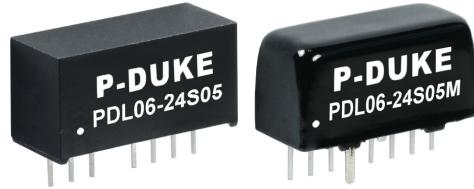


PDL06 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE
UP TO 6 Watts



FEATURES

- NO MINIMUM LOAD REQUIRED
- UP TO 3000VDC INPUT TO OUTPUT ISOLATION
- SMALL SIZE AND LOW PROFILE : 0.86 X 0.36 X 0.44 INCH
- LOW OUTPUT RIPPLE AND NOISE
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

| | | | | |
|----------------------|----------------------|-------------------|-----|-----|
| 3000VDC ISOLATION | 1600VDC ISOLATION | REMOTE CONTROL | OCP | SCP |
|----------------------|----------------------|-------------------|-----|-----|

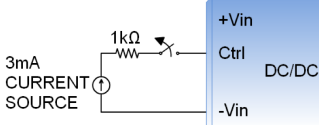
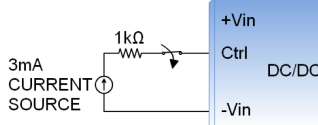
TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C otherwise noted

| Model Number | Input Range | Output Voltage | Output Current @Full Load | Input Current @ No Load | Efficiency | Maximum Capacitor Load |
|--------------|-------------|----------------|---------------------------|-------------------------|------------|------------------------|
| | VDC | VDC | mA | mA | % | µF |
| PDL06-05S3P3 | 4.5 ~ 9 | 3.3 | 1300 | 65mA | 77 | 6600 |
| PDL06-05S05 | 4.5 ~ 9 | 5 | 1200 | 105mA | 81 | 3300 |
| PDL06-05S09 | 4.5 ~ 9 | 9 | 666 | 105mA | 83 | 2000 |
| PDL06-05S12 | 4.5 ~ 9 | 12 | 500 | 105mA | 84 | 1600 |
| PDL06-05S15 | 4.5 ~ 9 | 15 | 400 | 105mA | 84 | 1400 |
| PDL06-05S24 | 4.5 ~ 9 | 24 | 250 | 105mA | 84 | 680 |
| PDL06-05D05 | 4.5 ~ 9 | ±5 | ±600 | 105mA | 81 | ±2000 |
| PDL06-05D12 | 4.5 ~ 9 | ±12 | ±250 | 105mA | 84 | ±900 |
| PDL06-05D15 | 4.5 ~ 9 | ±15 | ±200 | 105mA | 84 | ±660 |
| PDL06-12S3P3 | 9 ~ 18 | 3.3 | 1300 | 40mA | 78 | 6600 |
| PDL06-12S05 | 9 ~ 18 | 5 | 1200 | 55mA | 83 | 3300 |
| PDL06-12S09 | 9 ~ 18 | 9 | 666 | 55mA | 85 | 2000 |
| PDL06-12S12 | 9 ~ 18 | 12 | 500 | 55mA | 85 | 1600 |
| PDL06-12S15 | 9 ~ 18 | 15 | 400 | 55mA | 85 | 1400 |
| PDL06-12S24 | 9 ~ 18 | 24 | 250 | 55mA | 84 | 680 |
| PDL06-12D05 | 9 ~ 18 | ±5 | ±600 | 55mA | 82 | ±2000 |
| PDL06-12D12 | 9 ~ 18 | ±12 | ±250 | 55mA | 84 | ±900 |
| PDL06-12D15 | 9 ~ 18 | ±15 | ±200 | 55mA | 85 | ±660 |
| PDL06-24S3P3 | 18 ~ 36 | 3.3 | 1300 | 20mA | 78 | 6600 |
| PDL06-24S05 | 18 ~ 36 | 5 | 1200 | 28mA | 83 | 3300 |
| PDL06-24S09 | 18 ~ 36 | 9 | 666 | 28mA | 85 | 2000 |
| PDL06-24S12 | 18 ~ 36 | 12 | 500 | 28mA | 86 | 1600 |
| PDL06-24S15 | 18 ~ 36 | 15 | 400 | 28mA | 86 | 1400 |
| PDL06-24S24 | 18 ~ 36 | 24 | 250 | 28mA | 85 | 680 |
| PDL06-24D05 | 18 ~ 36 | ±5 | ±600 | 28mA | 82 | ±2000 |
| PDL06-24D12 | 18 ~ 36 | ±12 | ±250 | 28mA | 85 | ±900 |
| PDL06-24D15 | 18 ~ 36 | ±15 | ±200 | 28mA | 85 | ±660 |
| PDL06-48S3P3 | 36 ~ 75 | 3.3 | 1300 | 14mA | 78 | 6600 |
| PDL06-48S05 | 36 ~ 75 | 5 | 1200 | 14mA | 82 | 3300 |
| PDL06-48S09 | 36 ~ 75 | 9 | 666 | 14mA | 84 | 2000 |
| PDL06-48S12 | 36 ~ 75 | 12 | 500 | 14mA | 85 | 1600 |
| PDL06-48S15 | 36 ~ 75 | 15 | 400 | 14mA | 86 | 1400 |
| PDL06-48S24 | 36 ~ 75 | 24 | 250 | 14mA | 84 | 680 |
| PDL06-48D05 | 36 ~ 75 | ±5 | ±600 | 14mA | 82 | ±2000 |
| PDL06-48D12 | 36 ~ 75 | ±12 | ±250 | 14mA | 84 | ±900 |
| PDL06-48D15 | 36 ~ 75 | ±15 | ±200 | 14mA | 85 | ±660 |

PART NUMBER STRUCTURE

| | | | | | |
|--------------|---|--------------------------|--|---|----------|
| PDL06 | - | 48 | S | 05 | H |
| Series Name | Input Voltage (VDC) | Output Quantity | Output Voltage (VDC) | Case & Isolation Option | |
| | 05: 4.5~9 12: 9~18 24: 18~36 48: 36~75 | S: Single D: Dual | 3P3: 3.3 05: 5 09: 9 12: 12 15: 15 05: ±5 12: ±12 15: ±15 | □: Standard type Plastic case 1600VDC isolation H: Plastic case 3000VDC isolation M: Metal case 1600VDC isolation | |

INPUT SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--|---|----------------------|----------------------|-----------------------|----------|
| Operating input voltage range | 5Vin(nom) 12Vin(nom) 24Vin(nom) 48Vin(nom) | 4.5 9 18 36 | 5 12 24 48 | 9 18 36 75 | VDC |
| Start up voltage | 5Vin(nom) 12Vin(nom) 24Vin(nom) 48Vin(nom) | | | 4.5 9 18 36 | VDC |
| Shutdown voltage | 5Vin(nom) 12Vin(nom) 24Vin(nom) 48Vin(nom) | | 3.5 7 15 33 | | VDC |
| Start up time | Constant resistive load Power up Remote ON/OFF | | 5 5 | 10 10 | ms |
| Input surge voltage | 1 second, max. 5Vin(nom) 12Vin(nom) 24Vin(nom) 48Vin(nom) | | | 15 36 50 100 | VDC |
| Input reflected ripple current | | | 30 | | mAp-p |
| Input filter | | | Capacitor type | | |
| Remote ON/OFF | Ctrl pin applied current via 1kΩ DC-DC ON DC-DC OFF Remote off input current | 2 | 3 | 4 2.5 | mA mA |
| <p>Application circuit</p> <p>DC-DC ON</p>  <p>DC-DC OFF</p>  | | | | | |

OUTPUT SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|------------------------------------|--------------------------------|------|-------|-------|
| Voltage accuracy | | -1.0 | | +1.0 | % |
| Line regulation | Low Line to High Line at Full Load | -0.2 | | +0.2 | % |
| Load regulation | No Load to Full Load | -1.0 | | +1.0 | % |
| Cross regulation | Asymmetrical load 25%/100% FL | -5.0 | | +5.0 | % |
| Ripple and noise | 20MHz bandwidth | | 50 | | mVp-p |
| Temperature coefficient | | -0.02 | | +0.02 | %/°C |
| Transient response recovery time | 25% load step change | | 500 | | μs |
| Short circuit protection | | Continuous, automatic recovery | | | |

GENERAL SPECIFICATIONS

| Parameter | Conditions | | | Min. | Typ. | Max. | Unit |
|-----------------------|---------------------------|-----------------|---------------|------|------|-----------------------------|--|
| Isolation voltage | 1 minute | Input to Output | Standard Type | 1600 | | | VDC |
| | | | Suffix "H" | 3000 | | | |
| | Input (Output) to Case | Suffix "M" | 1600 | | | | |
| | | Suffix "M" | 1000 | | | | |
| Isolation resistance | 500VDC | | | 1 | | GΩ | |
| Isolation capacitance | | | Standard Type | | | 50 | pF |
| | | | Suffix "H" | | | 50 | |
| | | | Suffix "M" | | | 50 | |
| Switching frequency | Full load to minimum load | | | 100 | | | kHz |
| Safety approvals | | | | | | | UL60950-1 EN60950-1 IEC60950-1 |
| Case material | | | Standard Type | | | | Non-conductive black plastic Non-conductive black plastic Copper None |
| | | | Suffix "H" | | | | |
| | | | Suffix "M" | | | | |
| Base material | | | | | | | None |
| Potting material | | | | | | | Silicone (UL94 V-0) |
| Weight | | | Standard Type | | | 4.8g (0.17oz) | |
| | | | Suffix "H" | | | 4.8g (0.17oz) | |
| | | | Suffix "M" | | | 5.9g (0.21oz) | |
| MTBF | MIL-HDBK-217F | | Standard Type | | | 2.135 x 10 ⁶ hrs | |
| | | | Suffix "H" | | | 2.135 x 10 ⁶ hrs | |
| | | | Suffix "M" | | | 2.360 x 10 ⁶ hrs | |
| | | | Suffix "M" | | | 2.360 x 10 ⁶ hrs | |

ENVIRONMENTAL SPECIFICATIONS

| Parameter | Conditions | | | Min. | Typ. | Max. | Unit |
|-------------------------------|------------|------------------|------------------|------|------|------|--------------|
| Operating ambient temperature | | Standard type | Without derating | -40 | | +65 | °C |
| | | | With derating | +65 | | +90 | |
| | Suffix "H" | Without derating | -40 | | +65 | | |
| | | With derating | +65 | | +90 | | |
| | Suffix "M" | Without derating | -40 | | +70 | | |
| | | With derating | +70 | | +95 | | |
| Storage temperature range | | | | -55 | | +125 | °C |
| Thermal shock | | | | | | | MIL-STD-810F |
| Vibration | | | | | | | MIL-STD-810F |
| Relative humidity | | | | | | | 5% to 95% RH |

EMC SPECIFICATIONS

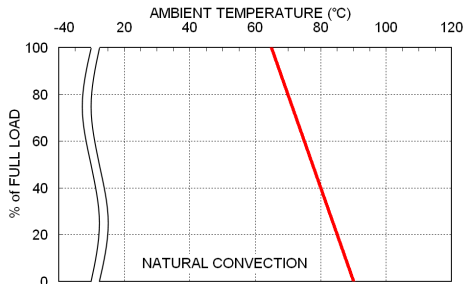
| Parameter | Conditions | | Level |
|-------------------------------|-------------|-----------------------------|-------------------|
| EMI ⁽¹⁾ | EN55022 | | Class A · Class B |
| ESD | EN61000-4-2 | Air ± 8kV and Contact ± 6kV | Perf. Criteria A |
| Radiated immunity | EN61000-4-3 | 10 V/m | Perf. Criteria A |
| Fast transient ⁽²⁾ | EN61000-4-4 | ± 2kV | Perf. Criteria A |
| Surge ⁽²⁾ | EN61000-4-5 | ±1kV | Perf. Criteria A |
| Conducted immunity | EN61000-4-6 | 10 Vr.m.s | Perf. Criteria A |

Note:

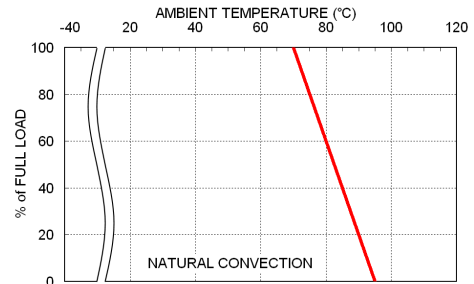
- The standard modules meet EMI Class A or Class B with external components. For further information, please contact with P-DUKE.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
The filter capacitor Power Mate suggest: 5 VDC input : Nippon chemi-con KY series, 330μF/50V.
Others : Nippon chemi-con KY series, 220μF/100V.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

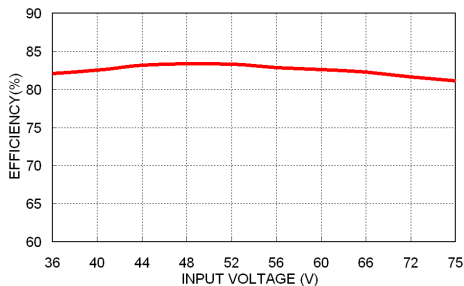
CHARACTERISTIC CURVE



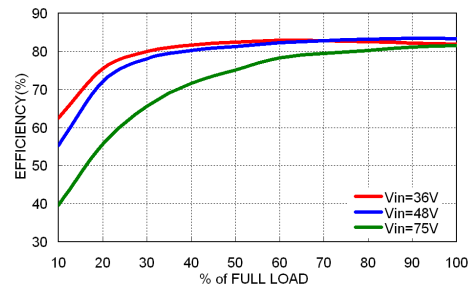
PDL06-48S05 Derating Curve



PDL06-48S05M Derating Curve



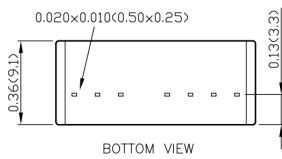
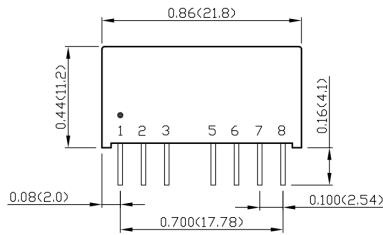
PDL06-48S05 Efficiency vs. Input Voltage



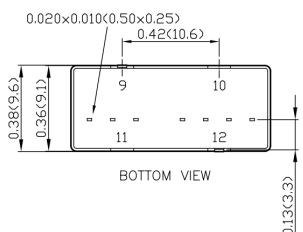
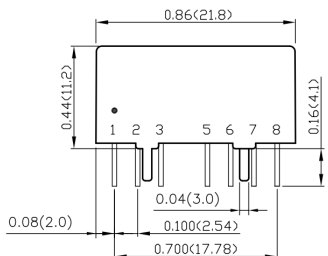
PDL06-48S05 Efficiency vs. Output Load

MECHANICAL DRAWING

Standard type, Suffix "H"



Suffix "M"



PIN CONNECTION

| PIN | SINGLE | DUAL |
|-----|--------------|--------------|
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 3 | Ctrl | Ctrl |
| 5 | NC*/No pin** | NC*/No pin** |
| 6 | +Vout | +Vout |
| 7 | -Vout | Common |
| 8 | NC | -Vout |

*NC pin for standard type model.

**No pin for 3kVDC isolation model (suffix "H").

1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)

PIN CONNECTION

| PIN | SINGLE | DUAL |
|-----|-----------|-----------|
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 3 | Ctrl | Ctrl |
| 5 | NC | NC |
| 6 | +Vout | +Vout |
| 7 | -Vout | Common |
| 8 | NC | -Vout |
| 9 | Case | Case |
| 10 | Stand off | Stand off |
| 11 | Stand off | Stand off |
| 12 | Case | Case |

1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)