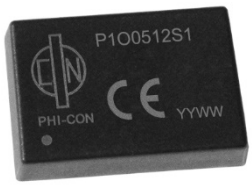
1 W DC-DC Converter P1O-Series

PHI-CON

- 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	Output current	Efficiency typ.	Capacitive load
	Nominal [V_{DC}]	Range [V_{DC}]	no load [mA]	full load [mA] max.	[V_{DC}]	[mA] max.	[%]	[µF] max.
Single output								
P1O053R3S1	5	4.5...5.5	50	426	3.3	400	62	220
P1O0505S1	5	4.5...5.5	42	448	5.0	300	67	220
P1O057R2S1	5	4.5...5.5	50	462	7.2	208	65	220
P1O0509S1	5	4.5...5.5	64	462	9.0	167	65	220
P1O0512S1	5	4.5...5.5	50	429	12.0	125	70	220
P1O0515S1	5	4.5...5.5	65	441	15.0	100	68	220
P1O0518S1	5	4.5...5.5	60	448	18.0	83	64	220
P1O0524S1	5	4.5...5.5	60	448	24.0	63	63	220
P1O123R3S1	12	10.8...13.2	50	177	3.3	400	62	220
P1O1205S1	12	10.8...13.2	25	187	5.0	300	67	220
P1O127R2S1	12	10.8...13.2	50	189	7.2	208	66	220
P1O1209S1	12	10.8...13.2	40	192	9.0	167	65	220
P1O1212S1	12	10.8...13.2	26	179	12.0	125	70	220
P1O1215S1	12	10.8...13.2	40	195	15.0	100	64	220
P1O1218S1	12	10.8...13.2	45	198	18.0	83	63	220
P1O1224S1	12	10.8...13.2	40	202	24.0	63	62	220
P1O243R3S1	24	21.6...26.4	45	104	3.3	400	53	220
P1O2405S1	24	21.6...26.4	20	98	5.0	300	64	220
P1O247R2S1	24	21.6...26.4	35	98	7.2	208	64	220
P1O2409S1	24	21.6...26.4	35	98	9.0	167	64	220
P1O2412S1	24	21.6...26.4	16	93	12.0	125	67	220
P1O2415S1	24	21.6...26.4	40	95	15.0	100	66	220
P1O2418S1	24	21.6...26.4	40	96	18.0	83	65	220
P1O2424S1	24	21.6...26.4	40	96	24.0	63	65	220
Dual output								
P1O053R3D1	5	4.5...5.5	15	377	±3.3	±200	70	2 x 1000
P1O0505D1	5	4.5...5.5	40	417	±5.0	±150	72	2 x 470
P1O057R2D1	5	4.5...5.5	35	429	±7.2	±104	70	2 x 470
P1O0509D1	5	4.5...5.5	20	429	±9.0	±83	70	2 x 470
P1O0512D1	5	4.5...5.5	25	423	±12.0	±63	71	2 x 470
P1O0515D1	5	4.5...5.5	30	423	±15.0	±50	71	2 x 470
P1O0518D1	5	4.5...5.5	30	429	±18.0	±41.5	70	2 x 220
P1O0524D1	5	4.5...5.5	35	435	±24.0	±31.5	69	2 x 220
P1O123R3D1	12	10.8...13.2	15	147	±3.3	±200	75	2 x 1000
P1O1205D1	12	10.8...13.2	6	162	±5.0	±150	77	2 x 470
P1O127R2D1	12	10.8...13.2	8	167	±7.2	±104	75	2 x 470
P1O1209D1	12	10.8...13.2	10	158	±9.0	±83	79	2 x 470
P1O1212D1	12	10.8...13.2	24	164	±12.0	±63	76	2 x 470
P1O1215D1	12	10.8...13.2	20	169	±15.0	±50	74	2 x 470
P1O1218D1	12	10.8...13.2	20	169	±18.0	±41.5	74	2 x 220
P1O1224D1	12	10.8...13.2	20	164	±24.0	±31.5	76	2 x 220
P1O243R3D1	24	21.6...26.4	8	76	±3.3	±200	72	2 x 1000
P1O2405D1	24	21.6...26.4	5	83	±5.0	±150	75	2 x 470
P1O247R2D1	24	21.6...26.4	8	83	±7.2	±104	75	2 x 470
P1O2409D1	24	21.6...26.4	10	82	±9.0	±83	76	2 x 470
P1O2412D1	24	21.6...26.4	10	81	±12.0	±63	77	2 x 470
P1O2415D1	24	21.6...26.4	10	82	±15.0	±50	76	2 x 470
P1O2418D1	24	21.6...26.4	13	89	±18.0	±41.5	70	2 x 220
P1O2424D1	24	21.6...26.4	16	87	±24.0	±31.5	72	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	D1	dual	H	3 kV_{DC}	M	Metal
		24	24 V	09	9 V			H6	6 kV_{DC}	Metal package only avaliable 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	≤ ± 10 %
Absolute maximum input surge voltage	P1O05xxxx: ≤ 7 VDC, ≤ 100 ms
	P1O12xxxx: ≤ 15 VDC, ≤ 100 ms
	P1O24xxxx: ≤ 28 VDC, ≤ 100 ms
Filter	Pi Network
Reflected input ripple current	≤ 35 mAp-p
Isolation:	
Rated voltage	Standard: ≥ 1000 V_{DC} Suffix H: ≥ 3000 V_{DC} Suffix H6: ≥ 6000 V_{DC}
Resistance	≥ 10^9 Ω
Capacitance	60 pF, typ.
Output	
Voltage tolerance	≤ ± 2 %
Ripple and noise (BW 20 MHz)	≤ 75 mVp-p
Short circuit protection	Continuous Automatic restart
Line voltage regulation	≤ ± 0.5 %
Load voltage regulation	≤ ± 1 at 0…100 % load range %
Tansient recovery time at 25 % load change steps	≤ 10 ms, typ.
Tansient response deviation at 25 % load change steps	P1Oxx3R3x1: ≤ ± 5 % All others: ≤ ± 3 %
Temperature coefficient	± 0.02 % / °C
General	
Switching frequency	single output 40 kHz, typ. dual output 350 kHz, typ.

Reliability MTBF MIL-HDBK-217F at 25 °C		≥ 1 Mio. H
Safety Standard		IEC 60950-1
RE	EN 55032	Class A
RE	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 temperatur		-40 … 85 °C
Case temperature		≤ 100 °C
Storage temperature		-40 … 125 °C
Derating		None required
Humidity		≤ 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		≤ 260 °C duration ≤ 10 s ≥ 1.5 mm distance from body

Note

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

Figure 1 Measure circuit for input ripple current

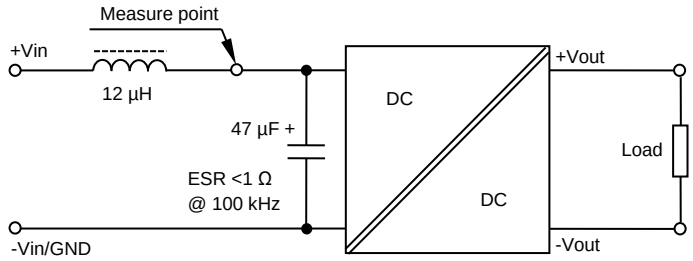


Figure 2 Measure circuit for output ripple & noise (BW 20 MHz)

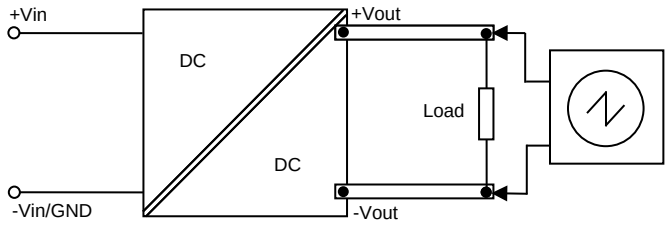
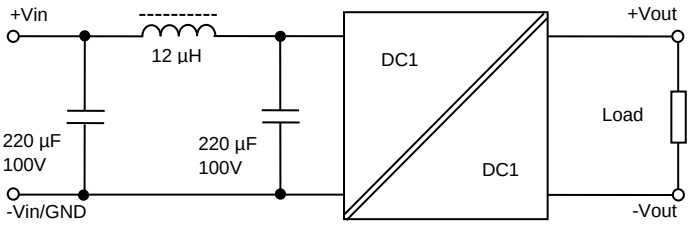


Figure 3 Recommended application circuit for EMC filter

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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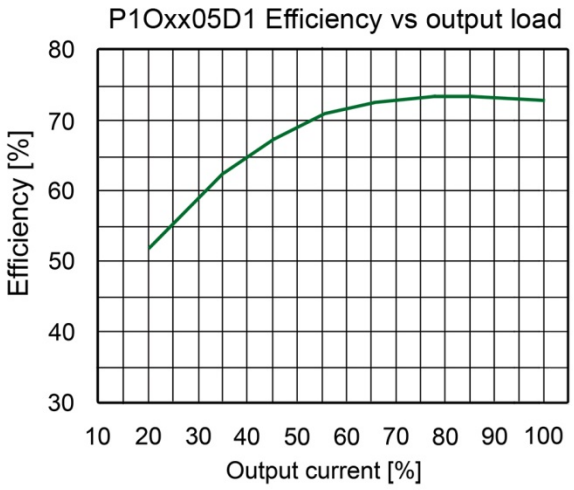

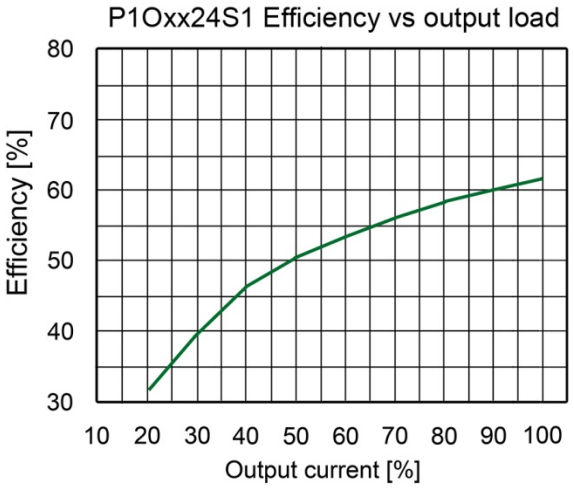

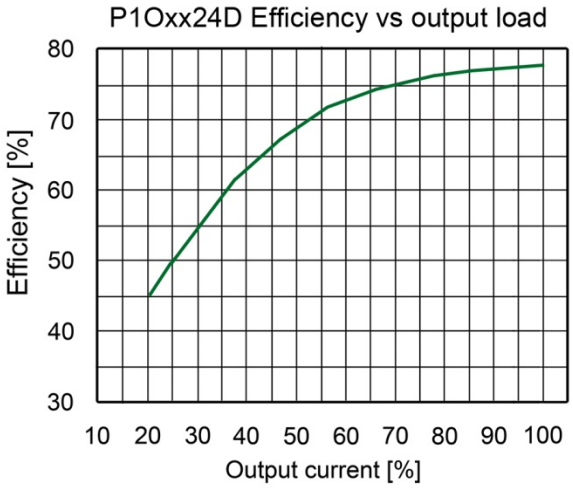

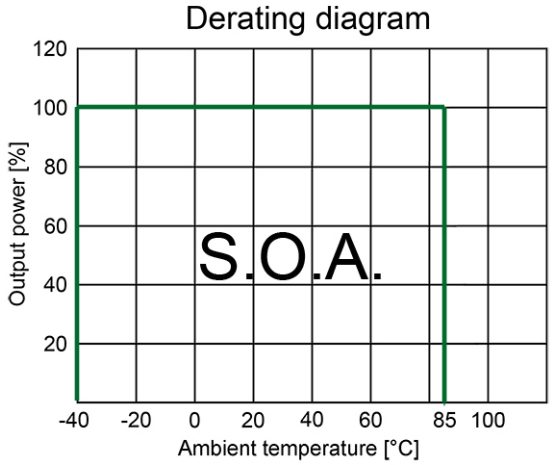

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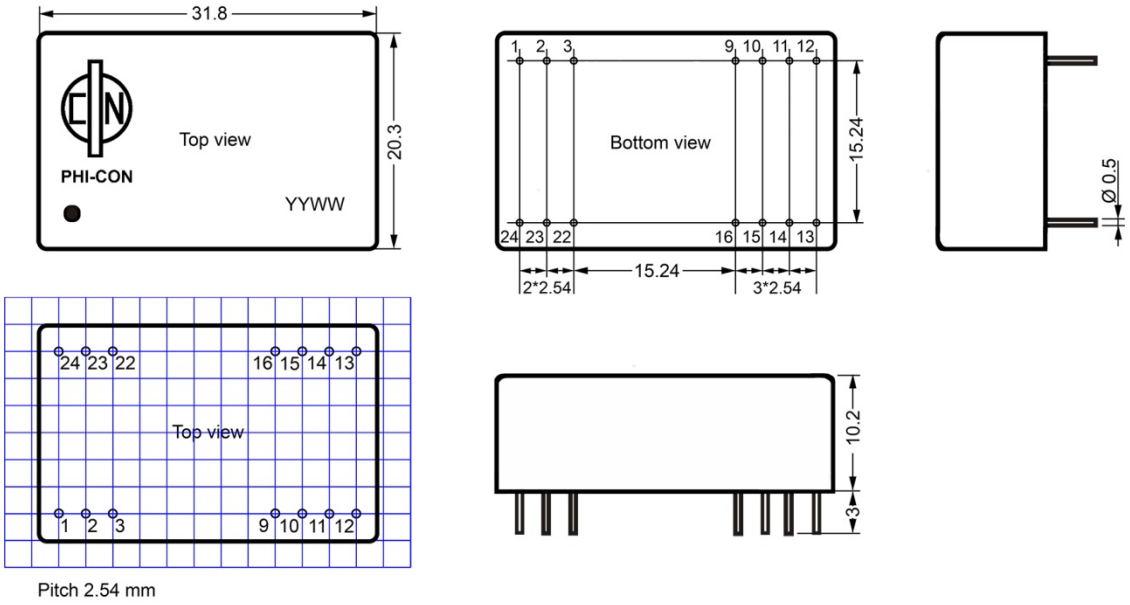
Mechanical dimensions plastic package



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				
	P1Oxxxxx1		P1Oxxxxx1H & P1Oxxxxx1H6	
Pin	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	+VOutput	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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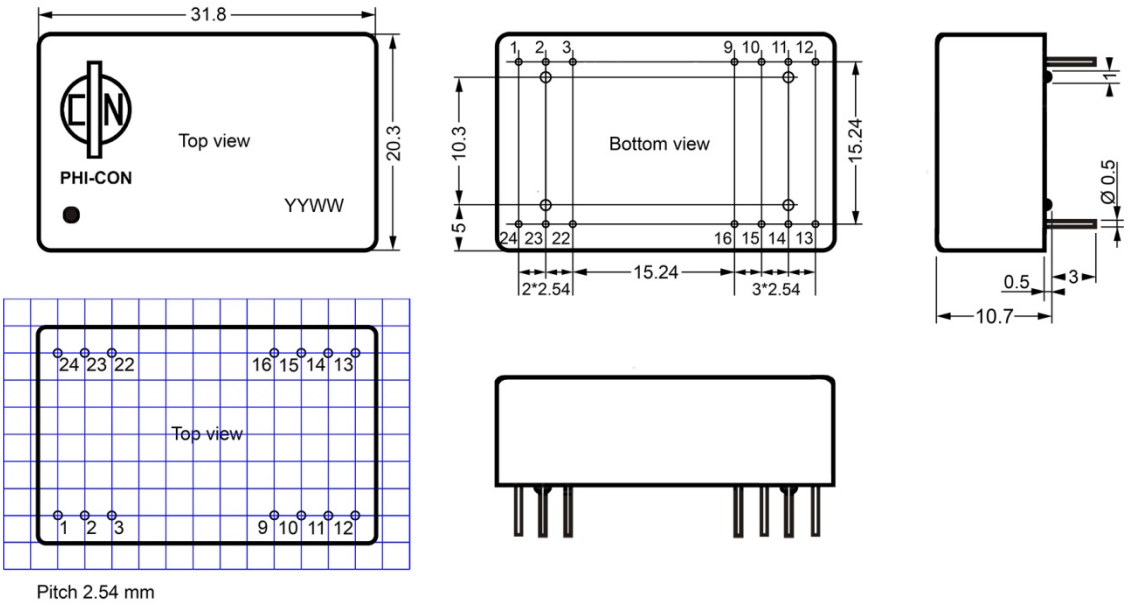
Mechanical dimensions metal package



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				
	P1Oxxxxx1M		P1Oxxxxx1HM	
Pin	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	+VOutput	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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