

1 W SMD DC-DC Converter P1PS_C-Series



- Single regulated output
- Up to 3000 V_{DC} isolation
- MTBF > 3.5 Mio. h at 25 °C
- -40...85 °C Operating temperature range
- Continuous short circuit protection



Model guide

Type	Input voltage		Output voltage [V _{DC}]	Input current at Vin 5 V		Output current		Output voltage drift @ load 10~100% [%] max.	Efficiency typ. [%]	Capacitive load max. [μF]
	Nominal	Range		no load [mA] typ.	full load [mA] typ.	[mA] min.	[mA] max.			
	[V _{DC}]	[V _{DC}]								
P1PS053R3CS	5.0	4.75..5.25	3.3	5	303	25	250	20	66	2400
P1PS0505CS	5.0	4.75..5.25	5.0	5	290	20	200	15	69	2400
P1PS0509CS	5.0	4.75..5.25	9.0	6	286	12	111	10	70	1000
P1PS0512CS	5.0	4.75..5.25	12.0	9	282	9	84	10	71	560
P1PS0515CS	5.0	4.75..5.25	15.0	9	282	7	67	10	71	560

Specifications

Input	
Voltage range	± 5 %
Filter	Capacitor
Reflected input ripple current	30mA, typ. (see Figure 1)
Surge voltage, max. 1 s	Vin -0.7 ~ 9 V _{DC}
Input / output:	
Isolation voltage tested for 60 sec. @ leakage current < 1 mA	3 kV _{DC}
Isolation Resistance @ 500 V _{DC}	10 ⁹ Ω, min.
Capacitance @ 100 mV, 100 kHz	20 pF, typ.
Output	
Output voltage tolerance	± 3 %
Voltage deviation @ 1% V _{in} change	± 0.25 %, max.
Load regulation at 10...100 % load change	P1PS053R3S: 3 %, max. All others: 2 %, max.
Temperature coefficient	0.03 % / °C, max., at full load
Ripple (BW 20 MHz)	75 mVp-p, max.
Noise (BW 20 MHz)	100 mVp-p, max.
Short circuit protection	Continuous, hiccup, auto restart
General	
Safety standard	EN 62368-1,
Switching frequency	250 kHz, typ.
Reliability, MIL-HDBK-217@25 °C	MTBF 3.5 Mio. h

Environmental		
CE	EN 55032, CISPR32	CLASS B (see Figure 3)
RE	EN 55032, CISPR32	CLASS B (see Figure 3)
ESD	EN-, IEC 61000-4-2	Air ± 8 kV perf. criteria B Contact ± 4 kV perf. criteria B
Operating ambient temperature		-40 °C ... 85 °C see derating diagram
Storage temperature		-55 °C ... 125 °C
Case temperature rise at full load		P1PS053R3CS: 30 °C, typ. All others 25 °C, typ.
Derating		See derating curve
Storage humidity		Up to 95 %, non condensing
Cooling		Free air convection
Physical		
Package material		Heat resistant plastic (UL94 V-0)
Weight		1.2 g
Mechanical dimensions		15.24 x 11.4 x 7.25 mm
Moisture sensitivity level IPC/JEDEC J-STD-020D.1.		MSL 1
Absolute maximum ratings		
Reflow soldering temperature IPC/JEDEC J-STD-020D.1.		≤ 217 °C for ≤ 60 s, ≤ 245 °C peak ≤ 10 s.
Manual soldering temperature		≤ 300 °C peak ≤ 10 s, 1.5 mm distance from case

Ordering information													
PHI-CON & output power		Series designation	Mounting technology		Input voltage		Output voltage		Revision	Output configuration		Packing	
P1	1 W	P	S	SMD	05	5 V	3R3	3.3V	C	S	Single	LT	Tube
							05	5 V				TR	Tape & Reel
							09	9 V					
							12	12 V					
							15	15 V					

Note:

1. Unless otherwise noted, all specifications are measured at Ta 25 °C, humidity <75 %, nominal input voltage and rated output load.
2. Operation under minimum load will not damage the converter. However, they may not meet all specifications.
3. Maximum capacitive load is tested at nominal input voltage and full load.
4. P1PS_C series is not usable for IGBT driver applications.
5. The converter are not hot pluggable

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Figure 1 Measure circuit for Input reflected ripple current

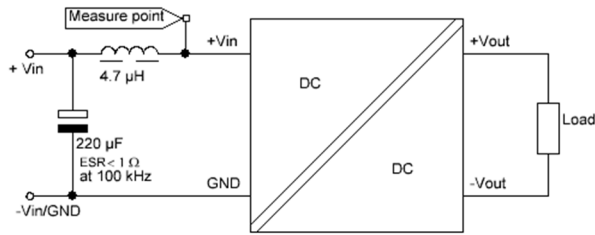
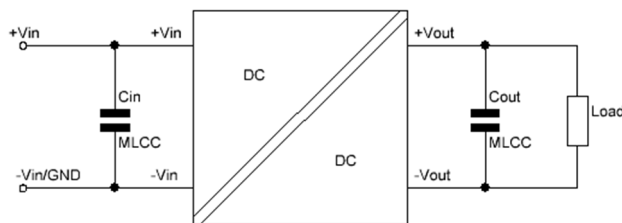


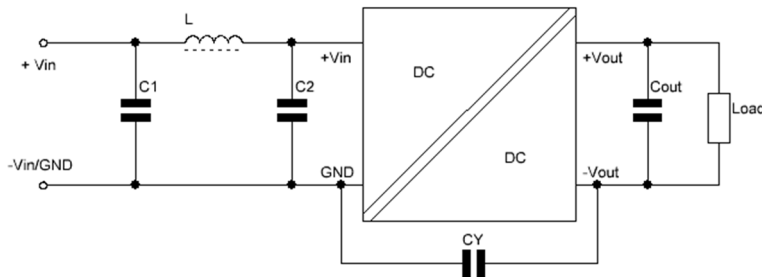
Figure 2 Typical peripheral circuit for ripple & noise reduction



Vin version	Cin	Vout version	Cout
P1PS05xxCS	4.7 µF	P1PSxx3R3CS	10 µF
		P1PSxx05CS	10 µF
		P1PSxx09CS	2.2 µF
		P1PSxx12CS	2.2 µF
		P1PSxx15CS	1 µF

If it is required to further reduce input and output ripple, a filter capacitor may be connected to the input and output terminals (see Figure 2). Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused if the capacitance is too large. Under the condition of safe and reliable operation, the recommended capacitive load values are shown in (see Table page 1).

Figure 3 Recommended external EMI circuit for Class B

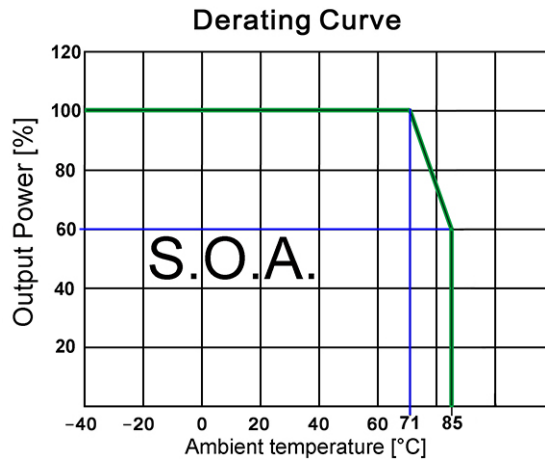


Model series	C1, C2	L	CY	Cout
P1PS3R3xxS	4.7 µF, 25 V	6.8 µH	-	See Table A
P1PS05xxS	4.7 µF, 25 V	6.8 µH	-	
P1PS09xxS	4.7 µF, 25 V	6.8 µH	-	
P1PS12xxS	4.7 µF, 25 V	6.8 µH	1 nF, 4 kV	
P1PS15xxS	4.7 µF, 25 V	6.8 µH	1 nF, 4 kV	

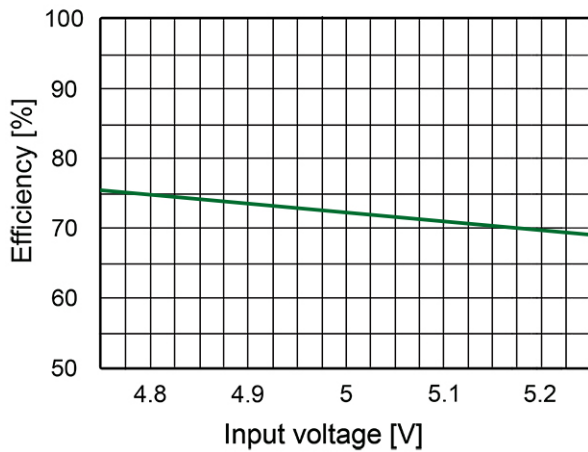
CY: Type HGZ102MBP (VISHAY), CD45-E2GA102M-GKA (TDK)

In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10 % rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side. The sum of the efficient power and resistor consumption power should not be less than 10 %.

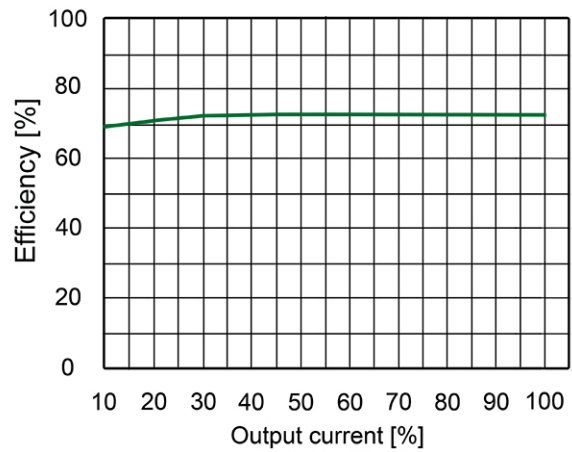
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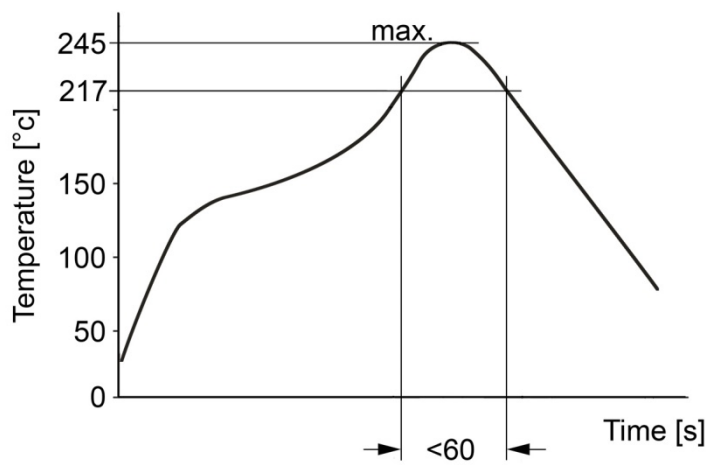
P1PS053R3CS Efficiency vs input voltage at full load



P1PS053R3CS Efficiency vs output load at Vin 5 V



Reflow soldering temperature profile

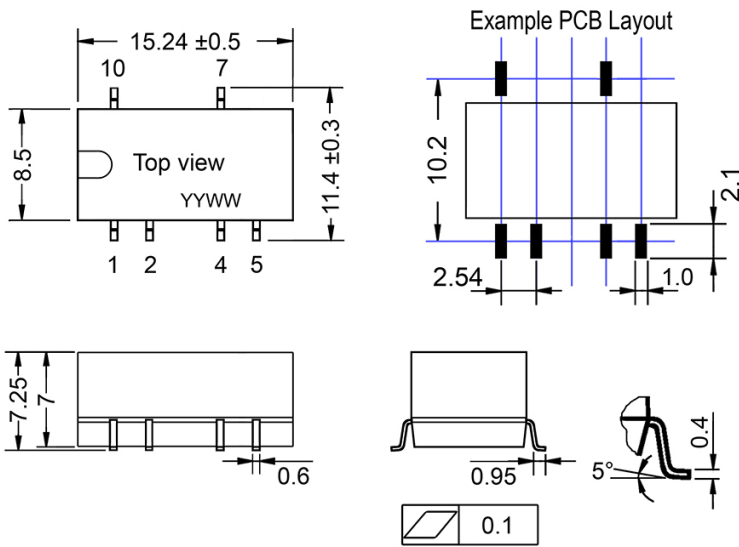




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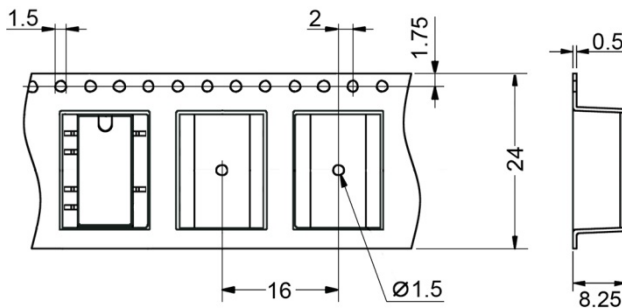
Package dimensions and footprint layout



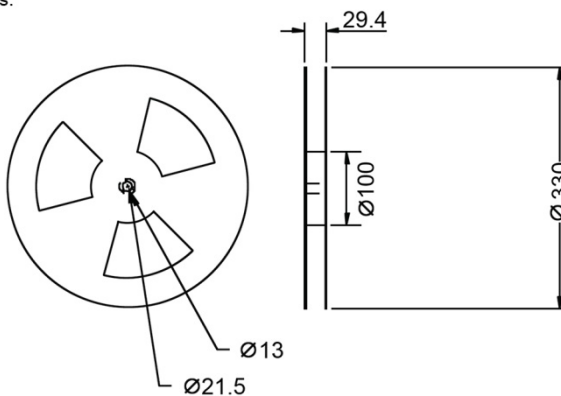
Notes:
All dimensions are in mm
General tolerances ± 0.25 mm
Pin tolerances ± 0.1 mm

Lead assignment	
Lead	Lead connection
1	- Vin / GND
2	+ Vin
3	No lead
4	- Vout / 0V
5	- Vout / 0V
6	No lead
7	+ Vout
8	No lead
9	No lead
10	Not connected

Tape dimensions:



Reel dimensions:



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