



**DESCRIPTION:** 2W 3KVDC Isolated Single & Dual Output DC/DC Converters

The PPH series are miniature, isolated 2W DC/DC converters in a SIP and DIP package. They offer the ideal solution in many space critical applications for board level power distribution. The internal SMD construction makes it possible to offer a product with high performance at low cost. The series offers smaller size, improved efficiency, lower output ripple noise and 3KVDC isolation.

### FEATURES

|   |  |   |
|---|--|---|
| RoHS compliant                              | Efficiency up to 86%   | Power density up to 1.44W/cm <sup>3</sup> |
| Operating temperature: -40°C to 105°C       | Dual output from a single input rail                                     | UL 94V-0 package material                 |
| Power sharing on output                     | 3KVDC isolation  | Industry standard pinout                  |
| Input voltage: 3.3V, 5V, 12V, 15V, 24V, 48V | Output voltage: ±5V, ±9V, ±12V, ±15V, ±24V / 3.3V, 5V, 9V, 12V, 15V, 24V | CE certification                          |

### SELECTION GUIDE

| Part Number | Nominal Input Voltage | Output Voltage | Output Current (Max./Min) | Efficiency | Package Style |
|-------------|-----------------------|----------------|---------------------------|------------|---------------|
|             | V                     | V              | mA                        | %          |               |
| PPH0505D    | 5                     | ±5             | ±200/±20                  | 80         | DIP           |
| PPH0509D    | 5                     | ±9             | ±110/±11                  | 80         | DIP           |
| PPH0512D    | 5                     | ±12            | ±84/±8.4                  | 81         | DIP           |
| PPH0515D    | 5                     | ±15            | ±68/±6.8                  | 84         | DIP           |
| PPH0505S    | 5                     | ±5             | ±200/±20                  | 80         | SIP           |
| PPH0509S    | 5                     | ±9             | ±110/±11                  | 80         | SIP           |
| PPH0512S    | 5                     | ±12            | ±84/±8.4                  | 82         | SIP           |
| PPH0515S    | 5                     | ±15            | ±68/±6.8                  | 83         | SIP           |
| PPH0524S    | 5                     | ±24            | ±42/±4.2                  | 84         | SIP           |
| PPH1205D    | 12                    | ±5             | ±200/±20                  | 80         | DIP           |
| PPH1209D    | 12                    | ±9             | ±110/±11                  | 83         | DIP           |
| PPH1212D    | 12                    | ±12            | ±84/±8.4                  | 84         | DIP           |
| PPH1215D    | 12                    | ±15            | ±68/±6.8                  | 86         | DIP           |
| PPH1224D    | 12                    | ±24            | ±42/±4.2                  | 85         | SIP           |
| PPH1205S    | 12                    | ±5             | ±200/±20                  | 80         | SIP           |
| PPH1209S    | 12                    | ±9             | ±110/±11                  | 83         | SIP           |
| PPH1212S    | 12                    | ±12            | ±84/±8.4                  | 84         | SIP           |
| PPH1215S    | 12                    | ±15            | ±68/±6.8                  | 86         | SIP           |
| PPH1224S    | 12                    | ±24            | ±42/±4.2                  | 85         | SIP           |
| PPH1505D    | 15                    | ±5             | ±200/±20                  | 80         | DIP           |
| PPH1505S    | 15                    | ±5             | ±200/±20                  | 80         | SIP           |
| PPH1515S    | 15                    | ±15            | ±68/±6.8                  | 86         | SIP           |
| PPH2405D    | 24                    | ±5             | ±200/±20                  | 80         | DIP           |
| PPH2409D    | 24                    | ±9             | ±110/±11                  | 85         | DIP           |
| PPH2412D    | 24                    | ±12            | ±84/±8.4                  | 86         | DIP           |
| PPH2415D    | 24                    | ±15            | ±68/±6.8                  | 86         | DIP           |
| PPH2424D    | 24                    | ±24            | ±42/±4.2                  | 85         | DIP           |
| PPH2405S    | 24                    | ±5             | ±200/±20                  | 82         | SIP           |
| PPH2409S    | 24                    | ±9             | ±110/±11                  | 85         | SIP           |
| PPH2412S    | 24                    | ±12            | ±84/±8.4                  | 85         | SIP           |
| PPH2415S    | 24                    | ±15            | ±68/±6.8                  | 85         | SIP           |
| PPH2424S    | 24                    | ±24            | ±42/±4.2                  | 85         | SIP           |
| PPH4805D    | 48                    | ±5             | ±200/±20                  | 82         | DIP           |
| PPH4809D    | 48                    | ±9             | ±110/±11                  | 82         | DIP           |
| PPH4812D    | 48                    | ±12            | ±84/±8.4                  | 85         | DIP           |
| PPH4815D    | 48                    | ±15            | ±68/±6.8                  | 85         | DIP           |
| PPH4805S    | 48                    | ±5             | ±200/±20                  | 82         | SIP           |
| PPH4809S    | 48                    | ±9             | ±110/±11                  | 83         | SIP           |
| PPH4812S    | 48                    | ±12            | ±84/±8.4                  | 85         | SIP           |
| PPH4815S    | 48                    | ±15            | ±68/±6.8                  | 84         | SIP           |

## SELECTION GUIDE

| Part Number | Nominal Input Voltage | Output Voltage | Output Current(Max./Min) | Efficiency | Package Style |
|-------------|-----------------------|----------------|--------------------------|------------|---------------|
|             | V                     | V              | mA                       | %          |               |
| PPH0303DA   | 3.3                   | 3.3            | 606/60.6                 | 73         | DIP           |
| PPH0305DA   | 3.3                   | 5              | 400/40                   | 79         | DIP           |
| PPH0503DA   | 5                     | 3.3            | 606/60.6                 | 74         | DIP           |
| PPH0505DA   | 5                     | 5              | 400/40                   | 80         | DIP           |
| PPH0509DA   | 5                     | 9              | 220/22                   | 80         | DIP           |
| PPH0512DA   | 5                     | 12             | 168/16.8                 | 81         | DIP           |
| PPH0515DA   | 5                     | 15             | 136/13.6                 | 84         | DIP           |
| PPH1205DA   | 12                    | 5              | 400/40                   | 80         | DIP           |
| PPH1209DA   | 12                    | 9              | 220/22                   | 83         | DIP           |
| PPH1212DA   | 12                    | 12             | 168/16.8                 | 84         | DIP           |
| PPH1215DA   | 12                    | 15             | 136/13.6                 | 86         | DIP           |
| PPH1224DA   | 12                    | 24             | 83/8.3                   | 87         | DIP           |
| PPH2405DA   | 24                    | 5              | 400/40                   | 80         | DIP           |
| PPH2409DA   | 24                    | 9              | 220/22                   | 85         | DIP           |
| PPH2412DA   | 24                    | 12             | 168/16.8                 | 86         | DIP           |
| PPH2415DA   | 24                    | 15             | 136/13.6                 | 86         | DIP           |
| PPH2424DA   | 24                    | 24             | 84/8.4                   | 85         | DIP           |
| PPH4805DA   | 48                    | 5              | 400/40                   | 82         | DIP           |
| PPH4809DA   | 48                    | 9              | 220/22                   | 82         | DIP           |
| PPH4812DA   | 48                    | 12             | 168/16.8                 | 85         | DIP           |
| PPH4815DA   | 48                    | 15             | 136/13.6                 | 85         | DIP           |

Add suffix "P" for continuous short circuit protection, for example PPH0505SP.

## GENERAL CHARACTERISTICS

| Parameter           | Conditions      | Min. | Typ. | Max. | Units |
|---------------------|-----------------|------|------|------|-------|
| Switching frequency | 3.3V & 5V input |      | 90   |      | kHz   |
| Switching frequency | 12V input       |      | 90   |      | kHz   |
| Switching frequency | 15V input       |      | 90   |      | kHz   |
| Switching frequency | 24V & 48V input |      | 90   |      | kHz   |

## INPUT CHARACTERISTICS

| Parameter     | Conditions | Min. | Typ. | Max. | Units |
|---------------|------------|------|------|------|-------|
| Voltage range | 3.3V input | 2.9  | 3.3  | 3.6  | V     |
| Voltage range | 5V input   | 4.5  | 5    | 5.5  | V     |
| Voltage range | 12V input  | 11   | 12   | 13   | V     |
| Voltage range | 24V input  | 22   | 24   | 26   | V     |
| Voltage range | 48V input  | 43   | 48   | 53   | V     |

## OUTPUT CHARACTERISTICS

| Parameter                               | Conditions                                    | Min. | Max. | Units |
|---|---|------|------|-------|
| Rated Power                             | TA=-40°C to 85°C                              |      | 2    | W     |
| Voltage Set Point Accuracy              | PPH0505D/S                                    | -5   | 7.5  | %     |
| Voltage Set Point Accuracy              | All other types                               | -5   | 5    | %     |
| Line regulation                         | High VIN to low VIN (voltage variation +/-5%) |      | 1.2  | %     |
| Load Regulation(10% load to rated load) | 5V output                                     |      | 10   | %     |
| Load Regulation(10% load to rated load) | 9V output                                     |      | 10   | %     |
| Load Regulation(10% load to rated load) | 12V output                                    |      | 10   | %     |
| Load Regulation(10% load to rated load) | 15V output                                    |      | 10   | %     |

## ISOLATION CHARACTERISTICS

| Parameter              | Conditions                | Min. | Typ. | Max. | Units |
|------------------------|---------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 second | 3000 |      |      | VDC   |
| Resistance             | Viso= 1000V               | 1    |      |      | GΩ    |

## ABSOLUTE MAXIMUM RATINGS

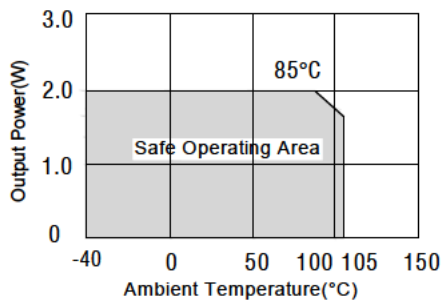
|   |          |
|---|----------|
| Short-circuit protection                        | 1 second |
| Lead temperature 1.5mm from case for 10 seconds | 300°C    |
| Internal power dissipation                      | 300mW    |
| Input voltage $V_{in}$ , PPH03                  | 5.5V     |
| Input voltage $V_{in}$ , PPH05                  | 7V       |
| Input voltage $V_{in}$ , PPH12                  | 15V      |
| Input voltage $V_{in}$ , PPH15                  | 18V      |
| Input voltage $V_{in}$ , PPH24                  | 28V      |
| Input voltage $V_{in}$ , PPH48                  | 54V      |

## TEMPERATURE CHARACTERISTICS

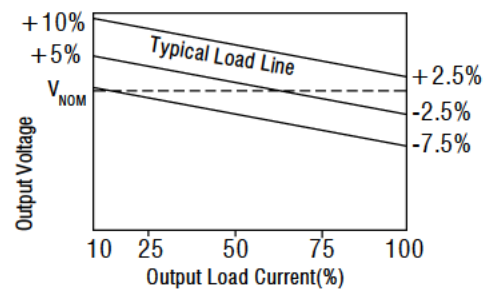
| Parameter              | Conditions  | Min. | Typ. | Max. | Units            |
|------------------------|---|------|------|------|------------------|
| Specification          | Derating if the temperature $\geq 85^\circ\text{C}$ | -40  |      | 105  | $^\circ\text{C}$ |
| Storage                |   | -50  |      | 130  | $^\circ\text{C}$ |
| Case Temperature above | 5V output   |      | 33   |      | $^\circ\text{C}$ |
| Case Temperature above | 12V output  |      | 27   |      | $^\circ\text{C}$ |
| Cooling                | Free air convection                                 |      |      |      |                  |

All specifications typical at  $T_A=25^\circ\text{C}$ , nominal input voltage and rated output current unless otherwise

## TEMPERATURE DERATING GRAPHS

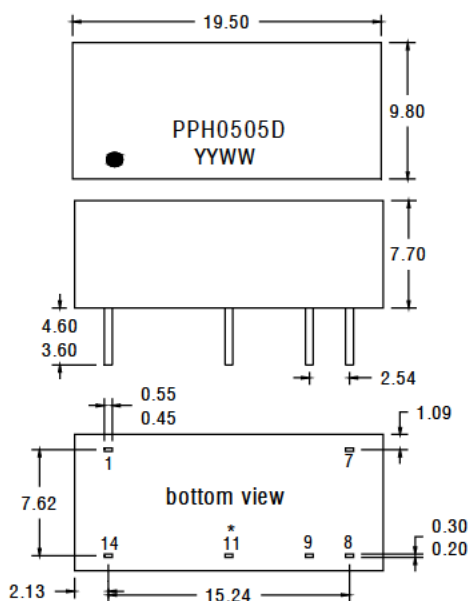


## TOLERANCE ENVELOPES

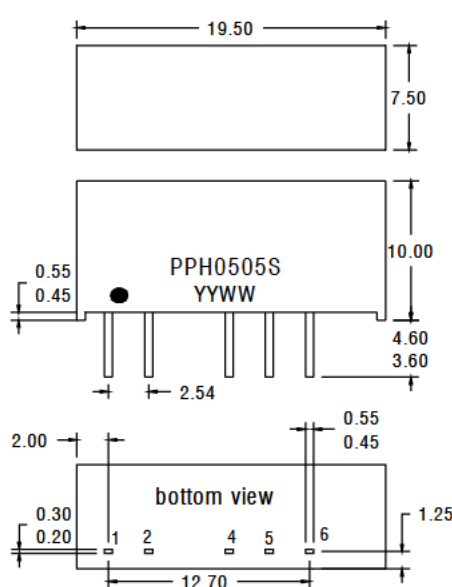


## MECHANICAL DIMENSIONS

### DIP Package



### SIP Package



All dimensions in mm  $\pm 0.25\text{mm}$ . All pins on a 2.54 mm pitch and within  $\pm 0.25\text{mm}$  of true position.  
Weight: 2.85g (DIP) 2.76g (SIP) \* Pin not fitted on single output variants.

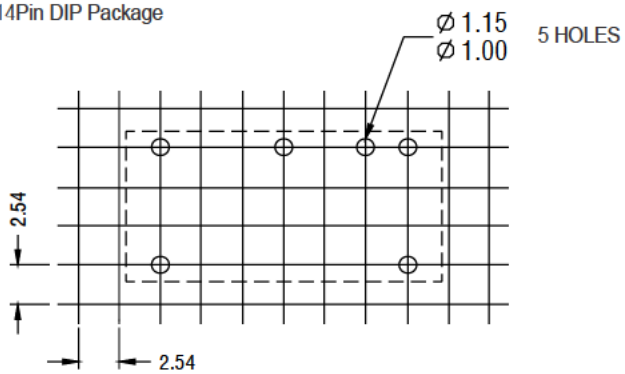
## PIN CONNECTIONS

| 14 PIN DIP |          |
|------------|----------|
| Pin        | Function |
| 1          | -Vin     |
| 7          | NC       |
| 8          | OV       |
| 9          | +Vout    |
| 11         | -Vout    |
| 14         | +Vin     |

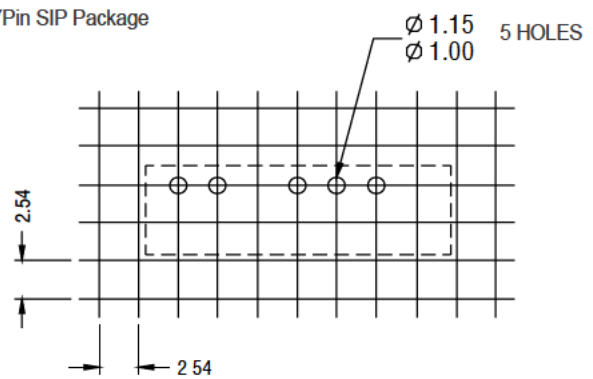
| 7 PIN SIP |          |
|-----------|----------|
| Pin       | Function |
| 1         | +Vin     |
| 2         | -Vin     |
| 4         | -Vout    |
| 5         | OV       |
| 6         | +Vout    |

## RECOMMENDED FOOTPRINT DETAILS

14Pin DIP Package

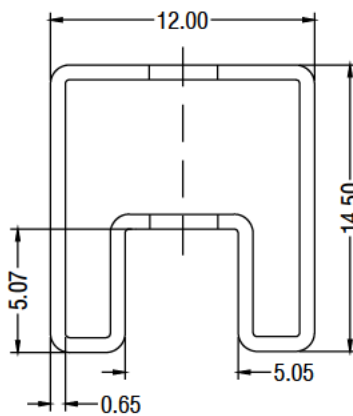


7Pin SIP Package

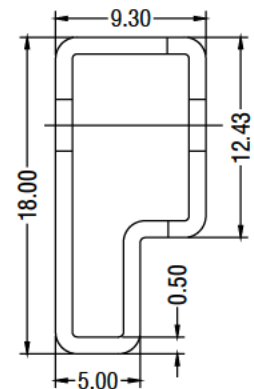


## TUBE OUTLINE DIMENSIONS

14Pin DIP Tube



7Pin SIP Tube



Unless otherwise stated all dimensions in mm  $\pm 0.5$ mm.

Tube length (14 Pin DIP) : 520mm  $\pm 2$ mm.

Tube length (7 Pin SIP) : 520mm  $\pm 2$ mm.

Tube Quantity:25PCS

## SOLDERING INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. Both SIP and DIP types in this series are backward compatible with Sn/Pb soldering systems.