

# MORNSUN®

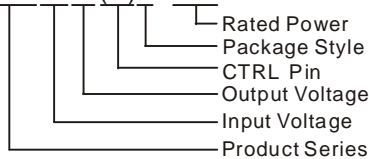
## PWA\_(C)D-10W & PWB\_(C)D-10W Series 10W, 4:1 WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



Patent Protection RoHS

### MODEL SELECTION

PWA2405(C)D-10W



### PRODUCT FEATURES

- 4:1 wide input range
- DIP package
- Operating Temperature: -40°C ~ +85°C
- 1500VDC Isolation
- Short circuit protection (automatic recovery)
- Metal shielding package
- Industry Standard Pinout
- MTBF>1,000,000 hours
- Good high temperature properties, can meet the industrial products technical requirements
- RoHS Compliance

### APPLICATIONS

The PWA\_(C)D-10W & PWB\_(C)D-10W series are specially designed for applications where a wide range input voltage 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 wide range (voltage range  $\leq 4:1$ );
- 2) Where isolation is necessary between input and output (isolation  $\leq 1500\text{VDC}$ );
- 3) Where the regulation of the output voltage and the output ripple noise are demanded.

### PRODUCT PROGRAM

Model Number	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load( $\mu\text{F}$ )	Efficiency (% , typ.) @Max. Load
	Nominal (Range)	Max*		Max.	Min.	@Max. Load	@No Load			
PWA2405(C)D-10W	24 (9-36)	40	$\pm 5$	$\pm 1000$	$\pm 100$	521	35	35	680	80
PWA2412(C)D-10W			$\pm 12$	$\pm 416$	$\pm 42$	508			330	82
PWA2415(C)D-10W			$\pm 15$	$\pm 333$	$\pm 33$	502			220	83
▲PWB2403D-10W			3.3	2400	240	548		100	2200	76
PWB2405(C)D-10W			5	2000	200	527		35	1000	79
PWB2412(C)D-10W			12	833	83	514			470	81
PWB2415(C)D-10W			15	666	67	508			330	82
PWB2424(C)D-10W			24	416	42	502			220	83
▲PWA4805(C)D-10W	48 (18-72)	80	$\pm 5$	$\pm 1000$	$\pm 100$	267	20	100	680	78
PWA4812(C)D-10W			$\pm 12$	$\pm 416$	$\pm 42$	254		35	330	82
PWA4815(C)D-10W			$\pm 15$	$\pm 333$	$\pm 33$	251		220	83	
▲PWB4803D-10W			3.3	2400	240	271		100	2200	77
▲PWB4805(C)D-10W			5	2000	200	267		35	1000	78
PWB4812(C)D-10W			12	833	83	254			470	82
PWB4815(C)D-10W			15	666	67	251			330	83

Note: 1. \*Input voltage can't exceed this value, or will cause the permanent damage.  
2. ▲:PWM mode, others PFM mode.  
3. "C" means the product with CTRL pin.

### INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1000 ms)	24VDC Input Models	-0.7	--	50	VDC
	48VDC Input Models	-0.7	--	100	
Start-up Voltage	24VDC Input Models	--	7.5	9	
	48VDC Input Models	--	16	18	

Short Circuit Input Power		--	1.5	2	W
Input Filter	PWM	C Filter			
	PFM	II Filter			

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units	
Output Power		1	--	10	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	--	±0.5	±1		
Transient Recovery Time	25% load step change	PWM	--	0.3	0.5	ms
		PFM	--	8	15	
Transient Response Deviation	25% load step change	--	--	±5	%	
Temperature Drift	100% load	--	--	±0.03	%/°C	
Ripple**	20MHz Bandwidth	--	20	50	mVp-p	
Noise**		--	75	150		
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.	Units
Isolation Voltage	Tested for 1 minute and 1mA max	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	--	1000	--	pF
Switching Frequency	Full load, nominal input	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	100	--	--	K hours
Case Material		Aluminum			
Weight		--	23.5	--	g

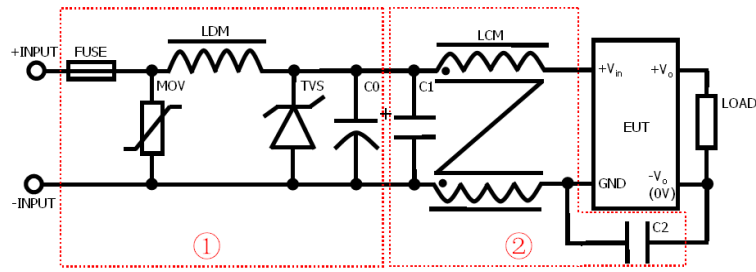
## ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Storage Humidity		--	--	95	%
Operating Temperature	Power derating (above 71°C)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise allowed at full load	Ta=25°C	--	30	--	
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)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV perf. Criteria B			
	EFT	IEC/EN61000-4-4 ±2KV perf. Criteria B (External Circuit Refer to Figure1)			
	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B (External Circuit Refer to Figure1)			

## EMC RECOMMENDED CIRCUIT

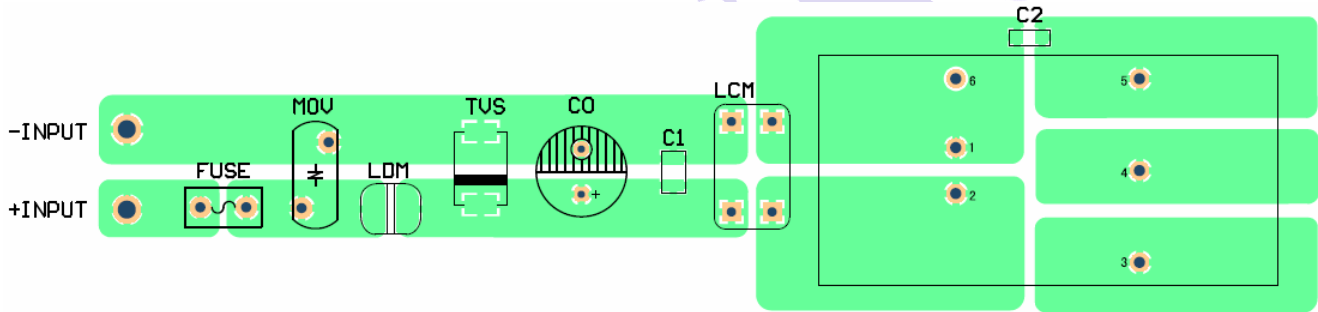


(Figure1)

Recommended external circuit parameters	PWA24_D-10W	PWB24_D-10W	PWA48_D-10W	PWA48_CD-10W	PWB48_D-10W	PWB48_CD-10W
FUSE	Choose according to load					
MOV	10D560K		10D121K			
LDM	82μH CD53					
TVS	SMCJ48A			SMCJ100A		
CO	120μF/50V			120μF/100V		
C1	--	--	4.7μF/100V 1210		--	4.7μF/100V 1210
LCM	--	--	3.3mH core:A10		--	3.3mH core:A10
C2	--	--	--	47pF/2KV 1206	--	--

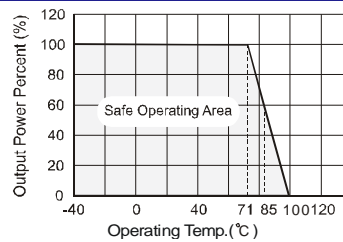
Note: In Figure 1, part① is EMS Recommended external circuit, part② is EMI recommended external circuit. Choose according to requirements.  
 2. If there is no recommended parameters, the model no require the external component.

## EMC RECOMMENDED CIRCUIT PCB LAYOUT

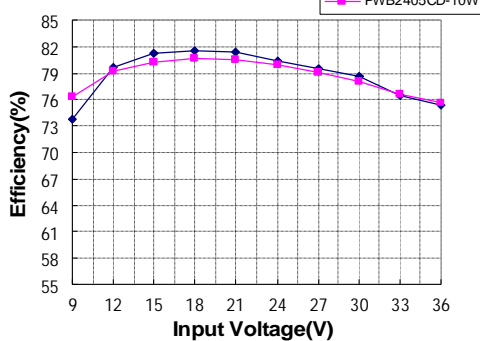


(Figure2)

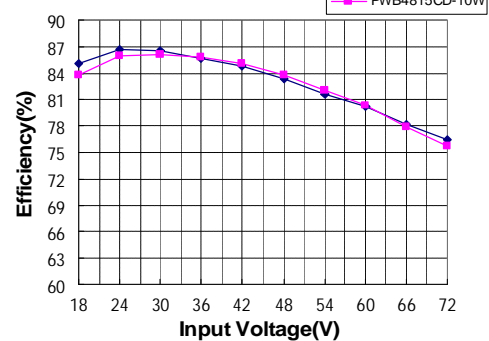
## PRODUCT TYPICAL CURVE

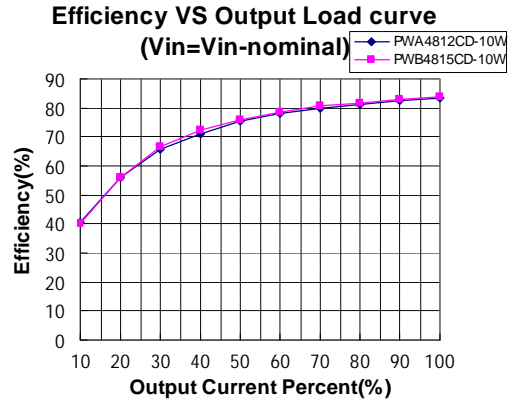
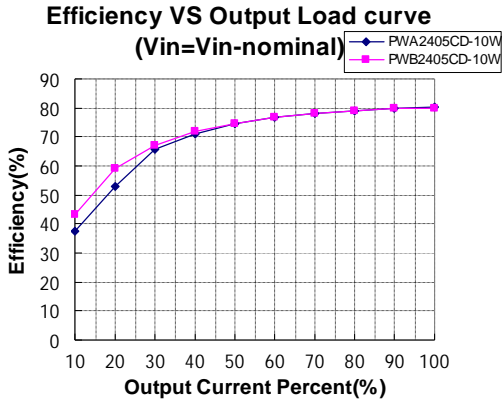


Efficiency VS Input Voltage curve (Full Load)

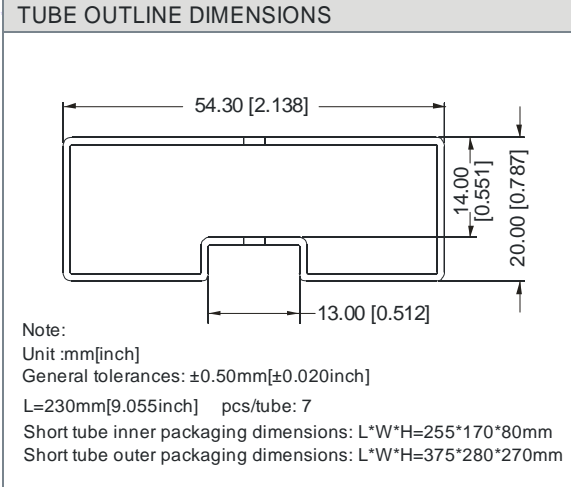
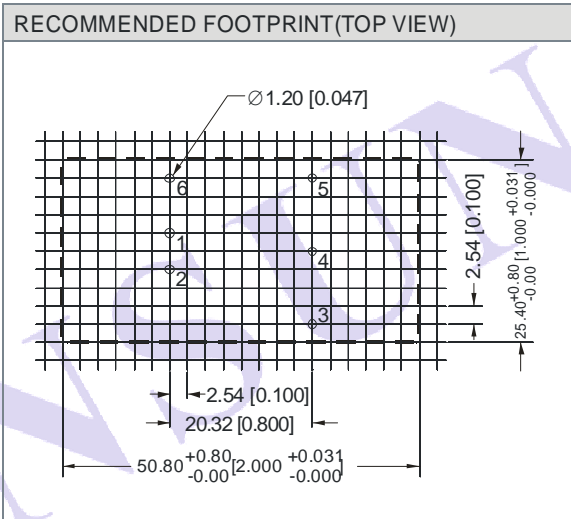
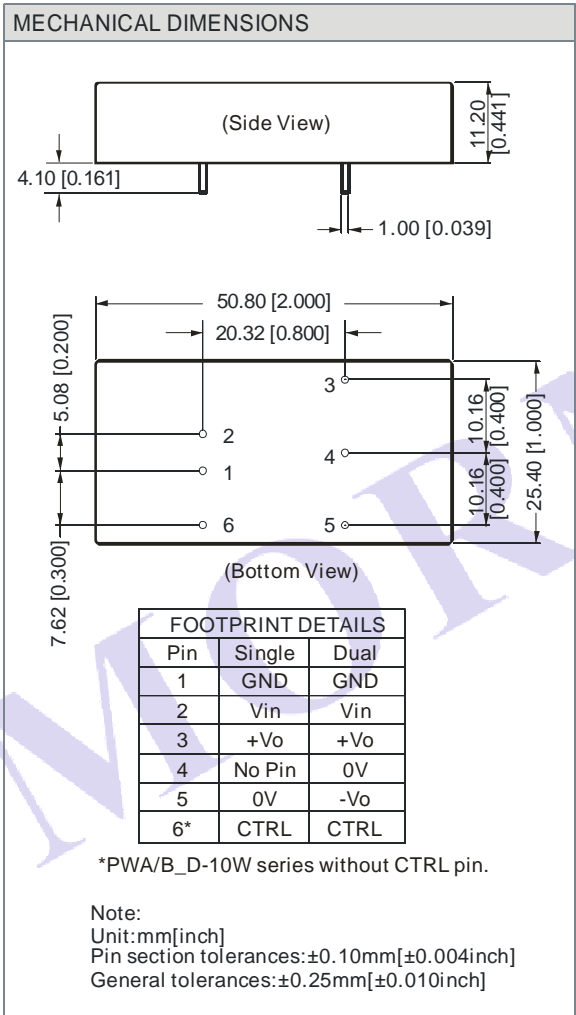


Efficiency VS Input Voltage curve (Full Load)





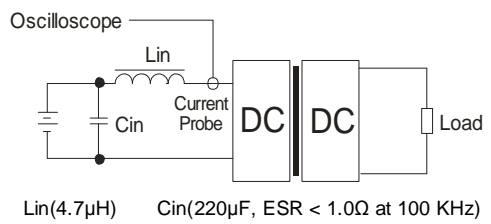
## OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING



## TEST CONFIGURATIONS

### Input Reflected-Ripple Current Test Setup

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



## DESIGN & APPLY 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.

### 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.

#### Input Fuse Selection Guide

24VDC Input Models	2000mA slow-Blow Type	48VDC Input Models	1000mA slow-Blow Type
--------------------	-----------------------	--------------------	-----------------------

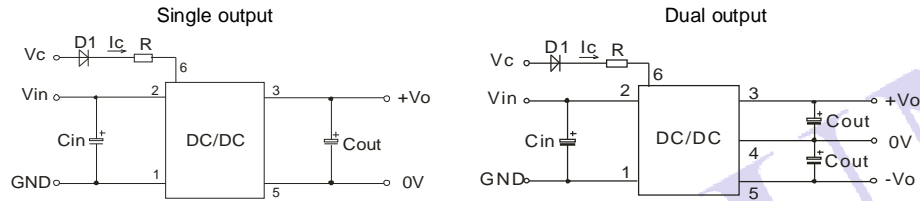
### 3) Recommended circuit

All the PWA\_(C)D-10W & PWB\_(C)D-10W series have been tested according to the following recommended testing circuit before leaving factory. (see Figure 3).

If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR. 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: Cin: 10μF~47μF

Cout:10μF/100mA



(Figure 3)

### 4) CTRL Terminal

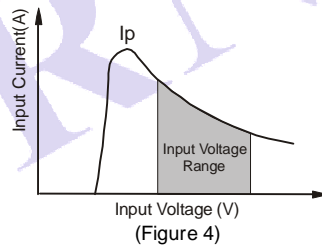
When open or high impedance, the converter work well; When this pin is 'high level'; the converter shutdown; It should be note that the input current should between 5-10mA,exceeding the maximum 20mA will cause permanence damage to the converter. The value of R can be derived as follows:

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

### 5) Input current

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

General: Ip ≤ 1.6\*lin-max



(Figure 4)

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

Note:

- 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, and that will reduce the life of product.
- Max. Capacitive Load tested at input voltage range and full load.
- All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- In this datasheet, all the test methods of indications are based on corporate standards.
- Only typical models listed, other models may be different, please contact our technical person for more details.
- Our company offer custom products.
- Specifications subject to change without 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: 86-20-28203030

Fax:86-20-28203068

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