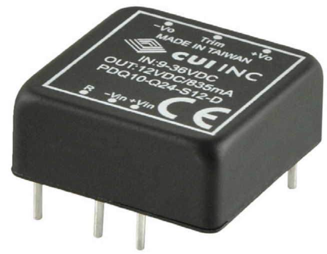
CUI INC
a bel group

SERIES: PDQ10-D | DESCRIPTION: DC-DC CONVERTER

FEATURES

- up to 10 W isolated output
- industry standard 1″ x 1″ package
- 4:1 input range
- single/dual regulated output
- over voltage, input under voltage lockout, and short circuit protections
- 1,500 Vdc isolation voltage
- five-sided shielded case
- remote on/off control
- output trim
- -40 to 105°C temperature range
- efficiency up to 86%



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 typ (%)
PDQ10-Q24-S3-D	24	9~36	3.3	0	2500	8.25	75	81
PDQ10-Q24-S5-D	24	9~36	5	0	2000	10	75	84
PDQ10-Q24-S12-D	24	9~36	12	0	835	10	100	86
PDQ10-Q24-S15-D	24	9~36	15	0	666	10	100	86
PDQ10-Q24-D5-D	24	9~36	±5	0	±1000	10	75	84
PDQ10-Q24-D12-D	24	9~36	±12	0	±416	10	100	86
PDQ10-Q24-D15-D	24	9~36	±15	0	±333	10	100	86
PDQ10-Q48-S3-D	48	18~75	3.3	0	2500	8.25	75	82
PDQ10-Q48-S5-D	48	18~75	5	0	2000	10	75	84
PDQ10-Q48-S12-D	48	18~75	12	0	835	10	100	86
PDQ10-Q48-S15-D	48	18~75	15	0	666	10	100	86
PDQ10-Q48-D5-D	48	18~75	±5	0	±1000	10	75	84
PDQ10-Q48-D12-D	48	18~75	±12	0	±416	10	100	86
PDQ10-Q48-D15-D	48	18~75	±15	0	±333	10	100	86

Notes: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope, with 10 μF tantalum and 1 μF ceramic capacitors on the output.
2. All specifications are measured at Ta=25°C, nominal input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY

PDQ10 - QXX - X XX - D

Base Number

Input Voltage

Output
S = single
D = dual

Output Voltage

Packaging Style:
D = DIP

INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	24 Vdc input models 48 Vdc input models	9 18	24 48	36 75	Vdc Vdc
surge voltage	for maximum of 100 ms 24 Vdc input models 48 Vdc input models			 50 100	 Vdc Vdc
current	24 Vdc input models 48 Vdc input models			1.4 0.7	A A
under voltage shutdown	24 Vdc input models, power up 24 Vdc input models, power down 48 Vdc input models, power up 48 Vdc input models, power down		8.8 8.0 17 16		Vdc Vdc Vdc Vdc
remote on/off[1]	turn on (3.5~36 Vdc or open circuit) turn off (<1.2 Vdc)				
filter	LC type				
input reverse polarity protection	no				
input fuse	3 A time delay fuse for 24 Vdc input models (recommended) 1.5 A time delay fuse for 48 Vdc input models (recommended)				

Notes: 1. CMOS or open collector TTL, reference to –Vin.

OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load	3.3 Vdc output models 5 Vdc output models 12 Vdc output models 15 Vdc output models ±5 Vdc output models ±12 Vdc output models ±15 Vdc output models			3,300 2,200 1,000 680 1,200 470 330	μF μF μF μF μF μF μF
voltage accuracy				±1.5	%
line regulation	from high line to low line			±0.5	%
load regulation	from 100% load to minimum load single output models dual output models			 ±0.5 ±1	 % %
voltage balance	dual output models			±1	%
cross regulation	load cross variation 25%/100% (dual output models)			±5	%
turn-on delay time, from input	from Vin, min to 10% Vo		2		ms
turn-on delay time, from on/off control	from Von/off to 10% Vo		2		ms
rise time	from 10% Vo to 90% Vo		1.5		ms
adjustability[2]	see application notes		±10		%
switching frequency	at nominal Vin, full load		280		kHz
dynamic load response	75%-100% step load change error band (Vout) recovery time		 5 500		 % μs
temperature coefficient			±0.03		%/°C

Note: 2. For single output models only.

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over voltage protection	zener or TVS clamp 3.3 Vdc output models 5 Vdc output models (single and dual) 12 Vdc output models (single and dual) 15 Vdc output models (single and dual)		 3.9 6.2 15 18		 Vdc Vdc Vdc Vdc
over current protection		120			%
short circuit protection	continuous, automatic recovery				

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute	1,500			Vdc
isolation resistance	input to output	1,000			MΩ
isolation capacitance	input to output		1,000		pF
conducted emissions	EN 55022 Class A & Class B (external circuit required, see Figure 3)				
MTBF	as per MIL-HDBK-217F, GB		1,300,000		hours
RoHS	2011/65/EU				

ENVIRONMENTAL

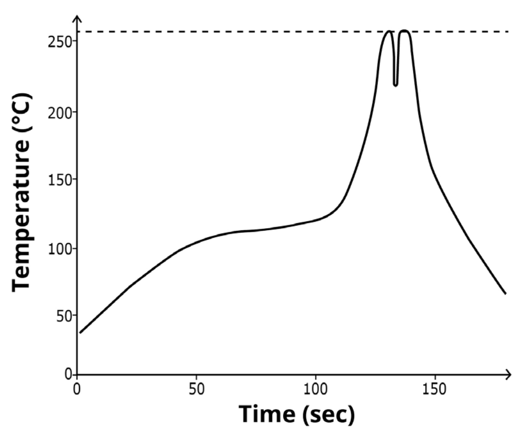
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		105	°C
storage temperature		-55		125	°C
operating humidity	non-condensing			95	%

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
wave soldering	see wave soldering profile			260	°C

Notes:
1. Soldering materials: Sn/Cu/Ni
2. Ramp up rate during preheat: 1.4°C/s (from 50°C to 100°C)
3. Soaking temperature: 0.5°C/s (from 100°C to 130°C), 60±20 seconds
4. Peak temperature: 260°C, above 250°C for 3~6 seconds
5. Ramp down rate during cooling: -10°C/s (from 260°C to 150°C)

WAVE SOLDERING PROFILE



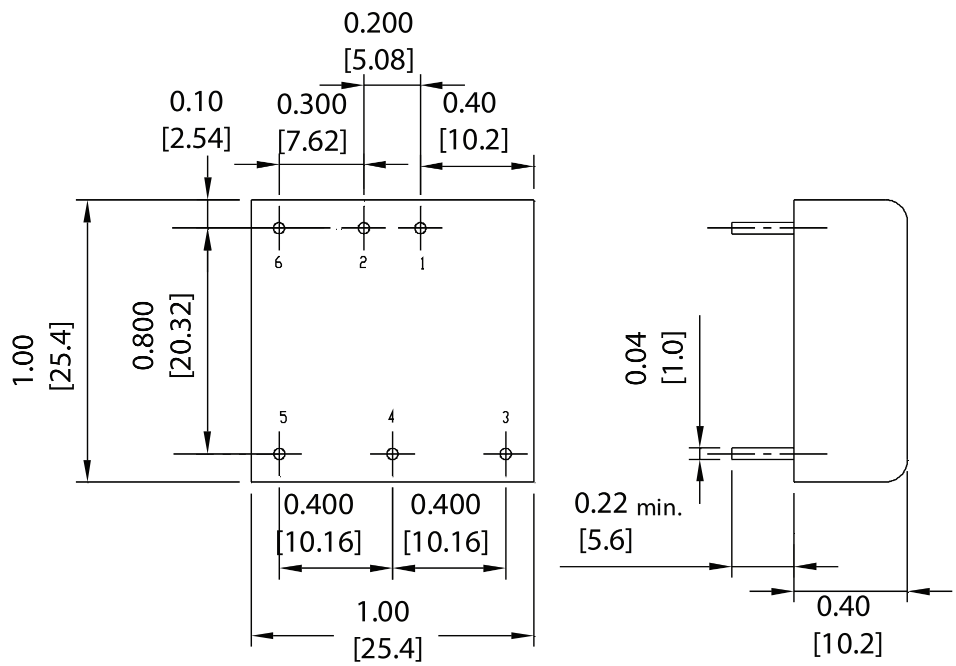
MECHANICAL

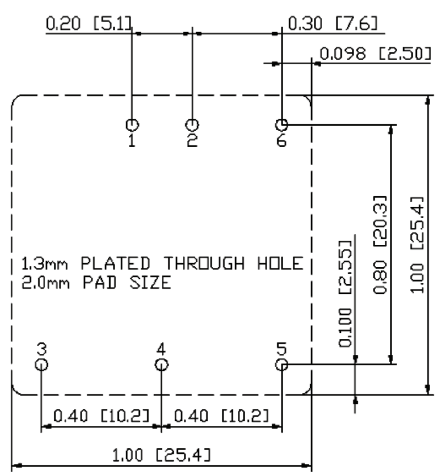
parameter	conditions/description	min	typ	max	units
dimensions	1.00 x 1.00 x 0.4 [25.4 x 25.4 x 10.2 mm]				inches
case material	black coated copper with non-conductive base				
weight			18		g

MECHANICAL DRAWING

units: inches [mm]
tolerance: X.XX ±0.02 [±0.5]
X.XXX ±0.010 [±0.25]
pin diameter tolerance: ±0.004[±0.1]

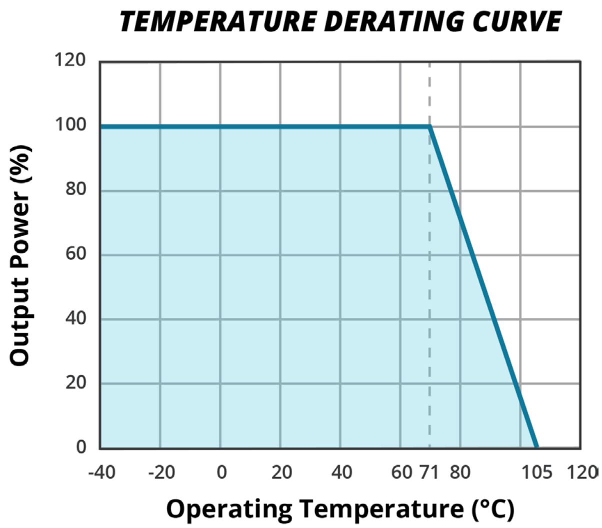
PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote	Remote



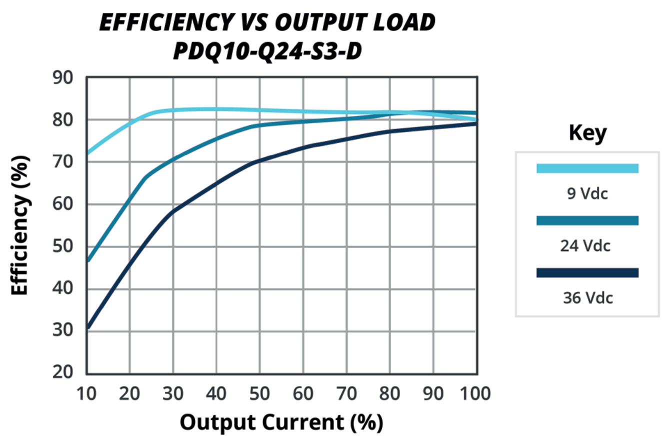


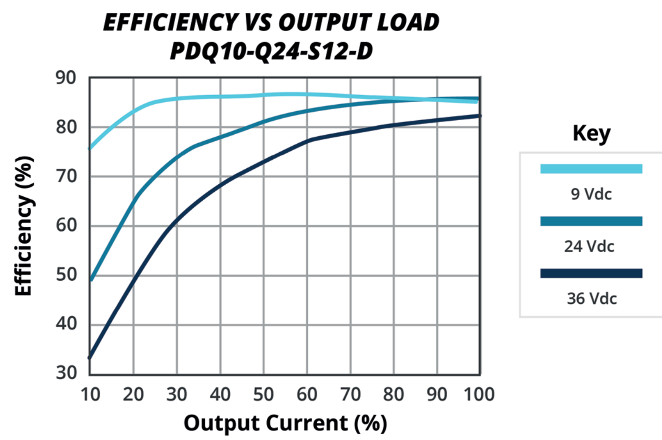
Recommended PCB Layout
Top View

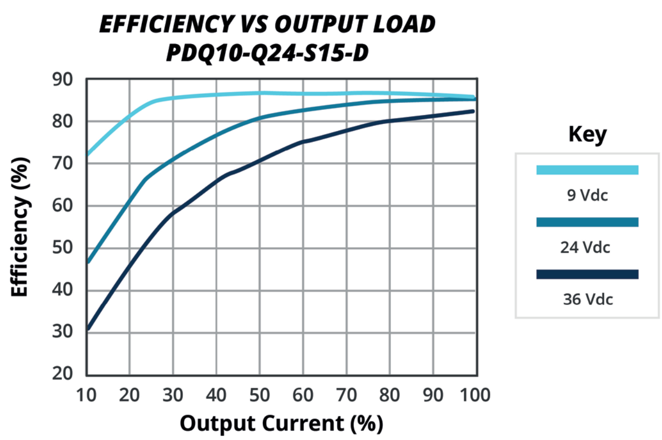
DERATING CURVE

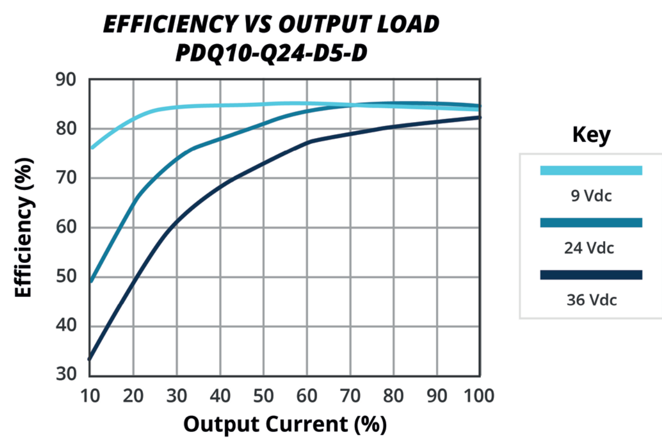


EFFICIENCY CURVES



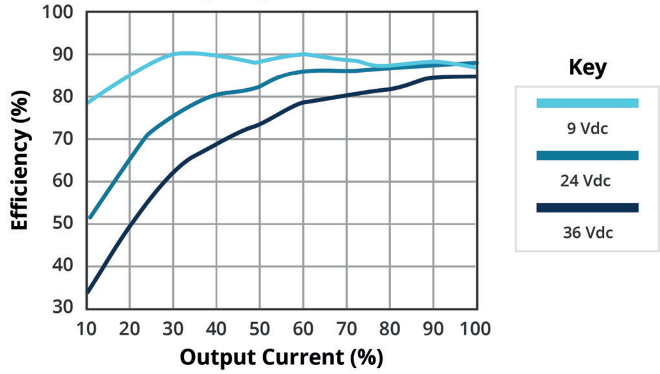




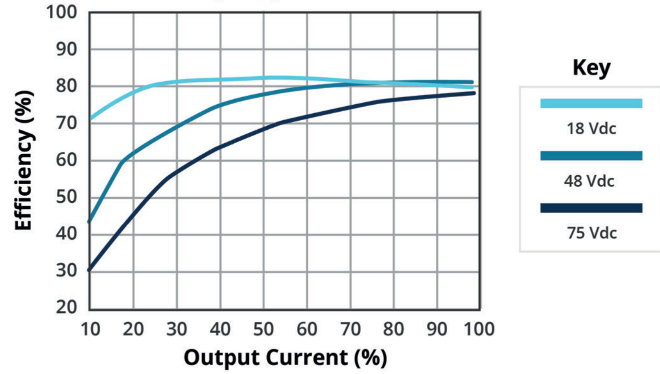


EFFICIENCY CURVES (CONTINUED)

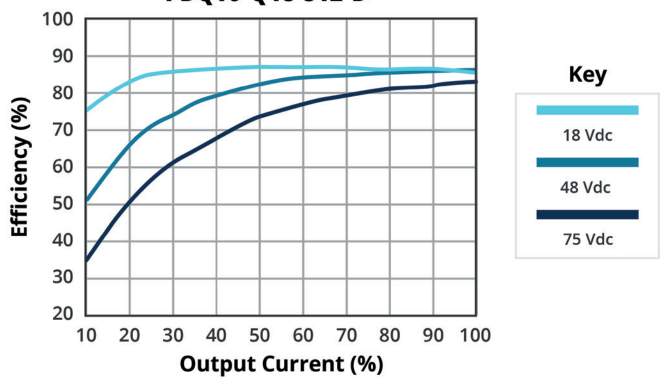
EFFICIENCY VS OUTPUT LOAD
PDQ10-Q24-D15-D



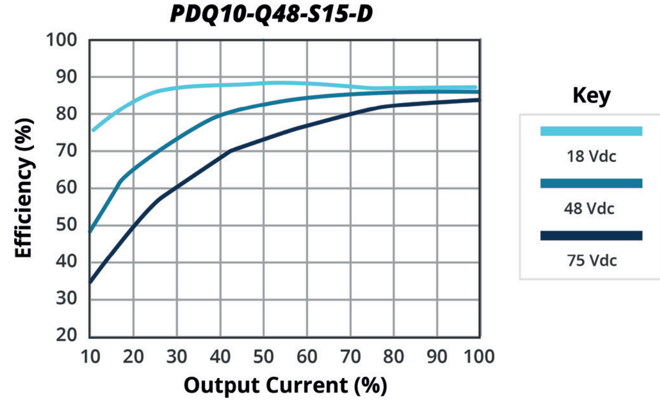
EFFICIENCY VS OUTPUT LOAD
PDQ10-Q48-S3-D



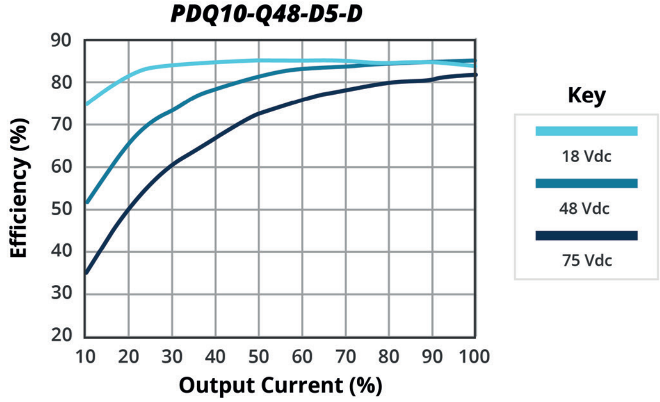
EFFICIENCY VS OUTPUT LOAD
PDQ10-Q48-S12-D



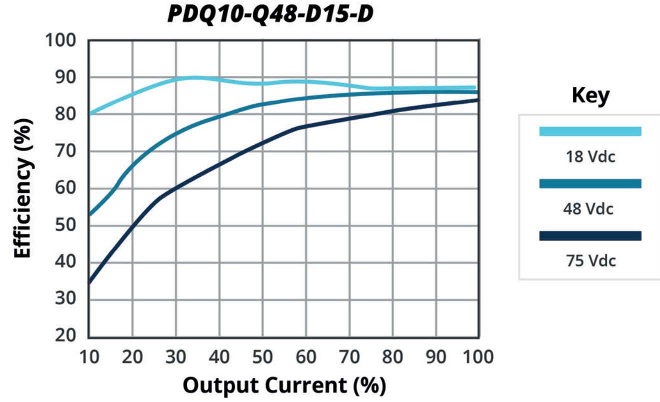
EFFICIENCY VS OUTPUT LOAD
PDQ10-Q48-S15-D



EFFICIENCY VS OUTPUT LOAD
PDQ10-Q48-D5-D



EFFICIENCY VS OUTPUT LOAD
PDQ10-Q48-D15-D



TEST CONFIGURATIONS

Input Ripple Current & Output Noise

Figure 1 Measuring Input Ripple Current

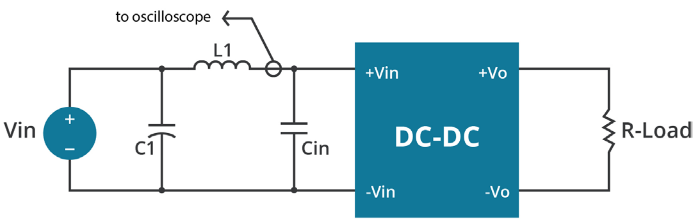


Figure 2 Measuring Output Ripple And Noise

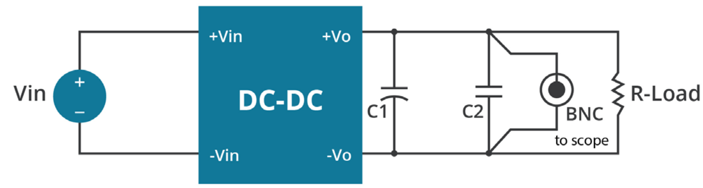


Table 1

L1	1 μH
C1	6.8 μF ceramic capacitor
Cin	none

Table 2

C1	10 μF tantalum capacitor
C2	1 μF ceramic capacitor

EMC RECOMMENDED CIRCUIT

Test Condition
Input Voltage: Nominal
Output Load: Full Load

Figure 3 Conducted Emissions Test Circuit

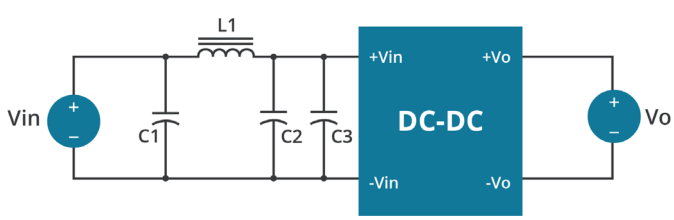


Table 3

EN55022 Class A Recommended External Circuit Components				
Input Voltage (Vdc)	C1	C2	C3	L1
24	NC	10 μF / 50 V	10 μF / 50 V	short
48	NC	4.7 μF / 100 V	4.7 μF / 100 V	short

Table 4

EN55022 Class B Recommended External Circuit Components				
Input Voltage (Vdc)	C1	C2	C3	L1
24	10 μF / 50 V	NC	10 μF / 50 V	3.3 μH
48	4.7 μF / 100 V	NC	4.7 μF / 100 V	3.3 μH

APPLICATION NOTES

Output Voltage Trimming

The output voltage can be adjusted (single outputs only) by using the trim pin and the use of either an external trim pot or the use of a single fixed resistor (see Figures below). If the trim function is not needed, leave the trim pin open.

Figure 4 Trim Adjustments Using A Trimpot

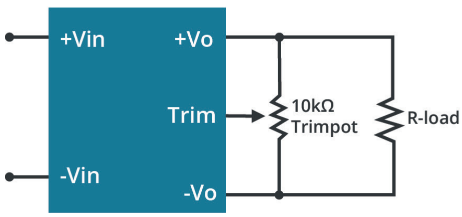


Figure 5 Trim Adjustments To Increase Output Voltage Using A Fixed Resistor

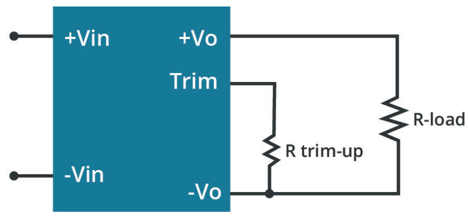
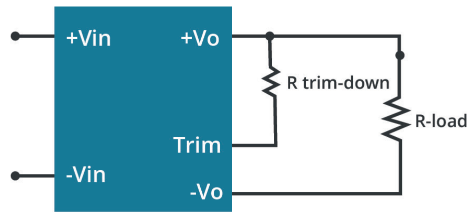


Figure 6 Trim Adjustments To Decrease Output Voltage Using A Fixed Resistor



Formula for Trim Resistor

$$R_{trim-up} = \left(\frac{Vr \times R1 \times (R2 + R3)}{(Vo - V_{o,\,nom}) \times R2}\right) - Rt \quad (k\Omega)$$

$$R_{trim-down} = R1 \times \left(\frac{Vr \times R1}{(V_{o,\,nom} - Vo) \times R2} - 1\right) - Rt \quad (k\Omega)$$

Note: $R_{trim-up}$ is the external resistor in kΩ
$R_{trim-down}$ is the external resistor in kΩ
$V_{O,\,nom}$ is the nominal output voltage
V_O is the desired output voltage
R1, R2, R3, Rt, and Vr are internal (see Table 5).

Table 5

Output Voltage (Vdc)	R1 (kΩ)	R2 (kΩ)	R3 (kΩ)	Rt (kΩ)	Vr (V)
3.3	2.74	1.8	0.27	9.1	1.24
5	2.32	2.32	0	8.2	2.5
12	6.8	2.4	2.32	22	2.5
15	8.06	2.4	3.9	27	2.5

REVISION HISTORY

rev.	description	date
1.0	initial release	07/12/2016
1.01	derating curve and circuit figures updated	07/26/2021
1.02	company address updated	11/05/2024

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

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