CUI INC
a bel group

SERIES: PQM1-M | DESCRIPTION: DC-DC CONVERTER

FEATURES

- 1 W isolated output
- smaller package
- single regulated output
- 1,500 Vdc isolation
- continuous short circuit protection
- extended temperature range (-40~85°C)
- high efficiency at light load
- efficiency up to 75%
- designed to meet EN/BS EN 62368-1



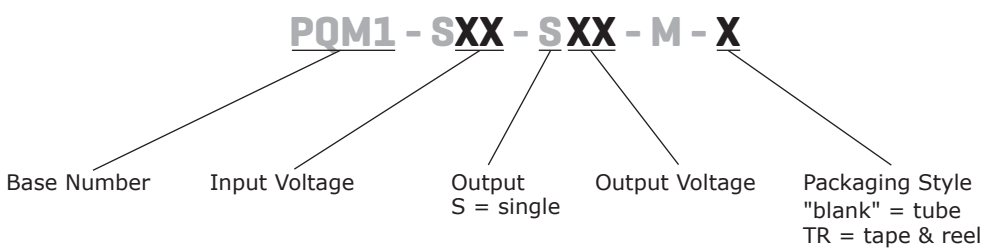
RoHS

MODEL

MODEL	input voltage		output voltage	output current		output power	ripple and noise[1]	efficiency
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	typ (mVp-p)	typ (%)
PQM1-S5-S3-M*	5	4.75~5.25	3.3	25	243	0.8	50	58
PQM1-S5-S5-M*	5	4.75~5.25	5	20	200	1	50	72
PQM1-S5-S9-M*	5	4.75~5.25	9	12	111	1	50	74
PQM1-S5-S12-M*	5	4.75~5.25	12	9	84	1	50	73
PQM1-S5-S15-M*	5	4.75~5.25	15	7	67	1	50	74
PQM1-S12-S5-M*	12	11.4~12.6	5	20	200	1	50	73
PQM1-S12-S9-M	12	11.4~12.6	9	12	111	1	50	74
PQM1-S12-S12-M*	12	11.4~12.6	12	9	84	1	50	73
PQM1-S12-S15-M*	12	11.4~12.6	15	7	67	1	50	75
PQM1-S24-S5-M*	24	22.8~25.2	5	20	200	1	50	65
PQM1-S24-S9-M	24	22.8~25.2	9	12	111	1	50	74
PQM1-S24-S12-M*	24	22.8~25.2	12	9	84	1	50	73
PQM1-S24-S15-M*	24	22.8~25.2	15	7	67	1	50	74

Note: 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.
2. * Discontinued model.

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	5 Vdc input models 12 Vdc input models 24 Vdc input models	4.75 11.4 22.8	5 12 24	5.25 12.6 25.2	Vdc Vdc Vdc
surge voltage	for maximum of 1 second 5 Vdc input models 12 Vdc input models 24 Vdc input models	 -0.7 -0.7 -0.7		 9 18 30	 Vdc Vdc Vdc
filter	capacitance filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	for Vin change of 1%			±0.25	%
load regulation	measured from 10% load to full load 3.3 Vdc output models all other models		 3 1		 % %
voltage accuracy	at 100% load			±3	%
switching frequency	at 100% load, nominal input voltage		100	300	kHz
temperature coefficient	at 100% load			±0.03	%/°C

PROTECTIONS

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

SAFETY AND COMPLIANCE

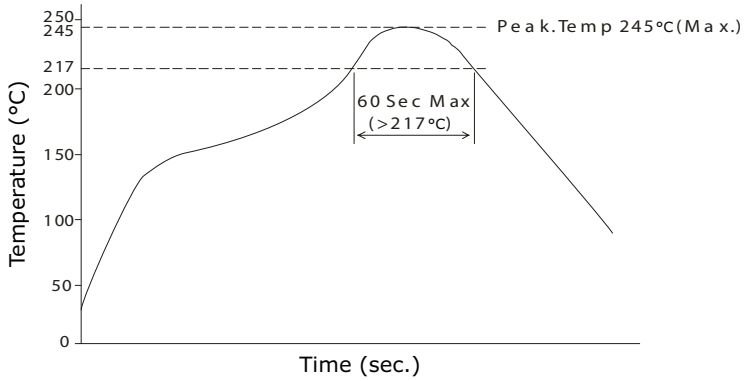
parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA max.	1,500			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
safety approvals	designed to meet 62368-1: EN, BS EN				
conducted emissions	CISPR22/EN55022 class B (external circuit required, see Figure 1)				
radiated emissions	CISPR22/EN55022 class B (external circuit required, see Figure 1)				
ESD	IEC/EN61000-4-2, class B, contact ± 8kV				
MTBF	as per MIL-HDBK-217F @ 25°C	3,500,000			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			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			245	°C



MECHANICAL

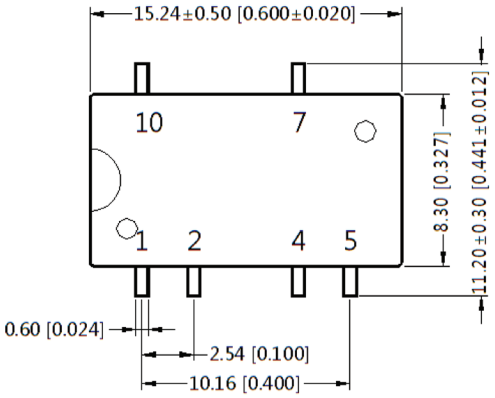
parameter	conditions/description	min	typ	max	units
dimensions	15.24 x 11.20 x 7.25 (0.600 x 0.441 x 0.285 inch)				mm
case material	epoxy resin (UL94-V0)				
weight			2.0		g

MECHANICAL DRAWING

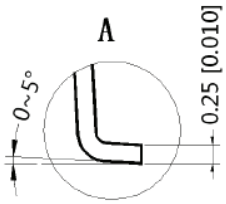
units: mm[inch]
tolerance: ±0.25[±0.010]
pin section tolerance: ±0.10[±0.004]

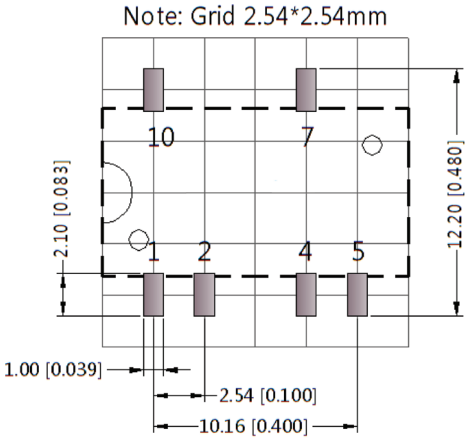
PIN CONNECTIONS	
PIN	FUNCTION
1	GND
2	Vin
4/5	0V
7	+Vo
10	NC

NC: No Connection

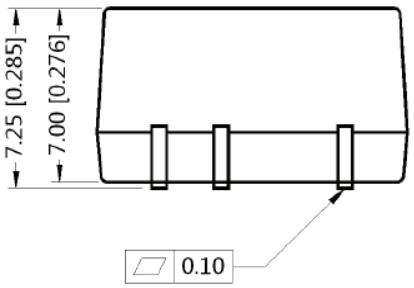


Top View

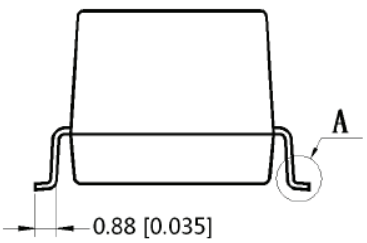




Top View
PCB Layout

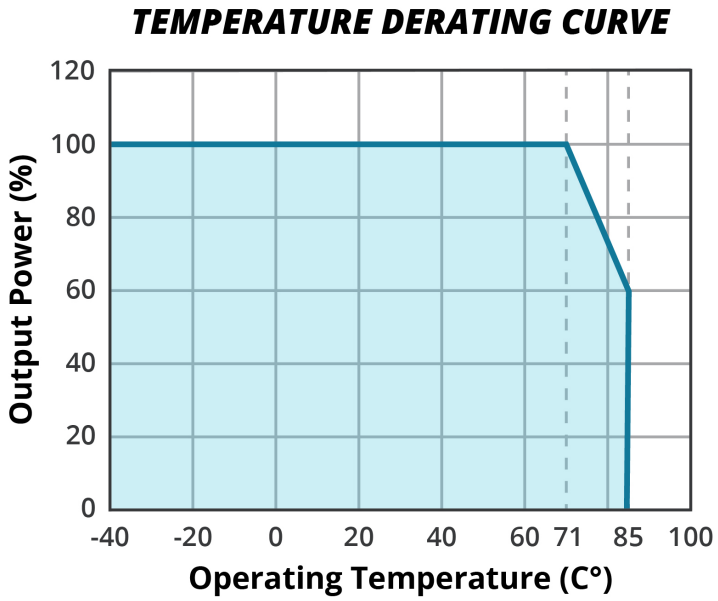


Front View



Side View

DERATING CURVE



EMC RECOMMENDED CIRCUIT

Figure 1

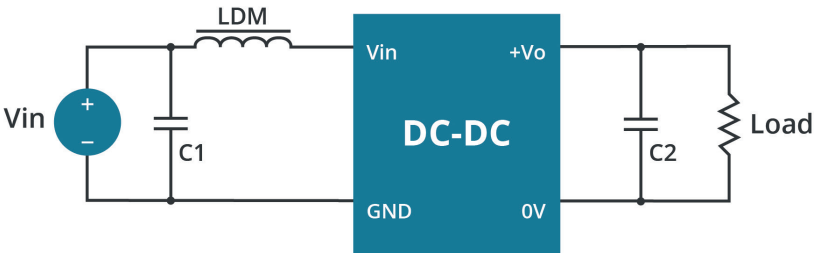


Table 1

Recommended external circuit components			
Vout (Vdc)	C1	C2	LDM
3.3	4.7μF/50V	10μF	6.8μH
5	4.7μF/50V	10μF	6.8μH
9	4.7μF/50V	4.7μF	6.8μH
12	4.7μF/50V	2.2μF	6.8μH
15	4.7μF/50V	1μF	6.8μH

APPLICATION NOTES

1. **Output load requirement**
   To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 10% 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. **Overload Protection**
   Under normal operating conditions, the output circuit of this product has no protection against overload. The simplest method to add this is to add a circuit breaker to the circuit.

3. **Recommended circuit**
   If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR (see Figure 2 & Table 2). 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 3).

Figure 2

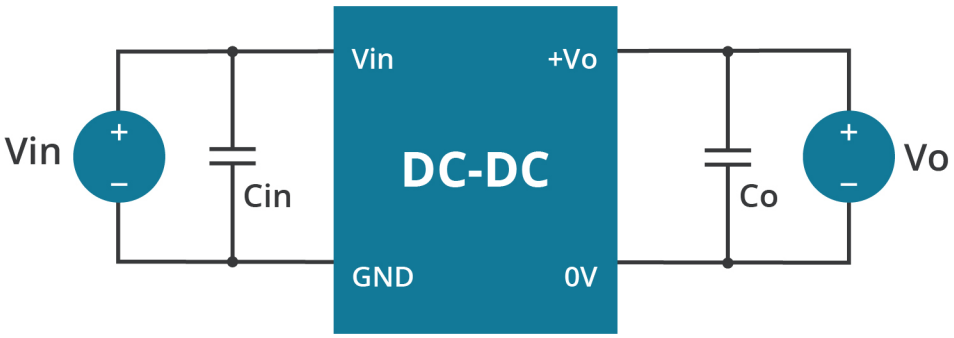


Table 2

Vin (Vdc)	Cin (µF)	Vo (Vdc)	Cout (µF)
5	4.7	3.3	10
12	2.2	5	10
24	1	9	4.7
--	--	12	2.2
--	--	15	1

Note: It's not recommended to connect any external capacitors in applications with less than 0.5 watt output.

Table 3

Vout (Vdc)	Max. Capacitive Load (µF)
3.3	220
5	220
9	220
12	220
15	220

Note: 1. Operation under minimum load will not damage the converter; however, they may not meet all specifications listed.
2. Max. capacitive load tested at input voltage range and full load.
3. All specifications 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	04/08/2014
1.01	safeties updated in features and safety approvals line	01/19/2021
1.02	product image updated	05/19/2021
1.03	updated derating curve and circuit figures	06/09/2021
1.04	discontinued model PQM1-S5-S15-M	09/08/2021
1.05	efficiency updated for PQM1-S24-S5-M	08/03/2022
1.06	discontinued models PQM1-S5-S12-M, PQM1-S5-S3-M & PQM1-S5-S5-M	11/11/2022
1.07	CE removed	11/16/2022
1.08	discontinued model PQM1-S12-S5-M	02/02/2023
1.09	discontinued model PQM1-S5-S5-M-TR	07/11/2023
1.10	discontinued model PQM1-S24-S12-M, PQM1-S24-S12-M-TR, PQM1-S24-S15-M, PQM1-S24-S15-M-TR, PQM1-S24-S5-M & PQM1-S24-S5-M-TR	09/26/2023
1.11	discontinued model PQM1-S12-S12-M, PQM1-S12-S12-M-TR, PQM1-S12-S15-M, PQM1-S12-S15-M-TR, PQM1-S5-S9-M & PQM1-S5-S9-M-TR	01/12/2024
1.12	discontinued model PQM1-S5-S15-M-TR	07/23/2024

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

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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.

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