

## MSA\_(M)D-3W & MSB\_(M)D-3W Series

### 3W, WIDE INPUT, ISOLATED & REGULATED

### DUAL/SINGLE OUTPUT DIP DC-DC CONVERTER

RoHS multi-country patent protection

#### FEATURES

- Wide (2:1) Input Range
- Efficiency Up To 82%
- Operating Temperature: -40°C to +85°C
- 1.5KVDC Isolation
- Short Circuit Protection(automatic recovery)
- Internal SMD construction
- No Heat Sink Required
- No external component required
- UL94-V0 Package
- Industry Standard Pin out
- MTBF>1,000,000 hours
- RoHS Compliance

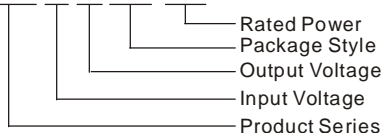
#### APPLICATIONS

The MSA\_(M)D-3W & MSB\_(M)D-3W Series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board. These products apply to:

- Where the voltage of the input power supply is wide range (voltage range  $\leq 2:1$ );
- Where isolation is necessary between input and output(isolation voltage  $\leq 1500\text{VDC}$ );
- Where the regulation of the output voltage and the output ripple noise are demanded.

#### MODEL SELECTION

MSA2405MD-3W



#### PRODUCT PROGRAM

Part Number	Input			Output			Efficiency (% , Typ)	Certificate
	Voltage (VDC)			Voltage (VDC)	Current (mA)			
	Nominal	Range	Max*		Max	Min		
MSA0505(M)D-3W	5	4.5-9	11	±5	±300	±30	68	
MSA0509(M)D-3W				±9	±167	±16	70	
MSA0512(M)D-3W				±12	±125	±12	72	
MSA0515(M)D-3W				±15	±100	±10	73	
MSB0505(M)D-3W				5	600	60	68	
MSB0509(M)D-3W				9	333	33	70	
MSB0512(M)D-3W				12	250	25	72	
MSB0515(M)D-3W				15	200	20	73	
MSB0524(M)D-3W				24	125	12	74	
MSA1205(M)D-3W				12	9-18	22	±5	±300
MSA1209(M)D-3W	±9	±167	±16				78	
MSA1212(M)D-3W	±12	±125	±12				79	
MSA1215(M)D-3W	±15	±100	±10				80	
MSB1205(M)D-3W	5	600	60				76	
MSB1209(M)D-3W	9	333	33				78	
MSB1212(M)D-3W	12	250	25				80	
MSB1215(M)D-3W	15	200	20				81	
MSB1224(M)D-3W	24	125	12				82	
MSA2405(M)D-3W	24	18-36	40				±5	±300
MSA2409(M)D-3W				±9	±167	±16	78	
MSA2412(M)D-3W				±12	±125	±12	80	
MSA2415(M)D-3W				±15	±100	±10	81	
MSB2403(M)D-3W				3.3	909	90	74	UL
MSB2405(M)D-3W				5	600	60	76	UL
MSB2409(M)D-3W				9	333	33	78	UL
MSB2412(M)D-3W				12	250	25	81	UL
MSB2415(M)D-3W				15	200	20	80	UL
MSB2424(M)D-3W				24	125	12	82	
MSA4805(M)D-3W	48	36-72	80	±5	±300	±30	76	
MSA4809(M)D-3W				±9	±167	±16	78	
MSA4812(M)D-3W				±12	±125	±12	80	
MSA4815(M)D-3W				±15	±100	±10	81	
MSB4803(M)D-3W				3.3	909	90	74	
MSB4805(M)D-3W				5	600	60	76	
MSB4809(M)D-3W				9	333	33	78	
MSB4812(M)D-3W				12	250	25	81	
MSB4815(M)D-3W				15	200	20	80	
MSB4824(M)D-3W				24	125	12	82	

\* Input voltage over it may cause permanent damage to the device.

Note: 1. Metal package style's series is MSA\_MD-3W & MSB\_MD-3W.

2. The load shouldn't be less than 10%, otherwise ripple will increase dramatically.

3. Operation under 10% load will not damage the converter; However, they may not meet all specification listed.

#### MORNSUN Science & Technology co.,Ltd.

Address: 2th floor 6th building, Hangzhou Industrial District, Guangzhou, China  
 Tel: 86-20-38601850  
 Fax: 86-20-38601272  
<http://www.mornsun-power.com>

#### ISOLATION SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation Capacitance	Input/Output		80		pF

## OUTPUT SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Output power	See below products program	0.3		3	W
Positive voltage accuracy	Refer to recommended circuit		±1	±3	%
Negative voltage accuracy	Refer to recommended circuit		±3	±5	
Load regulation	From 10% to 100% load		±0.5	±1*	
Line regulation	Input Voltage From Low to High		±0.2	±0.5	
Temperature drift(Vout)	Refer to recommended circuit			±0.03	%/°C
Ripple & Noise**	20MHz bandwidth		50	100	mVp-p
Switching frequency	100% load, nominal input voltage		300		KHz

\*Dual output models unbalanced load: ±5%.

\*\*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

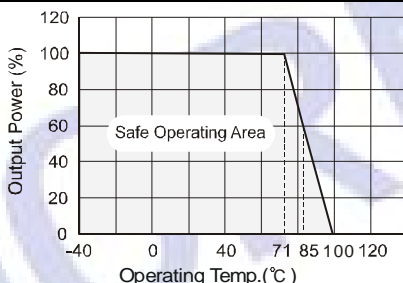
## COMMON SPECIFICATIONS

Item	Test Conditions	Min	Typ	Max	Units
Storage humidity				95	%
Operating temperature		-40		85	°C
Storage temperature		-55		125	
Temp. rise at full load			15		
Lead temperature	1.5mm from case for 10 seconds			300	
No-load Power consumption			0.2		W
Cooling	Free air convection				
Short circuit protection	Continuous, Automatic Recovery				
Case material	D: Plastic (UL94-V0); MD: Steel, Nickel Coated				
MTBF		1000			K hours
Weight			15		g

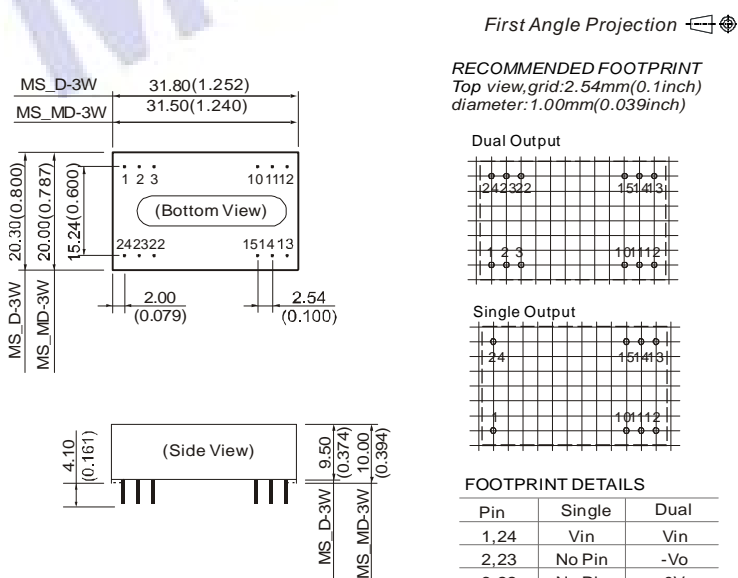
Note:

- All specifications measured at TA=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- See below recommended circuits for more details.

## TYPICAL CHARACTERISTICS



## OUTLINE DIMENSIONS & PIN CONNECTIONS



Note:

- Unit:mm(inch)
- Pin diameter:0.50mm(0.020inch)
- Pin diameter tolerances:±0.05mm(±0.002inch)
- General tolerances:±0.25mm(±0.010inch)

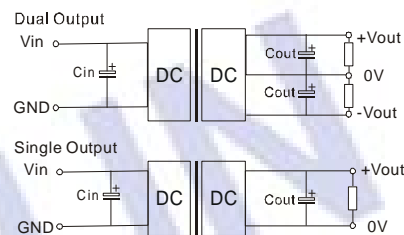
## APPLICATION NOTE

### Requirement On Output Load

In order to ensure the product operate efficiently and reliably, in addition to a max load (namely full load), a minimum load is specified for this kind of DC/DC converter. Make sure the specified range of input voltage is not exceeded, the minimum output load no less than 10% load. If the actual load is less than the specified minimum load, the output ripple may increase sharply while its efficiency and reliability will reduce greatly. If the actual output power is very small, please add an appropriate resistor as extra loading, or contact our company for other lower output power products.

### Recommended Circuit

All the MSA\_(M)D-3W & MSB\_(M)D-3W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load. Never be tested under no load (see Figure 1).



(Figure 1)

If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees (Table 1). Generally: If you want to use the products in high EMI, please choose our metal packaged products (MSA\_MD-3W & MSB\_MD-3W). Generally:

Cin: 5V&12V 100μF  
24V&48V 10μF-47μF  
Cout: 10μF/100mA

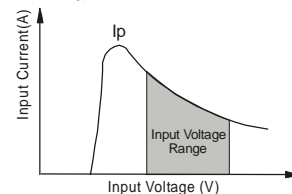
Output External Capacitor Table (Table 1)

Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout (μF)
5	1000	±5	680
9	680	±9	470
12	470	±12	330
15	330	±15	220
24	220	±24	100

### Input Current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the startup current of this kind of DC/DC module (See figure 2), Generally:

$$I_p \leq 1.4 \cdot I_{in-max}$$



(Figure 2)

No parallel connection or plug and play.