CUI INC
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SERIES: PRQE50W-D | **DESCRIPTION:** DC-DC CONVERTER

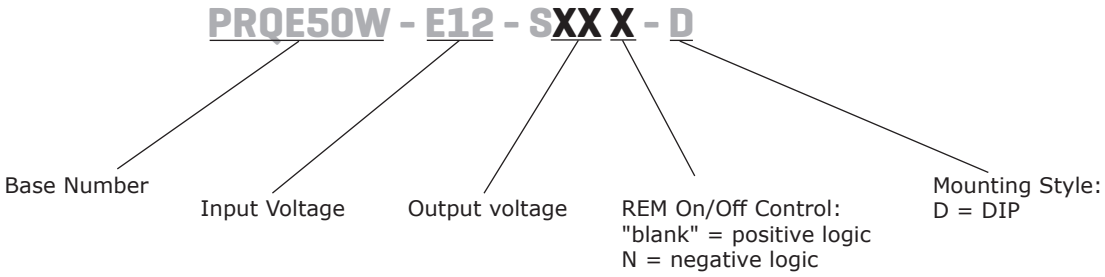
FEATURES

- 50 W isolated output
- ¼-Brick package with industry standard pin-out
- ultra-wide input voltage range, 9~75 V
- single regulated output
- output short circuit, over current, over voltage, & over temperature protection
- 3000 Vdc isolation
- meets UL/EN/IEC 62368-1
- designed to meet EN 61373 and EN 45545-2
- meets EN 50155 with external components
- 5000 meter operating altitude

MODEL	input voltage		output voltage	output current	output power	ripple & noise[1] Vo1/Vo2	efficiency[2]
	typ (Vdc)	range (Vdc)	(Vdc)	max (A)	max (W)	max (mVp-p)	typ (%)
PRQE50W-E12-S12-D	36	9~75	12	4.17	50	150	90
PRQE50W-E12-S15-D	36	9~75	15	3.33	50	150	90
PRQE50W-E12-S24-D	36	9~75	24	2.08	50	240	90
PRQE50W-E12-S28-D	36	9~75	28	1.79	50	240	90
PRQE50W-E12-S48-D	36	9~75	48	1.05	50	480	90

Notes: 1. Peak to peak, 5Hz to 20MHz bandwidth, full load, 22µF aluminum solid capacitor and 1µF ceramic capacitor.
2. 36Vdc input voltage.

PART NUMBER KEY



INPUT

parameter	conditions/description		min	typ	max	units
input voltage			9		75	Vdc
surge voltage	for maximum of 0.1 second				100	Vdc
current	at 9 Vdc input voltage, full load			6.7		A
inrush current					0.1	A^2s
filter	Pi filter					
remote on/off[3]	positive logic	models ON (>4.0 Vdc or on/off pin open circuit)				
		models OFF (on/off pin 0~1.0 Vdc)				
	negative logic	models ON (on/off pin 0~1.0 Vdc)				
		models OFF (>4.0 Vdc or on/off pin open circuit)				

Notes: 3. - Voltages referenced to -Vin pin.

OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load	12 Vdc output model 15 Vdc output model 24 Vdc & 28 Vdc output models 48 Vdc output model			8,000 6,800 2,350 700	µF µF µF µF
voltage accuracy	at 36 Vdc input volage, full load, 25°C			±1.0	%
line regulation	from low line to high line, full load			±0.2	%
load regulation	from full load to no load			±0.2	%
switching frequency	PWM mode		200		kHz
transient recovery time	75% ~ 100%, nominal input voltage			250	µs
transient response deviation	75% ~ 100%, nominal input voltage			±5	%
temperature coefficient	40°C ~ 105°C			±0.02	%/°C
adjustability	output power ≤ max. rated power	-20		15	%
remote sense	output power ≤ max. rated power, nominal output voltage			15	%

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over current protection	auto recovery, hiccup	110		210	%
over temperature protection	temperature measured at center of base plate shutdown recovery		 110 100		 °C °C
short circuit protection	continuous, auto recovery				

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output, for 1 minute			3,000 4,200	Vac Vdc
	input to case, for 1 minute			2,100 3,000	Vac Vdc
	output to case, for 1 minute			1,500 2,100	Vac Vdc
isolation resistance	input to output	100			MΩ
isolation capacitance	input to output; output to case		1,000		pF
safety approvals	certified to 62368: UL/EN/IEC				
concucted emissions	EN 55032 & EN 50155 Class A (with external filter)				
radiated emissions	EN 55032 & EN 50155 Class A (with external filter)				
ESD	EN 61000-4-2 Level 3: Air ±8kV, Contact ±6kV Perf. Criteria A				
radiated immunity	EN 61000-4-3 Level 3: 80~1000MHz, 20V/m Perf. Criteria A				
EFT/burst	EN 61000-4-4 Level 3: On power input port, ±2kV, external input capacitor required Perf. Criteria A				
surge	EN 61000-4-5 Level 4: Line to earth, ±4kV, Line to line, ±2kV Perf. Criteria A				
conducted immunity	EN 61000-4-6 Level 3: 0.15~80MHz, 10V Perf. Criteria A				
magnetic immunity	EN 61000-4-8 Level 1: 50Hz, 1A/m for EN55035:2017 Perf. Criteria A				
voltage dips and interruption	EN 50155 Class S3: 20ms interruptions Perf. Criteria A				
MTBF	as per MIL-HDBK-217F, 25°C 12 Vdc output model 15 Vdc output model 24 Vdc output model 28 Vdc output model 48 Vdc output model		 718 803 811 800 807		 kHours kHours kHours kHours kHours
RoHS	yes				

ENVIRONMENTAL

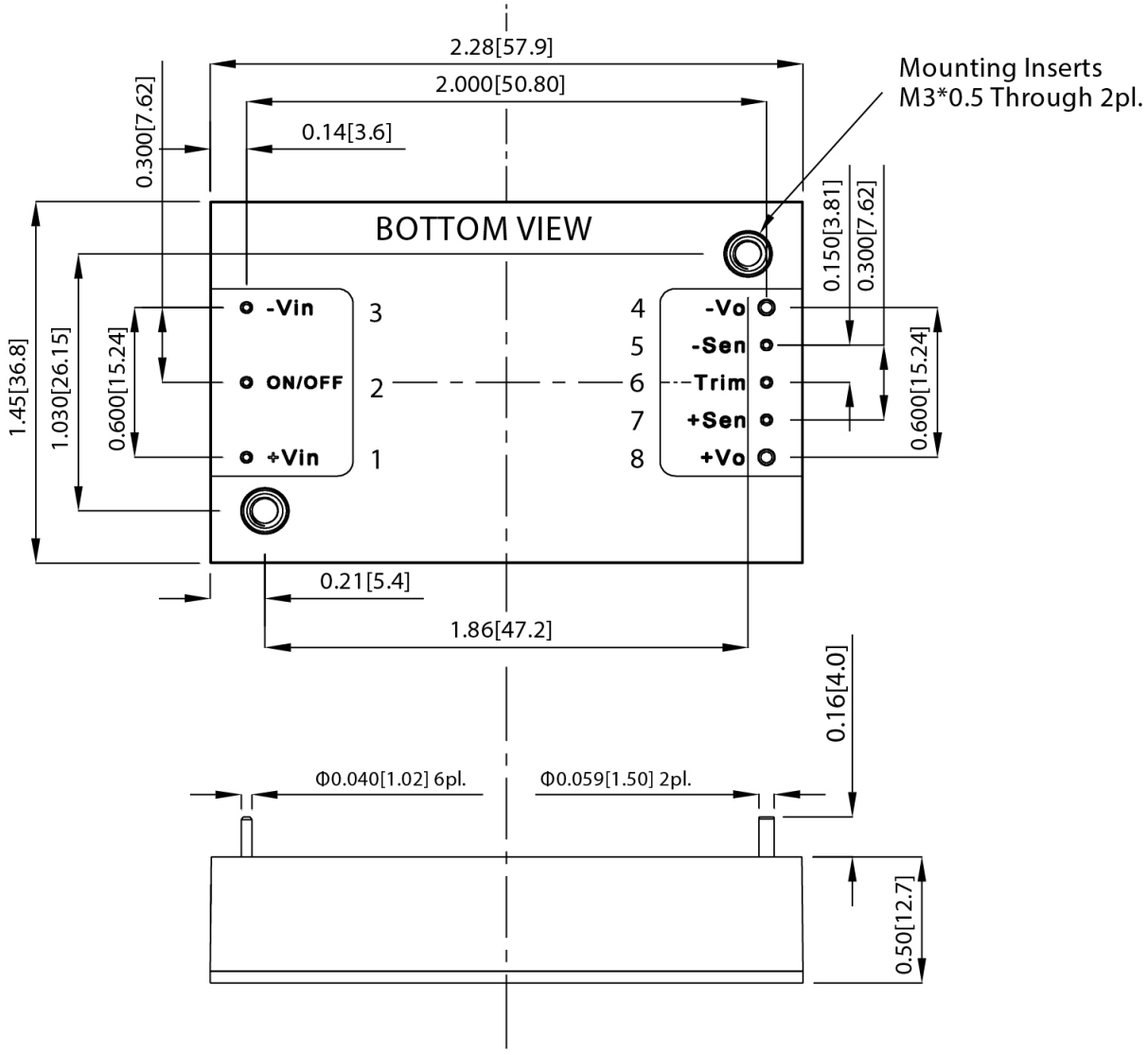
parameter	conditions/description	min	typ	max	units
ambient operating temperature	see derating curve	-40		105	°C
storage temperature		-55		125	°C
case temperature	measured at center of baseplate			105	°C
storage humidity	non-condensing	-		95	%

MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	2.28 × 1.45 × 0.50 [57.9 x 36.8 x 12.7 mm]				inch
case material	plastic, DAP, UL 94V-0				
weight			66		g

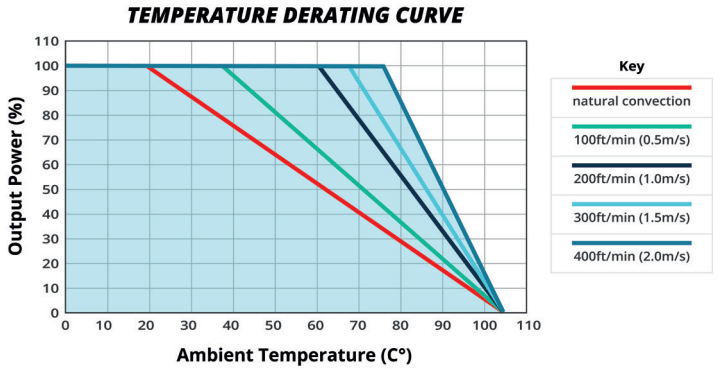
MECHANICAL DRAWING

units: inch [mm]
tolerances: inch: x.xx = ±0.02, x.xxx = ±0.010
mm: x.x = ±0.5, x.xx = ±0.25

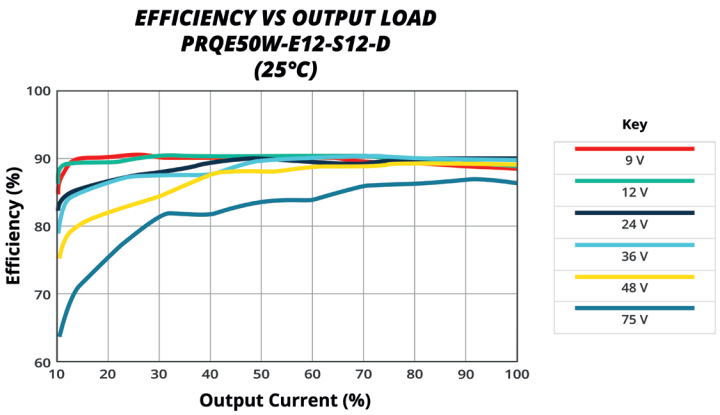


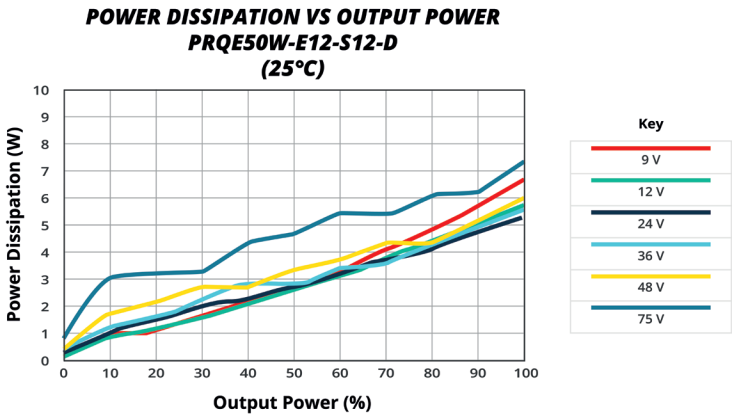
PIN Out	
PIN	Function
1	+Vin
2	ON/OFF
3	-Vin
4	-Vo
5	-Sense
6	Trim
7	+Sense
8	+Vo

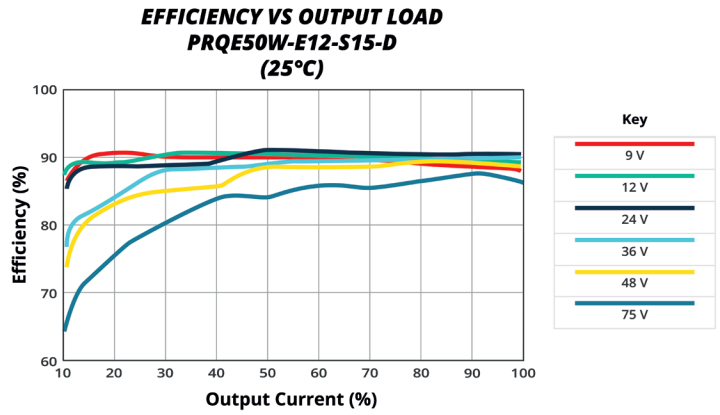
DERATING CURVES

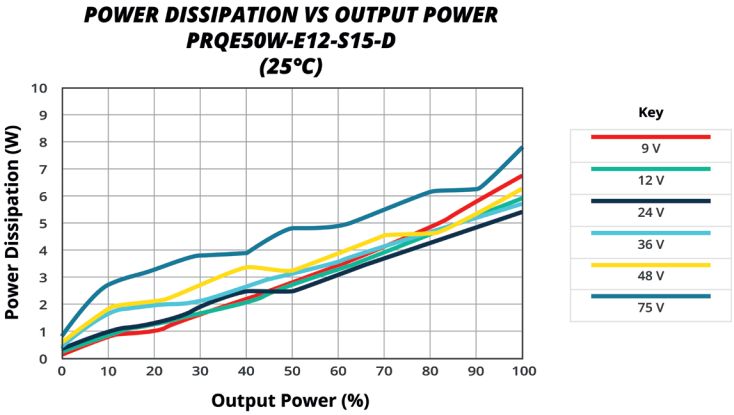


EFFICIENCY CURVES



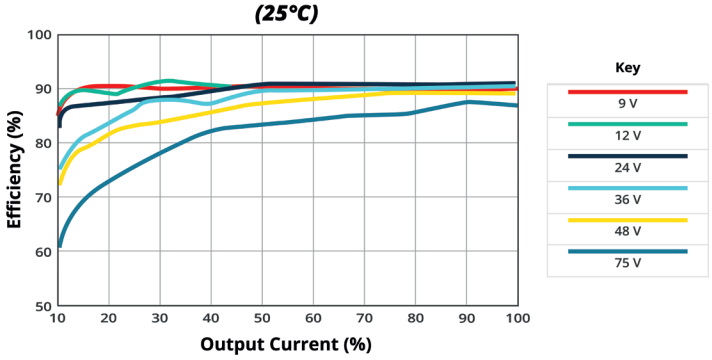




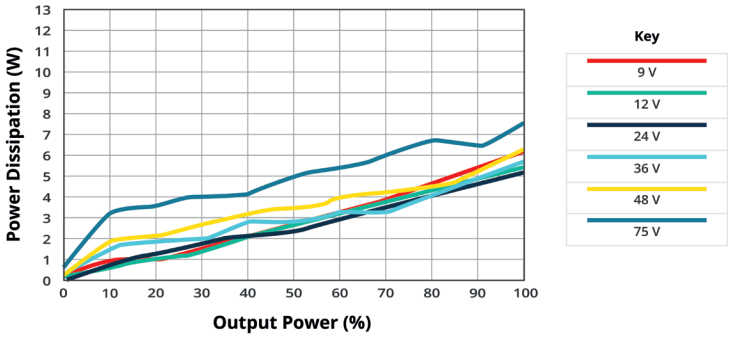


EFFICIENCY CURVES (CONTINUED)

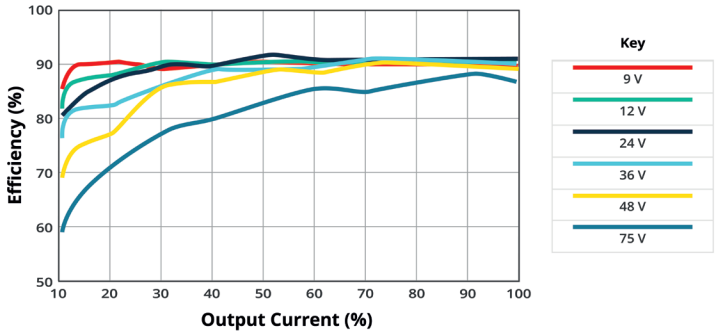
EFFICIENCY VS OUTPUT LOAD
PRQE50W-E12-S24-D
(25°C)



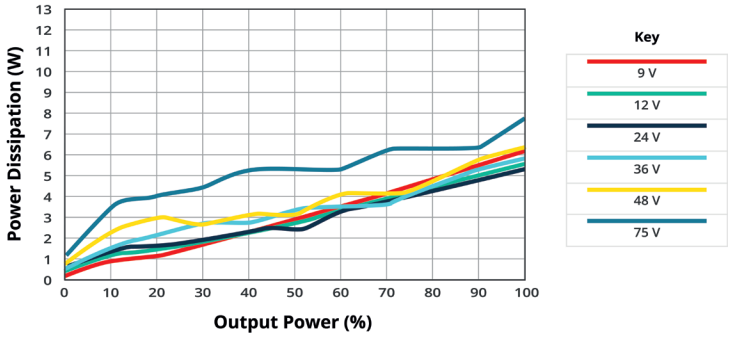
POWER DISSIPATION VS OUTPUT POWER
PRQE50W-E12-S24-D
(25°C)



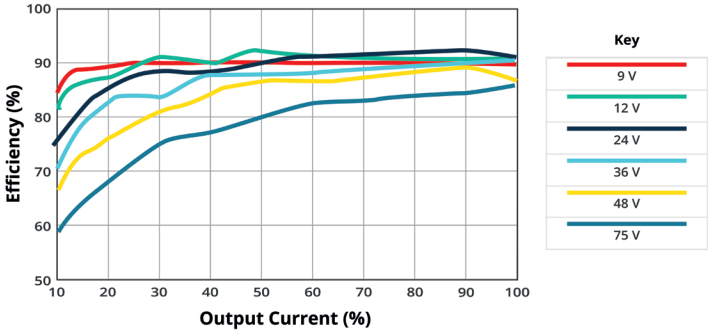
EFFICIENCY VS OUTPUT LOAD
PRQE50W-E12-S28-D
(25°C)



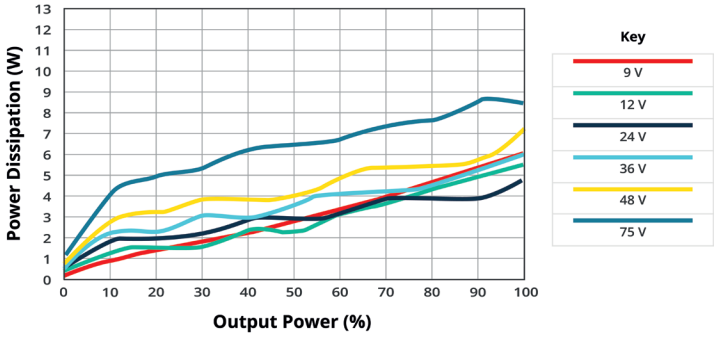
POWER DISSIPATION VS OUTPUT POWER
PRQE50W-E12-S28-D
(25°C)



EFFICIENCY VS OUTPUT LOAD
PRQE50W-E12-S48-D
(25°C)



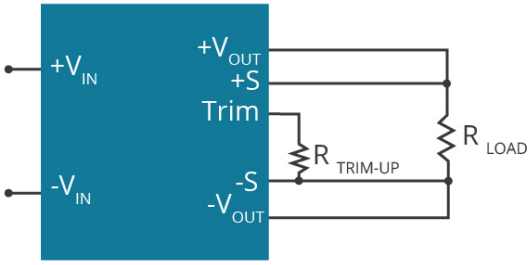
POWER DISSIPATION VS OUTPUT POWER
PRQE50W-E12-S48-D
(25°C)



APPLICATION NOTES

Figure 3

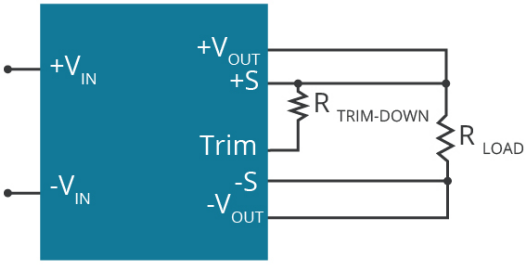
Trim up



$$R_{TRIM} = \left[\frac{V_{REF} \times R_{TOP} \times (R_{BOTTOM} + R_O)}{R_{BOTTOM} \times (V_{OUT} - V_{OUT,\,NOM})} \right] - R_{TRIM}\ (K\,\Omega)$$

Formula for Trim up

Trim down



$$R_{TRIM} = R_{TOP} \times \left[\frac{V_{REF} \times R_{TOP}}{R_{BOTTOM} \times (V_{OUT,\,NOM} - V_{OUT})} - 1 \right] - R_{TRIM}\ (K\,\Omega)$$

Formula for Trim down

$$R_{TRIM} = \left[\frac{2.5 \times 8.2 \times (2.4 + 0.91)}{2.4 \times (13.8 - 12)} \right] - 3.9 = 11.81\ (K\,\Omega)$$

Example for Trim up

$$R_{TRIM} = 8.2 \times \left[\frac{2.5 \times 8.2}{2.4 \times (12 - 9.6)} - 1 \right] - 3.9 = 17.08\ (K\,\Omega)$$

Example for Trim down

Table 3

V_{OUT}	R_1	R_2	R_3	R_{TRIM}	V_{REF}
(Vdc)	(kΩ)	(kΩ)	(kΩ)	(kΩ)	(V)
12	8.2	2.4	0.91	3.9	2.5
15	11.0	2.4	1.0	3.0	2.5
24	19.1	2.32	0.845	3.9	2.5
28	22.6	2.32	1.05	3.9	2.5
48	35.7	2.0	0.698	3.9	2.5

Note: Value for R_{TOP}, R_{BOTTOM}, R_O, and V_{REF} refer to Table 3 (fixed internal values).
R_{TRIM}: Trim resistance
a: User-defined parameter, no actual meanings
V_{NOM}: Nominal output voltage
V_{OUT}: Target output voltage

REVISION HISTORY

rev.	description	date
1.0	initial release	05/10/2022
1.01	output voltage trimming updated	05/30/2023

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

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