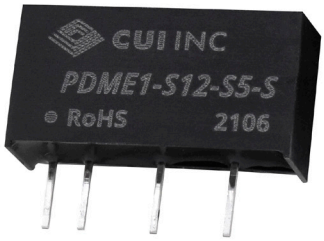
SERIES: PDME1-S | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

- 1 W isolated output
- unregulated output
- compact SIP package
- single/dual output models
- continuous short circuit protection
- extended temperature range (-40~105°C)
- 1500 Vdc isolation
- no load input current as low as 5 mA
- UL 62368-1 certified
- efficiency up to 85%
- designed to meet EN/BS EN 62368



RoHS c UL us

MODEL

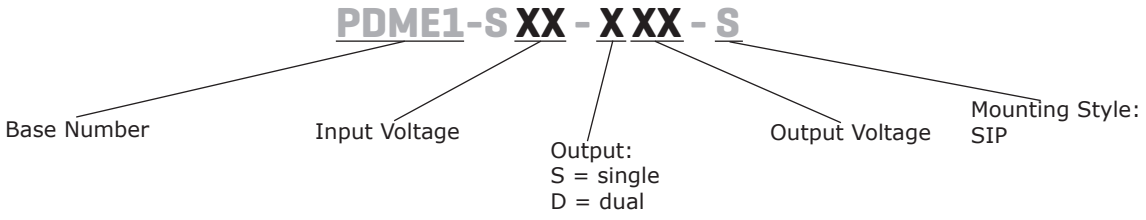
MODEL	input voltage typ (Vdc)	input voltage range (Vdc)	output voltage (Vdc)	output current min (mA)	output current max (mA)	output power max (W)	ripple & noise[1] max (mVp-p)	efficiency[2] typ (%)
PDME1-S3-S3-S[3]	3.3	2.97~3.63	3.3	30	303	1	100	79
PDME1-S3-S5-S[3]	3.3	2.97~3.63	5	20	200	1	100	82
PDME1-S3-S9-S[3]	3.3	2.97~3.63	9	11	111	1	100	85
PDME1-S3-S12-S[3]	3.3	2.97~3.63	12	8	83	1	100	82
PDME1-S3-S15-S[3]	3.3	2.97~3.63	15	7	67	1	100	82
PDME1-S3-S24-S[3]	3.3	2.97~3.63	24	4	42	1	100	84
PDME1-S3-D3-S[3]	3.3	2.97~3.63	±3.3	±15	±152	1	100	78
PDME1-S3-D5-S[3]	3.3	2.97~3.63	±5	±10	±100	1	100	82
PDME1-S3-D9-S[3]	3.3	2.97~3.63	±9	±6	±56	1	100	85
PDME1-S3-D12-S[3]	3.3	2.97~3.63	±12	±5	±42	1	100	82
PDME1-S3-D15-S[3]	3.3	2.97~3.63	±15	±4	±34	1	100	82
PDME1-S3-D24-S[3]	3.3	2.97~3.63	±24	±2	±21	1	100	84
PDME1-S5-S3-S	5	4.5~5.5	3.3	30	303	1	75	74
PDME1-S5-S5-S	5	4.5~5.5	5	20	200	1	75	82
PDME1-S5-S9-S	5	4.5~5.5	9	12	111	1	75	83
PDME1-S5-S12-S	5	4.5~5.5	12	9	84	1	75	83
PDME1-S5-S15-S	5	4.5~5.5	15	7	67	1	75	83
PDME1-S5-S24-S	5	4.5~5.5	24	4	42	1	100	85
PDME1-S5-D3-S[3]	5	4.5~5.5	±3.3	±15	±152	1	75	74
PDME1-S5-D5-S	5	4.5~5.5	±5	±10	±100	1	75	82
PDME1-S5-D9-S	5	4.5~5.5	±9	±6	±56	1	75	83
PDME1-S5-D12-S	5	4.5~5.5	±12	±5	±42	1	75	83
PDME1-S5-D15-S	5	4.5~5.5	±15	±4	±34	1	75	83
PDME1-S5-D24-S	5	4.5~5.5	±24	±3	±21	1	100	85
PDME1-S12-S3-S	12	10.8~13.2	3.3	30	303	1	75	75
PDME1-S12-S5-S	12	10.8~13.2	5	20	200	1	75	80
PDME1-S12-S9-S	12	10.8~13.2	9	12	111	1	75	80

MODEL (CONTINUED)

	input voltage		output voltage	output current		output power	ripple & noise[1]	efficiency[2]
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PDME1-S12-S12-S	12	10.8~13.2	12	9	83	1	75	80
PDME1-S12-S15-S	12	10.8~13.2	15	7	67	1	75	81
PDME1-S12-S24-S	12	10.8~13.2	24	4	42	1	100	81
PDME1-S12-D3-S	12	10.8~13.2	±3.3	±15	±152	1	75	75
PDME1-S12-D5-S	12	10.8~13.2	±5	±10	±100	1	75	80
PDME1-S12-D12-S	12	10.8~13.2	±12	±5	±42	1	75	81
PDME1-S12-D15-S	12	10.8~13.2	±15	±4	±34	1	75	81
PDME1-S12-D24-S	12	10.8~13.2	±24	±3	±21	1	100	80
PDME1-S15-S5-S	15	13.5~16.5	5	20	200	1	75	80
PDME1-S15-S9-S	15	13.5~16.5	9	12	111	1	75	80
PDME1-S15-S12-S	15	13.5~16.5	12	9	83	1	75	80
PDME1-S15-S15-S	15	13.5~16.5	15	7	67	1	75	81
PDME1-S15-D5-S	15	13.5~16.5	±5	±10	±100	1	75	80
PDME1-S15-D9-S	15	13.5~16.5	±9	±5	±56	1	75	80
PDME1-S15-D12-S	15	13.5~16.5	±12	±5	±42	1	75	80
PDME1-S15-D15-S	15	13.5~16.5	±15	±4	±34	1	75	81
PDME1-S15-D24-S	15	13.5~16.5	±24	±2	±21	1	100	81
PDME1-S24-S3-S	24	21.6~26.4	3.3	30	303	1	75	75
PDME1-S24-S5-S	24	21.6~26.4	5	20	200	1	75	79
PDME1-S24-S9-S	24	21.6~26.4	9	12	111	1	75	80
PDME1-S24-S12-S	24	21.6~26.4	12	83	9	1	75	81
PDME1-S24-S15-S	24	21.6~26.4	15	7	67	1	75	81
PDME1-S24-S24-S	24	21.6~26.4	24	4	42	1	100	81
PDME1-S24-D5-S	24	21.6~26.4	±5	±10	±100	1	75	80
PDME1-S24-D12-S	24	21.6~26.4	±12	±5	±42	1	75	81
PDME1-S24-D15-S	24	21.6~26.4	±15	±4	±34	1	75	79
PDME1-S24-D24-S	24	21.6~26.4	±24	±3	±21	1	100	80

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 all other output models			405 389	mA mA
	at full load 5 Vdc input models	3.3, 5 Vdc output 9, 12 Vdc output all other output models			286 254 254	mA mA mA
	at full load 12 Vdc input models				110	mA
	at full load 15 Vdc input models				88	mA
	at full load 24 Vdc input models				61	mA
filter	filter capacitor					

OUTPUT

parameter	conditions/description		min	typ	max	units
maximum capacitive load[5]	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 output 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 input models	3.3 Vdc output models all other output models			18 15	% %
	from 10% to full load all other input models	3.3 Vdc output models 5 Vdc output models all other output models			±20 ±15 ±10	% % %
switching frequency	100% load, nominal input voltage					
	3.3 Vdc input models			220		kHz
	all other input 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	1,500			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 approvals[6]	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				

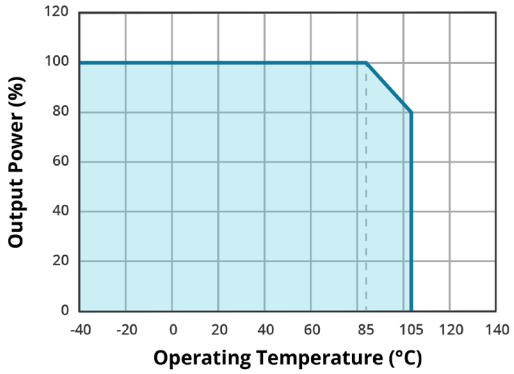
Note: 6. Model PDME1-S5-D3-S does not have UL or CE certification.

ENVIRONMENTAL

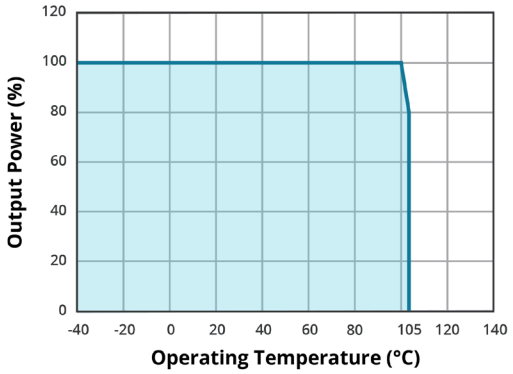
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
case temperature rise	3.3 Vdc output model at 25°C all other models at 25°C		25 15		°C °C

DERATING CURVES

TEMPERATURE DERATING CURVE
5 Vdc input models

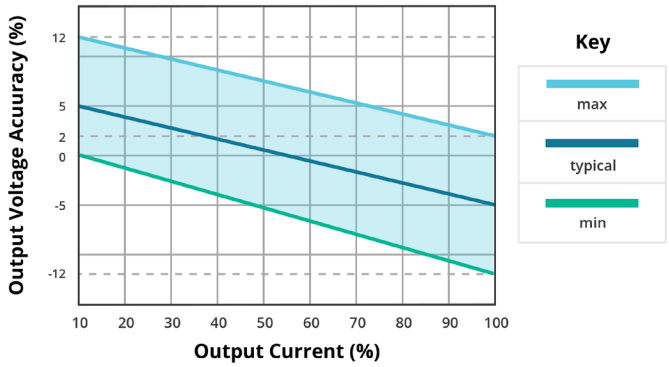


TEMPERATURE DERATING CURVE
all other input models

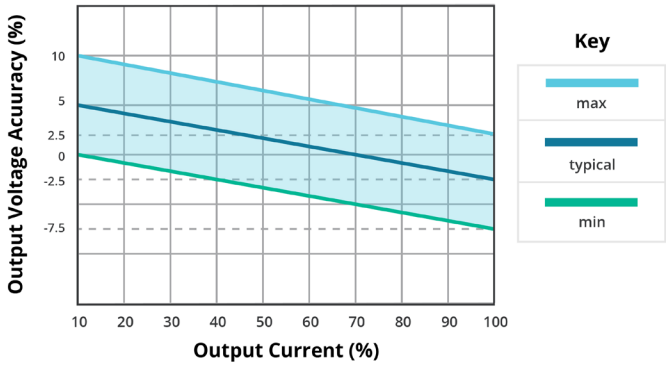


DERATING CURVES (CONTINUED)

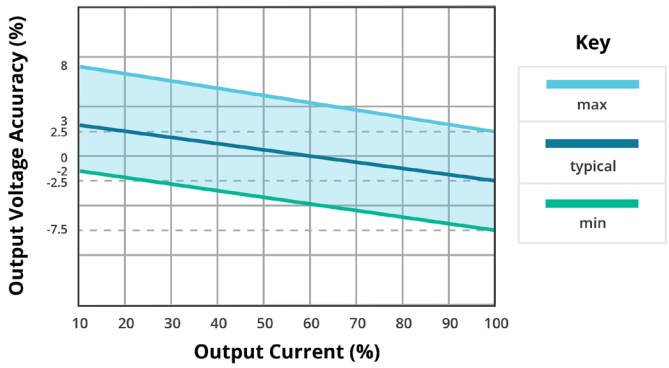
OUTPUT REGULATION CURVE
3.3, 5, 12, 15 & 24 Vdc input models / 3.3 Vdc output model
(nominal input)



OUTPUT REGULATION CURVE
3.3 & 5 Vdc input / all other output models
(nominal input)



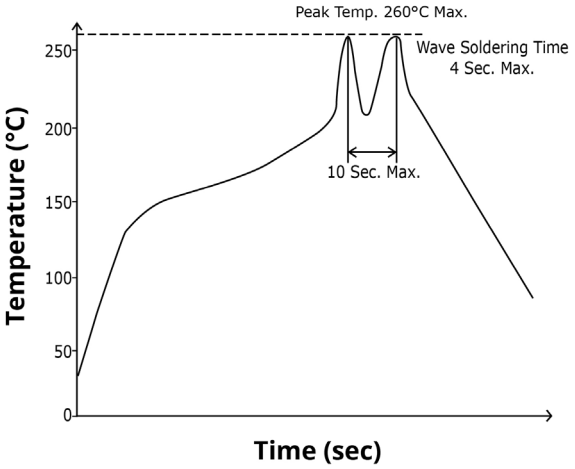
OUTPUT REGULATION CURVE
12, 15 & 24 Vdc input models / all other output models
(nominal input)



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



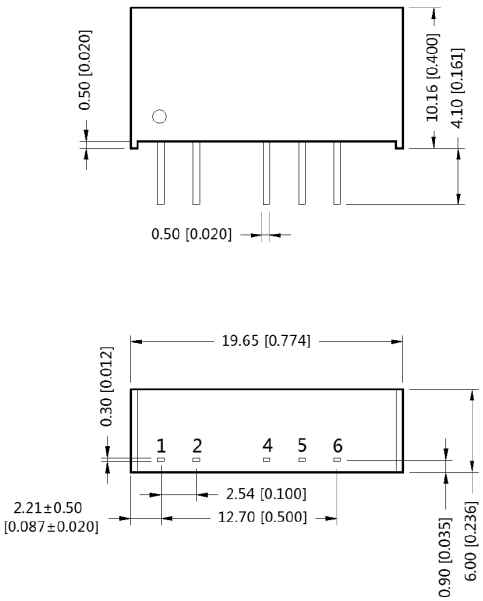
MECHANICAL

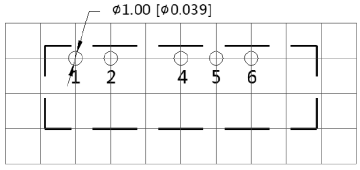
parameter	conditions/description	min	typ	max	units
dimensions	19.65 x 6.00 x 10.16[0.774 x 0.236 x 0.400 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			2.1		g

MECHANICAL DRAWING

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

PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	Vin	Vin
2	GND	GND
4	0V	-Vout
5	No Pin	0V
6	+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

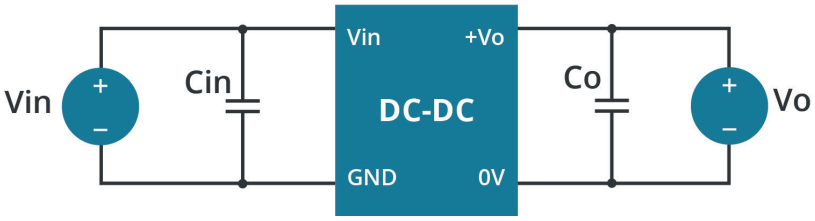


Table 1

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

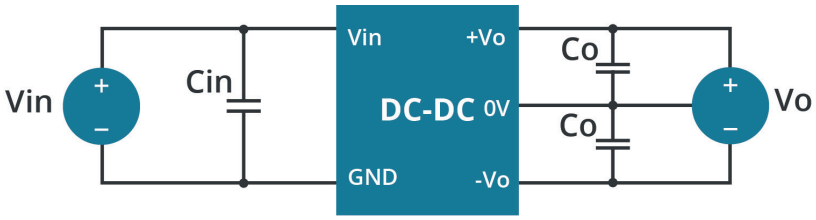


Table 2

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	±3.3, ±5	4.7 µF
		±9, ±12	1 µF
		±15, ±24	0.47 µF
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

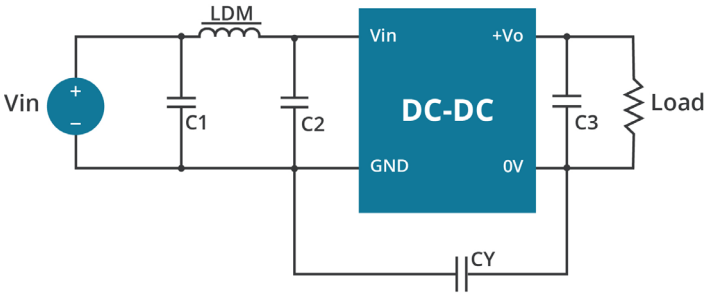


Figure 4
Dual Output Models

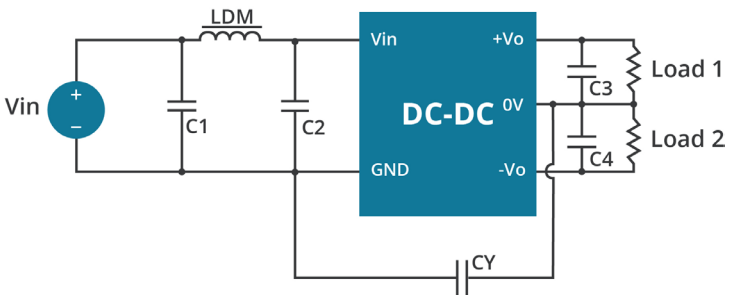


Table 3

Recommended External Circuit Components			
Vin (Vdc)	Vo (Vdc)	3.3, 5	9, 12, 15, 24
3.3	C1, C2	4.7 µF / 25 V	4.7 µF / 25 V
	CY	--	270 pF / 2 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	C1, C2	4.7 µF / 25 V	4.7 µF / 25 V
	CY	--	1 nF / 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
12, 15, 24	C1, C2	4.7 µF / 50 V	4.7 µF / 50 V
	CY	270 pF / 2 kVdc	270 pF / 2 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	01/12/2021
1.02	model table updated, packaging removed	03/08/2021
1.03	3.3 Vdc input model added, derating curves and circuit figures updated	05/26/2022
1.04	CE removed	11/04/2022
1.05	PDME1-S15-D9-S & PDME1-S15-D24-S added	08/15/2023

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

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