



PHI-CON

10 W DC-DC Converter P10E-Series

- Wide 2:1 input range
- 1500 V_{DC} isolation
- MTBF > 1 Mio. h
- Continuous short circuit protection
- Over current protection



Model guide

Type	Input voltage		Input current		Output voltage [V _{DC}] nom.	Output current		Efficiency [%] typ.	Capacitor load (note 2) [mA] max.
	Nominal [V _{DC}]	Range [V _{DC}]	No load [mA] max.	Full load [mA] typ.		[mA] min.	[mA] max.		
Single output									
P10E122R5S	12	9...18	10	790	2.5	0	3000	81	2200
P10E123R3S	12	9...18	10	1005	3.3	0	3000	84	2200
P10E1205S	12	9...18	10	990	5.0	0	2000	86	2200
P10E1212S	12	9...18	10	980	12.0	0	833	87	820
P10E1215S	12	9...18	10	960	15.0	0	667	89	470
P10E242R5S	24	18...36	10	380	2.5	0	3000	84	2200
P10E243R3S	24	18...36	10	495	3.3	0	3000	85	2200
P10E2405S	24	18...36	10	480	5.0	0	2000	89	2200
P10E2412S	24	18...36	10	485	12.0	0	833	88	820
P10E2415S	24	18...36	10	485	15.0	0	667	88	470
P10E482R5S	48	36...75	10	190	2.5	0	3000	84	2200
P10E483R3S	48	36...75	10	250	3.3	0	3000	85	2200
P10E4805S	48	36...75	10	240	5.0	0	2000	88	2200
P10E4812S	48	36...75	10	245	12.0	0	833	87	820
P10E4815S	48	36...75	10	240	15.0	0	667	88	470
Dual output									
P10E1212D	12	9...18	10	980	±12.0	0	±416	87	2 x 220
P10E1215D	12	9...18	10	970	±15.0	0	±333	88	2 x 150
P10E2412D	24	18...36	10	485	±12.0	0	±416	88	2 x 220
P10E2415D	24	18...36	10	475	±15.0	0	±333	90	2 x 150
P10E4812D	48	36...75	10	245	±12.0	0	±416	87	2 x 220
P10E4815D	48	36...75	10	245	±15.0	0	±333	87	2 x 150

Specifications

Input	
Filter	Pi Network
Reflected input ripple current	20 mA _{p-p} (see Figure 1)
Start up time	20 ms, typ.
Isolation:	
In / Out Rated voltage (60 s)	1500 V _{DC} , Standard
Input or output to case	1000 V _{DC}
Resistance	10 ⁹ Ω
Capacitance	1000 pF, typ.
Output	
Voltage accuracy	± 1 %
Line regulation	± 0.5 %, max.
Load regulation @ 0...100 % load change	± 0.5 % @ P10ExxxxS ± 1% @ P10ExxxxD & P10Exx3R3x
Over current protection	150 %, typ. of max. current
Short circuit protection	Continuous, automatic restart
Ripple and noise (at 20 MHz BW)	75 mV _{p-p} , max. (see Figure 2)
Dual output cross deviation @ 75 % load difference	5 %, max.
Temperature coefficient	± 0.02 % / °C
Transient recovery time	200 μs, typ. @ 25 % load steps
Output over voltage protection, Z-diode clamping	
P10Exx2R5S, P10Exx3R3S	3.9 V
P10Exx05S	6.2 V
P10Exx12x	15 V
P10Exx15x	18 V
General	
Switching frequency	330 kHz, typ.
Safety standards	IEC, EN, UL, cUL 60950-1 IEC, EN, UL, cUL 62368-1
Reliability calc. MTBF (MIL-HDBK-217F @ Ta 25 °C)	1 Mio. h

EMC specifications		
RE	EN 55032	Class A
CE	EN 55032	Class A (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 (see Figure 3)
Surge	EN-, IEC 61000-4-5	perf. criteria A (see Figure 3)
CS	EN-, IEC 61000-4-6	perf. criteria A
PFMF	EN-, IEC 61000-4-8	perf. criteria A
Environmental		
Operating ambient temperature	-40 ... 85 °C	
Case temperature	100 °C, max.	
Storage temperature	-40 ... 125 °C	
Derating	See SOA diagram	
Humidity	95 % max., non condensing	
Cooling	Air convection, 30..60 LFM	
Physical		
Weight	17 g	
Potting material	Epoxy (UL94V-0 rated)	
Case material	Aluminum	
Absolute maximum ratings		
Input voltage < 100 ms		
P10E12xxx	25 V _{DC}	
P10E24xxx	50 V _{DC}	
P10E48xxx	100 V _{DC}	
Lead soldering Temperature	≤ 260 °C peak, duration ≤ 10 s, distance from package ≥ 1.5 mm	

1. All specifications are typical at 25 °C, nominal input voltage and full load unless otherwise noted
2. The maximum capacitive load is specified at minimal input voltage and constant resistive load.
3. Parallel operation of DC/DC-Converter outputs is not recommendet.
4. The P10E-series is not usable in IGBT and MOSFET driver applications.

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Part number structure							
Output power	Series	Input voltage		Output voltage		Outputs	
P10	E	24		05		S	
10 Watt		12	9...18 V	2R5	2.5 V	S	single
		24	18..36 V	3R3	3.3 V	D	dual
		48	36..75 V	05	5 V		
				12	12 V		
				15	15 V		

Figure 1 Measure circuit input reflected ripple current

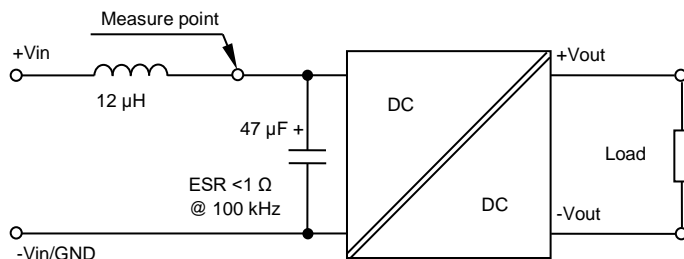


Figure 2 Measure circuit output ripple & noise voltage

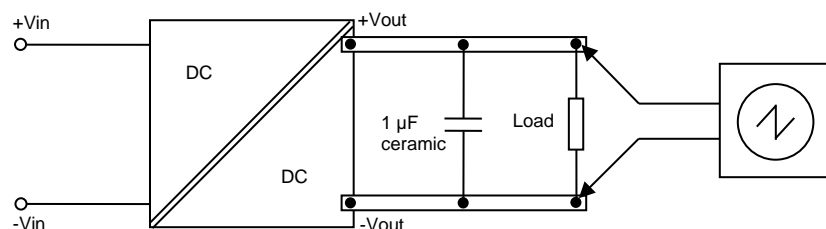
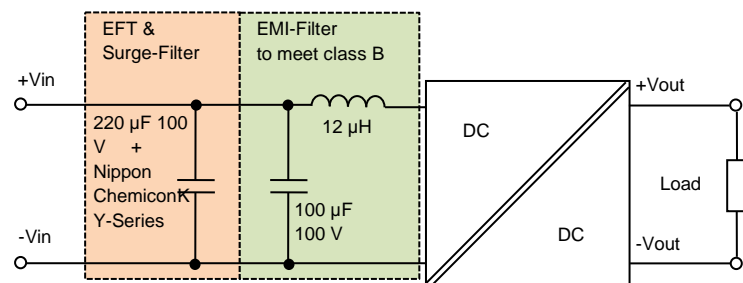


Figure 3

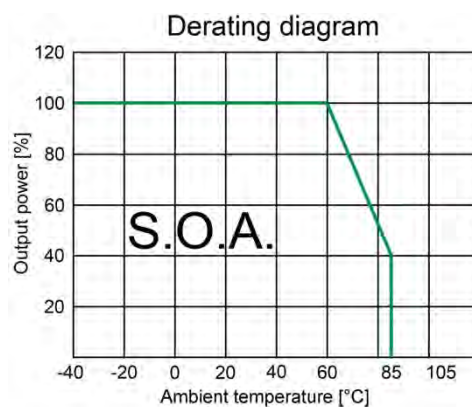
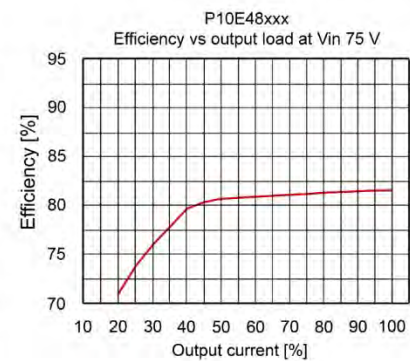
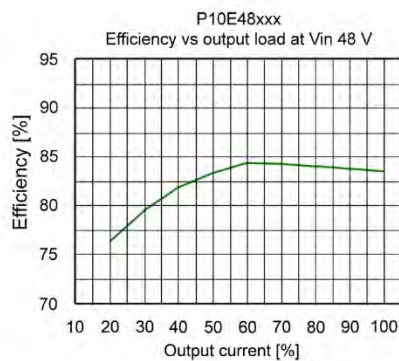
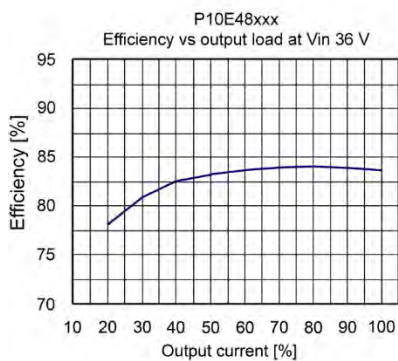
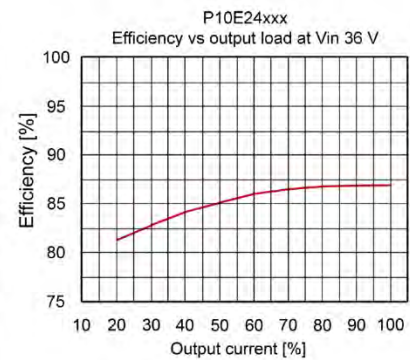
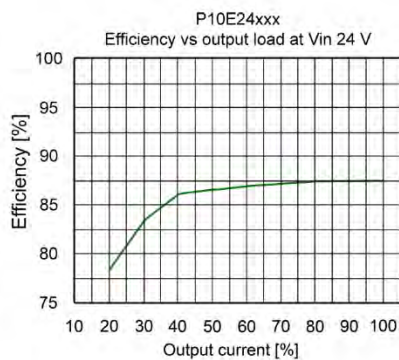
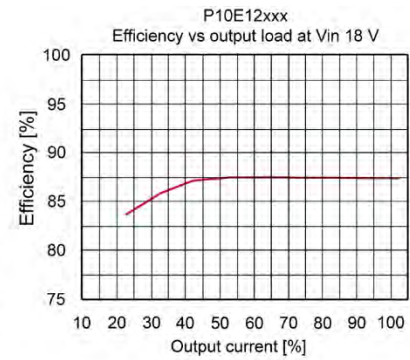
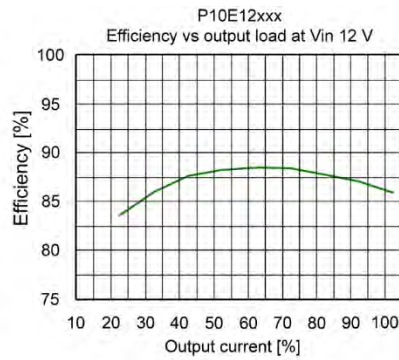
Application circuit to meet EFT EN 61000-4-4 class A, Surge EN 61000-4-5 class A and EMI conducted emission EN 55032 Class A





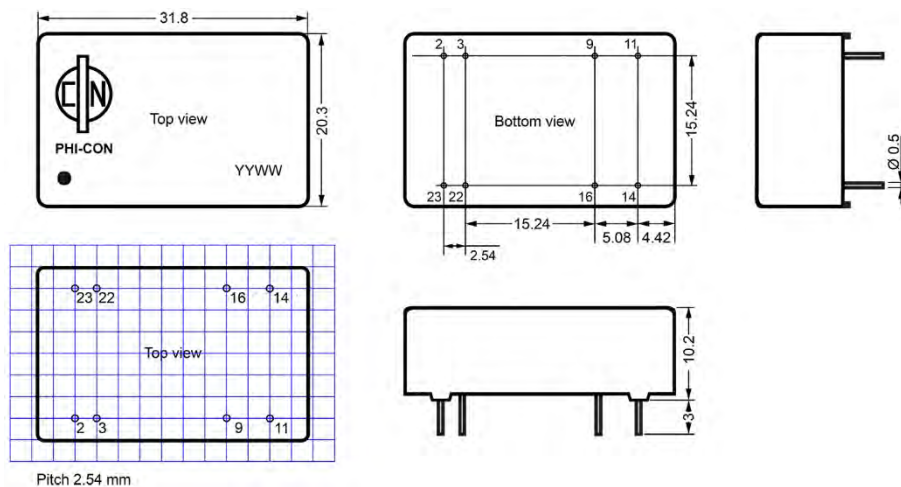
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Mechanical dimensions



Pin assignment		
	Single	Dual
2	-V Input	-V Input
3	-V Input	-V Input
9	No Pin	Common
11	Not Connected.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

All units in mm

1. Pin diameter tolerance ± 0.05 mm
2. Pin pitch tolerance ± 0.35 mm
3. Pin length tolerance ± 0.35 mm
4. Case tolerance ± 0.5 mm

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