壳温 Max case temperature			100%℃
相对湿度 Relative humidity			10%~90%
外壳材料(case material)			金属壳 Metal case
隔离电压(Isolation Voltage)	输入与输出 Input-output 500Vdc ≤0.5mA/1min 输入与外壳 Input-case 500Vdc ≤0.5mA/1min		
最小无故障间隔时间 MTBF	2X10^{5}Hrs		

HDC10-12S05 Series

SHINHOM
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产品命名方式 Product Nomination Method

举例 Forexample	H DC 10 — 24 S 05 ① ② ③ ④ ⑤ ⑥		
①	宽压输入：Wide input voltage	④	表示输入电压标称值 nominal value of input voltage
②	电源转换模式 DC-DC: Power conversion mode DC-DC	⑤	S 单路输出 S: Single output
③	表示输出功率大小 Ouput Power	⑥	输出电压大小 Output Voltage

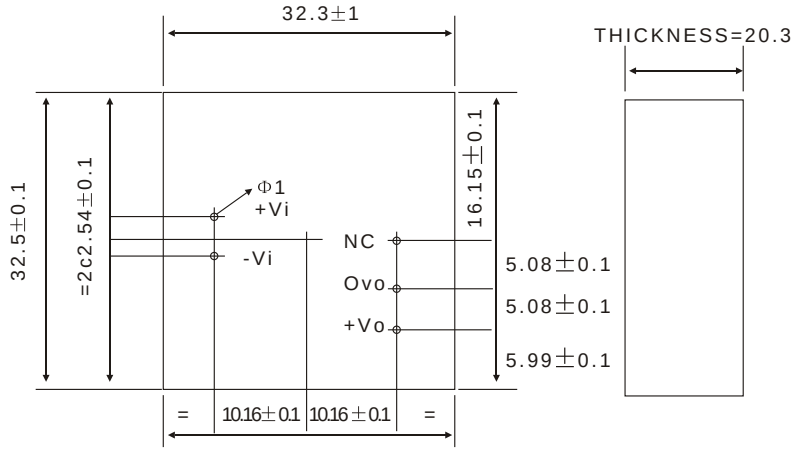
典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mV	V	MA	V	MA
	24V (10-33) v						
HDC10-24S05		5V	2000mA				

注：□代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。

□ Shows the nominal value of input voltag e, due to space limit ations the abov e list is only for some produ cts, If other than a list of products, please contact the Companys sales department.

封装尺寸图 Mechanical Data



NOTE:ALL UNITS ARE IN MILLEMETER (MM)

HDC 150~200 Half brick Series

SHINHOM
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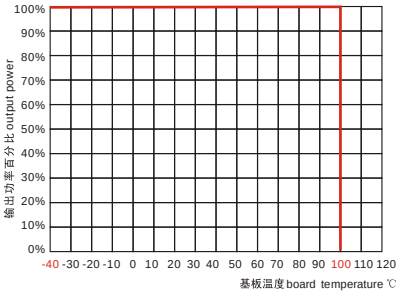
典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range
- ⊙ 转换效率 (典型 90%) Typical Efficiency 90%
- ⊙ 开关频率 Switching frequency：300KHz±30 KHz
- ⊙ 过流、短路保护，自动恢复 Over current/Short circuit protection,,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate (1500Vdc)
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 高功率密度 High power density

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc Input voltage	36	48	72	W 2:1
遥控端 Rremote ON/OFF		低电平遥控 control	高电平或悬空工作 high-voltage or Suspended work	3.5Vdc~+Vin
			低电平或接地关断 low-voltage or ground off	≤0.3Vdc
输入欠压保护 Under voltage protect	低于低端 输入电压保护，自动恢复 Lower than the low-input voltage protection, Self-urbish			

输出特性 Output

输出电压精度 Voltage accuracy		Vo1	±1.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo1	±0.2%
负载效应 Load regulation	20%~100%额定负载(Rated load)	Vo1	±0.5%
纹波及噪声 Ripple and noise	20MHz BM 满载(Full load) Vo≤5.0V,≤50mVp-p；Vo≥48V,≤180mVp-p； Other,≤100mVp-p;		
动态响应 Dynamicresponse	25%的标称负载阶跃 25% of the nominal load step	△Vo1/△t	±3.0/200us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	TRIM	±10%可调 (Adjustable)
启动延迟时间 Start delay time	典型值 Tpical value		≤200mS

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input, Full load	Vo≤5.0V,89% 典型(Typical)	Vo>5.0V, 90%典型(Typical)
开关频率 Switchingfrequency		300KHz 典型 (Typical)	最大 (Max) 330KHz
工作基板温度 Board temperature		自由空气对流 (Free air)	-40℃~+100℃
储存温度 Storage temperagure			-50℃~+125℃
相对湿度 Relative humidity			10%~90%
外壳材料(case material)			铝基板 aluminum baseplate
隔离电压(Isolation Voltage)	输入与输出 Input-output 1500Vdc; I输入与输出与基板 input/output-baseplate 500Vdc		
最小无故障间隔时间(MTBF)	$3x10^5$Hrs		

产品命名方式 Product Nomination Method

举例 Forexample	H DC 150 — 48 S 12 ① ② ③ ④ ⑤ ⑥

HDC 150~200
Half brick Series

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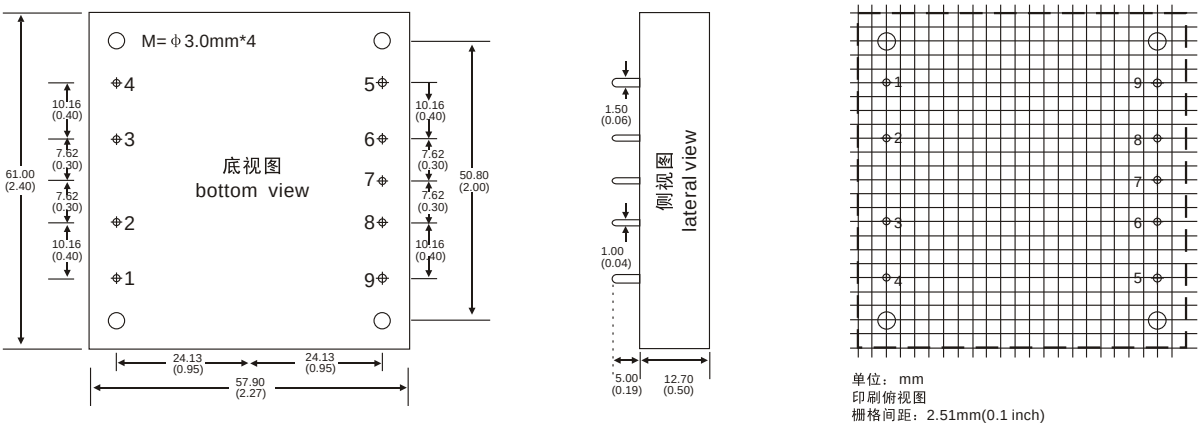
①	宽压输入： Wide input voltage	④	表示输入电压标称值 nominal value of input voltage
②	电源转换模式 DC-DC: Power conversion mode DC-DC	⑤	S 单路输出 S: Single output
③	表示输出功率大小 Ouput Power	⑥	输出电压大小 Output Voltage

典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 （Output voltage / current）					
		VO1		VO2		VO3	
		V	A	V	A	V	A
HDC150-48S12	48 V (36~72V)	12V	12.5A				
HDC200-48S28		28V	7.2A				
HDC200-48S12		12V	16.66A				

注：☐ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
☐ Shows the nominal value of input voltag e,due to space limit ations the abov e list is only for some produ cts,If other than a list of products,please contact the Companys sales department.

封装尺寸图 Mechanical Data



单位： mm
印刷俯视图
栅格间距：2.51mm(0.1 inch)

封装尺寸 Mechanical Data

封装代号 Package Code	L x W x H 单位：mm	封装号 Package No
半砖 Half brick	61.00x57.90x12.70	228240DC

管脚定义 Pin Assignments

管脚号码 Pin Number	1	2	3	4	5	6	7	8	9	
单路（S）S: Single	+Vin	REM	CASE	-Vin	GND	-S	TRIM	+S	+Vout	

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。
*Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

SHINHOM

HDC Series

DC/DC定压隔离1W系列

(DC/DC fixed input 1W)

典型性能 Typical performance

* 特点：定电压输入，隔离非稳定输出，1W功率　Characteristics:Fixed input,isolation,Unregulated Output,1W
* 隔离电压：1000VDC/3000VDC　Isolation voltage: 1000VDC/3000VDC
* 效率：高达80%　Efficiency: up to 80%
* 工作温度：-40℃~+85℃　Working temperature: -40℃~+85℃
* MTBF≥350万小时　MTBF≥35X10^5Hrs
* 符合RoHS指令　In line with RoHS codes
* 线性调节率（输入电压变化±1%时）±1.2%　Line regulation(once input change ±1%)±1.2%
* 负载调节率（10%-100%满载）15%　Load regulation(10%-100% full load)15%
* 纹波/噪声（20MHz 带宽）〈75mVp-p　Ripple and noise(20MHz Band width)<75mVp-p

典型产品列表 Typical product tabulates

型号 TYPE	输出电压范围 Input voltage range	标称输出电压/输出电流（Nominal output voltage/output current）					
		VO1			VO2		
		电压（V） Input voltage	最小电流 Min mA	最大电流 Max mA	电压（V） Input voltage	最小电流 Min mA	最大电流 Max mA
HDC01-□S05S	5V(4.5~5.5VDC)	5V	20mA	200mA			
HDC01-□S09S	12V(10.8~13.2VDC)	9V	11mA	110mA	-5V	-10mA	-100mA
HDC01-□S12S	24V(21.6~26.4VDC)	12V	8mA	83mA	-9V	-5.5mA	-55mA
HDC01-□S15S	48V(43.2~52.8VDC)	15V	6.8mA	68mA	-12V	-4mA	-40mA
HDC01-□S24S		24V	4.2mA	42mA	-15V	-3.3mA	-33mA
HDC01-□D05S		+5V	+10mA	+100mA	-24V	-2.1mA	-21mA
HDC01-□D09S		+9V	+5.5mA	+55mA			
HDC01-□D12S		+12V	+4mA	+40mA			
HDC01-□D15S		+15V	+3.3mA	+33mA			
HDC01-□D24S		+24V	+2.1mA	+21mA			
HDC01-□S05S3		5V	20mA	200mA			
HDC01-□S09S3		9V	11mA	110mA	+5V	+10mA	+100mA
HDC01-□S12S3		12V	8mA	83mA	+9V	+5.5mA	+55mA
HDC01-□S15S3		15V	6.8mA	68mA			
HDC01-□S24S3		24V	4.2mA	42mA			
HDC01-□D05IS		+5V	+10mA	+100mA			
HDC01-□D09IS		+9V	+5.5mA	+55mA			

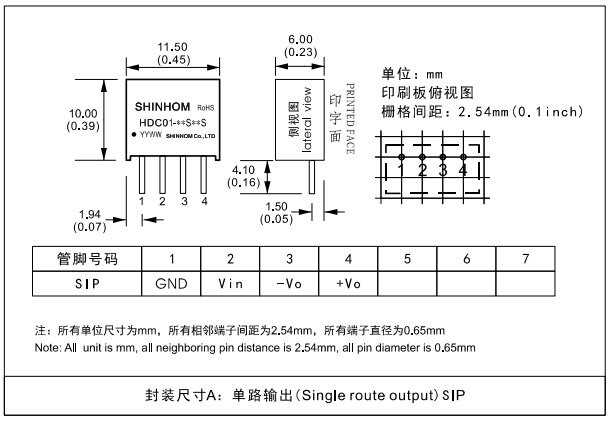
HDC01-□D12IS		+12V	+4mA	+40mA	+12V	+4mA	+40mA
HDC01-□D15IS		+15V	+3.3mA	+33mA	+15V	+3.3mA	+33mA
HDC01-□D24IS		+24V	+2.1mA	+21mA	+24V	+2.1mA	+21mA

注：□代表输入电压标称值，因篇幅有限，以上知识部分产品列表，若需列表以外产品，请与本公司销售部联系。
□Shows the nominal value of input voltage,due to space limitations,the above list is only for some products, if other than a list of products,please contact the company's sales department.

封装尺寸 Mechanical Data

封装代号	LxWxH 单位：mm	封装号
A（单路输出）	11.50x10.00x6.00	
B（单路输出）	19.50x10.00x6.00	
C（两路正负输出）	19.50x10.00x6.00	
D（两路隔离输出）	19.50x10.00x6.00	
E（单路输出3000VDC隔离）	19.50x10.00x6.00	

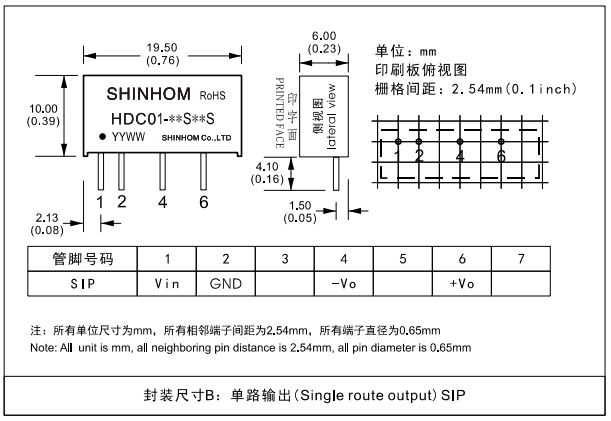
封装尺寸图 Mechanical Data



管脚号码	1	2	3	4	5	6	7
SIP	GND	Vin	-Vo	+Vo			

注：所有单位尺寸为mm，所有相邻端子间距为2.54mm，所有端子直径为0.65mm
Note: All unit is mm, all neighboring pin distance is 2.54mm, all pin diameter is 0.65mm

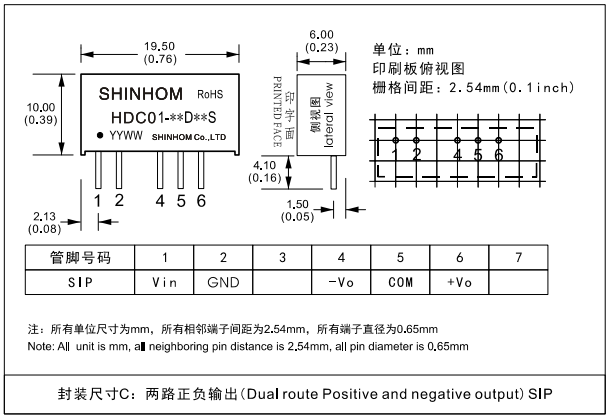
封装尺寸A：单路输出(Single route output) SIP



管脚号码	1	2	3	4	5	6	7
SIP	Vin	GND		-Vo		+Vo	

注：所有单位尺寸为mm，所有相邻端子间距为2.54mm，所有端子直径为0.65mm
Note: All unit is mm, all neighboring pin distance is 2.54mm, all pin diameter is 0.65mm

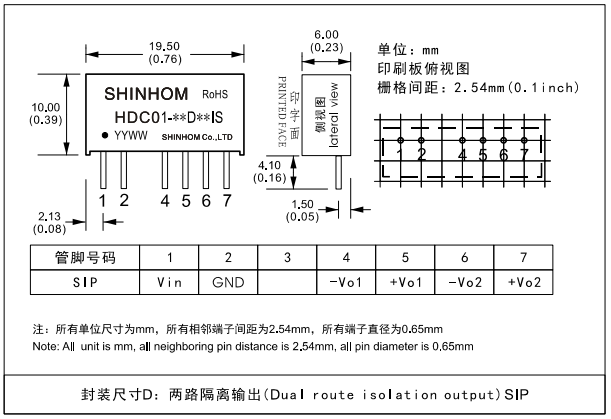
封装尺寸B：单路输出(Single route output) SIP



管脚号码	1	2	3	4	5	6	7
SIP	Vin	GND		-Vo	COM	+Vo	

注：所有单位尺寸为mm，所有相邻端子间距为2.54mm，所有端子直径为0.65mm
Note: All unit is mm, all neighboring pin distance is 2.54mm, all pin diameter is 0.65mm

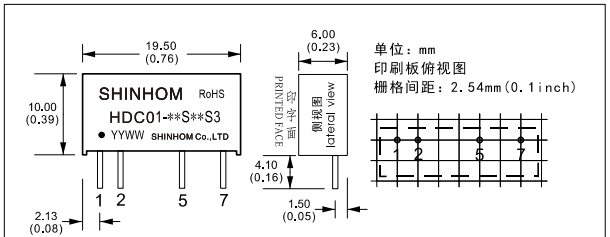
封装尺寸C：两路正负输出(Dual route Positive and negative output) SIP



管脚号码	1	2	3	4	5	6	7
SIP	Vin	GND		-Vo1	+Vo1	-Vo2	+Vo2

注：所有单位尺寸为mm，所有相邻端子间距为2.54mm，所有端子直径为0.65mm
Note: All unit is mm, all neighboring pin distance is 2.54mm, all pin diameter is 0.65mm

封装尺寸D：两路隔离输出(Dual route isolation output) SIP



管脚号码	1	2	3	4	5	6	7
SIP	Vin	GND			-Vo1		+Vo1

注：所有单位尺寸为mm，所有相邻端子间距为2.54mm，所有端子直径为0.65mm
Note: All unit is mm, all neighboring pin distance is 2.54mm, all pin diameter is 0.65mm

封装尺寸E：单路输出3000VDC隔离(Single rout t)

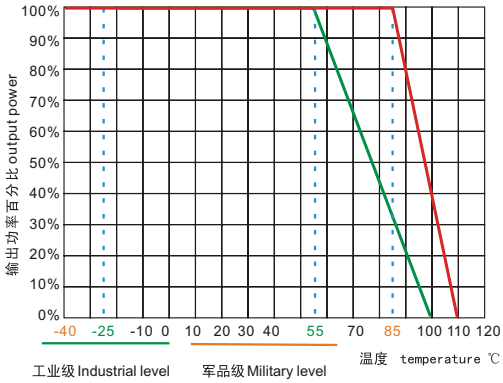
HDC10-15 Series

DC/DC 宽压输入 10–15W (DC/DC wide input 10–15W)

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ⊙ 转换效率 (典型 80%) Typical Efficiency 80%
- ⊙ 开关频率 Switching frequency：300KZh±30 KHz
- ⊙ 长期短路保护，自动恢复 Short circuit protection,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate (500/1000/1500Vdc)
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 金属外壳，输出纹波低 Metal case,Low Output Ripple

温度曲线图 Temper ature graph



技术参数 Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	4.5	5	9	W 2:1
Input voltage	9	12	18	W 2:1
	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	144	W 2:1
	10	12	36	W 4:1
	18	48	72	W 4:1
遥控端 Rremote ON/OFF	无遥控端 Non			
输入欠压保护 Under voltage protect	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection,Self-furbish			

输出特性 Output			
输出电压精度 Voltage accuracy		Vo1,V02	±1.0%,±2.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo1,V02	±0.2%,±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1,V02	±0.5%,±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V,≤50mVp-p；Vo≥48V,≤180mVp-p； Other,≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	无调节端 Non	
启动延迟时间 Start delay time	典型值 Typical value		≤200mS

SHINHOM ELECTRONICS ENTERPRISE CO.,LTD. No.100Yan Ta Northern Road Zip:710054 Tel:0086-29-87851838 Fax:0086-29-87851840

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input,Full load	Vo≤5.0V,75%典型	Vo>5.0V, 80%典型(Typical)
开关频率 Switching frequency		300KHHz 典型(Typical)	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-25℃~+55℃
		军品级 Military leve	-40℃~+85℃
储存温度 Storage temperagure		工业级 Industrial level	-40℃~+105℃
		军品级 Military levell	-55℃~+120℃
最大壳温 Max case temperature		工业级 Industrial level	+100℃
		军品级 Military level	+110℃
相对湿度 Relative humidity			10%~90%
外壳材料 case material	金属壳 Metal case		
隔离电压 Isolation Voltage	输入与输出 500/1000/1500 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^5$Hrs		

产品命名方式 Product Nomination Method

举例	H DC 10 — 48 S 05 J ① ② ③ ④ ⑤ ⑥ ⑦		
①	宽压输入：2：1 Wide input voltage	⑥	输出电压大小 Output Voltage
②	电源转换模式：DC（DC-DC） Dc-dc Con Verter	⑦	J 表示军品级，无表示工业级 J: That Military Level,nothing That Industrial Level
③	表示输出功率大小 Ouput Power		G 表示输入输出非隔离 G: That Input Output Non-isolated
④	表示输入电压标称值 Input voltage		I 表示双路输出隔离 I: That Dual-input Isolation
⑤	S 单路输出，D双路输出， S: Single output, D: dual output,		W 表示超宽范围4:1输入W: That Wide Range Of 4:1 Input

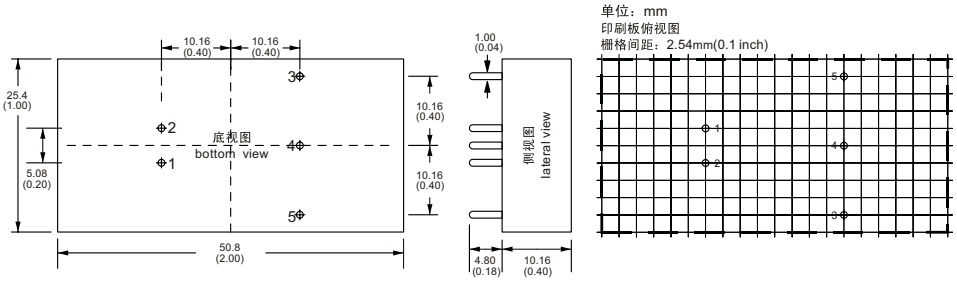
典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 （Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
HDC10-□S3V3	5V (4.5~9V) (不包含 HDC15) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	3.3V	2000mA				
HDC10-□S05		5V	2000mA				
HDC10-□S09		9V	1110mA				
HDC10-□S12		12V	830mA				
HDC10-□S15		15V	660mA				
HDC10-□S24		24V	410mA				
HDC12-□S3V3		3.3V	2400mA				
HDC12-□S05		5V	2400mA				
HDC12-□S09		9V	1330mA				
HDC12-□S12		12V	1000mA				
HDC12-□S15		15V	800mA				
HDC12□S24		24V	500mA				
HDC15-□S05		5V	3000mA				
HDC15-□S12		12V	1200mA				
HDC15-□S15		15V	1000mA				
HDC15-□S24		24V	625mA				

HDC10-□D3V3	5V (4.5~9V) (不包含 HDC15) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	+3.3V	1000mA	-3.3V	1000 mA		
HDC10-□D05		+5V	1000mA	-5V	1000 mA		
HDC10□D09		+9V	220mA	-9V	550 mA		
HDC10-□D12		+12V	410mA	-12V	410 mA		
HDC10-□D15		+15V	330mA	-15V	330 mA		
HDC10-□D24		+42V	210mA	-42V	210 mA		
HDC12-□D3V3		+3.3V	1200mA	-3.3V	1200 mA		
HDC12-□D05		+5V	1200mA	-5V	1200 mA		
HDC12-□D09		+9V	660mA	-9V	660 mA		
HDC12-□D12		+12V	500mA	-12V	500 mA		
HDC12-□D15		+15V	400mA	-15V	400 mA		
HDC12-□D24		+24V	250mA	-24V	250 mA		
HDC15-□D05		+5V	1500mA	-5V	1500 mA		
WDC15-□D09		+9V	830mA	-9V	830 mA		
HDC15-□D12		+12V	600mA	-12V	600 mA		
HDC15-□D15		+15V	500mA	-15V	500 mA		
HDC15-□D24		+24V	310mA	-24V	310 mA		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
□ Shows the nominal value of input voltage,due to space limitations, the abovelist is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
	50.80 x 25.40 x 10.16	200100DC

管脚定义 Pin Assignments

管脚号码	1	2	3	4	5					
单路（S）	-Vin	+Vin	+Vout	NP	GND					
双路（D）	-Vin	+Vin	+Vout1	COM	-Vout2					

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。
*Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

HDC-50~150W Series

SHINHOM
www.shinhom.com

特点 Features

Size 外形尺寸

- 61.0x57.9x12.7mm
  工业标准半砖封装和引脚
- Industry-standard Half-brick Footprint And Pinout
  高效率、高功率密度
- High Efficiency,High Power Density
  基板工作温度100℃
- Substrate Temperature 100 ℃

特征 Features

Size 外形尺寸

- 2.40x2.28x0.50inch
  工业标准半砖封装和足迹
- Industry Standard Half-Brick Package and Footprint
  高效率、高功率密度
- High Efficiency,High Power Density
  100℃底板行动
- 100℃ Baseplate Operation

输入特性 Input

注释（Notes and Conditions）

输入电压范围 (Input Voltage Range)			
标称(Nominal)	48Vdc	36~75Vdc	80Vdc Max
标称(Nominal)	24Vdc	18~36Vdc	40Vdc Max
输入欠压保护 Input Undervoltage Protection	<36Vdc (IN:48Vdc);<18Vdc(IN:24Vdc)		
遥控功能 Remote On/Off Function			
1)正逻辑 Positive Logic	开启(On)	高电平(.5~18Vdc)或悬空 (High Level or Open Circuit)	相对于-Vin(Reference to-Vin)
	关闭(Off)	低电平 (<1.4Vdc) 或与-Vin 短接	Low Level or Connect to -Vin
2)负逻辑 Negative Lotic	开启(On)	低电平(<0.4Vdc)或与-Vin 短接 (Low Level or Connect to-Vin)	相对于-Vin(Reference to -Vin)
	关闭(Off)	高电平(1.4~18Vdc) 或悬空 (High Level or Open Circuit)	

HDC-50~150W Series

SHINHOM
www.shinhom.com

输出特性 Input

注释（Notes and Conditions）

输出电压精度 (Voltage Set-Point Accuracy)	±1%	Vinom and Ionom
输出电压调节范围 (Output Voltage Trim Range)	±10%	
源效应 (Line Regulation)	±0.2%Vo	Vimin~Vimax，Ionom
负载效应 (Load Regulation)	±0.5&Vo	10%~100%Ionom,Vinom
输出过压保护 (Output Overvoltage Protection)	120%~140%Vo	Self Recovering
输出过流保护点 (Current Limit Threshold Range)	110%~150%Io	
短路保护 (Short-Circuit Protection)	连续可恢复 (Continuous,Automatic Recovery)	
瞬态响应 (Dynamic Response)		
过冲幅度 (Peak Deviation)	±5%Vo	25%-50%-25% of Ionom
恢复时间 (Settling Time)	200μs	and 50%-75%-50% of Ionom

一般特性 (General)

注释（Notes and Conditions）

温度系数 (Temperature Coefficient)	±0.02%℃	
隔离电压 (Isolation Voltage)		
输入与输出 (Input-Output)	1500Vdc 1min	
输入与外壳 (Input-Case)	1500Vdc 1min	
输出与外壳 (Output-Case)	500Vdc 1min	
工作基板温度 (Operating Baseplate Temperature)	-40℃~=+100℃	
贮存温度 (Storage Temperature)	-40℃~+125℃	
冷却方式 (Cooling)	加装散热器或强制风冷 Attach Heatsink of Forced Convection	
过温保护 (Thermal Shutdown Range)	100℃~110℃	基板温度 (Baseplate Temperature)
平均故障间隔时间 (MTBF)	2X105h	MIL-HDBK-217
重量 (Weight)	80g	

注：除非另有说明，指标一般在标称输入电压、满载和25℃基板温度下测得。
Note：All specifications are typical at nominal input，full load at 25℃ baseplate temperature unless otherwise stated.

HDC-50~150W Series SHINHOM

www.shinhom.com

型号列表(Models)

产品武型号 (1Model Number)	标称输入电压 (Input Voltage) Vdc	标称输出电压 (Output Voltage) Vdc	标称负载 (Output Current) A	额定输出功率 (Output Power) W	效率 (Efficiency) %	输出杂音电压峰峰值 (Ripple and Noise) mVp-p
HDC120-48S09	48	9.0*	13	120	84	200
HDC50-48S12	48	12.0	4.2	50	86	100
HDC100-48S12	48	12.0	8.4	100	85	100
HDC150-48S12	48	12.0	12.5	150	84	100
HDC150-48S12T	48	12.0	12.5	150	90	100
HDC50-48S15	48	15.0	3.3	50	87	100
HDC75-48S15	48	15.0	5	75	87	100
HDC100-48S15	48	15.0	6.67	100	85	100
HDC150-48S15	48	15.0	10	150	85	100
HDC100-48S24	48	24.0	4.2	100	86	200
HDC150-48S24	48	24.0	6.3	150	87	200
HDC150-48S26	48	26.0	5.8	150	87	200
HDC150-48S26A	48	26.0	5.8	150	87	200
HDC50-24S12	24	12.0	4.2	50	85	100
HDC100-24S12	24	12.0	8.4	100	85	100
HDC150-24S12	24	12.0	12.5	150	88	100
HDC50-24S15	24	15.0	3.3	50	85	100
HDC100-24S15	24	15.0	6.67	100	85	100
HDC150-24S15	24	20.0	7.5	150	86	200
HDC50-24S24	24	24.0	2.1	50	86	200
HDC100-24S24	24	24.0	4.2	100	85	200
HDC50-24S28	24	28.0	1.8	50	86	200
HDC50-24S48	24	48.0	1.04	50	86	200
HDC150-24S48	24	48.0	3.1	150	86	300

注：1、负逻辑遥控功能的产品在定货时须在型号中加“L”。如HDC100 - 48S12 为正逻辑遥控功能，要定负逻辑遥控功能的产品型号为HDC100 - L48S12。型号中有后缀“-T”的产品其输出电压调节方式不同。

2、-注：HDC120 - 48S09 的输出电压可以下调到6V。

（Notes：1,The standard product features Remote on/off Positive Logic ,the Negative Logic is optional by adding the big letter `L` to the Model number,for example,HDC100 - L48S12 model number indicates Negative Logic,but HDC100 - 48S12 indicates Positive Logic. Model Numbers with suffix`-T` have different output voltage adjustment.

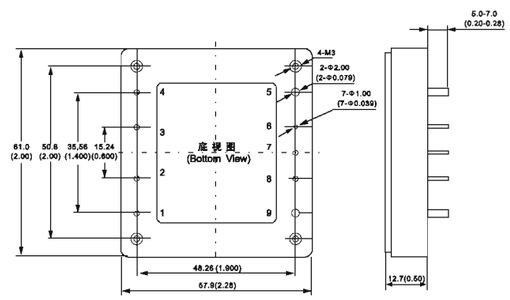
2,*note：Output voltage of HDC120 - 48S09 model number can be adjusted to 6V.）

HDC-50~150W Series SHINHOM

www.shinhom.com

安装尺寸(Mechanical Drawing)

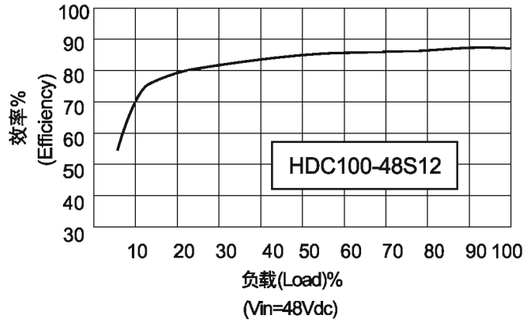
尺寸单位是mm(inches); All Dimensions in mm (inches)



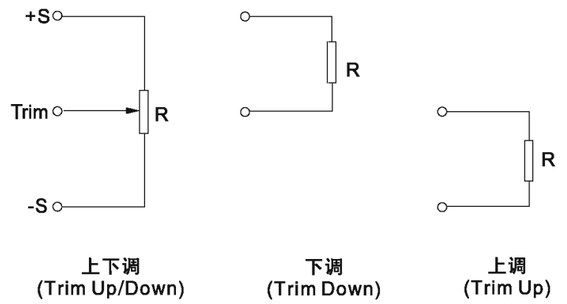
引脚定义(Pin Definition)			
1	+Vin	6	-S
2	Rem	7	Trim
3	FG	8	+S
4	-Vin	9	+Vout
5	-Vout		

未注公差按下表 (Tolerances Unless Otherwise Specified)	
mm	inches
x±0.5	.xx±0.02
xx±0.13	.xxx±0.005

效率负载曲线(Curve of Efficiency vs.Load)



输出电压调节(Output Voltage Trim)



带“–T” (with “–T”)	上下调 (Trim Up/Down)	下调 (Trim Down)	上调 (Trim Up)
	上下调 (Trim Up/Down)	上调 (Trim Up)	下调 (Trim Down)

15-20W

DHC Serise

DC/DC

特 性 Features

- 输入C型滤波 C type input filter
- 满负荷效率可达89% Full load efficiency up to 89%
- 高可靠性，长寿命设计 Design for high reliability,long lifetime
- 优异的限流保护，电源可连续处于短路状态 Excellent current limiting protection, can Continually operate in short circuit state
- 体积小，单双路输出 Small form factor,single output
- 高功率密度 High power density
- 引出脚功能兼容 Pin function compatible

输入特性 Input Characteristic

电压范围 (Voltage Range)	12 VDC(额定值)	9-18 VDC
	24 VDC(额定值)	18-36 VDC
	48 VDC(额定值)	36-72 VDC
	110 VDC(额定值)	80-180 VDC
反压保护 (Reverse Protection)	应用时外接熔丝 (Fuse Outside)	

输出特性 Output Characteristic

电压精度 (Voltage Set-point Accuracy)	±1%
输出电压调整范围 (Output Voltage Range)	±10%
电压调整率（主路） (Line Regulation<main>)	±0.2%
负载调整率（主路） (Load Regulation<main>)	±0.4%
交叉调节率 （主路30%-100%负载，副路80%负载） (Cross Regulation)	±3%
温度变化率 (Temperature Coefficient)	±0.01%/℃
电流限制点 (Output Current Limiting)	120%(Typ)
响应速度 (Dynamic Response)	400us
输出电流 (Output Current)	0.1-8A 任选
输出电压 (Output Voltage)	1.8-48V
功率 (Power)	15-20W

● 注: 交叉调节率仅指多路输出的电源

Note: Cross regulation is only refer to Multi-output.

一般特性 Gereral Characteristic

工作频率 (Switching Frequency)	160-200	KHz
隔离电阻 (Isolation Resistance)	500	MΩ
MTBF	>500000	h
绝缘强度（Isolation Voltage）		
输入-输出 (Input-Output)	>1500	VDC
输入-外壳 (Input-Case)	>1050	VDC
输出-外壳 (Output-Case)	>500	VDC
主路-副路 (Main-Aux)	>500	VDC

环境特性（Environmental Characteristics）

工作壳温 (Case Temperature)	(工业品) -25 - +85℃ (Industry)
	(军 Ⅰ) -40 - +85℃ (Military Ⅰ)
	(军 Ⅱ) -55 - +85℃ (Military Ⅱ)
存储温度 (Storage Temperature)	(工业品) -45 - +85℃ (Industry)
	(军 品) -55 - +85℃ (Military)

热阻特性 Heat Characteristic

冷却方式 (Cooling)	热 阻 (Thermal Resistance)
自然风冷 (Breaze of Nature)	12.45℃/W
0.5M/S	10.37℃/W
1M/S	7.73℃/W
1.5M/S	5.63℃/W
2M/S	4.66℃/W

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DHC Serise

15-20W

DC/DC

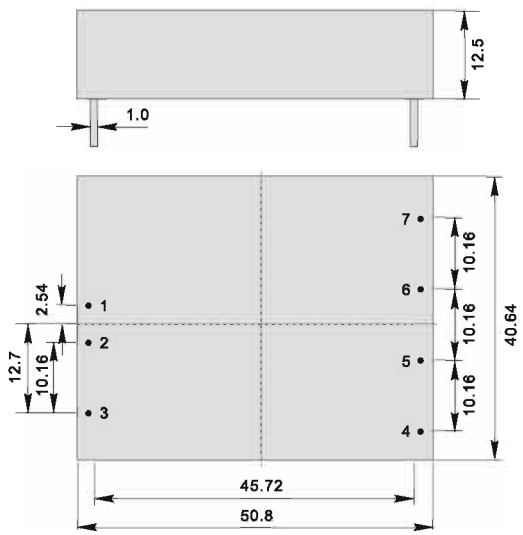
型 号 Models

	型 号 Models	输入电压 (Vdc) Input voltage	输入电压（范围) Input voltage<Range>	输出电压（Vdc) Output voltage	输出电流(A) Output current	纹波pk-pk(mv) Ripple and noise	效率 （Typ) Efficiency
单路（simplex）	HDC7.5-12S2.5	12	9-18	2.5	3	20	71%
	HDC13.2-12S3.3	12	9-18	3.3	4	33	75%
	HDC15-12S05	12	9-18	5.0	3	30	82%
	HDC7.8-24S2.5	24	18-36	2.5	3	25	73%
	HDC13.2-24S3.3	24	18-36	3.3	4	33	78%
	HDC15-24S05	24	18-36	5.0	3	30	82%
	HDC7.5-48S2.5	48	36-72	2.5	3	25	75%
	HDC13.2-48S3.3	48	36-72	3.3	4	33	79%
	HDC15-48S05	48	36-72	5.0	3	30	82%
	HDC15-110S24	110	80-180	24	0.63	200	85%
双路（econoscillator）	HDC10-12D2.5	12	9-18	±2.5	±2	25	78%
	HDC15-12D05	12	9-18	±5	±1.5	30	80%
	HDC15-12D15	12	9-18	±15	±0.5	100	86%
	HDC13.2-24D3.3	24	18-36	±3.3	±2	33	79%
	HDC15-24D05	24	18-36	±5	±1.5	30	80%
	HDC15-24D05+12	24	18-36	5+12	2/0.5	30/80	86%
	HDC13.2-48D3.3	48	36-72	±3.3	±2	33	80%
	HDC15-48D05	48	36-72	±5	±1.5	30	85%
	HDC15-48D15	48	36-72	±15	±0.5	100	89%
	HDC15-110D05	110	80-180	±5	±1.5	30	85%
	HDC20-110D12	110	80-180	±12	±0.83	80	86%
	HDC20-110D24	110	80-180	±24	±0.4	200	86%

■说明：仅列出典型型号，其他型号，请确定功率、输入电压及输出电压，致电我公司。

Only typical models listed, if you need other model,please conforn the power, input voltage and output voltage,then phone us.

外型尺寸图与引脚定义 Mechanical drawing and pin definition



单位（Unit):mm

引脚 Pin	单路 Sing	双路 DOU
1	+Vin	+Vin
2	-Vin	-Vin
3	REM	REM
4	TRIM	TRIM
5	-V0	GND
6	+V0	+V01
7	NC	+V02

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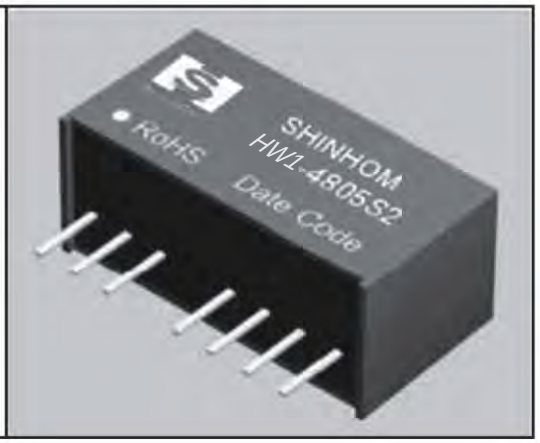
SHAANXI SHINHOM

LEAD FREE
RoHS compliance

HW1-Series

- Products 100% aging
- Includes filter capacitor
- Low ripple, noise
- Wide voltage 2: 1 input
- Can be customized according to user needs
- Net Weight: 4.5g
- I / O isolation voltage 1.5KV or 3.0KV
- In line with the ROHS Directive



Selection Guide

Refers to the nominal value at normal temperature 25 ℃, nominal input voltage, rated output current

Model	Input voltage (Vdc)	Output voltage (Vdc)	Efficiency (%) Typ.	No-load current (mA) Typ	Full load current (mA) Typ	Ripple (mV) Max	Output current (mA) Max	Load Rateofchange (%) Maxl
Single-row (column) single-output 1W Series								
HW1-1205S2	9~18	5.0	76	4	219	50	400	± 0.5
HW1-1212S2		12.0	80	4	209	100	167	± 0.5
HW1-1215S2		15.0	80	4	209	120	134	± 0.5
HW1-2405S2	18~36	5.0	78	4	107	50	400	± 0.5
HW1-2409S2		9.0	80	4	104	80	222	± 0.5
HW1-2412S2		12.0	80	4	104	100	167	± 0.5
HW1-2415S2		15.0	80	4	105	120	134	± 0.5
HW1-4805S2	36~75	5.0	75	4	56	50	400	± 0.5
HW1-4809S2		9.0	77	4	54	80	222	± 0.5
HW1-4812S2		12.0	78	4	54	100	167	± 0.5
HW1-4815S2		15.0	78	4	54	120	134	± 0.5

Notes: Load adjustment rate of output current from no load to full load change in the difference

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SHAANXI SHINHOM

LEAD FREE RoHS compliance

Input / Output Electrical Specifications

Is the typical room temperature 25 ℃. Nominal input voltage. Rated output current measured. Except where noted

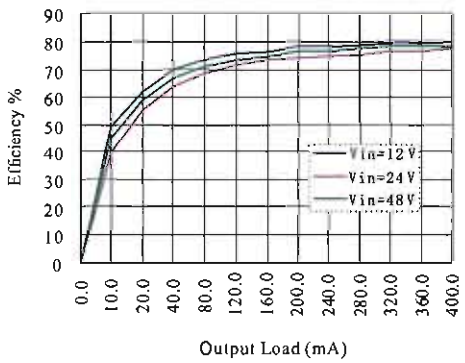
Parameters	Conditions	Min	Median	Max	Units
Input Voltage Range	12V Input Series	4.5	5	9	Vdc
	12V Input Series	9	12	18	
	24V Input Series	18	24	36	
	48V Input Series	36	48	75	
Linear stability of the rate of	Load output	---	---	±0.5	%
The stability of the rate of load	Single-output	---	---	±0.5	
Switching frequency	Basic input	---	150	---	KHz
Temperature drift coefficient		---	±0.01	±0.02	% / ℃
Isolation impedance	500 Vdc	1000	---	---	MΩ

Input / Output Electrical Specifications

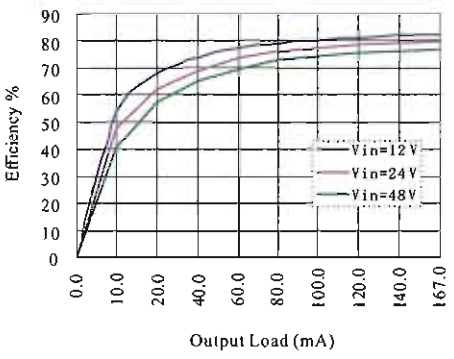
Operating temperature	-25℃~ +71℃	---
Storage temperature	-55℃~ +105℃	---
High Humidity	90 % Max	---
Thermal Methods	Natural heat dissipation	---
Shell Material	Flame-retardant heat-resistant material	---

Efficiency and output load curves

Vout = 5 Vdc



Vout = 12 Vdc



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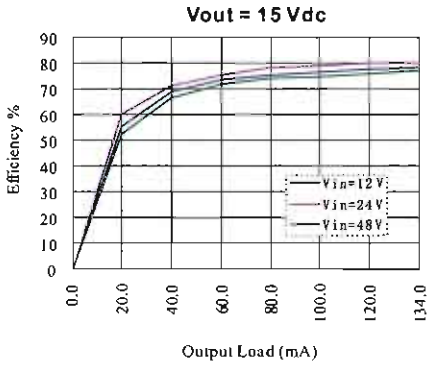
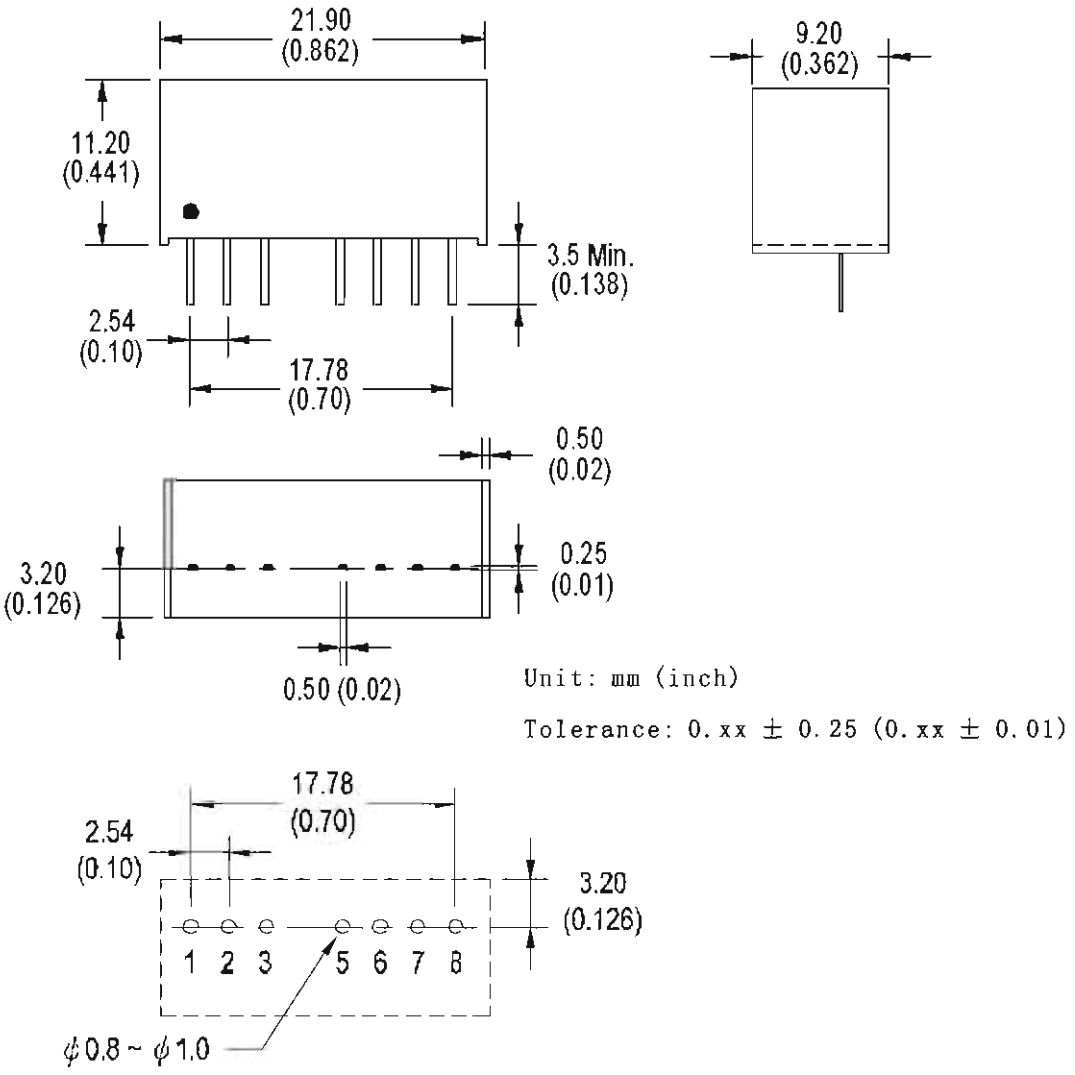


Package Dimensions



Unit: mm (inch)

Tolerance: 0.xx ± 0.25 (0.xx ± 0.01)

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Up to 1200mA | LED Driver

FEATURES:

- High Power LED Driver
- Constant Output Current
- Wide (7:1) Input Voltage Range
- High Efficiency (Up to 96%)
- Remote Control Function
- Dimming Function (0-100%)
- 24 Pin DIP Package
- Operating Temperature -40℃-+85℃

Models Single output

Model	Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Efficiency (%)
LED-3630C	5-36	2-32	300	96
LED-3635C	5-36	2-32	350	96
LED-3650C	5-36	2-32	500	96
LED-3660C	5-36	2-32	600	96
LED-3670C	5-36	2-32	700	96
LED-3680C	5-36	2-32	800	96
LED-3690C	5-36	2-32	900	96
LED-36100C	5-36	2-32	1000	96
LED-36110C	5-36	2-32	1100	96
LED-36120C	5-36	2-32	1200	96

NOTE:AII specifications in this datasheet are measured at an ambient temperature of 25℃,humidity<75%,nominal input voltage and at rated output load unless otherwise specified.

Input Specifications

Parameters	Nominal	Typical	Maximum	Units
Voltage range	24	5-36	36	VDC
On/OffCon trol (AnalogC ontrol) Input voltagera nge(0-1 2Vdc) (Leaveop enifnotuse d)	ON:Openor 0V>V<0.6V			
	OFF:0.6V>V<5V(1mA Max)			
DimmingC ontrol (Digital Control)	Max PWM Frequency (10%-90%) 200Hz			
DimmingC ontrol (AnalogC ontrol) Input voltagera nge(0-1 2Vdc)* (Leavepo enifnotuse d)	0.56V (1mA max) Analog Voltage (0%~100%) models: LED-3630C, LED-3635C, LED-3650C			
	0-6.5V (1mAmax)AnalogVoltage(0%~10 0%)models:LED-3660 C, LED-3670C, LED-3680C, LED-3690C, LED-36100C, LED-36110C, LED-36120C			

*NOTE:Exceeding 12Vdc on Dimming Control pin will damage the converter.

Output Specifications

Parameters	Conditions	Typical	Maximum	Units
Current accuracy		±2		%
Short Circuit protection	Regulated at the rated current for each model			
Output Open Protection	No Load			
Max load capacitance			100	μF
Ripple & Noise	20MHz Bandwidth	120		mV P-P

Up to 1200mA | LED Driver

General Specifications

Parameters	Conditions	Typical	Maximum	Units
Switching frequency	100% load	260		Khz
Operating temperature	-40 to +85			℃
Storage temperature		-40 to +125		℃
Max Case temperature			100	℃
Cooling	Free Air Convection			
Thermal Impedance		13.17		℃/ W
Humidity			95	% RH
Case material	Non-Conductive Black Plastic			

General Specifications (continued)

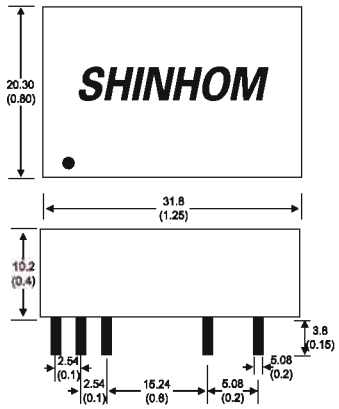
Parameters	Conditions	Typical	Maximum	Units
Potting material	Epoxy (Flammability UL94V-0)			
Weight		12		g
Dimensions (LxWxH)	1.25x0.80x0.40 inches		31.80x20.30x10.20 mm	

Pin Out Specifications

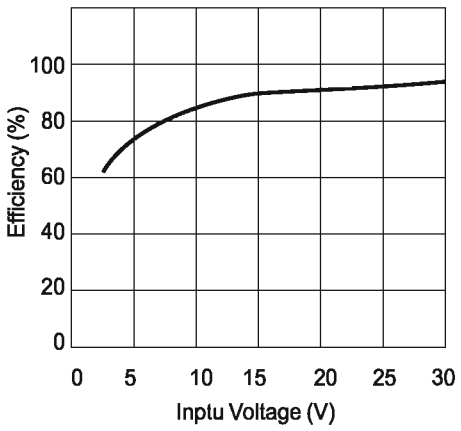
Pin	Single
1	Remote On/Off
2	-Vin
3	-Vin
9	NC
11	NC
14	LED+
16	LED-
22	+Vin
23	+Vin
24	DIM

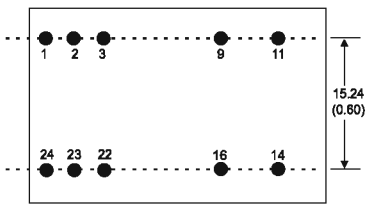
NC: Not Connected

Dimensions



Efficiency vs Input Voltage

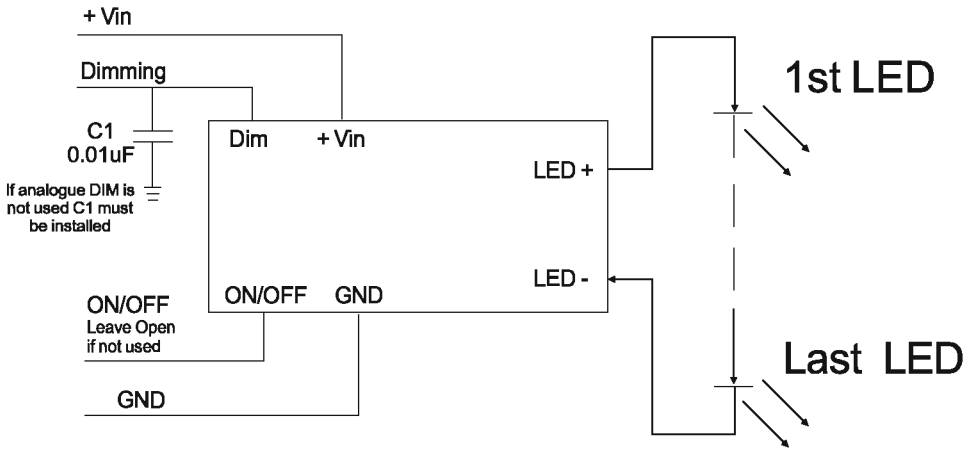




Mechanical Tolerances

Case Tolerance ±0.25mm Or ±0.01 Inches
Pin Tolerance ± 0.05 Or ± 0.002

Application Circuit

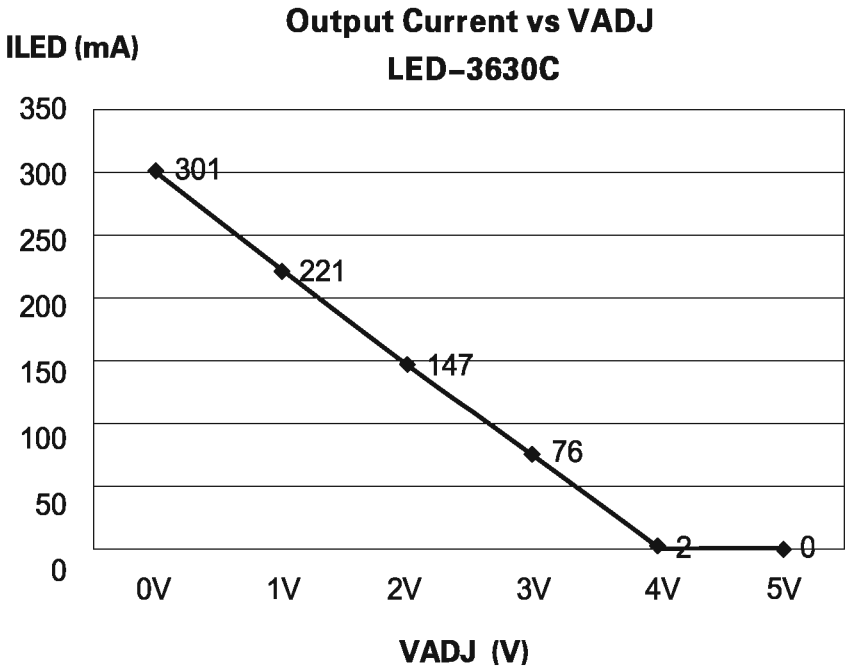


Note: The relation between input and output voltage for LED-C LED Driver step-down converter series is:

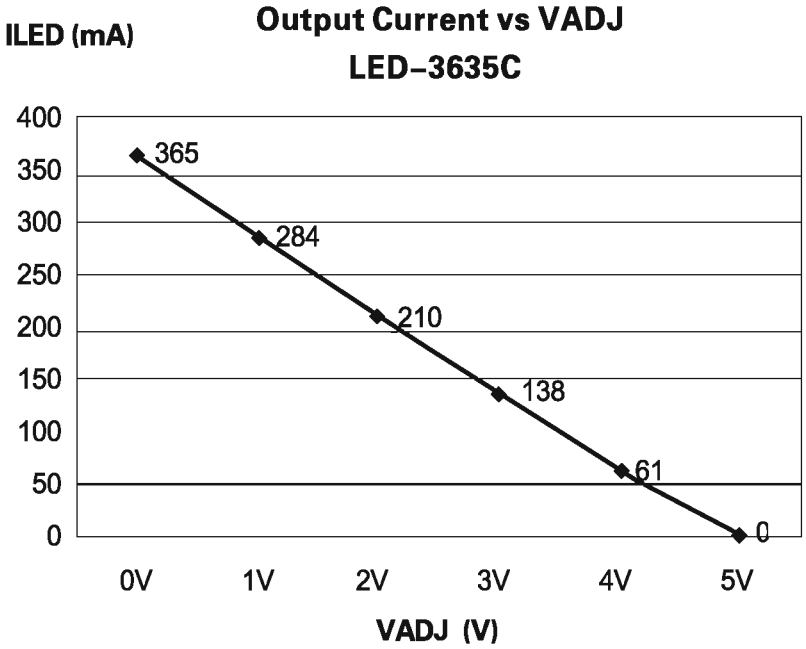
Vin-4V ⩾ Vout ⩾ Total LED voltage

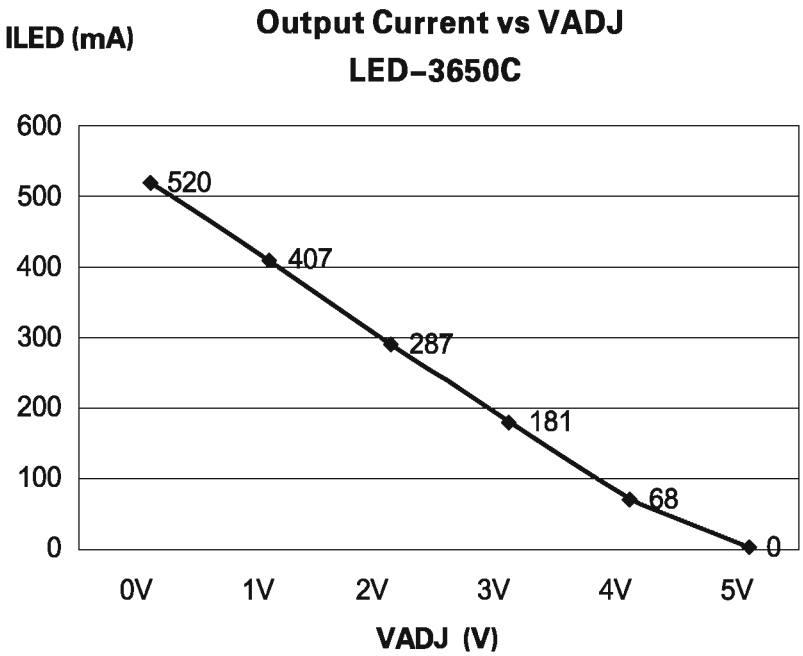
Vout / LED voltage = LED quantity

Output Current Versus Dimming Voltage

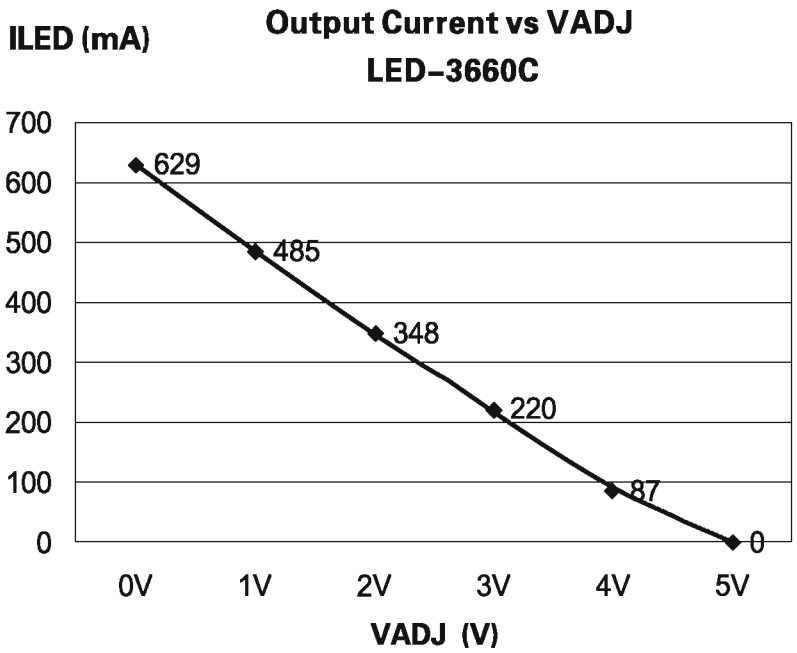


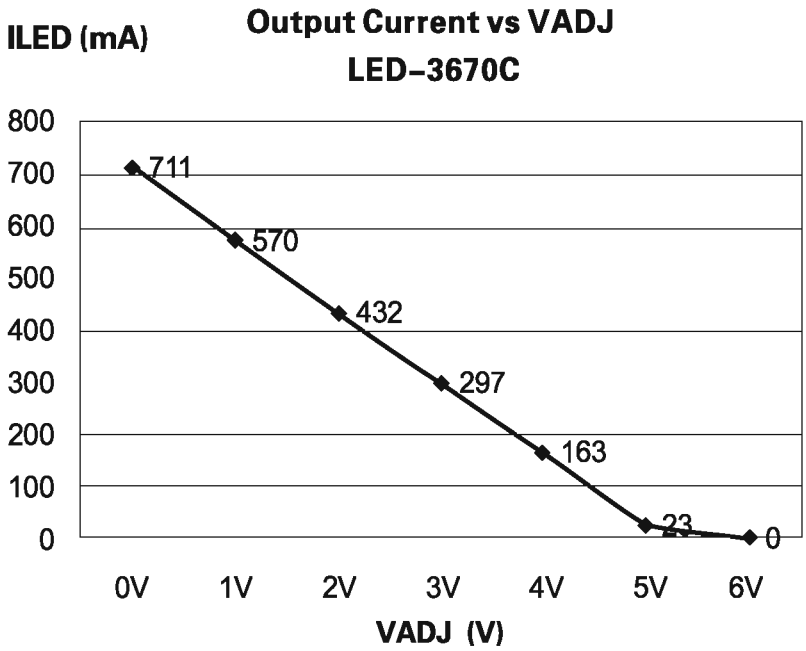
Output Current vs Dimming Voltage (continued)



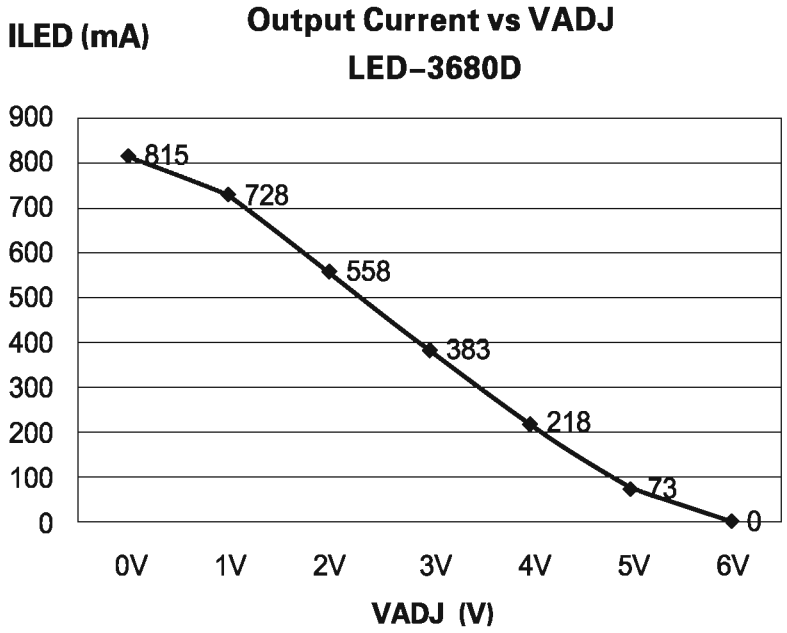


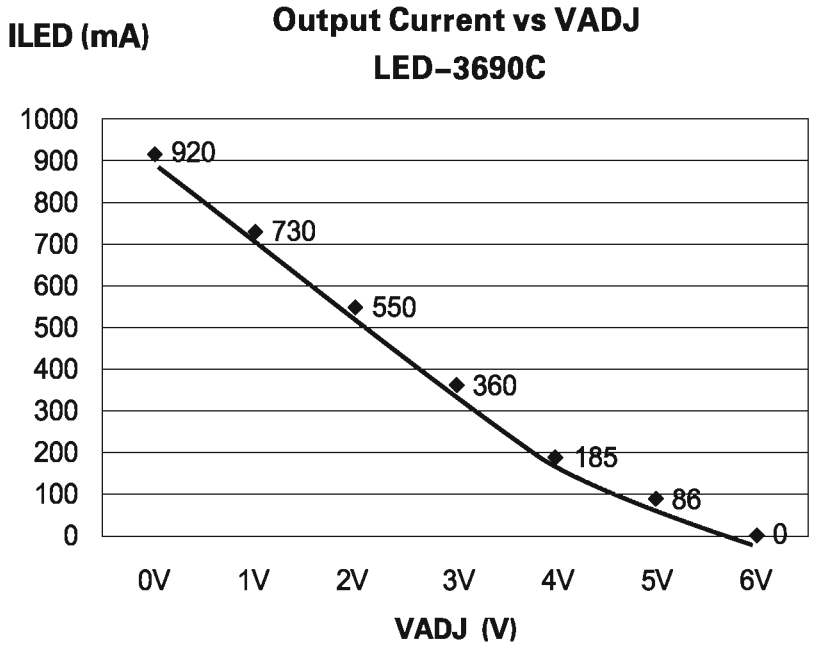
Output Current vs Dimming Voltage (continued)



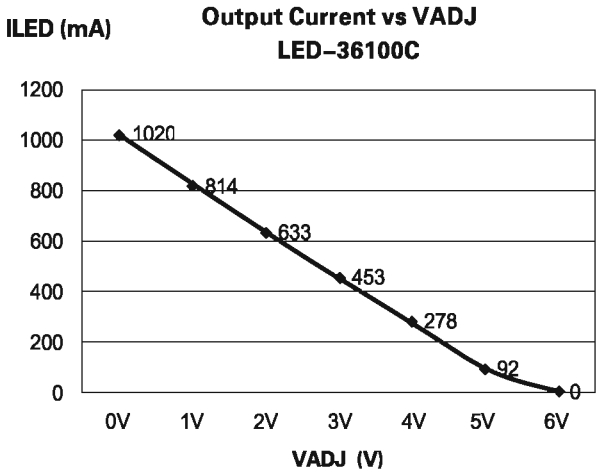


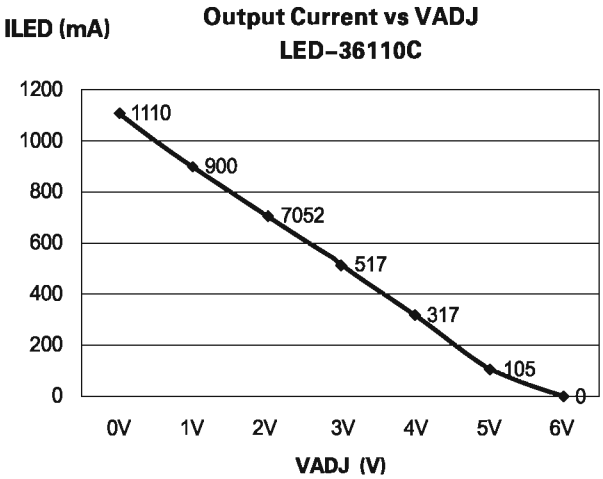
Output Current vs Dimming Voltage (continued)



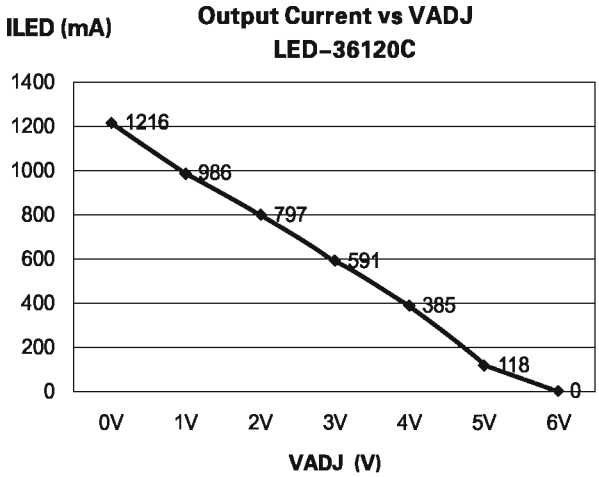


Output Current vs Dimming Voltage (continued)





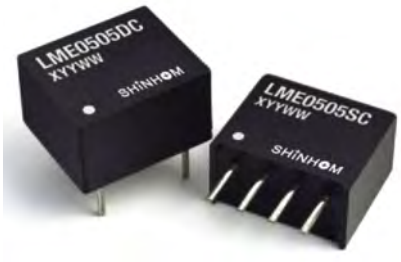
Output Current vs Dimming Voltage (continued)



NOTE: 1.Datasheets are updated as needed and as such,specifications are subject to change without notice, Cnce printed or downloaded,datasheets are no longer controlled by Aimtec; refer to www.aimtec.com for the most current product specifications. **2**.Product labels shown, including safety agency certifications on labels,may vary based on the date manufactured. **3**.mechanical drawings and specifications are for reference only. **4**.All specifications are measured at an ambient temperature of 25℃,humidity<75%, nominal input voltage and at raged output load unless otherwise specified.**5**.Aimtec may not have conducted destructive testing or chemical analysis on all internal components and chemicals at the time of publishing this document. CAS numbers and other limited information are considered proprietary and rnay not be available for release. **6**.This poduct is not designed for use in critical life support systems,equipment used in hazardous environments,nuclear control systems or other such applications which necessitate specific safety and regulatory standards other the ones listed in this datasheet.

LME SERIES

Isolated 250mW Single Output DC/DC Converters



FEATURES

- RoHS compliant
- Single output rail
- 1kVDC isolation
- High efficiency for low power applications
- SIP & DIP package styles
- Power density 0.36W/cm^3
- UL 94V-0 package material
- Footprint from 0.69cm^2
- 5V & 12V input
- 5V, 9V, 12V & 15V output
- No heatsink required
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.2 million hours
- Custom solutions available
- Pin compatible with NKE, NME & NML series
- PCB mounting

DESCRIPTION

The LME series of DC/DC converters are optimised for low-power operation. They are ideally suited to generating a negative supply where only a positive rail exists.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	V	V	mA	%	pF	kHrs	
LME0505DC	5	5	50	70	29	2279	DIP
LME0509DC	5	9	28	75	37	1139	
LME0512DC	5	12	21	75	41	624	
LME0515DC	5	15	16	75	40	357	
LME0505SC	5	5	50	70	29	2279	SIP
LME0509SC	5	9	28	75	37	1139	
LME0512SC	5	12	21	75	41	624	
LME0515SC	5	15	16	75	40	357	
LME1205DC	12	5	50	70	38	536	DIP
LME1209DC	12	9	28	75	40	434	
LME1212DC	12	12	21	75	43	330	
LME1215DC	12	15	16	75	45	237	
LME1205SC	12	5	50	70	38	536	SIP
LME1209SC	12	9	28	75	40	434	
LME1212SC	12	12	21	75	43	330	
LME1215SC	12	15	16	75	45	237	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5.0	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=0°C to 70°C			0.25	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, 5V output types			15	%
	10% load to rated load, all other types			10	
Ripple and Noise	BW=DC to 20MHz, all output types			100	mV p-p

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	1			GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		100		kHz

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, LME05 types	7V
Input voltage V_{IN}, LME12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating curve.
3. Supply voltage must be disconnected at the end of the short circuit duration.

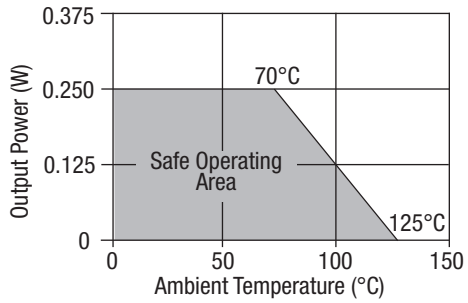
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

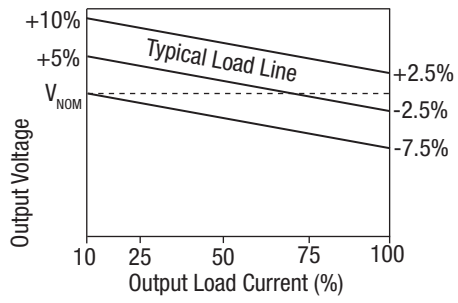
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Storage		-55		130	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies LME series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the LME series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

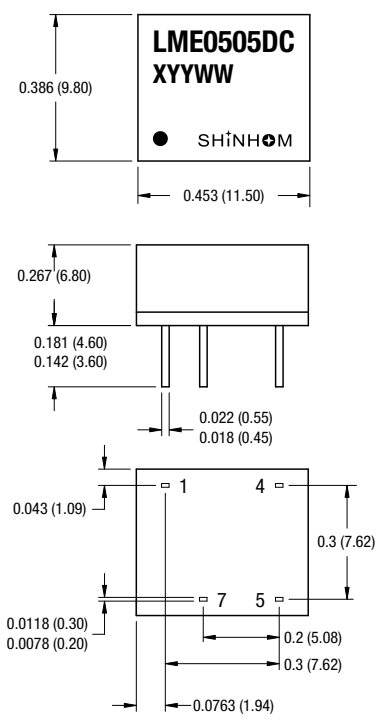
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The LME series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

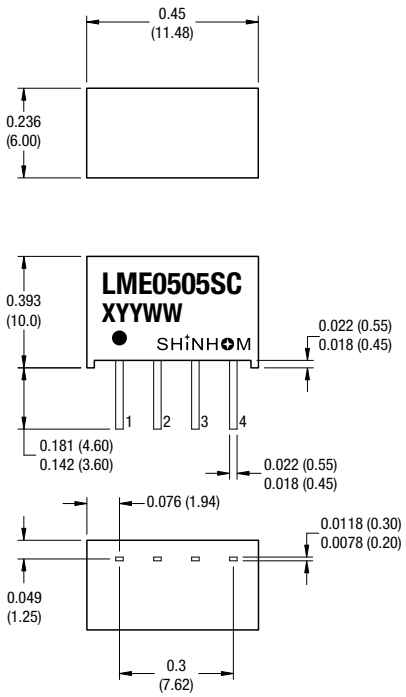
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 1.30g (SIP) 1.48g (DIP)

PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	$-V_{IN}$
4	$+V_{IN}$
5	$+V_{OUT}$
7	$-V_{OUT}$

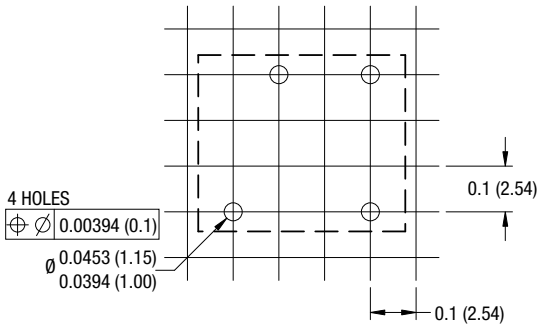
PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	$-V_{IN}$
2	$+V_{IN}$
3	$-V_{OUT}$
4	$+V_{OUT}$

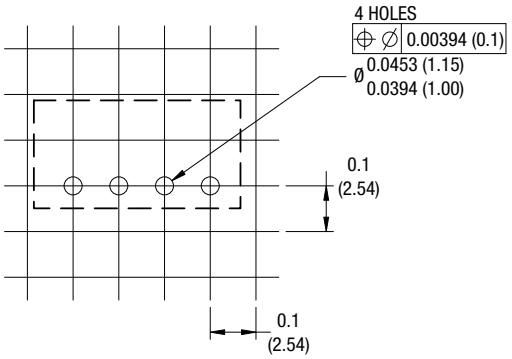
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package



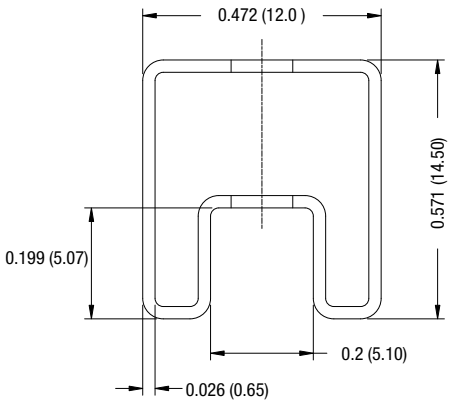
4 Pin SIP Package



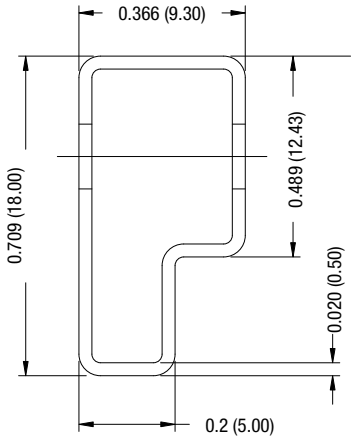
Unless otherwise stated all dimensions in inches (mm ±0.5mm).

TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm ±0.5mm).
Tube length (8 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (4 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 35

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

SHINHOM

DC/DC Converters

MDC 05 Series,6 Watt

Features

- Wide 2 :1 Input Range
- Full SMD -Design
- High Efficiency up to 86 %
- Extended Operating Temperature
- Range - 40℃ to 85℃
- I / O- isolation 1′ 500 VDC
- Indefinite short- Circuit Protection
- Input Filter meets EN 55022,Class A and
- FCC,Level A without external Components
- Shielded Metal Case with insulated
- Baseplate
- 24 - pin DIP with Industry Standard Pinout
- High Reliability,MTBF >1Mio.h
- 3 Year Product Warranty

The TEN 5 Series is a range of DC / DC - converter modules with wide input range of 2:1. State of the art SMD - technology guarantees a product with very high Reliability and good cost/performance ratio.High efficiency allows an operating temperature range of - 40℃ to + 85℃.I/O - isolation of 1′ 500 VDC together with conducted noise compliance to EN 55022 - A and FCC,level A makes these converters ideal for a wide range of applications in communications, mobile battery powered equipments and industrial systems.

Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
MDC 5-0510	4.5 - 7 VDC	3.3 VDC	1200 mA	75%
MDC 5-0511		5 VDC	1000mA	79%
MDC5-0512		12 VDC	500mA	82%
MDC 5-0513		15 VDC	400mA	82%
MDC 5-0521		± 5 VDC	± 500 mA	79%
MDC 5-0522		± 12 VDC	± 250 mA	82%
MDC 5-0523		± 15 VDC	± 200 mA	82%
MDC 5-1210	9 - 18 VDC	3.3 VDC	1200 mA	77%
MDC 5-1211		5 VDC	1000 mA	81%
MDC 5-1212		12 VDC	500 mA	84%
MDC 5-1213		15 VDC	400 mA	84%
MDC 5-1221		± 5 VDC	± 500 mA	81%
MDC 5-1222		± 12 VDC	± 250 mA	84%
MDC 5-1223		± 15 VDC	± 200 mA	84%
MDC 5-2410	18 - 36 VDC	3.3 VDC	1200 mA	79%
MDC 5-2411		5 VDC	1000 mA	83%
MDC 5-2412		12 VDC	500 mA	86%
MDC5-2413		15 VDC	400 mA	86%
MDC 5-2421		± 5 VDC	± 500 mA	83%
MDC 5-2422		± 12 VDC	± 250 mA	86%
MDC 5-2423		± 15 VDC	± 200 mA	86%
MDC 5-4810	36 - 75 VDC	3.3 VDC	1200 mA	79%
MDC 5-4811		5 VDC	1000 mA	83%
MDC 5-4812		12 VDC	500 mA	86%
MDC 5-4813		15 VDC	400 mA	86%
MDC 5-4821		± 5 VDC	± 500 mA	83%
MDC 5-4822		± 12 VDC	± 250 mA	86%
MDC 5-4823		± 15 VDC	± 200 mA	86%

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SHINHOM

DC/DC Converters

MDC 05 Series,6 Watt

Input Specifications

Input current no load /full load	5 Vin models:	50mA / 1460 mA typ.
	12 Vin models:	20m A / 590 mA typ.
	24 Vin models:	5mA / 290 mA typ.
	48 Vin models:	3mA / 145 mA typ.
Start-up voltage / under voltage shut down	5 Vin models:	4.4VDC / 4.0 VDC
	12 Vin models:	8.0VDC / 8.0 VDC
	24 Vin models:	16.0VDC / 16.0 VDC
	48 Vin models:	32.0VDC / 32.0 VDC
Surge voltage (1 sec.max.)	5 Vin models:	10 V max.
	12 Vin models:	25 V max.
	24 Vin models:	50 V max.
	48 Vin models:	100 V max.
Reverse voltage protection		1.0 A max.
Conducted noise (input)		EN 55022 level A , FCC part 15, level A

Output Specifications

Voltage set accuracy		1.0%
Regulation	– Input variation Vin min.to Vin max.	0.3% max.
	– Load variation 20 – 100%	
	single output models:	1.0% max.
	dual output models balanced load:	2.0% max.
	dual output models unbalanced load:	5.0% max.
Ripple and noise (20 Mh z Bandwidth)		50 mVpk-pk max.
Temperature coefficient		±0.02% /K
Output current limitation		>120% of Iout max.,constant current
Short-circuit protection		indefinite (automatic recovery)
Capacitive load	single output models:	6800 μF max.
	dual output models:	1000 μF max. (Each output)

General Specifications

Temperature ranges	– Operating	- 40 ℃…+ 85 ℃
	– Case temperature	+ 100 ℃ max.
	– Storage	- 55 ℃…+125 ℃
Derating		3.5%/K above 70 ℃
Humidity (non condensing)		95% rel H max.
Reliability,calculated MTBF (MIL-HDBK-217E ground benign)		>1 Mio.h @ + 25 ℃
Isolation voltage (60 sec)	– Input/Output	1′ 500 VDC
Isolation capacity	– Input/Output	380 pF typ.
Isolation resistance	– Input/Output	> 1′ 000 M Ohm (500 VDC)
Switching frequecy		300 kHz typ. (Pulse frequency modulation PFM)
Safety standards		UL 60950-1,IEC 60950-1,EN 60950-1
Safety approval		CSA File No.226037

All specifications valid at nominal input voltage,full load and after warm-up time unless otherwise stated

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SHINHOM

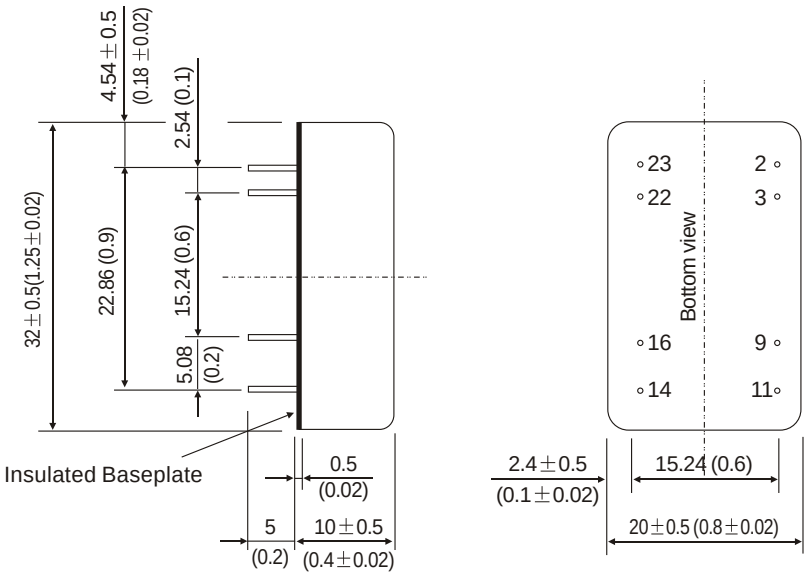
DC/DC Converters

MDC 05 Series,6 Watt

Physical Specifications

Case material	steel,nickel plated
Baseplate material	non conductive Fr4
Potting material	epoxy (UL 94V-0 rated)
Weight	14g (0.55 oz)
Soldering temperature	max. 265 ℃/ 10 sec.

Outline Dimensions mm (inches)



Pin diameter Φ0.5±0.05 （0.02±0.002）
Tolerances ±0.5(0.02)

Pin-Out

Pin	Single	Dual
2	-Vin (GND)	-Vin (GND)
3	-Vin (GND)	-Vin (GND)
9	No pin	Common
11	No com.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

Specifications can be changed any time without notice

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NDL SERIES

Isolated 2W Wide Input Single Output DC/DC Converters

FEATURES

- RoHS compliant
- 2:1 wide range voltage input
- Continuous short circuit protection with current foldback
- Operating temperature range -40ºC to 85ºC
- 0.75% regulation
- 1kVDC Isolation
- Efficiency to 83%
- Power density 0.9W/cm^3
- 5V, 12V, 24V & 48V nominal input
- 5V, 9V, 12V & 15V output
- No electrolytic capacitors
- Fully encapsulated
- External control
- Low noise
- Fully encapsulated

DESCRIPTION

The NDL series is a range of high performance miniature DC/DC converters having regulated outputs over the wide temperature range of -40ºC to 85ºC. The input voltage range is 2:1 with the output power at 2 watts and the input to output isolation is 1kVDC. Continuous short circuit protection, external control and extremely small SIP packaging provide state of the art functionality. Nominal input voltages of 5, 12, 24 and 48V with output voltages of 5,9,12 and 15V are available as standard with custom parts on request. The plastic case is rated to UL94V-0 with encapsulant to UL94V-1.

SELECTION GUIDE

Order Code	Input Voltage	Rated Output Voltage	Output Current[1]		Input Current[2]	Efficiency	Isolation Capacitance	MTTF[4]
			Min Load[3]	Full Load	Full Load			
	V (nom.)	V	mA	mA	mA	%	pF	kHrs
NDL0505SC	5	5	100	400	606	66	26	2015
NDL0509SC	5	9	55	222	558	71	27	1998
NDL0512SC	5	12	42	167	559	71	26	1980
NDL0515SC	5	15	33	134	549	73	27	1965
NDL1205SC	12	5	100	400	228	73	39	1994
NDL1209SC	12	9	55	222	211	79	38	1981
NDL1212SC	12	12	42	167	208	80	47	1961
NDL1215SC	12	15	33	134	206	81	47	1947
NDL2405SC	24	5	100	400	112	74	37	1722
NDL2409SC	24	9	55	222	102	81	40	1711
NDL2412SC	24	12	42	167	100	83	51	1696
NDL2415SC	24	15	33	134	100	83	58	1685
NDL4805SC	48	5	100	400	57	73	39	1719
NDL4809SC	48	9	55	222	52	80	40	1709
NDL4812SC	48	12	42	167	51	81	53	1694
NDL4815SC	48	15	33	134	51	82	65	1683

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	All NDL05 types	4.5	5	9	VDC
	All NDL12 types	9	12	18	
	All NDL24 types	18	24	36	
	All NDL48 types	36	48	72	
Reflected ripple current	All NDL05 types with 100µF at input			250	mA p-p
	All NDL12 types with 100µF at input			150	
	All NDL24 types with 10µF at input		300	380	
	All NDL48 types with 10µF at input		140	170	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	Continuous
Lead temperature 1.5mm from case for 10 seconds	300°C
Control pin input current	10mA
Input voltage 05 types	10V
Input voltage 12 types	20V
Input voltage 24 types	40V
Input voltage 48 types	80V

1. Refer to power derating graph for operating of 5V input types at 4.5 to 6V.
2. Measured at full load with external input/output capacitors.
3. A lower load condition is entirely safe but higher levels or output ripple will be experienced.
4. Calculated using MIL-HDBK-217F with nominal input voltage at full load.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS					
Parameter	Conditions [1]		TYP.	MAX.	Units
Voltage set point accuracy	All NDL05/12 input types with external input/output capacitors		±1	±3	%
	All NDL24/48 input types with external input/output capacitors		±2	±5	
Line regulation	All NDL05/12 input types, low line to high line with external input/output capacitors		0.05	0.5	%
	All NDL24/48 input types, low line to high line with external input/output capacitors		0.04	0.4	
Load regulation	All NDL05/12 input types, minimum load to rated load with external input/output capacitors		0.2	0.75	%
	All NDL24/48 input types, minimum load to rated load with external input/output capacitors		0.2	0.75	
Ripple	B/W = 20MHz to 300kHz with external input/output capacitors		5	10	mV rms
Noise	All NDL05 input types, B/W =DC to 100MHz with external input/output capacitors		20	35	mV p-p
	All NDL12 input types, B/W =DC to 100MHz with external input/output capacitors		110	170	
	All NDL24/48 input types, B/W =DC to 100MHz with external input/output capacitors		50	100	
Shutdown power	$+V_{IN}$ nominal		2.8		mW

ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			V_{DC}
Resistance	V_{ISO} = 1000VDC	1			GΩ

GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Control pin (CTRL) input current	Please refer to control pin application note	6.0	1.0	15	mA
Switching frequency	MAX. rated load to MIN. rated load, V_{IN} MIN. to V_{IN}. MAX.	100		600	kHz

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Operation		-40		85	ºC
Storage		-50		130	
Cooling	Free air convection				

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NDL series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NDL series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NDL series has an EI ferrite core, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

1. Refer to recommended test circuit for external input/output capacitors.

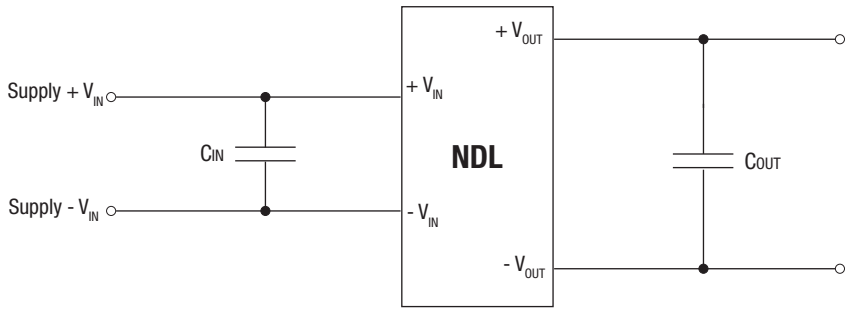
APPLICATION NOTES

External capacitance

Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

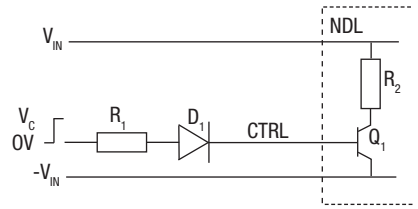
	Value	
Input Voltage (V)	C_{IN}	C_{OUT}
5 & 12	100µF, 25V	100µF, 25V
24 & 48	10µF, 200V	100µF, 25V

Test circuit



Control Pin

The NDL converters have a shutdown feature which enables the user to put the converter into a low power state. The control pin connects directly to the base of an internal transistor, and the switch off mechanism for the NDL works by forward biasing this NPN transistor. If the pin is left open (high impedance), the converter will be ON (there is no allowed low state for this pin), but once a control voltage is applied with sufficient drive current, the converter will be switched OFF. A suitable application circuit is shown below.



D_1 (e.g. 1N4001) is required to provide high impedence when the signal is low. From the NDL specification, the drive current to operate this function is recommended to be 6mA, and hence the value of R_1 can be derived as follows:

$$R_1 = \frac{V_C - V_D - V_Q}{I_C}$$

Assuming V_C=5V, V_D=0.7V and V_Q=1V:

$$R_1 = \frac{5 - 0.7 - 1.0}{6 \times 10^{-3}} = 550\Omega$$

Pin 8 (C_S)

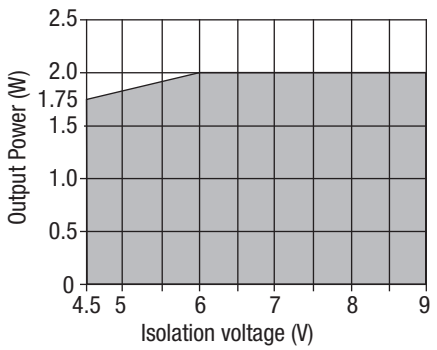
This pin provides a connection point to the main reservoir capacitor. Additional capacitance can be added from this pin to pin 7. Any lower ESR capacitor will remove ripple and noise to some degree. The benefit of this access point over simple additional output capacitance is that it precedes the output filter inductor. Maximum values of external capacitance will be dependent on the output voltage, the loading of the converter and the desired ripple figure. Values can be up to 100µF.

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

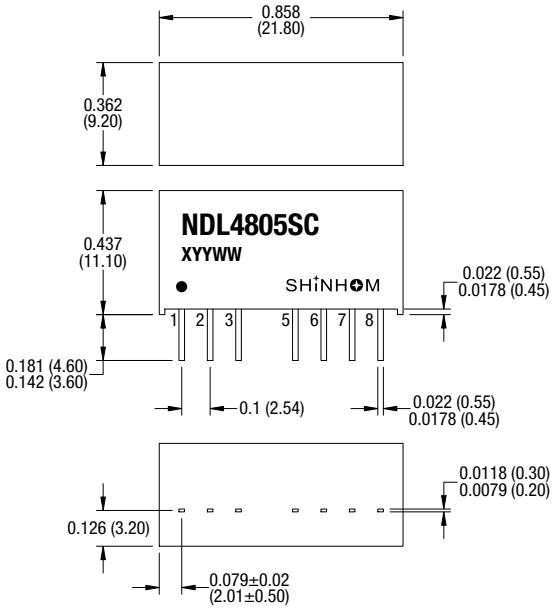
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

NDL05 POWER DERATING CURVE



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



Weight: 5.0g

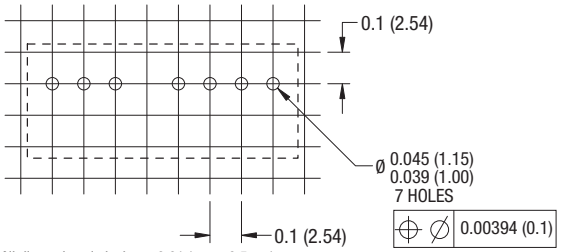
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

PIN CONNECTIONS

Pin	Function
1	$-V_{IN}$
2	$+V_{IN}$
3	CTRL
5*	IC
6	$+V_{OUT}$
7	$-V_{OUT}$
8	C_S

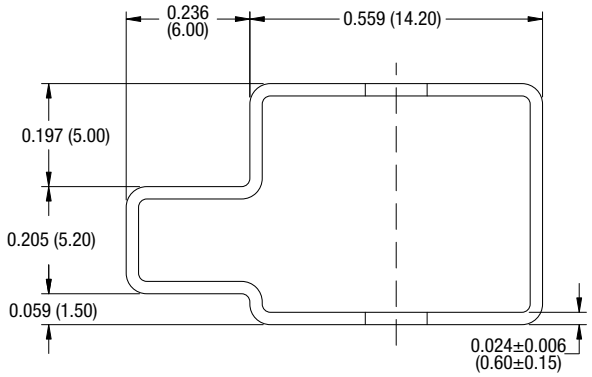
* This pin is internally connected, and must have no external connection and is used for mechanical reasons. External connection to anything will result in converter failure.

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.01 (mm ±0.5mm).

TUBE OUTLINE DIMENSIONS

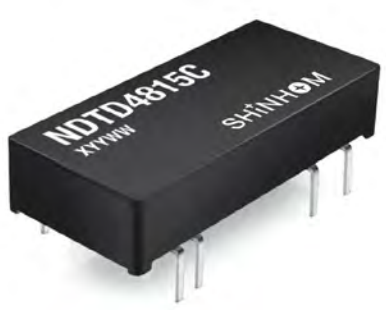


All dimensions in inches ±0.01 (mm ±0.5mm).
Tube length : 20.47±0.079 (520mm ±2mm).

Tube Quantity : 23

NDTD SERIES

Isolated 3W Wide Input Dual Output DC/DC Converters



FEATURES

- RoHS compliant
- Industry standard footprint
- Power density 0.90W/cm^3
- 2:1 wide input range
- Dual isolated output
- Short circuit protection
- Low profile 24 pin case
- Operating temperature range -40ºC to 85ºC
- Load and line regulation <1% on both outputs
- No heatsink required
- Footprint 4.73cm^2
- 1kVDC isolation
- 5V, 12V, 24V & 48V Input
- 3.3V, 5V, 12V & 15V Output
- Internal SMD construction
- Fully encapsulated

DESCRIPTION

The NDTD series is a range of low profile DC/DC converters offering dual outputs over a 2:1 input voltage range. All parts deliver 3W output power up to 85ºC without heatsinking. A flyback oscillator design with isolated feedback is used to give regulation over the full operating range of 25% to 100% of full load. It is strongly recommended that external capacitors be used on input and output to guarantee performance over full load and input voltage range (see application notes for guidance). The plastic case is rated to UL94V-0 and encapsulant to UL94V-1 and the connection pins are formed from a tin plated alloy 42 leadframe.

SELECTION GUIDE

Order code	Input voltage	Rated output voltage	Output current		Input current full load	Efficiency[2] (MIN.)	Isolation capacitance	MTTF[3]
			MIN. Load[1]	Full load				
	V (NOM.)	V	mA	mA	mA	%	pF	kHrs
NDTD0503C	5	±3.3	±113	±454	890	67	30	
NDTD0505C	5	±5	±75	±300	804	72	31	
NDTD0512C	5	±12	±31	±125	764	76	36	
NDTD0515C	5	±15	±25	±100	773	75	34	
NDTD1203C	12	±3.3	±113	±454	343	73	30	
NDTD1205C	12	±5	±75	±300	321	75	29	
NDTD1212C	12	±12	±31	±125	311	78	32	
NDTD1215C	12	±15	±25	±100	310	78	36	
NDTD2403C	24	±3.3	±113	±454	170	73	30	1671
NDTD2405C	24	±5	±75	±300	156	78	30	1675
NDTD2412C	24	±12	±31	±125	148	82	35	2075
NDTD2415C	24	±15	±25	±100	146	82	41	2080
NDTD4803C	48	±3.3	±113	±454	86	72	30	1667
NDTD4805C	48	±5	±75	±300	79	76	30	1669
NDTD4812C	48	±12	±31	±125	76	80	35	2090
NDTD4815C	48	±15	±25	±100	75	81	36	2045

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	5V input types	4.5	5	9	VDC
	12V input types	9	12	18	
	24V input types	18	24	36	
	48V input types	36	48	75	
Reflected ripple current[4]	5V input types		40	90	mA p-p
	12V, 24V & 48V input types		30	40	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	Continuous
Lead temperature 1.5mm from case for 10 seconds	300°C
Minimum output load for specification[1]	25% of rated output
Input voltage 5V types	10V
Input voltage 12V types	20V
Input voltage 24V types	40V
Input voltage 48V types	80V
Free air space	10mm MIN. around component

1. Please refer to output load application note section on page 3.
2. Measured at full load with external input/output capacitors, refer to test circuit.
3. Calculated using MIL-HDBK-217F with nominal input voltage at full load (ground benign) at 25°C.
4. Please refer to reflected ripple current measurement circuit on page 3.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS

Parameter	Conditions		MIN.	TYP.	MAX.	Units
Voltage set point accuracy	With external input/output capacitors	3.3V & 5V outputs		±2	±5	%
		12V & 15V outputs		±1	±3	
Line regulation	Low line to high line with external input/output capacitors			0.15	0.5	%
Load regulation	25% load to 100% load with external input/output capacitors with balanced load	3.3V & 5V outputs		0.5	1.0	%
		12V & 15V outputs		0.2	0.5	%
Ripple	BW = 20Hz to 300kHz with external input/output capacitors			15	40	mV rms
Ripple & noise	BW = DC to 20MHz with external input/output capacitors			90	150	mV p-p
Cross regulation	% voltage change on negative output when positive load varies from 12% to 50% of 3W rating, with negative load fixed at 50%	NDTD05XXC, NDTD1203C, NDTD1205C, NDTD2403C, NDTD2405C, NDTD4803C, NDTD4805C			5.0	%
		NDTD1212C, NDTD1215C, NDTD2412C, NDTD2415C, NDTD4812C, NDTD4815C		2.1	3.0	
Short circuit protection			Continuous			

GENERAL CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	100% to 25% load, VIN min to max	60		620	kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Operation		-40		85	ºC
Storage		-50		130	
Case temperature rise above ambient in still air	NDTD0503		54		
	NDTD1203C, NDTD2403C, NDTD4803C		40		
	NDTD0505C, NDTD0512C, NDTD1205C, NDTD2405C, NDTD4805C		35		
	NDTD0515C, NDTD1212C, NDTD1215C, NDTD2412C, NDTD4812C, NDTD2415C, NDTD4815C		28		

ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso=1KVDC	1			GΩ

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NDTD series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NDTD series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NDTD series has an EI ferrite core, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

APPLICATION NOTES

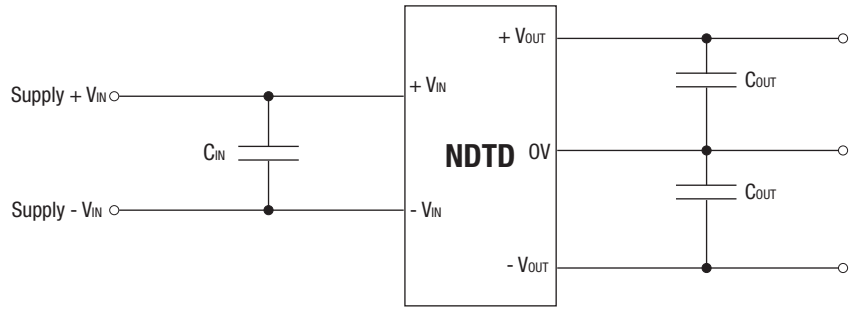
Recommended Input & Output Capacitors

Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

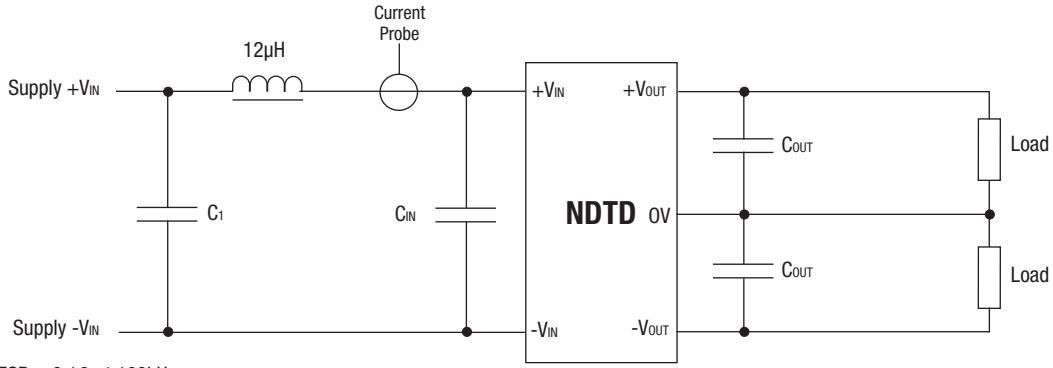
Input Voltage	C_{IN}
5V, 12V	100µF, 25V (0.25Ω at 100kHz)
24V, 48V	10µF, 100V (1.5Ω at 100kHz)

Output Voltage	C_{OUT}
3.3V, 5V	100µF, 25V (0.25Ω at 100kHz)
12V, 15V	47µF, 25V (0.4Ω at 100kHz)

Test circuit



Reflected Ripple Current Measurement



C_1 = 220µF, ESR < 0.1Ω at 100kHz

Output Load

The minimum load for correct operation is 25% of the full rated load across the specified input voltage range. Lower loads may cause a significant increase in output ripple and may cause the output voltage to exceed its specification transiently during power-down when the input voltage also falls below its rated minimum.

Cross Regulation

Load regulation is at its best when the positive and negative loads are balanced. When the loads are asymmetric, the negative output is not as tightly regulated as the positive output. To meet ripple specification a total minimum load of 25% full load is required, however, the NDTD can be used with much lighter loading at the expense of increased ripple. A small load is required on the negative output of 150mW to ensure the maximum negative output voltage is not exceeded.

TERMINOLOGY

LINE REGULATION

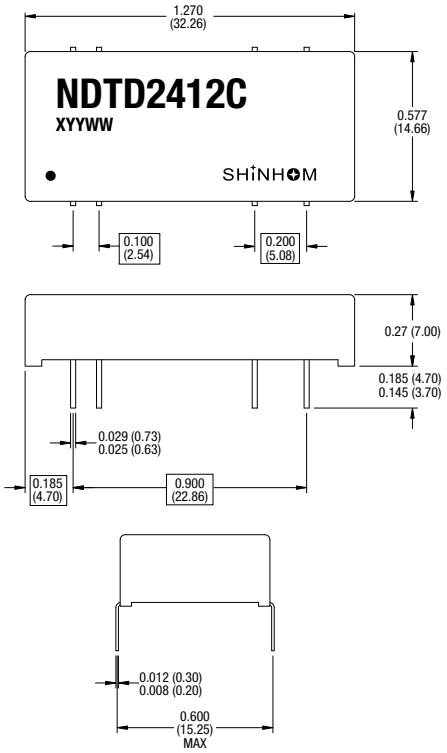
The percentage change in output voltage between low intput voltage and high intput voltage, measured with fixed output load i.e. a 5V part with an output voltage of 5.05V @ high input voltage and 5.03V @ low input voltage would have a line regulation of 0.4%.

$$\text{Line regulation} = \frac{V_{OUT}\text{ (Low Input V)} - V_{OUT}\text{ (High Input V)}}{V_{OUT}\text{ (Nominal Input V)}} \times 100\%$$

Where V_{OUT} (Nominal Input V) is 5V.

PACKAGE SPECIFICATIONS

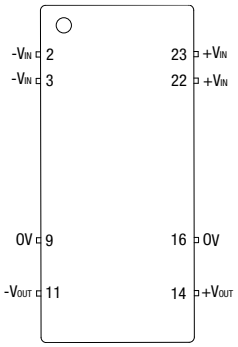
MECHANICAL DIMENSIONS



Weight: 6.0g

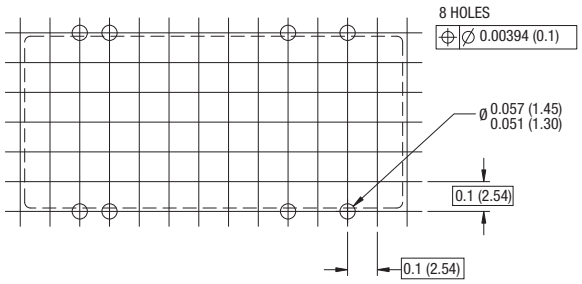
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

PIN CONNECTIONS



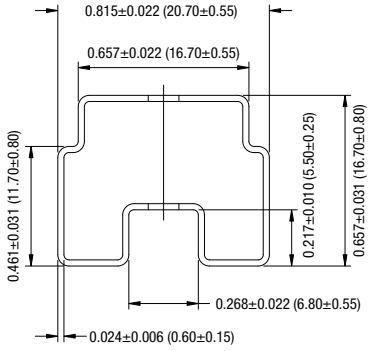
Pin	Function
2	-VIN
3	-VIN
9	0V
11	-VOUT
14	+VOUT
16	0V
22	+VIN
23	+VIN

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

TUBE OUTLINE DIMENSIONS



All dimensions in inches ±0.01 (mm) ±0.5mm.
Tube length : 20.47±0.079 (520mm ±2mm).

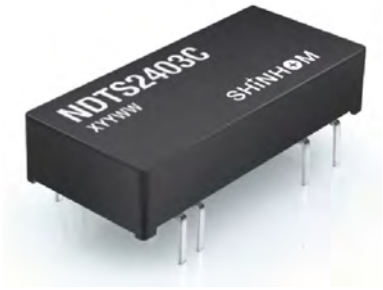
Tube Quantity : 15

RoHS COMPLIANCE INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin. The series is backward compatible with Sn/Pb soldering systems.

NDTS SERIES

Isolated 3W Single Output DC/DC Converters



FEATURES

- RoHS compliant
- Industry standard footprint
- Single isolated output
- Short circuit protection
- Operating temperature range –40°C to +85°C
- Low profile 24 pin case
- 2:1 Wide input range
- 5V, 12V, 24V & 48V Input
- 3.3V, 5V, 12V & 15V Output
- Footprint 4.73cm^2
- UL94V-0 Package materials
- No heatsink required
- Internal SMD construction
- Fully encapsulated

DESCRIPTION

The NDTS series is a range of low profile DC/DC converters offering a single regulated output over a 2:1 input voltage range. All parts deliver 3W output power up to 85°C without heatsinking. A flyback oscillator design with isolated feedback is used to give regulation over the full operating range of 25% to 100% of full load. It is strongly recommended that external capacitors be used on input and output to guarantee performance over full load and input voltage range (see recommended filter circuit for values).

SELECTION GUIDE

Order Code	Input Voltage	Rated Output Voltage	Output Current		Input Current	Efficiency (MIN.)	Isolation Capacitance	MTTF[2]
			MIN. Load	Full Load				
	V (NOM.)	V	mA	mA	mA	%	pF	kHrs
NDTS0503C	5	3.3	227	909	898	63	28	
NDTS0505C	5	5	150	600	806	71	30	
NDTS0512C	5	12	63	250	769	76	32	
NDTS0515C	5	15	50	200	757	77	33	
NDTS1203C	12	3.3	227	909	350	71	29	
NDTS1205C	12	5	150	600	320	73	32	
NDTS1212C	12	12	63	250	310	75	35	
NDTS1215C	12	15	50	200	310	76	32	
NDTS2403C	24	3.3	227	909	172	71	32	1671
NDTS2405C	24	5	150	600	156	78	32	1673
NDTS2412C	24	12	63	250	149	80	35	1650
NDTS2415C	24	15	50	200	147	84	35	1617
NDTS4803C	48	3.3	227	909	87	71	32	1676
NDTS4805C	48	5	150	600	83	75	32	1668
NDTS4812C	48	12	63	250	76	80	40	1631
NDTS4815C	48	15	50	200	75	80	40	1600

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	All NDTS05 types	4.5	5	9	V
	All NDTS12 types	9	12	18	
	All NDTS24 types	18	24	36	
	All NDTS48 types	36	48	72	
Reflected ripple current[1]	All NDTS05 types		50	150	mA p-p
	All NDTS12 types		30	100	
	All NDTS24 types		40	50	
	All NDTS48 types		30	40	

OUTPUT CHARACTERISTICS

Parameter	Conditions		MIN.	TYP.	MAX.	Units
Voltage set point accuracy	With external input/output capacitors			±1	±3	%
Line regulation	Low line to high line with external input/ output capacitors			0.15	0.5	%
Load regulation	Minimum load to rated load with external input/ output capacitors	0503, 0505, 1203, 1205		0.8	1.0	%
		2403, 2405, 4803, 4805		0.8	1.2	
		12V & 15V outputs		0.1	0.5	
Ripple	BW = 20Hz to 300kHz with external input/ output capacitors			15	40	mV rms
Ripple & noise	BW = DC to 20MHz with external input/output capacitors			90	150	mV p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	Continuous
Lead temperature 1.5mm from case for 10 seconds	300°C
Minimum output load for specification[3]	25% of rated output
Input voltage 05 types	10V
Input voltage 12 types	20V
Input voltage 24 types	40V
Input voltage 48 types	80V
Free air space	10mm MIN. around component

1. Please refer to relected ripple current measurement circuit on page 2.
2. Calculated using MIL-HDBK-217F with nominal input voltage at full load (ground benign) at 25°C.
3. Please refer to output load application note on page 3.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	100% to 25% load, V_{IN} MIN. to MAX.	70		650	kHz

ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation voltage	Flash tested for 1 second	1000			VDC
Resistance	Resistance	1			GΩ

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Operation		-40		85	ºC
Storage		-50		130	
Case temperature rise above ambient in still air	NDTS0515C, NDTS1205C, NDTS1212C, NDTS1215C, NDTS2405C, NDTS2412C, NDTS2415C, NDTS4812C & NDTS4815C		30		
	NDTS0505C, NDTS0512C, NDTS1203C, NDTS2403C, NDTS4803C & NDTS4805C		40		
	NDTS0503C		50		

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NDTS series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NDTS series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NDTS series has an EI ferrite core, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin. The series is backward compatible with Sn/Pb soldering systems.

APPLICATION NOTES

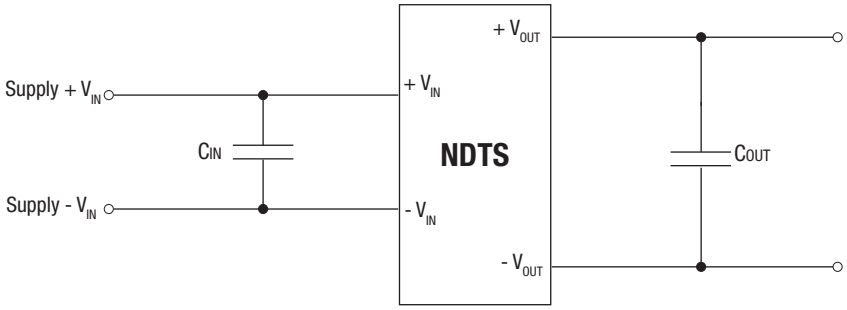
Recommended Input & Output Capacitors

Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

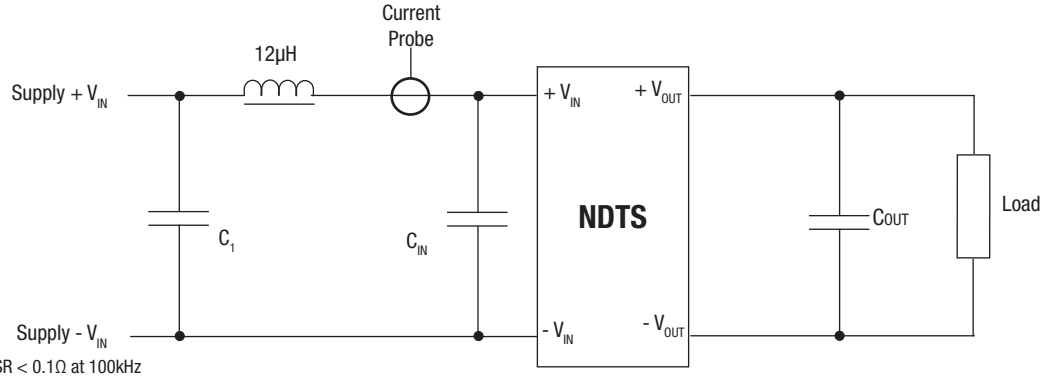
Input Voltage	C_{IN}
5V, 12V	100µF, 25V (0.25Ω at 100kHz)
24V, 48V	10µF, 100V (1.5Ω at 100kHz)

Output Voltage	C_{OUT}
3.3V, 5V	220µF, 16V (0.12Ω at 100kHz)
12V, 15V	100µF, 25V (0.25Ω at 100kHz)

Test circuit



Reflected Ripple Current Measurement



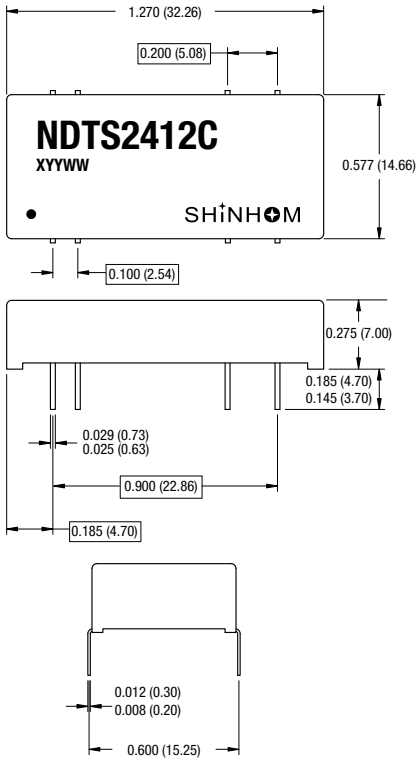
C_1 = 220µF, ESR < 0.1Ω at 100kHz

OUTPUT LOAD

The minimum load for correct operation is 25% of the full rated load across the specified input voltage range. Lower loads may cause a significant increase in output ripple and may cause the output voltage to exceed its specification transiently during power-down when the input voltage also falls below its rated minimum.

PACKAGE SPECIFICATIONS

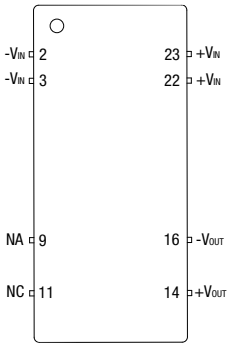
MECHANICAL DIMENSIONS



Weight: 6.2g

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

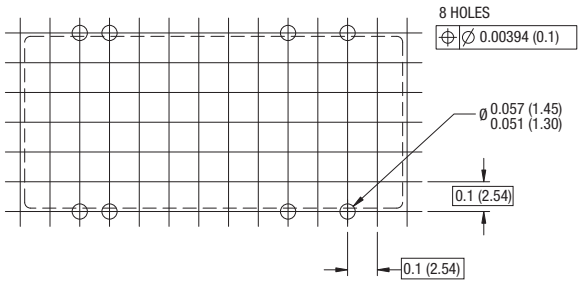
PIN CONNECTIONS



Pin	Function
2	-VIN
3	-VIN
9	NA
11	NC
14	+VOUT
16	-VOUT
22	+VIN
23	+VIN

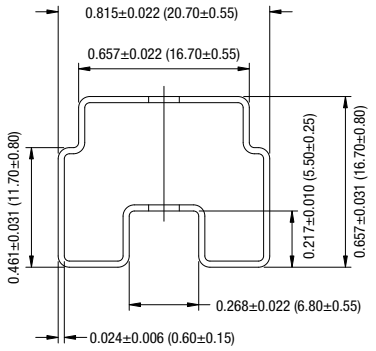
NA - Not available for electrical connection.
NC - No internal connection.

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

TUBE OUTLINE DIMENSIONS



All dimensions in inches ±0.01 (mm) ±0.5mm.
Tube length : 20.47±0.079 (520mm ±2mm).

Tube Quantity : 15

NDY SERIES

Isolated 3W Wide Input DC/DC Converters

FEATURES

- RoHS compliant
- Industry standard footprint
- Efficiency to 82%
- Power density 0.90W/cm^3
- 2:1 wide input range
- Single isolated output
- Short circuit protection
- Low profile 24 pin case
- UL 94V-0 package material
- Operating temperature range -40ºC to 85ºC
- No heatsink required
- Footprint 4.73cm^2
- 5V, 12V, 24V & 48V input
- 3.3V, 5V, 9V, 12V & 15V output
- Internal SMD construction
- Fully encapsulated

DESCRIPTION

The NDY series is a range of low profile DC/DC converters offering a single regulated output over a 2:1 input voltage range. All parts deliver 3W output power up to 85ºC without heatsinking, except the 4.5V to 9V input voltage range which should be derated to 2W at the lower input voltage. A flyback oscillator design with isolated feedback is used to give regulation over the full operating range of 25% to 100% of full load. It is strongly recommended that external capacitors be used on input and output to guarantee performance over full load and input voltage range.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Rated Output Voltage	Output Current[1]		Input Current Full load	Efficiency[2] (MIN.)	Isolation Capacitance	MTTF[3]
			MIN. Load	Full Load				
	V (nom.)	V	mA	mA	mA	%	pF	kHrs
NDY0505C	5	5	100-150	400-600	615	66	40	1939
NDY0509C	5	9	55-83	222-333	563	72	52	1926
NDY0512C	5	12	42-62	166-250	548	71	43	1907
NDY0515C	5	15	33-50	133-200	533	73	44	1924
NDY1205C	12	5	150	600	362	71	36	1928
NDY1209C	12	9	83	333	320	78	52	1916
NDY1212C	12	12	62	250	316	78	44	1897
NDY1215C	12	15	50	200	308	79	47	1914
NDY2403C	24	3.3	227	909	178	70	30	1671
NDY2405C	24	5	150	600	174	70	36	1673
NDY2409C	24	9	83	333	156	78	52	1663
NDY2412C	24	12	62	250	154	80	44	1644
NDY2415C	24	15	50	200	150	82	54	1657
NDY4803C	48	3.3	227	909	87	71	30	1676
NDY4805C	48	5	150	600	87	73	35	1668
NDY4809C	48	9	83	333	78	80	52	1663
NDY4812C	48	12	62	250	77	81	44	1648
NDY4815C	48	15	50	200	76	81	53	1661

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	All NDY05XX	4.5	5	9	VDC
	All NDY12XX	9	12	18	
	All NDY24XX	18	24	36	
	All NDY48XX	36	48	72	
Reflected ripple current[2]	NDY2403		180	360	mA p-p
	NDY4803		140	290	
	All NDY05XX		400	500	
	All NDY12XX		150	170	
	All other NDY24XX		290	360	
	All other NDY48XX		100	127	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	Continuous
Lead temperature 1.5mm from case for 10 seconds	300°C
Minimum load	25% of rated load
Input voltage 05 types	10V
Input voltage 12 types	20V
Input voltage 24 types	40V
Input voltage 48 types	80V
Internal dissipation	1.7W

1. Refer to power derating graph.
2. Measured at full load with external input/output capacitors, refer to filter circuit 1.
3. Calculated using MIL-HDBK-217F with nominal input voltage at full load (ground benign) at 25°C.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage set point accuracy	With external input/output capacitors		±1	±5	%
Line regulation	Low line to high line, 3.3V output with external input/output capacitors		0.05	0.25	%
	Low line to high line, all other outputs with external input/output capacitors		0.05	0.5	%
Load regulation	25% load to 100% load, 3.3V output with external input/output capacitors		0.6	1.0	%
	25% load to 100% load, all other outputs with external input/output capacitors		0.2	0.5	%
Ripple[1]	BW = 20Hz to 300kHz, 3.3V output with external input/output capacitors		80	120	mV rms
	BW = 20Hz to 300kHz, all other outputs with external input/output capacitors		5	10	
Noise[1]	BW = DC to 100MHz, 3.3V output with external input/output capacitors			180	mV p-p
	BW = DC to 20MHz, all other outputs with external input/output capacitors		50	100	

GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	100% load V_{IN} nominal 3.3V output	160		220	kHz
	25% load V_{IN} nominal 3.3V output	290		560	
	100% load V_{IN} nominal, all other outputs	80		220	
	25% load V_{IN} nominal, all other outputs	290		560	

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Operation		-40		85	°C
Storage		-50		130	
Cooling	Free air convection				

ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso=500VDC	1			GΩ

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NDY series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NDY series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NDY series has an EI ferrite core, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

1. For lower ripple refer to circuit for reduced ripple.

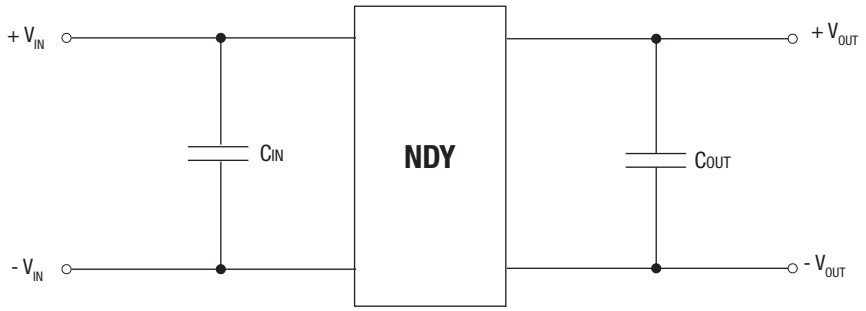
APPLICATION NOTES

Recommended input & output capacitors

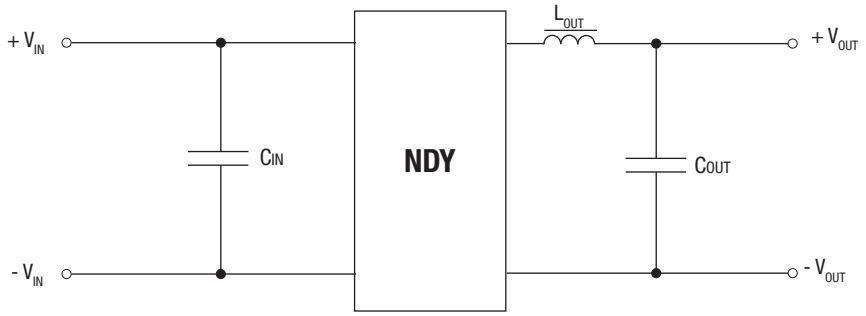
Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

Value		
C_{IN}	C_{OUT}	L_{OUT}
10µF, 200V good low esr capacitor	100µF, 25V good low esr capacitor	C&D Technologies Part No. 24100C

Test circuit, 5V, 12V and 15V output



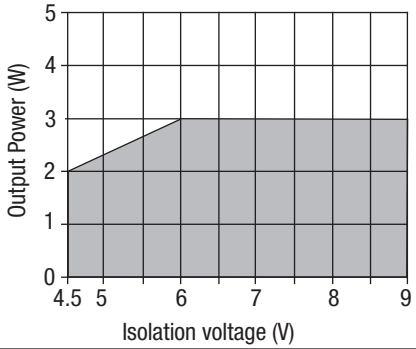
Recommended circuit for reduced ripple 3.3V output



Output load

The minimum rated load across the whole input voltage range is 25% of the full load output. It is important to take care that the load does not fall below this as the output ripple will greatly increase. While this condition will not harm the device the resultant increase in output ripple could cause customers' application to malfunction.

NDY05 POWER DERATING CURVE



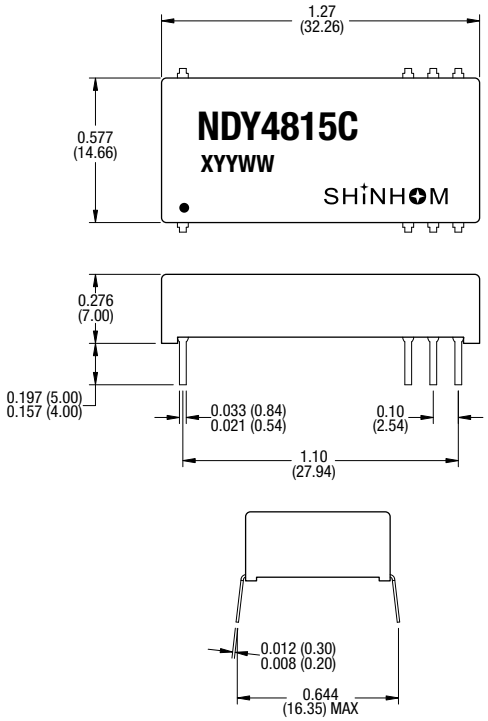
RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Bright Tin. The series is backward compatible with Sn/Pb soldering systems.

PACKAGE SPECIFICATIONS

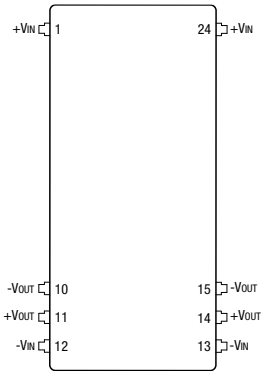
MECHANICAL DIMENSIONS



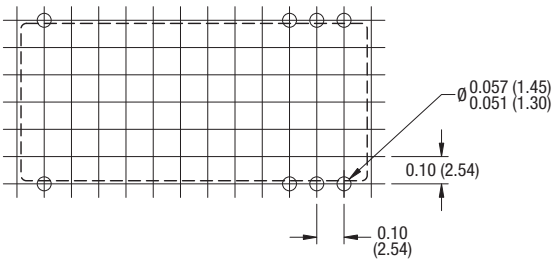
Weight: 6.2g (3.3V: 6.7g)

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

PIN CONNECTIONS (TOP VIEW)

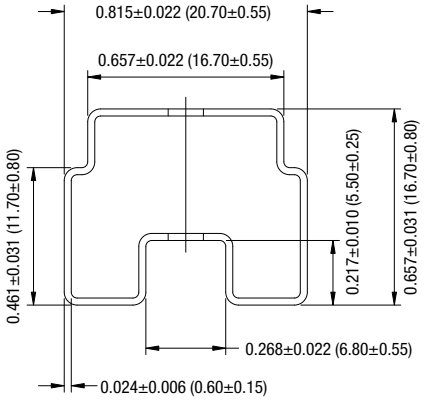


RECOMMENDED FOOTPRINT DETAILS



Unless otherwise stated all dimensions in inches ±0.01 (mm ±0.5mm).

TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ±0.01 (mm) ±0.5mm.
Tube length : 20.47±0.079 (520mm ±2mm).

Tube Quantity : 15

NKA SERIES

Isolated Sub-Miniature 1W Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency up to 82%
- Wide temperature performance at full 1 Watt load, –40°C to 85°C
- UL 94V-0 package material
- Reduced footprint at 0.98cm^2
- Industry standard pinout
- Power sharing on output
- 3.3V, 5V & 12V Input
- 3.3V, 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 1.6 Million hours
- No electrolytic or tantalum capacitors

DESCRIPTION

The NKA sub-miniature series of industrial temperature range DC/DC converters are the standard building blocks for on-board distributed power systems. The series offers smaller package size, improved efficiency, lower output ripple and 3kVDC isolation capability through the use of state of the art packaging and technology. Ideally suited for providing dual rail supplies on primarily digital boards with the added benefit of galvanic isolation to reduce switching noise. All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

SELECTION GUIDE

Order Code	Nominal Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Input Current at Rated Load (mA)	Efficiency %	Isolation Capacitance pF	MTTF[1] kHrs	Package Style
NKA0303DC	3.3	±3.3	±152	407	74	20	195	DIP
NKA0305DC	3.3	±5	±100	383	79	22	1121	
NKA0309DC	3.3	±9	±56	402	75	30	1035	
NKA0312DC	3.3	±12	±42	390	78	31	375	
NKA0315DC	3.3	±15	±33	384	79	32	206	
NKA0303SC	3.3	±3.3	±152	407	74	20	195	SIP
NKA0305SC	3.3	±5	±100	383	79	22	1121	
NKA0309SC	3.3	±9	±56	402	75	30	1035	
NKA0312SC	3.3	±12	±42	390	78	31	375	
NKA0315SC	3.3	±15	±33	384	79	32	206	
NKA0503DC	5	±3.3	±152	259	77	22	205	DIP
NKA0505DC	5	±5	±100	285	70	21	1697	
NKA0505DEC	5	±5	±100	249	80	26	1557	
NKA0509DC	5	±9	±56	263	76	25	682	
NKA0512DC	5	±12	±42	255	78	28	343	
NKA0515DC	5	±15	±33	253	79	29	188	
NKA0503SC	5	±3.3	±152	259	77	22	205	SIP
NKA0505SC	5	±5	±100	285	70	21	1697	
NKA0505SEC	5	±5	±100	249	80	26	1557	
NKA0509SC	5	±9	±56	263	76	25	682	
NKA0512SC	5	±12	±42	255	78	28	343	
NKA0515SC	5	±15	±33	253	79	29	188	
NKA1205DC	12	±5	±100	112	74	33	559	DIP
NKA1209DC	12	±9	±56	106	79	48	375	
NKA1212DC	12	±12	±42	104	81	55	243	
NKA1215DC	12	±15	±33	102	82	60	154	
NKA1205SC	12	±5	±100	112	74	33	559	SIP
NKA1209SC	12	±9	±56	106	79	48	375	
NKA1212SC	12	±12	±42	104	81	55	243	
NKA1215SC	12	±15	±33	102	82	60	154	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.
NKA0505DEC/NKA0505SEC offer higher efficiency than NKA0505SC/NKA0505DC but over a narrower operating temperature range. See temperature characteristics graph.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 3.3V input types	2.97	3.3	3.63	V
	Continuous operation, 5V input types	4.5	5	5.5	
	Continuous operation, 12V input types	10.8	12	13.2	
Reflected ripple current	3.3V input types		30	60	mA p-p
	All other types		20	35	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	550mW
Input voltage V_{IN}, NKA03 types	5.5V
Input voltage V_{IN}, NKA05 types	7V
Input voltage V_{IN}, NKA12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[1]	T_A=-40°C to 120°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, 0312 & 0315		8	14	%
	10% load to rated load, 3.3V output types		10	15	
	10% load to rated load, 5V output types		10	12	
	10% load to rated load, 9V output types		6.5	8	
	10% load to rated load, 12V output types		6	8.5	
	10% load to rated load, 15V output types		6	7	
Ripple and Noise	BW=DC to 20MHz, 0312 & 0315		25	60	mV p-p
	BW=DC to 20MHz, 3.3V output types		40	80	
	BW=DC to 20MHz, 5V output types		50	75	
	BW=DC to 20MHz, 9V output types		40	65	
	BW=DC to 20MHz, 12V output types		40	60	
	BW=DC to 20MHz, 15V output types		40	60	

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	3000			VDC
Resistance	Viso= 1000VDC		10		GΩ

GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	0303, 0305, 0312, 0315, 0503 and 0505XE		95		kHz
	All other types		120		

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case temperature rise above ambient	5V output types		30		
	All other output types		21		
Cooling	Free air convection				

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NKA series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NKA series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

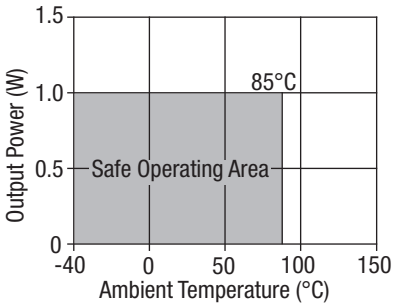
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NKA series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

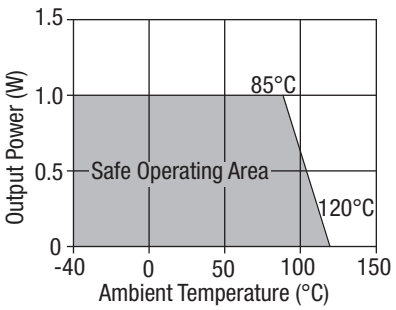
1. See Derating Graphs.
2. 12V input types have typically 3% less load regulation.

TEMPERATURE DERATING GRAPHS

NKA0303DC/SC, 0305DC/SC
0309DC/SC, 0505DEC/SEC
types only.

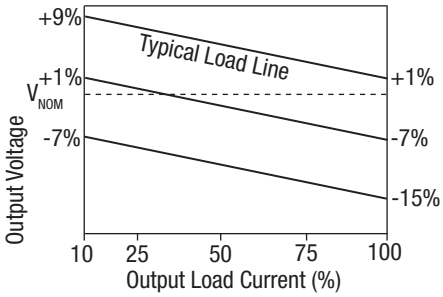


All other types.

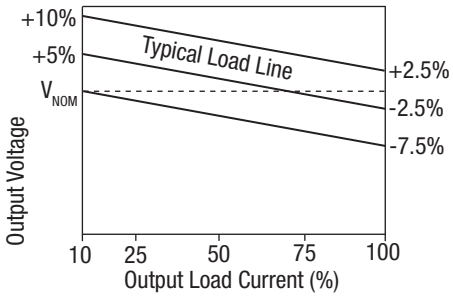


TOLERANCE ENVELOPES

3.3V output types.

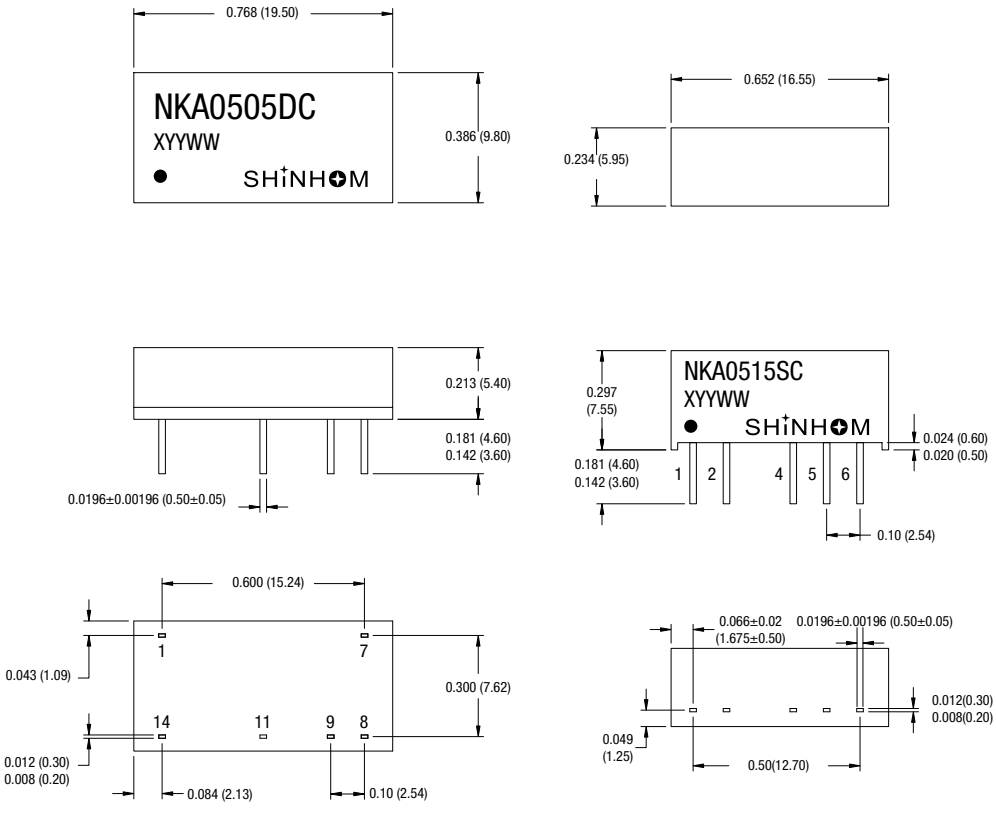


All other types.



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 1.4g (SIP) 1.9g (DIP)

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	-VIN
7	NC
8	0V
9	+VOUT
11	-VOUT
14	+VIN

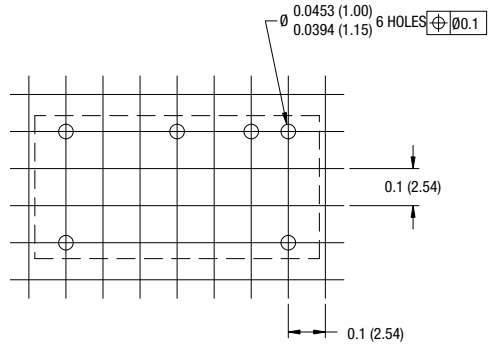
PIN CONNECTIONS - 6 PIN SIP

Pin	Function
1	+VIN
2	-VIN
4	-VOUT
5	0V
6	+VOUT

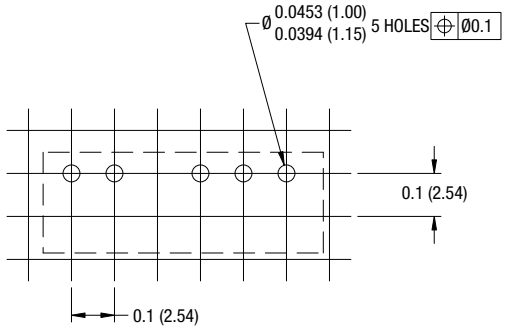
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

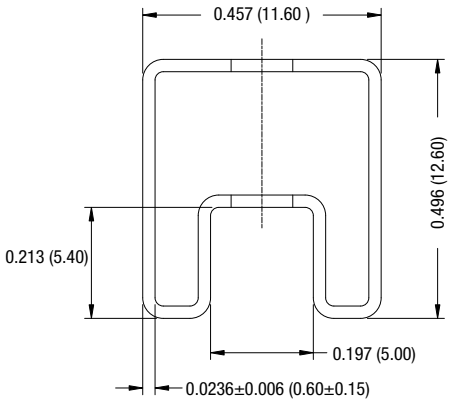


6 Pin SIP Package

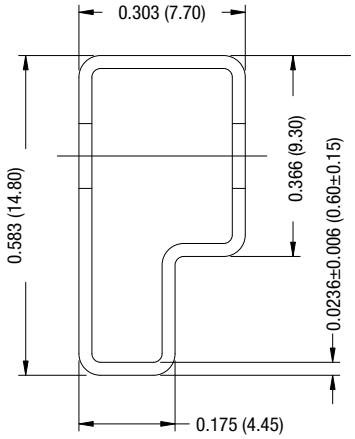


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



6 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (6 Pin SIP) : 20.67 (525mm ±2mm).

DIP Tube Quantity : 25
SIP Tube Quantity : 30

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NKE SERIES

Isolated Sub-Miniature 1W Single Output DC/DC Converters

FEATURES

- RoHS Compliant
- Sub-Miniature SIP & DIP Styles
- 3kVDC Isolation
- Efficiency up to 81%
- Wide Temperature performance at full 1 Watt load, –40°C to 85°C
- Increased Power Density to 2.09W/cm^3
- UL 94V-0 Package Material
- Footprint at 0.69cm^2
- Industry Standard Pinout
- 3.3V, 5V & 12V Input
- 3.3V, 5V, 9V, 12V and 15V Output
- No Heatsink Required
- Internal SMD Construction
- Fully Encapsulated with Toroidal Magnetics
- MTTF up to 2.4 Million hours
- Custom Solutions Available
- No Electrolytic or Tantalum Capacitors

DESCRIPTION

The NKE sub-miniature series of DC/DC Converters is particularly suited to isolating and/or converting DC power rails. A smaller package size, improved efficiency, lower output ripple and 3kVDC isolation capability through state of the art packaging and improved technology. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist. The wide temperature range guarantees startup from –40°C and full 1 watt output at 85°C.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	(V)	(V)	(mA)	(mA)	%	pF	kHrs	
NKE0303DC	3.3	3.3	303	400	75	30	1234	DIP
NKE0305DC	3.3	5	200	400	76	35	632	
NKE0309DC	3.3	9	111	403	75	30	1204	
NKE0303SC	3.3	3.3	303	400	75	30	1234	SIP
NKE0305SC	3.3	5	200	400	76	35	632	
NKE0309SC	3.3	9	111	403	75	30	1204	
NKE0503DC	5	3.3	303	270	75	40	619	DIP
NKE0505DC	5	5	200	289	69	28	2414	
NKE0505DEC	5	5	200	250	78	34	419	
NKE0509DC	5	9	111	266	75	29	1173	
NKE0512DC	5	12	83	260	77	30	633	
NKE0515DC	5	15	66	256	78	32	360	
NKE0503SC	5	3.3	303	270	75	40	619	SIP
NKE0505SC	5	5	200	289	69	28	2414	
NKE0505SEC	5	5	200	250	78	34	419	
NKE0509SC	5	9	111	266	75	29	1173	
NKE0512SC	5	12	83	260	77	30	633	
NKE0515SC	5	15	66	256	78	32	360	
NKE1205DC	12	5	200	117	71	35	620	DIP
NKE1209DC	12	9	111	107	78	50	488	
NKE1212DC	12	12	83	105	79	57	360	
NKE1215DC	12	15	66	103	81	60	252	
NKE1205SC	12	5	200	117	71	35	620	SIP
NKE1209SC	12	9	111	107	78	50	488	
NKE1212SC	12	12	83	105	79	57	360	
NKE1215SC	12	15	66	103	81	60	252	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.
NKE0505SEC/NKE0505DEC offers higher efficiency than NKE0505SC/NKE0505DC but over a narrower operating temperature range. See temperature characteristics graph.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 3.3V input types	2.97	3.3	3.63	V
	Continuous operation, 5V input types	4.5	5.0	5.5	
	Continuous operation, 12V input types	10.8	12.0	13.2	
Reflected ripple current	3.3V input types		40	60	mA p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	530mW
Input voltage V_{IN}, NKE03 types	5.5V
Input voltage V_{IN}, NKE05 types	7V
Input voltage V_{IN}, NKE12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[1]	T_A=-40°C to 120°C			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, 3.3V output types & 0309		10	15	%
	10% load to rated load, 5V output types		12	15	
	10% load to rated load, 9V output types		7.5	10	
	10% load to rated load, 12V output types		6.5	9.5	
	10% load to rated load, 15V output types		6.0	8.5	
Ripple and Noise	BW=DC to 20MHz, 3.3V output types & 0305, 0505SEC, 0505DEC		40	80	mV p-p
	BW=DC to 20MHz, other 5V output types		77	100	
	BW=DC to 20MHz, 9V output types		43	90	
	BW=DC to 20MHz, 12V output types		35	65	
	BW=DC to 20MHz, 15V output types		32	55	

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	3000			VDC
Resistance	Viso= 1000VDC		10		GΩ

GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All output types		115		kHz

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case temperature rise above ambient	0505D/S, 1205D/S			41	
	All other output types			32	
Cooling	Free air convection				

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NKE series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NKE series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

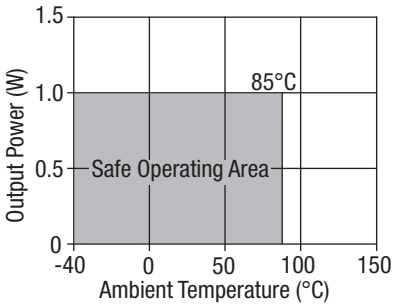
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NKE series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

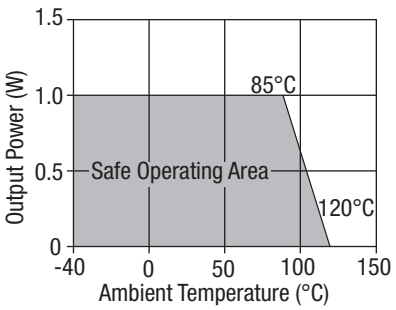
1. See Derating Graphs.
2. 12V input types have typically 3% less load regulation.

TEMPERATURE DERATING GRAPHS

NKE 0303DC/SC, 0305DC/SC, 0309DC/SC, 0503DC/SC, 0505DEC/SEC types only.

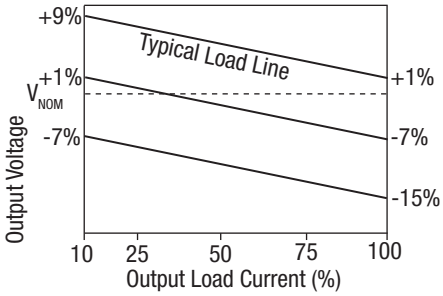


All other types.

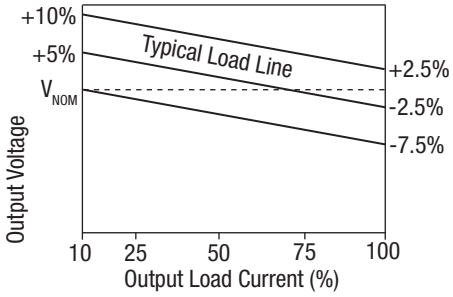


TOLERANCE ENVELOPES

3.3V output types.



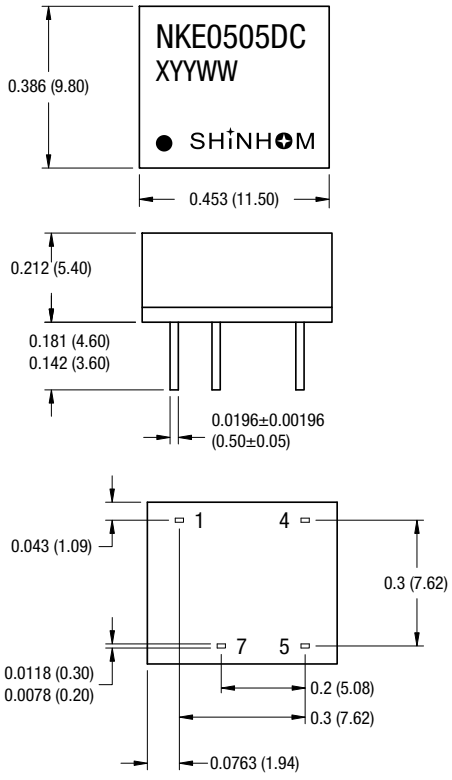
All other types.



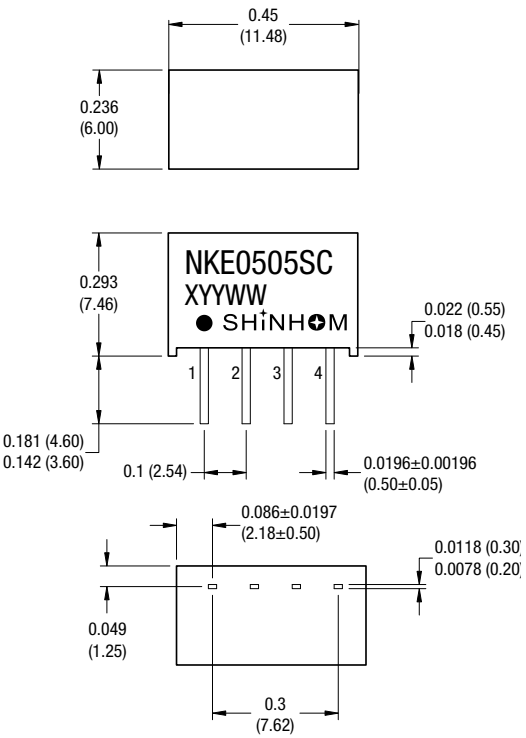
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 1.09g (SIP) 1.25g (DIP)

PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	-V_{IN}
4	+V_{IN}
5	+V_{OUT}
7	-V_{OUT}

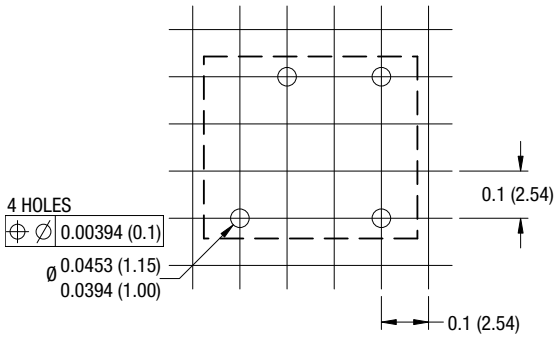
PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-V_{IN}
2	+V_{IN}
3	-V_{OUT}
4	+V_{OUT}

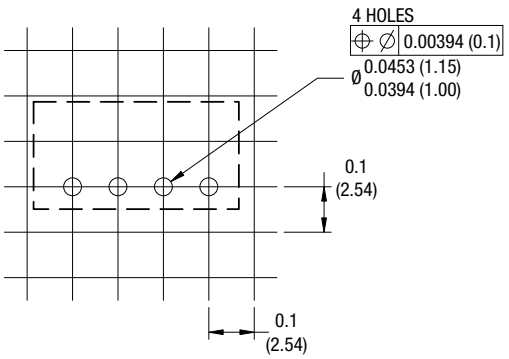
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

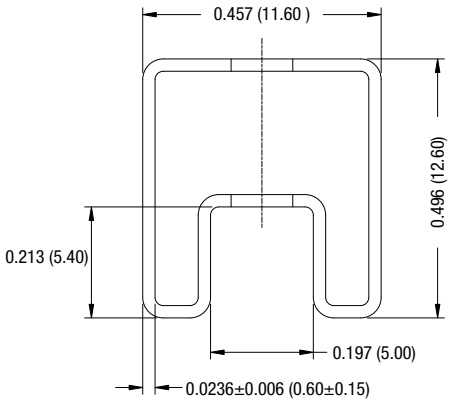


4 Pin SIP Package

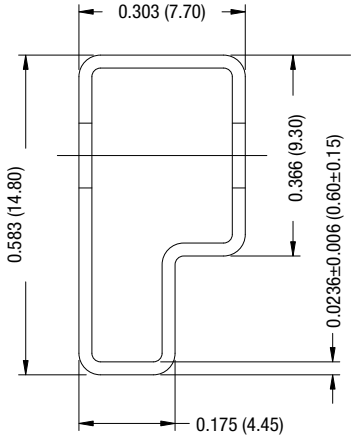


TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (8 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (4 Pin SIP) : 20.67 (525mm ±2mm).

Tube Quantity : 40

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NMA 5V & 12V SERIES

Isolated 1W Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency up to 78%
- Power density up to 0.85W/cm^3
- Wide temperature performance at full 1 Watt load, –40°C to 85°C
- Dual output from a single input rail
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- Industry standard pinout
- Power sharing on output
- 1kVDC isolation
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 1.6 million hours
- No electrolytic or tantalum capacitors

DESCRIPTION

The NMA series of industrial temperature range DC/DC converters are the standard buliding blocks for on-board distributed power systems. They are ideally suited for providing dual rail supplies on primarily digital boards with the added benefit of galvanic isolation to reduce switching noise. All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	(V)	(V)	(mA)	(mA)	%	pF	kHrs	
NMA0505DC	5	±5	±100	289	69	28	1697	DIP
NMA0509DC	5	±9	±55	267	75	32	682	
NMA0512DC	5	±12	±42	260	77	34	343	
NMA0515DC	5	±15	±33	256	78	36	188	
NMA0505SC	5	±5	±100	289	69	28	1697	SIP
NMA0509SC	5	±9	±55	267	75	32	682	
NMA0512SC	5	±12	±42	260	77	34	343	
NMA0515SC	5	±15	±33	256	78	36	188	
NMA1205DC	12	±5	±100	120	69	33	559	DIP
NMA1209DC	12	±9	±55	113	74	46	375	
NMA1212DC	12	±12	±42	111	75	55	243	
NMA1215DC	12	±15	±33	110	76	54	154	
NMA1205SC	12	±5	±100	120	69	33	559	SIP
NMA1209SC	12	±9	±55	113	74	46	375	
NMA1212SC	12	±12	±42	111	75	55	243	
NMA1215SC	12	±15	±33	110	76	54	154	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	
Reflected ripple current			20	33	mA p-p

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40°C to 120°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		10	12.5	%
	10% load to rated load, 9V output types		9	10	
	10% load to rated load, 12V output types		6.5	7.5	
	10% load to rated load, 15V output types		6	7.0	
Ripple and Noise	BW=DC to 20MHz, 5V output types		40	75	mV p-p
	BW=DC to 20MHz, 9V output types		25	50	
	BW=DC to 20MHz, 12V output types		25	50	
	BW=DC to 20MHz, 15V output types		20	50	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	450mW
Input voltage V_{IN}, NMA05 types	7V
Input voltage V_{IN}, NMA12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating graph.
3. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

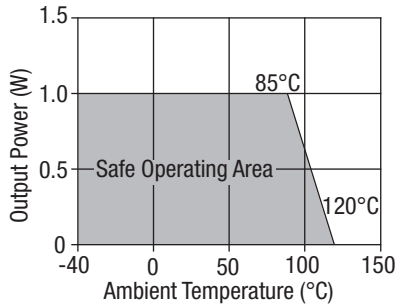
RoHS COMPLIANT 2002/95/EC

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 1000VDC		10		GΩ

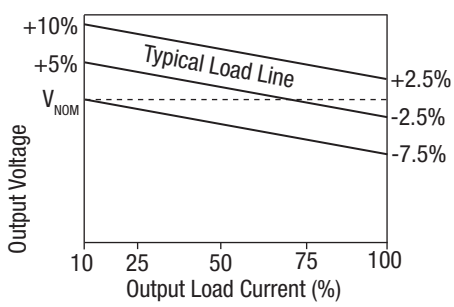
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		110		kHz
	12V input types		140		

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types		33		
	All other output types		28		
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMA series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMA series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

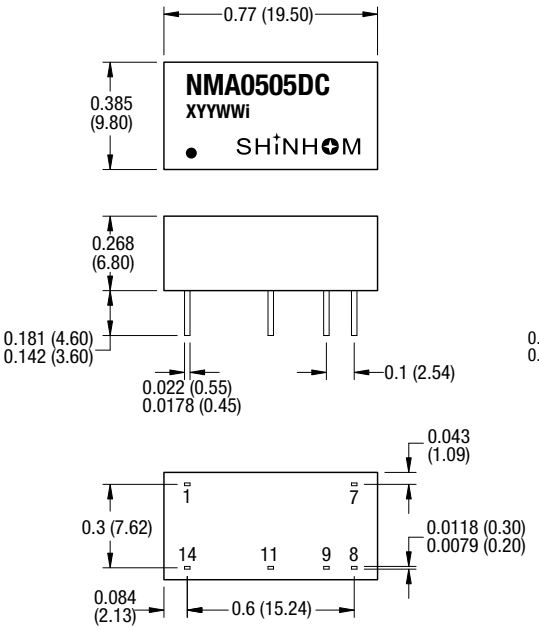
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMA series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

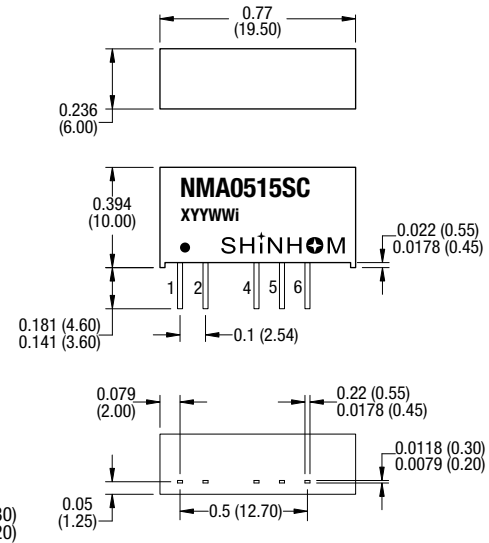
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.4g (DIP) 2.1g (SIP)

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	-V_{IN}
7	NC
8	0V
9	+V_{OUT}
11	-V_{OUT}
14	+V_{IN}

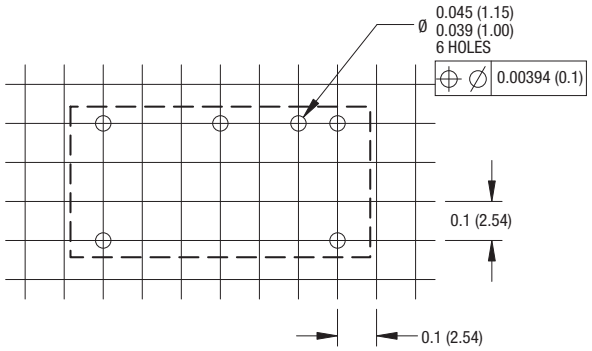
PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	+V_{IN}
2	-V_{IN}
4	-V_{OUT}
5	0V
6	+V_{OUT}

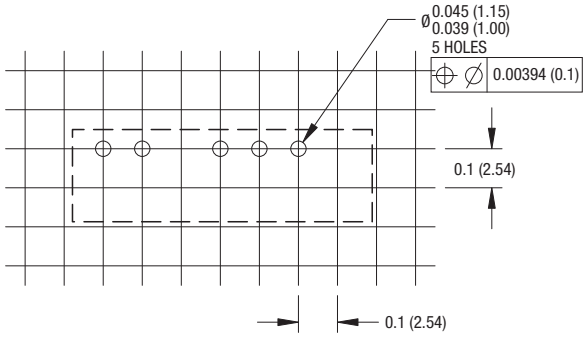
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

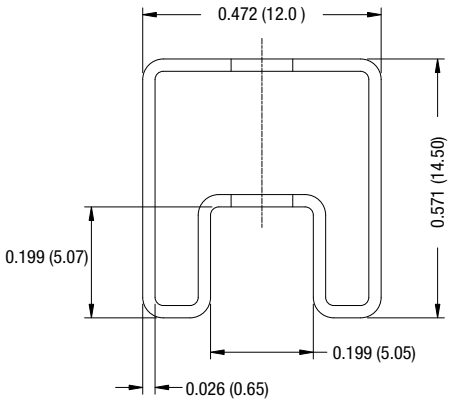


7 Pin SIP Package

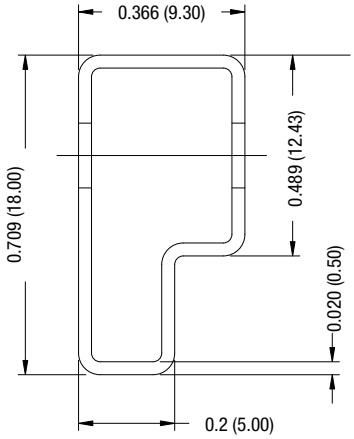


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NMA 24V & 48V SERIES

Isolated 1W Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency up to 80%
- Power density up to 0.85W/cm^3
- Dual output from a single input rail
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- Industry standard pinout
- Power sharing on output
- 1kVDC isolation
- 24V & 48V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required

DESCRIPTION

The NMA series of DC/DC converters are the standard buliding blocks for on-board distributed power systems. They are ideally suited for providing dual rail supplies on primarily digital boards with the added benefit of galvanic isolation to reduce switching noise. All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	(V)	(V)	(mA)	%	pF	kHrs	
NMA2405DC	24	±5	±100	70	39	194	DIP
NMA2409DC	24	±9	±55	77	85	129	
NMA2412DC	24	±12	±42	80	65	134	
NMA2415DC	24	±15	±33	80	95	101	
NMA2405SC	24	±5	±100	70	39	194	SIP
NMA2409SC	24	±9	±55	77	85	129	
NMA2412SC	24	±12	±42	80	65	134	
NMA2415SC	24	±15	±33	80	95	101	
NMA4805DC	48	±5	±100	70	26	206	DIP
NMA4809DC	48	±9	±55	80	38	174	
NMA4812DC	48	±12	±42	80	52	139	
NMA4815DC	48	±15	±33	80	56	104	
NMA4805SC	48	±5	±100	70	26	206	SIP
NMA4809SC	48	±9	±55	80	38	174	
NMA4812SC	48	±12	±42	80	52	139	
NMA4815SC	48	±15	±33	80	56	104	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 24V input types	21.6	24	26.4	V
	Continuous operation, 48V input types	43.2	48	52.8	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=0°C to 70°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}			1.2	%/%
Load Regulation	10% load to rated load, 5V output types			15	%
	10% load to rated load, all other output types			10	
Ripple and Noise	BW=DC to 20MHz, all input types			150	mV p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	450mW
Input voltage V_{IN}, NMA24 types	28V
Input voltage V_{IN}, NMA48 types	54V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating graph.
3. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	10			GΩ

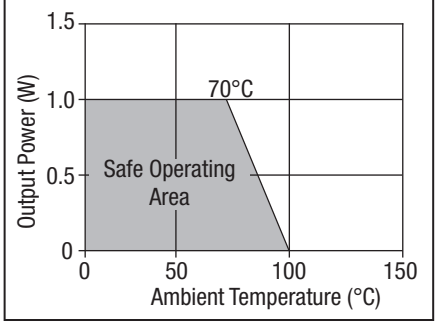
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		100		kHz

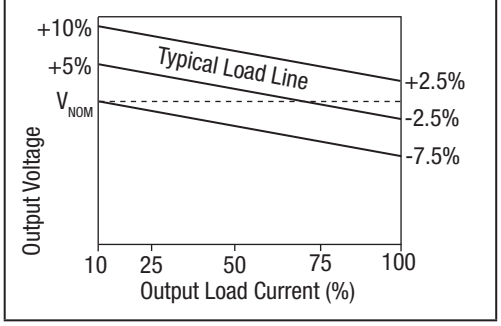
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMA series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMA series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

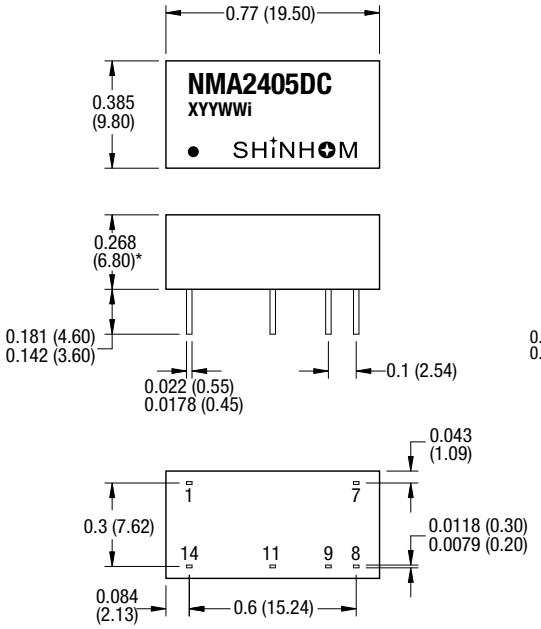
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMA series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

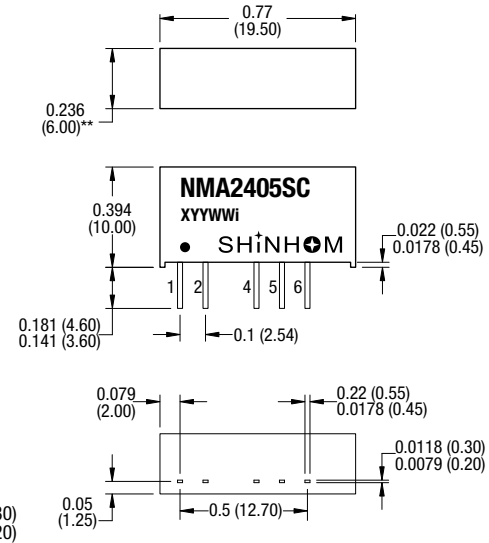
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



Weight:
2.4g (24V DIP)
2.9g (48V DIP)
2.2g (24V SIP)
2.9g (48V SIP)

* 0.303 (7.70) for 48V variants

** 0.295 (7.50) for 48V variants

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	$-V_{IN}$
7	NC
8	OV
9	$+V_{OUT}$
11	$-V_{OUT}$
14	$+V_{IN}$

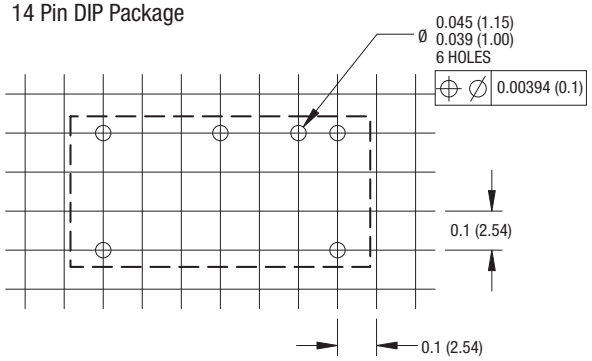
PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
4	$-V_{OUT}$
5	OV
6	$+V_{OUT}$

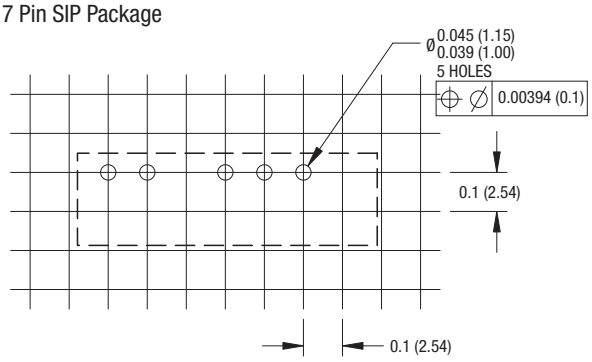
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

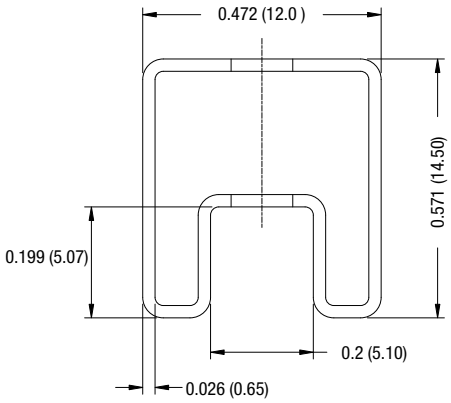


7 Pin SIP Package

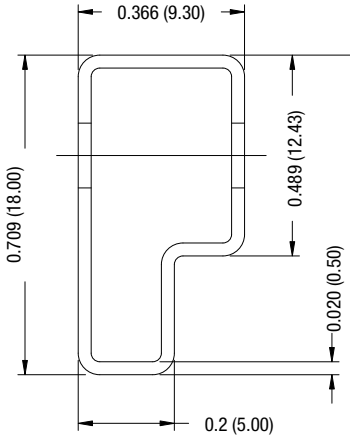


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NMD SERIES

Isolated 1W Twin Output DC/DC Converters

FEATURES

- RoHS compliant
- Twin independent outputs
- Input/output isolation 1kVDC
- Output/output isolation 1kVDC
- Power sharing on outputs
- Efficiency to 80%
- Power density 0.85W/cm^3
- UL 94V-0 package material
- Footprint from 1.17cm^2
- 5V & 12V input
- One 5V output (V1)
- 3.3V, 5V, 9V, 12V and 15V output (V2)
- No heatsink required
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 1.6 million hours
- Custom solutions available
- PCB mounting

DESCRIPTION

The NMD series of DC/DC converters are ideally suited to applications where a potential difference exists between loads, e.g. motor control circuits. The twin outputs offer cost and space savings by consolidating two DC/DC converters into one package. All of the rated power may be drawn from a single output provided the total load does not exceed 1 watt.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage 1	Output Voltage 2	Output Current 1	Output Current 2	Efficiency	MTTF[1]	Package Style
	V	V	V	mA	mA	%	kHrs	
NMD050503DC	5	5	3.3	100	152	70	1615	DIP
NMD050505DC	5	5	5	100	100	70	1615	
NMD050509DC	5	5	9	100	56	80	669	
NMD050512DC	5	5	12	100	42	80	339	
NMD050515DC	5	5	15	100	34	80	187	
NMD050503SC	5	5	3.3	100	152	70	1615	SIP
NMD050505SC	5	5	5	100	100	70	1615	
NMD050509SC	5	5	9	100	56	80	669	
NMD050512SC	5	5	12	100	42	80	339	
NMD050515SC	5	5	15	100	34	80	187	
NMD120505DC	12	5	5	100	100	70	489	DIP
NMD120509DC	12	5	9	100	56	80	343	
NMD120512DC	12	5	12	100	42	80	229	
NMD120515DC	12	5	15	100	34	80	148	
NMD120505SC	12	5	5	100	100	70	489	SIP
NMD120509SC	12	5	9	100	56	80	343	
NMD120512SC	12	5	12	100	42	80	229	
NMD120515SC	12	5	15	100	34	80	148	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5.0	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated power[2]	T_A=0°C to 125°C			1.0	W
Voltage set point accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load regulation	10% load to rated load, 3.3V output types			15	%
	10% load to rated load, 5V output types			15	
	10% load to rated load, 9V output types			10	
	10% load to rated load, 12V output types			10	
	10% load to rated load, 15V output types			10	
Ripple and noise	BW=DC to 20MHz, all output types			75	mV p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NMD05 types	7V
Input voltage V_{IN}, NMD12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating curve.
3. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

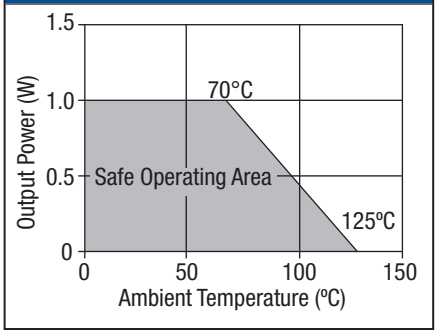
RoHS COMPLIANT 2002/95/EC

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	1			GΩ

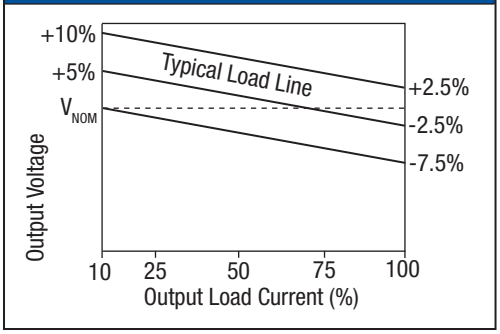
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		100		kHz

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	ºC
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

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For a part holding no specific agency approvals, such as the NMD series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

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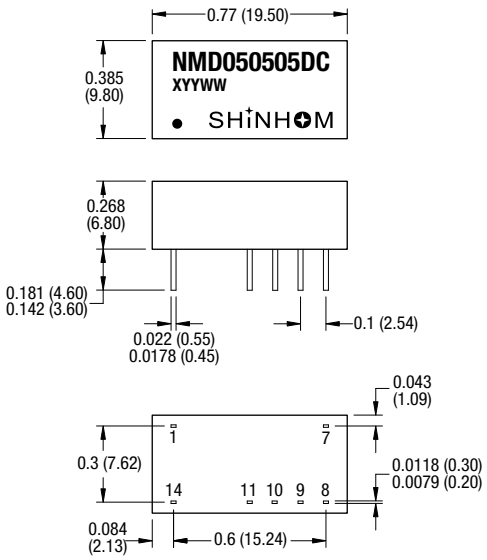
This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

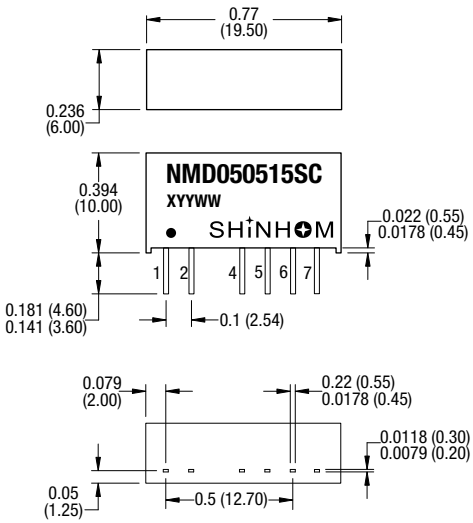
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.3g (DIP & SIP)

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	$-V_{IN}$
7	NC
8	$-V_{OUT2}$
9	$+V_{OUT2}$
10	$-V_{OUT1}$
11	$+V_{OUT1}$
14	$+V_{IN}$

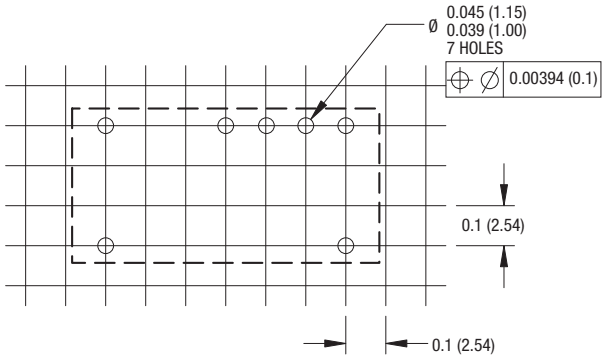
PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
4	$+V_{OUT1}$
5	$-V_{OUT1}$
6	$+V_{OUT2}$
7	$-V_{OUT2}$

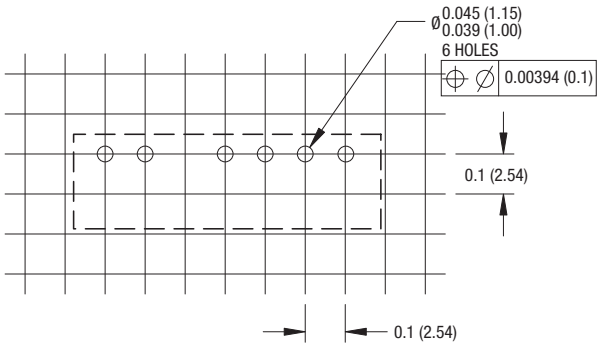
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

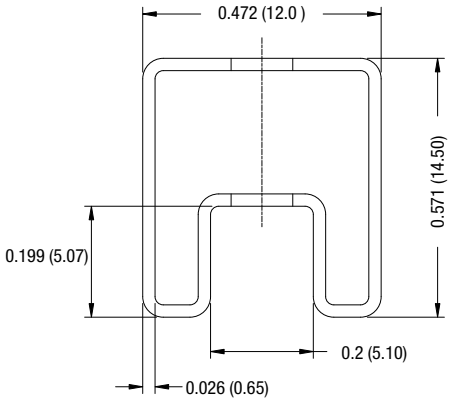


7 Pin SIP Package

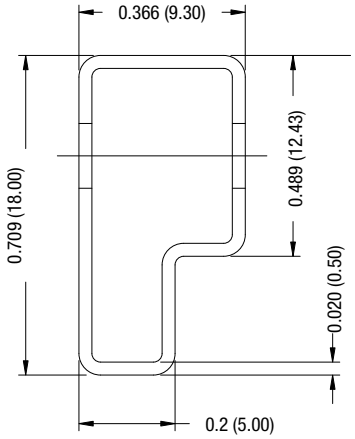


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

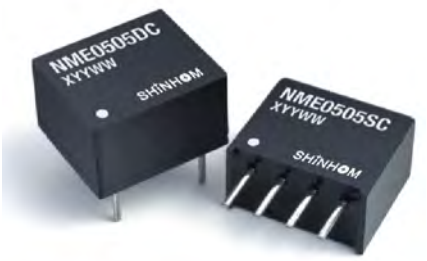
RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NME 5V & 12V SERIES

Isolated 1W Single Output DC/DC Converters



FEATURES

- RoHS compliant
- Single isolated output
- 1kVDC isolation
- Efficiency up to 80%
- Wide temperature performance at full 1 watt load, –40°C to 85°C
- Power density 1.53W/cm^3
- UL 94V-0 package material
- Footprint from 0.69cm^2
- Industry standard pinout
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- No heatsink required
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.4 million hours
- Custom solutions available
- Pin compatible with LME & NML series
- PCB mounting

DESCRIPTION

The NME series of DC/DC Converters is particularly suited to isolating and/or converting DC power rails. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist. The wide temperature range guarantees startup from –40°C and full 1 watt output at 85°C. For lower ripple, refer to output ripple reduction section.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	V	V	mA	mA	%	pF	kHrs	
NME0505DC	5	5	200	289	69	30	2414	DIP
NME0509DC	5	9	111	260	77	37	1173	
NME0512DC	5	12	83	256	78	33	633	
NME0515DC	5	15	66	250	80	40	360	
NME0524DC	5	24	42	248	80	48	290	
NME0505SC	5	5	200	289	69	30	2414	SIP
NME0509SC	5	9	111	260	77	37	1173	
NME0512SC	5	12	83	256	78	33	633	
NME0515SC	5	15	66	250	80	40	360	
NME0524SC	5	24	42	248	80	48	290	
NME1205DC	12	5	200	120	69	33	620	DIP
NME1209DC	12	9	111	115	74	48	488	
NME1212DC	12	12	83	105	76	55	360	
NME1215DC	12	15	66	110	75	52	252	
NME1205SC	12	5	200	120	69	33	620	SIP
NME1209SC	12	9	111	115	74	48	488	
NME1212SC	12	12	83	110	76	55	360	
NME1215SC	12	15	66	111	75	52	252	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5.0	5.5	V
	Continuous operation, 12V input types	10.8	12.0	13.2	
Reflected ripple current			26	48	mA p-p

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40°C to 120°C			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, 5V output types		14	15	%
	10% load to rated load, 9V output types		9	10	
	10% load to rated load, 12V output types		7.5	9.5	
	10% load to rated load, 15V output types		7.0	8.5	
	10% load to rated load, 24V output types		5.5	7.5	
Ripple and Noise	BW=DC to 20MHz, 5V output types		85	110	mV p-p
	BW=DC to 20MHz, 9V output types		60	75	
	BW=DC to 20MHz, 12V output types		50	65	
	BW=DC to 20MHz, 15V output types		40	55	
	BW=DC to 20MHz, 24V output types		140	180	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	450mW
Input voltage V_{IN}, NME05 types	7V
Input voltage V_{IN}, NME12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating curve.
3. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

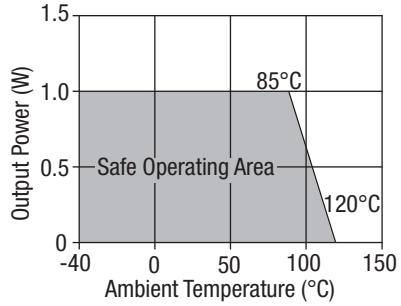
RoHS COMPLIANT 2002/95/EC

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 1000VDC		10		GΩ

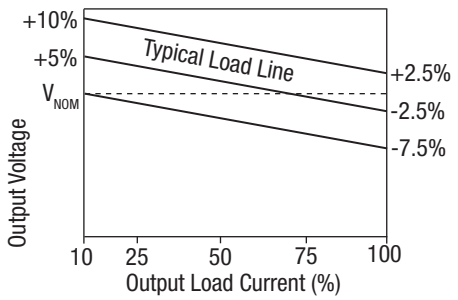
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		110		kHz
	12V input types		145		

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types			41	
	All other output types			32	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NME series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NME series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NME series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

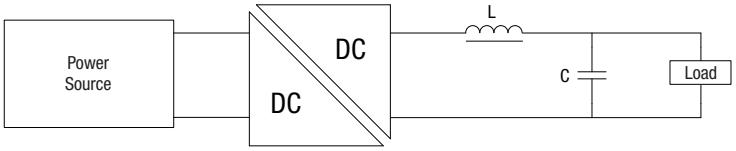
OUTPUT RIPPLE REDUCTION

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

Component selection

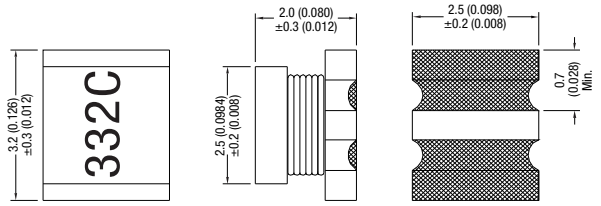
Capacitor: Ceramic chip capacitors are recommended. It is required that the ESR (Equivalent Series Resistance) should be as low as possible, X7R types are recommended. The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC/DC converter.

Inductor: The rated current of the inductor should not be less than that of the output of the DC/DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC/DC converter. The SRF (Self Resonant Frequency) should be >20MHz.

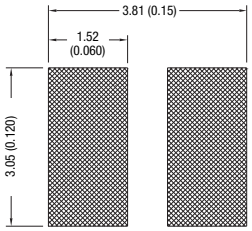


	Inductor			Capacitor		
	L, µH	Through Hole	SMD	C, µF	Size	V rating, V
5V output types	10	22R103C	82103C	4.70	1206	10
9V output types	47	22R473C	82473C	1.00	1206	25
12V output types	68	22R683C	82683C	0.47	0805	25
15V output types	100	22R104C	82104C	0.47	0805	25

SMD option 8200 Inductor Series Mechanical Dimensions

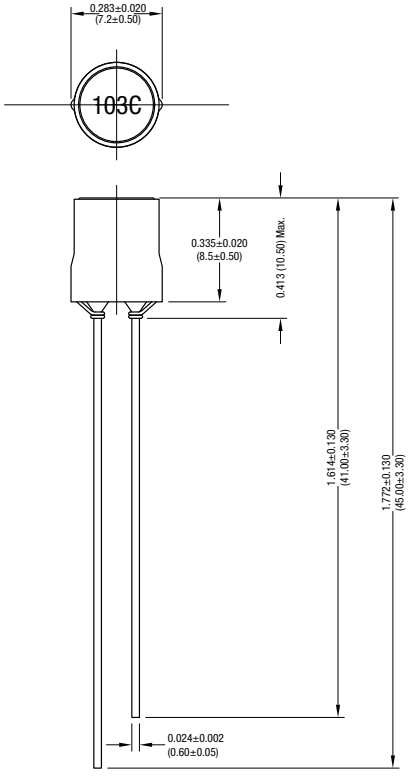


Recommended pad layout

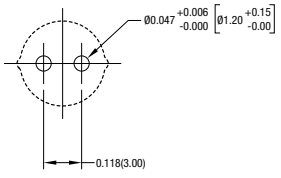


All dimensions in inches (mm).

Through hole option 2200R Inductor Series Mechanical Dimensions



Recommended footprint



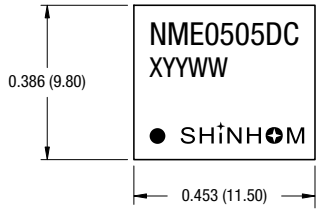
All dimensions in inches (mm).

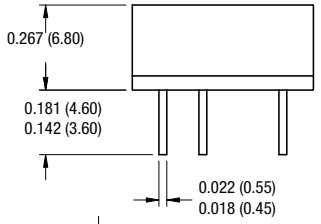
For more information please visit www.cd4power.com

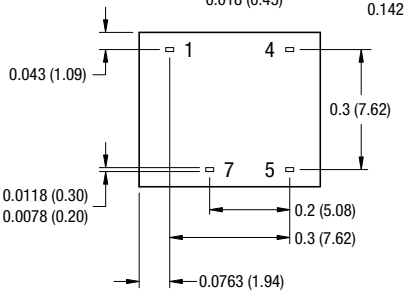
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

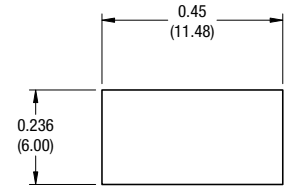
DIP Package

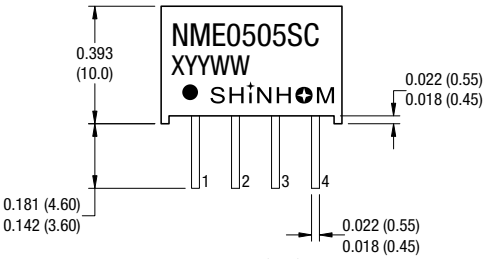


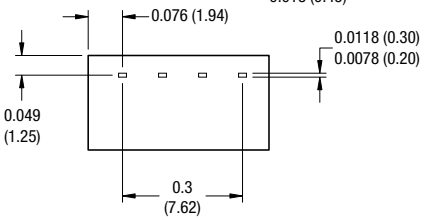




SIP Package







All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 1.30g (SIP) 1.48g (DIP)

PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	-V_{IN}
4	+V_{IN}
5	+V_{OUT}
7	-V_{OUT}

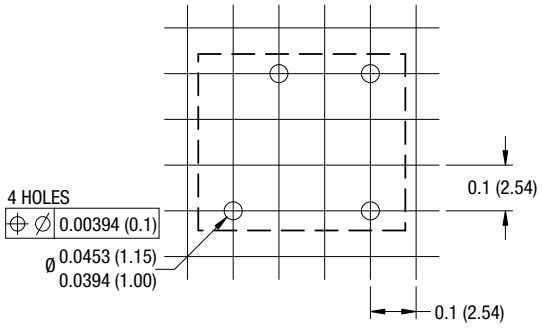
PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-V_{IN}
2	+V_{IN}
3	-V_{OUT}
4	+V_{OUT}

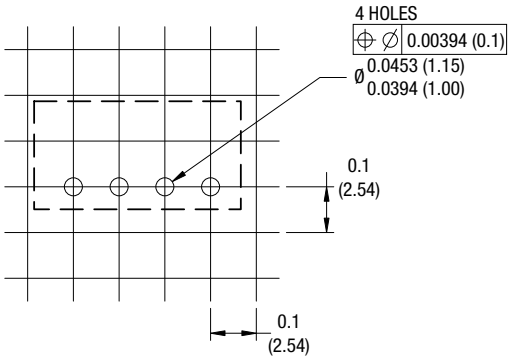
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

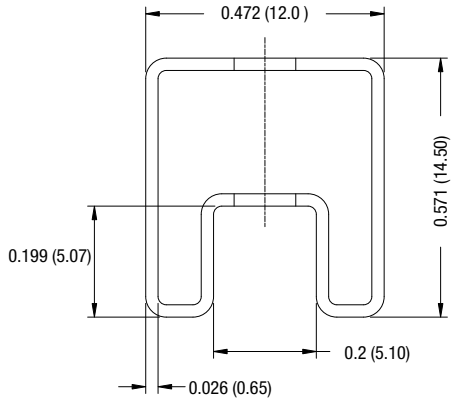


4 Pin SIP Package

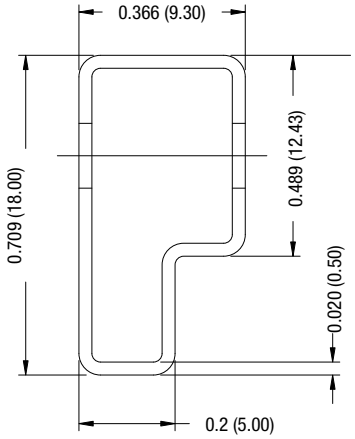


TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (8 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (4 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 35

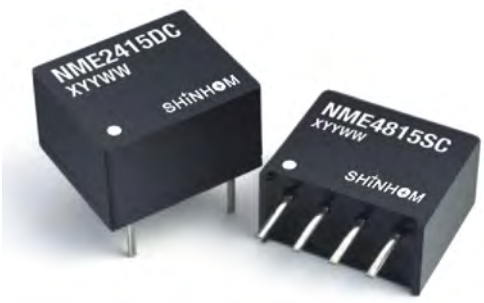
RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NME 24V & 48V SERIES

Isolated 1W Single Output DC/DC Converters



FEATURES

- RoHS Compliant
- Single Isolated Output
- 1kVDC Isolation
- Efficiency up to 80%
- Power Density 1.45W/cm^3
- UL 94V-0 Package Material
- Footprint from 0.69cm^2
- Industry Standard Pinout
- 24V & 48V Input
- 5V, 9V, 12V and 15V Output
- No Heatsink Required
- Internal SMD Construction
- Fully Encapsulated with Toroidal Magnetics
- No External Components Required
- Custom Solutions Available
- Pin Compatible with LME Series

DESCRIPTION

The NME series of DC/DC Converters is particularly suited to isolating and/or converting DC power rails. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist.

SELECTION GUIDE

Order Code	Nominal Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Efficiency %	Isolation Capacitance pF	MTTF[1] kHrs	Package Style
NME2405DC	24	5	200	70	40	201	DIP
NME2409DC	24	9	111	75	59	185	
NME2412DC	24	12	83	80	78	163	
NME2415DC	24	15	66	80	79	136	
NME2405SC	24	5	200	70	40	201	SIP
NME2409SC	24	9	111	75	59	185	
NME2412SC	24	12	83	80	78	163	
NME2415SC	24	15	66	80	79	136	
NME4805DC	48	5	200	70	32	213	DIP
NME4809DC	48	9	111	75	50	194	
NME4812DC	48	12	83	80	76	164	
NME4815DC	48	15	66	80	75	140	
NME4805SC	48	5	200	70	32	213	SIP
NME4809SC	48	9	111	75	50	194	
NME4812SC	48	12	83	80	76	164	
NME4815SC	48	15	66	80	75	140	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 24V input types	21.6	24	26.4	V
	Continuous operation, 48V input types	43.2	48	52.8	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=0°C to 70°C			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}			1.2	%/%
Load Regulation[2]	10% load to rated load, 5V output types			15	%
	10% load to rated load, all other output types			10	
Ripple and Noise	BW=DC to 20MHz, all output types			150	mV p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NME24 types	28V
Input voltage V_{IN}, NME48 types	54V

RoHS COMPLIANT 2002/95/EC

25

For full details go to www.cd4power.com/rohs

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating curve.
3. Supply voltage must be disconnected at the end of the short circuit duration.

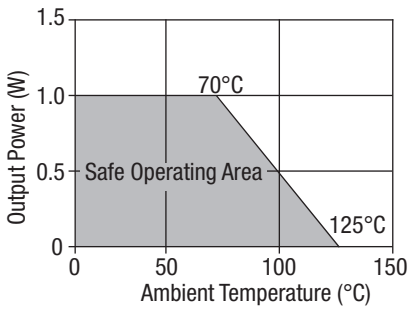
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	1			GΩ

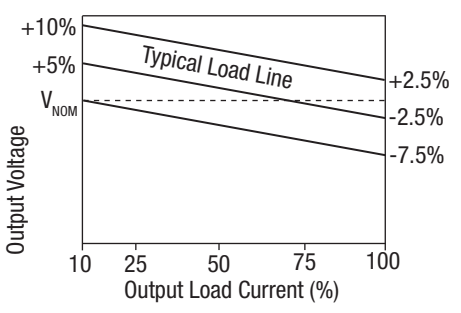
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All types		100		kHz

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NME series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NME series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

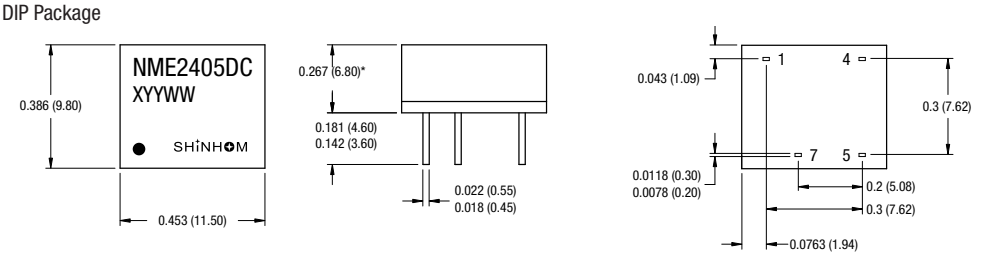
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NME series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

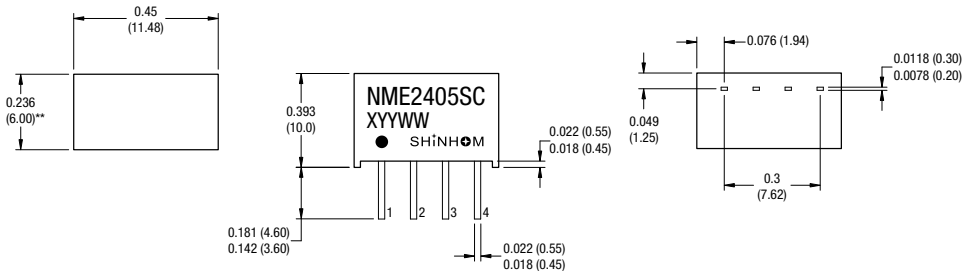
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



* 0.303 (7.70) for 48V variants

** 0.3 (7.50) for 48V variants

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 1.48g (DIP) 1.30g (SIP)

PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	-V_{IN}
4	+V_{IN}
5	+V_{OUT}
7	-V_{OUT}

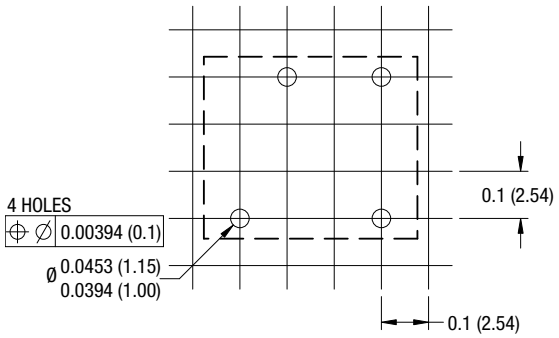
PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-V_{IN}
2	+V_{IN}
3	-V_{OUT}
4	+V_{OUT}

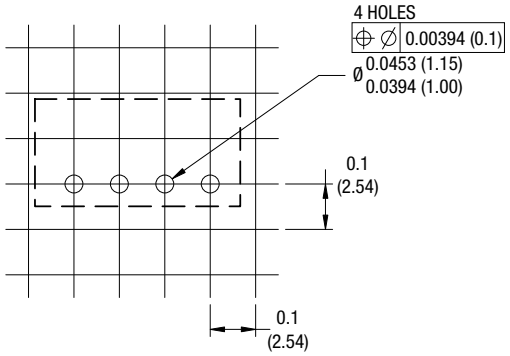
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

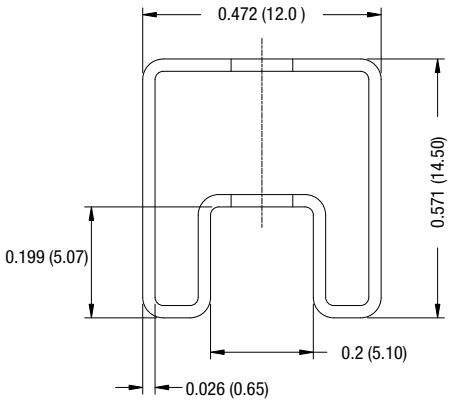


4 Pin SIP Package

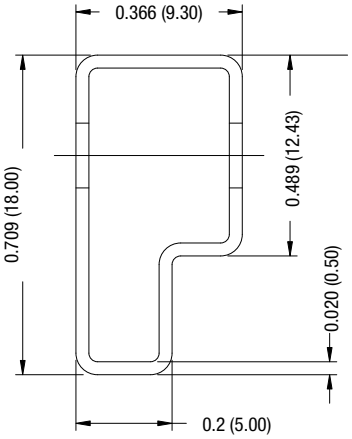


TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (8 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (4 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 35

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

FEATURES

- RoHS compliant
- Output regulation <1.5%
- Output programmable
- Power density 0.85W/cm^3
- Single isolated output
- SIP & DIP package styles
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- 1kVDC isolation
- 5V, 12V, 24V & 48V input
- 5V, 9V, 12V & 15V output
- SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.4 million hours
- PCB mounting

DESCRIPTION

The NMF series of DC/DC converters is used where a tightly regulated supply is required. They are ideal for situations where the intput voltage is not tightly controlled. The output trim pin makes the device particularly suitable for applications requiring a programmable output voltage. The 5V output version can be used to give a regulated output, adjustable between 1.2V and 5.0V with a single resistor. The single rail regulated output makes the ideal choice to power sensors, such as pressure transducers, hall effect sensors and mass airflow sensors.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Power Out	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	V	V	mA	mW	%	pF	kHrs	
NMF0505DC	5	5	100	500	50	37	1307	DIP
NMF0509DC	5	9	100	900	62	42	825	
NMF0512DC	5	12	83	1000	62	46	512	
NMF0515DC	5	15	67	1000	62	52	316	
NMF0505SC	5	5	100	500	50	37	1307	SIP
NMF0509SC	5	9	100	900	62	42	825	
NMF0512SC	5	12	83	1000	62	46	512	
NMF0515SC	5	15	67	1000	62	52	316	
NMF1205SC	12	5	100	500	50	62	456	DIP
NMF1209SC	12	9	100	900	62	82	379	
NMF1212SC	12	12	83	1000	62	98	290	
NMF1215SC	12	15	67	1000	62	108	218	
NMF1205SC	12	5	100	500	50	62	456	SIP
NMF1209SC	12	9	100	900	62	82	379	
NMF1212SC	12	12	83	1000	62	98	290	
NMF1215SC	12	15	67	1000	62	108	218	
NMF2405DC	24	5	100	500	50	69	843	DIP
NMF2409DC	24	9	100	900	62	106	613	
NMF2412DC	24	12	83	1000	62	129	422	
NMF2415DC	24	15	67	1000	62	151	279	
NMF2405SC	24	5	100	500	50	69	843	SIP
NMF2409SC	24	9	100	900	62	106	613	
NMF2412SC	24	12	83	1000	62	129	422	
NMF2415SC	24	15	67	1000	62	151	279	
NMF4805DC	48	5	100	500	50	51	200	DIP
NMF4809DC	48	9	100	900	62	86	283	
NMF4812DC	48	12	83	1000	62	108	162	
NMF4815DC	48	15	67	1000	62	127	135	
NMF4805SC	48	5	100	500	50	51	200	SIP
NMF4809SC	48	9	100	900	62	86	283	
NMF4812SC	48	12	83	1000	62	108	162	
NMF4815SC	48	15	67	1000	62	127	135	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.75	5	5.25	V
	Continuous operation, 12V input types	11.4	12	12.6	
	Continuous operation, 24V input types	22.8	24	25.2	
	Continuous operation, 48V input types	45.6	48	50.4	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	450mW
Input voltage V_{IN}, NMF05 types	7V
Input voltage V_{IN}, NMF12 types	15V
Input voltage V_{IN}, NMF24 types	28V
Input voltage V_{IN}, NMF48 types	54V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage set point accuracy	100% load			5	%
Rated power [1]	T_A= 0°C to 70°C			1	W
Line regulation	High V_{IN} to low V_{IN}			0.25	%/%
Load regulation	10% load to rated load		0.9	1.5	%
Ripple & noise	BW=DC to 20MHz, all output types			60	mV p-p

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	0.1			GΩ

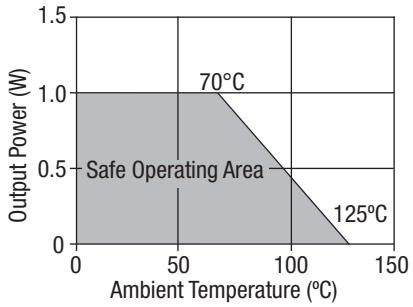
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		90		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Case temperature above ambient			38		
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



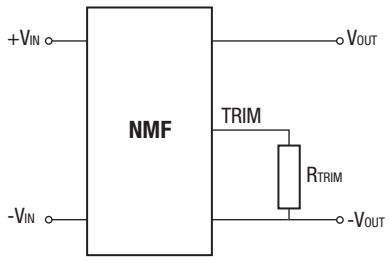
RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin over Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

OUTPUT VOLTAGE ADJUSTMENT (for 5V output variants)

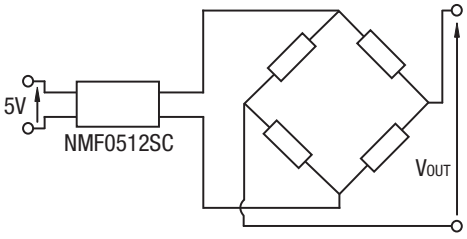
The trimming (adjust) input on the device allows output voltage adjustment from 1.2V to 3.3VDC by using a resistor as shown here. The table below provides R_{TRIM} values for the most commonly required output voltages. For applications not requiring the TRIM function, this pin must be left unconnected for normal regulated output.



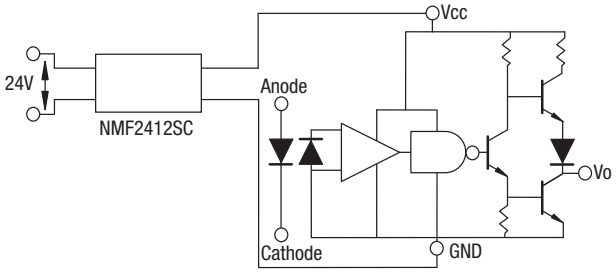
$V_{OUT\ SET}$ (V)	R_{TRIM} (Ω)
1.2	0
1.5	64
2.0	224
2.1	263
2.2	304
2.5	448
3.3	1071

TYPICAL APPLICATIONS

Pressure sensor, or strain gauge equivalent circuit



Scmitt Trigger



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMF series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMF series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

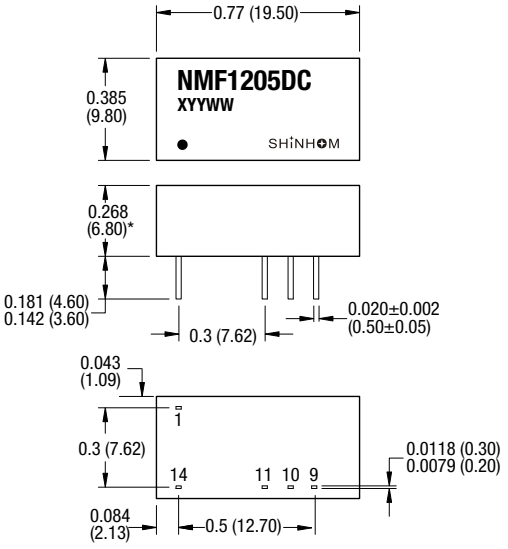
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMF series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

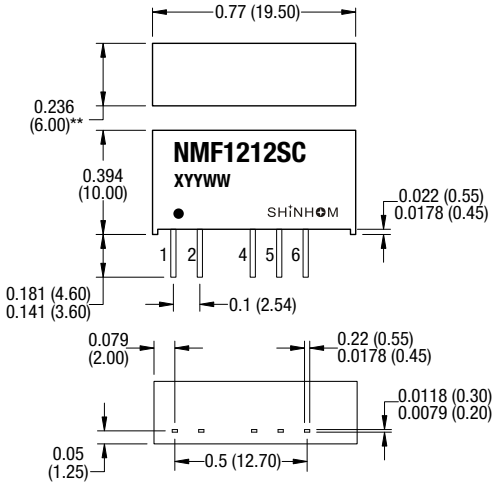
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* 0.303 (7.70) for 48V variants

** 0.295 (7.50) for 48V variants

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.4g (DIP) 2.1g (SIP) except for NMF24XX and NMF48XX DIP & SIP : 2.9g

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	-VIN
9	+VOUT
10	TRIM
11	-VOUT
14	+VIN

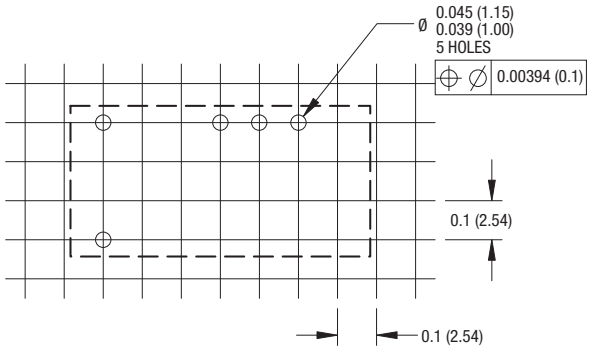
PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	+VIN
2	-VIN
4	-VOUT
5	TRIM
6	+VOUT

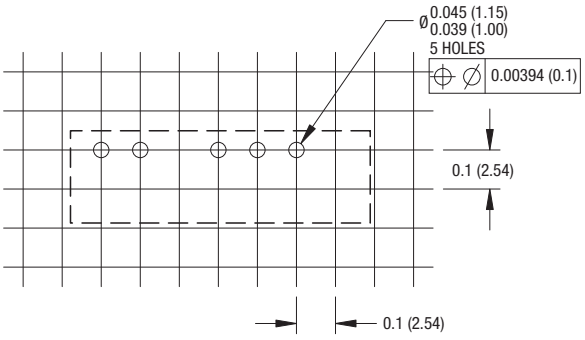
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



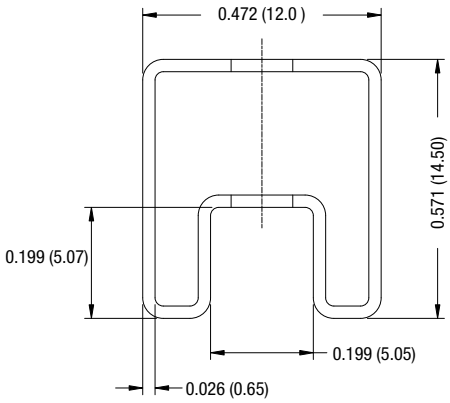
7 Pin SIP Package



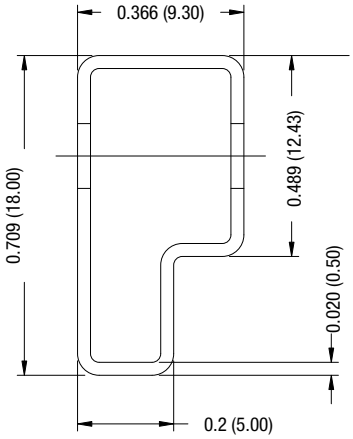
All dimensions in inches ±0.01 (mm ±0.25mm).

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



All dimensions in inches ±0.01 (mm ±0.25mm).
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

NMH SERIES

Isolated 2W Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency up to 86%
- Power density up to 1.44W/cm^3
- Wide temperature performance at full 2 watt load, –40°C to 85°C
- Dual output from a single input rail
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.46cm^2
- Industry standard pinout
- Power sharing on output
- 1kVDC isolation
- 5V, 12V, 24V & 48V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 1.5 million hours
- No electrolytic or tantalum capacitors

DESCRIPTION

The NMH series of industrial temperature range DC/DC converters are the standard buliding blocks for on-board point-of-use power systems. They are ideally suited for providing dual rail supplies on single rail boards with the added benefit of galvanic isolation to reduce circuit noise. All of the rated power may be drawn from a single pin provided the total load does not exceed 2 watts.

Pin compatibility with the NMA 1 watt series ensures minimal effort in upgrading distributed power systems.

RoHS COMPLIANT 2002/95/EC

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	(V)	(V)	(mA)	(mA)	%	pF	kHrs	
NMH0505DC	5	±5	±200	500	80	24	1574	DIP
NMH0509DC	5	±9	±111	494	81	28	663	
NMH0512DC	5	±12	±83	488	82	30	338	
NMH0515DC	5	±15	±67	476	84	33	187	
NMH0505SC	5	±5	±200	500	80	24	1574	SIP
NMH0509SC	5	±9	±111	494	81	28	663	
NMH0512SC	5	±12	±83	488	82	30	338	
NMH0515SC	5	±15	±67	476	84	33	187	
NMH1205DC	12	±5	±200	208	80	35	490	DIP
NMH1209DC	12	±9	±111	201	83	55	343	
NMH1212DC	12	±12	±83	198	84	63	229	
NMH1215DC	12	±15	±67	198	84	66	148	
NMH1205SC	12	±5	±200	208	80	35	490	SIP
NMH1209SC	12	±9	±111	201	83	55	343	
NMH1212SC	12	±12	±83	198	84	63	229	
NMH1215SC	12	±15	±67	198	84	66	148	
NMH2405DC	24	±5	±200	103	81	41	318	DIP
NMH2409DC	24	±9	±111	98	85	75	249	
NMH2412DC	24	±12	±83	97	86	95	183	
NMH2415DC	24	±15	±67	97	86	104	127	
NMH2405SC	24	±5	±200	103	81	41	318	SIP
NMH2409SC	24	±9	±111	98	85	75	249	
NMH2412SC	24	±12	±83	97	86	95	183	
NMH2415SC	24	±15	±67	97	86	104	127	
NMH4805DC	48	±5	±200	51	82	45	235	DIP
NMH4809DC	48	±9	±111	51	82	74	195	
NMH4812DC	48	±12	±83	49	85	90	152	
NMH4815DC	48	±15	±67	49	85	112	112	
NMH4805SC	48	±5	±200	51	82	45	235	SIP
NMH4809SC	48	±9	±111	51	82	74	195	
NMH4812SC	48	±12	±83	49	85	90	152	
NMH4815SC	48	±15	±67	49	85	112	112	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	
	Continuous operation, 24V input types	21.6	24	26.4	
	Continuous operation, 48V input types	43.2	48	52.8	
Reflected ripple current	5V input types		50		mA p-p
	12V input types		70		
	24V input types		130		
	48V input types		200		

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

OUTPUT CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Rated Power[1]	T_A=-40°C to 85°C			2	W
Voltage Set Point Accuracy	NMH0505DC/SC	-5		7.5	%
	All other types	-5		5	
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		5	10	%
	10% load to rated load, 9V output types		3	10	
	10% load to rated load, 12V output types				
	10% load to rated load, 15V output types				
Ripple and Noise	BW=DC to 20MHz, 5V output types		150	200	mV p-p
	BW=DC to 20MHz, 9V output types		100	150	
	BW=DC to 20MHz, 12V output types		80	150	
	BW=DC to 20MHz, 15V output types		70	150	

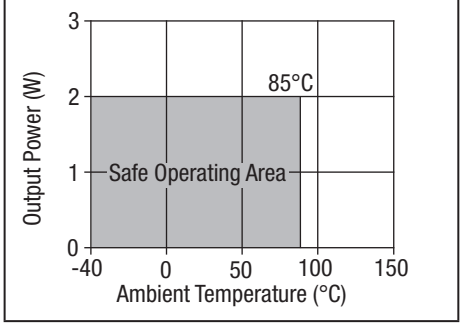
ABSOLUTE MAXIMUM RATINGS	
Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	300mW
Input voltage V_{IN}, NMH05 types	7V
Input voltage V_{IN}, NMH12 types	15V
Input voltage V_{IN}, NMH24 types	28V
Input voltage V_{IN}, NMH48 types	54V

ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500V	1	10		GΩ

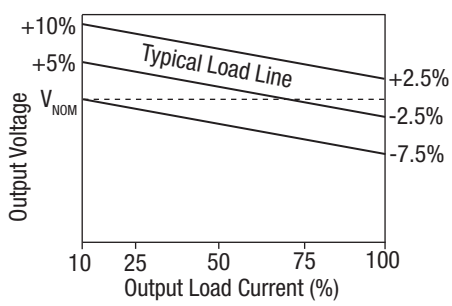
GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	5V input types		95		kHz
	12V input types		90		
	24V & 48V input types		80		

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types		30		
	12V output types		25		
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



1. See derating graph.
2. Supply voltage must be discontinued at the end of the short circuit duration.

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMH series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMH series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

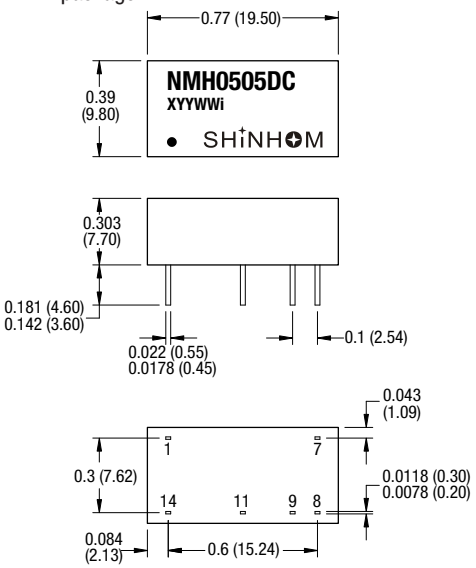
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMH series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

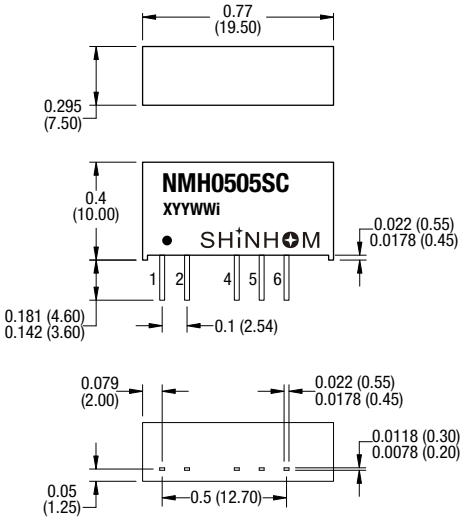
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.85g (DIP) 2.76g (SIP)

PIN CONNECTIONS - 14 PIN DIP

Pin	Function
1	$-V_{IN}$
7	NC
8	0V
9	$+V_{OUT}$
11	$-V_{OUT}$
14	$+V_{IN}$

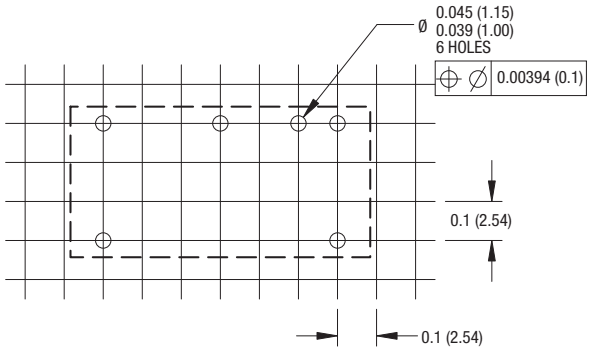
PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
4	$-V_{OUT}$
5	0V
6	$+V_{OUT}$

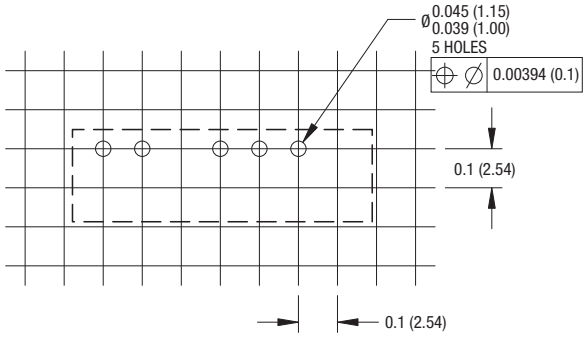
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

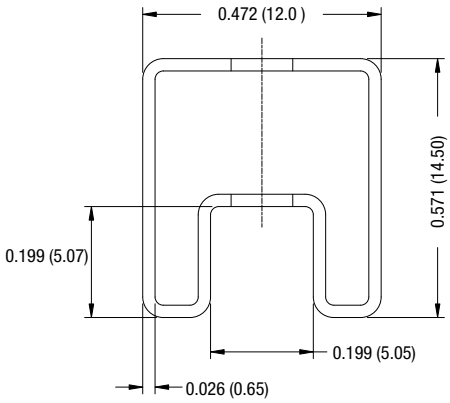


7 Pin SIP Package

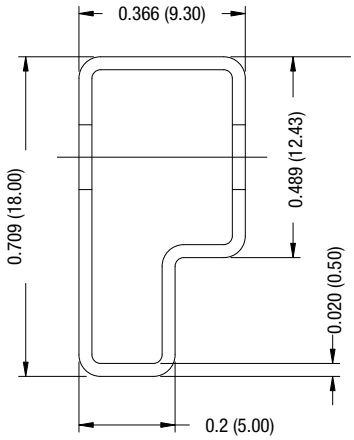


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

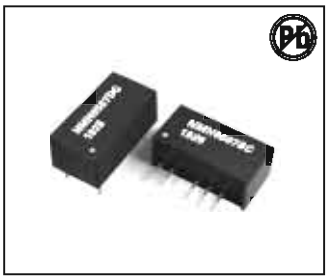
Tube Quantity : 25

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

2W DUAL OUTPUT DC–DC CONVERTER



INSTRUCTIONS:

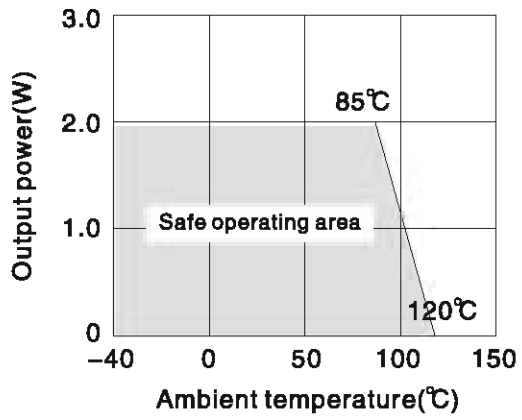
- Good temperature characteristic
- Isolation voltage 1500VDC
- Small SIP/DIP package
- International standard pins
- Internal placement design structure
- Comply with RoHS directive
- When in use, the load must not be less than 10%

ELECTRICAL CHARACTERISTICS@25℃

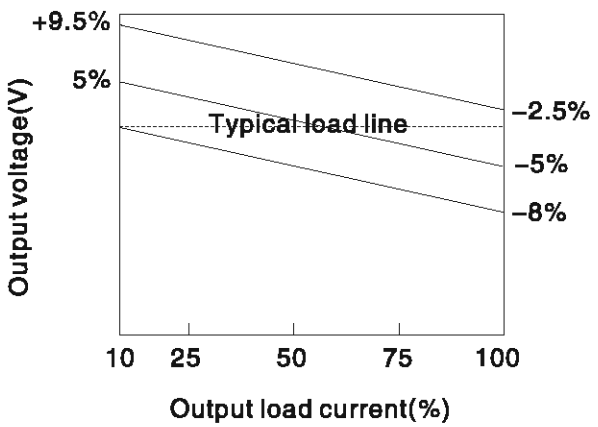
Part No./Customer P/N	NMH0507DC/AM2D–0507DZ
Input range	4.5~5.5
Output(Voltage,current)	±7.2VDC/±139mA
Output current	±14mA
Efficiency	78TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	–7.5（MIN）,+2.5(MAX)
Load regulation	15(TYP) 20(MAX)
Voltage regulation	1(TYP) ±1.2（MAX）
Output ripple + noise (20MHz bandwidth, nominal voltage input 100% load)	50 mV(TYP) 80 mV(MAX)
Switching frequency	100KHz(TYP)
Output short circuit protection	1S（Max）
Temperature drift coefficient (nominal voltage input 100% load, –40℃ ~ +85℃)	±0.03%/℃(MAX)
Store humidit	95%(MAX)
Working temperature (temperature ⩾85℃ for derating use)	–40℃ ~ 85℃
Storage temperature	–55℃ ~ 125℃
The shell heats up when the product is working	35℃（TYP）
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble–free time (TA=25℃)	1 million hours
Insulation resistance (insulation voltage 1000VDC)	1000MΩ(MIN)
The shell material	Flame–retardant heat–resistant plastics(UL94–V0)

TEMPERATURE DROP CURVE OF OUTPUT POWER

TEMPERATURE DERA TING ORAPHS



TOLERANCE ENVELOPES



2W DUAL OUTPUT DC–DC CONVERTER

PRECAUTIONS FOR USE

1.OUTPUT LOAD REQUIREMENT:

In order to ensure that the module can work efficiently and reliably, the minimum output load of the module can not be less than 10% of the rated load when in use, and the product is strictly prohibited to use without load!!If your power requirement is really small, please parallel a resistor at the output end. It is recommended that the resistance value is equivalent to 10% of the rated power, or choose our product with lower power level.

2.RECOMMENDED CIRCUIT:

If further reduction of input–output ripple is required, a capacitive filtering network can be connected to the input–output terminal, as shown in the application circuit (figure 1)

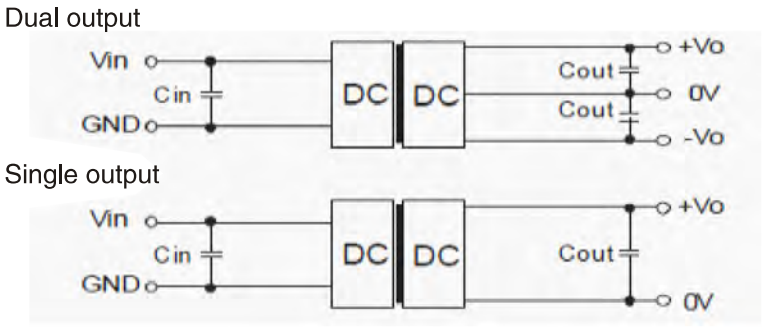


Figure 1

Vin (VDC)	Cin (uF)	Single output voltage (VDC)	Cout (uF)	Lout (uH)	Dual output voltage (VDC)	Cout (uF)	Lout (uH)
3.3/5	4.7	3.3	10	22	±5	4.7	47
12	2.2	5	10	22	±9	2.2	47
15	2.2	9	4.7	47	±12	1	150
24	1	12	2.2	47	±15	0.47	100
48	1	15/24	1	68	±24	0.47	100
Please choose a low ESR capacitor. For applications where the actual output power is less than 0.5W, external capacitance is not recommended							

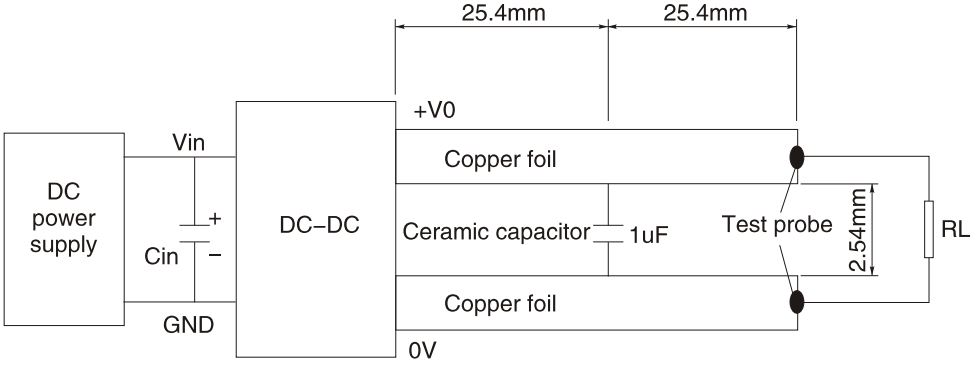
Capacity load table (table 1)

However, appropriate filter capacitance should be selected.If the capacitance is too large, it may cause startup problems.For the selection of output capacitance, please refer to the capacitive load table

3.THIS PRODUCT CAN NOT BE USED IN PARALLEL AND DOES NOT SUPPORT HOT PLUG

PRODUCT RIPPLE & NOISE TESTING

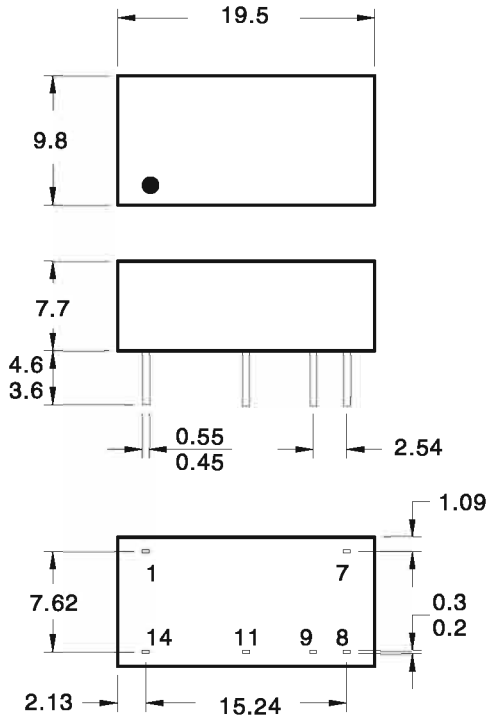
The ripple noise test of the product is carried out according to the following circuit.The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



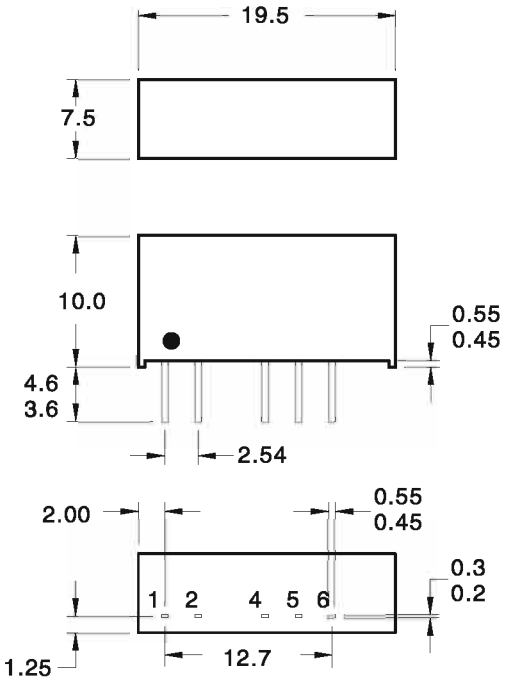
2W DUAL OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



All dimensions in mm ± 0.25mm.All pins on a 2.54mm pitch and within ± 0.25mm of true position
Weight: 2.85g(DIP) 2.76g(SIP)

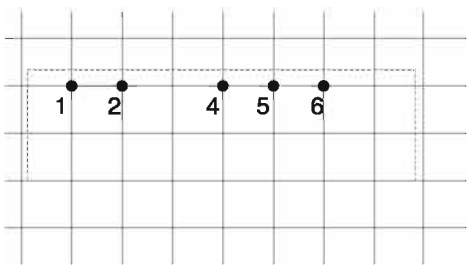
PIN WAY

PINS	DIP
14	Vin
1	GND
8	0V
9	+V0
11	–V0
7	NC

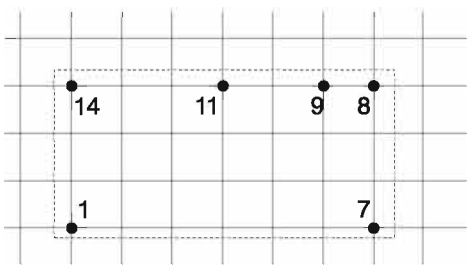
PINS	SIP
1	Vin
2	GND
4	–V0
5	0V
6	+V0

RECOMMENDED PAD

SIP

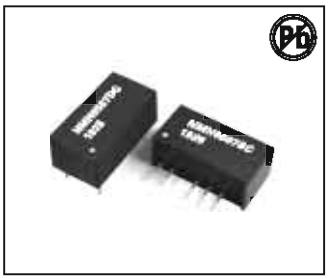


DIP



2.54mm*2.54mm/grid

2W SINGLE OUTPUT DC–DC CONVERTER



INSTRUCTIONS:

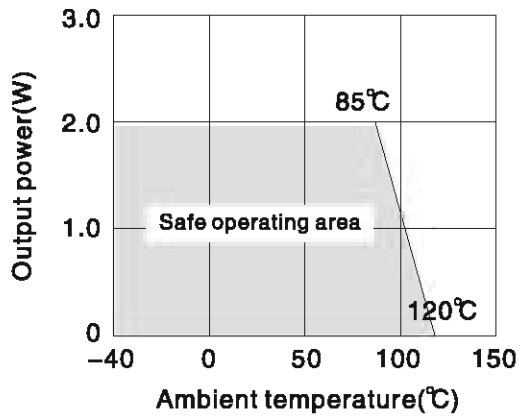
- Good temperature characteristic
- Isolation voltage 1500VDC
- Small SIP/DIP package
- International standard pins
- Internal placement design structure
- Comply with RoHS directive
- When in use, the load must not be less than 10%

ELECTRICAL CHARACTERISTICS@25℃

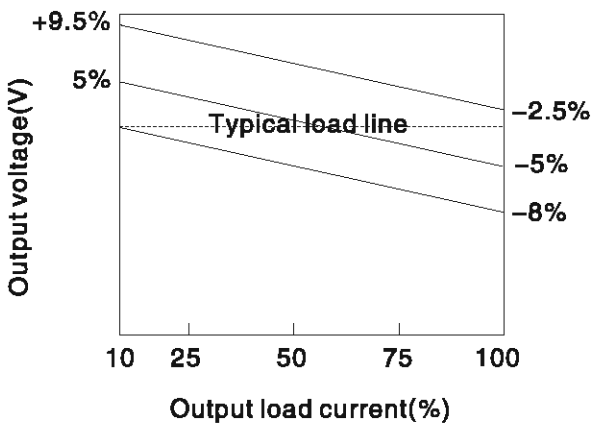
Part No./Customer P/N	NMH0507SC/AM2D–0507SZ
Input range	4.5~5.5
Output(Voltage,current)	7.2VDC/278mA
Output current	28mA
Efficiency	80TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	–7.5（MIN）,+2.5(MAX)
Load regulation	15(TYP) 20(MAX)
Voltage regulation	1(TYP) ±1.2（MAX）
Output ripple + noise (20MHz bandwidth, nominal voltage input 100% load)	100 mV(TYP) 150 mV(MAX)
Switching frequency	100KHz(TYP)
Output short circuit protection	1S（Max）
Temperature drift coefficient (nominal voltage input 100% load, –40℃ ~ +85℃)	±0.03%/℃(MAX)
Store humidit	95%(MAX)
Working temperature (temperature ⩾85℃ for derating use)	–40℃ ~ 85℃
Storage temperature	–55℃ ~ 125℃
The shell heats up when the product is working	35℃（TYP）
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble–free time (TA=25℃)	1 million hours
Insulation resistance (insulation voltage 1000VDC)	1000MΩ(MIN)
The shell material	Flame–retardant heat–resistant plastics(UL94–V0)

TEMPERATURE DROP CURVE OF OUTPUT POWER

TEMPERATURE DERA TING ORAPHS



TOLERANCE ENVELOPES



2W SINGLE OUTPUT DC-DC CONVERTER

PRECAUTIONS FOR USE

1.OUTPUT LOAD REQUIREMENT:

In order to ensure that the module can work efficiently and reliably, the minimum output load of the module can not be less than 10% of the rated load when in use, and the product is strictly prohibited to use without load!!If your power requirement is really small, please parallel a resistor at the output end. It is recommended that the resistance value is equivalent to 10% of the rated power, or choose our product with lower power level.

2.RECOMMENDED CIRCUIT:

If you want to further reduce the input-output ripple, you can connect an "LC" filtering network at the input-output end. The application circuit is shown in figure 1

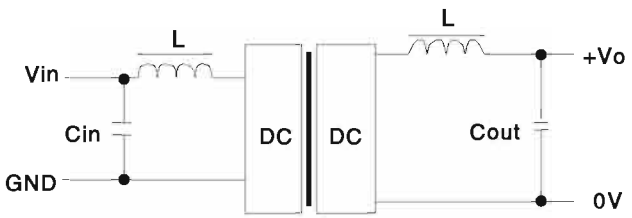


Figure 1

Vin (VDC)	Cin (uF)	Single output voltage (VDC)	Cout (uF)	Lout (uH)	Dual output voltage (VDC)	Cout (uF)	Lout (uH)
3.3/5	4.7	3.3	10	22	±5	4.7	47
12	2.2	5	10	22	±9	2.2	47
15	2.2	9	4.7	47	±12	1	150
24	1	12	2.2	47	±15	0.47	100
48	1	15/24	1	68	±24	0.47	100
Please choose a low ESR capacitor. For applications where the actual output power is less than 0.5W, external capacitance is not recommended							

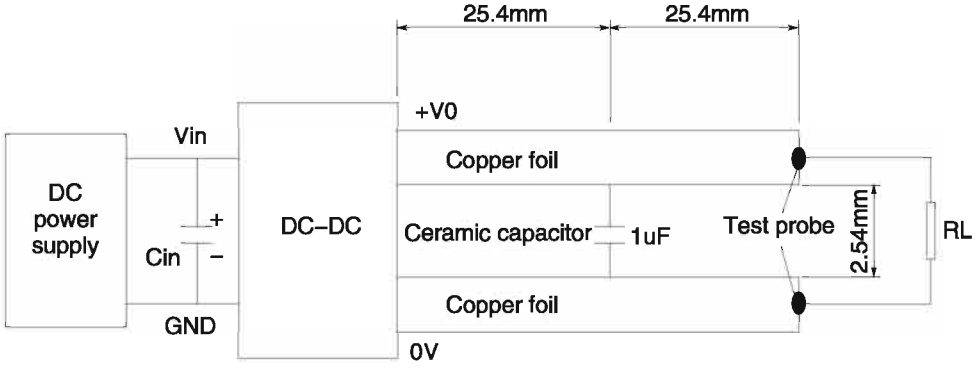
Capacity load table (table 1)

However, it should be noted that the selection of inductance value and the frequency of "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference.And choose the appropriate filter capacitance.If the capacitance is too large, it may cause startup problems.For the selection of output capacitance, please refer to the capacitive load table

3.THIS PRODUCT CAN NOT BE USED IN PARALLEL AND DOES NOT SUPPORT HOT PLUG

PRODUCT RIPPLE & NOISE TESTING

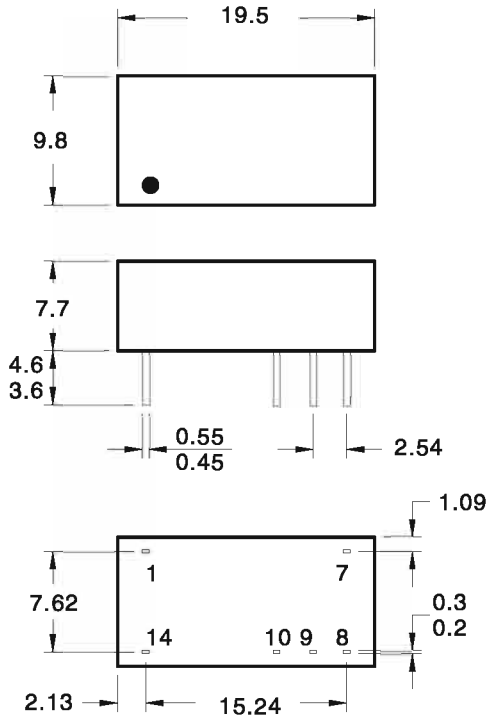
The ripple noise test of the product is carried out according to the following circuit.The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



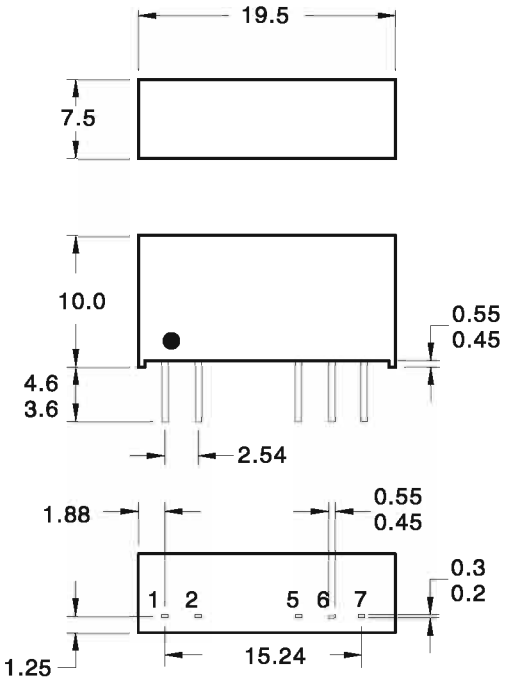
2W SINGLE OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



All dimensions in mm ± 0.25mm.All pins on a 2.54mm pitch and within ± 0.25mm of true position
Weight: 2.85g(DIP) 2.76g(SIP)

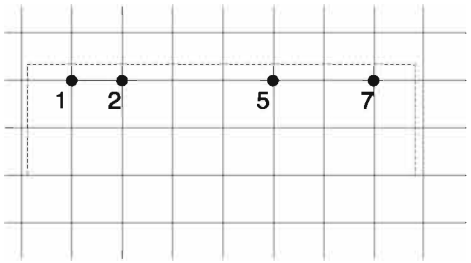
PIN WAY

PINS	DIP
14	Vin
1	GND
10	0V
8	+V0
7	NC

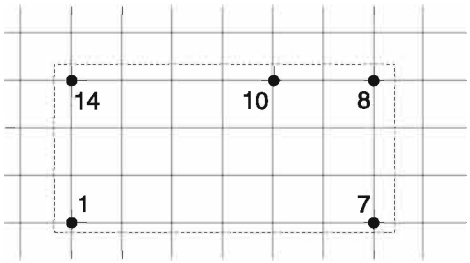
PINS	SIP
1	Vin
2	GND
5	0V
7	+V0

RECOMMENDED PAD

SIP

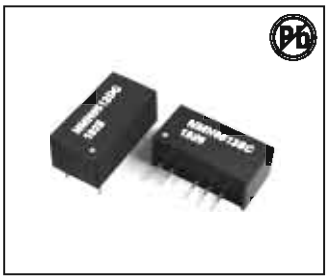


DIP



2.54mm*2.54mm/grid

2W SINGLE OUTPUT DC-DC CONVERTER



INSTRUCTIONS:

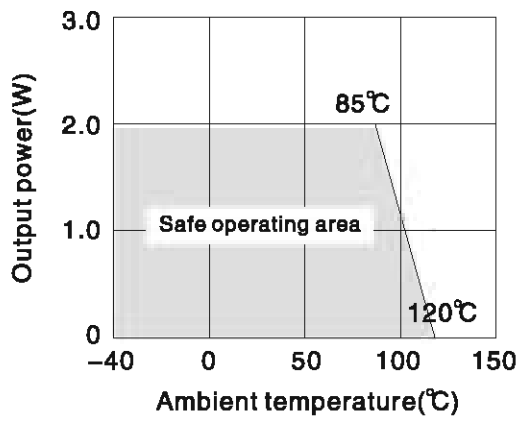
- Good temperature characteristic
- Isolation voltage 1500VDC
- Small SIP/DIP package
- International standard pins
- Internal placement design structure
- Comply with RoHS directive
- When in use, the load must not be less than 10%

ELECTRICAL CHARACTERISTICS@25℃

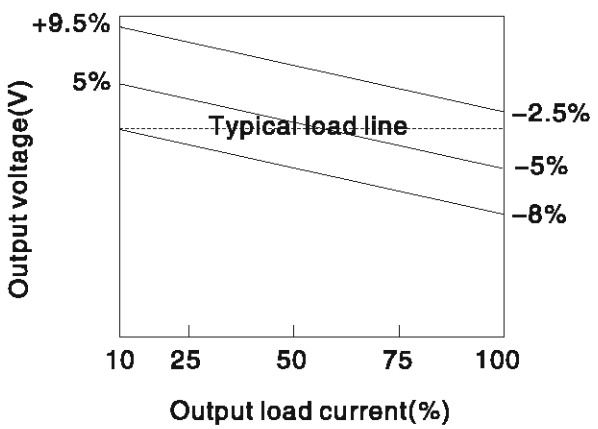
Part No./Customer P/N	NMH0512SC/AM2D-0512SZ
Input range	4.5~5.5
Output(Voltage,current)	12VDC/167mA
Output current	17mA
Efficiency	83TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	-7.5（MIN）,+2.5(MAX)
Load regulation	15(TYP) 20(MAX)
Voltage regulation	1(TYP) ±1.2（MAX）
Output ripple + noise (20MHz bandwidth, nominal voltage input 100% load)	50 mV(TYP) 80 mV(MAX)
Switching frequency	100KHz(TYP)
Output short circuit protection	1S（Max）
Temperature drift coefficient (nominal voltage input 100% load, -40℃ ~ +85℃)	±0.03%/℃(MAX)
Store humidit	95%(MAX)
Working temperature (temperature ≥85℃ for derating use)	-40℃~85℃
Storage temperature	-55℃~125℃
The shell heats up when the product is working	35℃（TYP）
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble-free time (TA=25℃)	1 million hours
Insulation resistance (insulation voltage 1000VDC)	1000MΩ(MIN)
The shell material	Flame-retardant heat-resistant plastics(UL94-V0)

TEMPERATURE DROP CURVE OF OUTPUT POWER

TEMPERATURE DERA TING ORAPHS



TOLERANCE ENVELOPES



2W SINGLE OUTPUT DC-DC CONVERTER

PRECAUTIONS FOR USE

1.OUTPUT LOAD REQUIREMENT:

In order to ensure that the module can work efficiently and reliably, the minimum output load of the module can not be less than 10% of the rated load when in use, and the product is strictly prohibited to use without load!!If your power requirement is really small, please parallel a resistor at the output end. It is recommended that the resistance value is equivalent to 10% of the rated power, or choose our product with lower power level.

2.RECOMMENDED CIRCUIT:

If you want to further reduce the input-output ripple, you can connect an "LC" filtering network at the input-output end. The application circuit is shown in figure 1

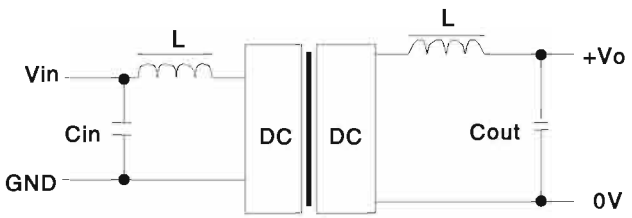


Figure 1

Vin (VDC)	Cin (uF)	Single output voltage (VDC)	Cout (uF)	Lout (uH)	Dual output voltage (VDC)	Cout (uF)	Lout (uH)
3.3/5	4.7	3.3	10	22	±5	4.7	47
12	2.2	5	10	22	±9	2.2	47
15	2.2	9	4.7	47	±12	1	150
24	1	12	2.2	47	±15	0.47	100
48	1	15/24	1	68	±24	0.47	100
Please choose a low ESR capacitor. For applications where the actual output power is less than 0.5W, external capacitance is not recommended							

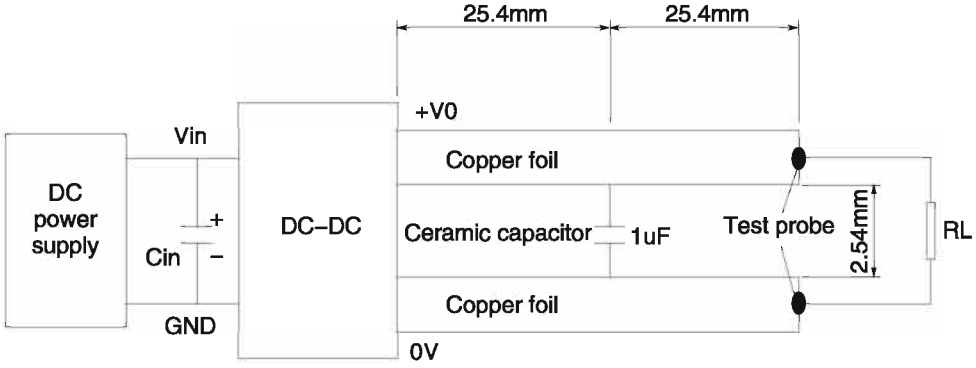
Capacity load table (table 1)

However, it should be noted that the selection of inductance value and the frequency of "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference.And choose the appropriate filter capacitance.If the capacitance is too large, it may cause startup problems.For the selection of output capacitance, please refer to the capacitive load table

3.THIS PRODUCT CAN NOT BE USED IN PARALLEL AND DOES NOT SUPPORT HOT PLUG

PRODUCT RIPPLE & NOISE TESTING

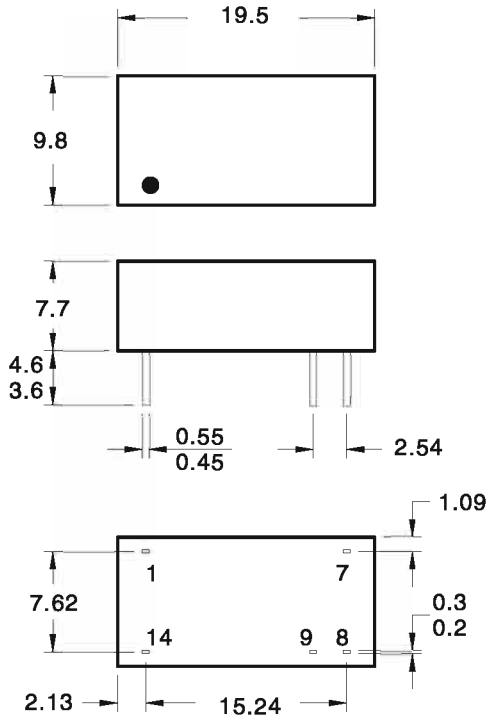
The ripple noise test of the product is carried out according to the following circuit.The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



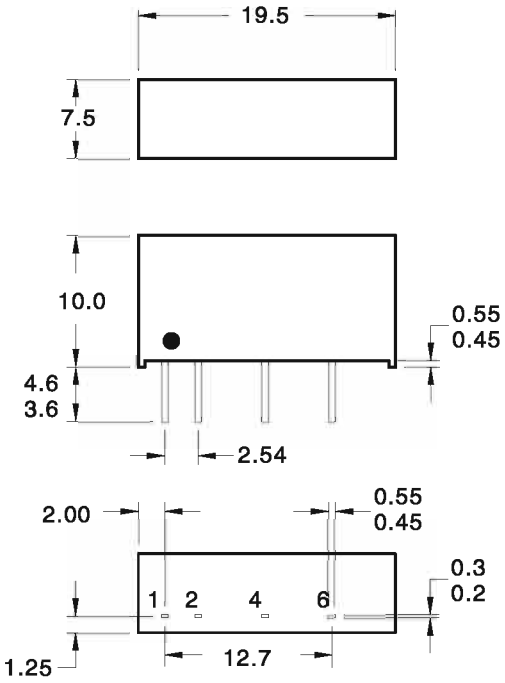
2W SINGLE OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



All dimensions in mm ± 0.25mm.All pins on a 2.54mm pitch and within ± 0.25mm of true position
Weight: 2.85g(DIP) 2.76g(SIP)

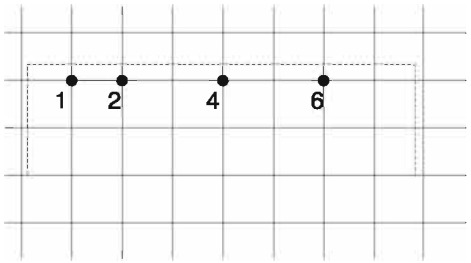
PIN WAY

PINS	DIP
14	Vin
1	GND
8	0V
9	+V0
7	NC

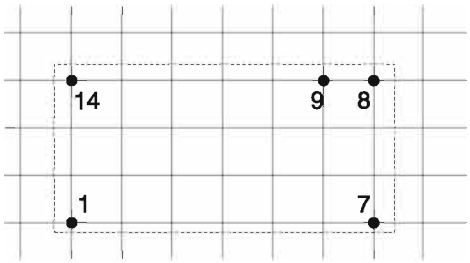
PINS	SIP
1	Vin
2	GND
4	0V
6	+V0

RECOMMENDED PAD

SIP



DIP



2.54mm*2.54mm/grid

NMJ SERIES

5.2kVDC Isolated 1W DC/DC Converters

FEATURES

- RoHS compliant
- UL60950 recognized
- Power density 0.42W/cm³
- Wide temperature performance at full 1 watt load, –40°C to 60°C
- Single and dual outputs
- UL 94V-0 package material
- No heatsink required
- Footprint 1.91cm²
- SIP package style
- 5.2kVDC isolation
- 3V, 5V & 12V input
- 3V, 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- Pin compatible with the NMV series SIP DC/DC converters
- MTTF up to 13 million hours
- Custom solutions available

PRODUCT OVERVIEW

The NMJ series are dual and single output DC/DC converters in a 7 pin SIP package style offering pin and functionality compatibility with the NMV series SIP DC/DC converters. The NMJ series is UL60950 recognized and suitable for applications where safety and miniaturisation are of paramount importance. Isolation barrier approved for supplementary/reinforced insulation - see page 2.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Ripple & Noise[4]	Efficiency (Min.)	Isolation Capacitance	MTTF[1]
	V	V	mA	mV p-p	%	pF	kHrs
NMJ0505SC	5	±5	±100	40	60	3.0	4950
NMJ0509SC	5	±9	±55	30	65	3.0	3832
NMJ0512SC	5	±12	±42	20	65	3.0	2770
NMJ0515SC	5	±15	±33	20	65	3.0	1903
NMJ1205SC	12	±5	±100	40	60	3.0	3688
NMJ1209SC	12	±9	±55	30	65	3.0	3029
NMJ1212SC	12	±12	±42	20	65	3.0	2324
NMJ1215SC	12	±15	±33	20	65	3.0	1682
NMJ0303SAC	3.3	3.3	303	70	66	3.0	13780
NMJ0503SAC	5	3.3	303	60	64	3.0	13460
NMJ0505SAC	5	5	200	50	68	3.0	13360
NMJ0509SAC	5	9	111	50	72	3.0	12700
NMJ0512SAC	5	12	83	50	71	3.0	11490
NMJ0515SAC	5	15	66	50	71	3.0	9980
NMJ1205SAC	12	5	200	50	69	3.0	8447
NMJ1209SAC	12	9	111	50	73	3.0	8176
NMJ1212SAC	12	12	83	50	73	3.0	7660
NMJ1215SAC	12	15	66	50	74	3.0	6950

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 3V input types	2.97	3.3	3.63	V
	Continuous operation, 5V input types	4.5	5	5.5	
	Continuous operation, 12V input types	10.8	12	13.2	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40ºC to 60ºC			1	W
Voltage Set Point Accuracy	See tolerance envelopes				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load regulation Single outputs	10% load to rated load, xx03		10.0	15.0	%
	10% load to rated load, 0505		7.0	10.0	
	10% load to rated load, 0509, 0512, 0515		6.0	10.0	
	10% load to rated load, 12xx		5.0	7.0	
Load regulation Dual outputs	10% load to rated load, 5V output types		10.0	15.0	%
	10% load to rated load, 9V output types		6.0	10.0	
	10% load to rated load, 12V output types		6.0	10.0	
	10% load to rated load, 15V output types		6.0	10.0	
Zero Load Power Consumption	All types		250		mW

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NMJ03 types	5V
Input voltage V_{IN}, NMJ05 types	7V
Input voltage V_{IN}, NMJ12 types	15V

1. Calculated using MIL-HDBK-217 FN2 calculation model with nominal input voltage at full load.
2. See derating graph.
3. Supply voltage must be discontinued at the end of the short circuit duration.
4. See ripple & noise test method.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	5200			VDC
Resistance	Viso= 500VDC		1		GΩ

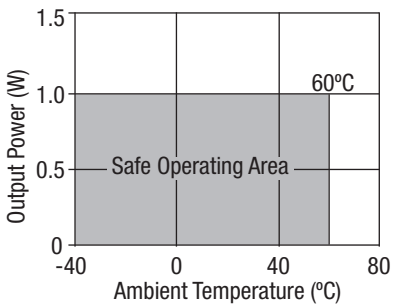
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	Single output		45		kHz
	Dual output		70		

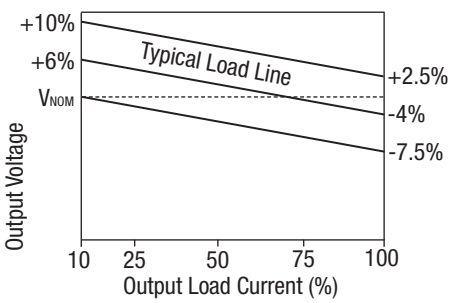
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		60	°C
Storage		-55		130	
Case Temperature above ambient	All output types			33	
Cooling	Free air convection				

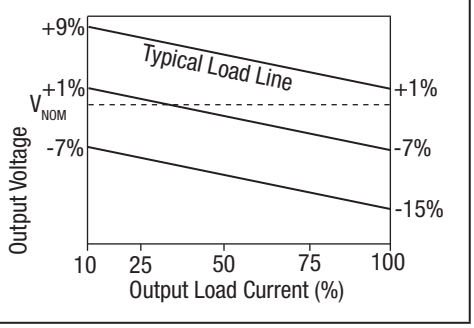
TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TOLERANCE ENVELOPE, 3.3V in, 3V out type only



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMJ series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 5.2kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The NMJ series has been recognized by Underwriters Laboratory to 300Vrms for Supplementary Insulation and 150Vrms for Reinforced Insulation.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

SAFETY APPROVAL

The NMJ series has been recognised by Underwriters Laboratory (UL) to UL 60950 for supplementary insulation up to 300Vrms and reinforced insulation up to 150Vrms at a maximum ambient temperature of 60ºC. File number E179522 applies.

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

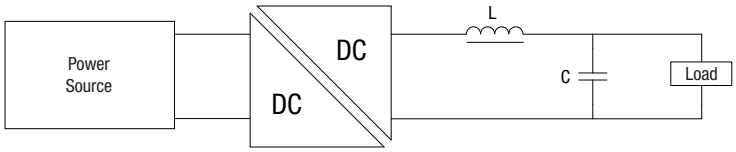
OUTPUT RIPPLE REDUCTION

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

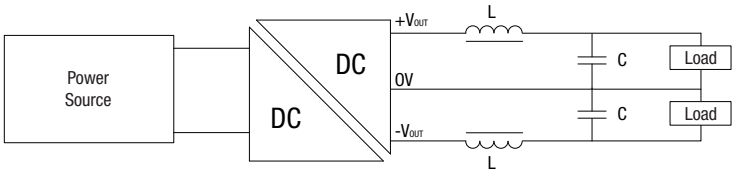
Component selection

Capacitor: It is required that the ESR (Equivalent Series Resistance) should be as low as possible, ceramic types are recommended.
The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC/DC converter.

Inductor: The rated current of the inductor should not be less than that of the output of the DC/DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC/DC converter. The SRF (Self Resonant Frequency) should be >20MHz.



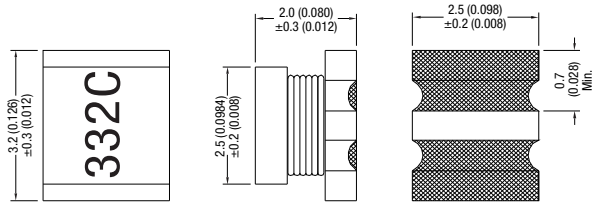
	Inductor			Capacitor		
	L, µH	Through Hole	SMD	C, µF	Size	V rating, V
3.3V single output types	Consult Factory					
5V single output types	Consult Factory					
9V single output types	Consult Factory					
12V single output types	Consult Factory					
15V single output types	Consult Factory					



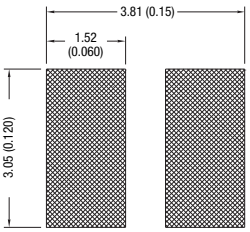
	Inductor			Capacitor		
	L, µH	Through Hole	SMD	C, µF	Size	V rating, V
5V dual output types	22	22R223C	82223C	4.70	1206	10
9V dual output types	Consult Factory					
12V dual output types	68	22R224C	82224C	0.47	0805	25
15V dual output types	Consult Factory					

OUTPUT RIPPLE REDUCTION (continued)

SMD option 8200 Inductor Series Mechanical Dimensions

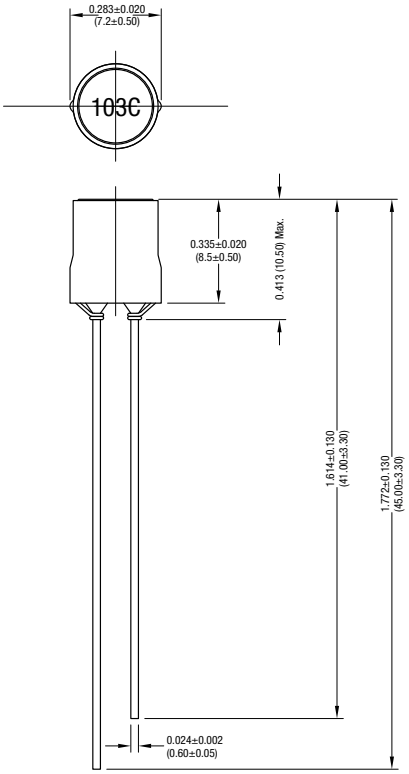


Recommended pad layout

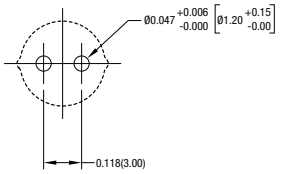


All dimensions in inches (mm).

Through hole option 2200R Inductor Series Mechanical Dimensions



Recommended footprint



All dimensions in inches (mm).

For more information please visit www.cd4power.com

RIPPLE & NOISE CHARACTERISATION METHOD

All measurement to be taken with the following components connected to the UUT as detailed below.

50 Ohm coax cable, solder connections one end, BNC plug at the other end.

C1 – 1µF X7R multilayer ceramic capacitor rated at minimum 3 x the output voltage of the UUT

C2 – 10µF tantalum capacitor rated at minimum 1.5 x the output voltage of the UUT with ESR of less than 100 milliohms at 100 kHz e.g. AVX TPS series.

C3 – 100nF multilayer ceramic capacitor, general purpose

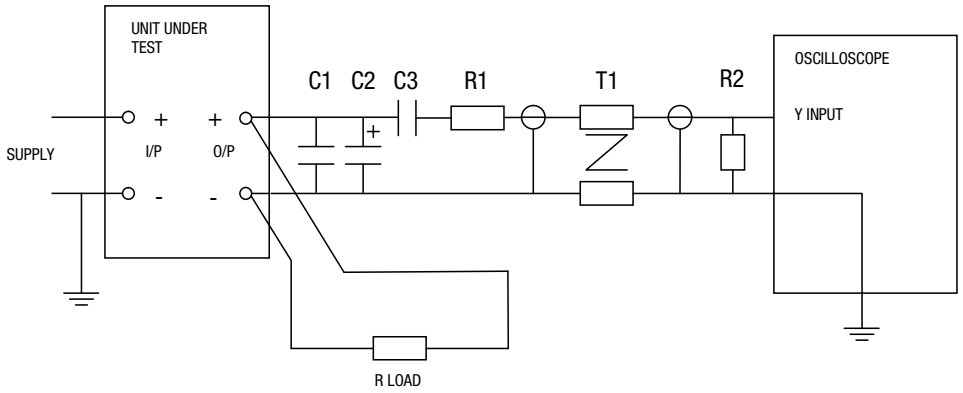
R1 – 450 Ohm resistor, carbon film, ±1%

R2 – 50 Ohm BNC termination

T1 – 3T of the coax cable through a ferrite toroid eg Ferroxcube TN32/19/13-3E25

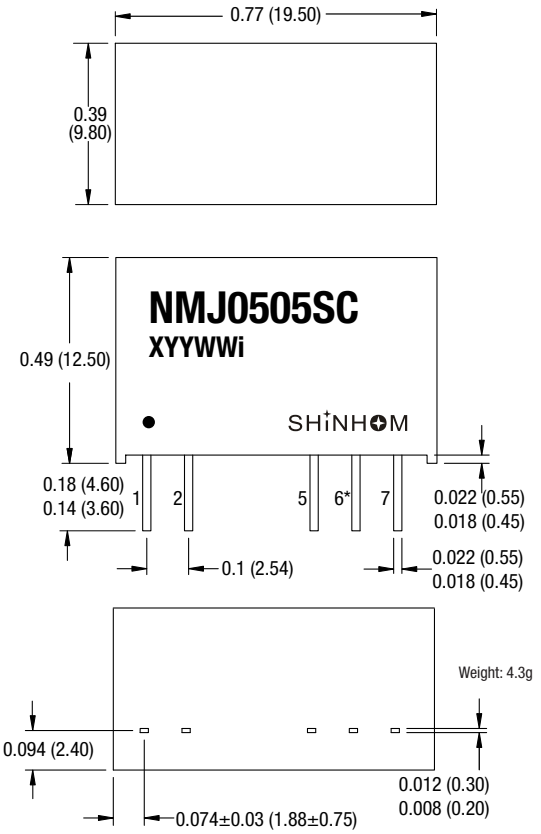
RLOAD – Resistive load at the UUT maximum rating. Connections via twisted wires.

Differential Mode Noise Test Schematic



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

* Pin not fitted on single output variants.

PIN CONNECTIONS

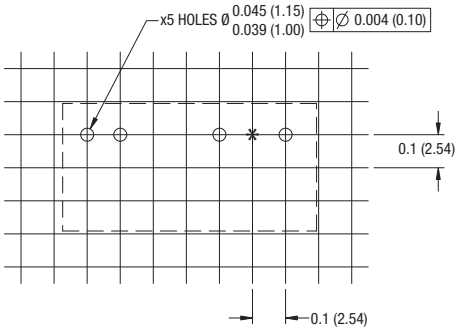
Dual Output

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

Single Output

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

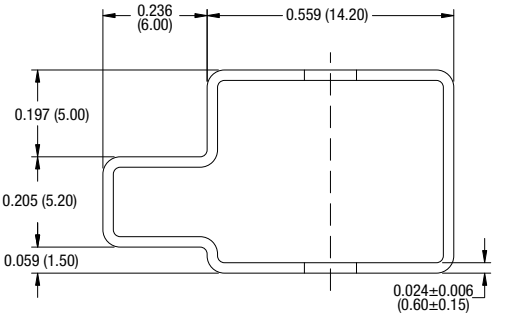
RECOMMENDED FOOTPRINT DETAILS



* Hole not required for single output variants.

All dimensions in inches ±0.01 (mm ±0.25mm).

TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ±0.02 (mm ±0.5mm).

Tube length : 20.669±0.079 (525mm±2mm).

Tube Quantity : 25

NML SERIES

Isolated 2W Single Output DC/DC Converters

FEATURES

- RoHS compliant
- Single isolated output
- 1kVDC isolation
- Efficiency up to 85%
- Wide temperature performance at full 2 watt load, –40°C to 85°C
- Power density 2.01W/cm^3
- UL 94V-0 package material
- Footprint from 1.05cm^2
- Industry standard pinout
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- No heatsink required
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.3 million hours
- Custom solutions available
- Pin compatible with LME & NME series
- No electrolytic or tantalum capacitors

DESCRIPTION

The NML series of DC/DC Converters is particularly suited to isolating and/or converting DC power rails. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist. The wide temperature range guarantees startup from –40°C and full 2 watt output at 85°C. Pin compatibility with the NME and LME ensures ease of upgrade-ability.

RoHS COMPLIANT 2002/95/EC

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]
	(V)	(V)	(mA)	(mA)	%	pF	kHrs
NML0505SC	5	5	400	513	78	19	2327
NML0509SC	5	9	222	492	81	27	1393
NML0512SC	5	12	167	479	84	32	832
NML0515SC	5	15	133	481	83	27	481
NML1205SC	12	5	400	207	81	28	716
NML1209SC	12	9	222	198	84	42	593
NML1212SC	12	12	167	197	85	46	461
NML1215SC	12	15	133	197	85	54	328

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	Continuous operation, 5V input types	4.5	5.0	5.5	V
	Continuous operation, 12V input types	10.8	12.0	13.2	
Reflected ripple current	5V input types		33		mA p-p
	12V input types		38		

OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Rated Power[2]	T_A=-40°C to 85°C			2.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, 5V output types		7.0	8.5	%
	10% load to rated load, 9V output types		4.5	5.2	
	10% load to rated load, 12V output types		4.5	5.5	
	10% load to rated load, 15V output types		3.7	8.5	
Ripple and Noise	NML0505SC, BW=DC to 20MHz		96	200	mV p-p
	NML0509SC, BW=DC to 20MHz		67		
	NML0512SC, BW=DC to 20MHz		59		
	NML0515SC, BW=DC to 20MHz		53		
	NML1205SC, BW=DC to 20MHz		76		
	NML1209SC, BW=DC to 20MHz		63		
	NML1212SC, BW=DC to 20MHz		53		
	NML1215SC, BW=DC to 20MHz		45		

ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	10			GΩ

ABSOLUTE MAXIMUM RATINGS

Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	805mW
Input voltage V_{IN}, NML05 types	7V
Input voltage V_{IN}, NML12 types	15V

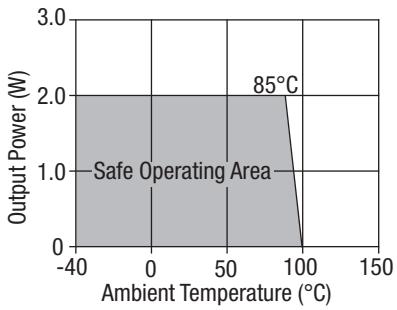
1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating curve.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

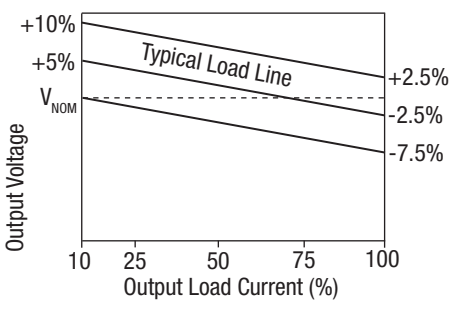
GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	5V input types		90		kHz
	12V input types		90		

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types			45	
	All other output types			36	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NML series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NML series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

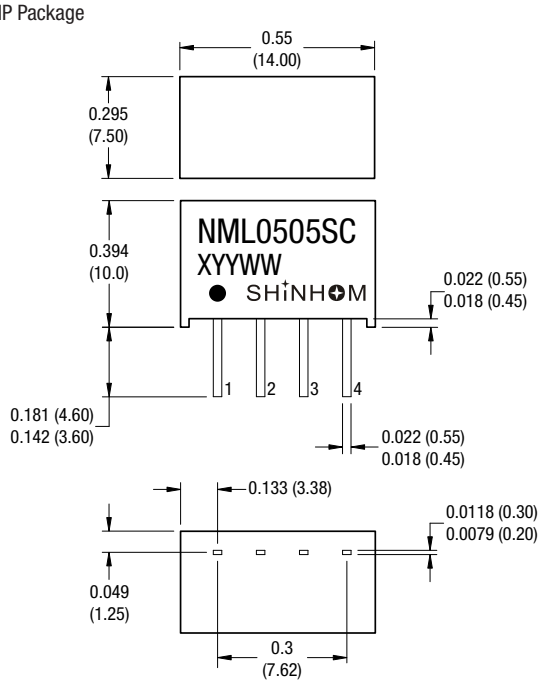
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NML series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

SIP Package



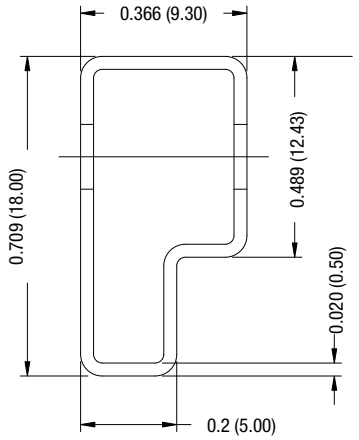
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.0g

PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	$-V_{IN}$
2	$+V_{IN}$
3	$-V_{OUT}$
4	$+V_{OUT}$

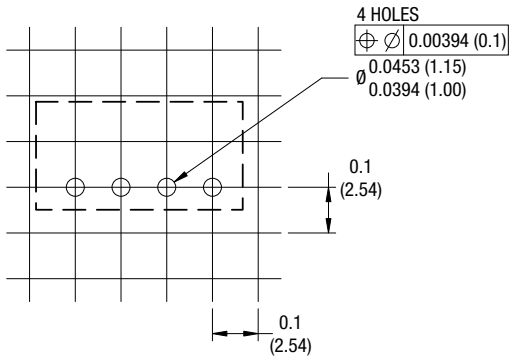
TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length : 20.47 (520mm ±2mm).

Tube Quantity : 35

RECOMMENDED FOOTPRINT DETAILS



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300oC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

FEATURES

- RoHS compliant
- 1kVDC isolation
- Efficiency up to 80%
- Wide temperature performance at full 1 watt load, –40°C to 85°C
- Power density up to 0.90W/cm^3
- UL 94V-0 package material
- Footprint from 1.17cm^2
- Industry standard pinout
- 5V, 12V & 24V input
- 5V, 12V & 15V output
- No heatsink required
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- MTTF up to 1.6 million hours
- Custom solutions available
- No electrolytic or tantalum capacitors

DESCRIPTION

The NMR series of industrial temperature range DC/DC converters are the standard building blocks for on-board distributed power systems. They are ideally suited for providing single rail supplies on primarily digital boards with the added benefit of galvanic isolation to reduce switching noise. Surface mount technology and advanced packaging materials produce rugged reliable performance over an extended temperature range from -40ºC to 85ºC.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]
	(V)	(V)	(mA)	(mA)	%	pF	kHrs
NMR100C	5	5	200	290	69	28	1322
NMR101C	5	12	83	260	77	33	235
NMR102C	5	15	67	253	79	40	127
NMR106C	12	5	200	121	69	36	515
NMR107C	12	12	83	110	76	58	184
NMR108C	12	15	67	110	76	56	111
NMR118C	24	5	200	60	70	61	156
NMR119C	24	12	83	53	78	98	77
NMR120C	24	15	67	52	80	122	51

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	
	Continuous operation, 24V input types	21.6	24	26.4	
Reflected ripple current	5V & 12V input types		40	60	mA p-p
	24V input types		50	90	

OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Rated Power[2]	T_A=-40°C to 85°C			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation[2]	10% load to rated load, NMR100C/106C		12.5	13.4	%
	10% load to rated load, NMR101C/107C		6.90	7.70	
	10% load to rated load, NMR102C/108C		6.50	7.50	
	10% load to rated load, NMR118C		6.80	10	
	10% load to rated load, NMR119C		2.80	4.0	
	10% load to rated load, NMR120C		2.50	3.50	
Ripple and Noise	BW=DC to 20MHz		30	50	mV p-p

ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso=1000VDC	10			GΩ

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	550mW
Input voltage V_{IN}, NMR100C, NMR101C, NMR102C	7V
Input voltage V_{IN}, NMR106C, NMR107C, NMR108C	15V
Input voltage V_{IN}, NMR118C, NMR119C, NMR120C	28V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating graph.
3. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

GENERAL CHARACTERISTICS

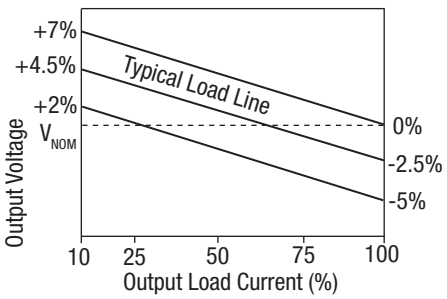
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	5V input types		110		kHz
	12V input types		160		
	24V input types		80		

TEMPERATURE CHARACTERISTICS

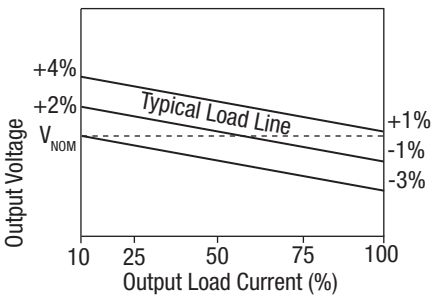
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types		33		
	All other output types		28		
Cooling	Free air convection				

TOLERANCE ENVELOPES

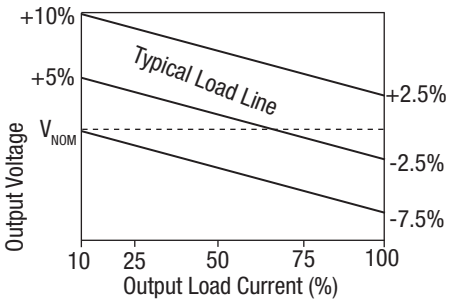
NMR118



NMR119, NMR120



All other types



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMR series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMR series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

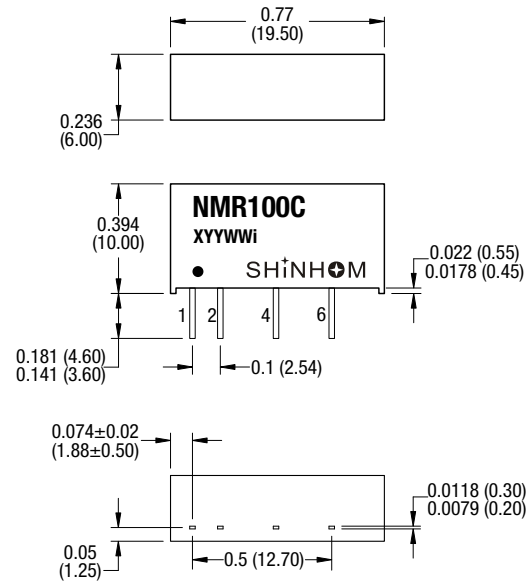
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMR series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

7 Pin SIP Package



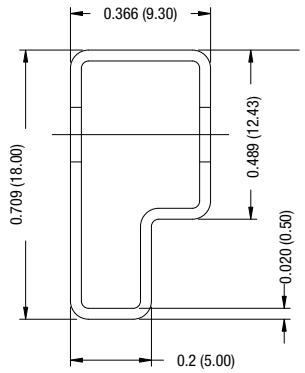
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.1g

PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
4	$-V_{OUT}$
6	$+V_{OUT}$

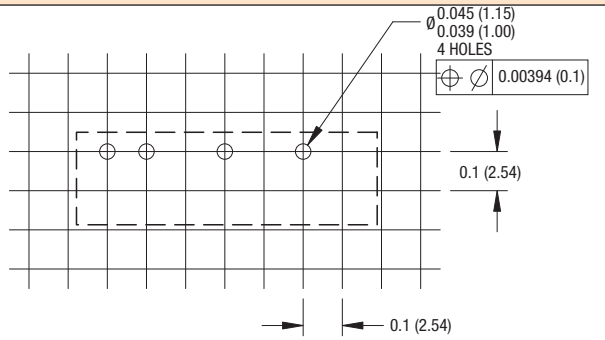
TUBE OUTLINE DIMENSIONS



All dimensions in inches ±0.01 (mm ±0.25mm)

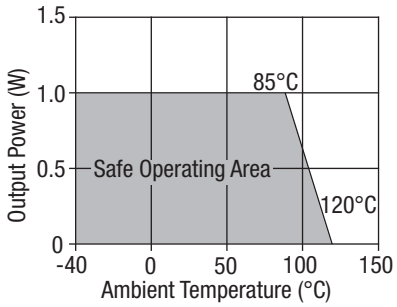
Tube quantity: 25

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.01 (mm ±0.25mm)

TEMPERATURE DERATING GRAPH



RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

NMS SERIES

6kVDC Isolated 2W Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- UL1950 recognized
- Efficiency to 82%
- Power density up to 0.44W/cm^3
- Dual outputs
- Low profile package
- UL 94V-0 package material
- No heatsink required
- Footprint 4.75cm^2
- 6kVDC isolation
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- MTTF up to 747 kHrs
- PCB mounting

DESCRIPTION

The NMS series of DC/DC converters are UL1950 recognized which makes them ideal for all telecom and safety applications where approved isolation is required. The low profile package allows mounting in rack systems without risk of touching other boards. The output configuration allows all of the rated power to be drawn from a single pin provided the total load does not exceed 2 watts. The devices feature low noise and low isolation capacitance suiltable for applications in high noise environments, e.g. heavy electrical machine interface.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Isolation Capacitance	MTTF[1]
	(V)	(V)	(mA)	%	pF	kHrs
NMS0505C	5	±5	±200	74	1.8	747
NMS0509C	5	±9	±111	76	1.9	327
NMS0512C	5	±12	±83	77	2.0	169
NMS0515C	5	±15	±67	78	2.1	93
NMS1205C	12	±5	±200	78	1.9	365
NMS1209C	12	±9	±111	81	2.0	224
NMS1212C	12	±12	±83	82	2.1	136
NMS1215C	12	±15	±67	82	2.2	82

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=0°C to 70°C			2	W
Voltage Set Point Accuracy	See tolerance envelope	-7.5		10	%
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		10	15	%
	10% load to rated load, 9V output types		6	15	
	10% load to rated load, 12V output types		6	15	
	10% load to rated load, 15V output types		6	15	
Ripple and Noise	BW=DC to 20MHz, all output types			200	mV p-p

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	6000			VDC
Resistance	Viso= 500VDC		10		GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		35		kHz

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[3]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	900mW
Input voltage V_{IN}, NMS05 types	7V
Input voltage V_{IN}, NMS12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. See derating graph.
3. Supply voltage must be disconnected at the end of the short circuit duration.

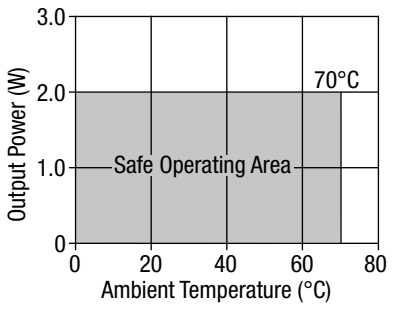
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

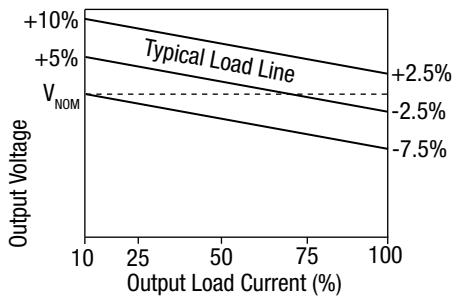
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Storage		-50		130	
Case Temperature above ambient	All output types			32	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



SAFETY APPROVAL

The NMS series has been recognised by Underwriters Laboratory (UL) to UL 60950 for supplementary insulation up to 300Vrms and reinforced insulation up to 150Vrms working voltage.

File number E179522 applies.

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMS series of dc/dc converters are all 100% production tested at their stated isolation voltage. This is 6kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

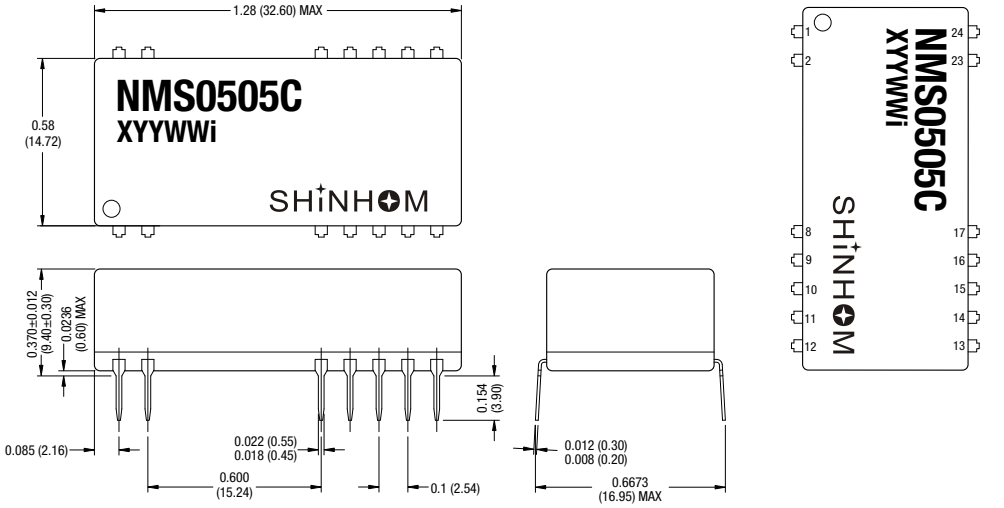
The NMS series has been recognized by Underwriters Laboratory to a working voltage of 300Vrms for Supplementary Insulation system and 150Vrms for Reinforced Insulation systems.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



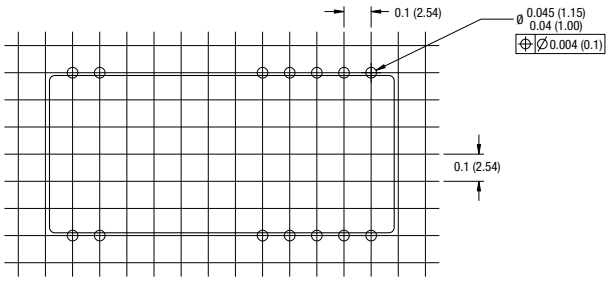
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 7.5g

PIN CONNECTIONS

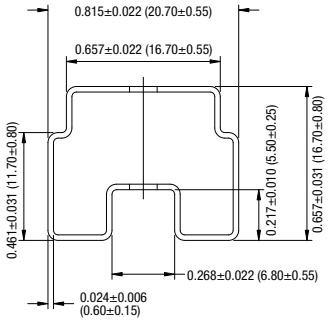
Pin	Function
1	+V_{IN}
2	-V_{IN}
8	-V_{OUT}
9	NC
10	0V
11	NC
12	+V_{OUT}
13	+V_{OUT}
14	NC
15	0V
16	NC
17	-V_{OUT}
23	NC
24	NC

RECOMMENDED FOOTPRINT DETAILS



Unless otherwise stated all dimensions in inches ±0.01 (mm) ±0.5mm.

TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ±0.01 (mm) ±0.5mm.
Tube length : 20.47±0.079 (520mm ±2mm).

Tube Quantity : 15

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Matte Tin over Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

FEATURES

- RoHS compliant
- Triple outputs (-24V, -48V & -72V)
- Input/output isolation 1kVDC
- Power sharing on outputs
- Industrial temperature range
- UL 94V-0 package material
- Internal SMD construction
- Toroidal magnetics
- No external components required
- Power density 1.65W/cm^3

DESCRIPTION

The NMT series is a range of DC/DC converters offering three output voltages of -24V, -48V and -72V from a single isolated 5V or 12V input voltage. The product is designed for use with telecommunications circuits requiring an on board supply for the -72V RING-TIP connection service generated from a nominal 5V or 12V DC input supply rail. The device also offers battery level voltages of -24V and -48V for access control and data pump IC's. The product is packaged in an 8 pin SIP case for minimum PCB footprint. The rated power may be shared or drawn from any one output providing the total output load does not exceed 3W.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output	Rated Output Current	Output Current[1]		Output Current[2]		MTTF[3]
				MIN. Load	Full Load	MIN. Load	Full Load	
	V		V	mA	mA	mA	mA	kHrs
NMT0572SC	5	$-V_{OUT1}$	-24	1.4	42	4.2	126	145
		$-V_{OUT2}$	-48	0.7	21	2.1	63	
		$-V_{OUT3}$	-72	0.5	14	1.4	42	
NMT1272SC	12	$-V_{OUT1}$	-24	1.4	42	4.2	126	145
		$-V_{OUT2}$	-48	0.7	21	2.1	63	
		$-V_{OUT3}$	-72	0.5	14	1.4	42	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage range	NMT0572SC	4.5	5.0	5.5	V
	NMT1272SC	10.8	12	13.2	
Ripple current (I_{RIPPLE})	NMT0572SC		85		mA
	NMT1272SC		66		
Zero load input current (I_{CCZL})	NMT0572SC, 0% output load		50	80	mA
	NMT1272SC, 0% output load		27.5	50	

OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Total Rated Power (P_{OUT})	Total of all outputs or any single output	0.1		3.0	W
Single Channel Voltage Set Point Accuracy	P_{OUT} = 100mW	0		10	%
	P_{OUT} = 3W	-7.5		2.5	
Output Voltage - $V_{OUT}1$	P_{OUT} = 100mW	24		26.4	V
	P_{OUT} = 3W	22.2		24.6	
Output Voltage - $V_{OUT}2$	P_{OUT} = 100mW	48		52.8	
	P_{OUT} = 3W	44.4		49.2	
Output Voltage - $V_{OUT}3$	P_{OUT} = 100mW	72		79.2	
	P_{OUT} = 3W	66.6		73.8	
Line regulation	V_{IN} = 90% to 110% of nominal		1.01	1.2	%
Load regulation	P_{OUT} = 100mW to 3W		8	15	
Ripple & Noise	DC to 20MHz single channel (24V)		220	400	mV

ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Isolation Capacitance	NMT0572SC, 1MHz, 1V		65		pF
	NMT1272SC, 1MHz, 1V		130		
Insulation Resistance	1000VDC	1	10		GΩ

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[4]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input Voltage V_{IN}, NMT0572SC	7V
Input voltage V_{IN}, NMT1272SC	15V

1. Assuming all 3 channels are equally loaded.
2. Assuming only 1 channel is loaded.
3. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
4. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Efficiency	All channels or any single channel	75	85		%
Switching frequency			85		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating temperature		-40		85	°C
Storage		-50		125	
Case temperature rise above ambient	1 litre static air chamber		27		

OUTPUT VOLTAGE CONFIGURATION

Although the output is described for negative rails, the input and output circuits are iternally isolated hence positive rails can also be generated, or a mixture of positive and negative. The output +V_{OUT} rail reference can be taken from any of the output terminals to give the range of outputs as described in the Output Voltage Configurations table below.

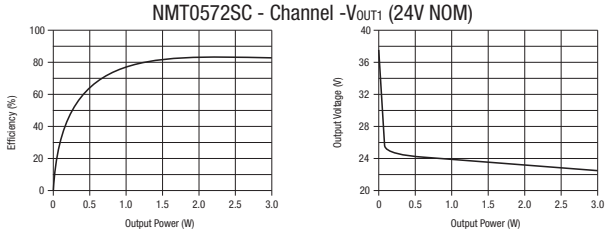
Channel Name	Standard Ref	Option 1	Option 2	Option 3
+V_{OUT}	0V	+24V	+48V	+72V
-V_{OUT1}	-24V	0V	+24V	+48V
-V_{OUT2}	-48V	-24V	0V	+24V
-V_{OUT3}	-72V	-48V	-24V	0V

POWER SHARING

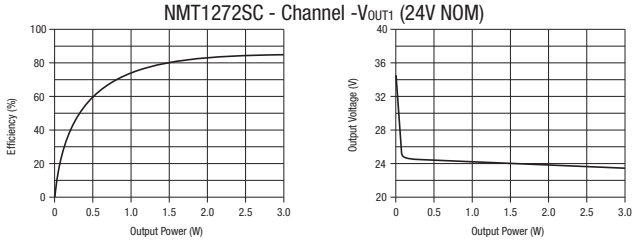
The 3W total power delivery can be taken from either a single channel, or from any combination of all three channels. This allows an enormous amount of flexibility, especially when combined with the selectable output 0V reference. For example, using the option 2 output configuration; -24V at 0.5W, +24V at 1W and +48V at 1.5W power supplies are available from a single NMT device.

PERFORMANCE CHARACTERISTICS

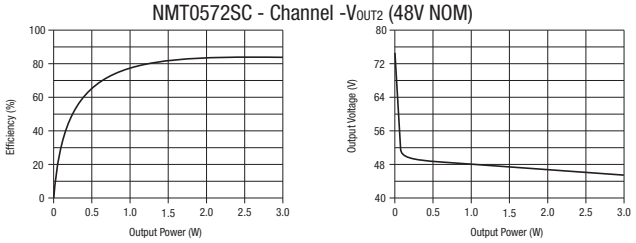
NMT0572SC - Channel -V_{OUT1} (24V NOM)



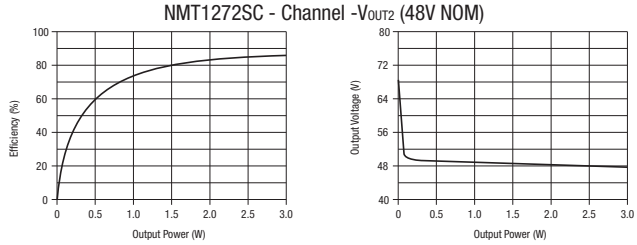
NMT1272SC - Channel -V_{OUT1} (24V NOM)



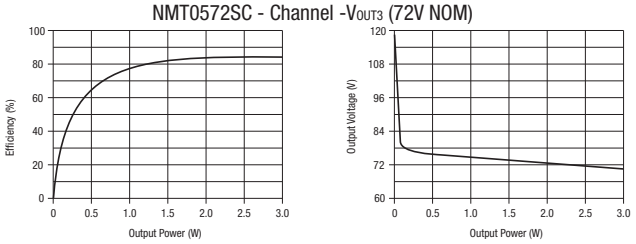
NMT0572SC - Channel -V_{OUT2} (48V NOM)



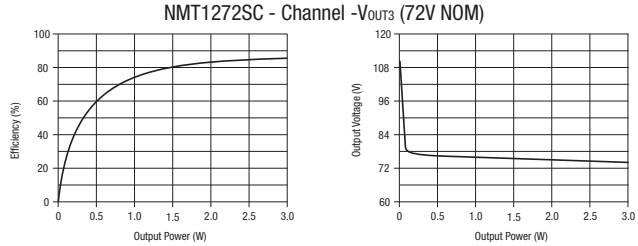
NMT1272SC - Channel -V_{OUT2} (48V NOM)



NMT0572SC - Channel -V_{OUT3} (72V NOM)



NMT1272SC - Channel -V_{OUT3} (72V NOM)



APPLICATION NOTES

RIPPLE SPECIFICATION

The output ripple for the NMT series is higher than standard for SHINHOM Technologies DC/DC converter. This is due to using low value ceramic capacitors internally for longer life perfomance of the component and the superimposition of ripples between each output channel. Consequently with a maximum 400mV ripple per output channel, at -72V the ripple is potentially three times this value (1.2V). The ripple will always be additively superimposed since the output windings are synchronized.

To reduce ripple, external capacitors are recommended with a value of 1µF per channel (see figure 1). This typically reduces the ripple to 50mV per channel. Further ripple reduction can be achieved by use of series inductors on each output channel plus additional external capacitors to form a pi-filter with the internal capacitors of the device.

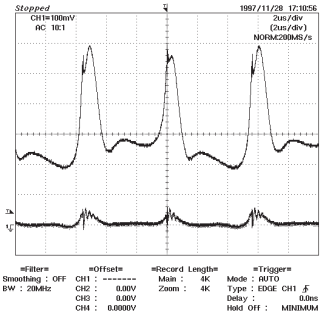


Figure 1. V_{OUT3} Output Ripple
Top: No external capacitors
Bottom: 1µF per channel external capacitors

SLIC CIRCUITS

The primary application for the NMT series is in subscriber line interface circuits (SLIC's), particularly for the Integrated Services Digital Network (ISDN). The NMT can also be used in standard telecommunications circuits where a local power source is preferred to the telephone system power due to either the power quality of the telecommunications system power supply or to avoid potential power line disturbances, such as lightening strikes and access switching, which will effect the target circuit function.

Another application area is in fibre-in-the-loop (FITL) or radio-in-the-loop (RITL) interfacing via a standard telecommunication SLIC, where the usual telecommunication battery voltage is not available due to the transmission media in use (fibre or radio). In particular, FITL/RITL interfaces directly on PC cards, in local monitor and boost circuits and at exchanges between the fibre/radio and wire media.

The supply rails can be used for ringing generators as well as SLIC circuits or where both are combined, such as in the AMD AM79R79 Ringing SLIC device (see figure 2). The -72V rail is used primarily for the generation of the ringing signal ($V_{BAT}1$), the -48V rail is used to supply in line access circuitry ($V_{BAT}2$) and the -24V supply for the on-chip regulator for the logic interface (V_{NEG}). Alternative devices from other manufacturers could use the -24V output for their internal circuit supply and -72V for ringing.

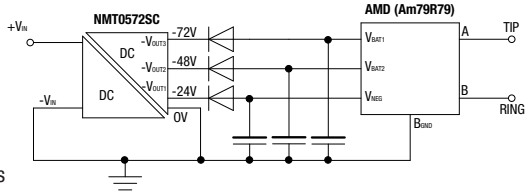


Figure 2. Supply for Ringing SLIC Device

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMT series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMT series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

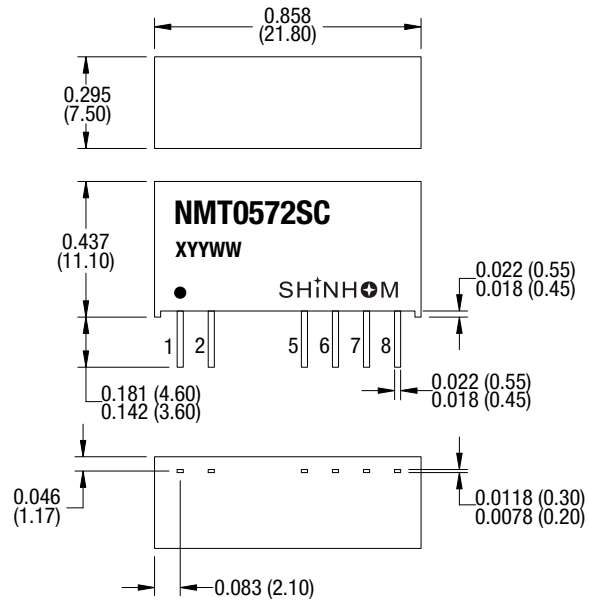
REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMT series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



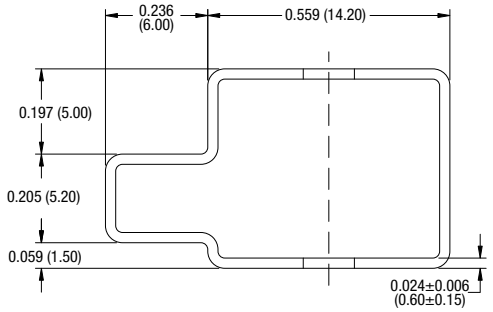
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 3.85g

PIN CONNECTIONS - 8 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$+V_{OUT}$
6	$-V_{OUT1}$
7	$-V_{OUT2}$
8	$-V_{OUT3}$

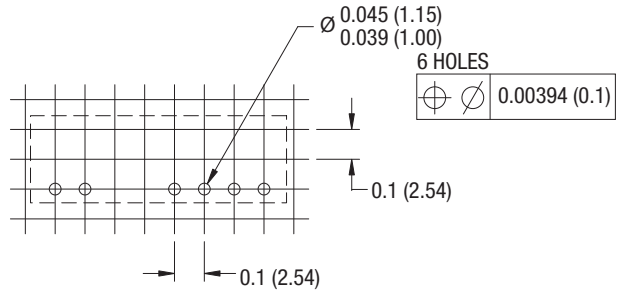
TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ±0.02 (mm ±0.5mm).
Tube length : 20.47±0.079 (520mm±2mm).

Tube Quantity : 23

RECOMMENDED FOOTPRINT DETAILS



Unless otherwise stated all dimensions in inches ±0.02 (mm ±0.5mm).

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

NMV 5V & 12V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency to 78%
- Power density up to 0.85W/cm^3
- Wide temperature performance at full 1 Watt load, –40°C to 85°C
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- Industry standard pinout
- Power sharing on dual output
- 3kVDC isolation (1 minute)
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.4 million hours
- No electrolytic or tantalum capacitors

DESCRIPTION

The NMV series of industrial temperature range DC/DC converters are the standard buliding blocks for on-board distributed power systems. They are ideally suited for providing local supplies on control system boards with the added benefit of 3kVDC galvanic isolation to reduce switching noise. Available in SIP and DIP with dual and single output pinout. All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

RoHS COMPLIANT 2002/95/EC

SELECTION GUIDE

Order Code	Nominal Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Input Current at Rated Load (mA)	Load Regulation (Typ) %	Load Regulation (Max) %	Ripple & Noise (Typ) mVp-p	Ripple & Noise (Max) mVp-p	Efficiency %	Isolation Capacitance pF	MTTF[1] kHrs	Package Style
NMV0505DAC	5	5	200	294	14.6	15	64	80	68	23	2414	DIP
NMV0509DAC	5	9	111	267	9.3	10	47	57	75	30	1173	
NMV0512DAC	5	12	84	260	7.4	8.0	35	49	77	26	633	
NMV0515DAC	5	15	67	256	6.7	7.3	32	44	78	27	360	
NMV0505SAC	5	5	200	294	14.6	15	64	80	68	23	2414	SIP
NMV0509SAC	5	9	111	267	9.3	10	47	57	75	30	1173	
NMV0512SAC	5	12	84	260	7.4	8.0	35	49	77	26	633	
NMV0515SAC	5	15	67	256	6.7	7.3	32	44	78	27	360	
NMV1205DAC	12	5	200	121	14.6	15	64	80	69	26	624	DIP
NMV1209DAC	12	9	111	113	9.3	10	47	57	74	35	490	
NMV1212DAC	12	12	84	108	7.4	8.0	35	49	77	43	361	
NMV1215DAC	12	15	67	108	6.7	7.3	32	44	77	42	252	
NMV1205SAC	12	5	200	121	14.6	15	64	80	69	26	624	SIP
NMV1209SAC	12	9	111	113	9.3	10	47	57	74	35	490	
NMV1212SAC	12	12	84	108	7.4	8.0	35	49	77	43	361	
NMV1215SAC	12	15	67	108	6.7	7.3	32	44	77	42	252	
NMV0505DC	5	±5	±100	280	9.0	10	33	40	71.5	21	1697	DIP
NMV0509DC	5	±9	±55	263	7.5	8.5	29	36	76	24	682	
NMV0512DC	5	±12	±42	256	6.8	7.5	27	32	78	26	343	
NMV0515DC	5	±15	±33	253	6.8	8.5	24	32	79	27	188	
NMV0505SC	5	±5	±100	280	9.0	10	33	40	71.5	21	1697	SIP
NMV0509SC	5	±9	±55	263	7.5	8.5	29	36	76	24	682	
NMV0512SC	5	±12	±42	256	6.8	7.5	27	32	78	26	343	
NMV0515SC	5	±15	±33	253	6.8	8.5	24	32	79	27	188	
NMV1205DC	12	±5	±100	117	9.0	10	33	40	71	27	563	DIP
NMV1209DC	12	±9	±55	113	7.5	8.5	29	36	74	35	377	
NMV1212DC	12	±12	±42	111	6.8	7.5	27	32	75	42	244	
NMV1215DC	12	±15	±33	110	6.8	8.5	24	32	76	41	154	
NMV1205SC	12	±5	±100	117	9.0	10	33	40	71	27	563	SIP
NMV1209SC	12	±9	±55	113	7.5	8.5	29	36	74	35	377	
NMV1212SC	12	±12	±42	111	6.8	7.5	27	32	75	42	244	
NMV1215SC	12	±15	±33	110	6.8	8.5	24	32	76	41	154	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	
Reflected ripple current			20	40	mA p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	560mW
Input voltage V_{IN}, NMV05 types	7V
Input voltage V_{IN}, NMV12 types	15V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

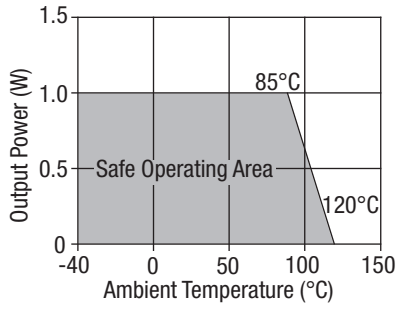
OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40°C to 120°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 minute	3000			VDC
Resistance	Viso= 1000VDC	10			GΩ

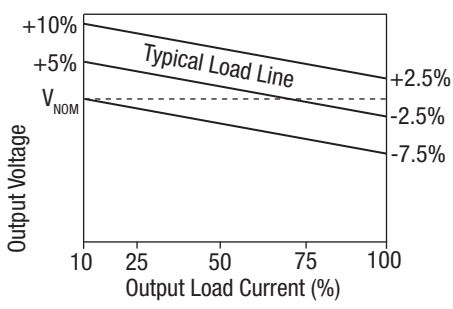
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		120	135	kHz
	12V input types		150	170	

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	
Case Temperature above ambient	5V output types			28	
	All other output types			25	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies N MV series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 3kVDC for 1 minute.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMV series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

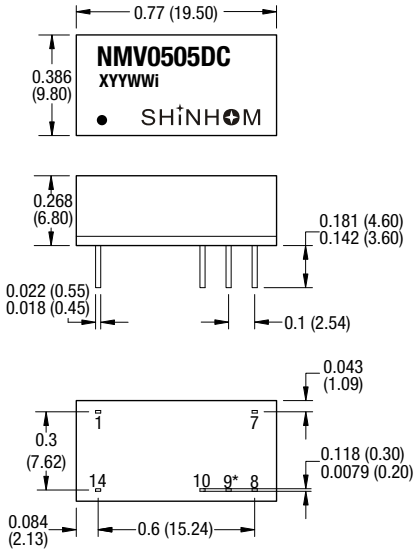
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMV series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

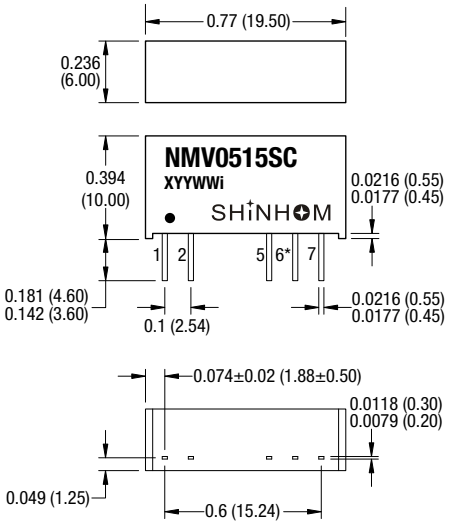
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* Pin not fitted on single output variants.

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.4g (DIP) 2.1g (SIP)

PIN CONNECTIONS

Single output variants

14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

Dual output variants

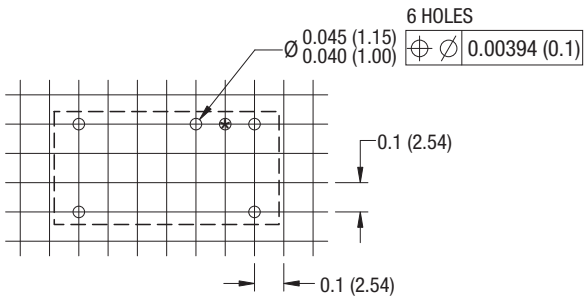
14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
9	0V
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

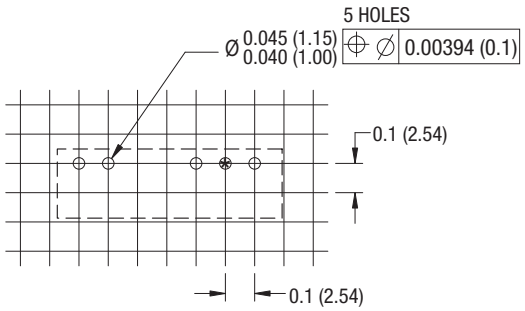
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



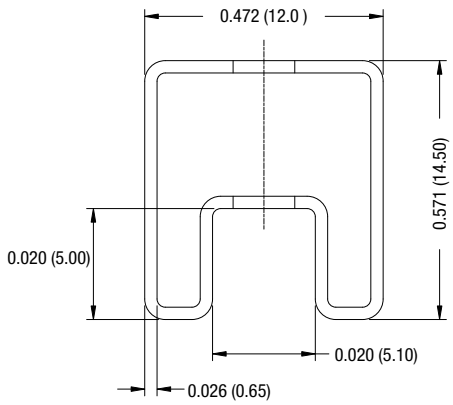
7 Pin SIP Package



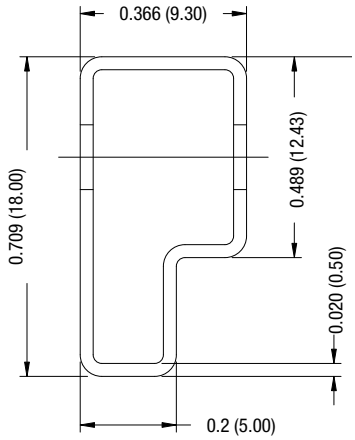
*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

NMV 24V & 48V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency to 85%
- Power density up to 0.85W/cm^3
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- Industry standard pinout
- Power sharing on dual output
- 3kVDC isolation (1 minute)
- 24V & 48V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- No electrolytic or tantalum capacitors

DESCRIPTION

The NMV series offers single or dual output versions in the same size package as the popular NMA series. The higher isolation is particularly useful in control type applications where the standard 1kV is not sufficient.

SELECTION GUIDE

Order Code	Nominal Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Load Regulation (Max) %	Ripple & Noise (Max) mV p-p	Efficiency %	Isolation Capacitance pF	MTTF[1] kHrs	Package Style
NMV2405DAC	24	5	200	15	150	70	33	201	DIP
NMV2409DAC	24	9	111	10	150	80	40	185	
NMV2412DAC	24	12	84	10	150	80	55	163	
NMV2415DAC	24	15	67	10	150	80	70	136	
NMV2405SAC	24	5	200	15	150	70	33	201	SIP
NMV2409SAC	24	9	111	10	150	80	40	185	
NMV2412SAC	24	12	84	10	150	80	55	163	
NMV2415SAC	24	15	67	10	150	80	70	136	
NMV4805DAC	48	5	200	15	150	70	48	213	DIP
NMV4809DAC	48	9	111	10	150	80	59	194	
NMV4812DAC	48	12	84	10	150	80	70	169	
NMV4815DAC	48	15	67	10	150	80	81	140	
NMV4805SAC	48	5	200	15	150	70	48	213	SIP
NMV4809SAC	48	9	111	10	150	80	59	194	
NMV4812SAC	48	12	84	10	150	80	70	169	
NMV4815SAC	48	15	67	10	150	80	81	140	
NMV2405DC	24	±5	±100	15	150	70	45	194	DIP
NMV2409DC	24	±9	±55	10	150	80	52	166	
NMV2412DC	24	±12	±42	10	150	80	65	134	
NMV2415DC	24	±15	±33	10	150	80	70	101	
NMV2405SC	24	±5	±100	15	150	70	45	194	SIP
NMV2409SC	24	±9	±55	10	150	80	52	166	
NMV2412SC	24	±12	±42	10	150	80	65	134	
NMV2415SC	24	±15	±33	10	150	80	70	101	
NMV4805DC	48	±5	±100	15	150	70	45	205	DIP
NMV4809DC	48	±9	±55	10	150	80	58	175	
NMV4812DC	48	±12	±42	10	150	80	68	137	
NMV4815DC	48	±15	±33	10	150	80	75	102	
NMV4805SC	48	±5	±100	15	150	70	45	205	SIP
NMV4809SC	48	±9	±55	10	150	80	58	175	
NMV4812SC	48	±12	±42	10	150	80	68	137	
NMV4815SC	48	±15	±33	10	150	80	75	102	

When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 24V input types	21.6	24	26.4	V
	Continuous operation, 48V input types	43.2	48	52.8	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NMV24 types	28V
Input voltage V_{IN}, NMV48 types	54V

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2. Supply voltage must be discontinued at the end of the short circuit duration.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

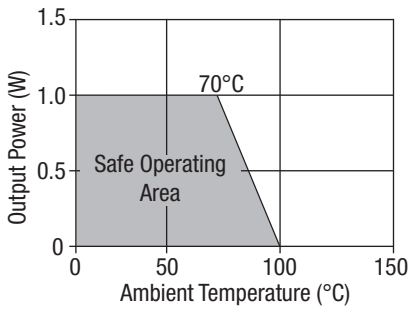
OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[1]	T_A=0°C to 70°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}			1.2	%/%

ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 minute	3000			VDC
Resistance	Viso= 1000VDC	1			GΩ

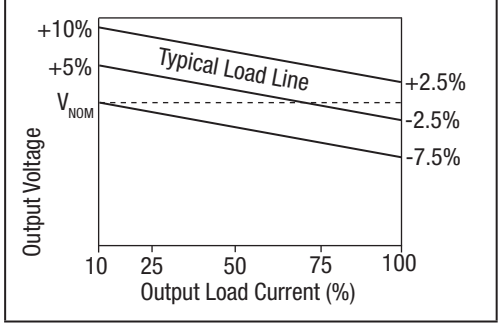
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		100		kHz

TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	°C
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TOLERANCE ENVELOPE



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

SHINHOM Technologies NMV series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 3kVDC for 1 minute.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMV series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

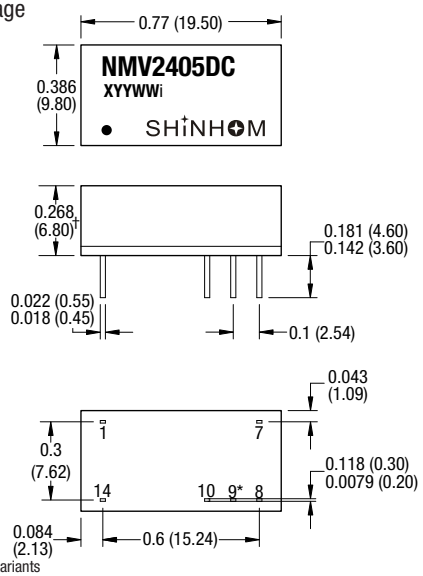
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMV series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

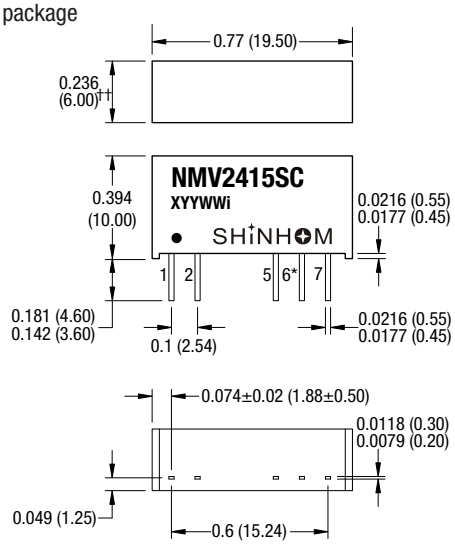
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



† 0.303 (7.70) for 48V variants

†† 0.300 (7.50) for 48V variants

* Pin not fitted on single output variants.

All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.11g (DIP and SIP)

PIN CONNECTIONS

Single output variants

14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

Dual output variants

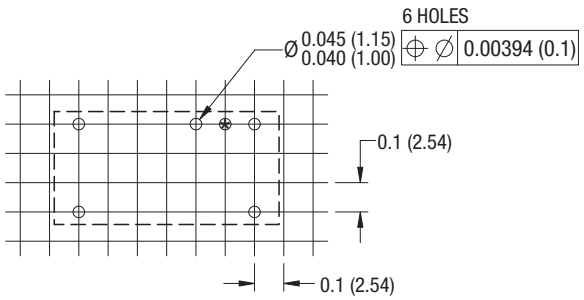
14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
9	0V
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

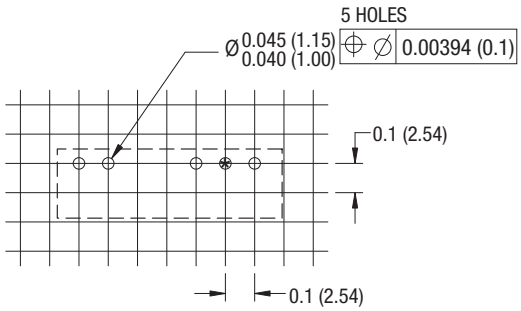
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



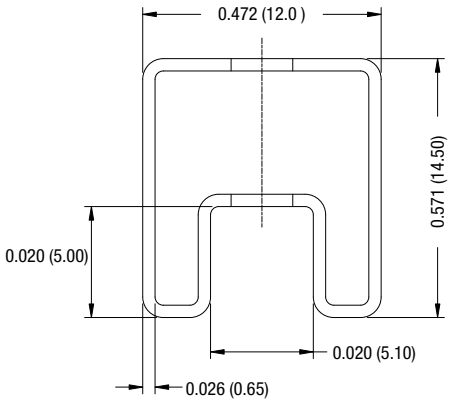
7 Pin SIP Package



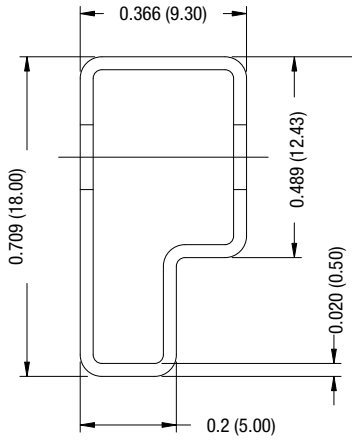
*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm) ±0.5mm.
Tube length (14 Pin DIP) : 20.47 (520mm ±2mm).
Tube length (7 Pin SIP) : 20.47 (520mm ±2mm).

Tube Quantity : 25

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

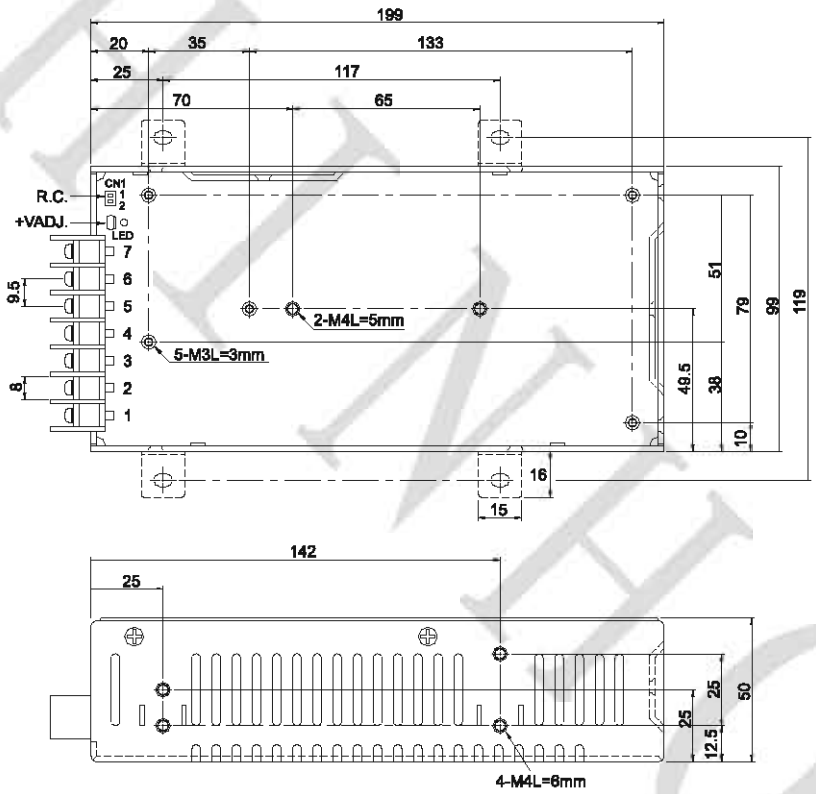
SHAANXISHINHOM ENTERPRISE CO.,LTD

150W Single Output Switch Power

PART NO:P150W-12V

- LOW COST, HIGH RELIABILITY
- 100% FULL LOAD BURN IN TEST
- OVERLOAD PROTECTION
- CONTINUOUS SHORT CIRCUIT PROTECTION
- NO MINIMUM LOAD REQUIRED
- HIGH EFFICIENCY,LOW WORKING TEMPERAT URE

Mechanical Specification(Unit:mm)



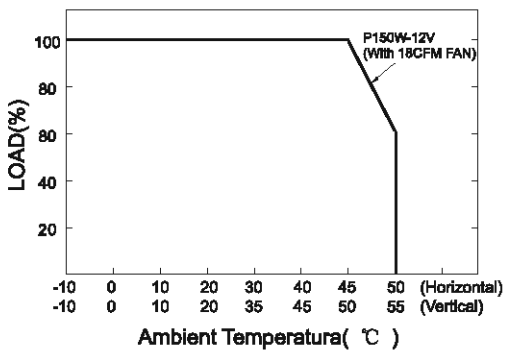
Terminal pin number assignment

PIN No.	Assignment	PIN No.	Assignment
1	AC/L	4,5	DC OUTPUT-V
2	AC/N	6,7	DC OUTPUT+V
3	FG ⏚		

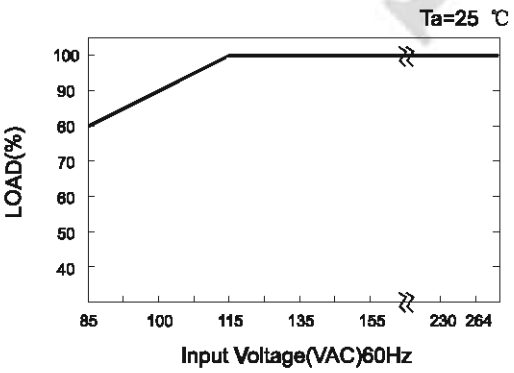
Remote ON/OFF(CN1):JST S2B-XH or equivalent(optional)

PIN No.	Assignment	Mating Housing	Terminal
1	RC +	JST XHP	JST SXH-001T-P0.6
2	RC -	or equivalent	or equivalent

Derating Curve



Output Derating VS Input Voltage



SHAANXISHINHOM ENTERPRISE CO.,LTD

150W Single Output Switch Power

SPECIFICATION All specification are typical at nominal input , full load at 25℃ unless otherwise stated

INPUT	VOLTAGE/CURRENT	110/230V AC
	FREQUENCY	47～63Hz
	EFFICIENCY	＞82% typ
	INRUSH CURRENT	＜30A@220Vac
	LEAKAGE CURRENT	＜0.5mA/220VAC
OUTPUT	VOLTAGE	CH1
		+12V
	CURRENT	12.5
	LINE REGULATION	＜±1.0%
	LOAD REGULATION	＜±1.0%
	RIPPLE 0～20MHz	＜50mV
	TEMPERATURE COEFFICIENT	＜±0.03%/℃
	OUTPUT VOLTAGE ADDITION	10.5V～14.2V
	START-UP TIME	<2.0 S at 120Vac input/<1.0 S at 230Vac input
	HOLD-UP TIME	> 20 mS at 120Vac input/> 20 mS at 230Vac input
	POWER	150W typ
PROTECTION FUNCTION	O.C.P	120%～180%
	O.V.P.	—
ISOLATION	INPUT-OUTPUT	1.5KVAC/min, Cutoff current＜5mA
	INPUT-FG	1.5KVAC/min, Cutoff current＜5mA
	OUTPUT-FG	0.5KVAC/min, Cutoff current＜5mA
ISOLATION RESISTANCE	INPUT-OUTPUT	≥50MΩ,500VDC
	INPUT-FG	≥50MΩ,500VDC
	OUTPUT-FG	≥50MΩ,500VDC
CONNECTION	INPUT/OUTPUT	9.5-7P
DIMENSIONS	LENGTH×WIDTH×HEIGHT	199*98*38
ENVIRONMENT	OPERATING TEMPERATURE	0℃～45℃, 20%～90% RH
	STORAGE TEMPERATURE	-25℃～85℃, 10%～95% RH

SWA 150~200 Series

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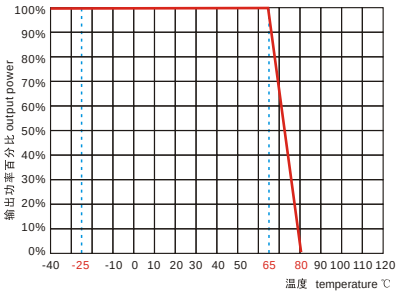
典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range
- ⊙ 转换效率 Typical Efficiency (典型 87%)
- ⊙ 开关频率 Switching frequency：100KHz
- ⊙ 过流、短路保护，自动恢复 Over current/Short circuit protection,,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 金属外壳 Metal case

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vac				
Input voltage	85（120Vdc）	220	265(380Vdc)	W
输入频率范围 Hz	47		440	
Frequency range				
遥控端 Rremote ON/OFF	无 遥 控 端 No remote control terminal			

输出特性 Output

输出电压精度 Voltage accuracy		Vo	±1.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo	±0.2%
负载效应 Load regulation	20%~100% 额定负载(Rated load)	Vo	±0.5%
纹波及噪声 Ripple and noise	20MHz BM 满载(Full load)		
	Vo≤5.0V,≤80mVp-p;	Vo≥48V,≤180mVp-p;	Other,≤120mVp-p;
启动延迟时间 Start delay time	典型值 Tpical value		1S

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input, Full load		87%典型(Typical)
开关频率 Switchingfrequency		100KHz 典型 (Typical)	最大 (max) 250KHz
工作温度 Operatingtemperature		自由空气对流 Free air	-25℃~+65℃
储存温度 Storage temperagure			-40℃~+105℃
最大壳温 Max case temperature			80%℃
相对湿度 Relative humidity			10%~90%
外壳材料(case material)			金属壳 Metal case
隔离电压(IsolationVoltage)	输入与输出 Input-output 2.5KV ≤ 10mA/1min		
输入与外壳 Input-case 输入与FG Input-FG 1.5KV ≤ 10mA/1min			
最小无故障间隔时间 MTBF	2X10^{5}Hrs		
外形尺寸	180x88x25mm		

产品命名方式 Product Nomination Method

举例 Forexample	S ①	WA ②	150 ③	—	220 ④	S ⑤	12 ⑥

①	W 表示宽压输入:AC85-265V W: Wide input voltage AC85-265V N窄压输入: AC165-265V N narrow voltage input AC165-2 65V	④	表示输入电压标称值 nominal value of input voltage
②	A 电源转换模式 AC-DC: A:Power conversion mode AC -DC	⑤	S 单路输出 S: Single output

SWA 150~200 Series

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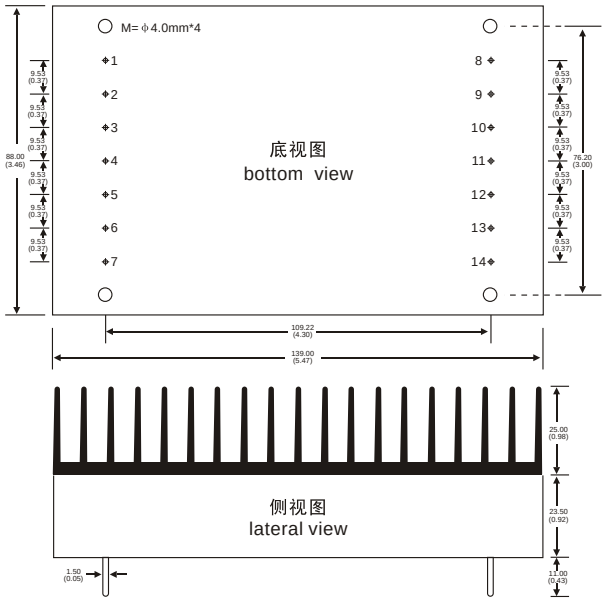
③	表示输出功率大小 Ouput Power	⑥	输出电压大小 Output Voltage

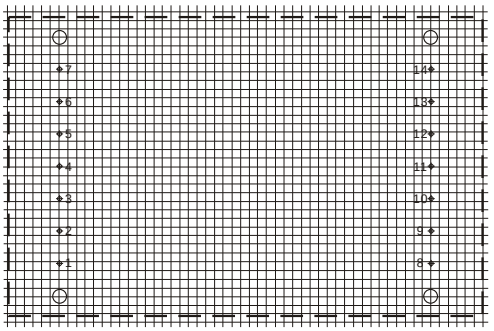
典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mV	V	MA	V	MA
SWA150-220S12	85~265VAC 120-380VDC	12V	12500mA				
SWA150-220S15		15	10000mA				
SWA150-220S27		27V	5500mA				
SWA150-220S48		48V	3125mA				
SWA200-220S12		12V	16670mA				
SWA200-220S15		15V	13300mA				
SWA200-220S27		27V	7400mA				
SWA200-220S48		48V	4200mA				

注：因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
due to space limitat ions the above list is only for some products ,If other than a list of products,please contact the Companys sales department.

封装尺寸图 Mechanical Data





单位：mm
印刷板俯视图
栅格间距：2.51mm(0.1inch)

封装尺寸 Mechanical Data

封装代号 Package Code	L x W x H 单位：mm	封装号 Package No
	139x88x25	

管脚定义 Pin Assignments

管脚号码 Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
单路（S）S: Single	AC(N)	NP	AC(N)	NP	NP	NP	FG	+Vo	+Vo	-Vo	-Vo	+SENSE	TRIM	-SENSE

注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。
Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

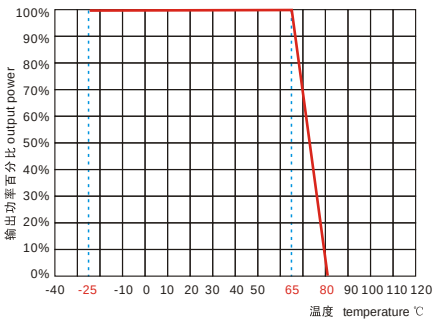
SWA150-200 Series

SHINHOM
www.shinhom.com

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range
- ⊙ 转换效率 Typical Efficiency (典型87 %)
- ⊙ 开关频率 Switching frequency：100KHz
- ⊙ 过流短路保护，自动恢复 current /Short circuit protection,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 金属外壳 Metal case

温度曲线图 Temper ature graph



技术参数 测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。

Technology parameter Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vac Input voltage	85(120Vdc)	220	265(380Vdc	W
输入频率范围 Hz Frequency range	47		440)	
遥控端 Rremote ON/OFF	无遥控端 No remote control terminal			

输出特性 Output	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection, Self -furbish		
输出电压精度 Voltage accuracy		Vo	±1.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo	±0.2%
负载效应 Load regulation	20%~100%额定负载(Rated load)	Vo	±0.5%
纹波及噪声 Ripple and noise	20MHz BM 满载(Full load)		
	Vo≤5.0V,≤80mVp-p;	Vo≥48V,≤180mVp-p;	Other,≤120mVp-p;
启动延迟时间 Start delay time	典型值 Tpical value		1S

一般特性 General			
转换效率 Efficiency	标称电压输入，满载 Nominal input, Full load		87%典型(Typical)
开关频率 Switchingfrequency		100KHz 典型 (Typical)	最大 (max) 250KHz
工作温度 Operatingtemperature		自由空气对流 Free air	-25℃~+55℃
储存温度 Storage temperagure			-40℃~+105℃
最大壳温 Max case temperature			80%℃
相对湿度 Relative humidity			10%~90%

SWA150-200 Series

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外壳材料(case material)			金属壳 Metal case
隔离电压(Isolation Voltage)	输入与输出 Input-output 2.5KV ≤10mA/1mi		
输入与外壳 Input-case 输入与FG Input-FG 1.5KV≤10mA 1min			
最小无故障间隔时间 MTBF	2X10^{5}Hrs		
外形尺寸	180*88*25mm		

产品命名方式 Product Nomination Method

举例 Forexample	SW A 150 — 220 S 12 ① ② ③ ④ ⑤ ⑥		
①	W宽压输入：AC85-265V Wide input voltage AC85-265V N窄压输入： AC165-265V Narrow input voltage AC85-265V	④	表示输入电压标称值 nominal value of input voltage
②	电源转换模式A (AC-DC): Power conversion mode A (AC-DC)	⑤	S 单路输出 S: Single output
③	表示输出功率大小 Ouput Power	⑥	输出电压大小 Output Voltage

典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mV	V	mV	V	mV
SWA150-220S12	85~265VAC 120~380VDC	12V	12500mA				
SWA150-220S15		15V	10000mA				
SWA150-220S27		27V	5500mA				
SWA150-220S48		48V	3125mA				
SWA200-220S12		12V	16670mA				
SWA200-220S15		15V	13300mA				
SWA220-220S27		27V	7400mA				
SWA200-220S48		48V	4200mA				

注: 因篇 幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
due to space limi tations the above list is only for some produc ts, If other than a list of products, please contact the Companys sales department.

SWA150-200 Series

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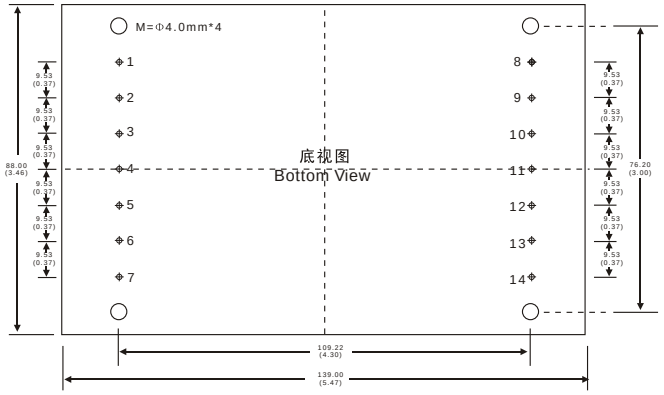
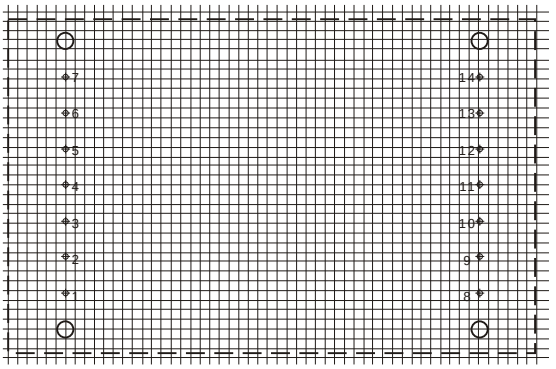
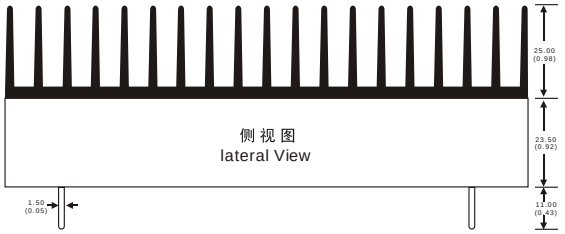
封装尺寸图 Mechanical Data







单位：mm
印刷板俯视图
栅间距：2.5mm(0.1inch)

封装尺寸图 Mechanical Data

封装代号 Package Code	LxWxH 单位：mm	封装号 Package No
M5	138x88x23.5	547346DC

管脚号码 Pin Number	1	2	3	4	5	6	7	8	9	10
单路(S) S: Single	AC(N)	NP	AC(L)	NP	NP	NP	FG	+Vo	+Vo	+Vo
	11	12	13	14						
	-Vo	+SENSE	TEIM	-SENSE						

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。

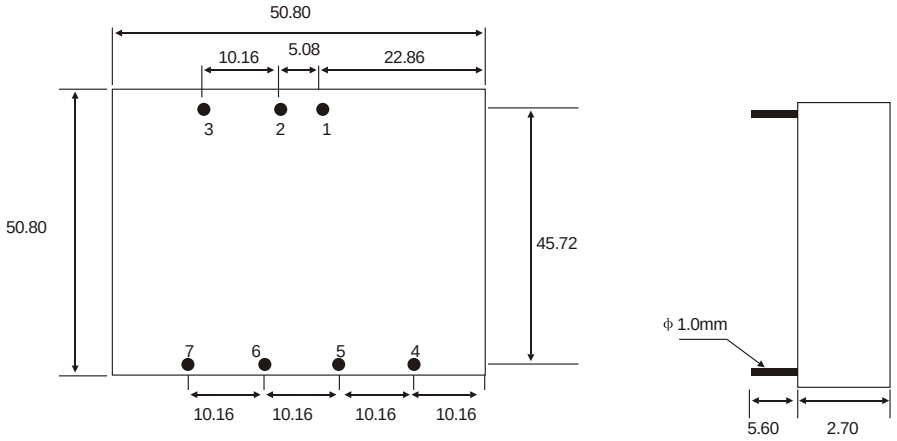
*Note:The power modules such as the definition of the pin does not match with the hand book,please refer to the atual item.

SHINHOM DC/DC Module power suppry 25w wide voltage isolation voltage regulator series

Feature:

- Input voltage range 4:1
- Can be directly fixed onto PCB board
- Remote on/off control
- Current - limiting protection
- Continuous automatic recovery

Dimension & bottom view(schematic diagram unit: mm standard size: 50.80mm*50.80mm*12.70mm)



Pin definition

Pin Description	1	2	3	4	5	6	7
Single Path	Vin+	Vin-	REM	NC	+24	GND	TRIM

Typical electrical characteristics:

Output voltage precision	±1	Temperature coefficient	±0.02%/℃
Source effect	±0.2%	Ripple and noise	50mVp-p Vo≤5Vdc
Load effect	±0.5%		100mVp-p other
Isolation voltage	500VDC(Normal)	Cooling method	air
Switch frequency	250kHz	Housing material	metal case
MTBF	2x105h	Efficiency	80%~90%
Shell temperature range	-25℃~+95℃(metal case)	Storage temperature range	-45℃~+105℃

Selection and technical parameters

Part number	Input voltage range (VDC)	Output voltage (VDC)	Output current (A)	Efficiency
SWDC25-2401	4.5-36	24	1	84%

SHINHOM

AC/DC Power Modules

TMLM Series **4 to 20 Watt**

Features

- AC/DC power modules for PCB mounting
- Highest power density
- Fully encapsulated plastic case
- Universal input 90-264 VAC,47-440 Hz
- High efficiency
- EMI meets EN 55022,class B and FCC,level B
- low ripple and noise
- Short circuit and overload protection
- 3-year product warranty

The TMLM Series switching power supplies,offer highest power density in a fully encapsulated module which can be soldered directly on to PCBs. This feature makes these modules an ideal solution for all space critical applications in commercial and industrial electronic equipment, International safety approvals qualify the product for worldwide markets. SMD-technology and high efficiency guarantees a high reliability of these Power Supplies.

Models

Order code	Output Power max.	Output 1	Output 2
TMLM04105	4.0Watt	5.0VDC/800mA	+3.3 VDC / 150 mA +5.0 VDC / 120 mA

Input Specifications

Input voltage	-Nominal	100-240 VAC
	-Range	90-264 VAC (UNIVERSAL INPUT)
	-DC range (TMLM 04& TMLM 05 models only)	120-370 VDC
Input frequency		47-440 Hz
Input current at full load (115VAC/230VAC)	TMLM04 models:	75 mA / 55 mA typ.
Inrush current (<2 ms)(115 VAC/230 VAC)	TMLM04 models:	15 A max / 25A max.
External Input Fuse Required (recommended value)		1.5 A slow blow type

Output Specifications

Voltage set accuracy			±2%
Regulation	- Input variation		0.3% max.(0.5% max.for TMLM 20 models, 3.0% max for output 2)
	- Load variation	TMLM 04 other models output 1:	0.5% max.(0-100% load)
		TMLM 04 output 2:	5.0% max.(1-100% load)

SHINHOM

AC/DC Power Modules

TMLM Series **4 to 20 Watt**

Minimum load	TMLM 04 models:	0% (1% for output 2)
	other models:	5%,operation at 0-load condition will not
		damage these power supplies,however,they
		may not meet all listed specifications.
Ripple and noise (20 Mhz bandwidth)	3.3-9.0 VDC models:	<100 mV
	12& 15 VDC models:	<150 mV
	24VDC models:	<220 mV
Current limitation		120-180% fold back
Short circuit protection		indefinite (autmatic recovery)
Overvoltage protection by Zehner diode (main output only)		120% of Vout typ.

Max. Capacitive load [μ F]

Output:		Model series
		TMLM 04
Single output models:	3.3 VDC	1200
	5.0 VDC	800
	9.0 VDC	440
	12 VDC	330
	15 VDC	260
	24 VDC	160
Dual output models:	5.0 VDC/3.3VDC	5600/4700
	12 VDC/5.0 VDC	330/4700

General Specifications

Temperature ranges	-Operating	-25℃ to +60℃
	-Storage (non operating)	-40℃ to +85℃
Derating		3.75℃/K above +80℃
		TMLM 20 models: 2.5%/K above 40℃
Temperature coefficient		0.02 %/K
Humidity (non condensing)		92% rel max.
Efficiency		75% typ.(depending on model)

SHINHOM

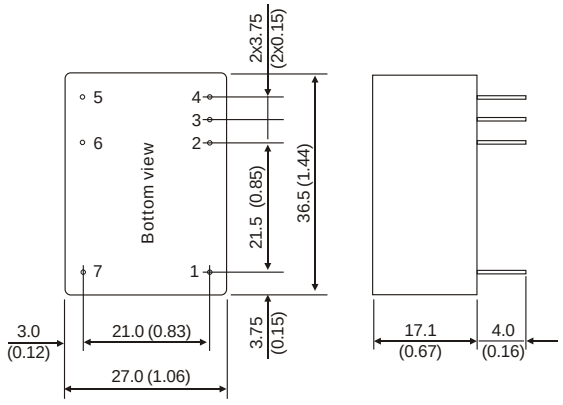
AC/DC Power Modules

TMLM Series **4 to 20 Watt**

Switching frequency		130 kHz typ. (Pulse width modulation PWM)
Hold-up time		15 ms min.
Isolation voltage (60 secretary)	-Input / Output	3`000 VAC
Leakage current	TMLM 04 models:	0.30 mA max.
Reliability / calculated MTBF (MIL-HDBK-217F,at 25℃,ground benign)		>330`000 h
Electromagnetic compatibility (EMC),emissions		EN 55022,class B,FCC part 15, level B
Electromagnetic compatibility (EMC),immunity		EN 61000-6-2:2005
Degre of protection		class ll to IEC/EN 60536
Safety standards		UL 60950-1,IEC/EN 60950-1
Safety approval		CUL/UL File E188913 (TMLM 20 pending)
		www.ul.com>certifications
Environment	-Vibration acc.IEC 60068-2-6;	3 axis,sine sweep,10-55Hz,1g,1oct/min
	-Shock acc, IEC 60068-2-27	3 axis,15g half sine,11msShock
		20 G (3 directions each 3 times)
Casing material		Plastic resin + fiberglass
		(flammability UL 94V-0 rated)

Outline Dimensions

TMLM 04 Models:



Pin – Out		
Pin	Single	Dual
1	No con	No con
2	+Vout	Vout 1
3	-Vout	Common
4	No com.	Vout 2
5	AC (L)	AC (L)
6	AC (N)	AC (N)
7	No con.	No con.

Pin diameter:0.5(0.02) **Weight: 26g (0.92 oz)**

All specifications valid at nominal input voltage ,full load and +25 after warm–up time unless otherwise stated,

TPE 3.3V, 5V & 12V Series

DESCRIPTION **1W 1.5KVDC and 2KVDC Isolated Single Output DC/DC Converters**

The TPE series are miniature, isolated 1W DC/DC converters in a SIP and DIP package. They offer the ideal solution in many space critical applications for board level power distribution. The internal SMD construction makes it possible to offer a product with high performance at low cost. The series offers smaller size, improved efficiency, lower output ripple noise.

FEATURES

RoHS compliant	Single isolated output	SIP:1.5KVDC /3KVDC isolation DIP: 2KVDC/3KVDC isolation
Efficiency up to 81%	Operating temperature :-40 to 105	Power density 1.53W/cm^3
UL 94V-0 package material	Footprint from 0.69cm^2	Industry standard pinout
Input voltage: 3.3V, 5V, 12V	Output voltage:3.3V,5V, 9V, 12V, 15V & 24V	CE certification

SELECTION GUIDE

Part Number	Nominal Input Voltage	Output Voltage	Output Current (Max./Min)	Efficiency	Max. Capacitive Load(μF)	Package Style
	V	V	mA	%		
TPE0303D	3.3	3.3	303/30.3	72	220	DIP
TPE0305D	3.3	5	200/20	74	220	DIP
TPE0309D	3.3	9	110/11	78	220	DIP
TPE0312D	3.3	12	83/8.3	78	220	DIP
TPE0315D	3.3	15	66/6.6	80	220	DIP
TPE0324D	3.3	24	42/4.2	79	220	DIP
TPE0303S	3.3	3.3	303/30.3	72	220	SIP
TPE0305S	3.3	5	200/20	74	220	SIP
TPE0309S	3.3	9	110/11	78	220	SIP
TPE0312S	3.3	12	83/8.3	78	220	SIP
TPE0315S	3.3	15	66/6.6	80	220	SIP
TPE0324S	3.3	24	42/4.2	79	220	SIP
TPE0503D	5	3.3	303/30.3	72	220	DIP
TPE0505D	5	5	200/20	68	220	DIP
TPE0509D	5	9	110/11	78	220	DIP
TPE0512D	5	12	83/8.3	77	220	DIP
TPE0515D	5	15	66/6.6	81	220	DIP
TPE0524D	5	24	42/4.2	80	220	DIP
TPE0503S	5	3.3	303/30.3	72	220	SIP
TPE0505S	5	5	200/20	70	220	SIP
TPE0509S	5	9	110/11	78	220	SIP
TPE0512S	5	12	83/8.3	78	220	SIP
TPE0515S	5	15	66/6.6	80	220	SIP
TPE0524S	5	24	42/4.2	79	220	SIP
TPE1203D	12	3.3	303/30.3	72	220	DIP
TPE1205D	12	5	200/20	69	220	DIP
TPE1209D	12	9	110/11	74	220	DIP
TPE1212D	12	12	83/8.3	76	220	DIP
TPE1215D	12	15	66/6.6	75	220	DIP
TPE1224D	12	24	42/4.2	79	220	DIP
TPE1203S	12	3.3	303/30.3	72	220	SIP
TPE1205S	12	5	200/20	71	220	SIP
TPE1209S	12	9	110/11	73	220	SIP
TPE1212S	12	12	83/8.3	76	220	SIP
TPE1215S	12	15	66/6.6	74	220	SIP
TPE1224S	12	24	42/4.2	79	220	SIP

Add suffix “P” for continuous short circuit protection, for example TPE0505SP.

Add suffix “/3H” for 3KVDC isolated, for example TPE0505S/3H.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	3.3V input	2.9	3.3	3.6	V
Voltage range	5V input	4.5	5.0	5.5	V
Voltage range	12V input	10.8	12.0	13.2	V
Reflected ripple current			26	48	mA p-p

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage SIP package	Tested for 1 second	1500/3000			VDC
Isolation test voltage DIP package	Tested for 1 second	2000/3000			VDC
Resistance	Viso= 1000VDC	1			GΩ

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power	TA= - 40°C to 85°C			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High VIN to low VIN (voltage variation +/-5%)		1.0	1.2	%/%
Load Regulation 10%load to rated load	3.3V output		14	15	%
Load Regulation 10%load to rated load	5V output		12	15	%
Load Regulation 10%load to rated load	9V output		9	10	%
Load Regulation 10%load to rated load	12V output		7.5	9.5	%
Load Regulation 10%load to rated load	15V output		7.0	8.5	%
Load Regulation 10%load to rated load	24V output		5.5	7.5	%
Ripple & Noise	20MHz bandwidth		70	100	mvp-p

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

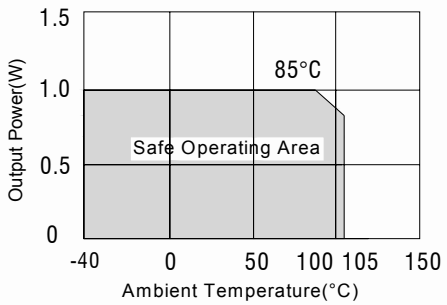
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	3.3V input		95		kHz
Switching frequency	5V input		110		kHz
Switching frequency	12V input		145		kHz
MTBF	MIL-HDBK-217F@25		3500		K hours

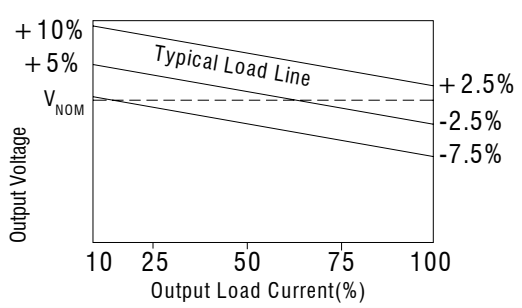
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	Derating if the temperature ≥85°C	-40		105	
Storage		-55		150	
Case Temperature above ambient	5V output			41	
Case Temperature above ambient	All other output			32	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPHS



TOLERANCE ENVELOPES

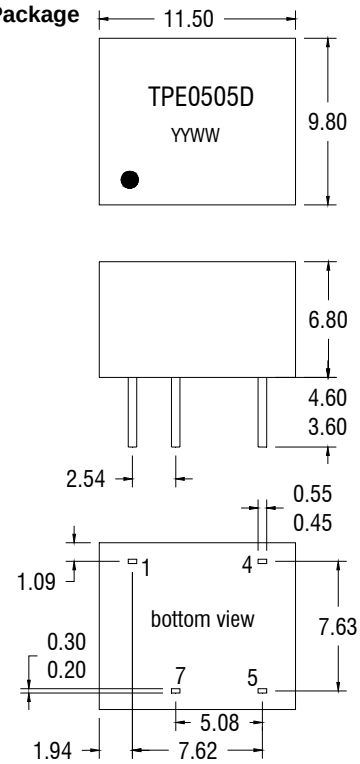


SOLDERING INFORMATION

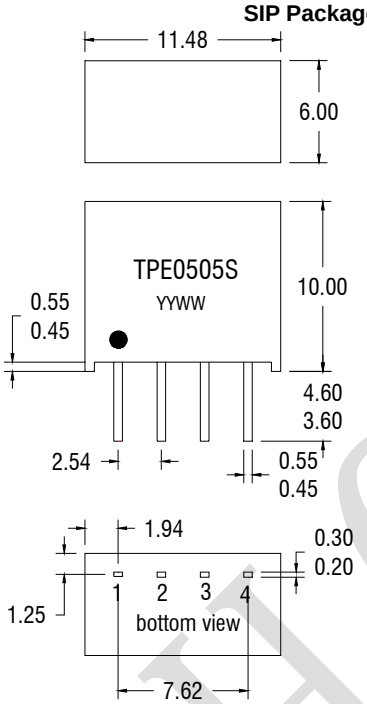
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. Both types in this series are backward compatible with Sn/Pb soldering systems.

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in mm ±0.25mm. All pins on a 2.54 mm pitch and within ±0.25mm of true position

Weight: 1.30g (SIP) 1.48g (DIP)

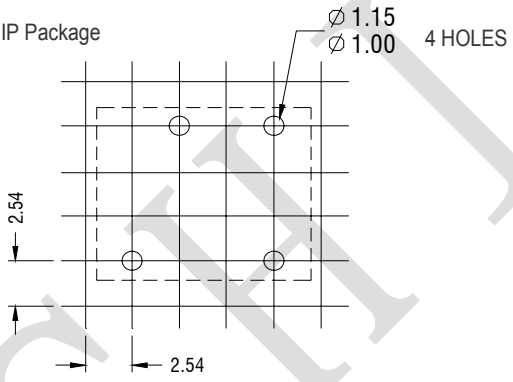
PIN CONNECTIONS

8 PIN DIP	
Pin	Function
1	-Vin
4	+Vin
5	+Vout
7	-Vout

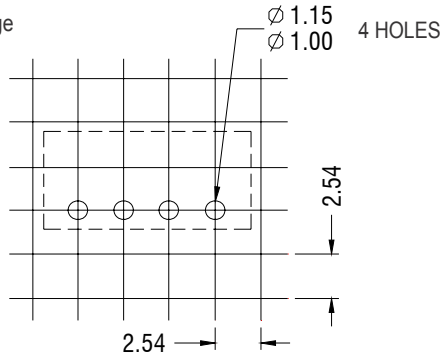
4 PIN SIP	
Pin	Function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

RECOMMENDED FOOTPRINT DETAILS

8Pin DIP Package

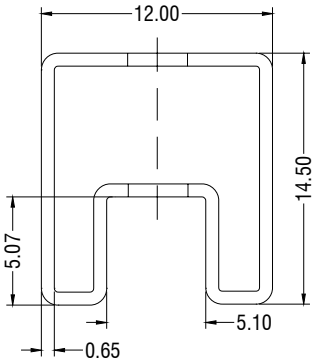


4Pin SIP Package

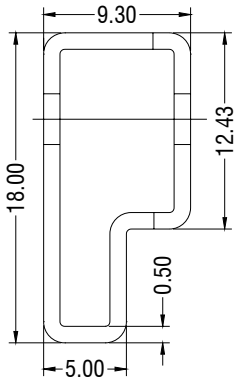


TUBE OUTLINE DIMENSIONS

8Pin DIP Tube



4Pin SIP Tube



Unless otherwise stated all dimensions in mm ±0.5mm.

Tube length (8 Pin DIP) : 520mm ±2mm.

Tube length (4 Pin SIP) : 520mm ±2mm.

Tube Quantity : 35PCS

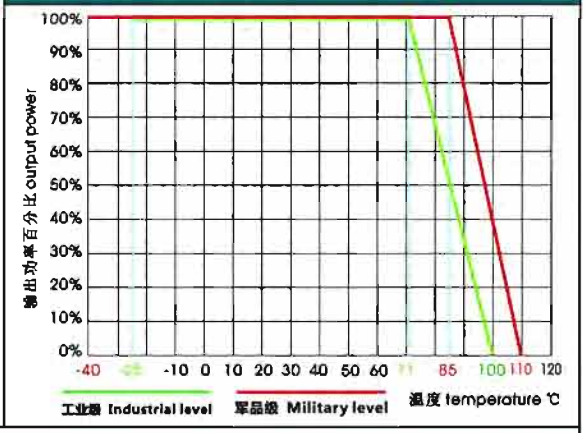
WDC3-6 Series

DC/DC 宽压输入 3-6W (DC/DC wide input 3-6W)

典型性能 Typical performance

- ◆ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ◆ 转换效率（典型 82%）Typical Efficiency 82%
- ◆ 开关频率 Switching frequency：300KHz ± 30 KHz
- ◆ 长期短路保护，自动恢复 Short circuit protection,Self-furbish
- ◆ 输入与输出高隔离 Input-output isolate (1000/1500/3000Vdc)
- ◆ PCB 板上直插式安装 Board in-line type installs
- ◆ 塑料/金属外壳，输出纹波低 Plastic / Metal case, Low Output Ripple

温度曲线图 Temperature graph



技术参数 测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及 25℃ 室温环境下测得。

Technology parameter Test condition: General Nominal Line, Tc=25℃, Rated resistant load unless other wise specified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	4.5	5	9	W 2:1
Input voltage	9	12	18	W 2:1
	18	24	36	W 2:1
	36	48	72	W 2:1
	9	12	36	W 4:1
	18	48	72	W 4:1
遥控端 Remote ON/OFF	无遥控端 Non			
输入欠压保护 Input undervoltage protection	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection ，Self-furbish			

输出特性 Output			
输出电压精度 Voltage accuracy		Vo1,Vo2	±1.0%, ±2.0%
源效应 Line regulation	标称负载，全电压范围	Vo1,Vo2	±0.2%, ±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1,Vo2	±0.5%, ±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V, ≤50mVp-p; Vo≥48V, ≤180mVp-p; Other, ≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	无调节端 Non	

启动延迟时间 Start delay time	典型值 Typical value		≤200mS

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input，Full load	Vo≤5.0V,78%典型(Typical)	Vo>5.0V，82%典型(Typical)
开关频率 Switching frequency		300KHz 典型(Typical)	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-30℃ ~ +71℃
		军品级 Military level	-40℃ ~ +85℃
储存温度 Storage temperature		工业级 Industrial level	-50℃ ~ +115℃
		军品级 Military level	-55℃ ~ +120℃
最大壳温 Max case temperature		工业级 Industrial level	+100℃
		军品级 Military level	+110℃
相对湿度 Relative humidity			10%~90%
外壳材料 case material			金属壳 Metal case
隔离电压 Isolation Voltage	输入与输出 1000/1500/3000 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$10X10^5$Hrs		

产品命名方式 Product Nomination Method

举例	W DC 5 - 48 S 05 J ① ② ③ ④ ⑤ ⑥ ⑦

①	宽压输入：2：1	⑥	输出电压大小
②	电源转换模式：DC（DC-DC）	⑦	J 表示军品级，无表示工业级
③	表示输出功率大小		G 表示输入输出非隔离
④	表示输入电压标称值		I 表示双路输出隔离
⑤	S 单路输出，D 双路输出，T 三路输出，Q 四路输出		W 表示超宽范围 4：1 输入

典型产品列表 Typical product tabulates

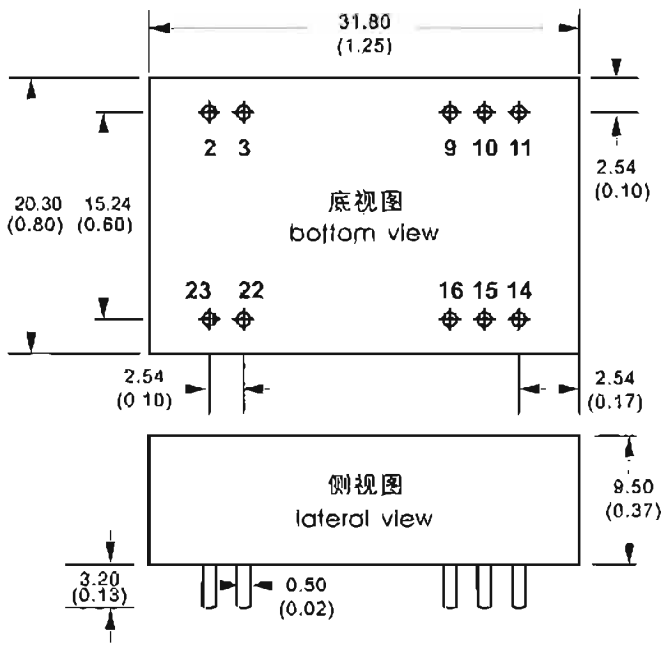
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC3-□S3V3	5V（4.5~9V） 12 V（9~18V） 24V（18~36V） 48V（36~72V） 12V（9~36V）W 48V（18~72V）W	3.3V	600mA				
WDC3-□S05		5V	600mA				
WDC3-□S09		9V	330mA				
WDC3-□S12		12V	250mA				
WDC3-□S15		15V	200mA				
WDC3-□S24		24V	125mA				
WDC5-□S3V3		3.3V	1000mA				
WDC5-□S05		5V	1000mA				
WDC5-□S09		9V	550mA				

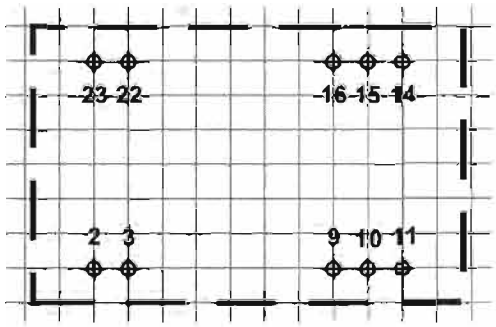
WDC5-□S12		12V	410mA				
WDC5-□S15		15V	330mA				
WDC5-□S24		24V	210mA				
WDC6-□S05		5V	1200 mA				
WDC6-□S09		9V	660 mA				
WDC6-□S12		12V	500 mA				
WDC6-□S15		15V	400 mA				
WDC6-□S24		24V	250 mA				
WDC3-□D3V3	5V（4.5~9V） 12 V（9~18V） 24V（18~36V） 48V（36~72V） 12V（9~36V） 48V（18~72V）	+3.3V	300 mA	-3.3V	300 mA		
WDC3-□D05		+5V	300 mA	-5V	300 mA		
WDC3-□D09		+9V	165 mA	-9V	165 mA		
WDC3-□D12		+12V	125 mA	-12V	125 mA		
WDC3-□D15		+15V	100 mA	-15V	100 mA		
WDC3-□D24		+24V	60 mA	-24V	60 mA		
WDC5-□D3V3		+3.3V	500 mA	-3.3V	500 mA		
WDC5-□D05		+5V	500 mA	-5V	500 mA		
WDC5-□D09		+9V	275 mA	-9V	275 mA		
WDC5-□D12		+12V	205 mA	-12V	205 mA		
WDC5-□D15		+15V	165 mA	-15V	165 mA		
WDC5-□D24		+24V	100 mA	-24V	100 mA		
WDC6-□D05		+5V	600 mA	-5V	600 mA		
WDC6-□D09		+9V	330 mA	-9V	330 mA		
WDC6-□D12		+12V	250mA	-12V	250mA		
WDC6-□D15		+15V	200mA	-15V	200mA		
WDC6-□D24		+24V	125mA	-24V	125mA		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。

□ Shows the nominal value of input voltage,due to space limitations ,the above list is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data





单位：mm

印刷板俯视图

栅格间距：2.54mm(0.1inch)

封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
	31.80 x 20.30 x 10.00	125080DC

管脚定义 Pin Assignments

管脚号码	2	3	9	10	11	14	15	16	22	23
单路（S）	-Vin	-Vin	NC	NC	NC	+Vout	NC	GND	+Vin	+Vin
双路（D）	-Vin	-Vin	COM	NC	-Vo2	+Vo1	NC	COM	+Vin	+Vin

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。

*Note：The power modules such as the definition of the pin does not match with the hand book,please refer to the actual item.

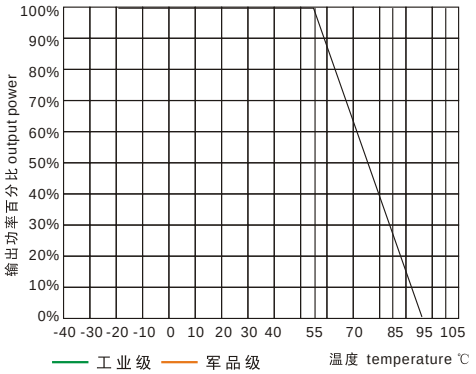
WDC10-15 Series

DC/DC 宽压输入 10–15W (DC/DC wide input 10–15W)

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ⊙ 转换效率 (典型 80%) Typical Efficiency 80%
- ⊙ 开关频率 Switching frequency：300KZh±30 KHz
- ⊙ 长期短路保护，自动恢复 Short circuit protection,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate (500/1000/1500Vdc)
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 金属外壳，输出纹波低 Metal case,Low Output Ripple

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	4.5	5	9	W 2:1
Input voltage	9	12	18	W 2:1
	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	144	W 2:1
	10	12	36	W 4:1
	18	48	72	W 4:1
遥控端 Rremote ON/OFF	无遥控端 Non			
输入欠压保护 Under voltage protect				

输出特性 Output

输出电压精度 Voltage accuracy		Vo1,V02	±1.0%,±2.0%
源效应 Line regulation	标称负载，全电压范围	Vo1,V02	±0.2%,±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1,V02	±0.5%,±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V,≤50mVp-p；Vo≥48V,≤180mVp-p； Other,≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压	无调节端	
启动延迟时间 Start delay time	典型值		≤200mS

一般特性 General

转换效率 Efficiency	标称电压输入，满载	Vo≤5.0V,75%典型	Vo>5.0V, 80%典型
开关频率 Switching frequency		300KHHz 典型	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-25℃~+55℃
		军品级 Military level	-40℃~+85℃
储存温度 Storage temperagure		-40℃~+105℃(工业级)	-55℃~+120℃(军品级)
最大壳温 Max case temperature		+95℃(工业级)	+105℃(军品级)
相对湿度 Relative humidity			10%~90%
外壳材料 case material		金属壳壳 Metal case	
隔离电压 Isolation Voltage	输入与输出 500/1000/1500 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^6$Hrs		

产品命名方式 Product Nomination Method

举例	W D 5 — 48 S 05 J ① ② ③ ④ ⑤ ⑥ ⑦		
①	宽压输入：2：1	⑥	输出电压大小
②	电源转换模式：D（DC-DC）	⑦	J 表示军品级，无表示工业级
③	表示输出功率大小		G 表示输入输出非隔离
④	表示输入电压标称值		I 表示双路输出隔离
⑤	S 单路输出，D双路输出，T三路输出，Q四路输出		W 表示超宽范围输入

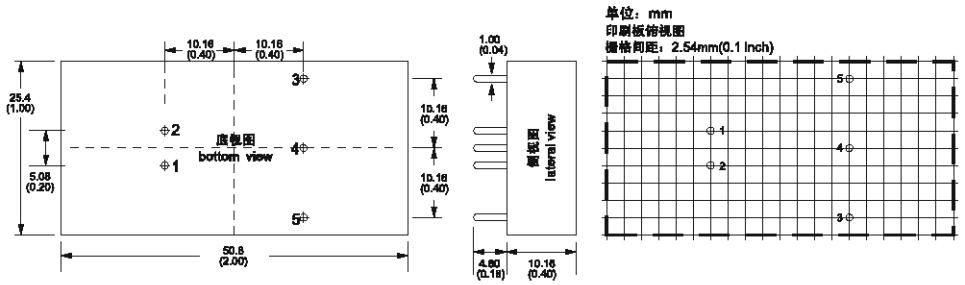
典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC10-□S3V3	5V (4.5~9V) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	3.3V	2000mA				
WDC10-□S05		5V	2000mA				
WDC10-□S09		9V	1110mA				
WDC10-□S12		12V	830mA				
WDC10-□S15		15V	660mA				
WDC10-□S24		24V	410mA				
WDC12-□S3V3		3.3V	2400mA				
WDC12-□S05		5V	2400mA				
WDC12-□S09		9V	1330mA				
WDC12-□S12		12V	1000mA				

WDC12-□S15	5V (4.5~9V) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) 48V (18~72V)	15V	800mA	-3.3V	1000 mA		
WDC12□S24		24V	500mA	-5V	1000 mA		
WDC15-□S05		5V	3000mA	-9V	550 mA		
WDC15-□S12		12V	1200mA	-12V	410 mA		
WDC10-□D3V3		+3.3V	1000mA	-15V	330 mA		
WDC10-□D05		+5V	1000mA	-42V	210 mA		
WDC10-□D09		+9V	550mA	-3.3V	1200 mA		
WDC10-□D12		+12V	410mA	-5V	1200 mA		
WDC10□D15		+15V	330mA	-9V	660 mA		
WDC10-□D24		+24V	210mA	-12V	500 mA		
WDC12-□D3V3		3.3V	1200mA	-15V	400 mA		
WDC12-□D05		+5V	1200mA	-24V	250 mA		
WDC12-□D09		+9V	660mA	-5V	1500 mA		
WDC12-□D12		+12V	500mA	-15V	600 mA		
WDC12-□D15		+15V	400mA				
WDC12-□D24		+24V	250mA				
WDC15-□D05		+5V	1500mA				
WDC15-□D12		+15V	600mA				

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
□ Shows the nominal value of input voltage,due to space limitations, the abovelist is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
	50.80 x 25.40 x 10.16	200100DC

管脚定义 Pin Assignments

管脚号码	1	2	3	4	5					
单路（S）	-Vin	+Vin	+Vout	NP	GND					
双路（D）	-Vin	+Vin	+Vout1	COM	-Vout2					

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。
*Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

WDC15 Series

15 Watt Single Output DC/DC Converter

Features

- Approved to IEC/EN60950, UL60950 safety standards
- Industry standard footprint: 1.65"x1.46"x0.4"(41.90x37.10x10.16mm^3)
- Typical efficiency: 82%,for 5Vout
- 2:1 wide input voltage range: 36-75V
- Single output: 3.3V, 5V, 12V, 15V
- Remote control
- Input under-voltage shutdown
- No minimum load requirement
- Output over-current;short-circuit protection (not commended for Vout 12V,15V)
- Isolation voltage: 1500Vdc,1min (Input-Output; Input-Case; Output-Case)

Environmental

- Operating ambient temperature range: -40℃ to 55℃
- Operating board temperature range: -40℃ to 100℃
- Storage temperature range: -55℃ to 125℃
- Temperature coefficient: <±0.02%/℃
- MTBF: >2 million hrs

Electrical Specifications

Input

Input range:	36-75V
Input under-voltage shutdown:	32-34V

Output

Voltage setpoint accuracy:	±1.0%Vo max
Voltage adjust:	None
Line regulation:	10mV max
Load regulation:	25mV max
Over-current protection:	>120%Io, auto-recovery
Short-circuit protection:	Continuous,auto-recovery
Ripple and noise:	<60mVpp max.
Transient response:	200mV max Recovery<400us max (25%~50%~25% Iomax) di/dt: 1A/10uS

Control

Control voltage:

Positive logic

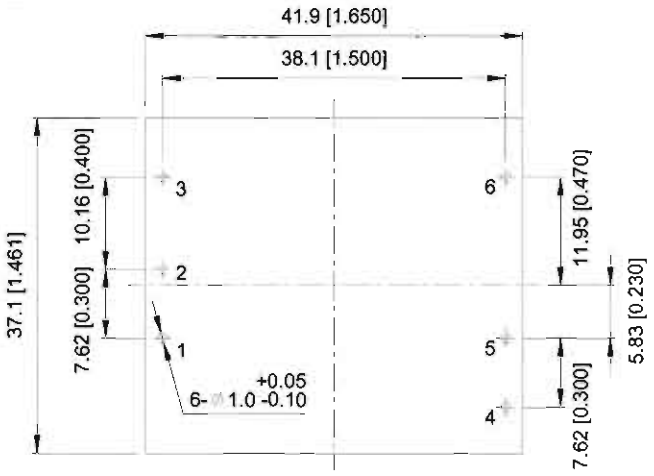
High =on	3.5 to 12Vdc
Low=off	-0.7 to 0.6Vdc

Control current:: 2mA max

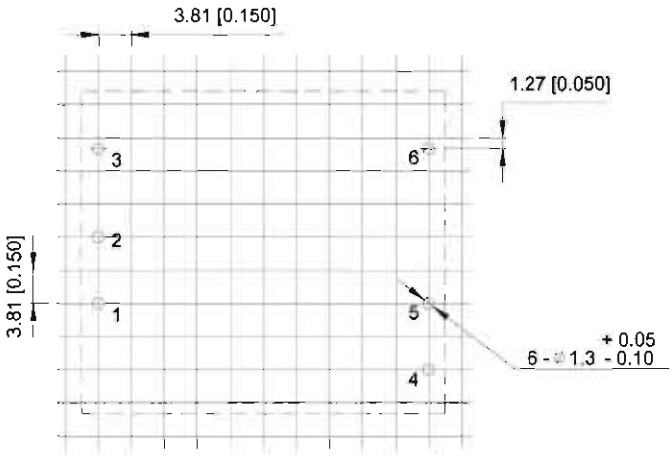
Ordering Information

Input Voltage	Output Voltage	Output Current	Efficiency	Model Number
48V	3.3V	3.5A	78%	WDC15-48S3V3
48V	5V	3A	82%	WDC15-48S05
48V	12V	1.25A	84%	WDC15-48S12
48V	15V	1A	85%	WDC15-48S15

Dimensions



Top View



Pin Assignments

1	+Vin
2	-Vin
3	CNT
4	-Vo
5	+Vo
6	NC

Pin Length: 5.8mm

TOLERANCES: X.Xmm=+/-0.5mm
X.XXmm=+/-0.25mm

Unit:mm[inch]

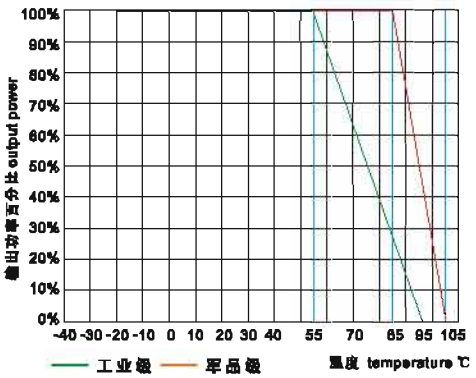
WDC10-15 Series

DC/DC 宽压输入 10–15W (DC/DC wide input 10–15W)

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ⊙ 转换效率 (典型80%) Typical Efficiency 88%
- ⊙ 开关频率 Switching frequency：300KZh±30 KHz
- ⊙ 长期短路保护，自动恢复 Short circuit protection,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate (500/1000/1500Vdc)
- ⊙ PCB 板上直插式安装 Board in-line type installs
- ⊙ 金属外壳，输出纹波低 Metal case,Low Output Ripple

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	4.5	5	9	W 2:1
Input voltage	9	12	18	W 2:1
	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	145	W 2:1
	10	12	36	W 4:1
	18	48	72	W 4:1
遥控端 Rremote ON/OFF	无遥控端 Non			
输入欠压保护 Under voltage protect				

输出特性 Output			
输出电压精度 Voltage accuracy		Vo1,V02	±1.0%,±2.0%
源效应 Line regulation	标称负载，全电压范围	Vo1,V02	±0.2%,±1.5%
负载效应 Load regulation	20%～100%额定负载	Vo1,V02	±0.5%,±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V,≤50mVp-p; Vo≥48V,≤180mVp-p; Other,≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压	无调节端	
启动延迟时间 Start delay time	典型值		≤200mS

SHINHOM ELECTRONICS ENTERPRISE CO.,LTD. No.100Yan Ta Northern Road Zip:710054 Tel:0086-29-87851838 Fax:0086-29-87851840

一般特性 General

转换效率 Efficiency	标称电压输入，满载		88%典型
开关频率 Switching frequency		300KHHz 典型	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-40℃~+71℃
		军品级 Military level	-40℃~+85℃
储存温度 Storage temperagure		-40℃~+105℃(工业级)	-55℃~+120℃(军品级)
最大壳温 Max case temperature		+95℃(工业级)	+105℃(军品级)
相对湿度 Relative humidity			10%~90%
外壳材料 case material		金属壳 Metal case	
隔离电压 Isolation Voltage	输入与输出 500/1000/1500 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^5$Hrs		

产品命名方式 Product Nomination Method

举例	W DC 5 — 48 S 05 J ① ② ③ ④ ⑤ ⑥ ⑦		
①	宽压输入：2：1 Wide input voltage	⑥	输出电压大小 Output Voltage
②	电源转换模式：DC（DC-DC） DC-DC Con Verter	⑦	J 表示军品级，无表示工业级 J: That Military Level,nothing That Industrial Level
③	表示输出功率大小 Ouput Power		G 表示输入输出非隔离 G: That Input Output Non-isolated
④	表示输入电压标称值 Input voltage		I 表示双路输出隔离 I: That Dual-input Isolation
⑤	S 单路输出，D双路输出，T三路输出，Q四路输出 S: Single output, D: dual output, T: triple output Q:quad output		W 表示超宽范围输入 W: That Wide Range Of Input

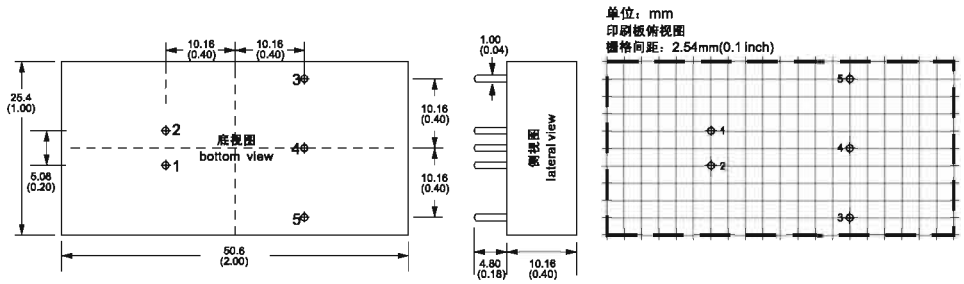
典型产品列表 Typical product tabulates

型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC10-□S3V3	5V (4.5~9V) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	3.3V	2000mA				
WDC10-□S05		5V	2000mA				
WDC10-□S09		9V	1110mA				
WDC10-□S12		12V	830mA				
WDC10-□S15		15V	660mA				
WDC10-□S24		24V	410mA				
WDC12-□S3V3		3.3V	2400mA				
WDC12-□S05		5V	2400mA				
WDC12-□S09		9V	1330mA				
WDC12-□S12		12V	1000mA				

WDC12-□S15	5V (4.5~9V) 12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) 48V (18~72V)	15V	800mA				
WDC12□S24		24V	500mA				
WDC15-□S05		5V	3000mA				
WDC15-□S12		12V	1200mA				
WDC10-□D3V3		+3.3V	1000mA	-3.3V	1000 mA		
WDC10-□D05		+5V	1000mA	-5V	1000 mA		
WDC10-□D09		+9V	550mA	-9V	550 mA		
WDC10-□D12		+12V	410mA	-12V	410 mA		
WDC10□D15		+15V	330mA	-15V	330 mA		
WDC10-□D24		+24V	210mA	-42V	210 mA		
WDC12-□D3V3		+3.3V	1200mA	-3.3V	1200 mA		
WDC12-□D05		+5V	1200mA	-5V	1200 mA		
WDC12-□D09		+9V	660mA	-9V	660 mA		
WDC12-□D12		+12V	500mA	-12V	500 mA		
WDC12-□D15		+15V	400mA	-15V	400 mA		
WDC12-□D24		+24V	250mA	-24V	250 mA		
WDC15-□S3.3		+3.3V	5000mA				
WDC15-□D12		+15V	600mA	-15V	600 mA		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。
□ Shows the nominal value of input voltage,due to space limitations, the abovelist is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
	50.80 x 25.40 x 10.16	200100DC

管脚定义 Pin Assignments

管脚号码	1	2	3	4	5					
单路（S）	-Vin	+Vin	+Vout	NP	GND					
双路（D）	-Vin	+Vin	+Vout1	COM	-Vout2					

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。
*Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

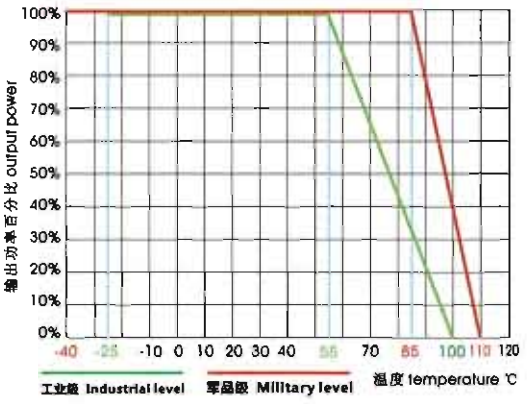
WDC15-20 Series

DC/DC 宽压输入 15-20W (DC/DC wide input 15-20W)

典型性能 Typical performance

- ◆ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ◆ 转换效率（典型 85%）Typical Efficiency 85%
- ◆ 开关频率 Switching frequency：300KHz ± 30 KHz
- ◆ 过流、短路保护,自动恢复 Over current/Short circuit protection,Self-furbish
- ◆ 输入与输出高隔离 Input-output isolate (500/1000/1500/2000Vdc)
- ◆ PCB 板上直插式安装 Board in-line type installs
- ◆ 金属外壳，输出纹波低 Metal case, Low Output Ripple

温度曲线图 Temperature graph



技术参数 测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及 25℃室温环境下测得。

Technology parameter Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wise specified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	9	12	18	W 2:1
Input voltage	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	144	W 2:1
	10	12	36	W 4:1
	18	48	72	W 4:1
遥控端 Remote ON/OFF		低电平遥控	高电平或悬空工作	3.5Vdc~+Vin
			低电平或接地关断	≤0.3Vdc
输入欠压保护 Input undervoltage protection	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection ， Self-furbish			

输出特性 Output

输出电压精度 Voltage accuracy		Vo1;Vo2,	±1.0%, ±2.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo1;Vo2	±0.2%, ±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1;Vo2	±0.5%, ±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V, ≤50mVp-p; Vo≥48V, ≤180mVp-p; Other, ≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	TRIM	±10%可调
启动延迟时间 Start delay time	典型值 Typical value		≤200mS

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input，Full load	Vo≤5.0V,80%典型(Typical)	Vo>5.0V，85%典型(Typical)
开关频率 Switching frequency		300KHz 典型(Typical)	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-25℃ ~ +55℃
		军品级 Military level	-40℃ ~ +85℃
储存温度 Storage temperature		工业级 Industrial level	-40℃ ~ +105℃
		军品级 Military level	-55℃ ~ +120℃
最大壳温 Max case temperature		工业级 Industrial level	+100℃
		军品级 Military level	+110℃
相对湿度 Relative humidity			10%~90%
外壳材料 case material			金属壳 Metal case
隔离电压 Isolation Voltage	输入与输出 500/1000/1500/2000 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^5$Hrs		

产品命名方式 Product Nomination Method

举例	W DC 20 - 48 D 05 G ① ② ③ ④ ⑤ ⑥ ⑦		
①	宽压输入：2：1	⑥	输出电压大小
②	电源转换模式：DC（DC-DC）	⑦	J 表示军品级，无表示工业级
③	表示输出功率大小		G 表示输入输出非隔离
④	表示输入电压标称值		I 表示双路输出隔离
⑤	S 单路输出，D 双路输出		W 表示超宽范围 4：1 输入

典型产品列表 Typical product tabulates

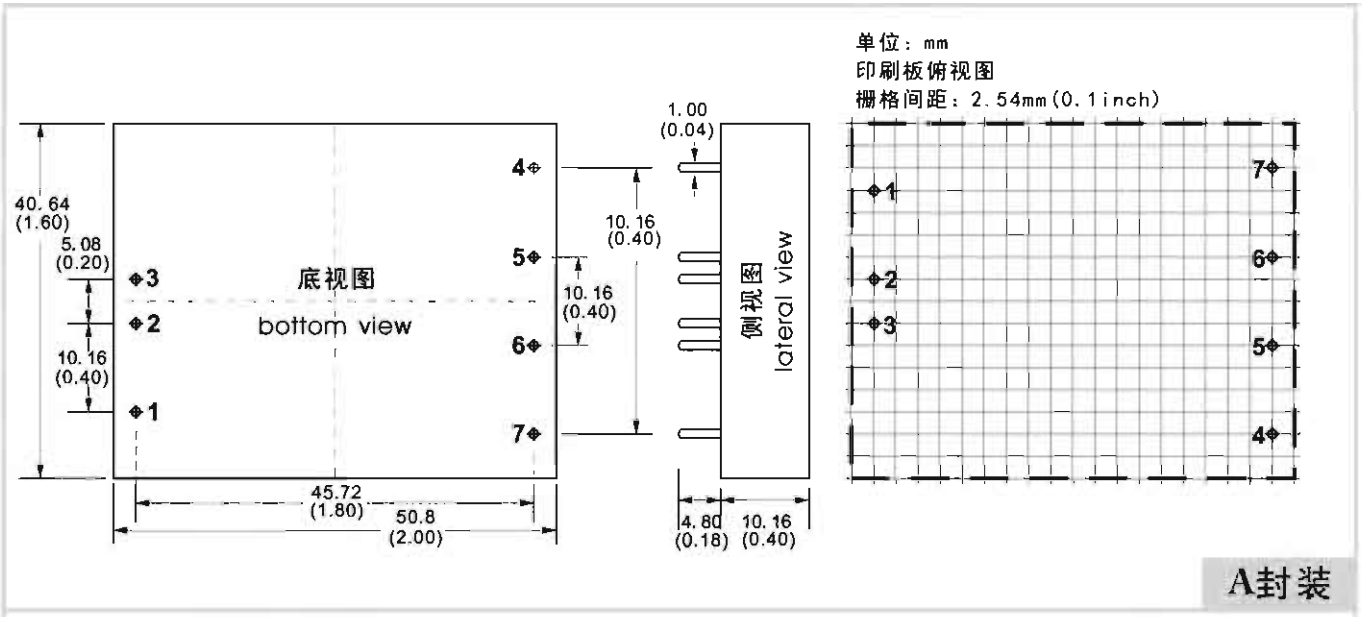
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC15-□S3V3	12 V（9~18V） 24V（18~36V） 48V（36~72V） 110V（72~144V） 12V（10~36V）W 48V（18~72V）W	3.3V	3000mA				
WDC15-□S05		5V	3000mA				
WDC15-□S09		9V	1600mA				
WDC15-□S12		12V	1250mA				
WDC15-□S15		15V	1000mA				
WDC15-□S24		24V	625mA				
WDC15-□S48		48V	310mA				
WDC20-□S3V3		3.3V	4000mA				
WDC20-□S05		5V	4000mA				
WDC20-□S09		9V	2220mA				
WDC20-□S12		12V	1660mA				
WDC20-□S15		15V	1330mA				
WDC20-□S24		24V	830mA				
WDC20-□S48		48V	410 mA				

WDC15-□D3V3	12 V（9~18V） 24V（18~36V） 48V（36~72V） 110V（72~144V）	+3.3V	1500 mA	-3.3V	1500 mA		
WDC15-□D05		+5V	1500 mA	-5V	1500 mA		
WDC15-□D09		+9V	830 mA	-9V	830 mA		
WDC15-□D12		+12V	625 mA	-12V	625mA		
WDC15-□D15		+15V	500 mA	-15V	500 mA		
WDC15-□D24		+24V	310 mA	-24V	310 mA		
WDC20-□D3V3		+3.3V	2000 mA	-3.3V	2000 mA		
WDC20-12D05		+5V	3000 mA	-5V	500 mA		
WDC20-□D09		+9V	1110 mA	-9V	1110 mA		
WDC20-□D12		+12V	830 mA	-12V	830 mA		
WDC20-□D15		+15V	660 mA	-15V	660 mA		
WDC20-□D24		+24V	410 mA	-24V	410 mA		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。

□ Shows the nominal value of input voltage,due to space limitations ,the above list is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
A	50.80 x 40.64 x 10.16	200160DC

管脚定义 Pin Assignments

管脚号码	1	2	3	4	5	6	7			
单路（S）	REM	-Vin	+Vin	NP	+Vout	GND	TRIM			
双路（D）	REM	-Vin	+Vin	+Vout1	COM	-Vout2	TRIM			

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。

*Note：The power modules such as the definition of the pin does not match with the hand book,please refer to the actual item.

SHINHOM

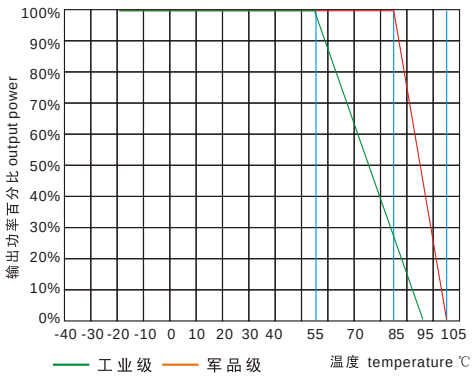
WDC15-20 Series

DC/DC 宽压输入 15–20W (DC/DC wide input 15–20W)

典型性能 Typical performance

- ⊙ 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ⊙ 转换效率 (典型 85%) Typical Efficiency 85%
- ⊙ 开关频率 Switching frequency：300KZh±30 KHz
- ⊙ 长期短路保护，自动恢复 Short circuit protection,Self-furbish
- ⊙ 输入与输出高隔离 Input-output isolate (500/1000/1500/2000Vdc)
- ⊙ PCB 板上直插式安装 Board in-line type installs

温度曲线图 Temper ature graph



技术参数
Technology parameter

测试条件：如无特殊指定，所有参数测试均在标称输入电压、纯阻性额定负载及25℃室温环境下测得。
Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wisespecified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	9	12	18	W 2:1
Input voltage	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	144	W 2:1
	10	12	36	W 2:1
	18	48	72	W 4:1
遥控端 Rremote ON/OFF		低电平遥控	高电平或悬空工作	3.5Vdc~+Vin
			低电平或接地关断	≤0.3Vdc
输入欠压保护 Under voltage protect				

输出特性 Output

输出电压精度 Voltage accuracy		Vo1,Vo2,Vo3	±1.0%,±2.0%
源效应 Line regulation	标称负载，全电压范围	Vo1,Vo2,Vo3	±0.2%,±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1,Vo2,Vo3	±0.5%,±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V,≤50mVp-p；Vo≥48V,≤180mVp-p； Other,≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压	TRIM	±10%可调
启动延迟时间 Start delay time	典型值		≤200mS

SHINHOM ELECTRONICS ENTERPRISE CO.,LTD. No.100Yan Ta Northern Road Zip:710054 Tel:0086-29-87851838 Fax:0086-29-87851840

一般特性 General

转换效率 Efficiency	标称电压输入，满载	Vo≤5.0V,80%典型	Vo>5.0V, 87%典型
开关频率 Switching frequency		300KHHz 典型	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-25℃~+95℃
		军品级 Military level	-40℃~+105℃
储存温度 Storage temperagure		-40℃~+120℃(工业级)	-55℃~+120℃(军品级)
最大壳温 Max case temperature		+110℃(工业级)	+125℃(军品级)
相对湿度 Relative humidity			10%~90%
外壳材料 case material		金属壳 Metal case	
隔离电压 Isolation Voltage	输入与输出 500/1000/1500/2000 Vdc ≤0.5mA/1min，输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^6$Hrs		

产品命名方式 Product Nomination Method

举例	W DC 5 — 48 S 05 J ① ② ③ ④ ⑤ ⑥ ⑦		
①	宽压输入：2：1 Wide input voltage	⑥	输出电压大小 Output Voltage
②	电源转换模式：DC（DC-DC） DC-DC Con Verter	⑦	J 表示军品级，无表示工业级 J: That Military Level,nothing That Industrial Level
③	表示输出功率大小 Ouput Power		G 表示输入输出非隔离 G: That Input Output Non-isolated
④	表示输入电压标称值 Input voltage		I 表示双路输出隔离 I: That Dual-input Isolation
⑤	S 单路输出，D双路输出，T三路输出，Q四路输出 S: Single output, D: dual output, T: triple output Q:quad output		W 表示超宽范围输入 W: That Wide Range Of Input

典型产品列表 Typical product tabulates

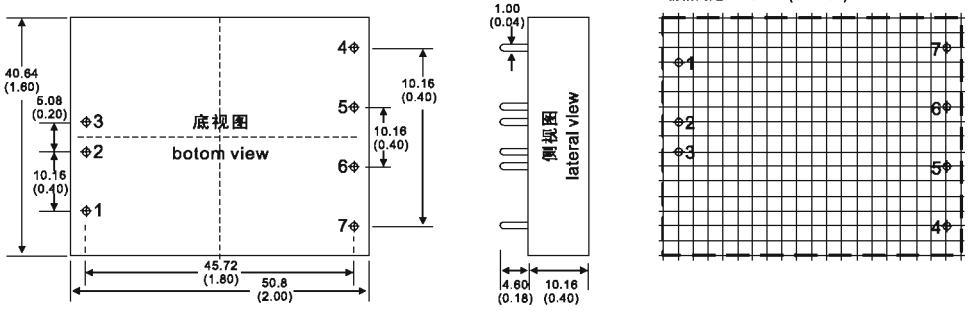
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC15-□S3V3	12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	3.3V	3000mA				
WDC15-□S05		5V	3000mA				
WDC15-□S09		9V	1600mA				
WDC15-□S12		12V	1250mA				
WDC15-□S15		15V	1000mA				
WDC15-□S24		24V	6250mA				
WDC15-□S48		48V	310mA				
WDC20-□S3V3		3.3V	4000mA				
WDC20-□S05		5V	4000mA				
WDC20-□S09		9V	2220mA				
WDC20-□S12		12V	1660mA				

WDC20-□S15	12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) 48V (18~72V)	15V	1330mA				
WDC20□S24		24V	830mA				
WDC20-□S48		48V	410mA				
WDC15-□D3V3		+3.3V	500mA	-3.3V	500 mA		
WDC15-□D05		+5V	500mA	-5V	500 mA		
WDC15-□D09		+9V	830mA	-9V	830 mA		
WDC15-□D12		+12V	625mA	-12V	625 mA		
WDC15-□D15		+15V	500mA	-15V	500 mA		
WDC15□D24		+24V	310mA	-42V	310 mA		
WDC20-□D3V3		+3.3V	2000mA	-3.3V	2000 mA		
WDC20-□D05		+5V	2000mA	-5V	2000 mA		
WDC20-□D09		+9V	1110mA	-9V	1110 mA		
WDC20-□D12		+12V	830mA	-12V	830 mA		
WDC20-□D15		+15V	660mA	-15V	660 mA		
WDC20-□D24		+24V	410mA	-24V	410 mA		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。

□ Shows the nominal value of input voltage,due to space limitations, the abovelist is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号	L x W x H 单位：mm	封装号
A	50.80 x 40.64x10.16	200160DC

管脚定义 Pin Assignments

管脚号码	1	2	3	4	5	6	7			
单路（S）	REM	-Vin	+Vin	NP	+Vout	GND	TRIM			
双路（D）	REM	-Vin	+Vin	+Vout1	COM	-Vout2	TRIM			

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。

*Note：The power modules such as the definition of the pin does not match with the hand book, please refer to the actual item.

SHINHOM

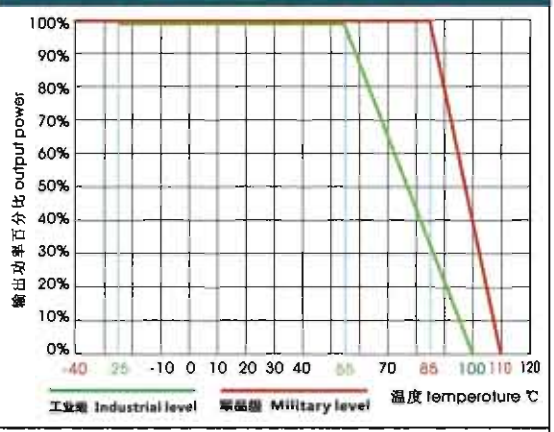
WDC50-150 Series

DC/DC宽压输入 50-150W (DC/DC wide input50-150W)

典型性能 Typical performance

- ◆ 宽范围输入 Wide Input voltage range (2:1)
- ◆ 转换效率（典型 87%）Typical Efficiency 87%
- ◆ 开关频率 Switching frequency：300KHz ± 30 KHz
- ◆ 过流、短路保护,自动恢复 Over current/Short circuit protection,Self-furbish
- ◆ 输入与输出高隔离 Input-output isolate (500/1000/1500/2000Vdc)
- ◆ PCB 板上直插式安装 Board in-line type installs
- ◆ 金属外壳，输出纹波低 Metal case, Low Output Ripple

温度曲线图 Temperature graph



技术参数 测试条件：如无特殊指定，所有参数测试均在标称输入电压，纯阻性额定负载及 25℃室温环境下测得。

Technology parameter Test condition:General Nominal Line,Tc=25℃, Rated resistant load unless other wise specified

输入特性 Input	Min	Nom	Max	Notes
输入电压 Vdc	9	12	18	W 2:1
Input voltage	18	24	36	W 2:1
	36	48	72	W 2:1
	72	110	144	W 2:1
遥控端 Remote ON/OFF		低电平遥控	高电平或悬空工作	3.5Vdc~+Vin
			低电平或接地关断	≤0.3Vdc
输入欠压保护 Input undervoltage protection	低于低端输入电压保护，自动恢复 Lower than the low-input voltage protection，Self-furbish			

输出特性 Output			
输出电压精度 Voltage accuracy		Vo1;Vo2	±1.0%, ±2.0%
源效应 Line regulation	标称负载，全电压范围 Nominal Load, full voltage range	Vo1;Vo2	±0.2%, ±1.5%
负载效应 Load regulation	20% ~ 100%额定负载	Vo1;Vo2	±0.5%, ±4.0%
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo≤5.0V, ≤50mVp-p; Vo≥48V, ≤180mVp-p; Other, ≤100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	△Vo1/△t	±4.0/500us%
输出电压调节 Voltage adjust	标称输出电压 Nominal output	TRIM	±10%可调

启动延迟时间 Start delay time	典型值 Typical value		≤200mS

一般特性 General

转换效率 Efficiency	标称电压输入，满载 Nominal input，Full load	Vo≤5.0V,80%典型(Typical)	Vo>5.0V，87%典型(Typical)
开关频率 Switching frequency		300KHz 典型(Typical)	最大 330KHz
工作温度 Operating temperature	自由空气对流 Free air	工业级 Industrial level	-25℃ ~ +55℃
		军品级 Military level	-40℃ ~ +85℃
储存温度 Storage temperature		工业级 Industrial level	-40℃ ~ +105℃
		军品级 Military level	-55℃ ~ +120℃
最大壳温 Max case temperature		工业级 Industrial level	+100℃
		军品级 Military level	+110℃
相对湿度 Relative humidity			10%~90%
外壳材料 case material			金属壳 Metal case
隔离电压 Isolation Voltage	输入与输出 500/1000/1500/2000 Vdc ≤0.5mA/1min,输入与外壳 500Vdc ≤0.5mA/1min		
最小无故障间隔时间(MTBF)	$2X10^5$Hrs		

产品命名方式 Product Nomination Method

举例	W DC 150 – 12 S 28 J ① ② ③ ④ ⑤ ⑥ ⑦

①	宽压输入：2：1	⑥	输出电压大小
②	电源转换模式：DC（DC-DC）	⑦	J 表示军品级，无表示工业级
③	表示输出功率大小		G 表示输入输出非隔离
④	表示输入电压标称值		I 表示双路输出隔离
⑤	S 单路输出，D 双路输出		W 表示超宽范围 4：1 输入

典型产品列表 Typical product tabulates

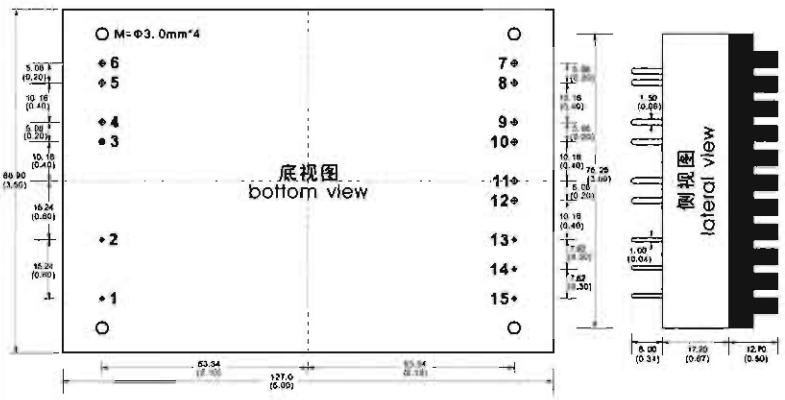
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流（Output voltage / current）					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC50-□S05	12 V（9~18V） 24V（18~36V） 48V（36~72V） 110V（72~144V）	5V	10A				
WDC50-□S12		12V	4.2A				
WDC50-□S24		24V	2.1A				
WDC50-□D05		+5V	5A	-5V	5A		
WDC50-□D12		+12V	2.1A	-12V	2.1A		
WDC50-□D24		+24V	1.1A	-24V	1.1A		
WDC75-□S05		5V	15A				

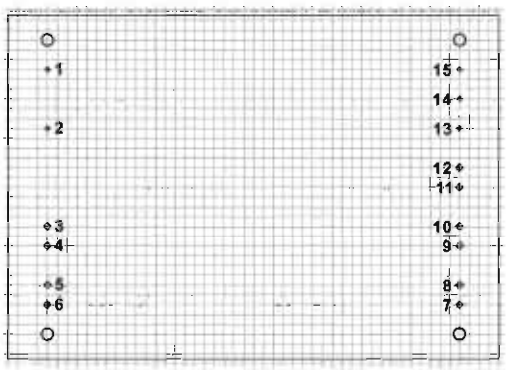
WDC75-□S12		12V	6.25A				
WDC75-□S24		24V	3.1A				
WDC75-□D05		+5V	7.5A	-5V	7.5A		
WDC75-□D12		+12V	3.1A	-12V	3.1A		
WDC75-□D24		+24V	1.55A	-24V	1.55A		
WDC100-□S12		12V	8.3A				
WDC100-□S15		15V	6.6A				
WDC100-□S24		24V	4.2A				
WDC100-□D12		+5V	4.15A	-5V	4.15A		
WDC100-□D15		+12V	3.3A	-12V	3.3A		
WDC100-□D24		+24V	2.1A	-24V	2.1A		
WDC150-□S12		12V	12.5A				
WDC150-□S15		15V	10A				
WDC150-12S28		28V	5.3A				
WDC150-□D12		+12V	6.25A	-12V	6.25A		
WDC150-□D15		+15V	5A	-15V	5A		
WDC150-□D24		+24V	3.12A	-24V	3.12A		

注：□ 代表输入电压标称值，因篇幅有限，以上只是部分产品列表，若需列表以外产品，请与本公司销售部联系。

□ Shows the nominal value of input voltage,due to space limitations ,the abovelist is only for some products,If other than a list of products, please contact the Company's sales department.

封装尺寸图 Mechanical Data





单位：mm　印刷板俯视图　栅格间距：2.54mm(0.1inch)

注：3、4、5、6、7、8、9、10、11、12管脚针为1.5mm,其余为1mm

Note:3, 4, 5, 6, 7, 8, 9, 10, 11, 12 pin Φ 1.5mm,others1mm

封装尺寸 Mechanical Data

封装代号	L x W x H　单位：mm	封装号
M1	127.00 x 88.90 x 17.20	500350DC

管脚定义 Pin Assignments

管脚号码	1	2	3:4	5:6	7:8	9:10	11:12	13	14	15
单路（S）	REM	CASE	-Vin	+Vin	+Vout	GND	NP	+S	TRIM	-S
双路（D）	REM	CASE	-Vin	+Vin	+Vout1	COM	-Vout2	+S	TRIM	-S

*注意：电源模块的各管脚定义如与选型手册不符，应以实物标签上的标注为准。

*Note：The power modules such as the definition of the pin does not match with the hand book,please refer to the actual item.

DC/DC Converter

WDC_P-6WR3 Series

SHINHOM

6W isolated DC-DC converter in DIP package
ultra wide input and regulated single output

CE Patent Protection RoHS

3 years Warranty

FEATURES

- Ultra wide 4:1 input voltage range
- High efficiency up to 85%
- No-load power consumption as low as 0.12W
- Reinforced isolation, I/O isolation test voltage: 6KVDC and 2MOPP high isolation
- Leakage current < 5 μA, under 240VAC/60Hz operating conditions
- Transformer creepage distance is 8mm, transformer clearance is 5mm
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output short circuit, over-current, over–voltage protection
- EN60601-1(3rd edition medical grade) approved, EN60601-1：2006+A1：2013
- Industry standard pin-out

WDC_P-6WR3 series of isolated 6W DC-DC converter products with an ultra wide input voltage range of 9-36VDC, 18-75VDC, input to output isolation is tested with 6000VDC, output over-voltage protection and output short circuit protection, EN60601-1 approval; they are widely used in applications that requiring high isolation, such as medical, electricity, also for energy storage systems that requiring an low no-load power consumption.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μF)
		Nominal (Range)	Max.*	Voltage (VDC)	Current (mA) Max./Min.		
CE	WDC2405P-6WR3	24 (9-36)	40	5	1200/0	78/80	2700
	WDC2406P-6WR3			6	1000/0	79/81	2200
	WDC2409P-6WR3			9	667/0	81/83	1800
	WDC2412P-6WR3			12	500/0	82/84	1000
	WDC2415P-6WR3			15	400/0	83/85	680
--	WDC2418P-6WR3			18	333/0	83/85	1200
CE	WDC2424P-6WR3			24	250/0	82/84	470
	WDC4805P-6WR3	48 (18-75)	80	5	1200/0	79/81	2700
	WDC4809P-6WR3			9	667/0	81/83	1800
	WDC4812P-6WR3			12	500/0	82/84	1000
	WDC4815P-6WR3			15	400/0	83/85	680
	WDC4824P-6WR3			24	250/0	82/84	470

Note:*Exceeding the maximum input voltage may cause permanent damage.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	309/5	317/8	mA
	48VDC input	--	154/4	159/7	
Reflected Ripple Current	24VDC input	--	20	--	
	48VDC input	--	20	--	
Surge Voltage (1sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Start-up Voltage	24VDC input	--	--	9	
	48VDC input	--	--	18	
Input Under-voltage Protection	24VDC input	5.5	6.5	--	
	48VDC input	12	15.5	--	
Input Filter		Pi filter			

SHINHOM ELECTRONICS ENTERPRISE CO.,LTD. No.100Yan Ta Northern Road Zip:710054 Tel:0086-29-87851838 Fax:0086-29-87851840

Hot Plug		Unavailable

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation①	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth	--	100	180	mVp-p
Over-current Protection	Input voltage range	110	150	260	%Io
Over-voltage Protection		110	--	160	%Vo
Short-circuit Protection		Continuous, self-recovery			

Note:
① Load regulation for 0%-100% load is ±5%;
② Ripple & Noise at＜5% load is 5%Vo max. The "parallel cable" method is used for Ripple and Noise test, oscilloscope using the 1X probe, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	6000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	10000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	13	20	pF
Leakage Current	240VAC/60Hz	--	3.6	5	uA
Application Part		CF Type			
Reinforced Isolation	Transformer creepage	8.0	--	--	mm
	Transformer clearance	5.0	--	--	
	PCB creepage & clearance	8.0	--	--	
	Optocoupler creepage	8.0	--	--	
Operating Temperature	Derating if the temperature is ⩾71℃ (see Fig. 1)	-40	--	85	℃
Storage Humidity	Without condensation	5	--	95	%RH
Storage Temperature		-55	--	125	℃
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
Switching Frequency*	PWM mode(nominal, full load)	--	300	--	KHz
Safety Standard		EN60601-1：2006+A1：2013			
Insulation Protection Grade	240VAC/60Hz	2xMOPP			
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Note:* Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

Case Material	Black flame-retardant and heat-resistant plastic (UL94 V-0)
Dimensions	31.60 x 20.30 x 10.20 mm
Weight	13.0g(Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	Others	CISPR32/EN55032	CLASS A (without extra components)	
		URH2418P-6WR3	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD		IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	EFT		IEC/EN61000-4-4	±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B

Immunity	Surge	IEC/EN61000-4-5	±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29	0-70%	perf. Criteria B

Typical Characteristic Curves

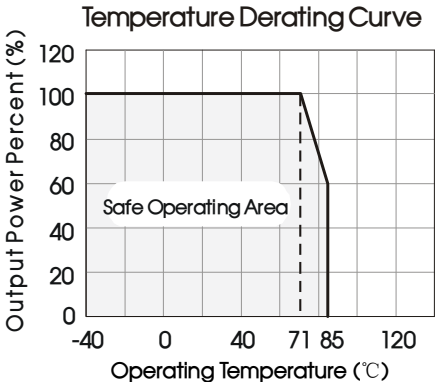
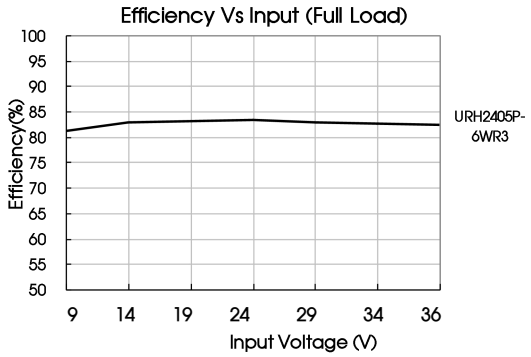
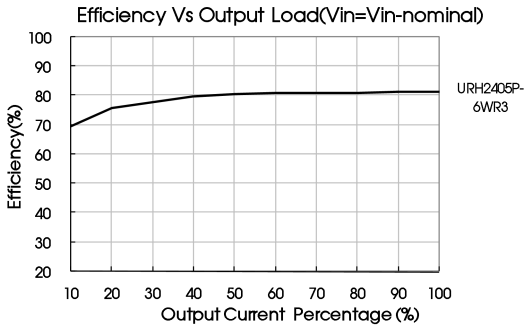
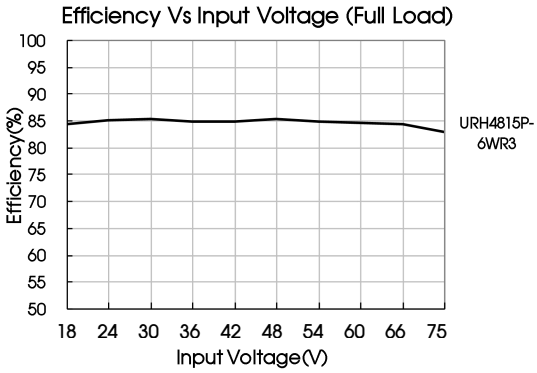
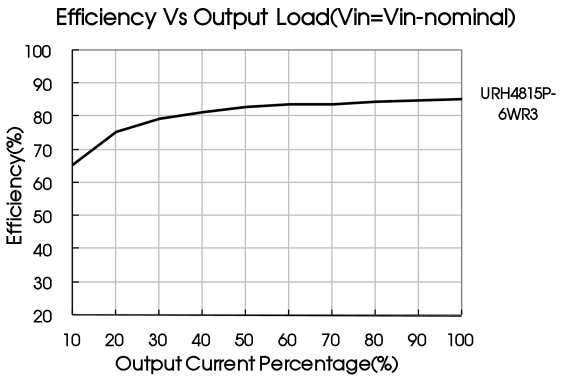


Fig. 1









Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.
Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

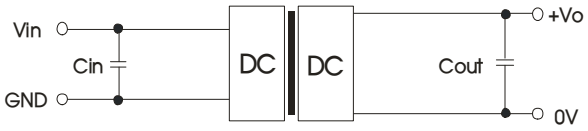


Fig. 2

Vin	Cin	Cout
24VDC	100uF	10μF
48VDC	10μF -47μF	10μF

2. EMC solution-recommended circuit

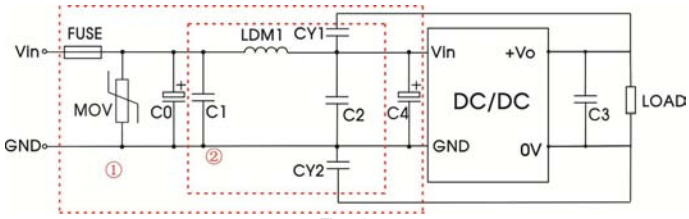


Fig. 3

Notes: For EMC tests we use part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

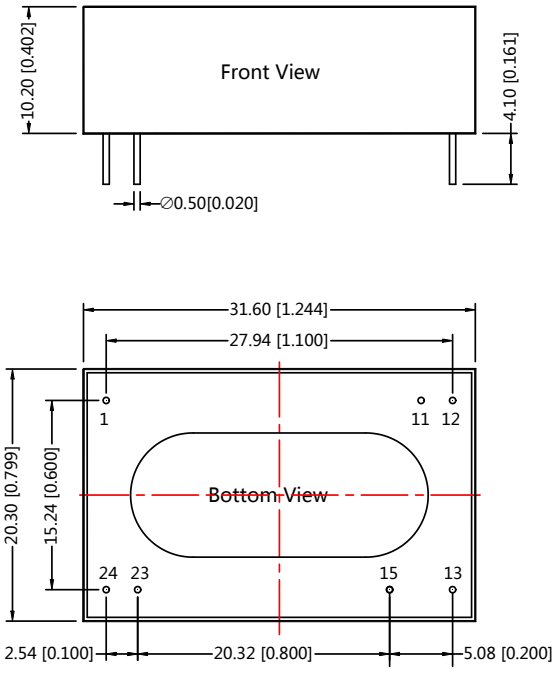
Parameter description:

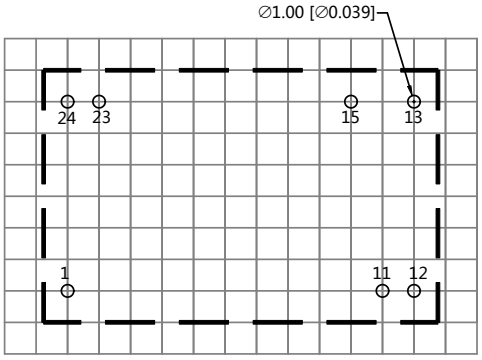
Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0, C4	330μF/50V	330μF/100V
C1, C2	10μF/50V	--
C3	Refer to the Cout in Fig.2	
LDM1	10μH	--
CY1, CY2	1nF/6KV	--

3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on www.shinhom.com

Dimensions and Recommended Layout





Note:Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	Vin
11	No Pin
12	0V
13	+Vo
15	No Pin
23	GND
24	GND

NC: No Connection

Note:
Unit :mm[inch]
Pin diameter tolerances :±0.10[± 0.004]
General tolerances:±0.50[±0.020]

HDC10-40W SERIES
SPECIFICATION

（Ver1.0，2018.09）

SHAANXI SHINHOM ENTERPRISE CO.,LTD

Tel: 029-87851838 Fax: 029-87851840 Http: www.shinhom.com E-mail: sales@shinhom.com.cn

Features:

- Standard 1 × 1 inch package
- Efficiency up to 90%
- 4:1 input range
- Stable voltage output
- Under voltage protect
- Remote On/Off
- Output overcurrent protection and short circuit protection
- Meets UL60950, EN60950, IEC60950 safety regulations, and CE certification standards

Unless otherwise specified, all specifications are measured at an ambient temperature of 25 ℃, rated input, and full load output conditions

Model selection table

Part No.	Input voltage (VDC)	Output voltage (VDC)	Output current (A)	Efficiency (%)
HDC10W-24S3.3	9~36	3.3	3	77
HDC10W-24S05	9~36	5	2	78
HDC10W-24S12	9~36	12	0.84	80
HDC10W-24S15	9~36	15	0.67	81
HDC10W-24S24	9~36	24	0.42	80
HDC10W-24D05	9~36	±5	1	75
HDC10W-24D12	9~36	±12	0.42	76
HDC10W-24D15	9~36	±15	0.34	77
HDC10W-48S3.3	18~75	3.3	3	77
HDC10W-48S05	18~75	5	2	78
HDC10W-48S12	18~75	12	0.84	80
HDC10W-48S15	18~75	15	0.67	81
HDC10W-48S24	18~75	24	0.42	80
HDC10W-48D05	18~75	±5	1	75
HDC10W-48D12	18~75	±12	0.42	76
HDC10W-48D15	18~75	±15	0.34	77
HDC15W-24S3.3	9~36	3.3	4	78
HDC15W-24S05	9~36	5	3	83
HDC15W-24S12	9~36	12	1.25	85
HDC15W-24S15	9~36	15	1	83
HDC15W-24S24	9~36	24	0.63	83
HDC15W-24D05	9~36	±5	1.5	80
HDC15W-24D12	9~36	±12	0.63	83
HDC15W-24D15	9~36	±15	0.5	80
HDC15W-48S3.3	18~75	3.3	4	78
HDC15W-48S05	18~75	5	3	83
HDC15W-48S12	18~75	12	1.25	85
HDC15W-48S15	18~75	15	1	83
HDC15W-48S24	18~75	24	0.63	83
HDC15W-48D05	18~75	±5	1.5	80
HDC15W-48D12	18~75	±12	0.63	83
HDC15W-48D15	18~75	±15	0.5	80
HDC20W-24S05	9~36	5	4	83
HDC20W-24S12	9~36	12	1.67	88
HDC20W-24S15	9~36	15	1.34	88
HDC20W-24D12	9~36	±12	0.84	87
HDC20W-24D15	9~36	±15	0.67	85
HDC20W-48S05	18~75	5	4	83
HDC20W-48S12	18~75	12	1.67	88
HDC20W-48S15	18~75	15	1.34	87
HDC20W-48D12	18~75	±12	0.84	87
HDC20W-48D15	18~75	±15	0.67	85
HDC30W-24S05	9~36	5	6	88
HDC30W-24S12	9~36	12	2.5	89
HDC30W-24S15	9~36	15	2	90
HDC30W-24D12	9~36	±12	1.25	88
HDC30W-24D15	9~36	±15	1	88
HDC30W-48S05	18~75	5	6	88
HDC30W-48S12	18~75	12	2.5	89
HDC30W-48S15	18~75	15	2	89
HDC30W-48D12	18~75	±12	1.25	88
HDC30W-48D15	18~75	±15	1	88
HDC15W-110S3.3	66~160	3.3	4	78
HDC15W-110S05	66~160	5	3	83
HDC15W-110S12	66~160	12	1.25	85
HDC15W-110S15	66~160	15	1	83
HDC15W-110S24	66~160	24	0.63	83
HDC15W-110D05	66~160	±5	1.5	80
HDC15W-110D12	66~160	±12	0.63	83
HDC15W-110D15	66~160	±15	0.5	80
HDC40-24S12	18~36	12	3.33	89
HDC40-48S15	36~72	15	2.66	89
HDC40-24D12	18~36	±12	1.66	88
HDC40-48D15	36~72	±15	1.33	88

Product specifications

Input electrical specifications

Input voltage range	24Vin	W:9-36V
	48Vin	W:18-75V
Under voltage protect	9Vinmin input ON	8.8V
	9Vinmin input OFF	8.0V
	18Vinmin input ON	17V
	18Vinmin input OFF	16V
Input instantaneous withstand voltage(100ms)	36Vinmax	50V max
	75Vinmax	100Vmax
Internal input filtering method of the module Logic Controller (see notes 4&5)		π type

Output electrical specifications

Output voltage accuracy		±1.5%max
Dynamic response		75% to 100% load variation
Output overshoot		±5%Vout
Recovery time		<500us
Output voltage regulating range	Single Output	90-110%Vout
Temperature drift coefficient		±0.02%/℃
Short circuit protection		Continuous and self-healing
Output voltage regulation with wire(Note 1)		±0.2%max
Output voltage regulation with load(Note 2)		±0.5%max
Over current protection		110%-160%
Start-up time		50ms max.

General specifications

insulation voltage	Input/Output	1500VDC
	Input/Case	1500VDC
	Output/Case	500VDC
insulation resistance		10^7Ω
Insulated capacitor		1000pF typ.
switching frequency		500kHz typ.
Operating temperature		-40℃－100℃
Storage temperatuer		-55℃to+105℃
Humidity		95%RH max
MTBF	MIL-HDBK-217F	1000K.Hrs
Size		1.0x1.0x0.40inch 25.4x25.4x10.2mm
Case material		Copper
Weight		20g

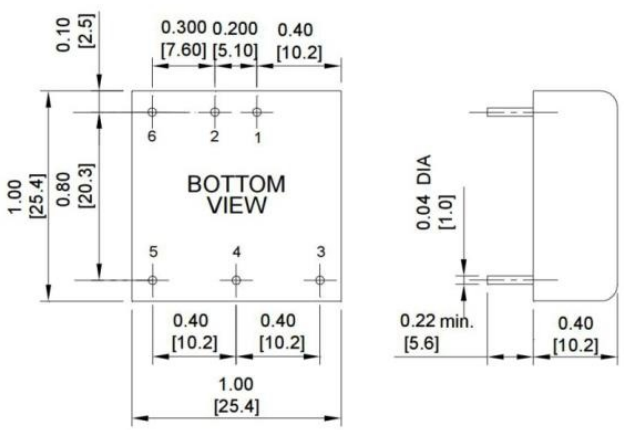
Notes

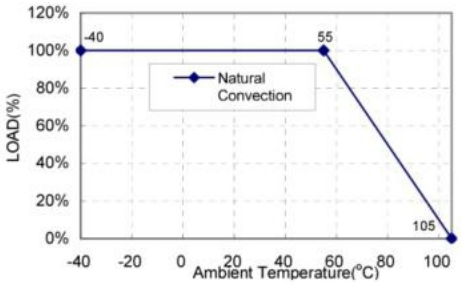
1. Input measured from low voltage to high voltage
2. Output measured from no-load to full load
3. Measure by connecting a 10uF tantalum capacitor and a 1uF ceramic capacitor across the output terminal
4. Module positive logic

	Input grounding as a reference
ON	>3.5Vdcto10Vdc or open circuit
OFF	<0.5Vdc

5. The working environment temperature is -40 ℃ -85 ℃, and the power starts to decrease at 55 ℃. The maximum shell temperature for use is 105 ℃

Size





PIN assignment

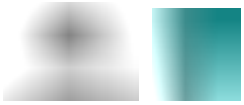
	Single	Du al
1	Vin +	Vin +
2	Vin -	Vin -
3	Vout +	Vout +
4	Output voltage adjustment/NP	GND
5	Vout -	Vout -
6	Enable control/NP	Enable control/NP

Note: When the power is 10W, both pins 4 and 6 are NP; When the power is above 15W, it can be selected

DC/DC Converter

HDC1W-05S05

1W isolated DC-DC converter
Fixed input voltage, unregulated single output



FEATURES

- Ultra-small, ultra-thin DFN package (9.00 x 7.00 x 3.10mm)
- Isolation capacitance as low as 8pF
- I/O isolation test voltage 3k VDC
- Operating ambient temperature range: -40℃ to +125℃
- High efficiency up to 85%
- Continuous short-circuit protection
- AEC-Q100 approved

UL 62368-1 EN 62368-1 IEC62368-1

HDC1W-05S05 are specially designed for applications where an isolated voltage is required in a distributed power supply system and especially suitable in applications such as digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current(mA) Max./Min.		
UL/EN/IEC	HDC1W-05S05	5 (4.5-5.5)	5	200/20	81/85	2400

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	5VDC input	--	235/7	247/15	mA
Reflected Ripple Current*		--	10	--	mA
Surge Voltage (1sec. max.)	5VDC input	-0.7	--	9	VDC
Input Filter		Capacitance filter			
Hot Plug		Unavailable			
Note: * Please refer to DC-DC Converter Application Note for detailed description of reflected ripple current testing method.					

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy		See output regulation curve (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	--	--	1.2	--
Load Regulation	10%-100% load	--	8	15	%
Ripple & Noise*	20MHz bandwidth	--	30	75	mVp-p
Temperature Coefficient	Full load	--	±0.02	--	%/℃
Short-circuit Protection		Continuous, self-recovery			
Note: * The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.					

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	3000	--	--	VDC
		1500	--	--	VAC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	8	--	pF
Operating Temperature	Derating when operating temperature≥105℃, (see Fig. 2)	-40	--	125	℃

Storage Temperature		-55	--	125	℃
Case Temperature Rise	Ta=25℃	--	10	--	
Storage Humidity	Non-condensing	--	--	95	%RH
Reflow Soldering Temperature*		Peak temp.≤245℃, maximum duration time≤60s over 217℃			
Vibration		10-150Hz, 0.75mm, 5G, 90Min. along X, Y and Z			
Switching Frequency	Full load, nominal input voltage	--	300	--	kHz
MTBF	MIL-HDBK-217F@25℃	7500	--	--	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 3			
Note: * See also IPC/JEDEC J-STD-020D.1.					

Mechanical Specifications

Case Material	Black epoxy resin; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	9.00 x 7.00 x 3.10 mm
Weight	0.5(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	CS	IEC/EN61000-4-6	3Vr.m.s	perf. Criteria A

Typical Characteristic Curves

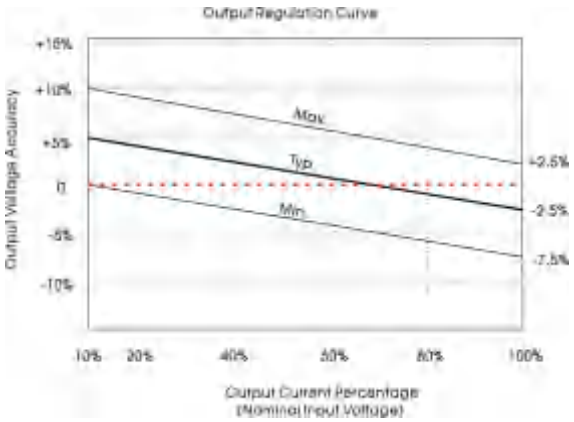


Fig. 1

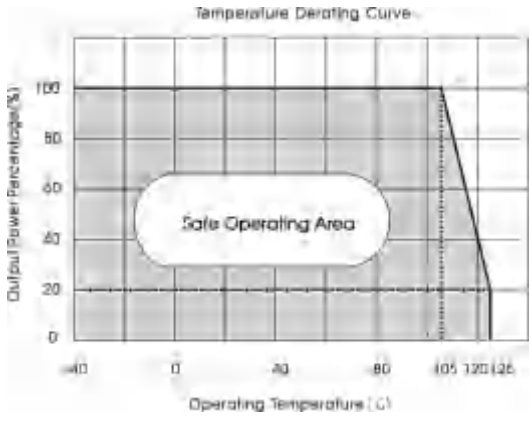
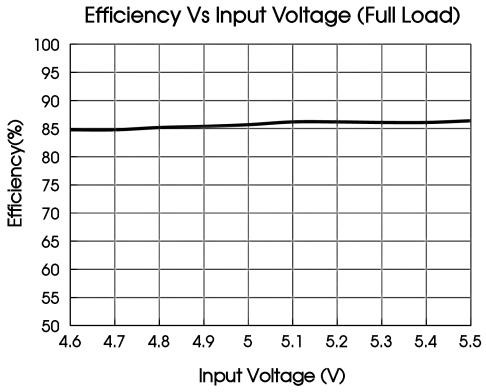
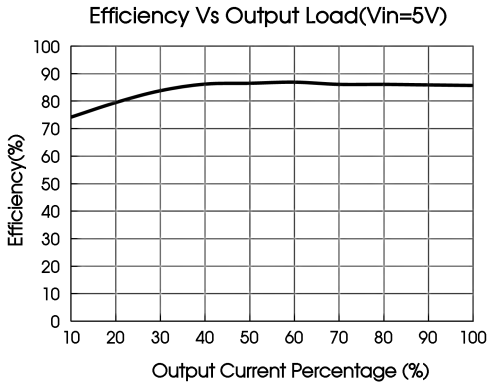


Fig. 2





Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules. For recommended input and output capacitor values refer to Table 1.

Fig.3

Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
5VDC	4.7μF/25V	5VDC	10μF/16V

2. EMC (CLASS B) compliance circuit

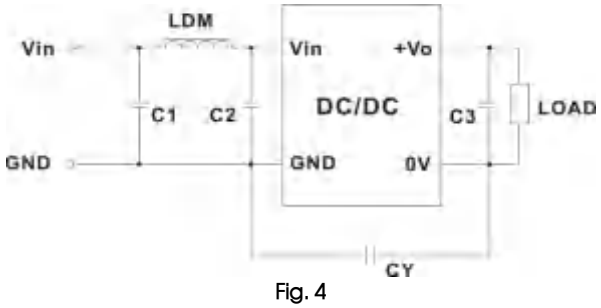
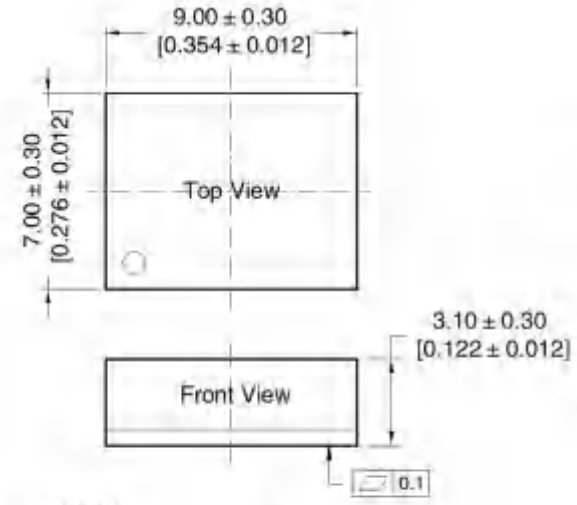


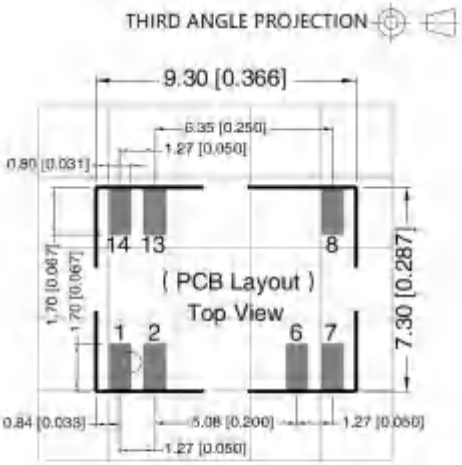
Fig. 4

Table 2: Recommended EMC filter values

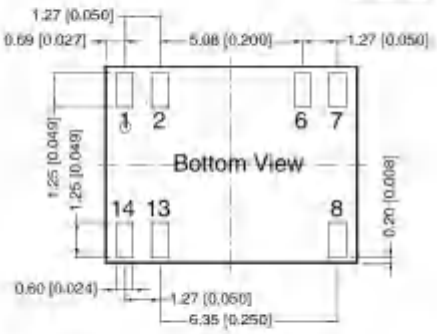
Input voltage 5VDC	Output voltage		5VDC
	Emissions	C1/C2	4.7μF /25V
		CY	47pF /4kVDC
		C3	Refer to the Cout in table 1
		LDM	6.8μH

Dimensions and Recommended Layout





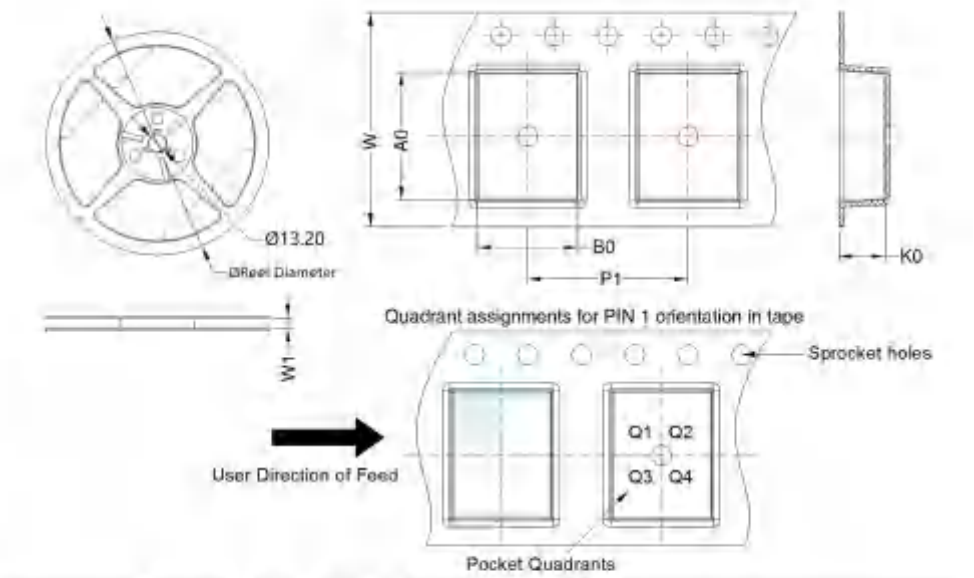
Note: Grid 2.54*2.54mm



Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]

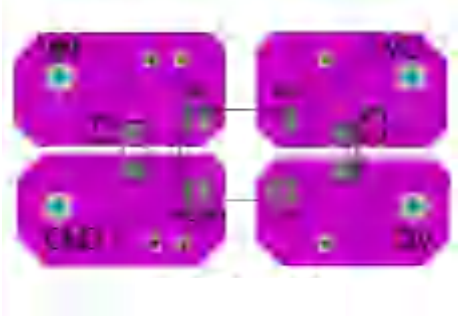
Pin–Out	
Pin	Mark
1,2	GND
6,7	0V
8	+Vo
13,14	Vin

Tape/Reel packaging



Device	Package Type	Pin	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
HDC1W-05S05	DFN 7x9	7	400	180.0	16.4	9.56	7.56	3.5	12.0	16.0	Q1

Temperature Rise Test PCB Layout



Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.