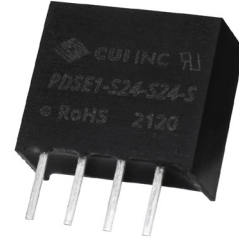


SERIES: PDSE1-S | DESCRIPTION: DC-DC CONVERTER
FEATURES

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

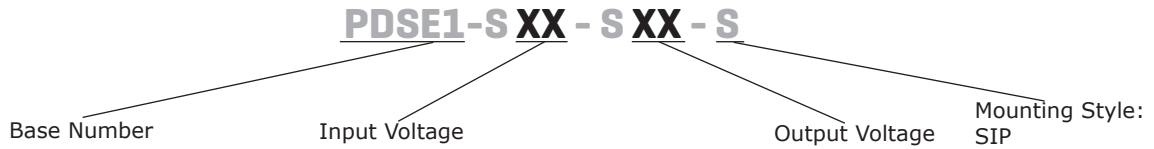


MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple & noise ¹ max (mVp-p)	efficiency ² typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PDSE1-S3-S3-S	3.3	2.97~3.63	3.3	30	303	1	75	79
PDSE1-S3-S5-S	3.3	2.97~3.63	5	20	200	1	75	82
PDSE1-S3-S9-S ⁴	3.3	2.97~3.63	9	11	111	1	75	85
PDSE1-S3-S12-S	3.3	2.97~3.63	12	8	83	1	75	82
PDSE1-S3-S15-S ⁴	3.3	2.97~3.63	15	7	67	1	75	82
PDSE1-S3-S24-S ⁴	3.3	2.97~3.63	24	4	42	1	100	84
PDSE1-S5-S3-S	5	4.5~5.5	3.3	30	303	1	75	74
PDSE1-S5-S5-S	5	4.5~5.5	5	20	200	1	75	82
PDSE1-S5-S9-S	5	4.5~5.5	9	12	111	1	75	83
PDSE1-S5-S12-S	5	4.5~5.5	12	9	84	1	75	83
PDSE1-S5-S15-S	5	4.5~5.5	15	7	67	1	75	83
PDSE1-S5-S24-S	5	4.5~5.5	24	4	42	1	100	85
PDSE1-S12-S3-S	12	10.8~13.2	3.3	30	303	1	75	75
PDSE1-S12-S5-S	12	10.8~13.2	5	20	200	1	75	80
PDSE1-S12-S9-S	12	10.8~13.2	9	12	111	1	75	80
PDSE1-S12-S12-S	12	10.8~13.2	12	9	83	1	75	80
PDSE1-S12-S15-S	12	10.8~13.2	15	7	67	1	75	81
PDSE1-S12-S24-S	12	10.8~13.2	24	5	42	1	100	81
PDSE1-S15-S5-S	15	13.5~16.5	5	20	200	1	75	80
PDSE1-S15-S9-S	15	13.5~16.5	9	12	111	1	75	80
PDSE1-S15-S12-S	15	13.5~16.5	12	9	83	1	75	80
PDSE1-S15-S15-S	15	13.5~16.5	15	7	67	1	75	81
PDSE1-S15-S24-S ⁴	15	13.5~16.5	24	5	42	1	100	81
PDSE1-S24-S3-S	24	21.6~26.4	3.3	30	303	1	75	75
PDSE1-S24-S5-S	24	21.6~26.4	5	20	200	1	75	79
PDSE1-S24-S9-S	24	21.6~26.4	9	12	111	1	75	80
PDSE1-S24-S12-S	24	21.6~26.4	12	9	83	1	75	81

MODEL	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 (%)
PDSE1-S24-S15-S	24	21.6~26.4	15	7	67	1	75	81
PDSE1-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. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.
 4. Model is not UL certified.

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	3.3 Vdc input models	3.3 Vdc output models all other output models		405 389	mA mA
	5 Vdc input models	3.3, 5 Vdc output models 9, 12 Vdc output models all other output models		286 254 254	mA mA mA
	12 Vdc input models	3.3 Vdc output models 5, 9, 12 Vdc output models all other output models		118 110 109	mA mA mA
	15 Vdc input models	5, 9, 12 Vdc output models all other output models		88 87	mA mA
	24 Vdc input models	3.3 Vdc output models 5 Vdc output models 9 Vdc output models all other output models		61 58 57 56	mA mA mA mA
filter	filter capacitor				

OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load ⁴	3.3, 5 Vdc output models			2,400	μF
	9 Vdc output models			1,000	μF
	12, 15 Vdc output models			560	μF
	all other models			220	μF
voltage accuracy	see tolerance envelope curves				
line regulation	for Vin change of 1%			±1.5	%
	3.3 Vdc output models			±1.2	%
load regulation	from 10% to full load				
	3.3 Vdc input models	3.3 Vdc output models		±18	%
		all other models		±15	%
	all other input models	3.3 Vdc output models		±20	%
5 Vdc output models			±15	%	
switching frequency	100% load, nominal input voltage				
	3.3 Vdc input models		220		kHz
temperature coefficient	at full load			±0.02	%/°C
		all other input models		270	kHz

Note: 4. 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

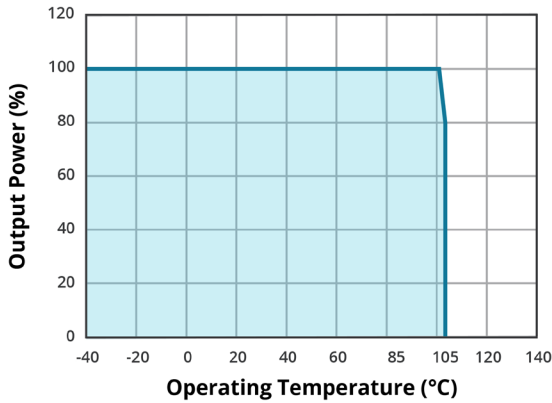
parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA	1,500			Vdc
	input to output for 1 second at 1 mA	3,000			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		20		pF
safety approvals	certified to 62368-1: UL designed to meet 62368: EN/BS EN				
conducted emissions	CISPR32/EN55032, class B (external circuit required, see Figure 2)				
radiated emissions	CISPR32/EN55032, class B (external circuit required, see Figure 2)				
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				

ENVIRONMENTAL

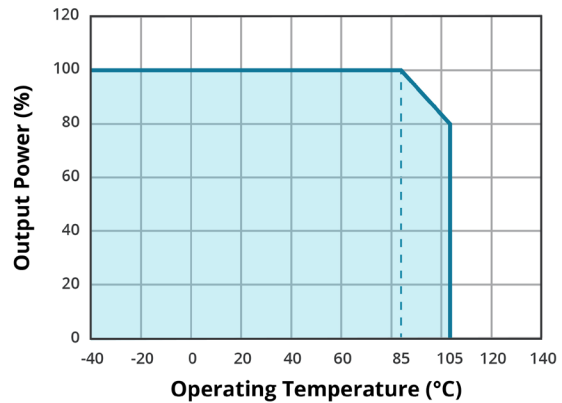
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves				
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
case temperature rise	3.3 Vdc input models	all output models	25		°C
	all other input models	3.3 Vdc output model at 25°C	25		°C
		all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

DERATING CURVES

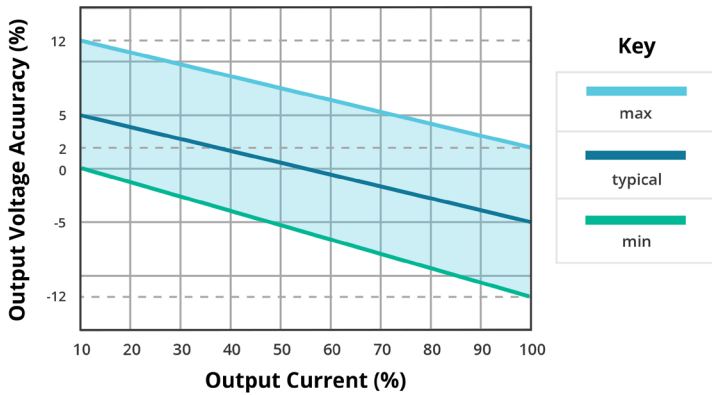
TEMPERATURE DERATING CURVE
3.3 Vdc input models



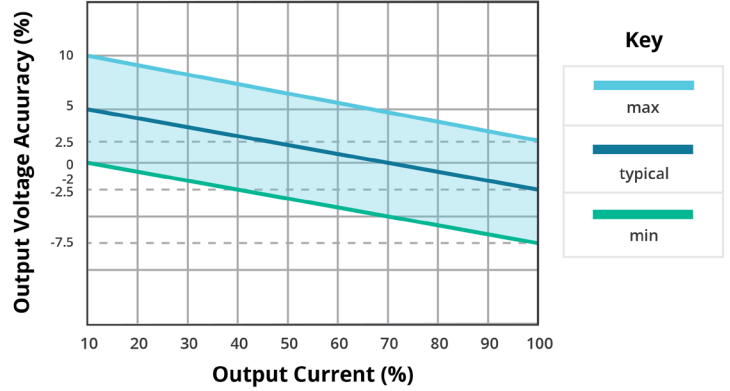
TEMPERATURE DERATING CURVE
all other input models



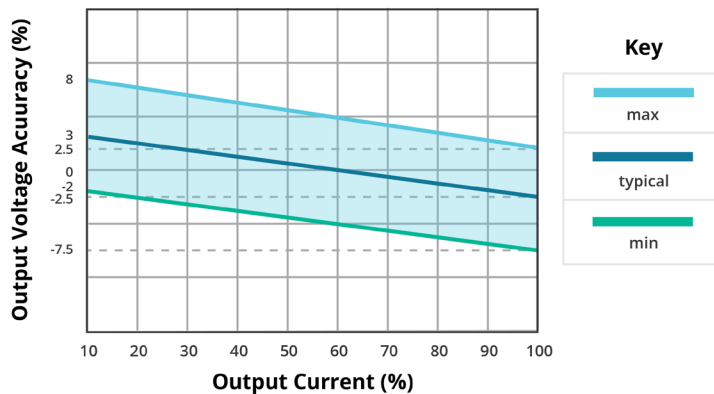
OUTPUT REGULATION CURVE
3.3 Vdc output models
(nominal input)



OUTPUT REGULATION CURVE
3.3, 5 Vdc input model / 5, 9, 12, 15, 24 Vdc output models
(nominal input)

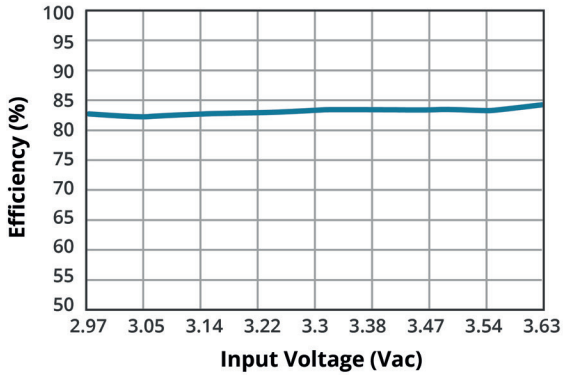


OUTPUT REGULATION CURVE
all other input models / 5, 9, 12, 15, 24 Vdc output models
(nominal input)



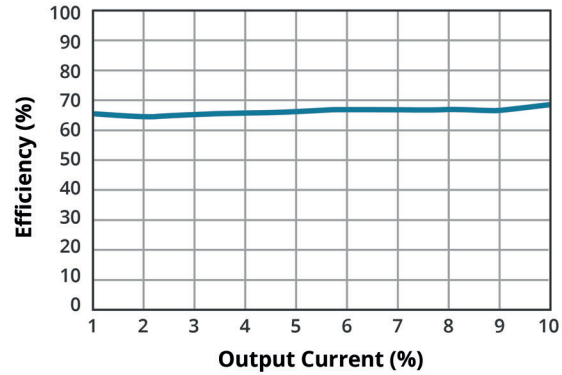
EFFICIENCY CURVES

EFFICIENCY VS INPUT VOLTAGE
(full load)



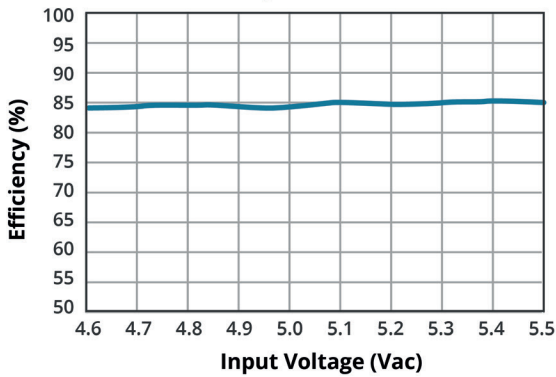
Key
PDSE1-S3-S5-S

EFFICIENCY VS OUTPUT LOAD
(Vin = 3.3V)



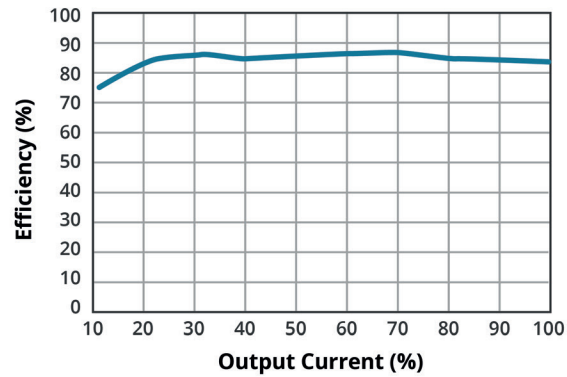
Key
PDSE1-S3-S5-S

EFFICIENCY VS INPUT VOLTAGE
(full load)



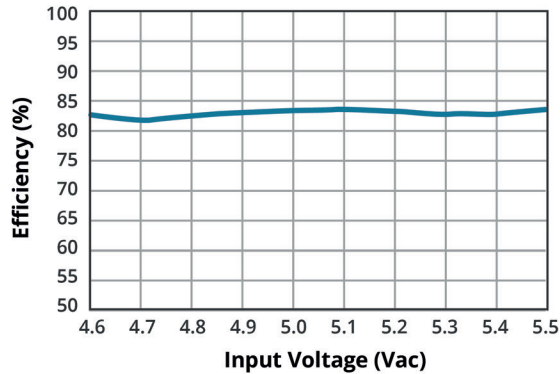
Key
PDSE1-S5-S5-S

EFFICIENCY VS OUTPUT LOAD
(Vin = 5V)



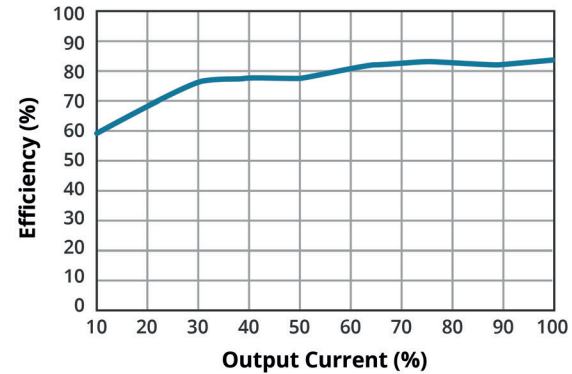
Key
PDSE1-S5-S5-S

EFFICIENCY VS INPUT VOLTAGE
(full load)



Key
PDSE1-S5-S15-S

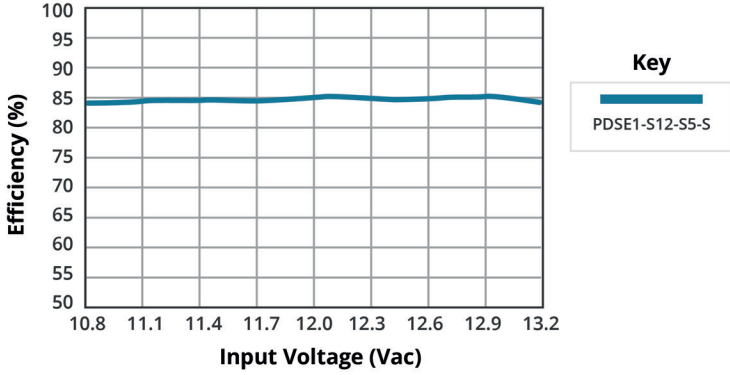
EFFICIENCY VS OUTPUT LOAD
(Vin = 5V)



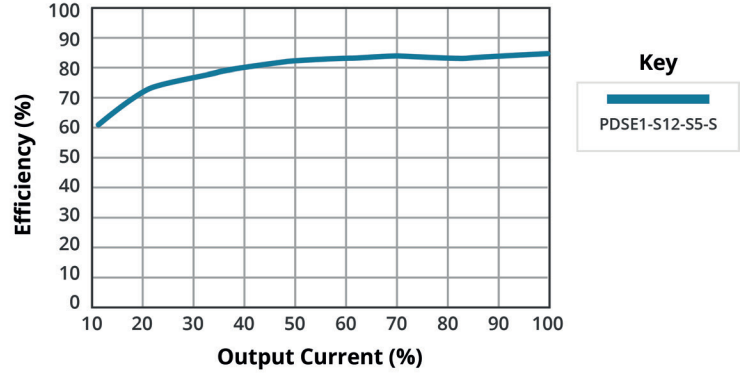
Key
PDSE1-S5-S15-S

EFFICIENCY CURVES (CONTINUED)

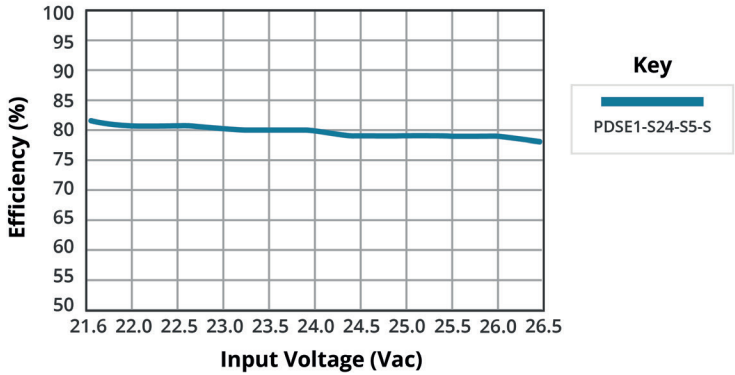
EFFICIENCY VS INPUT VOLTAGE
(full load)



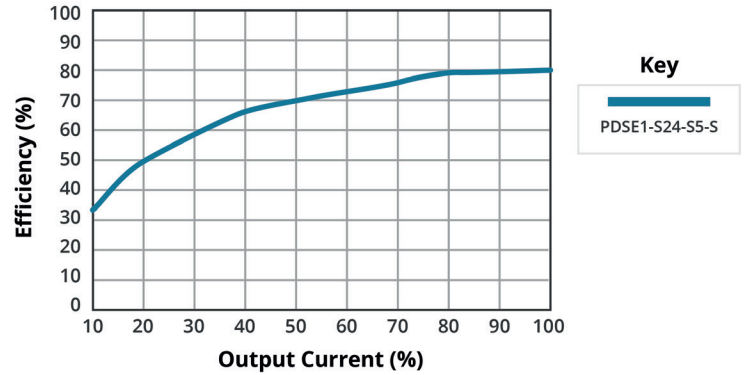
EFFICIENCY VS OUTPUT LOAD
($V_{in} = 12V$)



EFFICIENCY VS INPUT VOLTAGE
(full load)



EFFICIENCY VS OUTPUT LOAD
($V_{in} = 24V$)



SOLDERABILITY

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

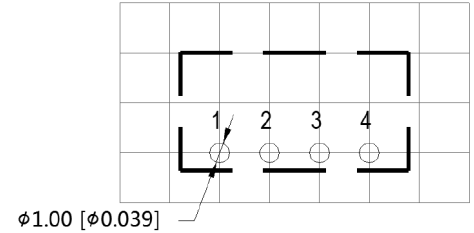
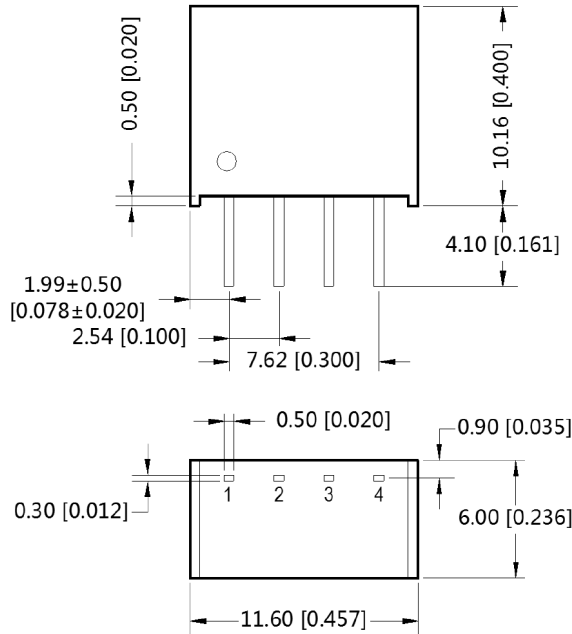
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	11.60 x 6.00 x 10.16 [0.457 x 0.236 x 0.400 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			1.3		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	V _{in}
3	0V
4	+V _{out}



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 (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

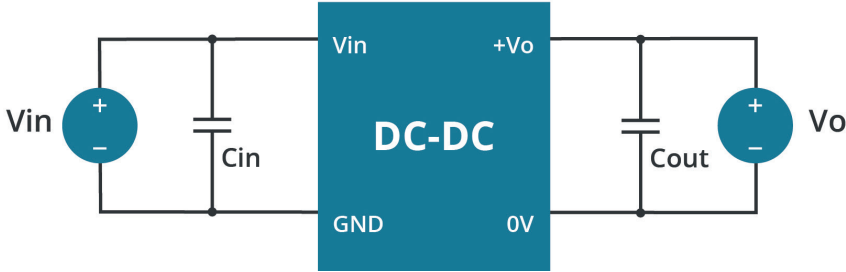


Table 1

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

EMC RECOMMENDED CIRCUIT

Figure 2

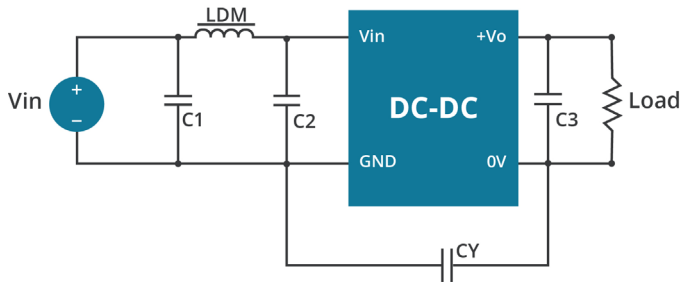


Table 2

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

REVISION HISTORY

rev.	description	date
1.0	initial release	05/10/2019
1.01	safeties updated in features and safety line, packaging removed	01/18/2021
1.02	datasheet updated	06/21/2021
1.03	CE certification removed	11/07/2022
1.04	3.3V input models added	03/08/2024

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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