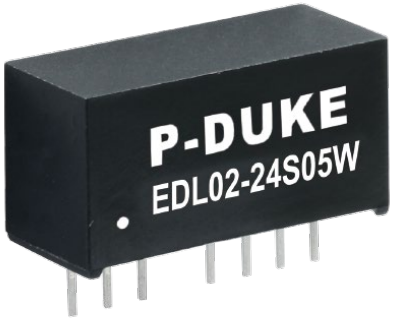
DC – DC

## Features

- 4:1 Wide Input Range
- Operating Temperature Range: -40~105°c
- Approved to UKCA, CE, RoHS & REACH
- Safety Standards to IEC/UL/EN62368-1
- Efficiency up to 82%
- EMC Class A & B




Ideal Power's 43EDL02-xyW 2W Series Pin Connection DC/DC Converters are certified to UKCA, CE, RoHS, REACH & IEC/UL/EN 62368-1 Standards and comply with Efficiency Regulations. These are primarily used in ITE, Video & Audio Industries and customised solutions are available upon request.

## Part Number Structure

| 43EDL02 - | 48 | S | 05 | W |
|---|---|---|---|---|
| Series Name | Input Voltage (VDC) | Output Quantity | Output Voltage (VDC) | Input Range |
| | **05:**4.5~13.2 | **S:** Single | **3P3:**3.3 | **4:1** |
| | **12:**9~18 | | **05:**5 | |
| | **24:**18~36 | | **09:**9 | |
| | **48:**36~75 | | **12:**12 | |
| | | | **15:**15 | |
| | | | **24:**24 | |
| | | **D:** Dual | **05:**±5 | |
| | | | **12:**±12 | |
| | | | **15:**±15 | |

## Models

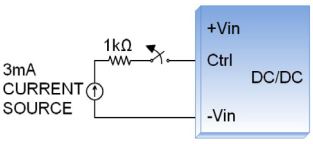
| Model Number | Input Range | Output Voltage | Output Current @Full Load mA | Input Current @No Load mA | Efficiency % | Maximum Capacitor Load µF |
|---|---|---|---|---|---|---|
| 43EDL02-12S3P3W | 4.5 ~ 18 | 3.3 | 500 | 30 | 75 | 3300 |
| 43EDL02-12S05W | 4.5 ~ 18 | 5 | 400 | 30 | 80 | 1680 |
| 43EDL02-12S09W | 4.5 ~ 18 | 9 | 222 | 35 | 81 | 1000 |
| 43EDL02-12S12W | 4.5 ~ 18 | 12 | 167 | 35 | 81 | 820 |
| 43EDL02-12S15W | 4.5 ~ 18 | 15 | 134 | 40 | 82 | 680 |
| 43EDL02-12S24W | 4.5 ~ 18 | 24 | 83 | 40 | 82 | 220 |
| 43EDL02-12D05W | 4.5 ~ 18 | ±5 | ±200 | 35 | 80 | ±1000 |
| 43EDL02-12D12W | 4.5 ~ 18 | ±12 | ±83 | 40 | 82 | ±470 |
| 43EDL02-12D15W | 4.5 ~ 18 | ±15 | ±67 | 45 | 81 | ±330 |
| 43EDL02-24S3P3W | 9 ~ 36 | 3.3 | 500 | 20 | 76 | 3300 |
| 43EDL02-24S05W | 9 ~ 36 | 5 | 400 | 20 | 80 | 1680 |
| 43EDL02-24S09W | 9 ~ 36 | 9 | 222 | 20 | 80 | 1000 |
| 43EDL02-24S12W | 9 ~ 36 | 12 | 167 | 20 | 82 | 820 |
| 43EDL02-24S15W | 9 ~ 36 | 15 | 134 | 20 | 82 | 680 |
| 43EDL02-24S24W | 9 ~ 36 | 24 | 83 | 20 | 82 | 220 |
| 43EDL02-24D05W | 9 ~ 36 | ±5 | ±200 | 20 | 79 | ±1000 |
| 43EDL02-24D12W | 9 ~ 36 | ±12 | ±83 | 20 | 82 | ±470 |
| 43EDL02-24D15W | 9 ~ 36 | ±15 | ±67 | 20 | 80 | ±330 |
| 43EDL02-48S3P3W | 18 ~ 75 | 3.3 | 500 | 10 | 74 | 3300 |
| 43EDL02-48S05W | 18 ~ 75 | 5 | 400 | 10 | 79 | 1680 |
| 43EDL02-48S09W | 18 ~ 75 | 9 | 222 | 10 | 81 | 1000 |
| 43EDL02-48S12W | 18 ~ 75 | 12 | 167 | 10 | 82 | 820 |
| 43EDL02-48S15W | 18 ~ 75 | 15 | 134 | 10 | 81 | 680 |
| 43EDL02-48S24W | 18 ~ 75 | 24 | 83 | 10 | 81 | 220 |
| 43EDL02-48D05W | 18 ~ 75 | ±5 | ±200 | 10 | 79 | ±1000 |
| 43EDL02-48D12W | 18 ~ 75 | ±12 | ±83 | 10 | 81 | ±470 |
| 43EDL02-48D15W | 18 ~ 75 | ±15 | ±67 | 10 | 81 | ±330 |

## Input Specifications

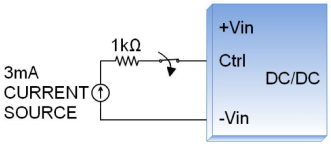
| Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Operating input voltage range | | 12Vin(nom) | 4.5 | 12 | 18 | VDC |
| | | 24Vin(nom) | 9 | 24 | 36 | |
| | | 48Vin(nom) | 18 | 48 | 75 | |
| Start-up voltage | | 12Vin(nom) | -- | -- | 4.5 | VDC |
| | | 24Vin(nom) | -- | -- | 9 | |
| | | 48Vin(nom | -- | -- | 18 | |
| Shutdown voltage | | 12Vin(nom) | 2 | 3 | 4 | VDC |
| | | 24Vin(nom) | 6 | 7 | 8 | |
| | | 48Vin(nom | 13 | 15 | 17 | |
| Start-up time | Constant resistive load | Power up | -- | 10 | 20 | ms |
| | | Remote ON/OFF | -- | 10 | 20 | |
| Input surge voltage | 1 second, max. | 12Vin(nom) | -- | -- | 25 | VDC |
| | | 24Vin(nom) | -- | -- | 50 | |
| | | 48Vin(nom | -- | -- | 100 | |
| Input filter | | | | Capacitor type | | |
| Remote ON/OFF | Ctrl pin applied current via 1kΩ | DC-DC ON | | Open or high impedance | | |
| | | DC-DC OFF | 2 | 3 | 4 | mA |
| | | Remote off input current | | 2.5 | | mA |

Application circuit

DC-DC ON




DC-DC OFF




## 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 | Single | -1.0 | -- | +1.0 | % |
| | | Dual | -1.0 | -- | +1.0 | |
| | 10% Load to 90% Load | Single | -0.5 | -- | +0.5 | |
| | | Dual | -0.8 | -- | +0.8 | |
| Cross regulation | Asymmetrical load 25%/100% FL | Dual | -5.0 | -- | +5.0 | |
| Ripple and noise | Measured by 20MHz bandwidth | | -- | 75 | -- | mVp-p |
| Temperature coefficient | | | -0.02 | -- | +0.02 | %/°C |
| Transient response recovery time | 25% load step change | | -- | 500 | -- | µs |
| Over current protection | | | 130 | 170 | 230 | % |
| Short circuit protection | | | Continuous, automatics recovery | | | |

## General Specifications

| Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Isolation voltage | 1 minute | Input to Output | 1600 | -- | -- | VDC |
| Isolation resistance | 500VDC | | 1 | -- | -- | GΩ |
| Isolation capacitance | | | -- | -- | 50 | pF |
| Switching frequency | Full load to minimum load | | 100 | -- | -- | kHz |
| Safety approvals | | | | | | IEC/ EN/ UL 62368-1 |
| Case material | | | | | | Non-conductive black plastic |
| Potting material | | | | | | Silicone (UL94 V-0) |
| Weight | | | | | | 4.5g (0.16oz) |
| MTBF | MIL-HDBK-217F | | | | | 6.621 x $10^6$ hrs |

## Environmental Specifications

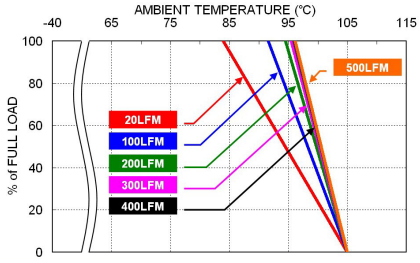
| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating base-plate temperature | With derating | -40 | -- | +105 | ℃ |
| Maximum case temperature | | -- | -- | 105 | ℃ |
| Storage temperature range | | -55 | -- | +125 | ℃ |
| Thermal shock | | | | | MIL-STD-810F |
| Vibration | | | | | MIL-STD-810F |
| Relative humidity | | | | | 5% to 95% RH |

## EMC Specifications

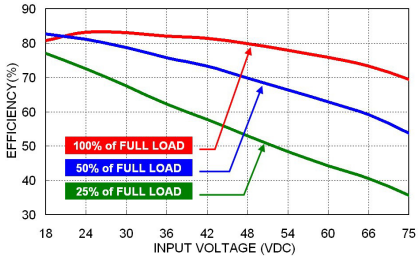
| Parameter | | Conditions | Level |
|---|---|---|---|
| EMI | EN55032 | With external components | Class A, Class B |
| EMS | EN55024 | | |
| ESD | EN61000-4-2 | Air ± 8kV and Contact ± 6kV | Perf. Criteria A |
| Radiated immunity | EN61000-4-3 | 10 V/m | Perf. Criteria A |
| Fast transient | EN61000-4-4 | ± 2kV<br>With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V) | Perf. Criteria A |
| Surge | EN61000-4-5 | ± 1kV<br>With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V) | Perf. Criteria A |
| Conducted immunity | EN61000-4-6 | 10 Vr.m.s | Perf. Criteria A |
| Power frequency magnetic field | EN61000-4-8 | 100A/m continuous; 1000A/m 1 second | Perf. Criteria A |

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

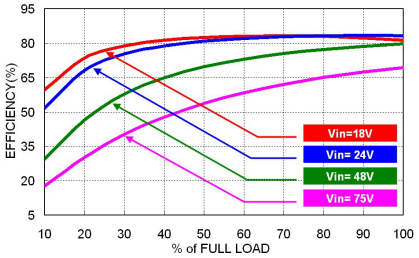
## Characteristic Curve




43EDL02-48S05W Derating Curve




43EDL02-48S05W Efficiency vs. Input Voltage




43EDL02-48S05W Efficiency vs. Output Load

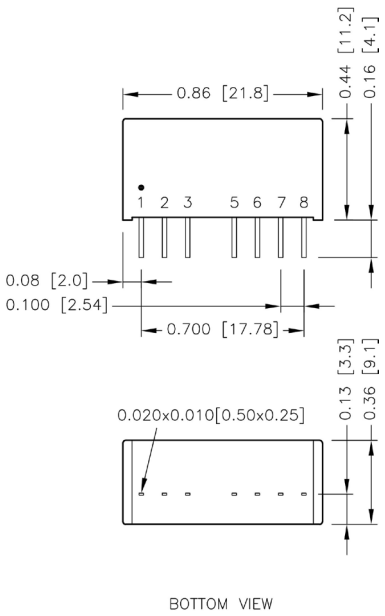
## Fuse Consideration

This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
The input line fuse suggest as below：

| Model | Fuse Rating (A) | Fuse Type |
|---|---|---|
| 43EDL02-12S□□W, 43EDL02-12D□□W | 1 | Slow-Blow |
| 43EDL02-24S□□W, 43EDL02-24D□□W | 0.5 | Slow-Blow |
| 43EDL02-48S□□W, 43EDL02-48D□□W | 0.315 | Slow-Blow |

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

## Mechanical Drawing

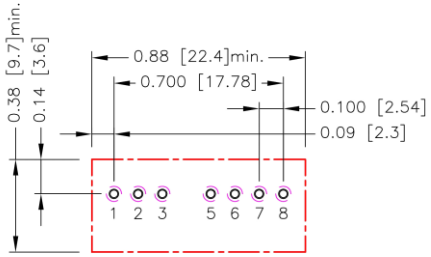



1. All dimensions in inch [mm]
2. Tolerance: x.xx±0.02 [x.x±0.5]
   x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

## 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 |

## Recommended Pad Layout

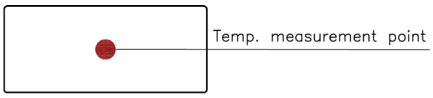



All dimensions in inch(mm)
Pad size(lead free recommended)
Through hole 1.2.3.5.6.7.8: Ø 0.031[0.80]
Top view pad 1.2.3.5.6.7.8: Ø 0.039[1.00]
Bottom view pad 1.2.3.5.6.7.8: Ø0.063[1.60]

## Thermal Considerations

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding Environment.
Proper cooling can be verified by measuring the point as the figure below.
The temperature at this location should not exceed “Maximum case temperature”.
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.
You can limit this Temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).




Top View

DC – DC