



PHI-CON

# 30 W DC-DC Converter P30J-Series

- Wide 4:1 input range
- 1600 V<sub>DC</sub> isolation
- Soft start up
- Remote control input
- Adjustable output voltage
- Standard package 1" x 1" x 0.4"
- -40...100 °C operating temperature range
- Protected against over current, continuous short circuit, and over temperature, over voltage



## Model guide

| Type                 | Input voltage              |                          | Input current     |                     | Output voltage [V <sub>DC</sub> ] | Output current |           | Efficiency typ. [%] | Capacitive load max. [μF] note 1 |
|----------------------|----------------------------|--------------------------|-------------------|---------------------|-----------------------------------|----------------|-----------|---------------------|----------------------------------|
|                      | Nominal [V <sub>DC</sub> ] | range [V <sub>DC</sub> ] | no load [mA] typ. | full load [mA] typ. |                                   | min. [mA]      | max. [mA] |                     |                                  |
| <b>Single output</b> |                            |                          |                   |                     |                                   |                |           |                     |                                  |
| P30J243R3S           | 24                         | 9...36                   | 10                | 1100                | 3.3                               | 0              | 7000      | 88                  | 10000                            |
| P30J2405S            | 24                         | 9...36                   | 10                | 1400                | 5.0                               | 0              | 6000      | 89                  | 7200                             |
| P30J2412S            | 24                         | 9...36                   | 10                | 1400                | 12.0                              | 0              | 2500      | 89                  | 1200                             |
| P30J2415S            | 24                         | 9...36                   | 10                | 1400                | 15.0                              | 0              | 2000      | 91                  | 1000                             |
| P30J483R3S           | 48                         | 18...75                  | 8                 | 540                 | 3.3                               | 0              | 7000      | 89                  | 10000                            |
| P30J4805S            | 48                         | 18...75                  | 8                 | 700                 | 5.0                               | 0              | 6000      | 90                  | 7200                             |
| P30J4812S            | 48                         | 18...75                  | 8                 | 700                 | 12.0                              | 0              | 2500      | 90                  | 1200                             |
| P30J4815S            | 48                         | 18...75                  | 8                 | 700                 | 15.0                              | 0              | 2000      | 92                  | 1000                             |
| <b>Dual output</b>   |                            |                          |                   |                     |                                   |                |           |                     |                                  |
| P30J2412D            | 24                         | 9...36                   | 10                | 1400                | ±12.0                             | ±0             | ±1250     | 89                  | 2 x 750                          |
| P30J2415D            | 24                         | 9...36                   | 10                | 1400                | ±15.0                             | ±0             | ±1000     | 91                  | 2 x 500                          |
| P30J4812D            | 48                         | 18...75                  | 8                 | 700                 | ±12.0                             | ±0             | ±1250     | 90                  | 2 x 750                          |
| P30J4815D            | 48                         | 18...75                  | 8                 | 700                 | ±15.0                             | ±0             | ±1000     | 91                  | 2 x 500                          |

## Specifications

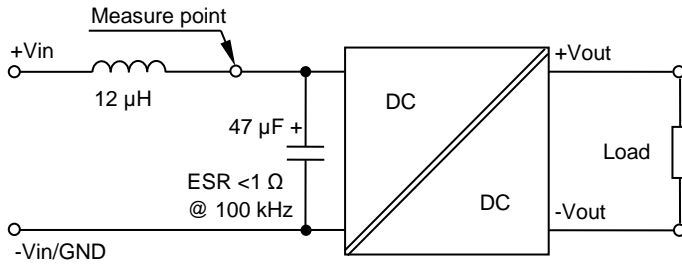
|  |                                   |
|--|-----------------------------------|
| <b>Input</b>   |                                   |
| Start up voltage                                       | P24Jxxx: 8.6 V<br>P48Jxxx: 17.5 V |
| Under voltage lockout                                  | P24Jxxx: 7.6 V<br>P48Jxxx: 16.5 V |
| Filter   | π - type                          |
| Input ripple current                                   | 30 mA <sub>p-p</sub> (see Fig. 1) |
| <b>Remote control input Pin 3</b>                      |                                   |
| On state   | 3 ... 12 V (see Fig. 3)           |
| Off state  | 0 ... 1.2 V (see Fig. 3)          |
| Idle current @ Off state                               | 2 mA, typ.                        |
| <b>Isolation:</b>                                      |                                   |
| Rated voltage, input to output                         | 1600 V <sub>DC</sub> , 60s        |
| Rated voltage, input or output to case                 | 1600 V <sub>DC</sub>              |
| Resistance   | 10 <sup>9</sup> Ω                 |
| Capacitance  | 2000 pF, typ.                     |
| <b>Output</b>  |                                   |
| Voltage accuracy                                       | ± 1 %                             |
| Voltage trim range, only single                        | ± 10 %, max.                      |
| Dual output cross regulation                           | ± 5 % @ 75 % load difference      |
| Line voltage regulation                                | ± 0.5 %                           |
| Load regulation, single output                         | ± 0.5 % @ 0 %...100 % load        |
| Load regulation, dual output, at balanced load current | ± 1 % @ 10 %...100 % load         |
| Ripple and noise (20 MHz BW)                           | 75 mV <sub>p-p</sub> (see Fig. 2) |
| Short circuit protection                               | Indefinite, automatic restart     |
| Over load protection                                   | 170 %, typ.                       |
| Temperature coefficient                                | ± 0.02 % / °C                     |
| Transient recovery time                                | 250 μs, typ., @ 25 % load steps   |
| Transient response deviation                           | ± 5 %, max.                       |
| <b>Output over voltage protection</b>                  |                                   |
| P30Jxx3R3x   | 3.9 V Z-Diode                     |
| P30Jxx05x  | 6.2 V Z-Diode                     |
| P30Jxx12x  | 15 V Z-Diode                      |
| P30Jxx15x  | 18 V Z-Diode                      |

|   |  |
|---|--|
| <b>General</b>                                      |  |
| Switching frequency                                 | 300 kHz, typ.  |
| Start up time                                       | 30 ms, typ.  |
| Reliability Calculated MBTF                         | 370 000 h  |
| Safety standards                                    | EN-, IEC-, UL-, ULc 60950-1<br>EN-, IEC-, UL-, ULc 62368-1 |
| <b>EMC</b>  |  |
| Radiated emissions                                  | EN 55032 class A   |
| Conducted emissions                                 | EN 55032 class A   |
| ESD   | IEC61000-4-2 perf. criteria A                              |
| RS  | IEC61000-4-3 perf. criteria A                              |
| EFT (see Fig. 4)                                    | IEC61000-4-4 perf. criteria A                              |
| Surge (see Fig. 4)                                  | IEC61000-4-5 perf. criteria A                              |
| CS  | IEC61000-4-6 perf. criteria A                              |
| PFMF  | IEC61000-4-8 perf. criteria A                              |
| <b>Environmental</b>                                |  |
| Operating ambient temperature                       | -40 ... 100 °C<br>(see derating diagram)                   |
| Case temperature                                    | 105 °C, max.   |
| Over temperature protection, automatic restart      | 115 °C, typ., case surface                                 |
| Storage temperature                                 | -55 .. 125 °C  |
| Storage humidity                                    | 95 %, max, non condensing                                  |
| Cooling by free air convection                      | > 16 ... 33 cm/s   |
| <b>Physical</b>                                     |  |
| Dimensions standard version                         | 25.4 x 25.4 x 10.9 mm                                      |
| Dimensions with heat sink                           | 25.4 x 25.4 x 17.2 mm                                      |
| Weight standard version                             | 19 g   |
| Weight with heat sink                               | 21 g   |
| Thermal impedance                                   | 13 K / W, standard version<br>12 K / W, with heat sink     |
| Case material                                       | Copper   |
| Potting Material                                    | Epoxy UL94V-0 rated  |
| <b>Absolute maximum ratings</b>                     |  |
| P30J24xxS, P30J24xxD                                | 50 V <sub>DC</sub> max. for 0.1 s max.                     |
| P30J48xxS, P30J48xxD                                | 100 V <sub>DC</sub> max. for 0.1 s max.                    |
| Pin soldering temperature distance 1.5 mm from body | 260 °C for 10 s  |

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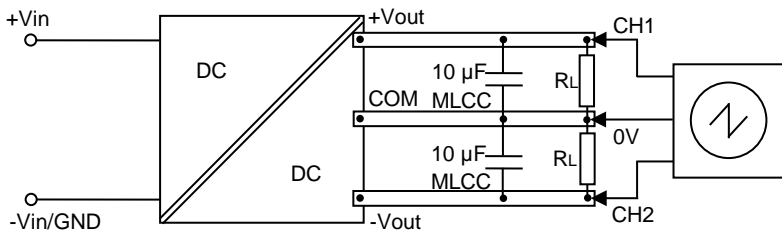
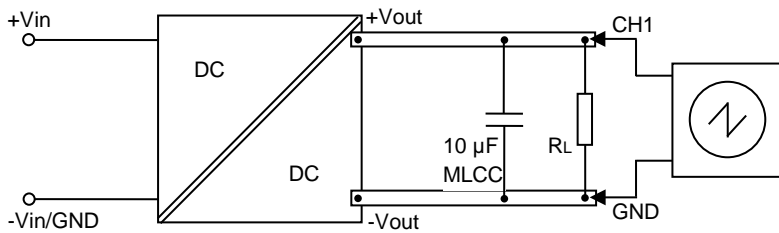
**Fig. 1 Input reflected ripple current measure circuit**

Input reflected current is measured through a source inductor and a source capacitor at nominal input voltage and full load.

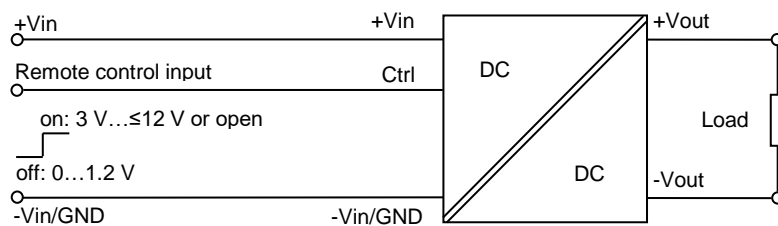


**Fig. 2 Output ripple & noise measurement test method**

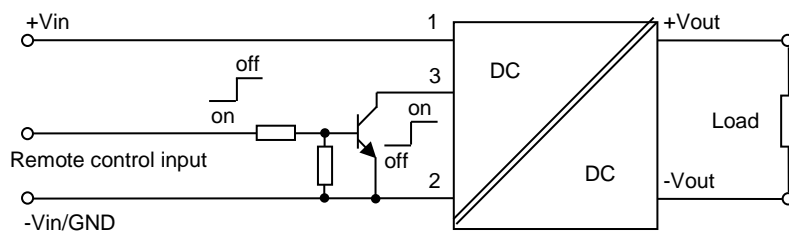
Use the following measurement circuit. The oscilloscope measurement bandwidth must be  $> 20$  MHz.



**Fig. 3 ON / OFF remote control circuit**

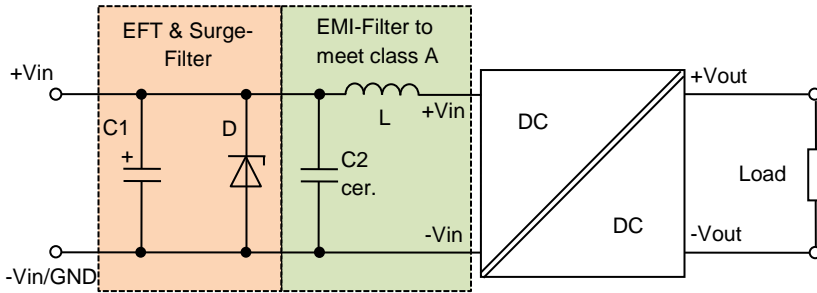


**ON / OFF remote control circuit for inverse logic**



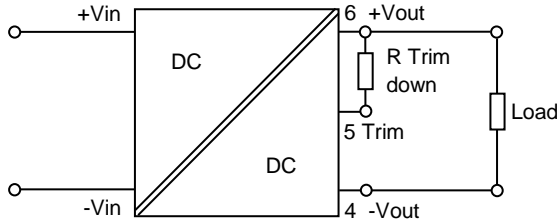
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Fig. 4 External circuits to meet EMI standards IEC61000-4-4 and IEC61000-4-5

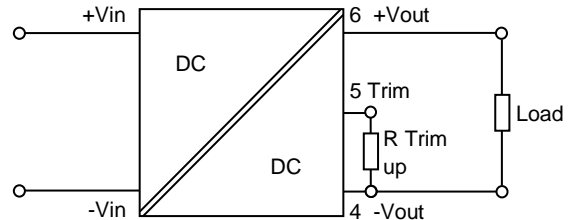


| BOM to Fig. 4 |                    |              |                    |                       |
|---------------|--------------------|--------------|--------------------|-----------------------|
| Type          | C1                 | D            | C2                 | D                     |
| P30J24xxx     | 3.3 $\mu$ F, 100 V | 0.82 $\mu$ H | 330 $\mu$ F, 100 V | TVS Diode 58 V, 3 kW  |
| P30J48xxx     | 1 $\mu$ F, 100 V   | 2.2 $\mu$ H  | 330 $\mu$ F, 100 V | TVS Diode 120 V, 3 kW |

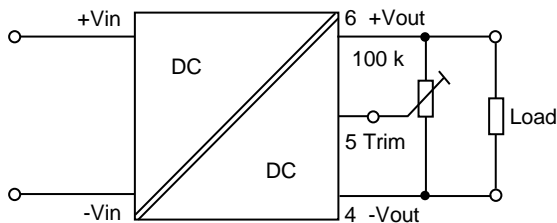
Fig. 5 Trim down application circuit with fixed resistors



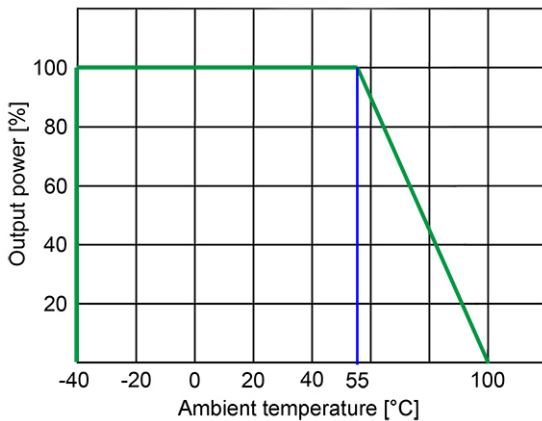
Trim trim up application circuit with fixed resistors



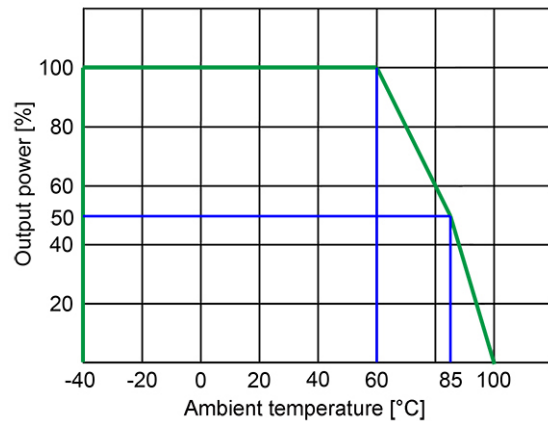
Trim application circuit with potentiometer



Derating diagram P30Jxxxxx



Derating diagram P30JxxxxxK

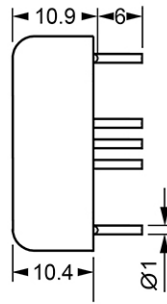
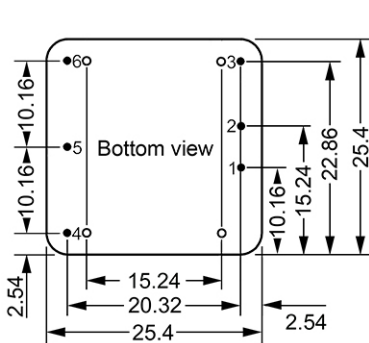




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## Dimensions standard version

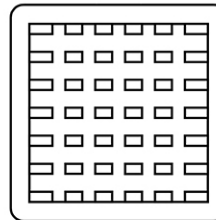
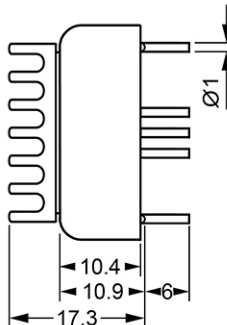
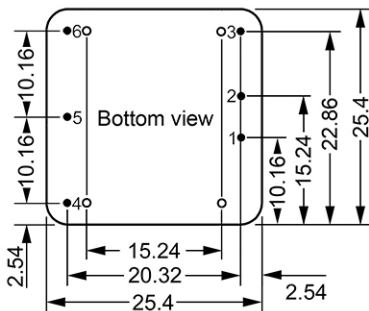


| Pin assignment |               |              |
|----------------|---------------|--------------|
| Pin            | Single output | Dual output  |
| 1              | +V input      | +V input     |
| 2              | -V input      | -V input     |
| 3              | Rem. control  | Rem. control |
| 4              | -V output     | -V output    |
| 5              | Trim          | Common       |
| 6              | +V output     | +V output    |

### Notes:

- Dimensions in mm
- Pin diameter tolerance  $\pm 0.05$  mm
- Pin pitch tolerance  $\pm 0.35$  mm
- Case tolerance  $\pm 0.5$  mm
- Stand off tolerance  $\pm 0.1$  mm

## Dimensions heatsink version



### Notes:

- Dimensions in mm
- Pin diameter tolerance  $\pm 0.05$  mm
- Pin pitch tolerance  $\pm 0.35$  mm
- Case tolerance  $\pm 0.5$  mm
- Stand off tolerance  $\pm 0.1$  mm

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