

# 5W DC-DC Converter P5C-Series

- 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>							
P5C053R3S	4.5...9	25	1200	3.3	0...1300	73	1000
P5C0505S	4.5...9	25	1333	5.0	0...1000	77	1000
P5C0512S	4.5...9	30	1235	12.0	0...417	82	220
P5C0515S	4.5...9	30	1280	15.0	0...333	82	100
<b>Dual output</b>							
P5C053R3D	4.5...9	25	1320	±3.3	±0...750	76	2 x 680
P5C0505D	4.5...9	30	1282	±5.0	±0...500	79	2 x 470
P5C0512D	4.5...9	35	1232	±12.0	±0...208	82	2 x 100
P5C0515D	4.5...9	40	1244	±15.0	±0...167	82	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

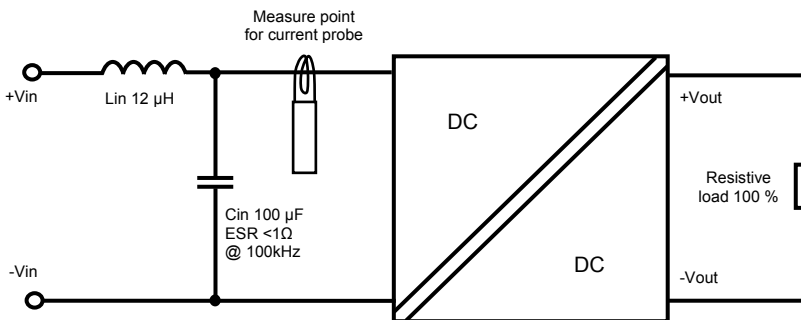
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## Note:

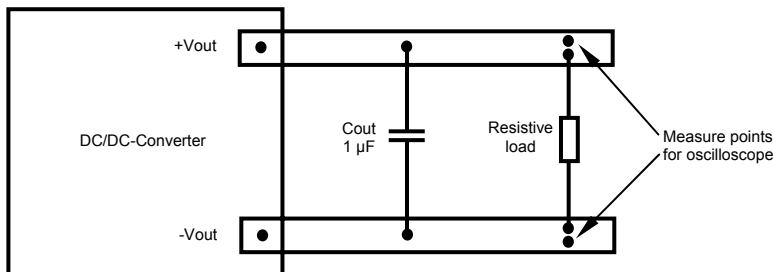
1. If one output load is 25 % to 100 % and the other output load is 100 %, than the output voltage drift rate will be max.  $\pm 5 \%$ .
2. Ripple and noise measured with a 1  $\mu\text{F}$  ceramic capacitor.
3. Tested by nominal input voltage and constant resistor load.
4. Tested by normal  $V_{in}$  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



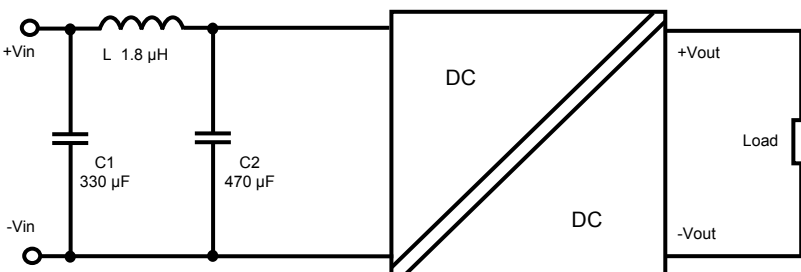
Input reflected ripple current is measured after the input inductor  $L_{in}$  and the source capacitor  $C_{in}$  at nominal input and full load.

## Output Ripple & Noise Measurement Test



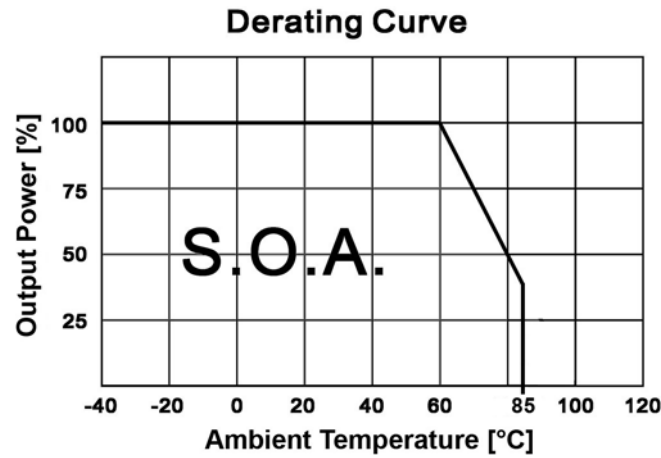
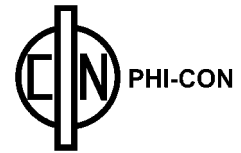
The oscilloscope measurement bandwidth must be better than 20 MHz.

## EMI Filter

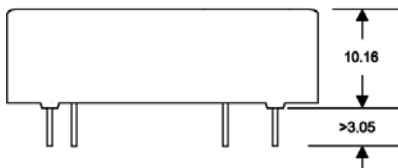
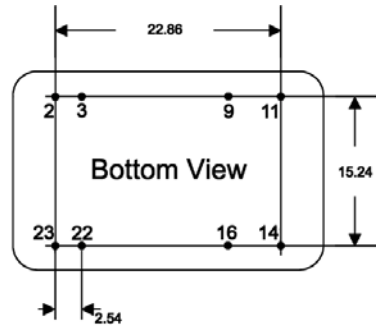
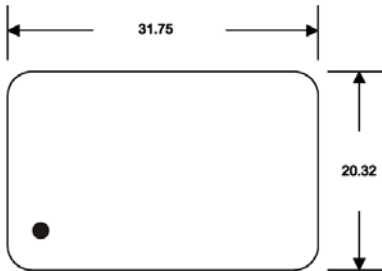


Input filter components C1, C2, L are used to help meet the conducted emissions requirements of the module. These components should be mounted as close as possible to the module. All pins should be minimized to decrease radiated noise.

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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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