

**SERIES:** PDSE2-M | **DESCRIPTION:** DC-DC CONVERTER**FEATURES**

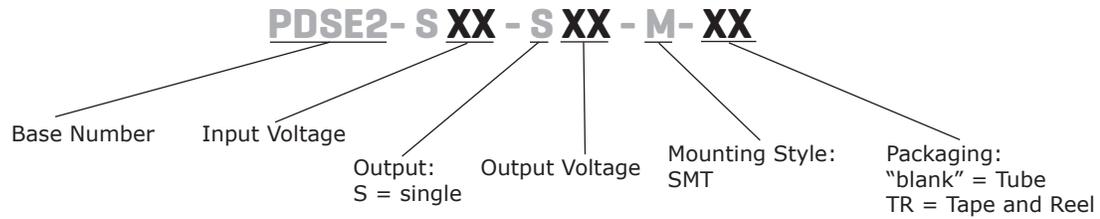
- 2 W isolated output
- single unregulated output
- 1,500 Vdc isolation
- continuous short circuit protection
- extended temperature range (-40~105°C)
- efficiency up to 86%
- designed to meet EN 62368

**MODEL**

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)			
PDSE2-S5-S3-M	5	4.5~5.5	3.3	40	400	1.32	200	78
PDSE2-S5-S5-M	5	4.5~5.5	5	40	400	2	200	84
PDSE2-S5-S7-M	5	4.5~5.5	7	29	286	2	200	84
PDSE2-S5-S9-M	5	4.5~5.5	9	22	222	2	200	85
PDSE2-S5-S12-M	5	4.5~5.5	12	17	167	2	200	85
PDSE2-S5-S15-M	5	4.5~5.5	15	13	133	2	200	86
PDSE2-S5-S24-M	5	4.5~5.5	24	8	83	2	200	86
PDSE2-S12-S5-M	12	10.8~13.2	5	40	400	2	150	83
PDSE2-S12-S9-M	12	10.8~13.2	9	22	222	2	150	83
PDSE2-S12-S12-M	12	10.8~13.2	12	17	167	2	150	84
PDSE2-S12-S15-M	12	10.8~13.2	15	13	133	2	150	84
PDSE2-S12-S24-M	12	10.8~13.2	24	8	83	2	150	85
PDSE2-S15-S5-M	15	13.5~16.5	5	40	400	2	150	83
PDSE2-S15-S15-M	15	13.5~16.5	15	13	133	2	150	84
PDSE2-S24-S5-M	24	21.6~26.4	5	40	400	2	150	83
PDSE2-S24-S9-M	24	21.6~26.4	9	22	222	2	150	83
PDSE2-S24-S12-M	24	21.6~26.4	12	17	167	2	150	84
PDSE2-S24-S15-M	24	21.6~26.4	15	13	133	2	150	84
PDSE2-S24-S24-M	24	21.6~26.4	24	8	83	2	150	85

Notes: 1. Measured at nominal input, 20 MHz bandwidth oscilloscope with 10 uF tantalum and 1 uF ceramic capacitors on the output (see Application circuit).  
 2. Measured at nominal input voltage, full load.  
 3. 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	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					
	5 Vdc input models	-0.7		9	Vdc	
	12 Vdc input models	-0.7		18	Vdc	
	15 Vdc input models	-0.7		21	Vdc	
current (full load/no load)	3.3 Vdc output models 5, 7 Vdc output models 9, 12 Vdc output models 15, 24 Vdc output models		339/8	357/--	mA	
		5 Vdc input models		477/8	500/--	mA
				471/8	494/--	mA
				466/8	488/--	mA
	12 Vdc input models 15 Vdc input models 24 Vdc input models		196/8 161/8 98/8		mA mA 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
	7, 9 Vdc output models			1,000	µF
	12, 15 Vdc output models			560	µF
	24 Vdc output models			220	µF
voltage accuracy	see output regulation curves				
line regulation	for Vin change of ±1%				
	3.3 Vdc output models all other output models			±1.5 ±1.2	% %
load regulation	from 10% to full load				
	3.3 Vdc output models			20	%
	5 Vdc output models all other models			15 10	% %
switching frequency	100% load, nominal input voltage				
	5 Vdc input models all other input models		220 260		kHz 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, auto recovery				

## SAFETY AND COMPLIANCE

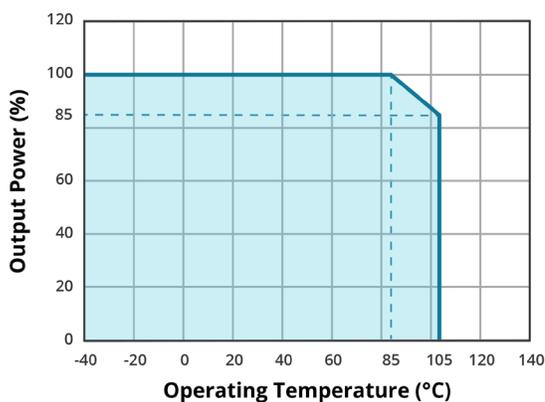
parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA	1,500			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		20		pF
safety approvals	designed to meet 62368: EN, BS EN				
conducted emissions	CISPR 32/EN 55032 Class B				
radiated emissions	CISPR 32/EN 55032 Class B				
ESD	IEC/EN 61000-4-2 Air ±8kV, Contact ±6kV				
MTBF	as per MIL-HDBK-217F, 25°C	3,500,000			hours
RoHS	yes				

## 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	5		95	%
case temperature rise	at 25°C		25		°C

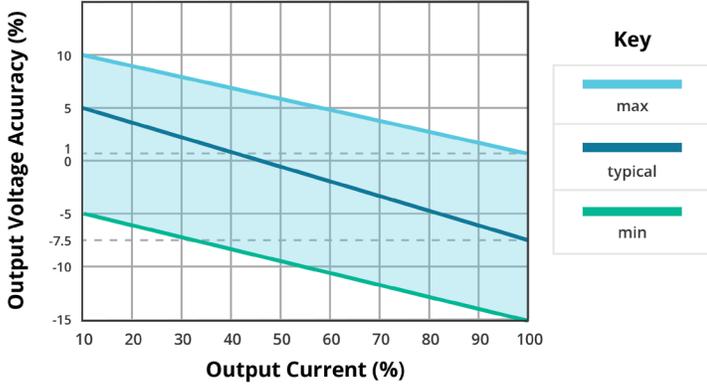
## DERATING CURVES

**TEMPERATURE DERATING CURVE**

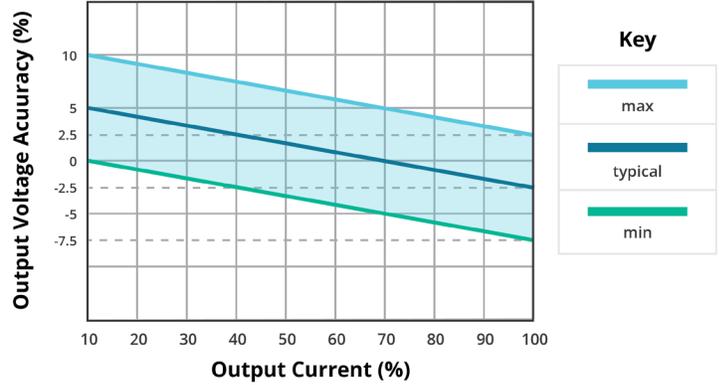


## DERATING CURVES (CONTINUED)

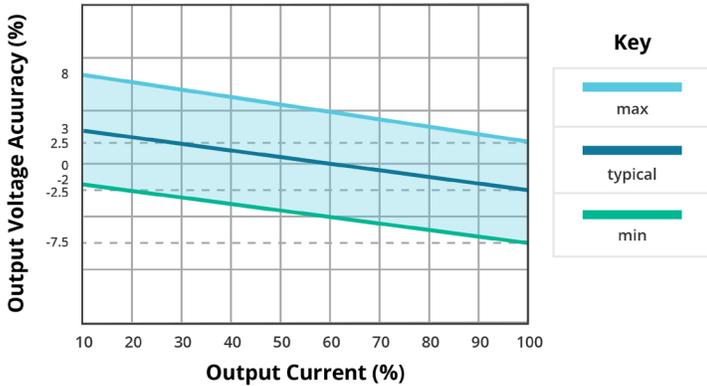
**OUTPUT REGULATION CURVE**  
5 Vdc input model/3.3 output model  
(nominal input)



**OUTPUT REGULATION CURVE**  
5 Vdc input model/all other output models  
(nominal input)

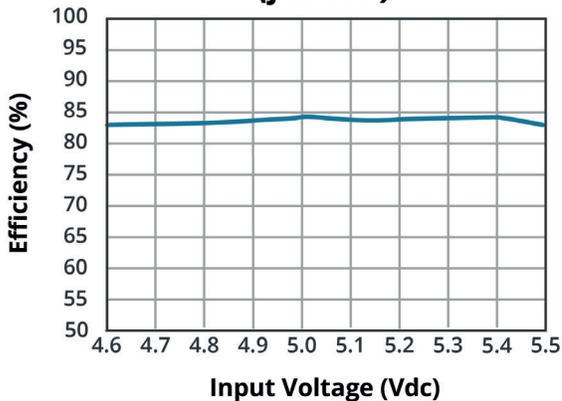


**OUTPUT REGULATION CURVE**  
all other input and output models  
(nominal input)

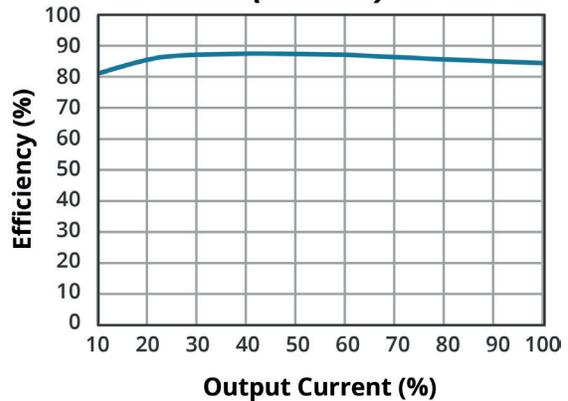


## EFFICIENCY CURVES

**EFFICIENCY VS INPUT VOLTAGE**  
PDSE2-S5-S5-M  
(full load)

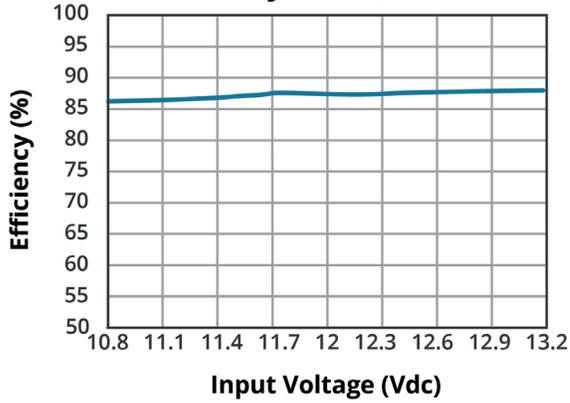


**EFFICIENCY VS OUTPUT LOAD**  
PDSE2-S5-S5-M  
(Vin = 5 V)

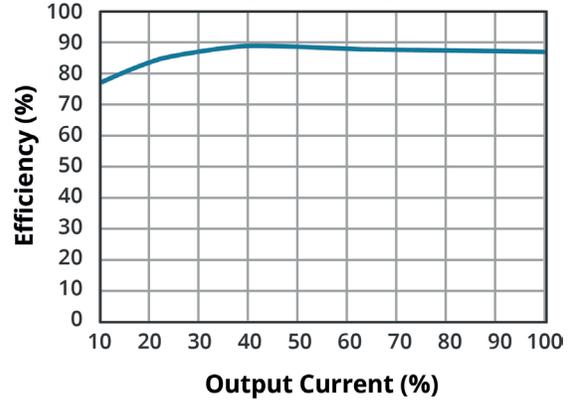


## EFFICIENCY CURVES

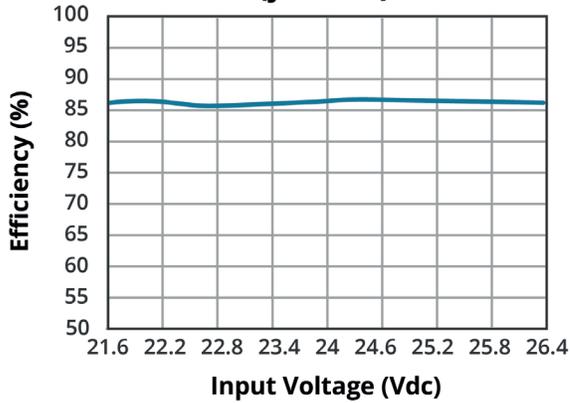
**EFFICIENCY VS INPUT VOLTAGE**  
**PDSE2-S12-S5-M**  
*(full load)*



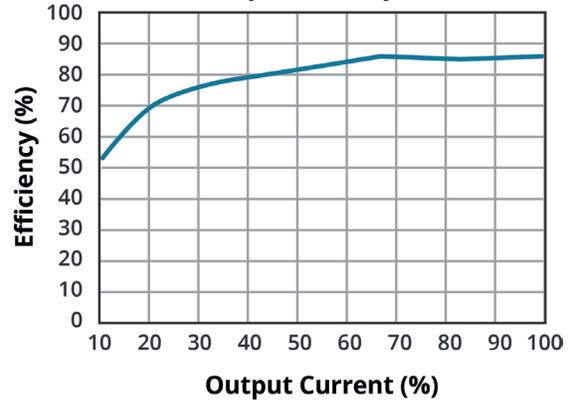
**EFFICIENCY VS OUTPUT LOAD**  
**PDSE2-S12-S5-M**  
*(Vin = 12 V)*



**EFFICIENCY VS INPUT VOLTAGE**  
**PDSE2-S24-S5-M**  
*(full load)*



**EFFICIENCY VS OUTPUT LOAD**  
**PDSE2-S24-S5-M**  
*(Vin = 24 V)*



## MECHANICAL

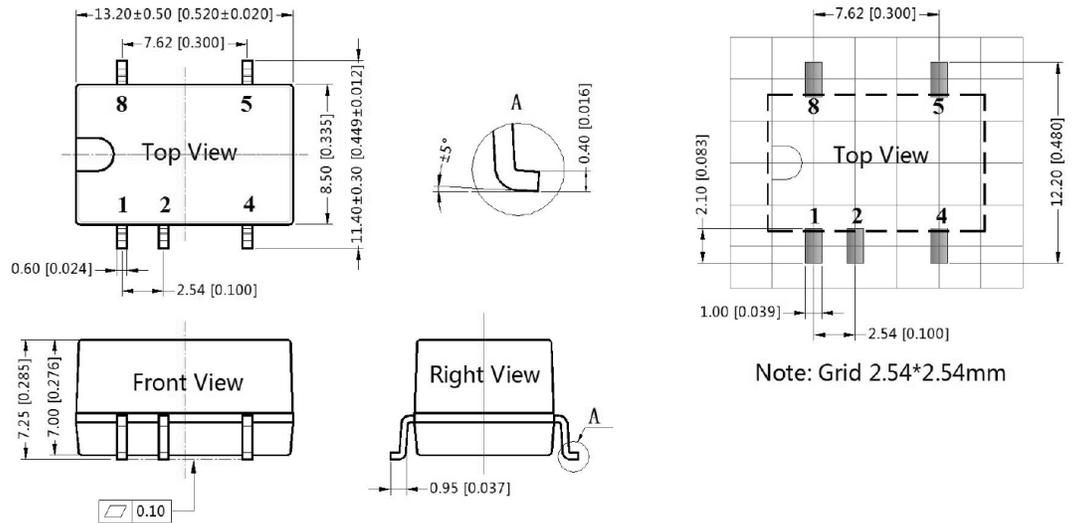
parameter	conditions/description	min	typ	max	units
dimensions	13.20 x 11.40 x 7.25 [0.520 x 0.448 x 0.285 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			1.4		g

## 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
4	0V
5	+Vo
8	NC

NC = No connect



## 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 (Figure 1) 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

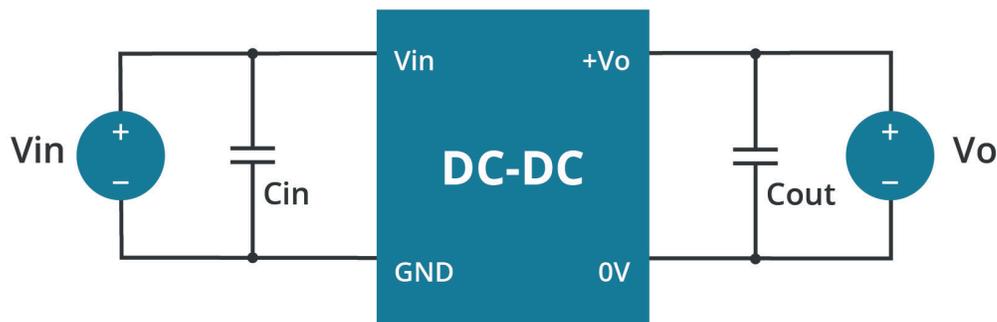


Table 1

Vin (Vdc)	Cin (μF / V)	Vo (Vdc)	Cout (μF / V)
5	4.7 / 16	3.3 / 5	10 / 16
---	---	7 / 9	4.7 / 16
---	---	12	2.2 / 25
---	---	15	1 / 25
---	---	24	0.47 / 50
12	2.2 / 25	5	10 / 10
15	1 / 25	9	2.2 / 25
24	1 / 50	12	2.2 / 25
---	---	15	1 / 25
---	---	24	0.47 / 50

## EMC RECOMMENDED CIRCUIT

Figure 2

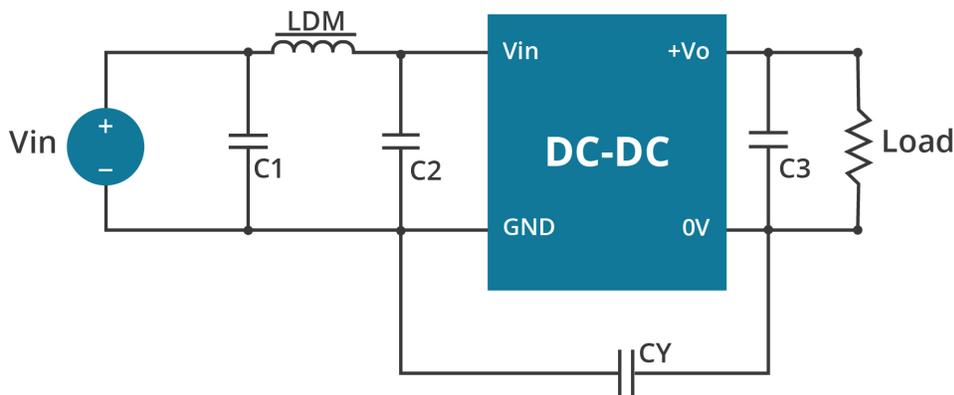


Table 2

Recommended External Circuit Components		
Vin	5 Vdc	12 / 15 / 24 Vdc
C1, C2	4.7 μF / 16 V	4.7 μF / 50 V
C3	refer to the Cout in Table 1	
CY	270 pF / 2 kV	
LDM	6.8 μH	

## REVISION HISTORY

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rev.	description	date
1.0	initial release	07/23/2021
1.01	CE certification removed	12/16/2022
1.02	5 V input models added	02/27/2023

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



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