MORNSUN
Industrial DC&AC converter professional

E_S-2W & F_S-2W Series

2W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER

RoHS

FEATURES

High Efficiency up to 85%
3000VDC Isolation
SIP Package
Internal SMD construction
No Heat sink Required
Temperature Range: -40°C to +85°C
No External Component Required
Industry Standard Pinout
RoHS Compliance

APPLICATIONS

The E_S-2W & F_S-2W 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

E 05 05 S-2W

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

PRODUCT PROGRAM

Part Number	Input		Output			Efficiency (%, Typ)	Certificate
	Voltage (VDC)		Voltage (VDC)	Current (mA)			
	Nominal	Range		Max	Min		
E0505S-2W	5	4.5-5.5	±5	±200	±20	82	UL CE
E0509S-2W			±9	±111	±12	83	UL CE
E0512S-2W			±12	±83	±9	84	UL CE
E0515S-2W			±15	±67	±7	82	UL CE
F0503S-2W*			3.3	400	40	74	
F0505S-2W			5	400	40	81	UL CE
F0509S-2W			9	222	23	83	UL CE
F0512S-2W			12	167	17	83	UL CE
F0515S-2W			15	133	14	83	UL CE
E1205S-2W	12	10.8-13.2	±5	±200	±20	80	UL CE
E1209S-2W			±9	±111	±12	83	UL CE
E1212S-2W			±12	±83	±9	85	UL CE
E1215S-2W			±15	±67	±7	82	UL CE
F1205S-2W			5	400	40	80	UL CE
F1209S-2W			9	222	23	82	UL CE
F1212S-2W			12	167	17	83	UL CE
F1215S-2W			15	133	14	83	UL CE
E2405S-2W	24	21.6-26.4	±5	±200	±20	82	UL CE
E2409S-2W			±9	±111	±12	82	UL CE
E2412S-2W			±12	±83	±9	85	UL CE
E2415S-2W			±15	±67	±7	85	UL CE
F2405S-2W			5	400	40	80	UL CE
F2409S-2W			9	222	23	82	UL CE
F2412S-2W			12	167	17	83	UL CE
F2415S-2W			15	133	14	84	UL CE
F2424S -2W			24	83	9	85	

*Designing

COMMON SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Storage humidity range				95	%
Operating Temp. Range		-40		85	°C
Storage Temp. Range		-55		125	
Temp. rise at full load			15	25	
Lead temperature	1.5mm from case for 10 seconds			300	
Short circuit protection				1	s
Cooling		Free air convection			
Case material		Plastic (UL94-V0)			
MTBF		3500			K hours
Weight			2.1		g

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

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ISOLATION SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1 mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ

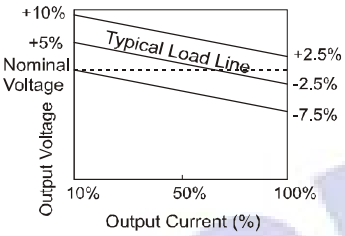
OUTPUT SPECIFICATIONS

Item	Test conditions		Min	Typ	Max	Units
Output power			0.2		2	W
Line regulation	For Vin change of ±1%	(3.3V output)			±1.5	%
		(others output)			±1.2	
Load regulation	10% to 100% load	(3.3V output)		12	20	
		(5V output)		10	15	
		(9V output)		8.3	10	
		(12V output)		6.8	10	
		(15V output)		6.3	10	
Output voltage accuracy			See tolerance envelope graph			
Temperature drift	100% full load				0.03	%/°C
Ripple& Noise*	20MHz Bandwidth			75	150	mVp-p
Switching frequency	Full load, nominal input			70		KHz
*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.						

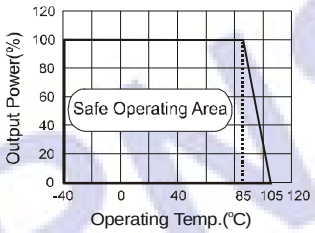
Note:
1. All specifications measured at T_A=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
2. Dual output models unbalanced load: ±5%.

TYPICAL CHARACTERISTICS

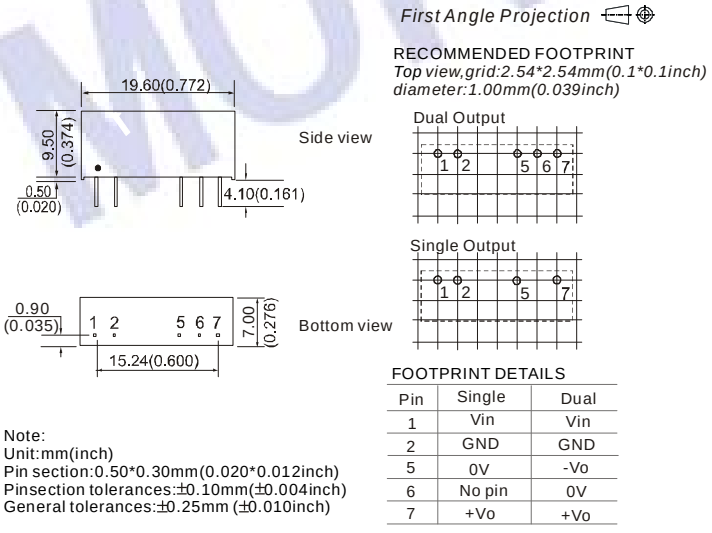
Tolerance Envelope Graph



Temperature Derating Graph



OUTLINE DIMENSIONS & PIN CONNECTIONS



FOOTPRINT DETAILS

Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No pin	0V
7	+Vo	+Vo

Note:
Unit:mm(inch)
Pin section:0.50*0.30mm(0.020*0.012inch)
Pinsection tolerances:±0.10mm(±0.004inch)
General tolerances:±0.25mm (±0.010inch)

APPLICATION NOTE

Requirement on output load

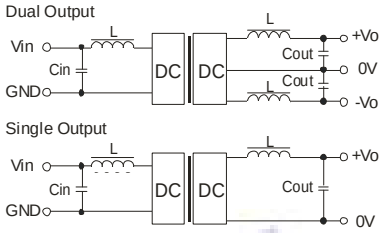
To ensure this module can operate efficiently and reliably, During operation, the minimum output load is not less than 10% of the full load, and that this product ***should never be operated under no load!*** If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power (E_S-1W&F_S-1W).

Overload Protection

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

Recommended circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).



(Figure 1)

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. 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 recommended capacitance of its filter capacitor sees (Table 1).

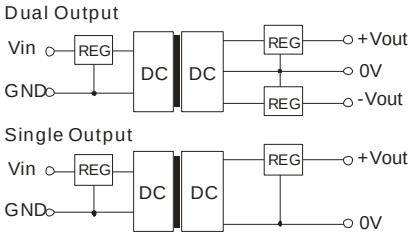
EXTERNAL CAPACITOR TABLE (TABLE 1)

Vin (VDC)	Cin (uF)	Single Vout (VDC)	Cout (uF)	Dual Vout (VDC)	Cout (uF)
5	4.7	3.3/5	10	±5	4.7
12	2.2	9	4.7	±9	2.2
24	1	12	2.2	±12	1
-	-	15	1	±15	1

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

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).



(Figure 2)

No parallel connection or plug and play.