

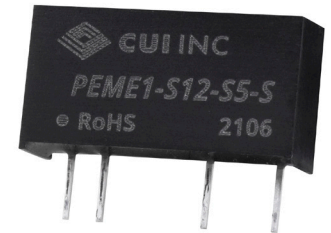


**THE DATASHEET OF  
PEME1-S12-S5-S**



**SERIES:** PEME1-S | **DESCRIPTION:** DC-DC CONVERTER**FEATURES**

- 1 W isolated output
- unregulated output
- single/dual output models
- continuous short circuit protection
- extended temperature range (-40~105°C)
- 3k Vdc isolation
- no load input current as low as 5 mA
- certified to UL 62368-1
- efficiency up to 85%
- designed to meet EN/BS EN 62368



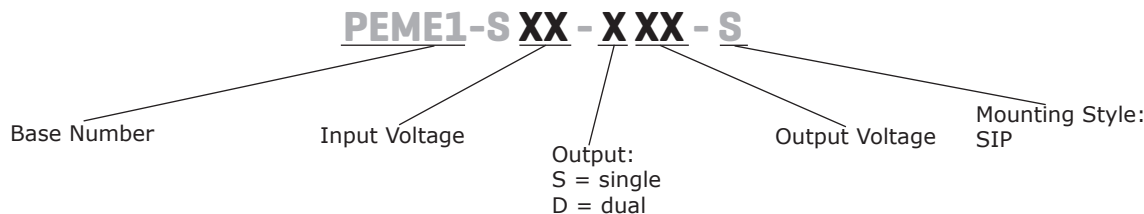
MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple & noise <sup>1</sup> max (mVp-p)	efficiency <sup>2</sup> typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PEME1-S3-D3-S <sup>3</sup>	3.3	2.97~3.63	±3.3	±15	±150	1	75	78
PEME1-S3-D5-S <sup>3</sup>	3.3	2.97~3.63	±5	±10	±100	1	75	82
PEME1-S3-D9-S <sup>3</sup>	3.3	2.97~3.63	±9	±6	±56	1	75	85
PEME1-S3-D12-S <sup>3</sup>	3.3	2.97~3.63	±12	±5	±42	1	75	82
PEME1-S3-D15-S <sup>3</sup>	3.3	2.97~3.63	±15	±4	±34	1	75	82
PEME1-S3-D24-S <sup>3</sup>	3.3	2.97~3.63	±24	±2	±21	1	100	84
PEME1-S3-S3-S <sup>3</sup>	3.3	2.97~3.63	3.3	30	303	1	75	79
PEME1-S3-S5-S <sup>3</sup>	3.3	2.97~3.63	5	20	200	1	75	82
PEME1-S3-S9-S <sup>3</sup>	3.3	2.97~3.63	9	11	111	1	75	85
PEME1-S3-S12-S <sup>3</sup>	3.3	2.97~3.63	12	8	83	1	75	82
PEME1-S3-S15-S <sup>3</sup>	3.3	2.97~3.63	15	7	67	1	75	82
PEME1-S3-S24-S <sup>3</sup>	3.3	2.97~3.63	24	4	42	1	100	84
PEME1-S5-D3-S <sup>3</sup>	5	4.5~5.5	±3.3	±15	±152	1	75	74
PEME1-S5-D5-S	5	4.5~5.5	±5	±10	±100	1	75	82
PEME1-S5-D9-S	5	4.5~5.5	±9	±6	±56	1	75	83
PEME1-S5-D12-S	5	4.5~5.5	±12	±5	±42	1	75	83
PEME1-S5-D15-S	5	4.5~5.5	±15	±4	±34	1	75	83
PEME1-S5-D24-S	5	4.5~5.5	±24	±3	±21	1	100	85
PEME1-S5-S3-S	5	4.5~5.5	3.3	30	303	1	75	74
PEME1-S5-S5-S	5	4.5~5.5	5	20	200	1	75	82
PEME1-S5-S9-S	5	4.5~5.5	9	12	111	1	75	83
PEME1-S5-S12-S	5	4.5~5.5	12	9	84	1	75	83
PEME1-S5-S15-S	5	4.5~5.5	15	7	67	1	75	83
PEME1-S5-S24-S	5	4.5~5.5	24	4	42	1	100	85
PEME1-S12-D3-S	12	10.8~13.2	±3.3	±15	±152	1	75	75
PEME1-S12-D5-S	12	10.8~13.2	±5	±10	±100	1	75	80
PEME1-S12-D12-S	12	10.8~13.2	±12	±5	±42	1	75	81
PEME1-S12-D15-S	12	10.8~13.2	±15	±4	±34	1	75	81
PEME1-S12-D24-S	12	10.8~13.2	±24	±2	±21	1	100	80

**MODEL  
(CONTINUED)**

MODEL (CONTINUED)	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple & noise <sup>1</sup> max (mVp-p)	efficiency <sup>2</sup> typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PEME1-S12-S3-S	12	10.8~13.2	3.3	30	303	1	75	75
PEME1-S12-S5-S	12	10.8~13.2	5	20	200	1	75	80
PEME1-S12-S9-S	12	10.8~13.2	9	12	111	1	75	80
PEME1-S12-S12-S	12	10.8~13.2	12	9	83	1	75	80
PEME1-S12-S15-S	12	10.8~13.2	15	7	67	1	75	81
PEME1-S12-S24-S	12	10.8~13.2	24	5	42	1	100	81
PEME1-S15-D5-S	15	13.5~16.5	±5	±10	±100	1	75	80
PEME1-S15-D12-S	15	13.5~16.5	±12	±5	±42	1	75	80
PEME1-S15-D15-S	15	13.5~16.5	±15	±4	±34	1	75	81
PEME1-S15-S5-S	15	13.5~16.5	5	20	200	1	75	80
PEME1-S15-S9-S	15	13.5~16.5	9	12	111	1	75	80
PEME1-S15-S12-S	15	13.5~16.5	12	9	83	1	75	80
PEME1-S15-S15-S	15	13.5~16.5	15	7	67	1	75	81
PEME1-S24-D5-S	24	21.6~26.4	±5	±10	±100	1	75	80
PEME1-S24-D12-S	24	21.6~26.4	±12	±5	±42	1	75	81
PEME1-S24-D15-S	24	21.6~26.4	±15	±4	±34	1	75	79
PEME1-S24-D24-S	24	21.6~26.4	±24	±2	±21	1	100	80
PEME1-S24-S3-S	24	21.6~26.4	3.3	30	303	1	75	75
PEME1-S24-S5-S	24	21.6~26.4	5	20	200	1	75	79
PEME1-S24-S9-S	24	21.6~26.4	9	12	111	1	75	80
PEME1-S24-S12-S	24	21.6~26.4	12	9	83	1	75	81
PEME1-S24-S15-S	24	21.6~26.4	15	7	67	1	75	81
PEME1-S24-S24-S	24	21.6~26.4	24	5	42	1	100	81

- Notes:
1. Measured at nominal input, 20 MHz bandwidth oscilloscope, with 10 µF tantalum and 1 µF ceramic capacitors on the output.
  2. Measured at nominal input voltage, full load.
  3. Model is not UL certified.
  4. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	3.3 Vdc input models	2.97	3.3	3.63	Vdc
	5 Vdc input models	4.5	5	5.5	Vdc
	12 Vdc input models	10.8	12	13.2	Vdc
	15 Vdc input models	13.5	15	16.5	Vdc
	24 Vdc input models	21.6	24	26.4	Vdc
surge voltage	for maximum of 1 second				
	3.3 Vdc input models	-0.7		5	Vdc
	5 Vdc input models	-0.7		9	Vdc
	12 Vdc input models	-0.7		18	Vdc
	15 Vdc input models	-0.7		21	Vdc
	24 Vdc input models	-0.7		30	Vdc
current	at full load				
	3.3 Vdc input models; 3.3 Vdc output			405	mA
	3.3 Vdc input models; all other outputs			389	mA
	5 Vdc input models; 3.3, 5 Vdc output			286	mA
	5 Vdc input models; 9, 12 Vdc output			254	mA
	5 Vdc input models; 15, 24 Vdc output			254	mA
	12 Vdc input models			118	mA
15 Vdc input models			88	mA	
	24 Vdc input models			59	mA
filter	filter capacitor				

## OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load <sup>5</sup>	3.3, 5 Vdc output models			2,400	μF
	9 Vdc output models			1,000	μF
	12, 15 Vdc output models			560	μF
	24, ±12, ±15 Vdc output models			220	μF
	±3.3, ±5 Vdc output models			1,200	μF
	±9 Vdc output models			470	μF
	all other models			100	μF
voltage accuracy	see tolerance envelope curves				
line regulation	for Vin change of 1%				
	3.3 Vdc output models			±1.5	%
	all other models			±1.2	%
load regulation	from 10% to full load				
	3.3 Vdc input; 3.3 Vdc output			18	%
	3.3 Vdc input; all other outputs			15	%
	5, 12 & 15 Vdc input; 3.3 Vdc output models			20	%
	5, 12 & 15 Vdc input; 5 Vdc output models			15	%
	all other models			10	%
switching frequency	at nominal input, full load				
	3.3 Vdc input		220		kHz
	all other models		270		kHz
temperature coefficient	at full load		±0.02		%/°C

Note: 5. Tested at input voltage range and full load.

## PROTECTIONS

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

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA	3,000			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		20		pF

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
safety approvals <sup>6</sup>	certified to 62368-1: UL designed to meet 62368: EN/BS EN				
conducted emissions	CISPR32/EN55032, class B (external circuit required, see Figure 3)				
radiated emissions	CISPR32/EN55032, class B (external circuit required, see Figure 3)				
ESD	IEC/EN61000-4-2, air ± 8 kV; contact ± 4 kV, class B				
MTBF	as per MIL-HDBK-217F, 25°C	3,500,000			hours
RoHS	yes				

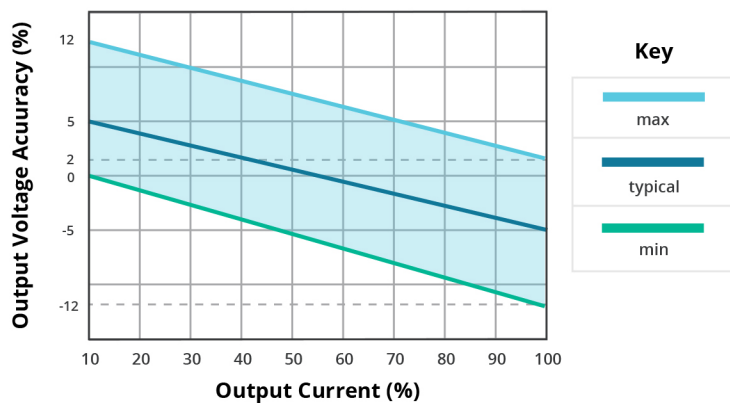
Note: 6. See the model table for additional info.

## ENVIRONMENTAL

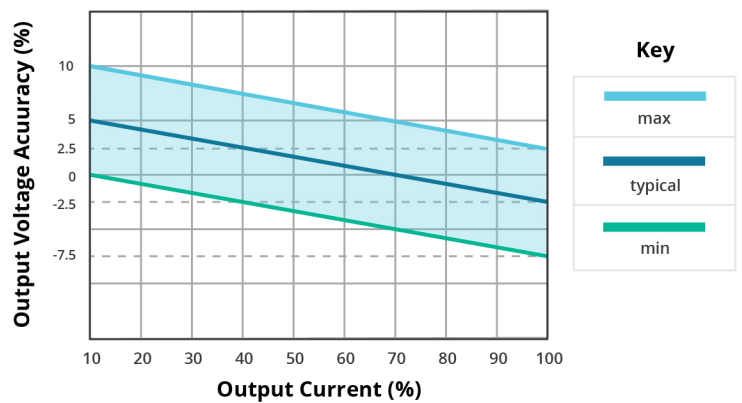
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
case temperature rise	3.3 Vdc output model at 25°C all other models at 25°C		25 15		°C °C

## DERATING CURVES

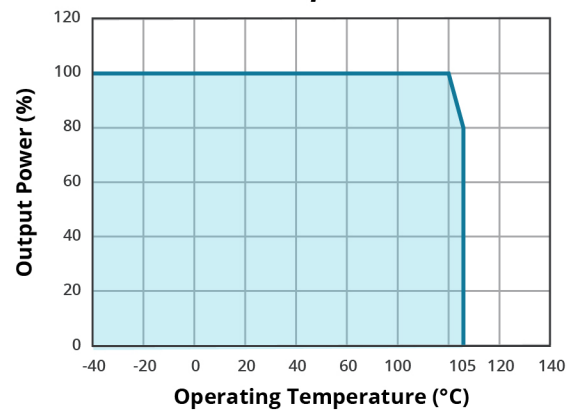
**OUTPUT REGULATION CURVE**  
3.3 Vdc output model  
(nominal input)



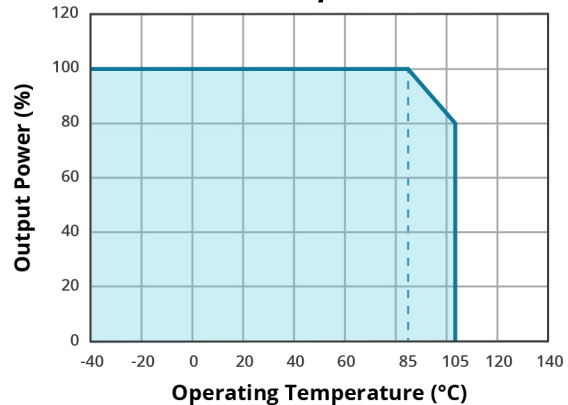
**OUTPUT REGULATION CURVE**  
all other output models  
(nominal input)



**TEMPERATURE DERATING CURVE**  
3.3 Vdc input models



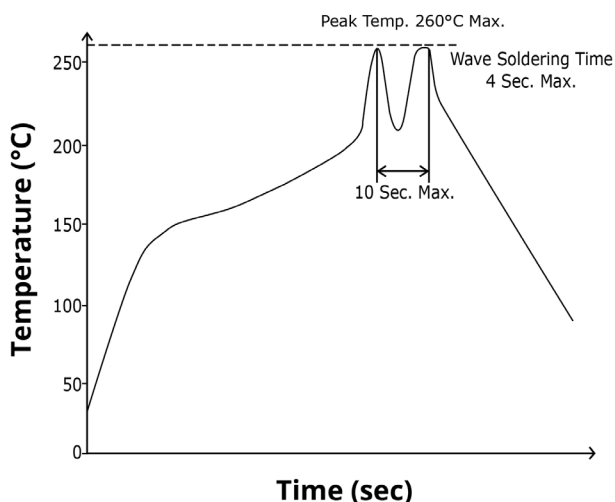
**TEMPERATURE DERATING CURVE**  
all other input models



## 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

### WAVE SOLDERING PROFILE



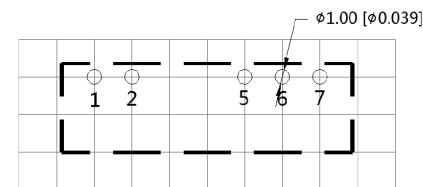
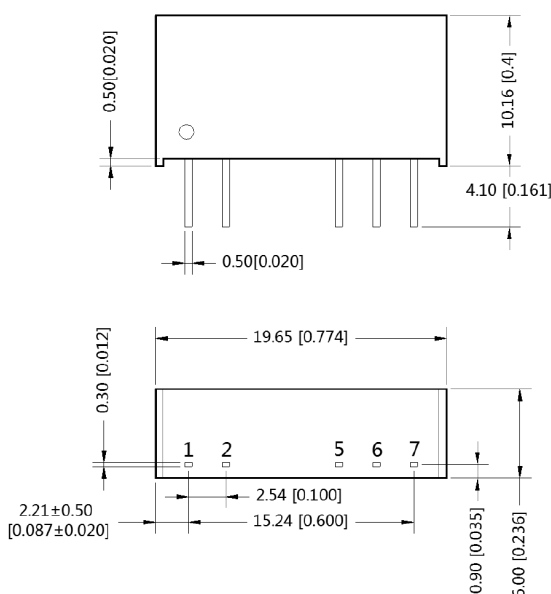
## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	19.65 x 6.00 x 10.16 [0.774 x 0.236 x 0.400 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			2.1		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	
	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vout
6	No Pin	0V
7	+Vout	+Vout

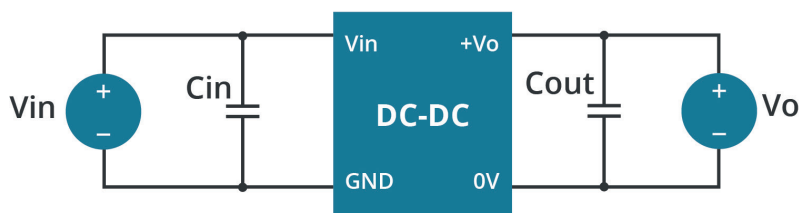


Note : Grid 2.54\*2.54mm  
Recommended PCB Layout  
Top View

## APPLICATION CIRCUIT

If you want to further reduce the input and output ripple, a filter capacitor may be connected to the input and output terminals (Figures 1 & 2) provided that the capacitance is less than the maximum capacitive load of the model, otherwise start-up problems may be caused if the capacitance is too large.

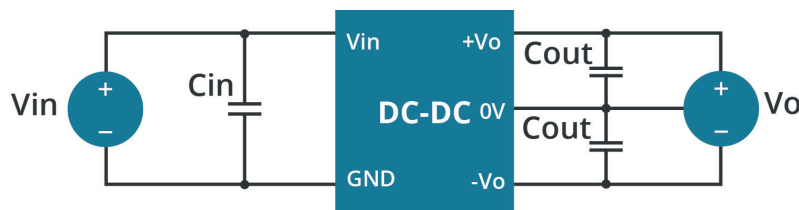
**Figure 1**  
Single Output Models



**Table 1**

Vin (Vdc)	Cin (μF/V)	Vo (Vdc)	Cout (μF/V)
3.3	10 μF/16 V	3.3, 5	10 μF/16 V
		9, 12	2.2 μF/25 V
		15, 24	1 μF/50 V
5	4.7	3.3, 5	10 μF/16 V
		9, 12	2.2 μF/25 V
		15, 24	1 μF/50 V
12	2.2 μF/25 V	3.3	10 μF/16 V
15	2.2 μF/25 V	5	10 μF/16 V
24	1 μF/50 V	9	2.2 μF/16 V
-	-	12	2.2 μF/25 V
-	-	15	1 μF/25 V
-	-	24	1 μF/50 V

**Figure 2**  
Dual Output Models

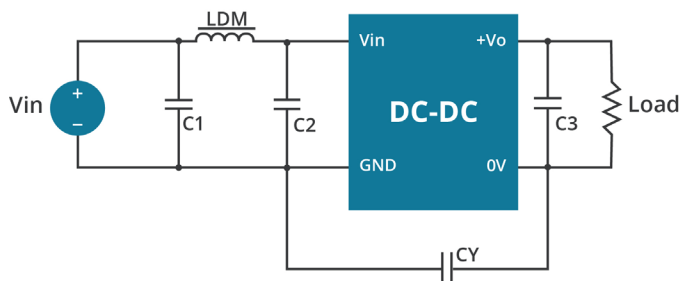


**Table 2**

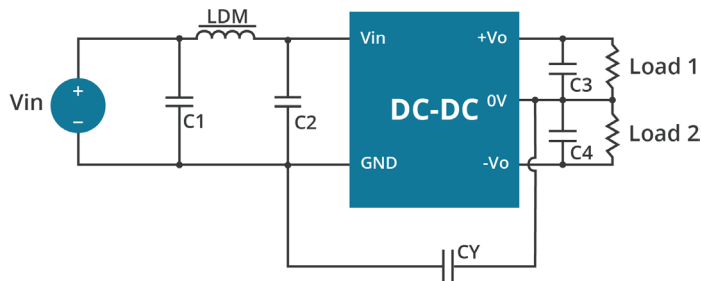
Vin (Vdc)	Cin (μF)	Vo (Vdc)	Cout (μF)
3.3	10 μF/16 V	±3.3, ±5	10 μF/16 V
		±9, ±12	2.2 μF/25 V
		±15, ±24	1 μF/50 V
5	4.7 μF/16 V	±3.3, ±5	4.7 μF/16 V
		±9, ±12	1 μF/25 V
		±15, ±24	0.47 μF/50 V
12	2.2 μF/25 V	±3.3	4.7 μF/16 V
15	2.2 μF/25 V	±5	4.7 μF/16 V
24	1 μF/50 V	±12	1 μF/25 V
-	-	±15	0.47 μF/25 V
-	-	±24	0.47 μF/50 V

## EMC RECOMMENDED CIRCUIT

**Figure 3**  
Single Output Models



**Figure 4**  
Dual Output Models



**Table 3**

Recommended External Circuit Components			
Vin (Vdc)	Vo (Vdc)	3.3, 5	9,12, 15, 24
3.3	C1/C2	4.7 nF/16 V	4.7 nF/16 V
	CY	--	270 pF/4 kVdc
	C3	refer to Cout in Tables 1, 2	
	LDM	6.8 μH	6.8 μH
Vin (Vdc)	Vo (Vdc)	3.3, 5, 9	12, 15, 24
5	CY	--	1 nF / 4kVdc
	C3	refer to Cout in Tables 1, 2	
	C1, C2	4.7 μF / 25 V	4.7 μF / 25 V
	LDM	6.8 μH	6.8 μH
Vin (Vdc)	Vo (Vdc)	3.3, 5, 9, 12, 15, 24	
12/15/24	C1/C2	4.7 μF / 50 V	4.7 μF / 50 V
	CY	270 pF/3 kVdc	270 pF/3 kVdc
	C3, C4	refer to Cout in Tables 1, 2	
	LDM	6.8 μH	6.8 μH

## REVISION HISTORY

rev.	description	date
1.0	initial release	05/10/2019
1.01	safeties updated in features and safety line, packaging removed	01/14/2021
1.02	model table updated	03/08/2021
1.03	derating curves and circuit figures updated	07/07/2021
1.04	CE certification removed	11/04/2022
1.05	3.3 Vin models added	08/24/2023

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



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