

PHI-CON

1W SMD DC-DC Converter P1JS-Series

- SMD 8 lead package
- Up to 3000 V_{DC} isolation
- MTBF > 3.5 Mio. h at 25 °C
- -40...105 °C operating temperature range
- Efficiency up to 81 %
- Continuous short circuit protection



Model guide

Type	Input voltage range [V _{DC}]	Input current		Output voltage [V _{DC}]	Output current		Output ripple & noise (see note 4) [mVp-p] typ.	Efficiency typ. [%]	Maximum capacitive load [μF]
		Full load [mA] typ.	No load [mA] typ.		min. [mA]	max. [mA]			
P1JS3R33R3S	2.97..3.63	415	25	3.3	30	303	30	73	220
P1JS3R305S	2.97..3.63	388	25	5.0	20	200	30	78	220
P1JS053R3S	4.5..5.5	263	20	3.3	30	303	30	76	220
P1JS0505S	4.5..5.5	250	20	5.0	20	200	30	80	220
P1JS0509S	4.5..5.5	250	20	9.0	11	110	30	80	220
P1JS0512S	4.5..5.5	250	20	12.0	9	84	30	80	220
P1JS0515S	4.5..5.5	250	20	15.0	7	66	60	80	220
P1JS0524S	4.5..5.5	250	20	24.0	5	42	60	80	220
P1JS123R3S	10.8..13.2	111	15	3.3	30	303	30	75	220
P1JS1205S	10.8..13.2	104	15	5.0	20	200	30	80	220
P1JS1209S	10.8..13.2	104	15	9.0	11	110	30	80	220
P1JS1212S	10.8..13.2	103	15	12.0	9	84	30	81	220
P1JS1215S	10.8..13.2	103	15	15.0	7	66	60	81	220
P1JS1515S	13.5..16.5	82	10	15.0	7	66	60	81	220
P1JS2405S	21.6..26.4	52	7	5.0	20	200	30	80	220
P1JS2409S	21.6..26.4	52	7	9.0	11	110	30	80	220
P1JS2415S	21.6..26.4	51	7	15.0	7	66	60	81	220
P1JS2424S	21.6..26.4	51	7	24.0	5	42	60	81	220

Part designation structure												
Output power		Series designation	Mounting technology		Input voltage		Output voltage		Output configuration		Packing	
P1	1 W	J	S	SMD	3R3	3.3 V	3R3	3.3 V	S	single	blank	Tube
					05	5 V	05	5 V			TR	Reel
					12	12 V	09	9 V				
					15	15V	12	12 V				
					24	24 V	15	15 V				
							24	24 V				

Specifications

Input	
Voltage range	± 10 % of nominal
Filter	Capacitors
Reflected ripple current	15 mA _{p-p} , typ.
Input / output:	
Isolation voltage tested for 60 sec. @ leakage current < 1mA	3 kV _{DC}
Isolation resistance @ 500 V _{DC}	10 ⁹ Ω, min.
Capacitance	20 pF, typ.
Output	
Output voltage drift @ 3.3V V _{out} models	± 1.5 % @ 1% V _{in} change
Output voltage drift @ all other models	± 1.2 % @ 1% V _{in} change
Output voltage tolerance	± 5 % @ 70 % load, See output voltage tolerance diagram
Output voltage deviation at load change	See output voltage tolerance diagram
Temperature coefficient	0.03 % / °C, max., at full load
Short circuit protection	Continuous, auto recovery
General	
Switching frequency	100 kHz, typ. 300 kHz, max.
Reliability, MTBF (MIL-HDBK-217 @ 25 °C)	3.5 Mio. hours
Physical	
Package material	Epoxy resin (UL94-V0)
Weight	1.5 g, typ.

Environmental		
Operating temperature (ambient)	-40 °C to +105 °C	
Storage temperature	-55 °C to +125 °C	
Derating	See derating curve	
Cooling	Free air convection	
Case temperature rise at full load	25 °C	
Humidity	Up to 95 %, non-condensing	
EMC		
EMI	CE	CISPR22 / EN55022 class B (Recommended circuit refer to Fig. 1)
	RE	CISPR22 / EN55022 class B (Recommended circuit refer to Fig. 1)
EMS	ESD	IEC/EN61000-4-2 contact ± 8 kV perf. criteria B
Absolute maximum ratings		
V _{in} 3.3 V types	-0.7 ~ 5 V _{DC} , max. 1 s	
V _{in} 5 V types	-0.7 ~ 9 V _{DC} , max. 1 s	
V _{in} 12 V types	-0.7 ~ 18 V _{DC} , max. 1 s	
V _{in} 15 V types	-0.7 ~ 21 V _{DC} , max. 1 s	
V _{in} 24 V types	-0.7 ~ 30 V _{DC} , max. 1 s	
Manual soldering lead temperature	300 °C max. 10 s max., 1.5 mm distance from body	
Soldering temperature	217 °C for 60 s max., 245 °C peak	
Moisture sensitivity level (MSL)	IPC/JEDEC J-STD-020D.1	

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Input reflected ripple current measure circuit

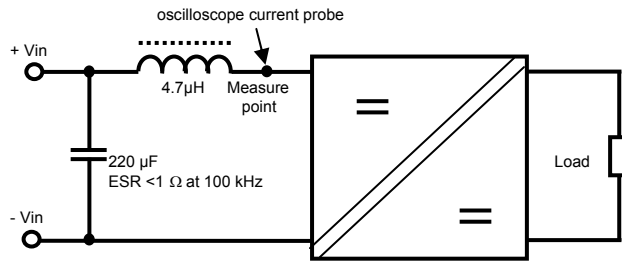
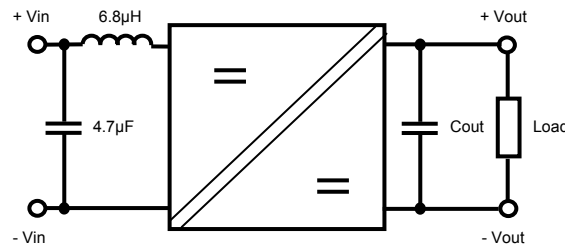
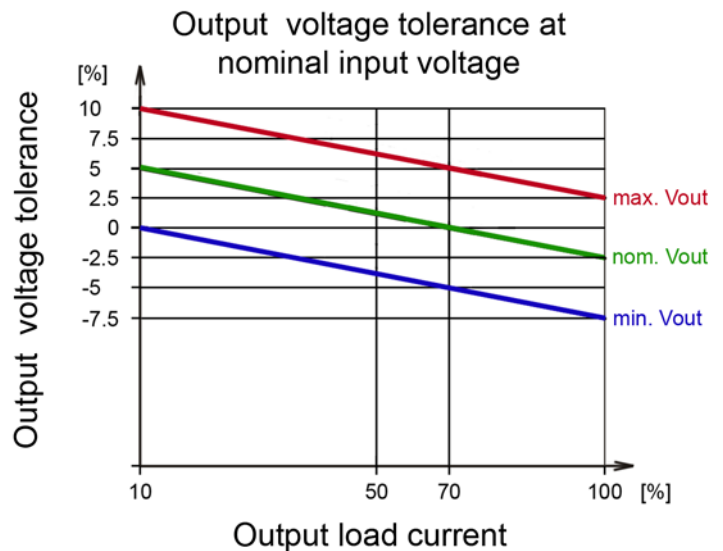
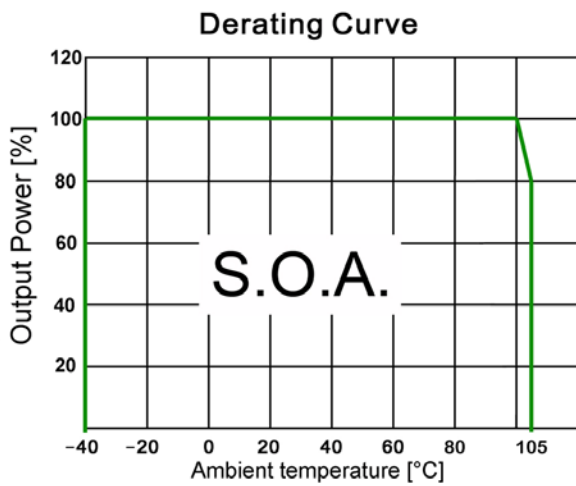


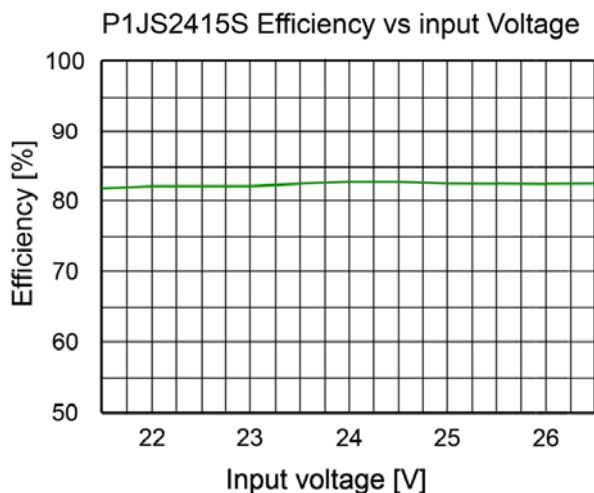
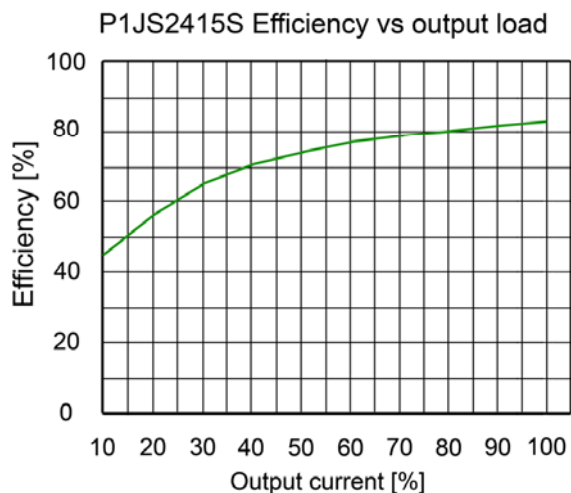
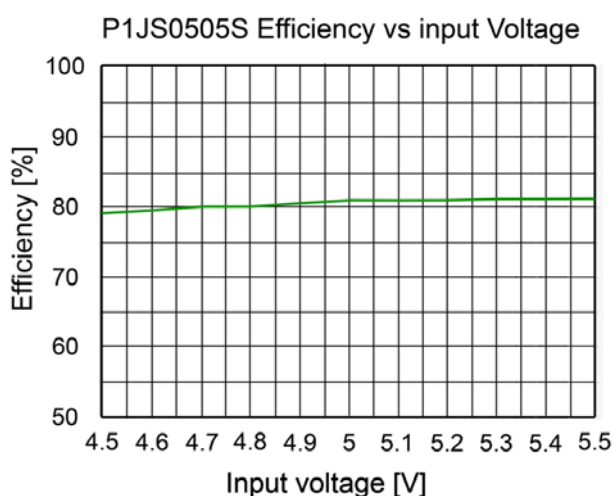
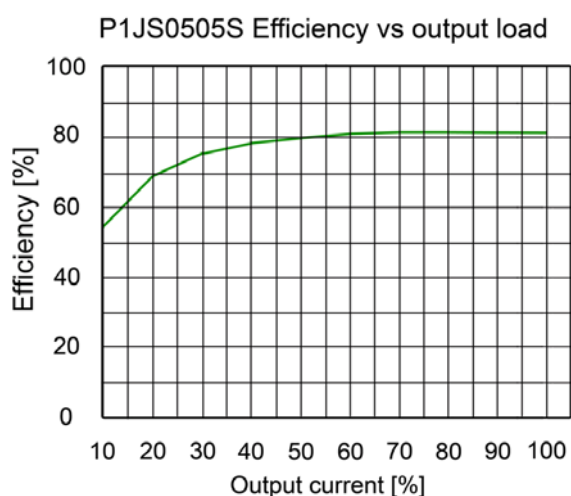
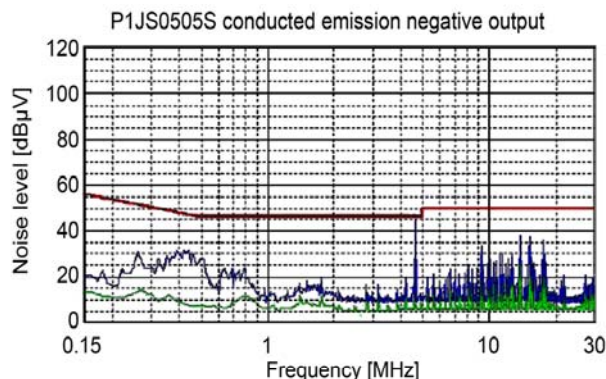
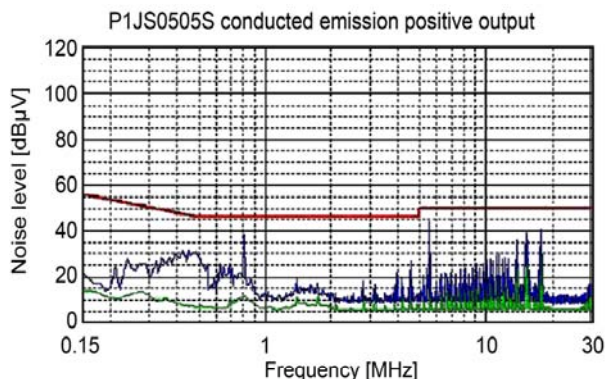
Figure 1 Recommended EMC / EMI circuit for Class B standard



Cout see to table at figure 3



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Note:

1. Operation under minimum load will not damage the converter, however they may not meet all specifications.
2. Max. capacitive load is tested at nominal input voltage and full load.
3. Unless otherwise noted, all specifications are measured at Ta 25 °C, humidity <75 %, nominal input voltage and rated output load.
4. Ripple and noise tested with „parallel cable“ method.
5. P1JS series is not usable for IGBT driver applications.

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Application notes

1) Requirement on output load

To ensure this module can operate efficiently and reliably during operation, the minimum output load must be **higher than 10 % of the full load**. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power. Operation with smaller load than minimum load will not damage the converter. However, they may not meet all specification listed, and that will reduce the life time of product.

2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self recovery fuse in series at the input end or add a circuit breaker to the circuit.

3) Output Voltage Regulation and Over-voltage Protection Circuit

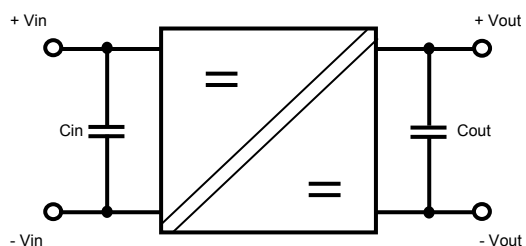
The simplest device for output voltage regulation, over voltage and over current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series.

4) Recommended circuit

If you want to further decrease the input / output ripple, filter capacitors may be connected to the input and output ends of the DC/DC converter, see (Figure 3).

It should also be noted that the capacitance of the capacitor must be proper. If the capacitance is too large, a startup problem might arise. It should also be noted that the capacitance of the capacitor must be proper. If the capacitance is too large, a startup problem might arise. For an safe and reliable operation of every model, the recommended capacitance of the capacitor refer to table below.

Figure 3



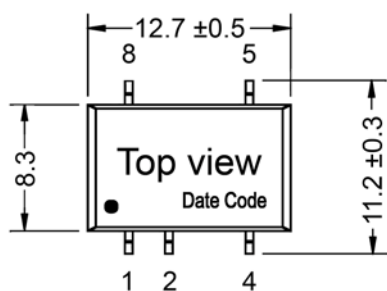
Vin	Cin	Vout	Cout
P1JS3R3xxS	4.7 μ F	P1JSxx3R3S	10 μ F
P1JS05xxS	4.7 μ F	P1JSxx05S	10 μ F
P1JS12xxS	2.2 μ F	P1JSxx09S	4.7 μ F
P1JS15xxS	2.2 μ F	P1JSxx12S	2.2 μ F
P1JS24xxS	1 μ F	P1JSxx15S	1 μ F
		P1JSxx24S	0.47 μ F

It's not recommended to connect any external capacitor in the application field with less than 0.5 W output power!

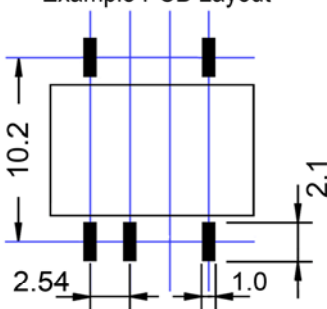
5) The input and the output of the product are recommended to be connected to ceramic capacitor or electrolytic capacitor. Using tantalum capacitor may cause risk of failure

6) Not for parallel connection or plug and play (hot swap) application!

Package dimensions



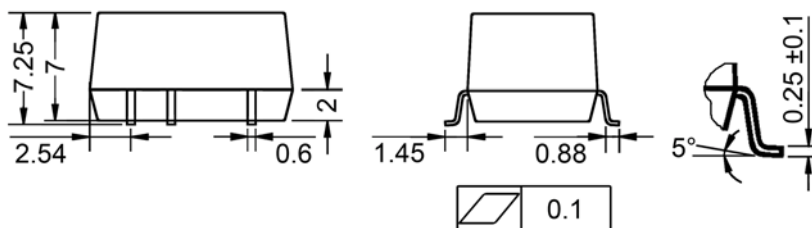
Example PCB Layout



Lead	
1	- Vininput
2	+ Vininput
3	No lead
4	- Voutput
5	+ Voutput
6	No lead
7	No lead
8	Not connected

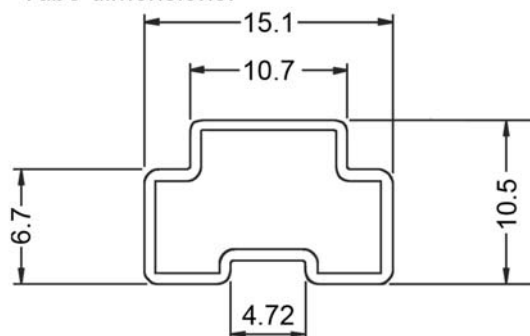
Notes:

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



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Tube dimensions:



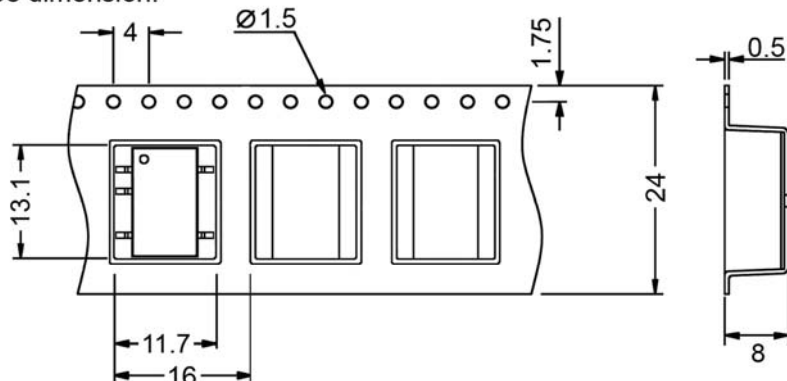
Unit: mm

General tolerances: ± 0.5 mm

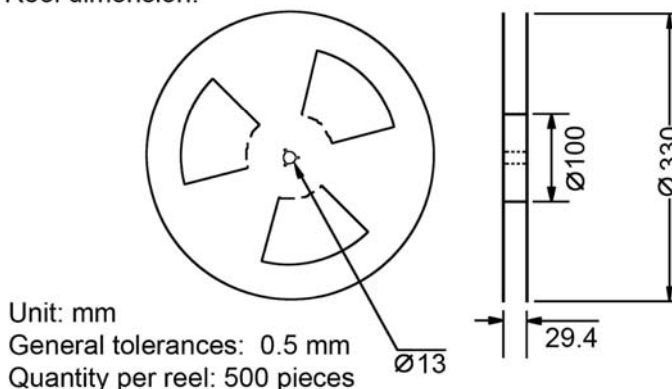
Short tube 220 mm, quantity 15 pieces

Long tube 530 mm, quantity 40 pieces

Tape dimension:



Reel dimension:



Unit: mm

General tolerances: 0.5 mm

Quantity per reel: 500 pieces

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