

SERIES: PDS1-M | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

- 1 W isolated output
- smaller package
- single and dual unregulated outputs
- 1,500 Vdc isolation
- continuous short circuit protection
- extended temperature range (-40~105°C)
- antistatic protection up to 8kV
- high efficiency at light load
- efficiency up to 82%

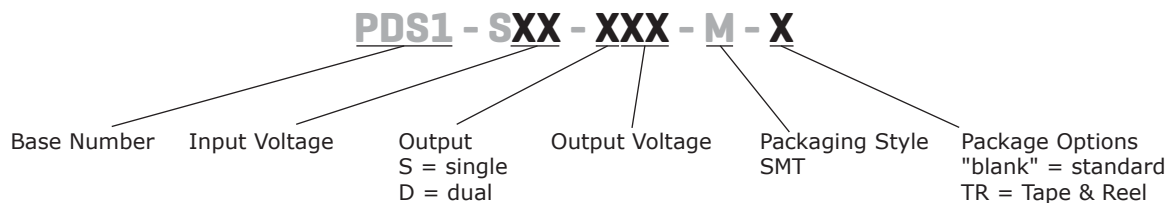


MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise ¹ typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PDS1-S3-D5-M	3.3	2.97~3.63	±5	±10	±100	1	30	78
PDS1-S3-D12-M	3.3	2.97~3.63	±12	±5	±42	1	30	80
PDS1-S3-D15-M	3.3	2.97~3.63	±15	±3	±33	1	60	80
PDS1-S5-S5-M	5	4.5~5.5	5	20	200	1	30	80
PDS1-S5-S9-M	5	4.5~5.5	9	12	111	1	30	80
PDS1-S5-S12-M	5	4.5~5.5	12	9	84	1	30	80
PDS1-S5-S15-M	5	4.5~5.5	15	7	67	1	60	80
PDS1-S5-S24-M	5	4.5~5.5	24	4	42	1	60	80
PDS1-S5-D5-M	5	4.5~5.5	±5	±10	±100	1	30	80
PDS1-S5-D9-M	5	4.5~5.5	±9	±6	±56	1	30	80
PDS1-S5-D12-M	5	4.5~5.5	±12	±5	±42	1	30	81
PDS1-S5-D15-M	5	4.5~5.5	±15	±3	±33	1	60	81
PDS1-S5-D24-M	5	4.5~5.5	±24	±2	±21	1	60	81
PDS1-S12-S5-M	12	10.8~13.2	5	20	200	1	30	80
PDS1-S12-S9-M	12	10.8~13.2	9	12	111	1	30	80
PDS1-S12-S12-M	12	10.8~13.2	12	9	84	1	30	81
PDS1-S12-S15-M	12	10.8~13.2	15	7	67	1	60	81
PDS1-S12-D5-M	12	10.8~13.2	±5	±10	±100	1	30	80
PDS1-S12-D9-M	12	10.8~13.2	±9	±6	±56	1	30	80
PDS1-S12-D12-M	12	10.8~13.2	±12	±5	±42	1	30	81
PDS1-S12-D15-M	12	10.8~13.2	±15	±3	±33	1	60	81
PDS1-S12-D24-M	12	10.8~13.2	±24	±2	±21	1	60	81
PDS1-S15-S15-M	15	13.5~16.5	15	7	67	1	60	81
PDS1-S24-S5-M	24	21.6~26.4	5	20	200	1	30	80
PDS1-S24-S9-M	24	21.6~26.4	9	11	110	1	30	80
PDS1-S24-S12-M	24	21.6~26.4	12	8	83	1	30	81
PDS1-S24-S15-M	24	21.6~26.4	15	7	67	1	60	81
PDS1-S24-S24-M	24	21.6~26.4	24	4	42	1	60	81

**MODEL
(CONTINUED)**

	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise ¹ typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PDS1-S24-D5-M	24	21.6~26.4	±5	±10	±100	1	30	82
PDS1-S24-D9-M	24	21.6~26.4	±9	±6	±56	1	30	82
PDS1-S24-D12-M	24	21.6~26.4	±12	±5	±42	1	30	82
PDS1-S24-D15-M	24	21.6~26.4	±15	±3	±33	1	60	82
PDS1-S24-D24-M	24	21.6~26.4	±24	±2	±21	1	60	82

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

PART NUMBER KEY**INPUT**

parameter	conditions/description	min	typ	max	units
operating input voltage	3.3 V input models	2.97	3.3	3.63	Vdc
	5 V input models	4.5	5	5.5	Vdc
	12 V input models	10.8	12	13.2	Vdc
	15 V input models	13.5	15	16.5	Vdc
	24 V input models	21.6	24	26.4	Vdc
surge voltage	for maximum of 1 second				
	3.3 V input models	-0.7		5	Vdc
	5 V input models	-0.7		9	Vdc
	12 V input models	-0.7		18	Vdc
	15 V input models	-0.7		21	Vdc
	24 V input models	-0.7		30	Vdc
filter	capacitance filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	for Vin change of 1%			±1.2	%
load regulation	measured from 10% load to full load				
	5 Vdc output models		12		%
	9 Vdc output models		8		%
	12 Vdc output models		7		%
	15 Vdc output models		6		%
	24 Vdc output models		5		%
voltage accuracy	see tolerance envelope curve				
switching frequency	100% load, nominal input voltage		100	300	kHz
temperature coefficient	100% load			±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				

SAFETY AND COMPLIANCE

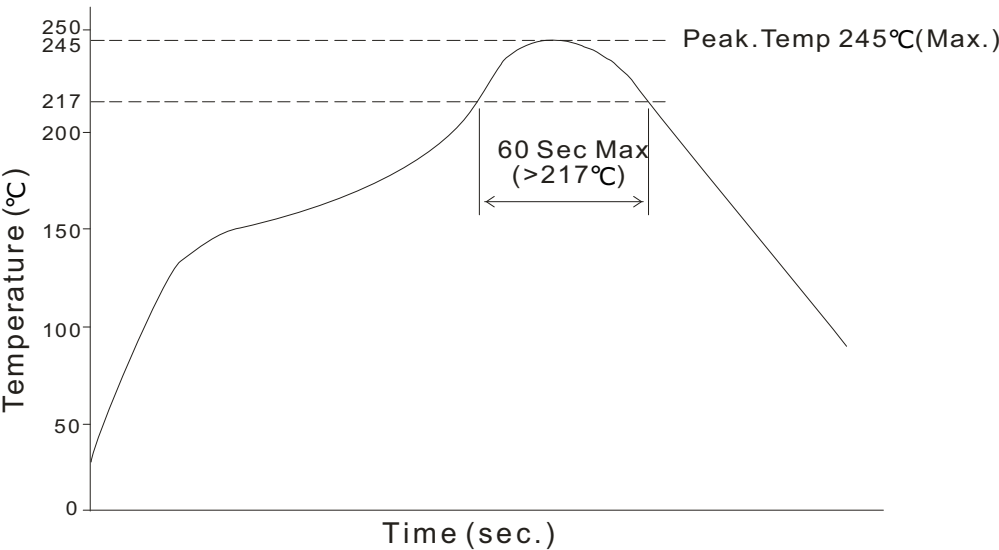
parameter	conditions/description	min	typ	max	units
isolation voltage	for 1 minute at 1 mA max.	1,500			Vdc
isolation resistance	at 500 Vdc	1,000			MΩ
conducted emissions	CISPR22/EN55022, class B (external circuit required, see Figure 1)				
ESD	IEC/EN 61000-4-2, class B, contact ±8KV				
MTBF	MIL-HDBK-217F @ 25 °C	3,500,000			hours
RoHS	2011/65/EU				

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		25		°C

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
reflow soldering	see reflow soldering profile			245	°C



MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	single output models: 12.7 x 8.30 x 7.25 dual output models: 15.24 x 8.30 x 7.25				mm mm
case material	epoxy resin (UL94-V0)				
weight	single output models dual output models		1.52 1.8		g g

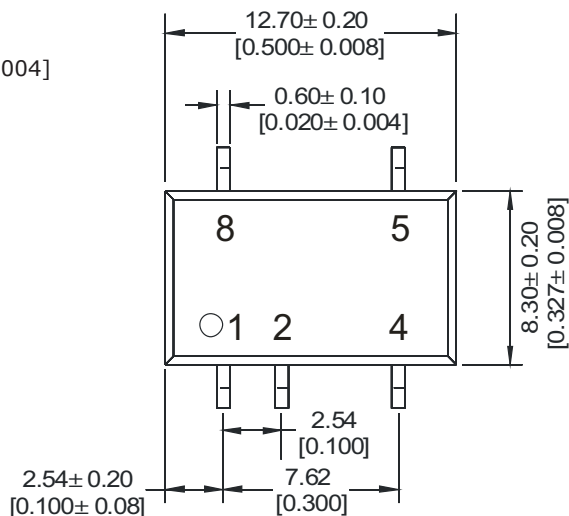
MECHANICAL DRAWING

SINGLE OUTPUT MODELS

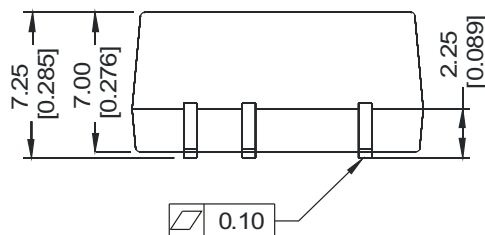
units: mm[inch]

tolerance: $\pm 0.25[\pm 0.010]$ pin section tolerance: $\pm 0.10[\pm 0.004]$

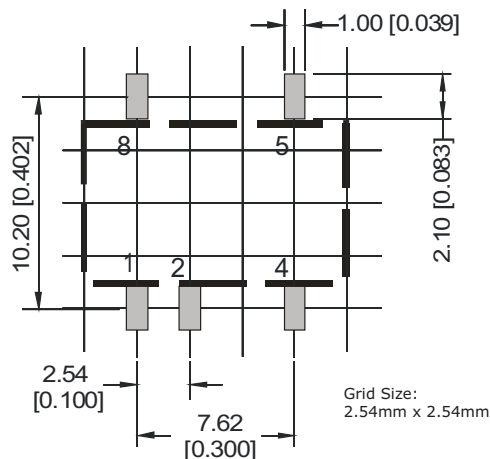
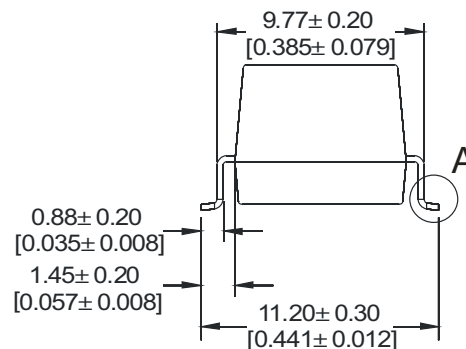
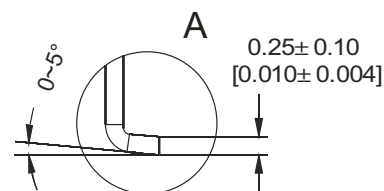
PIN CONNECTIONS	
PIN	function
1	GND
2	Vin
4	0V
5	+Vo
8	NC



Top View



Front View

PCB Layout
Top View

Side View

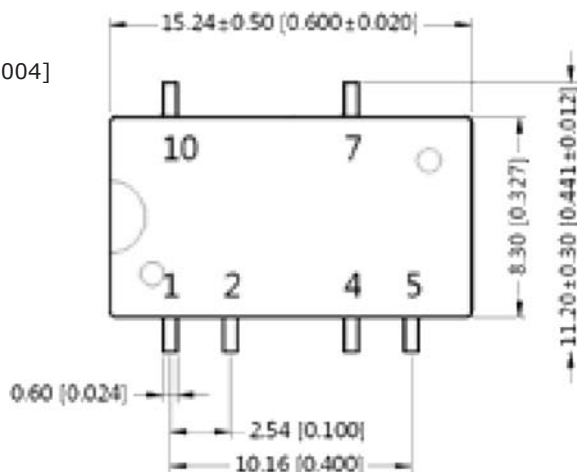
MECHANICAL DRAWING

DUAL OUTPUT MODELS

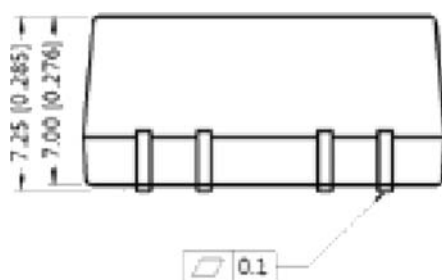
units: mm[inch]

tolerance: $\pm 0.25[\pm 0.010]$ pin section tolerance: $\pm 0.10[\pm 0.004]$

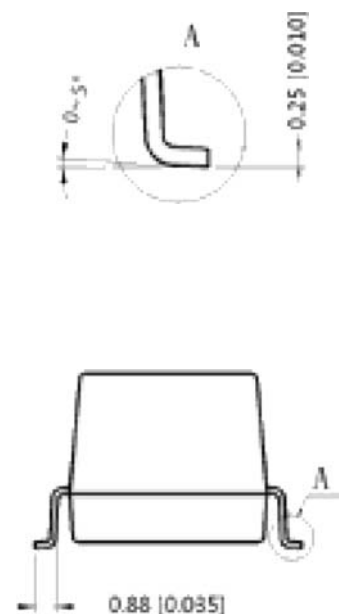
PIN CONNECTIONS	
PIN	function
1	GND
2	Vin
4	0V
5	-Vo
7	+Vo
10	NC



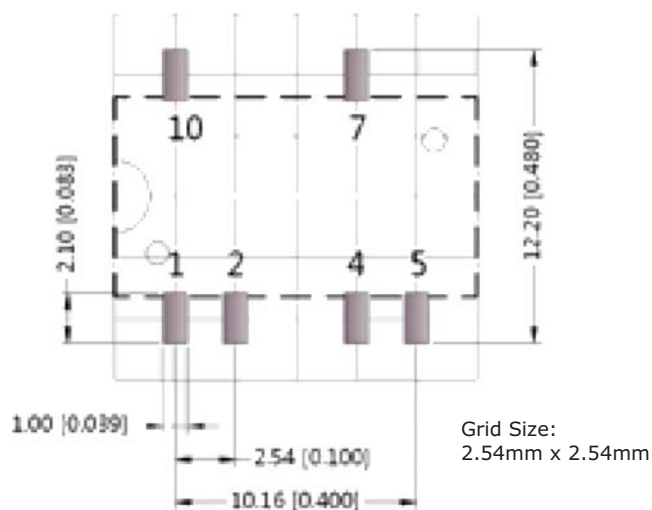
Top View



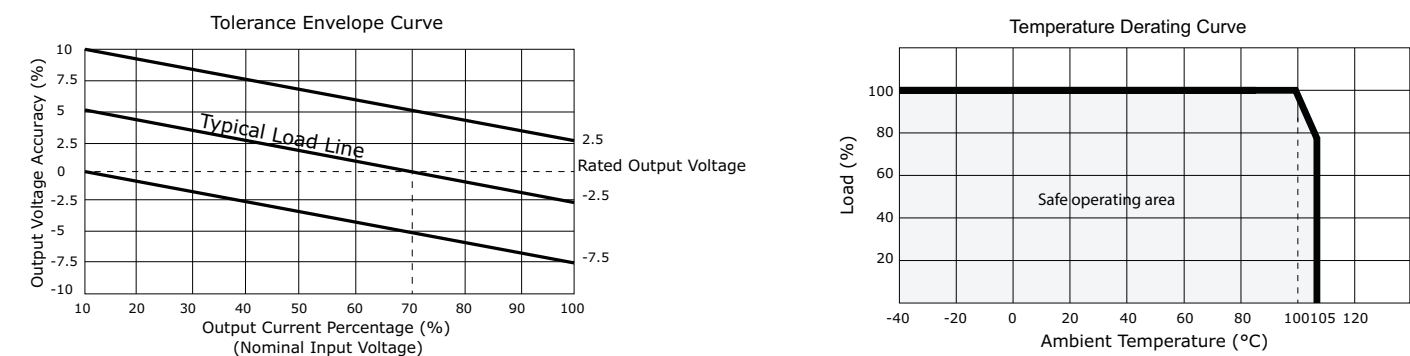
Front View



Side View

PCB Layout
Top View

DERATING CURVES



EMC RECOMMENDED CIRCUIT

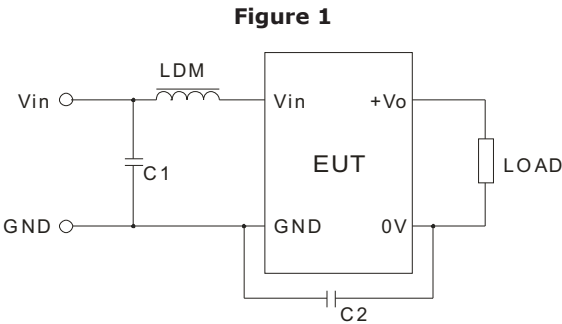


Table 1

Recommended external circuit components			
Vin (Vdc)	C1	LDM	C2 ¹
3.3	4.7μF/50V	6.8μH	NC
5	4.7μF/50V	6.8μH	NC
12	4.7μF/50V	6.8μH	NC
15	4.7μF/50V	6.8μH	470pF/2kV
24	4.7μF/50V	6.8μH	470pF/2kV

Note: 1. C2 is not required for dual output models.

TEST CONFIGURATION

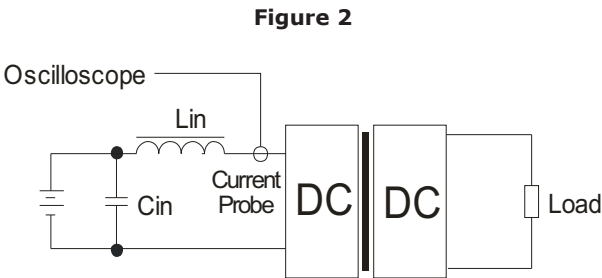


Table 2

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

1. Output load requirement

To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 10% 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.

2. Overload Protection

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

3. Recommended circuit

If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR (see Figure 3 & Table 3). 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 4).

Figure 3

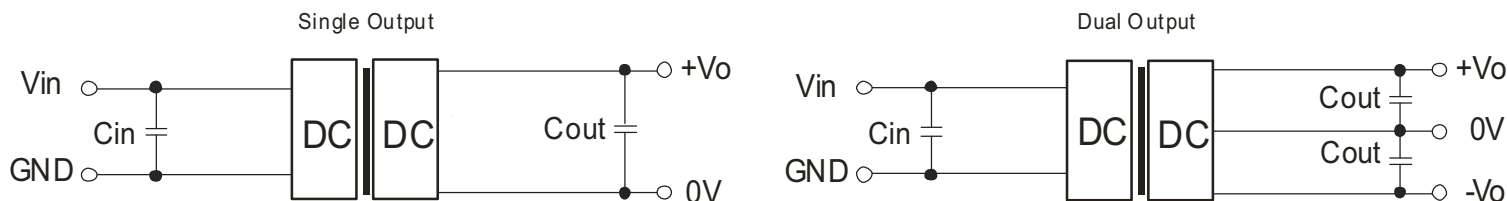


Table 3

Vin (Vdc)	Cin (μF)	Single Vo (Vdc)	Cout (μF)	Dual Vo (Vdc)	Cout (μF)
3.3	4.7	5	10	±5	4.7
5	4.7	9	4.7	±9	2.2
12	2.2	12	2.2	±12	1
15	2.2	15	1	±15	1
24	1	24	0.47	±24	0.47

Note: It's not recommended to connect any external capacitors in applications with less than 0.5 watt output.

Table 4

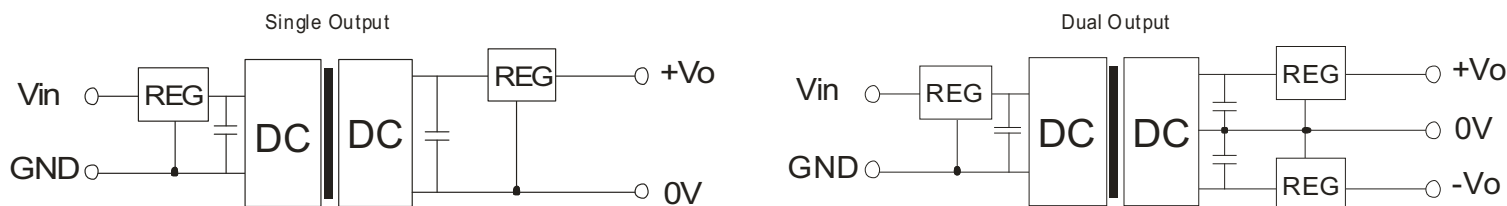
Single Vout (Vdc)	Max. Capacitive Load (μF)	Dual Vout (Vdc)	Max. Capacitive Load ¹ (μF)
5	220	5	100
9	220	9	100
12	220	12	100
15	220	15	100
24	220	24	100

Note: 1. For each output.

4. Output Voltage Regulation and Over-voltage Protection Circuit

The device for output voltage regulation, over-voltage and over-current protection is a linear regulator and a capacitor filtering network with overheat protection which can be connected to the input or output end in series (see Figure 4). The recommended capacitance of its filter capacitor (see Table 3), and the linear regulator is based on the actual voltage and current required.

Figure 4



Note: 1. Operation under minimum load will not damage the converter; however, they may not meet all specifications 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.

REVISION HISTORY

rev.	description	date
1.0	initial release	03/19/2013
1.01	added PDS1-S24-S12-M model	06/11/2013
1.02	added dual output models	02/17/2014

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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