

**SERIES:** PQDE6W-Q110 | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

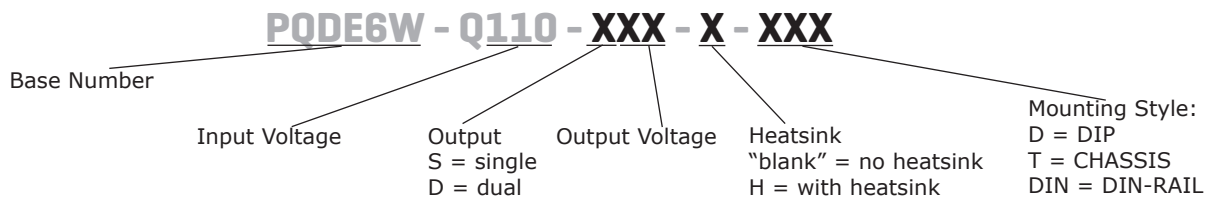
- up to 6W isolated output
- industry standard pinout
- ultra-wide 4:1 input range (40~160)
- single/dual outputs
- 2250 Vdc isolation
- output short circuit, over current and over voltage protection
- input undervoltage protection
- wide operating temp: -40°C to +85°C
- EN62368 approved
- meets EN50155 railway standard



MODEL	input voltage		output voltage	output current		output power	ripple & noise <sup>1</sup>	efficiency <sup>2</sup>
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	min/typ (%)
PQDE6W-Q110-D5	110	40~160	±5	0	±600	6	100	78/80
PQDE6W-Q110-D12	110	40~160	±12	0	±250	6	100	82/84
PQDE6W-Q110-D15	110	40~160	±15	0	±200	6	100	83/85
PQDE6W-Q110-S5	110	40~160	5	0	1200	6	100	78/80
PQDE6W-Q110-S12	110	40~160	12	0	500	6	100	82/84
PQDE6W-Q110-S15	110	40~160	15	0	400	6	100	83/85
PQDE6W-Q110-S24	110	40~160	24	0	250	6	100	84/86

Notes: 1. From 5~100% load, nominal input, 20 MHz bandwidth oscilloscope, with 10 µF tantalum and 1 µF ceramic capacitors on the output. From 0~5% load, ripple and noise is <5% Vo  
2. Measured at nominal input voltage and rated output load.

**PART NUMBER KEY**



**INPUT**

parameter	conditions/description	min	typ	max	units
operating input voltage		40		170	Vdc
start-up voltage				40	Vdc
surge voltage	for maximum of 1 second	-0.7		180	Vdc
current	full load / no load		68/3	70/8	mA
filter	Pi filter				
CTRL	module on: CTRL open or pulled high (3.5~12 V) module off: CTRL pulled low to GND (0~1.2 V)				

**OUTPUT**

parameter	conditions/description	min	typ	max	units
maximum capacitive load	output voltage				
	5 Vdc dual output			470	$\mu$ F
	12 Vdc dual output			100	$\mu$ F
	15 Vdc dual output			100	$\mu$ F
	5 Vdc single output			1000	$\mu$ F
	12 Vdc single output			470	$\mu$ F
	15 Vdc single output			220	$\mu$ F
	24 Vdc single output			100	$\mu$ F
voltage accuracy	0%~100% load		$\pm 1$	$\pm 3$	%
line regulation	from low line to high line, full load				
	+Vo		$\pm 0.2$	$\pm 0.5$	%
	-Vo		$\pm 0.5$	$\pm 1$	%
load regulation	5%~100% load				
	+Vo		$\pm 0.5$	$\pm 1$	%
	-Vo		$\pm 0.5$	$\pm 1.5$	%
switching frequency	PWM mode		300		kHz
transient recovery time	25% load step change, nominal input voltage		300	500	$\mu$ s
transient response deviation	25% load step change, nominal input voltage				
	5 Vdc, $\pm 5$ Vdc output		$\pm 3$	$\pm 8$	%
	other outputs		$\pm 3$	$\pm 5$	%
temperature coefficient	at full load		$\pm 0.02$	$\pm 0.03$	%/ $^{\circ}$ C

## PROTECTIONS

parameter	conditions/description	min	typ	max	units
over voltage protection		110		160	%Vo
over current protection		120		210	%
short circuit protection	continuous, auto recovery				

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output input/output to case	2,250 1,600			Vdc Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		1,000		pF
safety approvals	EN/IEC 62368				
EMI/EMC	CISPR 32/EN 55032 Class B				
conducted emissions	EN 50121-3-2 150kHz-500kHz 99dBuV, 500kHz-30MHz 93dBuV (see Fig.3 or Fig.4 for recommended circuit)				
radiated emissions	EN 50121-3-2 30MHz-230MHz 40dBuV/m at 10m, 230MHz-1GHz 47dBuV/m at 10m (see Fig.3 or Fig.4 for recommended circuit)				
ESD	IEC/EN 61000-4-2 Contact ±6KV/Air ±8KV, EN 50121-3-2 Contact ±6KV/Air ±8KV, perf. Criteria B				
radiated immunity	IEC/EN 61000-4-3 20 V/m, EN50121-3-2 20 V/m, perf. Criteria A				
EFT/burst	IEC/EN 61000-4-4 ±4KV, EN 50121-3-2 ±2kV 5/50ns 5kHz, perf. Criteria B				
surge	IEC/EN 61000-4-5 line to line ±2KV/line to ground ±4KV, EN 50121-3-2 line to line ±1KV (42Ω, 0.5μF) line to ground ±2KV (42Ω, 0.5μF), perf. Criteria B (see Fig.3 for recommended circuit)				
conducted immunity	IEC/EN 61000-4-6 10 Vr.m.s, EN50121-3-2 0.15MHz-80MHz 10Vr.m.s, perf. Criteria B				
MTBF	as per MIL-HDBK-217F, 25°C	1,000			K hours
RoHS	yes				

## 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	5		95	%
vibration	IEC61373 - Category 1, Grade B				

## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	25.40 × 25.40 × 11.70 Horizontal package (without heat sink)				mm
	25.40 × 25.40 × 16.20 Horizontal package (with heat sink)				mm
	76.00 × 31.50 × 21.20 A2S wiring package (without heat sink)				mm
	76.00 × 31.50 × 25.20 A2S wiring package (with heat sink)				mm
	76.00 × 31.50 × 25.80 A4S rail package (without heat sink)				mm
	76.00 × 31.50 × 29.80 A4S rail package (with heat sink)				mm
case material	aluminum alloy				
weight	Horizontal package without heatsink		12.5		g
	A2S wiring package without heatsink		36.0		g
	A4S rail package without heatsink		56.0		g
	Horizontal package with heatsink		17.0		g
	A2S wiring package with heatsink		40.0		g
	A4S rail package with heatsink		59.0		g

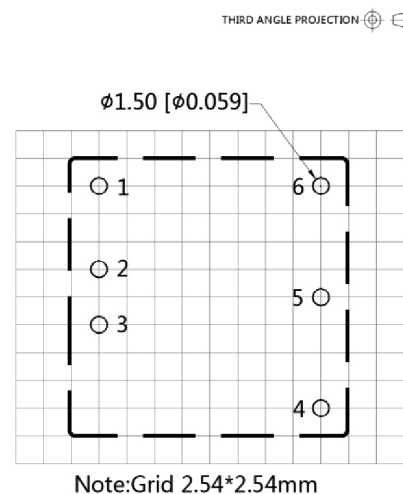
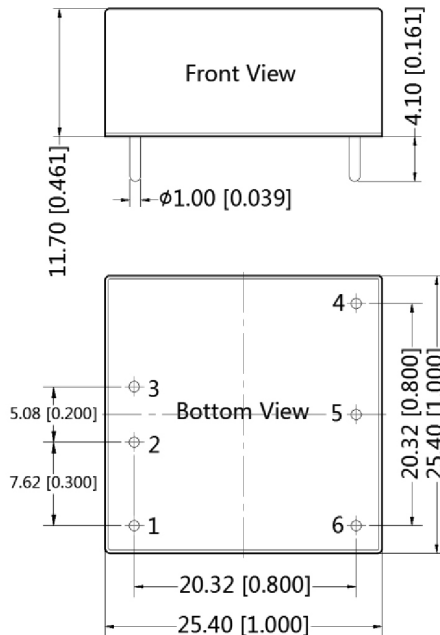
## MECHANICAL DRAWING

units: mm [inch]

tolerance: ±0.50[±0.020]

pin diameter tolerance: ±0.10[±0.004]

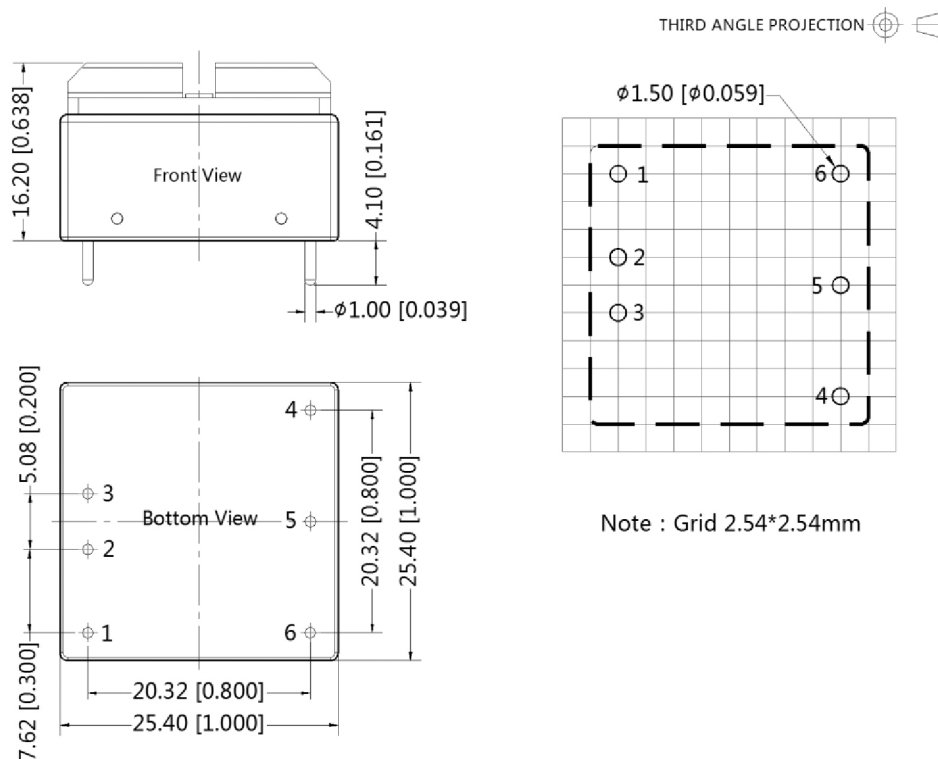
PIN	PIN Out	
	Single	Dual
1	no pin	ctrl
2	GND	GND
3	Vin	Vin
4	+Vo	+Vo
5	no pin	0V
6	0V	-Vo



## MECHANICAL DRAWING

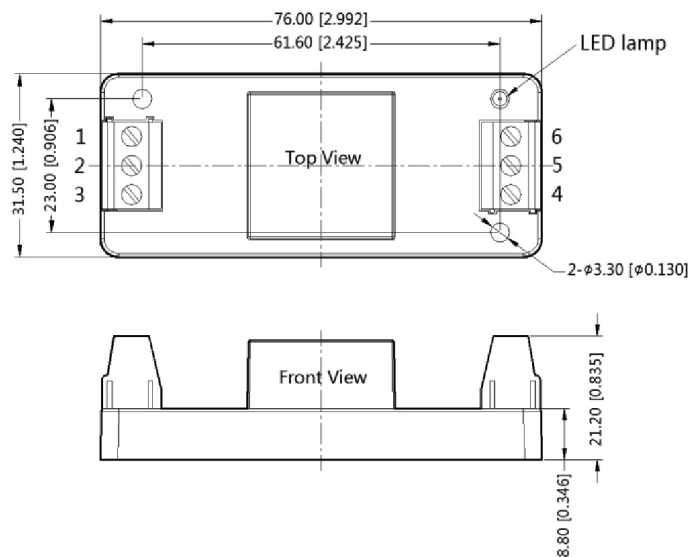
units: mm [inch]  
 tolerance:  $\pm 0.50$  [ $\pm 0.020$ ]  
 pin diameter tolerance:  $\pm 0.10$  [ $\pm 0.004$ ]

PIN Out		
PIN	Single	Dual
1	no pin	ctrl
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6	0V	-Vo



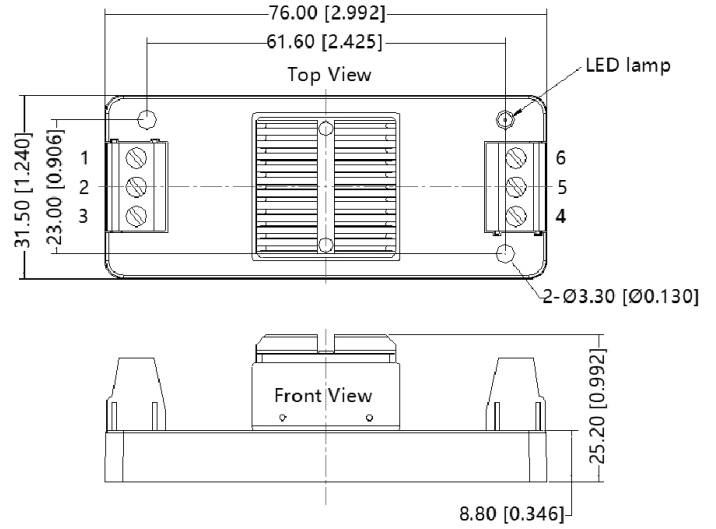
units: mm [inch]  
 wire range: 24-12 AWG  
 tightening torque: max 0.4 N·m  
 tolerance:  $\pm 0.50$  [ $\pm 0.020$ ]

PIN Out						
PIN	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	ctrl	GND	Vin	+Vo	0V	-Vo



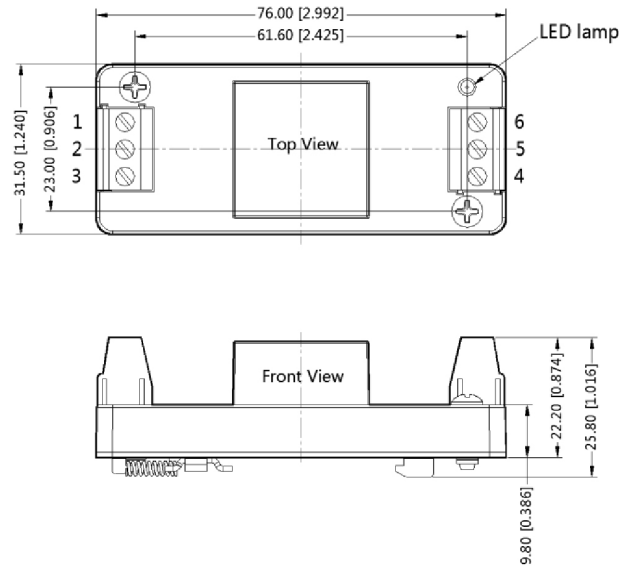
units: mm [inch]  
 wire range: 24-12 AWG  
 tightening torque: max 0.4 N·m  
 tolerance: ±1.00 [±0.039]

PIN Out						
PIN	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	ctrl	GND	Vin	+Vo	0V	-Vo



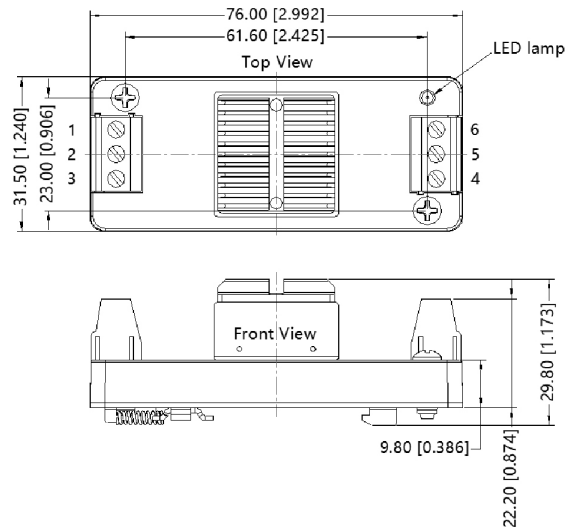
units: mm [inch]  
 mounting rail: TS35  
 wire range: 24-12 AWG  
 tightening torque: max 0.4 N·m  
 tolerance: ±1.00 [±0.039]

PIN Out						
PIN	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	ctrl	GND	Vin	+Vo	0V	-Vo



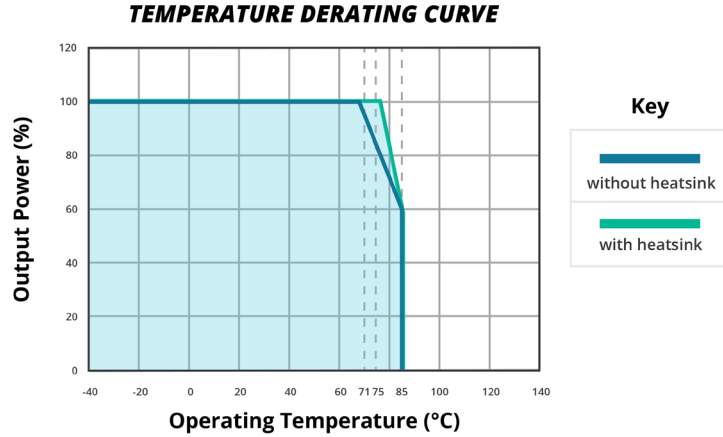
units: mm [inch]  
 mounting rail: TS35  
 wire range: 24-12 AWG  
 tightening torque: max 0.4 N·m  
 tolerance: ±1.00 [±0.039]

PIN Out						
PIN	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	ctrl	GND	Vin	+Vo	0V	-Vo



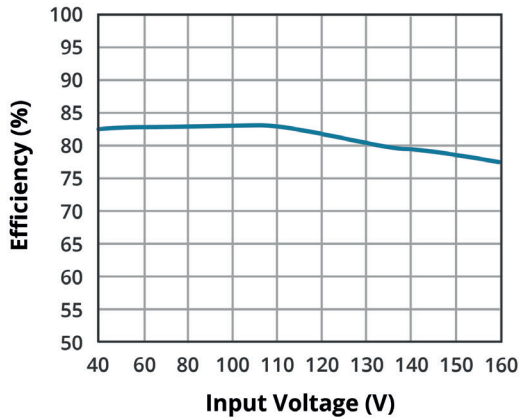
## DERATING CURVE

Figure 1

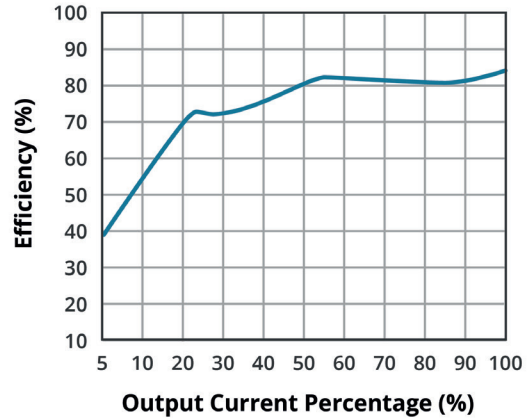


## EFFICIENCY CURVES

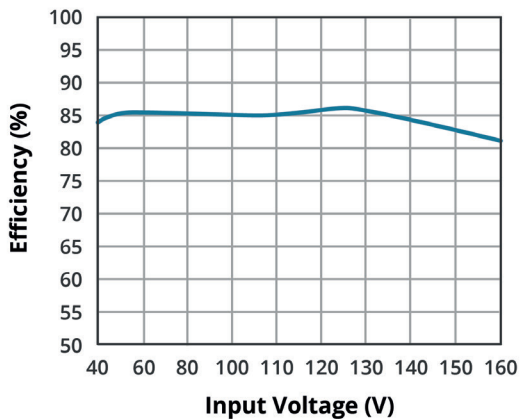
**EFFICIENCY VS INPUT VOLTAGE  
(full load)  
PQDE6W-Q110-D5**



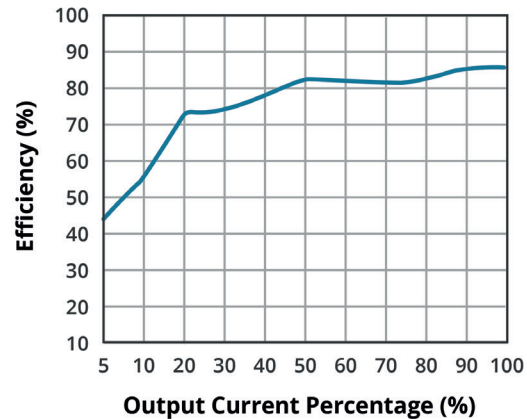
**EFFICIENCY VS OUTPUT LOAD  
(Vin = 110V)  
PQDE6W-Q110-D5**



**EFFICIENCY VS INPUT VOLTAGE  
(full load)  
PQDE6W-Q110-D5**

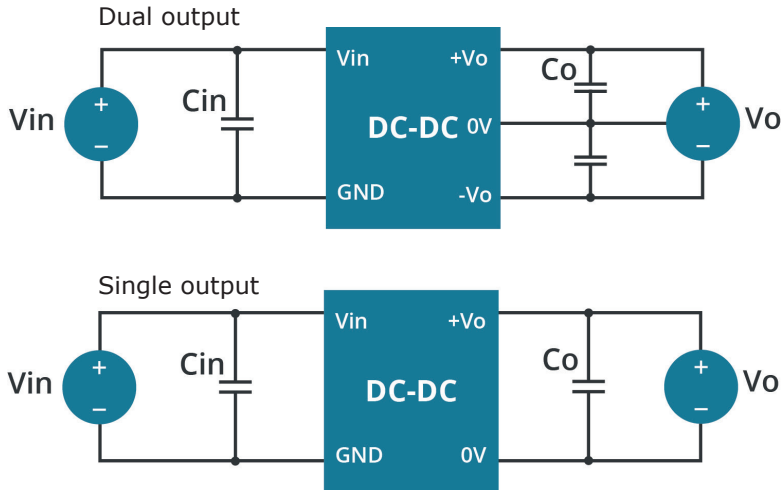


**EFFICIENCY VS OUTPUT LOAD  
(Vin = 110V)  
PQDE6W-Q110-D5**



## APPLICATION CIRCUIT

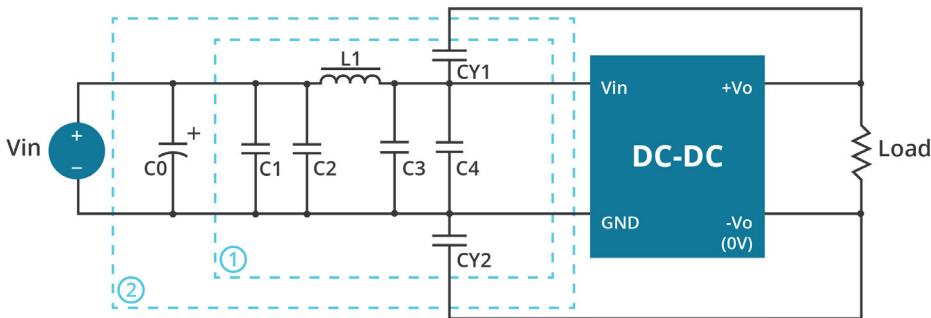
Figure 2



Cin	Cout
10 $\mu$ F -47 $\mu$ F	10 $\mu$ F

## EMC RECOMMENDED CIRCUIT

Figure 3



Parameter description

C0	100 $\mu$ F/200V
C1, C2, C3, C4	0.22 $\mu$ F/250V
L1	68 $\mu$ H
CY1, CY2	1nF/3KV



## REVISION HISTORY

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rev.	description	date
1.0	initial release	08/11/2020
1.01	operating temperature; curves and figures updated	06/02/2021

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



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