CUI INC®

SERIES: PQM3-M | DESCRIPTION: DC-DC CONVERTER

FEATURES

- 3 W isolated output
- smaller package
- single regulated output
- 1,500 Vdc isolation
- continuous short circuit
- temperature range (-40~105°C)
- high efficiency at light load
- high power density
- high vibration tolerance
- efficiency up to 81%

RoHS

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 and noise[1] max (mVp-p)	efficiency typ (%)
PQM3-D12-S5-M	12	9~18	5	30	600	3	60	75
PQM3-D12-S12-M	12	9~18	12	12	250	3	60	77
PQM3-D12-S15-M	12	9~18	15	10	200	3	60	79
PQM3-D24-S5-M	24	18~36	5	30	600	3	60	76
PQM3-D24-S12-M	24	18~36	12	12	250	3	60	81
PQM3-D24-S15-M	24	18~36	15	10	200	3	60	80
PQM3-D48-S5-M	48	36~75	5	30	600	3	60	77
PQM3-D48-S12-M	48	36~75	12	12	250	3	60	80
PQM3-D48-S15-M	48	36~75	15	10	200	3	60	80

Notes: 1. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 µF ceramic and 10 µF electrolytic capacitors on the output.

PART NUMBER KEY

PQM3 - DXX - SXX - M - X

Base Number	Input Voltage	Output Voltage	Packaging Style	Package Options
			SMT	"blank" = standard TR = Tape & Reel

INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	12 V input models 24 V input models 48 V input models	9 18 36	12 24 48	18 36 75	Vdc Vdc Vdc
start-up voltage	12 V input models 24 V input models 48 V input models	4.5 11 24	8 16 33	9 18 36	Vdc Vdc Vdc
surge voltage	for maximum of 1 second 12 V input models 24 V input models 48 V input models	 -0.7 -0.7 -0.7		 25 50 100	 Vdc Vdc Vdc
filter	pi filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	full load, input voltage from low to high		±0.2	±0.4	%
load regulation	5% to 100% load		±0.2	±0.75	%
voltage accuracy	5% to 100% load		±1	±3	%
no-load output voltage accuracy	5V models all other models		±1.5 ±1.5	±5 ±3	% %
switching frequency	100% load, nominal input voltage (PFM mode)		350		KHz
transient recovery time	25% load step change		0.5	1	ms
transient response deviation	25% load step change		±2	±5	%
temperature coeffecient	100% load		±0.02	±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				

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-b)				
radiated emissions	CISPR22/EN55022, class B (external circuit required, see Figure 1-b)				
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-a)				
surge	IEC/EN61000-4-5, class B, ± 2kV (external circuit required, see Figure 1-a)				
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		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	at full load, Ta=25°C		25		°C

SOLDERABILITY

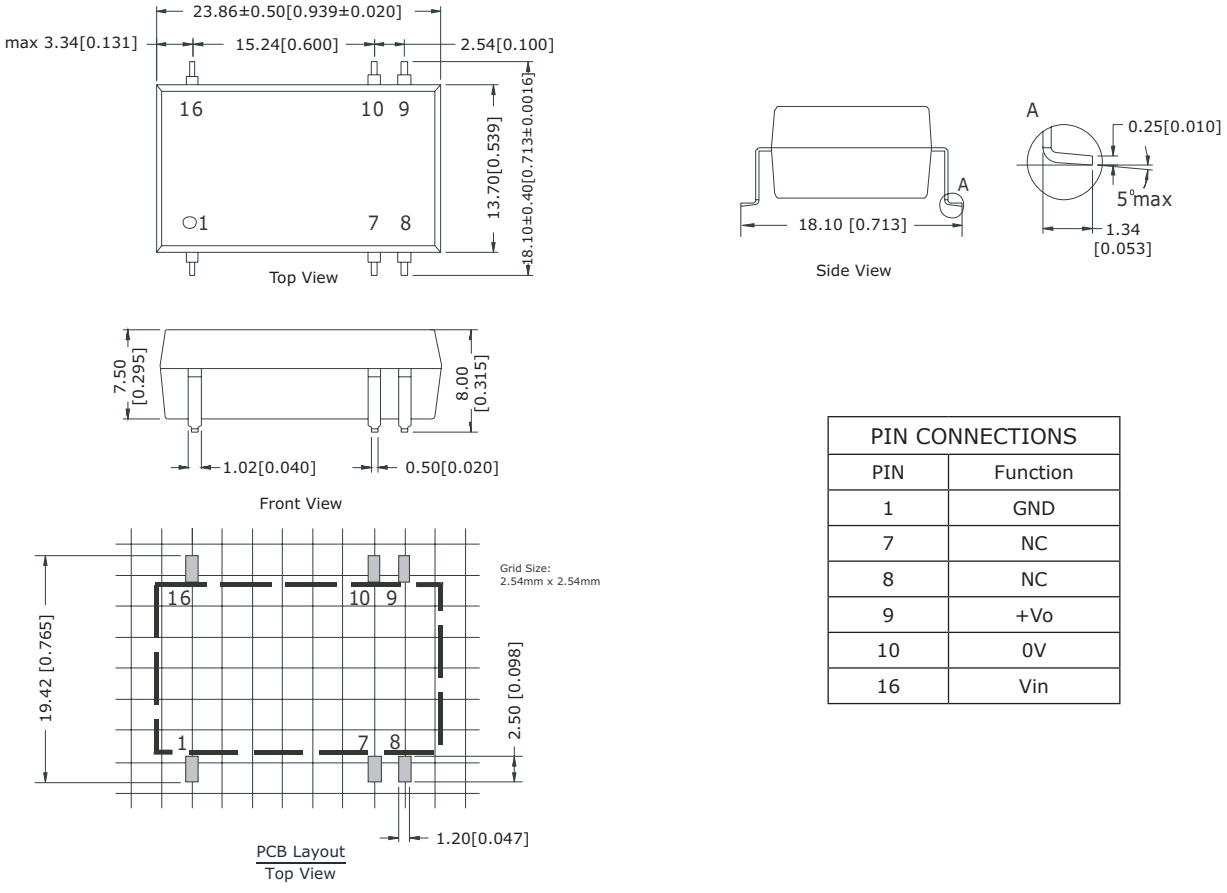
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
reflow soldering	see reflow soldering profile			240	°C

MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	23.86 x 13.70 x 8.00 (0.939 x 0.539 x 0.315 inch)				mm
case material	epoxy resin (UL94-V0)				
weight			5.2		g

MECHANICAL DRAWING

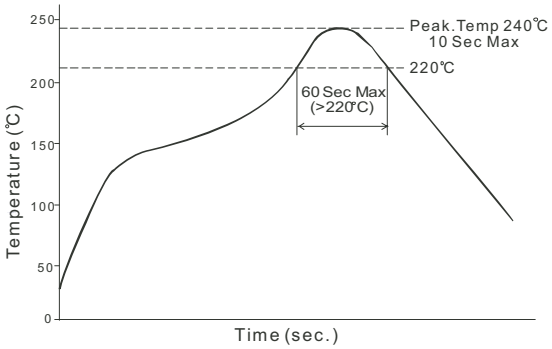
units: mm[inch]
tolerance: ±0.25[±0.010]
pin section tolerance: ±0.10[±0.004]



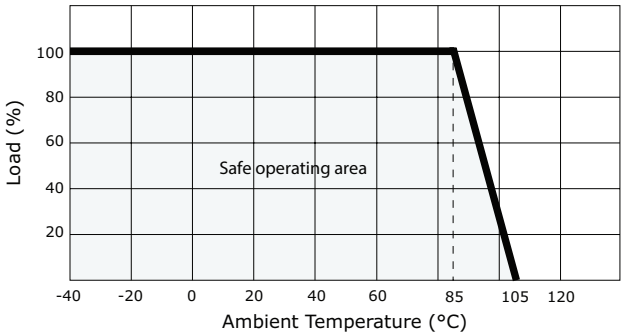
PIN CONNECTIONS	
PIN	Function
1	GND
7	NC
8	NC
9	+Vo
10	0V
16	Vin

DERATING CURVES

Reflow Soldering Profile



Temperature Derating Curve



EMC RECOMMENDED CIRCUIT

Figure 1

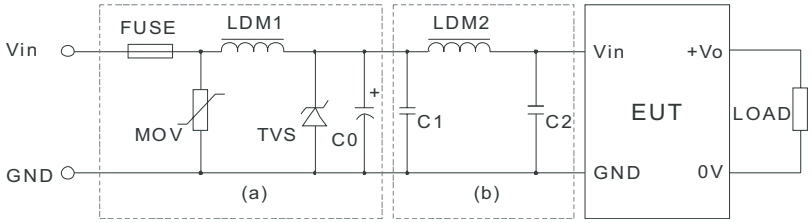


Table 1

Recommended external circuit components			
Vin (Vdc)	12	24	48
FUSE	choose according to practical input current		
MOV	--	10D560	10D101
LDM1	--	56μH	56μH
TVS	SMCJ28A	SMCJ48A	SMCJ90A
C0	680μF/25V	120μF/50V	120μF/100V
LDM2	12μH	12μH	12μH
C1	4.7μF/50V	4.7μF/50V	4.7μF/100V
C2	4.7μF/50V	4.7μF/50V	4.7μF/100V

TEST CONFIGURATION

Figure 2

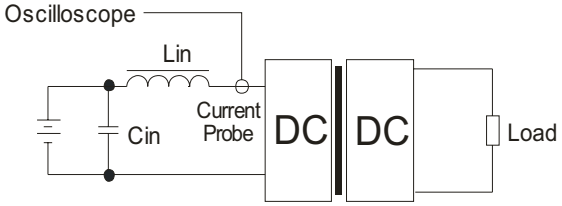


Table 2

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

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

APPLICATION NOTES

1. **Output load requirement**
   To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 5% of the full load during operation. If the actual output power is low, 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 & Table 3). If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be appropriate. If the capacitance is too high, a startup problem might arise. For every channel of the output, to ensure safe and reliable operation, the maximum capacitance must be less than the maximum capacitive load (see Table 4).

Figure 3

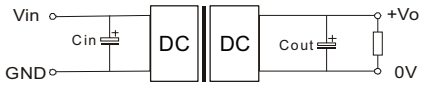


Table 3

Vin (Vdc)	Cin (μF)	Cout (μF/mA)
12	100	10/100
24	10~47	10/100
48	10~47	10/100

Table 4

Vout (Vdc)	Max. Capacitive Load (μF)
5	3300
12	1800
15	1000

3. **Input Current**
   When it is used in an unregulated condition, make sure that the input fluctuations and ripple voltage do not exceed the module standard. Refer to Figure 4 & Table 5 for the startup current of this dc-dc module.

Figure 4

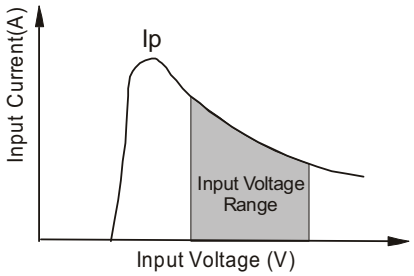


Table 5

Vin (Vdc)	Ip (mA)
12	640
24	320
48	160

Note: 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	03/19/2013
1.01	updated emc recommendations, updated spec	05/14/2014

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

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