15 W DC-DC Converter P15D-Series

PHI-CON

- Wide 2:1 input range
- Efficiency up to 87 %
- Isolation 1500 $V_{DC,}$
- Continuous short circuit protection
- On/Off-Control input optional
- Standard package 2" x 1" x 0.4"
- 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									
P15D123R3S	12	9...18	30	1030	3.3	0	3000	80	3300
P15D1205S	12	9...18	30	1525	5.0	0	3000	82	3300
P15D127R2S	12	9...18	30	1505	7.2	0	2083	83	2200
P15D1209S	12	9...18	30	1470	9.0	0	1666	85	1000
P15D1212S	12	9...18	30	1470	12.0	0	1250	85	1000
P15D1215S	12	9...18	30	1470	15.0	0	1000	85	680
P15D1218S	12	9...18	30	1470	18.0	0	833	85	470
P15D1224S	12	9...18	30	1455	24.0	0	625	86	470
P15D243R3S	24	18...36	25	515	3.3	0	3000	80	3300
P15D2405S	24	18...36	25	745	5.0	0	3000	84	3300
P15D247R2S	24	18...36	25	745	7.2	0	2083	84	2200
P15D2409S	24	18...36	25	735	9.0	0	1666	85	1000
P15D2412S	24	18...36	25	735	12.0	0	1250	85	1000
P15D2415S	24	18...36	25	725	15.0	0	1000	86	680
P15D2418S	24	18...36	25	725	18.0	0	833	86	470
P15D2424S	24	18...36	25	720	24.0	0	625	87	470
P15D483R3S	48	36...72	20	255	3.3	0	3000	80	3300
P15D4805S	48	36...72	20	370	5.0	0	3000	84	3300
P15D487R2S	48	36...72	20	370	7.2	0	2083	84	2200
P15D4809S	48	36...72	20	370	9.0	0	1666	85	1000
P15D4812S	48	36...72	20	365	12.0	0	1250	86	1000
P15D4815S	48	36...72	20	360	15.0	0	1000	87	680
P15D4818S	48	36...72	20	360	18.0	0	833	87	470
P15D4824S	48	36...72	20	360	24.0	0	625	87	470
Dual Output									
P15D123R3D	12	9...18	30	1560	±3.3	0	±1500	80	2 x 1000
P15D1205D	12	9...18	30	1525	±5.0	0	±1500	82	2 x 1000
P15D127R2D	12	9...18	30	1505	±7.2	0	±1041	83	2 x 680
P15D1209D	12	9...18	30	1490	±9.0	0	±833	84	2 x 470
P15D1212D	12	9...18	30	1490	±12.0	0	±625	84	2 x 470
P15D1215D	12	9...18	30	1490	±15.0	0	±500	84	2 x 330
P15D1218D	12	9...18	30	1470	±18.0	0	±416	85	2 x 220
P15D1224D	12	9...18	30	1470	±24.0	0	±312	85	2 x 220
P15D243R3D	24	18...36	25	515	±3.3	0	±1500	80	2 x 1000
P15D2405D	24	18...36	25	755	±5.0	0	±1500	83	2 x 1000
P15D247R2D	24	18...36	25	745	±7.2	0	±1041	84	2 x 680
P15D2409D	24	18...36	25	735	±9.0	0	±833	85	2 x 470
P15D2412D	24	18...36	25	725	±12.0	0	±625	86	2 x 470
P15D2415D	24	18...36	25	725	±15.0	0	±500	86	2 x 330
P15D2418D	24	18...36	25	720	±18.0	0	±416	87	2 x 220
P15D2424D	24	18...36	25	720	±24.0	0	±312	87	2 x 220
P15D483R3D	48	36...72	20	255	±3.3	0	±1500	80	2 x 1000
P15D4805D	48	36...72	20	370	±5.0	0	±1500	84	2 x 1000
P15D487R2D	48	36...72	20	370	±7.2	0	±1041	84	2 x 680
P15D4809D	48	36...72	20	365	±9.0	0	±833	85	2 x 470
P15D4812D	48	36...72	20	365	±12.0	0	±625	86	2 x 470
P15D4815D	48	36...72	20	360	±15.0	0	±500	87	2 x 330
P15D4818D	48	36...72	20	360	±18.0	0	±416	87	2 x 220
P15D4824D	48	36...72	20	360	±24.0	0	±312	87	2 x 220

Part number designation structure									
Output power	Series	Input voltage		Output voltage		Outputs		Primary / Secondary Isolation	
P15	D	24		05		S			
15 Watt		12	9..18 V	3R3	3.3 V	S	Single	blank	1.5 kV_{DC}
		24	18..36 V	05	5 V	D	Dual ±		
		48	36..72 V	7R2	7.2 V				
				09	9 V				
				12	12 V				
				15	15 V				
				18	18 V				
				24	24 V				

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Specifications

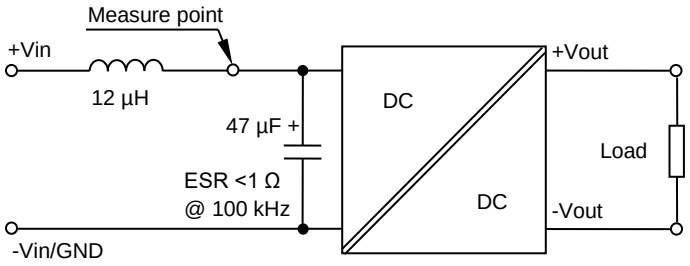
Input	
Start up time @ resistive Load and Vin nominal	20 ms, typ.
Filter	π - type
Reflected input ripple current	35 mAp-p, typ. (see Fig. 1)
Isolation Voltage:	
Input to output	Suffix blank: 1.5 kV_{DC} for 60 s
Input or output to Case	1 kV_{DC} for 1 min.
Resistance	10^9 Ω
Capacitance	500 pF, typ.
Output	
Voltage tolerance	± 1 %, max.
Load regulation at 0..100 % load	Single output: ± 0.5 %, Dual output: ± 1 %
Line voltage regulation	± 0.5 %, max.
Over current protection	140 %, typ. of max. Iout
Short circuit protection	Continuous
Short circuit restart	Automatic
Ripple and noise (at 20 MHz BW)	100 mVp-p, max. (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 %, max.
General	
Switching frequency	200 kHz, typ.
Safety standards	EN-, IEC-, UL-, cUL 60950-1 EN-, IEC-, UL-, cUL 62368-1
Reliability calculated MTBF @ 25 °C (MIL-HDBK-217F)	1.12 Mio. h

EMC	
Radiated emissions	EN55032 class A
Conducted emissions (see figure 3)	EN55032 class A
ESD	IEC61000-4-2 perf. crit. A
RS	IEC61000-4-3 perf. crit. A
EFT (see figure 3)	IEC61000-4-4 perf. crit. A
Surge (see figure 3)	IEC61000-4-5 perf. crit. A
CS	IEC61000-4-6 perf. crit. A
PFMF	IEC61000-4-8 perf. crit. A
Environmental	
Operating ambient temperature	-40 ... 85 °C -40 ... 70 °C without derating
Storage temperature	-40 ... 125 °C
Case temperature	100 °C, max.
Derating	None required
Humidity	95% max. non condensing
Cooling	Free air convection, 30…60 LFM
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, nickel coated
Absolute maximum ratings	
Input voltage P15D12xxx	25 V_{DC}, max. 100 ms
Input voltage P15D24xxx	50 V_{DC}, max. 100 ms
Input voltage P15D48xxx	100 V_{DC}, max. 100 ms
Soldering temperature min. 1.5 mm distance from case	260 °C max. for 10 s max.

Note:

1. The maximum capacitive load is specified at minimal input voltage and constant resistive load.
2. With input filter circuit to meet of conducted emissions EN55032 class A. (See figure 3)
3. An external input blocking capacitor is required if the converter has to meet IEC61000-4-5.
   Suggested capacitor type: KY-series, 220 µF, 100 V, Nippon Chemicon. (See figure 3)
4. No load operation will not damage the converter, however they may not meet all listed parameters.

Figure 1 Measurement circuit for reflected input ripple current

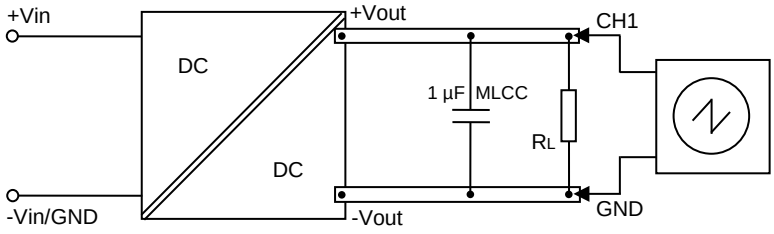


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Figure 2 Measurement method for output ripple voltage (BW 0…20 MHz)
Single output



Dual output

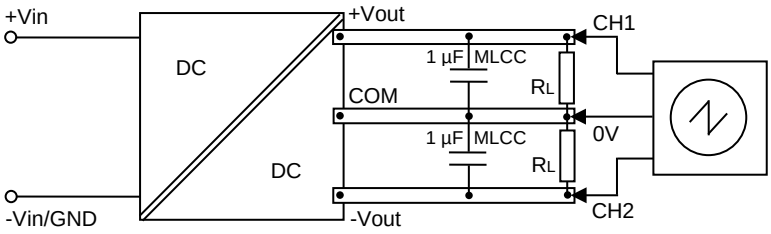
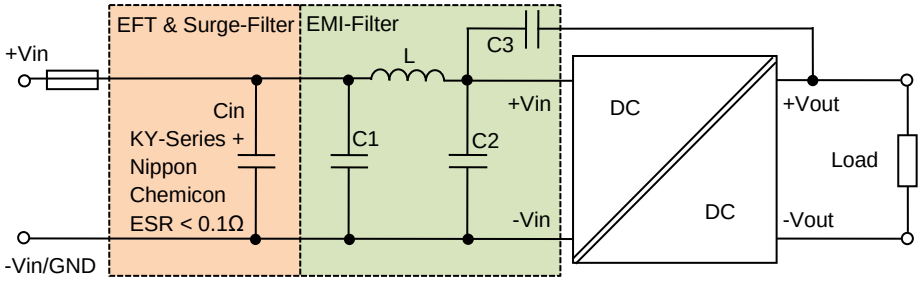


Figure 3 Recommended input filter circuit to meet EFT & Surge and EMI specifications

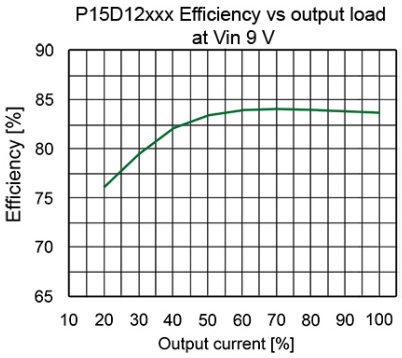


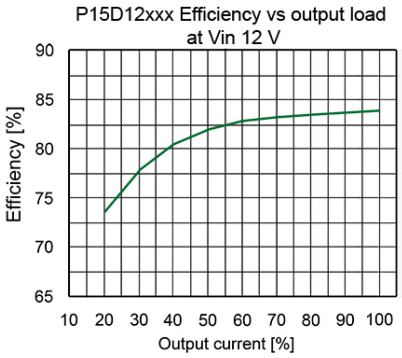
BOM to Figure 3					
Family	Cin	C1	C2	L	C3
P15D12xxx	220 µF, 100 V	330 µF, 100 V	100 µF, 100V	12 µH	1 nF, 3kV
P15D24xxx	220 µF, 100 V	330 µF, 100 V	100 µF, 100V	12 µH	1 nF, 3kV
P15D48xxx	220 µF, 100 V	330 µF, 100 V	100 µF, 100V	12 µH	1 nF, 3kV

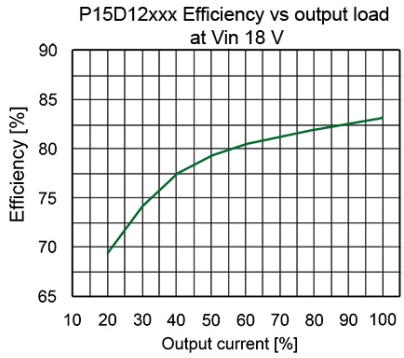
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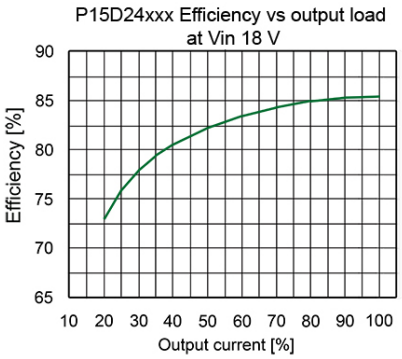
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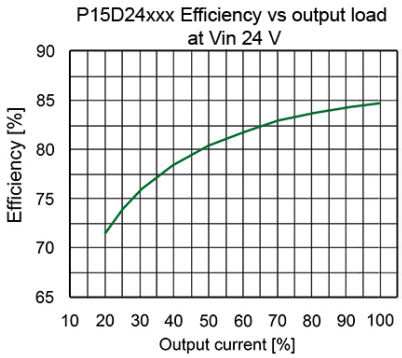
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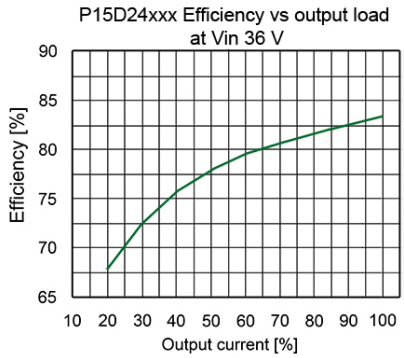


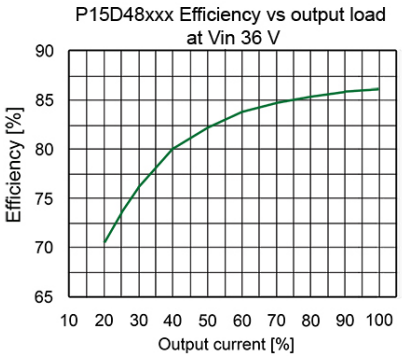


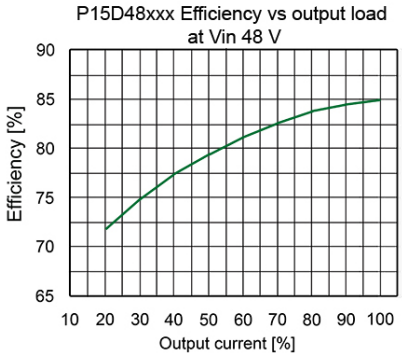


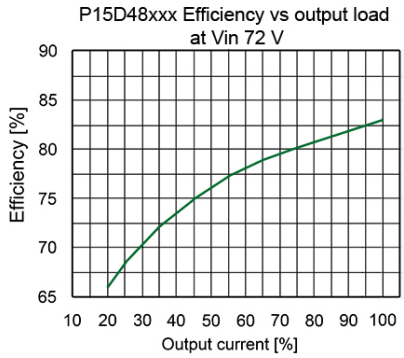


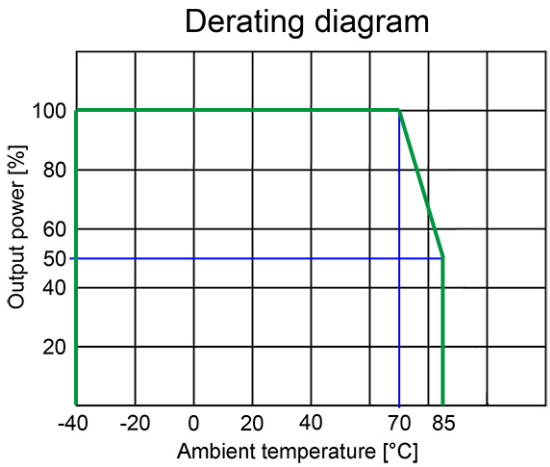












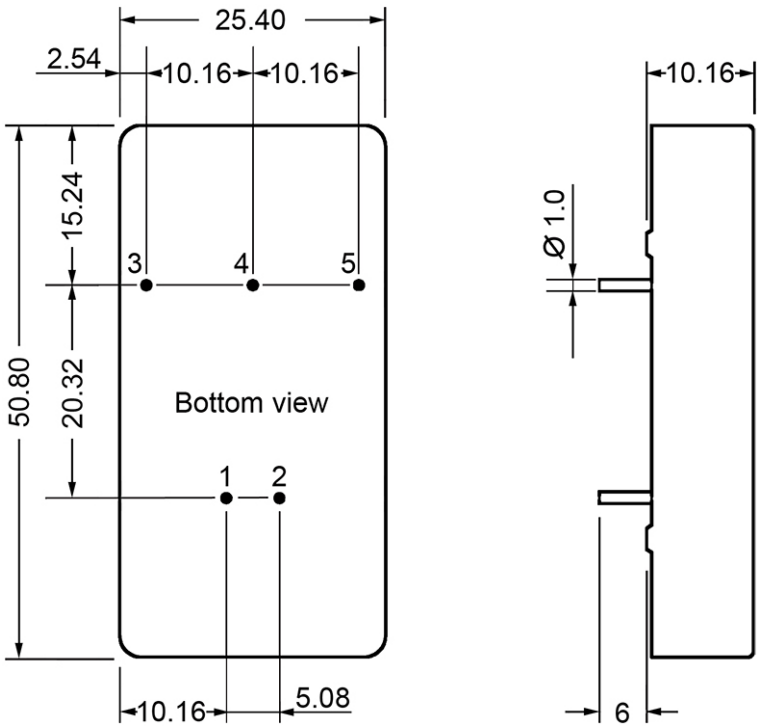
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Note:
All dimensions in mm
1. Pin diameter tolerance ± 0.05
2. Pin pitch tolerance ± 0.35
3. Pin length tolerance ± 0.35
4. Case tolerance ± 0.5

Pin assignment		
Pin	Single output	Dual output
1	+ V input	+ V input
2	- V input	- V input
3	+ V output	+ V output
4	No pin	Common
5	- V output	- V output

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