



PHI-CON

3W DC-DC Converter P3i-Series

- 8 Pin SIL
- Wide 4:1 input range
- MTBF >1.7 Mio. Hours
- 1600 V_{DC} isolation
- Continuous short circuit protection
- Remote control input on / off



Model guide

Type	Input nominal voltage [V _{DC}]	Input current no-load [mA]	Input current full-load [mA]	Output voltage [V _{DC}]	Output current [mA]	Efficiency typ. [%]	Capacitive load max.(3) [μF]
Single Output							
P3i123R3S	4.5...18	40	268	3.3	700	72	1800
P3i1205S	4.5...18	40	325	5.0	600	77	1000
P3i1212S	4.5...18	40	309	12.0	250	81	170
P3i1215S	4.5...18	40	309	15.0	200	81	100
P3i243R3S	9...36	25	129	3.3	700	75	1800
P3i2405S	9...36	25	159	5.0	600	79	1000
P3i2412S	9...36	30	153	12.0	250	82	170
P3i2415S	9...36	30	153	15.0	200	82	100
P3i483R3S	18...75	15	66	3.3	700	74	1800
P3i4805S	18...75	15	81	5.0	600	78	1000
P3i4812S	18...75	15	79	12.0	250	80	170
P3i4815S	18...75	15	78	15.0	200	81	100
Dual Output							
P3i1205D	4.5...18	40	325	±5.0	±300	77	2 x 470
P3i1212D	4.5...18	40	313	±12.0	±125	80	2 x 100
P3i1215D	4.5...18	40	310	±15.0	±100	80	2 x 47
P3i2405D	9...36	30	159	±5.0	±300	79	2 x 470
P3i2412D	9...36	30	159	±12.0	±125	79	2 x 100
P3i2415D	9...36	35	157	±15.0	±100	80	2 x 47
P3i4805D	18...75	15	80	±5.0	±300	79	2 x 470
P3i4812D	18...75	15	80	±12.0	±125	79	2 x 100
P3i4815D	18...75	15	80	±15.0	±100	79	2 x 47

Part number structure						
Output power	Series	Input voltage		Output voltage		Outputs
P3	i	12		3R3		S
3 Watt		12	4.5..18 V	3R3	3.3 V	S
		24	9..36 V	05	5 V	D
		48	18..75 V	12	12 V	
				15	15 V	



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Specifications

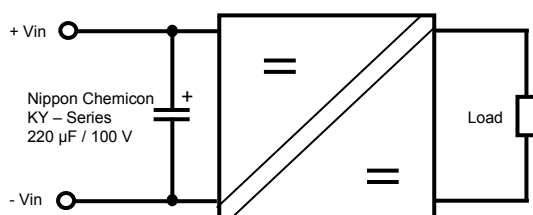
Input	
Filter	Capacitors
Input reflected ripple current	20 mAp-p
On / off controll pin	on: open off: -2...-4 mA control current (via series resistor 1 k Ω , see figure 3)
Standby current consumption	2.5 mA typ.
Isolation:	
I/O isolation voltage	1600 V _{DC} (tested for 3 s)
Resistance	10 ⁹ Ω , min.
Capacitance	200 pF, typ.
Output	
Voltage accuracy	Single outp. $\pm 1\%$ @ load 0..100 % Dual outp. $\pm 1\%$ @ load 10..100 %
Line voltage regulation	$\pm 0.2\%$, max.
Load regulation	$\pm 1\%$, max.
Cross regulation, dual output	$\pm 5\%$ (see note 1)
Short circuit protection	Continuous
Short circuit restart	Automatic
Start up time @ Vin nom & R - load	30 ms, typ
Ripple and noise (at 20 MHz BW)	30 mVp-p, max. (see note 2)
Temperature coefficient	$\pm 0.02\%$ / °C
Transient recovery time	250 μ s, typ., (see note 4)
Transient response deviation	$\pm 3\%$, max.
General	
Switching frequency	100 kHz, min.
Reliability calculated MTBF (Mil-HDBK-217F)	1.7 Mio.h @ 25°C
Safety in accordance with	IEC60950-1

Environmental	
Operating temperatur (ambient)	-40 °C to +85 °C (see derating curve)
Case temperature	100 °C, max.
Storage temperature	-40 °C ... +125 °C
Derating	None required
Humidity	Up to 95%, non condensing
Cooling	Free air convection
Physical	
Dimensions SIP8	21.9 x 11.1 x 9.2 mm
Weight	4.8 g
Case material	Non conductive black plastic, UL94-V0
Potting material	Silicon UL94-V0
EMC Specifications	
Radiated emissions	EN55022 level A
Conducted emissions	EN55022 level A (see note 7)
ESD	EN61000-4-2 pref. criteria A
Radiated immunity	EN61000-4-3 pref. criteria A
Fast transient	EN61000-4-4 pref. criteria A
Surge (see note 8)	EN61000-4-5 pref. criteria A
Conducted surge (see note 8)	EN61000-4-6 pref. criteria A
PFMF	EN61000-4-8 pref. criteria A
Absolute maximum ratings	
Input surge voltage (100 ms)	
Vin 12V types	-0.7...25 Vdc
Vin 24V types	-0.7...50 Vdc
Vin 48V types	-0.7...100 Vdc
Soldering Temperature	
1.5 mm from package 10 s	260 °C

Notes:

- One output is 25 % to 100 % burdened, the other output is 100 % burdened. The output voltage deviation can be $\pm 5\%$.
- Measured with a 1 μ F ceramic capacitor. (see Figure 1)
- Test by minimal Vin and constant resistive load.
- Test by nominal Vin and 100 % to 25 % load at 25 % load step change.
- Measured input reflected ripple current with a simulated source inductance of 12 μ H and source capacitance of 47 μ F, ESR < 1 Ω at 100 kHz. (see Figure 2)
- Exceeding the absolute ratings of the converter could cause damage. It is not allowed for continuous operatin ratings.
- Input filter components are be required to help meet conducted emission class A, which application refer to the EMI filter of design and feature configuration.
- An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. Suggested is a value of 220 μ F / 100 V of Nippon Chemicon's KY-Series.
- All specifications are typical at 25 °C, nominal input voltage and full load unless otherwise noted.

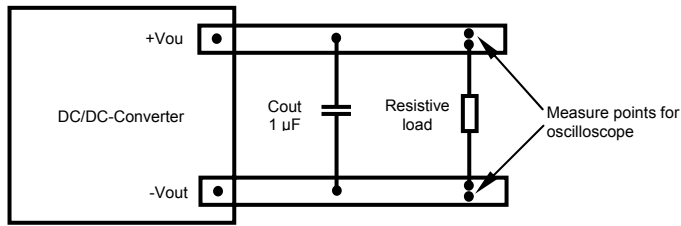
Application circuit IEC61000-4-4 and IEC61000-4-5, see note 8



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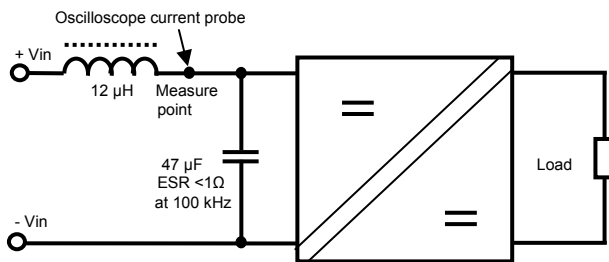
Output ripple & noise measurement test method (Figure 1)

Use the following measurement circuit. The oscilloscope measurement bandwidth must be > 20 MHz.

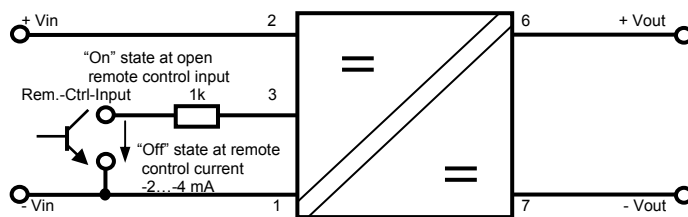


Input reflected ripple current measure circuit (Figure 2)

Input reflected current is measured through a source inductor and a source capacitor at nominal input voltage and full load.

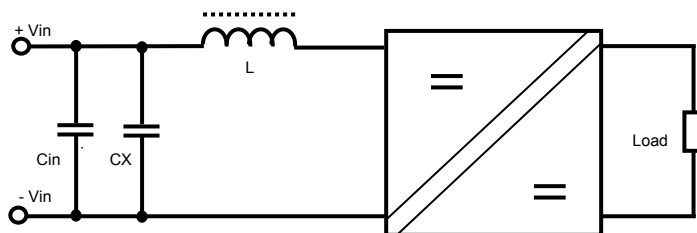


Remote control function



EMI Filter

The filter components are used to help meet conducted emissions requirement for the module. These components should be closed mounted as possible to the module. All leads should be minimized to decrease radiated noise.



Type	Cin	CX	L
P3i12xxxx	220 µF	10 µF Ceramic	2.5 µH
P3i24xxxx	220 µF	2.2 µF Ceramic	10 µH
P3i48xxxx	220 µF	2.2 µF Ceramic	18 µH

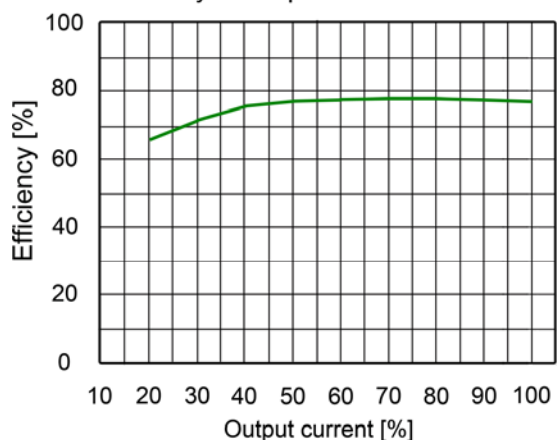


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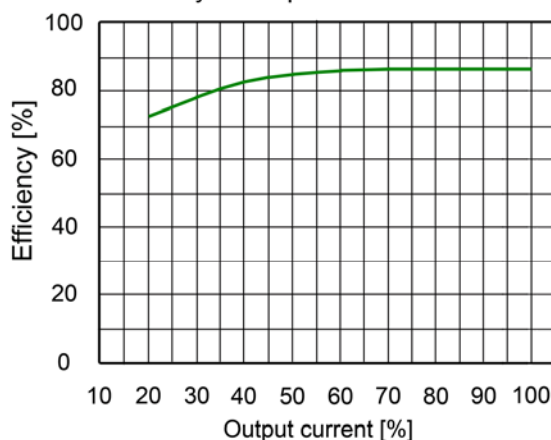
P3i123R3S

Efficiency vs output load at Vin 4.5 V_{DC}



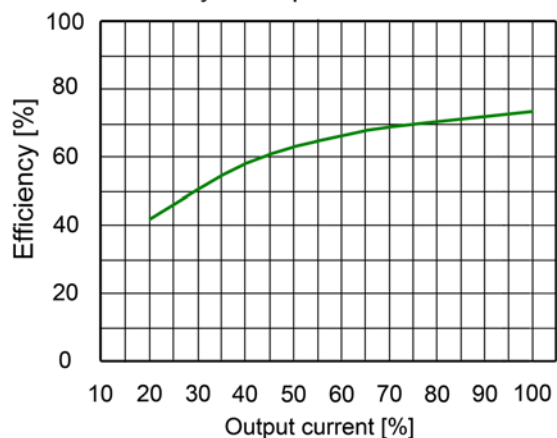
P3i4815S

Efficiency vs output load at Vin 18 V_{DC}



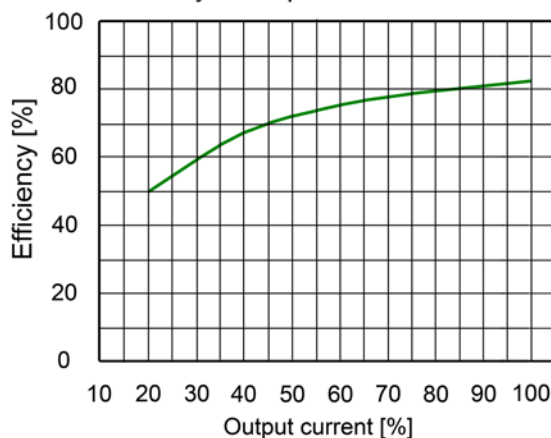
P3i123R3S

Efficiency vs output load at Vin 12 V_{DC}



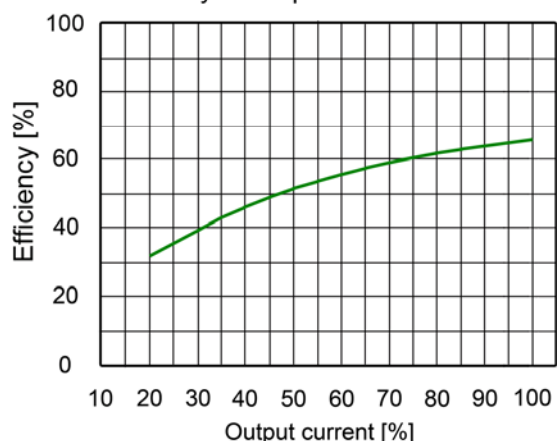
P3i4815S

Efficiency vs output load at Vin 48 V_{DC}



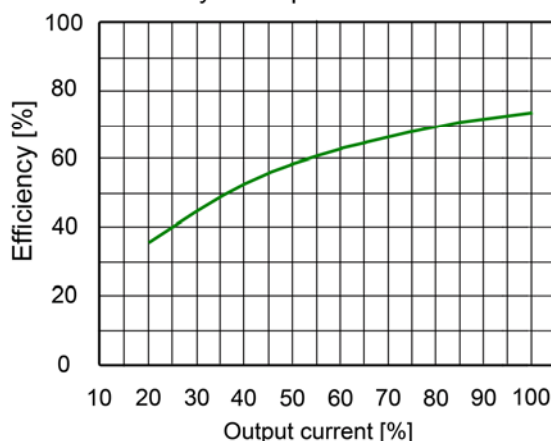
P3i123R3S

Efficiency vs output load at Vin 18 V_{DC}

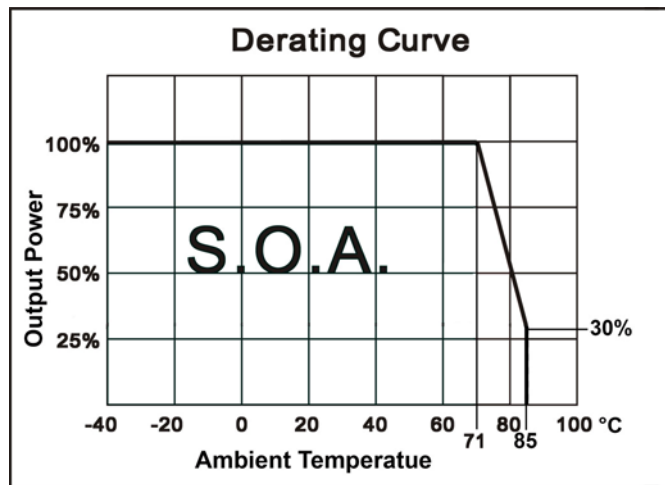


P3i4815S

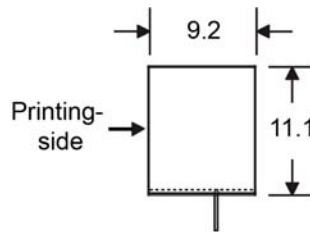
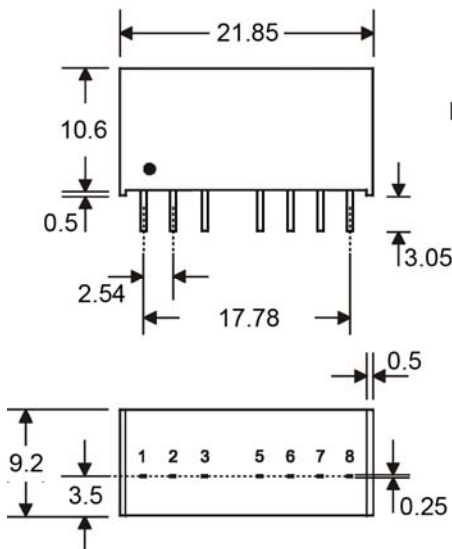
Efficiency vs output load at Vin 72 V_{DC}



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Dimensions



- Notes :**
 All dimensions are typical in millimeters.
 1. Pin diameter: 0.5
 2. Pin pitch tolerance: ± 0.35
 3. Case Tolerance: ± 0.5

Pin connections

Pin	Single	Dual
1	-V Input	-V Input
2	+V Input	+V Input
3	Rem. Ctrl. on/off	Rem. Ctrl. on/off
5	N.C.	N.C.
6	+V Output	+V Output
7	-V Output	Common
8	N.C.	-V Output

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