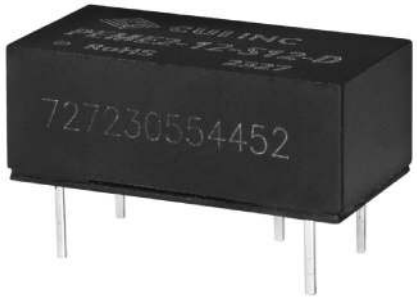
SERIES: PEME2-D | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

- 2 W isolated output
- single/dual unregulated output
- 3,000 Vdc isolation
- continuous short circuit protection
- extended temperature range (-40~105°C)
- no-load input current as low as 8mA
- UL 62368 approved
- designed to meet EN/BS EN 62368



RoHS c UL us

MODEL

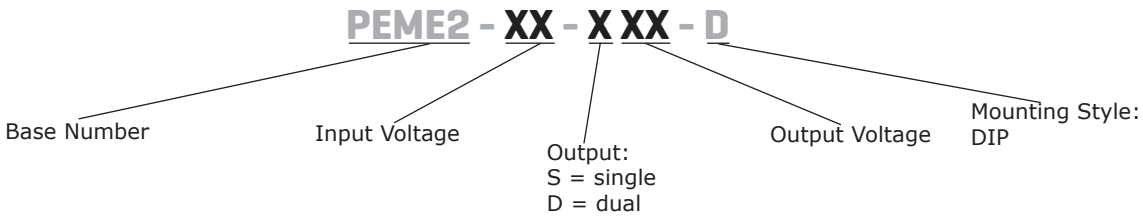
MODEL	input voltage		output voltage	output current		output power	ripple & noise[1]	efficiency[2]
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PEME2-5-D3-D[3]	5	4.5~5.5	±3.3	±30	±303	2	200	78
PEME2-5-D5-D[3]	5	4.5~5.5	±5	±20	±200	2	200	84
PEME2-5-D9-D[3]	5	4.5~5.5	±9	±11	±111	2	200	85
PEME2-5-D12-D[3]	5	4.5~5.5	±12	±8	±83	2	200	85
PEME2-5-D15-D[3]	5	4.5~5.5	±15	±7	±67	2	200	86
PEME2-5-D24-D[3]	5	4.5~5.5	±24	±4	±42	2	200	86
PEME2-5-S3-D[3]	5	4.5~5.5	3.3	40	400	2	200	78
PEME2-5-S5-D[3]	5	4.5~5.5	5	40	400	2	200	84
PEME2-5-S9-D[3]	5	4.5~5.5	9	22	222	2	200	85
PEME2-5-S12-D[3]	5	4.5~5.5	12	17	167	2	200	85
PEME2-5-S15-D[3]	5	4.5~5.5	15	13	133	2	200	86
PEME2-5-S24-D[3]	5	4.5~5.5	24	8	83	2	200	86
PEME2-12-D3-D[3]	12	10.8~13.2	±3.3	±30	±303	2	180	75
PEME2-12-D5-D	12	10.8~13.2	±5	±20	±200	2	180	80
PEME2-12-D12-D	12	10.8~13.2	±12	±8	±83	2	180	83
PEME2-12-D15-D	12	10.8~13.2	±15	±7	±67	2	180	83
PEME2-12-D24-D	12	10.8~13.2	±24	±4	±42	2	200	85
PEME2-12-S5-D	12	10.8~13.2	5	40	400	2	180	82
PEME2-12-S9-D	12	10.8~13.2	9	23	222	2	180	82
PEME2-12-S12-D	12	10.8~13.2	12	17	167	2	180	84
PEME2-12-S15-D	12	10.8~13.2	15	13	133	2	180	85
PEME2-12-S24-D	12	10.8~13.2	24	8	83	2	200	86
PEME2-15-D9-D[3]	15	13.5~16.5	±9	±11	±111	2	180	81
PEME2-15-D12-D[3]	15	13.5~16.5	±12	±8	±83	2	180	81
PEME2-15-D15-D[3]	15	13.5~16.5	±15	±7	±67	2	180	81
PEME2-15-S5-D[3]	15	13.5~16.5	5	40	400	2	180	79
PEME2-15-S9-D[3]	15	13.5~16.5	9	23	222	2	180	82
PEME2-15-S15-D[3]	15	13.5~16.5	15	13	133	2	180	79

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 (%)
PEME2-24-D5-D	24	21.6~26.4	±5	±20	±200	2	180	80
PEME2-24-D12-D	24	21.6~26.4	±12	±8	±83	2	180	83
PEME2-24-D15-D	24	21.6~26.4	±15	±7	±67	2	180	83
PEME2-24-D24-D	24	21.6~26.4	±24	±4	±42	2	200	84
PEME2-24-S5-D	24	21.6~26.4	5	40	400	2	180	80
PEME2-24-S9-D	24	21.6~26.4	9	23	222	2	180	80
PEME2-24-S12-D	24	21.6~26.4	12	17	167	2	180	84
PEME2-24-S15-D	24	21.6~26.4	15	13	133	2	180	86
PEME2-24-S24-D	24	21.6~26.4	24	8	83	2	200	86

Notes:
1. Measured at nominal input, 20 MHz bandwidth oscilloscope.
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	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
	24 Vdc input models		-0.7		30	Vdc
current (full load/no load)	5 Vdc input models	3.3 Vdc output models		513/8	541/--	mA
		5 Vdc output models		477/8	500/--	mA
		9, 12 Vdc output models		471/8	494/--	mA
		15, 24 Vdc output models		466/8	488/--	mA
	12 Vdc input models	all output models		208/8	219/--	mA
	15 Vdc input models	all output models		169/8	178/--	mA
	24 Vdc input models	all output models		104/8	113/--	mA
reflected ripple current[5]				15		mA
filter	filter capacitor					

Note: 5. See the Application Notes for specific operation.

OUTPUT

parameter	conditions/description		min	typ	max	units
maximum capacitive load[6]	5, 12, 15, 24 Vdc input models	3.3, 5 Vdc output models			2,400	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
		±24 Vdc output models			100	µF
	5 Vdc input models	9 Vdc output models			1,000	µF
	12, 15, 24 Vdc input models	9 Vdc output models			1,200	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[7]	5 Vdc input models	3.3 Vdc output models		11	20	%
		5 Vdc output models		10	15	%
		9, 12, 15 Vdc output models		8	10	%
		24 Vdc output models		6	10	%
	all other input models	3.3 Vdc output models		15	20	%
		5 Vdc output models		7	15	%
		9, 12 Vdc output models		5	10	%
		15 Vdc output models		4	10	%
		24 Vdc output models		3	10	%
switching frequency	at nominal input, full load					
	5 Vdc input			220		kHz
	all other models			260		kHz
temperature coefficient	at full load			±0.02		%/°C

Note: 6. The specified maximum capacitive load for positive and negative output is identical.
7. From 10% to 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, 1 mA max	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[8]	certified to 62368-1: UL				
	designed to meet 62368: EN/BS EN				
conducted emissions	CISPR32/EN55032 Class B (see Fig. 4 for recommended circuit)				
radiated emissions	CISPR32/EN55032 Class B (see Fig. 4 for recommended circuit)				
ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B				
MTBF	as per MIL-HDBK-217F, 25°C	3,500,000			hours
RoHS	yes				

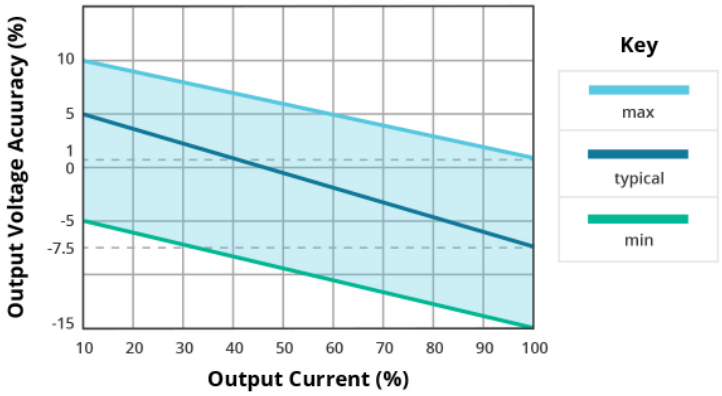
Note: 8. See the model table for reference regarding UL certification.

ENVIRONMENTAL

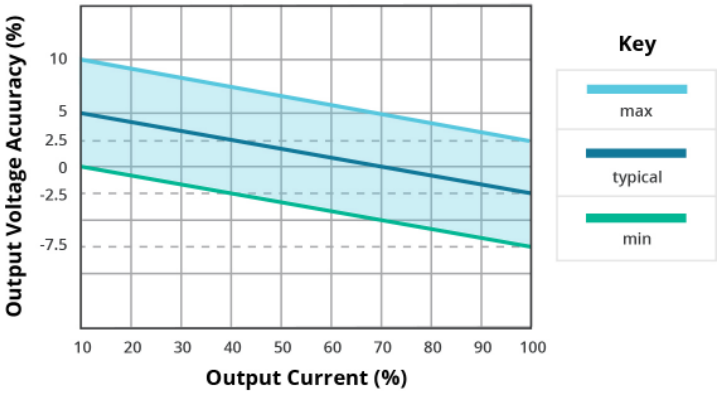
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
case temperature rise	5 Vdc output model at 25°C		25		°C
vibration	10-150Hz, 5G, 0.75mm. Along X, Y and Z				

DERATING CURVES

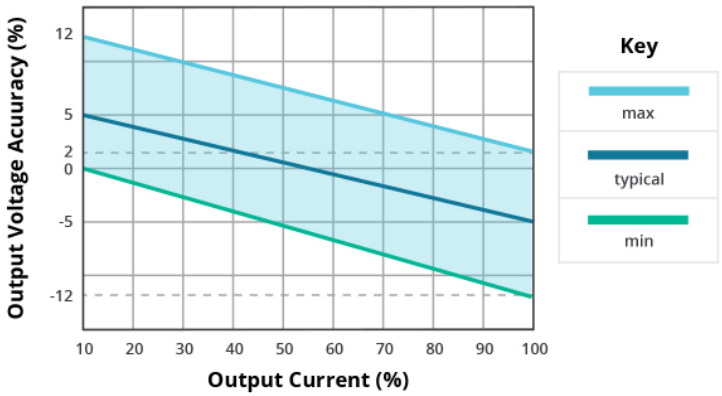
OUTPUT REGULATION CURVE
5 Vdc input models; 3.3 Vdc output model
(nominal input)



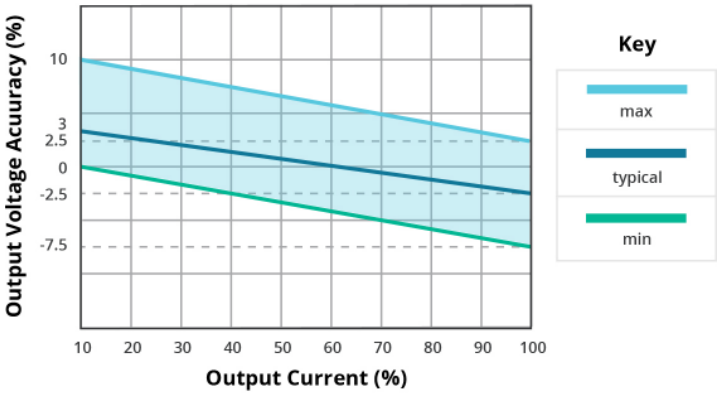
OUTPUT REGULATION CURVE
5 Vdc input models; all other output models
(nominal input)



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

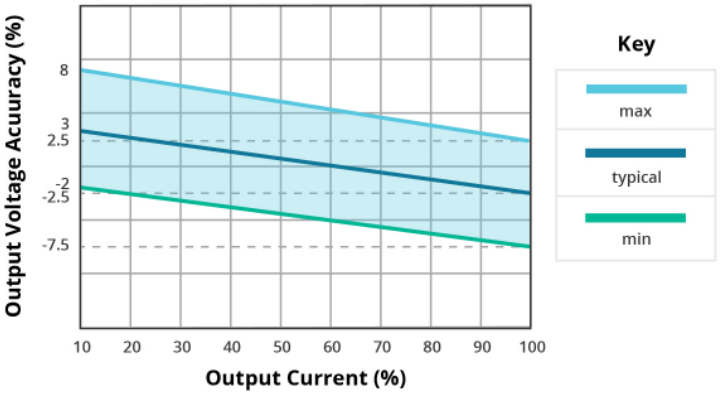


OUTPUT REGULATION CURVE
12, 15 & 24 Vdc input models; 3.3 Vdc output model
(nominal input)

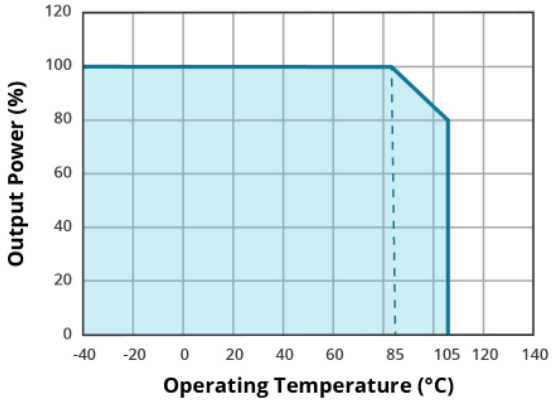


DERATING CURVES (CONTINUED)

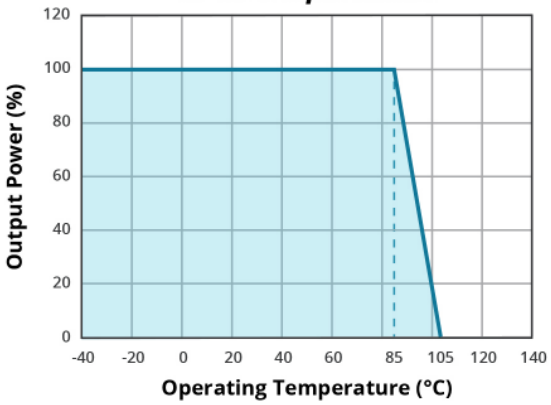
OUTPUT REGULATION CURVE
12, 15 & 24 Vdc input models; all other Vdc output model (nominal input)



TEMPERATURE DERATING CURVE
5 Vdc input models

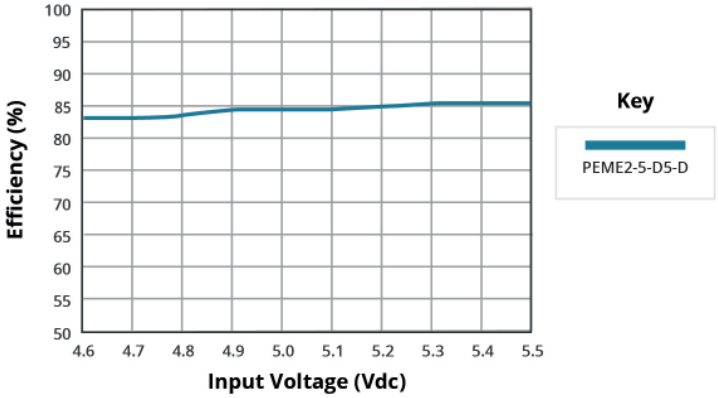


TEMPERATURE DERATING CURVE
all other input models

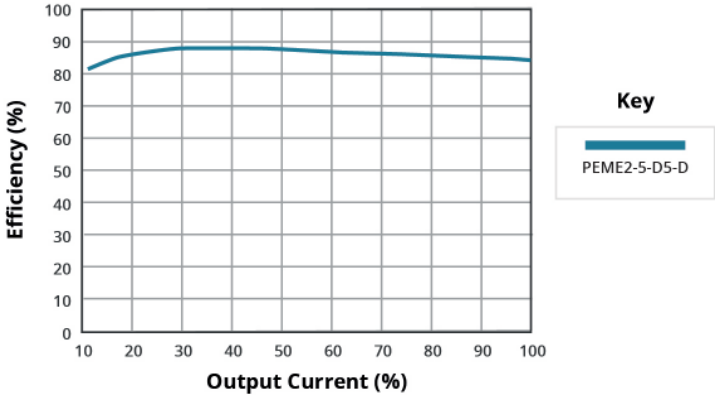


EFFICIENCY CURVES

EFFICIENCY VS INPUT VOLTAGE
(full load)



EFFICIENCY VS OUTPUT CURRENT
(Vin = 5 Vdc)



SOLDERABILITY

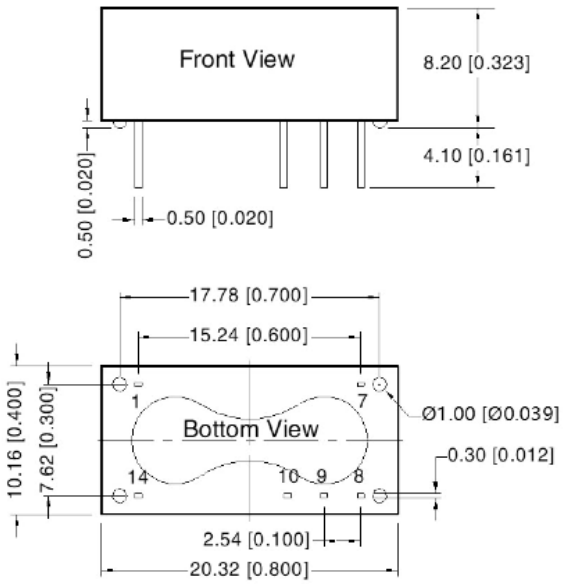
parameter	conditions/description	min	typ	max	units
pin soldering resistance	1.5 mm from case for 10 seconds			300	°C

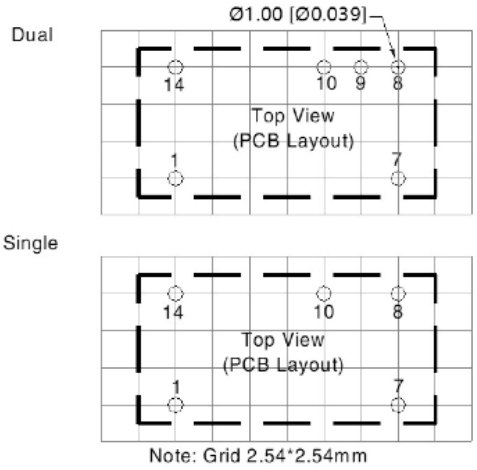
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	20.32 x 10.16 x 8.20 [0.800 x 0.400 x 0.323 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			2.4		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	GND	GND
7	NC	NC
8	+Vo	+Vo
9	No Pin	0V
10	0V	-Vo
14	Vin	Vin

APPLICATION CIRCUIT

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 1 & 2.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1 & 2.

Figure 1
Single Output Models

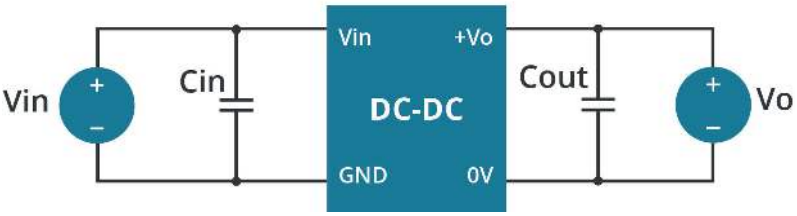


Table 1

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

Figure 2
Dual Output Models

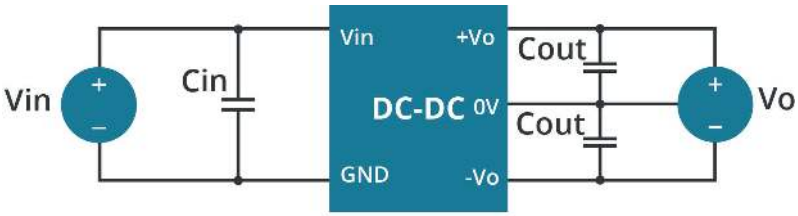


Table 2

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

EMC RECOMMENDED CIRCUIT

Figure 3
Single Output Models

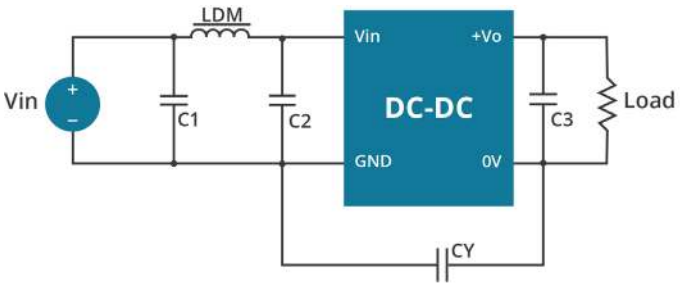


Figure 4
Dual Output Models

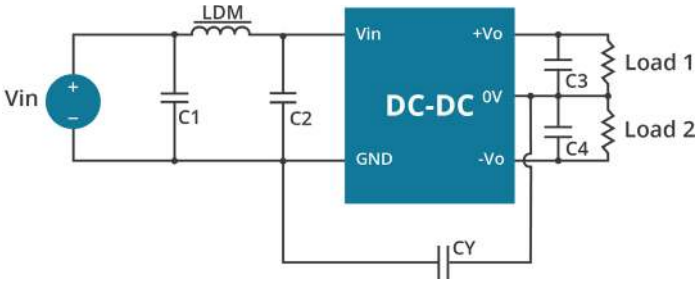


Table 3

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

REVISION HISTORY

rev.	description	date
1.0	initial release	09/26/2023

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

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