



PHI-CON

1 W SMD DC-DC Converter P1JS_CS-Series

- Single output unregulated
- Up to 3000 V_{DC} isolation
- MTBF > 3.5 Mio. h at 25 °C
- -40...105 °C Operating temperature range
- Efficiency up to 85 %
- Continuous short circuit protection



Model guide

Type	Input voltage		Output voltage [V _{DC}]	Input current		Output current		Output voltage drift @ load 10~100% [mV] max.	Efficiency typ. [%]	Capacitive load max. [μF]
	Nominal [V _{DC}]	Range [V _{DC}]		no load [mA] typ.	full load [mA] typ.	[mA] min.	[mA] max.			
	P1JS053R3CS	5	4.5..5.5	3.3	5	270	30	303	20	74
P1JS0505CS	5	4.5..5.5	5.0	5	270	20	200	15	82	2400
P1JS0509CS	5	4.5..5.5	9.0	12	240	12	111	10	83	1000
P1JS0512CS	5	4.5..5.5	12.0	12	240	9	84	10	83	560
P1JS0515CS	5	4.5..5.5	15.0	18	240	7	67	10	83	560
P1JS0524CS	5	4.5..5.5	24.0	18	240	4	42	10	85	220
P1JS1205CS	12	10.8..13.2	5.0	8	107	20	200	15	82	2400
P1JS1209CS	12	10.8..13.2	9.0	8	106	12	111	10	83	1000
P1JS1212CS	12	10.8..13.2	12.0	8	106	9	84	10	83	560
P1JS1215CS	12	10.8..13.2	15.0	8	106	7	67	10	83	560
P1JS1224CS	12	10.8..13.2	24.0	8	103	4	42	10	85	220
P1JS1505CS	15	13.5..16.5	5.0	8	86	20	200	15	82	2400
P1JS1515CS	15	13.5..16.5	15.0	8	85	7	67	10	83	560
P1JS2405CS	24	21.6..26.4	5.0	8	55	20	200	15	82	2400
P1JS2409CS	24	21.6..26.4	9.0	8	55	12	111	10	83	1000
P1JS2412CS	24	21.6..26.4	12.0	8	55	9	84	10	83	560
P1JS2415CS	24	21.6..26.4	15.0	8	55	7	67	10	83	560
P1JS2424CS	24	21.6..26.4	24.0	8	53	4	42	10	85	220

Specifications

Input	
Voltage range	± 10 %
Filter	Capacitor
Reflected input ripple current	P1JS05xxCS: 15 mA, typ. (see Figure 1) All others: 30 mA, typ.
Input / output:	
Isolation voltage tested for 60 sec. @ leakage current < 1 mA	3 kV _{DC}
Isolation Resistance @ 500 V _{DC}	≥ 10 ⁹ Ω
Capacitance @ 100 mV, 100 kHz	20 pF, typ.
Output	
Voltage deviation @ 1% V _{in} change	P1JS053R3CS: ≤ ± 1.5 % All others: ≤ ± 1.2 %
Output voltage tolerance at 70 % load	See diagram, page 3
Temperature coefficient	0.02 % / °C, max., at full load
Ripple & noise (BW 20 MHz)	P1JSxx24CS: ≤ 100 mVpp (see Figure 2) All others: ≤ 75 mVpp
Short circuit protection	Continuous, hiccup, auto restart
General	
Switching frequency	270 kHz, typ.
Safety standard	EN-, IEC-, UL 62368-1

Environmental		
CE	EN 55032, CISPR 32	Class B (see Figure 3)
RE	EN 55032, CISPR 32	Class B (see Figure 3)
ESD	EN, IEC 61000-4-2	Air ± 8 kV perf. criteria B Contact ± 6 kV perf. criteria B
Operating ambient temperature	-40 ... 105 °C with derating	
Storage temperature	-55 ... 125 °C	
Case temperature rise at full load	25 °C, typ.	
Derating	See derating curve	
Storage humidity	Up to 95 %, non condensing	
Cooling	Free air convection, ≥ 30 LFM	
Physical		
Package material	Heat resistant plastic (UL94 V-0)	
Dimensions	13.2 x 11.4 x 7.25 mm	
Weight	1.4 g	
Reliability, MTBF (MIL-HDBK-217 @ 25 °C)	3.5 Mio. h	
Absolute maximum ratings		
Surge voltage, duration ≤ 1 s	P1JS05xxCS	V _{in} -0.7 ~ 9 V _{DC}
	P1JS12xxCS	V _{in} -0.7 ~ 18 V _{DC}
	P1JS15xxCS	V _{in} -0.7 ~ 21 V _{DC}
	P1JS24xxCS	V _{in} -0.7 ~ 30 V _{DC}
Reflow soldering temperature	≤ 217 °C duration ≤ 60 s, ≤ 245 °C peak ≤ 10 s	
Moisture sensitivity level IPC/JEDEC J-STD-020D.1	MSL 1	

Part designation structure

PHI-CON & output power	Series designation	Mounting technology	Input voltage	Output voltage	Revision	Output configuration	Packing						
P1	1 W	J	S	SMT	05	5 V	3R3	3.3V	C	S	Single	Blanc	Tube
												TR	Tape & Reel
Example: P1JS1205CS		PHI-CON, Pout: 1 W, Series: J, SMD, Vin: 12 V, Vout: 5 V, Revision C, Single Output, Tube Packing											

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Note:

1. Operation under minimum load will not damage the converter. However, they may not meet all specifications.
2. Maximum 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. Specifications of this product are subject to changes without prior notice.
5. P1JS series is not usable for IGBT driver applications.
6. The converters are not hot pluggable
7. The converter outputs are not parallel usable
8. 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 t the output side. The sum of the efficient power and resistor consumption power should not by less than 10 %.

Figure 1 Measure circuit for Input reflected ripple current

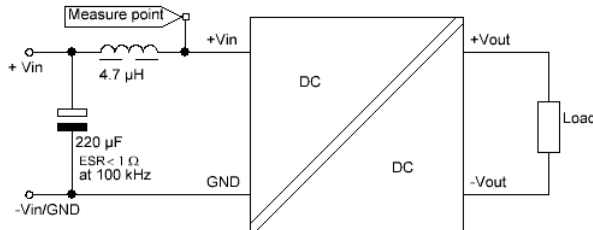
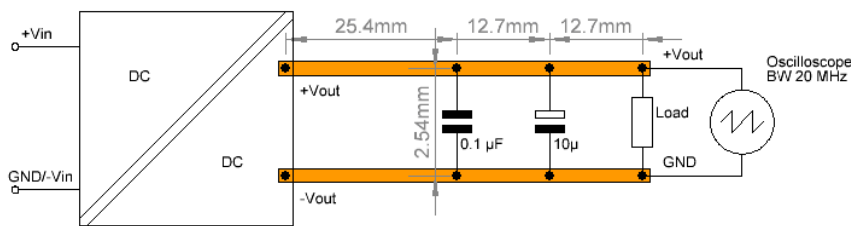
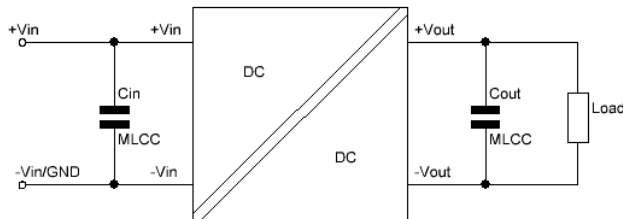


Figure 2 Measure circuit for output ripple & noise (BW20MHz)



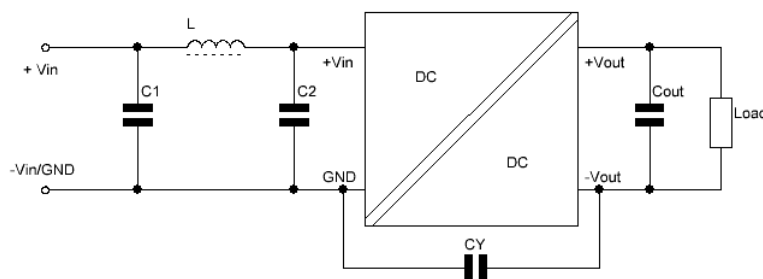
Typical application circuit for ripple & noise reduction



Vin version	Cin	Vout version	Cout
P1JS05xxCS	4.7 µF, 16 V	P1JS053R3CS	10 µF
P1JS12xxCS	2.2 µF, 25 V	P1JSxx05CS	10 µF
P1JS15xxCS	2.2 µF, 25 V	P1JSxx09CS	2.2 µF
P1JS24xxCS	1 µF, 50 V	P1JSxx12CS	2.2 µF
		P1JSxx15CS	1 µF
		P1JSxx24CS	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 EMC circuit for EN 55032 Class B



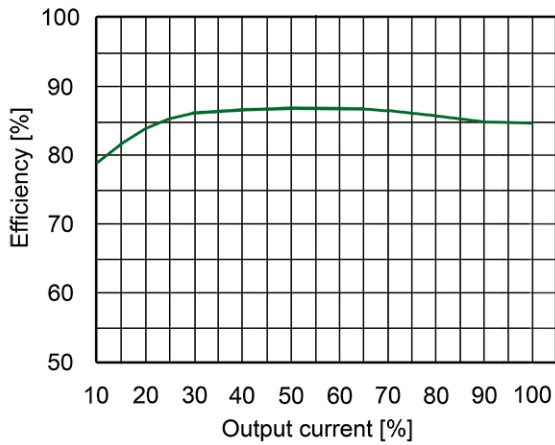
C1, C2	L	CY	Cout
4.7 µF, 50 V	6.8 µH	270pF, 4 kV	See table A



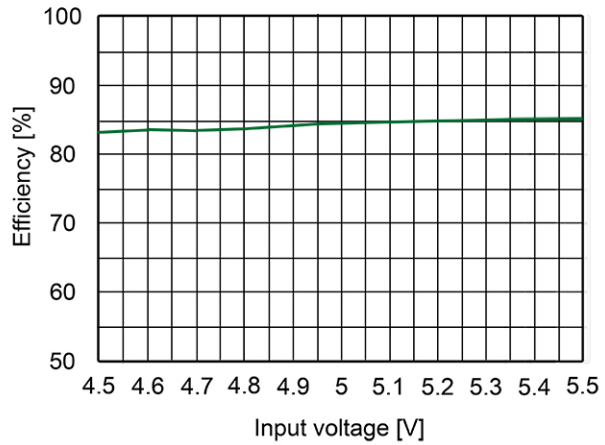
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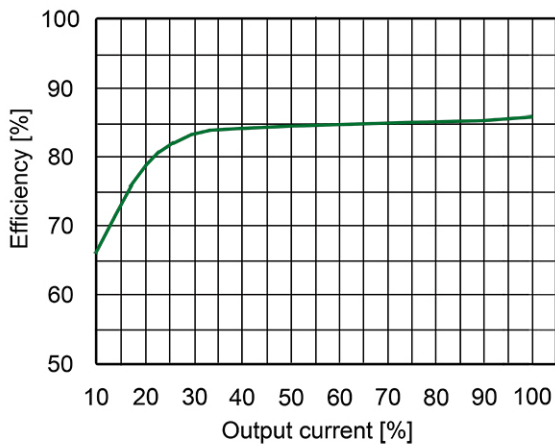
P1JS0505CS Efficiency vs output load at Vin 5 V



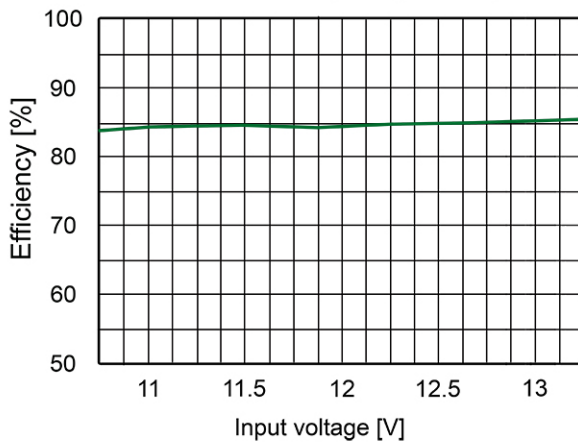
P1JS0505CS Efficiency vs input Voltage



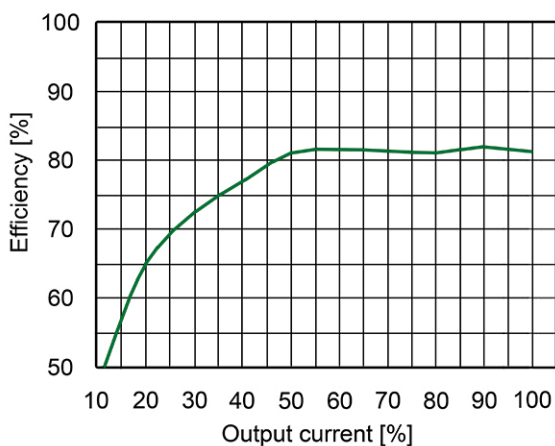
P1JS1205CS Efficiency vs output load at Vin 12 V



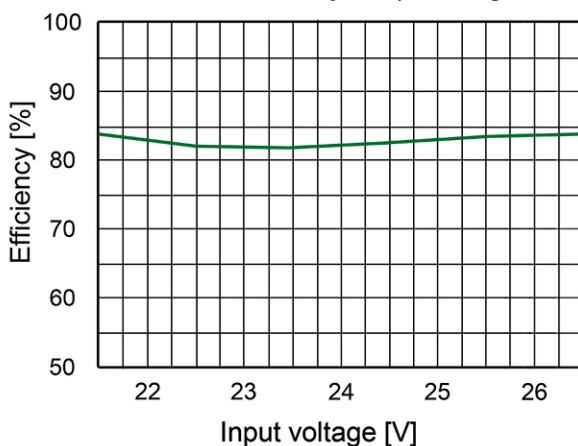
P1JS1205CS Efficiency vs input Voltage



P1JS2405CS Efficiency vs output load at Vin 24 V



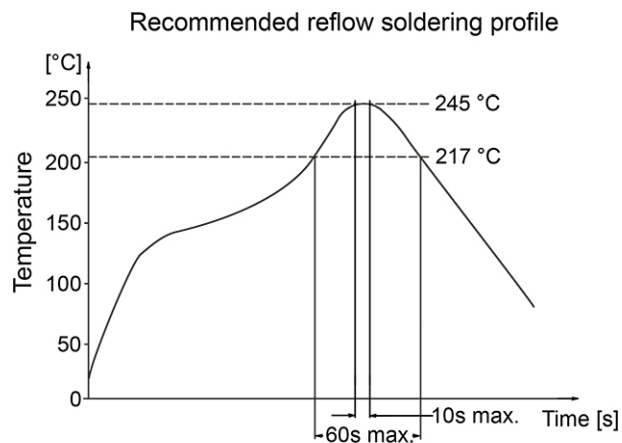
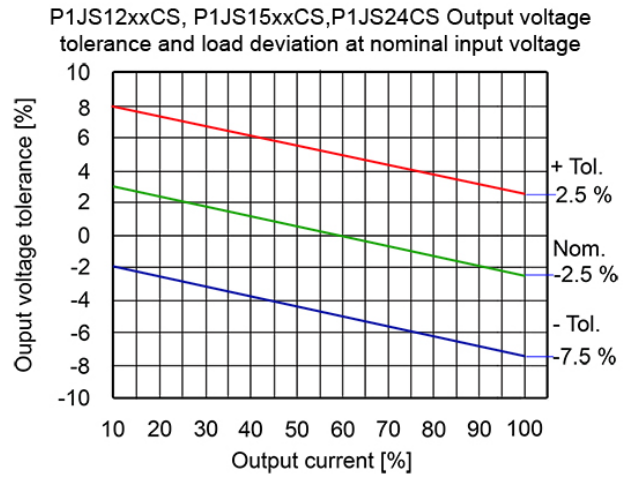
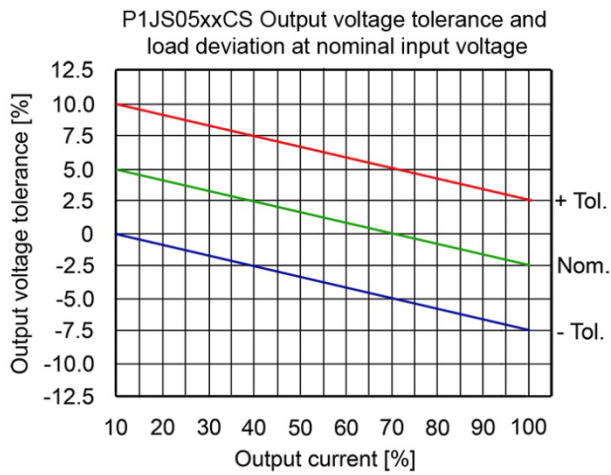
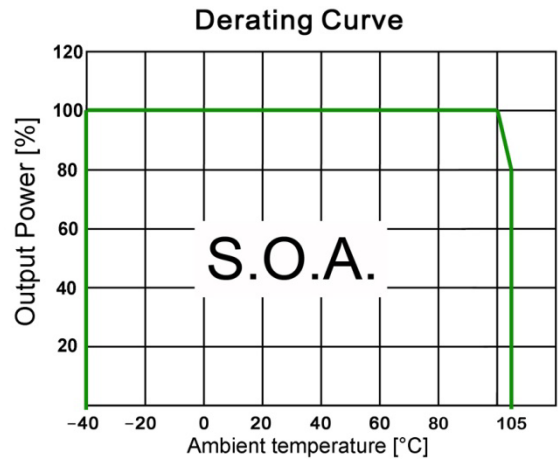
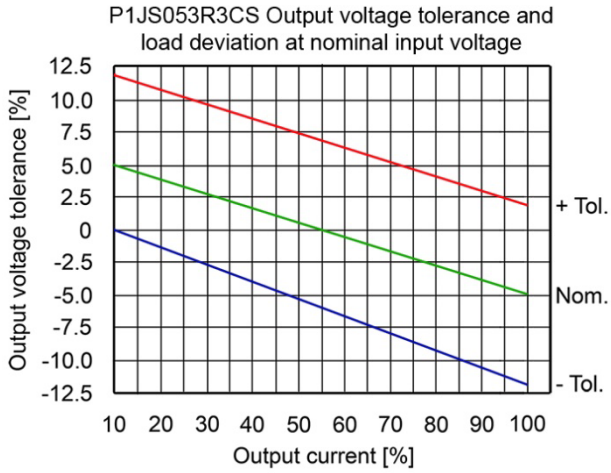
P1JS2405CS Efficiency vs input Voltage





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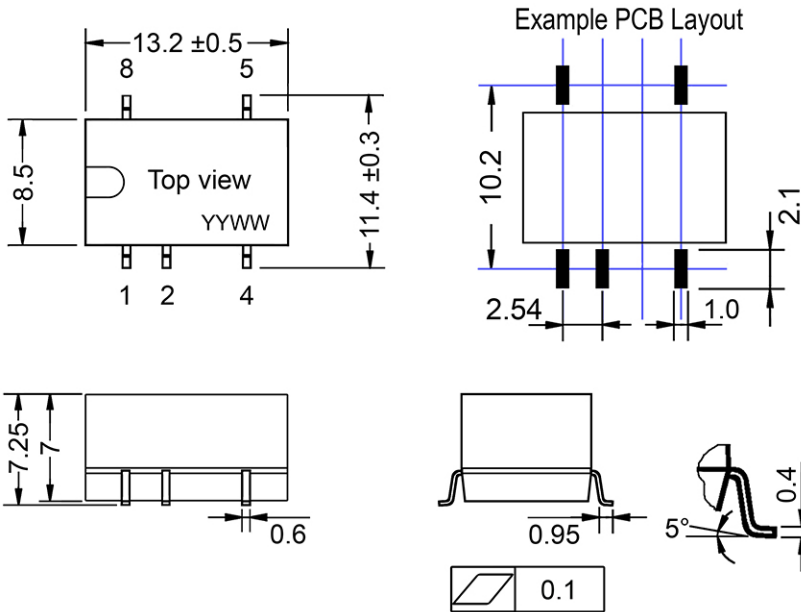
This curve applies only to hot air reflow soldering.



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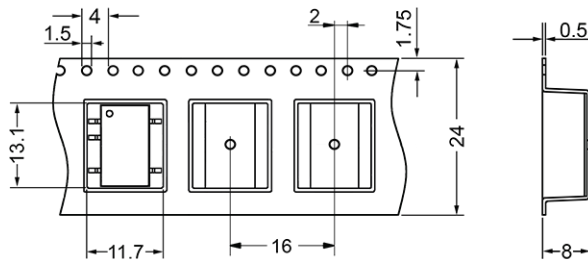
Mechanical dimensions package and footprint layout



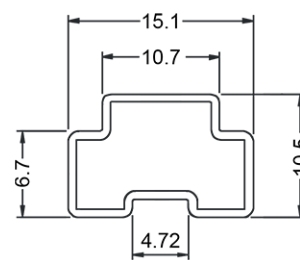
Notes:
 All dimensions are in mm
 General tolerances ± 0.25 mm
 Pin tolerances ± 0.1 mm

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

Tape dimensions:

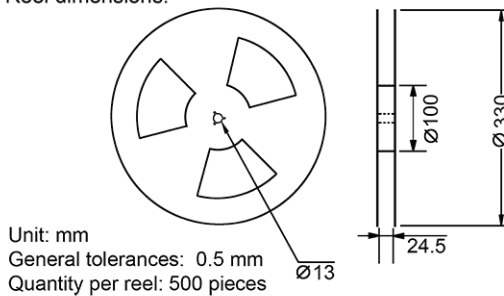


Tube dimensions:



Unit: mm
 General tolerances: ± 0.5 mm
 Quantity per reel: 40 pieces

Reel dimensions:



Unit: mm
 General tolerances: 0.5 mm
 Quantity per reel: 500 pieces

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Rev: 20220408 f