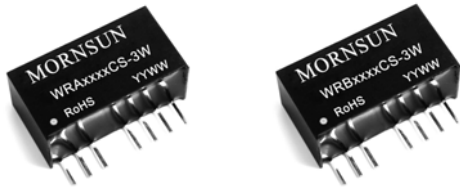
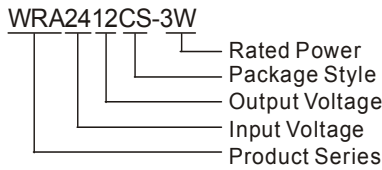


WRA_CS-3W & WRB_CS-3W Series 3W, WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



Patent Protection RoHS

PART NUMBER SYSTEM



FEATURES

- 2:1 wide input range
- 1.5KVDC isolation
- Short circuit protection (automatic recovery)
- External On/Off control
- High power density
- Operating temperature range: -40°C to +85°C
- UL94-V0 Package

APPLICATIONS

The WRA_CS-3W & WRB-CS-3W series are designed for application where a wide input voltage range, isolated output is required from a distributed power system. For these DC-DC converters, You can reduce the design point of failure and save the development of micro power supply's manpower, material and time costs, also better ensure product quality stability, protect safety and reliability of the end of products.

These products apply to where:

- 1) Input voltage ranges ≤ 2:1;
- 2) 1.5KVDC input and output isolation;
- 3) Regulated and low ripple noise is required.

SELECTION GUIDE

Model Number	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load# (μF)	Efficiency (%. typ.) @Max. Load				
	Nominal (Range)	Max*		Max.	Min.	@Max. Load	@No Load							
WRA1205CS-3W	12 (9.0-18)	22	±5	±300	±30	338	20	50	680	74				
WRA1209CS-3W			±9	±167	±16	329			470	76				
WRA1212CS-3W			±12	±125	±13	320			330	78				
WRA1215CS-3W			±15	±100	±10	316			220	79				
WRB1203CS-3W			3.3	909	91	352			2200	71				
WRB1205CS-3W			5	600	60	338			1000	74				
WRB1209CS-3W			9	333	33	329			680	76				
WRB1212CS-3W			12	250	25	338			470	74				
WRB1215CS-3W			15	200	20	333			330	75				
WRB1224CS-3W			24	125	13	320			220	78				
WRA2405CS-3W	24 (18-36)	40	±5	±300	±30	164	10	250	680	76				
WRA2409CS-3W			±9	±167	±17	160			470	78				
WRA2412CS-3W			±12	±125	±13	158			330	79				
WRA2415CS-3W			±15	±100	±10	156			220	80				
WRB2403CS-3W			3.3	909	91	176			2200	71				
WRB2405CS-3W			5	600	60	164			1000	76				
WRB2409CS-3W			9	333	33	160			680	78				
WRB2412CS-3W			12	250	25	156			470	80				
WRB2415CS-3W			15	200	20	156			330	80				
WRB2424CS-3W			24	125	13	152			220	82				
WRB4805CS-3W			48 (36-72)	80	5	600			60	83	8	250	680	75
WRB4812CS-3W					12	250			25	80			330	78
WRB4815CS-3W	48(36-72)	80	15	200	20	78	8	250	220	80				

Note: 1. Models listed with strike-through text have been officially discontinued.
2.*Input voltage can't exceed this value, or will cause the permanent damage.
3. # For each output.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	12VDC Input Models	-0.7	--	25	VDC
	24VDC Input Models	-0.7	--	50	
	48VDC Input Models	-0.7	--	100	
Start-up Voltage	12VDC Input Models	--	8.5	9	VDC
	24VDC Input Models	--	17	18	
	48VDC Input Models	--	33	36	
Short Circuit Input Power		--	1.5	--	W
Input Filter	Capacitance Filter				

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.3	--	3	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy		--	±3	±5	
Output Voltage Balance	Dual Output, Balanced Loads	--	±0.5	±1	%
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	10% to 100% load	WRA_CS-3W	--	±0.5	±1.0
		WRB_CS-3W	--	±0.5	±0.75
Transient Recovery Time	25%~ 50%~25% load or	--	4	15	ms
Transient Response Deviation	50%~75%~50% load step change	--	±3	±5	%
Temperature Drift	100% load	--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	--	50	100	mVp-p
Short Circuit Protection	Continuous, automatic recovery				

Note: Dual output models unbalanced load: ±5%.

*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.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	--	80	--	pF
Switching Frequency	Full load, nominal input	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours
Case Material	Plastic(UL94-V0)				
Weight		--	6	--	g

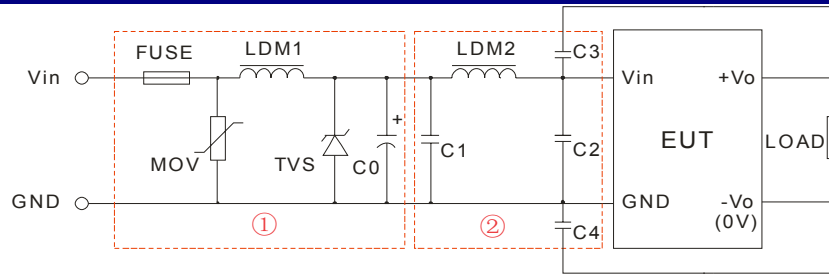
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 71°C)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise allowed at full load	Operating Temperature curve range	--	15	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling	Free air convection				

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS A (External Circuit Refer to Figure1-②)			
	RE	CISPR22/EN55022 CLASS A (External Circuit Refer to Figure1-②)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV perf. Criteria B			
	EFT	IEC/EN61000-4-4 ±2KV perf. Criteria B (External Circuit Refer to Figure 1-①)			
	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B (External Circuit Refer to Figure 1-①)			

EMC RECOMMENDED CIRCUIT



(Figure1)

WRA_CS -3W Recommended external circuit parameters:

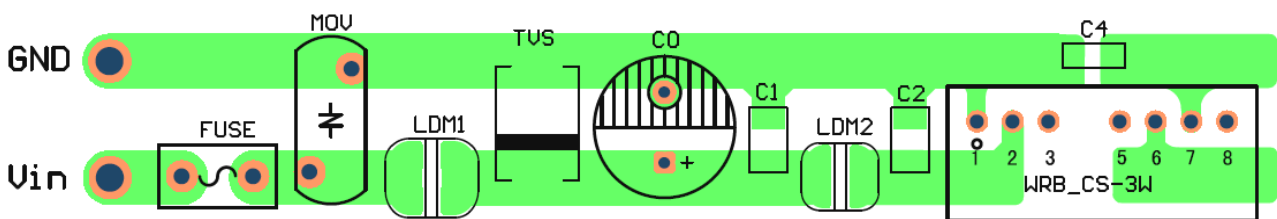
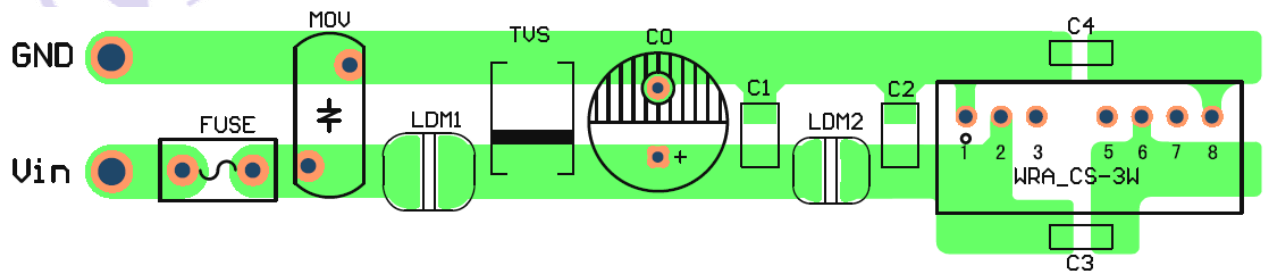
Model		WRA12_CS-3W	WRA24_CS-3W
EMS	FUSE	Choose according to practical input current	
	MOV	--	10D560K
	LDM1	--	56 μ H
	TVS	SMCJ28A	SMCJ48A
	C0	680 μ F/25V	120 μ F/50V
EMI	C1	4.7 μ F/50V	
	LDM2	6.8 μ H	
	C2	--	4.7 μ F/50V
	C3	1000pF/2KV	
	C4	1000pF/2KV	

WRB_CS -3W Recommended external circuit parameters:

Model		WRB12_CS-3W	WRB24_CS-3W	WRB48_CS-3W
EMS	FUSE	Choose according to practical input current		
	MOV	--	10D560K	10D101K
	LDM1	--	56 μ H	
	TVS	SMCJ28A	SMCJ48A	SMCJ90A
	C0	680 μ F/25V	120 μ F/50V	120 μ F/100V
EMI	C1	2.2 μ F/50V		2.2 μ F/100V
	LDM2	12 μ H		
	C2	1 μ F/50V	1 μ F/100V	
	C4	1000pF/2KV		

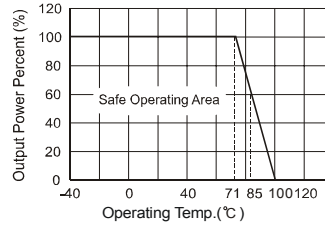
Note: 1. In Figure 1, part ① is EMS Recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.

EMC RECOMMENDED CIRCUIT PCB LAYOUT

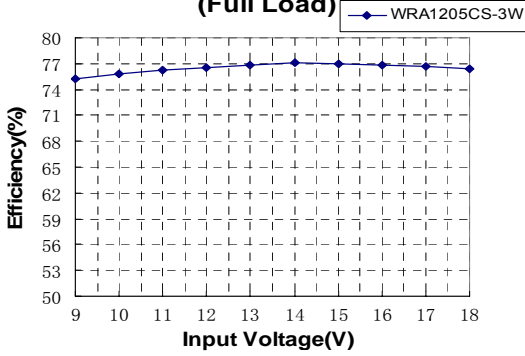


(Figure 2)

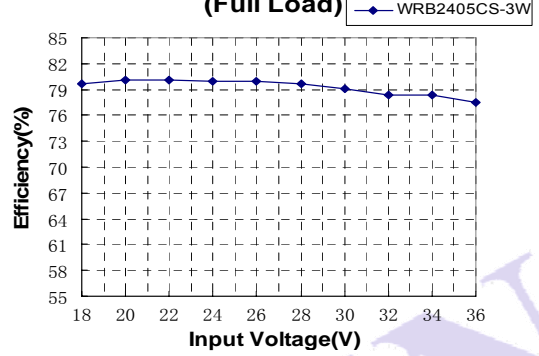
PRODUCT TYPICAL CURVE



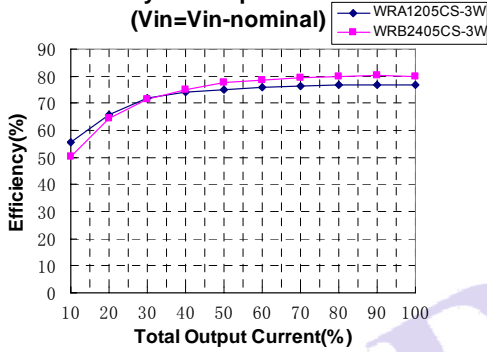
Efficiency VS Input Voltage curve (Full Load)



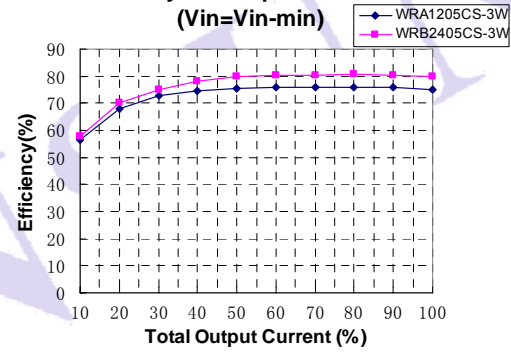
Efficiency VS Input Voltage curve (Full Load)



Efficiency VS Output Load curve (Vin=Vin-nominal)



Efficiency VS Output Load curve (Vin=Vin-min)



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

FOOTPRINT DETAILS

Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	CTRL	CTRL
5	NC	NC
6	+Vo	+Vo
7	0V	0V
8	CS	-Vo

NC: No connection

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

RECOMMENDED FOOTPRINT

Note: grid 2.54*2.54mm

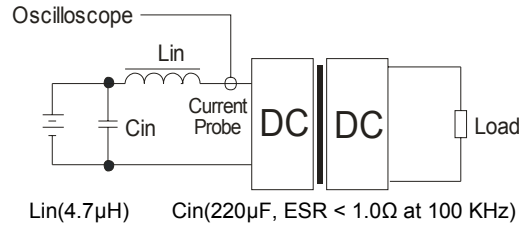
TUBE OUTLINE DIMENSIONS

Note:
 Unit :mm[inch]
 General tolerances: ± 0.50mm [± 0.020inch]
 L=530mm[20.866inch] Devices per tube quantity: 22pcs
 L=220mm[8.661inch] Devices per tube quantity: 8pcs
 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

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 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 (WRA_CS-2W、WRB_CS-2W series).

2) Overload Protection

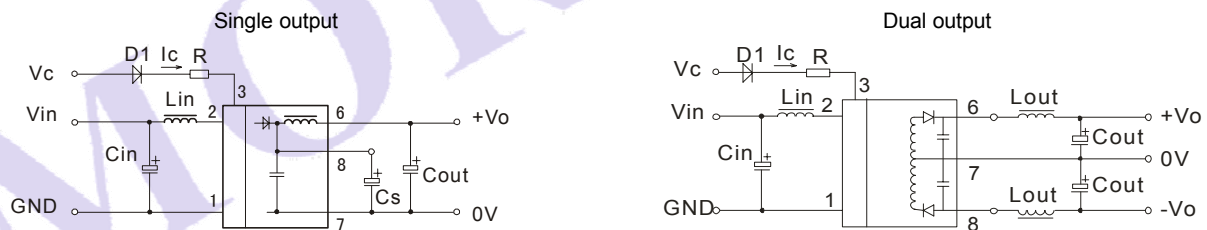
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is add a circuit breaker to the circuit.

3) 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 3).

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 greatest capacitance of its filter capacitor must less than the Max. Capacitive Load.

General: C_{in} : 12V 100μF
 24V&48V 10μF~47μF
 C_{out} : 100μF (Typ.)
 L_{in} : 4.7μH~120μH
 L_{out} : 2.2μH~10μH
 C_s : 10μF~22μF



(Figure 3)

4) CTRL Terminal

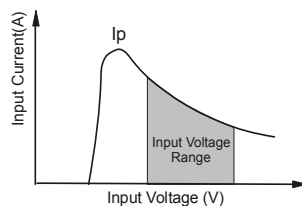
When open or high impedance, the converter work well; When this pin is 'high'; the converter shutdown; It should be note that the input current should between 5-10mA,exceeding the maximum 20mA will cause permanence damage to the converter. The value of R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C}$$

5) Input current

Nominal input voltage range.The input current of the power supply must be sufficient to the startup current (I_p) of the DC/DC module (Figure 4).

General: $I_p \leq 1.4 * I_{in-max}$



(Figure 4)

6) Cannot use in parallel and hot swap

Note:

1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. To ensure reliable operation at light load or no load, the product output must be external 100μF aluminum electrolytic capacitance or greater than 10μF tantalum capacitance.
5. In this datasheet, all the test methods of indications are based on our corporate standards.
6. All characteristics are for listed model only, non-standard models may perform differently, please contact our technical person for more detail.
7. Contact us for your specific requirement.
8. Specifications subject to change without prior notice.

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