

## 500W AC-DC Power Modules

<https://product.tdk.com/en/power/pfh>  
[www.emea.lambda.tdk.com/pfh500f](http://www.emea.lambda.tdk.com/pfh500f)



The 4" x 2.4" footprint, high efficiency PFH500 series of AC-DC power modules are used in environments where convection or forced air cooling is not viable. Suitable for use in outdoor enclosures or liquid cooled applications, these pcb mounted power modules accept a wide range AC input and deliver an adjustable, regulated output. High ambient temperatures can be tolerated as the conduction cooled baseplate can withstand -40 to 100°C temperatures. These third generation modules also have a PMBus™ interface with read/write capability for remote monitoring and programming.

| Features                                  | Benefits                                                              |
|-------------------------------------------|-----------------------------------------------------------------------|
| • Compact 4" x 2.4" x 0.53" Brick Package | • Less Board Area Required                                            |
| • Metal Case                              | • Easier Thermal Management and Lower Radiated EMI                    |
| • High Power Density, High Efficiency     | • Less Waste Heat to Manage and Reduced AC Power Consumption          |
| • 100°C Rated Baseplate Temperature       | • Cold plate / Conduction Cooling for Fanless and Rugged Environments |
| • PMBus™ Interface                        | • Remote Monitoring and Programming via i²C                           |
| • Optional Droop Mode Load Sharing        | • Simplified Paralleling for Higher Power or Redundant Applications   |

| Model Selector                   |                            |                         |                            |                                  |                      |                          |
|----------------------------------|----------------------------|-------------------------|----------------------------|----------------------------------|----------------------|--------------------------|
| Model                            | Nominal Output Voltage (V) | Output Adjust Range (V) | Maximum Output Current (A) | Maximum Power (W) <sup>(1)</sup> | Mounting Inserts     | Droop Mode Current Share |
| <a href="#">PFH500F-12-000-R</a> | 12                         | 9.6 - 14.4              | 42                         | 504                              | 3.3mm Ø Non-threaded | No                       |
| <a href="#">PFH500F-12-0D0-R</a> | 12                         | 9.6 - 14.4              | 42                         | 504                              | 3.3mm Ø Non-threaded | Yes                      |
| <a href="#">PFH500F-12-100-R</a> | 12                         | 9.6 - 14.4              | 42                         | 504                              | 3mm (M3) Threaded    | No                       |
| <a href="#">PFH500F-12-1D0-R</a> | 12                         | 9.6 - 14.4              | 42                         | 504                              | 3mm (M3) Threaded    | Yes                      |
| <a href="#">PFH500F-28-000-R</a> | 28                         | 22.4 - 33.6             | 18                         | 504                              | 3.3mm Ø Non-threaded | No                       |
| <a href="#">PFH500F-28-0D0-R</a> | 28                         | 22.4 - 33.6             | 18                         | 504                              | 3.3mm Ø Non-threaded | Yes                      |
| <a href="#">PFH500F-28-100-R</a> | 28                         | 22.4 - 33.6             | 18                         | 504                              | 3mm (M3) Threaded    | No                       |
| <a href="#">PFH500F-28-1D0-R</a> | 28                         | 22.4 - 33.6             | 18                         | 504                              | 3mm (M3) Threaded    | Yes                      |
| <a href="#">PFH500F-48-000-R</a> | 48                         | 38.4 - 52.8             | 10.5                       | 504                              | 3.3mm Ø Non-threaded | No                       |
| <a href="#">PFH500F-48-0D0-R</a> | 48                         | 38.4 - 52.8             | 10.5                       | 504                              | 3.3mm Ø Non-threaded | Yes                      |
| <a href="#">PFH500F-48-100-R</a> | 48                         | 38.4 - 52.8             | 10.5                       | 504                              | 3mm (M3) Threaded    | No                       |
| <a href="#">PFH500F-48-1D0-R</a> | 48                         | 38.4 - 52.8             | 10.5                       | 504                              | 3mm (M3) Threaded    | Yes                      |

|                |   |                            |   |                                                 |                                                             |          |   |                |
|----------------|---|----------------------------|---|-------------------------------------------------|-------------------------------------------------------------|----------|---|----------------|
| <b>PFH500F</b> | - | <b>28</b>                  | - | <b>1</b>                                        | <b>D</b>                                                    | <b>0</b> | - | <b>R</b>       |
|                |   | Output voltage 12, 28, 48V |   | 0 Non-threaded inserts<br>1 M3 threaded inserts | 0 No droop mode current share<br>D Droop mode current share |          |   | RoHS Compliant |

## Related Products

|                       | Part Number                         | Description                                                                              |
|-----------------------|-------------------------------------|------------------------------------------------------------------------------------------|
| AC-DC Power Module    | <a href="#">PFH500A-28</a>          | 85-135 Vac / 375-420 Hz Input, 28Vdc @ 500W Module                                       |
| Heatsink              | <a href="#">HS00110</a>             | 2.4" x 4" x 1.5" aluminum heatsink with cylindrical pin fins with integrated thermal pad |
| Inrush Resistor       | <a href="#">AR00719</a>             | 22Ω 1.6W Thermal fuse resistor                                                           |
| EMI Common Mode Choke | <a href="#">ARA00499</a>            | 6.3 mH Common Mode Inductor, Through Hole                                                |
| Evaluation Kits       | <a href="#">PFH05W12-100-EVK-S1</a> | Evaluation board with a PFH500F-12-100-R module and heatsink fitted                      |
|                       | <a href="#">PFH05W12-1D0-EVK-S1</a> | Evaluation board with a PFH500F-12-1D0-R module and heatsink fitted                      |
|                       | <a href="#">PFH05W28-100-EVK-S1</a> | Evaluation board with a PFH500F-28-100-R module and heatsink fitted                      |
|                       | <a href="#">PFH05W28-1D0-EVK-S1</a> | Evaluation board with a PFH500F-28-1D0-R module and heatsink fitted                      |
|                       | <a href="#">PFH05W48-100-EVK-S1</a> | Evaluation board with a PFH500F-48-100-R module and heatsink fitted                      |
|                       | <a href="#">PFH05W48-1D0-EVK-S1</a> | Evaluation board with a PFH500F-48-1D0-R module and heatsink fitted                      |

## Specifications

| Model                                  | PFH500F-12 |                                                                                                  | PFH500F-28   | PFH500F-48  |
|----------------------------------------|------------|--------------------------------------------------------------------------------------------------|--------------|-------------|
| Input                                  |            |                                                                                                  |              |             |
| Input Voltage Range                    | Vac        | 85 - 265 (low line derating may apply)                                                           |              |             |
| Input Frequency                        | Hz         | 47 - 63                                                                                          |              |             |
| Input Current (115/230 Vac)            | A          | 5.0 / 2.5                                                                                        |              |             |
| Inrush Current                         | A          | 9 / 18 (20A peak)                                                                                |              |             |
| Leakage Current                        | -          | Will depend on the value of the external Y capacitors (refer to evaluation data)                 |              |             |
| Power Factor (230Vac, 80% load)        | -          | >0.95                                                                                            |              |             |
| Harmonic Compliance                    | -          | Meets IEC61000-3-2                                                                               |              |             |
| No Load Power Consumption              |            | See evaluation report on website                                                                 |              |             |
| Hold-up Time                           | ms         | Will depend on the value of the external bulk capacitance (refer to evaluation data)             |              |             |
| Efficiency (typ 115/230Vac, 100% Load) | %          | 90 / 92                                                                                          | 90 / 92      | 89 / 91     |
| Conducted & Radiated EMI               | -          | EN55032 Class B (See Instruction Manual for conditions)                                          |              |             |
| Immunity                               | -          | Meets IEC61000-4-2, -3, -4, -5, -6, 8, -11, -12, -14 (refer to <a href="#">immunity report</a> ) |              |             |
| Insulation Class                       | -          | Class II                                                                                         |              |             |
| Safety Certifications and Markings     | -          | IEC/UL/CSA/EN62368-1, 60950-1, CE Mark and UKCA Mark                                             |              |             |
| Output                                 |            |                                                                                                  |              |             |
| Output Voltage Setpoint Tolerance      | %          | ±2% (115Vac, Io = 0%)                                                                            |              |             |
| Line Regulation (50% Load)             | %          | 0.3                                                                                              | 0.15         | 0.1         |
| Load Regulation (115/230Vac) (2)       | %          | 0.125 (10% to 100% load)                                                                         | 0.1          | 0.1         |
| Droop Rate (-xDx-R suffix)             | mV/A       | 25                                                                                               | 50           | 100         |
| Ripple & Noise                         | mV         | 150                                                                                              | 400          | 400         |
| Minimum Load                           | -          | No minimum load required                                                                         |              |             |
| Overcurrent Protection (hiccup)        | A          | 47.5                                                                                             | 21.5         | 12.5        |
| Overvoltage Protection (max)           | V          | 15.7                                                                                             | 25.5         | 55          |
| Overtemperature Protection             | °C         | Input line / output load dependent (Refer to Instruction Manual)                                 |              |             |
| Remote Sense                           | -          | Yes                                                                                              |              |             |
| Remote ON/OFF                          | -          | Negative Logic; Low (< 1V) = Module On (300 μA, 3.3V max)                                        |              |             |
| Power Good                             | -          | Active Low (< 1 Vdc @ 150 mA, 50V max)                                                           |              |             |
| Auxiliary Output                       | Vdc        | 10 - 14 @ 200 mA max.                                                                            |              |             |
| External Load Capacitance (CC Mode)    | uF         | 3,000 - 10,000                                                                                   | 470 - 6,000  | 470 - 4,000 |
| External Load Capacitance (CR Mode)    | uF         | 3,000 - 45,000                                                                                   | 470 - 20,000 | 470 - 6,000 |
| Parallel Operation                     | -          | Yes. Droop mode current share models and main output voltage only (refer to suffix xDx-R)        |              |             |

| Specifications                  |     |                                                                                                                                         |            |            |
|---------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------|------------|------------|
| Model                           |     | PFH500F-12                                                                                                                              | PFH500F-28 | PFH500F-48 |
| Environmental                   |     |                                                                                                                                         |            |            |
| Operating Baseplate Temperature | °C  | -40 - 100 (see derating curves)                                                                                                         |            |            |
| Storage Temperature             | °C  | -55 to 125                                                                                                                              |            |            |
| Humidity (non condensing)       | %RH | 20-95 (Operating) / 10-95 (Non Operating)                                                                                               |            |            |
| Cooling                         | -   | Conduction                                                                                                                              |            |            |
| Altitude                        | m   | 2,000 (contact factory for higher altitudes)                                                                                            |            |            |
| Withstand Voltage               | Vac | Input to Output: 3.0kVac; Input to Case: 2.5kVac; Output to Case: 1.5kVdc                                                               |            |            |
| Vibration                       | -   | MIL-STD-810G 514.6 Cat 4, 10                                                                                                            |            |            |
| Shock                           | -   | MIL-STD-810G 516.6 Procedure I                                                                                                          |            |            |
| Other                           |     |                                                                                                                                         |            |            |
| Communications Interface        |     | i2C (2 Address pins, CLK, Data, Alert) / PMBus Protocol (Refer to <a href="#">PFH500 PMBus Specifications</a> and <a href="#">GUI</a> ) |            |            |
| Weight                          | g   | 225                                                                                                                                     |            |            |
| Size (LxWxH)                    | mm  | 101.6 x 61.0 x 13.3                                                                                                                     |            |            |
| Size (LxWxH)                    | in  | 4.00 x 2.40 x 0.53                                                                                                                      |            |            |
| MTBF - Telcordia SR-332         | -   | > 2.2 MHrs, 100% Load, 230 Vac, Ta = 40 °C                                                                                              |            |            |
| Warranty                        | yrs | 3                                                                                                                                       |            |            |

| PMBus Monitoring and Programming Functions |                |
|--------------------------------------------|----------------|
| Function                                   | PMBus Commands |
| Output Voltage Data Format                 | Read only      |
| Output Voltage Programming                 | Read / Write   |
| Output Droop Rate (Current share)          | Read only      |
| Overvoltage Protection Set Point           | Read / Write   |
| Overtemperature Protection Fault Limit     | Read / Write   |
| Overcurrent Protection Set Point           | Read / Write   |
| Output Undervoltage Fault Trip Limit       | Read / Write   |
| Internal Temperature Monitor 1 (Output)    | Read only      |
| Internal Temperature Monitor 2 (Output)    | Read only      |
| Internal Temperature Monitor 3 (Input)     | Read only      |
| Internal Temperature Monitor 3 (Input)     | Read only      |
| High Voltage Bus Monitor                   | Read only      |
| Output Voltage Monitor                     | Read only      |
| Output Current Monitor                     | Read only      |
| DC-DC Switching Frequency Monitor          | Read only      |
| Input Voltage Monitor                      | Read only      |
| Input Current Monitor                      | Read only      |
| Power Supply Status                        | Read only      |
| Power Supply Fault Status                  | Read only      |
| SMBAlert Mask                              | Read / Write   |
| Remote On/Off                              | Write only     |
| Manufacturing Information                  | Read only      |
| Restore Data Functions                     | Read / Write   |

**Notes:**

See website for detailed specifications, evaluation data and instruction manual.

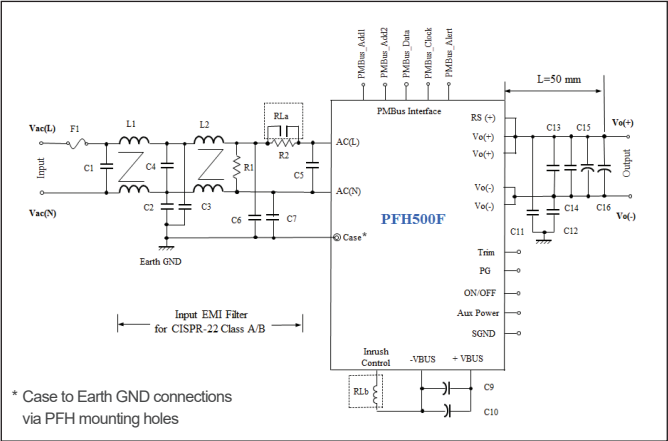
Specifications are typical based on nominal inputs, 25°C ambient temperature unless otherwise stated.

External components required. Refer to the product [Instruction Manual](#) for more detailed information.

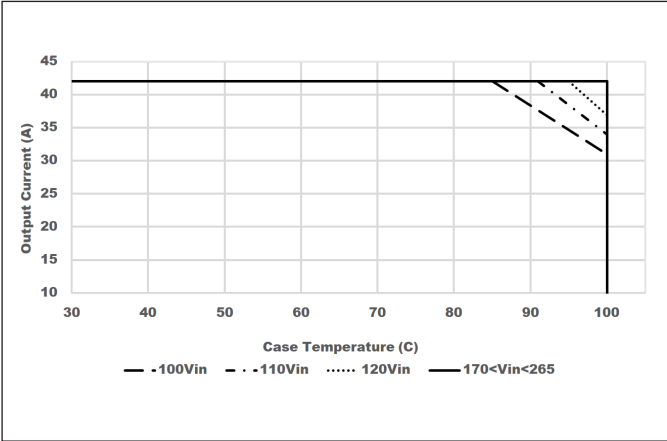
(1) Total output power including the auxiliary output

(2) Excludes droop mode current share models

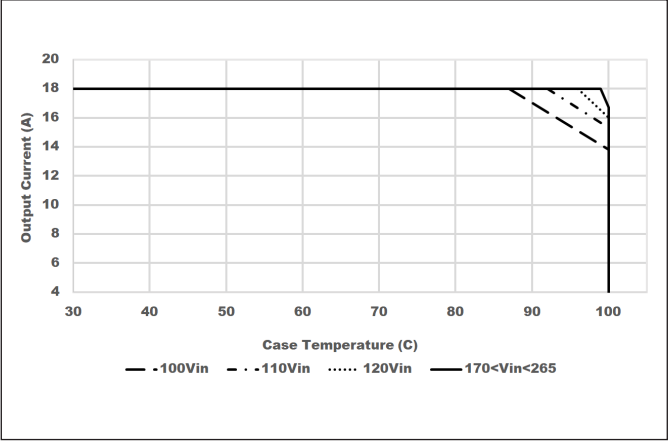
PFH500F Basic Connection Diagram



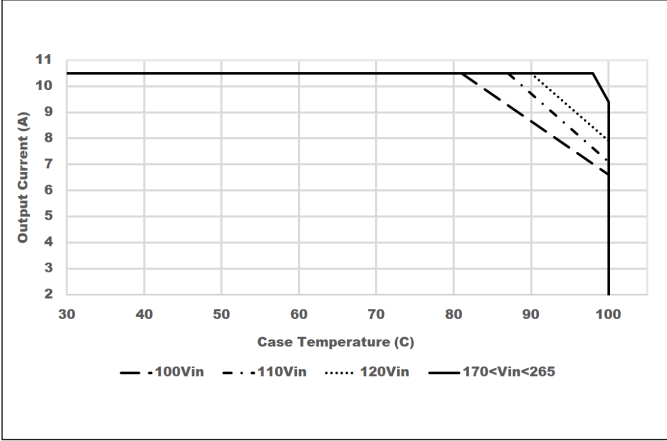
PFH500F-12 Derating Curve



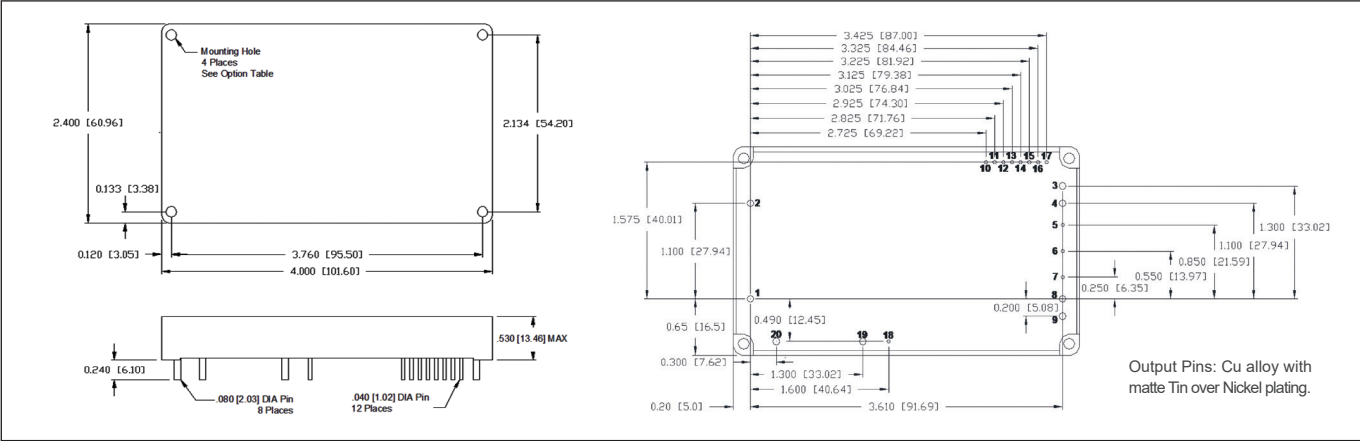
PFH500F-28 Derating Curve



PFH500F-48 Derating Curve



Mechanical Specification



| Pinout |                              |     |                               |     |                              |     |                               |
|--------|------------------------------|-----|-------------------------------|-----|------------------------------|-----|-------------------------------|
| PIN    | Function                     | PIN | Function                      | PIN | Function                     | PIN | Function                      |
| 1      | AC Input (Line) or AC (L)    | 7   | Remote Sense (+) or RS (+)    | 13  | PMBus Clock                  | 19  | - Boost Voltage Bus or - VBUS |
| 2      | AC Input (Neutral) or AC (N) | 8   | Vout (+)                      | 14  | PMBus Data                   | 20  | + Boost Voltage Bus or + VBUS |
| 3      | Vout (-)                     | 9   | Vout (+)                      | 15  | PMBus Alert                  |     |                               |
| 4      | VOUT (-)                     | 10  | Power Good or PG              | 16  | PMBus Address 2              |     |                               |
| 5      | Remote ON/OFF                | 11  | Secondary Signal GND or SGND  | 17  | PMBus Address 1              |     |                               |
| 6      | TRIM                         | 12  | Aux Power Supply or Aux Power | 18  | Inrush Control or Inrush CTL |     |                               |



## TDK-Lambda France SAS

Tel: +33 1 60 12 71 65  
france@fr.tdk-lambda.com  
www.emea.lambda.tdk.com/fr



## Italy Sales Office

Tel: +39 02 61 29 38 63  
info.italia@it.tdk-lambda.com  
www.emea.lambda.tdk.com/it



## Netherlands

info@nl.tdk-lambda.com  
www.emea.lambda.tdk.com/nl



## TDK-Lambda Germany GmbH

Tel: +49 7841 666 0  
info@de.tdk-lambda.com  
www.emea.lambda.tdk.com/de



## Austria Sales Office

Tel: +43 2256 655 84  
info@at.tdk-lambda.com  
www.emea.lambda.tdk.com/at



## Switzerland Sales Office

Tel: +41 44 850 53 53  
info@ch.tdk-lambda.com  
www.emea.lambda.tdk.com/ch



## Nordic Sales Office

Tel: +45 8853 8086  
info@dk.tdk-lambda.com  
www.emea.lambda.tdk.com/dk



## TDK-Lambda UK Ltd.

Tel: +44 (0) 12 71 85 66 66  
info@uk.tdk-lambda.com  
www.emea.lambda.tdk.com/uk



## TDK-Lambda Ltd.

Tel: +9 723 902 4333  
info@tdk-lambda.co.il  
www.emea.lambda.tdk.com/il



## C.I.S.

### Commercial Support:

Tel: +7 (495) 665 2627

### Technical Support:

Tel: +7 (812) 658 0463  
info@tdk-lambda.ru  
www.emea.lambda.tdk.com/ru



## TDK-Lambda Americas

Tel: +1 800-LAMBDA-4 or 1-800-526-2324  
powersolutions@us.tdk-lambda.com  
www.us.lambda.tdk.com



## TDK Electronics do Brasil Ltda

Tel: +55 11 3289-9599  
sales.br@tdk-electronics.tdk.com  
www.tdk-electronics.tdk.com/en



## TDK-Lambda Corporation

Tel: +81-3-6778-1113  
www.jp.lambda.tdk.com



## TDK-Lambda (China) Electronics Co. Ltd.

Tel: +86 21 6485-0777  
powersolutions@cn.tdk-lambda.com  
www.lambda.tdk.com.cn



## TDK-Lambda Singapore Pte Ltd.

Tel: +65 6251 7211  
tls.mkt@sg.tdk-lambda.com  
www.sg.lambda.tdk.com



## TDK India Private Limited, Power Supply Division

Tel: +91 80 4039-0660  
mathew.philip@in.tdk-lambda.com  
www.sg.lambda.tdk.com

