MORNSUN
Industrial DC&AC converter professional

E_M-1W Series

1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL OUTPUT SUPERMINIATURE SIP PACKAGE

multi-country patent protection **RoHS**

FEATURES

- High Efficiency up to 79%
- 6Pin SIP Package
- Small Footprint
- Industry Standard Pinout
- 3KVDC Isolation
- Temperature Range -40°C to +85°C
- No Heat sink Required
- No External Component Required
- RoHS Compliance

APPLICATIONS

The E_M-1W Series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

1) Where the voltage of the input power supply is fixed (voltage variation ≤±10%);
2) Where isolation is necessary between input and output (isolation voltage ≤3000VDC);
3) Where the regulation of the output voltage and the output ripple noise are not demanding.

Such as: purely digital circuits, ordinary low frequency analog circuits, and IGBT power device driving circuits.

MODEL SELECTION

E0505M-1W

- Rate Power
- Package Style
- Output Voltage
- Input Voltage
- Product Series

PRODUCT PROGRAM

Part Number	Input		Output			Efficiency (%, Typ)
	Voltage (VDC)		Voltage (VDC)	Current (mA)		
	Nominal	Range		Max	Min	
E0305M-1W	3.3	3.0-3.6	±5	±100	±10	70
E0505M-1W	5	4.5-5.5	±5	±100	±10	72
E0509M-1W			±9	±56	±6	77
E0512M-1W			±12	±42	±5	78
E0515M-1W			±15	±33	±4	79
E1205M-1W	12	10.8-13.2	±5	±100	±10	71
E1209M-1W			±9	±56	±6	73
E1212M-1W			±12	±42	±5	74
E1215M-1W			±15	±33	±4	75

COMMON SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Operating Temp. range		-40		+85	°C
Storage Temp. range		-55		+125	
Storage humidity range				95	%
Lead temperature	1.5mm from case for 10 seconds			300	°C
Short circuit protection*				1	S
Temp. rise at full load			15	25	°C
Isolation voltage	Tested for 1 minute and 1mA Max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Cooling		Free air convection			
Case material		Plastic (UL94-V0)			
MTBF		3500			K hours

*Supply voltage must be discontinued at the end of short circuit duration.

OUTPUT SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Output power		0.1		1	W
Line regulation	For Vin change of 1%			±1.2	%
Load regulation	10% to 100% full load		10	15	%
Output voltage accuracy		See tolerance envelope graph			
Temperature drift	100% full load			0.03	%/°C
Output ripple& Noise*	20MHz Bandwidth		50	75	mVp-p
Switching frequency	Full load, nominal input		100		KHz

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

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

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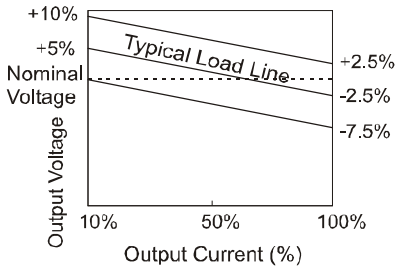
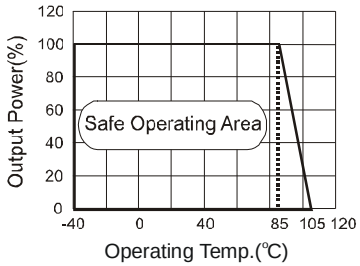
TYPICAL CHARACTERISTICS

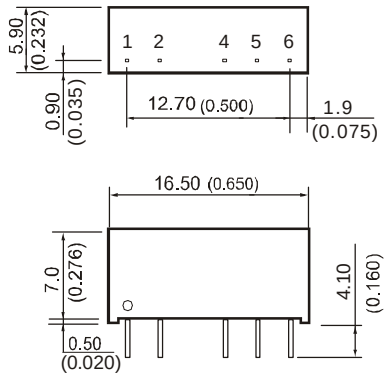
Tolerance Envelope Graph



Temperature Derating Graph

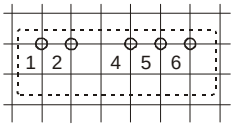


OUTLINE DIMENSIONS& PIN CONNECTION



First Angle Projection

RECOMMENDED FOOTPRINT
Top view,grid：2.54mm(0.1inch)
dia meter：1.00mm(0.039inch)



FOOT PRINT DETAILS

Pin	Functions
1	Vin
2	GND
4	-Vo
5	0V
6	+Vo

Note:
Unit:mm(inch)
Pin section:0.50*0.3mm(0.020*0.012inch)
Pin tolerances:±0.10mm（±0.004inch）
Generaltolerances:±0.25mm(±0.010inch)

APPLICATION NOTE

Requirement on output load

To ensure this module can operate efficiently and reliably, a minimum load is specified for this kind of DC/DC converter in addition to a maximum load (namely full load). During operation, make sure the specified range of input voltage is not exceeded, the minimum output load is ***not less than 10%*** of the full load, and that ***this product should never be operated under no 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.

Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against over-current and short-circuits. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

Filtering

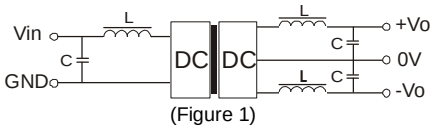
In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees the **external capacitor table.**

EXTERNAL CAPACITOR TABLE

V in (VDC)	Cin (uF)	Vout (VDC)	Cout (uF)
5	4.7	5	4.7
12	2.2	9	2.2
24	1	12	1
--	--	15	0.47

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

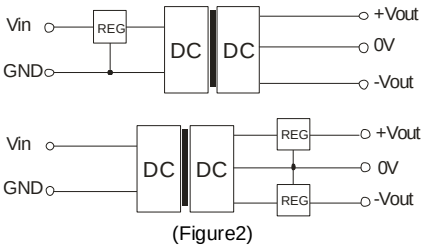
To get an extremely low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference (Figure 1).



(Figure 1)

Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).



(Figure2)

No parallel connection or plug and play.