

PHI-CON

# 60W DC-DC Converter P60A-Series

- Offer single, dual and triple output
- 50 to 60 W Output power
- 2:1 Wide input voltage range
- International safety standard approval
- Six-Sided continuous shield
- High efficiency up to 86%
- Short circuit protection



## Model selection guide

| Typ                  | Input              |                 | Output 1           |         | Output 2 (or Dual Output) |         | Efficiency typ. | Output Power |
|----------------------|--------------------|-----------------|--------------------|---------|---------------------------|---------|-----------------|--------------|
|                      | nominal voltage    | current no load | voltage            | current | voltage                   | current |                 |              |
|                      | [V <sub>DC</sub> ] | [mA]            | [V <sub>DC</sub> ] | [A]     | [V <sub>DC</sub> ]        | [A]     | [%]             | [W]          |
| <b>Single output</b> |                    |                 |                    |         |                           |         |                 |              |
| P60A12S05P           | 9-18               | 20              | 5.0                | 12.0    |                           |         | 79              | 60           |
| P60A12S12P           | 9-18               | 20              | 12.0               | 5.0     |                           |         | 82              | 60           |
| P60A12S15P           | 9-18               | 20              | 15.0               | 4.0     |                           |         | 82              | 60           |
| P60A12S24P           | 9-18               | 20              | 24.0               | 2.5     |                           |         | 84              | 60           |
| P60A24S05P           | 18-36              | 15              | 5.0                | 12.0    |                           |         | 80              | 60           |
| P60A24S12P           | 18-36              | 15              | 12.0               | 5.0     |                           |         | 84              | 60           |
| P60A24S15P           | 18-36              | 15              | 15.0               | 4.0     |                           |         | 84              | 60           |
| P60A24S24P           | 18-36              | 15              | 24.0               | 2.5     |                           |         | 85              | 60           |
| P60A48S05P           | 36-72              | 10              | 5.0                | 12.0    |                           |         | 83              | 60           |
| P60A48S12P           | 36-72              | 10              | 12.0               | 5.0     |                           |         | 85              | 60           |
| P60A48S15P           | 36-72              | 10              | 15.0               | 4.0     |                           |         | 85              | 60           |
| P60A48S24P           | 36-72              | 10              | 24.0               | 2.5     |                           |         | 86              | 60           |
| <b>Dual output</b>   |                    |                 |                    |         |                           |         |                 |              |
| P60A12D05P           | 9-18               | 20              | 5.0                | 5.0     | 5.0                       | 5.0     | 78              | 50           |
| P60A12D12P           | 9-18               | 20              | 12.0               | 2.5     | 12.0                      | 2.5     | 80              | 60           |
| P60A12D15P           | 9-18               | 20              | 15.0               | 2.0     | 15.0                      | 2.0     | 80              | 60           |
| P60A12D512P          | 9-18               | 20              | 5.0                | 5.0     | 12.0                      | 2.5     | 79              | 55           |
| P60A24D05P           | 18-36              | 15              | 5.0                | 5.0     | 5.0                       | 5.0     | 80              | 50           |
| P60A24D12P           | 18-36              | 15              | 12.0               | 2.5     | 12.0                      | 2.5     | 82              | 60           |
| P60A24D15P           | 18-36              | 15              | 15.0               | 2.0     | 15.0                      | 2.0     | 82              | 60           |
| P60A24D512P          | 18-36              | 15              | 5.0                | 12.0    | 12.0                      | 2.5     | 80              | 60           |
| P60A48D05P           | 36-72              | 10              | 5.0                | 5.0     | 5.0                       | 5.0     | 80              | 50           |
| P60A48D12P           | 36-72              | 10              | 12.0               | 2.5     | 12.0                      | 2.5     | 84              | 60           |
| P60A48D15P           | 36-72              | 10              | 15.0               | 2.0     | 15.0                      | 2.0     | 84              | 60           |
| P60A48D512P          | 36-72              | 10              | 5.0                | 12.0    | 12.0                      | 2.5     | 81              | 60           |
| <b>Triple output</b> |                    |                 |                    |         |                           |         |                 |              |
| P60A12T512P          | 9-18               | 20              | 5.0                | 5.0     | ± 12.0                    | ± 1.25  | 78              | 55           |
| P60A24T512P          | 18-36              | 15              | 5.0                | 5.0     | ± 12.0                    | ± 1.25  | 79              | 55           |
| P60A48T512P          | 36-72              | 10              | 5.0                | 5.0     | ± 12.0                    | ± 1.25  | 80              | 55           |

Suffix "P" PCB mounting type, heat sink will be added on module.

Suffix "T" Chassis mounting type, (terminal block) heat sink or fan force cooling.

Indicate suffix when order!

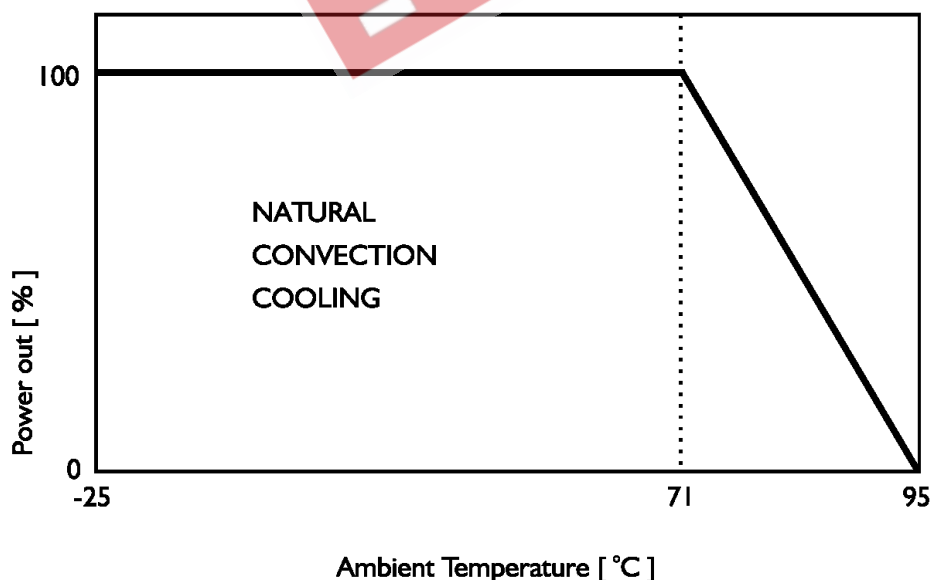
# 60W DC-DC Converter P60A-Series

## Specifications

| Input   |   |
|---|---|
| Voltage range   | 9-18 V <sub>DC</sub><br>18-36 V <sub>DC</sub><br>36-72 V <sub>DC</sub>          |
| Filter  | Pi-type   |
| Input reversed protection   | Shunt diode built in,<br>external fuse recommended !                            |
| Output  |   |
| Output Power  | 60 W max.   |
| Voltage accuracy<br>(full load and nominal V <sub>in</sub> )                                  | ±1%   |
| Voltage adjustability   | ±10%  |
| Ripple and noise<br>(at 20 MHz BW)  | ± 1% of V <sub>out</sub>  |
| Short circuit   | Continuous  |
| Line voltage regulation<br>(I <sub>out</sub> nom, V <sub>in</sub> min... V <sub>in</sub> max) | ±1%   |
| Load voltage regulation<br>(I <sub>out</sub> min... I <sub>out</sub> nom)                     | Single output model: ± 2%<br>Dual output model: ±2%<br>Triple output model: ±5% |
| Transient recovery time @<br>25% load, step changed   | 500 μs  |
| Temperature coefficient   | ± 0.02% / °C, max   |
| Minimum load  | Single: and Dual: 0%<br>+5V of triple output 0%<br>±12V of triple output 20%    |

| General                                  |   |
|--|---|
| Efficiency                               | See table   |
| Switching frequency                      | 80 kHz, typ.  |
| Environmental                            |   |
| Operating temperature<br>ambient         | -25°C to +95°C<br>(with derating, see diagram)                          |
| Operating temperature<br>case            | +95 °C, max.  |
| Storage temperature range                | -25 °C to +100 °C   |
| Cooling                                  | Free air convection   |
| MTBF according to<br>MIL-HDBK-217F, GF40 | 122,500 hrs   |
| Physical                                 |   |
| Dimensions "P" model                     | 3.5 x 5.5 x 1.4 inches<br>88.9 x 139.7 x 35.6 mm                        |
| Dimensions "T" model                     | 3.5 x 5.5 x 1.29 inches<br>88.9 x 139.7 x 32.9 mm                       |
| Weight                                   | "P" Model 690 g<br>"T" Model 570 g                                      |
| Case material                            | metal   |
| Isolation                                |   |
| Rated voltage                            | 1500 V <sub>DC</sub> , min  |
| Resistance                               | 10 <sup>9</sup> Ω, min.   |
| Remote control                           |   |
| Remote control on                        | Open or > + 5.5 V <sub>DC</sub>   |
| Remote control off                       | Short or 0V ... < + 1.8 V <sub>DC</sub><br>referenced to - Input, pin 2 |
| Shutdown idle current                    | 10mA  |

## Derating

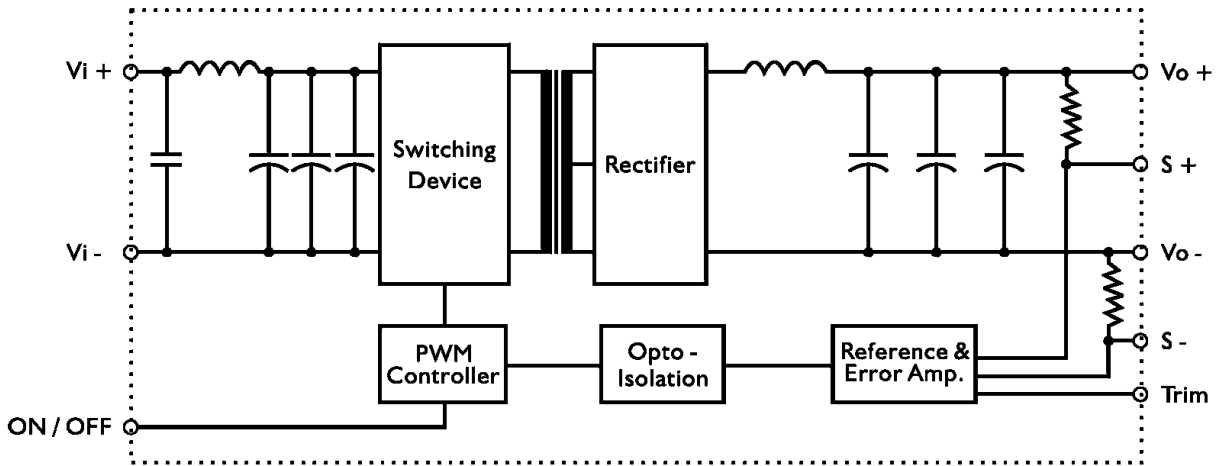


# 60W DC-DC Converter P60A-Series

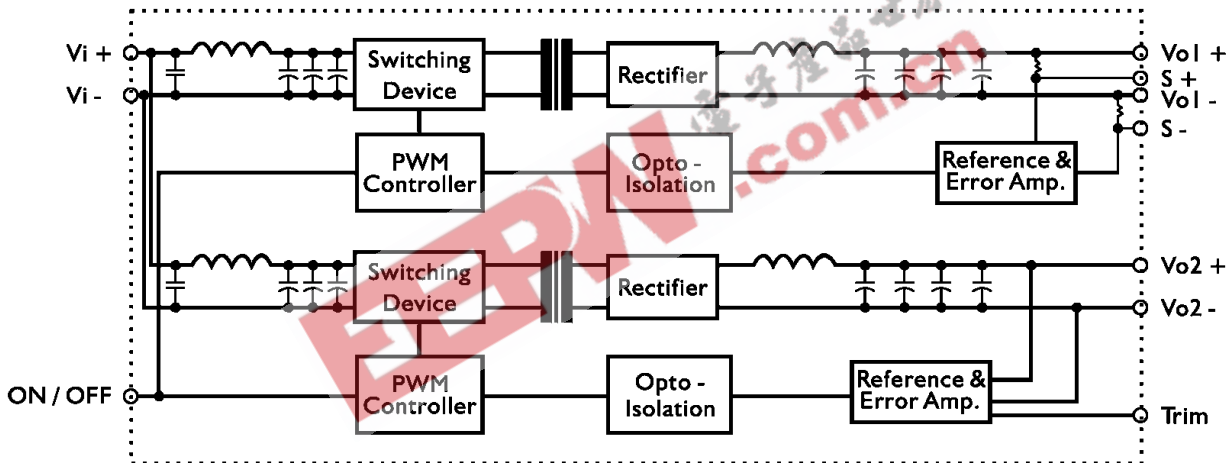


## Internal circuit schematic

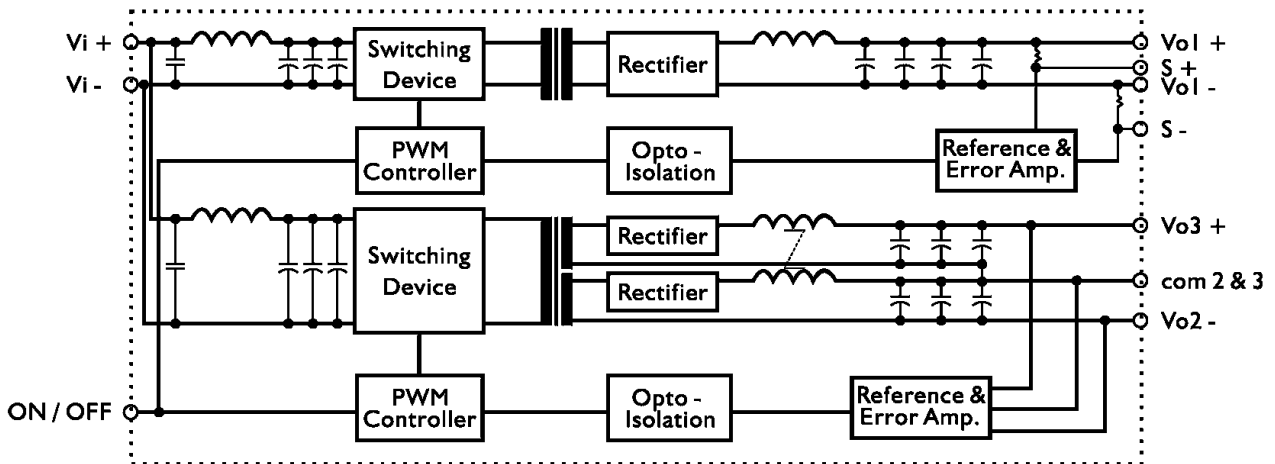
Block diagram for P60A series with single output



Block diagram for P60A series with double output



Block diagram for P60A series with triple output



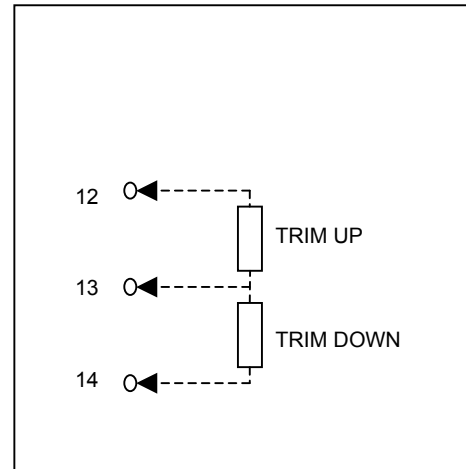
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## Pin connections

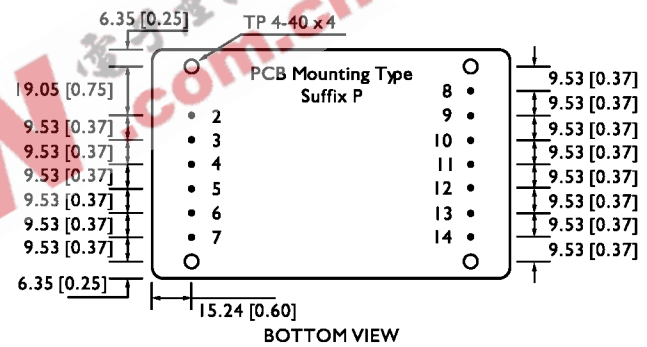
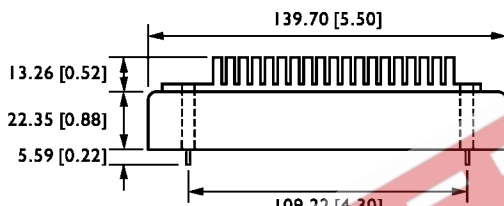
| Pin | Single             | Dual               | Triple               |
|-----|--------------------|--------------------|----------------------|
| 1   | Omitted            | Omitted            | Omitted              |
| 2   | - Input            | - Input            | - Input              |
| 3   | - Input            | - Input            | - Input              |
| 4   | + Input            | + Input            | + Input              |
| 5   | + Input            | + Input            | + Input              |
| 6   | Remote CTRL        | Remote CTRL        | Remote CTRL          |
| 7   | NC                 | NC                 | NC                   |
| 8   | - Output           | - Sense / Trim up  | - Sense / Trim up    |
| 9   | - Output           | - Output           | - Output             |
| 10  | + Output           | + Output           | + Output             |
| 11  | + Output           | + Sense/ trim down | + Sense/ trim down   |
| 12  | - Sense / Trim up  | - Output 2         | - Output 2           |
| 13  | TRIM               | TRIM               | Common -Vo 2 & +Vo 3 |
| 14  | + Sense/ trim down | + Output 2         | + Output 3           |

## Trimming

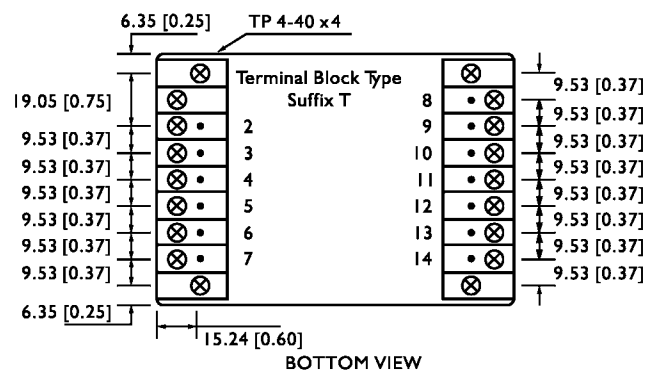
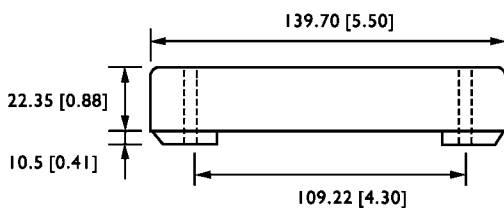


## Dimensions

### CASE : HH- P- 60



### CASE : HH- T



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