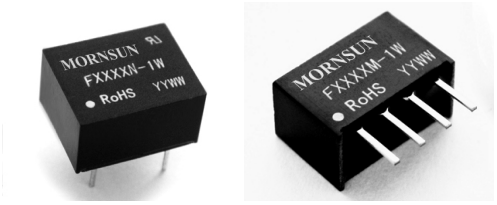
MORNSUN®



F_M-1W & F_N-1W Series

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

RoHS

FEATURES

- High Efficiency up to 81%
- 3000VDC Isolation
- Temperature Range: -40°C ~ +85°C
- No Heatsink Required
- No External Component Required
- Internal SMD Construction
- Industry Standard Pinout
- RoHS Compliance

APPLICATIONS

The F_M-1W & F_N-1W series is 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

F0505M-1W

- Rated 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.	
F0303M -1W	3.3	2.97-3.63	3.3	303	30	68
F0305M -1W			5	200	20	71
F0305N -1W			5	200	20	71
F0503M -1W	5	4.5-5.5	3.3	303	30	68
F0505M -1W			5	200	20	75
F0509M -1W			9	111	12	73
~~F0512M -1W~~			~~12~~	~~83~~	~~9~~	~~74~~
F0515M -1W			15	67	7	75
F0503N -1W			3.3	303	30	71
F0505N -1W			5	200	20	68
~~F0509N -1W~~			~~9~~	~~111~~	~~12~~	~~76~~
~~F0512N -1W~~			~~12~~	~~83~~	~~9~~	~~75~~
~~F0515N -1W~~			~~15~~	~~67~~	~~7~~	~~77~~
~~F1203M -1W~~	12	10.8-13.2	~~3.3~~	~~303~~	~~30~~	~~70~~
F1205M -1W			5	200	20	71
F1209M -1W			9	111	12	73
F1212M -1W			12	83	9	73
F1215M -1W			15	67	7	74
F1203N -1W			3.3	303	30	72
~~F1205N -1W~~			~~5~~	~~200~~	~~20~~	69
~~F1209N -1W~~			~~9~~	~~111~~	~~12~~	75
F1212N -1W			12	83	9	77
~~F1215N -1W~~			~~15~~	~~67~~	~~7~~	79
F2405N -1W	24	21.6-26.4	5	200	20	69
F2412N -1W			12	83	9	78
F2415N -1W			15	67	7	79
~~F2424N -1W~~			~~24~~	~~42~~	~~3~~	81
F2405M-1W			5	200	20	71

Note:
Models listed with strike-through text have been officially discontinued.

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
Isolation capacitance			60		pF

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Http://www.mornsun-power.com

OUTPUT SPECIFICATIONS

Item	Test conditions		Min.	Typ.	Max.	Units
Output power			0.1		1	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)		15	20	
		(5V output)		12.8	15	
		(9V output)		8.3	15	
		(12V output)		6.8	15	
		(15V output)		6.3	15	
		(24V output)		6.0	15	
Output voltage accuracy			See tolerance envelope graph			
Temperature drift	100% full load				±0.03	%/°C
Ripple& Noise*	20MHz Bandwidth			100	150	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.

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			25	30	
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	F_M-1W series		1.05		g
	F_N-1W series		1.8		

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

APPLICATION NOTE

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.

2) 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).

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).

3) 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).

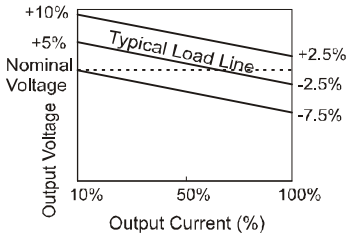
4) Overload Protection

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.

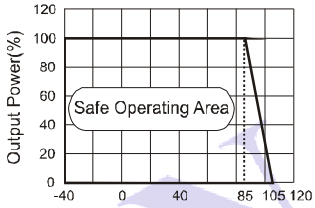
5) No parallel connection or plug and play

TYPICAL CHARACTERISTICS

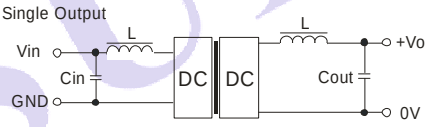
Tolerance Envelope Graph



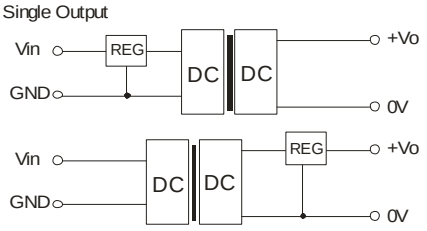
Temperature Derating Graph



RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

EXTERNAL CAPACITOR TABLE (TABLE 1)

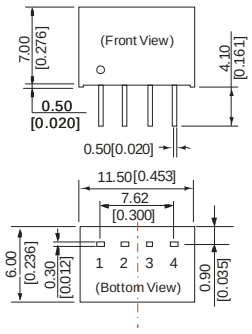
Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10
12	2.2	9	4.7
24	1	12	2.2
-	-	15/24	1

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

OUTLINE DIMENSIONS & PIN CONNECTIONS

F_M-1W

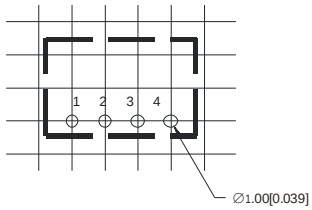
MECHANICAL DIMENSIONS



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

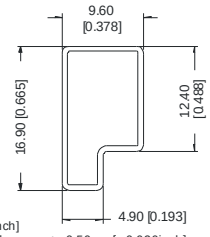
Note:
Unit: mm[inch]
Pin section tolerances: ±0.10mm[±0.004inch]
General tolerances: ±0.25mm[±0.010inch]

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm

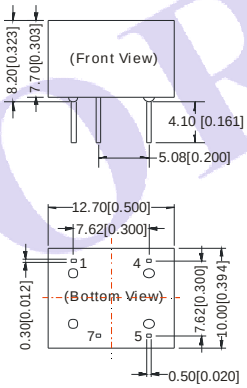
TUBE OUTLINE DIMENSIONS



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

F_N-1W

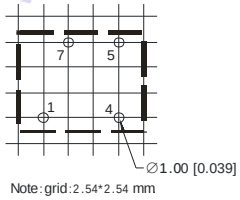
MECHANICAL DIMENSIONS



FOOTPRINT DETAILS	
Pin	Function
1	GND
4	Vin
5	+Vo
7	0V

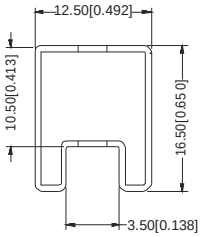
Note:
Unit:mm[inch]
Pin section tolerances:±0.10mm[±0.004inch]
General tolerances:±0.25mm[±0.010inch]

RECOMMENDED FOOTPRINT



Note: grid:2.54*2.54 mm

TUBE OUTLINE DIMENSIONS



Note:
Unit :mm[inch]
General tolerances: ±0.50mm[±0.020inch]
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Short tube outer packaging dimensions
(with six inner packaging boxes):L*W*H=375*280*270mm
Long tube inner packaging dimensions: L*W*H=580*200*100mm
Long tube outer packaging dimensions
(with two inner packaging boxes):L*W*H=600*215*220mm
Long tube outer packaging dimensions
(with three inner packaging boxes):L*W*H=600*215*325mm

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. Only typical models listed, other models may be different, please contact our technical person for more details.
4. In this datasheet, all the test methods of indications are based on corporate standards.