

# 6W DC-DC Converter P6C-Series



PHI-CON

- Wide 2:1 input range
- Low input voltage range 4.5 to 9 V
- Up to 3500 V<sub>DC</sub> isolation
- MTBF >1.12 Mio. hours
- Continuous short circuit protection



## Model guide

Type	Input voltage range [V <sub>DC</sub> ]	Input current		Output voltage [V <sub>DC</sub> ]	Output current min. / max. [mA]	Efficiency typ. [%]	Capacitor load max. (see note 3) [mA]
		No load [mA]	Full load [mA]				
<b>Single output</b>							
P6C053R3S	4.5...9	25	1292	3.3	0...1400	73	1000
P6C0505S	4.5...9	25	1600	5.0	0...1200	76	1000
P6C0512S	4.5...9	30	1490	12.0	0...500	82	330
P6C0515S	4.5...9	30	1472	15.0	0...400	82	220
<b>Dual output</b>							
P6C053R3D	4.5...9	25	1658	±3.3	0...±910	75	2 x 680
P6C0505D	4.5...9	25	1548	±5.0	0...±600	79	2 x 330
P6C0512D	4.5...9	35	996	±12.0	0...±250	83	2 x 100
P6C0515D	4.5...9	40	997	±15.0	0...±200	83	2 x 47

Suffix: "H" for 3.5 kV<sub>DC</sub> isolation voltage

## Specifications

<b>Input</b>	
Filter	LC circuit
Reflected ripple current	35 mA <sub>p-p</sub> , typ.
Start up time	20 ms, typ.
<b>Isolation:</b>	
Rated voltage (1 minute, input to output)	1500 V <sub>DC</sub> , Standard 3500 V <sub>DC</sub> , Suffix "H"
Resistance	10 <sup>9</sup> Ω
Capacitance	500 pF, typ.
<b>Output</b>	
Voltage tolerance	± 1 %, max. ± 2 %, max. @ 3.3 V types
Dual outputs cross regulation (see note 1)	± 5 %, max.
Ripple and noise at 20 MHz BW (see note 2)	60 mV <sub>p-p</sub> , max.
Short circuit protection	Continuous, automatic restart
Current limiting	~150 %, typ. of full load
Line voltage regulation	± 0.5 %, max.
Load voltage regulation	± 0.5 %, max. ± 1.5 %, max. @ 3.3 V types
Temperature coefficient	± 0.02 % / °C
Transient recovery time (see note 4)	250 μs, typ.
Transient response deviation (see note 4)	3 %, max.
<b>General</b>	
Switching frequency	270 kHz, typ.
Reliability calculated MTBF (MIL-HDBK-217F)	1.21 Mio. hours
Safety in accordance with	IEC 60950-1

<b>EMC</b>	
Radiated emissions	EN55022 ClassA
Conducted emissions (see note 5)	EN55022 ClassA
ESD	IEC 61000-4-2 perf. crit. A
RS	IEC 61000-4-3 perf. crit. A
EFT ( see note 6)	IEC 61000-4-4 perf. crit. A
Surge ( see note 6)	IEC 61000-4-5 perf. crit. A
CS	IEC 61000-4-6 perf. crit. A
PFMF	IEC 61000-4-8 perf. crit. A
<b>Environmental</b>	
Operating temperatur (ambient)	-40 °C to +85 °C
Case temperature	100 °C, max.
Storage temperature	-40 °C to +125 °C
Derating	None required
Humidity	Up to 95%, non-condensing
Cooling	Free air convection
<b>Physical</b>	
Dimensions	31.75 x 20.32 x 10.16 mm
Weight	17 g metal, standard
Potting material	Epoxy (UL94-V-0 rated)
Case material	Nickel coated copper
<b>Absolute maximum ratings</b>	
Input voltage 0.1 s max.	-0.7 V <sub>DC</sub> ... 15 V <sub>DC</sub>
Lead soldering Temperature	260 °C for 10 s, distance from package 1.5 mm

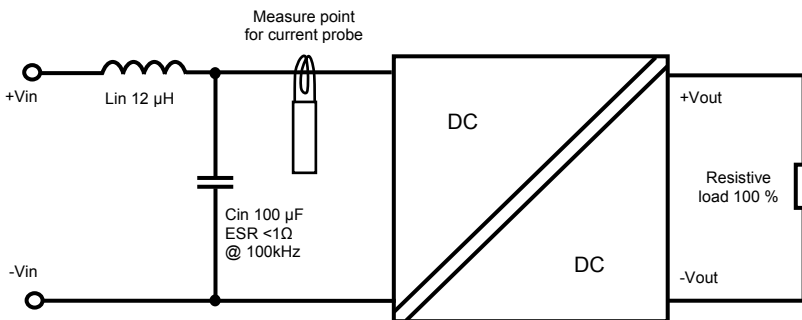
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**Note:**

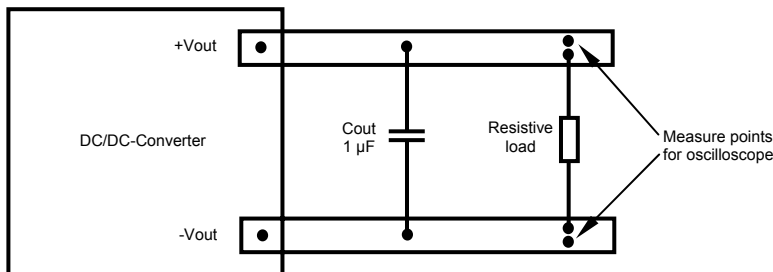
1. If one output load is 25 % to 100 % and the other output load is 100 %, than the output voltage drift rate will be max.  $\pm 5 \%$ .
2. Ripple and noise measured with a 1  $\mu\text{F}$  ceramic capacitor.
3. Tested by nominal input voltage and constant resistor load.
4. Tested by normal  $V_{in}$  and 25 % load step change (75 % - 50 % - 25 % of  $I_o$ ).
5. It's recommended to add C1 330  $\mu\text{F}$ , C2 470  $\mu\text{F}$ , L 1.8  $\mu\text{H}$  on the input end to achieve EN55022 conducted Class A.
6. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. C1 330  $\mu\text{F}$ , C2 470  $\mu\text{F}$ , L 1.8  $\mu\text{H}$

**Measure circuit for input reflected ripple current**



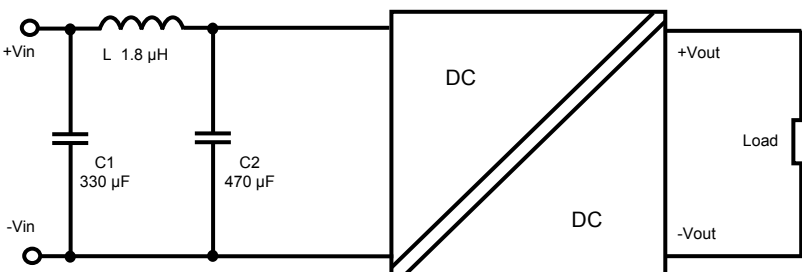
Input reflected ripple current is measured after the input inductor  $L_{in}$  and the source capacitor  $C_{in}$  at nominal input and full load.

**Output Ripple & Noise Measurement Test**



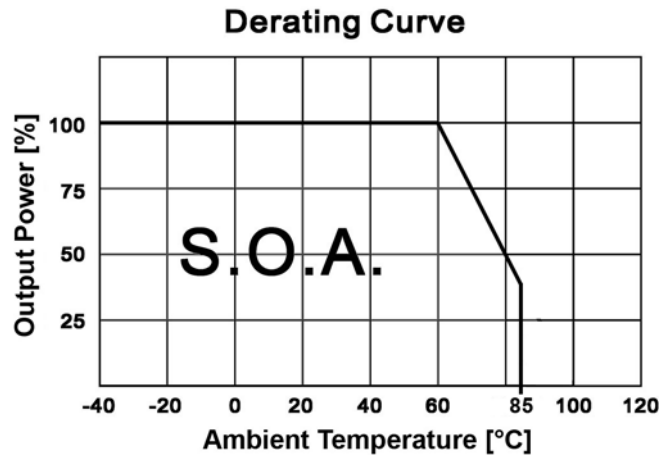
The oscilloscope measurement bandwidth must be better than 20 MHz.

**EMI Filter**

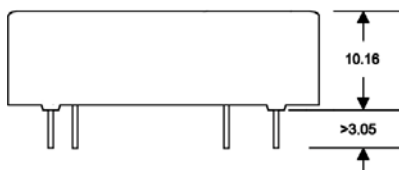
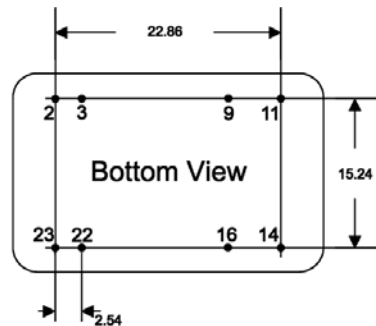
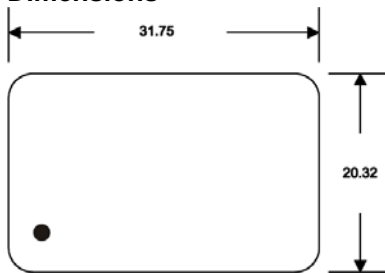


Input filter components C1, C2, L are used to help meet the conducted emissions requirements of the module. These components should be mounted as close as possible to the module. All pins should be minimized to decrease radiated noise.

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### Dimensions



Notes: All dimensions are typical in millimeters  
 1. Pin diameter:  $0.5 \pm 0.05$   
 2. Pin pitch tolerance:  $\pm 0.35$   
 3. Case Tolerance:  $\pm 0.5$

### Pin connections

Pin	Single	Dual
2	-V Input	-V Input
3	-V Input	-V Input
9	Omitted	Common
11	N.C.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

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