



PHI-CON

15 W DC-DC Converter P15L-Series

- Wide 2:1 input range
- Efficiency up to 89 %
- 1600 V_{DC} isolation
- Continuous short circuit & over current protection
- Soft start
- On/Off - control input
- Standard package 2" x 1" x 0.4"



Model guide

Type	Input voltage		Input current		Output voltage [V _{DC}]	Output current		Efficiency [%] typ.	Capacitive load (note 1) [μF] max.
	nominal [V _{DC}]	range [V _{DC}]	No load [mA] max.	Full load [mA] typ.		[mA] min.	[mA] max.		
Single Output									
P15L123R3S	12	9...18	30	1010	3.3	0	3000	82	3300
P15L1205S	12	9...18	30	1470	5.0	0	3000	85	3300
P15L1212S	12	9...18	30	1410	12.0	0	1250	89	1000
P15L1215S	12	9...18	30	1410	15.0	0	1000	89	680
P15L243R3S	24	18...36	25	705	3.3	0	3000	82	3300
P15L2405S	24	18...36	25	735	5.0	0	3000	85	3300
P15L2412S	24	18...36	25	705	12.0	0	1250	89	1000
P15L2415S	24	18...36	25	705	15.0	0	1000	89	680
P15L483R3S	48	36...75	20	255	3.3	0	3000	81	3300
P15L4805S	48	36...75	20	365	5.0	0	3000	86	3300
P15L4812S	48	36...75	20	356	12.0	0	1250	88	1000
P15L4815S	48	36...75	20	350	15.0	0	1000	89	680
Dual Output									
P15L123R3D	12	9...18	30	1010	±3.3	0	±1500	82	2 x 1000
P15L1205D	12	9...18	30	1470	±5.0	0	±1500	85	2 x 1000
P15L1212D	12	9...18	35	1455	±12.0	0	±625	86	2 x 470
P15L1215D	12	9...18	30	1455	±15.0	0	±500	89	2 x 330
P15L243R3D	24	18...36	25	505	±3.3	0	±1500	82	2 x 1000
P15L2405D	24	18...36	25	725	±5.0	0	±1500	86	2 x 1000
P15L2412D	24	18...36	25	700	±12.0	0	±625	89	2 x 470
P15L2415D	24	18...36	25	700	±15.0	0	±500	89	2 x 330
P15L483R3D	48	36...75	20	250	±3.3	0	±1500	82	2 x 1000
P15L4805D	48	36...75	20	365	±5.0	0	±1500	86	2 x 1000
P15L4812D	48	36...75	20	355	±12.0	0	±625	88	2 x 470
P15L4815D	48	36...75	20	350	±15.0	0	±500	89	2 x 330

Specifications

Input		
Under voltage protection, typ.	Start up [V _{DC}]	Lockout [V _{DC}]
P15L12xxx:	8.6	7.9
P15L24xxx:	17.8	16
P15L48xxx:	33.5	30.5
Start up time at Vin nom & R load	20 ms, typ.	
Filter	π - type	
Reflected input ripple current	20 mA _{p-p} , typ.	(see Figure 1)
Remote CTRL threshold level (see Figure 3)	ON 2.5 ... 5.5 V _{DC} or open input	OFF ≤ 0.8 V _{DC}
Idle current, CTRL - OFF state	2.5 mA, typ.	
Isolation Voltage:		
Input to output for 1 min.	≥ 1.6 kV _{DC}	
Input or output to case for 1 min.	≥ 1.6 kV _{DC}	
Resistance, input to output	≥ 10 ⁹ Ω	
Capacitance	1200 pF, typ.	
Output		
Voltage tolerance	≤ ± 1 %	
Line regulation	≤ ± 0.5 %	
Load regulation at 0..100 % load	Single output: ± 0.5 %, Dual output: ± 1 %, balanced load	
Cross deviation @ dual output	≤ ± 5 %, @ ≤ 75 % load difference	
Over current protection	140 %, typ. of max. I _{out}	
Short circuit protection	Continuous, hiccup, auto restart	
Ripple and noise BW 20 MHz	≤ 75 mV _{p-p} (see Figure 2)	
Temperature coefficient	± 0.02 % / °C	
Transient recovery time at 25 % load change steps	250 μs, typ.	
Transient response deviation at 25 % load change steps	± 3 %, typ.	
General		
Switching frequency	300 kHz, typ.	
Reliability calculated MTBF: (MIL-HDBK-217F @ 25 °C)	≥ 1.12 Mio. h	

Safety standard	EN 62368-1		
EMC			
RE	EN 55032	Class A	
CE	EN 55032	Class A (see Figure 4)	
ESD	IEC 61000-4-2	Air: ±8 kV, Contact: ± 2 kV Perf. criteria A	
RS	IEC 61000-4-3	10 V/m Perf. criteria A	
EFT	IEC 61000-4-4	±2 kV Perf. criteria A (see Figure 4)	
Surge	IEC 61000-4-5	±1 kV Perf. criteria A (see Figure 4)	
CS	IEC 61000-4-6	10 V _{rms} Perf. criteria A	
PFMF	IEC 61000-4-8	1 A/m Perf. criteria A	
Environmental			
Operating ambient temperature	-40 ... 95 °C, see derating		
Storage temperature	-40 ... 125 °C		
Case temperature	≤ 100 °C		
Derating	See diagram		
Storage humidity	95 % max. non condensing		
Cooling	Free air convection, 30.. 65 LFM		
Thermal impedance	12 K/W, without heat sink 10 K/W, with heat sink		
Physical			
Standard version		Dimensions	Weight
		50.8 x 25.4 x 10.2 mm	31 g
Heat sink version		50.8 x 25.4 x 16.3 mm	42.3 g
Case material		Nickel coated copper	
Potting material		Epoxy (UL94V-0 rated)	
Pin material		Brass solder coated	
Absolute maximum ratings			
P15L12xxx:		Vin: ≤ 30 V _{DC} duration ≤ 100 ms	
P15L24xxx:		Vin: ≤ 50 V _{DC} duration ≤ 100 ms	
P15L48xxx:		Vin: ≤ 100 V _{DC} duration ≤ 100 ms	
Soldering temperature		≤ 260 °C peak duration ≤ 10 s, ≥ 1.5 mm distance from case	

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Ordering information										
Output power	Series	Input voltage		Output voltage		Outputs		Control input		Heat sink
P15	L	24		05		S		C		K
15 Watt		12	9..18 V	3R3	3.3 V	S	Single	blank	-	blank
		24	18..36 V	05	5 V	D	Dual ±	C	yes	K
		48	36..72 V	12	12 V					
				15	15 V					
Example:	P15L2405SHCK			Pout: 15 W, Vin: 24 V, Vout: 5 V, Single output, Control function, Heat sink						

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 4)
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 4).

Figure 1 Measure circuit for reflected input ripple current

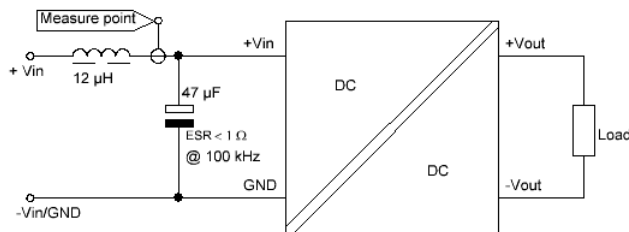


Figure 2a Measurement method for output ripple voltage at single output

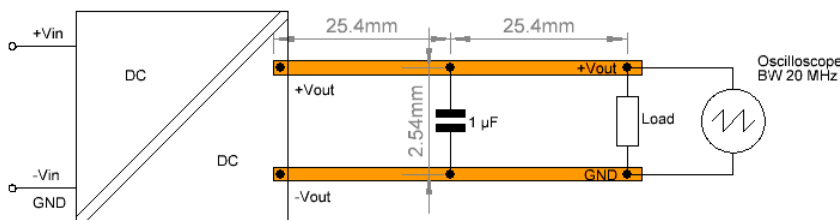
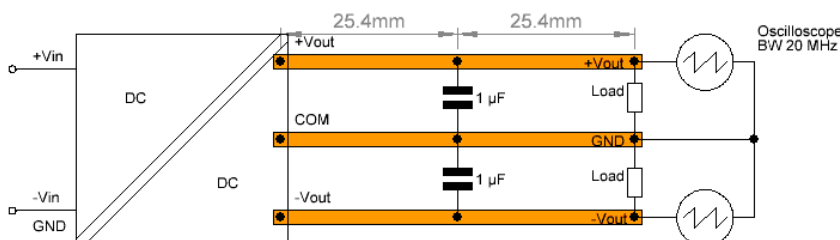


Figure 2b Measurement method for output ripple voltage at dual output





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Figure 3 Application circuit for optional remote control function

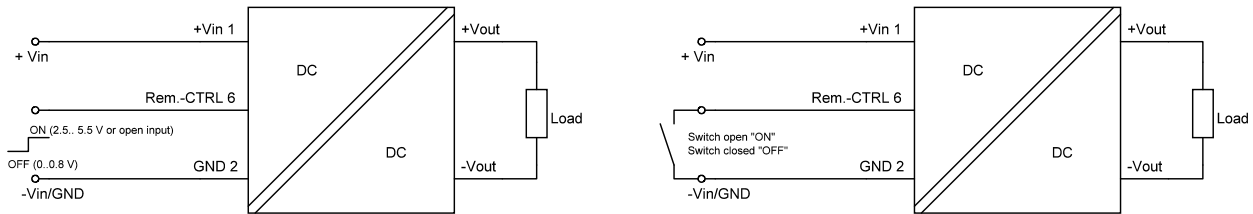


Figure 4 Recommended input filter circuit to meet EFT & Surge and EMI specifications

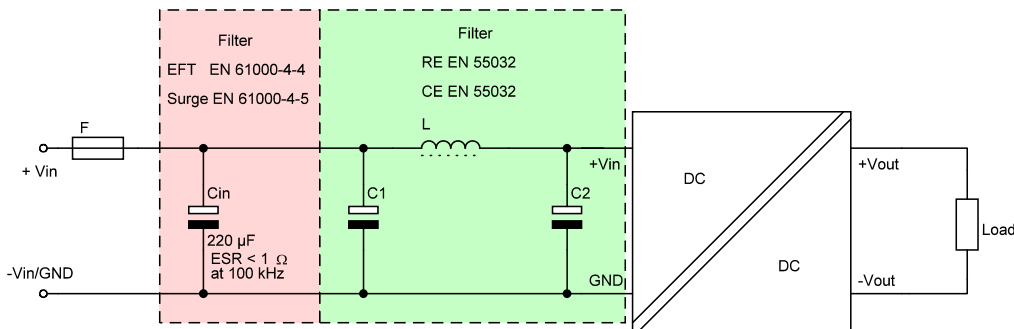
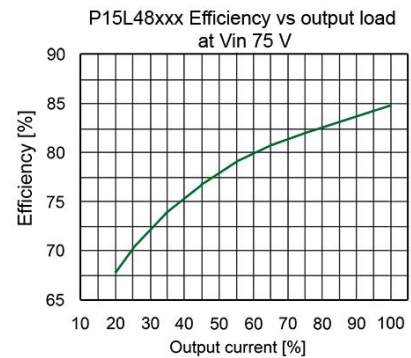
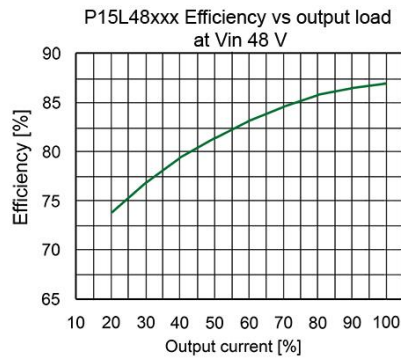
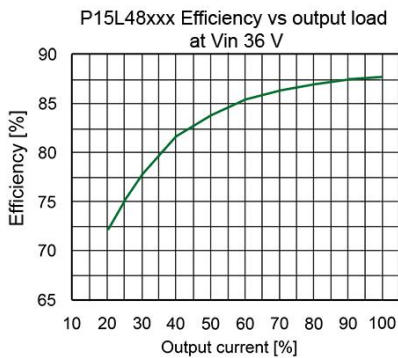
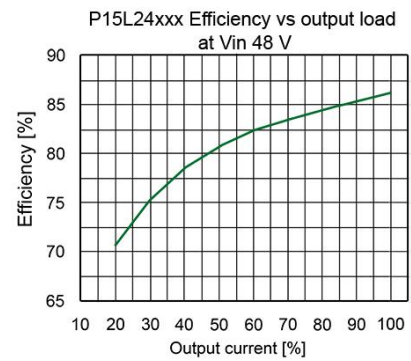
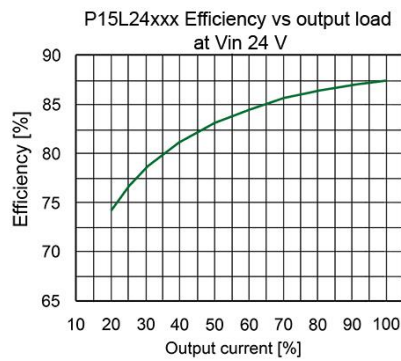
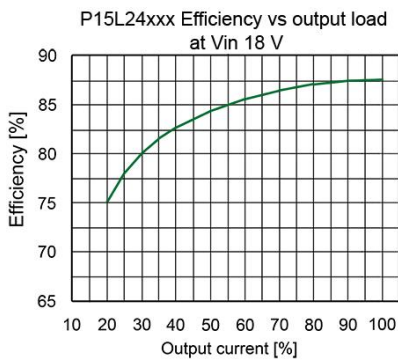
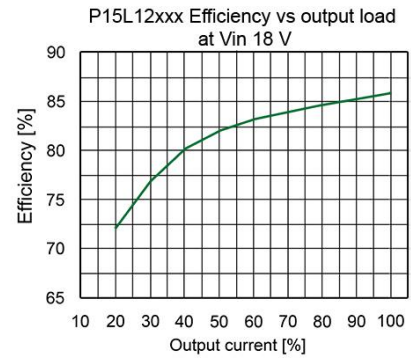
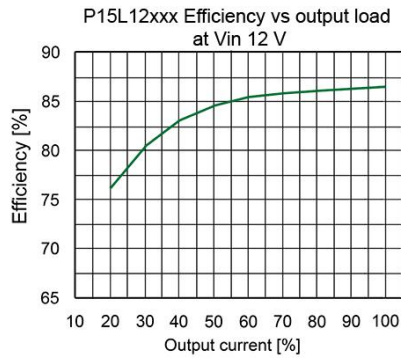
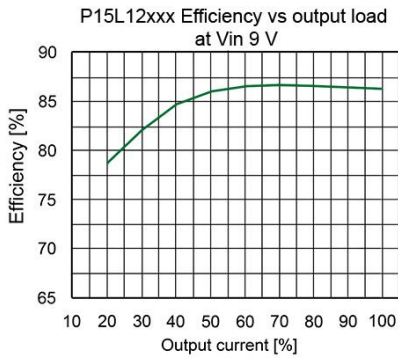


Table to figure 4					
Type	F (Time delayed)	Cin	C1	L	C2
P15L12xxx	3.15 A	220 µF, 100 V	330 µF, 100 V	12 µH	100 µF, 100V
P15L24xxx	1.6 A	220 µF, 100 V	330 µF, 100 V	12 µH	100 µF, 100V
P15L48xxx	0.8 A	220 µF, 100 V	330 µF, 100 V	12 µH	100 µF, 100V



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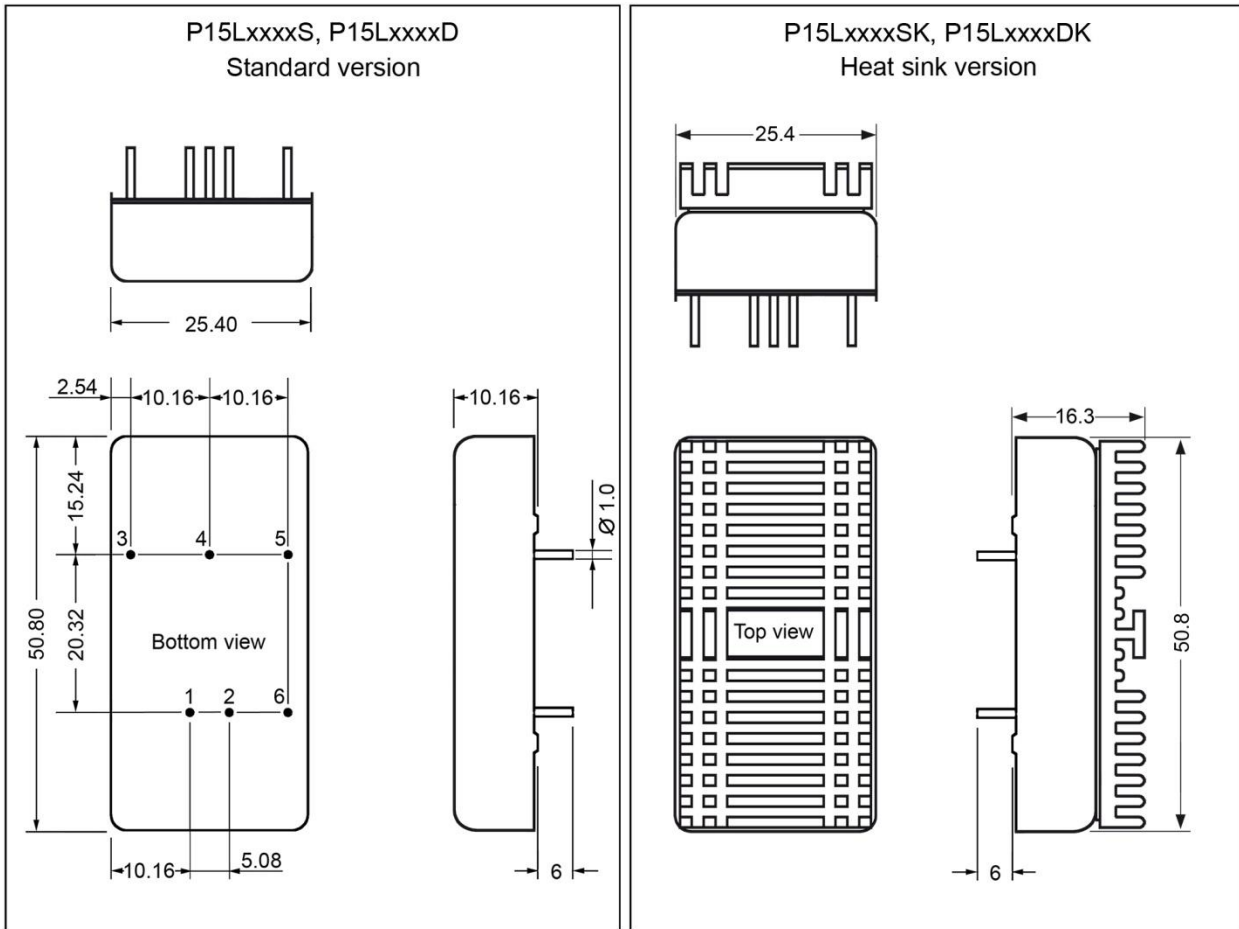




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Mechanical dimensions



Pin assignment				
Pin	P15LxxxxSxx	P15LxxxxDxx	P15LxxxxSCxx	P15LxxxxDCxx
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	Rem. CTRL	Rem. CTRL

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

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