1 W DC-DC Converter P1Y-Series

PHI-CON

- 14 Pin DIL
- Low ripple and noise
- Up to 1000 V_{DC} isolation
- Optional 3 kV_{DC} & 6 kV_{DC} isolation
- -40...85 °C Operating temperature range
- Output voltage not regulated

CE

Model guide, single output

Type	Input voltage		Input current		Output voltage [V_{DC}]	Output current [mA] max.	Efficiency typ. [%]	Capacitive load (note 2) [µF] max.
	nominal [V_{DC}]	range [V_{DC}]	no load [mA]	full load [mA]				
P1Y3R33R3DS	3.3	2.97..3.63	30	400	3.3	303	76	220
P1Y3R305DS	3.3	2.97..3.63	30	390	5.0	200	78	220
P1Y3R37R2DS	3.3	2.97..3.63	30	380	7.2	140	79	220
P1Y3R309DS	3.3	2.97..3.63	30	380	9.0	111	80	220
P1Y3R312DS	3.3	2.97..3.63	30	390	12.0	84	79	220
P1Y3R315DS	3.3	2.97..3.63	30	390	15.0	67	78	220
P1Y3R318DS	3.3	2.97..3.63	30	415	18.0	56	73	220
P1Y3R324DS	3.3	2.97..3.63	30	415	24.0	42	73	220
P1Y053R3DS	5.0	4.5..5.5	18	255	3.3	303	78	220
P1Y0505DS	5.0	4.5..5.5	18	245	5.0	200	81	220
P1Y057R2DS	5.0	4.5..5.5	18	245	7.2	140	81	220
P1Y0509DS	5.0	4.5..5.5	18	245	9.0	111	82	220
P1Y0512DS	5.0	4.5..5.5	18	250	12.0	84	79	220
P1Y0515DS	5.0	4.5..5.5	18	250	15.0	67	80	220
P1Y0518DS	5.0	4.5..5.5	18	240	18.0	56	83	220
P1Y0524DS	5.0	4.5..5.5	18	245	24.0	42	82	220
P1Y123R3DS	12.0	10.8..13.2	20	110	3.3	303	75	220
P1Y1205DS	12.0	10.8..13.2	20	105	5.0	200	79	220
P1Y127R2DS	12.0	10.8..13.2	20	110	7.2	140	75	220
P1Y1209DS	12.0	10.8..13.2	20	105	9.0	111	80	220
P1Y1212DS	12.0	10.8..13.2	20	105	12.0	84	79	220
P1Y1215DS	12.0	10.8..13.2	20	100	15.0	67	82	220
P1Y1218DS	12.0	10.8..13.2	20	100	18.0	56	81	220
P1Y1224DS	12.0	10.8..13.2	20	110	24.0	42	76	220
P1Y153R3DS	15.0	13.5..16.5	10	83	3.3	303	80	220
P1Y1505DS	15.0	13.5..16.5	10	82	5.0	200	81	220
P1Y157R2DS	15.0	13.5..16.5	10	85	7.2	140	78	220
P1Y1509DS	15.0	13.5..16.5	10	85	9.0	111	78	220
P1Y1512DS	15.0	13.5..16.5	10	83	12.0	84	80	220
P1Y1515DS	15.0	13.5..16.5	10	84	15.0	67	79	220
P1Y1518DS	15.0	13.5..16.5	10	83	18.0	56	80	220
P1Y1524DS	15.0	13.5..16.5	10	80	24.0	42	83	220
P1Y243R3DS	24.0	21.6..26.4	7	56	3.3	303	74	220
P1Y2405DS	24.0	21.6..26.4	7	54	5.0	200	77	220
P1Y247R2DS	24.0	21.6..26.4	7	57	7.2	140	73	220
P1Y2409DS	24.0	21.6..26.4	7	55	9.0	111	76	220
P1Y2412DS	24.0	21.6..26.4	7	53	12.0	84	78	220
P1Y2415DS	24.0	21.6..26.4	7	52	15.0	67	80	220
P1Y2418DS	24.0	21.6..26.4	7	51	18.0	56	82	220
P1Y2424DS	24.0	21.6..26.4	7	52	24.0	42	80	220

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1 W DC-DC Converter P1Y-Series

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Model guide, dual output

Type	Input voltage		Input current		Output voltage [V_{DC}]	Output current [mA] max.	Efficiency typ. [%]	Capacitive load (note 2) [µF] max.
	nominal [V_{DC}]	range [V_{DC}]	no load [mA]	full load [mA]				
P1Y3R33R3D	3.3	2.97..3.63	30	460	±3.3	±152	66	2 x 100
P1Y3R305D	3.3	2.97..3.63	30	430	±5.0	±100	70	2 x 100
P1Y3R37R2D	3.3	2.97..3.63	30	420	±7.2	±70	72	2 x 100
P1Y3R309D	3.3	2.97..3.63	26	400	±9.0	±56	75	2 x 100
P1Y3R312D	3.3	2.97..3.63	30	395	±12.0	±42	77	2 x 100
P1Y3R315D	3.3	2.97..3.63	25	390	±15.0	±34	78	2 x 100
P1Y3R318D	3.3	2.97..3.63	25	400	±18.0	±28	75	2 x 100
P1Y3R324D	3.3	2.97..3.63	25	400	±24.0	±21	75	2 x 100
P1Y053R3D	5.0	4.5..5.5	20	300	±3.3	±152	67	2 x 100
P1Y0505D	5.0	4.5..5.5	20	270	±5.0	±100	74	2 x 100
P1Y057R2D	5.0	4.5..5.5	15	255	±7.2	±70	79	2 x 100
P1Y0509D	5.0	4.5..5.5	15	245	±9.0	±56	81	2 x 100
P1Y0512D	5.0	4.5..5.5	15	250	±12.0	±42	80	2 x 100
P1Y0515D	5.0	4.5..5.5	20	245	±15.0	±34	82	2 x 100
P1Y0518D	5.0	4.5..5.5	20	245	±18.0	±28	81	2 x 100
P1Y0524D	5.0	4.5..5.5	22	245	±24.0	±21	81	2 x 100
P1Y123R3D	12.0	10.8..13.2	13	123	±3.3	±152	68	2 x 100
P1Y1205D	12.0	10.8..13.2	10	123	±5.0	±100	74	2 x 100
P1Y127R2D	12.0	10.8..13.2	10	110	±7.2	±70	76	2 x 100
P1Y1209D	12.0	10.8..13.2	13	110	±9.0	±56	78	2 x 100
P1Y1212D	12.0	10.8..13.2	10	100	±12.0	±42	82	2 x 100
P1Y1215D	12.0	10.8..13.2	10	100	±15.0	±34	82	2 x 100
P1Y1218D	12.0	10.8..13.2	15	100	±18.0	±28	82	2 x 100
P1Y1224D	12.0	10.8..13.2	20	110	±24.0	±21	75	2 x 100
P1Y153R3D	15.0	13.5..16.5	20	90	±3.3	±152	75	2 x 100
P1Y1505D	15.0	13.5..16.5	20	90	±5.0	±100	75	2 x 100
P1Y157R2D	15.0	13.5..16.5	18	90	±7.2	±70	75	2 x 100
P1Y1509D	15.0	13.5..16.5	18	85	±9.0	±56	77	2 x 100
P1Y1512D	15.0	13.5..16.5	20	85	±12.0	±42	77	2 x 100
P1Y1515D	15.0	13.5..16.5	20	85	±15.0	±34	77	2 x 100
P1Y1518D	15.0	13.5..16.5	15	90	±18.0	±28	75	2 x 100
P1Y1524D	15.0	13.5..16.5	15	89	±24.0	±21	75	2 x 100
P1Y243R3D	24.0	21.6..26.4	7	62	±3.3	±152	67	2 x 100
P1Y2405D	24.0	21.6..26.4	7	56	±5.0	±100	74	2 x 100
P1Y247R2D	24.0	21.6..26.4	7	55	±7.2	±70	78	2 x 100
P1Y2409D	24.0	21.6..26.4	7	55	±9.0	±56	78	2 x 100
P1Y2412D	24.0	21.6..26.4	7	53	±12.0	±42	80	2 x 100
P1Y2415D	24.0	21.6..26.4	7	53	±15.0	±34	80	2 x 100
P1Y2418D	24.0	21.6..26.4	7	51	±18.0	±28	81	2 x 100
P1Y2424D	24.0	21.6..26.4	7	51	±24.0	±21	82	2 x 100

Ordering information									
Output power	Series	Input voltage		Output voltage		Outputs		Primary / secondary isolation	
P1	Y	05		05		D		H	
1 Watt		3R3	3.3 V	3R3	3.3 V	DS	single	blanc	1 kV_{DC}
		05	5 V	05	5 V	D	dual	H	3 kV_{DC}
		12	12 V	7R2	7.2 V			H6	6 kV_{DC}
		15	15 V	09	9 V				
		24	24 V	12	12 V				
				15	15 V				
				18	18 V				
				24	24 V				
Example:	P1Y0505DH		Pout: 1 W, Vin 5 V, Vout ±5 V, Dual Output, Isolation voltage: 3 kV_{DC}						

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Model guide, dual isolated outputs

Input		
Voltage range		± 10%
Filter		Capacitors
Reflected ripple current		20 mAp-p (see Figure 1)
I/O-Isolation:		
DC-Isolation voltage input / output		≥ 1 kV_{DC}, optional ≥ 3 kV_{DC} & 6 kV_{DC}
Resistance		≤ 10^9 Ω
Capacitance		60 pF, typ.
Output		
Voltage Tolerance		≤ ± 3 %
Ripple and noise (at 20 MHz BW)		≤ 75 mVp-p (see Figure 2)
Short circuit protection		No
Line voltage deviation @ 1% Vin change		± 1.2 %
Voltage stability at load change 20...100 %		Only P1Yxx3R3x ± 20 % All others ± 10 %
Temperature drift		± 0.02 %/°C
EMC		
RE	EN 55032	Class B (see Figure 2)
CE	EN 55032	Class B (see Figure 2)
ESD	EN 61000-4-2	Perf. crit. A
RS	EN 61000-4-3	Perf. crit. A
EFT	EN 61000-4-4	Perf. crit. A (see Figure 2)
Surge	EN 61000-4-5	Perf. crit. A (see Figure 2)
CS	EN 61000-4-6	Perf. crit. A
PFMF	EN 61000-4-8	Perf. crit. A

General	
Safety standard, designed to meet	EN-, IEC-, UL 60950-1 & EN-, IEC-, UL 62368-1
Switching frequency	~ 80 kHz
Reliability calculated MTBF (MIL-HDBK-217 F)	1.12 Mio. h
Environmental	
Operating temperature (ambient)	-40 … 85 °C
Case temperature	≤ 100 °C
Storage temperature	-40 … 125 °C
Derating	None required
Humidity	Up to 95 %, non condensing
Cooling	Free air convection, ≥35 LFM
Physical	
Weight	2.7 g
Case material	Non conductive black plastic (UL94V-0 rated)
Potting material	Epoxy (UL94V-0 rated)
Capacitive Load:	
Single Output	≤220 µF
Dual Output	2 x ≤ 100 µF
Absolute maximum input voltage	
P1Y3R3xxxxx-Series	6 VDC, ≤ 100 ms
P1Y05xxxxx-Series	7 VDC, ≤ 100 ms
P1Y12xxxxx-Series	15 VDC, ≤ 100 ms
P1Y15xxxxx-Series	18 VDC, ≤ 100 ms
P1Y24xxxxx-Series	28 VDC, ≤ 100 ms
Pin soldering temperature	≤ 260 °C duration ≤ 10 s, ≤ 1.5 mm distance from body

1. All values are specified at 25 °C, nominal input voltage and full load unless otherwise specified.
2. Output ripple and noise measured with 20 MHz bandwidth. See Figure 2.
3. Capacitive load is specified by minimal input voltage and constant resistive load.
4. Measured input reflected ripple current with a simulated source inductance of 12 µH and a source capacitor 47 µF. See Figure 1.
5. Input filter circuit is required if the module to meet conducted emissions class B, surge & transients EN 61000-4-4 and EN 61000-4-5. All converters are to use about an external fuse. See Figure 3.
6. Exceeding the absolute maximum ratings of the unit could cause damage. It is not allowed for continuous operating.
7. Operation under no load conditions will not damage these devices, however they may not meet all listed specifications.
8. Not usable for high voltage IGBT- and MOSFET-driver applications.

Figure 1 Measure circuit for input ripple current

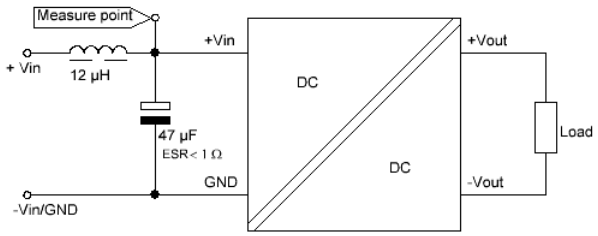

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Figure 1 Measure circuit for output ripple & noise

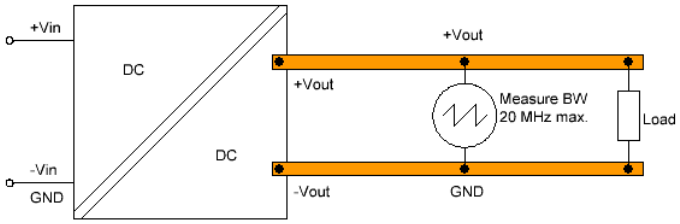
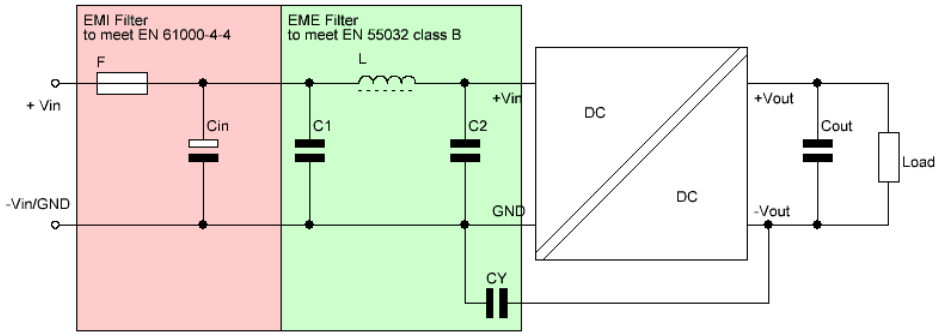


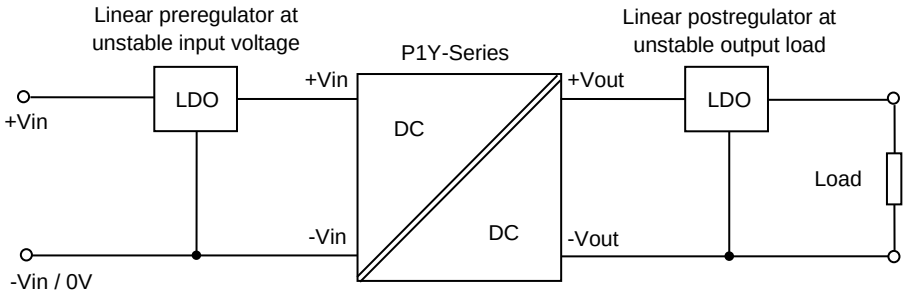
Figure 2 Application circuit to meet EN 61000-4-4 and EN 61000-4-5 and EMI class B



BOM to Figure 2					
Type	Fuse time delay type [mA]	Cin	C1	C2	CY
P1Y3R3xxx	800	470 µF	2.2 µF ceramic chip	-	-
P1Y05xxx	500	470 µF	2.2 µF ceramic chip	-	-
P1Y12xxx	300	470 µF	2.2 µF ceramic chip	-	-
P1Y15xxx	300	470 µF	2.2 µF ceramic chip	-	-
P1Y24xxx	300	470 µF	2.2 µF ceramic chip	2.2 µF ceramic chip	470 pF ceramic chip

The EMI filter components are to meet the contucted emissions requirement of the converter. These components should be as near as possible mounted to the converter. All leads should be as short as possible to minimize the radiation.

Application example with low drop out linear voltage regulator for input or output stabilisation



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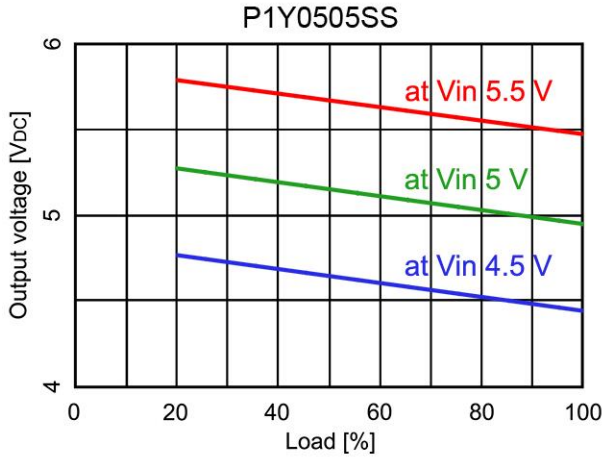
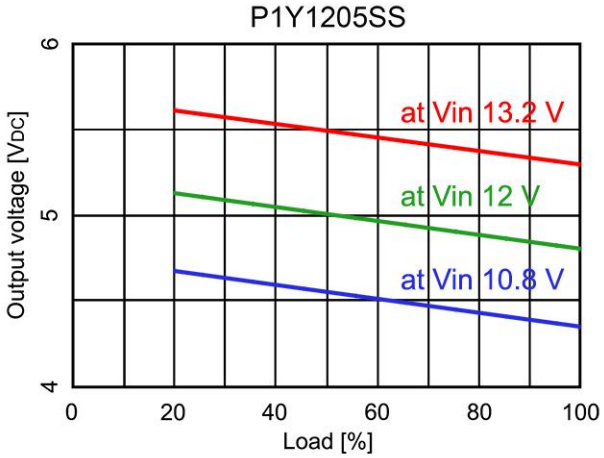
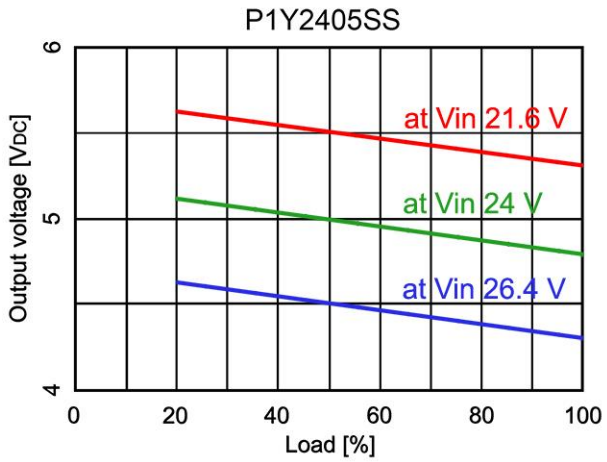
Output voltage at load change







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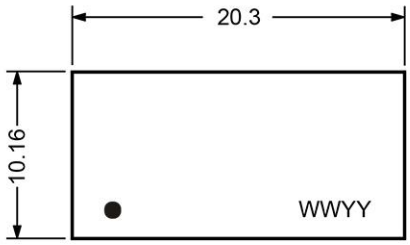
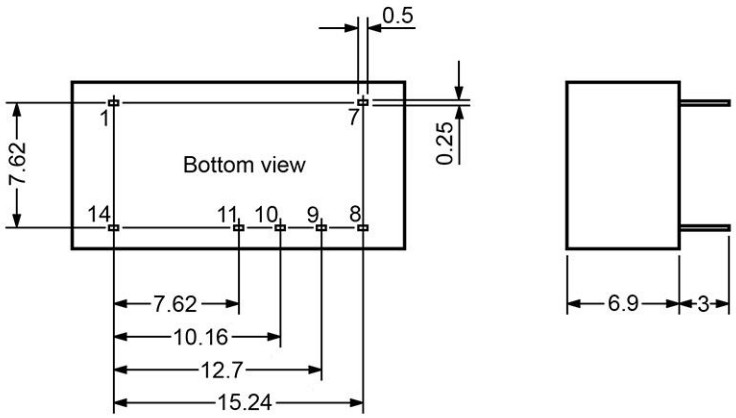
Dimensions



Units in mm
1. Pin cross section tolerance ± 0.05
2. Pin length tolerance ± 0.35
3. Case tolerance ± 0.5



Pin assignment				
Pin	1 kV_{DC} Isolation		3 kV_{DC} & 6 kV_{DC} Isolation	
	Single	Dual	Single	Dual
1	-V Input	-V Input	-V Input	-V Input
7	Not con.	Not con.	Not con.	Not con.
8	No pin	Common	+V Output	+V Output
9	+V Output	+V Output	No pin	Common
10	No pin	No pin	-V Output	-V Output
11	-V Output	-V Output	No pin	No pin
14	+V Input	+V Input	+V Input	+V Input

Rev: 20210906 f

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