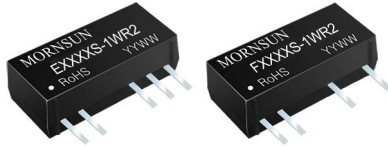


E_S-1WR2 & F_S-1WR2 Series 1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



Patent Protected RoHS



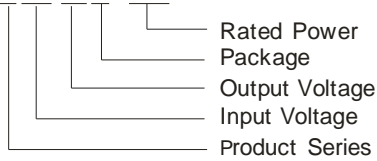
Continuous Short
Circuit Protection

FEATURES

- SIP package
- Efficiency up to 81%
- High power density
- Low temperature drift
- No external component required
- 3000VDC isolation
- Operating temperature range:
-40°C ~ +105°C
- Industry standard pinout

PART NUMBER SYSTEM

F0505S-1WR2



APPLICATIONS

The E_S-1WR2 & F_S-1WR2 Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage variation rang: $\pm 10\%$ Vin;
- 2) 3000VDC input and output isolation;
- 3) Regulated and low ripple noise is not required.

Such as: digital circuits, low frequency analog circuits, and relay drive circuits.

SELECTION GUIDE

Model	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA,Typ.)	Max. Capacitive Load ① (μF)	Efficiency (%, Typ.) @Max. Load			
			Max.	Min.	@ Max. Load	@ No Load						
F0303S-1WR2	3.3 (2.97-3.63)	3.3	303	30	415	25		220	73			
F0305S-1WR2		5	200	20	388				78			
E0503S-1WR2	5 (4.5-5.5)	±3.3	±152	±15	274	20	100	220	73			
E0505S-1WR2		±5	±100	±10	250				80			
E0512S-1WR2		±12	±42	±5	250				80			
E0515S-1WR2		±15	±33	±4	247				81			
E0524S-1WR2		±24	±21	±2	247				81			
F0503S-1WR2		3.3	303	30	267				15	220	100	75
F0505S-1WR2		5	200	20	250							80
F0512S-1WR2		12	83	9	250							80
F0515S-1WR2		15	67	7	247							81
F0524S-1WR2		24	42	5	247							81
E1203S-1WR2	12 (10.8-13.2)	±3.3	±152	±15	114	15	100	220				73
E1205S-1WR2		±5	±100	±10	104				80			
E1212S-1WR2		±12	±42	±5	103				81			
E1215S-1WR2		±15	±33	±4	103				81			
F1203S-1WR2		3.3	303	30	111				10	220	100	75
F1205S-1WR2		5	200	20	104							80
F1212S-1WR2		12	83	9	104							80
F1215S-1WR2		15	67	7	103							81
E1505S-1WR2	15 (13.5-16.5)	±5	±100	±10	84	10	220	100	80			
E1515S-1WR2		±15	±33	±4	83				81			
F1505S-1WR2		5	200	20	84				7	100	100	80
F1515S-1WR2		15	67	7	83							81
E2403S-1WR2	24 (21.6-26.4)	±3.3	±152	±15	58	7	100	100	73			
E2405S-1WR2		±5	±100	±10	53				80			

E2412S-1WR2	24 (21.6-26.4)	±12	±42	±5	51	7	15	100	81
E2415S-1WR2		±15	±33	±4	53				79
E2424S-1WR2		±24	±21	±2	53				80
F2403S-1WR2		3.3	303	30	56			220	75
F2405S-1WR2		5	200	20	53				79
F2412S-1WR2		12	83	9	51				81
F2415S-1WR2		15	67	7	51				81
F2424S-1WR2		24	42	4	51				81

Note: ① For dual output converter, the given value is the same for each output.

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	
	15VDC Input	-0.7	--	21	
	24VDC Input	-0.7	--	30	
Input Filter		Capacitance			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		See tolerance envelope curve				
Line Regulation	For Vin change of ±1%	3.3VDC output	--	--	±1.5	%
		Others	--	--	±1.2	
Load Regulation	10% to 100% load	3.3VDC output	--	18	--	
		5VDC output	--	12	--	
		12VDC output	--	8	--	
		15VDC output	--	7	--	
		24VDC output	--	6	--	
Temperature coefficient	100% load	--	--	±0.03	%/°C	
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤12VDC	--	30	--	mVp-p
		Output Voltage :15VDC,24VDC	--	60	--	
Short Circuit Protection*		Continuous, automatic recovery				

Note:* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at *DC-DC Application Notes*.

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, Tested for 1 minute and leakage current less than 1 mA	3000	--	--	VDC
Isolation Resistance	Input-Output, Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	20	--	pF
Switching Frequency	Full load, nominal input	--	100	300	KHz
MTBF	MIL-HDBK-217F@25°C	3500	--	--	K hours
Case Material		Epoxy Resin (UL94-V0)			
Weight		--	2.4	--	g

ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (≥ 85°C, see Figure 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise	Ta=25°C, 100% Load	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

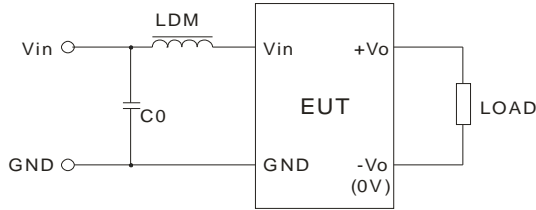
EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS B (Recommended Circuit Refer to Figure1)
	RE	CISPR22/EN55022 CLASS B (Recommended Circuit Refer to Figure1)

EMS	ESD	E_S-1WR2	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
		F_S-1WR2	IEC/EN61000-4-2	Contact ±8KV	perf. Criteria B

EMC RECOMMENDED CIRCUIT

EMI Typical Recommended Circuit Refer to Figure1 (CLASS B) :

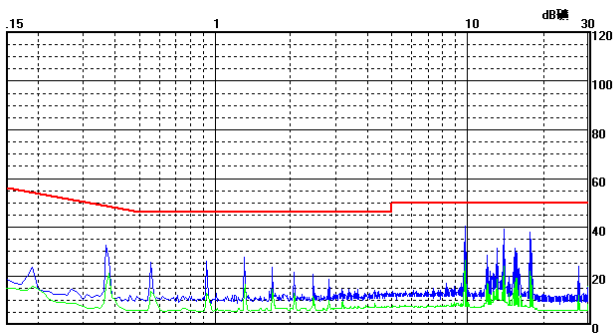


(Figure 1)

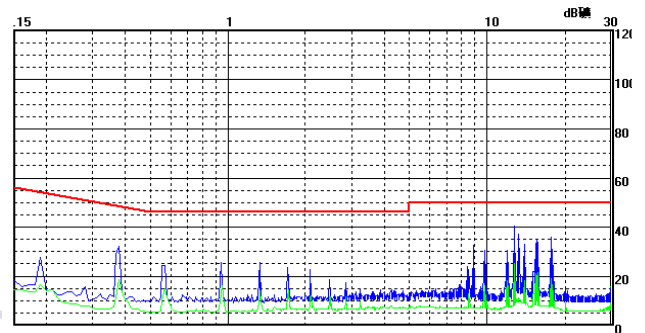
Recommended typical circuit parameters:

EMI	Vin(V)	3.3/5/12/15/24
	C0	4.7μF /50V
	LDM	6.8μH

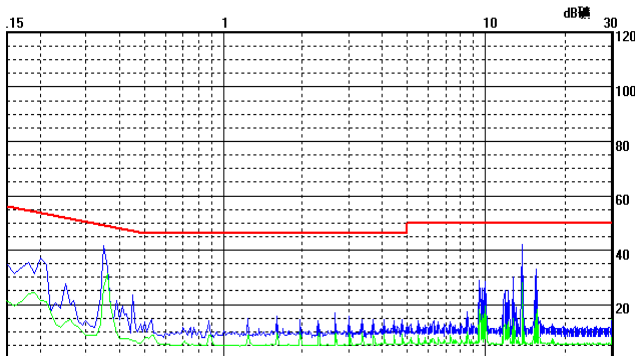
EMC TEST WAVEFORM (CLASS B APPLY CIRCUIT)



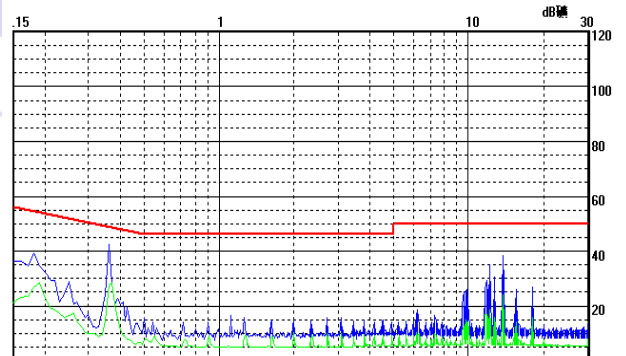
E2415S-1WR2 CE (Class B, Positive line)



E2415S-1WR2 CE (Class B, Negative line)

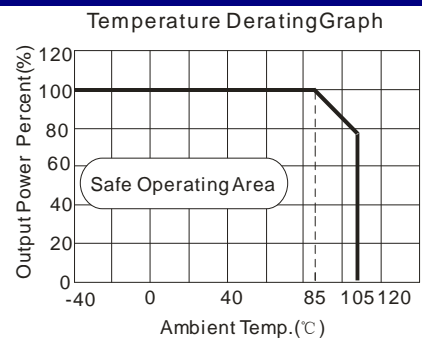
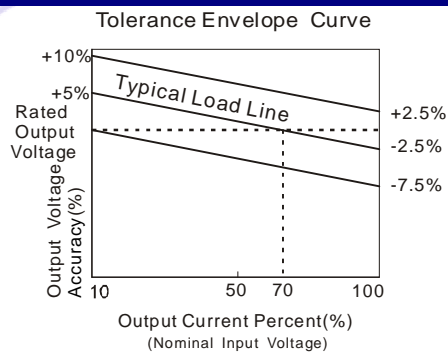


F2405S-1WR2CE (Class B, Positive line)

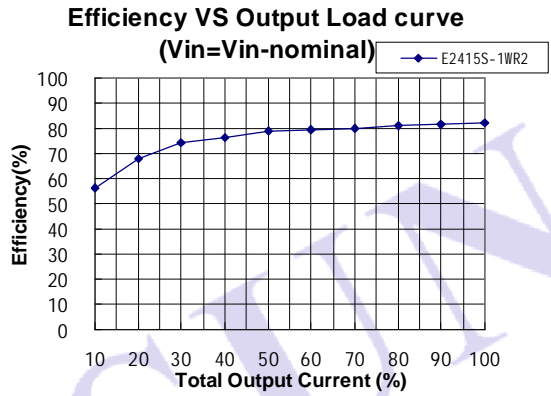
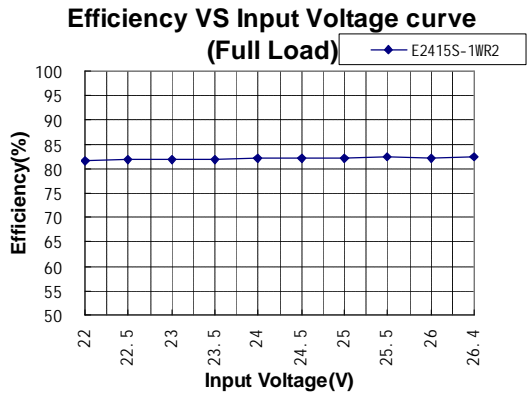
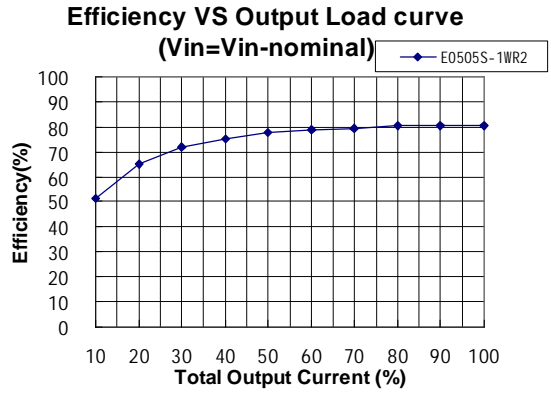
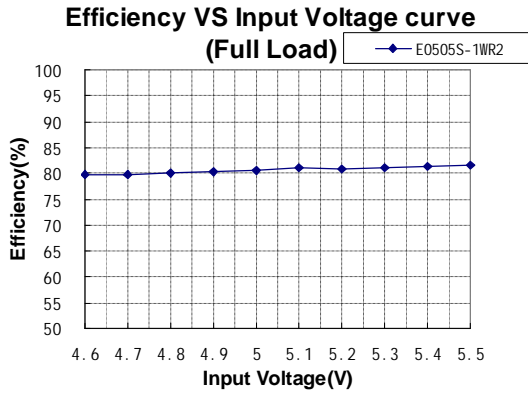


F2405S-1WR2 CE (Class B, Negative line)

PRODUCT TYPICAL CURVE



(Figure 2)



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

THIRD ANGLE PROJECTION

Top View dimensions: 19.50±0.50 [0.768±0.020], 9.00 [0.354], 8.30 [0.366], 4.10±0.50 [0.161±0.020], 2.13 [0.084], 10.16 [0.4], 15.24 [0.6], 0.60±0.50 [0.024±0.020]

Front View dimensions: 6.00 [0.236], 4.50 [0.177], 17.50 [0.689], 0.60 [0.024], 5.60 [0.22], 1.65 [0.065], 0.30 [0.012]

Right View dimensions: 1.65 [0.065], 0.30 [0.012]

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

PIN CONNECTION		
Pin	F_S	E_S
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

RECOMMENDED FOOTPRINT DETAILS

F_S

E_S

Note : Grid 2.54*2.54mm

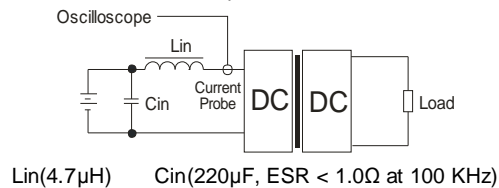
TUBE PACKAGING DIMENSIONS

Note:
Unit: mm[inch]
General tolerances: ±0.50 [±0.020]
L=530mm [20.866] Quantity: 25pcs
L=220mm [8.661] Quantity: 10pcs
Inner carton(S): L*W*H=255*170*80
Outer carton(S): L*W*H=375*280*270
Inner carton(L): L*W*H=580*200*100
Outer carton(L): L*W*H=600*215*220, 2 inner cartons(L)
Outer carton(L): L*W*H=600*215*325, 3 inner cartons(L)

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} and Capacitor C_{in} to simulate source impedance.



DESIGN CONSIDERATIONS

1) Requirement for output load

To ensure this module can operate efficiently and reliably, 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 to the output in parallel to increase the load.

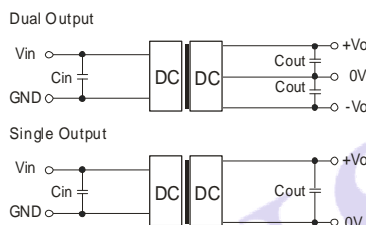
2) Overload Protection

Under normal operating conditions, the output circuit of these products have not overload protection. The simplest method is to add a breaker circuit in 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, refer to Figure 3.

It should also be noted that the capacitance of the capacitor must be proper. If the capacitance is too large, a startup problem might arise. For ensuring every channel of output can provide a safe and reliable operation, the recommended capacitance of the capacitor refer to Table 1.



(Figure 3)

EXTERNAL CAPACITOR TABLE (Table 1)

Vin (VDC)	Cin (μF)	Single Vo (VDC)	Cout (μF)	Dual Vo (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10	$\pm 3.3/\pm 5$	4.7
12	2.2	12	2.2	± 12	1
15	2.2	15/24	1	$\pm 15/\pm 24$	0.47
24	1	--	--	--	--

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

4) The input and the output of the product are recommended to be connected to ceramic capacitor or electrolytic capacitor. Using tantalum capacitor may cause risk of failure

5) It is not recommended to increase the output power capability by connecting two or more converters in parallel. The product is not hot-swappable

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specifications.
2. Max. Capacitive Load is tested at nominal input voltage and full load.
3. Unless otherwise noted, All specifications are measured at $T_a=25^\circ C$, humidity<75%, nominal input voltage and rated output load.
4. In this datasheet, all test methods are based on our corporate standards.
5. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more detail.
6. Please contact our technical support for any specific requirement.
7. Specifications of this product are subject to changes without prior notice.

MORNSUN Science & Technology Co.,Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou, P.R.China.

Tel: 86-20-38601850

Fax: 86-20-38601272

E-mail: info@mornsun.cn

[Http://www.mornsun-power.com](http://www.mornsun-power.com)