

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

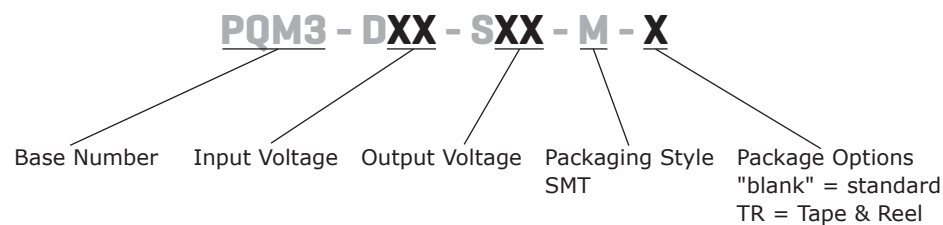
**FEATURES**

- 3 W isolated output
- smaller package
- single regulated output
- 1,500 Vdc isolation
- continuous short circuit, over current protection
- temperature range (-40~105°C)
- high efficiency at light load
- high power density
- high vibration tolerance
- efficiency up to 80%



MODEL	input voltage		output voltage (Vdc)	output current		output power max (W)	ripple and noise <sup>1</sup> max (mVp-p)	efficiency typ (%)
	typ (Vdc)	range (Vdc)		min (mA)	max (mA)			
PQM3-D12-S5-M	12	9~18	5	30	600	3	45	75
PQM3-D12-S12-M	12	9~18	12	13	250	3	45	80
PQM3-D12-S15-M	12	9~18	15	10	200	3	45	80
PQM3-D24-S5-M	24	18~36	5	30	600	3	45	77
PQM3-D24-S12-M	24	18~36	12	13	250	3	45	80
PQM3-D24-S15-M	24	18~36	15	10	200	3	45	80
PQM3-D48-S5-M	48	36~75	5	30	600	3	45	77
PQM3-D48-S12-M	48	36~75	12	13	250	3	45	80
PQM3-D48-S15-M	48	36~75	15	10	200	3	45	80

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	12 V input models	9	12	18	Vdc
	24 V input models	18	24	36	Vdc
	48 V input models	36	48	75	Vdc
start-up voltage	12 V input models	4.5	8	9	Vdc
	24 V input models	11	16	18	Vdc
	48 V input models	24	33	36	Vdc
surge voltage	for maximum of 1 second				
	12 V input models	-0.7		25	Vdc
	24 V input models	-0.7		50	Vdc
	48 V input models	-0.7		100	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		±1.5	±5	%
	all other models		±1.5	±3	%
switching frequency	100% load, nominal input voltage		350		KHz
transient recovery time	25% load step change		0.5	1	ms
transient response deviation	25% load step change		±2	±5	%
temperature coefficient	100% load		±0.02	±0.03	%/°C

**PROTECTIONS**

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				
over current protection		120			%

**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)				
ESD	IEC/EN61000-4-2, class B, contact ± 4kV/ air ± 8kV				
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 compliant	yes				

## 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

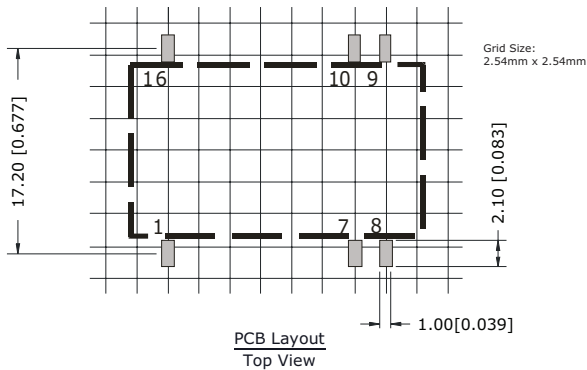
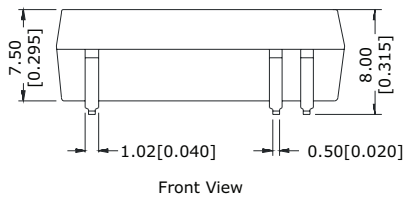
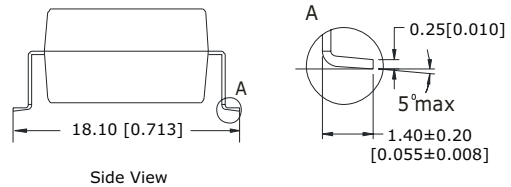
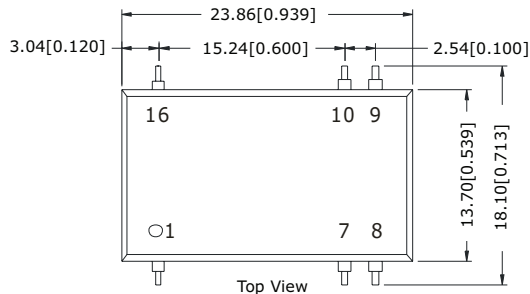
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
reflow soldering	see reflow soldering profile			245	°C

## 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

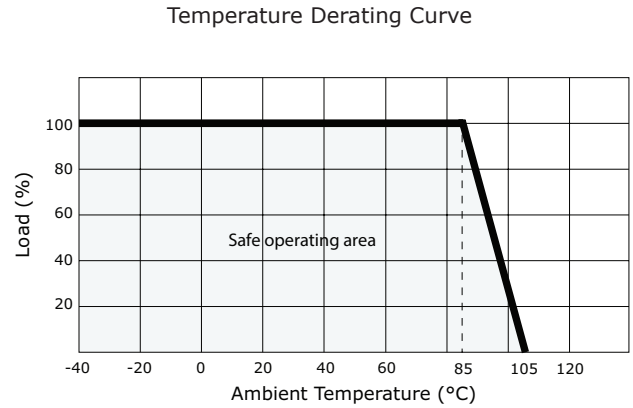
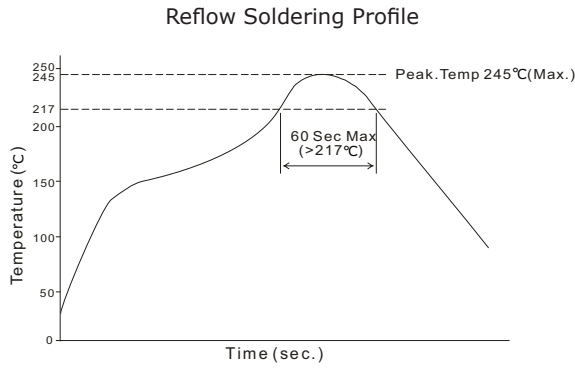
## MECHANICAL DRAWING

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



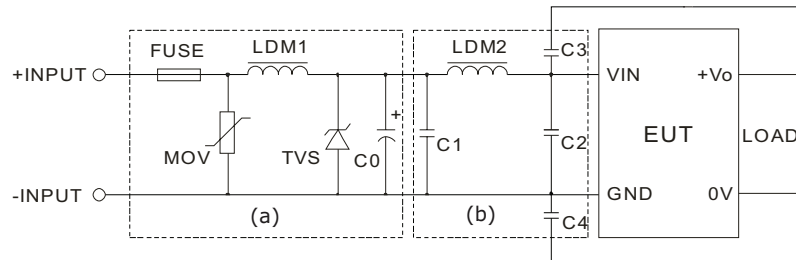
PIN CONNECTIONS	
PIN	Function
1	GND
7	NC
8	NC
9	+Vo
10	0V
16	Vin

## DERATING CURVES



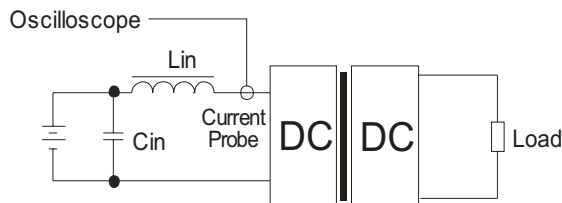
## EMC RECOMMENDED CIRCUIT

Figure 1



Recommended external circuit components			
Vin (Vdc)	12	24	48
FUSE	choose according to practical input current		
MOV	TBD	10D560	10D101
LDM1	TBD	56μH	56μH
TVS	TBD	SMCJ48A	SMCJ90A
C0	TBD	120μF/50V	120μF/100V
LDM2	TBD	12μH	12μH
C1	TBD	475K/50V	475K/100V
C2	TBD	475K/50V	475K/100V
C3	TBD	--	--
C4	TBD	--	--

## TEST CONFIGURATION



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 2). 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 1).

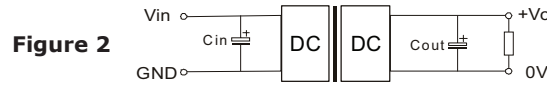


Figure 2

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

Table 1

### 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 3 for the startup current of this dc-dc module.

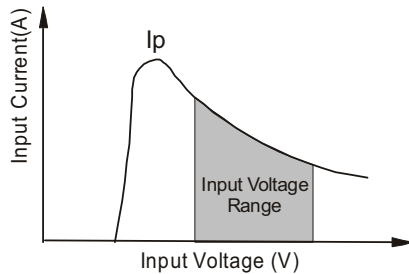


Figure 3

Vin (Vdc)	Ip (mA)
12	600
24	300
48	150

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

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rev.	description	date
1.0	initial release	03/19/2013

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



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