

# PDL03 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE  
UP TO 3 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<br>ISOLATION | 1600VDC<br>ISOLATION | REMOTE<br>CONTROL | OCP | SCP |
|----------------------|----------------------|-------------------|-----|-----|
|----------------------|----------------------|-------------------|-----|-----|

## TECHNICAL SPECIFICATION

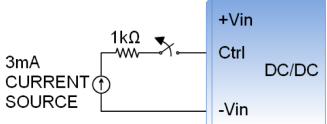
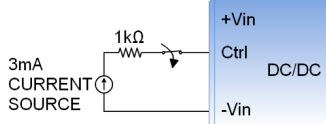
All specifications are typical at nominal input, full load and 25°C otherwise noted

| Model Number | Input Range | Output Voltage | Output Current @Full Load | Input Current @ No Load | Efficiency | Maximum Capacitor Load |
|--------------|-------------|----------------|---------------------------|-------------------------|------------|------------------------|
|              | VDC         | VDC            | mA                        | mA                      | %          | μF                     |
| PDL03-05S3P3 | 4.5 ~ 9     | 3.3            | 700                       | 45                      | 75         | 3300                   |
| PDL03-05S05  | 4.5 ~ 9     | 5              | 600                       | 45                      | 79         | 1680                   |
| PDL03-05S09  | 4.5 ~ 9     | 9              | 333                       | 55                      | 80         | 1000                   |
| PDL03-05S12  | 4.5 ~ 9     | 12             | 250                       | 55                      | 81         | 820                    |
| PDL03-05S15  | 4.5 ~ 9     | 15             | 200                       | 55                      | 82         | 680                    |
| PDL03-05D05  | 4.5 ~ 9     | ±5             | ±300                      | 55                      | 78         | ±1000                  |
| PDL03-05D12  | 4.5 ~ 9     | ±12            | ±125                      | 60                      | 81         | ±470                   |
| PDL03-05D15  | 4.5 ~ 9     | ±15            | ±100                      | 60                      | 81         | ±330                   |
| PDL03-12S3P3 | 9 ~ 18      | 3.3            | 700                       | 25                      | 77         | 3300                   |
| PDL03-12S05  | 9 ~ 18      | 5              | 600                       | 25                      | 81         | 1680                   |
| PDL03-12S09  | 9 ~ 18      | 9              | 333                       | 30                      | 80         | 1000                   |
| PDL03-12S12  | 9 ~ 18      | 12             | 250                       | 30                      | 83         | 820                    |
| PDL03-12S15  | 9 ~ 18      | 15             | 200                       | 30                      | 83         | 680                    |
| PDL03-12D05  | 9 ~ 18      | ±5             | ±300                      | 30                      | 82         | ±1000                  |
| PDL03-12D12  | 9 ~ 18      | ±12            | ±125                      | 30                      | 83         | ±470                   |
| PDL03-12D15  | 9 ~ 18      | ±15            | ±100                      | 30                      | 83         | ±330                   |
| PDL03-24S3P3 | 18 ~ 36     | 3.3            | 700                       | 16                      | 76         | 3300                   |
| PDL03-24S05  | 18 ~ 36     | 5              | 600                       | 16                      | 82         | 1680                   |
| PDL03-24S09  | 18 ~ 36     | 9              | 333                       | 17                      | 82         | 1000                   |
| PDL03-24S12  | 18 ~ 36     | 12             | 250                       | 18                      | 83         | 820                    |
| PDL03-24S15  | 18 ~ 36     | 15             | 200                       | 18                      | 84         | 680                    |
| PDL03-24D05  | 18 ~ 36     | ±5             | ±300                      | 17                      | 80         | ±1000                  |
| PDL03-24D12  | 18 ~ 36     | ±12            | ±125                      | 18                      | 83         | ±470                   |
| PDL03-24D15  | 18 ~ 36     | ±15            | ±100                      | 18                      | 85         | ±330                   |
| PDL03-48S3P3 | 36 ~ 75     | 3.3            | 700                       | 10                      | 74         | 3300                   |
| PDL03-48S05  | 36 ~ 75     | 5              | 600                       | 10                      | 79         | 1680                   |
| PDL03-48S09  | 36 ~ 75     | 9              | 333                       | 11                      | 80         | 1000                   |
| PDL03-48S12  | 36 ~ 75     | 12             | 250                       | 12                      | 81         | 820                    |
| PDL03-48S15  | 36 ~ 75     | 15             | 200                       | 12                      | 82         | 680                    |
| PDL03-48D05  | 36 ~ 75     | ±5             | ±300                      | 12                      | 79         | ±1000                  |
| PDL03-48D12  | 36 ~ 75     | ±12            | ±125                      | 12                      | 82         | ±470                   |
| PDL03-48D15  | 36 ~ 75     | ±15            | ±100                      | 12                      | 83         | ±330                   |

## PART NUMBER STRUCTURE

| Series Name | Input Voltage (VDC)                             | Output Quantity | Output Voltage (VDC)                           | Isolation Option                                              |
|-------------|-------------------------------------------------|-----------------|------------------------------------------------|---------------------------------------------------------------|
| PDL03 -     | <b>48</b>                                       | <b>S</b>        | <b>05</b>                                      | <b>H</b>                                                      |
|             | 05: 4.5~9<br>12: 9~18<br>24: 18~16<br>48: 36~75 | S: Single       | 3P3: 3.3<br>05: 5<br>09: 9<br>12: 12<br>15: 15 | □: Standard type<br>1600VDC isolation<br>H: 3000VDC isolation |
|             |                                                 | D: Dual         | 05: ±5<br>12: ±12<br>15: ±15                   |                                                               |

## INPUT SPECIFICATIONS

| Parameter                                                                                                                                                                                                                            | Conditions                                                                            | Min.                 | Typ.                     | Max.                  | Unit     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------|--------------------------|-----------------------|----------|
| Operating input voltage range                                                                                                                                                                                                        | 5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                                   | 4.5<br>9<br>18<br>36 | 5<br>12<br>24<br>48      | 9<br>18<br>36<br>75   | VDC      |
| Start up time                                                                                                                                                                                                                        | Constant resistive load<br>Power up<br>Remote ON/OFF                                  |                      | 30<br>30                 |                       | ms       |
| Input surge voltage                                                                                                                                                                                                                  | 100 ms, max.<br>5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                   |                      |                          | 15<br>36<br>50<br>100 | VDC      |
| Input reflected ripple current                                                                                                                                                                                                       | 5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                                   |                      | 400<br>150<br>380<br>170 |                       | mAp-p    |
| Input filter <sup>(1)</sup>                                                                                                                                                                                                          |                                                                                       |                      |                          | Capacitor type        |          |
| Remote ON/OFF                                                                                                                                                                                                                        | DC-DC ON<br>Ctrl pin applied current via 1kΩ<br>DC-DC OFF<br>Remote off input current | 2                    | 3                        | 4<br>2.5              | mA<br>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<br>Single        | -1.0                           |      | +1.0  | %     |
|                                  | Dual                                  | -1.0                           |      | +1.0  | %     |
|                                  | 5% Load to 100% Full Load<br>Single   | -0.5                           |      | +0.5  | %     |
| Cross regulation                 | Asymmetrical load 25%/100% FL<br>Dual | -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<br>Suffix "H" | 1600<br>3000 |      |                                      | VDC  |
| Isolation resistance  | 500VDC                    |                 |                             | 1            |      |                                      | GΩ   |
| Isolation capacitance |                           |                 | Standard Type<br>Suffix "H" |              |      | 200<br>40                            | pF   |
| Switching frequency   | Full load to minimum load |                 |                             | 100          |      |                                      | kHz  |
| Safety approvals      |                           |                 |                             |              |      | UL60950-1<br>EN60950-1<br>IEC60950-1 |      |
| Case material         |                           |                 |                             |              |      | Non-conductive black plastic         |      |
| Base material         |                           |                 |                             |              |      | None                                 |      |
| Potting material      |                           |                 |                             |              |      | Silicone (UL94 V-0)                  |      |
| Weight                |                           |                 |                             |              |      | 4.8g (0.17oz)                        |      |
| MTBF                  | MIL-HDBK-217F             |                 |                             |              |      | 4.871 x 10 <sup>6</sup> hrs          |      |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter                     | Conditions |                                   |  | Min.       | Typ. | Max.         | Unit |
|-------------------------------|------------|-----------------------------------|--|------------|------|--------------|------|
| Operating ambient temperature |            | Without derating<br>With derating |  | -40<br>+71 |      | +71<br>+100  | °C   |
| Storage temperature range     |            |                                   |  | -55        |      | +125         | °C   |
| Thermal shock                 |            |                                   |  |            |      | MIL-STD-810F |      |
| Vibration                     |            |                                   |  |            |      | MIL-STD-810F |      |
| Relative humidity             |            |                                   |  |            |      | 5% to 95% RH |      |

## EMC SPECIFICATIONS

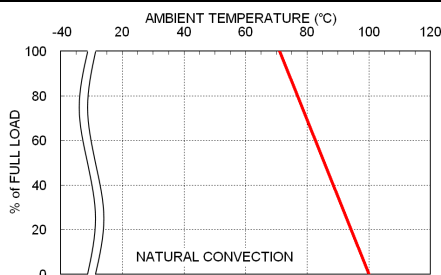
| Parameter                     | Conditions  |                             | Level             |
|-------------------------------|-------------|-----------------------------|-------------------|
| EMI <sup>(2)</sup>            | EN55022     |                             | Class A · Class B |
| ESD 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

### Note:

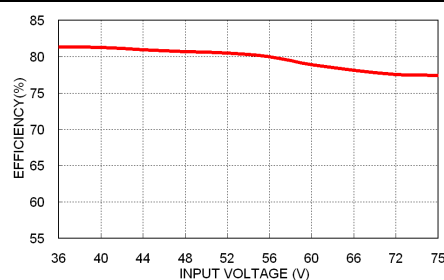
- It will not damage the device without installing external input capacitors. It's helpful to reduce input reflected ripple current if external input capacitors are installed.
- The standard modules meet EMI Class A or Class B with external components. For further information, please contact with P-DUKE.
- 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: Nippon chemi-con KY series, 220μF/100V.

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

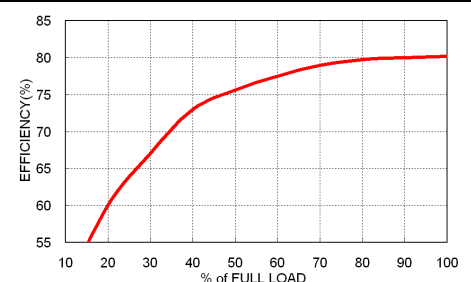
## CHARACTERISTIC CURVE



PDL03-48S05 Derating Curve

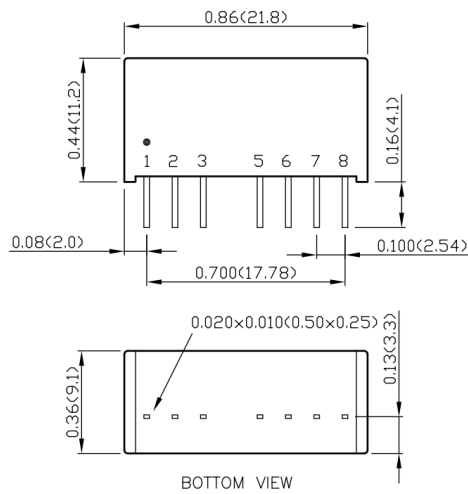


PDL03-48S05 Efficiency vs. Input Voltage



PDL03-48S05 Efficiency vs. Output Load

**MECHANICAL DRAWING**



**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)