

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

**FEATURES**

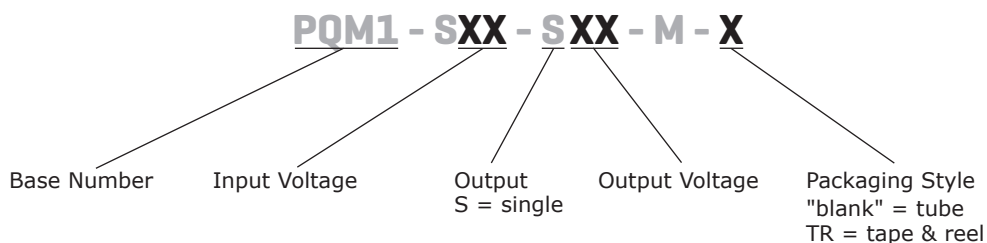
- 1 W isolated output
- smaller package
- single regulated output
- 1,500 Vdc isolation
- continuous short circuit protection
- extended temperature range (-40~85°C)
- high efficiency at light load
- efficiency up to 75%
- designed to meet EN/BS EN 62368-1



MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise <sup>1</sup> typ (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
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	4.75	5	5.25	Vdc
	12 Vdc input models	11.4	12	12.6	Vdc
	24 Vdc input models	22.8	24	25.2	Vdc
surge voltage	for maximum of 1 second				
	5 Vdc input models	-0.7		9	Vdc
	12 Vdc input models	-0.7		18	Vdc
	24 Vdc input models	-0.7		30	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		3		%
	all other models		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

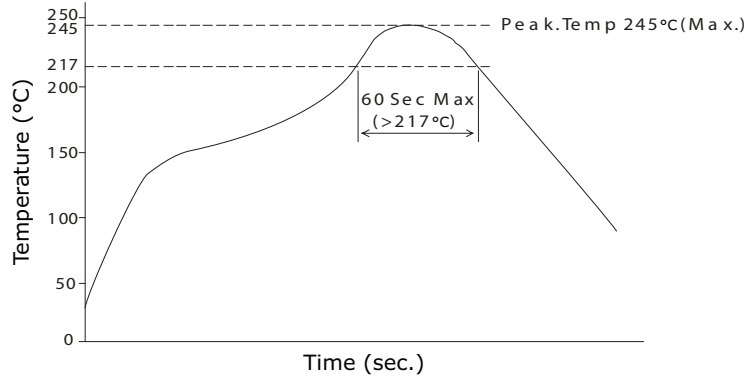
parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA max.	1,500			Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
safety approvals	designed to meet 62368-1: EN, BS EN				
conducted emissions	CISPR22/EN55022 class B (external circuit 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

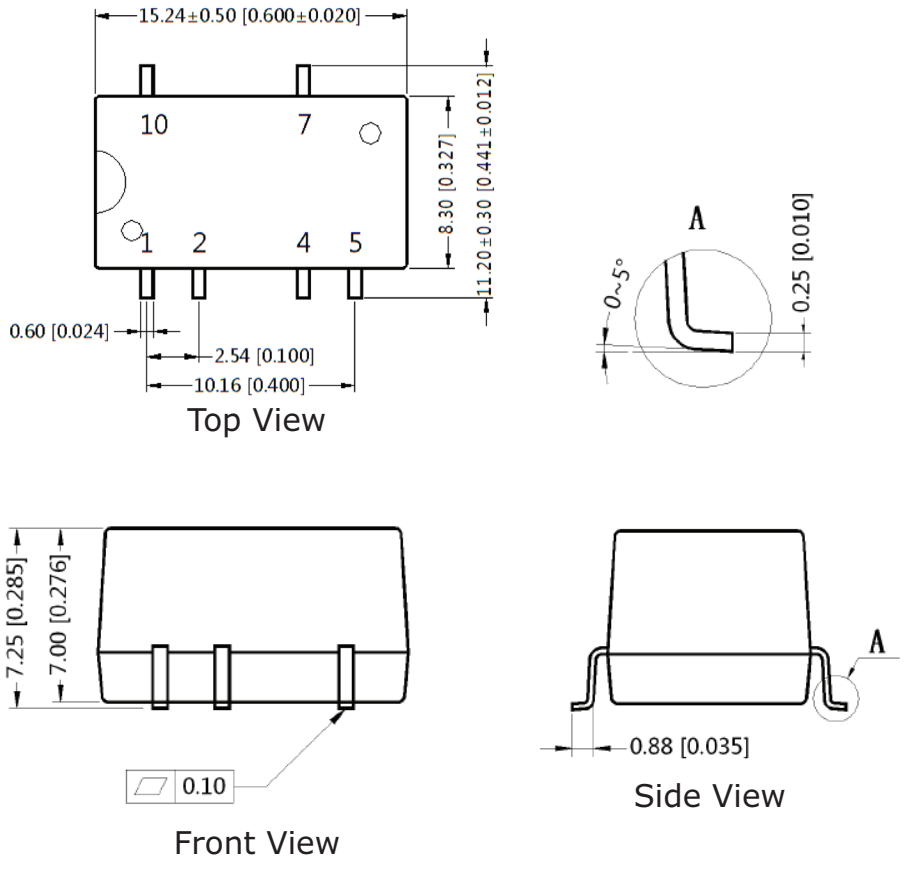
parameter	conditions/description	min	typ	max	units
dimensions	15.24 x 11.20 x 7.25 (0.600 x 0.441 x 0.285 inch)				mm
case material	epoxy resin (UL94-V0)				
weight			2.0		g

## MECHANICAL DRAWING

units: mm[inch]  
 tolerance:  $\pm 0.25[\pm 0.010]$   
 pin section tolerance:  $\pm 0.10[\pm 0.004]$

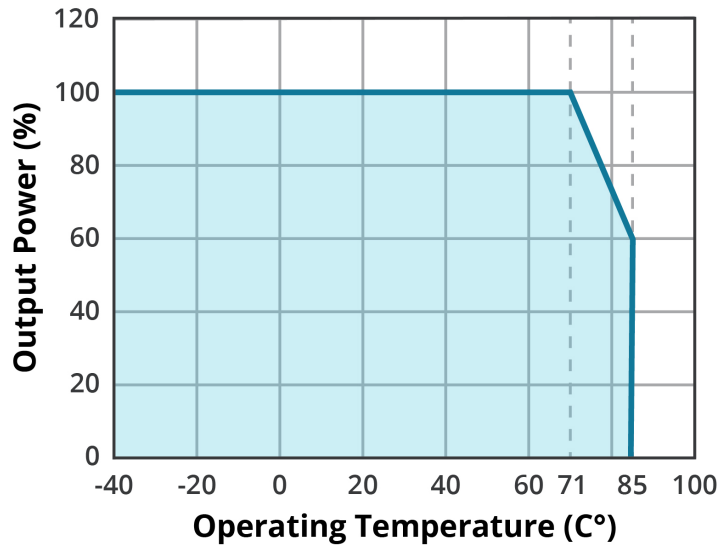
PIN CONNECTIONS	
PIN	FUNCTION
1	GND
2	Vin
4/5	0V
7	+Vo
10	NC

NC: No Connection



## DERATING CURVE

### TEMPERATURE DERATING CURVE



## EMC RECOMMENDED CIRCUIT

Figure 1

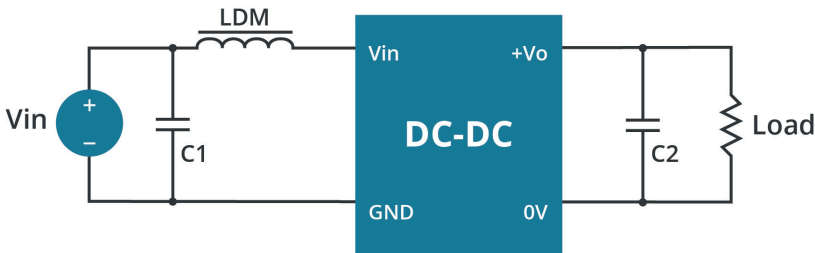


Table 1

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

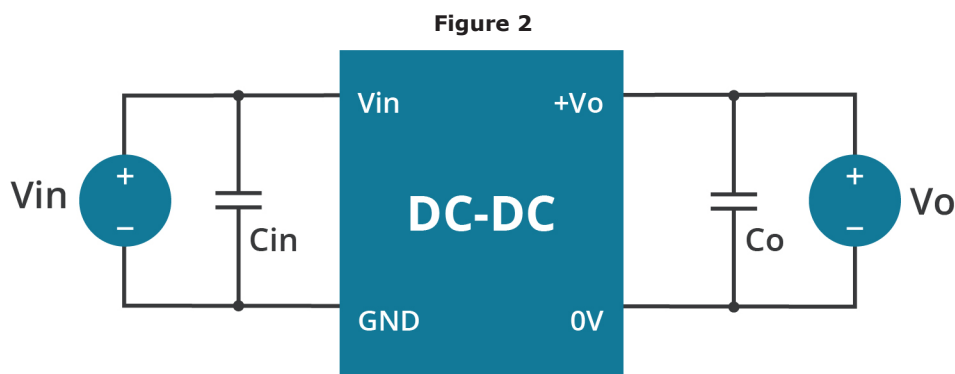
To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 10% of the full load during operation. If the actual output power is low, connect a resistor at the output end in parallel to increase the load.

### 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).



**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

**Table 3**

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

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

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.



# CUI INC

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#### Headquarters

15575 SW Sequoia Pkwy #100  
Portland, OR 97224  
**800.275.4899**

Fax 503.612.2383

**cui.com**  
techsupport@cui.com

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