

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

**FEATURES**

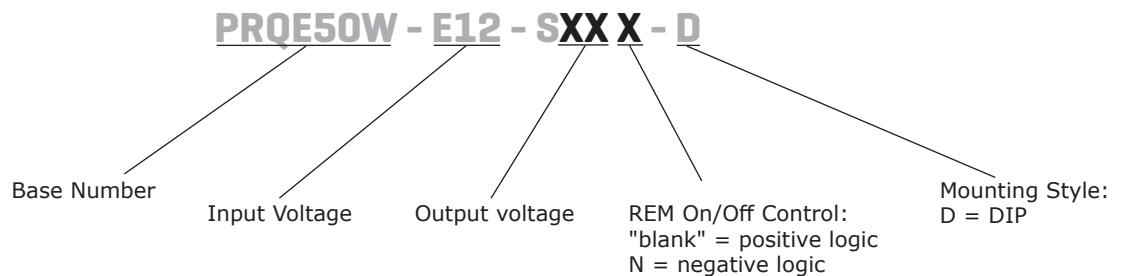
- 50 W isolated output
- ¼-Brick package with industry standard pin-out
- ultra-wide input voltage range, 9~75 V
- single regulated output
- output short circuit, over current, over voltage, & over temperature protection
- 3000 Vdc isolation
- meets UL/EN/IEC 62368-1
- designed to meet EN 61373 and EN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



MODEL	input voltage		output voltage	output current	output power	ripple & noise <sup>1</sup> Vo1/Vo2	efficiency <sup>2</sup>
	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 <sup>2</sup> s
filter	Pi filter				
remote on/off <sup>3</sup>	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			8,000	μF
	15 Vdc output model			6,800	μF
	24 Vdc & 28 Vdc output models			2,350	μF
	48 Vdc output model			700	μF
voltage accuracy	at 36 Vdc input voltage, 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				
conducted 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		718		kHours
	15 Vdc output model		803		kHours
	24 Vdc output model		811		kHours
	28 Vdc output model		800		kHours
	48 Vdc output model		807		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

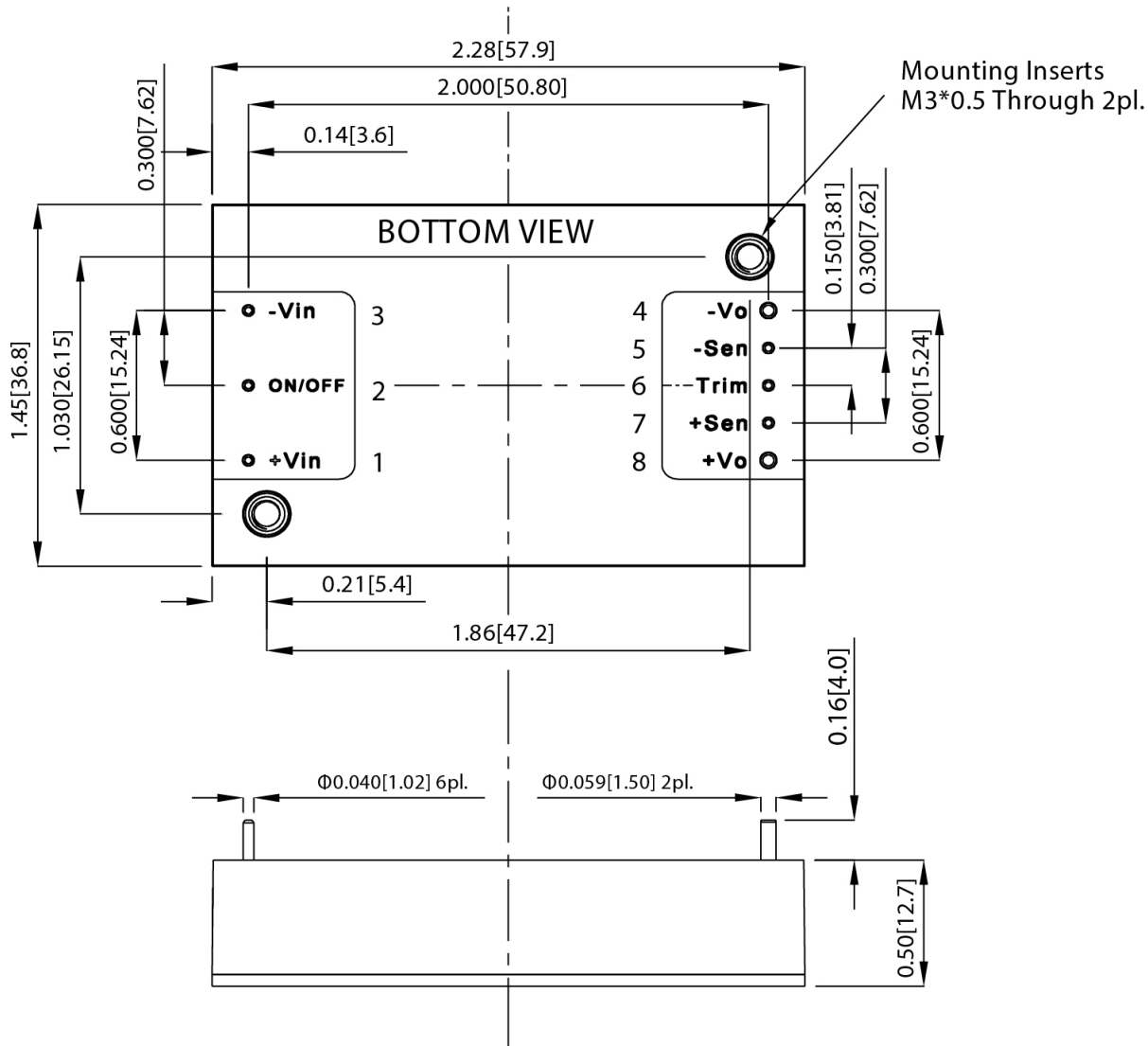
parameter	conditions/description	min	typ	max	units
dimensions	2.28 × 1.45 × 0.50 [57.9 × 36.8 × 12.7 mm]				inch
case material	plastic, DAP, UL 94V-0				
weight			66		g

## MECHANICAL DRAWING

units: inch [mm]

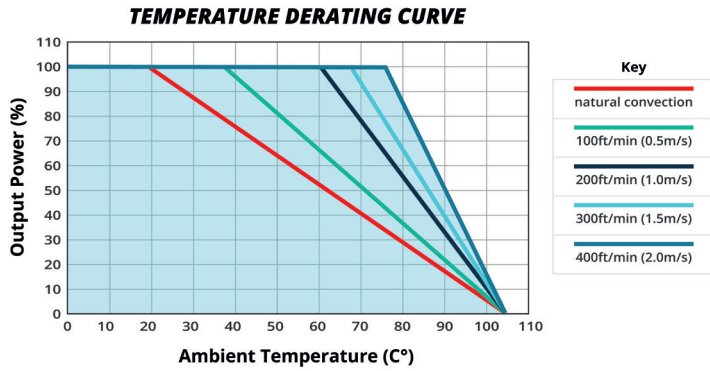
tolerances: inch: x.xx = ±0.02, x.xxx = ±0.010

mm: x.x = ±0.5, x.xx = ±0.25



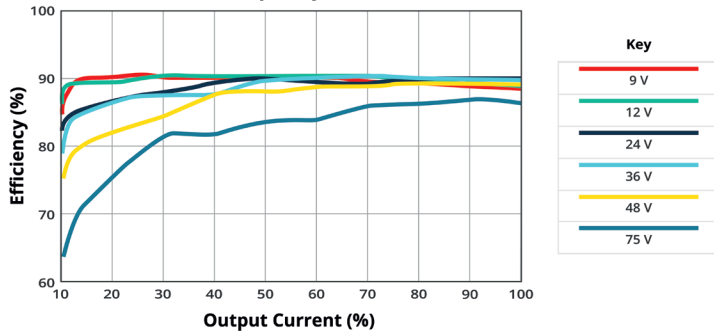
PIN Out	
PIN	Function
1	+Vin
2	ON/OFF
3	-Vin
4	-Vo
5	-Sense
6	Trim
7	+Sense
8	+Vo

## DERATING CURVES

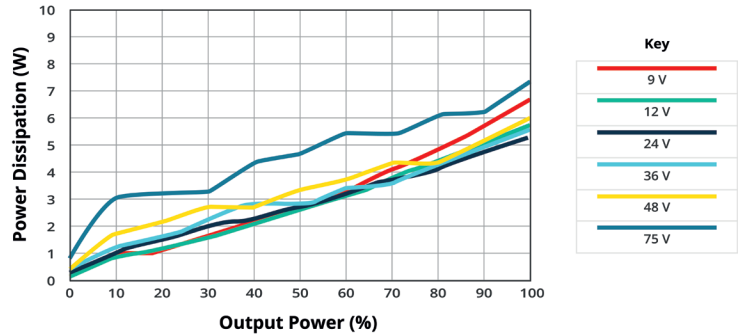


## EFFICIENCY CURVES

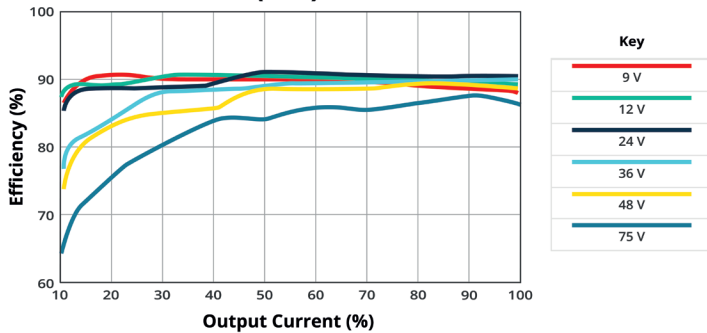
**EFFICIENCY VS OUTPUT LOAD  
PRQE50W-E12-S12-D  
(25°C)**



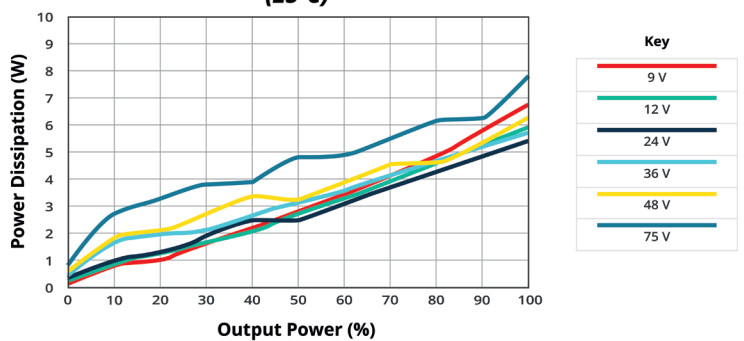
**POWER DISSIPATION VS OUTPUT POWER  
PRQE50W-E12-S12-D  
(25°C)**



**EFFICIENCY VS OUTPUT LOAD  
PRQE50W-E12-S15-D  
(25°C)**

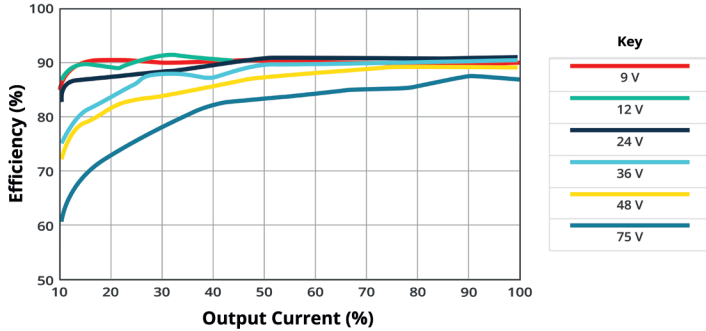


**POWER DISSIPATION VS OUTPUT POWER  
PRQE50W-E12-S15-D  
(25°C)**

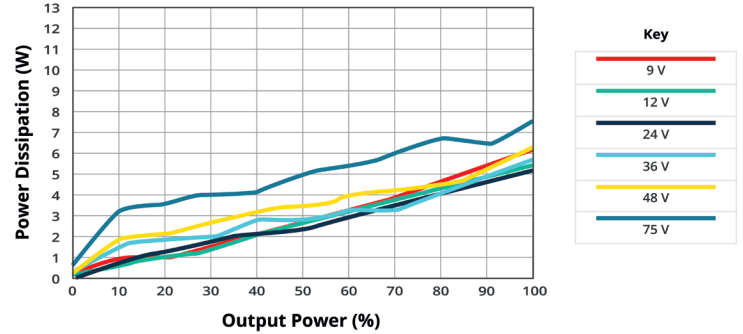


## EFFICIENCY CURVES (CONTINUED)

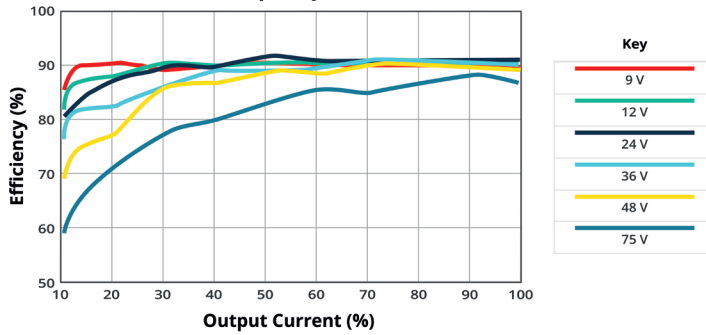
**EFFICIENCY VS OUTPUT LOAD**  
**PRQE50W-E12-S24-D**  
**(25°C)**



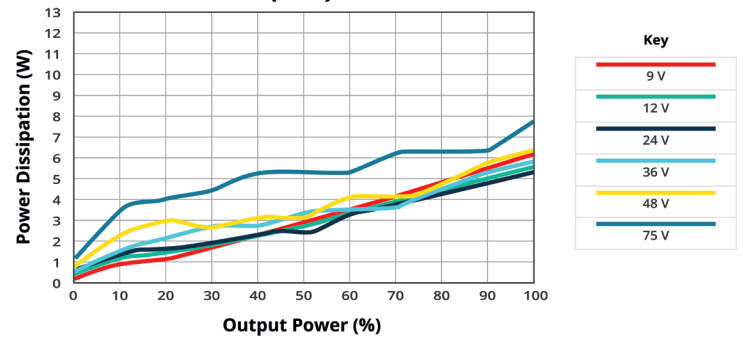
**POWER DISSIPATION VS OUTPUT POWER**  
**PRQE50W-E12-S24-D**  
**(25°C)**



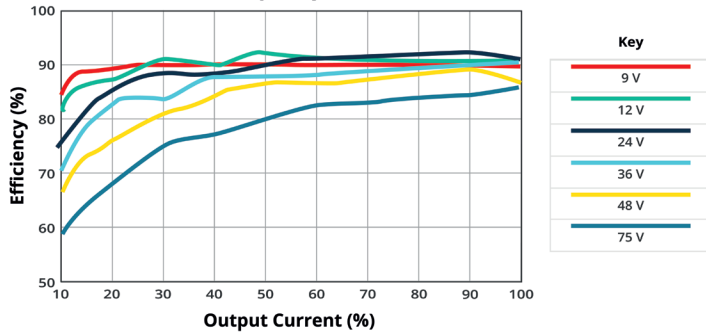
**EFFICIENCY VS OUTPUT LOAD**  
**PRQE50W-E12-S28-D**  
**(25°C)**



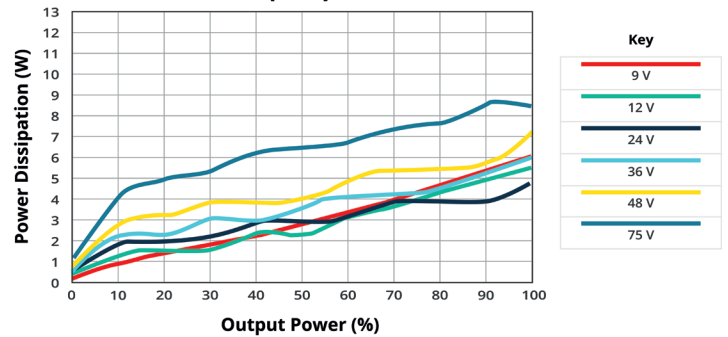
**POWER DISSIPATION VS OUTPUT POWER**  
**PRQE50W-E12-S28-D**  
**(25°C)**



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



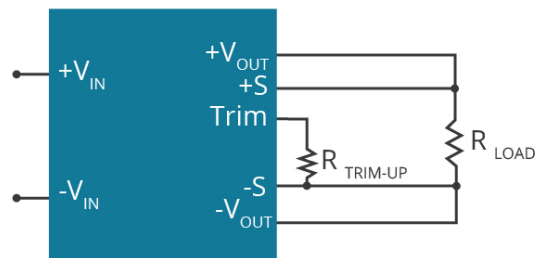
**POWER DISSIPATION VS OUTPUT POWER**  
**PRQE50W-E12-S48-D**  
**(25°C)**



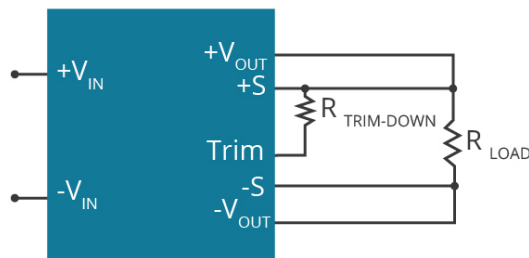
## APPLICATION NOTES

Figure 3

Trim up



Trim down



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

Formula for Trim up

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

Formula for Trim down

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

Example for Trim up

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

Example for Trim down

Table 3

V <sub>OUT</sub> (Vdc)	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)	R <sub>3</sub> (kΩ)	R <sub>TRIM</sub> (kΩ)	V <sub>REF</sub> (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<sub>TOP</sub>, R<sub>BOTTOM</sub>, R<sub>O</sub>, and V<sub>REF</sub> refer to Table 3 (fixed internal values).

R<sub>TRIM</sub>: Trim resistance

a: User-defined parameter, no actual meanings

V<sub>NOM</sub>: Nominal output voltage

V<sub>OUT</sub>: Target output voltage

## REVISION HISTORY

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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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