



**THE DATASHEET OF
PEM2-S15-D15-S**



SERIES: PEM2-S | **DESCRIPTION:** DC-DC CONVERTER**FEATURES**

- 2 W isolated output
- smaller package
- single/dual unregulated output
- 3,000 Vdc isolation
- short circuit protection
- extended temperature range (-40~105°C)
- antistatic protection up to 8kV
- high efficiency at light load
- efficiency up to 86%
- designed to meet EN/BS EN 62368



MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise ² typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PEM2-S5-S5-S ^{1,*}	5	4.5~5.5	5	40	400	2	75	82
PEM2-S5-S12-S ^{1,*}	5	4.5~5.5	12	17	167	2	75	82
PEM2-S5-S15-S ^{1,*}	5	4.5~5.5	15	13	133	2	75	83
PEM2-S5-S24-S ^{1,*}	5	4.5~5.5	24	8	83	2	75	84
PEM2-S5-D5-S ^{1,*}	5	4.5~5.5	±5	±20	±200	2	75	80
PEM2-S5-D12-S ^{1,*}	5	4.5~5.5	±12	±8	±83	2	75	83
PEM2-S5-D15-S ^{1,*}	5	4.5~5.5	±15	±7	±67	2	75	82
PEM2-S5-D24-S ^{1,*}	5	4.5~5.5	±24	±4	±42	2	75	84
PEM2-S12-S5-S ^{1,*}	12	10.8~13.2	5	40	400	2	75	82
PEM2-S12-S12-S ^{1,*}	12	10.8~13.2	12	17	167	2	75	84
PEM2-S12-S15-S ^{1,*}	12	10.8~13.2	15	13	133	2	75	85
PEM2-S12-D5-S ^{1,*}	12	10.8~13.2	±5	±20	±200	2	75	80
PEM2-S12-D12-S ^{1,*}	12	10.8~13.2	±12	±8	±83	2	75	84
PEM2-S12-D15-S ^{1,*}	12	10.8~13.2	±15	±7	±67	2	75	84
PEM2-S15-S5-S*	15	13.5~16.5	5	40	400	2	75	80
PEM2-S15-D15-S	15	13.5~16.5	±15	±7	±67	2	75	84
PEM2-S24-S5-S ^{1,*}	24	21.6~26.4	5	40	400	2	75	80
PEM2-S24-S12-S ^{1,*}	24	21.6~26.4	12	17	167	2	75	84
PEM2-S24-S15-S ^{1,*}	24	21.6~26.4	15	13	133	2	75	86
PEM2-S24-S24-S ¹	24	21.6~26.4	24	8	83	2	75	86
PEM2-S24-D5-S ^{1,*}	24	21.6~26.4	±5	±20	±200	2	75	80
PEM2-S24-D12-S ^{1,*}	24	21.6~26.4	±12	±8	±83	2	75	84
PEM2-S24-D15-S ^{1,*}	24	21.6~26.4	±15	±7	±67	2	75	84

Notes: 1. Model is UL approved.
 2. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 µF ceramic and 10 µF electrolytic capacitors on the output.
 3. * Discontinued model.

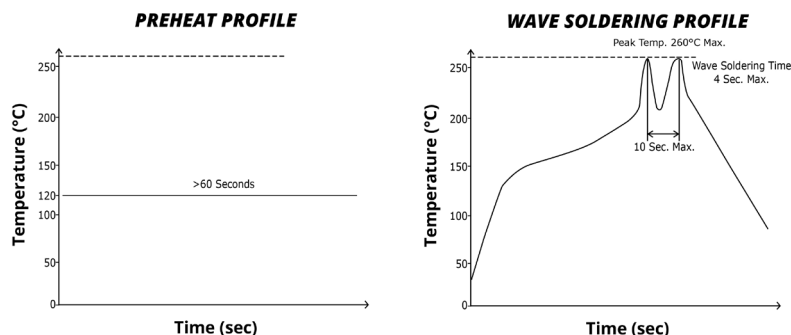
ENVIRONMENTAL

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 ¹	see wave soldering profile			260	°C

Notes: 1. Preheat conditions: At 120°C for over 1 minute.



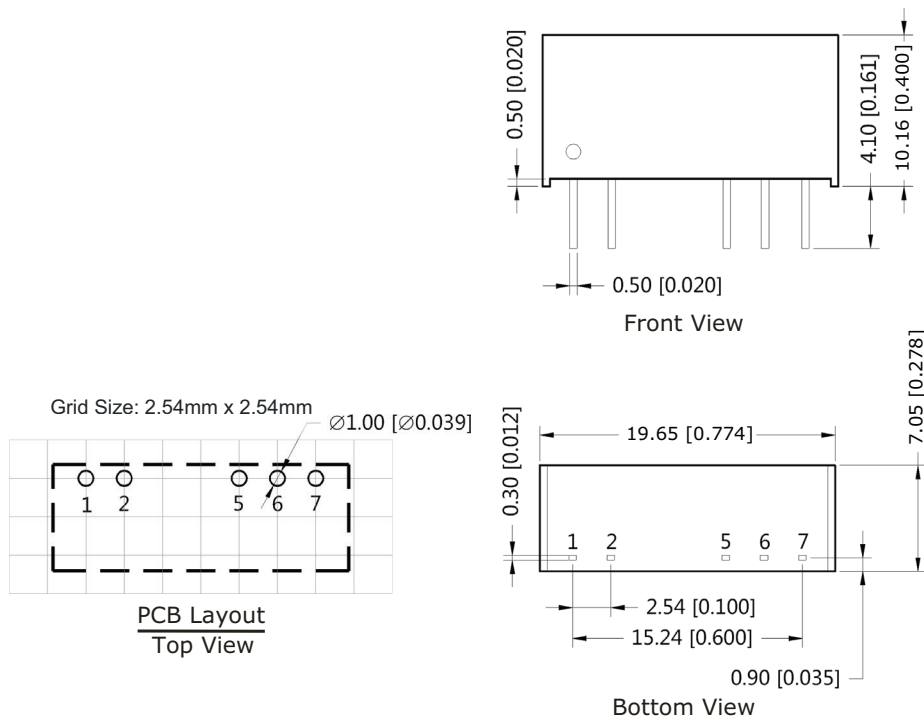
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	19.65 x 7.05 x 10.16 (0.774 x 0.278 x 0.400 inch)				mm
case material	plastic (UL94-V0)				
weight			2.4		g

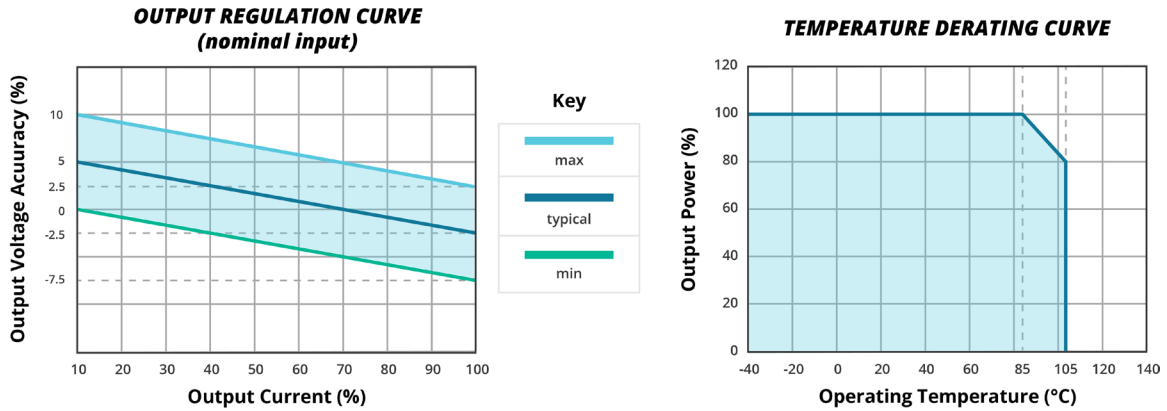
MECHANICAL DRAWING

units: mm[inch]
 tolerance: ±0.25[±0.010]
 pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS		
PIN	Single Output	Dual Output
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo



DERATING CURVES



EMC RECOMMENDED CIRCUIT

Figure 1

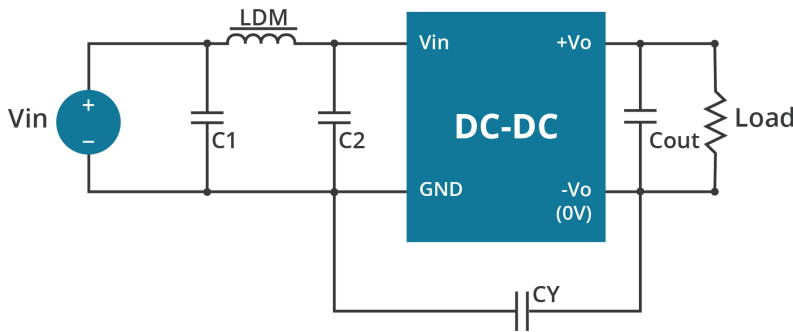


Table 1

Recommended external circuit components			
V_{in} (Vdc)	C1, C2	CY	LDM
5	4.7 μ F/50V	-	6.8 μ H
12	4.7 μ F/50V	-	6.8 μ H
15	4.7 μ F/50V	-	6.8 μ H
24	4.7 μ F/50V	1nF/3kV	6.8 μ H

Note: 1. See Table 3 for C_{out} values.

TEST CONFIGURATION

Figure 2

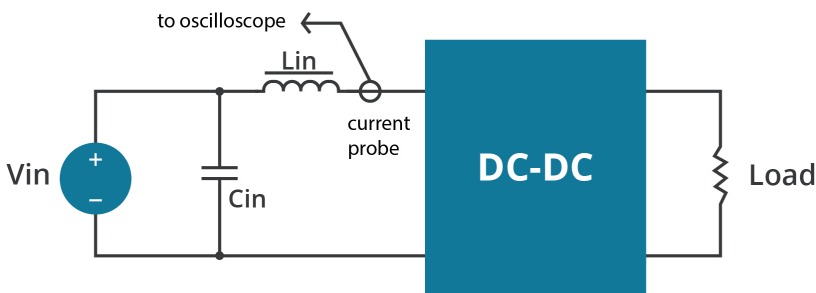


Table 2

External components	
L_{in}	4.7 μ H
C_{in}	220 μ F, ESR < 1.0 Ω at 100 kHz

Note: Input reflected-ripple current is measured with an inductor L_{in} and Capacitor C_{in} 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

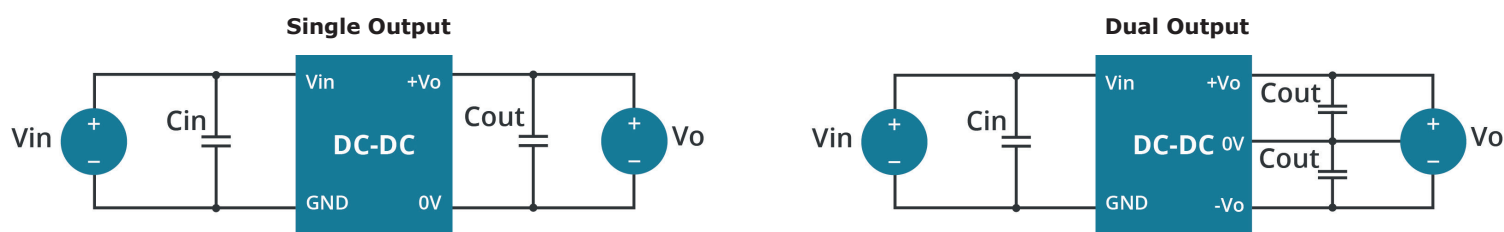


Table 3

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

Table 4

Single Vout (Vdc)	Max. Capacitive Load (μF)	Dual Vout (Vdc)	Max. Capacitive Load ¹ (μF)
5	220	5	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 1), and the linear regulator is based on the actual voltage and current required.

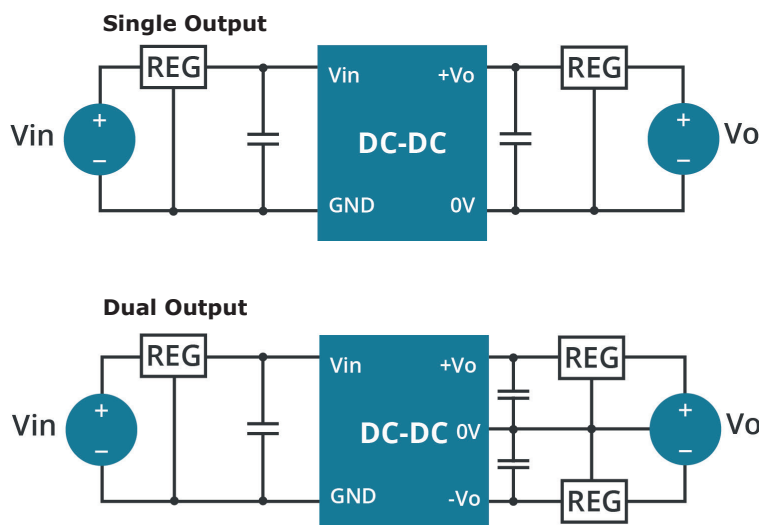


Figure 4

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	03/21/2013
1.01	added UL approval to some models, updated spec	02/26/2015
1.02	added model, updated emc recommendations, updated datasheet	11/19/2015
1.03	added packaging details	07/13/2017
1.04	added wave soldering preheat conditions	12/04/2017
1.05	corrected short circuit protection details	10/24/2018
1.06	transistor changed from Fairchild FSB560A to Diodes Inc part FMMT619TA	12/03/2018
1.07	safeties updated in features and safety approvals line, packaging removed	01/18/2021
1.08	derating curves and circuit figures updated	07/13/2021
1.09	discontinued models PEM2-S12-D15-S & PEM2-S12-S15-S	09/13/2022
1.10	CE certification updated	12/16/2022
1.11	discontinued models PEM2-S15-S5-S & PEM2-S5-S12-S	09/26/2023
1.12	discontinued models PEM2-S12-D12-SPEM2-S12-D5-S, PEM2-S12-S12-S, PEM2-S24-D12-S, PEM2-S24-D15-S, PEM2-S24-D5-S, PEM2-S24-S12-S, PEM2-S24-S15-S, PEM2-S24-S5-S, PEM2-S5-D12-S, PEM2-S5-D24-S, PEM2-S5-D5-S, PEM2-S5-S15-S & PEM2-S5-S24-S	01/12/2024
1.13	discontinued models PEM2-S12-S5-S, PEM2-S5-S5-S & PEM2-S5-D15-S	04/05/2024

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



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