10 W DC-DC Converter P10D-Series

PHI-CON

- Wide 4:1 input range
- Efficiency up to 85 %
- 1500 V_{DC} isolation
- Continuous short circuit protection
- On/Off-Control input optional
- Standard package 2" x 1" x 0.4"
- MTBF 1.12 Mio. h
- Wide operating temperature range -40..85 °C

Model guide

Type	Input voltage		Input current		Output voltage	Output current		Efficiency	Capacitive load (note1)
	nominal [V_{DC}]	range [V_{DC}]	No load [mA] max.	Full load [mA] typ.	[V_{DC}]	[mA] min.	[mA] max.	[%] typ.	[µF] max.
Single Output									
P10D243R3S	24	9...36	25	350	3.3	0	2000	80	3300
P10D2405S	24	9...36	25	510	5.0	0	2000	82	3300
P10D247R2S	24	9...36	25	500	7.2	0	1388	83	1000
P10D2409S	24	9...36	25	500	9.0	0	1111	83	680
P10D2412S	24	9...36	25	490	12.0	0	833	85	680
P10D2415S	24	9...36	25	490	15.0	0	666	85	470
P10D483R3S	48	18...72	20	175	3.3	0	2000	79	3300
P10D4805S	48	18...72	20	255	5.0	0	2000	82	3300
P10D487R2S	48	18...72	20	250	7.2	0	1388	83	1000
P10D4809S	48	18...72	20	250	9.0	0	1111	83	680
P10D4812S	48	18...72	20	245	12.0	0	833	85	680
P10D4815S	48	18...72	20	245	15.0	0	666	85	470
Dual Output									
P10D2405D	24	9...36	25	510	±5.0	0	±1000	82	2 x 2200
P10D247R2D	24	9...36	25	500	±7.2	0	±694	83	2 x 470
P10D2409D	24	9...36	25	500	±9.0	0	±555	83	2 x 470
P10D2412D	24	9...36	25	490	±12.0	0	±416	85	2 x 470
P10D2415D	24	9...36	25	490	±15.0	0	±333	85	2 x 330
P10D4805D	48	18...72	20	255	±5.0	0	±1000	82	2 x 2200
P10D487R2D	48	18...72	20	250	±7.2	0	±694	83	2 x 470
P10D4809D	48	18...72	20	250	±9.0	0	±555	83	2 x 470
P10D4812D	48	18...72	20	245	±12.0	0	±416	85	2 x 470
P10D4815D	48	18...72	20	245	±15.0	0	±333	85	2 x 330

Specifications

Input	
Under voltage protection P10D24xxx	Lock in: 8.6 V_{DC}, typ. Lock out: 8 V_{DC}, typ.
Under voltage protection P10D48xxx	Lock in: 16 V_{DC}, typ. Lock out: 14 V_{DC}, typ.
Start up time	20 ms, typ.
Filter	π - type
Reflected input ripple current	35 mAp-p, typ. (see Fig. 1)
Remote control (optional) Pin 6 (see fig. 4)	On: open or 2.5…5.5 V_{DC} Off: 0…0.7 V_{DC}
Off state input idle current	2.5 mA
Isolation Voltage:	
Input to output	1.5 kV_{DC} for 1 min.
Input or output to Case	1 kV_{DC} for 1 min.
Resistance	10^9 Ω
Capacitance	1200 pF, typ.
Output	
Voltage accuracy	± 1 %
Load voltage regulation	± 0.5 %, at 10..100 % load
Line voltage regulation	± 0.5 %, max.
Over current protection	140 % of max. Iout
Dual output cross deviation	± 5 %, max. at 75 % load difference between the outputs
Short circuit protection	Continuous
Short circuit restart	Automatic
Ripple and noise (at 20 MHz BW)	75 mVp-p, max. (see Figure 2)
Temperature coefficient	± 0.02 % / °C
General	
Switching frequency	300 kHz, typ.
Safety standards	EN-, IEC-, cUL-, UL 60950-1 EN-, IEC-, cUL-, UL 62368-1
Reliability calc. MTBF (MIL-HDBK-217F)	1.12 Mio. h

EMC	
Radiated emissions	EN 55032 class A
Conducted emissions (see note 2)	EN 55032 class A
ESD	IEC61000-4-2 perf. crit. B
RS	IEC61000-4-3 perf. crit. A
EFT	IEC61000-4-4 perf. crit. A
Surge (see note 3)	IEC61000-4-5 perf. crit. A
CS	IEC61000-4-6 perf. crit. A
PFMF	IEC61000-4-8 perf. crit. A
Environmental	
Operating temperatur (ambient)	-40 ... 85 °C
Storage temperature	-40 ... 125 °C
Case temperature	100 °C, max.
Derating	None required
Humidity	95 % max. non condensing
Cooling	Free air convection, 30..65 LFM
Thermal impedance	Without heatsink: 12 K / W
Physical	
Dimensions	50.8 x 25.4 x 10.16 mm
Weight	31 g
Case material	Nickel coated brass
Potting material	Epoxy (UL94V-0 rated)
Pin material	Brass solder coated
Absolute maximum ratings	
Input voltage P10D24xxx	50 V_{DC}, max. 100 ms
Input voltage P10D48xxx	100 V_{DC}, max. 100 ms
Soldering temperature	≤ 260 °C max. for ≤ 10 s max., ≥ 1.5 mm distance from case

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Part number ordering key									
Output power	Series	Input voltage		Output voltage		Outputs		Remote control	
P10	D	24		05		S		C	
10 Watt		24	9..36 V	3R3	3.3 V	S	single	Blank	No remote control Input
		48	18..72 V	05	5 V	D	dual		
				7R2	7.2 V			C	With control input (Optional)
				09	9 V				
				12	12 V				
				15	15 V				

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. With input filter circuit to meet of conducted emissions EN 55032 class A. (see Figure 3)
4. An external input blocking capacitor is required if the converter has to meet the surge test IEC 61000-4-5. Suggested capacitor type: KY-series, 220 µF, 100 V, Nippon Chemicon (see Figure 3).

Figure 1 Measurement circuit for reflected input ripple current

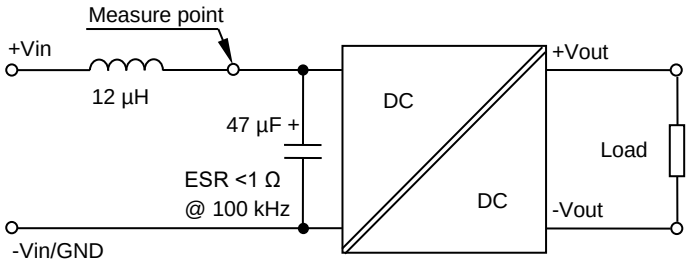
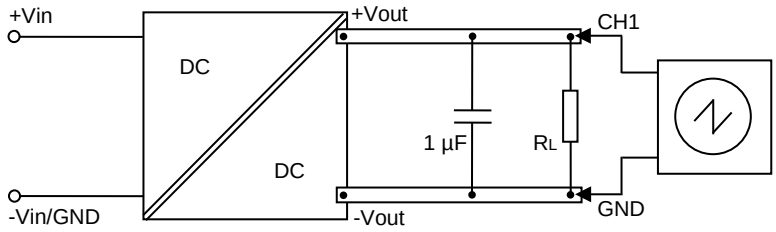


Figure 2 Measurement method for output ripple voltage (BW 20 MHz)

Single output version



Dual output version

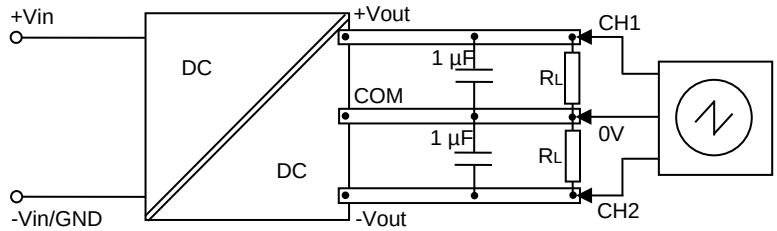


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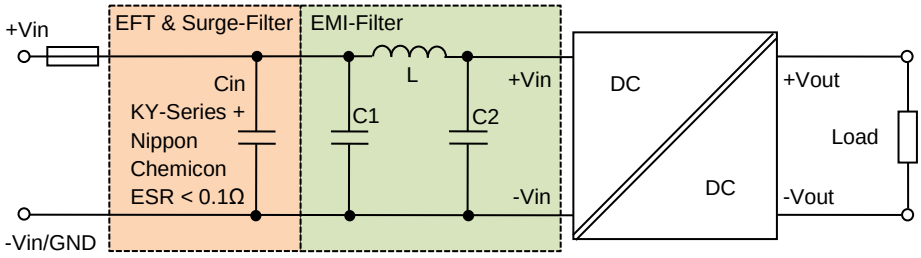
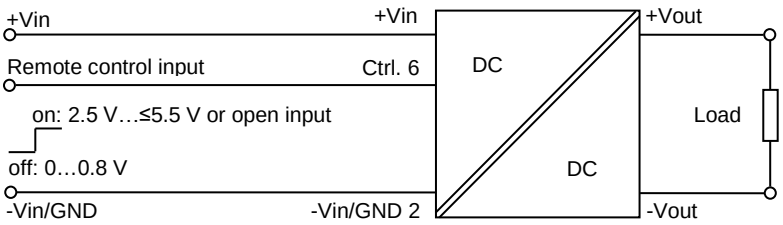
Figure 3 Recommended input filter circuit to meet EMI (EN 55032 class A) and Surge (IEC 61000-4-5) specifications

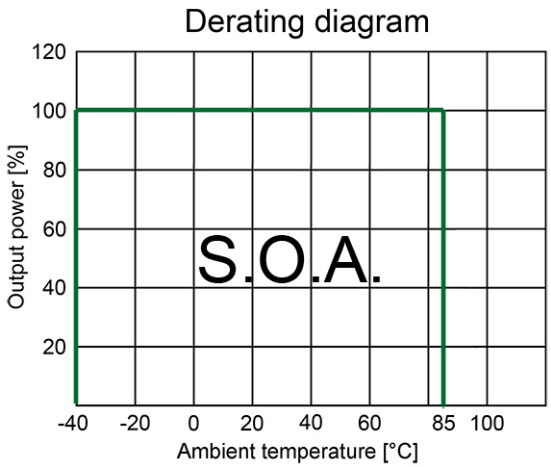


BOM to Figure 3				
Family	Cin	C1	C2	L
P10D24xxx	220 µF, 100 V	330 µF, 100 V	100 µF, 100V	12 µH
P10D48xxx	220 µF, 100 V	330 µF, 100 V	100 µF, 100V	12 µH

Figure 4 Application circuit for remote control function.



This feature is optional, please see part number ordering key table.



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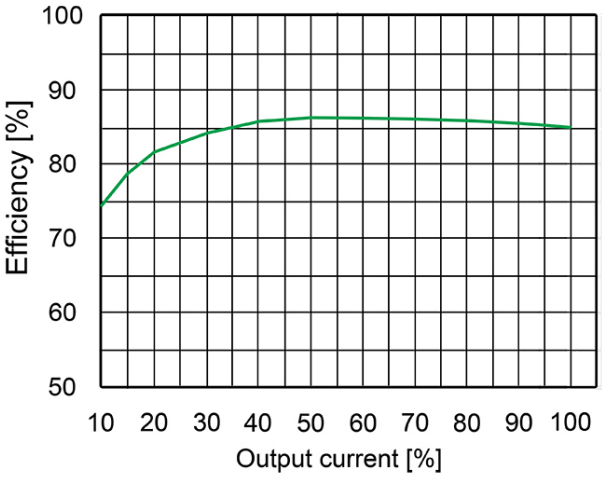
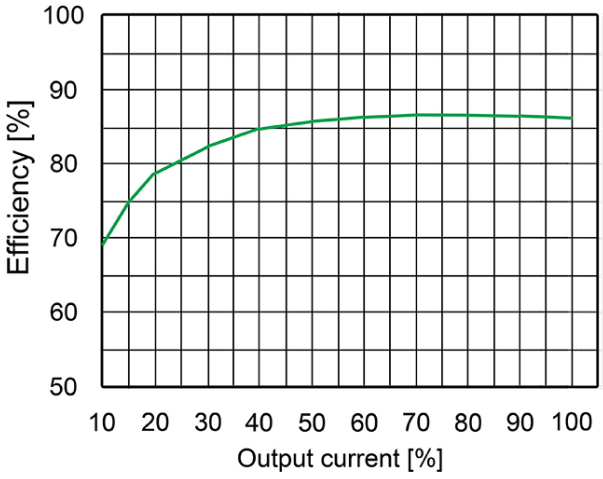
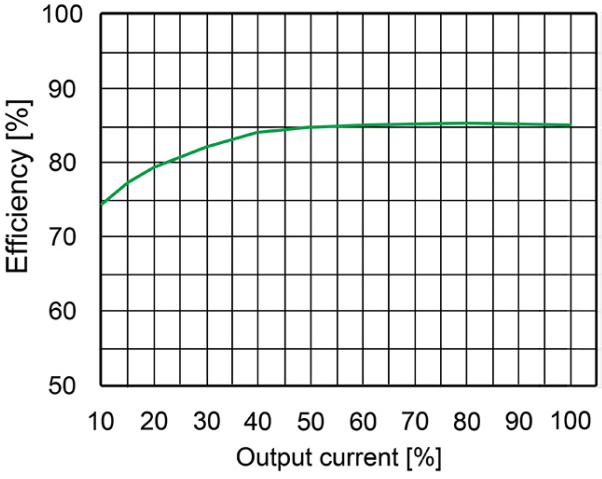
P10D24xxx Efficiency vs output load at Vin 9 VDC



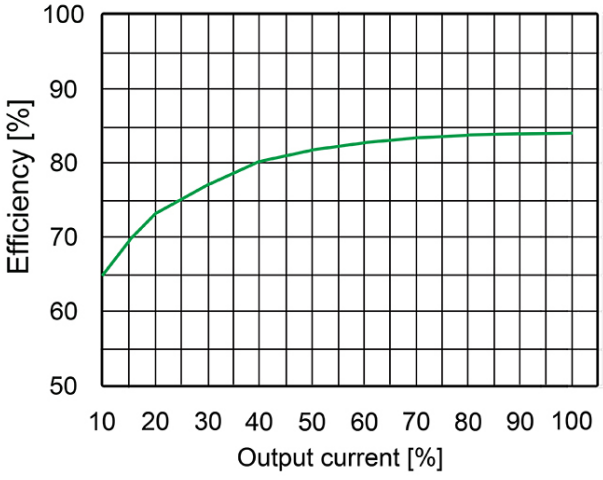
P10D48xxx Efficiency vs output load at Vin 18 VDC



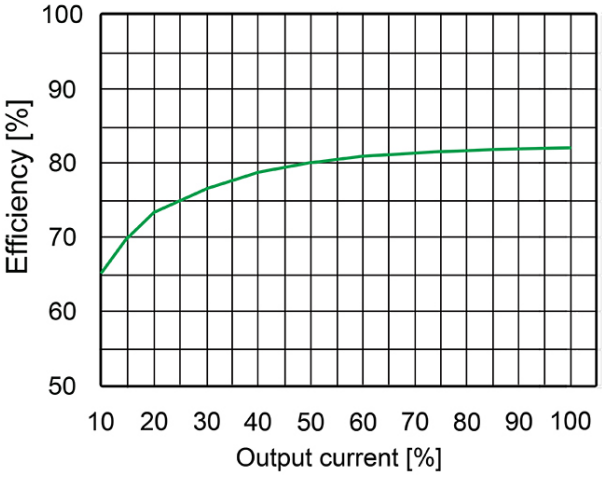
P10D24xxx Efficiency vs output load at Vin 24VDC



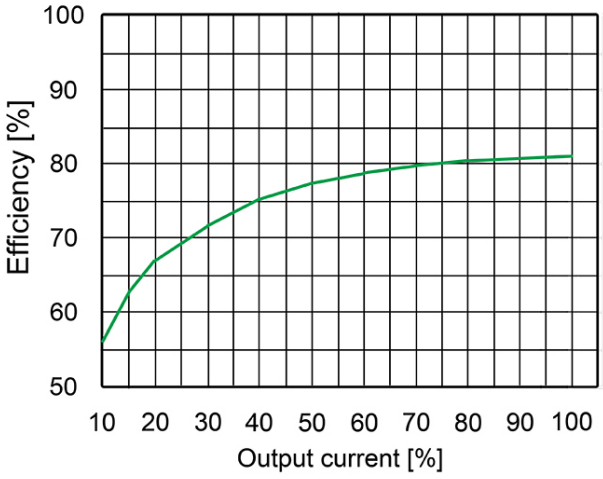
P10D48xxx Efficiency vs output load at Vin 48 VDC



P10D24xxx Efficiency vs output load at Vin 36 VDC



P10D48xxx Efficiency vs output load at Vin 72 VDC



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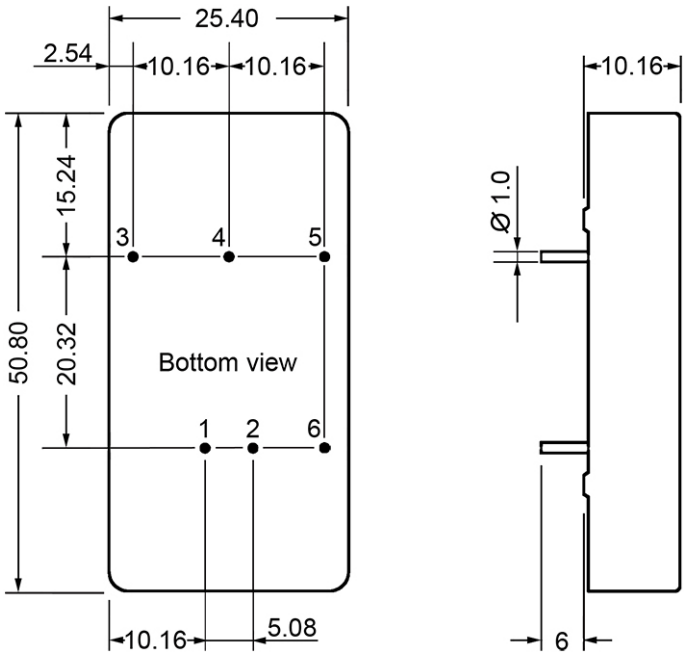

Note:
All dimensions in mm
1. Pin diameter tolerance ± 0.05
2. Pin pitch tolerance ± 0.35
3. Pin length tolerance ± 0.35
4. Case tolerance ± 0.5

Pin assignment				
	Without remote control		With remote control	
Pin	Single	Dual	Single	Dual
1	+V input	+V input	+V input	+V input
2	-V input	-V input	-V input	-V input
3	+V output	+V output	+V output	+V output
4	No pin	common	No pin	common
5	-V output	-V output	-V output	-V output
6	No pin	No pin	Remote CTRL	Remote CTRL

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