



PHI-CON

2 W DC-DC Converter P2C-Series

- Regulated
- DIL 24 pin package
- Low ripple and noise
- Up to 6000 V_{DC} isolation
- MTBF ≥ 1 Mio. h
- Continuous short circuit protection
- -40...85 °C Operation temperature range
- Metal case optional



Model guide

Type	Input voltage		Input current		Output voltage [V _{DC}]	Output current [mA] max.	Efficiency typ. [%]	Capacitive load [μF] max.
	Nominal [V _{DC}]	Range [V _{DC}]	no load [mA]	full load [mA] max.				
Single output								
P2C053R3S2	5	4.5...5.5	75	622	3.3	500	53	330
P2C0505S2	5	4.5...5.5	75	615	5.0	400	65	330
P2C0509S2	5	4.5...5.5	75	597	9.0	222	67	330
P2C0512S2	5	4.5...5.5	75	571	12.0	166	70	330
P2C0515S2	5	4.5...5.5	75	588	15.0	133	68	330
P2C0518S2	5	4.5...5.5	75	600	18.0	111	66	330
P2C0524S2	5	4.5...5.5	75	615	24.0	83.5	65	330
P2C123R3S2	12	10.8...13.2	12	245	3.3	500	56	330
P2C1205S2	12	10.8...13.2	12	260	5.0	400	64	330
P2C1209S2	12	10.8...13.2	12	245	9.0	222	68	330
P2C1212S2	12	10.8...13.2	12	238	12.0	166	70	330
P2C1215S2	12	10.8...13.2	12	252	15.0	133	66	330
P2C1218S2	12	10.8...13.2	12	254	18.0	111	66	330
P2C1224S2	12	10.8...13.2	12	256	24.0	83.5	65	330
P2C243R3S2	24	21.6...26.4	25	120	3.3	500	57	330
P2C2405S2	24	21.6...26.4	25	132	5.0	400	63	330
P2C2409S2	24	21.6...26.4	25	132	9.0	222	63	330
P2C2412S2	24	21.6...26.4	25	122	12.0	166	68	330
P2C2415S2	24	21.6...26.4	25	122	15.0	133	68	330
P2C2418S2	24	21.6...26.4	25	122	18.0	111	68	330
P2C2424S2	24	21.6...26.4	25	122	24.0	83.5	68	330
Dual output								
P2C053R3D2	5	4.5...5.5	30	638	±3.3	±300	62	2 x 1000
P2C0505D2	5	4.5...5.5	30	588	±5.0	±200	68	2 x 1000
P2C0509D2	5	4.5...5.5	40	571	±9.0	±111	70	2 x 470
P2C0512D2	5	4.5...5.5	40	571	±12.0	±83	70	2 x 470
P2C0515D2	5	4.5...5.5	40	571	±15.0	±67	70	2 x 470
P2C0518D2	5	4.5...5.5	40	575	±18.0	±56	69	2 x 330
P2C0524D2	5	4.5...5.5	50	579	±24.0	±42	69	2 x 220
P2C123R3D2	12	10.8...13.2	20	250	±3.3	±300	66	2 x 1000
P2C1205D2	12	10.8...13.2	20	228	±5.0	±200	73	2 x 1000
P2C1209D2	12	10.8...13.2	20	222	±9.0	±111	75	2 x 470
P2C1212D2	12	10.8...13.2	20	213	±12.0	±83	78	2 x 470
P2C1215D2	12	10.8...13.2	35	216	±15.0	±67	77	2 x 470
P2C1218D2	12	10.8...13.2	35	217	±18.0	±56	77	2 x 330
P2C1224D2	12	10.8...13.2	35	219	±24.0	±42	76	2 x 220
P2C243R3D2	24	21.6...26.4	15	121	±3.3	±300	68	2 x 1000
P2C2405D2	24	21.6...26.4	15	114	±5.0	±200	73	2 x 1000
P2C2409D2	24	21.6...26.4	15	111	±9.0	±111	75	2 x 470
P2C2412D2	24	21.6...26.4	15	104	±12.0	±83	80	2 x 470
P2C2415D2	24	21.6...26.4	20	108	±15.0	±67	77	2 x 470
P2C2418D2	24	21.6...26.4	20	109	±18.0	±56	77	2 x 330
P2C2424D2	24	21.6...26.4	20	111	±24.0	±42	75	2 x 220

Ordering information

Output power	Series	Input voltage		Output voltage		Outputs		Primary / secondary isolation		Package material	
P2	C	05		05		S2		H		M	
2 Watt		05	5 V	3R3	3.3 V	S2	single	blanc	1 kV _{DC}	blanc	Plastic
		12	12 V	05	5 V	D2	dual	H	3 kV _{DC}	M	Metal
		24	24 V	09	9 V			H6	6 kV _{DC}	Metal package only available for 1 kV _{DC} & 3 kV _{DC} I/O-isolation voltage	
				12	12 V						
				15	15 V						
				18	18 V						
				24	24 V						



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Specifications

Input	
Voltage range	$\leq \pm 10\%$
Absolute maximum input surge voltage	P2C05xxxx: $\leq 7\text{ VDC}, \leq 100\text{ ms}$ P2C12xxxx: $\leq 15\text{ VDC}, \leq 100\text{ ms}$ P2C24xxxx: $\leq 28\text{ VDC}, \leq 100\text{ ms}$
Filter	Pi Network
Reflected input ripple current	$\leq 35\text{ mA}_{p-p}$
Isolation:	
Rated voltage	Standard: $\geq 1000\text{ V}_{DC}$ Suffix H: $\geq 3000\text{ V}_{DC}$ Suffix H6: $\geq 6000\text{ V}_{DC}$
Resistance	$\geq 10^9\ \Omega$
Capacitance	60 pF, typ.
Output	
Voltage tolerance	$\leq \pm 2\%$
Ripple and noise (BW 20 MHz)	$\leq 75\text{ mV}_{p-p}$
Short circuit protection	Continuous Automatic restart
Line voltage regulation	$\leq \pm 0.5\%$
Load voltage regulation	$\leq \pm 1\%$ at 0...100% load range
Transient recovery time at 25% load change steps	$\leq 10\text{ ms}$, typ.
Transient response deviation at 25% load change steps	P2Cxx3R3x2: $\leq \pm 5\%$ All others: $\leq \pm 3\%$
Temperature coefficient	$\pm 0.02\% / ^\circ\text{C}$
General	
Switching frequency	single output 40 kHz, typ. dual output 250 kHz, typ.

Reliability MTBF MIL-HDBK-217F at 25 °C	$\geq 1\text{ Mio. h}$
Safety Standard designed to meet	EN-, IEC-, UL 60950-1 EN-, IEC-, UL 62368-1
RE	EN 55032 Class A
CE	EN 55032 Class A (see Figure 3)
ESD	EN 61000-4-2 Perf. criteria A
RS	EN 61000-4-3 Perf. criteria A
EFT	EN 61000-4-4 Perf. criteria A (see Figure 3)
Surge	EN 61000-4-5 Perf. criteria A (see Figure 3)
CS	EN 61000-4-6 Perf. criteria A
PFMF	EN 61000-4-8 Perf. criteria A
Environmental	
Operating ambient temperature	-40 ... 85 °C
Case temperature	$\leq 100\text{ }^\circ\text{C}$
Storage temperature	-40 ... 125 °C
Derating	None required
Humidity	$\leq 95\%$, non-condensing
Cooling	Free-air convection, 30...65 LFM
Physical	
Dimensions	31.75 x 20.32 x 10.16 mm
Weight	12.5 g plastic case 17 g metal Suffix "M"
Case material	Standard, non-conductive black plastic
Potting material	Epoxy (UL94V-0 rated)
Pin soldering temperature	$\leq 260\text{ }^\circ\text{C}$ duration $\leq 10\text{ s}$ $\geq 1.5\text{ mm}$ distance from body

Note

- All parameter are typical specified at Ta 25 °C, nominal input voltage and full load unless otherwise specified.
- Maximal capacitive output load is specified at minimal input voltage and constant resistive load.
- Not usable for high voltage IGBT- and MOSFET-driver applications.

Figure 1 Measure circuit for input ripple current

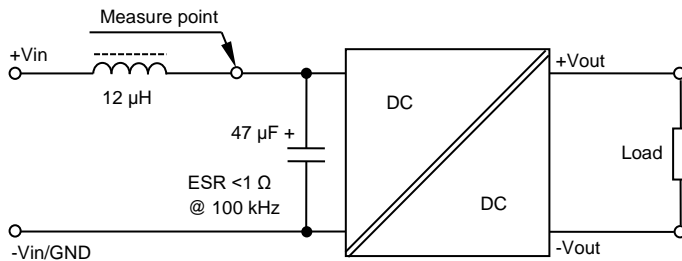


Figure 2 Measure circuit for output ripple & noise (BW 20 MHz)

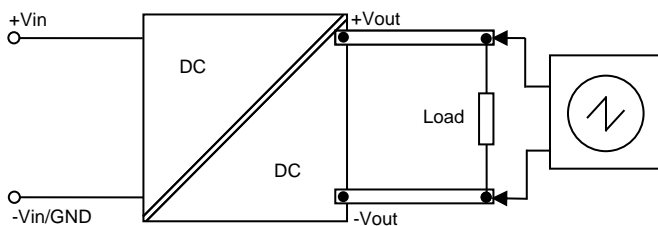
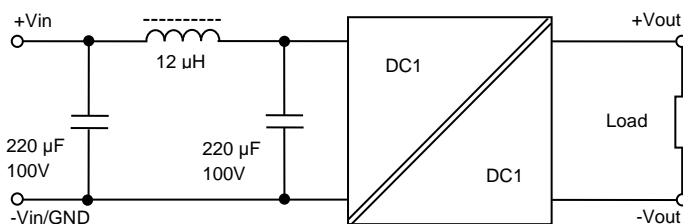


Figure 3 Recommended application circuit for EMC filter

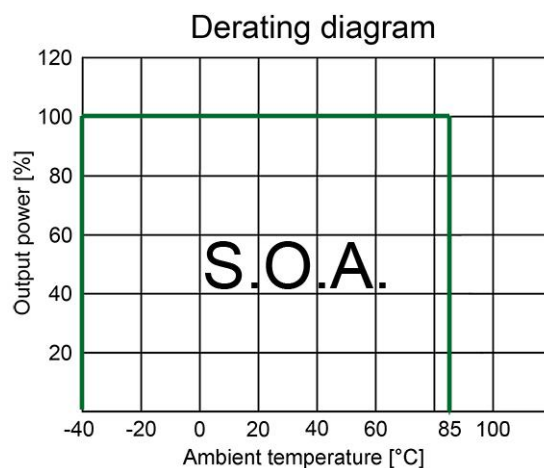
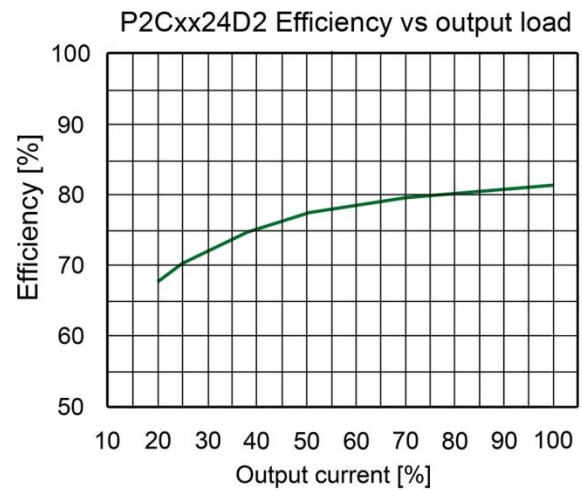
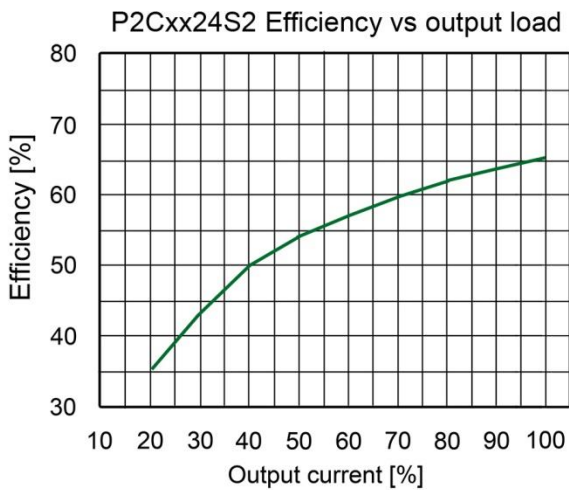
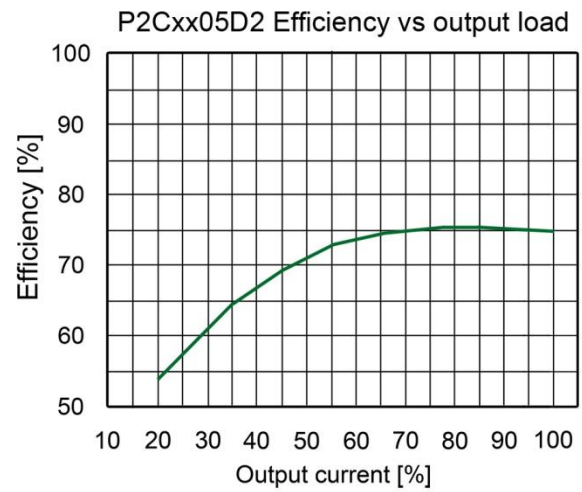
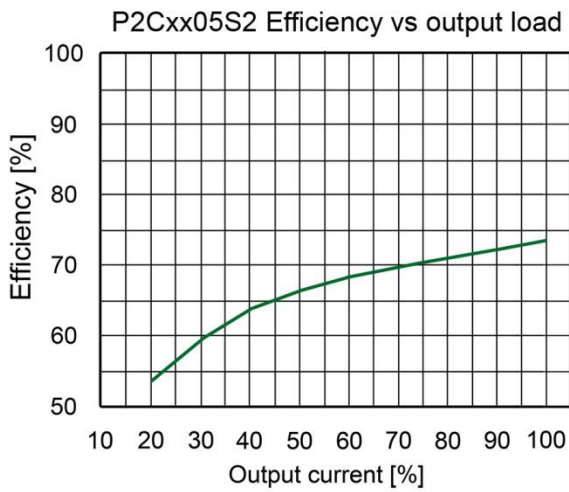
The EMI input filter is used to help meet conducted emissions requirement EN 55032 class A for the module and the standards EFT EN 61000-4-4 and Surge EN 61000-4-5 performance criteria A. These components should be mounted as close as possible to the module.





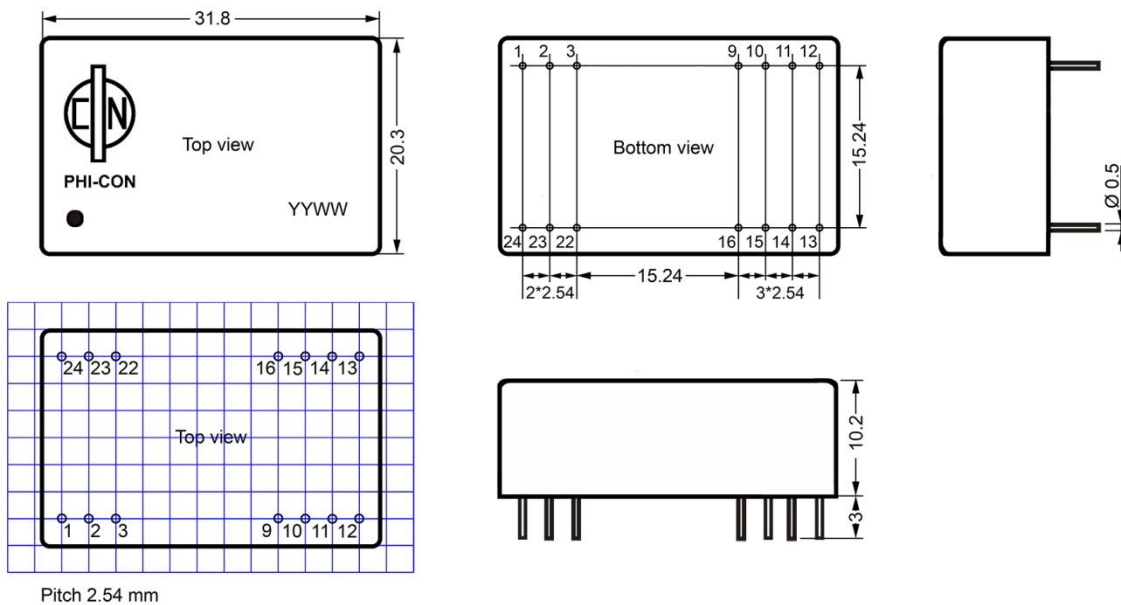
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Mechanical dimensions plastic package

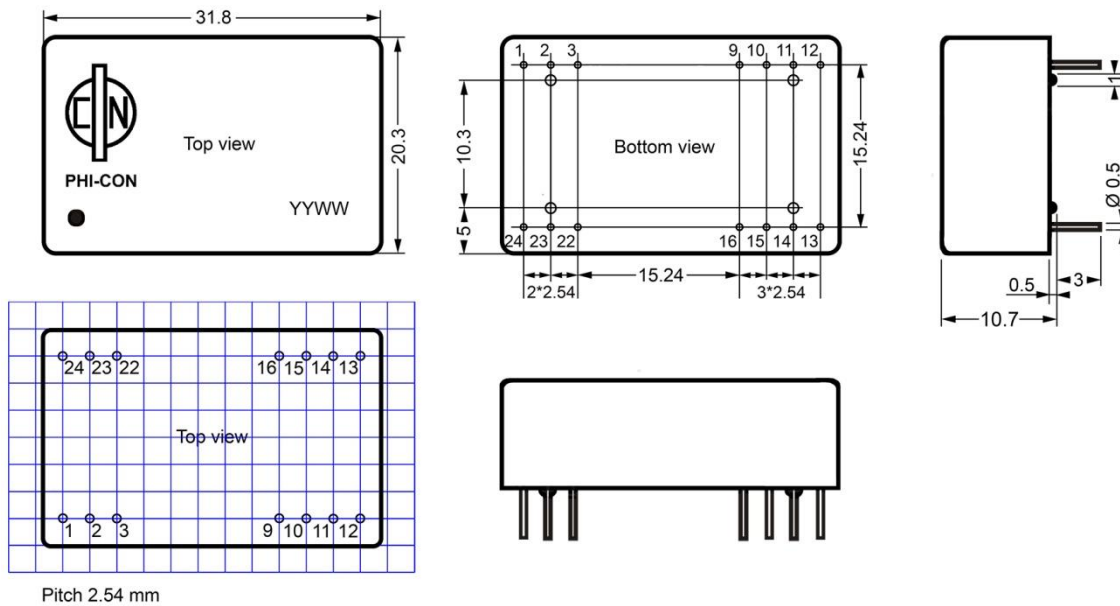


Note:
 All dimensions in mm
 Package tolerance ± 0.5 mm
 Pin length tolerance ± 0.35 mm
 Pin diameter tolerance ± 0.05 mm
 Pin pitch tolerance ± 0.35 mm

Pin assignment				
Pin	P2Cxxxxx2		P2Cxxxxx2H & P2Cxxxxx2H6	
	Single	Dual	Single	Dual
1	+V Input	+V Input	+V Input	+V Input
2	Not connected	-V Output	+V Input	+V Input
3	Not connected	Common	No Pin	No Pin
10	-V Output	Common	No Pin	Common
11	+V Output	+V Output	No Pin	Common
12	-V Input	-V Input	-V Output	No Pin
13	-V Input	-V Input	+V Output	-V Output
14	+V Output	+V Output	No Pin	No Pin
15	-V Output	Common	No Pin	+V Output
22	Not connected	Common	No Pin	No Pin
23	Not connected	-V Output	-V Input	-V Input
24	+V Input	+V Input	-V Input	-V Input

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Mechanical dimensions metal package



Note:

All dimensions in mm
 Package tolerance ± 0.5 mm
 Pin length tolerance ± 0.35 mm
 Pin diameter tolerance ± 0.05 mm
 Pin pitch tolerance ± 0.35 mm

Pin assignment				
Pin	P2Cxxxx2M		P2Cxxxx2HM	
	Single	Dual	Single	Dual
1	+V Input	+V Input	+V Input	+V Input
2	Not connected	-V Output	+V Input	+V Input
3	Not connected	Common	No Pin	No Pin
10	-V Output	Common	No Pin	Common
11	+V Output	+V Output	No Pin	Common
12	-V Input	-V Input	-V Output	No Pin
13	-V Input	-V Input	+V Output	-V Output
14	+V Output	+V Output	No Pin	No Pin
15	-V Output	Common	No Pin	+V Output
22	Not connected	Common	No Pin	No Pin
23	Not connected	-V Output	-V Input	-V Input
24	+V Input	+V Input	-V Input	-V Input

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