SERIES: PQA50-T | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

- up to 50 W isolated output
- 2:1 input range (18~36 V, 36~75 V)
- smaller package
- single, regulated output
- 1,500 Vdc isolation
- short circuit, over current, input under voltage protection
- inverse polarity protection
- remote on/off
- operating temperature range (-40~85°C)
- six sided metal shielding
- efficiency up to 91%

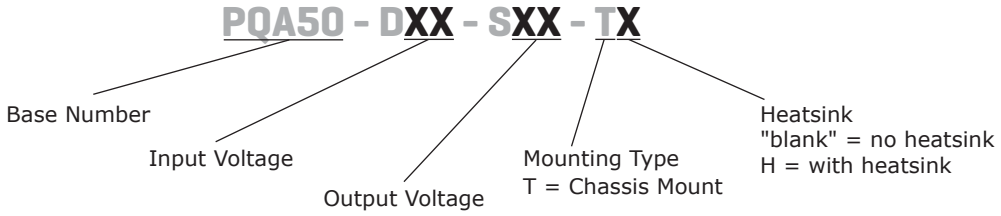
RoHS

MODEL

MODEL	input voltage typ (Vdc)	input voltage range (Vdc)	output voltage (Vdc)	output current min (mA)	output current max (A)	output power max (W)	ripple and noise[1] max (mVp-p)	efficiency typ (%)
PQA50-D24-S3-T	24	18~36	3.3	500	10	33	120	89
PQA50-D24-S5-T	24	18~36	5	500	10	50	120	91
PQA50-D24-S12-T	24	18~36	12	208	4.167	50	120	91
PQA50-D24-S15-T	24	18~36	15	167	3.333	50	120	91
PQA50-D24-S24-T	24	18~36	24	104	2.083	50	120	91
PQA50-D48-S3-T	48	36~75	3.3	500	10	33	120	89
PQA50-D48-S5-T	48	36~75	5	500	10	50	120	91
PQA50-D48-S12-T	48	36~75	12	208	4.167	50	120	91
PQA50-D48-S15-T	48	36~75	15	167	3.333	50	120	91
PQA50-D48-S24-T	48	36~75	24	104	2.083	50	120	91

Notes: 1. ripple and noise are measured at 20 MHz BW by "parallel cable" method

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	24 V input models	18	24	36	Vdc
	48 V input models	36	48	75	Vdc
start-up voltage	input under voltage protection				
	24 V input models	18			Vdc
	48 V input models	36			Vdc
	input over voltage protection				
	24 V input models			36	Vdc
	48 V input models			75	Vdc
under/over voltage shutdown	input under voltage protection				
	24 V input models			16	Vdc
	48 V input models			32	Vdc
	input over voltage protection				
	24 V input models	40			Vdc
	48 V input models	81			Vdc
surge voltage	for maximum of 1 second				
	24 V input models	-0.7		50	Vdc
	48 V input models	-0.7		100	Vdc
start-up time	nominal input, constant load		10		ms
CTRL[1]	models ON (CTRL open or connect TTL high level, 3-12 Vdc)				
	models OFF (CTRL connect GND or low level, 0-1.2 Vdc)				
	input current (models OFF)		6		mA
filter	pi filter				

Note 1: CTRL pin voltage is referenced to GND.

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	full load, input voltage from low to high		±0.2	±0.5	%
load regulation	10% to 100% load		±0.5	±1	%
voltage accuracy			±1	±3	%
adjustability			±10		%
switching frequency	PWM mode		320		KHz
transient recovery time	25% load step change		300	500	µs
transient response deviation	25% load step change		±3	±5	%
temperature coefficient	100% load		±0.02		%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				
over current protection			150		%
over voltage protection	3.3 Vdc output models		3.9		Vdc
	5 Vdc output models		6.2		Vdc
	12 Vdc output models		15		Vdc
	15 Vdc output models		18		Vdc
	24 Vdc output models		30		Vdc
over temperature protection			110		°C

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	for 1 minute at 1 mA max.	1,500			Vdc
isolation resistance	at 500 Vdc	1,000			MΩ
conducted emissions	CISPR22/EN55022 class B (external circuit required, see figure 1)				
radiated emissions	CISPR22/EN55022 class B (external circuit required, see figure 1)				
ESD	IEC/EN61000-4-2 class B, contact ± 4kV				
radiated immunity	IEC/EN61000-4-3 class A, 10V/m				
EFT/burst	IEC/EN61000-4-4 class B, ± 2kV (external circuit required, see figure 1)				
surge	IEC/EN61000-4-5 class B, ± 2kV (external circuit required, see figure 1)				
conducted immunity	IEC/EN61000-4-6 class A, 3 Vr.m.s				
voltage dips & interruptions	IEC/EN61000-4-29 class B, 0%-70%				
MTBF	as per MIL-HDBK-217F @ 25°C	1,000,000			hours
RoHS	2011/65/EU				

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
case temperature	at full load, operating temperature curve range			105	°C
vibration	10-55Hz, 30 min. along x, y, and z			10	G

MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	chassis mount: 76.0 x 31.5 x 21.2 chassis mount with heatsink: 76.0 x 31.5 x 25.1				mm mm
case material	aluminum alloy				
weight	chassis mount chassis mount with heatsink		57 65		g g

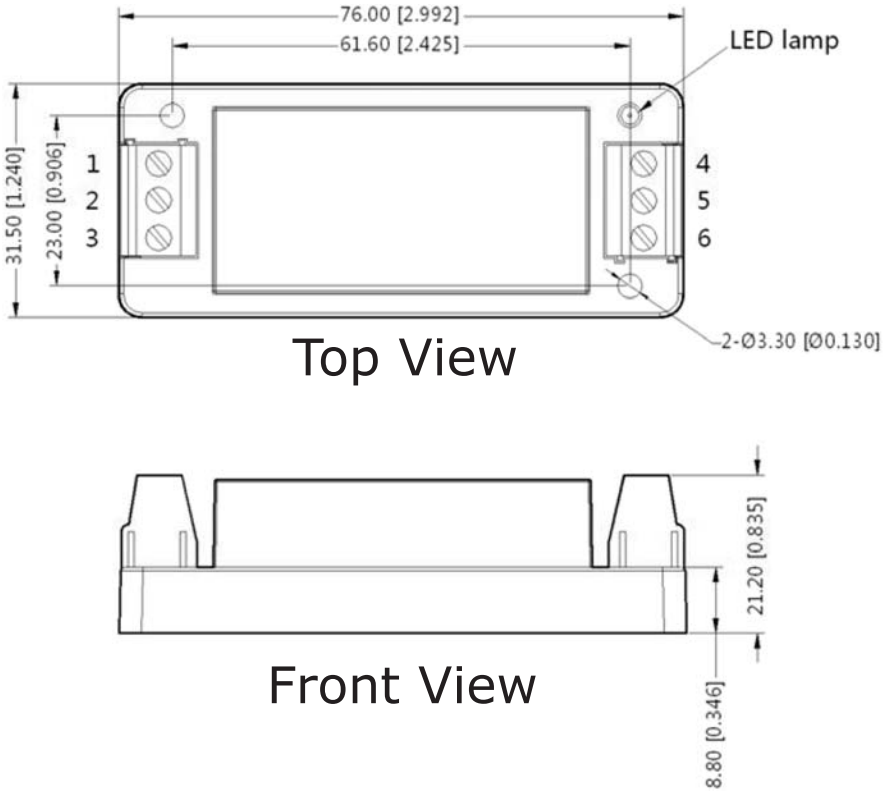
MECHANICAL DRAWING

CHASSIS MOUNT

units: mm[inch]
tolerance: ±0.50[±0.020]

wire range: 24~12 AWG

PIN CONNECTIONS	
PIN	Function
1	CTRL
2	GND
3	Vin
4	Trim
5	0V
6	+Vo

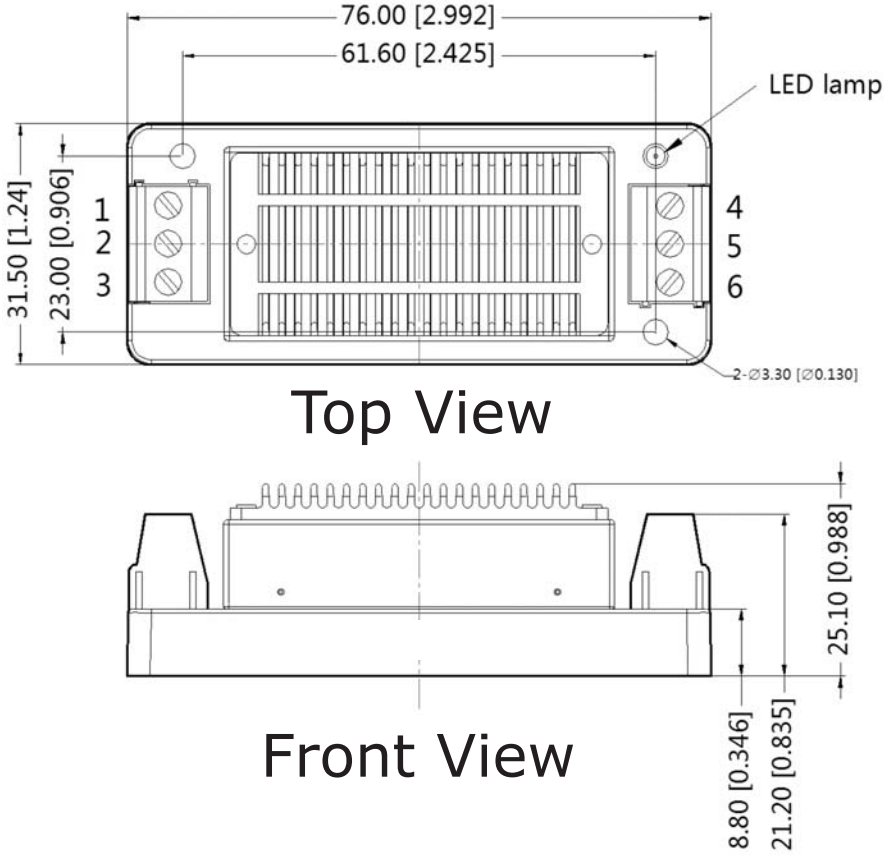


CHASSIS MOUNT WITH HEATSINK

units: mm[inch]
tolerance: ±0.50[±0.020]

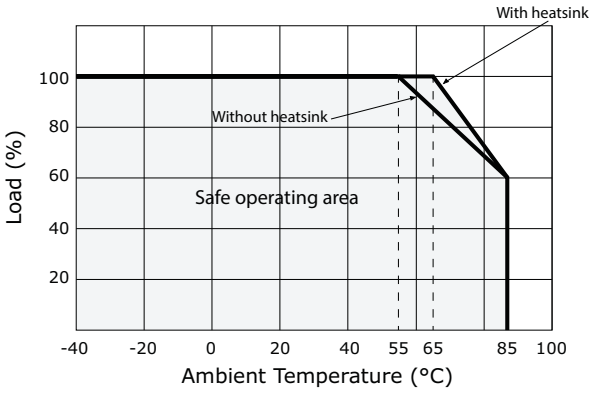
wire range: 24~12 AWG

PIN CONNECTIONS	
PIN	Function
1	CTRL
2	GND
3	Vin
4	Trim
5	0V
6	+Vo

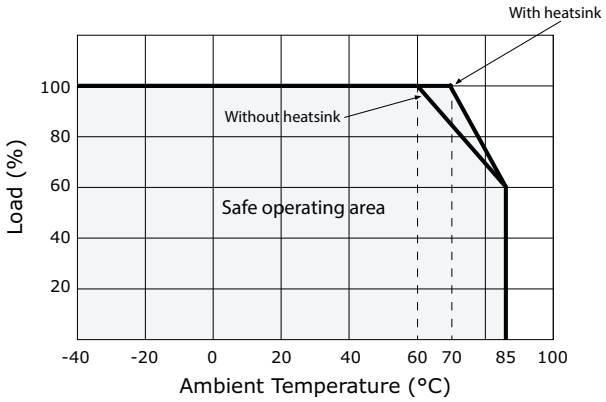


DERATING CURVES

Output Voltage ≤ 5V



Output Voltage > 5V



EMC RECOMMENDED CIRCUIT

Figure 1

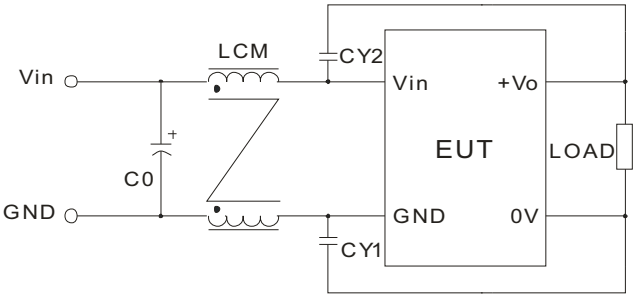


Table 1

Recommended external circuit components		
Vin (Vdc)	24	48
C0	330μF/50V	330μF/100V
CY1, CY2	1nF/2KV	1nF/2KV
LCM	2.2mH	2.2mH

TEST CONFIGURATION

Figure 2

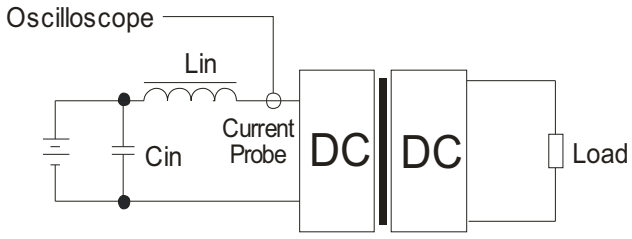


Table 2

External components	
Lin	4.7μH
Cin	220μF, ESR < 1.0Ω at 100 KHz

Note: 1. Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.

APPLICATION NOTES

1. **Requirement on output load**
   To ensure this module can operate efficiently and reliably, the minimum output load cannot be less than 5% of the full load during operation. If the actual output power is small, please connect a resistor at the output end in parallel to increase the load.

2. **Recommended circuit**
   This series has been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load (see Figure 3). If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR (see table 3). However, the capacitance must not exceed the maximum capacitive load or a start-up problem might arise (see table 4).

Figure 3

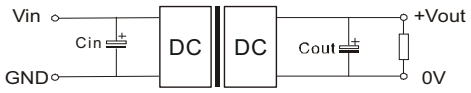


Table 3

Vout (Vdc)	Cin (μF)	Cout (μF)
3.3	100	220
5	100	220
12	100	100
15	100	100
24	100	47

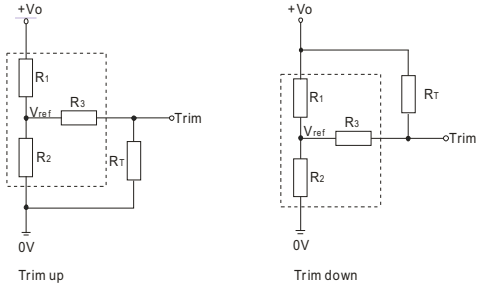
Table 4

Vout (Vdc)	Max. Capacitive Load (μF)
3.3	27000
5	18900
12	3700
15	2000
24	1000

3. **Output Voltage Trimming**
   Leave open if not used.

Figure 4

Application Circuit for Trim Pin
(part in broken line is the interior of models)



Formula for Trim Resistor

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vo' - Vref} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - Vref}{Vref} \cdot R_2$$

Note: Value for R1, R2, R3, and Vref (see Table 5)
R_T: Trim Resistor
a: User-defined parameter, no actual meanings
Vo': The trim up/down voltage

Table 5

Vout (Vdc)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	4.788	2.87	15	1.24
5	2.87	2.87	12.1	2.5
12	11	2.87	22	2.5
15	15	3	22	2.5
24	20	2.308	15	2.5

Notes:
1. Minimum load shouldn't be less than 5%, otherwise ripple may increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specifications listed.
2. Maximum capacitive load is tested at input voltage range and full load.
3. All specifications are measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

REVISION HISTORY

rev.	description	date
1.0	initial release	01/21/2014

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

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