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TDK·Lambda

PYQ50 Series

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	Benefits
• Quarter-Brick Footprint	• Industry Standard Package Size
• 14 - 160Vdc Wide Input Range (12:1)	• Supports the Majority of Railway DC Input Voltages
• Certified to IEC 62368-1, Tested According to EN 50155	• Easier System Compliance
• Potted Plastic Case	• High Resistance to Shock and Vibration
• 3000Vdc Input to Output Isolation	• 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

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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 ± 8kV and Contact ± 6kV	A	-
Radiated Susceptibility	EN61000-4-3	20V/m	A	-
Electrical Fast Transient Burst	EN61000-4-4	± 2kV	A	With an input filter of two 82uF capacitors and a 180V suppressor diode (SMDJ180A)
Surge	EN61000-4-5	± 2kV	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

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Specifications

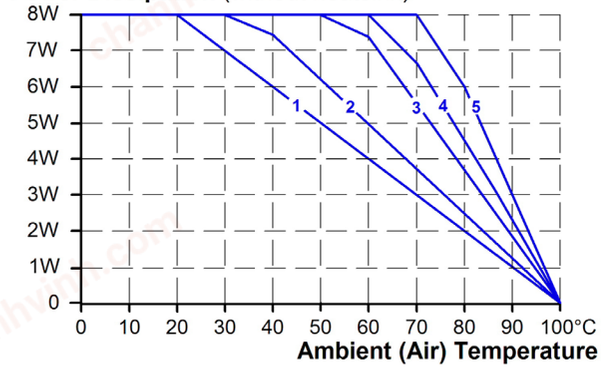
Model		PYQ50
Environmental		
Operating Temperature(2)	°C	-40 to +100 (see derating section and confirm case temperatures in end system)
Maximum Case Temperature	°C	100
Storage Temperature	°C	-55 to +125
Humidity (non condensing)	%RH	95 (maximum, for operation & storage)
Cooling	-	Convection, conduction 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 22µF electrolytic/tantalum capacitor and a 1µF 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

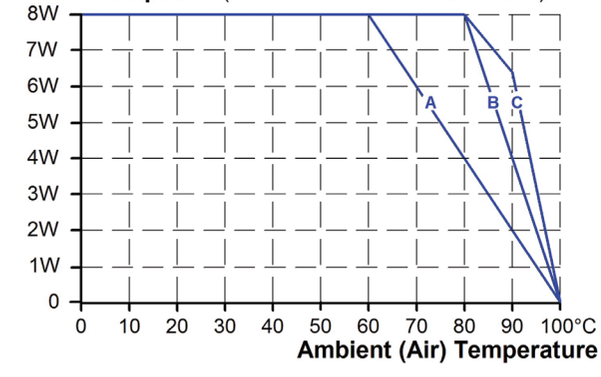
The possible temperature range depends on the power dissipation at the operating point of the DC-DC converter and the cooling method used.
See installation manual for details.

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)

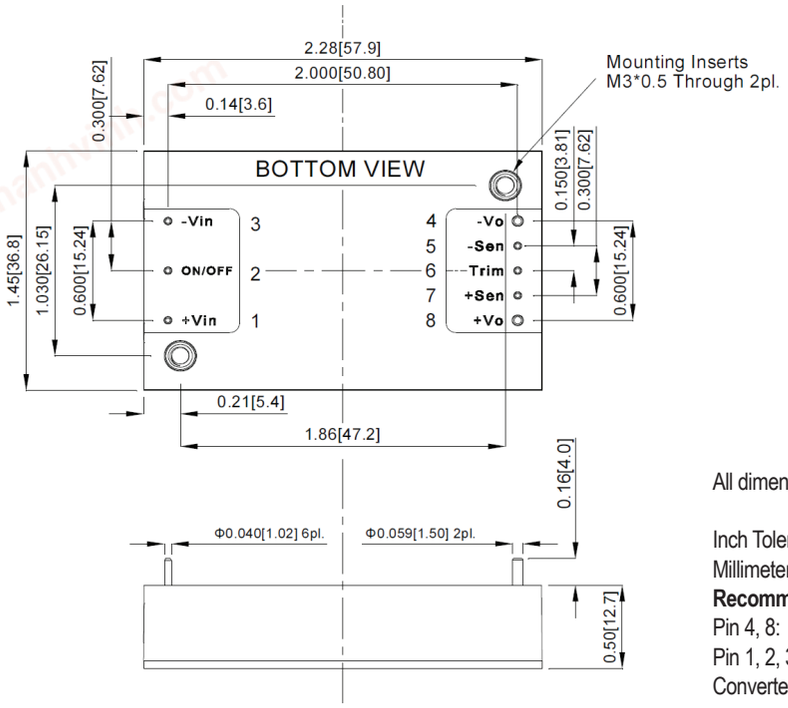
Power Dissipation (with heatsink ACC-PYQB-HC01)



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)

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Outline Drawing and Pinout



Pin Assignment:

Pin	Function
1	+V Input
2	R/C
3	-V Input
4	-V Output
5	- Sense
6	Trim
7	+ Sense
8	+V Output

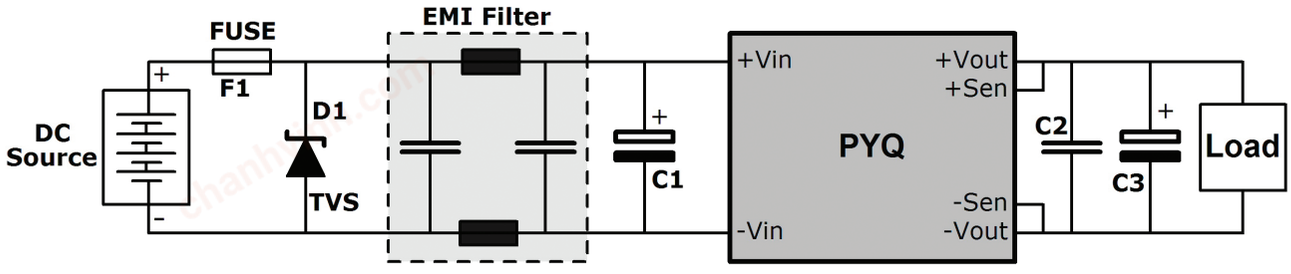
All dimensions in inch [mm]

Inch Tolerances:	x.xx±0.02, x.xxx±0.01
Millimeter Tolerances:	x.x±0.5, x.xx±0.25

Recommendations for Pad Design:

Pin 4, 8:	1.8mm plated, through hole 3.3mm pad size
Pin 1, 2, 3, 5, 6, 7:	1.3mm plated, through hole 2.5mm pad size
Converter Screws:	3.5mm through hole

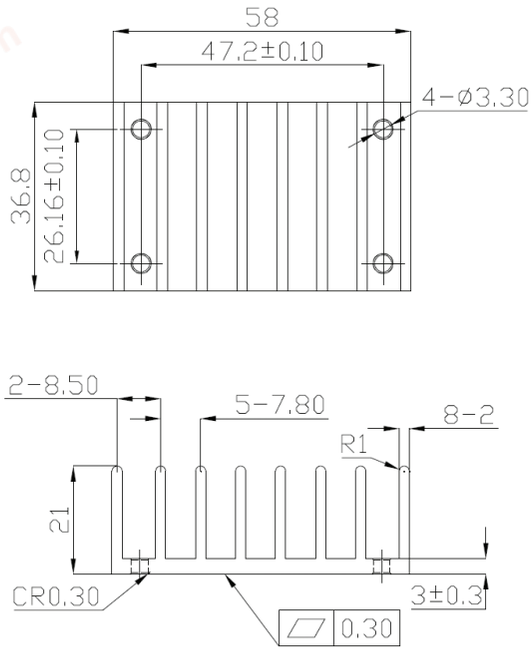
Recommended Wiring Scheme

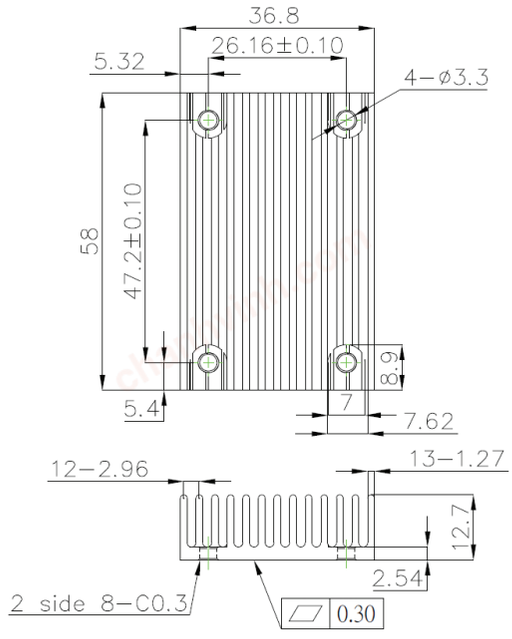


Fuse F1: The DC-DC converter is not internally fused. An external input fuse must always be used. Use a 6A slow-blow fuse.
Diode D1: Transient voltage suppressor diode (TVS) SMDJ180A.
Capacitor C1: 82uF aluminum capacitor
Capacitor C2: 1uF multi layer ceramic capacitor
Capacitor C3: 22µF aluminum or tantalum capacitor.
EMI Filter: This filter reduces the conducted emission to the input. See installation manual for details.

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Heatsinks





	ACC-PYQB-HC01	ACC-PYQB-HC05
Fin Style	**Transverse**	**Longitudinal**
Size (L x W x H)	58 x 36.8 x 21mm	36.8 x 58 x 12.7mm
Thermal Impedance	4.78°C/W nat. convection	5.61°C/W nat. convection
	2.44°C/W with 100LFM	4.01°C/W with 100LFM
	2.06°C/W with 200LFM	3.39°C/W with 200LFM
	1.76°C/W with 300LFM	2.86°C/W with 300LFM
	1.58°C/W with 400LFM	2.49°C/W with 400LFM

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