

**SERIES:** PQP3-M | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

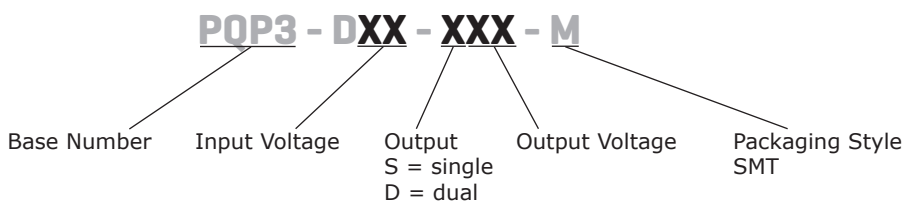
- wide 2:1 input range
- single & dual output options
- 1500 Vdc isolation
- industry standard pin-out
- ultra compact SMD package
- short circuit protection (continuous)
- wide operating temp: -40°C to +85°C
- supports negative output (dual output model)
- designed to meet EN/BS EN 62368



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)			
PQP3-D12-S3-M	12	9~18	3.3	38	758	2.5	100	75
PQP3-D12-S5-M	12	9~18	5	30	600	3	100	79
PQP3-D12-S12-M	12	9~18	12	13	250	3	100	82
PQP3-D12-S15-M	12	9~18	15	10	200	3	100	83
PQP3-D12-S24-M	12	9~18	24	6	125	3	100	81
PQP3-D24-S3-M	24	18~36	3.3	38	758	2.5	100	74
PQP3-D24-S5-M	24	18~36	5	30	600	3	100	81
PQP3-D24-S12-M	24	18~36	12	13	250	3	100	83
PQP3-D24-S15-M	24	18~36	15	10	200	3	100	83
PQP3-D24-S24-M	24	18~36	24	6	125	3	100	83
PQP3-D12-D5-M	12	9~18	±5	±15	±300	3	100	78
PQP3-D12-D9-M	12	9~18	±9	±9	±167	3	100	78
PQP3-D12-D12-M	12	9~18	±12	±7	±125	3	100	79
PQP3-D12-D15-M	12	9~18	±15	±5	±100	3	100	79
PQP3-D24-D5-M	24	18~36	±5	±15	±300	3	100	78
PQP3-D24-D9-M	24	18~36	±9	±9	±167	3	100	80
PQP3-D24-D12-M	24	18~36	±12	±7	±125	3	100	82
PQP3-D24-D15-M	24	18~36	±15	±5	±100	3	100	81

Notes: 1. Ripple & noise testing condition at nominal input voltage and 5%-100% load, the "tip and barrel" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
input voltage	12 Vdc input models	9	12	18	Vdc
	24 Vdc input models	18	24	36	Vdc
start-up voltage	12 Vdc input models			9	Vdc
	24 Vdc input models			18	Vdc
surge voltage	for maximum of 1 second				
	12 Vdc input models	-0.7		25	Vdc
	24 Vdc input models	-0.7		50	Vdc
filter	capacitance filter				
current	12 Vdc input models		321/30	338/50	mA
	24 Vdc input models		156/20	165/40	mA

## OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	min to max Vin		±0.2	±0.5	%
load regulation	5% ~ 100% load		±0.5	±1	%
set-point accuracy	5% ~ 100% load				
	positive outputs		±1	±3	%
	negative outputs		±3	±5	%
switching frequency	full load, nominal input		300		kHz
transient response	25% load step change		±2.5	±5	%
temperature coefficient	full load			±0.03	%/°C

## PROTECTIONS

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

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input-output electric strength test for 1 minute	1500			Vdc
isolation resistance	input-output insulation at 500 Vdc	1000			MΩ
isolation capacitance	input-output capacitance at 100 KHz / 0.1 V		100		pF
safety approvals	designed to meet 62368: EN, BS EN				
EMC	CISPR32/EN55032 Class B (see recommended circuits)				
ESD	IEC/EN61000-4-2, Contact ±6K, perf. Criteria B				
radiated immunity	CISPR32/EN55032				
EFT/burst	IEC/EN61000-4-4, ±2KV, perf. Criteria B (see recommended circuits)				
surge	IEC/EN61000-4-5, line to line ±2KV, perf. Criteria B (see recommended circuits)				
conducted immunity	IEC/EN61000-4-6 3 Vrms				
RoHS	yes				
MTBF	MIL-HDBK-217F @ 25°C	1000			kHours

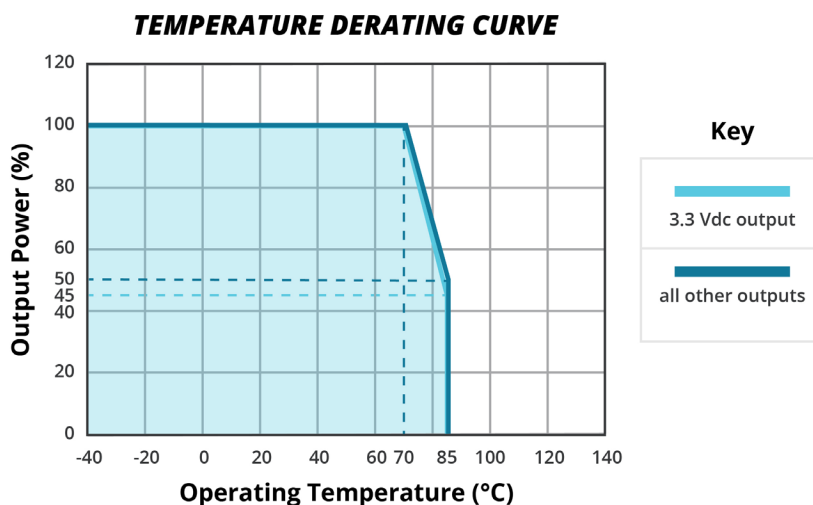
## ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature		-40		85	°C
storage temperature		-55		125	°C
humidity	non-condensing	5		95	%

## SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
reflow soldering	60 s max			245	°C

## DERATING CURVE



## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	14 x 14 x 9				mm
case material	Black plastic; flame-retardant and heat-resistant (UL94-V0)				
weight			2.2		g

## MECHANICAL DRAWING

units: mm [inches]

pin diameter tolerance:  $\pm 0.10$  [ $\pm 0.004$ ]

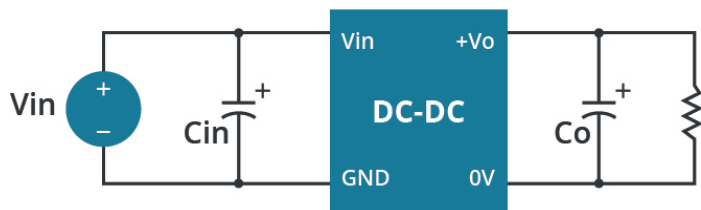
tolerance:  $\pm 0.50$  [ $\pm 0.020$ ]

PIN CONNECTIONS		
PIN	Single	Dual
1	GND	GND
4	Vin	Vin
5	+Vo	+Vo
6	NC	0V
7	0V	-Vo



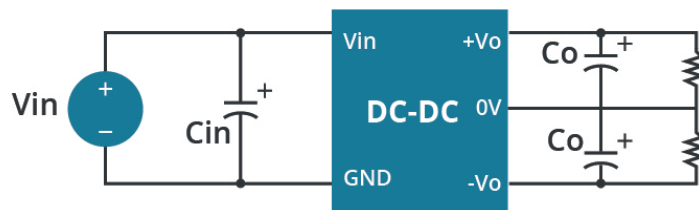
## RECOMMENDED CIRCUITS

**Figure 1**  
Single output



Parameter Description		
Vin (Vdc)	12	24
Cin	47uF/25V	47uF/50V
Vo (Vdc)	3.3, 5	12, 15, 24
Co	100uF/6.3V	27uF/35V

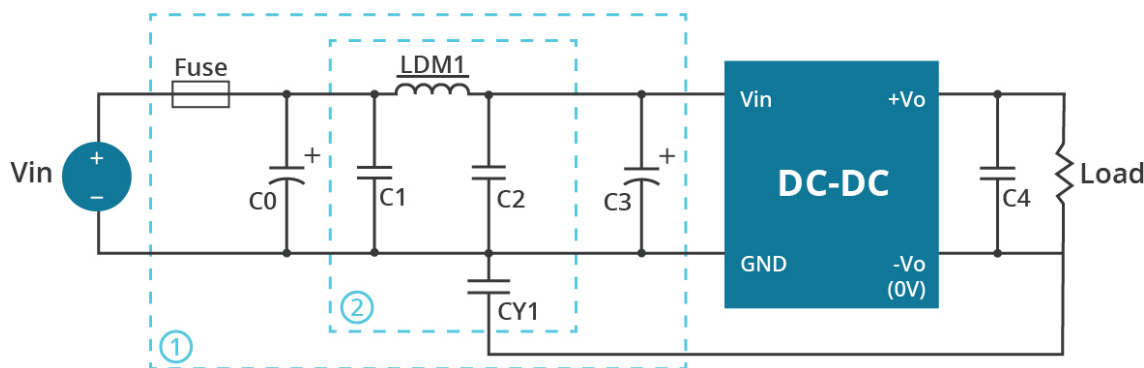
**Figure 2**  
Dual output



Parameter Description		
Vin (Vdc)	12	24
Cin	47uF/50V	
Vo (Vdc)	5, 9	12, 15
Co	47uF/16V	10uF/25V

## EMC COMPLIANCE CIRCUITS

**Figure 3**  
Single output

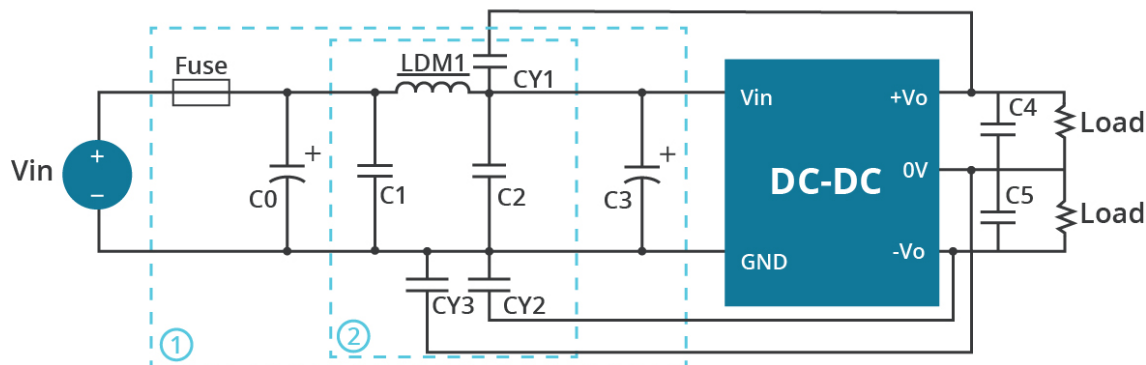


Parameter Description										
Part No.	Vin: 12 Vdc					Vin: 24 Vdc				
Vo (Vdc)	3.3	5	12	15	24	3.3	5	12	15	24
FUSE	slow blow, choose according to actual input current									
C0	1000µF/25V					680µF/50V				
C1	10µF/50V		4.7µF/50V			10µF/50V		4.7µF/50V		
LDM1	15µH									
C2	4.7µF/50V									
C3	330µF/50V									
CY1	1nF/2KV									
C4	Refer to the Cout Fig.2									

Note: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

## EMC COMPLIANCE CIRCUITS (CONTINUED)

**Figure 4**  
**Dual output**



Parameter Description			
Part No.	Vin: 12 Vdc		Vin: 24 Vdc
Vo (Vdc)	±5, ±9, ±12	±15	±5, ±9, ±12, ±15
FUSE	slow blow, choose according to actual input current		
C0	1000µF/25V		680µF/50V
C1	4.7µF/50V		
LDM1	10µH		
C2	10µF/50V		
C3	330µF/50V		
CY1	1nF/2KV	470pF/2KV	1nF/2KV
CY2	1nF/2KV	470pF/2KV	1nF/2KV
CY3	1nF/2KV	470pF/2KV	/
C4,C5	Refer to the Cout Fig.3		

Note: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

## REVISION HISTORY

rev.	description	date
1.0	initial release	03/28/2020
1.01	tolerance update to page 4	06/09/2020
1.02	derating curve and circuit figures updated	07/15/2021
1.03	CE certification removed	11/22/2022
1.04	dual output circuits added	05/31/2023

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



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