

## 20W Single and Dual Output DC-DC converters



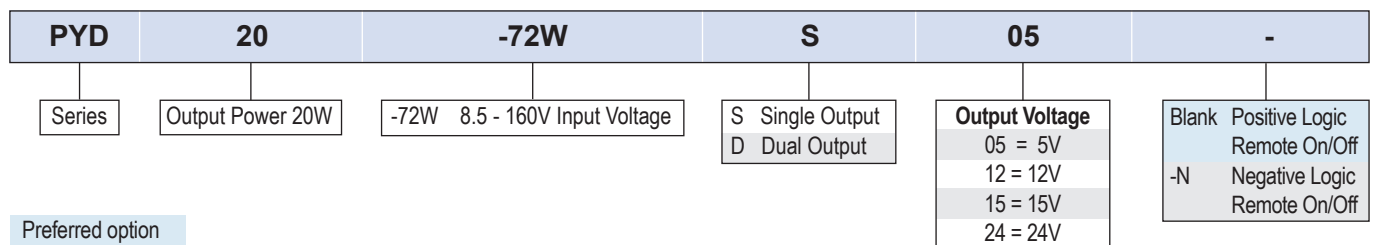
The 20W 2 x 1" footprint PYD series of isolated DC-DC converters operate from an ultra wide range input of 8.5 to 160Vdc (18:1) with single and dual output voltages from 5V to 48V<sup>(1)</sup>. Single output models can be adjusted -20% to +15% by using the trim terminal. The PYD20 models have efficiencies of up to 90% and can operate in ambient temperature of -40 to 105°C. The input to output isolation is 3,000Vac 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 PYD20 series is also tested according to the EN 50155 railroad standard for electronic equipment in railroad vehicles.

| Features   | Benefits   |
|--|--|
| • 2" x 1" Footprint                                      | • Industry Standard Package Size                   |
| • 8.5 - 160Vdc Wide Input Range (18:1)                   | • Supports the Majority of Rail 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           |
| • 3000Vac 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 (µF) |
| <b>Single Outputs</b>       |                   |                    |                     |                   |                            |                               |                               |
| PYD20-72WS05                | 8.5 - 160         | 5                  | 4                   | 20                | 5                          | 86 / 85                       | 6800                          |
| PYD20-72WS12                | 8.5 - 160         | 12                 | 1.67                | 20                | 8                          | 89 / 88                       | 3300                          |
| PYD20-72WS15                | 8.5 - 160         | 15                 | 1.33                | 20                | 8                          | 89 / 88                       | 2200                          |
| <b>Dual Outputs</b>         |                   |                    |                     |                   |                            |                               |                               |
| PYD20-72WD12 <sup>(1)</sup> | 8.5 - 160         | ±12                | ±0,833              | 20                | 8                          | 89 / 88                       | 820                           |
| PYD20-72WD15 <sup>(1)</sup> | 8.5 - 160         | ±15                | ±0,667              | 20                | 8                          | 89 / 88                       | 680                           |
| PYD20-72WD24 <sup>(1)</sup> | 8.5 - 160         | ±24                | ±0,417              | 20                | 8                          | 90 / 89                       | 330                           |

### Notes

(1) ±12V dual output models can provide a 24V single output by utilizing just the +Vout and -Vout pins, leaving the COM unconnected. Similarly ±15V models can be used as a 30V single output and ±24V models a single 48V output.



| Related Products |             |                                      |
|------------------|-------------|--------------------------------------|
| Type             | Part Number | Description                          |
| DC-DC Converter  | PYQ50       | 30-50W, Input 14-160V, 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                             |     | PYD20   |
| <b>Input</b>                      |     |   |
| Input Voltage Range               | Vdc | 8.5 - 160. Derate output power linearly to 70% load from 12V to 8.5 input |
| Input Surge Voltage               | Vdc | 200 (100ms maximum)   |
| Input Shutdown Voltage            | Vdc | 7.5 Typ.  |
| Start-up Time (typ)               | ms  | 10 (15 for 5V output)   |
| No Load Power 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  |
| Safety Certification and Markings | -   | IEC/UL/CSA/EN62368-1, CE Mark and UKCA Mark. Designed to meet EN45545-2   |

| Immunity                        |             |                                     |          |   |
|---------------------------------|-------------|-------------------------------------|----------|---|
| Test                            | Standard    | Test Level                          | Criteria | Notes (See installation manuals for external circuitry)                             |
| ESD                             | EN61000-4-2 | Air $\pm$ 8kV and Contact $\pm$ 6kV | A        | -   |
| Radiated Susceptibility         | EN61000-4-3 | 20V/m                               | A        | -   |
| Electrical Fast Transient Burst | EN61000-4-4 | $\pm$ 2kV                           | A        | With an input filter of two 100uF capacitors and a 180V suppressor diode (SMCJ180A) |
| Surge                           | EN61000-4-5 | $\pm$ 2kV                           | A        |   |
| Conducted Susceptibility        | EN61000-4-6 | 10 Vrms                             | A        | -   |

| Specifications                |       |  |
|-------------------------------|-------|--|
| Model                         |       | PYD20  |
| <b>Output</b>                 |       |  |
| Output Voltage Tolerance      | %     | $\pm$ 1  |
| Output Voltage Adjustment     | %     | -20/+15 (single output models only)  |
| Switching Frequency           | kHz   | 180 - 220  |
| Line Regulation               | %     | $\pm$ 0.2  |
| Load Regulation               | %     | Single output: $\pm$ 0.2, Dual output: $\pm$ 1   |
| Cross Regulation              | %     | Dual output: $\pm$ 5 (Asymmetrical 25% to 100% load change)  |
| External Load Capacitance     | -     | See model selector table   |
| Ripple & Noise <sup>(2)</sup> | mVp-p | 5V: 75; all other outputs: 100   |
| Temperature Coefficient       | %/°C  | $\pm$ 0.02   |
| Minimum Load                  | -     | No minimum load required   |
| Transient Loading             | -     | 250us recovery time for a 25% load change  |
| Overcurrent Protection (typ)  | %     | 150 hiccup mode)   |
| Overvoltage Protection (typ)  | V     | Zener clamp method. 5V: 6.2, 12V: 15, 15V: 18, 24V: 30   |
| Overtemperature Protection    | °C    | 110, automatic recovery when temperature falls below 92  |
| Remote Sense                  | -     | No remote sense  |
| Remote On/Off                 | -     | Positive Logic (Blank): ON: Open or 4-160V, OFF Short or 0-1.2V<br>Negative Logic (-N): ON: Short or 0-1.2V, OFF: Open or 4-160V |

| Specifications                   |        |  |
|----------------------------------|--------|--|
| Model                            | PYD20  |  |
| <b>Environmental</b>             |        |  |
| Operating Temperature(3)         | °C     | -40 to +105 (see derating section and confirm case temperatures in end system) |
| Maximum Case Temperature         | °C     | 105  |
| Storage Temperature              | °C     | -55 to +125  |
| Humidity (non condensing)        | %RH    | 95 (maximum, for operation & storage)  |
| Cooling                          | -      | Convection or forced air   |
| Altitude                         | m      | 5,000 (operating)  |
| Withstand Voltage (For 1 minute) | -      | Input to output 3000Vac or 4200Vdc   |
| Isolation Capacitance            | pF     | 20 (input to output)   |
| Vibration (Operating)            | -      | MIL-STD-810F, EN61373  |
| Thermal Shock                    | -      | MIL-STD-810F   |
| <b>Other</b>                     |        |  |
| Weight (Typ)                     | g      | 28.5   |
| Size (LxWxH)                     | mm     | 50.8 x 25.4 x 10.2   |
| Size (LxWxH)                     | Inches | 2 x 1 x 0.4  |
| Case Material                    | -      | Plastic  |
| MTBF - MIL-HDBK-217F, Full Load  | Hours  | 1,242,000 - 1,631,000 depending on model                                       |
| Warranty                         | yrs    | 3  |

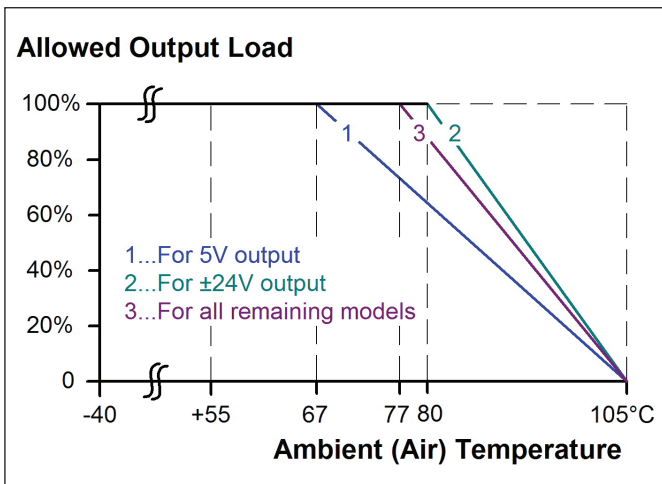
**Notes**

See website for detailed specifications, test methods and installation manual

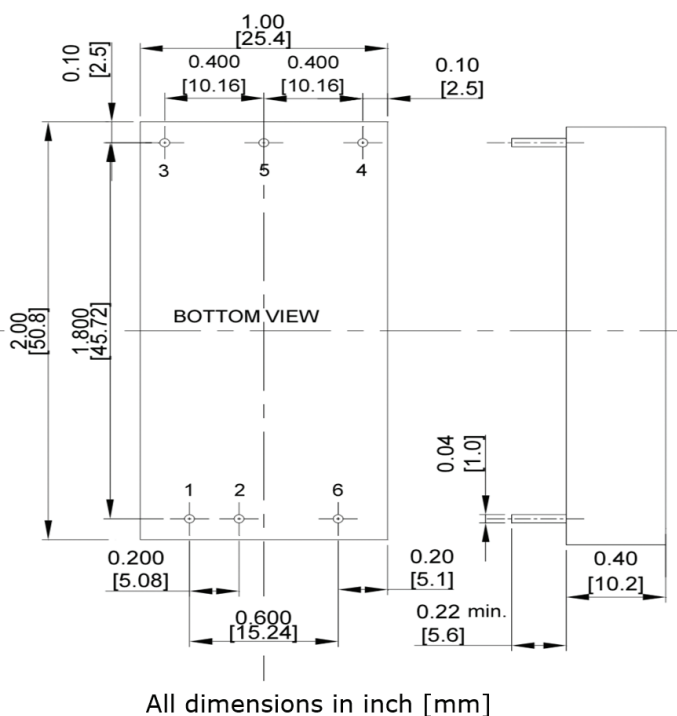
(2): Measured with a 20MHz bandwidth oscilloscope across a 1uF/100V X7R MLCC

(3): 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**



**Outline Drawing and Pinout**



**Inch tolerances:**

x.xx±0.02, x.xxx±0.01

Pin diameter ±0.004

**Millimeter tolerances:**

x.x±0.5, x.xx±0.25

Pin diameter ±0.10

**Pad size recommendations** (all pads)

Through hole:  $\Phi$  0.051 [1.30]

Top view pad:  $\Phi$  0.064 [1.63]

Bottom view pad:  $\Phi$  0.102 [2.60]

**Pin assignment**

| Pin | Single output | Dual outputs |
|-----|---------------|--------------|
| 1   | +V Input      | +V Input     |
| 2   | -V Input      | -V Input     |
| 3   | +V Output     | +V Output    |
| 4   | TRIM          | -V Output    |
| 5   | -V Output     | COM          |
| 6   | R/C           | R/C          |



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