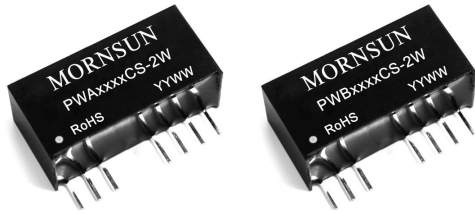


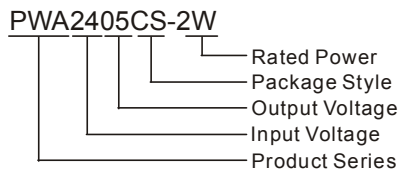
# MORNSUN®

## PWA\_CS-2W & PWB\_CS-2W Series 2W, ULTRAWIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT, DC/DC CONVERTER



Patent Protection RoHS

### PART NUMBER SYSTEM



### FEATURES

1. High Efficiency up to 79%
2. I/O Isolation 1500VDC
3. 4:1 wide input range
4. Short circuit protection(automatic recovery)
5. Operating Temperature: -40°C to +85°C
6. Remote ON/OFF control
7. Internal SMD construction
8. UL94-V0 package

### APPLICATIONS

The PWA\_CS-2W & PWB\_CS-2W Series are designed for application where a wide range input voltage power supplies are isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage range  $\leq 4:1$ ;
- 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# ( $\mu$ F)	Efficiency (% , typ.) @Max. Load
	Nominal (Range)	Max.*		Max.	Min.	@Max. Load	@No Load			
PWA2405CS-2W	24 (9-36)	40	$\pm 5$	$\pm 200$	$\pm 20$	110	15	200	680	75
PWA2409CS-2W			$\pm 9$	$\pm 111$	$\pm 11$	107			470	78
PWA2412CS-2W			$\pm 12$	$\pm 83$	$\pm 8$	107			330	78
PWA2415CS-2W			$\pm 15$	$\pm 67$	$\pm 7$	107			220	78
PWB2403CS-1W6			3.3	500	50	101			2200	68
PWB2405CS-2W			5	400	40	109			1000	75
PWB2409CS-2W			9	222	22	107			680	78
PWB2412CS-2W			12	167	16	105			470	79
PWB2415CS-2W			15	133	13	105			330	79
PWA4805CS-2W			48 (18-72)	80	$\pm 5$	$\pm 200$			$\pm 20$	55
PWA4812CS-2W	$\pm 12$	$\pm 83$			$\pm 8$	53	330	78		
PWA4815CS-2W	$\pm 15$	$\pm 67$			$\pm 7$	53	220	79		
PWB4803CS-1W6	3.3	500			50	48	2200	72		
PWB4805CS-2W	5	400			40	56	1000	75		
PWB4812CS-2W	12	167			16	53	470	78		
PWB4815CS-2W	15	133			13	53	330	79		

Note: 1\*Input voltage can't exceed this value, or will cause the permanent damage.  
2.#The capacitive loads of positive and negative outputs are identical.

### INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Start-up Voltage	24VDC input	--	7.5	9	
	48VDC input	--	16.5	18	
Input Filter		Capacitance Filter			

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.2	--	2	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy		--	±3	±5	
Output Voltage Balance	Dual Output, Balanced Loads	--	0.3	0.6	
Line regulation	Input voltage from low to high	--	±0.2	±0.75	%
Load regulation*	10% to 100% load	--	±0.5	±1.5	
Transient Recovery Time	25% Load step change	--	--	25	ms
Transient Response Deviation		--	±3	±5	%
Temperature Drift	100% full load	--	--	±0.03	%/°C
Ripple & Noise**	20MHz Bandwidth	--	50	150	mVp-p
Short Circuit Protection		Continuous, automatic recovery			

Note: 1.\*Dual output models unbalanced load: ±5%Max.  
2.\*\*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	100% load, input voltage range	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours
Case Material		Plastic(UL94-V0)			
Weight		--	5.8	--	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 at full load	Ta=25°C	--	15	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

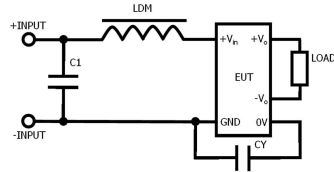
## EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS A (External Circuit Refer to Figure1, 2)			
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B (External Circuit Refer to Figure 4)	
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B (External Circuit Refer to Figure 3)	
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B (External Circuit Refer to Figure 3)	

## EMC RECOMMENDED CIRCUIT

### PWA\_CS-2W Series

#### EMI Recommended External Circuit:



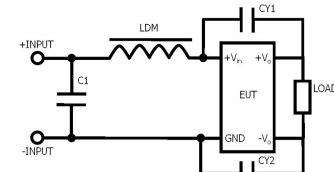
(Figure 1)

#### Recommended parameters:

- Vin: 24V  
 ①C1: 4.7 $\mu$ F/50V;  
 ②LDM: 6.8 $\mu$ H;  
 ③CY: 1000pF/2000V。  
 Vin: 48V  
 ①C1: 4.7 $\mu$ F/100V;  
 ②LDM: 6.8 $\mu$ H;  
 ③CY: 1000pF/2000V。

### PWB\_CS-2W Series

#### EMI Recommended External Circuit:

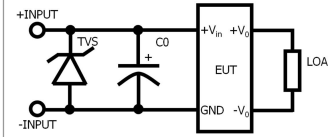


(Figure 2)

#### Recommended parameters:

- Vin: 24V  
 ①C1: 4.7 $\mu$ F/50V;  
 ②LDM: 6.8 $\mu$ H;  
 ③CY2: 100pF/2000V。  
 Vin: 48V  
 ①C1: 4.7 $\mu$ F/100V;  
 ②LDM: 6.8 $\mu$ H;  
 ③CY1: 100pF/2000V;  
 ④CY2: 100pF/2000V。

#### EMS Recommended External Circuit:

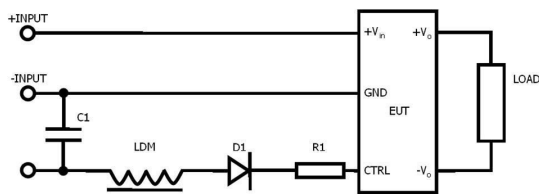


(Figure 3)

#### Recommended parameters:

- Vin: 24V  
 ①TVS: SMCJ40A,1500W;  
 ②C0: 680 $\mu$ F/50V。  
 Vin: 48V  
 ①TVS: SMCJ90A,1500W;  
 ②C0: 680 $\mu$ F/100V。

#### ESD Recommended External Circuit:



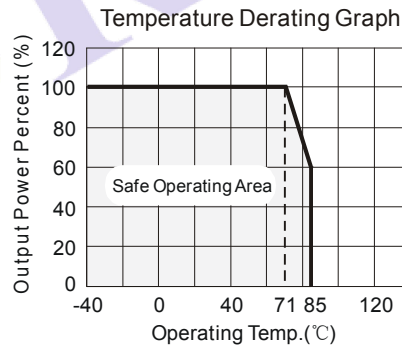
(Figure 4)

#### Recommended parameters:

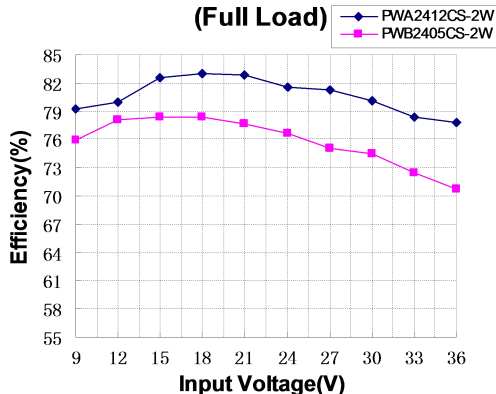
- Vin: 24V  
 ①C1: 1 $\mu$ F/50V;  
 ②LDM: 0.18 $\mu$ H;  
 ③D1: RB050LA Schottky diodes;  
 ④R1: 510 $\Omega$ 。  
 Vin: 48V  
 ①C1: 1 $\mu$ F/100V;  
 ②LDM: 0.18 $\mu$ H;  
 ③D1: RB050LA Schottky diodes;  
 ④R1: 510 $\Omega$ 。

Note: If there is no recommended parameters, the model no require the external component.

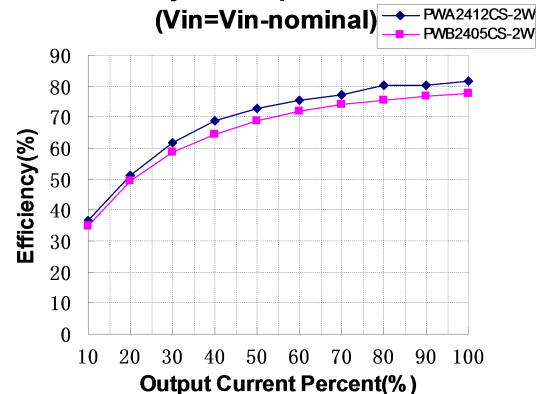
## PRODUCT TYPICAL CURVE



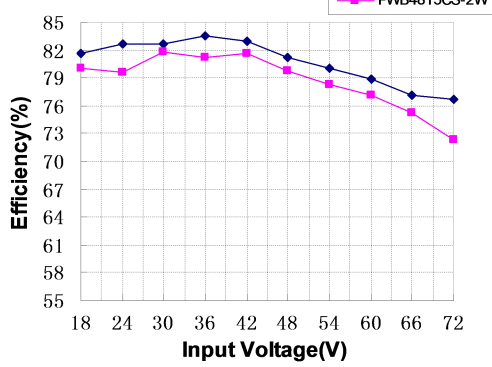
### Efficiency VS Input Voltage curve (Full Load)



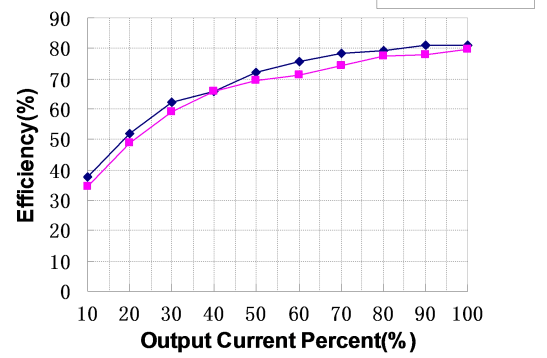
### Efficiency VS Output Load curve (Vin=Vin-nominal)



**Efficiency VS Input Voltage curve (Full Load)**



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



**OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING**

**MECHANICAL DIMENSIONS**

**FOOTPRINT DETAILS**

Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	CTRL	CTRL
6	+Vo	+Vo
7	NC	0V
8	NC	NC
9	0V	-Vo

NC: No Connection

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.

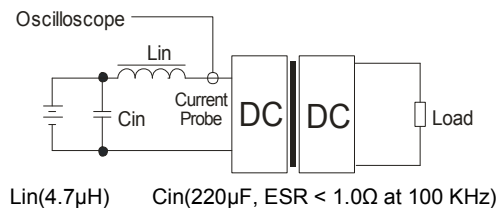
**TUBE OUTLINE DIMENSIONS**

Note:  
Unit: mm[inch]  
General tolerances: ± 0.50mm [± 0.020inch]  
L=530mm [20.866inch] Tube Quantity: 18pcs  
L=220mm [8.661inch] Tube Quantity: 7pcs  
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 Lin and Capacitor Cin 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 is not less than 10% of the full load, and 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.

### 2) Overload Protection

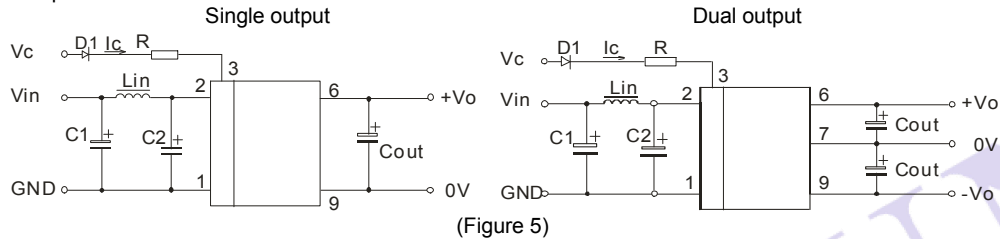
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

### 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 5).

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: C1/C2:10-100 $\mu$ F  
Cout:100 $\mu$ F  
Lin:4.7-120 $\mu$ H



(Figure 5)

### 4) TRL Terminal

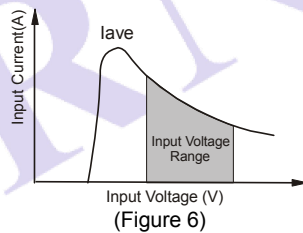
When open or high impedance, the converter work well; When this pin is 'high'; the converter shutdown; It should be note that the input current should between 5-10mA,exceeding the maximum 20mA will cause permanence damage to the converter. The value of Vc not limited and desirable 5VDC, 12VDC, or directly with Vin. The value of R can be derived as follows:

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

### 5) Input current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the flash startup average current of this kind of DC/DC module (Figure 7).

General: Vin:24V Iave =426mA  
Vin:48V Iave =213mA



(Figure 6)

### 6) No parallel connection or plug and play.

Note:

1. Recommend to use module with more than 10% load, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
2. Max. Capacitive Load is tested at input voltage range and full load.
3. All date in the datasheet are measured according to nominal input voltage, rated output load, TA=25 $^{\circ}$ C, humidity<75%, unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. The performance in the datasheet is just fit for the part number in the selection guide, and may be different from the customer-designed product, you can get more details from MORNSUN FAE.
6. Contact us for your specific requirement.
7. Specifications subject to change 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

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