

7W AC/DC-DC CONVERTER

SWAC07S 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 complies with EN55032 Class B Electromagnetic compatibility (EMC) characteristics and Class I isolation levels (safety regulations), and typical circuits can pass 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 complies with EN55032 Class B Class 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

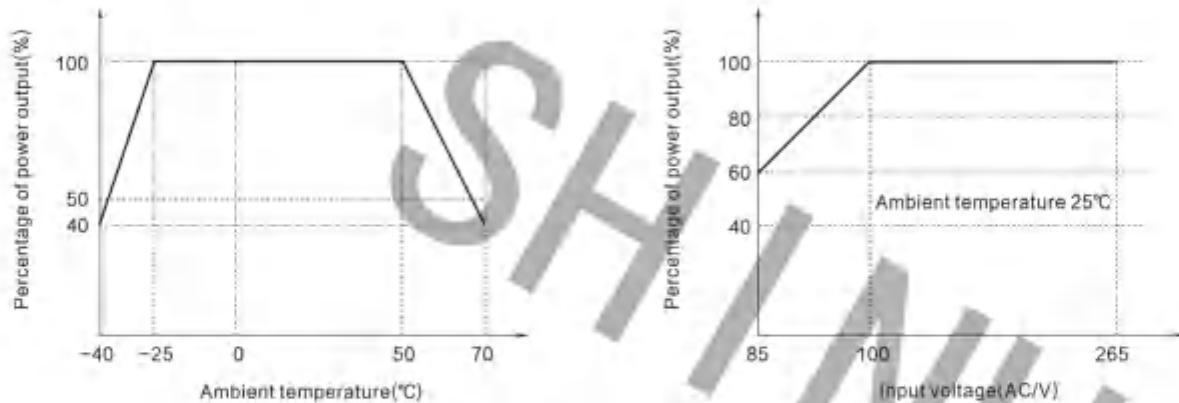
ELECTRICAL CHARACTERISTICS:

Part No.	Input						Output					Ripple and noise					
	Voltage range	Current @10V	Current @20V	Power factor	Start-up time	Attenuation rate	DC Voltage	Rated current	Rated power	Efficiency (Typ)	Voltage accuracy	Load regulation	20M bandwidth/typ	20M bandwidth/max	20M bandwidth/typ	20M bandwidth/max	
SWAC07S-ZKS05	65~265VAC 100~375Vdc 50/60Hz	<100mA	<70mA	<0.58	<300ms	1~4KV ±30dB	5V	1400mA	7W	82%	±1%	±1%	20mV	40mV	40mV	70mV	
SWAC07S-ZKS06							6V	1160mA		82%			20mV	46mV	40mV	70mV	
SWAC07S-ZKS09							9V	780mA		82%			20mV	46mV	40mV	70mV	
SWAC07S-ZKS12							12V	580mA		84%			±0.8%	20mV	30mV	45mV	70mV
SWAC07S-ZKS15							15V	480mA		84%			±0.8%	20mV	30mV	45mV	70mV
SWAC07S-ZKS20							20V	360mA		84%			±0.8%	40mV	70mV	46mV	85mV
SWAC07S-ZKS24							24V	292mA		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°C. 2. The recommended power is 20% to 70% of the rated power of the module (at 25°C).																

PRODUCT CHARACTERISTICS:

Item	Working condition
Switching frequency	65KHz
Short circuit protection	Long-term short circuit, self-recovery
Overload protection	> Load 150%, recoverable
Overheat protection	The surface temperature of the module is 100 °C (± 4°C), and it is protected from overheating
Hi-Pot	Input-Output 3000VAC, 1min (withstand voltage test is limit damage test, can not be tested multiple times)
Operating temperature	-40~70°C (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°C

ELECTRICAL CHARACTERISTICS:



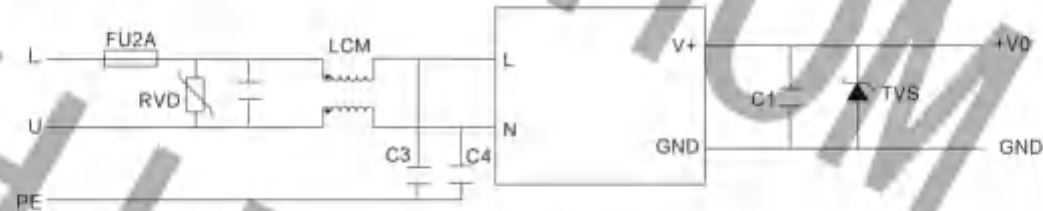
1. When the input voltage ranges from 85V to 100VAC, Converter must be derated
2. Ambient temperature $\leq -25^{\circ}\text{C}$, or ambient temperature $\geq 50^{\circ}\text{C}$, Converter must be derated
3. This product is suitable for use in a natural air-cooled environment. If it is needed in a sealed environment, it is necessary to consider the power usage of the module comprehensively.

APPLICATION CIRCUIT:

Typical application circuit



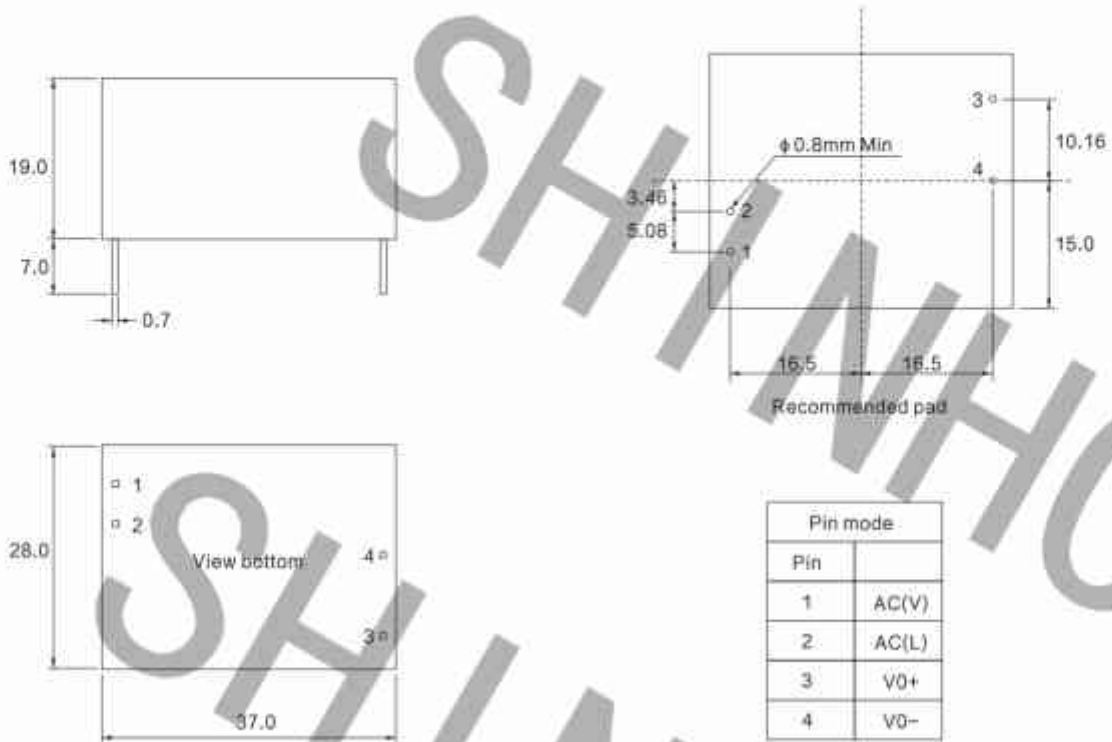
EMC enhanced recommendation circuit



Part No.	FUSE	RVD	C2	LCM	C3,C4	C1	TVS
SWAC07S-28S05	1A/250VAC	14D431K	0.33 μF 275VAC	DU9,B 60mH	222M 250V	CBB capacitor 104/50V	5V: P6KE6.8A 12V: P6KE15A 24V: P6KE28A
SWAC07S-28S06							
SWAC07S-28S09							
SWAC07S-28S12							
SWAC07S-28S15							
SWAC07S-28S20							
SWAC07S-28S24							

1. SWAC07S 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:



DC-DC CONVERTER

Fixed Input voltage Part No.	Input Voltage(V)	Output Power(W)	Output Voltage(V)	Output mode	Packaging	Dimension	Shell Material	Isolation Voltage(V)	Page Number	
HDC01S	2.97-3.63, 4.5-5.5, 10.8-13.2, 13.5-16.5, 21.6-25.4	1	3.3, 5, 9, 12, 15, 25, ±5, ±9, ±12, ±15	1	SIP4	11.60x5.00x10.20	plastic	1500	03	
HDC01S HDC01S		1		1,2	SIP6,SIP7	19.60x5.00x9.60		1500,3000	04/05	
HDC02S HDC02S		2		1,2	SIP6,SIP7	19.65x7.05x10.16		1500,3000	06/07	
HDC01M		1		1	SMD4	13.70x11.00x5.95		1500	08	
HDC01S		1		1	SIP7	19.65x7.05x10.16		6000	09	
HDC01S HDC02S		1-2		1,2	SIP7	19.60x9.80x12.50		6000	10/11	
HDC01S		1		2	SIP7	19.50x9.80x12.50		6000	12	
HDC01S HDC02S		1-2		1	SIP8	19.60x5.00x9.60 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	52(max)	1.5-7.5		1	SIP3	11.80x7.55x10.16	plastic		15	
WDC78-1000	36(max)	2.5-15		1	SIP3	11.80x7.55x10.16			16	
WDCW02S WDCV02S	4.5-9, 9-18, 18-36, 36-75, 4.5-16, 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					21/22	
WDC03S WDCV03S		2.5-3		1,2					23/24	
WDC03S WDCV03S		3		1,2	SIP8	22.00x9.50x12.00		3000	25/26	
WDC06S WDCV06S		6		1,2					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
+Vo	+Output
COM	Output grounding
-Vo	-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 Voltage

1W DC-DC CONVERTER

FEATURES:

Packaging: SIP4
 Operating Temperature: -40℃ ~ 105℃
 Isolation Voltage: 1500VDC
 Efficiency: The maximum efficiency can reach 88%
 Meet a criterion: International standard pin mode

APPLICATION:

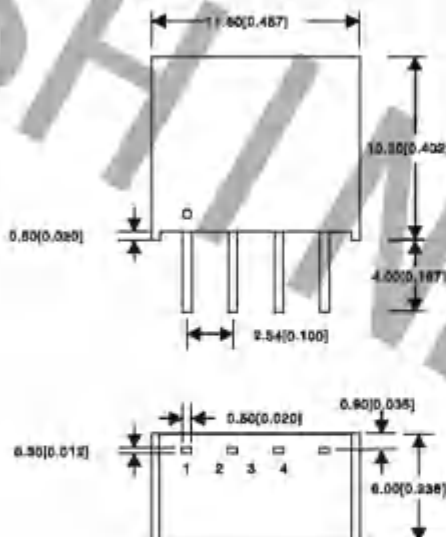
Electric power,
 Industrial control
 communication,
 IoT
 Automobile



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-08503	3.3 (2.87~3.63)	3.3	0	303	82	4000
HDCL01S-08505		5	0	200	83	4000
HDCL01S-08509		9	0	111	84	2000
HDCL01S-08512		12	0	84	85	1000
HDCL01S-06503	5 (4.5~5.5)	3.3	0	303	83	4000
HDCL01S-06505		5	0	200	86	4000
HDCL01S-06509		9	0	111	86	2000
HDCL01S-06512		12	0	84	86	1000
HDCL01S-06515		15	0	67	86	680
HDCL01S-06524		24	0	42	86	580
HDCL01S-12503	12 (10.8~13.2)	3.3	0	303	84	4000
HDCL01S-12505		5	0	200	86	4000
HDCL01S-12509		9	0	111	87	2000
HDCL01S-12512	15 (13.5~16.5)	3.3	0	303	84	4000
HDCL01S-12515		5	0	200	87	4000
HDCL01S-12509		9	0	111	86	2000
HDCL01S-12512		12	0	84	86	1000
HDCL01S-12515	24 (21.6~26.4)	3.3	0	303	84	4000
HDCL01S-12515		5	0	200	87	4000
HDCL01S-12524		24	0	42	86	580

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit
 Dimension: in mm
 Terminal diameter tolerance: $\pm 0.15 (\pm 0.004)$
 Unmarked tolerance: $\pm 0.50 (\pm 0.020)$

1W DC-DC CONVERTER

FEATURES:

Packaging: SIP8
Operating Temperature: -40°C ~ 105°C
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

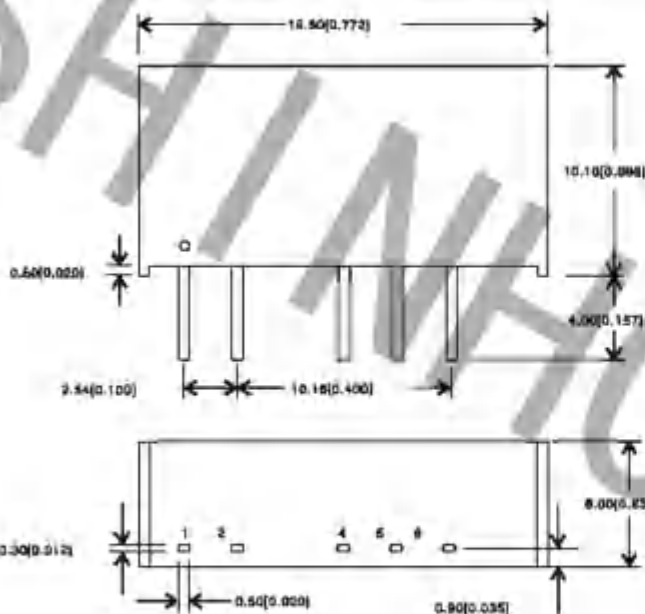


ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC) Rating	Output			Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
		Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC01S-03300	3.3 (2.97-3.53)	3.3	0	305	82	4000
HDC01S-03300		5	0	290	83	4000
HDC01S-03300		8	0	111	84	2000
HDC01S-03312		12	0	84	85	1000
HDC01S-05000	5 (4.5-5.5)	3.3	0	305	83	4000
HDC01S-05000		5	0	300	85	4000
HDC01S-05000		8	0	111	86	2000
HDC01S-05012		12	0	84	86	1000
HDC01S-05015		15	0	67	86	880
HDC01S-05024		24	0	42	86	580
HDC01S-05005		±5	0	±100	86	±2000
HDC01S-05008		±8	0	±56	86	±1000
HDC01S-05012		±12	0	±43	86	±680
HDC01S-05015		±15	0	±34	86	±220
HDC01S-12000	12 (10.8-13.2)	3.3	0	305	84	4000
HDC01S-12000		5	0	300	86	4000
HDC01S-12000		8	0	111	87	2000
HDC01S-12012		12	0	84	87	1000

Part Number	Input Voltage(VDC) Rating	Output			Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
		Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC01S-18000	18 (16.8-19.2)	18	0	87	85	860
HDC01S-18000		24	0	42	86	580
HDC01S-18000		±3.3	0	±152	84	±2000
HDC01S-18000		±5	0	±100	86	±2000
HDC01S-18000		±8	0	±56	87	±1000
HDC01S-18000		±12	0	±43	87	±680
HDC01S-12015	24 (21.6-26.4)	±15	0	±34	86	±220
HDC01S-24003		3.3	0	305	84	4000
HDC01S-24005		5	0	300	87	4000
HDC01S-24006		6	0	111	86	2000
HDC01S-24012		12	0	84	88	1000
HDC01S-24015		15	0	67	86	880
HDC01S-24024		24	0	42	89	580
HDC01S-24033		±3	0	±100	87	±2000
HDC01S-24038		±8	0	±56	89	±1000
HDC01S-24043		±13	0	±42	89	±680
HDC01S-24055		±15	0	±34	86	±220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	V _{in}	V _{in}
2	GND	GND
4	-V _o	-V _o
5	No Pin	COM
8	+V _o	+V _o

NC cannot be connected to any external circuit

Dimension in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmarked tolerance: ±0.50(±0.025)

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
Automobiles

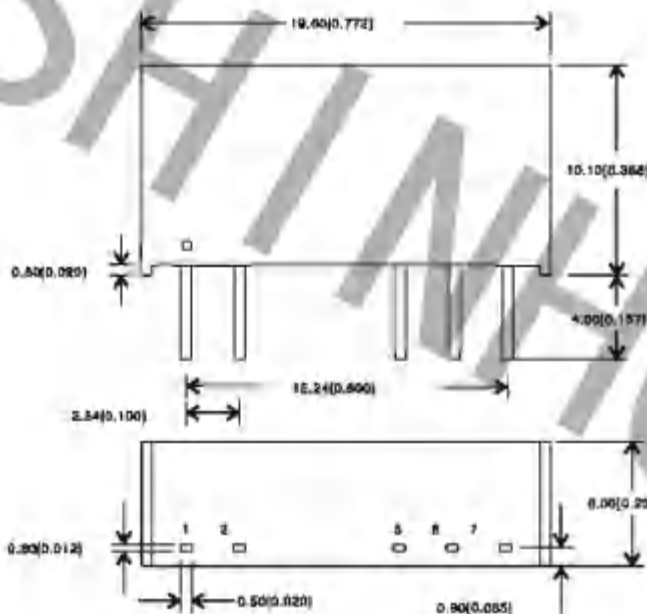


ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC) Rating	Output			Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
		Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE015-0200	5.2 (2.47~8.65)	3.3	0	508	82	4000
HDCE015-0200		5	0	200	83	4000
HDCE015-0200		8	0	111	84	2000
HDCE015-0200		12	0	84	85	1000
HDCE015-0400	8 (4.5~8.5)	3.3	0	505	83	4000
HDCE015-0400		5	0	200	88	4000
HDCE015-0400		8	0	111	88	2000
HDCE015-0400		12	0	84	88	1000
HDCE015-0400		15	0	67	85	500
HDCE015-0400		20	0	48	80	500
HDCE015-0400		±8	0	±100	88	±2000
HDCE015-0400		±8	0	±50	88	±1000
HDCE015-0400		±12	0	±42	88	±500
HDCE015-0400		±15	0	±34	88	±220
HDCE015-1200		3.3	0	908	84	4000
HDCE015-1200		5	0	300	85	4000
HDCE015-1200		8	0	111	87	2000
HDCE015-1200		12	0	84	87	1000

Part Number	Input Voltage(VDC) Rating	Output			Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
		Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDCE015-1500	12 (10.5~13.2)	15	0	97	88	500
HDCE015-1500		±8	0	±40	89	500
HDCE015-1500		±3.3	0	±180	84	±2000
HDCE015-1500		±5	0	±100	85	±2000
HDCE015-1500	24 (21.5~26.4)	±6	0	±50	87	±1000
HDCE015-1500		±12	0	±42	87	±500
HDCE015-1500		±15	0	±34	88	±220
HDCE015-2400		3.3	0	308	84	4000
HDCE015-2400		5	0	200	87	4000
HDCE015-2400		8	0	111	88	2000
HDCE015-2400		12	0	84	88	1000
HDCE015-2400		15	0	67	88	500
HDCE015-2400		20	0	48	86	500
HDCE015-2400		±5	0	±100	87	±2000
HDCE015-2400		±6	0	±50	88	±1000
HDCE015-2400		±12	0	±42	88	±500
HDCE015-2400		±15	0	±34	88	±220

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	OND	OND
3	-Vo	-Vo
4	No Pin	COM
5	+Vo	+Vo

NC: Cannot be connected to any external circuit

Dimensions in mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unmarked tolerance: $\pm 0.50(\pm 0.020)$

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:

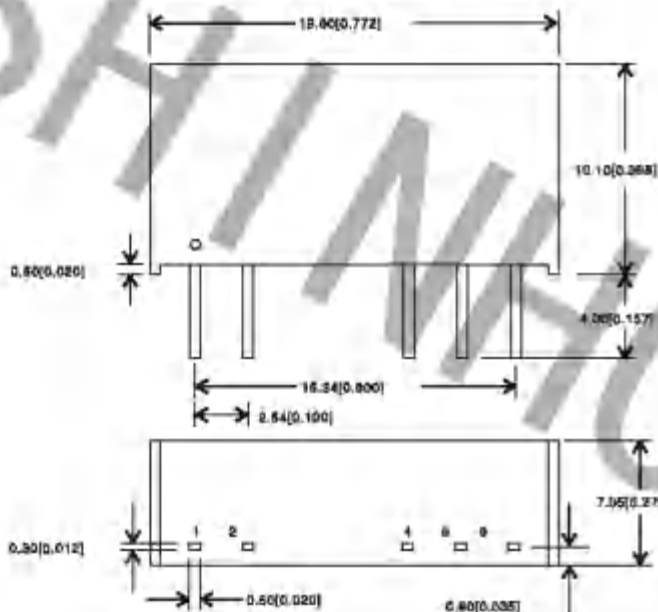
Electric power,
Industrial control
communication,
IoT
Automobile
Rail traffic



ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC) Rating	Output			Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
		Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC0225-05001	3.3 (2.97~3.58)	3.3	0	400	82	2400
HDC0225-05004		5	0	400	82	2400
HDC0225-05008		8	0	222	84	1000
HDC0225-05012		12	0	187	85	820
HDC0225-05003	5 (4.5~5.5)	3.3	0	400	83	2400
HDC0225-05005		5	0	400	85	2400
HDC0225-05008		8	0	222	85	1000
HDC0225-05012		12	0	187	86	820
HDC0225-05015		15	0	132	87	580
HDC0225-05024		24	0	85	88	580
HDC0225-05033		±3.3	0	±300	88	±1000
HDC0225-05050		±5	0	±200	85	±1000
HDC0225-05080		±8	0	±111	85	±580
HDC0225-05012		±12	0	±80	88	±580
HDC0225-05015		±15	0	±87	87	±220
HDC0225-05024		±24	0	±63	88	±580
HDC0225-12001	12 (10.8~13.2)	12	0	400	84	2400
HDC0225-12003		3	0	400	85	2400
HDC0225-12008		8	0	222	86	1000
HDC0225-12012		12	0	187	87	820
HDC0225-12015		15	0	132	88	580
HDC0225-12024		24	0	85	88	580
HDC0225-12033		±3.3	0	±300	88	±1000
HDC0225-12050		±5	0	±200	85	±1000
HDC0225-12080		±8	0	±111	85	±580
HDC0225-12012		±12	0	±80	88	±580
HDC0225-12015		±15	0	±87	87	±220
HDC0225-12024		±24	0	±63	88	±580
HDC0225-24001	24 (21.6~26.4)	24	0	400	84	2400
HDC0225-24003		3	0	400	85	2400
HDC0225-24008		8	0	222	86	1000
HDC0225-24012		12	0	187	87	820

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	Vin	Vin
2	GND	GND
5	-Vo	-Vo
6	Hi Pin	COM
7	+Vo	+Vo

MC: Cannot be connected to any external circuit

Dimensions in mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Dimensional tolerances: $\pm 0.50(\pm 0.020)$

1W DC-DC CONVERTER

FEATURES:

Packaging: SMD8
Operating Temperature: -40℃ ~ 105℃
Isolation Voltage: 1600VDC
Efficiency: The maximum efficiency can reach 88%
Meet a criterion: International standard pin mode

APPLICATION:

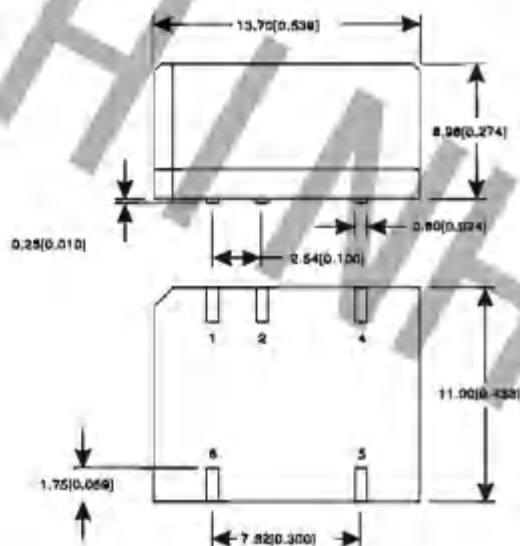
Electric power,
Industrial control
communication,
IoT
Automobile
Rail traffic



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)		
HDC01M-03003	3.3 (2.97~3.63)	3.3	0	300	80	3000
HDC01M-03005		5	0	200	82	3000
HDC01M-03008		8	0	111	83	1200
HDC01M-03013		13	0	64	84	620
HDC01M-05005	5 (4.5~5.5)	5.5	0	300	82	3000
HDC01M-05008		8	0	200	85	3000
HDC01M-05008		8	0	111	86	1200
HDC01M-05013		13	0	64	86	620
HDC01M-08013	8 (7.2~9.0)	8	0	67	86	680
HDC01M-08016		16	0	42	87	330
HDC01M-08005		5.5	0	300	82	3000
HDC01M-08008		8	0	200	85	3000
HDC01M-12005	12 (10.8~13.2)	12	0	111	88	1200
HDC01M-12012		12	0	64	87	620
HDC01M-12015		15	0	67	87	680
HDC01M-12024		24	0	42	88	330

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: $\pm 0.10(\pm 0.004)$

Unmarked tolerance: $\pm 0.50(\pm 0.020)$

1W DC-DC CONVERTER

FEATURES:

Packaging: SIP7
 Operating Temperature: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$
 Isolation Voltage: 4200VAC or 6000VDC
 Efficiency: The maximum efficiency can reach 85%
 Meet a criterion: international standard pin mode

APPLICATION:

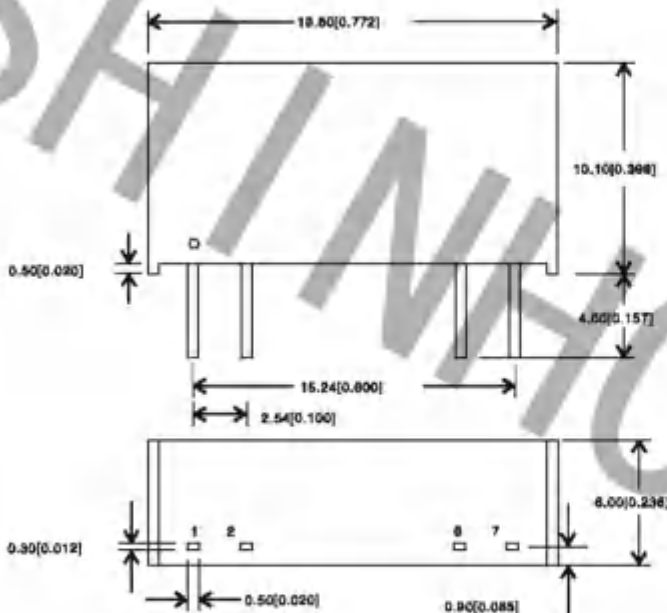
IGBT drive
 SiC drive



ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (%)Typ	Capacitive Load,Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)		
HDCF018-03603	3.3 (2.97~3.63)	3.3	303	78	4000
HDCF018-03805		5	200	81	4000
HDCF018-03612		12	84	82	1000
HDCF018-05803	5 (4.5~5.5)	3.3	303	80	4000
HDCF018-05605		5	200	84	4000
HDCF018-05812		12	84	85	1000
HDCF018-05615	12 (10.8~13.2)	15	67	85	880
HDCF018-12803		3.3	303	82	4000
HDCF018-12605		5	200	85	4000
HDCF018-24803	24 (21.6~26.4)	3.3	303	81	4000
HDCF018-24805		5	200	85	4000

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit
 Dimension: in mm
 Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$
 Unmarked tolerances: $\pm 0.50 (\pm 0.020)$

1W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

Armature

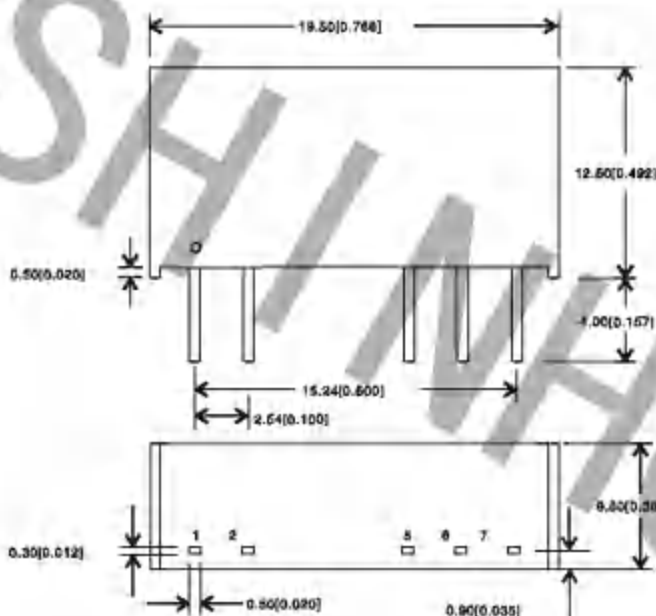


ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC0015-25005	5 (4.5-5.5)	5	4	200	78	220
HDC0015-25012		12	1.66	84	80	
HDC0015-25015		15	1.36	88	81	
HDC0015-35005		±5	±2	±100	79	#100
HDC0015-35012		±12	±1	±40	80	
HDC0015-35015		±15	±1	±35	81	
HDC0015-12005	12 (10.8-13.2)	5	4	200	78	220
HDC0015-12012		12	1.66	84	81	
HDC0015-12015		15	1.36	88	79	
HDC0015-15005		±5	±2	±100	79	#100
HDC0015-15012		±12	±1	±40	81	
HDC0015-15015		±15	±1	±35	81	

Part Number	Input Voltage(VDC)	Output			Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Voltage (VDC)	Current Min (mA)	Current Max (mA)		
HDC0015-12015	12(10.8-13.2)	±15	±1	±35	79	#100
HDC0015-15005	15 (13.5-16.5)	5	20	200	79	220
HDC0015-15008		±5	±10	±100	80	
HDC0015-15015		±15	±4	±30	81	
HDC0015-24005	24 (21.6-26.4)	5	4	200	78	220
HDC0015-24012		12	1.66	84	79	
HDC0015-24015		15	1.36	88	79	
HDC0015-24005		±5	±2	±100	78	#100
HDC0015-24012		±12	±1	±40	79	
HDC0015-24015		±15	±1	±35	79	

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	V _{in}	V _{in}
2	GND	GND
5	-V _o	-V _o
6	No Pin	No Pin
7	+V _o	+V _o

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: 1500VDC
 Efficiency: The maximum efficiency can reach 82%
 Meet a criterion: International standard pin mode

APPLICATION:

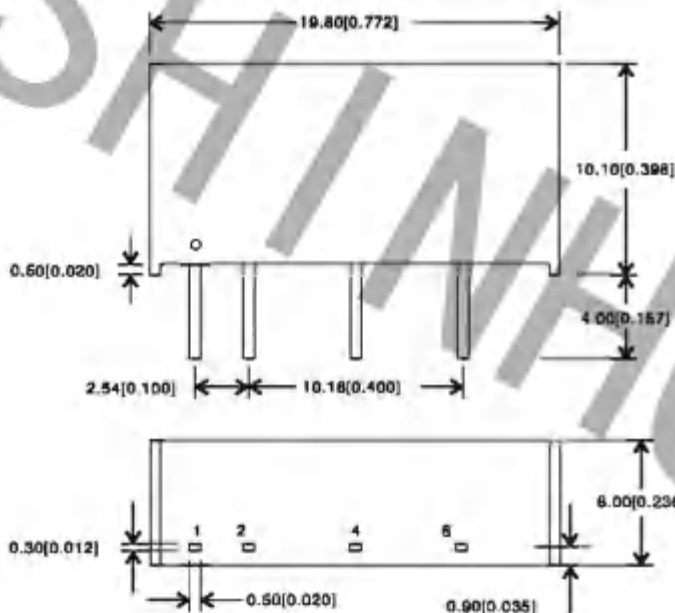
Electric Power, Industrial Control



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	V _{IN}
2	GND
4	-V _O
5	+V _O

NC: Cannot be connected to any external circuit

Dimensions: in mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unmarked tolerances: $\pm 0.50 (\pm 0.020)$

2W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

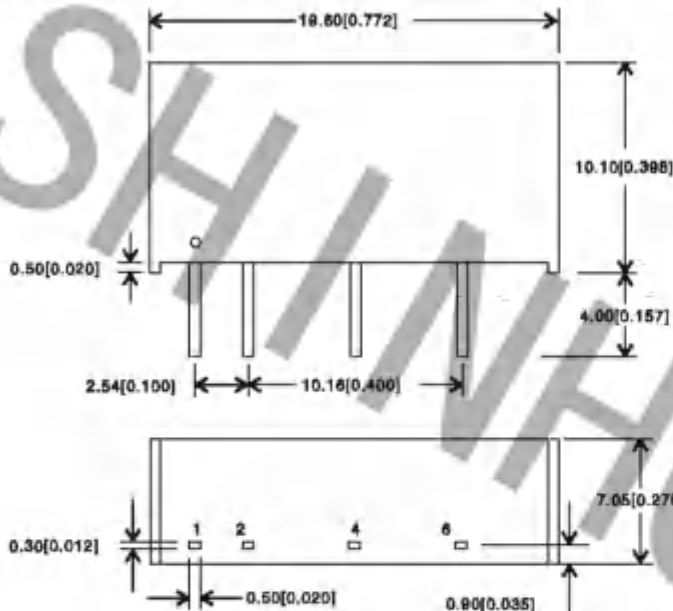
Electric power
 Industrial control
 Communication
 IoT
 Rail transit



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: $\pm 0.10 (\pm 0.004)$

Unremarked tolerance: $\pm 0.50 (\pm 0.020)$

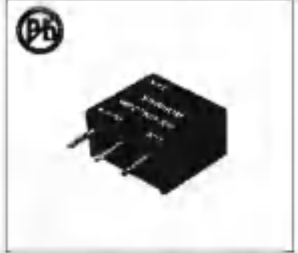
1.5W~7.5W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

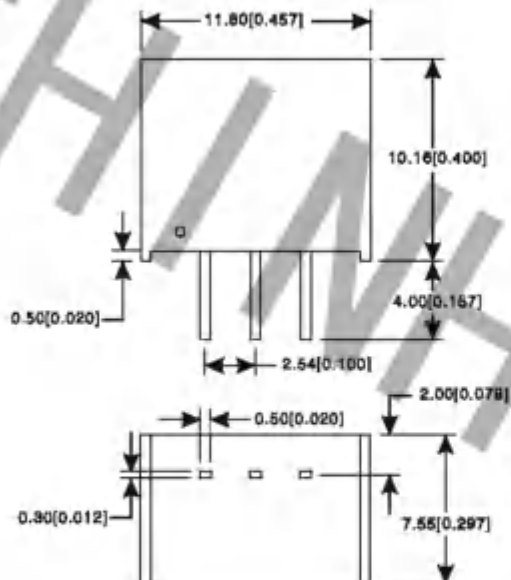
Electric power
 Industrial control
 Communication
 IoT
 Rail transit
 Automobile



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	88	80	660
WDC7805-500	24 (6.5-36)	5	500	90	84	660
	12 (7-31)	-5	-300	80	81	330
WDC7809-500	24 (12-36)	9	500	93	90	660
WDC7812-500	24 (15-36)	12	500	94	91	660
	12 (8-24)	-12	-150	84	85	330
WDC7815-500	24 (18-36)	15	500	95	93	660
	12 (8-21)	-15	-150	85	87	330

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
3	+Vo

Dimensional unit: mm

Terminal diameter tolerance: $\pm 0.10 [\pm 0.004]$

Unremarked tolerances: $\pm 0.50 [\pm 0.020]$

2.5W~15W DC-DC CONVERTER

FEATURES:

Packaging: SIP3
Operating Temperature: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$
Full voltage stabilized output
Efficiency: The maximum efficiency can reach 86%
With output short circuit

APPLICATION:

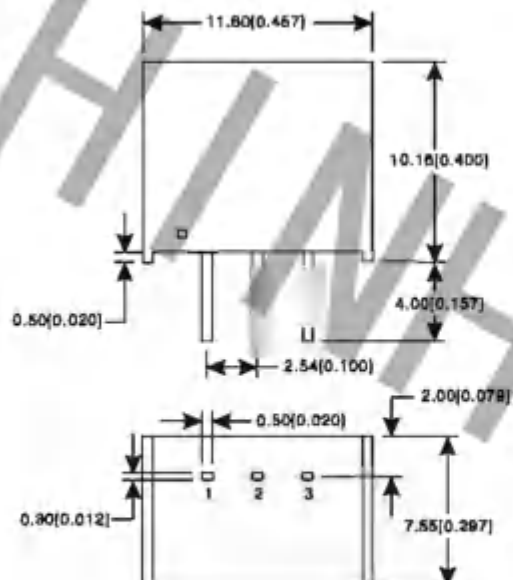
Electric power
Industrial control
Communication
Instrument & apparatus
Rail transit



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 (8~38)	3.3	1000	90	81	880
WDC7805-1000	24 (8~38)	5	1000	93	88	880
	12 (8~27)	-5	-500	86	82	330
WDC7809-1000	24 (13~38)	9	1000	96	90	880
WDC7812-1000	24 (16~38)	12	1000	98	93	880
	12 (8~20)	-12	-300	89	88	330
WDC7815-1000	24 (20~38)	15	1000	98	94	880
	12 (8~18)	-15	-300	88	88	330

PHYSICAL CHARACTERISTICS:



Pin	Definition
1	Vin
2	GND
3	+Vo

Dimensional unit: mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unmarked tolerances: $\pm 0.50 (\pm 0.020)$

2W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

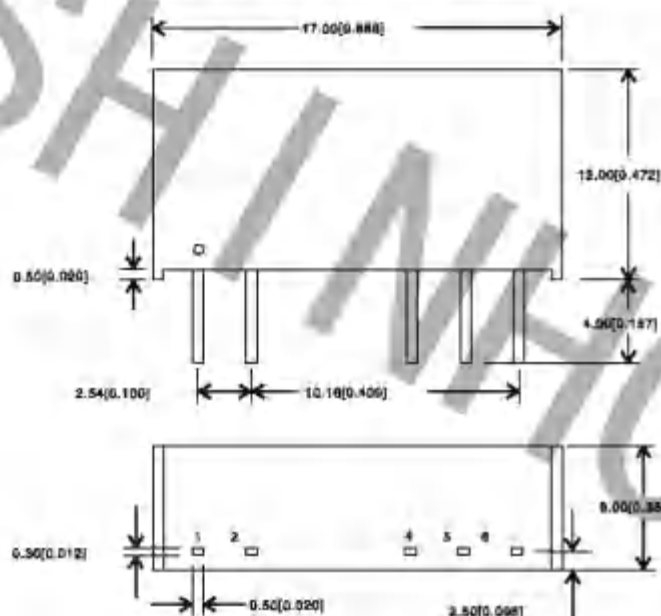
Electric power
 Industrial control
 Communication
 Instrument & apparatus
 Rail transit



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)			
WDC05B-0500	5 (4.5-9)	3.3	800	0	120/200	80	1800
WDC05B-0800		5	400	0	120/200	82	2200
WDC05B-0812		12	167	0	150/200	85	880
WDC05B-0815		15	133	0	150/200	84	470
WDC05B-0812		±12	±83	0	150/200	83	±470
WDC05B-0815		±15	±67	0	150/200	81	±330
WDC05B-1200	12 (9-18)	3.3	800	0	120/200	80	2700
WDC05B-1205		5	400	0	120/200	83	2200
WDC05B-1212		12	167	0	150/200	84	880
WDC05B-1215		15	133	0	150/200	84	470
WDC05B-1212		±12	±83	0	150/200	83	±470
WDC05B-1215		±15	±67	0	150/200	81	±330
WDC05B-2400	24 (18-36)	3.3	800	0	120/200	78	2700
WDC05B-2405		5	400	0	120/200	80	2200
WDC05B-2412		12	167	0	150/200	82	880
WDC05B-2415		15	133	0	150/200	82	470
WDC05B-2412		±12	±83	0	150/200	81	±470
WDC05B-2415		±15	±67	0	150/200	80	±330
WDC05B-4800	48 (36-75)	3.3	800	0	120/200	75	2700
WDC05B-4805		5	400	0	120/200	80	2200
WDC05B-4812		12	167	0	150/200	82	880
WDC05B-4815		15	133	0	150/200	82	470
WDC05B-4812		±12	±83	0	150/200	81	±470
WDC05B-4815		±15	±67	0	150/200	80	±330

PHYSICAL CHARACTERISTICS:



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

Dimension: in mm

Tolerance: diameter tolerance: ±0.10(±0.004)

Unremarked tolerance: ±0.50(±0.020)

2W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

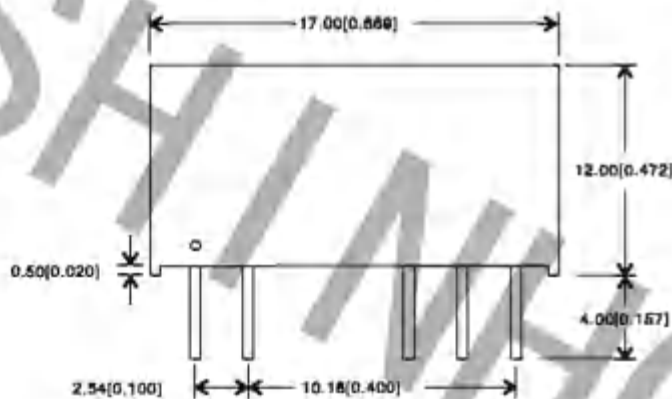
Electric power
 Industrial control
 Communication
 Instrument & apparatus
 Rail transit



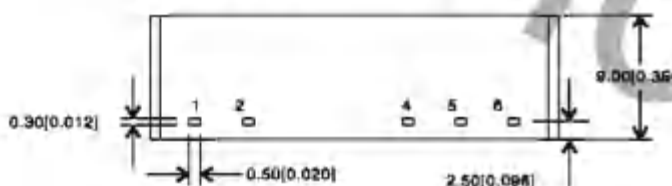
ELECTRICAL CHARACTERISTICS:

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	1750
WDCV02S-24S05		5	5	400	120/200	60	1000
WDCV02S-24S12		12	12	167	150/200	63	170
WDCV02S-24S15		15	15	133	150/200	62	110
WDCV02S-24D12		±12	±12	±83	150/200	61	#100
WDCV02S-24D15		±15	±15	±67	150/200	60	#47
WDCV02S-48S03	48 (36-75)	3.3	3.3	600	120/200	76	1780
WDCV02S-48S05		5	5	400	120/200	79	1000
WDCV02S-48S12		12	12	167	150/200	62	170
WDCV02S-48S15		15	15	133	150/200	61	110
WDCV02S-48D12		±12	±12	±83	150/200	61	#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: SIF8

2:1 Wide input voltage range

Operating Temperature: -40°C ~ 85°C

Isolation Voltage:1500VDC

Efficiency: The maximum efficiency can reach 86%.

With input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

Electric power

Industrial control

Communication

Instrument & apparatus

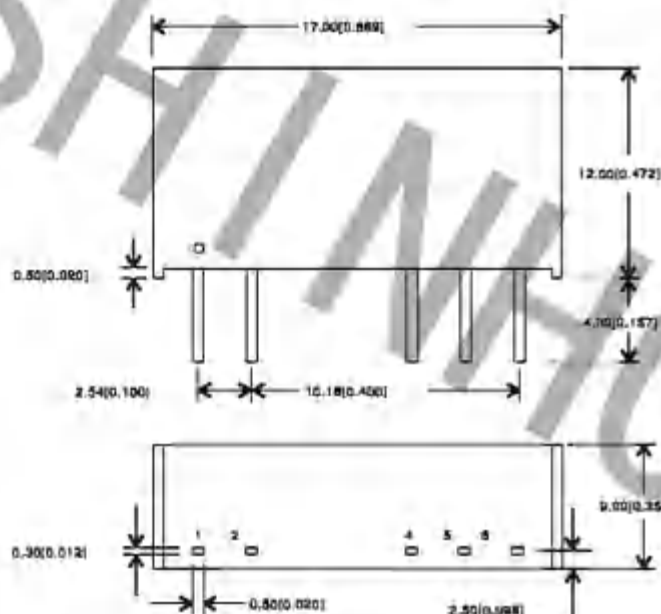
Rail transit



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)			
WDC0905-4800	3 (4.5-6)	3.3	600	38	120/200	79	1800
WDC0905-4800		5	600	30	120/200	82	2200
WDC0905-4810		12	250	18	150/200	85	860
WDC0905-4810		15	200	10	150/200	85	470
WDC0905-4812		±12	±130	±8	150/200	85	#470
WDC0905-4815		±15	±100	±5	150/200	82	#330
WDC0905-1200	10 (9-18)	3.3	600	38	120/200	82	2700
WDC0905-1200		5	600	30	130/200	83	2300
WDC0905-1210		12	250	13	150/200	86	560
WDC0905-1210		15	200	10	180/200	88	470
WDC0905-1212		±12	±130	±8	180/200	84	#470
WDC0905-1215		±15	±100	±5	150/200	83	4300

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	V _{in}	V _{in}
4	+V _a	-V _a
6	No Pin	COM
8	-V _a	-V _a

Dimensions: 4.5 x 1.5 x 1.5 cm

Terminal diameter tolerance: ± 0.10 (± 0.004)

Unremarkable histology: a 0.50 (a/r, p20)

3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

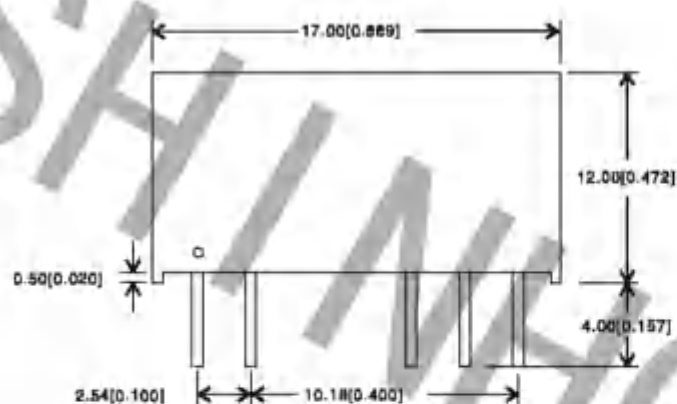
Electric power
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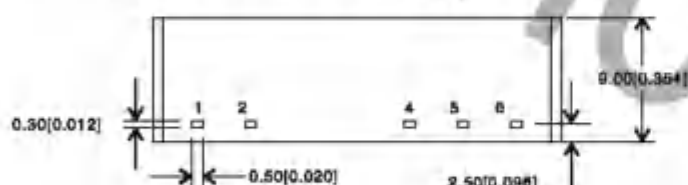
ELECTRICAL CHARACTERISTICS:

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 (36-75)	3.3	600	38	120/200	77	1780
WDCV03S-48S05		5	600	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	±6	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

4:1 Wide input voltage range

Operating Temperature: -40°C - 85°C

Isolation Voltage:1500VDC

Low Ripple Noise

With Input undervoltage, output overcurrent, short circuit, over voltage protection

APPLICATION:

Electric power
Industrial control
Communication
IoT
Automobile

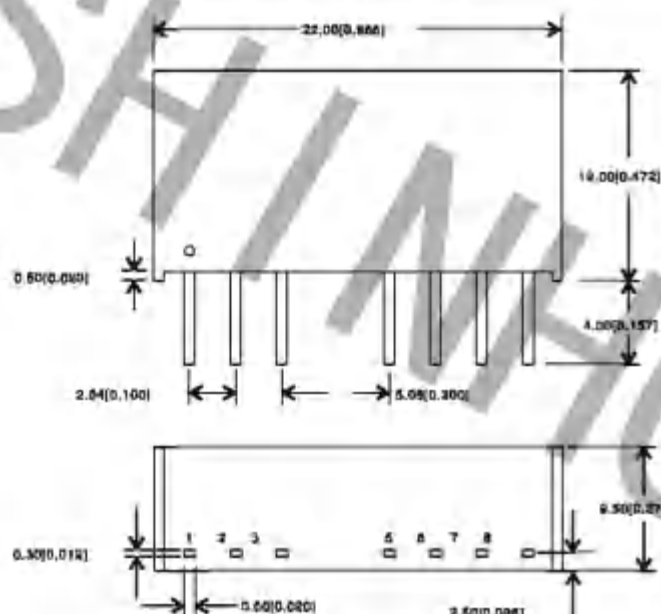


ELECTRICAL CHARACTERISTICS:

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)			
WDCV15-1200	12 (4.5-15)	3.3	303	15	100/150	73/75	2700
WDCV15-1250		5	200	10	100/150	74/78	2200
WDCV15-1300		8	111	8	100/150	75/80	1000
WDCV15-15015		12	88	4	100/150	80/82	880
WDCV15-15015		15	67	3	100/150	81/83	470
WDCV15-1500		24	42	2	100/150	78/81	350
WDCV15-1100		±5	±100	±2	100/150	78/78	#1000
WDCV15-12015		±12	±42	±2	100/150	77/79	6470
WDCV15-15015	±15	±33	±2	100/150	78/80	6330	
WDCV15-4000	24 (8-35)	3.3	303	15	70/100	82/74	2700
WDCV15-4000		5	200	10	70/100	79/81	2200
WDCV15-4000		12	88	4	70/100	87/83	880

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)			
WDCV15-2400	24 (8-35)	15	87	3	70/100	81/83	470
WDCV15-4000		24	42	2		81/83	330
WDCV15-4000		±5	±100	±2		77/79	#1000
WDCV15-4000		±12	±42	±2		81/83	6470
WDCV15-4000		±15	±33	±2		81/83	6330
WDCV15-1200		3.3	303	15		78/75	2700
WDCV15-1250		5	200	10		74/78	2200
WDCV15-1300		8	111	8		75/80	1000
WDCV15-15015	48 (18-75)	15	87	3	100/150	82/84	470
WDCV15-4000		±5	±100	±2		77/79	#1000
WDCV15-4000		±12	±42	±2		80/82	6470
WDCV15-4000	±15	±33	±2	80/82	6330		

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	V _{in}	V _{in}
3	Ctrl	Ctrl
5	NC	NC
6	+V _s	+V _s
7	-V _s	COM
8	NC	-V _s

NC: Cannot be connected to any external client.

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Technical drawing tolerance: $\pm 0.10 \pm 0.04$

Unrestricted International: 0.5208 and 0.0001

2.5~3W DC-DC CONVERTER

FEATURES:

Packaging: SIF8
 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:

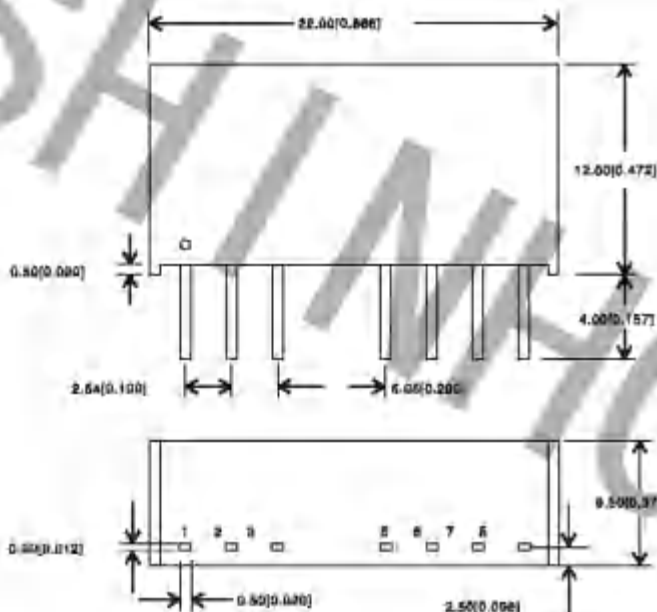
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Ripple&Noise (Max./Max.) MVP-P	Full Load Efficiency (%Typ)	Capacitive Load,Max (uF)	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)					Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC05S-0500	5 (4.5-9)	3.3	758	38	40/75	88	1800	WDC05S-0500	24 (15-38)	3.3	758	38	100/150	74	2700
WDC05S-0800		5	500	25		73	2200	WDC05S-0800		5	500	30		81	3200
WDC05S-1200		12	209	10		77	880	WDC05S-1200		12	250	15		82	880
WDC05S-1500		15	167	8		74	470	WDC05S-1500		15	200	10		84	470
WDC05S-2400		24	104	5		78	330	WDC05S-2400		24	125	8		82	330
WDC05S-4000		±5	±300	±15		74	±1000	WDC05S-4000		±5	±300	±15		78	±1000
WDC05S-4000		±12	±104	±5		77	±470	WDC05S-4000		±12	±125	±8		82	±470
WDC05S-4000		±15	±83	±4		77	±330	WDC05S-4000		±15	±100	±5		82	±330
WDC05S-4000		±24	±52	±0		78	±220	WDC05S-4000		3.3	758	38		75	2700
WDC05S-1500	12 (9-18)	3.3	758	38	70/100	75	2700	WDC05S-4000	48 (36-75)	5	800	30	100/160	78	2200
WDC05S-1200		5	500	30		78	2200	WDC05S-4000		12	250	15		80	880
WDC05S-1200		12	200	10		82	880	WDC05S-4000		15	200	10		84	470
WDC05S-1500		15	300	10		83	470	WDC05S-4000		24	125	8		82	330
WDC05S-1500		24	125	8		51	330	WDC05S-4000		±5	±300	±15		78	±1000
WDC05S-4000		±5	±300	±15		78	±1000	WDC05S-4000		±12	±125	±8		82	±470
WDC05S-4000		±12	±104	±5		77	±470	WDC05S-4000		±15	±100	±5		82	±330
WDC05S-4000		±15	±83	±4		77	±330								
WDC05S-4000		±24	±52	±0		78	±220								
WDC05S-1500		3.3	758	38		75	2700								

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

Ferrule diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unmarked tolerance: $\pm 0.50 (\pm 0.020)$

3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

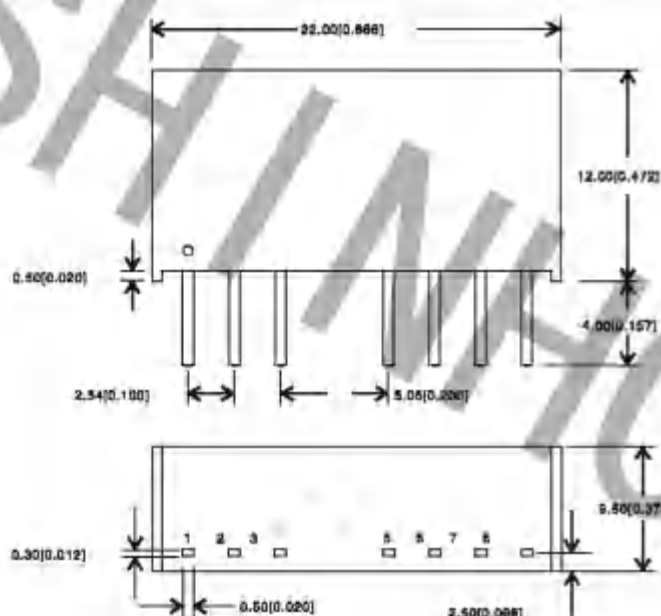
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output:		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)	Part Number	Input Voltage(VDC)	Output:		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)				Rating	Voltage (VDC)	Current Max (mA)		
WDCV08S-12S03	12 (4.5-18)	3.3	700	74	1780	WDCV08S-24D05	24 (8-36)	±5	±300	78	±470
WDCV08S-12S05		5	600	78	1000	WDCV08S-24D12		±12	±125	80	±100
WDCV08S-12S12		12	250	80	170	WDCV08S-24D15		±15	±100	81	±47
WDCV08S-12S15		15	200	80	110	WDCV08S-48S03	48 (18-75)	3.3	700	74	1780
WDCV08S-12D05		±5	±300	80	±470	WDCV08S-48S05		5	600	78	1000
WDCV08S-12D12		±12	±125	80	±100	WDCV08S-48S12		12	250	78	170
WDCV08S-12D15		±15	±100	80	±47	WDCV08S-48S15		15	200	78	110
WDCV08S-24S03	24 (8-36)	3.3	700	75	1780	WDCV08S-48D05		±5	±300	78	±470
WDCV08S-24S05		5	600	80	1000	WDCV08S-48D12		±12	±125	78	±100
WDCV08S-24S12		12	250	81	170	WDCV08S-48D15		±15	±100	80	±47
WDCV08S-24S15		15	200	81	110						

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimension unit: mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unmarked tolerances: $\pm 0.50(\pm 0.020)$

3W DC-DC CONVERTER

FEATURES:

Packaging: SIP6
2:1 Wide input voltage range
Operating Temperature: -40°C ~ 85°C
Isolation Voltage: 3000VDC
The maximum efficiency can reach 84%
With input undervoltage, output overcurrent,
short circuit, over voltage protection

APPLICATION:

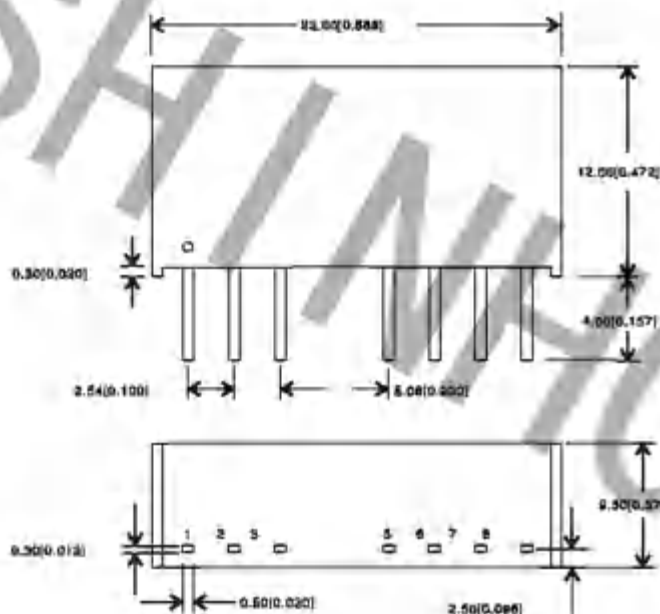
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output			Approx.Notes (Max./Max.) MVP-P	Full Load Efficiency (% Typ)	Capacitive Load Max (uF)	Part Number	Input Voltage(VDC)	Output			Approx.Notes (Max./Max.) MVP-P	Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)					Rating	Voltage (VDC)	Current Max (mA)	Current Min (mA)			
WDC335-0800	5 (4.5-6)	8.3	756	38	40/75	88	1800	WDC335-0800	24 (18-34)	8.3	756	38	100/150	88	1800
WDC335-0805		9	800	45		79	1800	WDC335-0805		9	800	45		81	1800
WDC335-0812		12	306	10		77	881	WDC335-0812		12	306	15		83	880
WDC335-0815		15	187	8		74	470	WDC335-0815		15	200	10		83	470
WDC335-0824		24	104	5		70	300	WDC335-0824		24	100	5		80	300
WDC335-0808		±5	±300	±13		74	±1000	WDC335-0808		±5	±300	±15		79	±1000
WDC335-0812		±12	±104	±5		77	±470	WDC335-0812		±12	±126	±8		83	±470
WDC335-0815		±15	±88	±4		71	±330	WDC335-0815		±15	±100	±5		83	±330
WDC335-0824		±24	±52	±3		78	±320	WDC335-0824		±24	±52	±3		78	±320
WDC335-1200	12 (9-18)	3.3	756	38	70/100	75	2700	WDC335-1200	48 (35-75)	3.3	756	38	100/150	75	2700
WDC335-1205		5	300	10		78	2800	WDC335-1205		5	300	10		80	2800
WDC335-1212		12	250	13		82	880	WDC335-1212		12	200	10		84	470
WDC335-1218		18	200	10		83	470	WDC335-1218		18	126	8		83	330
WDC335-1224		24	126	5		81	330	WDC335-1224		±3	±300	±15		79	±1000
WDC335-1208		±5	±300	±15		78	±1000	WDC335-1208		±12	±126	±8		82	±470
WDC335-1212		±12	±104	±5		77	±470	WDC335-1212		±15	±100	±5		83	±330
WDC335-1218		±15	±100	±5		80	±330	WDC335-1218		±18	±100	±5		83	±330
WDC335-1200		±3.3	±756	±38		75	±2700	WDC335-1200		±3.3	±756	±38		75	±2700
WDC335-1205		±5	±300	±10		78	±2800	WDC335-1205		±5	±300	±10		80	±2800

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any internal circuit

Dimensions: in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unspecified tolerance: ±0.50(±0.020)

3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

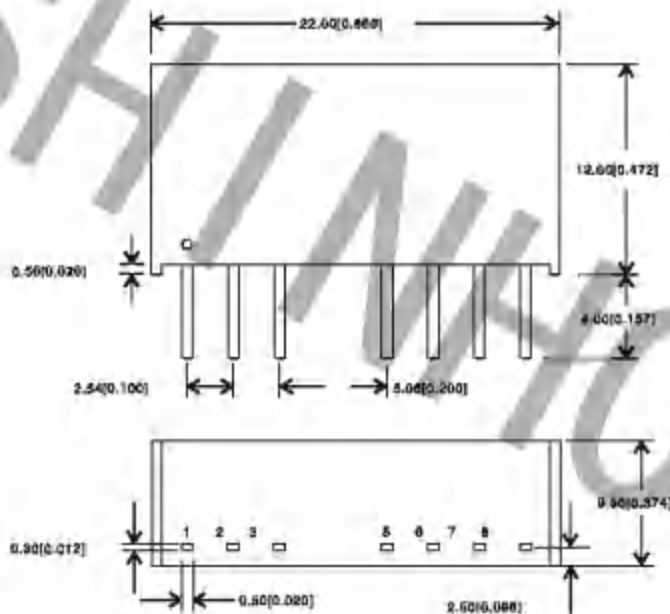
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)	Part Number	Input Voltage(VDC)	Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Voltage (VDC)	Current Max (mA)				Rating	Voltage (VDC)	Current Max (mA)		
WDCVE03S-12503	12 (4.5-18)	3.3	750	74	1750	WDCVE03S-24005	24 (9-36)	±5	±300	78	±470
WDCVE03S-12505		5	500	78	1000	WDCVE03S-24012		±12	±125	80	±100
WDCVE03S-12512		12	250	80	170	WDCVE03S-24015		±15	±100	81	±47
WDCVE03S-12515		15	200	80	110	WDCVE03S-48503	48 (18-75)	3.3	700	74	1750
WDCVE03S-12503		±3	±300	80	±470	WDCVE03S-48505		5	500	78	1000
WDCVE03S-12012		±12	±125	80	±100	WDCVE03S-48512		12	250	78	170
WDCVE03S-12015		±15	±100	80	±47	WDCVE03S-48515		15	200	78	110
WDCVE03S-24503	24 (9-36)	3.3	750	75	1750	WDCVE03S-48505		±5	±300	78	±470
WDCVE03S-24505		5	500	80	1000	WDCVE03S-48012		±12	±125	78	±100
WDCVE03S-24012		12	250	81	170	WDCVE03S-48015		±15	±100	80	±47
WDCVE03S-24515		15	200	81	110						

PHYSICAL CHARACTERISTICS:



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

NC Cannot be connected to any external circuit

Dimension in mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unmarked tolerances: $\pm 0.50(\pm 0.020)$

6W DC-DC CONVERTER

FEATURES:

Packaging: SIP8
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:

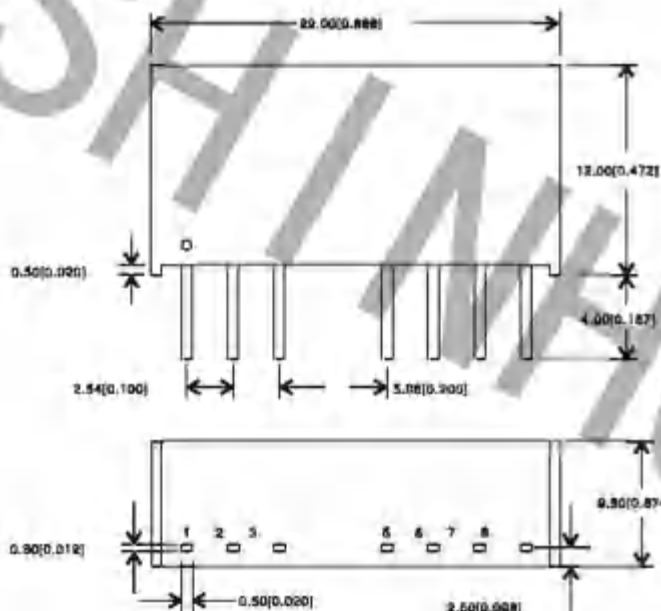
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)	Part Number	Input Voltage(VDC)		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current (Max)(mA)				Rating	Max		
WDC06S-05S03	5 (4.5-6)	12	3.3	1860/0	75	1800	WDC06S-24S03	24 (18-35)	40	75	1800
WDC06S-05S05			5	1200/0	79	1000	WDC06S-24S05			81	1000
WDC06S-05S09			9	887/0	81	470	WDC06S-24S09			85	470
WDC06S-05S12			12	500/0	83	470	WDC06S-24S12			87	470
WDC06S-05S15			15	400/0	83	220	WDC06S-24S15			88	220
WDC06S-05S24			24	250/0	84	100	WDC06S-24S24			88	100
WDC06S-12S03	12 (9-18)	30	3.3	1560/0	77	1800	WDC06S-48S03	48 (35-75)	80	79	1800
WDC06S-12S05			5	1200/0	81	1000	WDC06S-48S05			84	1000
WDC06S-12S09			9	887/0	83	470	WDC06S-48S09			85	470
WDC06S-12S12			12	500/0	86	470	WDC06S-48S12			87	470
WDC06S-12S15			15	400/0	85	220	WDC06S-48S15			88	220
WDC06S-12S24			24	250/0	85	100	WDC06S-48S24			88	100

PHYSICAL CHARACTERISTICS:



Pin	Single ended	Dual ended
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: $\pm 0.10(\pm 0.004)$

Unremarked tolerances: $\pm 0.50(\pm 0.020)$

6W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

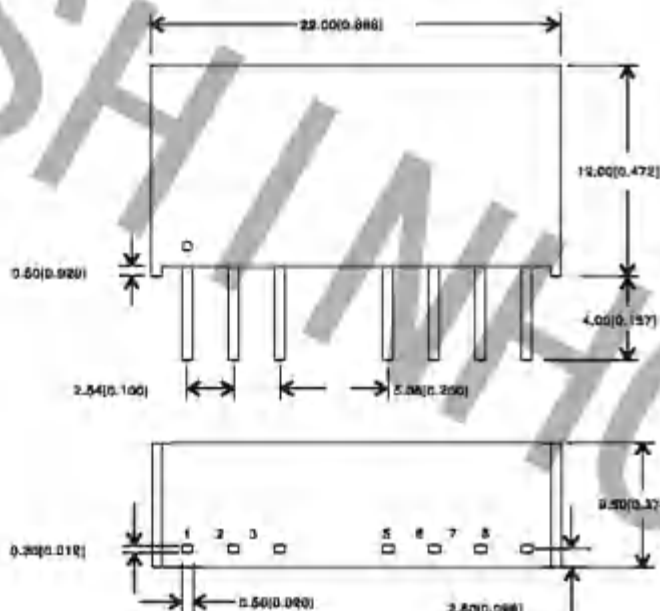
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)	Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current (mA)				Rating	Max	Voltage (VDC)	Current (mA)		
WDCVMS-12503	12 (4.5-18)	35	3.3	1500/0	78	1000	WDCVMS-24250	24 (9-36)	40	3.3	1000/0	80	88%
WDCVMS-12505			5	1200/0	79	1000	WDCVMS-24009			5	800/0	83	88%
WDCVMS-12509			9	807/0	81	470	WDCVMS-24012			12	550/0	83	88%
WDCVMS-12512			12	500/0	83	470	WDCVMS-24015			15	400/0	83	88%
WDCVMS-12515			15	400/0	84	220	WDCVMS-24024			24	250/0	82	88%
WDCVMS-12524			24	250/0	82	100	WDCVMS-48003	48 (18-75)	80	3.3	1000/0	79	1000
WDCVMS-20003			3.3	1000/0	79	1000	WDCVMS-48005			5	1000/0	80	1000
WDCVMS-20009			9	800/0	81	470	WDCVMS-48009			9	807/0	82	870
WDCVMS-20012			12	550/0	81	470	WDCVMS-48012			12	500/0	83	470
WDCVMS-20015			15	400/0	83	220	WDCVMS-48015			15	400/0	83	220
WDCVMS-20024			24	250/0	82	100	WDCVMS-48024			24	250/0	82	100
WDCVMS-24003	24 (9-36)	40	3.3	1000/0	78	1000	WDCVMS-48033			3.3	1000/0	81	84%
WDCVMS-24005			5	1200/0	80	1000	WDCVMS-48033			5	1000/0	81	84%
WDCVMS-24009			9	807/0	84	470	WDCVMS-48033			9	807/0	84	84%
WDCVMS-24012			12	500/0	86	470	WDCVMS-48033			12	500/0	84	84%
WDCVMS-24015			15	400/0	87	220	WDCVMS-48033			15	400/0	84	84%
WDCVMS-24024			24	250/0	85	100	WDCVMS-48033			24	250/0	83	88%

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimensional unit: mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unmarked tolerances: $\pm 0.50(\pm 0.020)$





3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

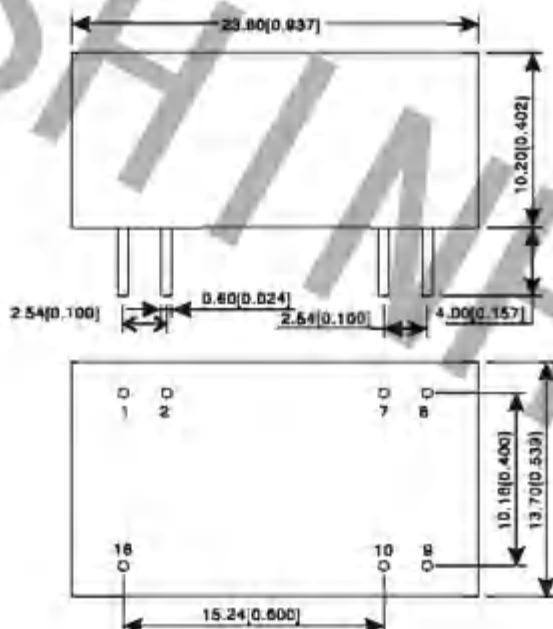
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ELECTRICAL CHARACTERISTICS:

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 (9-16)	3.3	800/0	278	30	73/75	220
WDC03N-12S05		5	800/0	314		78/75	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	447
WDC03N-12D12		±12	±125/0	314		78/80	447
WDC03N-12D15		±15	±100/0	314		78/80	447
WDC03N-24S03	24 (18-36)	3.3	600/0	140	30	78/75	220
WDC03N-24S05		5	600/0	158		78/75	220
WDC03N-24S12		12	150/0	158		78/80	47
WDC03N-24S15		15	200/0	158		78/80	47
WDC03N-24S24		24	125/0	158		78/80	47
WDC03N-24D05		±5	±300/0	158		75/77	447
WDC03N-24D12		±12	±125/0	158		78/80	447
WDC03N-24D15		±15	±100/0	158		78/80	447

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
15	Vin	Vin

NC: Cannot be connected to any external circuit

Dimensions: In mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unremarked tolerance: $\pm 0.50(\pm 0.020)$

3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

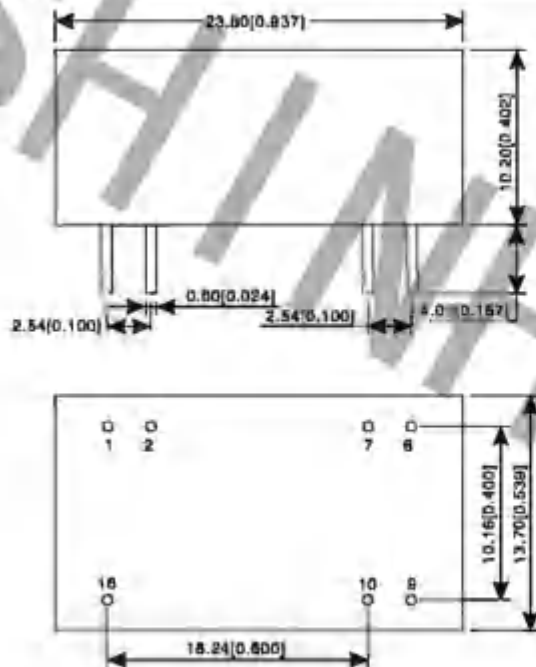
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ELECTRICAL CHARACTERISTICS:

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	800/0	153	30	73/75	220
WDCV03N-24S05		5	600/0	160		76/78	220
WDCV03N-24S12		12	250/0	156		78/80	47
WDCV03N-24S15		15	200/0	156		78/80	47
WDCV03N-24S24		24	125/0	156		78/80	47
WDCV03N-24D05		±5	±300/0	162		75/77	847
WDCV03N-24D12		±12	±125/0	156		78/80	847
WDCV03N-24D15		±15	±100/0	156		76/80	847
WDCV03N-48S03	48 (18-75)	3.3	800/0	88	20	73/75	220
WDCV03N-48S05		5	600/0	88		78/78	220
WDCV03N-48S12		12	250/0	78		78/80	47
WDCV03N-48S15		15	200/0	76		78/80	47
WDCV03N-48S24		24	125/0	76		78/80	47
WDCV03N-48D05		±5	±300/0	81		75/77	847
WDCV03N-48D12		±12	±125/0	76		78/80	847
WDCV03N-48D15		±15	±100/0	76		78/80	847

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimensions: in mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unremarked tolerances: $\pm 0.50 (\pm 0.020)$

6W DC-DC CONVERTER

FEATURES:

Packaging: DIP18
2:1 Wide Input voltage range
Operating Temperature: -40°C ~ 88°C
Isolation Voltage: 1500VDC
The maximum efficiency can reach 86%
With input undervoltage, output overcurrent,
short circuit, over voltage protection

APPLICATION:

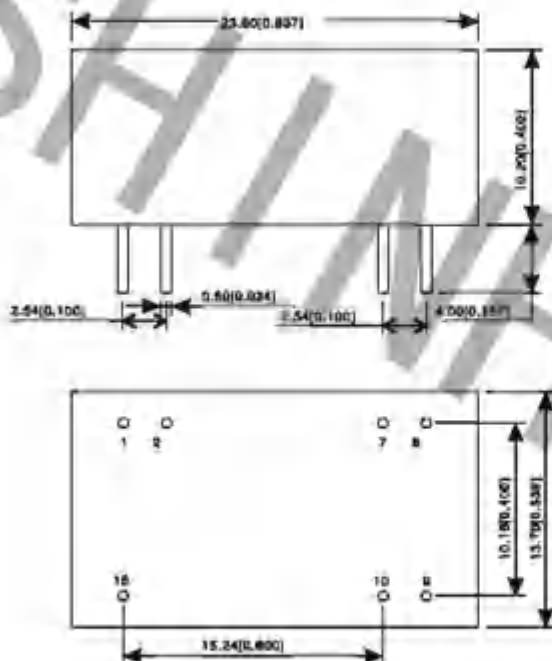
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Input Current		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Voltage (VDC)	Current Max/Min(mA)	No-load current(mA) Max	No-load current(mA) Max			
WDC6W-12S3	12 (9-18)	3.3	1500/0	284	10	78/80	680	7
WDC6W-12S5		5	1200/0	305		81/83	680	
WDC6W-12S12		12	500/0	291		85/87	330	
WDC6W-12S15		15	400/0	291		85/86	330	
WDC6W-12S24		24	250/0	287		86/88	150	
WDC6W-12S35		±5	±500/0	305		80/82	4330	
WDC6W-12S12		±15	±250/0	291		85/87	1150	
WDC6W-12S15		±15	±200/0	287		85/87	1150	
WDC6W-48S3	24 (8-36)	3.3	1800/0	132	2	78/80	680	8
WDC6W-48S5		5	1200/0	152		81/83	680	
WDC6W-48S12		12	500/0	145		85/87	330	
WDC6W-48S15		15	400/0	145		85/88	330	
WDC6W-48S24	24 (8-36)	24	250/0	142	2	86/88	150	8
WDC6W-48S35		±5	±500/0	151		81/83	4330	
WDC6W-48S12		±12	±250/0	144		85/87	1150	
WDC6W-48S15		±15	±200/0	144		85/87	1150	

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

Dimension: 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:

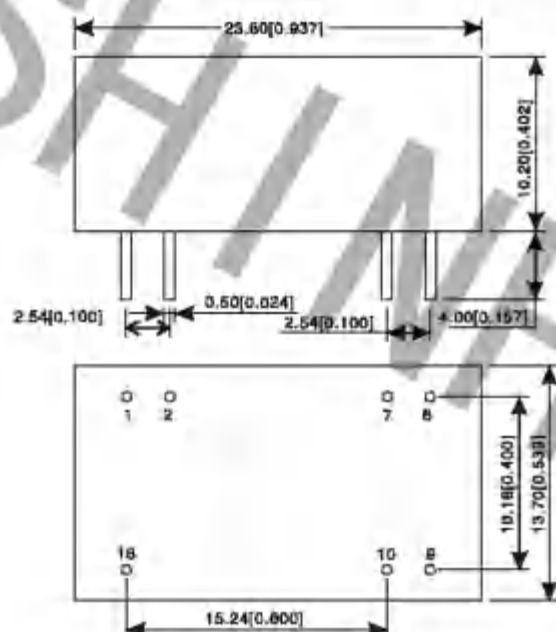
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ELECTRICAL CHARACTERISTICS:

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	1800/0	284	3	76/79	880
WDCV06N-24S05		5	1200/0	305		80/82	880
WDCV06N-24S12		12	500/0	291		84/86	880
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	1800/0	132	#	76/78	880
WDCV06N-48S05		5	1200/0	152		80/82	880
WDCV06N-48S12		12	500/0	145		84/86	330
WDCV06N-48S15		15	400/0	145		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
8	NC	COM
9	+Vo	+Vo
10	-Vo	-Vo
15	Vin	Vin

NC: Cannot be connected to any external circuit

Dimension in mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unremarked tolerance: $\pm 0.50 (\pm 0.020)$

10W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

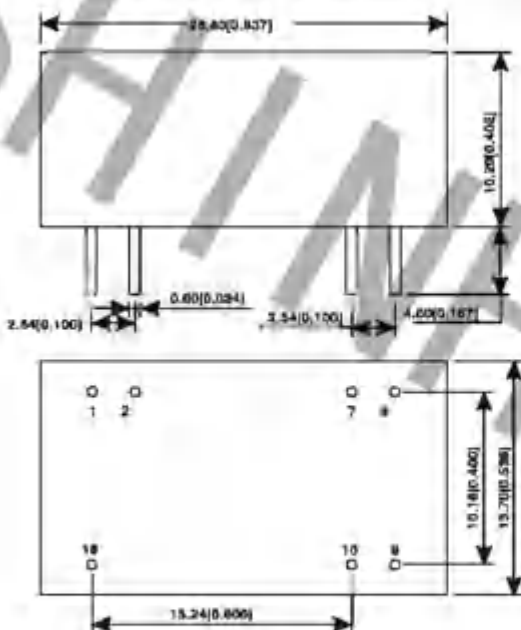
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ELECTRICAL CHARACTERISTICS:

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		
WDC10W-12B05	18 (9-18)	3.3	2400/0	940	20	77/79	2800
WDC10W-12B06		5	2000/0	1015		81/82	1800
WDC10W-12B12		12	833/0	906		84/86	580
WDC10W-12B15		15	667/0	887		85/87	560
WDC10W-12B24		24	416/0	866		86/87	200
WDC10W-12B05		5	±1000/0	1015		81/82	4500
WDC10W-12B12		12	±833/0	906		84/86	9300
WDC10W-12B15		15	±667/0	888		84/85	9200
WDC10W-24B05	24 (18-36)	3.3	2400/0	484	15	79/80	2800
WDC10W-24B06		5	2000/0	506		81/83	1300
WDC10W-24B12		12	833/0	476		85/87	580
WDC10W-24B15		15	667/0	478		86/88	580
WDC10W-36B05	36 (18-36)	3.3	±160/0	475	10	88/88	280
WDC10W-36B06		±5	±180/0	505		81/84	1580
WDC10W-36B12		±12	±160/0	478		85/87	8300
WDC10W-36B15		±15	±333/0	475		85/87	4200
WDC10W-36B24		3.3	2400/0	200		78/80	2800
WDC10W-48B05	48 (24-72)	5	2000/0	251	8	81/83	1300
WDC10W-48B12		12	833/0	238		85/87	580
WDC10W-48B15		15	667/0	237		86/88	580
WDC10W-48B24		3.3	±160/0	286		88/88	280
WDC10W-48B36		±5	±1000/0	251		81/83	4500
WDC10W-48B12		±12	±416/0	290		85/87	8300
WDC10W-48B15		±15	±833/0	296		86/87	4200

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

Dimension in mm

Terminal dimension tolerance: ±0.10(±0.004)

Upper marked tolerance: ±0.50(±0.020)

10W DC-DC CONVERTER

FEATURES:

Packaging: DIP18
2:1 Wide input voltage range
Operating Temperature: -40°C ~ 85°C
Isolation Voltage: 1500VDC
The maximum efficiency can reach 88%
With input undervoltage, output overcurrent,
short circuit, over voltage protection

APPLICATION:

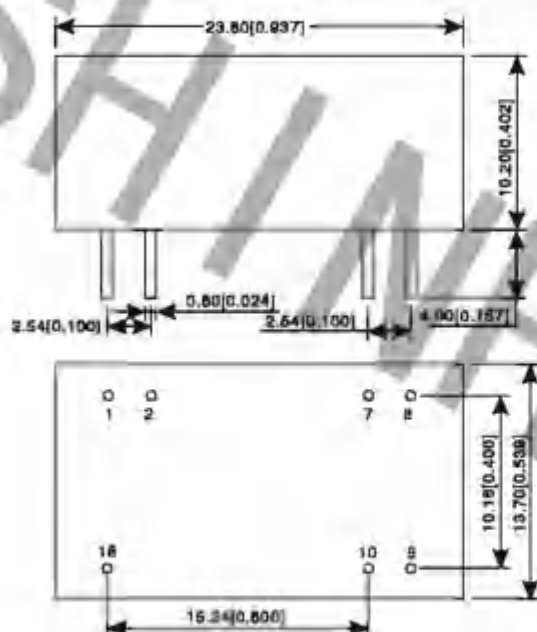
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ELECTRICAL CHARACTERISTICS:

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	484	10	78/80	2500
WDCV10N-24S05		5	2000	502		81/83	1300
WDCV10N-24S12		12	833	479		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	478		85/87	#390
WDCV10N-24D15		±15	±333	478		84/87	#200
WDCV10N-48S03	48 (18-75)	3.3	2700	232	8	78/80	2500
WDCV10N-48S05		5	2000	251		81/83	1300
WDCV10N-48S12		12	833	236		85/87	560
WDCV10N-48S15		15	666	237		86/88	560
WDCV10N-48S24		24	416	236		86/88	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
16	Vin	Vin

NC: Cannot be connected to any external circuit

Dimensional unit: mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unremarked tolerance: $\pm 0.50 (\pm 0.020)$

3W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

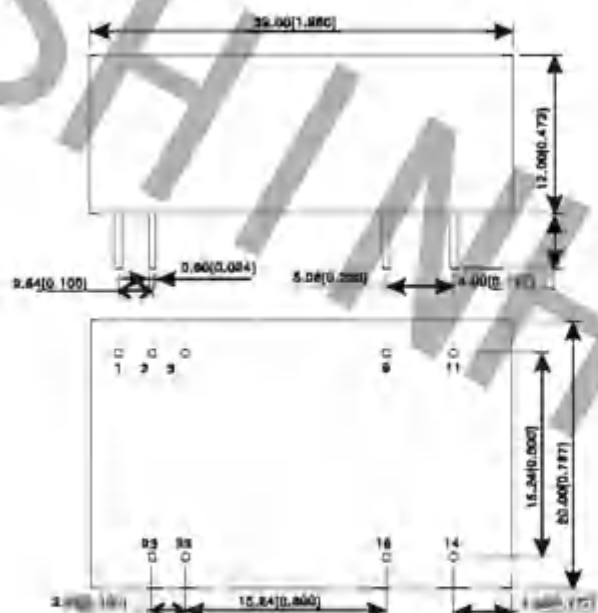
Electric power
Industrial control
Medical



ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC2P-0803V	5 (4.3-6)	11	5	600/50	74	4700
WDC2P-0812V			12	250/12	72	2700
WDC2P-0815V			15	200/10	72	2200
WDC2P-0819V			±3	±300/±15	76	#2000
WDC2P-0812V			±12	±125/±5	78	#1500
WDC2P-0819V			±15	±100/±5	78	#1000
WDC2P-1203V	12 (9-18)	20	3.3	900/48	74	4700
WDC2P-1206V			5	600/30	81	4700
WDC2P-1212V			18	300/15	80	3700
WDC2P-1215V			15	300/10	82	3200
WDC2P-1224V			24	125/5	85	1800
WDC2P-1203V			±5	±300/±15	85	#2300
WDC2P-1212V			±12	±125/±5	84	#1800
WDC2P-1215V			±15	±100/±5	84	#1500
WDC2P-1203V			3.3	900/48	78	#700
WDC2P-1206V			5	600/30	82	4700
WDC2P-1212V	24 (18-36)	40	12	250/12	88	2700
WDC2P-1215V			15	200/10	86	2300
WDC2P-1203V			±5	±300/±15	82	#2300
WDC2P-1212V			±12	±125/±5	84	#1800
WDC2P-1215V			±15	±100/±5	85	#1000
WDC2P-1203V			3.3	900/48	78	#700
WDC2P-1206V			5	600/30	82	4700
WDC2P-1212V			12	250/12	88	2700
WDC2P-1215V			15	200/10	86	2300
WDC2P-1203V			±5	±300/±15	82	#2300
WDC2P-1212V			±12	±125/±5	84	#1800
WDC2P-1215V			±15	±100/±5	85	#1000
WDC2P-2403V	34(18-36)	40	3.3	900/48	78	4700

PHYSICAL CHARACTERISTICS:



3W DC-DC CONVERTER

FEATURES:

Packaging: DIP24
4:1 Wide input voltage range
Operating Temperature: -40°C ~ 85°C
Isolation Voltage: 1500VDC
The maximum efficiency can reach 86%
With input undervoltage, output overcurrent,
short circuit, over voltage protection

APPLICATION:

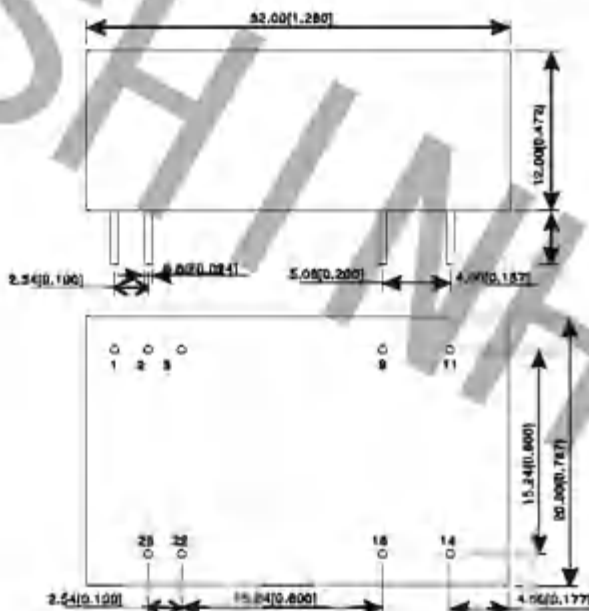
Electric power
Industrial control
Medical



ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV3P-1204V	12 (4.5-18)	25	3.3	800/48	73	2700
WDCV3P-1205V			5	600/30	47	2200
WDCV3P-1207V			12	350/12	78	680
WDCV3P-1209V			15	260/10	77	680
WDCV3P-1254V			24	125/8	75	470
WDCV3P-1205V			±5	±300/±15	78	±1000
WDCV3P-1207V			±12	±138/±8	78	±330
WDCV3P-1209V			±15	±100/±5	78	±220
WDCV3P-1204V			3.3	800/48	73	2700
WDCV3P-1205V			5	600/30	80	2200
WDCV3P-1207V	24 (9-36)	40	12	250/12	81	680
WDCV3P-1209V			15	200/10	82	680
WDCV3P-1204V			3.3	800/48	73	2700
WDCV3P-1205V			5	600/30	79	2200
WDCV3P-1207V			12	250/12	82	680
WDCV3P-1209V	48 (18-75)	80	15	200/10	83	680
WDCV3P-1204V			24	125/8	81	470
WDCV3P-1205V			±5	±300/±15	79	±1000
WDCV3P-1207V			±12	±125/±8	82	±330
WDCV3P-1209V			±15	±100/±5	83	±220

PHYSICAL CHARACTERISTICS:



6W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

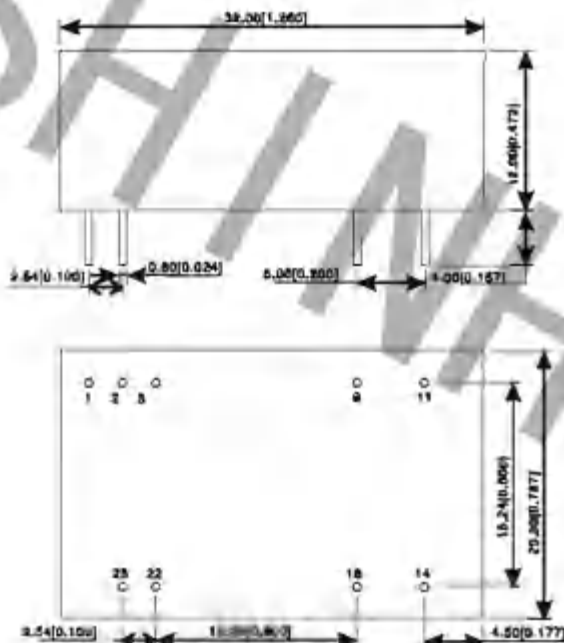
Electric power
Industrial control
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)	Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Ave(mA)				Rating	Max	Voltage (VDC)	Current Max/Ave(mA)		
WDCMP-0505V3	5 (4.5-6)	12	5	1200/0	78	1000	WDCMP-0505V3	5 (4.5-6)	12	5	1200/0	82	1000
WDCMP-0512V3			12	800/0	84	470	WDCMP-0512V3			12	800/0	88	470
WDCMP-0515V3			15	400/0	84	230	WDCMP-0515V3			15	400/0	86	230
WDCMP-0524V3			24	250/0	84	100	WDCMP-0524V3			24	250/0	88	100
WDCMP-0505V3			±5	±800/0	78	±1000	WDCMP-0505V3			±5	±800/0	83	±800
WDCMP-0512V3			±12	±800/0	84	±470	WDCMP-0512V3			±12	±800/0	88	±470
WDCMP-0515V3			±15	±400/0	84	±230	WDCMP-0515V3			±15	±400/0	86	±230
WDCMP-0524V3			±24	±250/0	84	±100	WDCMP-0524V3			±24	±250/0	88	±100
WDCMP-1205V3	12 (6-18)	40	3.3	1500/0	78	1800	WDCMP-1205V3	12 (6-18)	40	3.3	1500/0	78	1800
WDCMP-1205V3			5	1200/0	80	1000	WDCMP-1205V3			5	1200/0	83	1000
WDCMP-1212V3			12	800/0	84	470	WDCMP-1212V3			12	800/0	87	470
WDCMP-1215V3			15	400/0	84	230	WDCMP-1215V3			15	400/0	86	230
WDCMP-1224V3			24	250/0	84	100	WDCMP-1224V3			24	250/0	87	100
WDCMP-1205V3			±3.3	±1500/0	80	±1800	WDCMP-1205V3			±3.3	±1500/0	83	±1800
WDCMP-1212V3			±5	±1200/0	84	±1000	WDCMP-1212V3			±5	±1200/0	87	±1000
WDCMP-1215V3			±12	±800/0	84	±470	WDCMP-1215V3			±12	±800/0	86	±470
WDCMP-1224V3			±15	±400/0	84	±230	WDCMP-1224V3			±15	±400/0	86	±230
WDCMP-2405V3	24(15-36)	20	3.3	1000/0	78	1800	WDCMP-2405V3	24(15-36)	20	3.3	1000/0	78	1800

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimension: in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unspecified tolerance: ±0.50(±0.020)

6W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

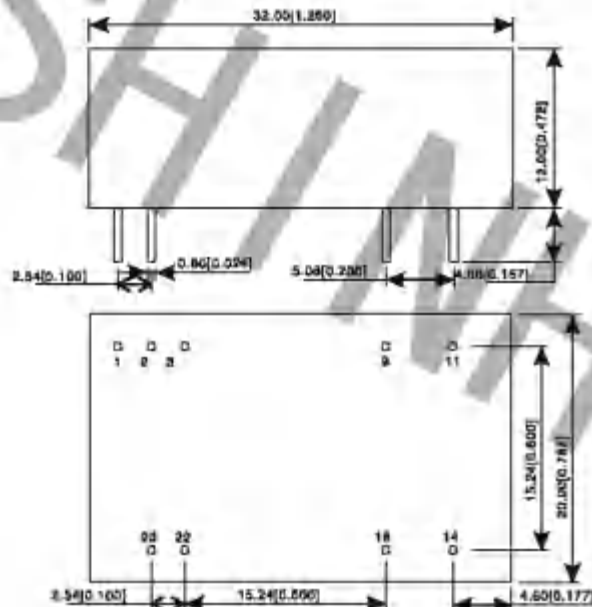
Electric power
Industrial control
Automobile



ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage (VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min (mA)		
WDCV06F-1200V3	12 (4.5-18)	25	3.3	1500/0	78	1800
WDCV06F-1200V5			5	1200/0	82	1000
WDCV06F-1200V9			9	867/0	84	880
WDCV06F-12015V3			12	500/0	85	470
WDCV06F-12015V5			15	400/0	86	320
WDCV06F-12024V5			24	250/0	87	100
WDCV06F-12050V5			±5	±500/0	88	±470
WDCV06F-12012V5			±12	±250/0	88	±100
WDCV06F-12015V5			±15	±200/0	88	±100
WDCV06F-12024V5			±24	±125/0	88	±100
WDCV06F-2400V3	24 (9-36)	40	3.3	1500/0	78	1800
WDCV06F-2400V5			5	1200/0	82	1000
WDCV06F-2400V9			9	867/0	85	880
WDCV06F-24012V3			12	500/0	87	470
WDCV06F-4800V3	48 (18-75)	60	3.3	1500/0	78	1800
WDCV06F-4800V5			5	1200/0	82	1000
WDCV06F-48012V3			12	500/0	87	470
WDCV06F-48015V3			15	400/0	88	320
WDCV06F-48024V3			24	250/0	88	100
WDCV06F-48050V3			±5	±500/0	88	±470
WDCV06F-48012V3			±12	±250/0	87	±100
WDCV06F-48015V3			±15	±200/0	88	±100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	NO PIN	NO PIN
2	GND	GND
3	GND	GND
4	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: $\pm 0.10 (\pm 0.004)$

Unmarked tolerances: $\pm 0.50 (\pm 0.020)$

10W DC-DC CONVERTER

FEATURES:

Packaging: DIP24
2:1 Wide input voltage range
Operating Temperature: -40°C ~ 85°C
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
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Automobile

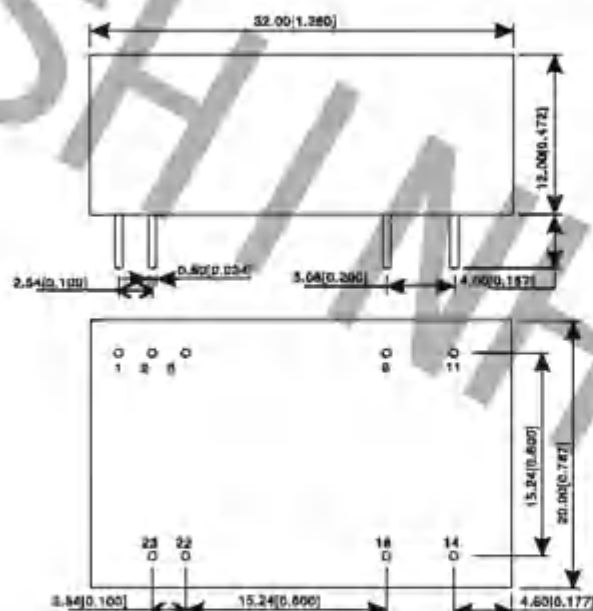


ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10P-0500V1	5 (4.5-6)	12	3.3	2400/0	88	1200
WDC10P-0500V2			5	2000/0	84	1000
WDC10P-0500V3			12	833/0	85	470
WDC10P-0500V4			15	667/0	88	330
WDC10P-0500V5			24	416/0	87	100
WDC10P-0500V6			±5	±1000/0	82	#1000
WDC10P-0500V7			±12	±416/0	86	#470
WDC10P-0500V8			±15	±333/0	87	#330
WDC10P-1200V1	12 (9-18)	20	3.3	2400/0	87	1200
WDC10P-1200V2			5	2000/0	87	1000
WDC10P-1200V3			12	833/0	87	470
WDC10P-1200V4			15	667/0	87	330
WDC10P-1200V5			24	416/0	88	100
WDC10P-1200V6			±5	±1000/0	83	#1000
WDC10P-1200V7			±12	±416/0	87	#470
WDC10P-1200V8			±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-2400V1	24 (18-36)	40	3.3	2400/0	87	1200
WDC10P-2400V2			5	2000/0	86	1000
WDC10P-2400V3			12	833/0	87	470
WDC10P-2400V4			15	667/0	87	330
WDC10P-2400V5			24	416/0	88	100
WDC10P-2400V6			±5	±1000/0	83	#1000
WDC10P-2400V7			±12	±416/0	87	#470
WDC10P-2400V8			±15	±333/0	87	#330
WDC10P-4800V1	48 (36-75)	80	3.3	2400/0	87	1200
WDC10P-4800V2			5	2000/0	86	1000
WDC10P-4800V3			12	833/0	87	470
WDC10P-4800V4			15	667/0	87	330
WDC10P-4800V5			24	416/0	88	100
WDC10P-4800V6			±5	±1000/0	83	#1000
WDC10P-4800V7			±12	±416/0	87	#470
WDC10P-4800V8			±15	±333/0	87	#330

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	CTRL	CTRL
2	GND	GND
3	GND	DRO
6	SD PIN	ZDRA
11	NC	-Vo
14	+Vo	+Vo
18	-Vo	COM
22	Vin	Vin
23	Vin	Vin

NC:Pin is not connected to any external circuit

Dimensions in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmarked tolerance: ±0.50(±0.020)

10W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

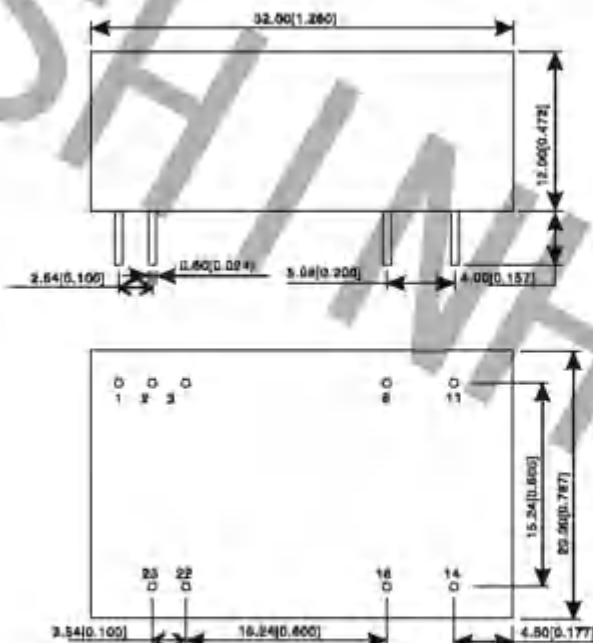
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV12F-1200W	12 (4.8-18)	25	3.3	2400/0	83	1200
WDCV12F-2500W			5	2000/0	84	1000
WDCV12F-3330W			12	833/0	86	470
WDCV12F-6670W			18	667/0	87	330
WDCV12F-1330W			24	416/0	88	100
WDCV12F-1200W			±5	±1000/0	85	#1000
WDCV12F-1330W			±12	±416/0	86	#470
WDCV12F-1500W			±15	±333/0	87	#330
WDCV12F-2400W			3.3	2400/0	87	1200
WDCV12F-2500W			5	2000/0	88	1000
WDCV12F-2400W	24 (9-36)	40	12	833/0	87	470
WDCV12F-2400W			15	667/0	87	330
WDCV12F-2400W			3.3	2400/0	87	1200
WDCV12F-2400W			5	2000/0	88	1000
WDCV12F-2400W			±5	±1000/0	85	#1000
WDCV12F-2400W			±12	±416/0	87	#470
WDCV12F-2400W			±15	±333/0	87	#330
WDCV12F-2400W	48 (18-75)	80	3.3	2400/0	87	1200
WDCV12F-2400W			5	2000/0	88	1000
WDCV12F-2400W			12	833/0	87	470
WDCV12F-2400W			15	667/0	87	330
WDCV12F-2400W			24	416/0	88	100
WDCV12F-2400W			±5	±1000/0	85	#1000
WDCV12F-2400W			±12	±416/0	87	#470
WDCV12F-2400W			±15	±333/0	87	#330

PHYSICAL CHARACTERISTICS:



PIN	Single output	Dual output
1	CTRL	CTRL
2	GND	GND
3	GND	GND
5	NO FIN	COM
11	NC	-Va
14	+Va	+Va
15	-Va	COM
22	Vin	Vin
23	Vin	Vin

NC: Cannot be connected to any external circuit

Dimension in mm

Terminal diameter tolerance: $\pm 0.10 (\pm 0.004)$

Unremarked tolerance: $\pm 0.50 (\pm 0.020)$

6W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

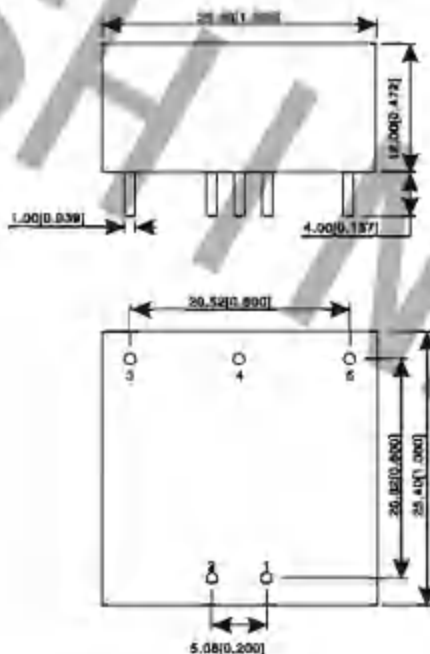
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV80-1205V3	12 (4.5-18)	28	5.3	1500/0	78	1800
WDCV80-1208V3			5	1200/0	82	1000
WDCV80-1209V3			9	667/0	84	880
WDCV80-1212V3			12	500/0	86	470
WDCV80-1215V3			15	400/0	88	220
WDCV80-1224V3			24	250/0	87	100
WDCV80-1205V3			±5	±800/0	82	±470
WDCV80-1212V3			±12	±250/0	88	±100
WDCV80-1215V3			±15	±200/0	88	±100
WDCV80-1224V3			±24	±100/0	88	±100
WDCV80-2405V3	24 (9-36)	40	5	1200/0	83	1000
WDCV80-2408V3			8	667/0	85	880
WDCV80-2412V3			12	500/0	87	470
WDCV80-2415V3			15	400/0	88	220
WDCV80-2424V3			24	250/0	88	100
WDCV80-4805V3	48 (18-72)	80	5	1200/0	83	1000
WDCV80-4808V3			8	667/0	85	880
WDCV80-4812V3			12	500/0	87	470
WDCV80-4815V3			15	400/0	88	220
WDCV80-4824V3			24	250/0	88	100
WDCV80-4805V3			±5	±800/0	83	±470
WDCV80-4812V3			±12	±250/0	87	±100
WDCV80-4815V3			±15	±200/0	88	±100

PHYSICAL CHARACTERISTICS:



Pin	Single output	Dual output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vs
4	NC Pin	-Vs
5	-Vo	-Vs

NC: Cannot be connected to any external circuit

Dimension: in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmarked distances: ±0.50(±0.020)

10W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

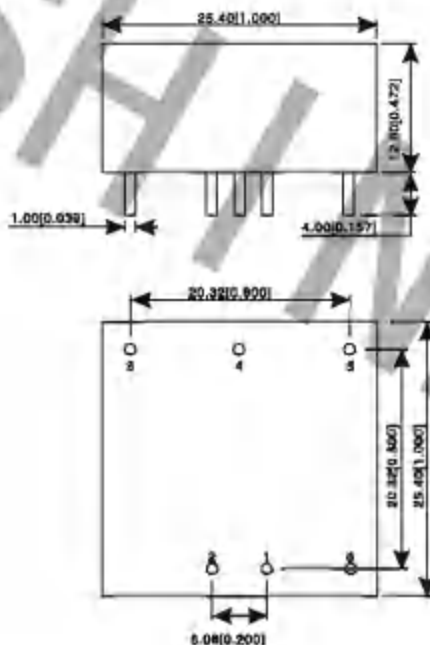
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC10Q-0605V3	5 (4.5-6)	12	5	2000/0	85	470
WDC10Q-06012V3			12	834/0	83	470
WDC10Q-06015V3			15	667/0	84	330
WDC10Q-06024V3			24	417/0	83	100
WDC10Q-0605V3			±5	±1000/0	78	±1000
WDC10Q-06012V3			±12	±834/0	83	±470
WDC10Q-06015V3			±15	±667/0	84	±330
WDC10Q-06024V3			±24	±417/0	83	±100
WDC10Q-1205V3	12(8-18)	20	5	2000/0	83	2200
WDC10Q-2405V3	24 (18-36)	40	5	2000/0	82	2200
WDC10Q-24012V3			12	834/0	87	470
WDC10Q-24015V3			15	667/0	88	330
WDC10Q-24024V3			24	417/0	88	100
WDC10Q-4805V3	48 (36-75)	80	3.3	2400/0	78	2300
WDC10Q-4805V3			5	2000/0	82	2200
WDC10Q-48012V3			12	833/0	87	470
WDC10Q-48015V3			15	667/0	87	330
WDC10Q-48024V3			24	416/0	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
6	Ctrl	Ctrl

NC: Cannot be connected to any external circuit

Dimension: in mm

Terminal diameter tolerance: $\pm 0.10(\pm 0.004)$

Unmarked dimensions: $\pm 0.50(\pm 0.020)$

10W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

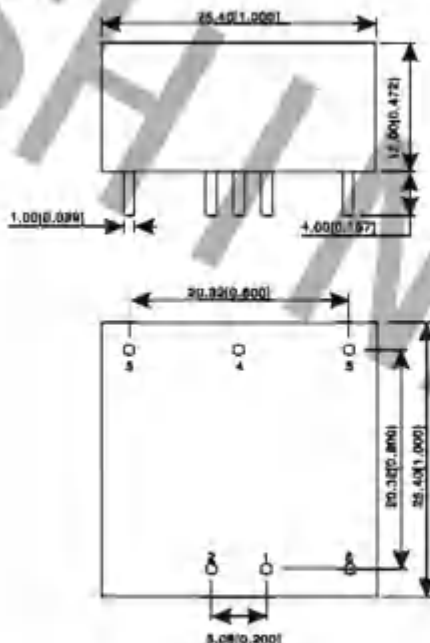
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage (VDC)		Output		Full Load Efficiency (%) Typ	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min (mA)		
WDCV10G-1200V0	12 (9-18)	25	3.3	2400/0	77	2200
WDCV10G-1200V5			5	2000/0	82	2200
WDCV10G-1200V9			9	1111/0	84	880
WDCV10G-1201V0			12	833/0	85	470
WDCV10G-1201V5			15	667/0	85	330
WDCV10G-1201V9			18	444/0	87	100
WDCV10G-1202V0			±3	±1000/0	82	±1000
WDCV10G-1202V5			±5	±555/0	85	±680
WDCV10G-1202V9			±9	±444/0	88	±470
WDCV10G-1203V0			±15	±333/0	88	±330
WDCV10G-2400V0	24 (9-36)	40	±24	±205/0	86	±100
WDCV10G-2400V5			3.3	2400/0	78	2200
WDCV10G-2400V9			5	2000/0	82	2200
WDCV10G-2401V0			9	1111/0	85	880
WDCV10G-2401V5			12	833/0	88	470
WDCV10G-4800V0	48 (18-75)	80	15	667/0	85	330
WDCV10G-4800V5			24	444/0	88	100
WDCV10G-4800V9			±3	±1000/0	83	±1000
WDCV10G-4801V0			±5	±555/0	87	±670
WDCV10G-4801V5			±9	±333/0	87	±330
WDCV10G-4801V9			±24	±205/0	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)

Unmarked tolerances: ±0.80 (±0.030)

15W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

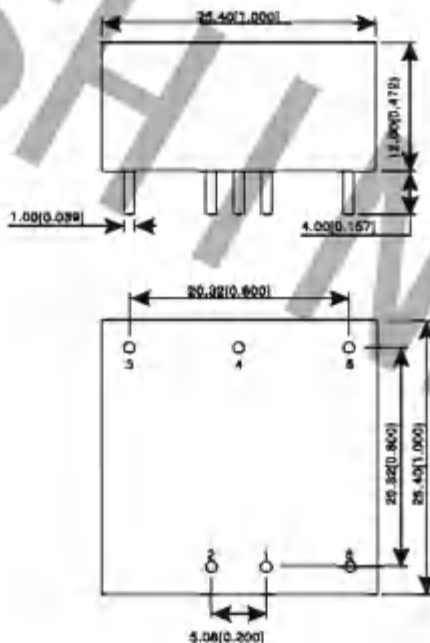
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC15Q-12S03V0	12 (9-18)	20	3.3	4000/0	88	4700
WDC15Q-12S05V0			5	3000/0	90	4700
WDC15Q-12S10V0			12	1250/0	90	1000
WDC15Q-12S15V0			15	1000/0	91	820
WDC15Q-12S24V0			24	825/0	91	270
WDC15Q-24S03V0	24 (18-36)	40	3.3	4000/0	88	4700
WDC15Q-24S05V0			5	3000/0	90	4700
WDC15Q-24S10V0			12	1250/0	91	1000
WDC15Q-24S15V0			15	1000/0	91	820
WDC15Q-48S03V0	48 (36-75)	80	3.3	4000/0	88	4700
WDC15Q-48S05V0			5	3000/0	90	4700
WDC15Q-48S10V0			12	1250/0	91	1000
WDC15Q-48S15V0			15	1000/0	91	820

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: $\pm 0.10(\pm 0.004)$

Unmarked tolerances: $\pm 0.50(\pm 0.020)$

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:

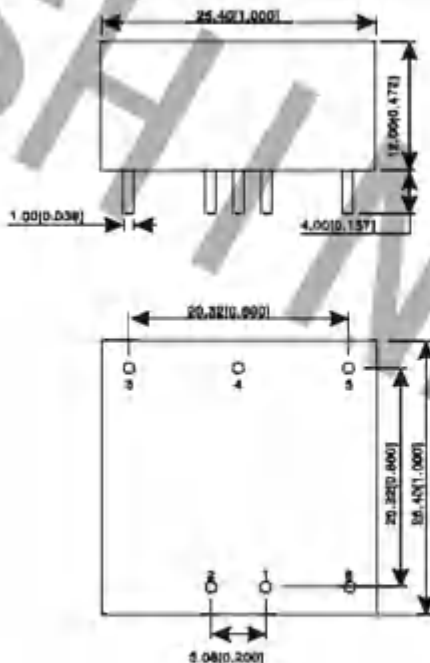
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCY15Q-2400V0	24 (9-38)	40	3.3	4000/0	88	4700
WDCY15Q-3400V0			5	3000/0	90	4700
WDCY15Q-4810V0			12	1250/0	90	1000
WDCY15Q-4815V0			15	1000/0	91	820
WDCY15Q-3405V0			24	925/0	91	270
WDCY15Q-4805V0			±5	±1500/0	87	#1500
WDCY15Q-4812V0			±12	±825/0	90	#470
WDCY15Q-4815V0			±15	±500/0	90	#330
WDCY15Q-4805V0			±24	±812/0	89	#200
WDCY15Q-4812V0			±5	±1500/0	86	#1500
WDCY15Q-4815V0			±12	±825/0	89	#470
WDCY15Q-4815V0			±15	±500/0	88	#330
WDCY15Q-4805V0			±24	±812/0	90	#200

PHYSICAL CHARACTERISTICS:



Pin	Single output	Onset 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

Dimension unit: mm

Terminal diameter: tolerance: $\pm 0.10 (\pm 0.004)$

Unmarked tolerance: $\pm 0.50 (\pm 0.020)$

20W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

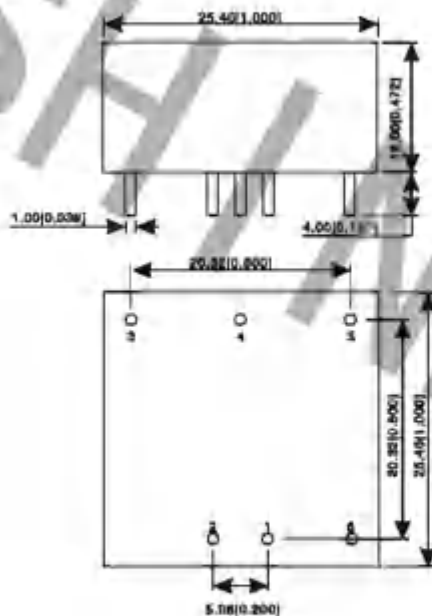
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDC20Q-12018	12 (9-18)	30	±1.5	±657/0	87	#225
WDC20Q-12024			±2.4	±417/0	88	#220
WDC20Q-12008	24 (18-36)	40	3.3	5000/0	88	10000
WDC20Q-12005			5	4000/0	90	10000
WDC20Q-12009			8	2522/0	87	4700
WDC20Q-12012			12	1867/0	87	1800
WDC20Q-12015			15	1535/0	88	1000
WDC20Q-12024			24	834/0	88	500
WDC20Q-12005			±5	±2000/0	84	#4800
WDC20Q-12008			±9	±1111/0	86	#1000
WDC20Q-12011			±12	±834/0	86	#800
WDC20Q-24018	24 (18-36)	40	±1.5	±867/0	88	#225
WDC20Q-24024			±2.4	±417/0	88	#500
WDC20Q-48008	48 (36-75)	60	3.3	5000/0	88	10000
WDC20Q-48005			5	4000/0	90	10000
WDC20Q-48009			8	2522/0	89	4700
WDC20Q-48012			12	1867/0	89	1800
WDC20Q-48015			15	1535/0	90	1000
WDC20Q-48024			24	834/0	90	500
WDC20Q-48005			±5	±2000/0	86	#4800
WDC20Q-48008			±12	±834/0	86	#800
WDC20Q-48011			±15	±667/0	89	#525

PHYSICAL CHARACTERISTICS:



No.	Design output	Final output
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	Vref	Com
5	-Vo	-Vo
6	Ctrl	Ctrl

NC: Cannot be connected to any external circuit

Dimensions: in mm

Terminal dimension tolerance: ±0.10(±0.004)

Unmarked tolerance: ±0.50(±0.020)

20W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

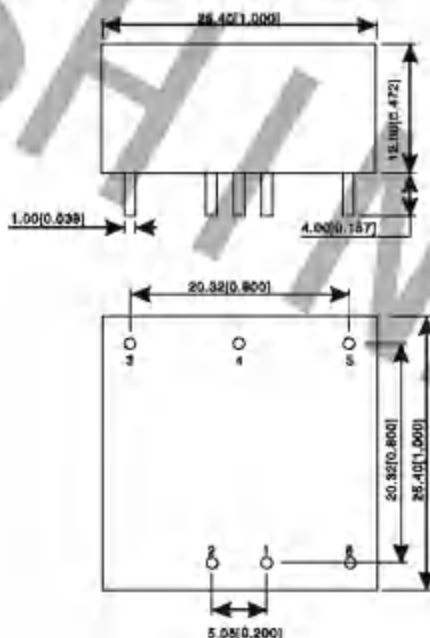
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ELECTRICAL CHARACTERISTICS:

Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV20Q-24B03	24 (8-36)	40	3.3	5000/0	86	10000
WDCV20Q-24B05			5	4000/0	85	10000
WDCV20Q-24B09			9	2222/0	89	4700
WDCV20Q-24B12			12	1667/0	88	1800
WDCV20Q-24B15			15	1333/0	90	1000
WDCV20Q-24B24			24	834/0	86	500
WDCV20Q-24B03			±5	±2000/0	88	#4800
WDCV20Q-24B09			±8	±1111/0	84	#1000
WDCV20Q-24B12			±12	±834/0	88	#800
WDCV20Q-24B15			±15	±667/0	85	#625
WDCV20Q-48B03	48 (18-75)	60	3.3	5000/0	86	10000
WDCV20Q-48B05			5	4000/0	86	10000
WDCV20Q-48B09			9	2222/0	86	4700
WDCV20Q-48B12			12	1667/0	87	1800
WDCV20Q-48B15			15	1333/0	90	1000
WDCV20Q-48B24			24	834/0	86	500
WDCV20Q-48B03			±5	±2000/0	88	#4800
WDCV20Q-48B09			±12	±834/0	86	#800
WDCV20Q-48B12			±15	±667/0	86	#625
WDCV20Q-48B15						

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimensions: 1x mm

Terminal dimension tolerance: ±0.10(±0.004)

Dimensional 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:

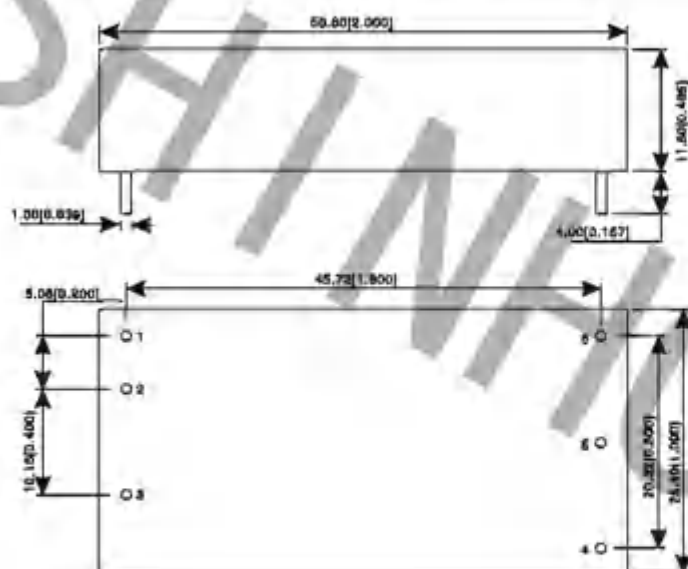
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ELECTRICAL CHARACTERISTICS:

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	85	10000
WDC30R-24S08			8	3333/0	88	4700
WDC30R-24S12			12	2500/0	85	2700
WDC30R-24S15			15	2000/0	90	1880
WDC30R-24S24			24	1250/0	90	880
WDC30R-48S03	48 (36~75)	60	3.3	6000/0	85	10000
WDC30R-48S05			5	6000/0	85	10000
WDC30R-48S12			12	2500/0	85	2700
WDC30R-48S15			15	2000/0	85	1880
WDC30R-48S24			24	1250/0	85	880
WDC40R-24S03	24 (18~36)	40	3	6000/0	88	10000
WDC40R-24S12			12	3333/0	90	2780
WDC40R-24S15			15	2887/0	91	1880
WDC40R-24S24			24	1887/0	91	880
WDC40R-48S12	48 (36~75)	60	12	3333/0	90	2700
WDC40R-48S15			15	2887/0	91	1880
WDC40R-48S24			24	1887/0	91	880

PHYSICAL CHARACTERISTICS:



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

NC: Cannot be connected to any external circuit

Dimension in mm

Terminal dimension tolerance: ±0.10(±0.004)

Unmarked tolerance: ±0.50(±0.020)

30W DC-DC CONVERTER

FEATURES:

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

APPLICATION:

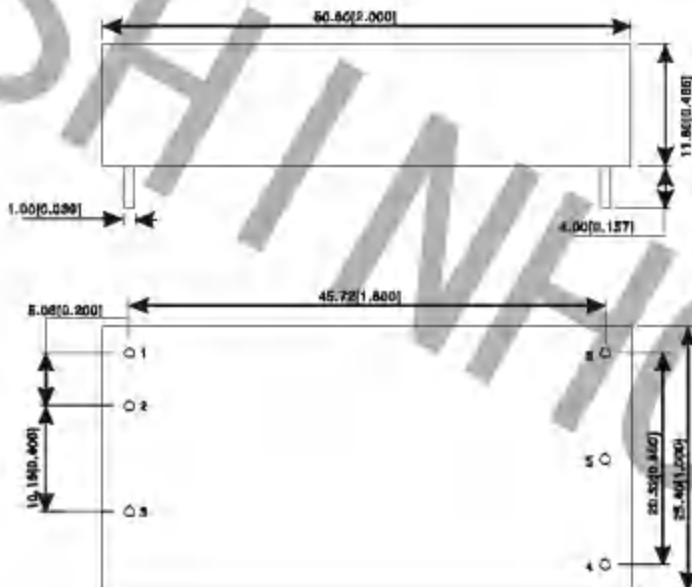
Electric power
Industrial control
Communication
Instruments & Apparatus
Rail traffic



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-4865	24 (6-36)	40	5.5	8000/0	85	10000
WDCV30R-4865			5	8000/0	88	10000
WDCV30R-4866			8	3385/0	88	4700
WDCV30R-4812			12	2500/0	89	2700
WDCV30R-4815			15	2000/0	89	1880
WDCV30R-4824			24	1250/0	87	880
WDCV30R-4806			±6	±3000/0	88	8000
WDCV30R-4812			±12	±1250/0	89	1250
WDCV30R-4815			±15	±1000/0	88	880
WDCV30R-4804					±4	±825/0
Part Number	Input Voltage(VDC)		Output		Full Load Efficiency (% Typ)	Capacitive Load, Max (uF)
	Rating	Max	Voltage (VDC)	Current Max/Min(mA)		
WDCV30R-4804	48 (12-75)	80	±4	±825/0	88	470
WDCV30R-4804			3.3	8500/0	88	10000
WDCV30R-4806			6	8000/0	87	10000
WDCV30R-4812			12	2500/0	88	2700
WDCV30R-4815			15	2000/0	88	1880
WDCV30R-4824			24	1250/0	87	880
WDCV30R-4806			±6	±3000/0	88	8000
WDCV30R-4812			±12	±1250/0	89	1250
WDCV30R-4815			±15	±1000/0	88	880

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: Control be connected to any external circuit

Dimensions: in mm

Terminal diameter tolerance: ±0.10(±0.004)

Unmated tolerance: ±0.30(±0.012)

HDC10-12S05 Series

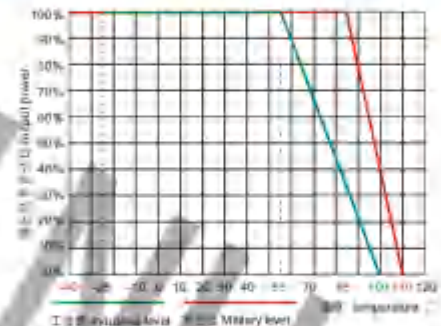
SHINHOM

www.shinhom.com

典型性能 Typical performance

- ① 宽范围输入 Wide Input voltage range
- ② 转换效率(典型80%) Typical Efficiency 80%
- ③ 开关频率 Switching frequency: 300KHz±30KHz
- ④ 长期短路保护, 自动恢复 Short circuit protection, Self-furbish
- ⑤ 输入与输出高隔离 Input-output isolate
- ⑥ PCB 板上直插式安装 Board in-line type installs
- ⑦ 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 Input voltage	10	12	33	W
遥控端 Remote ON/OFF	无遥控端 Non 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 BW 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	ΔVo/Δt	±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 Typical 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 Switching frequency		300KHz 典型(Typical)	最大(max) 250KHz
工作温度 Operating temperature	自由空气对流 Free air		-25℃~+55℃
储存温度 Storage temperature			-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 ⁴ Hrs	

HDC10-12S05 Series

SHINHOM
www.shinhom.com

产品命名方式 Product Nomination Method

举例 Forexample	H ①	DC ②	10 ③	— 24 ④	S ⑤	05 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

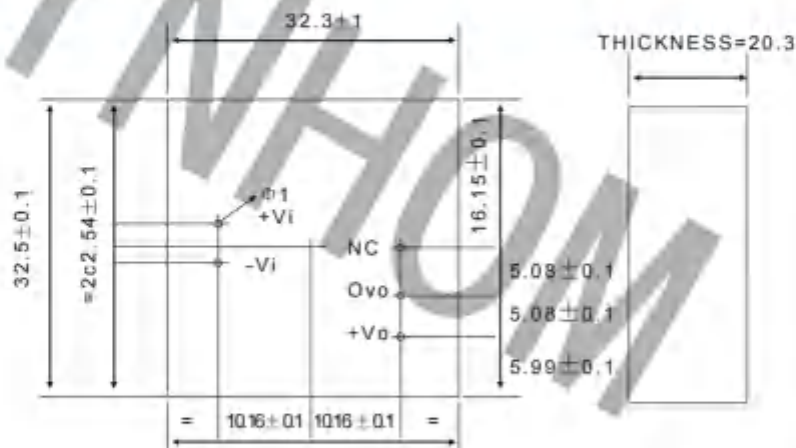
典型产品列表 Typical product tabulates

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
HDC10-24S05	24V (10-33) v	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 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



NOTE: ALL UNITS ARE IN MILLEMMETER (MM)

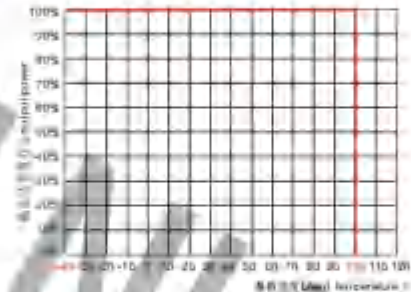
HDC 150~200 Half brick Series

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 90%) Typical Efficiency 90%
- 开关频率 Switching frequency: 300KHz $\pm$ 30 KHz
- 过流、短路保护, 自动恢复 Over current/Short circuit protection, Self-recovery
- 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 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, 额定性额定负载及 25°C 室温环境下测得

Technology parameter

Test condition: General Nominal Line, $T_c=25^\circ\text{C}$, Rated resistant load unless other wise specified

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		低电平遥控控制 control	高电平或悬空工作 High voltage or Suspended work 低电平或接地关断 Low voltage or ground off	3.5Vdc ~ +Vin $\leq 0.3Vdc$
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-recovery			

输出特性 Output

输出电压精度 Voltage accuracy		Vo1	$\pm 1.0\%$
源效应 Line regulation	标称负载, 全电压范围 Nominal Load, full voltage range	Vo1	$\pm 0.2\%$
负载效应 Load regulation	20%~100%额定负载(Rated load)	Vo1	$\pm 0.5\%$
纹波及噪声 Ripple and noise	20MHz BW 满载(Full load) $V_o \leq 5.0V, \leq 50mVp-p$; $V_o > 48V, \leq 180mVp-p$; Other, $\leq 100mVp-p$		
动态响应 Dynamic response	25%的标称负载阶跃 25% of the nominal load step	$\Delta V_o / \Delta I$	$\pm 3.0/200\mu s\%$
输出电压调节 Voltage adjust	标称输出电压 Nominal output	TRIM	$\pm 10\%$ 可调 (Adjustable)
启动延迟时间 Start delay time	典型值 Typical value		$\leq 200ms$

一般特性 General

转换效率 Efficiency	标称电压输入, 满载 Nominal input, Full load	$V_o \leq 5.0V, 89\%$ 典型(Typical)	$V_o > 5.0V, 90\%$ 典型(Typical)
开关频率 Switching frequency		300KHz 典型(Typical)	最大(Max) 330KHz
工作基板温度 Board temperature		自由空气对流(Free air)	$-40^\circ\text{C} \sim +100^\circ\text{C}$
储存温度 Storage temperature			$-50^\circ\text{C} \sim +125^\circ\text{C}$
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; 输入与输出与基板 input/output-baseplate 500Vdc		
最小无故障间隔时间(MTBF)	3×10^5 Hrs		

产品命名方式 Product Nomination Method

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

HDC 150~200 Half brick Series

SHINHOM
www.shinhom.com

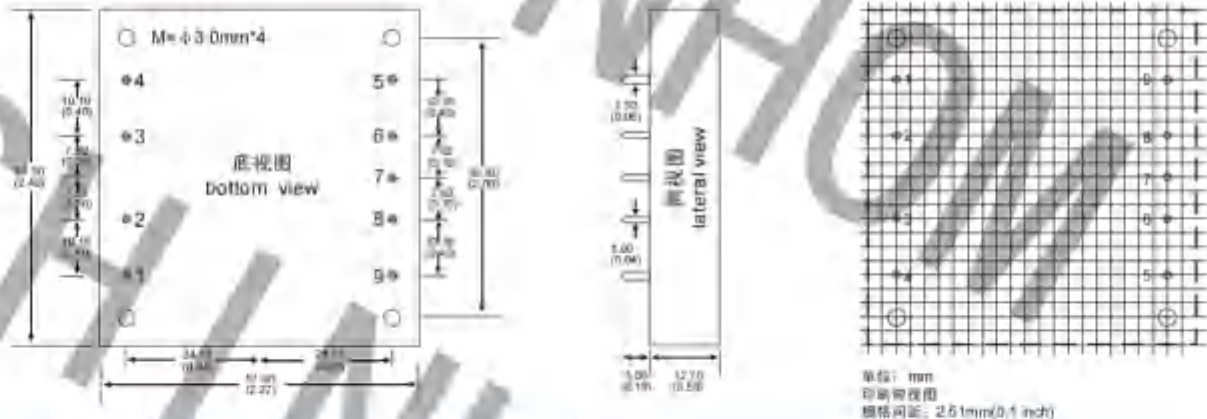
①	宽压输入: Wide input voltage	④	表示输入电压标称值 nominal value of input voltage
②	电源转换模式 DC-DC: Power conversion mode DC-DC	⑤	S 单路输出 S: Single output
③	表示输出功率大小 Output Power	⑥	输出电压大小 Output Voltage

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	48V (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 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

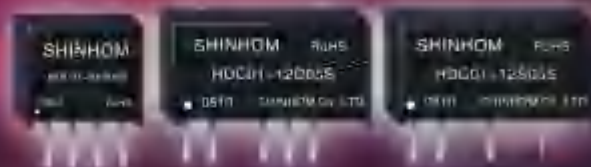
封装代号 Package Code	LxWxH 单位: mm	封装号 Package No
半砖 Half brick	61.00x57.90x12.70	228240DC

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.



典型性能 Typical Performance

- ★ 特点: 定电压输入, 隔离非稳定输出, 1W功率 Characteristic: 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°C ~ $+85^{\circ}\text{C}$ Working temperature: -40°C ~ $+85^{\circ}\text{C}$
- ★ MTBF ≥ 350 万小时 MTBF $\geq 35 \times 10^5$ Hrs
- ★ 符合RoHS指令 In line with RoHS codes
- ★ 线性调节率 (输入电压变化 $\pm 1\%$ 时) $\pm 1.2\%$ Line regulation (once input change $\pm 1\%$) $\pm 1.2\%$
- ★ 负载调节率 (10%~100%满载) 15% Load regulation (10%~100% full load) 15%
- ★ 纹波/噪声 (20MHz 带宽) $< 75\text{mVp-p}$ Ripple and noise (20MHz Band width) $< 75\text{mVp-p}$

典型产品列表 Typical Product List

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			

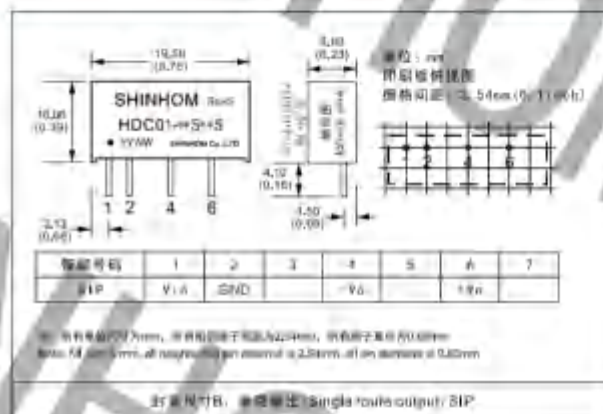
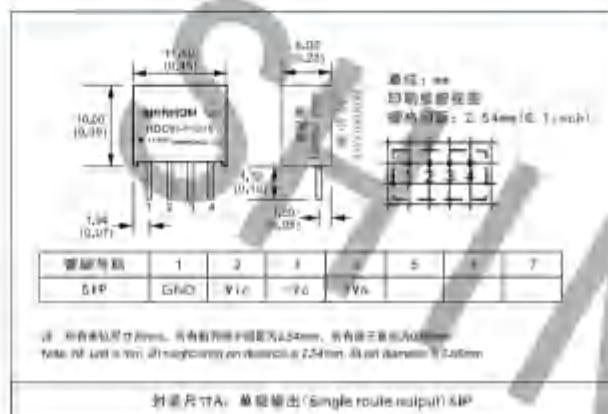
HDC01-□D12IS		+12V	+4mA	+40mA	+12V	+4mA	+40mA
HDC01-□D15IS		+15V	+3.3mA	+33mA	+15V	+3.3mA	+33mA
HDC01-□D24IS		+24V	+2.1mA	+21mA	+24V	+2.1mA	+21mA

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 Size

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





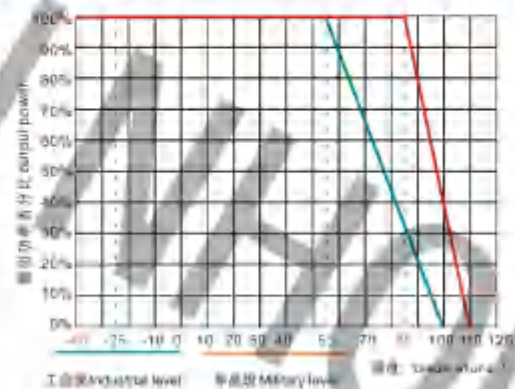
HDC10-15 Series

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

典型性能 Typical performance

- ① 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ② 转换效率 (典型 80%) Typical Efficiency 80%
- ③ 开关频率 Switching frequency: 300KHz $\pm$ 30 KHz
- ④ 长期短路保护, 自动恢复 Short circuit protection, Self-furbish
- ⑤ 输入与输出高隔离 Input-output isolate (500/1000/1500Vdc)
- ⑥ PCB 板上直插式安装 Board in-line type installs
- ⑦ 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	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 Remote ON/OFF	无遥控端 Non			
输入欠压保护 Under voltage protect	低于低输入电压保护, 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	$\pm 1.0\%$, $\pm 2.0\%$
负载效应 Line regulation	标称负载, 全电压范围 Nominal Load, full voltage range	Vo1, Vo2	$\pm 0.2\%$, $\pm 1.5\%$
负载效应 Load regulation	20% ~ 100% 额定负载	Vo1, Vo2	$\pm 0.5\%$, $\pm 4.0\%$
纹波及噪声 Ripple and noise	20MHz BM 满载, Vo $\leq$ 5.0V, $\leq$ 50mVp-p; Vo $\geq$ 48V, $\leq$ 180mVp-p; Other, $\leq$ 100mVp-p;		
动态响应 Dynamic response	25% 的标称负载阶跃	$\Delta Vo1/\Delta t$	$\pm 4.0/500\mu s\%$
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		$\leq 200ms$

一般特性 General

转换效率 Efficiency	标称电压输入, 满载 Nominal input, Full load	$V_o \leq 5.0V$, 75% 典型	$V_o > 5.0V$, 80% 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			全金属壳 Metal case
隔离电压 Isolation Voltage	输入与输出 500/1000/1500 Vdc $\leq 0.5mA/1min$, 输入与外壳 500Vdc $\leq 0.5mA/1min$		
最小无故障间隔时间(MTBF)	2×10^5 Hrs		

产品命名方式 Product Nomination Method

举例	H DC 10 — 48 S 05 J			
	①	②	③	④
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			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 Output 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

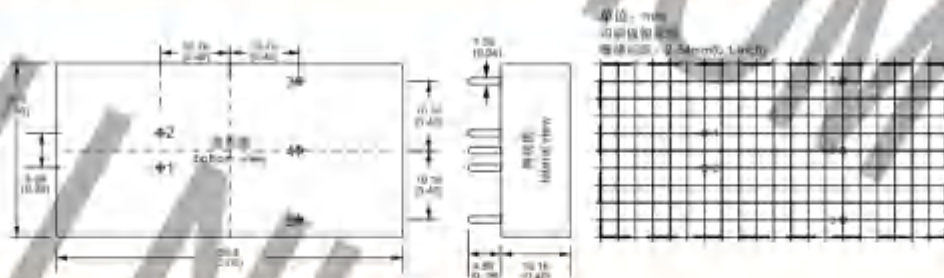
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
HDC10-□S3V3	5V (4.5~9V) (不包含 HDC15)	3.3V	2000mA				
HDC10-□S05		5V	2000mA				
HDC10-□S09		9V	1110mA				
HDC10-□S12		12V	830mA				
HDC10-□S15		15V	660mA				
HDC10-□S24	12V (9~18V)	24V	410mA				
HDC12-□S3V3	24V (18~36V)	3.3V	2400mA				
HDC12-□S05	48V (36~72V)	5V	2400mA				
HDC12-□S09	110V (72~144V)	9V	1330mA				
HDC12-□S12	12V (10~36V) W	12V	1000mA				
HDC12-□S15		15V	800mA				
HDC12-□S24	48V (18~72V) W	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		+24V	210mA	-24V	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 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



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 Logic	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

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输出特性 Output

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)	200 μs	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 or 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

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HDC-50~150W Series

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型号列表(Models)

产品型号 (Model 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) %	输出纹波电压峰值 (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

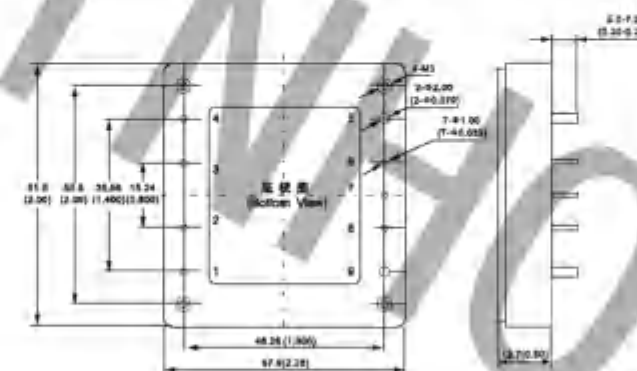
注：1、负逻辑遥控功能的产品在订货时须在型号中加“L”，如HDC100-48S12 为正逻辑遥控功能，要定负逻辑遥控功能的产品型号为HDC100-L48S12。型号中有后缀“-T”的产品其输出电压调节方式不同。

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.)

安装尺寸(Mechanical Drawing)



15-20W

DHC Serise

DC/DC

主要特性 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	12 VDC(额定值)	9-18 VDC
(Voltage Range)	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	应用时外接保险丝
(Reverse Protection)	(Fuse Outside)

输出特性 Output Characteristic

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

● 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 General Characteristic

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

环境特性 (Environmental Characteristics)

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

散热特性 Heat Characteristic

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

DHC Serie

15-20W

DC/DC

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
HDC7.5-12S2.5	12	9-18	2.5	3	20	71%
HDC15-12S3.3	12	9-18	3.3	4	31	73%
HDC15-12S05	12	9-18	5.0	3	30	82%
HDC15-24S05	24	18-36	5.0	3	30	71%
HDC13.2-24S3.3	24	18-36	3.3	4	33	78%
HDC15-24S08	24	18-36	8.0	3	30	82%
HDC7.5-48S2.5	48	36-72	2.5	3	25	75%
HDC15-48S3.3	48	36-72	3.3	4	31	79%
HDC15-48S05	48	36-72	5.0	3	30	82%
HDC15-110S24	110	80-180	24	0.83	80	86%
HDC10-12D2.5	12	9-18	±2.5	±2	25	78%
HDC15-12D05	12	9-18	±5	±0.5	100	86%
HDC15-24D05	24	18-36	±5	±0.5	100	86%
HDC15-24D05	24	18-36	±5	±1.5	30	80%
HDC15-24D05+12	24	18-36	±12	±0.5	100	89%
HDC13.2-48D3.3	48	36-72	±3.3	±2	33	80%
HDC15-48D05	48	36-72	±5	±0.5	100	89%
HDC15-48D15	48	36-72	±15	±0.5	100	89%
HDC15-110D05	110	80-180	±5	±1.5	30	80%
HDC20-110D12	110	80-180	±12	±0.83	80	86%
HDC20-110D24	110	80-180	±24	±0.4	30	80%

■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 conform the power, input voltage and output voltage, then phone us.

机械尺寸图及引脚定义 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

1W1-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 °C, 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 Rate change (%) Max
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

Professional

Quality

Good Faith



SHAANXI SHINHOM



RoHS
Compliant

Input-Output Electrical Specifications

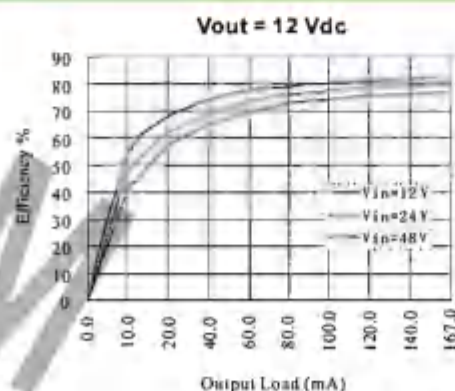
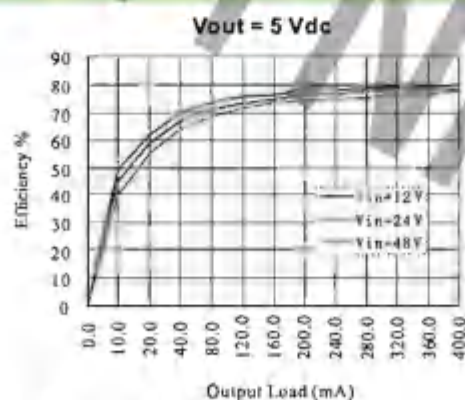
Is the typical room temperature 25 °C. Nominal input voltage. Rated output current measured. Except where noted

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 coefficient		---	±0.01	±0.02	% / °C
Input ripple	500 Vdc	1000	---	---	mV

Input-Output Mechanical Specifications

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

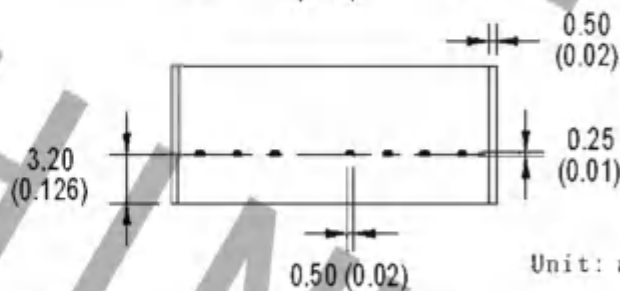
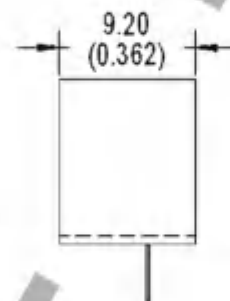
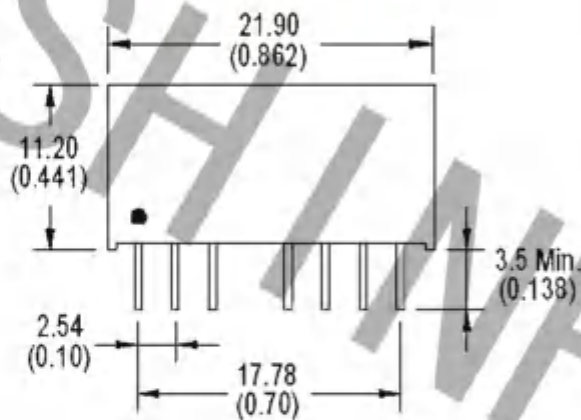
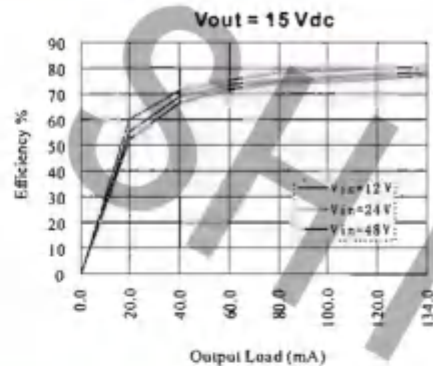
Efficiency and load regulation curves



Professional

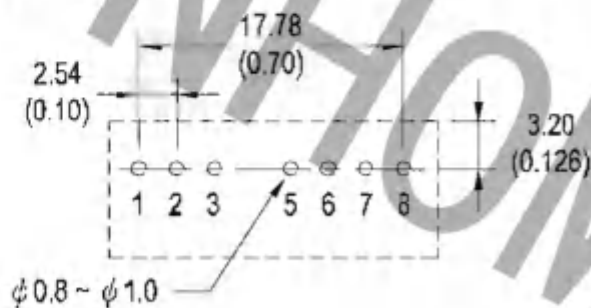
Quality

Good Faith



Unit: mm (inch)

Tolerance: 0.xx ± 0.25 (0.xx ± 0.01)



Professional

Quality

Good Faith



Up to 1200mA | LED Driver



FEATURES:

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

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: All specifications in this datasheet are measured at an ambient temperature of 25°C, 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/Off Control (Analog Control)	ON: Open or 0V > V < 0.6V			
Input voltage range (0-1.2Vdc) (Leave open if not use it)	OFF: 0.6V > V < 5V (1mA Max)			
Dimming Control (Digital Control)	Max PWM Frequency (10%-90%) 20KHz			
Dimming Control (Analog Control)	0.56V (1mA max) Analog Voltage (0%~100%) models: LED-3630C, LED-3635C, LED-3650C			
Input voltage range (0-1.2Vdc)* (Leave open if not use it)	0-6.5V (1mA max) Analog Voltage (0%~100%) models: LED-3660C, 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

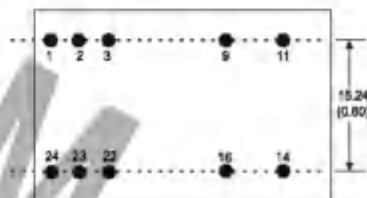
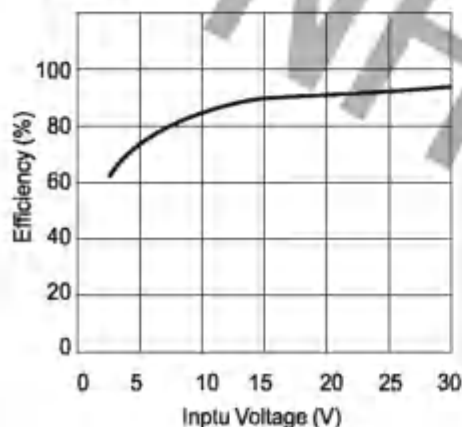
Pin	Single
1	Remote On/Off
2	-Vin
3	-Vin
9	NC
11	NC
14	LED+
16	LED-
22	+Vin
23	+Vin
24	DIM

NC: Not Connected

Dimensions



Efficiency vs Input Voltage



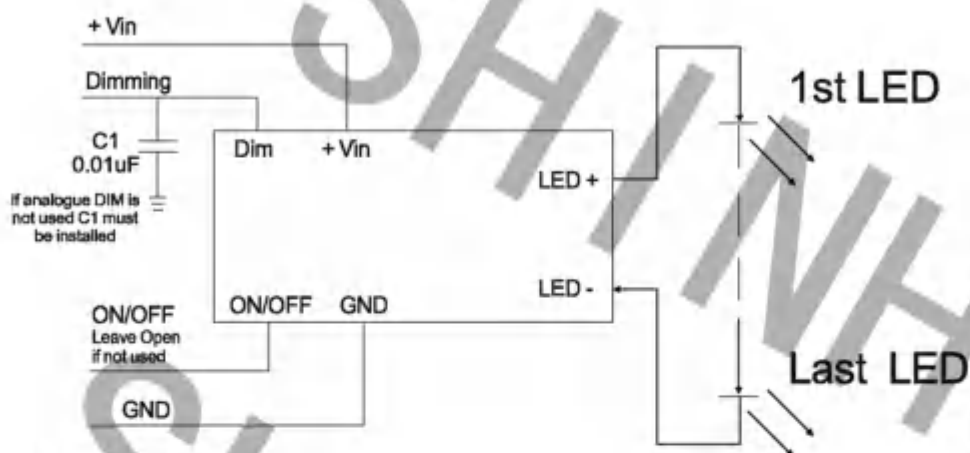
Mechanical Tolerances

Case Tolerance $\pm 0.25\text{mm}$ Or ± 0.01 inches
Pin Tolerance ± 0.05 Or ± 0.002



Up to 1200mA | LED Driver

Application Circuit

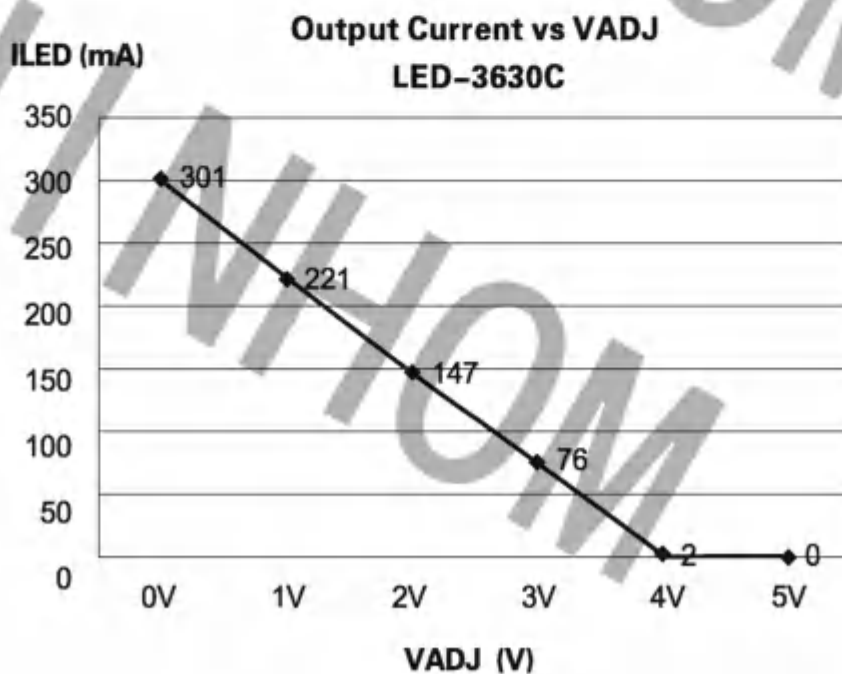


Note: The relation between input and output voltage for LED-C LED Driver step-down converter series is:

$$V_{in}-4V \geq V_{out} \geq \text{Total LED voltage}$$

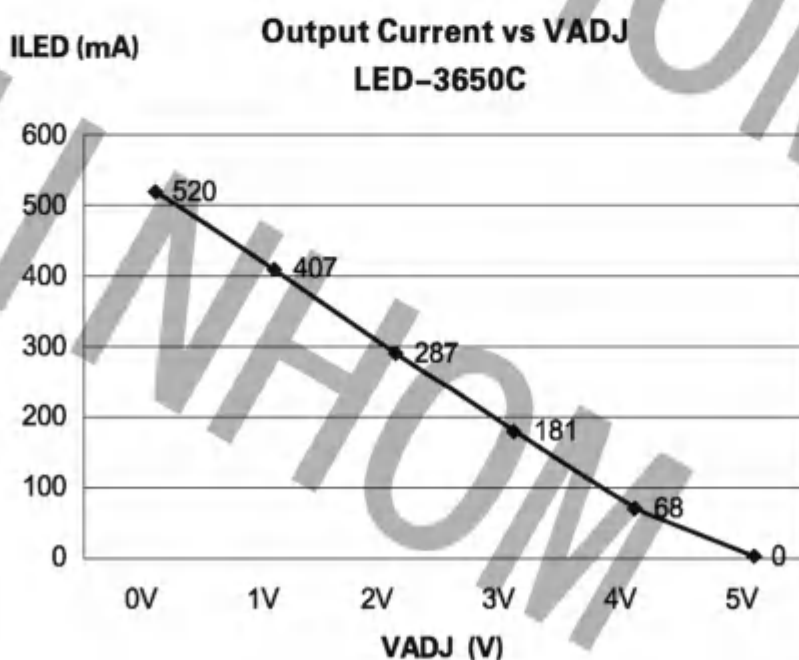
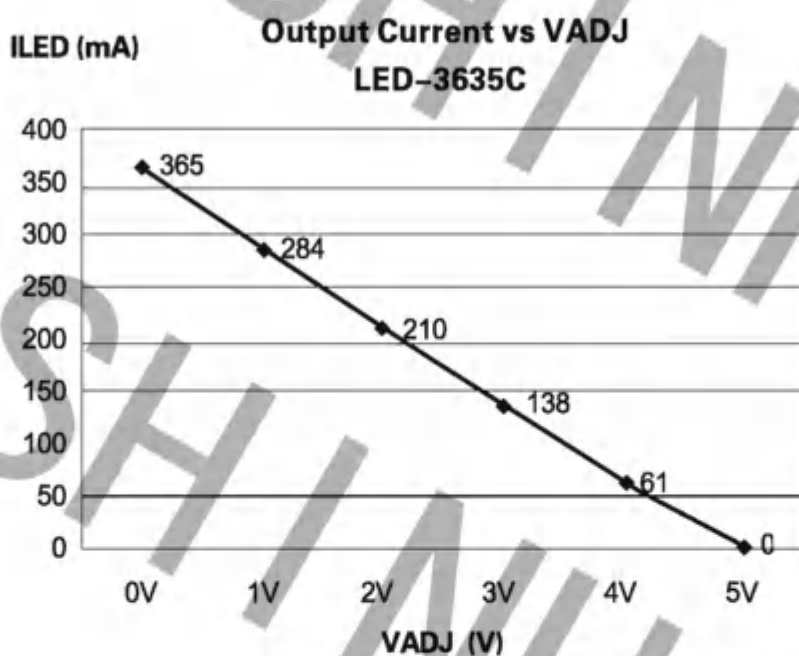
$$V_{out} / \text{LED voltage} = \text{LED quantity}$$

Output Current Versus Dimming Voltage



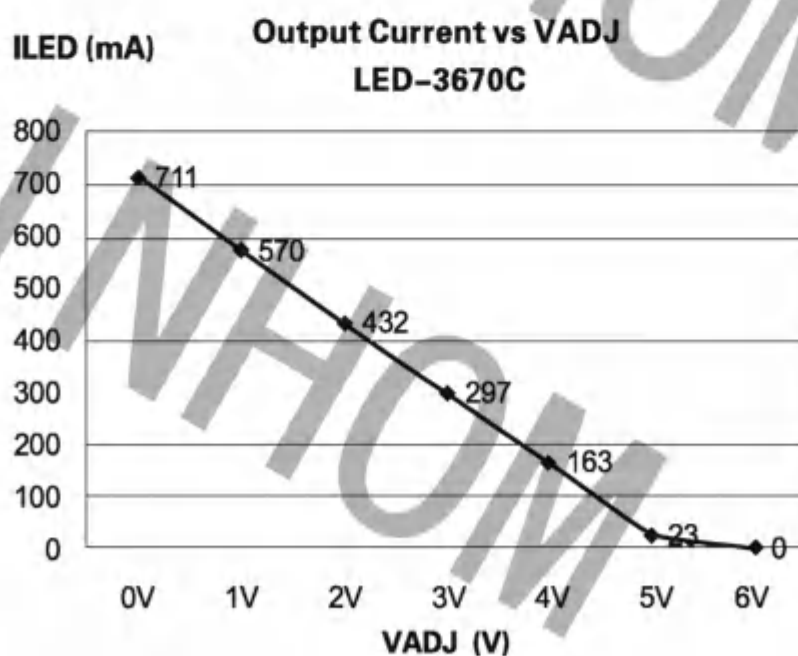
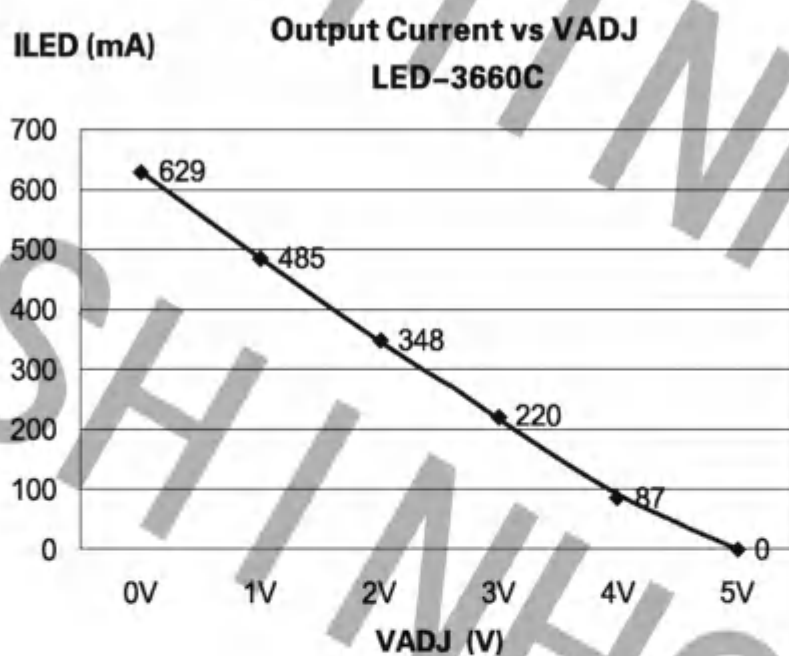


Output Current vs Dimming Voltage (continued)





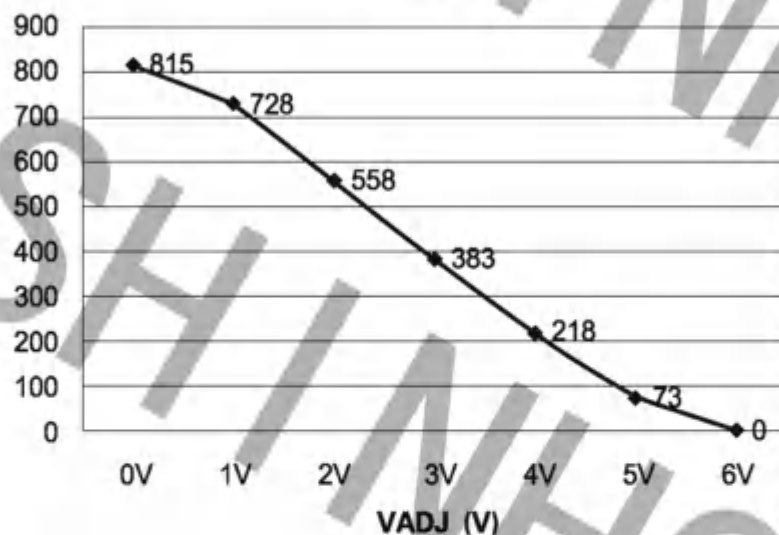
Output Current vs Dimming Voltage (continued)



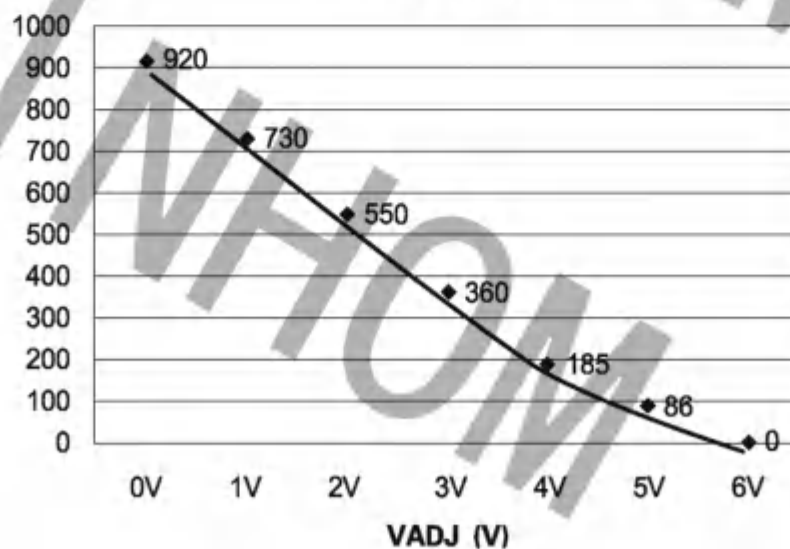


Output Current vs Dimming Voltage (continued)

**Output Current vs V_{ADJ}
LED-3680D**



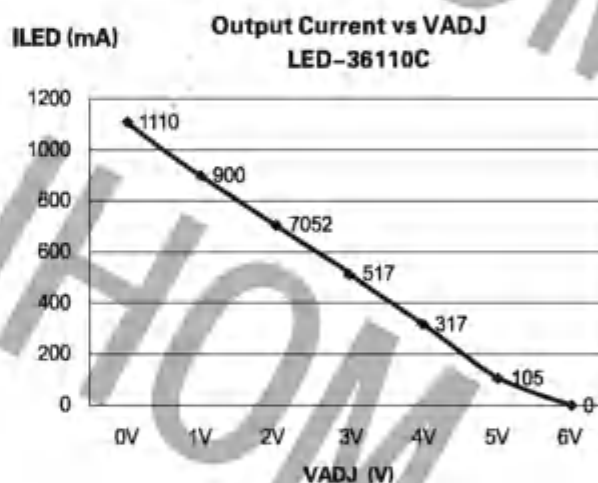
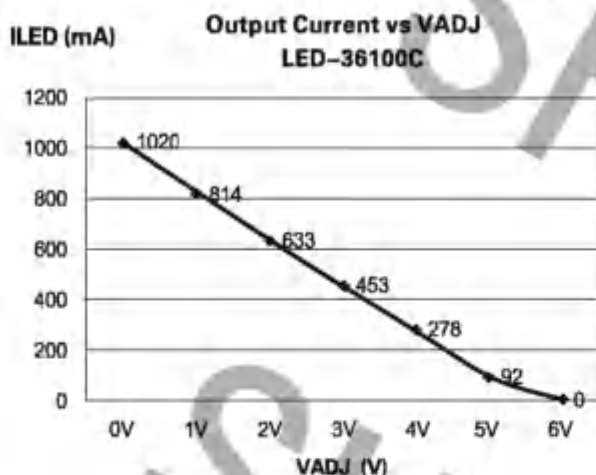
**Output Current vs V_{ADJ}
LED-3690C**



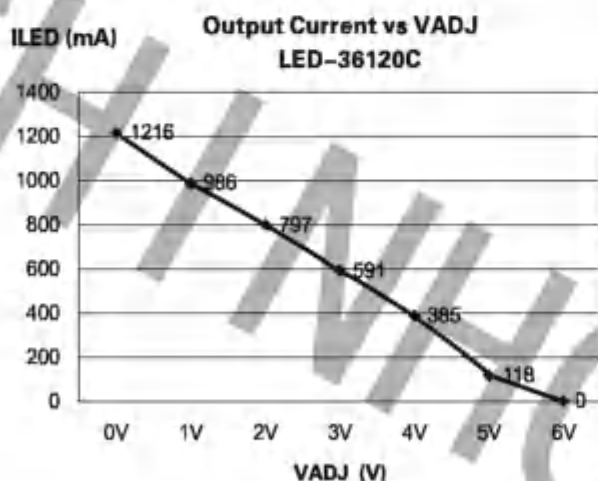


Up to 1200mA | LED Driver

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. Once 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 rated 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 may not be available for release. 6. This product 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.



FEATURES

- RoHS compliant
- Single output rail
- 1kVDC isolation
- High efficiency for low power applications
- SIP & DIP package styles
- Power density 0.36W/cm³
- UL 94V-0 package material
- Footprint from 0.69cm²
- 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	Mhrs	
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	370	
LME1215DC	12	15	16	75	45	287	
LME1205SC	12	5	50	70	38	536	SIP
LME1209SC	12	9	28	75	40	434	
LME1212SC	12	12	21	75	43	370	
LME1215SC	12	15	16	75	45	287	

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 ³	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
Withstand test voltage	Flash tested for 1 second	1000			VDC
Resistance	V _{iso} =500VDC	1			GΩ

GENERAL CHARACTERISTICS

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

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	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.

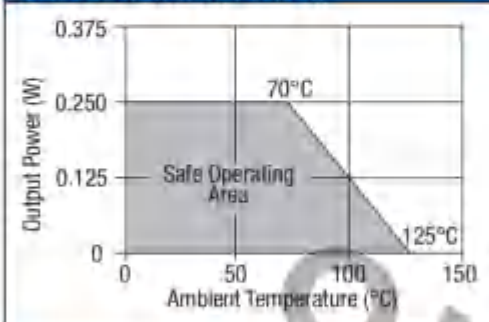
All specifications typical at T_a=25°C, nominal input voltage and rated output current unless otherwise specified.



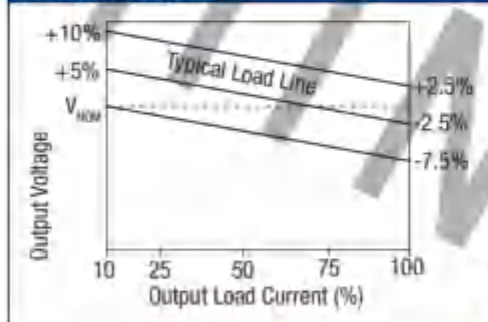
TEMPERATURE CHARACTERISTICS

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.

SHINOHM 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

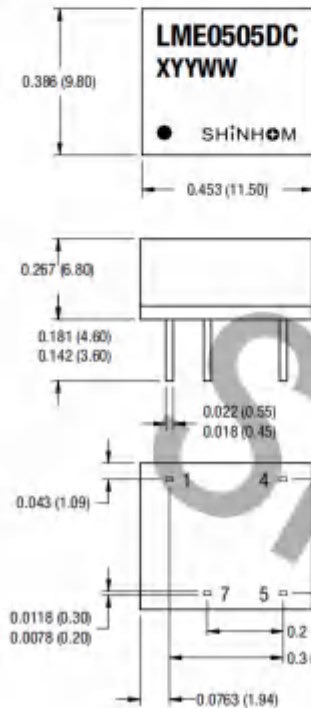
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The LME series has toroidal isolation transformers, with no additional insulation between 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.

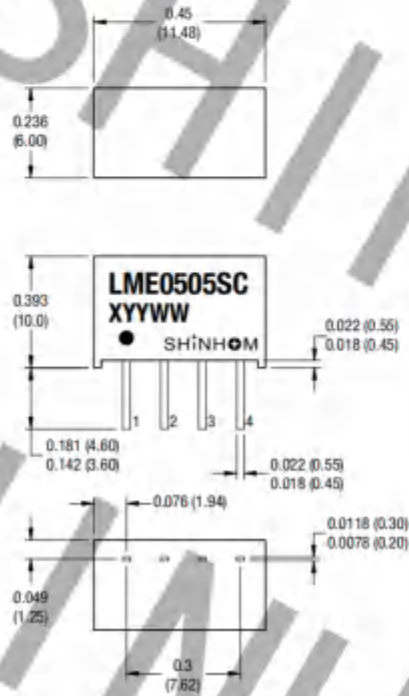
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



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}

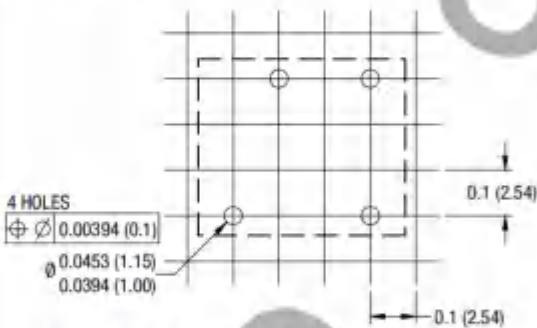
All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position.

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

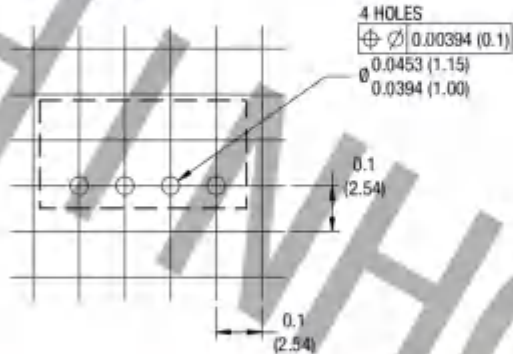
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package



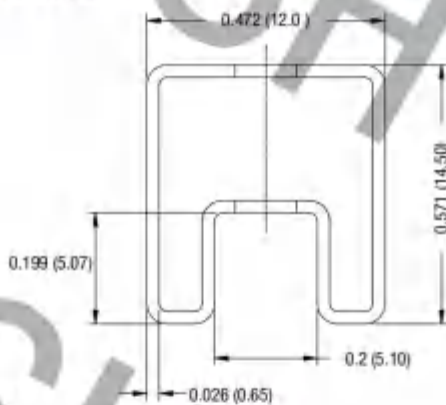
4 Pin SIP Package



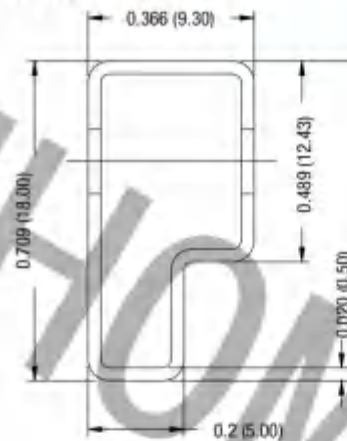
Unless otherwise stated all dimensions in inches (mm) ± 0.5 mm.

TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



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

Tube Quantity : 35

RoHS COMPLIANT INFORMATION



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.



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 °C to 85 °C
- ◆ 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 °C to +85 °C. 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%



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:	20mA / 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		1.0A 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 Mhz 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 μ F max.
	dual output models:	1000 μ F max. (Each output)

General Specifications

Temperature ranges	- Operating	- 40 °C ~ + 85 °C
	- Case temperature	+ 100 °C max.
	- Storage	- 55 °C ~ + 125 °C
Derating		3.5%/K above 70 °C
Humidity (non condensing)		95% rel H max.
Reliability, calculated MTBF (MIL-HDBK-217E ground benign)		> 1 Mio.h @ + 25 °C
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 frequency		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



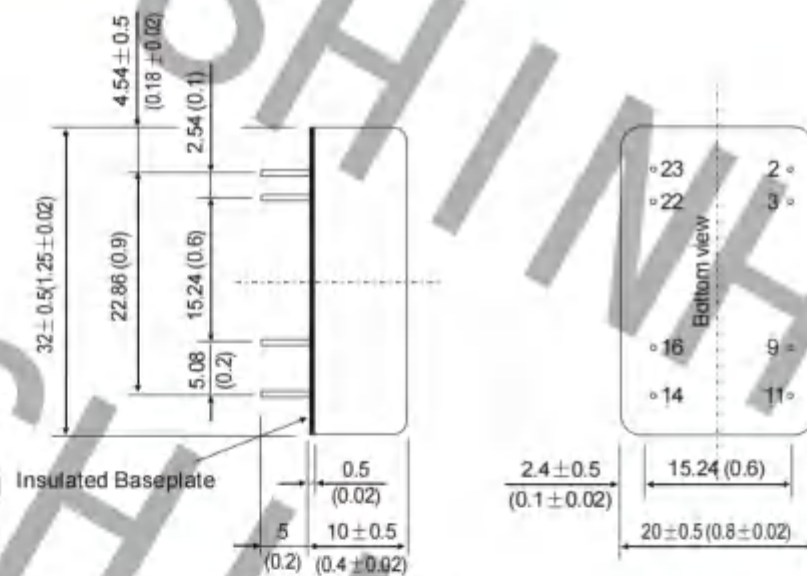
DC/DC Converters

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 °C / 10 sec.

Outline Dimensions mm (inches)



Pin diameter $\phi 0.5 \pm 0.05$ (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



FEATURES

- RoHS compliant
- 2:1 wide range voltage input
- Continuous short circuit protection with current foldback
- Operating temperature range -40°C to 85°C
- 0.75% regulation
- 1kVDC isolation
- Efficiency to 83%
- Power density 0.9W/cm²
- 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 -40°C to 85°C. 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
	V (nom.)	V	Min Load ³	Full Load	Full Load			
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	1686
NDL2415SC	24	15	33	134	100	83	50	1605
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	360	
	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 of output ripple will be experienced.
4. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
All specifications typical at T=25°C, nominal input voltage and rated output current unless otherwise specified.



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	°C
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.

SHIN-HOM 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 E 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.

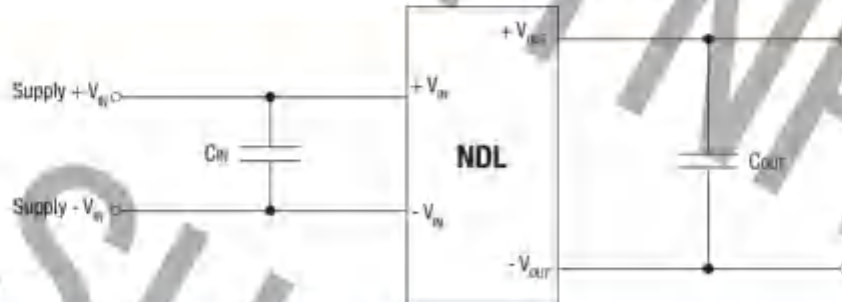
APPLICATION NOTES

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.

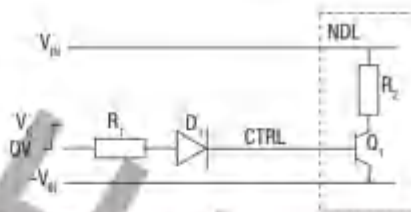
Value		
Input Voltage (V)	C _{IN}	C _{OUT}
5 & 12	100µF, 25V	100µF, 25V
24 & 48	10µF, 200V	100µF, 25V

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.



D₁ (e.g. 1N4001) is required to provide high impedance 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 R₁ can be derived as follows:

$$R_1 = \frac{V_{CC} - V_{BE} - V_{EE}}{I_C}$$

Assuming V_{CC}=5V, V_{BE}=0.7V and V_{EE}=1V:

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

Pin 8 (C4)

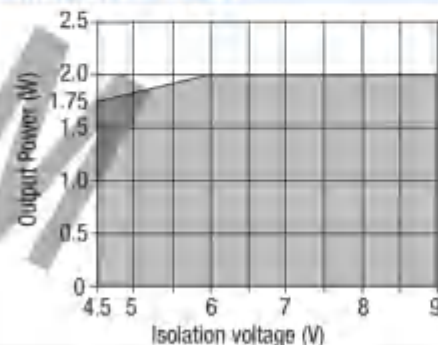
This pin provides a connection point to the main reservoir capacitor. Additional capacitance can be added from this pin to pin 7. Any lower ESR capacitor will remove ripple and noise to some degree. The benefit of this access point over simple additional output capacitance is that it precedes the output 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



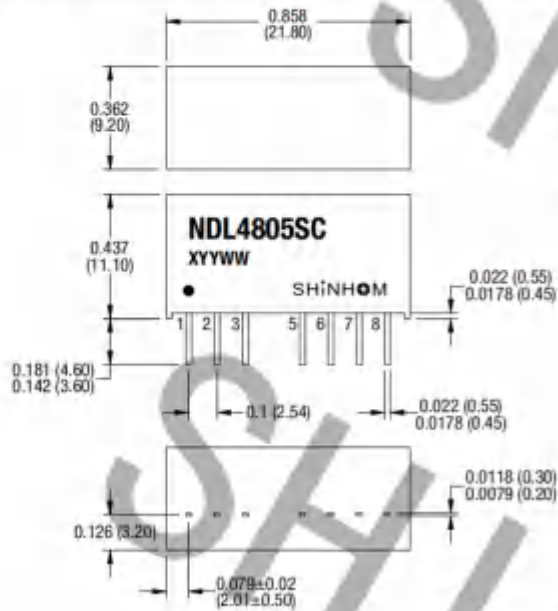
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

NDL05 POWER DERATING CURVE



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



Weight: 5.0g

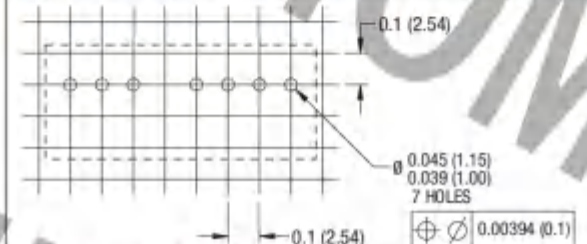
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

PIN CONNECTIONS

Pin	Function
1	-VIN
2	+VIN
3	CTRL
5*	IC
6	+Vout
7	-Vout
8	Cs

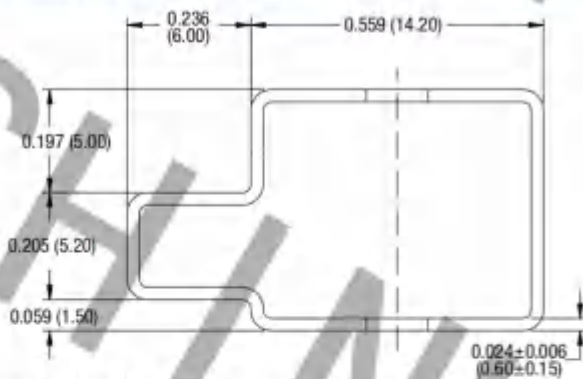
* This pin is internally connected, and must have no external connection and is used for mechanical reasons. External connection to anything will result in converter failure.

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



FEATURES

- RoHS compliant
- Industry standard footprint
- Power density 0.90W/cm²
- 2:1 wide input range
- Dual isolated output
- Short circuit protection
- Low profile 24 pin case
- Operating temperature range -40°C to 85°C
- Load and line regulation <1% on both outputs
- No heatsink required
- Footprint 4.73cm²
- 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 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 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 V (NOM.)	Rated output voltage V	Output current		Input current full load mA	Efficiency ² (MIN.) %	Isolation capacitance pF	MTTF ³ kHrs
			MIN. Load ¹ mA	Full load mA				
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	79	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	75	80	35	2090
NDTD4815C	48	±15	±25	±100	75	81	38	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	28V
Input voltage 24V types	48V
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=25°C, nominal input voltage and rated output current unless otherwise specified.



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 = 0C 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		±1	5.0	
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	°C
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.

SHINOHM 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 E1 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.

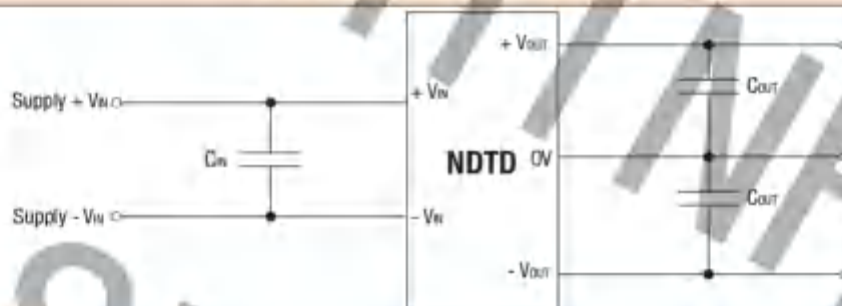
APPLICATION NOTES

Recommended Input & Output Capacitors

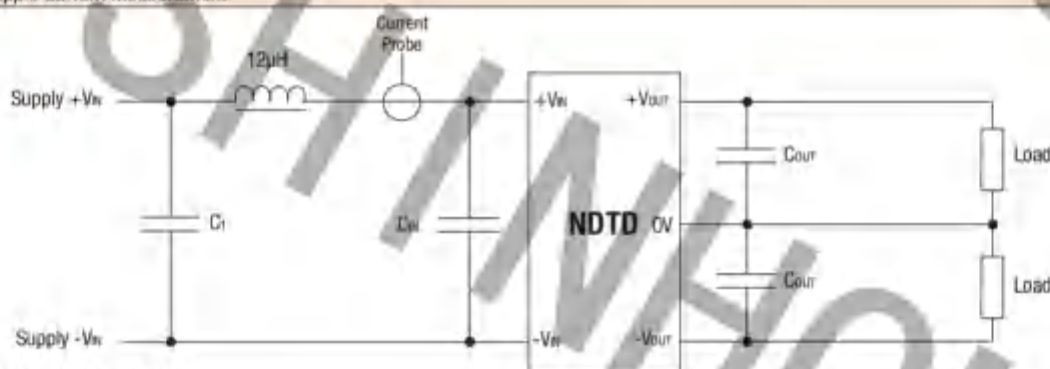
Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

Input Voltage	C _{IN}	Output Voltage	C _{OUT}
5V, 12V	100µF, 25V (0.25Ω at 100kHz)	3.3V, 5V	100µF, 25V (0.25Ω at 100kHz)
24V, 48V	10µF, 100V (1.5Ω at 100kHz)	12V, 15V	47µF, 25V (0.4Ω at 100kHz)

Test circuit



Reflected Ripple Current Measurement



C₁ = 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

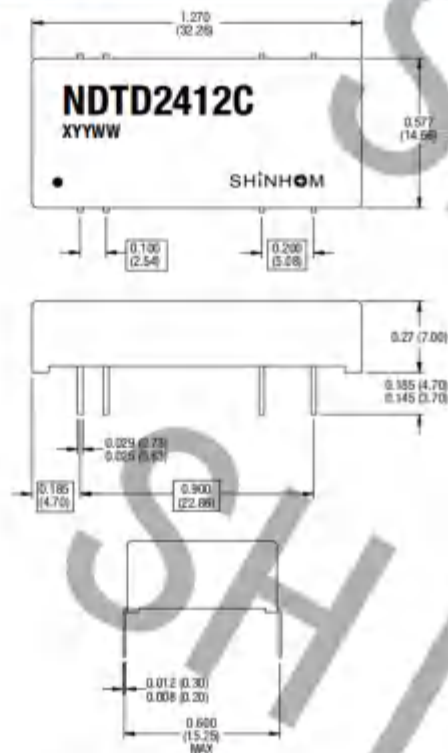
The percentage change in output voltage between low input voltage and high input voltage, measured with fixed output load i.e. a 5V part with an output voltage of 5.05V @ high input voltage and 5.03V @ low input voltage would have a line regulation of 0.4%.

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

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

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



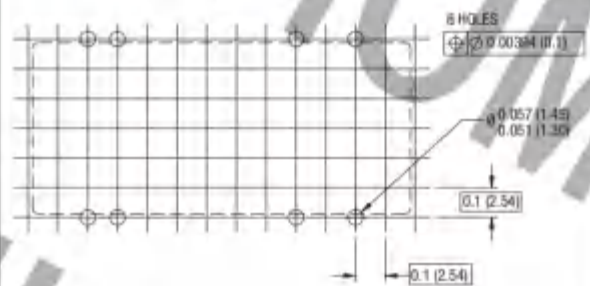
Weight: 6.0g
All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position.

PIN CONNECTIONS



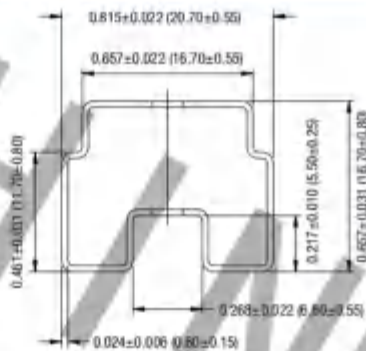
Pin	Function
2	-VIN
3	-VIN
9	0V
11	-VOUT
14	+VOUT
16	0V
22	+VIN
23	+VIN

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ± 0.01 (mm ± 0.25 mm). 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 ± 0.5 mm).
Tube length : 20.47 $\pm$ 0.079 (520mm $\pm$ 2mm).

Tube Quantity : 15

RoHS COMPLIANCE INFORMATION



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 this product series is Tin. The series is backward compatible with Sn/Pb soldering systems.



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 4.73cm²
- 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 ¹
	V (NOM.)	V	MIN. Load	Full Load	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	92	1676
NDTS4805C	48	5	150	600	83	75	32	1688
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 ²	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	0.8	1.0	%
		1203, 1205			
		2403, 2405	0.8	1.2	
		4803, 4805			
	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 reflected ripple current measurement circuit on page 2.

2. Calculated using MIL-HDBK-217F with nominal input voltage at full load (ground design) at 25°C.

3. Please refer to output load application note on page 3.

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



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	°C
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.

SHINOHM 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 E1 ferrite core, with no additional insulation between primary and secondary windings of enamelled 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



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 this product series is Tin. The series is backward compatible with Sn/Pb soldering systems.

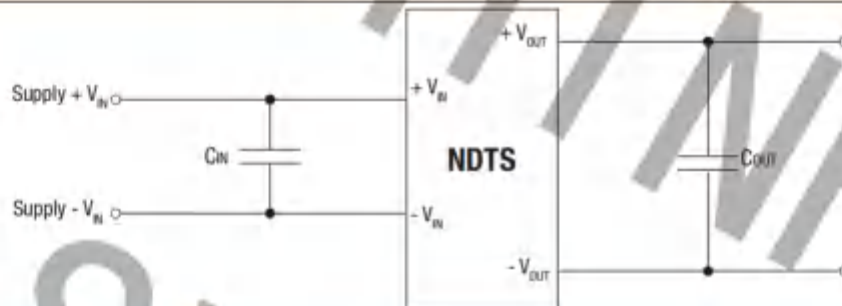
APPLICATION NOTES

Recommended Input & Output Capacitors

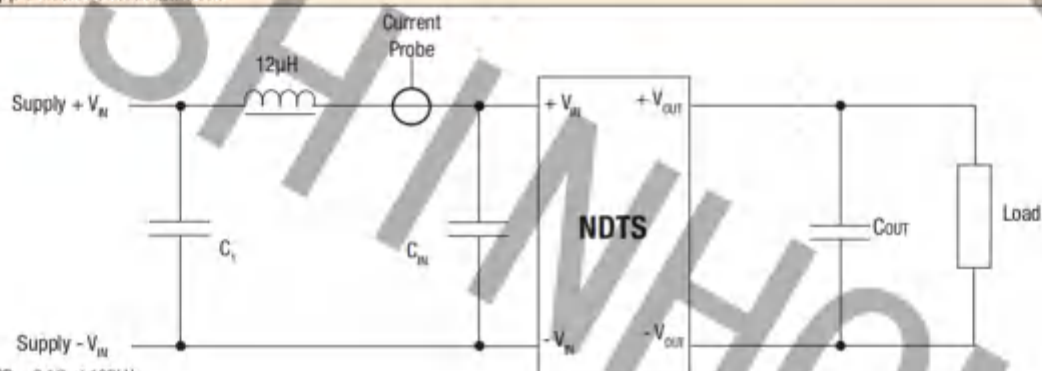
Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

Input Voltage	C_{IN}	Output Voltage	C_{OUT}
5V, 12V	100 μ F, 25V (0.25 Ω at 100kHz)	3.3V, 5V	220 μ F, 16V (0.12 Ω at 100kHz)
24V, 48V	10 μ F, 100V (1.5 Ω at 100kHz)	12V, 15V	100 μ F, 25V (0.25 Ω at 100kHz)

Test circuit



Reflected Ripple Current Measurement



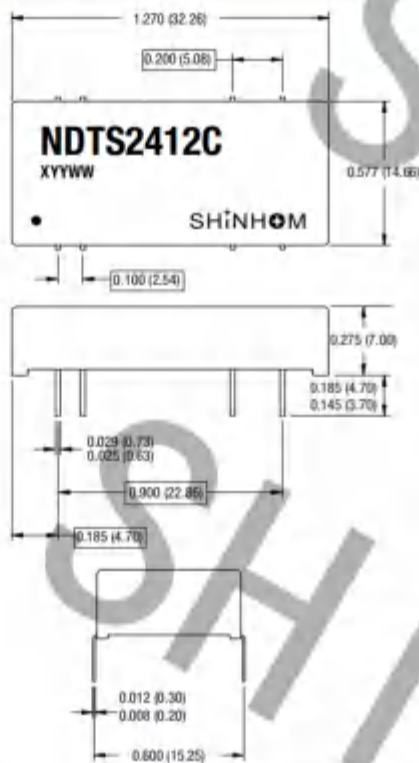
$C_I = 220\mu\text{F}$, ESR < 0.1 Ω at 100kHz

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



All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position. Weight: 6.2g

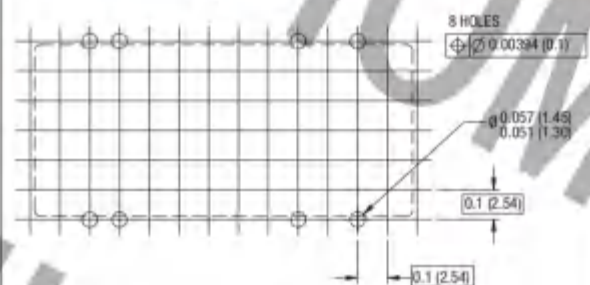
PIN CONNECTIONS



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

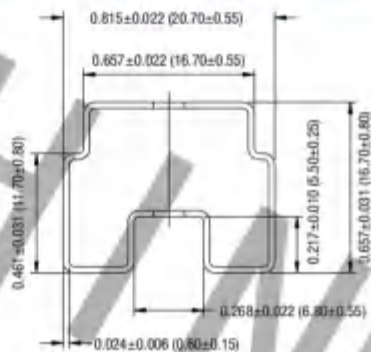
NA - Not available for electrical connection.
NC - No internal connection.

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ± 0.01 (mm ± 0.25 mm). 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 ± 0.5 mm).
Tube length: 20.47 $\pm$ 0.079 (520mm $\pm$ 2mm).

Tube Quantity: 15



FEATURES

- RoHS compliant
- Industry standard footprint
- Efficiency to 82%
- Power density 0.90W/cm³
- 2:1 wide input range
- Single isolated output
- Short circuit protection
- Low profile 24 pin case
- UL 94V-0 package material
- Operating temperature range -40°C to 85°C
- No heatsink required
- Footprint 4.73cm²
- 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 85°C 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 V (nom.)	Rated Output Voltage V	Output Current ¹		Input Current Full load mA	Efficiency ² (MIN.) %	Isolation Capacitance pF	MTTF ³ kHrs
			MIN. Load mA	Full Load mA				
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	63	315	320	78	52	1916
NDY1212C	12	12	62	250	316	78	44	1897
NDY1215C	12	15	50	200	306	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	63	315	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	50	1676
NDY4805C	48	5	150	600	67	73	35	1668
NDY4809C	48	9	63	315	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	
	NDY2403		180	360	
Reflected ripple current ²	NDY4809		140	290	mA p-p
	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 density 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.



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_o nominal 3.3V output	160		220	kHz
	25% load V_o nominal 3.3V output	290		560	
	100% load V_o nominal, all other outputs	80		220	
	25% load V_o 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	$V_{iso}=500VDC$	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.

SHIN-OM 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 E 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

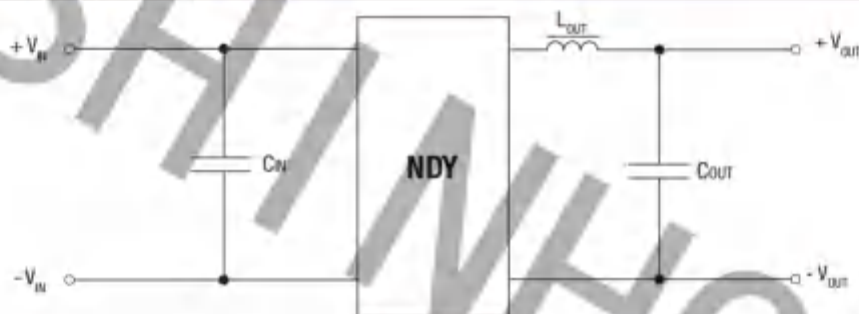
Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

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

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



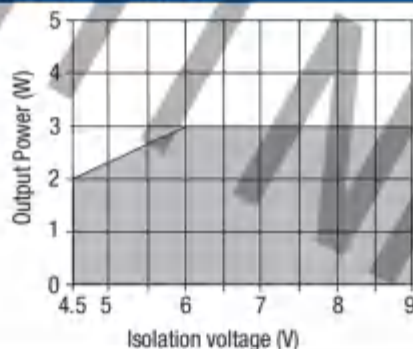
Recommended circuit for reduced ripple 3.3V output



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



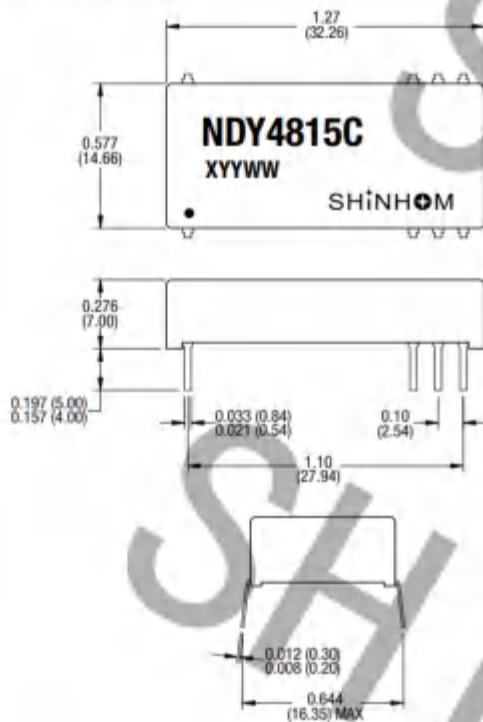
RoHS COMPLIANCE INFORMATION



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 this product series is Bright Tin. The series is backward compatible with Sn/Pb soldering systems.

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



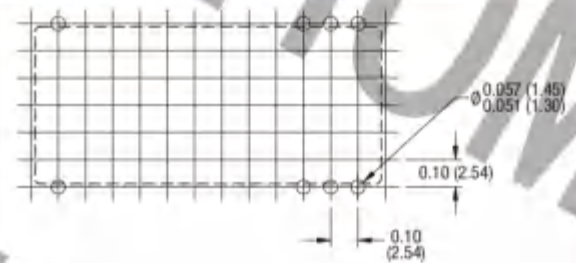
Weight: 6.2g (3.3V: 6.7g)

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

PIN CONNECTIONS (TOP VIEW)

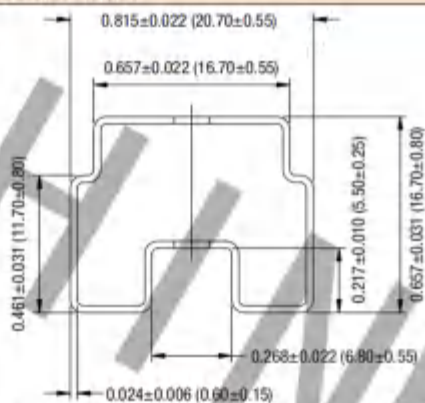


RECOMMENDED FOOTPRINT DETAILS



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

TUBE OUTLINE DIMENSIONS



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

Tube Quantity: 15



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 0.98cm²
- 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	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF	Package Style
	(V)	(V)	(mA)	(mA)	%	pF	kHrs	
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	76	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	76	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	
NKA0505DC	5	±5	±100	249	80	26	1557	
NKA0509DC	5	±9	±56	263	76	25	682	
NKA0512DC	5	±12	±42	255	78	28	943	
NKA0515DC	5	±15	±33	253	79	29	188	SIP
NKA0503SC	5	±3.3	±152	259	77	22	205	
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	943	DIP
NKA0515SC	5	±15	±33	253	79	29	188	
NKA1205DC	12	±5	±100	112	74	33	559	
NKA1209DC	12	±9	±56	106	79	40	375	
NKA1212DC	12	±12	±42	104	81	55	243	
NKA1215DC	12	±15	±33	102	82	60	154	SIP
NKA1205SC	12	±5	±100	112	74	33	559	
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.
NKA0505DC/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 ¹	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.



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	8W=DC to 20MHz, 0312 & 0315		25	60	mV p-p
	8W=DC to 20MHz, 3.3V output types		40	80	
	8W=DC to 20MHz, 5V output types		50	75	
	8W=DC to 20MHz, 9V output types		40	65	
	8W=DC to 20MHz, 12V output types		40	60	
	8W=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	V _{iso} = 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.

SHINOHM 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 of test 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.

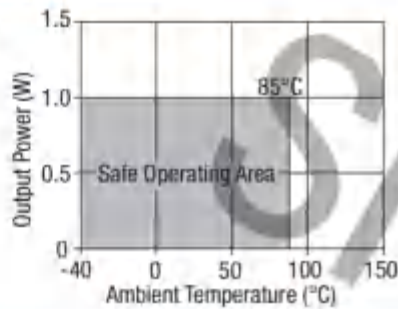
This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

1. See Derating Graphs.

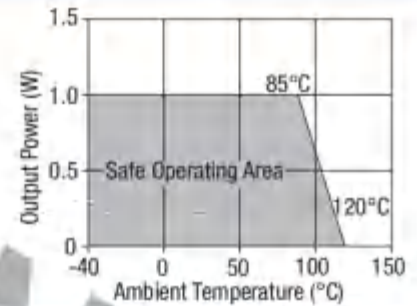
2. 12V input types have typically 2% less load regulation.

TEMPERATURE DERATING GRAPHS

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

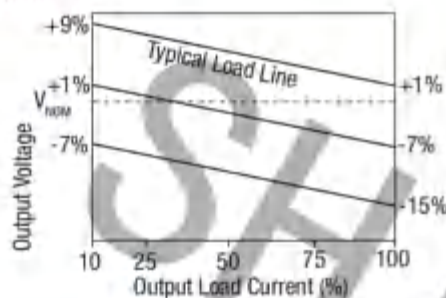


All other types.

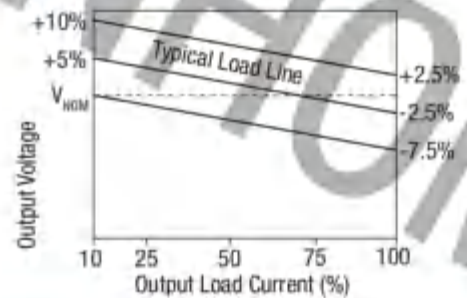


TOLERANCE ENVELOPES

3.3V output types.

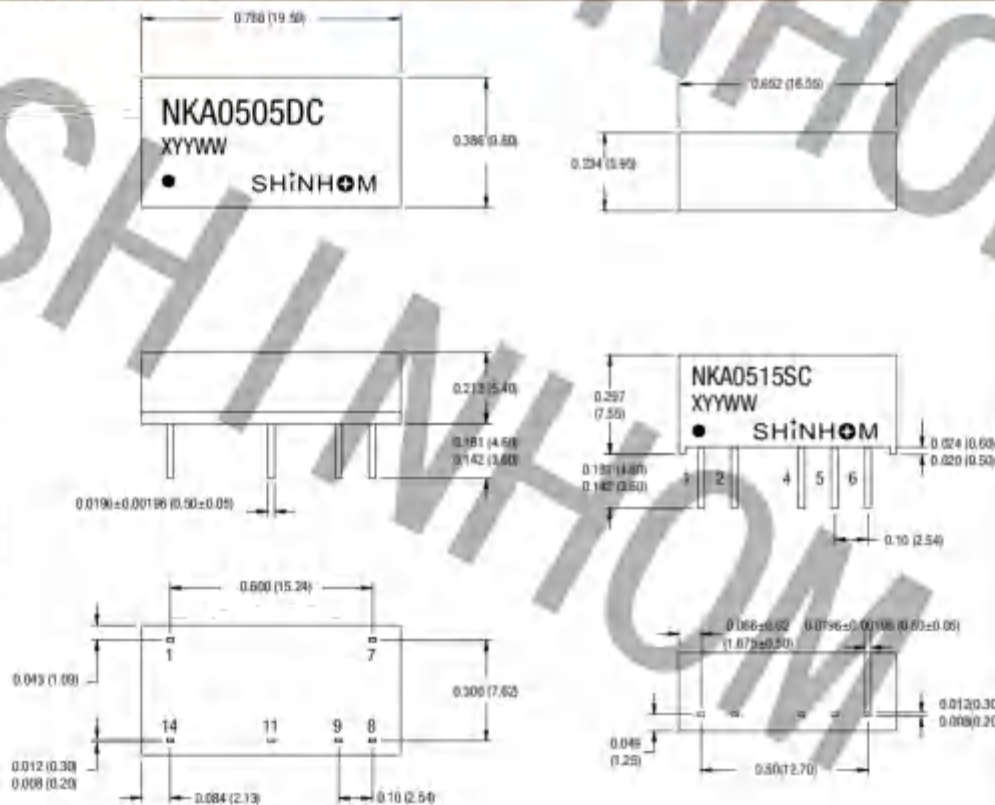


All other types.



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



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 - 6 PIN SIP

Pin	Function
1	+V _{IN}
2	-V _{IN}
4	-V _{OUT}
5	OV
6	+V _{OUT}

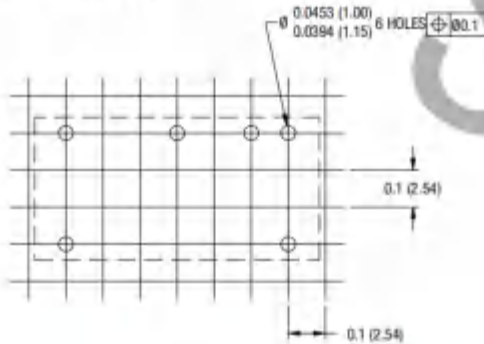
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

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

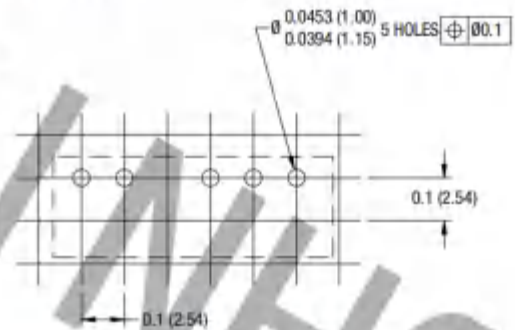
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

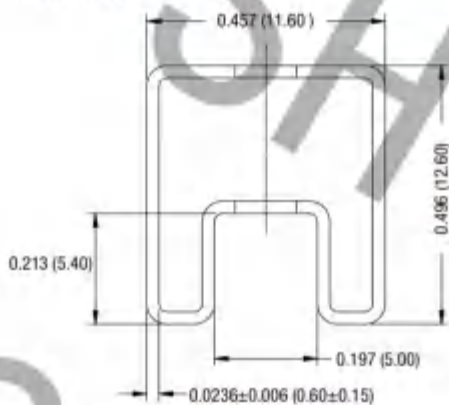


6 Pin SIP Package

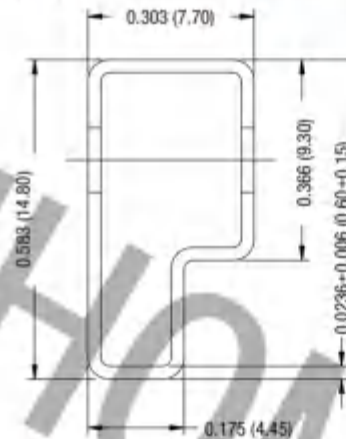


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



6 Pin SIP Tube



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

DIP Tube Quantity : 25
SIP Tube Quantity : 30

RoHS COMPLIANCE INFORMATION



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
- 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/cm³
- UL 94V-0 Package Material
- Footprint at 0.69cm²
- 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 (V)	Output Voltage (V)	Output Current (mA)	Input Current at Rated Load (mA)	Efficiency (%)	Isolation Capacitance (pF)	MTTF ¹ (Khrs)	Package Style
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	
NKE0509DC	5	9	111	266	75	29	1173	
NKE0512DC	5	12	83	260	77	30	633	SIP
NKE0515DC	5	15	66	256	78	32	360	
NKE0503SC	5	3.3	303	270	75	40	619	
NKE0505SC	5	5	200	289	69	28	2414	DIP
NKE0505SEC	5	5	200	250	78	34	419	
NKE0509SC	5	9	111	266	75	29	1173	
NKE0512SC	5	12	83	260	77	30	633	SIP
NKE0515SC	5	15	66	256	78	32	360	
NKE1205DC	12	5	200	117	71	35	620	DIP
NKE1209DC	12	9	111	107	76	50	480	
NKE1212DC	12	12	83	105	79	57	360	
NKE1215DC	12	15	66	103	81	60	252	SIP
NKE1205SC	12	5	200	117	71	35	620	
NKE1209SC	12	9	111	107	78	50	488	
NKE1212SC	12	12	83	105	79	57	360	DIP
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	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 full MTTF input current duration.

All specifications typical at $T_a = 25^\circ\text{C}$, 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 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, 0505SEQ, 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	85	
	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		GO

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.

SHIN-OM 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.

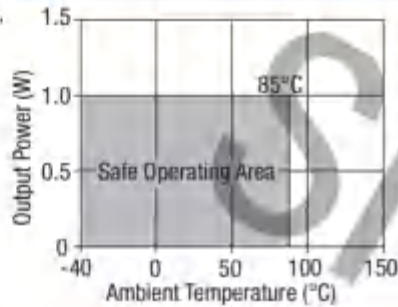
This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

1. See Derating Graphs.

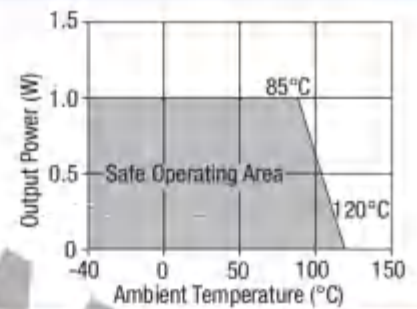
2. 12V input types have typically 3% less load regulation.

TEMPERATURE DERATING GRAPHS

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

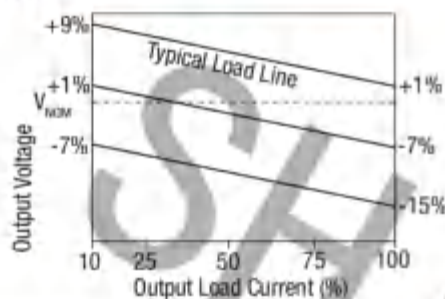


All other types.

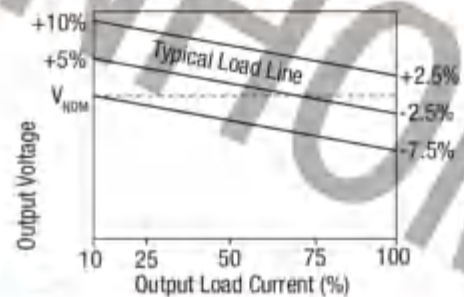


TOLERANCE ENVELOPES

3.3V output types.



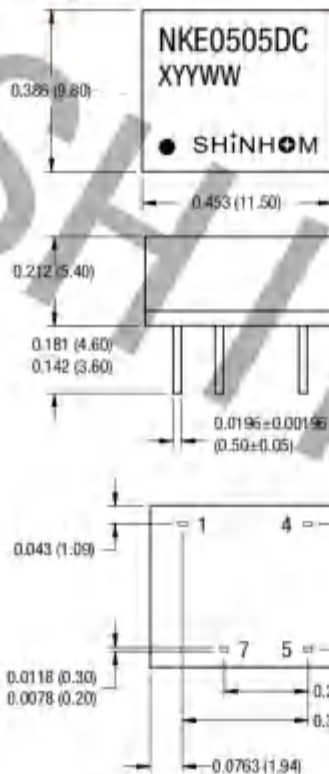
All other types.



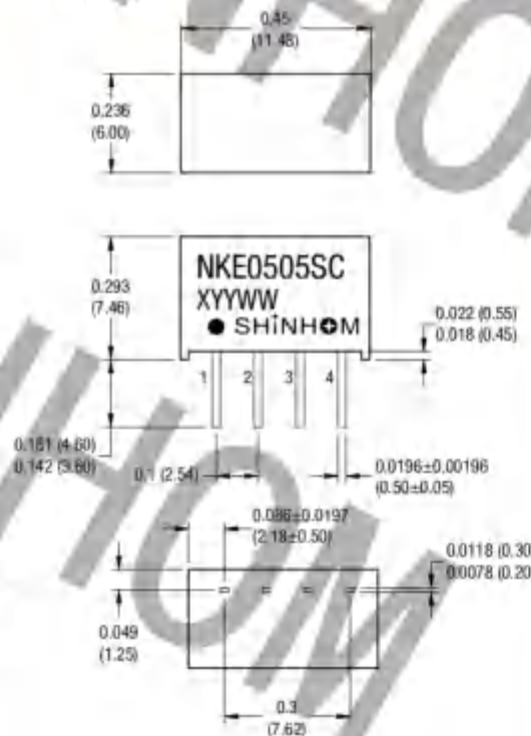
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	-VIN
4	+VIN
5	+VOUT
7	-VOUT

PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-VIN
2	+VIN
3	-VOUT
4	+VOUT

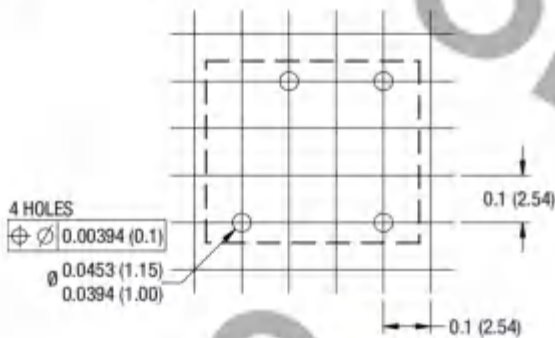
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

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

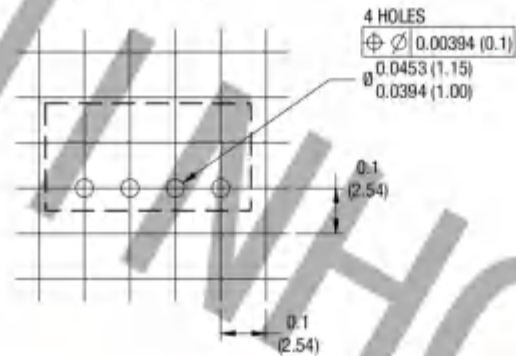
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

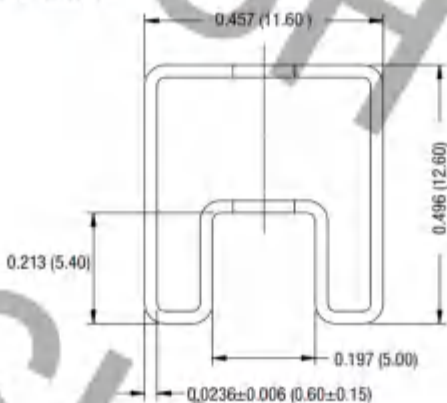


4 Pin SIP Package

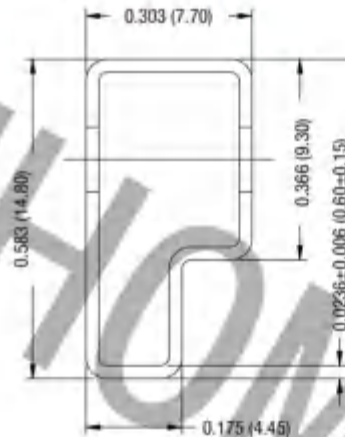


TUBE OUTLINE DIMENSIONS

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) = 20.87 (525mm ±2mm).

Tube Quantity : 40

RoHS COMPLIANCE INFORMATION



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
- Efficiency up to 78%
- Power density up to 0.85W/cm³
- 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 1.17cm²
- 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 building 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	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	659	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	659	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	V
Reflected ripple current			20	33	mA p-p

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 _I to low V _I		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		8	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	
			20	50	

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 _I , NMA05 types	7V
Input voltage V _I , NMA12 types	15V

1. Calculated using MIL-HDBK-217F with non-load 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.

NMA 5V & 12V SERIES

Isolated 1W Dual Output DC/DC Converters

ISOLATION CHARACTERISTICS

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

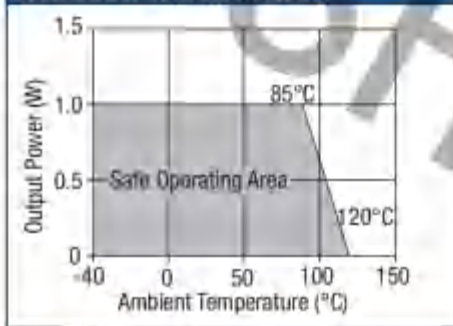
GENERAL CHARACTERISTICS

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

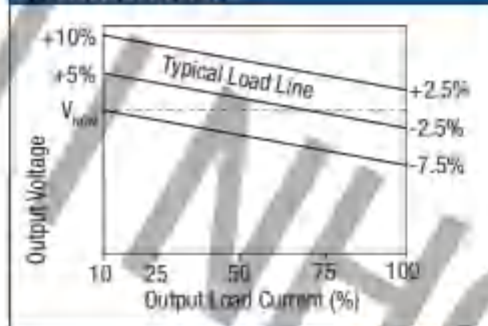
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		130	
Case Temperature above ambient	5V output types All other output types		33 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.

SHIN-HOM 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 the 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.

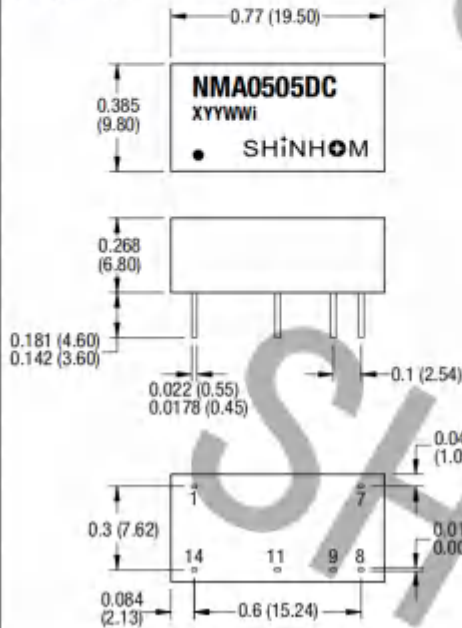
NMA 5V & 12V SERIES

Isolated 1W Dual Output DC/DC Converters

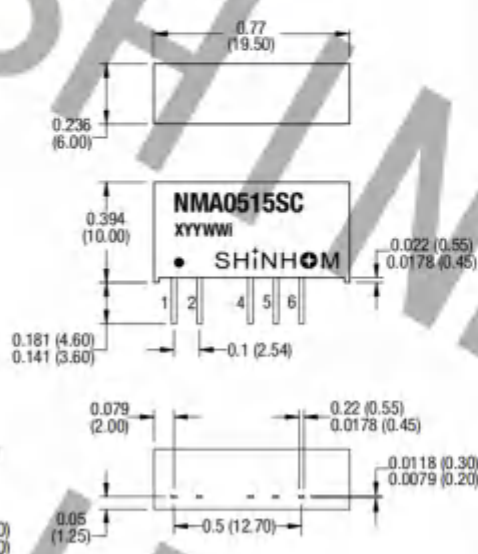
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



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}

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

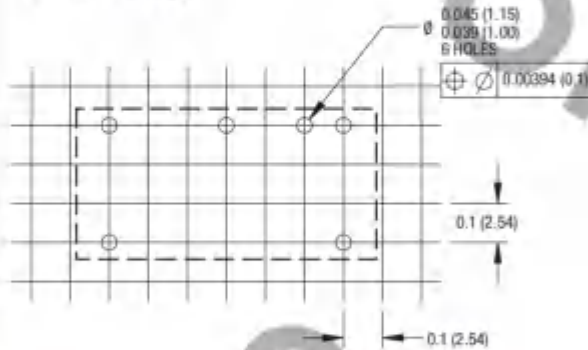
NMA 5V & 12V SERIES

Isolated 1W Dual Output DC/DC Converters

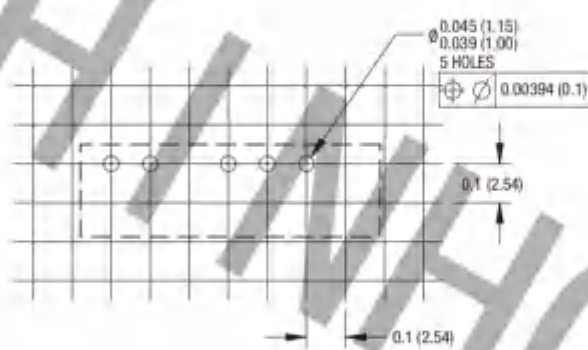
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

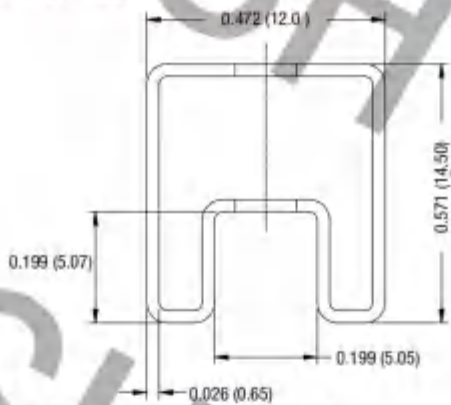


7 Pin SIP Package

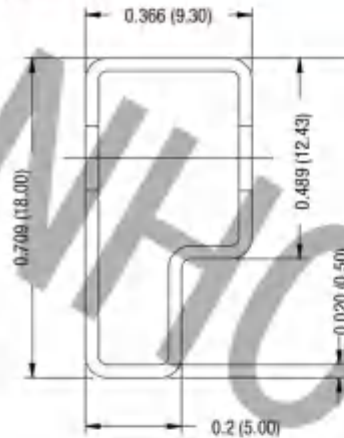


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity: 25

RoHS COMPLIANT INFORMATION



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
- Efficiency up to 80%
- Power density up to 0.85W/cm³
- Dual output from a single input rail
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm²
- 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 building 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 (V)	Output Voltage (V)	Output Current (mA)	Efficiency (%)	Isolation Capacitance (pF)	MTTF ¹ (Hrs)	Package Style
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 thermal 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.



NMA 24V & 48V SERIES

Isolated 1W Dual Output DC/DC Converters

ISOLATION CHARACTERISTICS

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

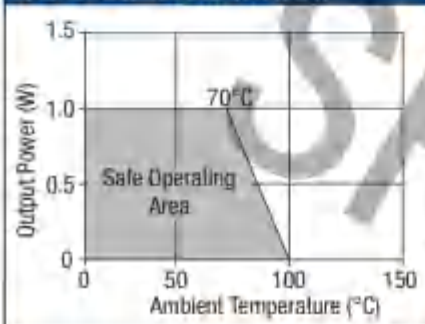
GENERAL CHARACTERISTICS

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

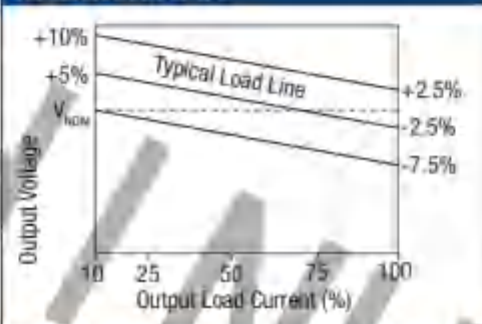
TEMPERATURE CHARACTERISTICS

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.

SHIN-OM 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.

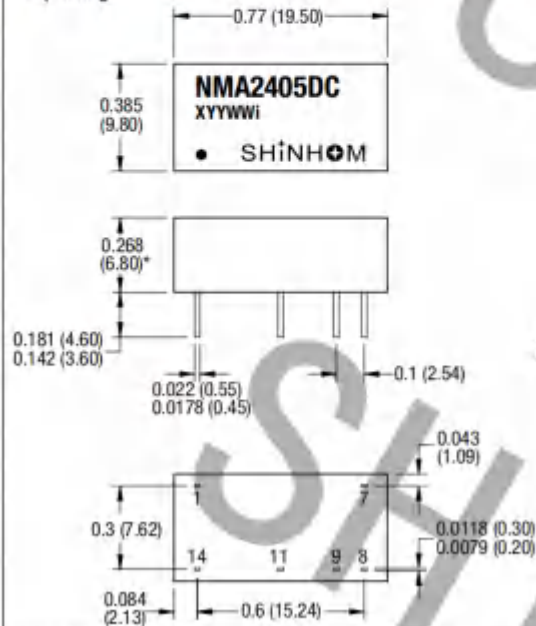
NMA 24V & 48V SERIES

Isolated 1W Dual Output DC/DC Converters

PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



* 0.303 (7.70) for 48V variants

** 0.295 (7.50) for 48V variants

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

SIP package



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

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}

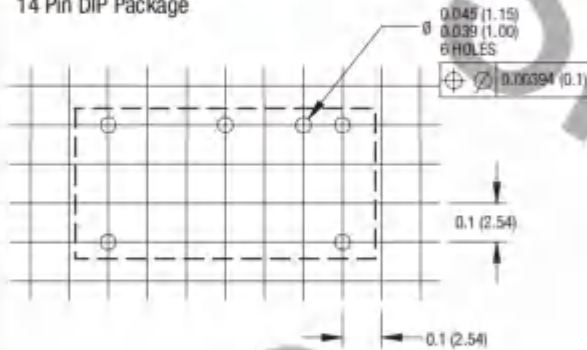
NMA 24V & 48V SERIES

Isolated 1W Dual Output DC/DC Converters

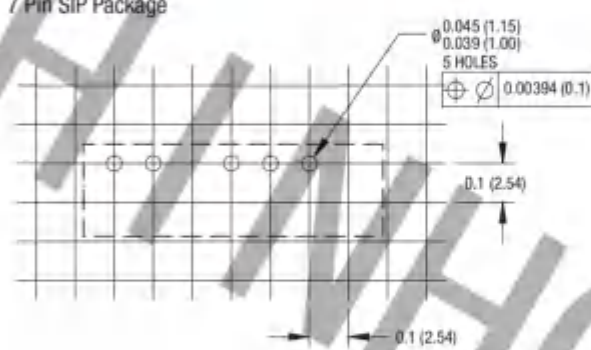
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

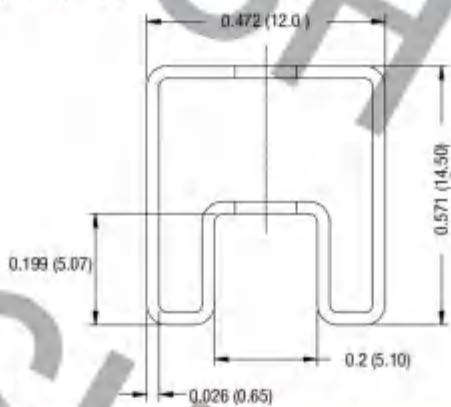


7 Pin SIP Package

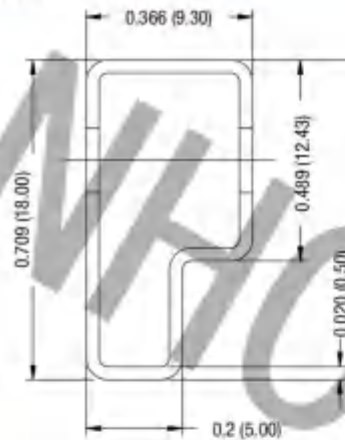


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity: 25

RoHS COMPLIANT INFORMATION



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
- Twin independent outputs
- Input/output isolation 1kVDC
- Output/output isolation 1kVDC
- Power sharing on outputs
- Efficiency to 80%
- Power density 0.85W/cm²
- UL 94V-0 package material
- Footprint from 1.17cm²
- 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 outputs. 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	Normal Input Voltage V	Output Voltage 1 V	Output Voltage 2 V	Output Current 1 mA	Output Current 2 mA	Efficiency %	MTTF ¹ khrs	Package Style
NMD050503DC	5	5	3.3	100	152	70	1615	DIP
NMD050505DC	5	5	5	100	100	70	1615	
NMD050509DC	5	5	9	100	56	60	669	
NMD050512DC	5	5	12	100	42	60	339	
NMD050515DC	5	5	15	100	34	60	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	60	669	
NMD050512SC	5	5	12	100	42	60	339	
NMD050515SC	5	5	15	100	34	60	187	
NMD120505DC	12	5	5	100	100	70	489	DIP
NMD120509DC	12	5	9	100	56	60	343	
NMD120512DC	12	5	12	100	42	60	229	
NMD120515DC	12	5	15	100	34	60	148	
NMD120505SC	12	5	5	100	100	70	489	SIP
NMD120509SC	12	5	9	100	56	60	343	
NMD120512SC	12	5	12	100	42	60	229	
NMD120515SC	12	5	15	100	34	60	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-247T 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

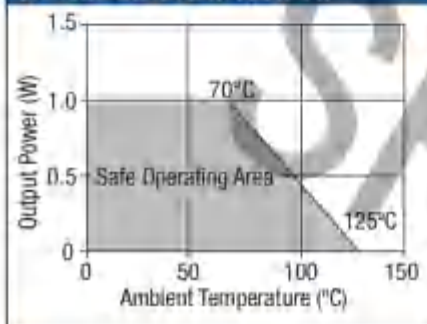
GENERAL CHARACTERISTICS

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

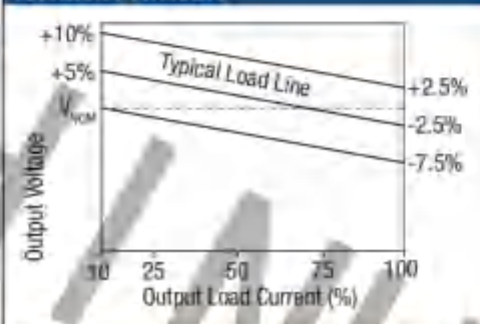
TEMPERATURE CHARACTERISTICS

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.

SHIN-HOM Technologies NMD 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 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

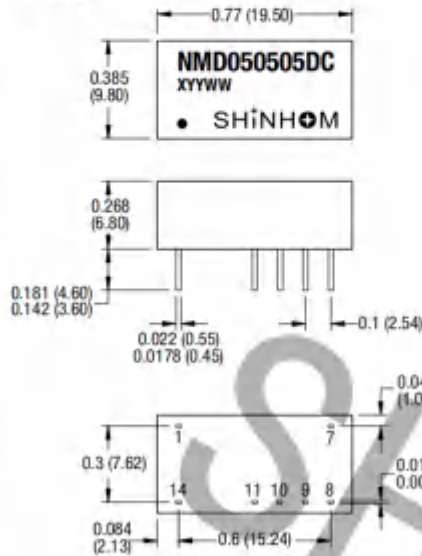
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMD series has toroidal isolation transformers, with no additional insulation between 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.

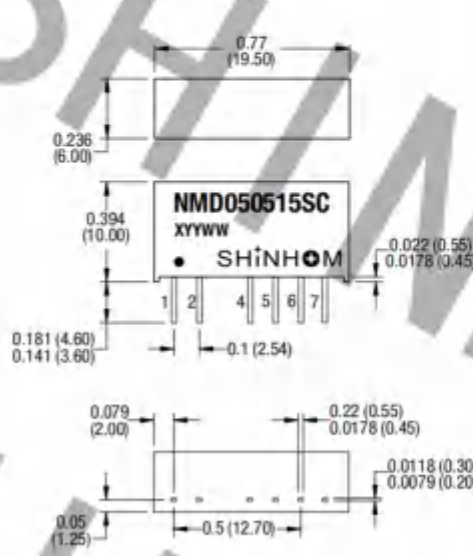
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



PIN 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}

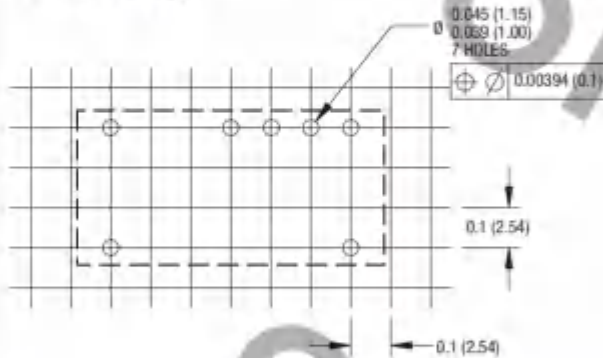
All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position.

Weight: 2.3g (DIP & SIP)

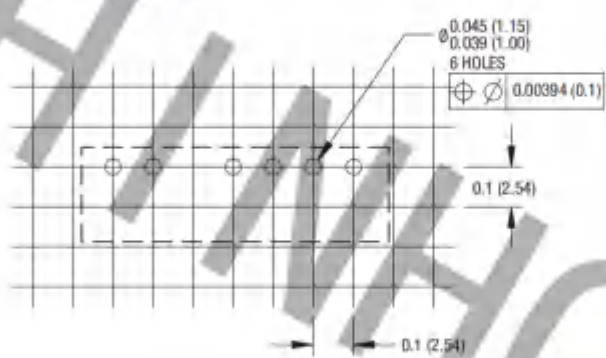
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

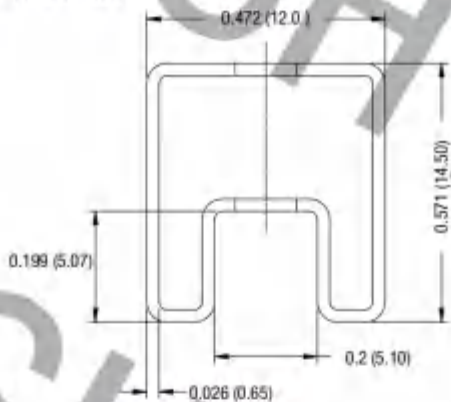


7 Pin SIP Package

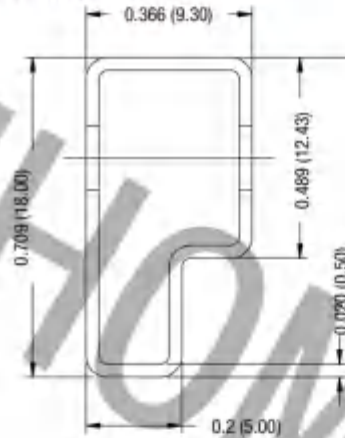


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25

RoHS COMPLIANT INFORMATION



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
- Single isolated output
- 1kWDC isolation
- Efficiency up to 80%
- Wide temperature performance at full 1 watt load, -40°C to 85°C
- Power density 1.53W/cm²
- UL 94V-0 package material
- Footprint from 0.69cm²
- 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	Package Style
	V	V	mA	mA	%	pF	klhrs	
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	112	74	48	488	
NME1212DC	12	12	83	105	78	55	360	
NME1215DC	12	15	66	110	75	52	252	
NME1205SC	12	5	200	120	69	33	620	
NME1209SC	12	9	111	115	74	48	488	SIP
NME1212SC	12	12	83	110	78	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. This slows 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	V
Reflected ripple current			26	48	mA p-p

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	%/V
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 base 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.



NME 5V & 12V SERIES

Isolated 1W Single Output DC/DC Converters

ISOLATION CHARACTERISTICS

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

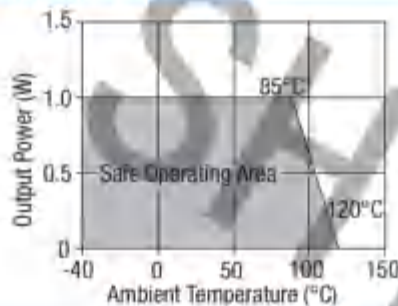
GENERAL CHARACTERISTICS

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

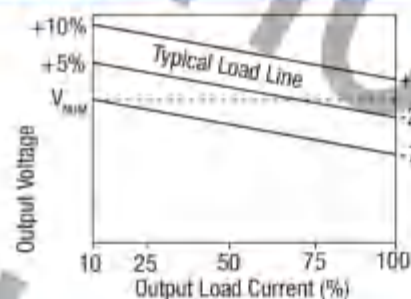
TEMPERATURE CHARACTERISTICS

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.

SHINOHM 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.

NME 5V & 12V SERIES

Isolated 1W Single Output DC/DC Converters

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

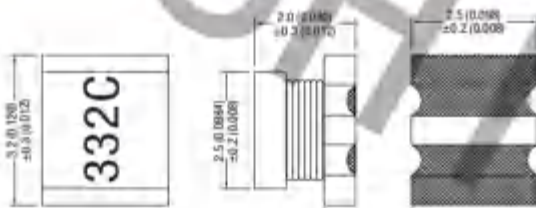
Capacitor: Ceramic chip capacitors are recommended. It is required that the ESR (Equivalent Series Resistance) should be as low as possible, X7R types are recommended. The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC/DC converter.

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.

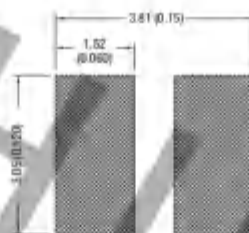


	Inductor			Capacitor		
	L, μ H	Through Hole	SMD	C, μ F	Size	V rating, V
5V output types	10	22R103C	82103C	4.70	1206	10
9V output types	47	22R473C	82473C	1.00	1206	25
12V output types	68	22R683C	82683C	0.47	0805	25
15V output types	100	22R104C	82104C	0.47	0805	25

SMD option 8200 Inductor Series Mechanical Dimensions



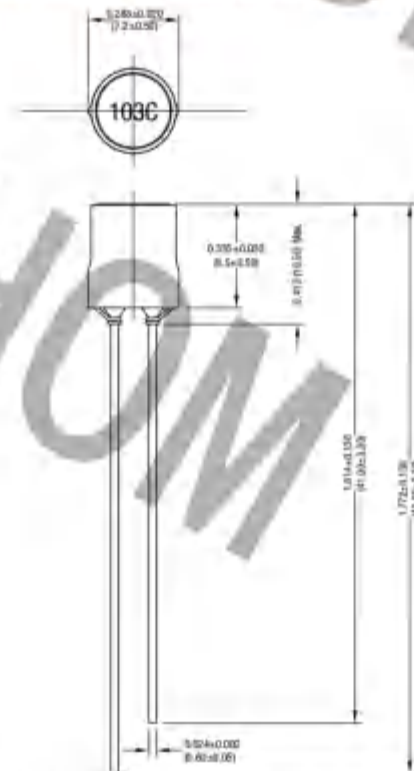
Recommended pad layout



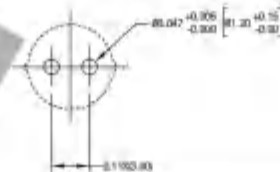
All dimensions in inches (mm).

For more information please visit www.cd4power.com

Through hole option 2200R Inductor Series Mechanical Dimensions



Recommended footprint



All dimensions in inches (mm).

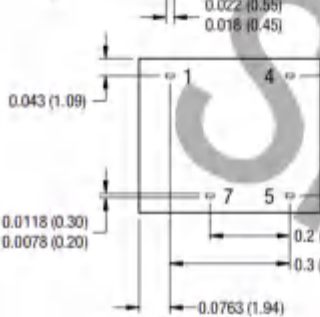
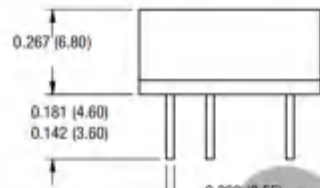
NME 5V & 12V SERIES

Isolated 1W Single Output DC/DC Converters

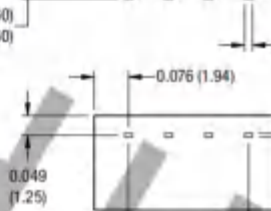
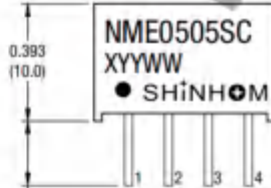
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP Package



SIP Package



PIN CONNECTIONS - 8 PIN DIP

Pin	Function
1	-VIN
4	+VIN
5	+VOUT
7	-VOUT

PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-VIN
2	+VIN
3	-VOUT
4	+VOUT

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

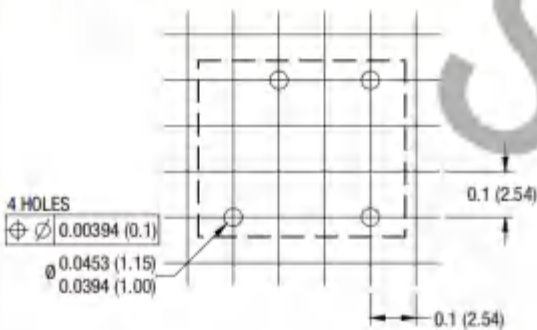
NME 5V & 12V SERIES

Isolated 1W Single Output DC/DC Converters

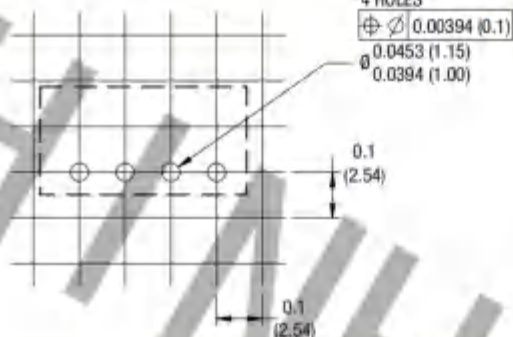
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

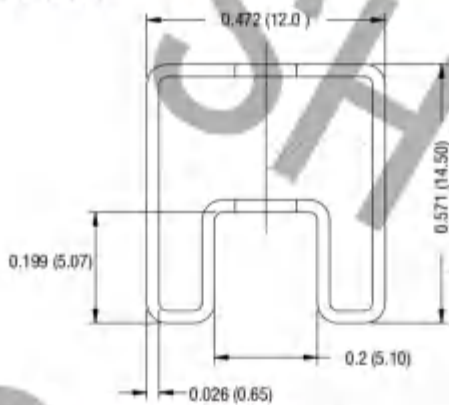


4 Pin SIP Package

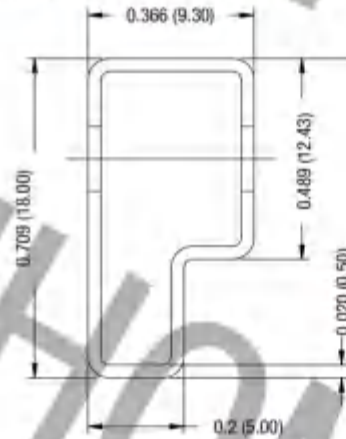


TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



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

Tube Quantity : 35

RoHS COMPLIANCE INFORMATION



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
- ▶ Single Isolated Output
- ▶ 1kVDC Isolation
- ▶ Efficiency up to 80%
- ▶ Power Density 1.45W/cm²
- ▶ UL 94V-0 Package Material
- ▶ Footprint from 0.69cm²
- ▶ 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 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 ¹	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	%V _o
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

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

2. See loading 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.



For full details go to
www.co4power.com/rohs

NME 24V & 48V SERIES

Isolated 1W Single Output DC/DC Converters

ISOLATION CHARACTERISTICS

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

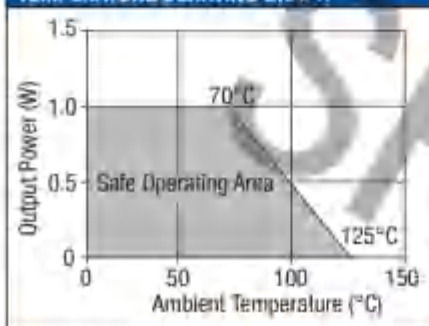
GENERAL CHARACTERISTICS

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

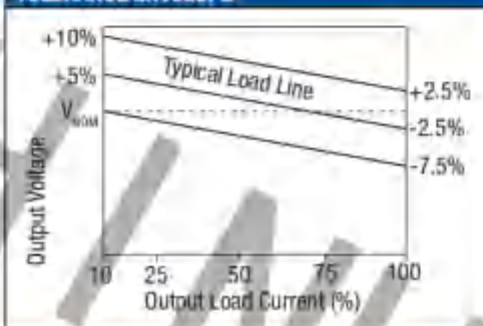
TEMPERATURE CHARACTERISTICS

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.

SHIN-HOM 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.

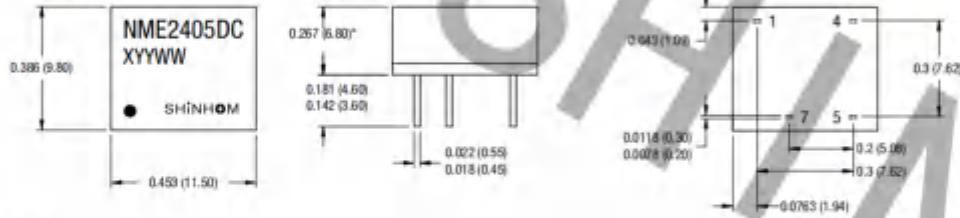
NME 24V & 48V SERIES

Isolated 1W Single Output DC/DC Converters

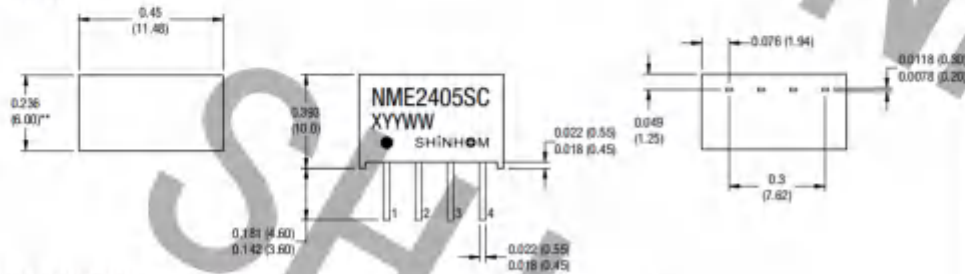
PACKAGE SPECIFICATIONS

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 ± 0.25 mm). 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}

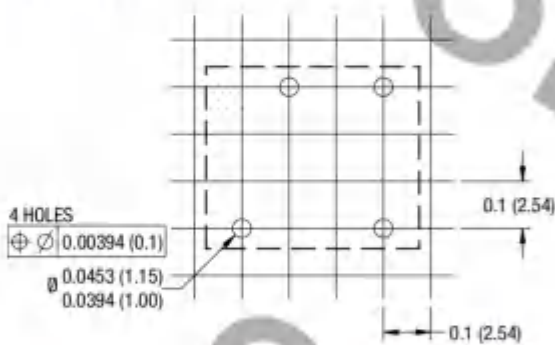
NME 24V & 48V SERIES

Isolated 1W Single Output DC/DC Converters

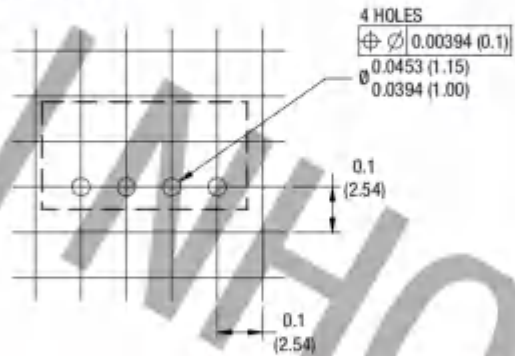
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

8 Pin DIP Package

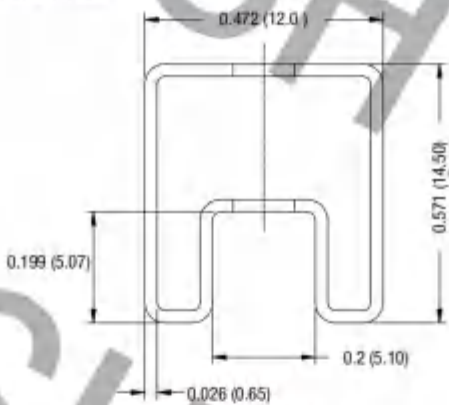


4 Pin SIP Package

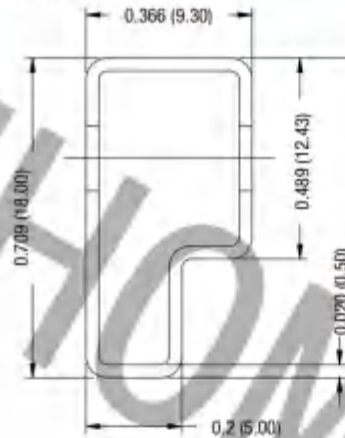


TUBE OUTLINE DIMENSIONS

8 Pin DIP Tube



4 Pin SIP Tube



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

Tube Quantity : 35

RoHS COMPLIANT INFORMATION



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/cm²
- Single isolated output
- SIP & DIP package styles
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm²
- 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 input 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	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	22.6	24	25.2	
	Continuous operation, 48V input types	45.6	48	50.4	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	1 second
Lead temperature, 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 $T_a = 25^\circ\text{C}$, nominal input voltage and rated output current unless otherwise specified.



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	8W=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	V _{iso} = 500VDC	0.1			GΩ

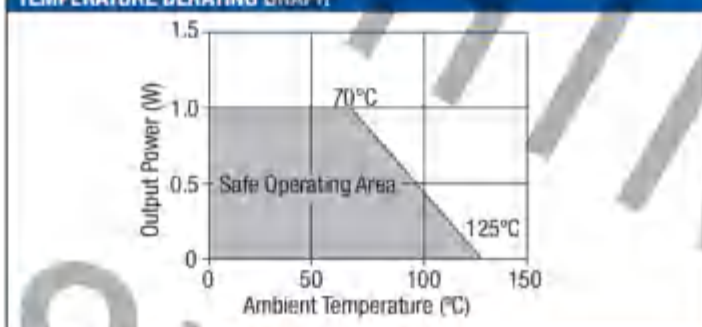
GENERAL CHARACTERISTICS

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			35		
Storage		-55		150	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



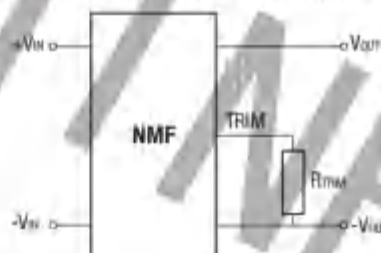
RoHS COMPLIANCE INFORMATION



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 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)

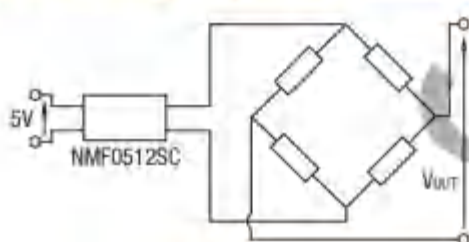
The trimming (adjust) input on the device allows output voltage adjustment from 1.2V to 3.3VDC by using a resistor as shown here. The table below provides R_{TRIM} values for the most commonly required output voltages. For applications not requiring the TRIM function, this pin must be left unconnected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



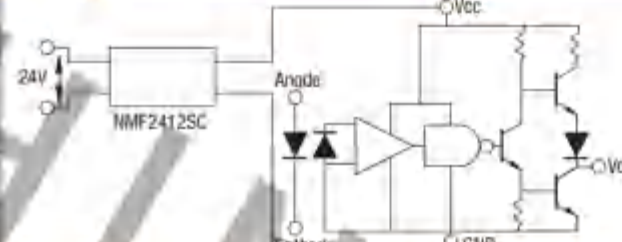
V _{OUT SET} (V)	R _{TRIM} (Ω)
1.2	0
1.5	64
2.0	224
2.1	263
2.2	304
2.5	448
3.3	1071

TYPICAL APPLICATIONS

Pressure sensor, or strain gauge equivalent circuit



Schmitt 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.

SHINROM 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

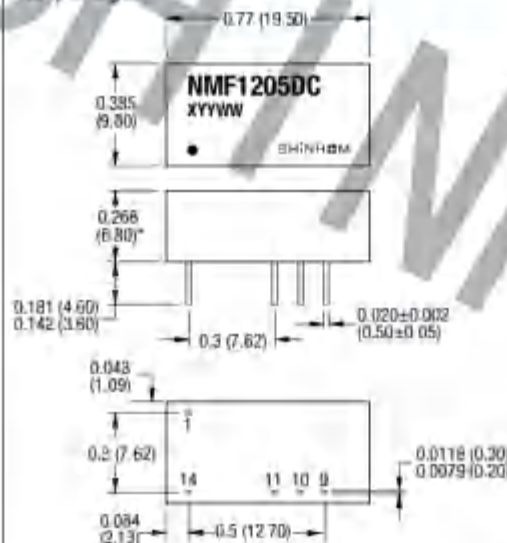
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMF series has toroidal isolation transformers, with no additional insulation between 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 the 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.

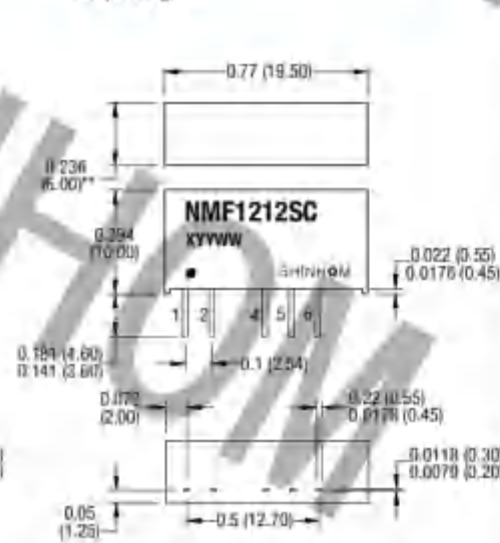
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* 0.300 (7.70) for 48V variants

** 0.295 (7.50) for 48V variants

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

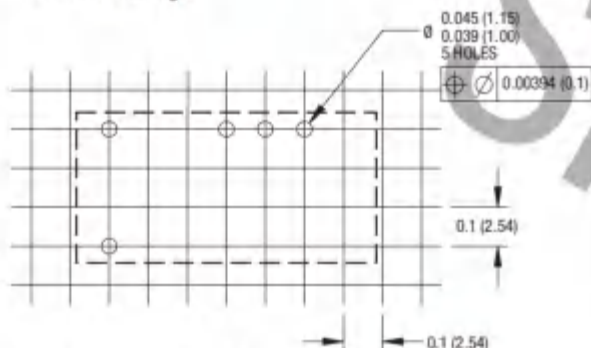
PIN CONNECTIONS - 7 PIN SIP

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

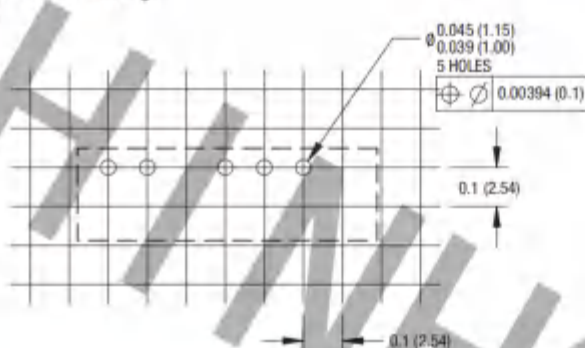
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



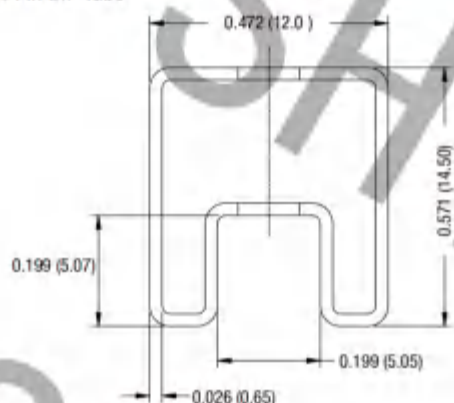
7 Pin SIP Package



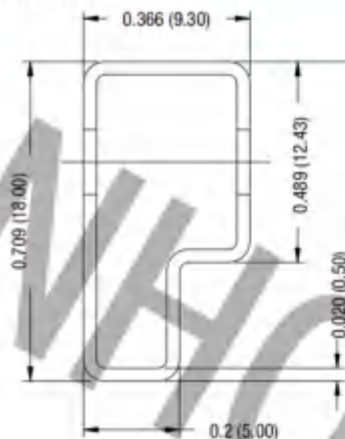
All dimensions in inches ± 0.01 (mm ± 0.25 mm).

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25



FEATURES

- RoHS compliant
- Efficiency up to 86%
- Power density up to 1.44W/cm²
- 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 1.46cm²
- 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 building 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.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF	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	185	
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	185	
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.



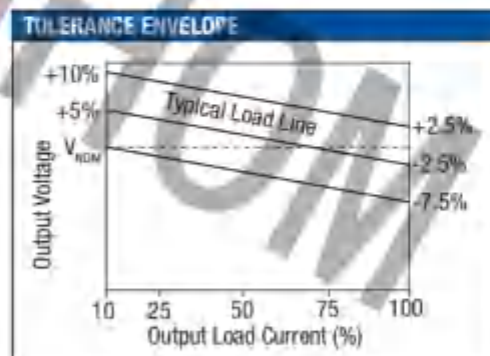
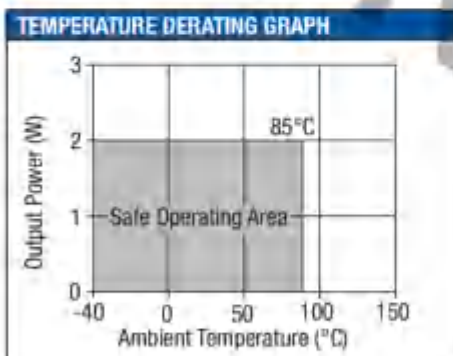
OUTPUT CHARACTERISTICS					
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Rated Power ¹	T _A = -40°C to 85°C			2	W
Voltage Set Point Accuracy	NMH0505DC/SC	-5		7.5	%
	All other types	-5		5	
Line regulation	High V _{IN} to low V _{IN}		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		5	10	
	10% load to rated load, 9V output types				%
	10% load to rated load, 12V output types		3	10	
	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				



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.

SHINOHM 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

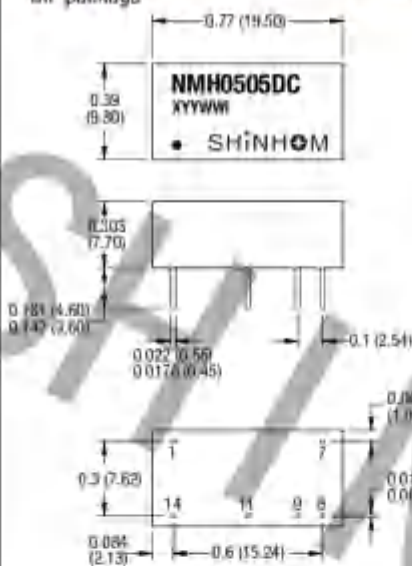
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMH series has toroidal isolation transformers, with no additional insulation between 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



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}

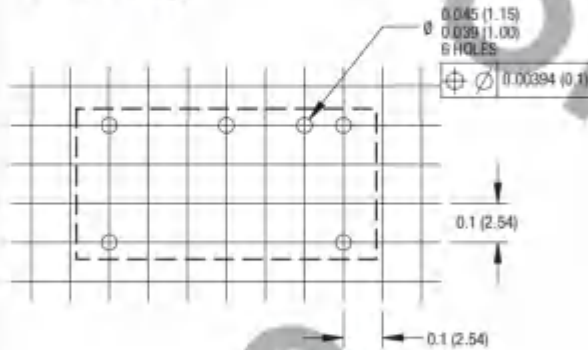
All dimensions in inches ± 0.01 mm ± 0.25 mm. All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of top surface.

Weight: 2.05g (DIP) 2.76g (SIP)

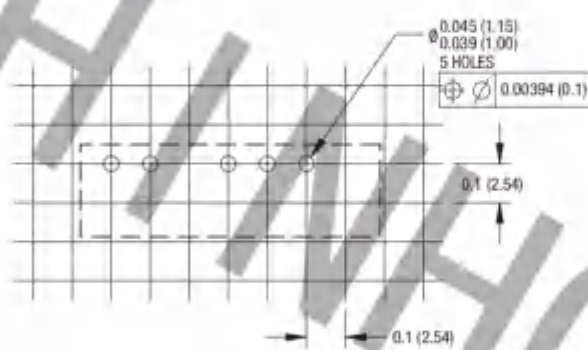
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

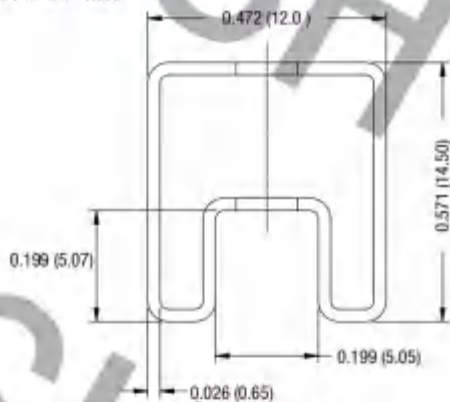


7 Pin SIP Package

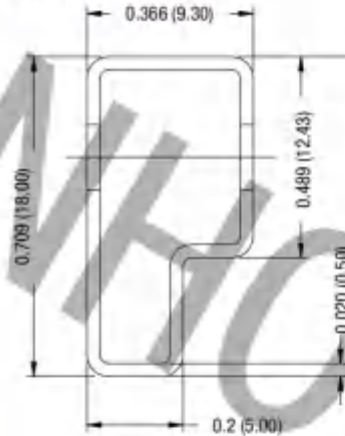


TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25

RoHS COMPLIANT INFORMATION



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%

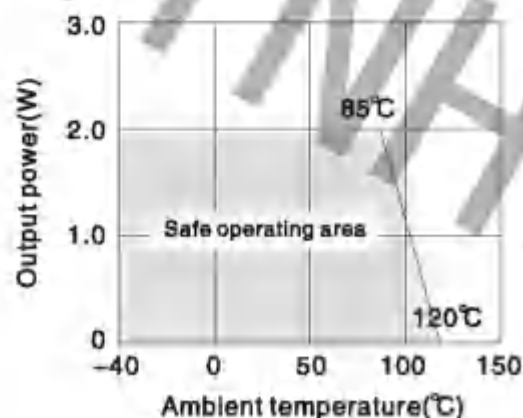


ELECTRICAL CHARACTERISTICS@25°C

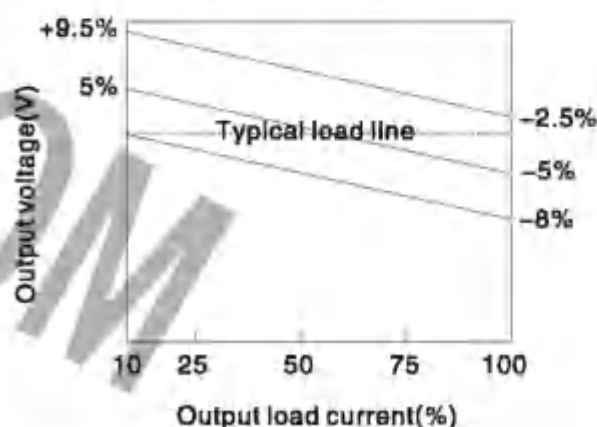
Part No./Customer P/N	NMH0507DC/AM2D-0507DZ
Input range	4.5-5.5
Output(Voltage,current)	$\pm 7.2\text{VDC} \pm 139\text{mA}$
Output current	$\pm 14\text{mA}$
Efficiency	78TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	-7.5 (MIN) ,+2.5(MAX)
Load regulation	15(TYP) 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°C - +85°C)	$\pm 0.03\%/^{\circ}\text{C}$ (MAX)
Store humidit	95%(MAX)
Working temperature (temperature $\geq 85^{\circ}\text{C}$ for derating use)	-40°C - 85°C
Storage temperature	-55°C - 125°C
The shell heats up when the product is working	35°C (TYP)
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble-free time (TA=25°C)	1 million hours
Insulation resistance (Insulation voltage 1000VDC)	1000M Ω (MIN)
The shell material	Flame-retardant heat-resistant plastics(UL94-V0)

TEMPERATURE DROP CURVE OF OUTPUT POWER

TEMPERATURE DERATING GRAPHS



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)

Dual output



Single output



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

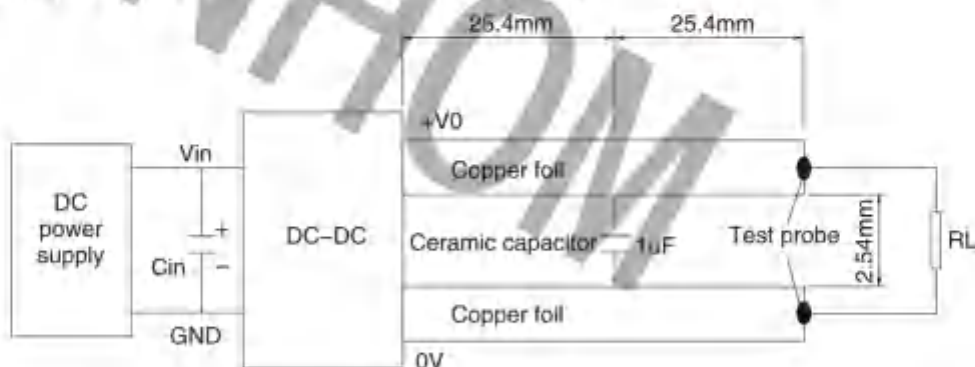
Capacity load table (table 1)

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

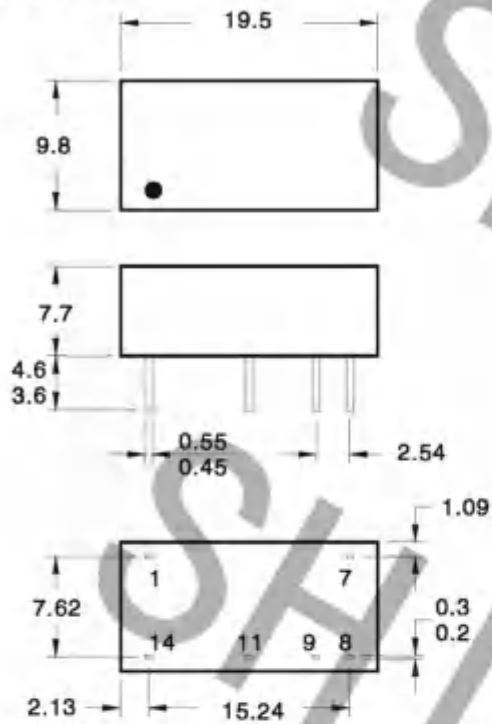
The ripple noise test of the product is carried out according to the following circuit. The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



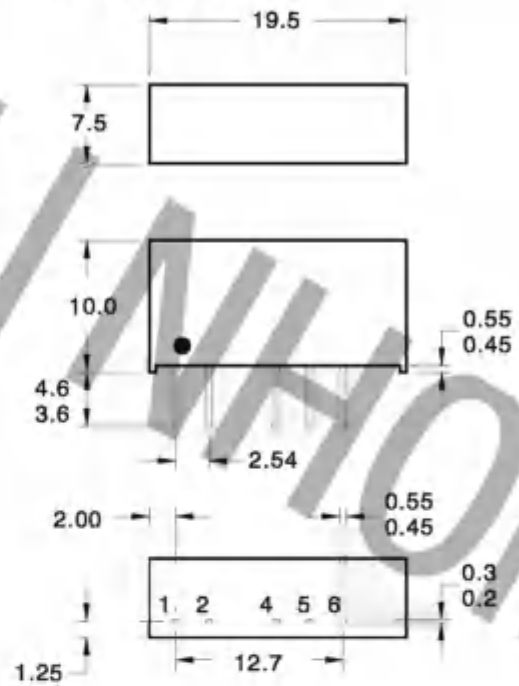
2W DUAL OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



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

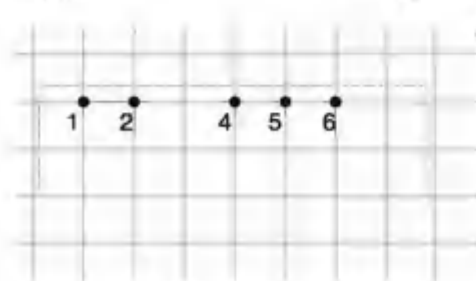
PIN WAY

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

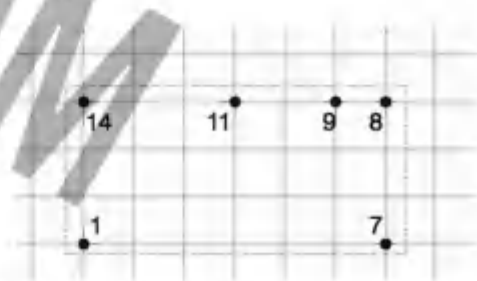
PINS	SIP
1	Vin
2	GND
4	-V0
5	0V
6	+V0

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%

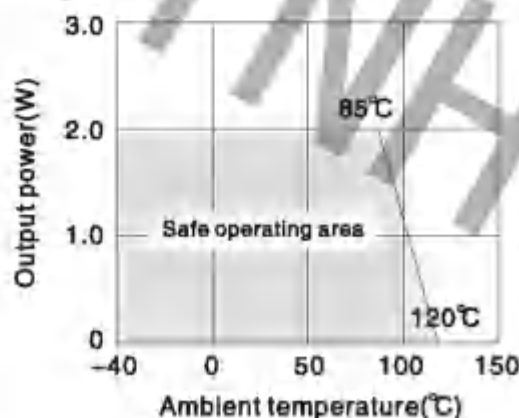


ELECTRICAL CHARACTERISTICS@25°C

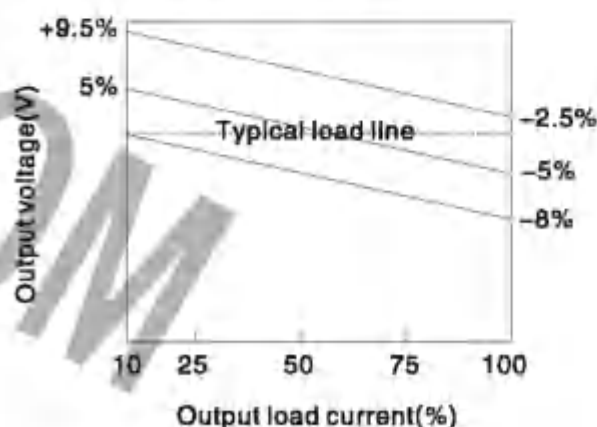
Part No./Customer P/N	NMH05078C/AM2D-0507SZ
Input range	4.5~5.5
Output(Voltage,current)	7.2VDC/276mA
Output current	28mA
Efficiency	80TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	-7.5 (MIN) ,+2.5(MAX)
Load regulation	15(TYP) 20(MAX)
Voltage regulation	1(TYP) ±1.2 (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°C ~ +85°C)	± 0.03%/°C(MAX)
Store humidit	95%(MAX)
Working temperature (temperature ≥ 85°C for derating use)	-40°C ~ 85°C
Storage temperature	-55°C ~ 125°C
The shell heats up when the product is working	35°C (TYP)
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble-free time (TA=25°C)	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 DERATING GRAPHS



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

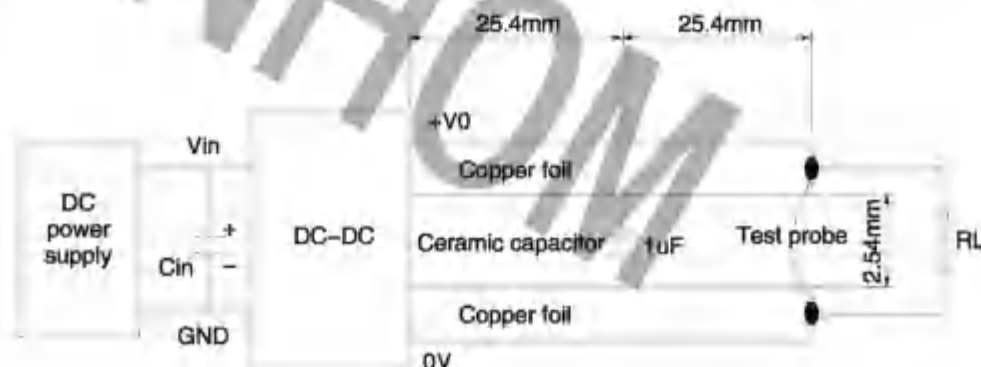
Capacity load table (table 1)

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

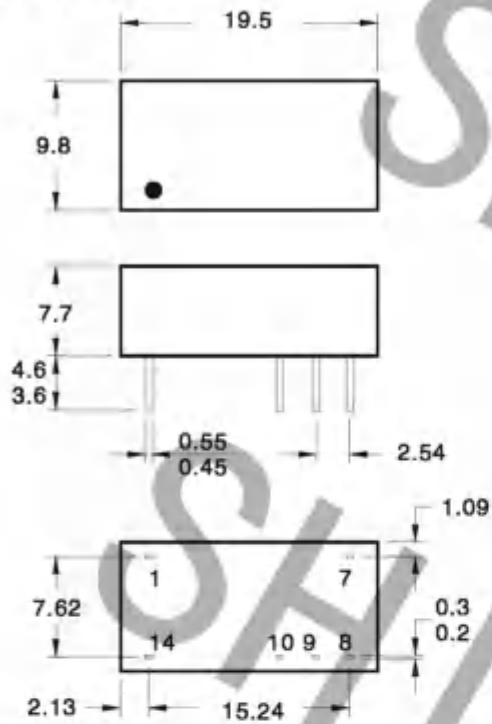
The ripple noise test of the product is carried out according to the following circuit. The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



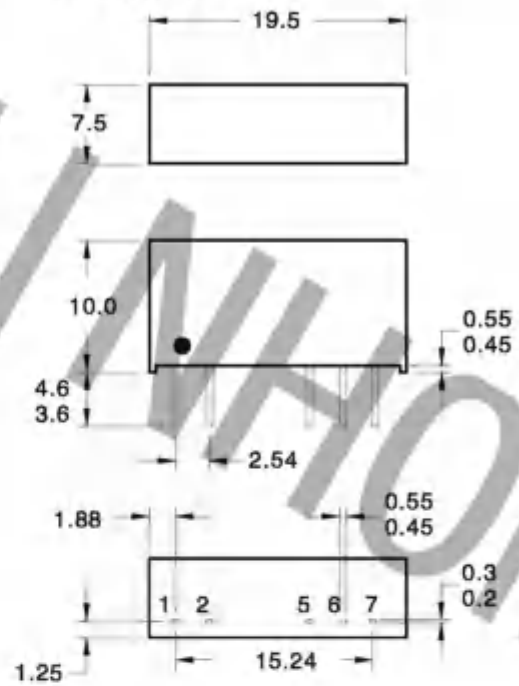
2W SINGLE OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



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

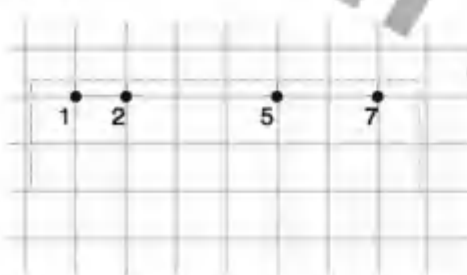
PIN WAY

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

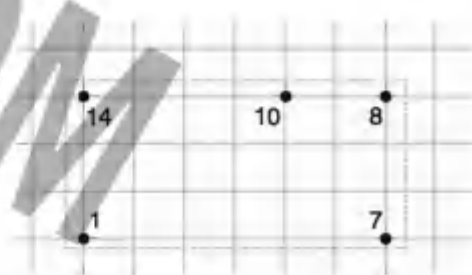
PINS	SIP
1	Vin
2	GND
5	0V
7	+V0

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%

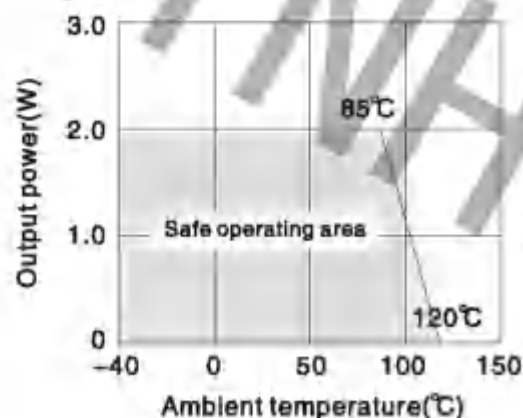


ELECTRICAL CHARACTERISTICS@25°C

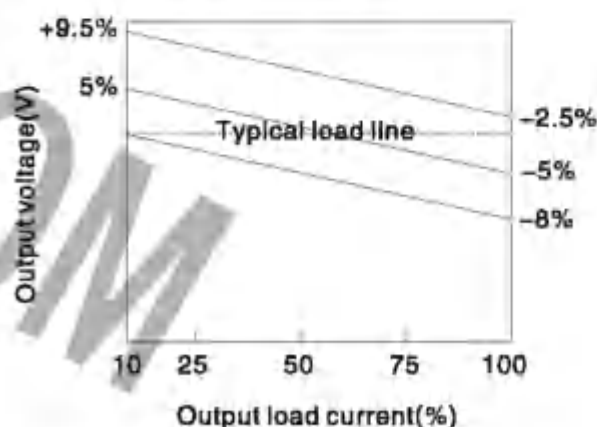
Part No./Customer P/N	NMH0512SC/AM2D-0512SZ
Input range	4.5-5.5
Output(Voltage,current)	12VDC/167mA
Output current	17mA
Efficiency	83TYP
Load capacitance	470uF
Output voltage accuracy (input voltage range, 100% load)	-7.5 (MIN) ,+2.5(MAX)
Load regulation	15(TYP) 20(MAX)
Voltage regulation	1(TYP) ±1.2 (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°C - +85°C)	± 0.03%/°C(MAX)
Store humidit	95%(MAX)
Working temperature (temperature ≥ 85°C for derating use)	-40°C - 85°C
Storage temperature	-55°C - 125°C
The shell heats up when the product is working	35°C (TYP)
Insulation strength (test time 1 min, leakage current less than 0.5mA)	1500VDC
Cooling way	Natural cooling
Mean trouble-free time (TA=25°C)	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 DERATING GRAPHS



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

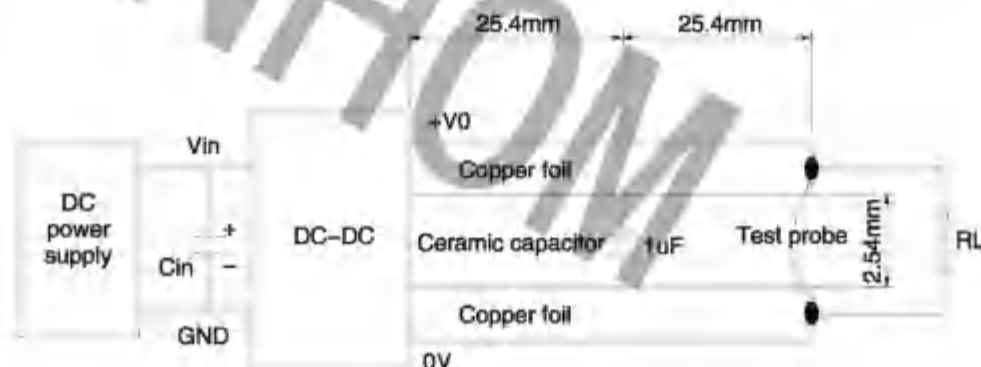
Capacity load table (table 1)

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

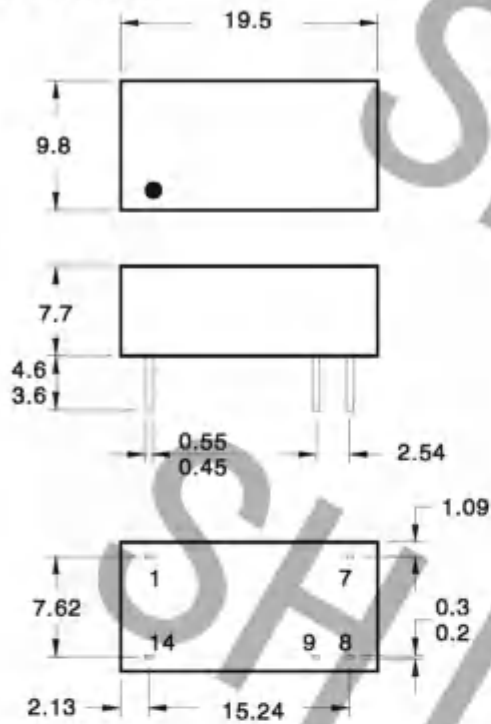
The ripple noise test of the product is carried out according to the following circuit. The sum of the voltage drops of the two parallel copper foil strips shall be less than 2% of the output voltage value



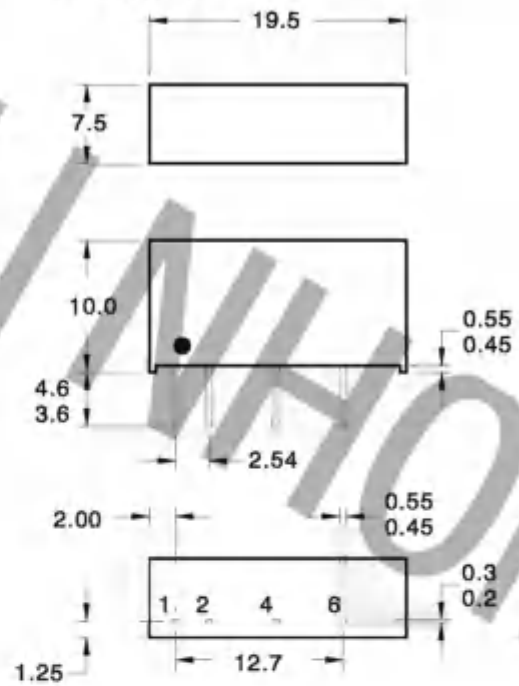
2W SINGLE OUTPUT DC-DC CONVERTER

APPEARANCE DIMENSION, SUGGESTED PRINTING BOARD DRAWING, PIN WAY

DIP PACKAGE



SIP PACKAGE



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

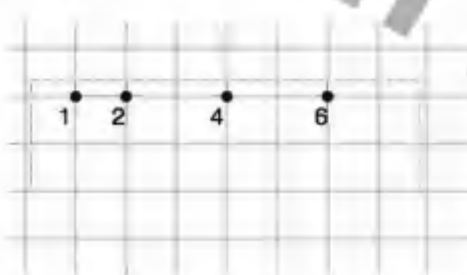
PIN WAY

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

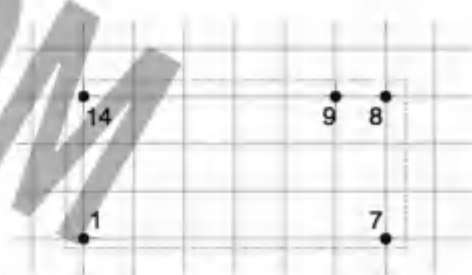
PINS	SIP
1	Vin
2	GND
4	0V
6	+V0

RECOMMENDED PAD

SIP



DIP



2.54mm*2.54mm/grid

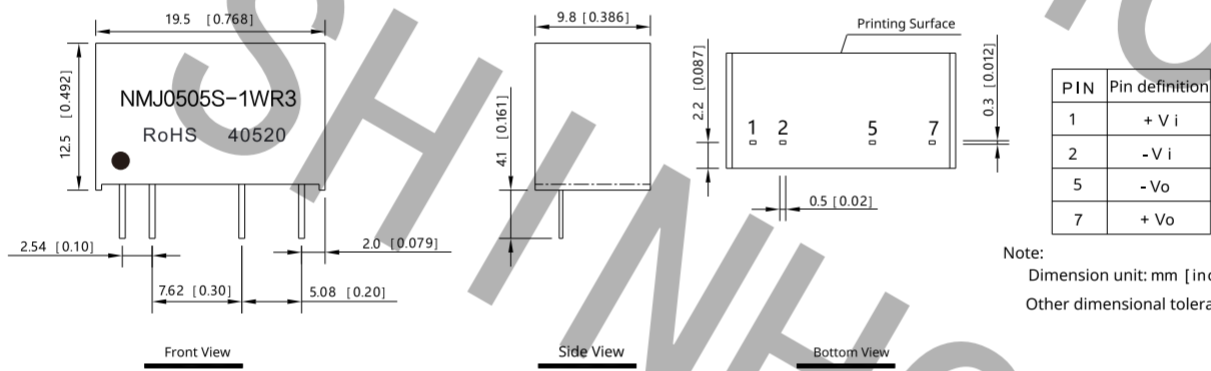
Product Performance

- ★ Compact SIP Packaging
- ★ Output Short Circuit Protection, Self-Recovery
- ★ Isolation Voltage 6000VDC
- ★ High Efficiency, High Power Density, Low Ripple Noise
- ★ Industrial-grade product design, compact size
- ★ Operating temperature range: - 40 ~ + 85 °C



The NMJ0505 series is a specialized application provided by shinhome for customers based on the requirements of onboard power supply, generating a group of input-output isolation. This product is widely used in pure digital circuits, generally low-frequency analog circuit scenarios, relay drive circuits, data exchange circuit applications, and so on. It requires a relatively stable input power voltage, isolation between input and output, and does not have high precision requirements for output voltage.

Package size diagram



Product selection

Model	Input Voltage Range	Nominal Output Voltage/Current (Vo/Io)	Efficiency (Typ)	Minimum Output Current	Maximum Capacitive Load
NMJ0303S-1WR3	2.97~3.63V (Nominal: 3.3VDC)	3.3V/300mA	81%	30mA	10uF
NMJ0305S-1WR3		5V/200mA	81%	20mA	10uF
NMJ0812S-1WR3		12V/83mA	82%	9mA	4.7uF
NMJ0315S-1WR3		15V/67mA	78%	7mA	2.2uF
NMJ0324S-1WR3		24V/42mA	82%	4mA	1uF
NMJ0503S-1WR3	4.5~5.5V (nominal: 5VDC)	3.3V/300mA	81%	30mA	10uF
NMJ0505S-1WR3		5V/200mA	81%	20mA	10uF
NMJ0512S-1WR3		12V/83mA	82%	9mA	4.7uF
NMJ0515S-1WR3		15V/67mA	78%	7mA	2.2uF
NMJ0524S-1WR3		24V/42mA	82%	4mA	1uF
NMJ1203S-1WR3	10.8~13.2V (nominal: 12VDC)	3.3V/300mA	81%	30mA	10uF
NMJ1205S-1WR3		5V/200mA	83%	20mA	10uF
NMJ1212S-1WR3		12V/83mA	79%	9mA	4.7uF
NMJ1215S-1WR3		15V/67mA	80%	7mA	2.2uF
NMJ1224S-1WR3		24V/42mA	81%	4mA	1uF

NMJ1503S-1WR3		3.3V/300mA	81%	30mA	10uF
NMJ1505S-1WR3	13.5~16.5V (Nominal: 15VDC)	5V/200mA	79%	20mA	10uF
NMJ1512S-1WR3		12V/83mA	83%	9mA	4.7uF
NMJ1515S-1WR3		15V/67mA	82%	7mA	2.2uF
NMJ1524S-1WR3		24V/42mA	79%	4mA	1uF
NMJ2403S-1WR3	21.6~26.4V (nominal: 24VDC)	3.3V/300mA	81%	30mA	10uF
NMJ2405S-1WR3		5V/200mA	80%	20mA	10uF
NMJ2412S-1WR3		12V/83mA	81%	9mA	4.7uF
NMJ2415S-1WR3		15V/67mA	82%	7mA	2.2uF
NMJ2424S-1WR3		24V/42mA	80%	4mA	1uF

Output Characteristics

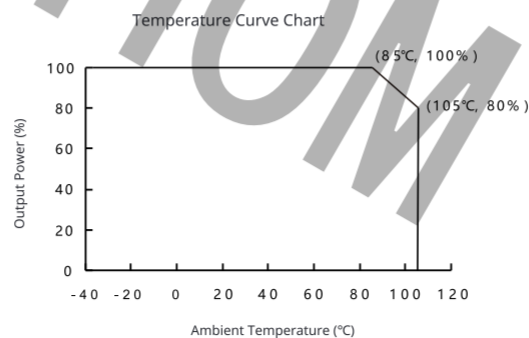
Item	Operating Conditions	Min	Typ	Max
Output Power		0.1W	--	--
Output voltage accuracy	Input voltage range, 100% load	--	± 15%	--
Voltage adjustment rate	Under rated load, input voltage variation ±1%	--	± 1.5%	--
Load adjustment rate	10%~100% load	--	15%	20%
Output ripple noise ①	20MHz bandwidth (peak-to-peak)	--	150 mV	20 0mV
Temperature drift coefficient	Nominal voltage input, 100% load, -40°C~+85°C	--	--	± 0.03%/°C

* Note: ①The test method for ripple noise adopts the parallel line test method, for specific operational methods refer to "DC-DC Module Power Supply Application Guide".

General Characteristics

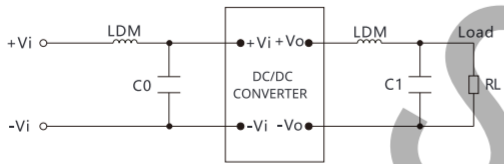
Item	Operating Conditions	Min	Typ	Max
Insulation voltage	Input-output, testing time 60s	6000VDC	--	--
Working temperature		-40°C	--	+85°C
Storage temperature		-55°C	--	+105°C
Storage humidity		--	--	95%RH
Switching frequency		--	100KHz	--
MTBF	MIL-HDBK-217F, 25°C		3500,000h	
Shell material	Black flame retardant and heat-resistant plastic (UL94-V0)			

Product Performance Curve



Reference scheme

1 Typical application circuit diagram



Figure[1] Typical Application Circuit

Comment (Figure 1)

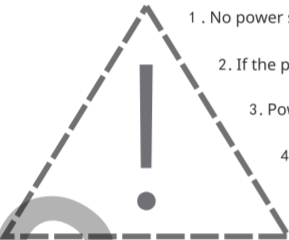
- It is recommended to make external capacitors for the product input or output terminals.
- It is not advisable to use ceramic capacitors or electrolytic capacitors.
- Use tantalum capacitors, otherwise there is a certain risk of failure.
- b. The product does not support outputting parallel increased power or hot-swapping
- Use

Input Voltage	3.3 V	5 V	12V	15V	24 V
C0	4.7μF	4.7μF	2.2μF	2.2μF	1μF

Output Voltage	3.3 V	5 V	12V	15V	24 V
C1	10μF	10μF	4.7μF	2.2μF	1μF

LDM	6.8μH
-----	-------

Safety precautions and statement



- No power supply product shall exceed the rated output power, nor exceed the rated input voltage range
- If the power supply product has multiple outputs, all outputs must be loaded simultaneously according to their respective ratios
- Power supply products without short circuit protection must not have short circuit conditions at the output terminals
- If the physical pin definitions of the power supply product are inconsistent with the product selection manual, the physical pin definitions shall prevail
- Never modify our power supply products at will; we shall not be responsible for any consequences caused by such actions



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/cm²
- UL 94V-0 package material
- Footprint from 1.05cm²
- 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.



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	V
Reflected ripple current	5V input types		33		mA p-p
	12V input types		38		mA p-p

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		2.0	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		5.7	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	V _{iso} = 500VDC	10			GΩ

ABSOLUTE MAXIMUM RATINGS

Lead temperature (5mm from case for 70 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 loading curve.

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

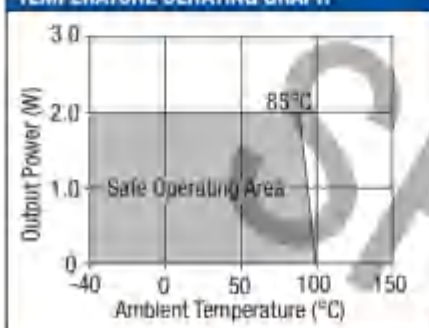
GENERAL CHARACTERISTICS

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

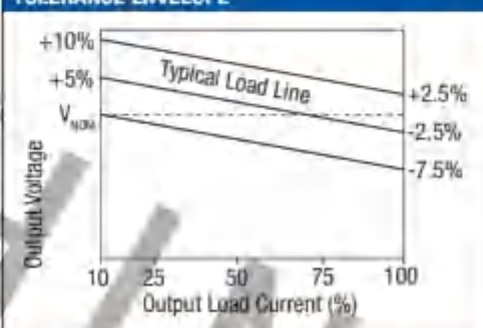
TEMPERATURE CHARACTERISTICS

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.

SHINOHM 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

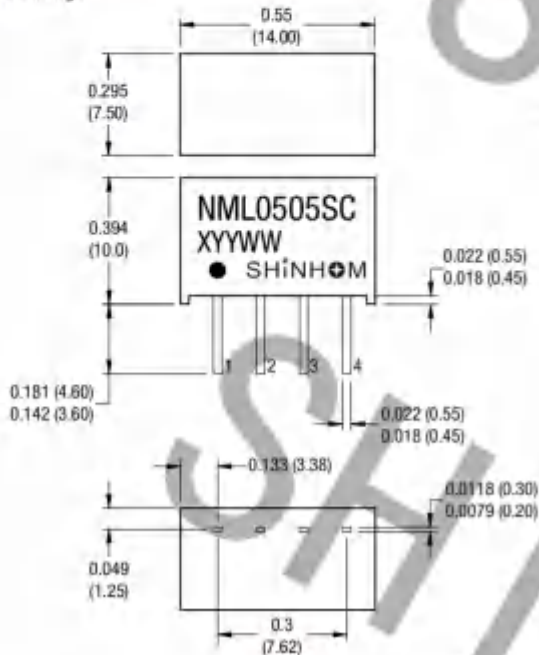
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NML series has toroidal isolation transformers, with no additional insulation between 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



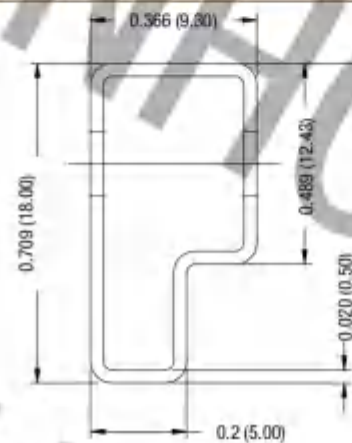
All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position.

Weight: 2.0g

PIN CONNECTIONS - 4 PIN SIP

Pin	Function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

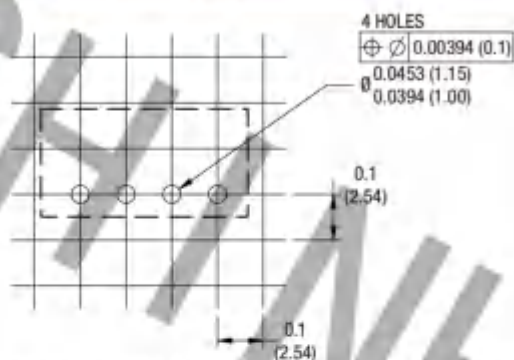
TUBE OUTLINE DIMENSIONS



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

Tube Quantity : 35

RECOMMENDED FOOTPRINT DETAILS



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

RoHS COMPLIANT INFORMATION



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 this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.



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	1235
NMR102C	5	15	67	253	79	40	127
NMR106C	12	5	200	121	69	36	515
NMR107C	12	12	83	119	75	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 _i to low V _i		1.0	1.2	%/%
Load Regulation ¹	10% load to rated load, NMR100C/106C		12.5	13.4	%
	10% load to rated load, NMR101C/107C		5.90	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 _i , NMR100C, NMR101C, NMR102C	TV
Input voltage V _i , NMR106C, NMR107C, NMR108C	15V
Input voltage V _i , 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.

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/cm²
- UL 94V-0 package material
- Footprint from 1.17cm²
- 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

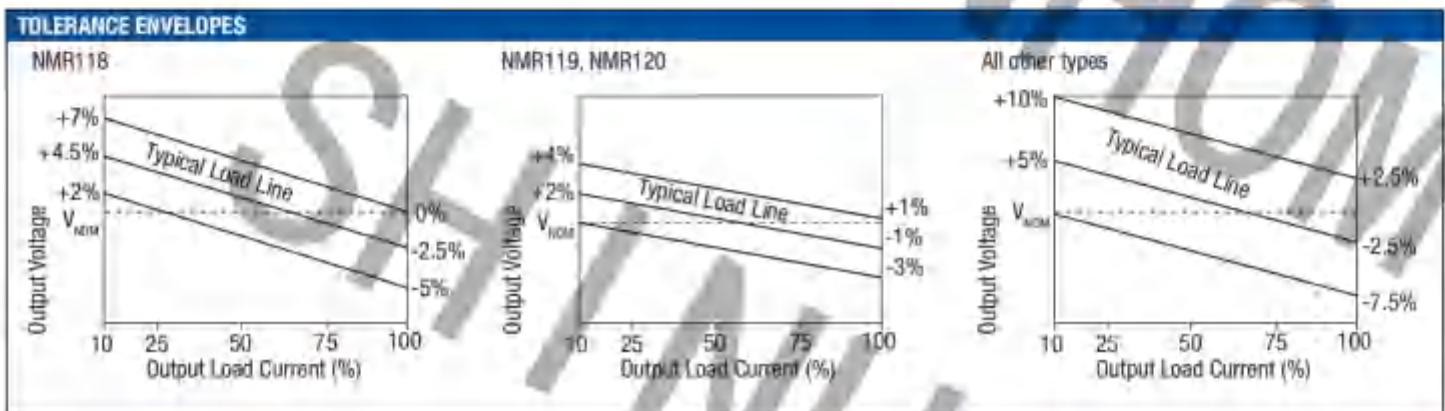
DESCRIPTION

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 -40°C to 85°C.



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				

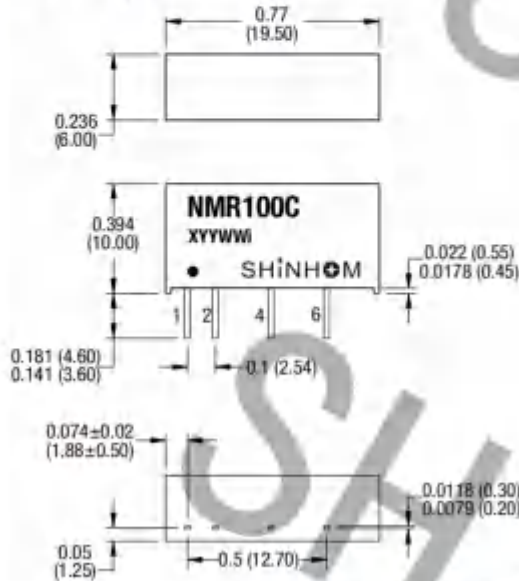


TECHNICAL NOTES	
ISOLATION VOLTAGE 'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical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



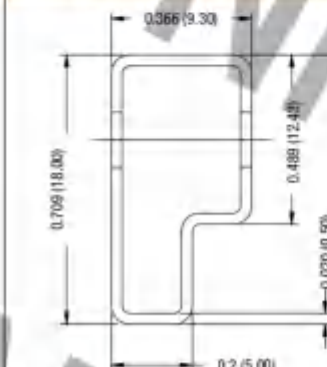
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 2.1g

PIN CONNECTIONS - 7 PIN SIP

Pin	Function
1	+Vin
2	-Vin
4	-Vout
6	+Vout

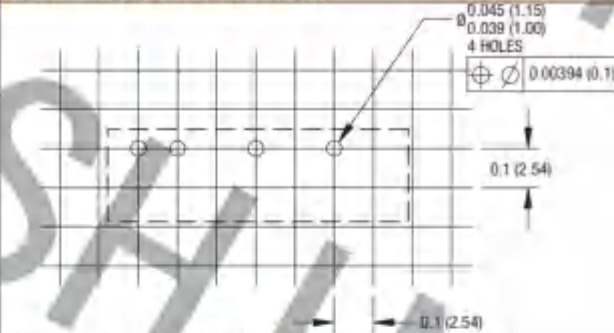
TUBE OUTLINE DIMENSIONS



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

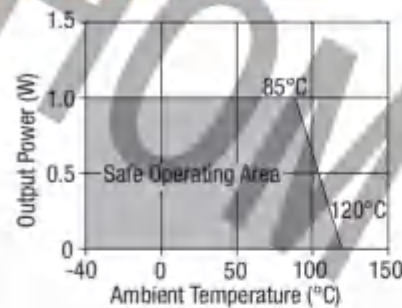
Tube quantity: 25

RECOMMENDED FOOTPRINT DETAILS



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

TEMPERATURE DERATING GRAPH



RoHS COMPLIANT INFORMATION



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 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
- UL1950 recognized
- Efficiency to 82%
- Power density up to 0.44W/cm²
- Dual outputs
- Low profile package
- UL 94V-0 package material
- No heatsink required
- Footprint 4.75cm²
- 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 suitable 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	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		8	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 ²	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.

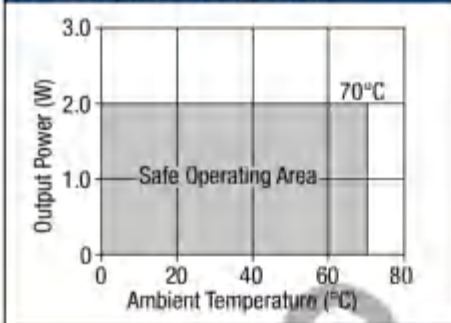
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.



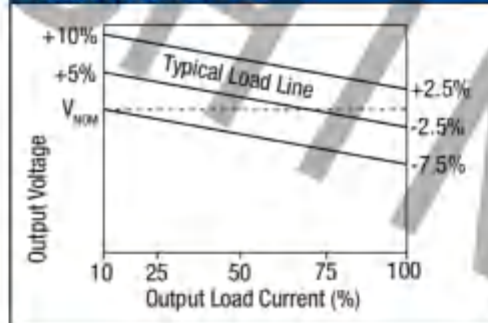
TEMPERATURE CHARACTERISTICS

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.

SHINOHM 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?"

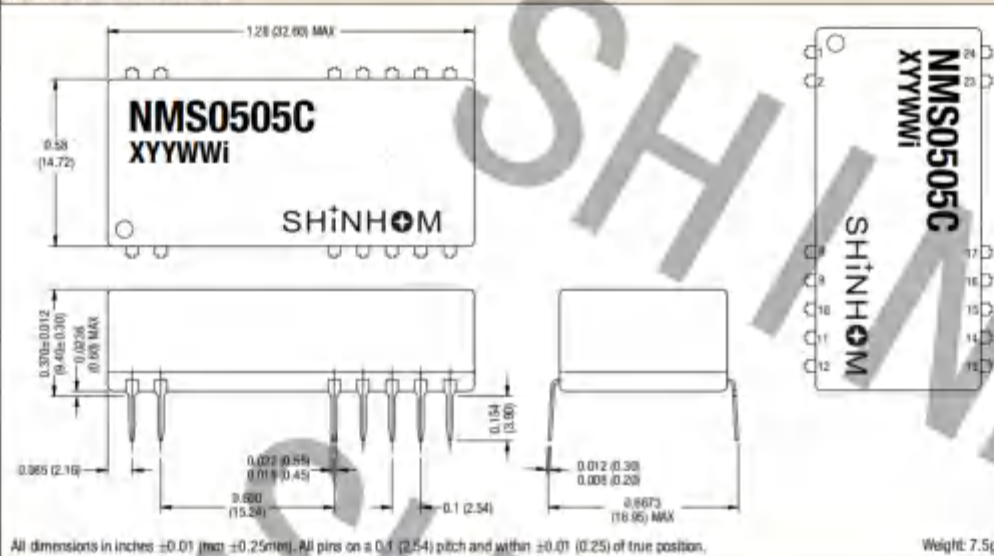
The NMS series has been recognized by Underwriters Laboratory to a working voltage of 300Vrms for Supplementary Insulation system and 150Vrms for Reinforced Insulation systems.

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

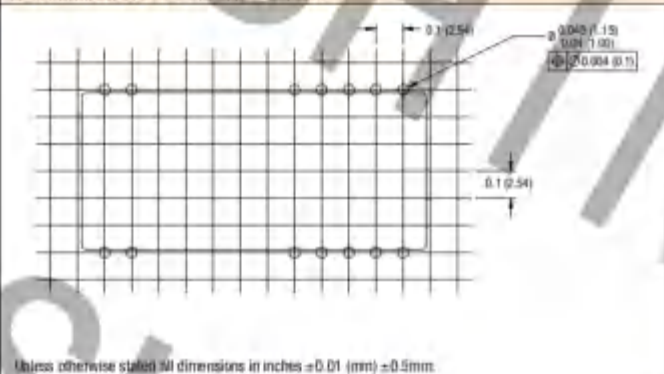
MECHANICAL DIMENSIONS



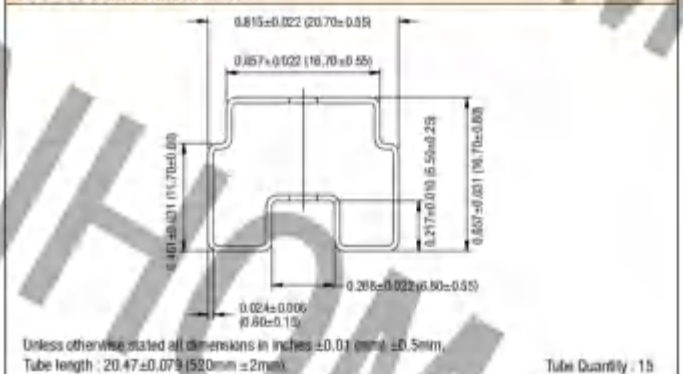
PIN CONNECTIONS

Pin	Function
1	+V _{IN}
2	-V _{IN}
8	-V _{OUT}
9	NC
10	OV
11	NC
12	+V _{OUT}
13	+V _{OUT}
14	NC
15	OV
16	NC
17	-V _{OUT}
23	NC
24	NC

RECOMMENDED FOOTPRINT DETAILS



TUBE OUTLINE DIMENSIONS



RoHS COMPLIANCE INFORMATION



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 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/cm²

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	
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		65		mA
	NMT1272SC		66		
Zero load input current (I _{load})	NMT0572SC, 0% output load		50	30	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 _{out1}	P _{out} = 100mW	24		26.4	V
	P _{out} = 3W	22.2		24.6	
Output Voltage - V _{out2}	P _{out} = 100mW	48		52.8	
	P _{out} = 3W	44.4		49.2	
Output Voltage - V _{out3}	P _{out} = 100mW	72		79.2	V
	P _{out} = 3W	66.6		73.6	
Line regulation	V _{in} = 50% 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		
Isolation Resistance	1000VDC	1	10		GΩ

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection ⁴	1 second
Lead temperature 5mm from case for 70 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.



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

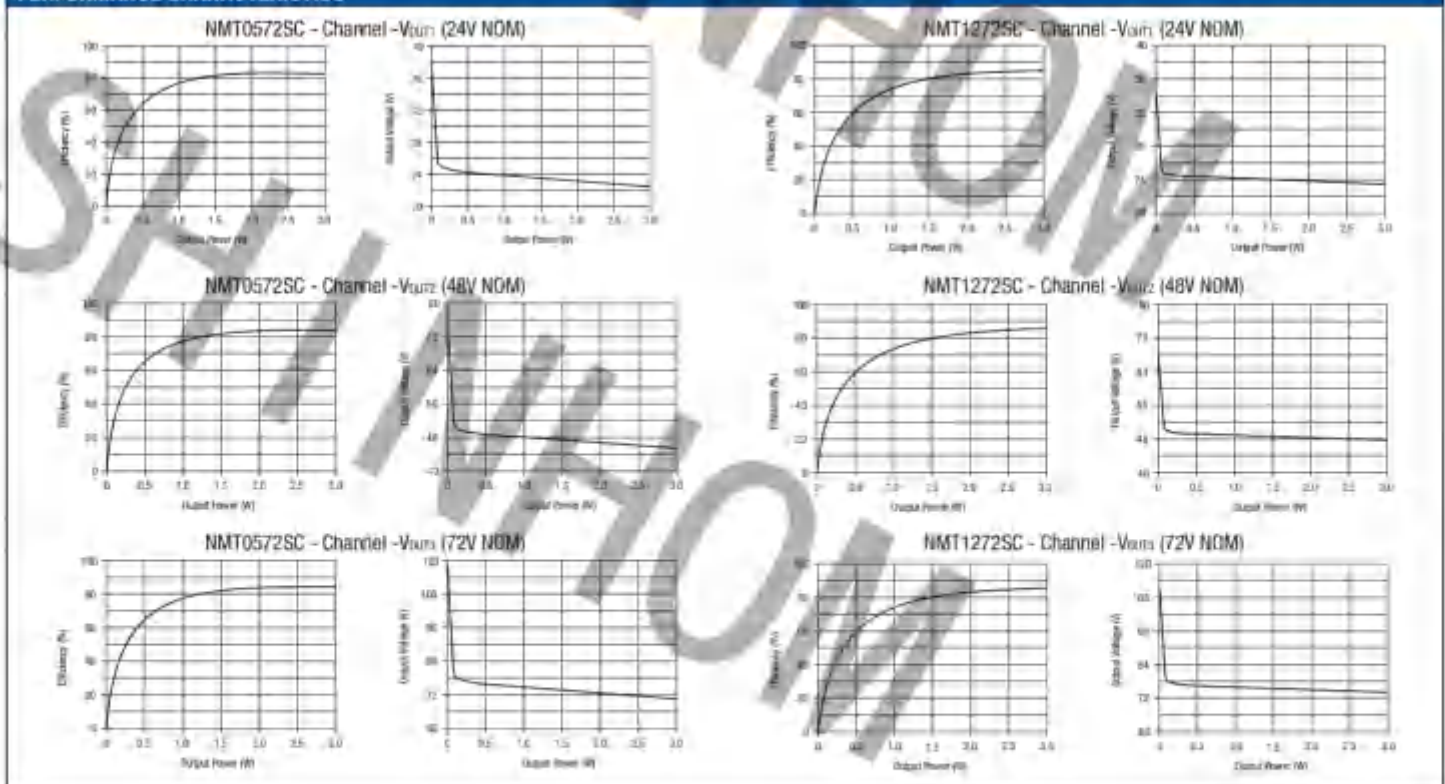
Although the output is described for negative rails, the input and output circuits are internally isolated hence positive rails can also be generated, or a mixture of positive and negative. The output $+V_{OUT}$ rail reference can be taken from any of the output terminals to give the range of outputs as described in the Output Voltage Configurations table below.

Channel Name	Standard Ref	Option 1	Option 2	Option 3
$+V_{OUT1}$	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



APPLICATION NOTES

RIPPLE SPECIFICATION

The output ripple for the NMT series is higher than standard for SHIN-HOM Technologies DC/DC converter. This is due to using low value ceramic capacitors internally for longer life performance 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 the 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 1 μ F 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.

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 lightning 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, RITL/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_{ring1}), the -48V rail is used to supply in line access circuitry (V_{in2}) and the -24V supply for the on-chip regulator for the logic interface (V_{in3}). Alternative devices from other manufacturers could use the -24V output for their internal circuit supply and -72V for ringing.

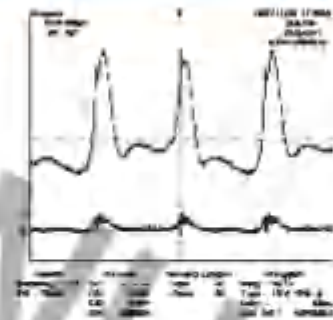


Figure 1. 100mV Output Ripple
Top: No external capacitors
Bottom: 1 μ F per channel external capacitors

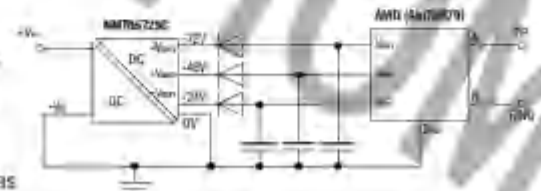


Figure 2. Supply for Ringing SLIC Device

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.

SHIN-HOM 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.

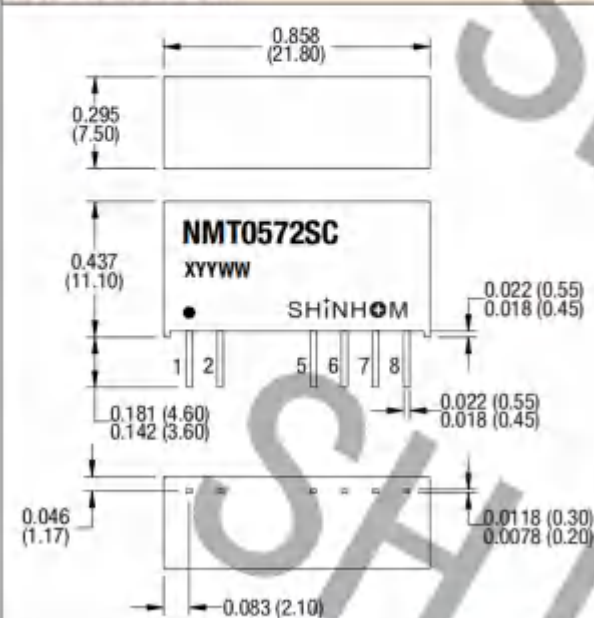
REPEATED HIGH-VOLTAGE ISOLATION TESTING

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



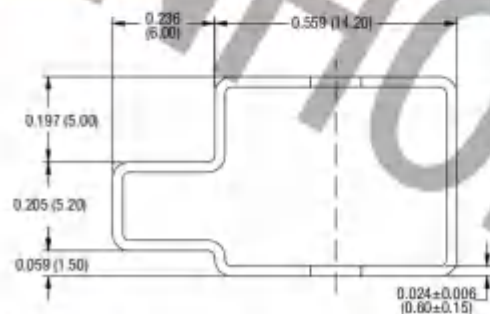
All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position.

Weight: 3.85g

PIN CONNECTIONS - 8 PIN SIP

Pin	Function
1	+VIN
2	-VIN
5	+VOUT
6	-VOUT1
7	-VOUT2
8	-VOUT3

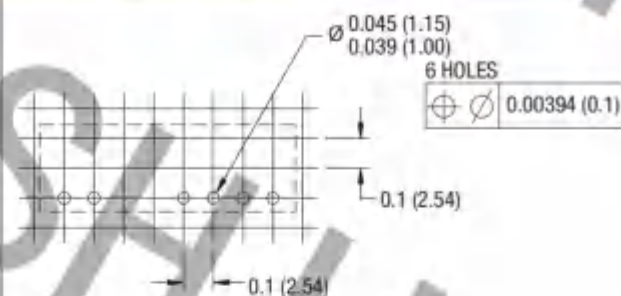
TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ± 0.02 (mm ± 0.5 mm).
Tube length : 20.47 $\pm$ 0.079 (520mm $\pm$ 2mm).

Tube Quantity : 23

RECOMMENDED FOOTPRINT DETAILS



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

RoHS COMPLIANT INFORMATION



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 this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.



SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Load Regulation (Typ)	Load Regulation (Max)	Ripple & Noise (Typ)	Ripple & Noise (Max)	Efficiency	Isolation Capacitance	MTTF	Package Style
	(V)	(V)	(mA)	(mA)	%	%	mVp-p	mVp-p	%	pF	kHrs	
NMV0505DAC	5	5	200	294	14.6	15	84	80	68	23	2414	DIP
NMV0509DAC	5	9	111	267	8.3	10	47	57	75	33	1173	
NMV0512DAC	5	12	84	260	7.4	8.0	35	49	77	26	633	
NMV0515DAC	5	15	67	250	6.7	7.3	32	44	78	27	360	
NMV0505SAC	5	5	200	294	14.6	15	84	80	68	23	2414	SIP
NMV0509SAC	5	9	111	267	8.3	10	47	57	75	30	1173	
NMV0512SAC	5	12	84	260	7.4	8.0	35	49	77	25	633	
NMV0515SAC	5	15	67	256	6.7	7.3	32	34	78	27	360	
NMV1205DAC	12	5	200	121	14.6	15	64	80	68	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	42	360	
NMV1215DAC	12	15	67	108	6.7	7.3	32	44	77	42	252	
NMV1205SAC	12	5	200	121	14.6	15	64	80	68	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	42	360	
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 output 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	V
Reflected ripple current			20	40	mA p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	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-213F 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 $T=25^{\circ}\text{C}$, nominal input voltage and rated output current unless otherwise specified.

FEATURES

- RoHS compliant
- Efficiency to 78%
- Power density up to $0.85\text{W}/\text{cm}^3$
- 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 building 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.



NMV 5V & 12V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power ²	T _{amb} =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

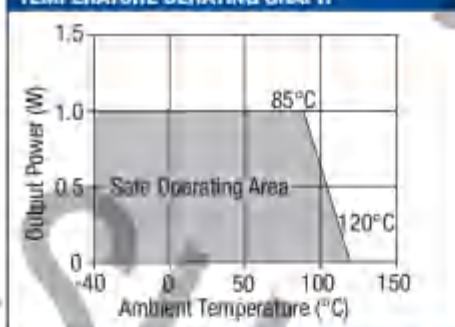
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		120	135	kHz
	12V input types		150	170	

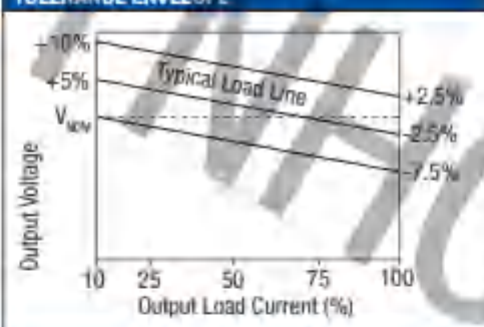
TEMPERATURE CHARACTERISTICS

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.

SHINOHM 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.

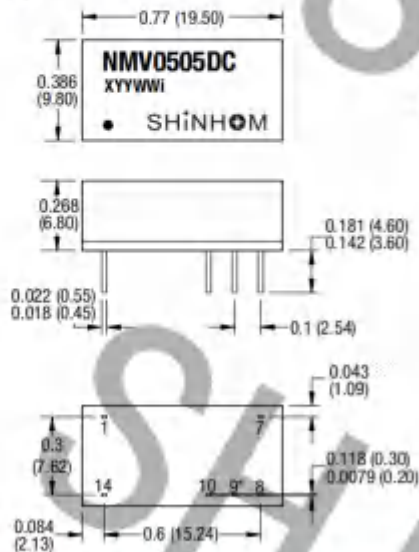
NMV 5V & 12V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

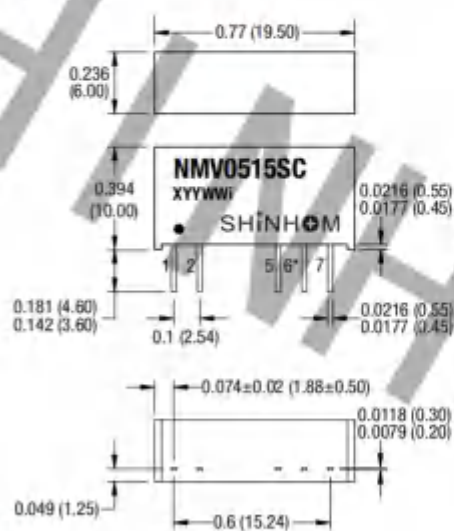
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* Pin not fitted on single output variants.

All dimensions in inches ± 0.01 (mm ± 0.25 mm). 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		7 Pin SIP	
Pin	Function	Pin	Function
1	-VIN	1	+VIN
7	NC	2	-VIN
8	+VOUT	5	-VOUT
10	-VOUT	7	+VOUT
14	+VIN		

Dual output variants

14 Pin DIP		7 Pin SIP	
Pin	Function	Pin	Function
1	-VIN	1	+VIN
7	NC	2	-VIN
8	+VOUT	5	-VOUT
9	0V	6	0V
10	-VOUT	7	+VOUT
14	+VIN		

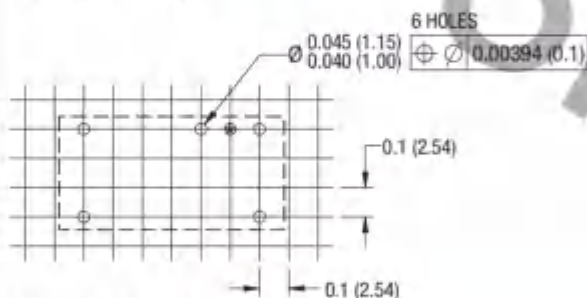
NMV 5V & 12V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

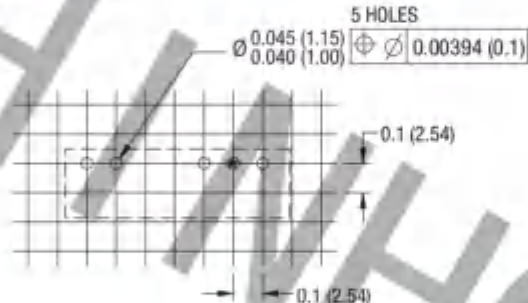
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



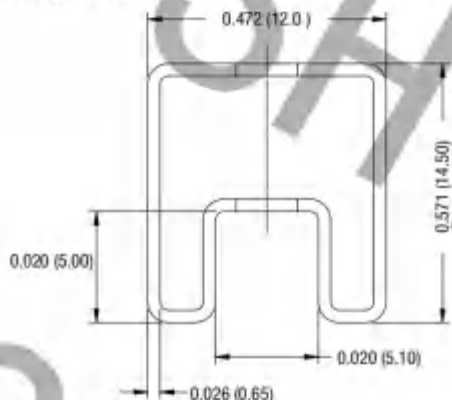
7 Pin SIP Package



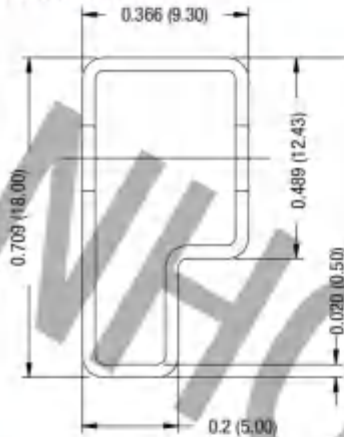
*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25

RoHS COMPLIANT INFORMATION



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
- Efficiency to 85%
- Power density up to 0.85W/cm²
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm²
- 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	Output Voltage	Output Current	Load Regulation (Max)	Ripple & Noise (Max)	Efficiency	Isolation Capacitance	MTTF	Package Style
	(V)	(V)	(mA)	(%)	(mV p-p)	(%)	(pF)	(kHrs)	
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	Condition	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 ¹	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. Guaranteed 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=25°C, nominal input voltage and rated output current unless otherwise specified.



NMV 24V & 48V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power	$T_A = 0^{\circ}\text{C}$ 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	$V_{iso} = 1000\text{VDC}$	1			GΩ

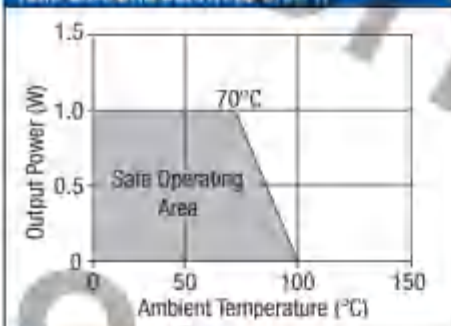
GENERAL CHARACTERISTICS

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

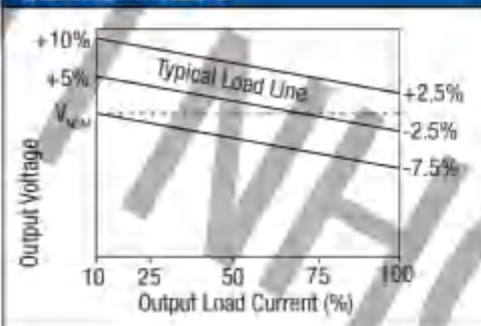
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	$^{\circ}\text{C}$
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.

SHIN-HOM 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?"

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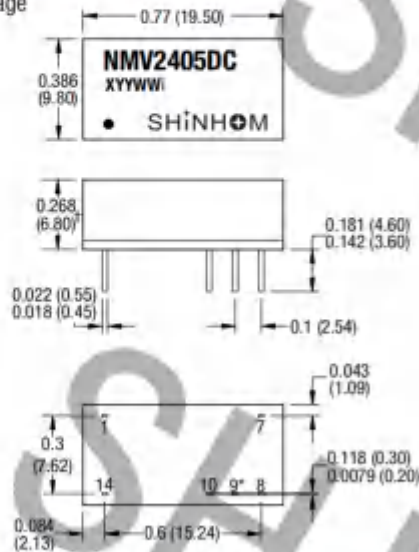
NMV 24V & 48V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

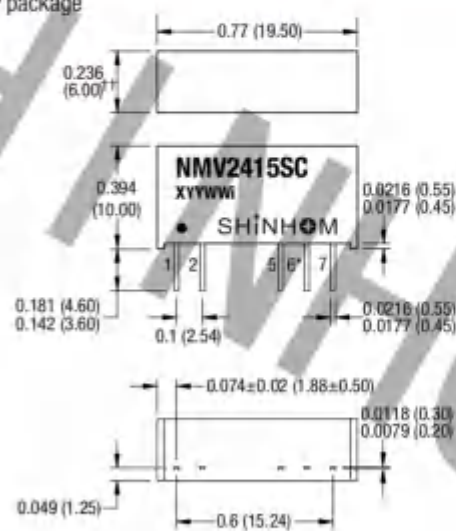
PACKAGE SPECIFICATIONS

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		7 Pin SIP	
Pin	Function	Pin	Function
1	-VIN	1	+VIN
7	NC	2	-VIN
8	+VOUT	5	-VOUT
10	-VOUT	7	+VOUT
14	+VIN		

Dual output variants

14 Pin DIP		7 Pin SIP	
Pin	Function	Pin	Function
1	-VIN	1	+VIN
7	NC	2	-VIN
8	+VOUT	5	-VOUT
9	0V	6	0V
10	-VOUT	7	+VOUT
14	+VIN		

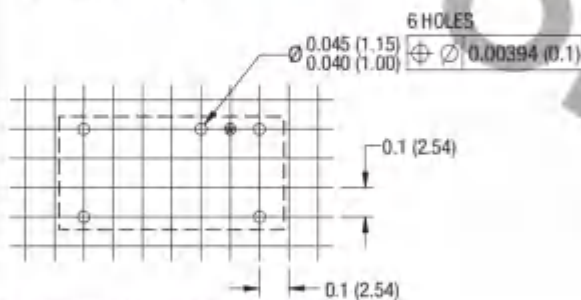
NMV 24V & 48V SERIES

3kVDC Isolated 1W Single & Dual Output DC/DC Converters

PACKAGE SPECIFICATIONS (continued)

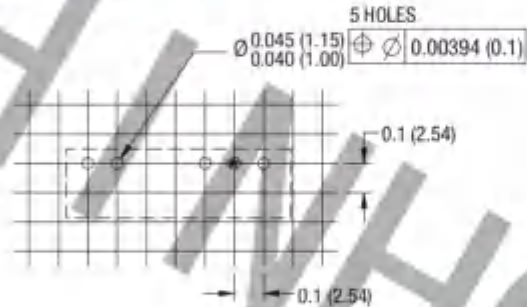
RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



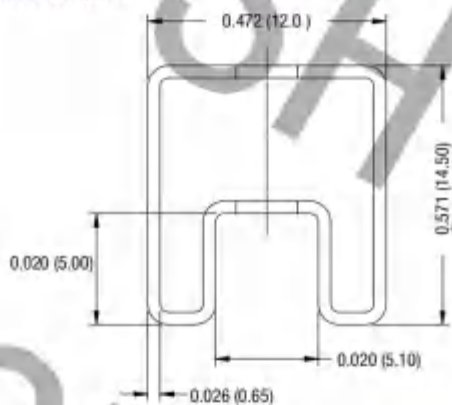
*Hole not required for single output variants.

7 Pin SIP Package



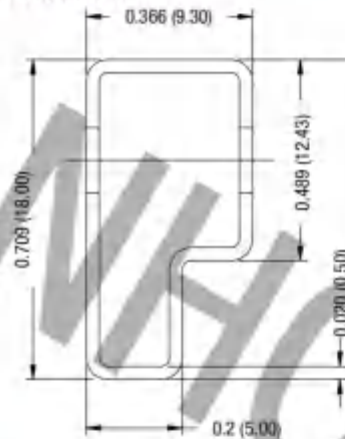
TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



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

7 Pin SIP Tube



Tube Quantity : 25

RoHS COMPLIANT INFORMATION



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

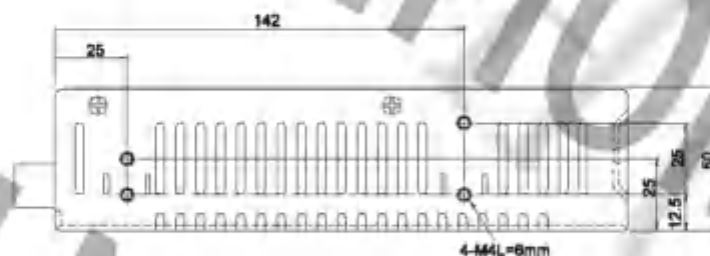
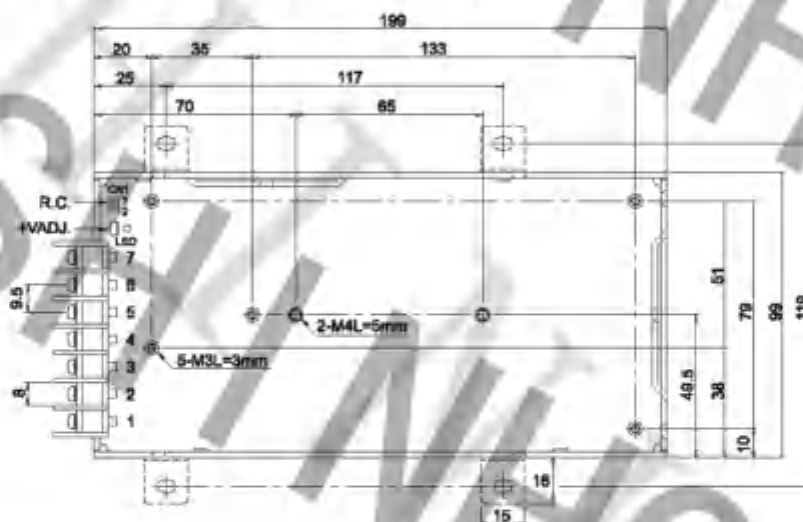
150W Single Output Switch Power

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 TEMPERATURE

Mechanical Specification(Unit:mm)



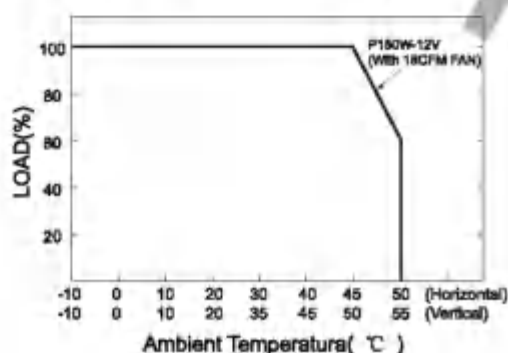
Terminal pin number assignment

PIN No.	Assignment	PIN No.	Assignment
1	AC/L	4,5	DC OUTPUT-V
2	AC/N	6,7	DC OUTPUT+V
3	FG -		

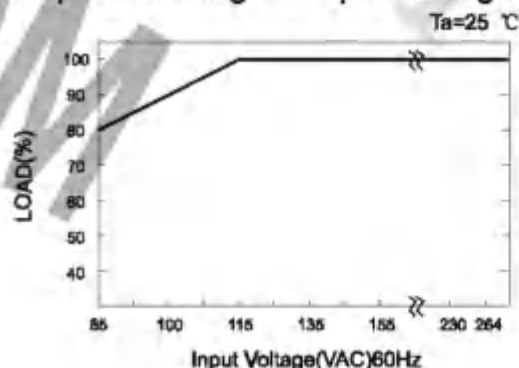
Remote ON/OFF (CH1): JST S2B-XH or equivalent (optional)

PIN No.	Assignment	Mating Housing	Terminal
1	RC +	JST XHP or equivalent	JST SXH-001T-P0.6 or equivalent
2	RC -		

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

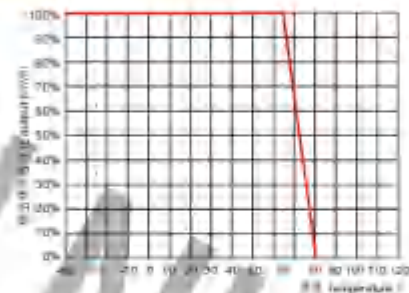
SHINHOM

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 Over current/Short circuit protection, Self-furish
- 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 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 Vac				
Input voltage	85 (120Vdc)	220	265(380Vdc)	W
输入频率范围 Hz	47		440	
Frequency range				
遥控端 Remote 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 Typical 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 Switching frequency	100KHz 典型(Typical)	最大(max) 250KHz
工作温度 Operating temperature	自由空气对流 Free air	-25℃~+65℃
储存温度 Storage temperature		-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(Isolation Voltage)	输入与输出 Input-output 2.5KV ≤ 10mA/1min	
	输入与外壳 Input-case 1.5KV ≤ 10mA/1min	
	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 For example	S WA 150 — 220 S 12	
	① ② ③ ④ ⑤ 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 AC165-265V
②	A电源转换模式 AC-DC: A Power conversion mode AC-DC	S单路输出 S: Single output

SWA 150~200 Series

SHINHOM

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(P) 表示输出功率大小 Output Power

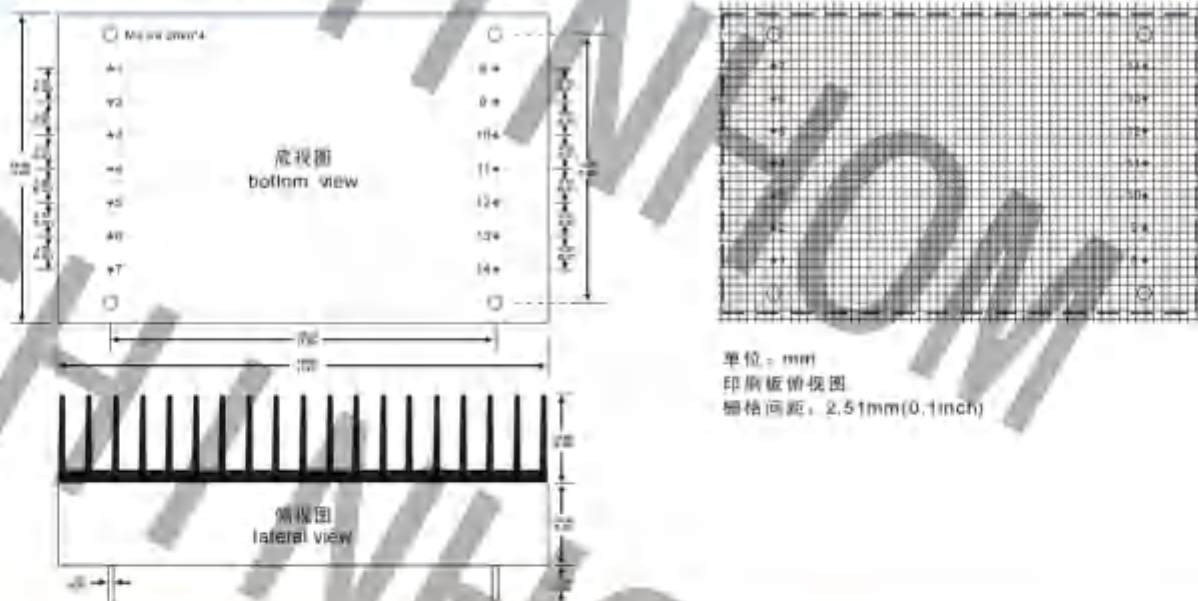
(V) 输出电压大小 Output Voltage

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	mA	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
Company's sales department

封装尺寸图 Mechanical Data



封装尺寸 Mechanical Data

封装代号 Package Code	LxWxH 单位: mm	封装号 Package No
	139x80x25	

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.

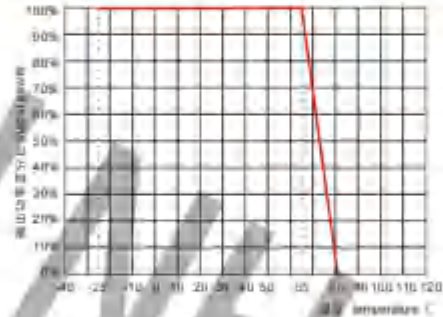
SWA150-200 Series

SHINHOM
www.shinhom.com

典型性能 Typical performance

- ① 宽范围输入 Wide input voltage range
- ② 转换效率 Typical Efficiency (典型87%)
- ③ 开关频率 Switching frequency: 100KHz
- ④ 过流短路保护, 自动恢复 current/Short circuit protection, Self-furbish
- ⑤ 输入与输出高隔离 Input-output isolate
- ⑥ PCB 板上直插式安装 Board in-line type installs
- ⑦ 金属外壳 Metal case

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 wispecified

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			

Output

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 Typical 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 Switching frequency		100KHz 典型(Typical)	最大(max) 250KHz
工作温度 Operating temperature		自由空气对流 Free air	-25℃~+55℃
储存温度 Storage temperature			-40℃~+105℃
最大壳温 Max case temperature			80%℃
相对湿度 Relative humidity			10%~90%

SWA150-200 Series

SHINHOM

www.shinhome.com

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 ⁴ Hrs		
外形尺寸	180*88*25mm		

产品命名方式 Product Nomination Method

举例 Fore sample	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 Output 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				

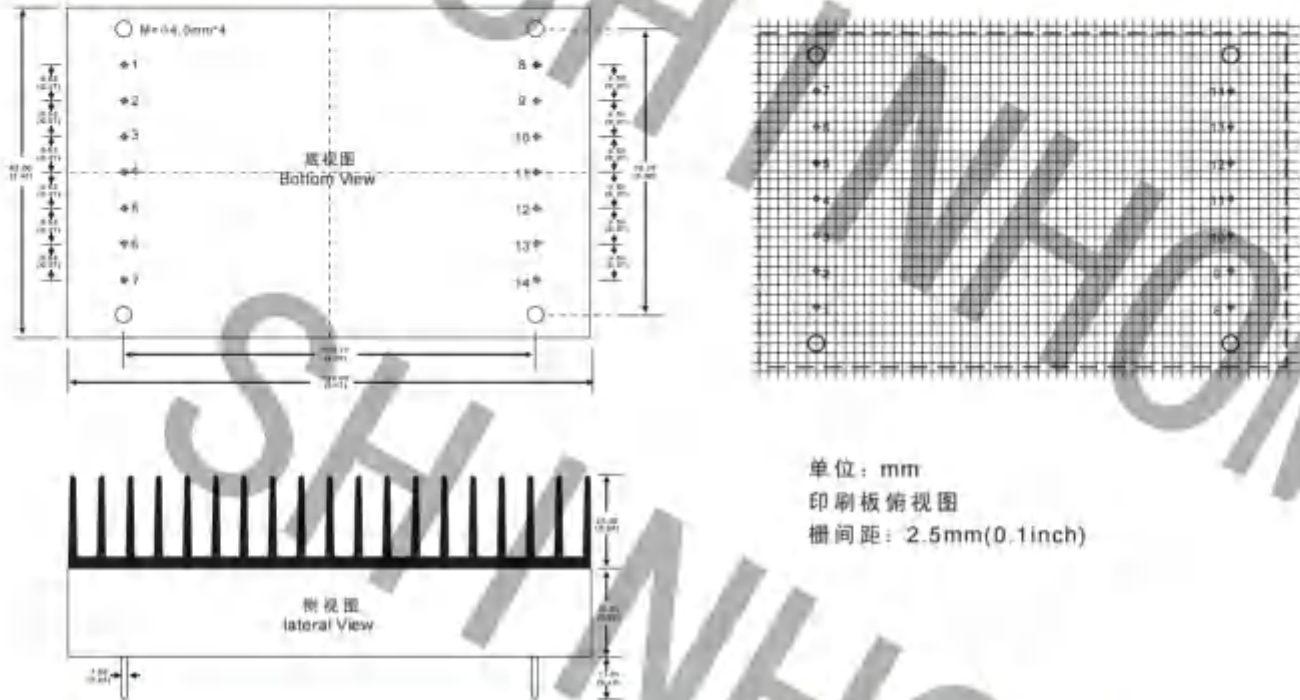
注: 因篇幅有限, 以上只是部分产品列表, 若需列表以外产品, 请与本公司销售部联系。

due to space limitations the above list is only for some products, if other than a list of products, please contact the Company's sales department.

SWA150-200 Series

SHINHOM
www.shinhom.com

封装尺寸图 Mechanical Data



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.

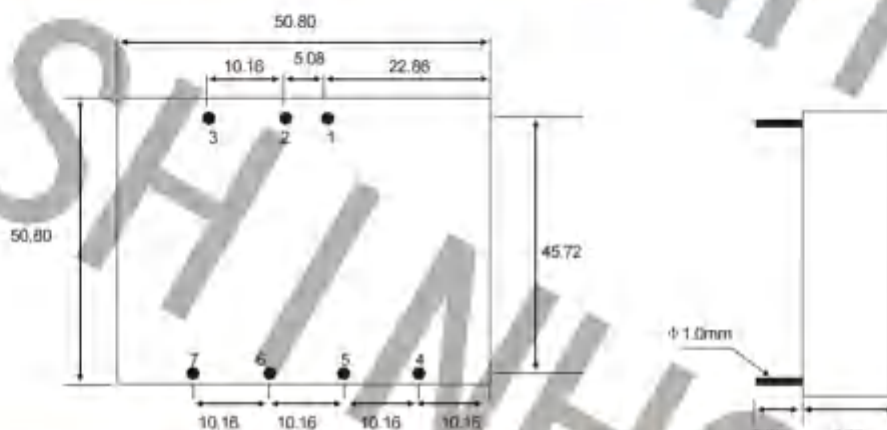
SHINHOM DC/DC Module power supply 25w wide voltage isolation voltage regulator series



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	$\pm 0.02\%/^{\circ}\text{C}$
Source effect	$\pm 0.2\%$	Ripple and noise	50mVp-p $V_o \leq 5\text{Vdc}$
Load effect	$\pm 0.5\%$		100mVp-p other
Isolation voltage	500VDC (Normal)	Cooling method	air
Switch frequency	250kHz	Housing material	metal case
MTBF	2x10 ⁵ h	Efficiency	80%~90%
Shell temperature range	-25 $^{\circ}\text{C}$ ~+95 $^{\circ}\text{C}$ (metal case)	Storage temperature range	-45 $^{\circ}\text{C}$ ~+105 $^{\circ}\text{C}$

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%



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)
		TMLM 04 other models output 1:	0.5% max. (0-100% load)
	- Load variation	TMLM 04 output 2:	5.0% max. (1-100% load)



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 (automatic recovery)
Overvoltage protection by Zehner diode (main output only)		120% of Vout typ.

Max. Capacitive load [μ F]

		Model series
Output:		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	5.0 VDC/3.3VDC	5600/4700
models:	12 VDC/5.0 VDC	330/4700

General Specifications

Temperature ranges	-Operating	-25°C to +60°C
	-Storage (non operating)	-40°C to +85°C
Derating		3.75°C/K above +80°C
		TMLM 20 models: 2.5%/K above 40°C
Temperature coefficient		0.02 %/K
Humidity (non condensing)		92% rel max.
Efficiency		75% typ. (depending on model)



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 °C,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
Degree of protection		class II 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 diameter:0.5(0.02)

Weight: 26g (0.92 oz)

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.

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 V	Output Voltage V	Output Current (Max./Min) mA	Efficiency %	Max. Capacitive Load(μF)	Package Style
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

TPE 3.3V, 5V & 12V Series

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			G'

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		14	15	%
Load Regulation	10%load to rated load		12	15	%
Load Regulation	10%load to rated load		9	10	%
Load Regulation	10%load to rated load		7.5	9.5	%
Load Regulation	10%load to rated load		7.0	8.5	%
Load Regulation	10%load to rated load		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.

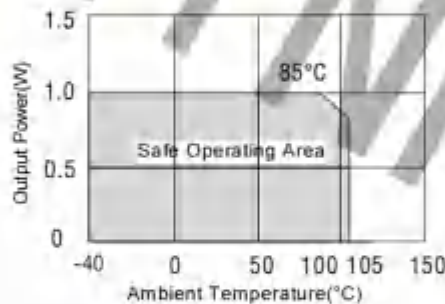
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	3.3V input		-)		kHz
Switching frequency	5V input		110		kHz
Switching frequency	12V input		145		kHz
MTBF	MIL-HDBK-217F@25		3500		K hours

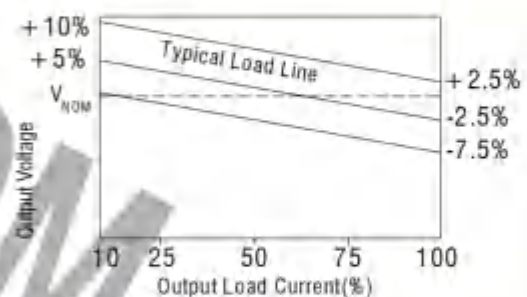
TEMPERATURE CHARACTERISTICS

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



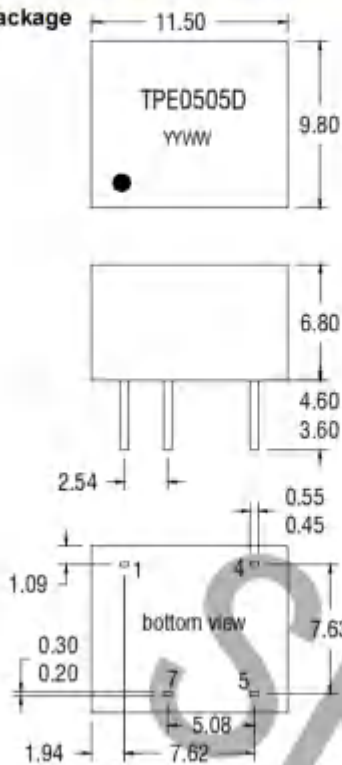
SOLDERING INFORMATION

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.

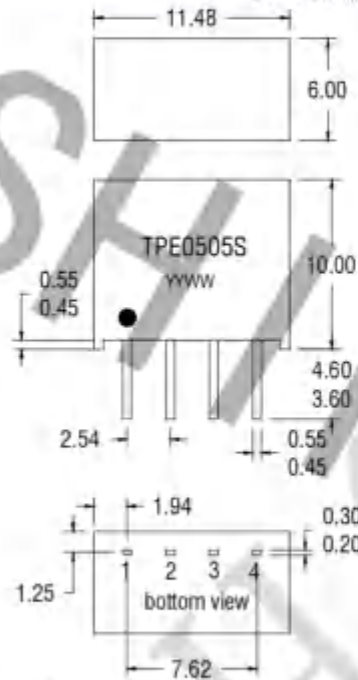
TPE 3.3V, 5V & 12V Series

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in mm ± 0.25 mm. All pins on a 2.54 mm pitch and within ± 0.25 mm of true position
Weight: 1.30g (SIP) 1.48g (DIP)

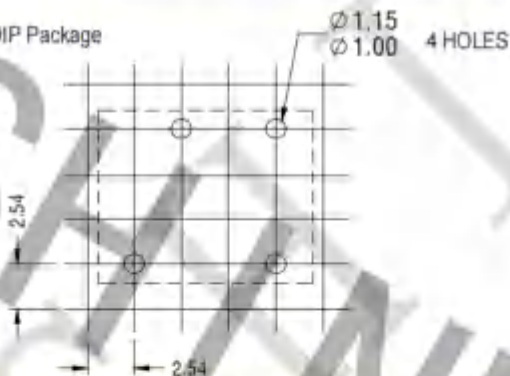
PIN CONNECTIONS

8 PIN DIP	
Pin	Function
1	-Vin
4	+Vin
5	+Vout
7	-Vout

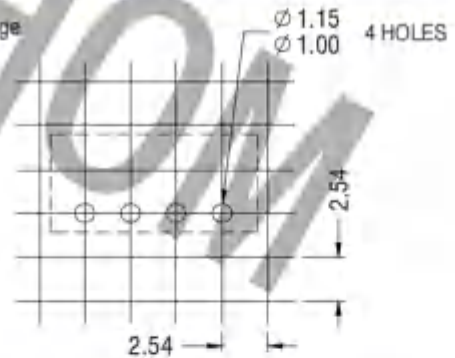
4 PIN SIP	
Pin	Function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

RECOMMENDED FOOTPRINT DETAILS

8Pin DIP Package

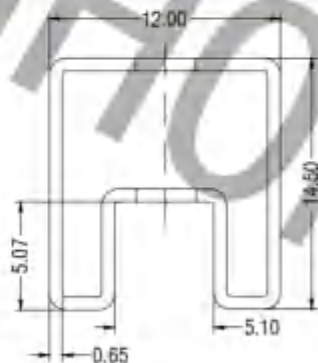


4Pin SIP Package

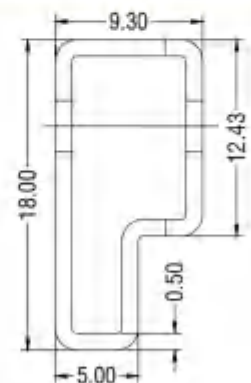


TUBE OUTLINE DIMENSIONS

8Pin DIP Tube



4Pin SIP Tube



Unless otherwise stated all dimensions in mm ± 0.5 mm.

Tube length (8 Pin DIP) : 520mm ± 2 mm.

Tube length (4 Pin SIP) : 520mm ± 2 mm.

Tube Quantity : 35PCS



WDC3-6 Series

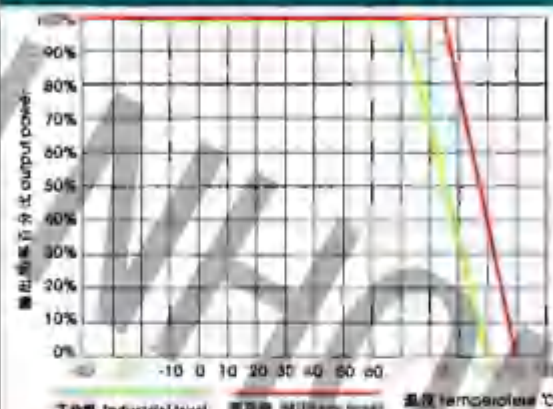
DC/DC 宽压输入 3-6W

(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 $\pm$ 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

Technology parameter

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	$\pm 1.0\%$, $\pm 2.0\%$
源效应 Line regulation	标称负载, 全电压范围	Vo1,Vo2	$\pm 0.2\%$, $\pm 1.5\%$
负载效应 Load regulation	20% ~ 100% 额定负载	Vo1,Vo2	$\pm 0.5\%$, $\pm 4.0\%$
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo $\leq$ 5.0V, $\leq 50\text{mVp-p}$; Vo $\geq 48\text{V}$, $\leq 180\text{mVp-p}$; Other, $\leq 100\text{mVp-p}$;		
动态响应 Dynamic response	25%的标称负载阶跃	$\Delta V_o1/\Delta t$	$\pm 4.0/500\mu\text{s}$
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
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		

产品命名方法 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 products tabulates

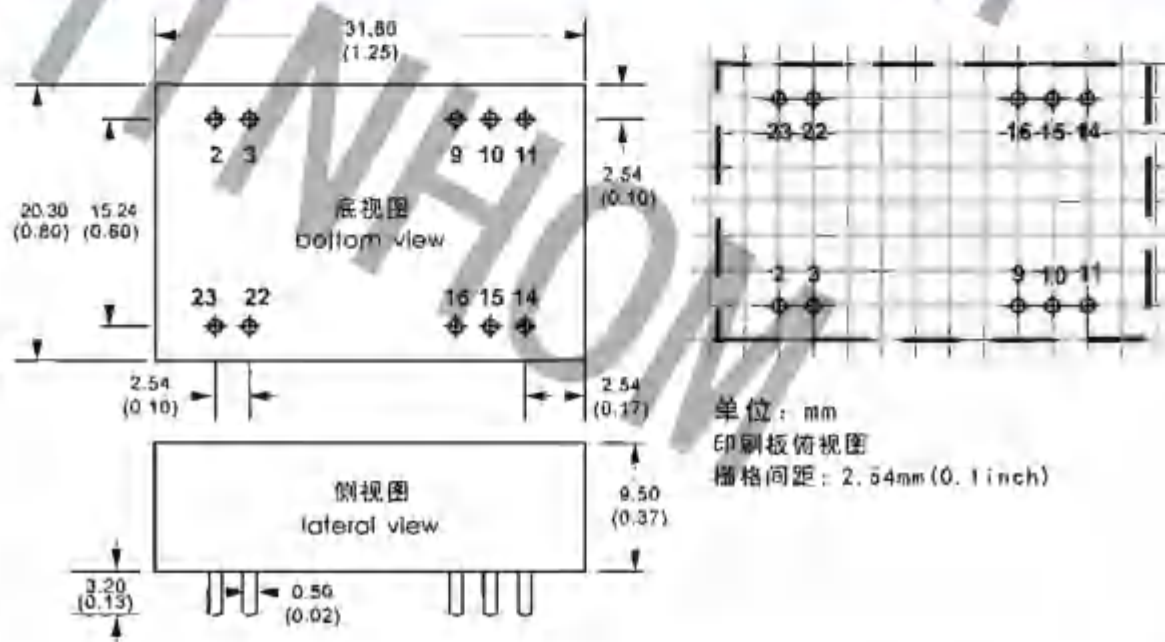
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC3-□S3V3	5V (4.5~9V)	3.3V	600mA				
WDC3-□S05	12V (9~18V)	5V	600mA				
WDC3-□S09	24V (18~36V)	9V	330mA				
WDC3-□S12	48V (36~72V)	12V	250mA				
WDC3-□S15	12V (9~36V) W	15V	200mA				
WDC3-□S24	48V (18~72V) W	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		+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 (4.5~9V)	+5V	500 mA	-5V	500 mA		
WDC5-□D09	12V (9~18V)	+9V	275 mA	-9V	275 mA		
WDC5-□D12	24V (18~36V)	+12V	205 mA	-12V	205 mA		
WDC5-□D15	48V (36~72V)	+15V	165 mA	-15V	165 mA		
WDC5-□D24	12V (9~36V)	+24V	100 mA	-24V	100 mA		
WDC6-□D05	48V (18~72V)	+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		

□ 代表输入电压和电流, 与引脚有关, 以上只是部分产品, 更多产品请咨询本公司销售人员或联系。

□ 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
	31.80 x 20.30 x 10.00	125080DC

管脚定义 Pin Assignment

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.



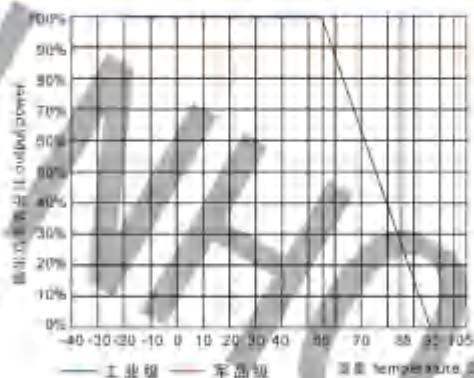
WDC10-15 Series

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: 300KHz $\pm$ 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 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 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 Remote 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,Vo2	$\pm 1.0\%, \pm 2.0\%$
源效应 Line regulation	标称负载, 全电压范围	Vo1,Vo2	$\pm 0.2\%, \pm 1.5\%$
负载效应 Load regulation	20% ~ 100%额定负载	Vo1,Vo2	$\pm 0.5\%, \pm 4.0\%$
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo $\leq$ 5.0V, $\leq$ 50mVp-p; Vo $\geq$ 48V, $\leq$ 180mVp-p; Other, $\leq$ 100mVp-p;		
动态响应 Dynamic response	25%的标称负载阶跃	$\Delta Vo1/\Delta t$	$\pm 4.0/500us\%$
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		$\leq 200ms$

一般特性 General

转换效率 Efficiency	标称电压输入, 满载	$V_o \leq 5.0V$, 75% 典型	$V_o > 5.0V$, 80% 典型
开关频率 Switching frequency		300KHz 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 temperature		-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%~80%
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 $\leq 0.5mA/1min$, 输入与外壳 500Vdc $\leq 0.5mA/1min$		
最小无故障间隔时间 (MTBF)	2×10^5 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		+8V	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 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



封裝尺寸 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" (41.90x37.10x10.16mm³)
- 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°C to 55°C
- Operating board temperature range: -40°C to 100°C
- Storage temperature range: -55°C to 125°C
- Temperature coefficient: $< \pm 0.02\%/^{\circ}\text{C}$
- MTBF: > 2 million hrs

Electrical Specifications

Input

Input range: 36-75V
Input under-voltage shutdown: 32-34V

Output

Voltage setpoint accuracy: $\pm 1.0\% V_o$ max
Voltage adjust: None
Line regulation: 10mV max
Load regulation: 25mV max
Over-current protection: $> 120\% I_o$, auto-recovery
Short-circuit protection: Continuous, auto-recovery
Ripple and noise: $< 60\text{mV}_{\text{pp}}$ max.
Transient response: 200mV max
Recovery $< 400\mu\text{s}$ max
(25%~50%~25% I_{omax})
dI/dt: 1A/10 μs

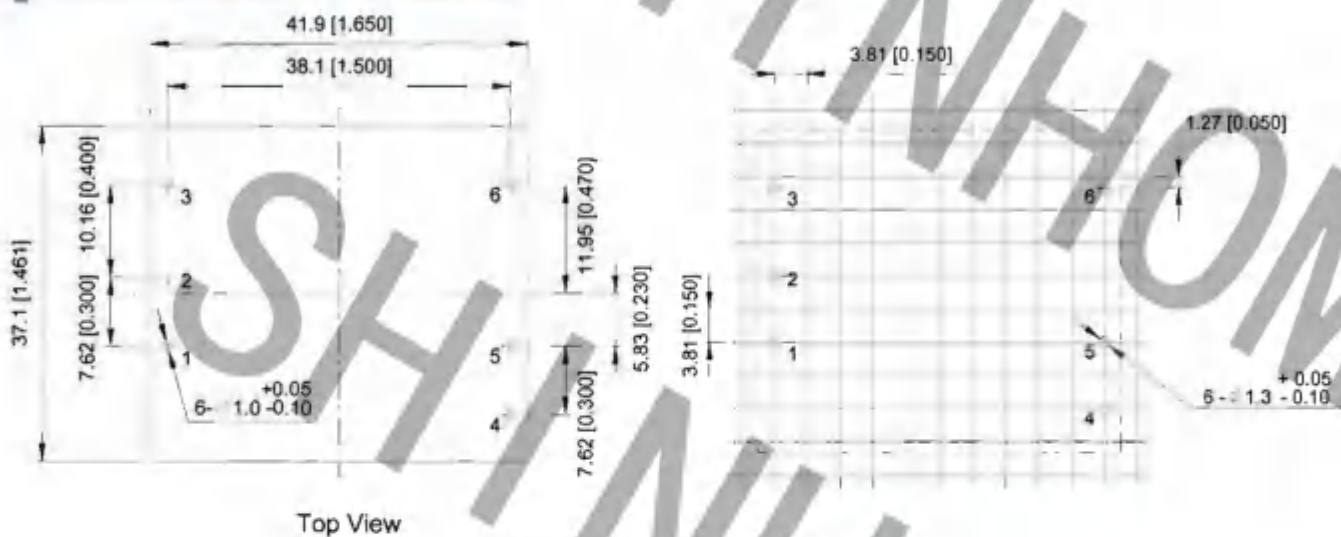
Control

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



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]

SHINHOM

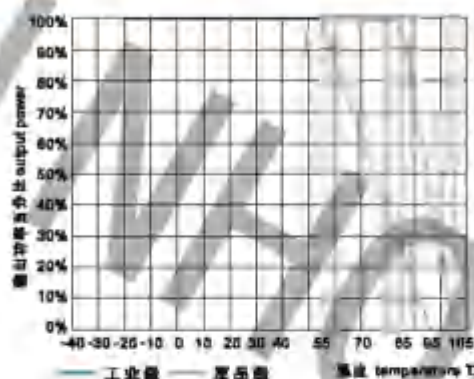
WDC10-15 Series

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: 300KHz±30 KHz
- ◎ 长期短路保护, 自动恢复 Short circuit protection, Self-turbish
- ◎ 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

温度特性图 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, $T_c=25^\circ\text{C}$, 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
	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, Vo2	±1.0%, ±2.0%
负载调节 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 $V_o \leq 5.0\text{V}, \leq 50\text{mVp-p}$; $V_o \geq 48\text{V}, \leq 180\text{mVp-p}$; Other, $\leq 100\text{mVp-p}$;		
动态响应 Dynamic response	25% 的标称负载阶跃	$\Delta V_o / \Delta t$	±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		88%典型
开关频率 Switching frequency		300KHz 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 temperature		-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 Output 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表示宽范围输入 W: That Wide Range Of Input	

典型产品表 Typical product table

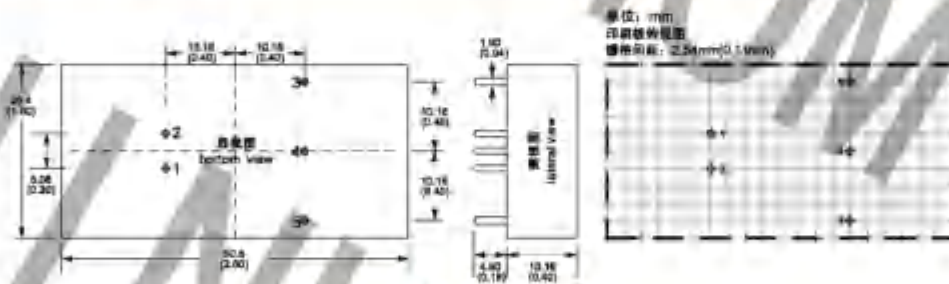
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC10-□S3V3	5V (4.5~9V)	3.3V	2000mA				
WDC10-□S05		5V	2000mA				
WDC10-□S09		9V	1110mA				
WDC10-□S12		12V	830mA				
WDC10-□S15		15V	660mA				
WDC10-□S24		24V	410mA				
WDC12-□S3V3	12V (10~36V) W 48V (18~72V) W	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	-24V	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 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
	50.80 x 25.40 x 10.16	200100DC

引脚定义 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.



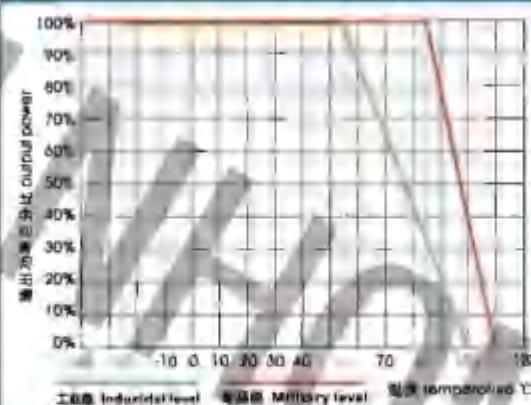
WDC15-20 Series

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 $\pm$ 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°C 室温环境下测得。

Technology parameter

Test condition: General Nominal Line, $T_c=25^{\circ}\text{C}$, Rated resistant load unless other wise specified

输入特性 Input

	Min	Nom	Max	Notes
输入电压 Vdc	18	24	36	W 2:1
Input voltage	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 $\rightarrow$ Vin
			低电平或接地关断	$\leq 0.3\text{Vdc}$

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,	$\pm 1.0\%$, $\pm 2.0\%$
源效应 Line regulation	标称负载, 全电压范围 Nominal Load, full voltage range	Vo1;Vo2	$\pm 0.2\%$, $\pm 1.5\%$
负载效应 Load regulation	20% ~ 100% 额定负载	Vo1;Vo2	$\pm 0.5\%$, $\pm 4.0\%$
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo $\leq 5.0\text{V}$, $\leq 50\text{mVp-p}$; Vo $\geq 48\text{V}$, $\leq 180\text{mVp-p}$; Other, $\leq 100\text{mVp-p}$;		
动态响应 Dynamic response	25% 的标称负载阶跃	$\Delta\text{Vo1}/\Delta t$	$\pm 4.0/500\mu\text{s}\%$
输出电压调节 Voltage adjust	标称输出电压 Nominal output	TRIM	$\pm 10\%$ 可调
启动延迟时间 Start delay time	典型值 Typical value		$\leq 200\text{mS}$

一般特性 General

转换效率 Efficiency	标称电压输入, 满载 Nominal input, Full load	$V_o \leq 5.0V$, 80% 典型(Typical)	$V_o > 5.0V$, 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 $\leq 0.5mA/1min$, 输入与外壳 500Vdc $\leq 0.5mA/1min$		
最小无故障间隔时间(MTBF)	2×10^5 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 talqulates

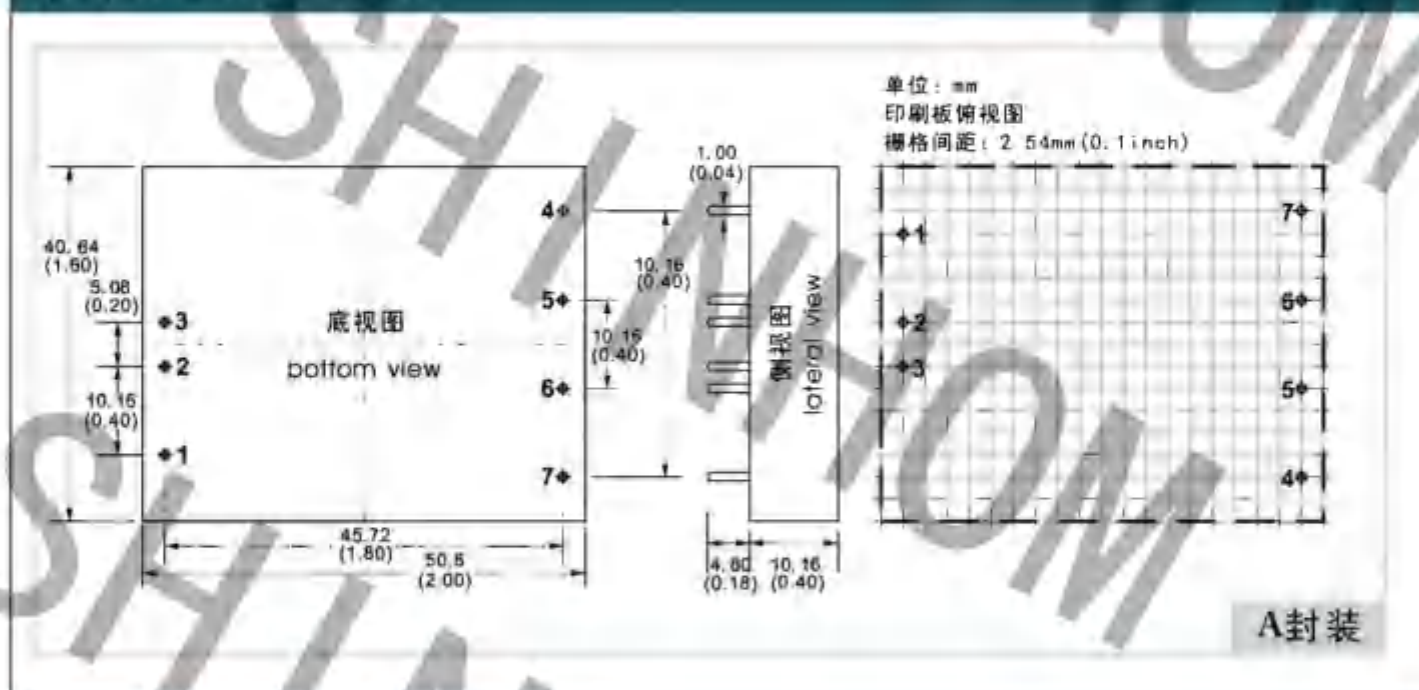
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC15-□S3V3	12V (9~18V)	3.3V	3000mA				
WDC15-□S05		5V	3000mA				
WDC15-□S09		9V	1600mA				
WDC15-□S12		12V	1250mA				
WDC15-□S15		15V	1000mA				
WDC15-□S24	24V (18~36V)	24V	625mA				
WDC15-□S48	48V (36~72V)	48V	310mA				
WDC20-□S3V3	110V (72~144V)	3.3V	4000mA				
WDC20-□S05	12V (10~36V) W	5V	4000mA				
WDC20-□S09	48V (18~72V) W	9V	2220mA				
WDC20-□S12		12V	1660mA				
WDC20-□S15		15V	1330mA				
WDC20-□S24		24V	830mA				
WDC20-□S48		48V	410 mA				

WDC15-□D3V3	12V (5~18V) 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~~	~~2000 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 ~~table~~ 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

引脚定义 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.



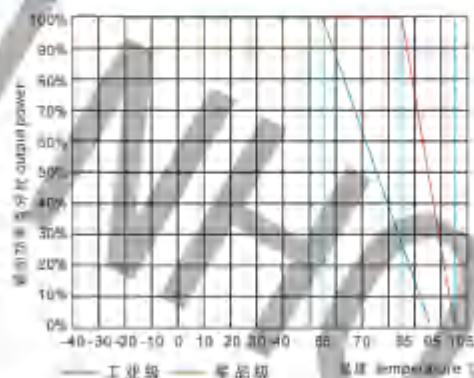
WDC15-20 Series

DC/DC 宽压输入 15-20W (DC/DC wide input 15-20W)

典型性能 Typical performance

- ① 宽范围输入 Wide Input voltage range (2:1 or 4:1)
- ② 转换效率 (典型 85%) Typical Efficiency 85%
- ③ 开关频率 Switching frequency: 300KHz $\pm$ 30 KHz
- ④ 长期短路保护, 自动恢复 Short circuit protection, Self-furbish
- ⑤ 输入与输出高隔离 Input-output isolate (500/1000/1500/2000Vdc)
- ⑥ PCB 板上直插式安装 Board in-line type installs

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 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	$\pm 1.0\%$, $\pm 2.0\%$
源效应 Line regulation	标称负载, 全电压范围	Vo1, Vo2, Vo3	$\pm 0.2\%$, $\pm 1.5\%$
负载效应 Load regulation	20% ~ 100% 额定负载	Vo1, Vo2, Vo3	$\pm 0.5\%$, $\pm 4.0\%$
纹波及噪声 Ripple and noise	20MHz BM 满载 Vo $\leq$ 5.0V, $\leq 50\text{mVp-p}$; Vo $\geq 48\text{V}$, $\leq 180\text{mVp-p}$; Other, $\leq 100\text{mVp-p}$;		
动态响应 Dynamic response	25% 的标称负载阶跃	$\Delta\text{Vo1}/\Delta t$	$\pm 4.0/500\mu\text{s}\%$
输出电压调节 Voltage adjust	标称输出电压	TRIM	$\pm 10\%$ 可调
启动延迟时间 Start delay time	典型值		$\leq 200\text{ms}$

一般特性 General

转换效率 Efficiency	标称电压输入, 满载	$V_o \leq 5.0V$, 80% 典型	$V_o > 5.0V$, 87% 典型
开关频率 Switching frequency		300KHz 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 temperature		-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%~80%
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 $\leq 0.5mA/1min$, 输入与外壳 500Vdc $\leq 0.5mA/1min$		
最小无故障间隔时间(MTBF)	2×10^5 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 Output 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

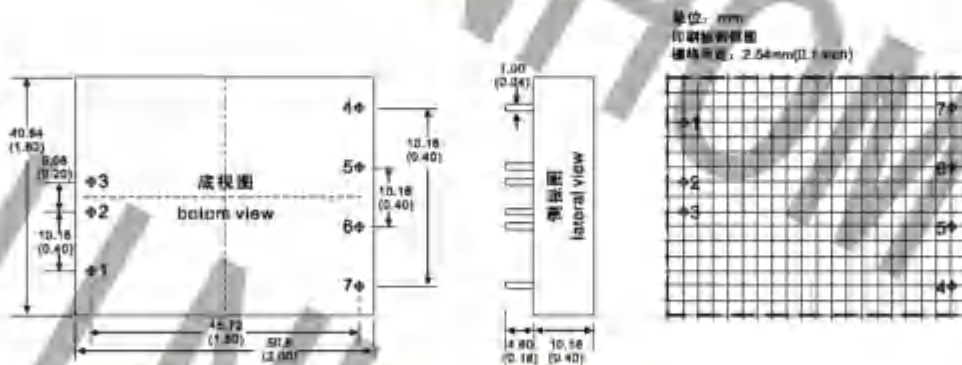
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC15-□S3V3	12V (9~18V) 24V (18~36V) 48V (36~72V) 110V (72~144V) 12V (10~36V) W 48V (18~72V) W	3.3V	3000mA				
WDC15-□S05		5V	3000mA				
WDC15-□S09		9V	1600mA				
WDC15-□S12		12V	1250mA				
WDC15-□S15		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		15V	1330mA				
WDC20-□S24		24V	830mA				
WDC20-□S48		48V	410mA				
WDC15-□D3V3		+3.3V	500mA	-3.3V	500mA		
WDC15-□D05		+5V	500mA	-5V	500mA		
WDC15-□D09	12V (9~18V)	+9V	830mA	-9V	830mA		
WDC15-□D12	24V (18~36V)	+12V	625mA	-12V	625mA		
WDC15-□D15	48V (36~72V)	+15V	500mA	-15V	500mA		
WDC15-□D24	110V (72~144V)	+24V	310mA	-24V	310mA		
WDC20-□D3V3	12V (10~36V)	+3.3V	2000mA	-3.3V	2000mA		
WDC20-□D05	48V (18~72V)	+5V	2000mA	-5V	2000mA		
WDC20-□D09		+9V	1110mA	-9V	1110mA		
WDC20-□D12		+12V	830mA	-12V	830mA		
WDC20-□D15		+15V	660mA	-15V	660mA		
WDC20-□D24		+24V	410mA	-24V	410mA		

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.



DC/DC寬正輸入 50-150W (DC/DC wide input 50-150W)

温度曲线图 Temperature graph

-

Technology parameter

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输出特性 Output

启动延迟时间 Start delay time	典型值 Typical value		≤200mS
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 ⁶ Hrs		

产品命名方式 Product Nomenclature 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

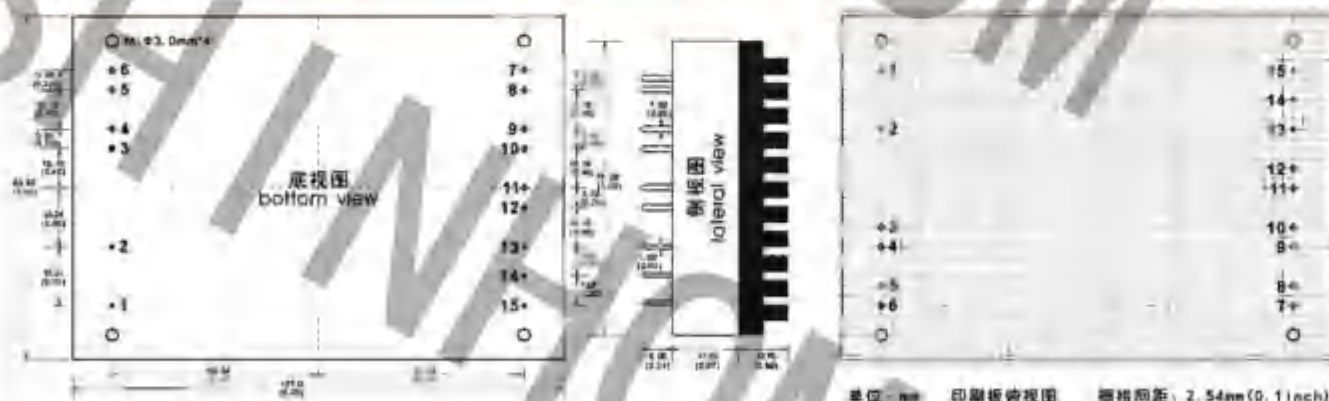
型号 TYPE	输入电压范围 Input voltage range	输出电压/电流 (Output voltage / current)					
		VO1		VO2		VO3	
		V	mA	V	mA	V	mA
WDC50-□S05	12V (9~18V)	5V	10A				
WDC50-□S12	24V (18~36V)	12V	4.2A				
WDC50-□S24	48V (36~72V)	24V	2.1A				
WDC50-□D05	110V (72~144V)	+5V	5A	-5V	5A		
WDC50-□D12		+12V	2.1A	-12V	2.1A		
WDC50-□D24		+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			
WDC150-12S24	24V	6.3A			
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，以下只是部分产品列表，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



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, others 1mm

单位: mm 印刷板俯视图 栅格间距: 2.54mm (0.1 inch)

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

引脚定义 Pin Assignment

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**

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 μ A, under 240VAC/60Hz operating conditions
- Transformer creepage distance is 8mm, transformer clearance is 5mm
- Operating ambient temperature range: -40°C to +85°C
- 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 (%)	Max. Capacitive Load (μ F)
		Nominal (Range)	Max.*	Voltage (VDC)	Current (mA) Max./Min.	Min./Typ.	
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
	WDC2424P-6WR3			24	250/0	82/84	470
CE	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				

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 Regulation	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	%/°C
Ripple & Noise*	20MHz bandwidth	---	100	180	mVp-p
Over-current Protection		110	150	260	%Io
Over-voltage Protection	Input voltage range	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	---	3.0	5	μA
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°C (see Fig. 1)	-40	---	85	°C
Storage Humidity	Without condensation	5	---	95	%RH
Storage Temperature		-55	---	125	°C
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	---	---	300	°C
Vibration		10-55Hz, 2G, 80 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°C	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 (UL94V-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	$\pm 2\text{KV}$ (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 V _{r.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

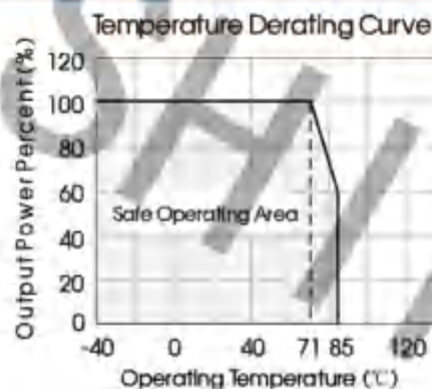
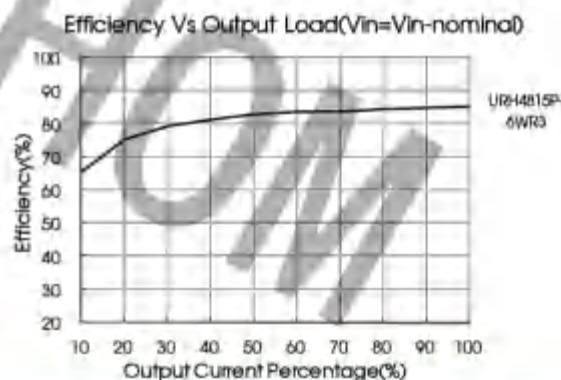
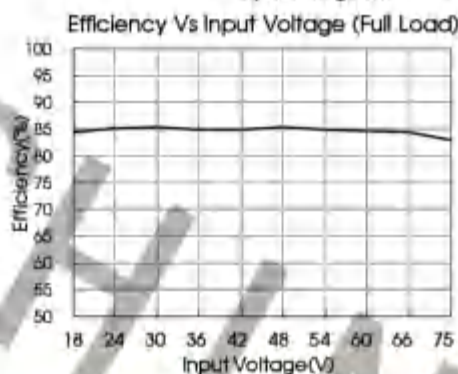
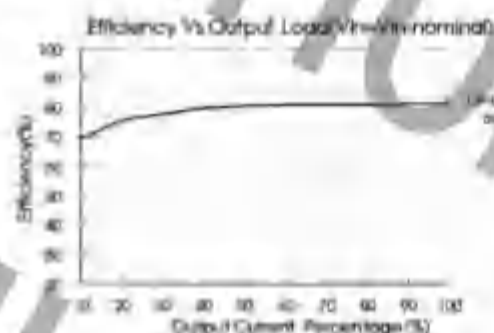
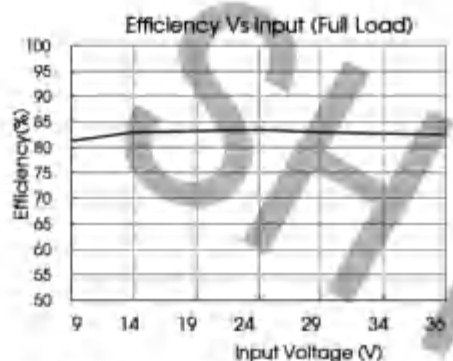


Fig. 1



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 C_{in} and C_{out} 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

V _{in}	C _{in}	C _{out}
24VDC	100 μ F	10 μ F
48VDC	10 μ F-47 μ F	10 μ F

2. EMC solution-recommended circuit

Parameter description:

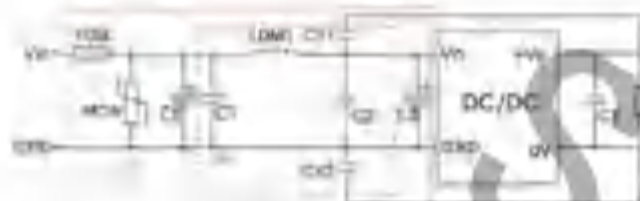


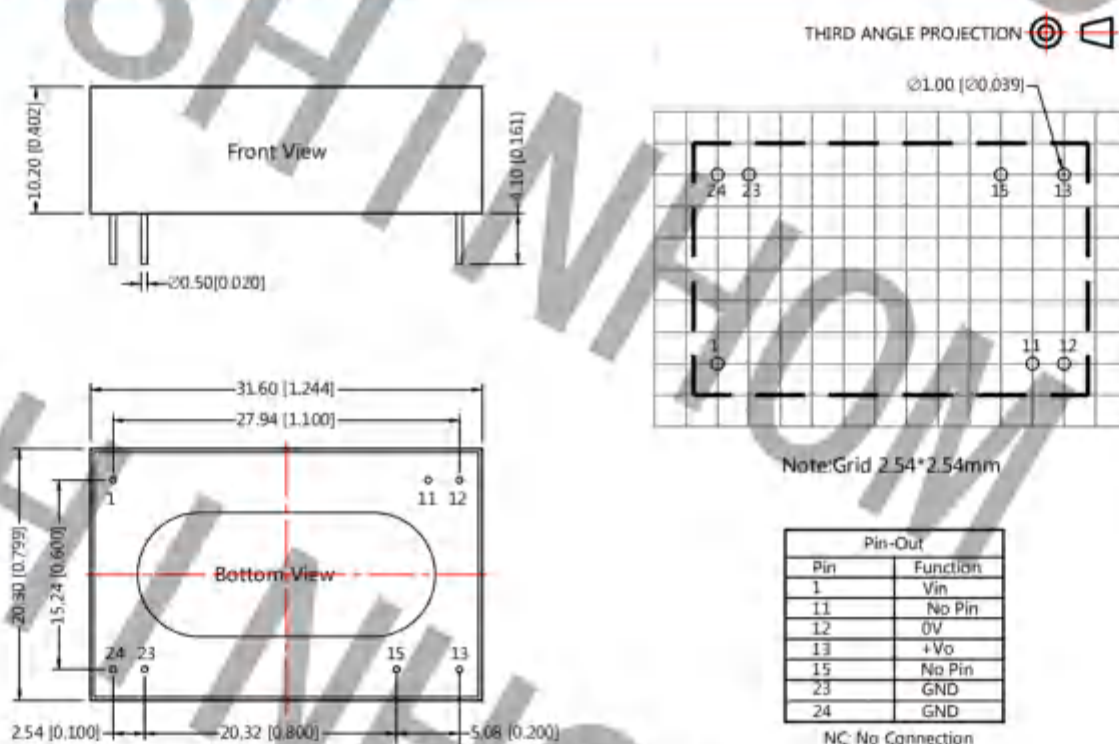
Fig. 3

Notes: For EMC tests we use part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0, C4	330 μ F/50V	330 μ F/100V
C1, C2	10 μ F/50V	—
C3	Refer to the Cout in Fig.2	
LDM1	10 μ H	—
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.shinohm.com

Dimensions and Recommended Layout



Note:
Unit :mm[inch]
Pin diameter tolerances : $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$

HDC10-40W SERIES SPECIFICATION

(Ver1.0, 2018.09)

SHAANXI SHINHOM ENTERPRISE CO.,LTD

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 °C, rated input, and full load output conditions

Model selection table

Part No.	Input voltage (VDC)	Output voltage (VDC)	Output current (A)	Efficiency (%)	Part No.	Input voltage (VDC)	Output voltage (VDC)	Output current (A)	Efficiency (%)
HDC10W-24S3.3	9~36	3.3	3	77	HDC20W-24S05	9~36	5	4	83
HDC10W-24S05	9~36	5	2	78	HDC20W-24S12	9~36	12	1.67	88
HDC10W-24S12	9~36	12	0.84	80	HDC20W-24S15	9~36	15	1.34	88
HDC10W-24S15	9~36	15	0.67	81	HDC20W-24D12	9~36	±12	0.84	87
HDC10W-24S24	9~36	24	0.42	80	HDC20W-24D15	9~36	±15	0.67	85
HDC10W-24D05	9~36	±5	1	75	HDC20W-48S05	18~75	5	4	83
HDC10W-24D12	9~36	±12	0.42	76	HDC20W-48S12	18~75	12	1.67	88
HDC10W-24D15	9~36	±15	0.34	77	HDC20W-48S15	18~75	15	1.34	87
HDC10W-48S3.3	18~75	3.3	3	77	HDC20W-48D12	18~75	±12	0.84	87
HDC10W-48S05	18~75	5	2	78	HDC20W-48D15	18~75	±15	0.67	85
HDC10W-48S12	18~75	12	0.84	80	HDC30W-24S05	9~36	5	6	88
HDC10W-48S15	18~75	15	0.67	81	HDC30W-24S12	9~36	12	2.5	89
HDC10W-48S24	18~75	24	0.42	80	HDC30W-24S15	9~36	15	2	90
HDC10W-48D05	18~75	±5	1	75	HDC30W-24D12	9~36	±12	1.25	88
HDC10W-48D12	18~75	±12	0.42	76	HDC30W-24D15	9~36	±15	1	88
HDC10W-48D15	18~75	±15	0.34	77	HDC30W-48S05	18~75	5	6	88
HDC15W-24S3.3	9~36	3.3	4	78	HDC30W-48S12	18~75	12	2.5	89
HDC15W-24S05	9~36	5	3	83	HDC30W-48S15	18~75	15	2	89
HDC15W-24S12	9~36	12	1.25	85	HDC30W-48D12	18~75	±12	1.25	88
HDC15W-24S15	9~36	15	1	83	HDC30W-48D15	18~75	±15	1	88
HDC15W-24S24	9~36	24	0.63	83	HDC15W-110S3.3	66~160	3.3	4	78
HDC15W-24D05	9~36	±5	1.5	80	HDC15W-110S05	66~160	5	3	83
HDC15W-24D12	9~36	±12	0.63	83	HDC15W-110S12	66~160	12	1.25	85
HDC15W-24D15	9~36	±15	0.5	80	HDC15W-110S15	66~160	15	1	83
HDC15W-48S3.3	18~75	3.3	4	78	HDC15W-110S24	66~160	24	0.63	83
HDC15W-48S05	18~75	5	3	83	HDC15W-110D05	66~160	±5	1.5	80
HDC15W-48S12	18~75	12	1.25	85	HDC15W-110D12	66~160	±12	0.63	83
HDC15W-48S15	18~75	15	1	83	HDC15W-110D15	66~160	±15	0.5	80
HDC15W-48S24	18~75	24	0.63	83	HDC40-24S12	18~36	12	3.33	89
HDC15W-48D05	18~75	±5	1.5	80	HDC40-48S15	36~72	15	2.66	89
HDC15W-48D12	18~75	±12	0.63	83	HDC40-24D12	18~36	±12	1.66	88
HDC15W-48D15	18~75	±15	0.5	80	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)		± type

Output electrical specifications

Output voltage accuracy	±1.5%amax	
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 ⁷ Ω	
Insulated capacitor	1000pF typ.	
switching frequency	500kHz typ	
Operating temperature	-40℃ ~ 100℃	
Storage temperature	-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:

ON	Input grounding as a reference
OFF	>3.5Vdc to 10Vdc or open circuit
	<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℃

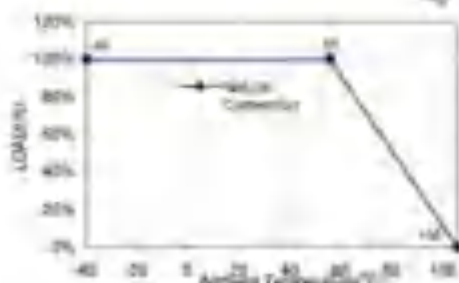
Size



PIN assignment

	Single	Dual
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

<http://www.shinhom.com> www.shinhomtech.com

1W Isolated DC-DC converter

Fixed input voltage, unregulated single output



UL US CE CB RoHS

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.

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°C to +125°C
- High efficiency up to 85%
- Continuous short-circuit protection
- AEC-Q100 approved

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; $\pm 1\%$	—	—	1.2	—
Load Regulation	10%-100% load	—	8	15	%
Ripple & Noise*	20MHz bandwidth	—	30	75	mVp-p
Temperature Coefficient	Full load	—	± 0.02	—	%/°C
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 $\geq 105^\circ\text{C}$, (see Fig. 2)	-40	—	125	°C

DC/DC Converter

HDC1W-05S05

[Http://www.shinhom.com](http://www.shinhom.com) www.shinhomtech.com

Storage Temperature		-55	—	125	°C
Case Temperature Rise	Ta=25°C	—	10	—	
Storage Humidity	Non-condensing	—	—	95	%RH
Reflow Soldering Temperature*		Peak temp. ≤245°C, maximum duration time ≤60s over 217°C			
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°C	7500	—	—	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 3			

Note: * See also IPC/JEDEC J-STD-020D.1.

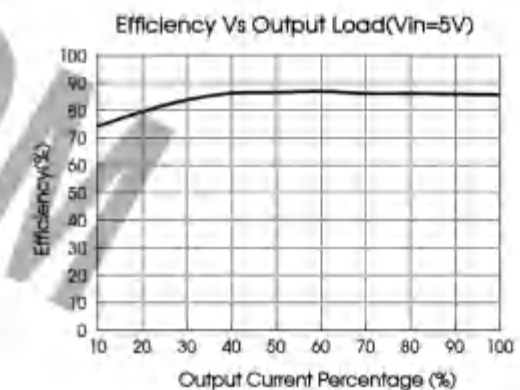
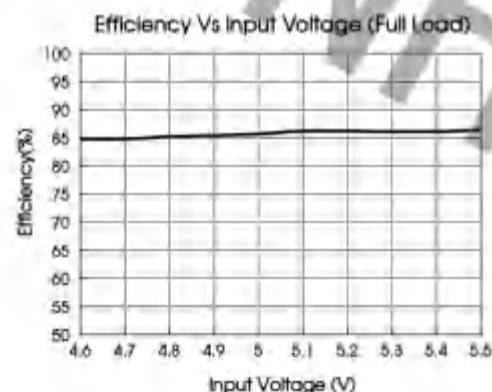
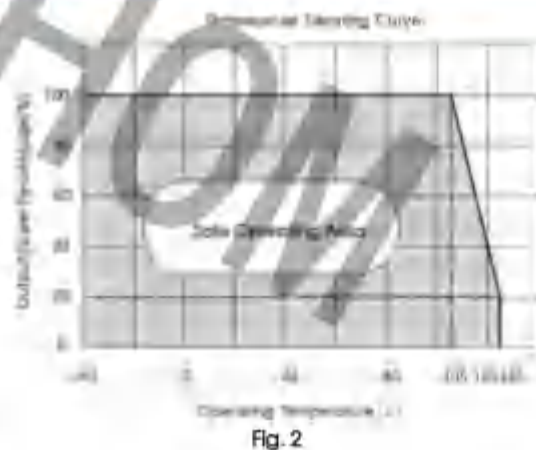
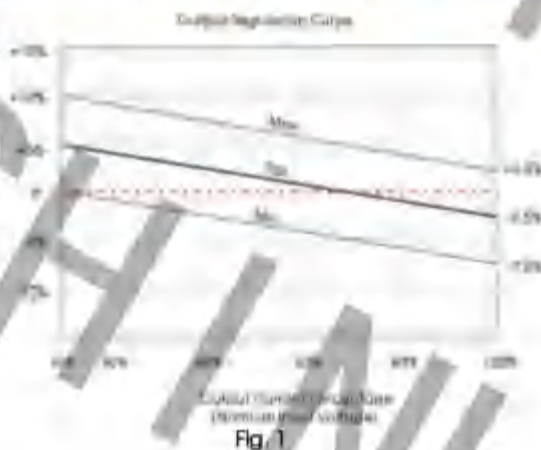
Mechanical Specifications

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	3Vrms perf. Criteria A

Typical Characteristic Curves



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.

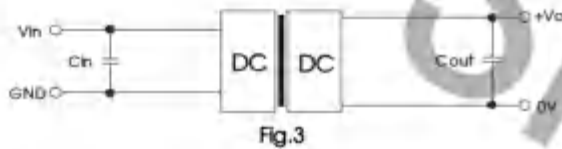


Fig.3

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

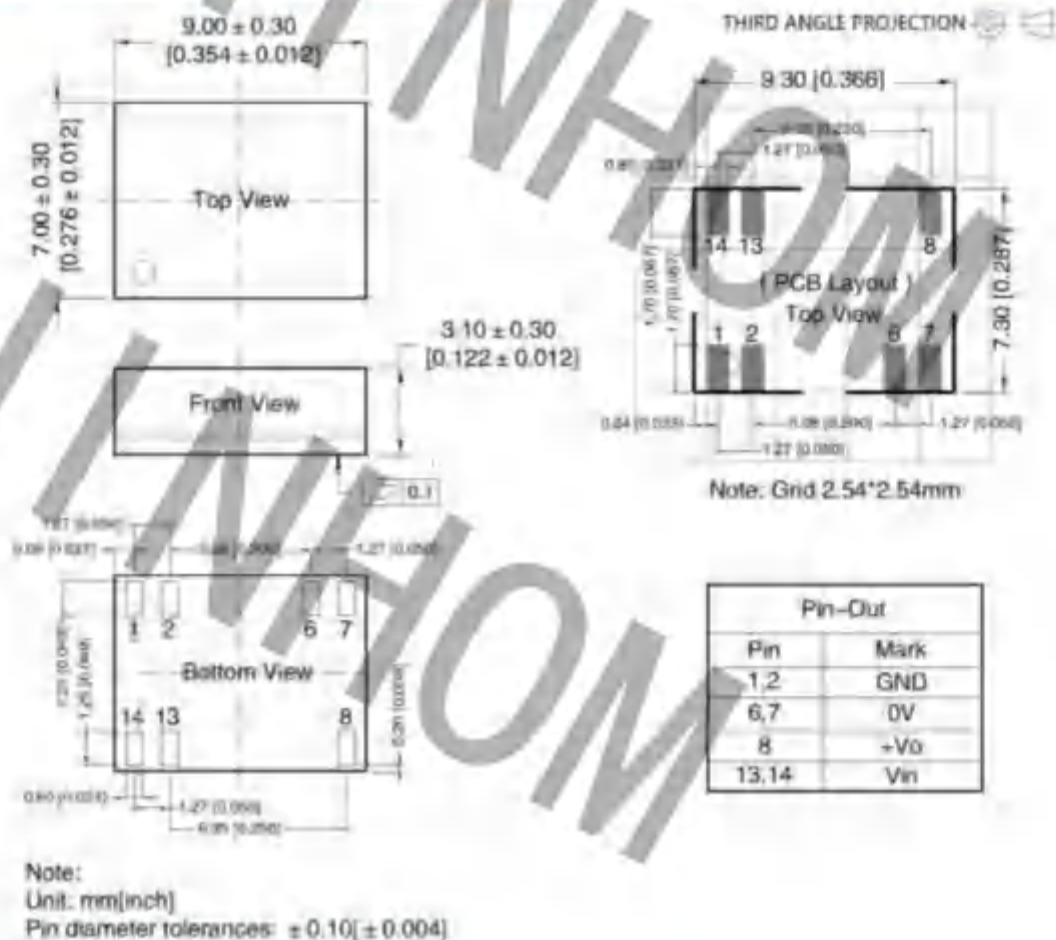


Fig.4

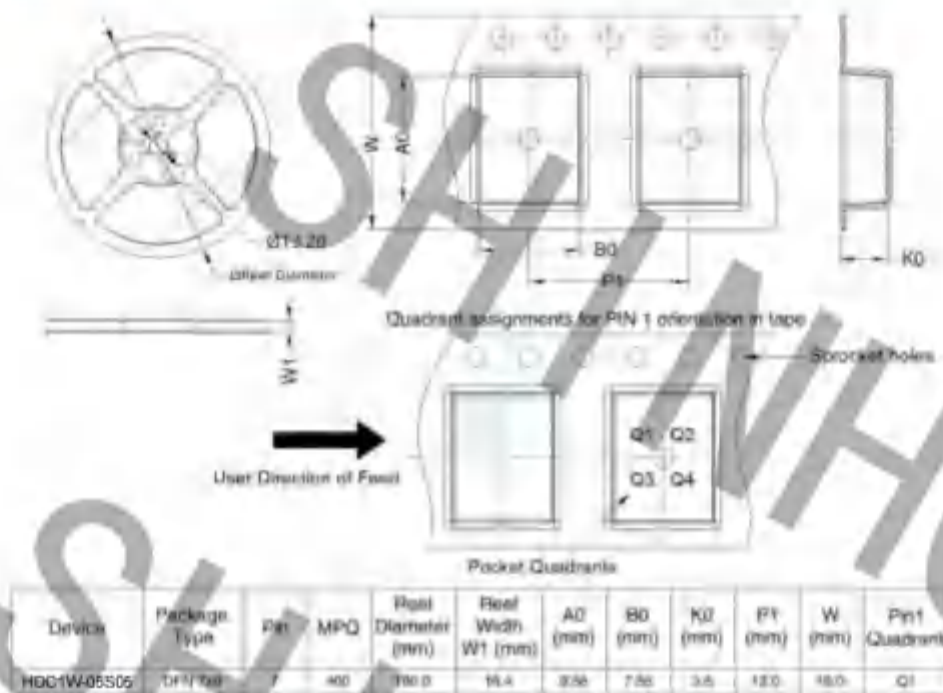
Table 2: Recommended EMC filter values

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



Tape/Reel packaging



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 $T_a=25^{\circ}\text{C}$, 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.

1W DC-DC module power supply



Feature

- Good temperature characteristics
- Isolation voltage 6000VDC
- Small SIP encapsulation
- International standard pins
- Internal SMT design structure
- Compliant with RoHS
- When in use, the load cannot be less than 10%

Electrical characteristics

MODEL	INPUT RANGE	OUTPUT (V, I)	INPUT I _{in}	EFFICIENCY	CAPACITY
MN0505S	4.5~5.5	±5VDC/±100mA	±10mA	80TYP	100μF
MN0507S	4.5~5.5	±7.2VDC/±70mA	±7.0mA	83TYP	100μF
MN0512S	4.5~5.5	±12VDC/±42mA	±4mA	85TYP	100μF
MN0515S	4.5~5.5	±15VDC/±33mA	±3mA	85TYP	100μF
MN0524S	4.5~5.5	±24VDC/±21mA	±2mA	84TYP	100μF
MN1205S	10.8~13.2	±5VDC/±100mA	±10mA	81TYP	100μF
MN1209S	10.8~13.2	±9VDC/±56mA	±5.6mA	83TYP	100μF
MN1212S	10.8~13.2	±12VDC/±42mA	±4mA	83TYP	100μF
MN1215S	10.8~13.2	±15VDC/±33mA	±3mA	85TYP	100μF
MN1224S	10.8~13.2	±24VDC/±21mA	±2mA	85TYP	100μF
MN1505S	13.5~16.5	±5VDC/±100mA	±10mA	81TYP	100μF
MN1509S	13.5~16.5	±9VDC/±56mA	±5.6mA	83TYP	100μF
MN1512S	13.5~16.5	±12VDC/±42mA	±4mA	84TYP	100μF
MN1515S	13.5~16.5	±15VDC/±33mA	±3mA	85TYP	100μF
MN1524S	13.5~16.5	±24VDC/±21mA	±4mA	85TYP	100μF
MN2405S	21.6~26.4	±5VDC/±100mA	±10mA	82TYP	100μF
MN2409S	21.6~26.4	±9VDC/±56mA	±5.6mA	83TYP	100μF
MN2412S	21.6~26.4	±12VDC/±42mA	±4mA	85TYP	100μF
MN2415S	21.6~26.4	±15VDC/±33mA	±3mA	85TYP	100μF
MN2424S	21.6~26.4	±24VDC/±21mA	±2mA	85TYP	100μF

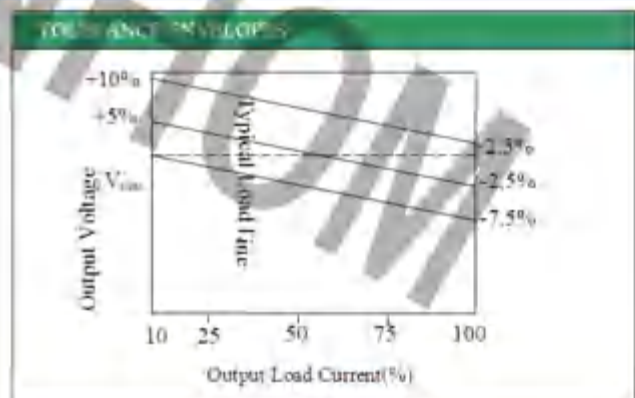
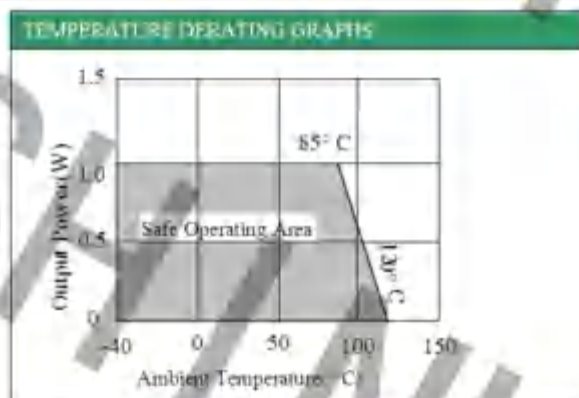
The above models with P after encoding have continuous short-circuit protection and self recovery function. Product suffix S - SIP encapsulation, D - DIP encapsulation.

General characteristics

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)	15 mV(TYP) 30 mV(MAX)
Switching frequency	100KHz(TYP)
Short Circuit Protection	1S (Max)
Temperature drift coefficient (nominal voltage input 100% load, -40 ℃~+85 ℃)	±0.03%/℃(MAX)
Storage humidity	95%(MAX)
Working temperature (temperature ≥ 85 ℃ for derating use)	-40℃ ~85℃
Storage temperature	-55℃~125℃
The shell heats up during product operation	35℃ (TYP)
Insulation strength (test time 1 minute, leakage current less than 0.5mA)	6000VDC
Cooling method	natural cooling
Mean time between failures (TA=25 ℃)	1 million hours (MIN)
Insulation resistance (insulation voltage 1000VDC)	1000MΩ(MIN)
Housing material	Flame retardant and heat-resistant plastic (UL94-V0)

Note: The working temperature refers to the surface temperature of the module during operation. After testing, when the temperature of the high and low temperature test chamber is set to -40 ℃~65 ℃, the surface temperature of the module has reached -40 ℃~85 ℃.

Temperature derating curve of output power



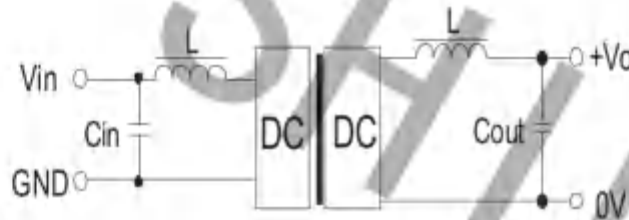
Precautions for use

① Output load requirements

In order to ensure the efficient and reliable operation of the module, the minimum output load during use must not be less than 10% of the rated load, and the product is strictly prohibited from being used without load!!! If your required power is indeed small, please connect a resistor in parallel at the output end. It is recommended to have a resistance value equivalent to 10% of the rated power, or choose our company's products with lower power levels.

② Recommended Circuit

If further reduction of input and output ripple is required, an "LC" filtering network can be connected to the input and output terminals, as shown in the application circuit (Figure 1).



(fig 1)

Vin (VDC)	Cin (μF)	Single output voltage (VDC)	Cout (μF)	Lout (μH)	Dual output voltage (VDC)	Cout (μF)	Lout (μH)
3.3/5	4.7	5	10	22	±5	4.7	22
12	2.2	9	4.7	100	±9	2.2	100
15	2.2	12	2.2	150	±12	1	150
24	1	15/24	1	220	±15	0.47	220
48	1						

Please choose capacitors with low ESR. For applications with actual output power less than 0.5W, it is recommended not to use external capacitors

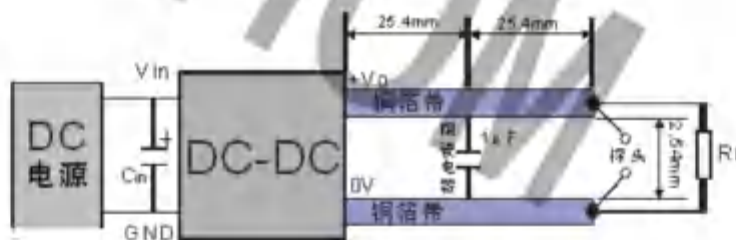
Capacity Load Table (Table 1)

However, it should be noted that the selection of inductance values and the frequency of the "LC" filtering network itself should be offset from the DC/DC frequency to avoid mutual interference. And select appropriate filtering capacitors. If the capacitance is too large, it is likely to cause startup problems. Please refer to the recommended capacitive load table for the selection of output capacitors.

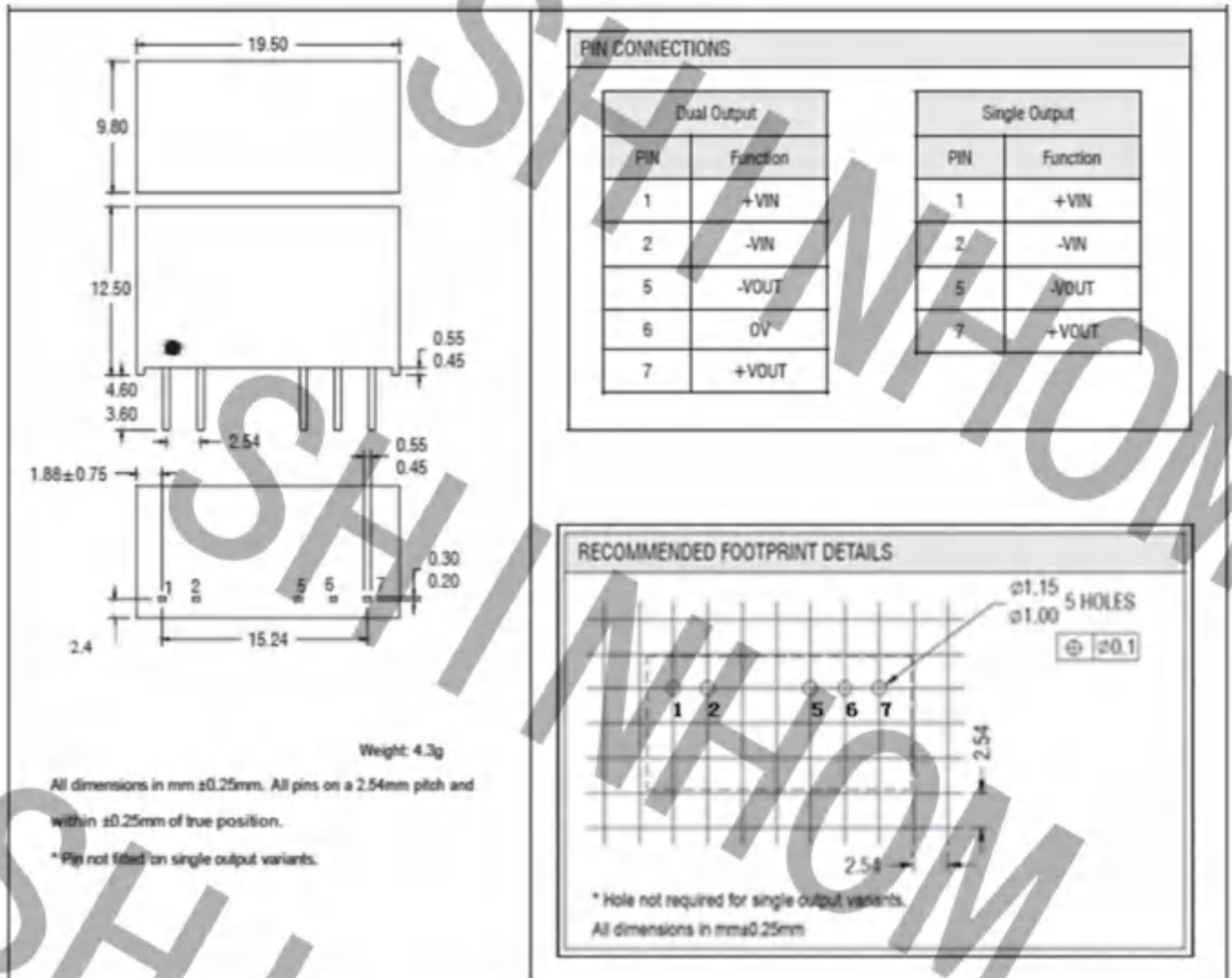
③ This product cannot be used in parallel and does not support hot swapping.

○ Ripple&Noise Testing of Products

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



O Appearance size, suggested printed board diagram, pin method



HDC150W-300W Series

Specification

SHAANXI SHINHOM ENTERPRISE CO.,LTD

Tel: 029-87851838 Fax: 029-87851840

E-mail: sales@shinhom.com.cn

F-No.8, Yanta Northern Road,Xi'an Shaanxi Pro. China

Features:

- Industry-standard Half-brick Footprint
- Typical Efficiency 90%
- 4:1 input range
- Regulated power output
- Under voltage protect
- Remote On/Off
- Over current/Short circuit protection
- Compliance with UL60950, EN60950, IEC60950, CE certification standards



1500VDC ISOLATION	REMOTE CONTROL	UVP	DCP	SCP	SYNC
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Note: All specifications are typical at nominal input, full load at 25°C baseplate temperature unless otherwise stated.

Models

Part No	Input voltage (VDC)	Output voltage (VDC)	Output current (A)	Efficiency (%)	Part No	Input voltage (VDC)	Output voltage (VDC)	Output current (A)	Efficiency (%)
HDC150-24S3.3	18-36	3.3	30	86	HDC300W-48S24	18-75	24	12.5	90
HDC150-24S05	18-36	5	30	88	HDC300W-48S48	18-75	48	6.25	87
HDC150-24S12	18-36	12	12.5	89	HDC300W-110S3.3	66-160	3.3	60	86
HDC150-24S15	18-36	15	10	88	HDC300W-110S05	66-160	5	60	88
HDC150-24S24	18-36	24	6.25	88	HDC300W-110S12	66-160	12	25	89
HDC150-24S48	18-36	48	3.13	87	HDC300W-110S15	66-160	15	20	88
HDC150W-48S3.3	18-75	3.3	30	86	HDC300W-110S24	66-160	24	12.5	88
HDC150W-48S05	18-75	5	30	88	HDC300W-110S48	66-160	48	6.25	87
HDC150W-48S12	18-75	12	12.5	89	HDC300-300S3.3	200-400	3.3	60	86
HDC150W-48S15	18-75	15	10	88	HDC300-300S05	200-400	5	60	88
HDC150W-48S24	18-75	24	6.25	90	HDC300-300S12	200-400	12	25	89
HDC150W-48S48	18-75	48	3.13	87	HDC300-300S15	200-400	15	20	88
HDC200-24S3.3	18-36	3.3	40	86	HDC300-300S24	200-400	24	12.5	88
HDC200-24S05	18-36	5	40	88	HDC300-300S48	200-400	48	6.25	87
HDC200-24S12	18-36	12	16.67	89					
HDC200-24S15	18-36	15	13.34	88					
HDC200-24S24	18-36	24	8.34	88					
HDC200-24S48	18-36	48	4.17	87					
HDC200W-48S3.3	18-75	3.3	40	86					
HDC200W-48S05	18-75	5	40	88					
HDC200W-48S12	18-75	12	16.67	89					
HDC200W-48S15	18-75	15	13.34	88					
HDC200W-48S24	18-75	24	8.34	88					
HDC200W-48S48	18-75	48	4.17	87					
HDC300-24S3.3	18-36	3.3	60	86					
HDC300-24S05	18-36	5	60	88					
HDC300-24S12	18-36	12	25	89					
HDC300-24S15	18-36	15	20	88					
HDC300-24S24	18-36	24	12.5	88					
HDC300-24S48	18-36	48	6.25	87					
HDC300W-48S3.3	18-75	3.3	60	86					
HDC300W-48S05	18-75	5	60	88					
HDC300W-48S12	18-75	12	25	89					
HDC300W-48S15	18-75	15	20	88					

Technology parameter

Input

Input voltage range	24Vin	W:9-36V, 18-36V
	48Vin	W:18-75V, 36-75V
	110Vin, 300Vin	—
Input Under voltage Protection	9Vinmin Input ON	8.8V
	9Vinmin Input OFF	8.0V
	18Vinmin Input ON	17V
	18Vinmin Input OFF	16V
	66Vinmin Input ON	62V
	66Vinmin Input OFF	60V
	200Vinmin Input ON	180V
	200Vinmin Input OFF	175V

General

Efficiency	—
Hi-Pot	Input/Output 1500VDC, 3000VDC@110S/300S
	Input/Case 1500VDC, 3000VDC@110S/300S
	Output/Case 500VDC
Insulation resistance	107 Ω
Insulation capacitance	1000pF Typ.
Switching Frequency	300kHz Typ.
Operating temperature	-40℃—100℃
Storage temperature	-55℃to+105℃
Humidity	95%RHmax
MTBF	MIL-HDBK-217F 1000K.Hrs
Size	2.4x2.28x0.50inch 61x57.9x12.7mm
Weight	120g

Output

Output voltage accuracy	±1.5%max
Dynamic response:75% to 100% Load variation	
Peak Deviation	±5%Vout
Settling Time	<500us
Output Voltage adjust range	Single output 90-110%Vout
Temperature Coefficient	±0.02%/℃
Short-Circuit Protection	Continuous Automatic Recovery
Line regulation(Note 1)	±0.5%max
Load regulation(Note 2)	±1%max
Output Overvoltage Protection	115-140%Vnom
Current Limit Threshold Range	110%-160%
Start delay time	50msmax.

1. Input is measured from low voltage to high voltage
2. Output is measured from no load to full load
3. During measurement, 10uF tantalum capacitor and 1uF ceramic capacitor shall be connected at the output end
4. Positive Logic
ON Reference Input grounding
OFF >3.5Vdcto10Vdc or Open circuit
<0.5Vdc
5. Max. Case temperature 105℃, OTP:105℃ Hysteresis 25℃

Size



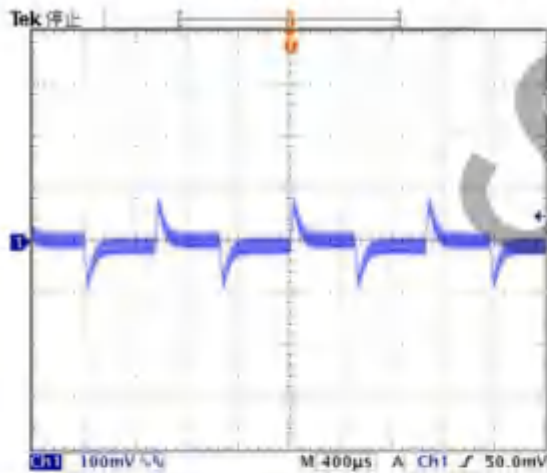
Pins	1	2	3	4	5	6	7	8	9
	-Vin	Case	CNT	+Vin	+Vo	+S	TRIM	-S	-Vo

Unit: mm(inch)

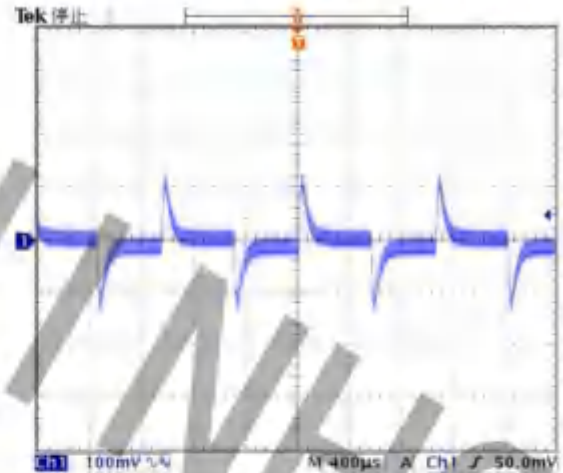
X.X±0.5mm(X.XX±0.02inch)

X.XX±0.25mm(X.XXX±0.010inch)

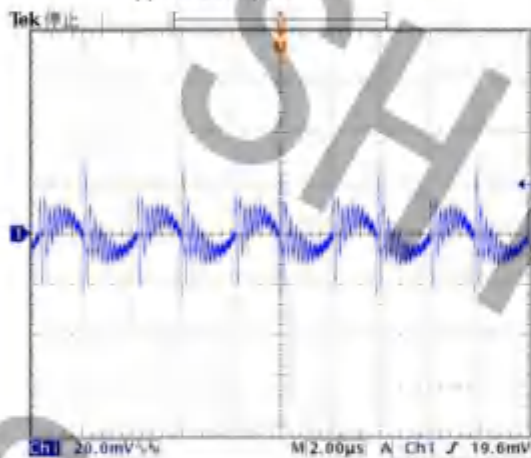
Typical dynamic response(25%--50%--25%)



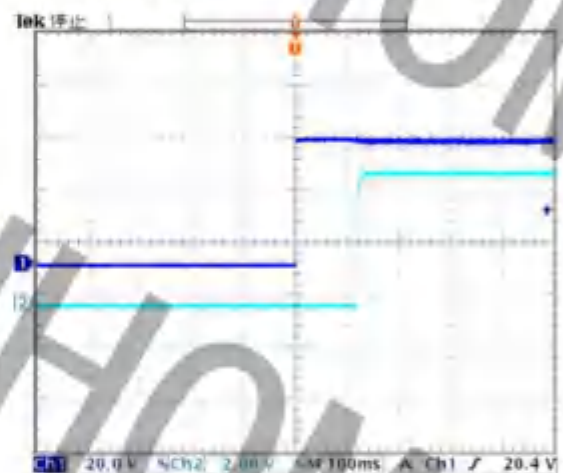
Typical dynamic response(50%--75%--50%)



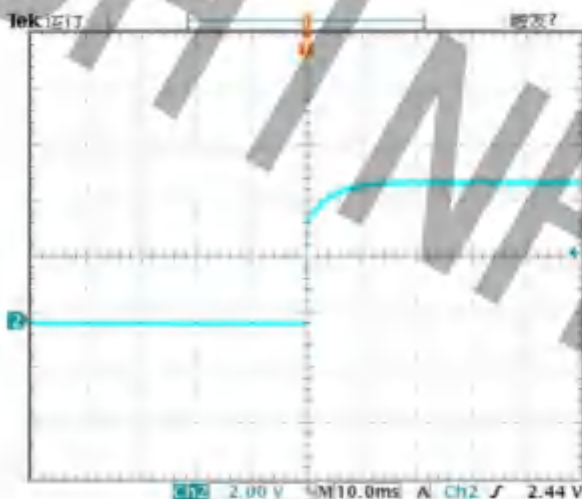
Typical output



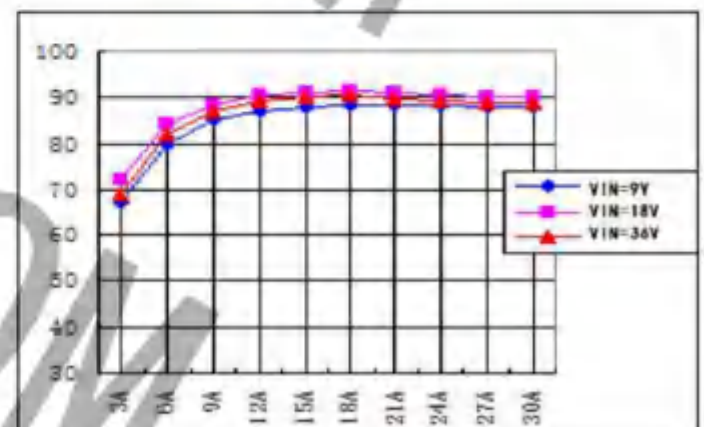
Typical startup delay time



Typical startup setup time



Typical efficiency curve



FEATURES

- 1 W isolated output
- smaller package
- single and dual unregulated outputs
- 1,500 Vdc Min. isolation
- short circuit protection
- extended temperature range (-40~105°C)
- antistatic protection up to 8kV
- high efficiency at light load
- efficiency up to 82%

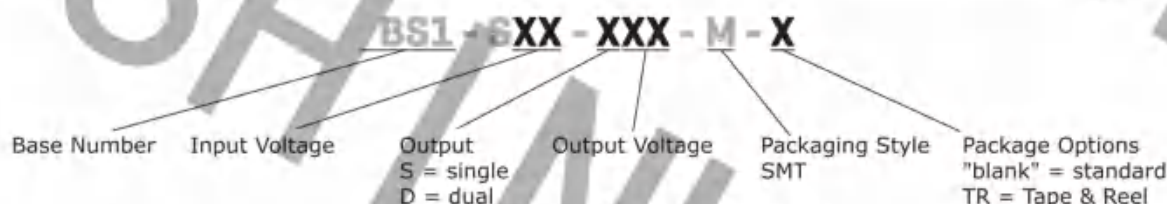


MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise ² typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
BS1-S3-S3-M ^{3,4}	3.3	2.97~3.63	3.3	30	303	1	60	69
BS1-S3-S5-M ^{1,3,4}	3.3	2.97~3.63	5	20	200	1	60	74
BS1-S3-D5-M ^{3,4}	3.3	2.97~3.63	±5	±10	±100	1	60	76
BS1-S3-D12-M ^{3,4}	3.3	2.97~3.63	±12	±5	±42	1	60	77
BS1-S3-D15-M ^{3,4}	3.3	2.97~3.63	±15	±3	±33	1	60	78
BS1-S5-S3-M ^{1,3,4}	5	4.5~5.5	3.3	30	303	1	60	72
BS1-S5-S5-M ^{1,3}	5	4.5~5.5	5	20	200	1	60	80
BS1-S5-S9-M ^{3,4}	5	4.5~5.5	9	12	111	1	60	80
BS1-S5-S12-M ^{1,3}	5	4.5~5.5	12	9	84	1	60	80
BS1-S5-S15-M ^{1,3,4}	5	4.5~5.5	15	7	67	1	60	80
BS1-S5-S24-M ^{1,3}	5	4.5~5.5	24	4	42	1	60	80
BS1-S5-D5-M ^{3,4}	5	4.5~5.5	±5	±10	±100	1	60	80
BS1-S5-D9-M ^{3,4}	5	4.5~5.5	±9	±6	±56	1	60	80
BS1-S5-D12-M ^{3,4}	5	4.5~5.5	±12	±5	±42	1	60	79
BS1-S5-D15-M ³	5	4.5~5.5	±15	±3	±33	1	60	81
BS1-S5-D24-M ^{3,4}	5	4.5~5.5	±24	±2	±21	1	60	81
BS1-S12-S3-M ^{1,3}	12	10.8~13.2	3.3	30	303	1	60	72
BS1-S12-S5-M ^{1,3,4}	12	10.8~13.2	5	20	200	1	60	71
BS1-S12-S9-M ^{1,3,4}	12	10.8~13.2	9	12	111	1	60	80
BS1-S12-S12-M ^{1,3,4}	12	10.8~13.2	12	9	84	1	60	80
BS1-S12-S15-M ^{1,3,4}	12	10.8~13.2	15	7	67	1	60	80
BS1-S12-D5-M ^{3,4}	12	10.8~13.2	±5	±10	±100	1	60	80
BS1-S12-D9-M ^{3,4}	12	10.8~13.2	±9	±6	±56	1	60	80
BS1-S12-D12-M ^{3,4}	12	10.8~13.2	±12	±5	±42	1	60	73
BS1-S12-D15-M ^{3,4}	12	10.8~13.2	±15	±3	±33	1	60	81
BS1-S12-D24-M ^{3,4}	12	10.8~13.2	±24	±2	±21	1	60	81
BS1-S15-S15-M ^{3,4}	15	13.5~16.5	15	7	67	1	60	80

**MODEL
(CONTINUED)**

	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise ² typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
BS1-S24-S5-M ^{1,3,4}	24	21.6~26.4	5	20	200	1	60	73
BS1-S24-S9-M ^{1,3,4}	24	21.6~26.4	9	12	111	1	60	80
BS1-S24-S12-M ^{3,4}	24	21.6~26.4	12	9	84	1	60	80
BS1-S24-S15-M ^{1,4}	24	21.6~26.4	15	7	67	1	60	72
BS1-S24-S24-M ^{1,3,4}	24	21.6~26.4	24	4	42	1	60	80
BS1-S24-D5-M ^{3,4}	24	21.6~26.4	±5	±10	±100	1	60	70
BS1-S24-D9-M ^{3,4}	24	21.6~26.4	±9	±6	±56	1	60	80
BS1-S24-D12-M ^{3,4}	24	21.6~26.4	±12	±5	±42	1	60	72
BS1-S24-D15-M ^{3,4}	24	21.6~26.4	±15	±3	±33	1	60	71
BS1-S24-D24-M ^{3,4}	24	21.6~26.4	±24	±2	±21	1	60	80

Notes: 1. UL approved
2. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 μ F ceramic and 10 μ F electrolytic capacitors on the output.
3. Standard option discontinued.
4. Tape and Reel option discontinued.

PART NUMBER KEY**INPUT**

parameter	conditions/description	min	typ	max	units
operating input voltage	3.3 Vdc input models	2.97	3.3	3.63	Vdc
	5 Vdc input models	4.5	5	5.5	Vdc
	12 Vdc input models	10.8	12	13.2	Vdc
	15 Vdc input models	13.5	15	16.5	Vdc
	24 Vdc input models	21.6	24	26.4	Vdc
surge voltage	for maximum of 1 second				
	3.3 Vdc input models	-0.7		5	Vdc
	5 Vdc input models	-0.7		9	Vdc
	12 Vdc input models	-0.7		18	Vdc
	15 Vdc input models	-0.7		21	Vdc
	24 Vdc input models	-0.7		30	Vdc
filter	capacitance filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	for Vin change of 1%				
	3.3 Vdc output models			±1.5	%
	all other models			±1.2	%
load regulation	measured from 10% load to full load				
	3.3 Vdc output models		18		%
	5 Vdc output models		12		%
	9 Vdc output models		8		%
	12 Vdc output models		7		%
	15 Vdc output models		6		%
	24 Vdc output models		5		%
voltage accuracy	see tolerance envelope curve				
switching frequency	100% load, nominal input voltage		100		kHz
temperature coefficient	100% load			±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection ¹	3 & 24 Vdc input models			1	s
	BS1-S5-S12-M, BS1-S5-D24-M			1	s
	all other models: automatic recovery				

Note: 1. The supply voltage must be discontinued at the end of the short circuit duration

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA max.	1,500			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output at 100 kHz/0.1 V		20		pF
safety approvals ²	certified to 60950-1: UL designed to meet 62368: EN				
conducted emissions	CISPR32/EN55032, class B (external circuit required, see Figure 1)				
radiated emissions	CISPR32/EN55032, class B (external circuit required, see Figure 1)				
ESD	IEC/EN 61000-4-2, class B, contact ±8kV (single output models) IEC/EN 61000-4-2, class B, contact ±6kV (dual output models)				
MTBF	as per MIL-HDBK-217F @ 25 °C	3,500,000			hours
RoHS	2011/65/EU				

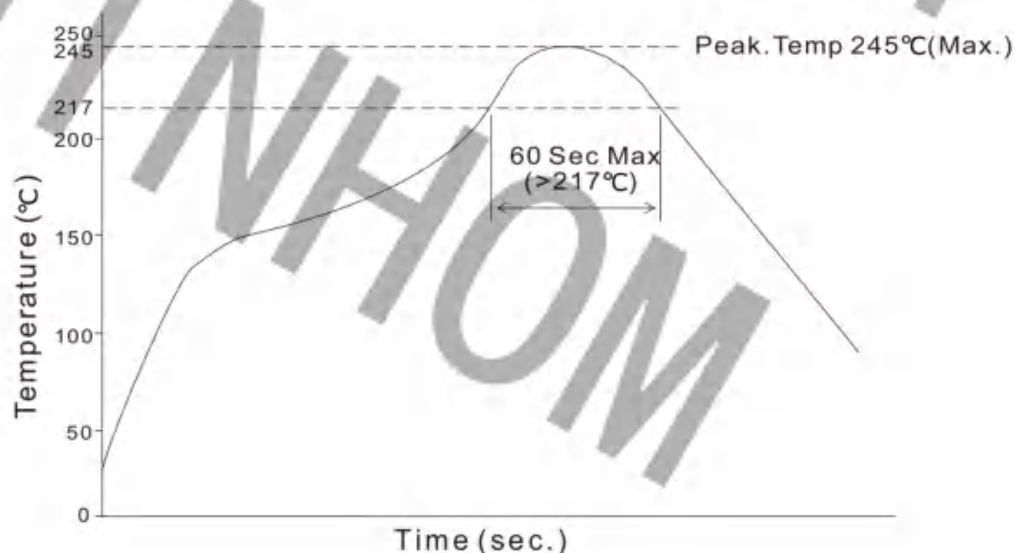
Note: 2. See specific models noted on pages 1 & 2

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	at full load, Ta=25°C		25		°C

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
reflow soldering	see reflow soldering profile			245	°C



MECHANICAL

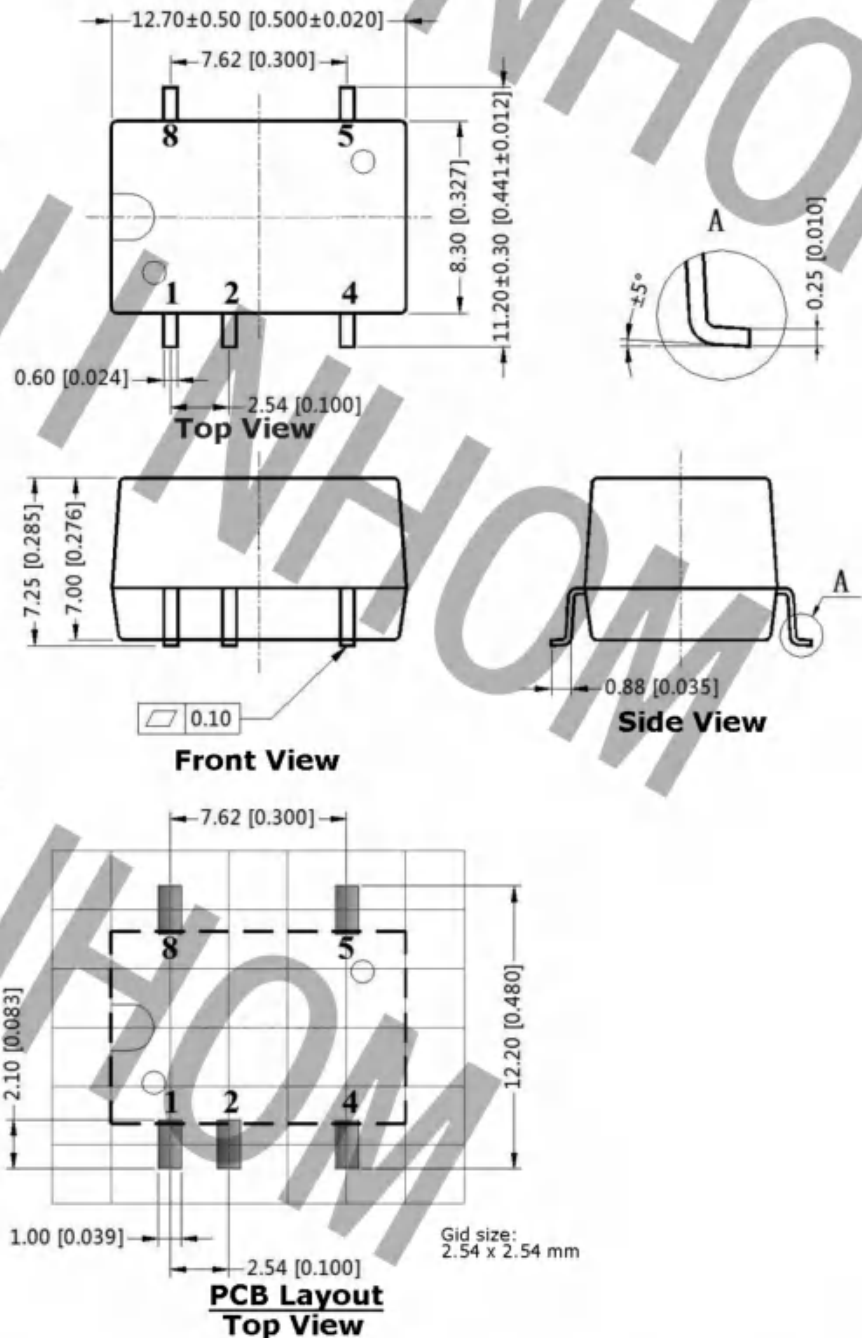
parameter	conditions/description	min	typ	max	units
dimensions	single output models: 12.7 x 8.30 x 7.25 dual output models: 15.24 x 8.30 x 7.25				mm mm
case material	epoxy resin (UL94-V0)				
weight	single output models dual output models		1.6 2.0		g g

MECHANICAL DRAWING**SINGLE OUTPUT MODELS**

units: mm[inch]

tolerance: $\pm 0.25[\pm 0.010]$ pin section tolerance: $\pm 0.10[\pm 0.004]$

PIN CONNECTIONS	
PIN	Function
1	GND
2	Vin
4	0V
5	+Vo
8	NC

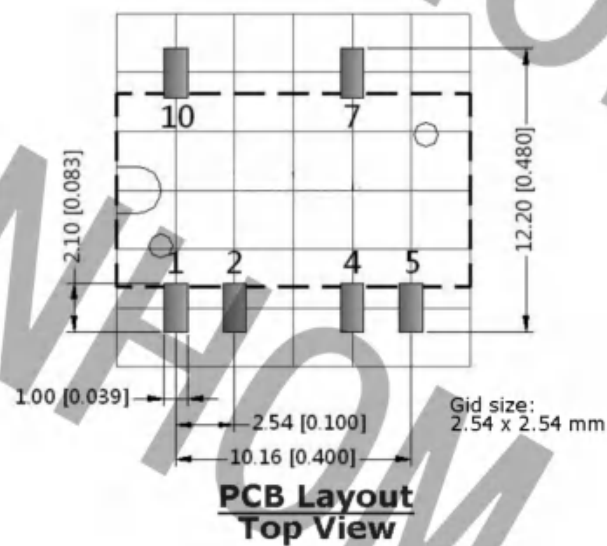
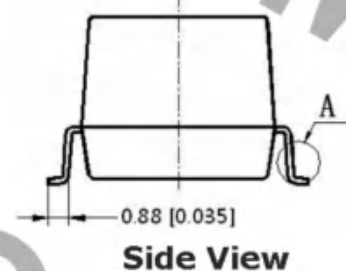
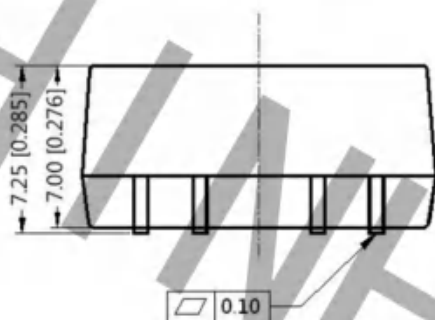
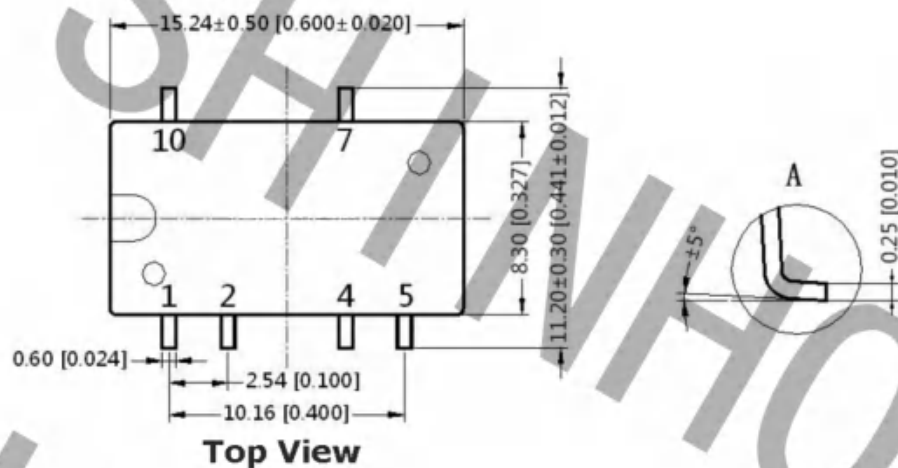


DUAL OUTPUT MODELS

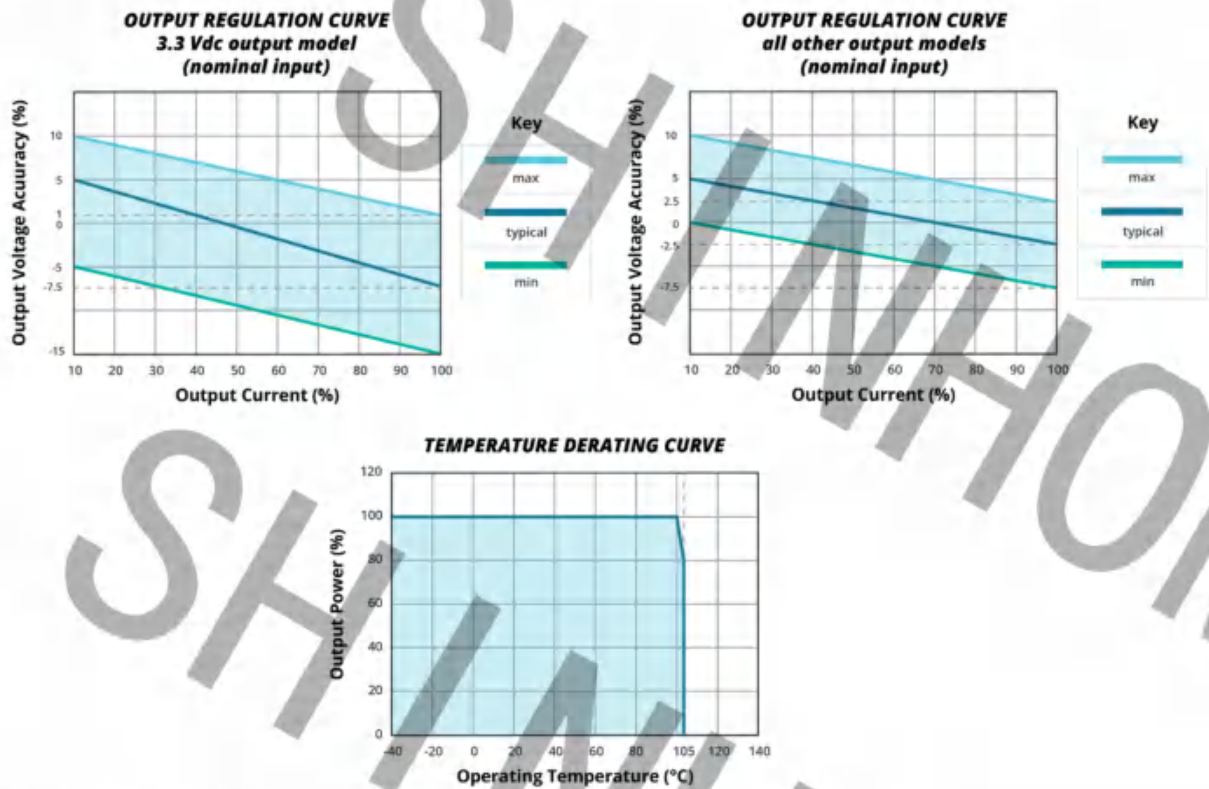
tolerance: $\pm 0.25[\pm 0.010]$

pin section tolerance: $\pm 0.10 [\pm 0.004]$

PIN CONNECTIONS	
PIN	Function
1	GND
2	V _{in}
4	0V
5	-V _o
7	+V _o
10	NC



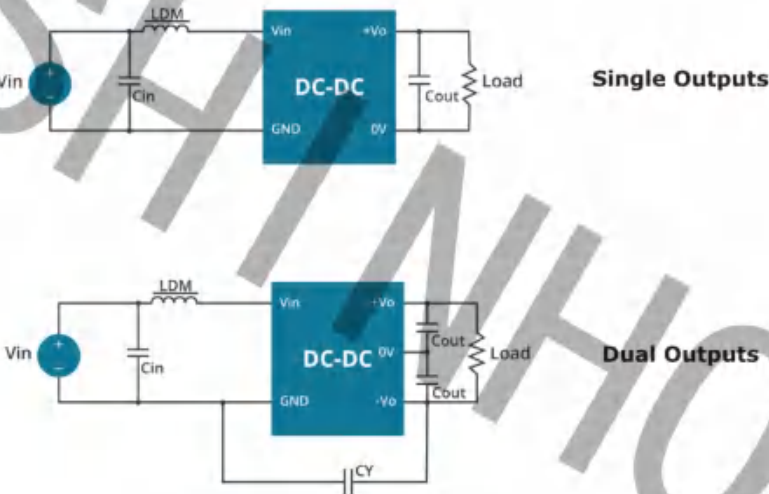
DERATING CURVES



EMC RECOMMENDED CIRCUIT

Figure 1

Table 1



Recommended external circuit components				
Vout (dc)	Cin	LDM	Cout	CY
3.3	4.7μF/50V	6.8μH	10μF	-
5	4.7μF/50V	6.8μH	10μF	-
9	4.7μF/50V	6.8μH	4.7μF	-
12	4.7μF/50V	6.8μH	2.2μF	-
15	4.7μF/50V	6.8μH	1μF	-
24	4.7μF/50V	6.8μH	0.47μF	-
±5	4.7μF/50V	6.8μH	4.7μF	-
±9	4.7μF/50V	6.8μH	2.2μF	-
±12	4.7μF/50V	6.8μH	1μF	-
±15	4.7μF/50V	6.8μH	1μF	1nF/2kV
±24	4.7μF/50V	6.8μH	0.47μF	1nF/2kV

Note: 1. See Cout values in Tables 1 and 2.
2. 24 Vdc output models require CY also.

APPLICATION NOTES

1. **Output load requirement**
To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 10% of the full load during operation. If the actual output power is low, connect a resistor at the output end in parallel to increase the load.
2. **Overload Protection**
Under normal operating conditions, the output circuit of this product has no protection against overload. The simplest method to add this is to add a circuit breaker to the circuit.
3. **Recommended circuit**
If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR (see Figure 2 & Table 1). However, the capacitance of the output filter capacitor must be appropriate. If the capacitance is too high, a startup problem might arise. For every channel of the output, to ensure safe and reliable operation, the maximum capacitance must be less than the maximum capacitive load (see Table 2). It's not recommended to connect any external capacitors in applications with less than 0.5 watt output.

Figure 2

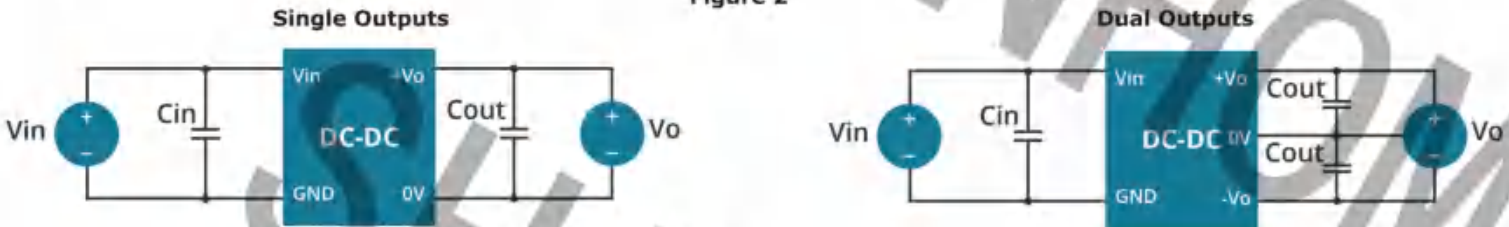


Table 2

Single Vout (Vdc)	Max. Capacitive Load (μF)	Dual Vout (Vdc)	Max. Capacitive Load ¹ (μF)
3.3	220	-	-
5	220	± 5	100
9	220	± 9	100
12	220	± 12	100
15	220	± 15	100
24	220	± 24	100

Note: 1. For each output.

4. **Output Voltage Regulation and Over-voltage Protection Circuit**
The device for output voltage regulation, over-voltage and over-current protection is a linear regulator and a capacitor filtering ne work with overheat protection which can be connected to the input or output end in series (see Figure 3). The recommended capacitance of its filter capacitor (see Table 1 & 2), and the linear regulator is based on the actual voltage and current required.

Figure 3



Note:

1. Operation under minimum load will not damage the converter; however, they may not meet all specifications listed.

2. Max. capacitive load tested at input voltage range and full load.

3. It is recommended to use either ceramic capacitors or electrolytic capacitors on the input and the output. Using tantalum capacitors may increase the risk of failure.

4. All specifications measured at: $T_a=25^{\circ}C$, humidity<75%, nominal input voltage and rated output load, unless otherwise specified.

Features

- 1/2 Brick
- Efficiency to 90%
- 4:1 Input Range
- Regulated Outputs
- Input Under Voltage Protection
- Remote On/Off
- Continuous Over Load \ Short Circuit Protection
- Meets EN60950-1.CE Mark



1500VDC ISOLATION

REMOTE CONTROL

UVP

DCP

SCP

SYNC

All Specifications Typical at Nominal Line, Full Load, and 25 °C Unless Otherwise Noted.

Selection Guide

Order Code	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (A)	Eff. (%)	Order Code	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (A)	Eff. (%)
WD150W-24S33	9~36	3.3	30	86	WD300W-48S24	18~75	24	12.5	90
WD150W-24S05	9~36	5	30	88	WD300W-48S48	18~75	48	6.25	87
WD150W-24S12	9~36	12	12.5	89	WD350W-48S33	18~75	3.3	70	86
WD150W-24S15	9~36	15	10	88	WD350W-48S05	18~75	5	70	88
WD150W-24S26	9~36	26	5.70	85	WD350W-48S12	18~75	12	29	89
WD150W-24S48	9~36	48	3.13	87	WD350W-48S15	18~75	15	23	88
WD150W-48S33	18~75	3.3	30	86	WD350W-48S28	18~75	28	12.5	90
WD150W-48S05	18~75	5	30	88	WD350W-48S48	18~75	48	7.3	87
WD150W-48S12	18~75	12	12.5	89	WD300-300S33	200~400	3.3	60	86
WD150W-48S15	18~75	15	10	88	WD300-300S05	200~400	5	60	88
WD150W-48S24	18~75	24	6.25	90	WD300-300S12	200~400	12	25	89
WD150W-48S48	18~75	48	3.13	87	WD300-300S15	200~400	15	20	88
WD200W-24S33	9~36	3.3	40	86	WD300-300S24	200~400	24	12.5	88
WD200W-24S05	9~36	5	40	88	WD300-300S48	200~400	48	6.25	87
WD200W-24S12	9~36	12	16.67	89	WD400-24S33	18~36	3.3	80	80
WD200W-24S15	9~36	15	13.34	88	WD400-24S05	18~36	5	80	88
WD200W-24S24	9~36	24	8.34	88	WD400-24S12	18~36	12	33.3	89
WD200W-24S48	9~36	48	4.17	87	WD400-24S15	18~36	15	26.6	88
WD200W-48S33	18~75	3.3	40	86	WD400-24S24	18~36	24	16.6	88
WD200W-48S05	18~75	5	40	88	WD400-24S48	18~36	48	8.3	87
WD200W-48S12	18~75	12	16.67	89					
WD200W-48S15	18~75	15	13.34	88					
WD200W-48S24	18~75	24	8.34	88	WD450-48S33	36~75	3.3	90	88
WD200W-48S48	18~75	48	4.17	87	WD450-48S05	36~75	5	90	89
WD300W-24S33	9~36	3.3	60	86	WD450-48S12	36~75	12	37.5	89
WD300W-24S05	9~36	5	60	88	WD450-48S24	36~75	24	19	91
WD300W-24S12	9~36	12	25	89	WD450-48S28	36~75	28	16	91.5
WD300W-24S15	9~36	15	20	88	WD450-48S48	36~75	48	9.3	89
WD300W-24S24	9~36	24	12.5	88					
WD300W-24S48	9~36	48	6.25	87					
WD300W-48S33	18~75	3.3	60	86	NO 'W' is 2:1 Input Voltage range				
WD300W-48S05	18~75	5	60	88					
WD300W-48S12	18~75	12	25	89					
WD300W-48S15	18~75	15	20	88					

Specifications

INPUT CHARACTERISTICS

Input Voltage range	24Vin	W 9-36V
	48Vin	W 18-75V
	110Vin	W 66-160V
Under voltage lock out	Turn on @9Vinmin	8.8V
	Turn off @9Vinmin	8.0V
	Turn on @18Vinmin	17V
	Turn off @18Vinmin	16V
	Turn on @66Vinmin	62V
	Turn off @66Vinmin	60V
	Turn on @200Vinmin	180V
	Turn off @200Vinmin	175V
Input Filter		LC Type
Positive Logic Remote on/off		See Note

OUTPUT CHARACTERISTICS

Voltage Accuracy	±1.5% max
Transient Response	25% Step Load Change
Error band	±5% Vout
Recovery Time	<500us
External Trim Adj.Range	90-110%Vout
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation	±0.5% max
Load Regulation	±1.0% max
Ripple and Noise	100 mVp-p typ.
Output Current Limit	110%-160%
Start-up Time	50ms max.

GENERAL CHARACTERISTICS

Eff.		See Note
Isolation Voltage	I/O	1500 VDC
	I/CASE	1500 VDC
	O/CASE	500 VDC
Isolation Resistance	(500VDC)	10 ¹² Ohms min
Isolation Capacitance		1000pF typ.
Switching frequency		350kHz typ.
Case Temperature		105°C max.
Cooling		Natural Convection
Storage Temperature		-55°C to +105°C
Humidity		95%RH max
MTBF	MIL-HDBK-217F	1000K.Hrs
Dimensions		2.4 x 2.28 x 0.50 inch
		61x 57.9 x 12.7 mm
Case Material		Six-Sided shield metal case
Weight		90g

EMC CHARACTERISTICS

EMI	Conduction	EN 55032, FCC part 15	B
	Radiation	EN 55032, FCC part 15	B
EMS		EN55024	
	ESD	EN 61000-4-2 Air±6kV, Contact±4kV	B
	Radiated immunity	EN 61000-4-3 10V/m	A
	Fast transient	EN 61000-4-4 ±2kV	B
	Surge	EN 61000-4-5 ±2kV	B
	Conducted immunity	EN 61000-4-6 10Vrms	A

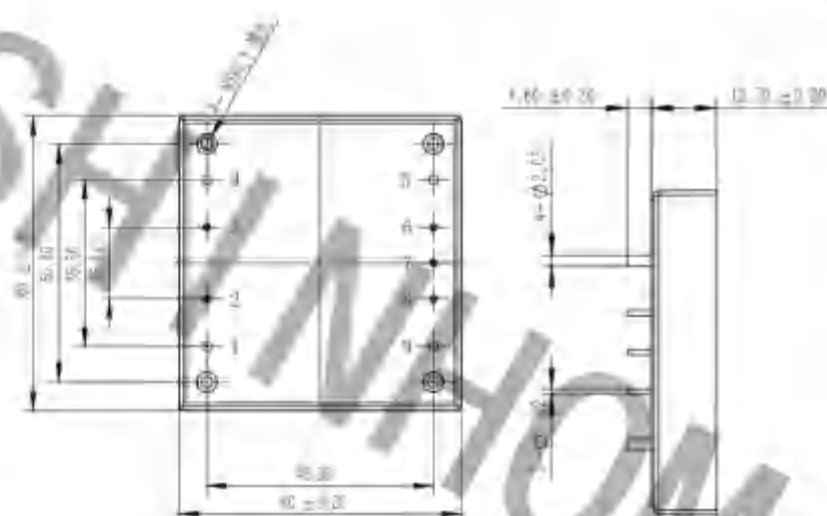
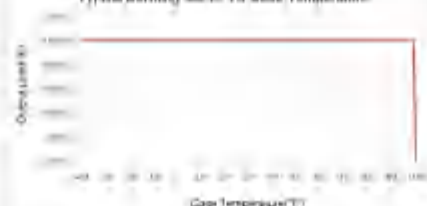
MECHANICAL DIMENSIONS & PIN CONNECTION

PIN CONNECTION

1	+Input
2	ON/OFF
3	Case
4	-Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

Derating Curve

Typical Derating Curve VS Case Temperature:



Design reference

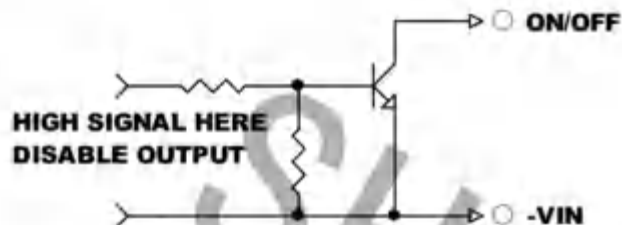
Application Circuit



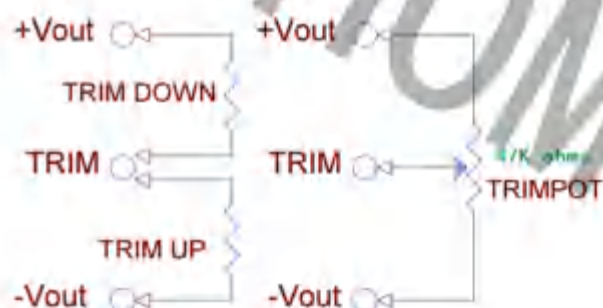
C1 Typical Value: recommend 2.2uF/1W output power

C2 Typical Value: recommend 100uF/1A output current

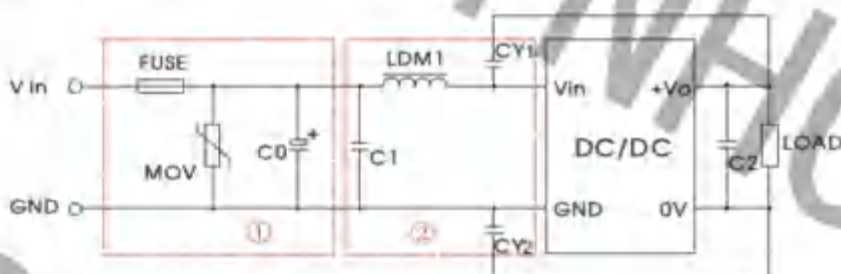
Remote on/off control



External Output Trim



EMC Recommend Circuit



Position	Parameter
FUSE	According to the actual choice
MOV	According to the actual choice
C0	220uF Electrolytic capacitor
C1	2.2uF/1W output power
C2	100uF/1A output current
LDM1	According to the actual choice
CY1	1nF/2KV
CY2	1nF/2KV

The first part is used for EMC testing, and the second part is used for EMI filtering, which can be selected according to requirements.

Note

1. Measured From High Line to Low Line.
2. Measured From Full Load to min. Load.
3. The output ripple and noise is measured with 10uF Aluminium electrolytic capacitor and 0.1uF Ceramic capacitor across output.
4. Positive Logic

Module ON	>+3.5V or Open Circuit
Module OFF	< 0.5Vdc or Short to -input
5. Operation Ambient Temperature Range

- 40°C ~100°C
Derating, Above 100°C, Linearly to Zero Power at +105°C