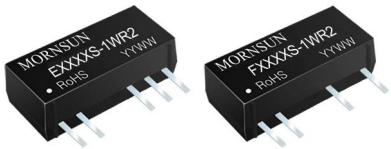
MORNSUN®

E_S-1WR2 & F_S-1WR2 Series

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



Continuous Short Circuit Protection

Patent Protected **RoHS**

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

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

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: ±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)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA,Typ.)	Max. Capacitive Load ① (μF)	Efficiency (%, Typ.) @Max. Load
	Nominal (Range)		Max.	Min.	@Max. Load	@No Load			
F0303S-1WR2	3.3 (2.97-3.63)	3.3	303	30	415	25	15	220	73
F0305S-1WR2		5	200	20	388				78
E0503S-1WR2	5 (4.5-5.5)	±3.3	±152	±15	274	20		100	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			220	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	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			220	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		100	80
E1515S-1WR2		±15	±33	±4	83				81
F1505S-1WR2		5	200	20	84			220	80
F1515S-1WR2		15	67	7	83				81
E2403S-1WR2	24 (21.6-26.4)	±3.3	±152	±15	58	7		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℃	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℃, 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			

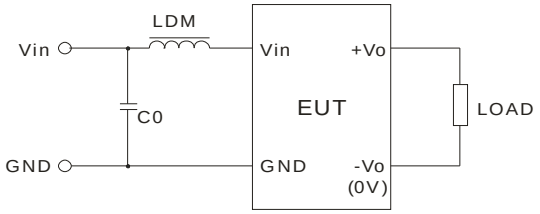
EMC SPECIFICATIONS

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）:

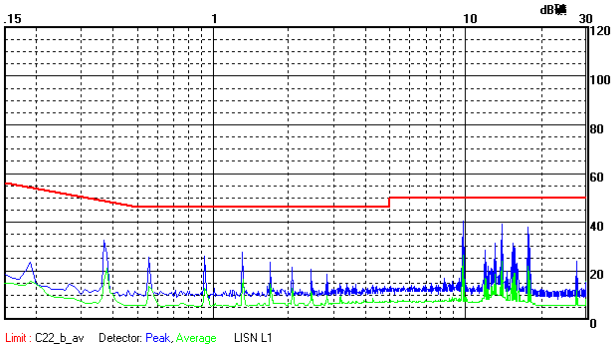


(Figure 1)

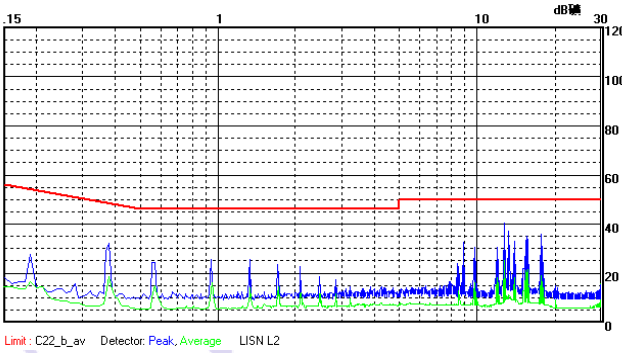
Recommended typical circuit parameters:

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

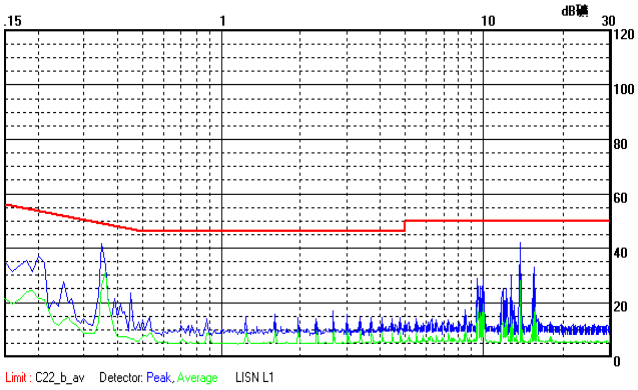
EMC TEST WAVEFORM (CLASS B APPLY CIRCUIT)



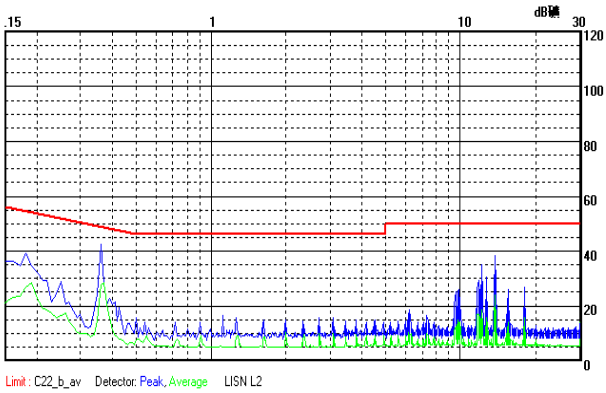
E2415S-1WR2 CE（Class B, Positive line）



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



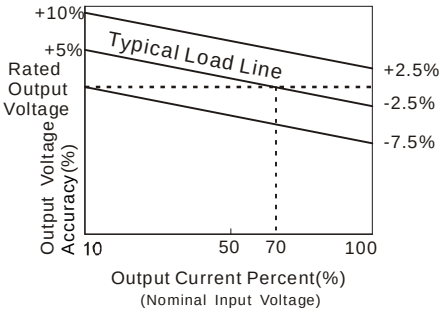
F2405S-1WR2CE（Class B, Positive line）



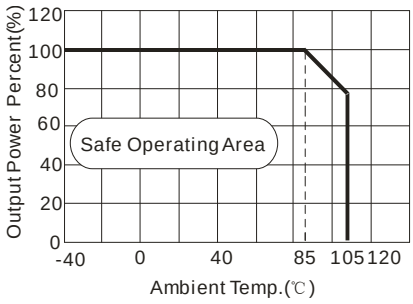
F2405S-1WR2 CE（Class B, Negative line）

PRODUCT TYPICAL CURVE

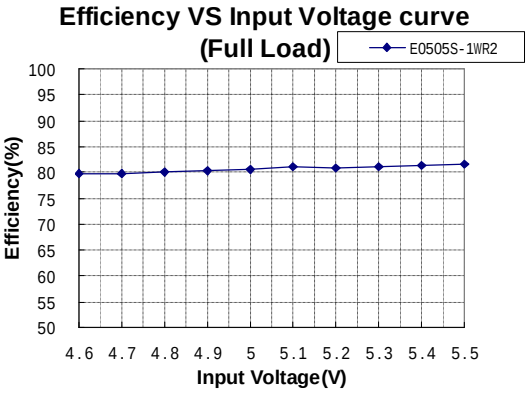
Tolerance Envelope Curve

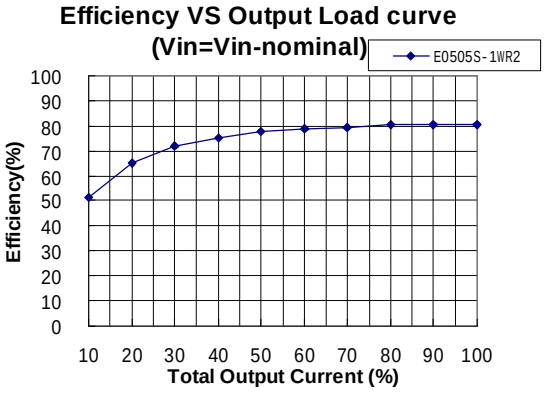


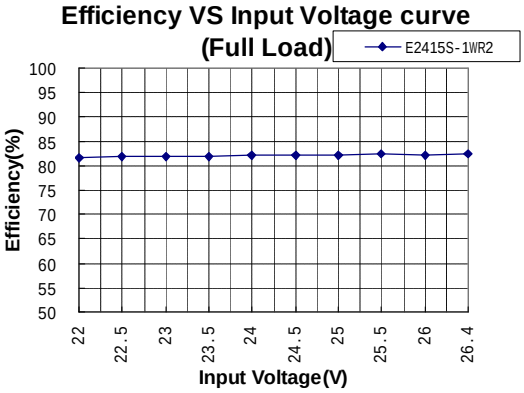
Temperature DeratingGraph

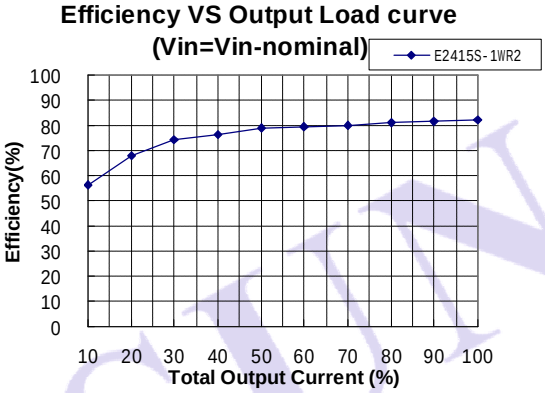


(Figure 2)



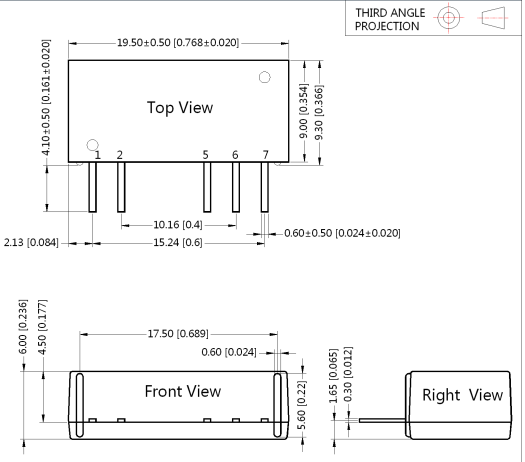






OUTLINE DIMENSIONS,RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

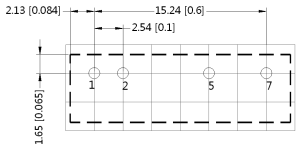


Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

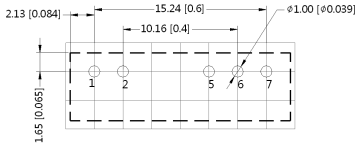
PIN CONNECTION		
Pin	F_S	E_S
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

RECOMMENDED FOOTPRINT DETAILS

F_S

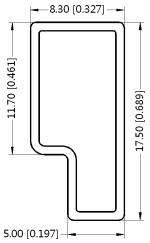


E_S



Note : Grid 2.54*2.54mm

TUBE PACKAGING DIMENSIONS

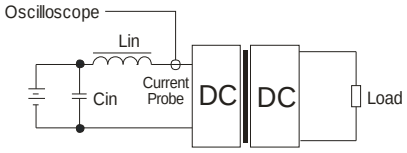


Note:
Unit:mm[inch]
General tolerances:±0.50[±0.020]
L=530mm[20.866] Quantity:25pcs
L=220mm[8.661] Quantity:10pcs
Inner carton(S):L*W*H=255*170*80
Outer carton(S):L*W*H=375*280*270
Inner carton(L):L*W*H=580*200*100
Outer carton(L):L*W*H=600*215*220,2 inner cartons(L)
Outer carton(L):L*W*H=600*215*325,3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

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

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



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

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.

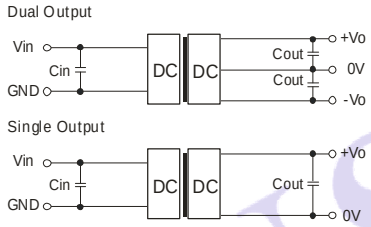
2) Overload Protection

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	±3.3/±5	4.7
12	2.2	12	2.2	±12	1
15	2.2	15/24	1	±15/±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 Ta=25°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.

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