



PHI-CON

# 2 W DC-DC Converter P2Z-Series

- 7 Pin SIL
- Low ripple and noise
- MTBF > 1.12 Mio. h
- Single output
- Dual  $\pm$  output with center tap



## Model guide

Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ]	Output current [mA] max.	Efficiency [%] typ.	Capacitive load [ $\mu$ F] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	No load [mA] typ.	Full load [mA] typ.				
<b>Single output</b>								
P2Z3R33R3DS	3.3	2.97...3.63	25	800	3.3	400	76	470
P2Z3R305DS	3.3	2.97...3.63	30	800	5.0	400	76	470
P2Z3R37R2DS	3.3	2.97...3.63	30	810	7.2	278	76	470
P2Z3R309DS	3.3	2.97...3.63	30	760	9.0	222	80	470
P2Z3R312DS	3.3	2.97...3.63	35	750	12	167	81	470
P2Z3R315DS	3.3	2.97...3.63	35	780	15	133	78	470
P2Z3R318DS	3.3	2.97...3.63	35	780	18	111	78	470
P2Z3R324DS	3.3	2.97...3.63	35	770	24	83	79	470
P2Z053R3DS	5	4.5...5.5	30	370	3.3	400	72	470
P2Z0505DS	5	4.5...5.5	30	510	5.0	400	78	470
P2Z057R2DS	5	4.5...5.5	30	500	7.2	278	80	470
P2Z0509DS	5	4.5...5.5	30	500	9.0	222	80	470
P2Z0512DS	5	4.5...5.5	30	490	12.0	167	82	470
P2Z0515DS	5	4.5...5.5	30	490	15.0	133	82	470
P2Z0518DS	5	4.5...5.5	30	490	18.0	111	82	470
P2Z0524DS	5	4.5...5.5	30	490	24.0	83	82	470
P2Z123R3DS	12	10.8...13.2	20	170	3.3	400	65	470
P2Z1205DS	12	10.8...13.2	20	215	5.0	400	77	470
P2Z127R2DS	12	10.8...13.2	20	210	7.2	278	80	470
P2Z1209DS	12	10.8...13.2	20	210	9.0	222	80	470
P2Z1212DS	12	10.8...13.2	20	205	12.0	167	82	470
P2Z1215DS	12	10.8...13.2	20	205	15.0	133	82	470
P2Z1218DS	12	10.8...13.2	20	210	18.0	111	80	470
P2Z1224DS	12	10.8...13.2	20	210	24.0	83	80	470
P2Z243R3DS	24	21.6...26.4	10	75	3.3	400	72	470
P2Z2405DS	24	21.6...26.4	10	105	5.0	400	79	470
P2Z247R2DS	24	21.6...26.4	10	105	7.2	278	80	470
P2Z2409DS	24	21.6...26.4	10	105	9.0	222	80	470
P2Z2412DS	24	21.6...26.4	10	100	12.0	167	80	470
P2Z2415DS	24	21.6...26.4	10	100	15.0	133	82	470
P2Z2418DS	24	21.6...26.4	10	100	18.0	111	82	470
P2Z2424DS	24	21.6...26.4	10	105	24.0	83	80	470
P2Z483R3DS	48	43.2...52.8	6	45	3.3	400	60	470
P2Z4805DS	48	43.2...52.8	6	55	5.0	400	77	470
P2Z487R2DS	48	43.2...52.8	6	55	7.2	278	77	470
P2Z4809DS	48	43.2...52.8	6	55	9.0	222	77	470
P2Z4812DS	48	43.2...52.8	6	53	12.0	167	78	470
P2Z4815DS	48	43.2...52.8	6	53	15.0	133	78	470
P2Z4818DS	48	43.2...52.8	6	53	18.0	111	78	470
P2Z4824DS	48	43.2...52.8	6	55	24.0	83	75	470
<b>Dual output</b>								
P2Z3R33R3D	3.3	2.97...3.63	25	800	$\pm$ 3.3	$\pm$ 200	76	2 x 220
P2Z3R305D	3.3	2.97...3.63	40	780	$\pm$ 5.0	$\pm$ 200	78	2 x 220
P2Z3R37R2D	3.3	2.97...3.63	40	800	$\pm$ 7.2	$\pm$ 139	76	2 x 220
P2Z3R309D	3.3	2.97...3.63	40	800	$\pm$ 9.0	$\pm$ 111	76	2 x 220
P2Z3R312D	3.3	2.97...3.63	45	780	$\pm$ 12.0	$\pm$ 84	78	2 x 220
P2Z3R315D	3.3	2.97...3.63	45	780	$\pm$ 15.0	$\pm$ 67	78	2 x 220
P2Z3R318D	3.3	2.97...3.63	45	780	$\pm$ 18.0	$\pm$ 56	78	2 x 220
P2Z3R324D	3.3	2.97...3.63	45	770	$\pm$ 24.0	$\pm$ 42	79	2 x 220
P2Z053R3D	5	4.5...5.5	30	405	$\pm$ 3.3	$\pm$ 200	65	2 x 220
P2Z0505D	5	4.5...5.5	30	555	$\pm$ 5.0	$\pm$ 200	72	2 x 220
P2Z057R2D	5	4.5...5.5	30	555	$\pm$ 7.2	$\pm$ 139	72	2 x 220
P2Z0509D	5	4.5...5.5	30	520	$\pm$ 9.0	$\pm$ 111	77	2 x 220
P2Z0512D	5	4.5...5.5	30	510	$\pm$ 12.0	$\pm$ 84	78	2 x 220
P2Z0515D	5	4.5...5.5	30	500	$\pm$ 15.0	$\pm$ 67	80	2 x 220
P2Z0518D	5	4.5...5.5	30	500	$\pm$ 18.0	$\pm$ 56	80	2 x 220
P2Z0524D	5	4.5...5.5	30	500	$\pm$ 24.0	$\pm$ 42	80	2 x 220



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Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ]	Output current [mA] max.	Efficiency [%] typ.	Capacitive load [μF] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	No load [mA] typ.	Full load [mA] typ.				
Dual output								
P2Z123R3D	12	10.8...13.2	20	165	±3.3	±200	67	2 x 220
P2Z1205D	12	10.8...13.2	20	220	±5.0	±200	75	2 x 220
P2Z127R2D	12	10.8...13.2	20	220	±7.2	±139	76	2 x 220
P2Z1209D	12	10.8...13.2	20	215	±9.0	±111	77	2 x 220
P2Z1212D	12	10.8...13.2	20	205	±12.0	±84	82	2 x 220
P2Z1215D	12	10.8...13.2	20	205	±15.0	±67	82	2 x 220
P2Z1218D	12	10.8...13.2	20	205	±18.0	±56	82	2 x 220
P2Z1224D	12	10.8...13.2	20	205	±24.0	±42	82	2 x 220
P2Z243R3D	24	21.6...26.4	10	80	±3.3	±200	68	2 x 220
P2Z2405D	24	21.6...26.4	10	110	±5.0	±200	75	2 x 220
P2Z247R2D	24	21.6...26.4	10	110	±7.2	±139	75	2 x 220
P2Z2409D	24	21.6...26.4	10	105	±9.0	±111	80	2 x 220
P2Z2412D	24	21.6...26.4	10	100	±12.0	±84	82	2 x 220
P2Z2415D	24	21.6...26.4	10	100	±15.0	±67	82	2 x 220
P2Z2418D	24	21.6...26.4	10	100	±18.0	±56	82	2 x 220
P2Z2424D	24	21.6...26.4	10	100	±24.0	±42	82	2 x 220
P2Z483R3D	48	43.2...52.8	6	45	±3.3	±200	60	2 x 220
P2Z4805D	48	43.2...52.8	6	55	±5.0	±200	73	2 x 220
P2Z487R2D	48	43.2...52.8	6	55	±7.2	±139	77	2 x 220
P2Z4809D	48	43.2...52.8	6	55	±9.0	±111	77	2 x 220
P2Z4812D	48	43.2...52.8	6	50	±12.0	±84	80	2 x 220
P2Z4815D	48	43.2...52.8	6	50	±15.0	±67	80	2 x 220
P2Z4818D	48	43.2...52.8	6	50	±18.0	±56	80	2 x 220
P2Z4824D	48	43.2...52.8	6	50	±24.0	±42	80	2 x 220

## Specifications

<b>Input</b>	
Voltage range	± 10 %
Filter	Capacitors
Input reflected ripple current	20 mA <sub>p-p</sub> , typ. (see Figure 1)
<b>Isolation:</b>	
Rated voltage	1000 V <sub>DC</sub> Standard see ordering information table
Resistance	10 <sup>9</sup> Ω
Capacitance	60 pF, typ.
<b>Output</b>	
Voltage accuracy	± 3 %, max.
Voltage balance (dual outputs)	± 1 %
Ripple and noise, BW 20 MHz	75 mV <sub>p-p</sub> , max. (see Figure 2)
Short circuit protection	Not integrated
Line voltage regulation	± 1.2 % / ΔV <sub>in</sub> 1.0 %
Load deviation at load 20...100 %	P2Zxx3R3: ± 20%, all others: ± 10 %
Temperature coefficient	± 0.02 %/°C
<b>EMC specifications</b>	
RE	EN 55032 Class B
CE	EN 55032 Class B (see Figure 3)
ESD	EN-, IEC 61000-4-2 perf. criteria A
RS	EN-, IEC 61000-4-3 perf. criteria A
EFT	EN-, IEC 61000-4-4 perf. criteria A
Surge	EN-, IEC 61000-4-5 perf. criteria A
CS	EN-, IEC 61000-4-6 perf. criteria A
PFMF	EN-, IEC 61000-4-8 perf. criteria A

<b>General</b>	
Safety in accordance	EN-, IEC 60950-1
Reliability calculated MTBF (MIL-HDBK-217F at 25°C)	1.12 Mio h
Switching frequency	80 kHz, typ.
<b>Environmental</b>	
Operating temperature (ambient)	-40 ... 85 °C
Case temperature maximum	100 °C
Storage temperature	-40 °C to +125 °C
Derating	None required
Humidity	Up to 90 %, non condensing
Cooling	Free air convection, 30...65 LFM
<b>Physical</b>	
Dimensions see drawing	6 (7.2) x 19.5 x 10 mm
Weight	2.3 g, only P2Z48xxx: 2.5 g
Case material	Non conductive black plastic
<b>Absolute maximum ratings</b>	
P2Z3R3xxx types	V <sub>in</sub> ≤ 6 V, duration ≤ 100 ms
P2Z05xxx types	V <sub>in</sub> ≤ 7 V, duration ≤ 100 ms
P2Z12xxx types	V <sub>in</sub> ≤ 15 V, duration ≤ 100 ms
P2Z24xxx types	V <sub>in</sub> ≤ 28 V, duration ≤ 100 ms
P2Z48xxx types	V <sub>in</sub> ≤ 54 V, duration ≤ 100 ms
Pin soldering temperature	≤ 260 °C, duration ≤ 10 s max., ≥ 1.5 mm distance from body

## Note:

- All values are rated at 25 °C, nominal input voltage and full load unless otherwise specified.
- Maximum output capacitive load tested by minimal input voltage and constant resistive load.
- Operation under no load conditions will not damage the converter however they may not meet all listed specifications.
- Not usable for MOSFET- and IGBT driver applications.

Ordering information									
Output Power	Series	Input voltage		Output voltage		Outputs		Primary / secondary isolation	
P2	Z	05		24		SS		H	
PHI-CON 2 Watt		3R3	3.3 V	3R3	3.3 V	DS	Single output	Blanc	1 kV
		05	5 V	05	5 V	D	Dual output	H	3 kV
		12	12 V	7R2	7.2V			H6	6 kV
		24	24 V	09	9 V				
		48	48 V	12	12 V				
				15	15V				
				18	18 V				
				24	24 V				

# 2 W DC-DC Converter P2Z-Series

Figure 1 Measure circuit for input ripple current

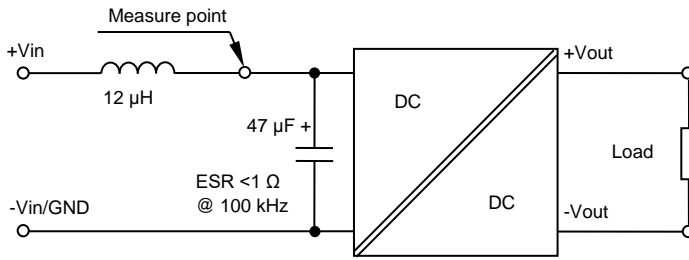
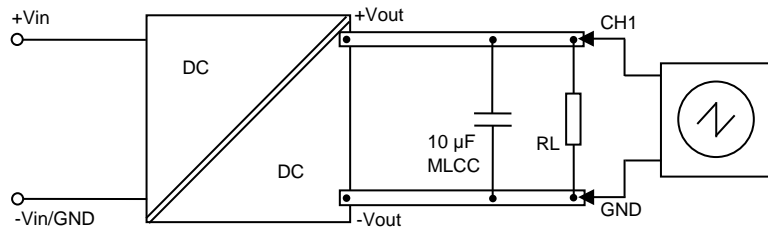


Figure 2 Measure circuit for output ripple and noise voltage  
Single output



Dual output

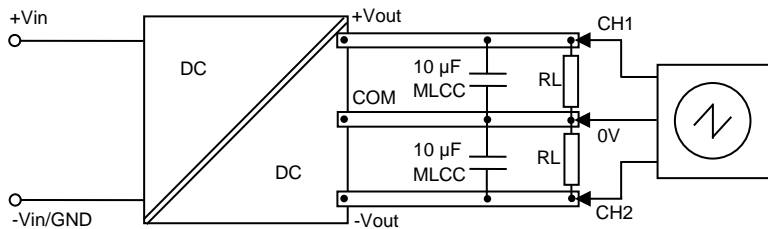
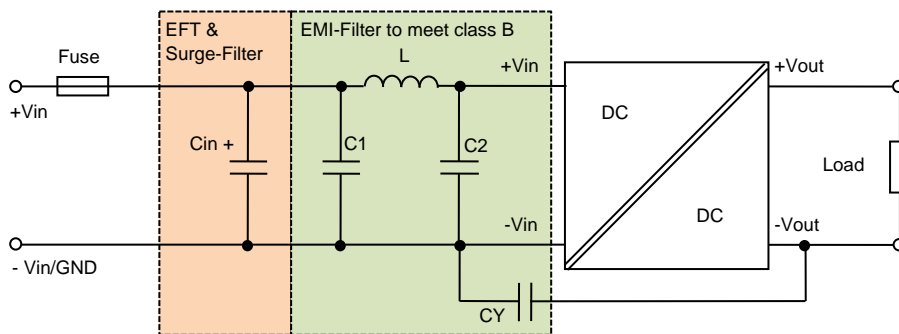


Figure 3 Application circuit to meet EN 61000-4-4 and EN 61000-4-5 and EN 55032 class B



Type	Fuse time delay [mA]	Cin		L	C1		C2		CY	
		[µF]	[V]		[µF]	technology	[µF]	type	[pF]	[kV]
P2Z3R3xxx	800	470	100	18	2.2	MLCC	-	-	-	-
P2Z05xxx	500	470	100	18	2.2	MLCC	-	-	-	-
P2Z12xxx	300	470	100	18	2.2	MLCC	-	-	-	-
P2Z15xxx	300	470	100	18	2.2	MLCC	-	-	-	-
P2Z24xxx	300	470	100	18	2.2	MLCC	2.2	MLCC	470	≥ 2
P2Z48xxx	300	470	100	18	10	Elyt.	2.2	MLCC	470	≥ 2

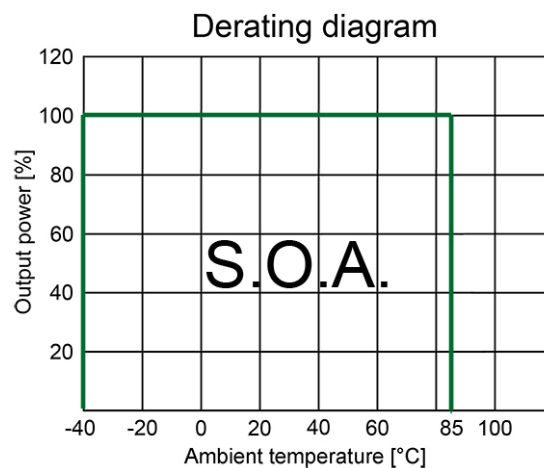
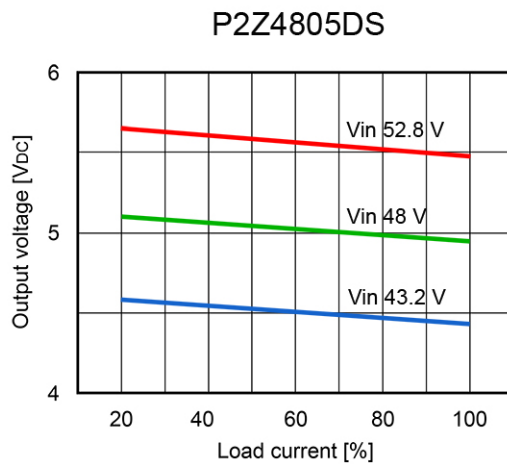
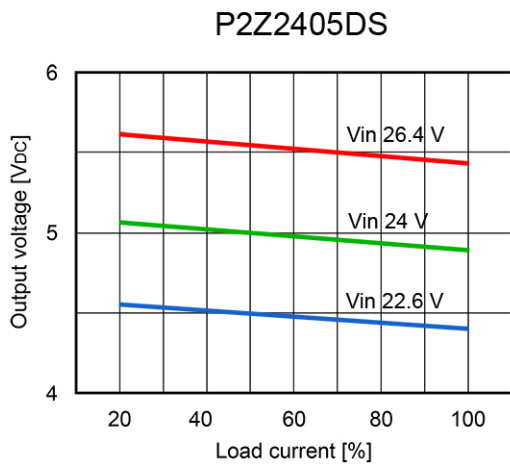
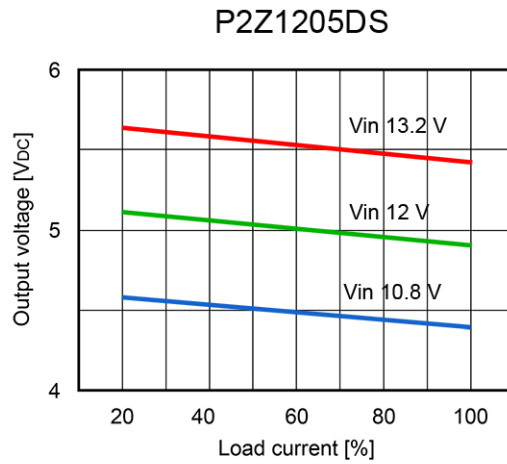
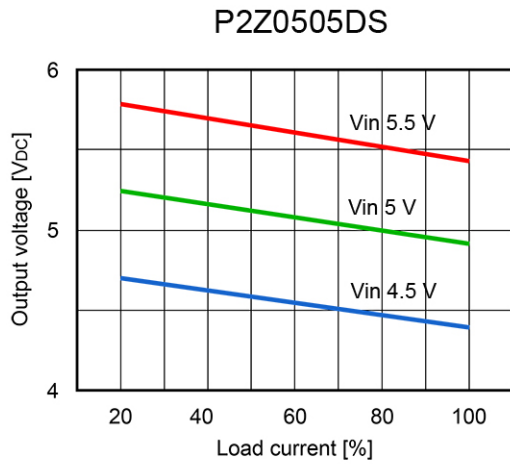
The EMI filter components are to meet the conducted emissions requirement of the converter. These components should be as near as possible mounted to the converter. All leads should be as short as possible to minimize the radiation



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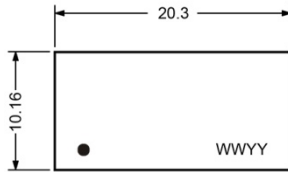
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Output voltage vs load current and input voltage

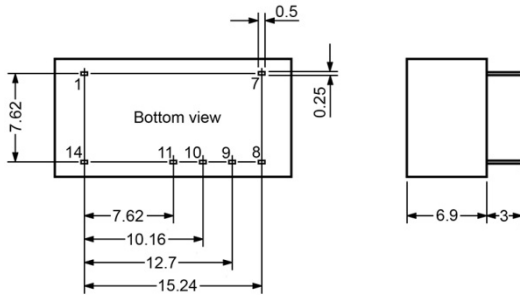


# 2 W DC-DC Converter P2Z-Series

## Mechanical dimensions



Unit: mm  
 Pin cross section:  $0.5 \times 0.25 \pm 0.05$  mm  
 Pin length tolerance:  $\pm 0.35$  mm  
 Pitch tolerance:  $\pm 0.35$  mm  
 Case tolerance:  $\pm 0.5$  mm



Pin assignment				
Pin	1 kV Standard Isolation		3 kV <sub>DC</sub> & 6 kV <sub>DC</sub> Isolation	
	Single	Dual	Single	Dual
1	-V Input	-V Input	-V Input	-V Input
7	NC	NC	NC	NC
8	No Pin	Common	+V Output	+V Output
9	+V Output	+V Output	Omitted	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

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