

date 03/20/2013

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SERIES: PRMC1-S | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

- 1 W isolated output
- smaller package
- single regulated output
- 3,000 Vdc isolation
- continuous short circuit, over current protection
- temperature range (-40~105°C)
- high efficiency at light load
- efficiency up to 82%



MODEL		nput oltage	output voltage		tput rrent	output power	ripple and noise¹	efficiency
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PRMC1-D5-S5-S	5	4.5~9	5	10	200	1	75	72
PRMC1-D5-S12-S	5	4.5~9	12	4	83	1	75	77
PRMC1-D5-S15-S	5	4.5~9	15	3	67	1	75	77
PRMC1-D12-S5-S	12	9~18	5	10	200	1	75	76
PRMC1-D12-S12-S	12	9~18	12	4	83	1	75	80
PRMC1-D12-S15-S	12	9~18	15	3	67	1	75	81
PRMC1-D24-S5-S	24	18~36	5	10	200	1	75	76
PRMC1-D24-S12-S	24	18~36	12	4	83	1	75	81
PRMC1-D24-S15-S	24	18~36	15	3	67	1	75	81
PRMC1-D24-S24-S	24	18~36	24	6	42	1	75	82
PRMC1-D48-S5-S	48	36~75	5	10	200	1	75	76
PRMC1-D48-S12-S	48	36~75	12	4	83	1	75	81
PRMC1-D48-S15-S	48	36~75	15	3	67	1	75	81

Notes: 1. ripple and noise are measured at 20 MHz BW by "parallel cable" method

PART NUMBER KEY

PRMC1 - DXX - SXX - S

Base Number Input Voltage Output Voltage Packaging Style SIP

INPUT

parameter	conditions/description	min	typ	max	units
	5 V input models	4.5	5	9	Vdc
anaustina innut valtaas	12 V input models	9	12	18	Vdc
operating input voltage	24 V input models	18	24	36	Vdc
	48 V input models	36	48	75	Vdc
	5 V input models	3.5	4	4.5	Vdc
start up voltage	12 V input models	4.5	8	9	Vdc
start-up voltage	24 V input models	11	16	18	Vdc
	48 V input models	24	33	36	Vdc
	for maximum of 1 second				-
	5 V input models	-0.7		12	Vdc
surge voltage	12 V input models	-0.7		25	Vdc
5	24 V input models	-0.7		50	Vdc
	48 V input models	-0.7		100	Vdc
filter	capacitance filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	full load, input voltage from low to high		±0.2	±0.5	%
load regulation	5% to 100% load		±0.4	±0.75	%
voltage accuracy	5% to 100% load		±1	±3	%
no-load output voltage accuracy	5V output models all other models		±1.5 ±1.5	±5 ±3	% %
switching frequency	100% load, nominal input voltage		180		KHz
transient recovery time	25% load step change		0.5	1	ms
transient response deviation	25% load step change		±3	±5	%
temperature coefficient	100% load		±0.02	±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				
over current protection		120			%

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	for 1 minute at 1 mA max.	3,000			Vdc
isolation resistance	at 500 Vdc	1,000			МΩ
conducted emissions CISPR22/EN55022, class B, (external circuit required, see Figure 1-b)					
radiated emissions	CISPR22/EN55022, class B, (external circ	uit required, see Figure	1-b)		
ESD ¹	IEC/EN61000-4-2, class B, contact ± 4kV/ air ± 8kV				
radiated immunity	IEC/EN61000-4-3, class A, 10V/m				
EFT/burst	IEC/EN61000-4-4, class B, ± 2kV (external circuit required, see Figure 1-a)				
surge	IEC/EN61000-4-5, class B, ± 2kV (external circuit required, see Figure 1-a)				
conducted immunity	IEC/EN61000-4-6, class A, 3 Vr.m.s				
voltage dips and interruptions	oltage dips and interruptions IEC/EN61000-4-29, class B, 0%-70%				
MTBF	as per MIL-HDBK-217F @ 25°C 1,000,000				hours
RoHS compliant	yes				

1. 24V input models can only meet ESD contact ±2kV with external circuit 1-c hooked up. 24V input models can meet ESD contact ±4kV with external circuit 1-a, 1-b, and 1-c hooked up.

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	at full load, Ta=25°C		25		°C

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
wave soldering	see wave soldering profile			260	°C

MECHANICAL

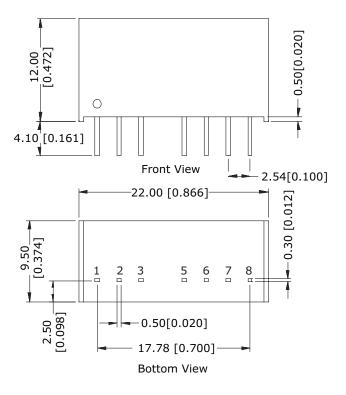
parameter	conditions/description	min	typ	max	units
dimensions	22.00 x 9.50 x 12.00 (0.866 x 0.374 x 0.472 inch)				mm
case material	plastic (UL94-V0)				
weight			4.92		g

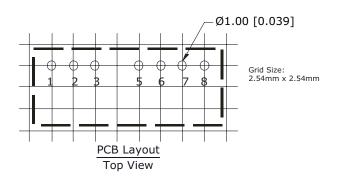
MECHANICAL DRAWING

units: mm[inch]

tolerance: $\pm 0.25[\pm 0.010]$

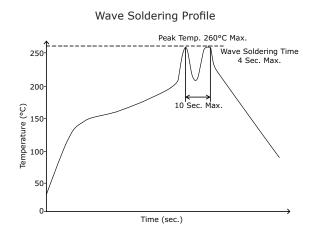
pin section tolerance: $\pm 0.10[\pm 0.004]$

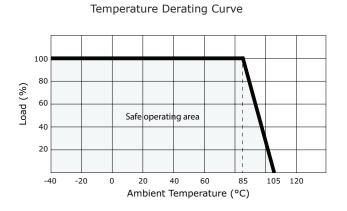




PIN CONNECTIONS		
PIN	Function	
1	GND	
2	Vin	
3	CTRL	
5	NC	
6	+Vo	
7	0V	
8	CS	

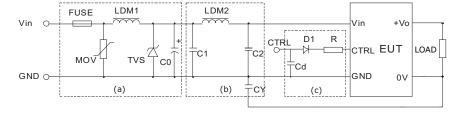
DERATING CURVES





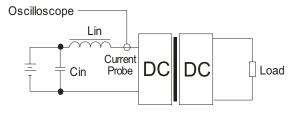
EMC RECOMMENDED CIRCUIT

Figure 1



	Recommended external circuit components					
Vin (Vdc)	5	12	24	48		
FUSE	choo	ose according to p	oractical input cur	rent		
MOV	TBD		10D560	10D101		
LDM1	TBD		56µH	56µH		
TVS	TBD	SMCJ28A	SMCJ48A	SMCJ90A		
C0	TBD	680µF/25V	120µF/50V	120µF/100V		
C1	TBD	4.7µF/50V	4.7μF/50V	4.7μF/100V		
LDM2	TBD	12µH	12µH	12µH		
C2	TBD	4.7μF/50V	4.7μF/50V	4.7μF/100V		
CY	TBD	1nF	1nF	1nF		
D1	TBD	RB160M-60/1A	RB160M-60/1A	RB160M-60/1A		
R	Follows: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$					
Cd	47nF/50V	47nF/50V	47nF/50V	47nF/50V		

TEST CONFIGURATION



External components			
Lin 4.7µH			
Cin	220μF, ESR $< 1.0Ω$ at 100 KHz		

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

APPLICATION NOTES

Output load requirement

To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 5% of the full load during operation. If the actual output power is low, connect a resistor at the output end in parallel to increase the load.

Recommended circuit

This series has been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load (see Figure 2). If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be appropriate. If the capacitance is too high, a startup problem might arise. For every channel of the output, to ensure safe and reliable operation, the maximum capacitance must be less than the maximum capacitive load (see Table 1).

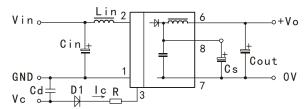


Figure 2

Vin Cin Cs Cout Lin (Vdc) (µF) (μH) (µF) (µF) 5 100 4.7-120 10-22 47 12 100 4.7-120 10-22 47 4.7-120 10-22 24 10 47 48 4.7-120 10-22 10 47

Table 1

CTRL Terminal

When open or applied high impedance, the converter will turn on. When it's pulled high, the converter will shutdown. The input current should between 5-10mA. Exceeding the maximum 20mA will cause permanent damage to the converter. The value for R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

Input Current

When it is used in an unregulated condition, make sure that the input fluctuations and ripple voltage do not exceed the module standard. Refer to Figure 3 for the startup current of this dc-dc module.

nput Current(A) Figure 3

Input Voltage (V)

Vin (Vdc)	Ip (mA)
5	470
12	180
24	110
48	42

Note:

^{1.} Minimum load shouldn't be less than 5%, otherwise ripple may increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specifications listed.

^{2.} Maximum capacitive load is tested at input voltage range and full load.

^{3.} All specifications are measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

CUI Inc | SERIES: PRMC1-S | DESCRIPTION: DC-DC CONVERTER

REVISION HISTORY

rev.	description	date
1.0	initial release	03/20/2013

The revision history provided is for informational purposes only and is believed to be accurate.



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CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

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