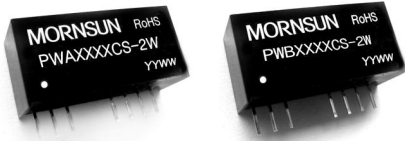


MORNSUN®

PWA_CS-2W & PWB_CS-2W Series 2W, ULTRAWIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT, DC/DC CONVERTER



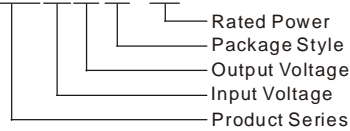
Patent Protection RoHS

PRODUCT FEATURES

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

MODEL SELECTION

PWA2405CS-2W



APPLICATIONS

The PWA_CS-2W & PWB_CS-2W 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 ranges 4:1);
- 2) Where isolation is necessary between input and output(isolation≤1500VDC);
- 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(μF)	Efficiency (%. typ.) @Max. Load
	Nominal (Range)	Max.*		Max.	Min.	@Max. Load	@No Load			
PWA2405CS-2W	24 (9-36)	40	±5	±200	±20	109	15	200	680	76
PWA2409CS-2W			±9	±111	±11	107			470	78
PWA2412CS-2W			±12	±83	±8	107			330	78
PWA2415CS-2W			±15	±67	±7	107			220	78
PWB2403CS-1W6			3.3	500	50	101			2200	68
PWB2405CS-2W			5	400	40	109			1000	76
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	±5	±200			±20	55
★PWA4809CS-2W	±9	±111			±11	53	470	78		
PWA4812CS-2W	±12	±83			±8	53	330	78		
PWA4815CS-2W	±15	±67			±7	53	220	79		
PWB4803CS-1W6	3.3	500			50	48	2200	72		
PWB4805CS-2W	5	400			40	56	1000	75		
★PWB4809CS-2W	9	222			22	55	680	76		
PWB4812CS-2W	12	167			16	53	470	78		
PWB4815CS-2W	15	133			13	53	330	79		

*Input voltage can't exceed this value, or will cause the permanent damage.★Still not design.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1 sec. max.)	24VDC Input Models	-0.7	--	50	VDC
	48VDC Input Models	-0.7	--	100	

Start-up Voltage	24VDC Input Models	--	7.5	9	VDC
	48VDC Input Models	--	16.5	18	
Internal Power Dissipation*		--	--	2	W
Short Circuit Input Power		--	--	1.6	
Input Filter		C Filter			
Note: *If the product work beyond this value, may result in injury or permanent damage, testing is not recommended, and it does not allow reverse.					

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
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			
*Dual output models unbalanced load: ±5%Max. **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	--	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.	Units
Storage Humidity		--	--	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 (CLASS A) :

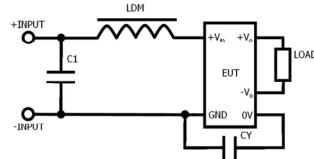


Figure 1

Recommended parameters:

Vin: 24V

- ①C1: 4.7 μ F/50V 1210;
- ②LDM: 6.8 μ H;
- ③CY: 1000pF/2000V 1206。

Vin: 48V

- ①C1: 4.7 μ F/100V 1210;
- ②LDM: 6.8 μ H;
- ③CY: 1000pF/2000V 1206。

PWB_CS-2W Series

EMI Recommended External Circuit (CLASS A) :

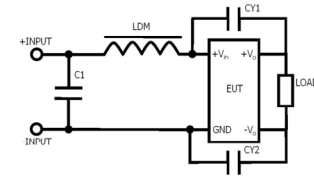


Figure 2

Recommended parameters:

Vin: 24V

- ①C1: 4.7 μ F/50V 1210;
- ②LDM: 6.8 μ H;
- ③CY2: 100pF/2000V 1206。

Vin: 48V

- ①C1: 4.7 μ F/100V 1210;
- ②LDM: 6.8 μ H;
- ③CY1: 100pF/2000V 1206;
- ④CY2: 100pF/2000V 1206。

EMS Recommended External Circuit:

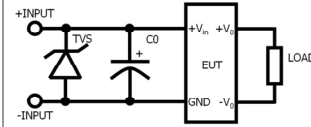


Figure 3

Recommended parameters:

Vin: 24V

- ①TVS: SMCJ40A,1500W (EPCOS);
- ②C0: 680 μ F/50V (NCC)。

Vin: 48V

- ①TVS: SMCJ90A,1500W (EPCOS);
- ②C0: 680 μ F/100V (NCC)。

ESD Recommended External Circuit:

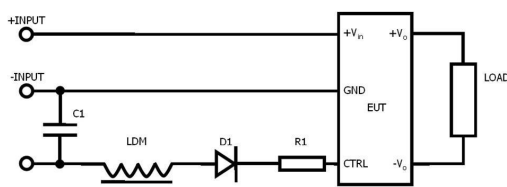


Figure 4

Recommended parameters:

Vin: 24V

- ①C1: 1 μ F/50V 1206;
- ②LDM: 0.18 μ H;
- ③D1: RB050LA Schottky diodes(ROHM);
- ④R1: 510 Ω 1206。

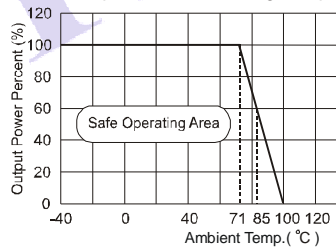
Vin: 48V

- ①C1: 1 μ F/100V 1206;
- ②LDM: 0.18 μ H;
- ③D1: RB050LA Schottky diodes (ROHM);
- ④R1: 510 Ω 1206。

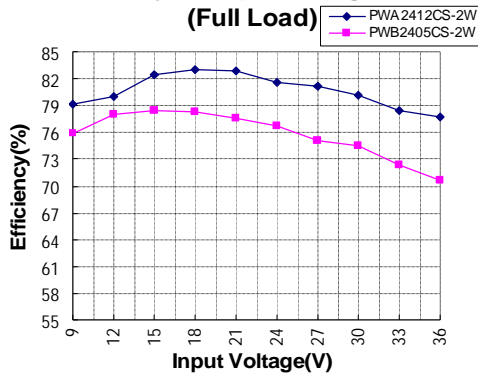
Note: If there is no recommended parameters, the model no require the external component.

PRODUCT TYPICAL CURVE

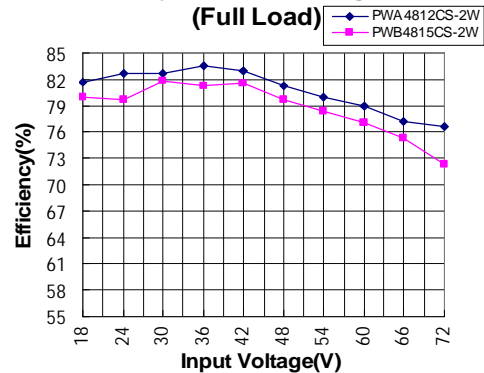
Temperature Derating Graph

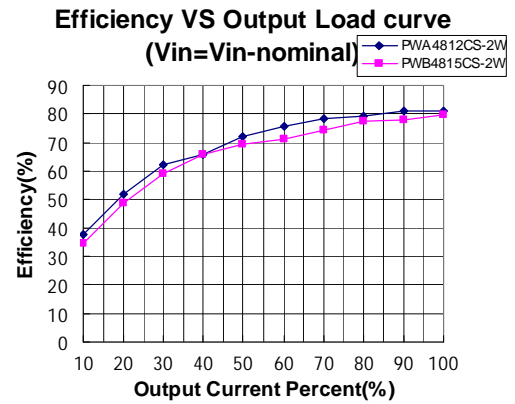
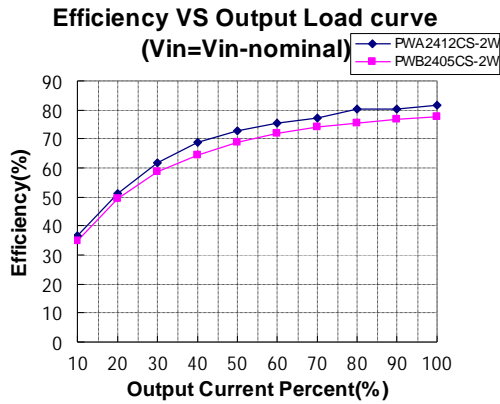


Efficiency VS Input Voltage curve (Full Load)



Efficiency VS Input Voltage curve (Full Load)





OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

Note:
Unit:mm[inch]
Pin section:0.50*0.30mm[0.020*0.012inch]
Pin tolerances:± 0.10mm[± 0.004inch]
General tolerances± 0.25mm[± 0.010inch]

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

RECOMMENDED FOOTPRINT(TOP VIEW)

Note: Grid 2.54*2.54mm.

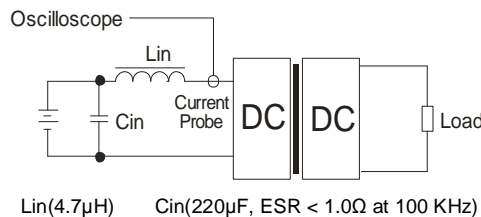
TUBE OUTLINE DIMENSIONS

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: 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 C_{in} 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 is not less than 10% of the full load, and that 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.

Input Fuse Selection Guide

24VDC Input Models	250mA slow-Blow Type	48VDC Input Models	150mA slow-Blow Type
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3) Recommended Circuit

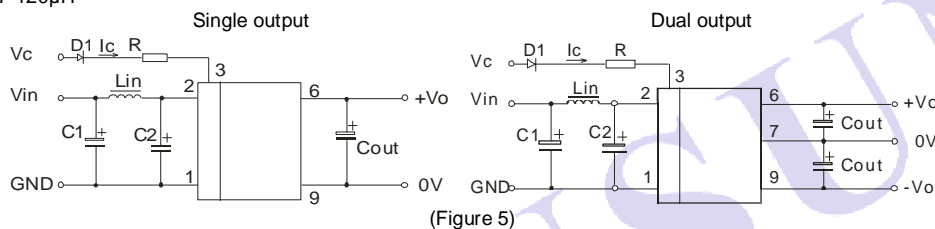
If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 5).

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 μ F

Cout:100 μ F

Lin:4.7-120 μ H



4) TRL Terminal

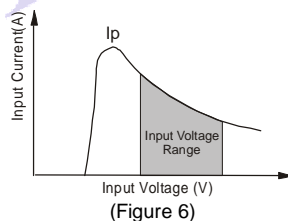
When open or high impedance, the converter work well; When this pin is 'high'; the converter shutdown; It should be note that the input current should between 5-10mA,exceeding the maximum 20mA will cause permanence damage to the converter. The value of Vc not limited and desirable 5VDC, 12VDC, or directly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

$$R = \frac{V_c - V_D - 1.0}{I_c}$$

5) Input current

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 6).

General: Ip \leq 1.4*lin-max



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.
- 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.

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