

30-50W Single Output DC-DC converters, 1/4 Brick

<https://product.tdk.com/en/power/py>
www.emea.lambda.tdk.com/py



The 30-50W Quarter-brick footprint PYQ series of isolated DC-DC converters operate from an ultra wide range input of 14 to 160Vdc (12:1) with single output voltages from 5V to 48V. The output voltage can be adjusted between -20% to +10% by using the trim terminal. Sense lines for the output voltage ensure a stable output voltage even with changing loads. The PYQ50 models have efficiencies of up to 89% and can operate in ambient temperature of -40 to 100°C. The input to output isolation is 3,000Vdc and the units are potted to provide a high resistance to shock and vibration. The converters are certified according to the 62368-1 safety standards and with additional circuits, the PYQ50 series is also tested according to the EN 50155 railroad standard for electronic equipment in railroad vehicles.

Features

- Quarter-Brick Footprint
- 14 - 160Vdc Wide Input Range (12:1)
- Certified to IEC 62368-1, Tested According to EN 50155
- Potted Plastic Case
- 3000Vdc Input to Output Isolation

Benefits

- Industry Standard Package Size
- Supports the Majority of Railway DC Input Voltages
- Easier System Compliance
- High Resistance to Shock and Vibration
- Suitable For Railway and Industrial Applications

Model Selector

Model	Input Voltage (V)	Output Voltage (V)	Maximum Current (A)	Maximum Power (W)	No Load Input Current (mA)	Efficiency (%) at 72 / 110Vdc	Maximum Load Capacitance (uF)
PYQ50-72WS05	14 - 160	5	6	30	5	83 / 81	10000
PYQ50-72WS12	14 - 160	12	4.2	50	5	87 / 86	6800
PYQ50-72WS24	14 - 160	24	2.1	50	5	89 / 87	3300
PYQ50-72WS48	14 - 160	48	1.05	50	8	88 / 85	680

PYQ	50	-72W	S	05	-
Series	Output Power 50W (30W for 5V Version)	-72W 14 - 160V Input Voltage	S Single Output	Output Voltage 05 = 5V 12 = 12V 24 = 24V 48 = 48V	Blank Positive Logic Remote On/Off and M3 Thread -N Negative Logic Remote On/Off and M3 Thread -PD Positive Logic Remote On/Off and 3.2mm Hole -ND Negative Logic Remote On/Off and 3.2mm Hole

Preferred option

Related Products

Type	Series	Description
Heatsink kit (User installation)	ACC-PYQB-HC01	HC1 heatsink, thermal pad, screws and washers
Heatsink kit (User installation)	ACC-PYQB-HC05	HC5 heatsink, thermal pad, screws and washers
DC-DC Converter	PYD20	20W, Input 8.5-160V, 2" x 1"
DC-DC Converter	PYQ75	75W, Input 9-75V, quarter brick
DC-DC Converter	PYH200	200W, Input 14-160V, half brick
DC-DC Converter	CN-B	200-300W, Input 60-160V, half brick

Specifications

Model			PYQ50
Input			
Input Voltage Range	Vdc	14 - 160	
Input Surge Voltage	Vdc	200 (100ms maximum)	
Input Shutdown Voltage	Vdc	12 Typ.	
Start-up Time (typ)	ms	25	
No Load Current Consumption	-	See model selector table. Typically 3mA when remote on/off is activated	
Efficiency	-	See model selector table	
Conducted & Radiated EMI	-	EN55032. See installation manual for external circuitry	
Immunity	-	See immunity section	
Railway Applications	-	EN50155, EN45545-2, EN61373, EN50121-3-2: See application note for railway use	
Safety Certification and Markings	-	IEC/UL/CSA/EN62368-1, CE Mark and UKCA Mark	

Immunity

Test	Standard	Test Level	Criteria	Notes (See installation manuals for external circuitry)
ESD	EN61000-4-2	Air ± 8 kV and Contact ± 6 kV	A	-
Radiated Susceptibility	EN61000-4-3	20V/m	A	-
Electrical Fast Transient Burst	EN61000-4-4	± 2 kV	A	With an input filter of two 82uF capacitors and a 180V suppressor diode (SMDJ180A)
Surge	EN61000-4-5	± 2 kV	A	
Conducted Susceptibility	EN61000-4-6	10 Vrms	A	-

Specifications

Model			PYQ50
Output			
Output Voltage Tolerance	%	± 1	
Output Voltage Adjustment	%	-20/+10	
Switching Frequency	kHz	215-265	
Line Regulation	%	± 0.2	
Load Regulation	%	± 0.2	
External Load Capacitance	-	See model selector table	
Ripple & Noise(1)	mVp-p	100	
Temperature Coefficient	%/°C	± 0.02	
Minimum Load	-	No minimum load required	
Transient Loading	-	250us recovery time for a 25% load change	
Overcurrent Protection (typ)	%	110-220 (hiccup mode)	
Overvoltage Protection (typ)	%	115-140	
Overtemperature Protection	°C	110, automatic recovery when temperature falls below 100	
Remote Sense	%	± 10	
Remote On/Off	-	Positive Logic (Blank): ON: Open or 3.5-160V, OFF: Short or 0-1.2V Negative Logic (-N): ON: Short or 0-1.2V, OFF: Open or 3.5-160V	

Specifications

Model

PYQ50

Environmental

Operating Temperature ⁽²⁾	°C	-40 to +100 (see derating section and confirm case temperatures in end system)
Maximum Case Temperature	°C	100
Storage Temperature	°C	-55 to +125
Humidity (non condensing)	%RH	95 (maximum, for operation & storage)
Cooling	-	Convection, conduction or forced air
Altitude	m	5,000 (operating)
Withstand Voltage (For 1 minute)	Vdc/Vac	Input to output 3000Vdc, input to case 2500Vdc, output to case 500Vac
Isolation Capacitance	pF	1000 (input to output), 1500 (input to base plate)
Vibration (Operating)	-	MIL-STD-810F, EN61373
Thermal Shock	-	MIL-STD-810F

Other

Weight (Typ)	g	61.5
Size (LxWxH)	mm	57.9 x 36.8 x 12.7
Size (LxWxH)	Inches	2.28 x 1.45 x 0.5
Case Material	-	Plastic
Base Plate Material	-	Aluminum
MTBF - MIL-HDBK-217F, Full Load, GB25	Hours	791,000 - 810,000 depending on model
Warranty	yrs	3

Notes

See website for detailed specifications, test methods and installation manual

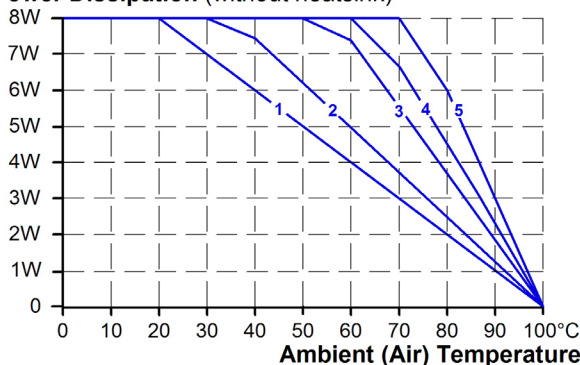
(1): Measured with a 22 μ F electrolytic/tantalum capacitor and a 1 μ F ceramic multi-layer capacitor parallel in measurement path.

(2): The case temperature must be confirmed in the end application. The product rating may be affected by airflow direction and physical obstructions near the module.

Derating Curve - Vertical Mount, Natural Convection

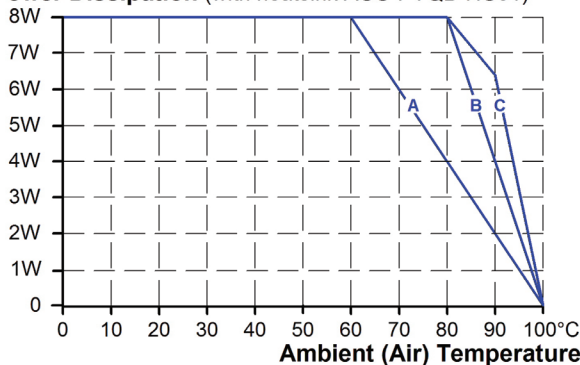
The possible temperature range depends on the power dissipation at the operating point of the DC-DC converter and the cooling method used. See installation manual for details.

Power Dissipation (without heatsink)



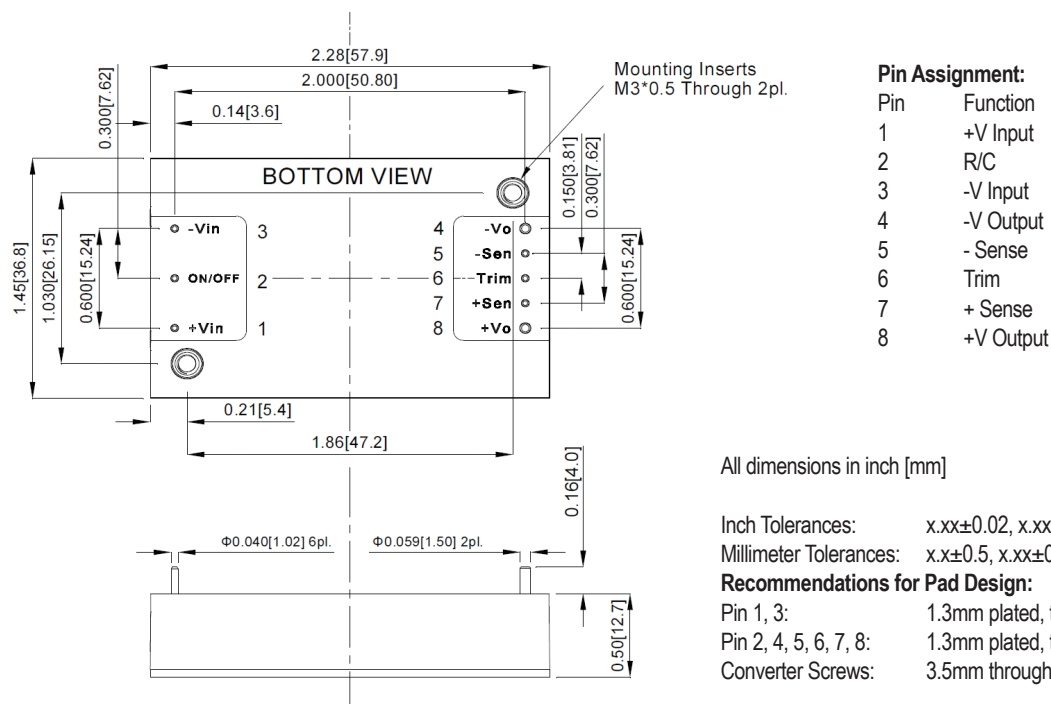
1. Natural convection 20LFM (0.1m/s, RTH 10.1°C/W)
2. Forced air 100LFM (0.5m/s, RTH 8.0°C/W)
3. Forced air 200LFM (1.0m/s, RTH 5.4°C/W)
4. Forced air 300LFM (1.5m/s, RTH 4.4°C/W)
5. Forced air 400LFM (2.0m/s, RTH 3.4°C/W)

Power Dissipation (with heatsink ACC-PYQB-HC01)

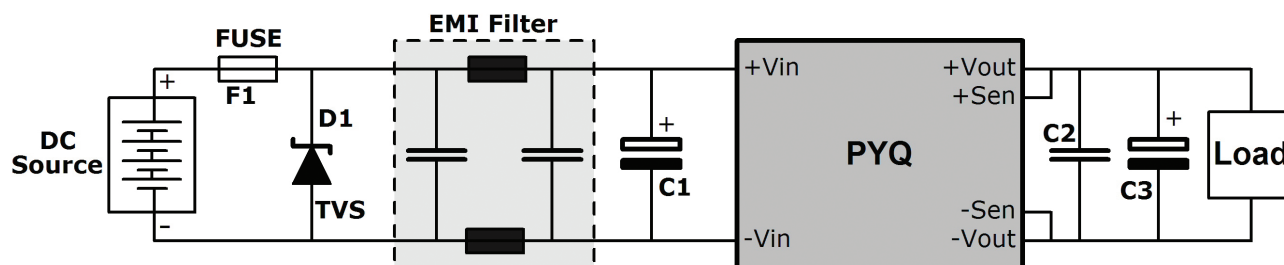


- A. Natural convection 20LFM (0.1m/s, RTH 4.78°C/W)
- B. Forced air 100LFM (0.5m/s, RTH 2.44°C/W)
- C. Forced air 400LFM (2.0m/s, RTH 1.58°C/W)

Outline Drawing and Pinout



Recommended Wiring Scheme



Fuse F1: The DC-DC converter is not internally fused. An external input fuse must always be used. Use a 6A slow-blow fuse.

Diode D1: Transient voltage suppressor diode (TVS) SMDJ180A.

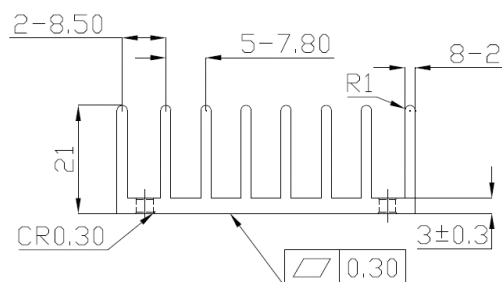
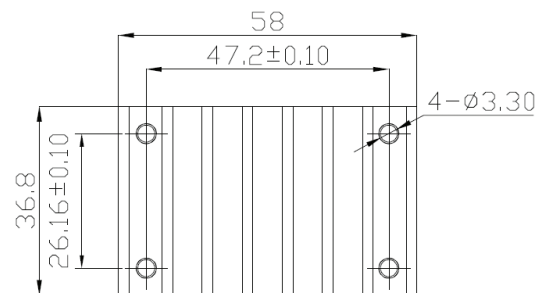
Capacitor C1: 82uF aluminum capacitor

Capacitor C2: 1uF multi layer ceramic capacitor

Capacitor C3: 22uF aluminum or tantalum capacitor.

EMI Filter: This filter reduces the conducted emission to the input. See installation manual for details.

Heatsinks



ACC-PYQB-HC01

Transverse

Fin Style

Size (L x W x H)

Thermal Impedance

58 x 36.8 x 21mm

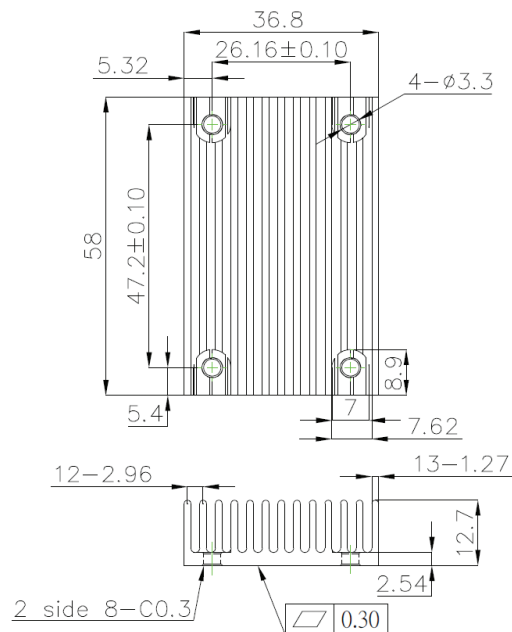
4.78°C/W nat. convection

2.44°C/W with 100LFM

2.06°C/W with 200LFM

1.76°C/W with 300LFM

1.58°C/W with 400LFM



ACC-PYQB-HC05

Longitudinal

36.8 x 58 x 12.7mm

5.61°C/W nat. convection

4.01°C/W with 100LFM

3.39°C/W with 200LFM

2.86°C/W with 300LFM

2.49°C/W with 400LFM



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