CUI INC
a bel group

SERIES: PQDE6W | DESCRIPTION: DC-DC CONVERTER

FEATURES

- industry standard footprint
- high efficiency up to 88%
- single and dual output models available
- board mount
- 1500 Vdc isolation
- industrial operating temp -40~+85 °C
- 4:1 wide input range
- input under voltage protection & over voltage protection
- over current protection
- EN/BS EN 62368-1 certified



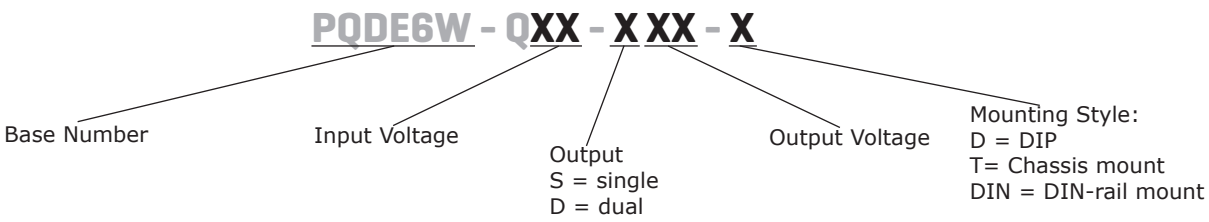
RoHS c UL us CE

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 (%)
PQDE6W-Q24-S3[3]	24	9~36	3.3	0	1500	4.95	85	79
PQDE6W-Q24-S5[3]	24	9~36	5	0	1200	6	85	83
PQDE6W-Q24-S9[3]	24	9~36	9	0	667	6	85	85
PQDE6W-Q24-S12[3]	24	9~36	12	0	500	6	85	87
PQDE6W-Q24-S15[3]	24	9~36	15	0	400	6	85	88
PQDE6W-Q24-S24[3]	24	9~36	24	0	250	6	85	88
PQDE6W-Q24-D5[3]	24	9~36	±5	0	±600	6	85	83
PQDE6W-Q24-D12[3]	24	9~36	±12	0	±250	6	85	87
PQDE6W-Q24-D15[3]	24	9~36	±15	0	±200	6	85	88
PQDE6W-Q24-D24[3]	24	9~36	±24	0	±125	6	85	88
PQDE6W-Q48-S3	48	18~75	3.3	0	1500	4.95	85	79
PQDE6W-Q48-S5	48	18~75	5	0	1200	6	85	83
PQDE6W-Q48-S12	48	18~75	12	0	500	6	85	87
PQDE6W-Q48-S15	48	18~75	15	0	400	6	85	88
PQDE6W-Q48-S24	48	18~75	24	0	250	6	85	88
PQDE6W-Q48-D5	48	18~75	±5	0	±600	6	85	83
PQDE6W-Q48-D12	48	18~75	±12	0	±250	6	85	87
PQDE6W-Q48-D15	48	18~75	±15	0	±200	6	85	88

Notes:
1. From 5~100% load, nominal input, 20 MHz bandwidth oscilloscope, with 10 µF tantalum and 1 µF ceramic capacitors on the output. From 0~5% load, ripple and noise is <5% Vo.
2. Measured at nominal input voltage, full load.
3. Model is not CE 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	24 Vdc input models 48 Vdc input models		9 18	24 48	36 75	Vdc Vdc
start-up voltage	24 Vdc input models 48 Vdc input models				9 18	Vdc Vdc
surge voltage	for maximum of 1 second 24 Vdc input models 48 Vdc input models		 -0.7 -0.7		 50 100	 Vdc Vdc
under voltage shutdown	24 Vdc input models 48 Vdc input models		5.5 12	6.5 15.5		Vdc Vdc
current	24 Vdc input models	3.3 Vdc output models all other models			268 309	mA mA
	48 Vdc input models	3.3 Vdc output models all other models			134 155	mA mA
filter	Pi filter					
input reverse polarity protection	only present on chassis mount and DIN-rail mount models					
no load power consumption				0.12		W

OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load[1]	3.3 Vdc output models 5 Vdc output models 9 Vdc output models 12, ±5 Vdc output models 15 Vdc output models all other models			1,800 1,000 680 470 220 100	µF µF µF µF µF µF
voltage accuracy[2]	0% to full load		±1	±3	%
line regulation	from low line to high line, full load positive outputs negative outputs		 ±0.2 ±0.5	 ±0.5 ±1	 % %
load regulation[3]	from 5% to full load positive outputs negative outputs		 ±0.5 ±0.5	 ±1 ±1.5	 % %
voltage balance[4]	dual output models			±5	%
cross regulation	dual output models: main output 50% load secondary output from 10~100% load			±5	%
switching frequency[5]	PWM mode		300		kHz
transient recovery time	25% load step change, nominal input voltage		300	500	µs

OUTPUT (CONTINUED)

parameter	conditions/description	min	typ	max	units
transient response deviation	25% load step change, nominal input voltage 3.3, 5, ±5 Vdc output models all other models		 ±5 ±3	 ±8 ±5	 % %
temperature coefficient	at full load			±0.03	%/°C

Note:
1. Tested at input voltage range and full load.
2. At 0~5% load, the max output voltage accuracy for the ±5 & ±9 Vdc output models is ±5%.
3. At 0~100% load, the max load regulation is ±5%.
4. Unbalanced loads should not exceed ±5%. If ±5% is exceeded, the product performance cannot be guaranteed.
5. Value is based on full load. At loads <50%, the switching frequency decreases with decreasing load.

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over voltage protection		110		160	%
over current protection		110	140	190	%
short circuit protection	continuous, self recovery				

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA	1,500			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		1,000		pF
safety approvals	certified to 62368-1: EN/BS EN certified to 60950-1: UL				
conducted emissions	CISPR22/EN55022, class A (no external circuit); class B (external circuit required, see Figure 3-b)				
radiated emissions	CISPR22/EN55022, class A (no external circuit); class B (external circuit required, see Figure 3-b)				
ESD	IEC/EN61000-4-2, contact ± 4kV, class B				
radiated immunity	IEC/EN61000-4-3, 10V/m, class A				
EFT/burst	IEC/EN61000-4-4, ± 2kV, class B (external circuit required, see Figure 3-a)				
surge	IEC/EN61000-4-5, line-line ± 2kV, class B (external circuit required, see Figure 3-a)				
conducted immunity	IEC/EN61000-4-6, 3 Vr.m.s, class A				
voltage dips & interruptions	IEC/EN61000-4-29, 0%-70%, class B				
insulation grade[6]	functional				
MTBF	as per MIL-HDBK-217F, 25°C	1,000,000			hours
RoHS	yes				

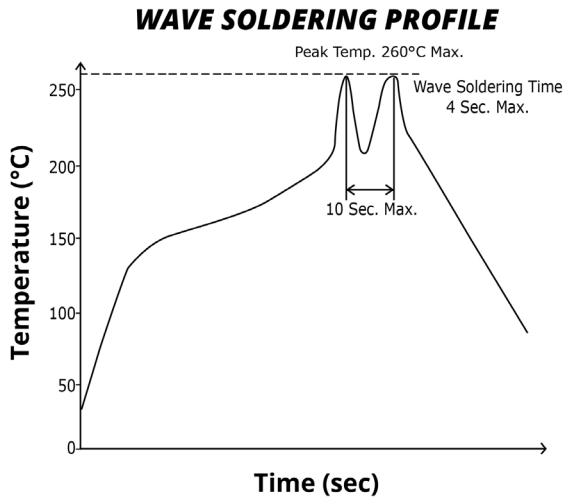
Note: 6. Only suitable for class 1 energy sources (ES1).

ENVIRONMENTAL

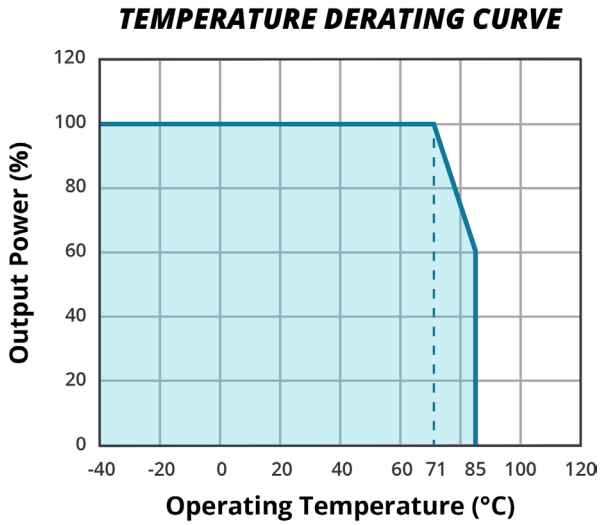
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
vibration	10~55 Hz for 30 minutes on each axis		10		G

SOLDERABILITY

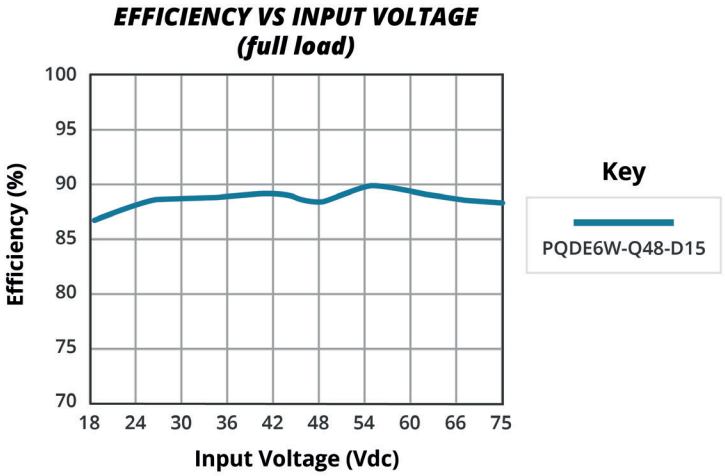
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
wave soldering	see wave soldering profile			260	°C

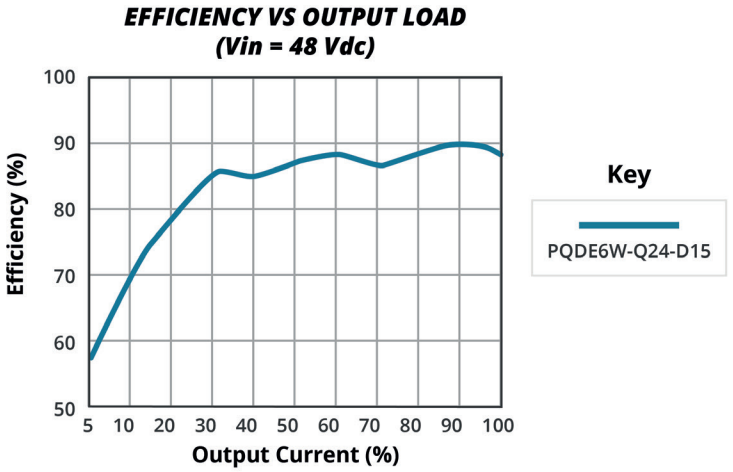


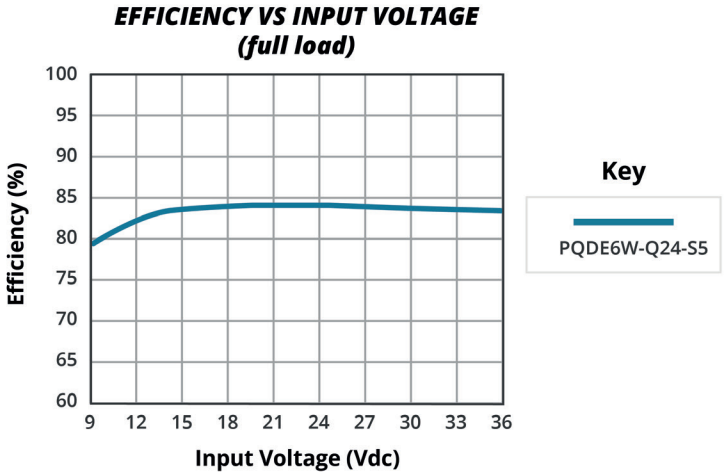
DERATING CURVE

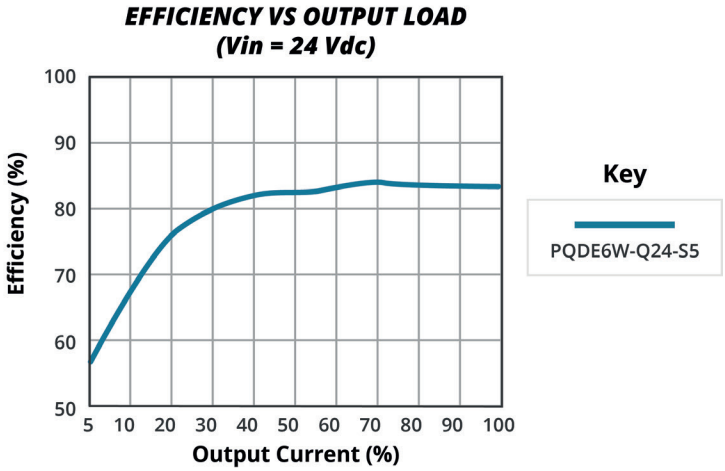


EFFICIENCY CURVES









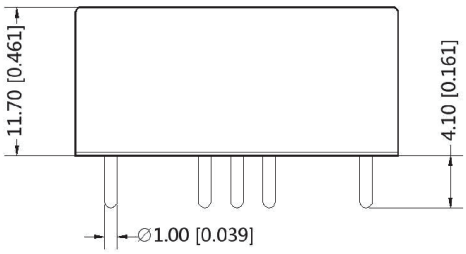
MECHANICAL

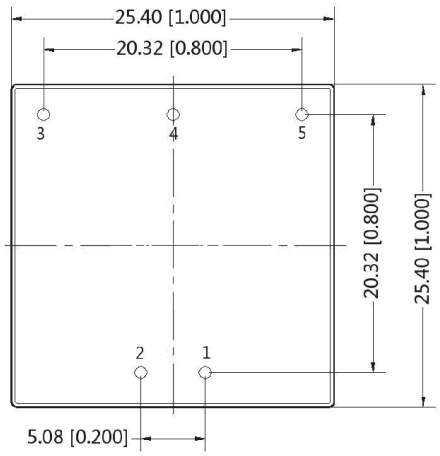
parameter	conditions/description	min	typ	max	units
dimensions	DIP Chassis DIN-Rail	25.40 x 25.40 x 11.70 [1.000 x 1.000 x 0.461 inch] 76.00 x 31.50 x 21.20 [2.992 x 1.240 x 0.835 inch] 76.00 x 31.50 x 25.80 [2.992 x 1.240 x 1.016 inch]			mm mm mm
case material	aluminum alloy				
weight	DIP Chassis DIN-Rail		14 36 56		g g g

MECHANICAL DRAWING

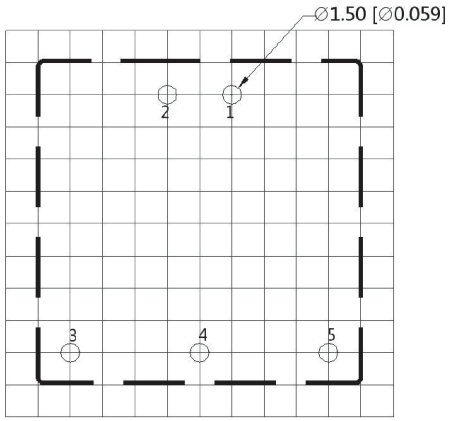
units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]

PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vout	+Vout
4	No Pin	0V
5	0V	-Vout





Note: 2.54 x 2.54 mm grid



Recommended PCB Layout
Top View

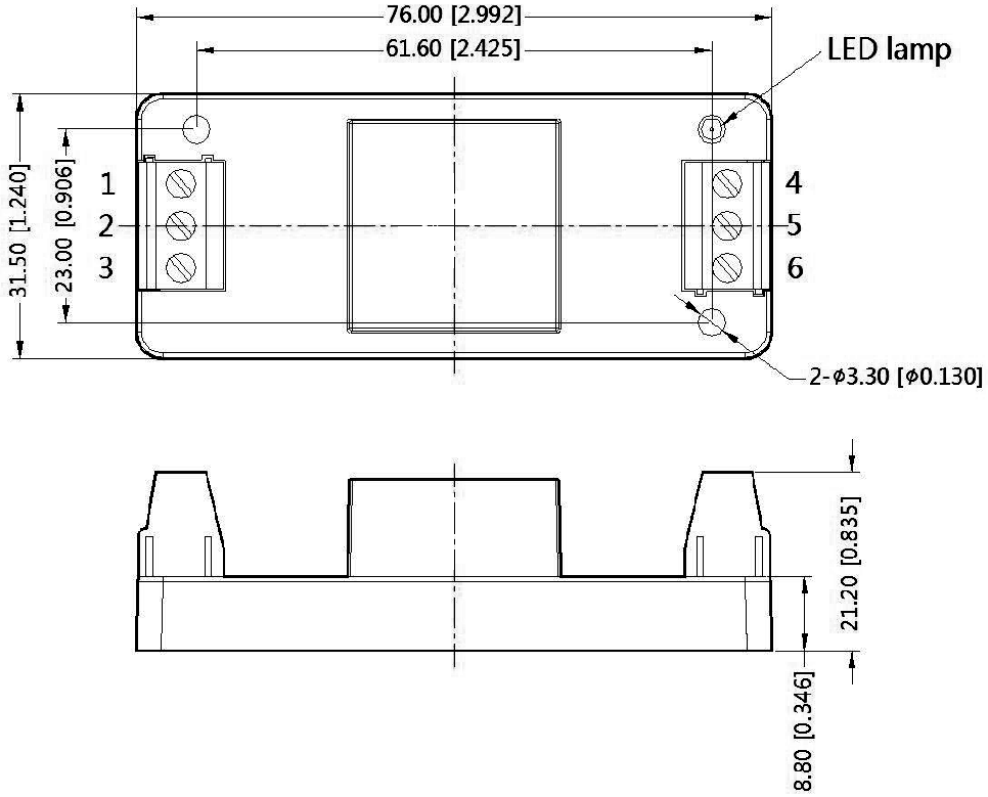
MECHANICAL DRAWING (CHASSIS)

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

wire range: 24~12 AWG
tightening torque: max 0.4 N*m

PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	NC	NC
2	GND	GND
3	Vin	Vin
4	0V	-Vout
5	NC	0V
6	+Vout	+Vout

NC=no connection



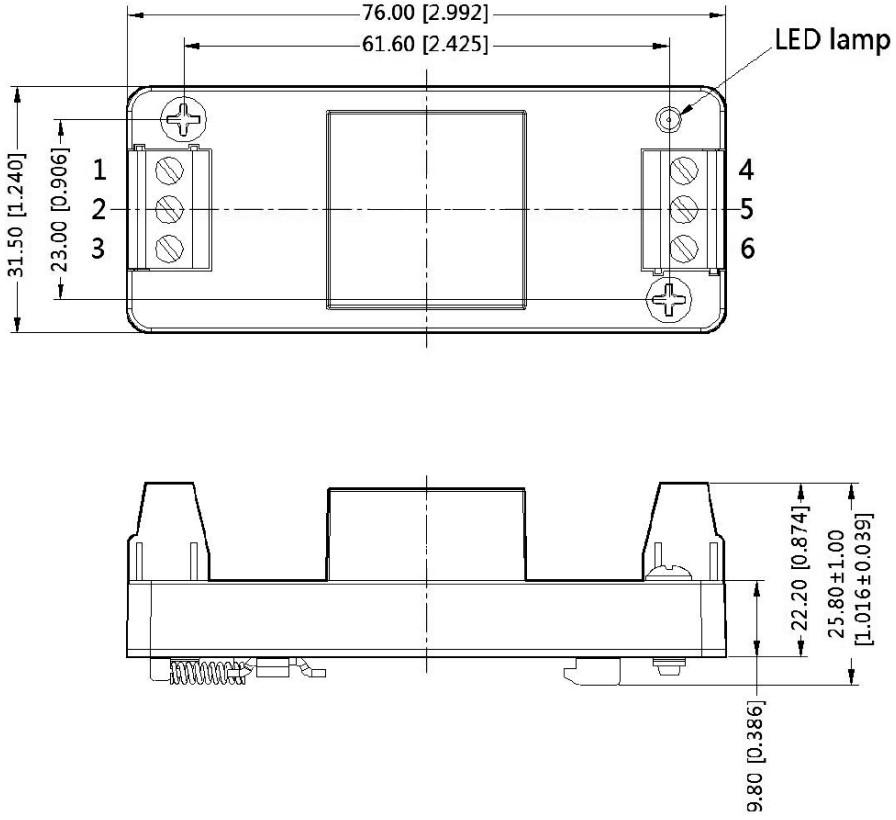
MECHANICAL DRAWING (DIN-RAIL)

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

installed on DIN rail TS35
wire range: 24~12 AWG
tightening torque: max 0.4 N*m

PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	NC	NC
2	GND	GND
3	Vin	Vin
4	0V	-Vout
5	NC	0V
6	+Vout	+Vout

NC=no connection



APPLICATION CIRCUIT

This series has been tested according to the following recommended circuits (Figures 1 & 2) before leaving the factory. If you want to further reduce the input and output ripple, you can increase the input and output capacitors or select capacitors of low equivalent impedance provided that the capacitance is less than the maximum capacitive load of the model.

Figure 1
Single Output Models

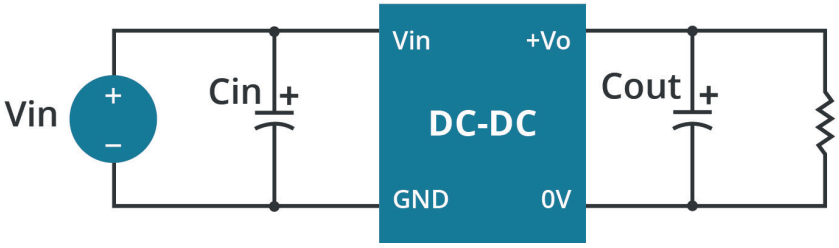


Figure 2
Dual Output Models

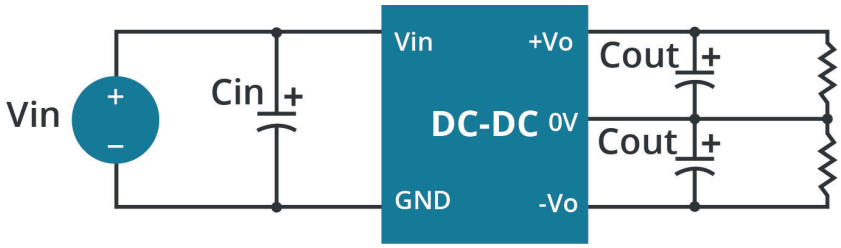


Table 1

Vin (Vdc)	Cin (µF/V)	Cout (µF/V)
24	100 µF/50 V	10 µF/50 V
48	10 µF ~ 47 µF / 100 V	10 µF/50 V

EMC RECOMMENDED CIRCUIT

Figure 3

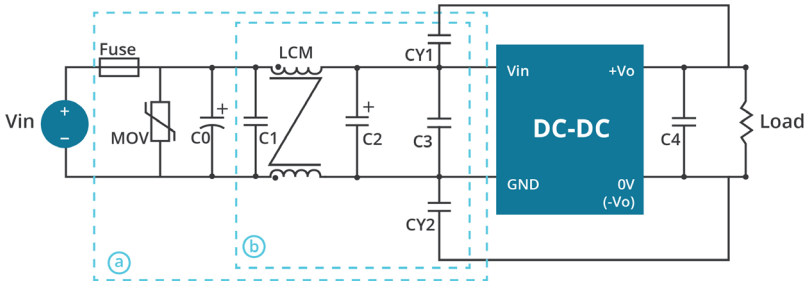


Table 2

Recommended External Circuit Components		
Vin (Vdc)	24	48
FUSE	choose according to actual input current	
MOV	S20K30	S14K60
C0	680 µF / 50 V	680 µF / 100 V
C1	1 µF / 50 V	1 µF / 100 V
C2	330 µF / 50 V	330 µF / 50 V
C3	4.7 µF / 50 V	4.7 µF / 100 V
C4	10 µF	
LCM	4.7 mH	
CY1, CY2	1 nF / 2 kV	

Notes: For EMC tests part ① in Figure 3 was used for immuninty and part ② for emissions test. Selecting based on needs.

REVISION HISTORY

rev.	description	date
1.0	initial release	02/20/2018
1.01	features and safety line updated, packaging removed	01/14/2021
1.02	derating curve and circuit figures updated	07/21/2021
1.03	chassis, din-rail models added	11/01/2022
1.04	CE certification updated	11/09/2022
1.05	safety section updated	03/15/2023
1.06	product photo updated	07/18/2023

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

CUI INC
a bel group

Headquarters
20050 SW 112th Ave.
Tualatin, OR 97062
800.275.4899

Fax 503.612.2383
cui.com
techsupport@cui.com

CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

CUI reserves the right to make changes to the product at any time without notice. Information provided by CUI is believed to be accurate and reliable. However, no responsibility is assumed by CUI for its use, nor for any infringements of patents or other rights of third parties which may result from its use.

CUI products are not authorized or warranted for use as critical components in equipment that requires an extremely high level of reliability. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

CUI Inc.:

PQDE6W-Q24-D12-D PQDE6W-Q48-D12-D PQDE6W-Q24-D15-D PQDE6W-Q24-D24-D PQDE6W-Q24-D5-D PQDE6W-Q48-S5-D PQDE6W-Q48-D15-D PQDE6W-Q48-D5-D PQDE6W-Q48-S12-D PQDE6W-Q48-S15-D PQDE6W-Q48-S24-D PQDE6W-Q48-S3-D PQDE6W-Q24-S12-D PQDE6W-Q24-S15-D PQDE6W-Q24-S24-D PQDE6W-Q24-S3-D PQDE6W-Q24-S5-D PQDE6W-Q24-S9-D