

# MORNSUN®

## B\_M-1W Series

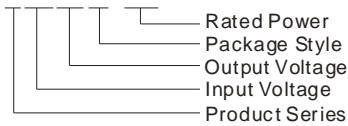
**1W, SUPERMINIATURE FIXED INPUT  
ISOLATED & UNREGULATED SINGLE OUTPUT  
DC-DC CONVERTER**



Patent Protection RoHS

### PART NUMBER SYSTEM

B0505M-1W



### FEATURES

- Efficiency up to 78%
- Super Miniature SIP Package
- 1KVDC Isolation
- Operating Temperature Range: -40°C to +85°C
- Low Temperature Rise
- No external component required
- Industry standard pinout

### APPLICATIONS

The B\_M-1W Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage variation  $\leq \pm 10\%$ ;
- 2) 1KVDC input and output isolation;
- 3) Regulated and low ripple noise is not required.

Such as: digital circuits and low frequency analog circuits.

### SELECTION GUIDE

Model Number	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load( $\mu$ F)	Efficiency (% , typ.) @Max. Load	Approval
			Max.	Min.	@Max. Load	@No Load				
B0303M-1W	3.3 (3.0-3.6)	3.3	303	30	373	40	20	220	69	
B0305M-1W		5	200	20	389				74	
B0505M-1W	5 (4.5-5.5)	5	200	20	251	20			70	
B0509M-1W		9	111	12	256				76	
B0512M-1W		12	83	9	252				77	
B0515M-1W		15	67	7	244				78	
B1205M-1W	12 (10.8-13.2)	5	200	20	118	15			70	
B1212M-1W		12	83	9	106				77	
B1215M-1W		15	67	7	105				78	

### INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	3.3VDC input	-0.7	--	5	VDC
	5VDC input	-0.7	--	9	
	12VDC input	-0.7	--	18	
Input Filter		Capacitance Filter			

### OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Power		0.1	--	1	W	
Output Voltage Accuracy		See tolerance envelope curve				
Line Regulation	For $V_{in}$ change of $\pm 1\%$	--	--	$\pm 1.2$	%	
Load Regulation	10% to 100% load	3.3VDC output	--	12		20
		5VDC output	--	10.5		15
		9VDC output	--	8.3		10
		12VDC output	--	6.8		10
		15VDC output	--	6.3		10

Temperature Drift	100% load	--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	--	75	100	mVp-p
Short Circuit Protection**		--	--	1	s

Note: 1.\*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.  
2.\*\*Supply voltage must be discontinued at the end of short circuit duration.

### COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA	1000	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	--	30	--	pF
Switching Frequency	Full load, nominal input	--	100	--	KHz
MTBF	MIL-HDBK-217F@25°C	3500	--	--	K hours
Case Material		Plastic (UL94-V0)			
Weight		--	1.05	--	g

### ENVIRONMENTAL SPECIFICATIONS

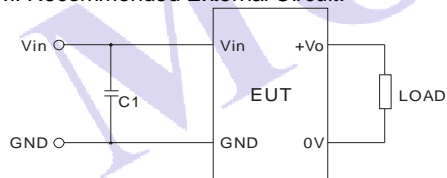
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

### EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS A ( External Circuit Refer to Figure1 )
EMS	ESD	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

### EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit:



(Figure 1)

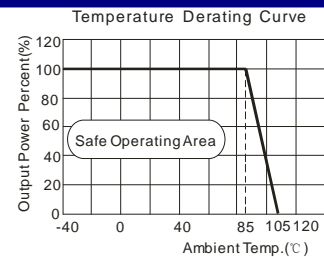
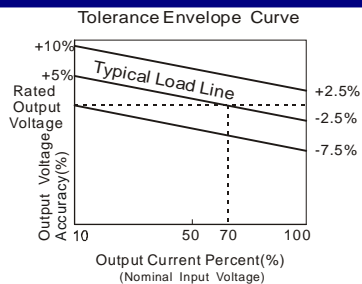
Recommended external circuit parameters:

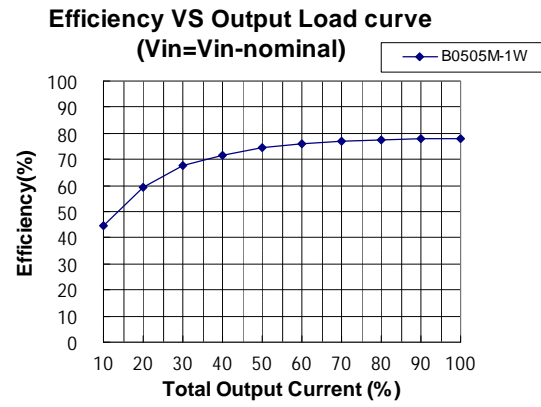
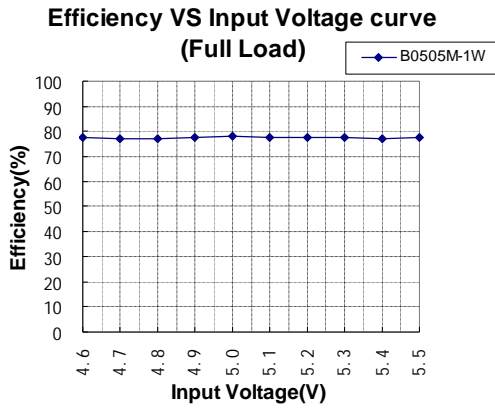
Vin: 3.3V/5V/12V

C1: 1μF/50V

Note: Product bare input of 3.3V、5V、12V already meet CLASS A, but the margin is not enough, add the capacitor margin increase.

### PRODUCT TYPICAL CURVE





## OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

#### MECHANICAL DIMENSIONS

**Front View Dimensions:**  
 Total height: 7.00 [0.276]  
 Pin height: 4.10 [0.161]  
 Pin pitch: 0.50 [0.020]  
 Pin width: 0.50 [0.020]

**Bottom View Dimensions:**  
 Total width: 11.50 [0.453]  
 Pin pitch: 7.62 [0.300]  
 Pin width: 0.90 [0.035]  
 Pin offset: 0.30 [0.012]  
 Pin offset: 0.236 [0.0093]

Pin	Function
1	GND
2	Vin
3	0V
4	+Vo

Note:  
 Unit: mm[inch]  
 Pin section tolerances: ±0.10mm[±0.004inch]  
 General tolerances: ±0.25mm[±0.010inch]

#### RECOMMENDED FOOTPRINT

Note: grid 2.54\*2.54mm.  
 Hole diameter: Ø1.00 [0.039]

#### TUBE OUTLINE DIMENSIONS

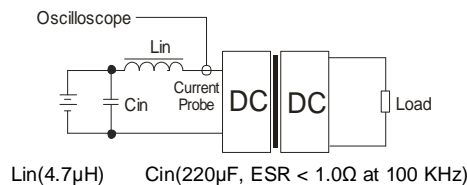
**Tube Outline Dimensions:**  
 Top width: 9.60 [0.378]  
 Total height: 16.90 [0.665]  
 Bottom width: 4.90 [0.193]  
 Right side height: 12.40 [0.488]

Note:  
 Unit: mm[inch]  
 General tolerances: ± 0.50mm [±0.020inch]  
 L=530mm[20.866inch] Tube Quantity: 43pcs  
 L=220mm[8.661inch] Tube Quantity: 17pcs  
 Short tube inner package dimensions: L\*W\*H= 255\*170\*80mm  
 Short tube outer package dimensions(with six inner package boxes):  
 L\*W\*H= 375\*280\*270mm  
 Long tube inner package dimensions: L\*W\*H= 580\*200\*100mm  
 Long tube outer package dimensions(with two inner package boxes):  
 L\*W\*H= 600\*215\*220mm  
 Long tube outer package dimensions(with three inner package boxes):  
 L\*W\*H= 600\*215\*325mm

## TEST CONFIGURATIONS

### Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.



## DESIGN CONSIDERATIONS

### 1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load **could not be less than 10% of the full load**. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power (B\_M-W2 series).

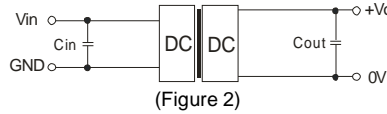
## 2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is add a circuit breaker to the circuit.

## 3) Recommended circuit

If you want to further decrease the input/output ripple, an capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 2).

It should also be noted that the capacitance of 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 recommended capacitance of its filter capacitor sees (Table 1).



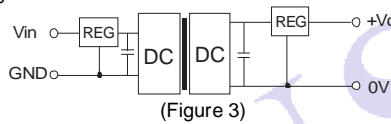
EXTERNAL CAPACITOR TABLE (TABLE 1)

$V_{in}$ (VDC)	$C_{in}$ ( $\mu F$ )	$V_{out}$ (VDC)	$C_{out}$ ( $\mu F$ )
3.3/5	4.7	3.3/5	10
12	2.2	9	4.7
--	--	12	2.2
--	--	15	1

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

## 4) Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear regulator and an capacitor filtering network with overheat protection that is connected to the input or output end in series (Figure 3), the recommended capacitance of its filter capacitor sees (Table 1), linear regulator based on the actual voltage and current to reasonable selection.



## 5) Cannot use in parallel and hot swap

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All date in the datasheet are measured according to nominal input voltage, rated output load,  $T_A=25^{\circ}C$ , humidity<75%, unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. The performance in the datasheet is just fit for the part number in the selection guide, and may be different from the customer-designed product, you can get more details from MORNSUN FAE.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

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