15 W DC-DC Converter P15ExxxxBx-Series

PHI-CON

- Wide 4:1 input range
- 3000 V_{DC} isolation
- Continuous short circuit protection
- Over current-, continuous short circuit- and over voltage protection
- Wide operation temperature range -40...100 °C
- Adjustable output voltage
- On / Off remote control input
- Soft start function



Model guide

Type	Input voltage		Input current		Output voltage [V_{DC}]	Output current		Efficiency typ. [%]	Capacitor load [µF] max.
	Nominal [V_{DC}]	Range [V_{DC}]	no load [mA] typ.	full load [mA] typ.		[mA] min.	[mA] max.		
Single output									
P15E243R3BS	24	9...36	10	510	3.3	0	3000	82	3300
P15E2405BS	24	9...36	10	750	5.0	0	3000	85	3300
P15E2412BS	24	9...36	10	735	12.0	0	1250	88	680
P15E2415BS	24	9...36	10	720	15.0	0	1000	89	470
P15E483R3BS	48	18...75	10	255	3.3	0	3000	82	3300
P15E4805BS	48	18...75	10	375	5.0	0	3000	85	3300
P15E4812BS	48	18...75	10	370	12.0	0	1250	87	680
P15E4815BS	48	18...75	10	365	15.0	0	1000	88	470
Dual output									
P15E2405BD	24	9...36	10	750	±5.0	0	±1500	85	2 x 2200
P15E2412BD	24	9...36	10	720	±12.0	0	±625	88	2 x 470
P15E2415BD	24	9...36	15	715	±15.0	0	±500	89	2 x 330
P15E4805BD	48	18...75	8	370	±5.0	0	±1500	88	2 x 2200
P15E4812BD	48	18...75	8	360	±12.0	0	±625	90	2 x 470
P15E4815BD	48	18...75	10	365	±15.0	0	±500	88	2 x 330

Specifications

Input	
Start up voltage	P15E24xxBx: 8.8 V_{DC} P15E48xxBx: 17.5 V_{DC}
Under voltage lockout	P15E24xxBx: 7.6 V_{DC} P15E48xxBx: 16.5 V_{DC}
Filter	Pi Network
Start up time with R-load	30 ms, typ.
Reflected ripple current	20 mAp-p, (see fig. 2)
ON / OFF Control threshold (see figures 6)	On: 3...12 V_{DC} or open input Off: 0...1.2 V_{DC} Standby idle current 2 mA, typ.
Isolation:	
Input / output voltage Input or output to case	3000 V_{DC} 1600 V_{DC}
Resistance	10^9 Ω
Capacitance	2000 pF, typ.
Output	
Voltage tolerance	± 1 %, max.
Voltage trim range only single output (see fig. 5)	± 10 %, max.
Voltage balance at dual outputs	± 1 % at balanced load
Line voltage regulation	± 0.5 %, max.
Dual output cross deviation @ 75 % load difference	± 5 %, typ.
Load regulation 0...100 % load	Single: ± 0.5 %, max. Dual: ± 1 %, max. (balanced load)
Transient recovery time @ 25 % load change steps	250 µs, typ.
Transient response drift @ 25 % load change steps	± 3 %, max. @ all others ± 5 %, max. @ P15Exx3R3BS
Temperature coefficient	± 0.02 % / °C
Ripple and noise (at 20 MHz BW)	Single output: 75 mVp-p, max., Dual output: 60 mVp-p, max. (see figures 3)
Short circuit protection	Indefinite, hiccup, automatic restart
Over load protection	170 % of Iout, typ.
Over voltage protection	140 % of Vout, typ.

General	
Switching frequency	300 kHz, typ.
Safety Standard	EN, IEC, UL, ULc 60950-1 EN, IEC, UL, ULc 62368-1
Reliability calculated MTBF MIL-HDBK-217F	600.000 h at 25 °C
EMC Characteristics	
Radiated Emissions	EN55032 class A
Conducted Emissions (see fig.4)	EN55032 class A
ESD	IEC61000-4-2 perf. criteria B
RS	IEC61000-4-3 perf. criteria A
EFT (see fig. 4)	IEC61000-4-4 perf. criteria A
Surge (see fig. 4)	IEC61000-4-5 perf. criteria A
CS	IEC61000-4-6 perf. criteria A
PFMF	IEC61000-4-8 perf. criteria A
Environmental	
Operating ambient temperature (see derating diagram)	-40…77 °C, without derating -40…100 °C, with derating
Case temperature	105 °C max.
Thermal resistance	12 K/W, typ. without heat sink 11 K/W, typ. with heat sink
Storage temperature	-55…125 °C
Storage humidity	Up to 95 %, non condensing
Free air convection cooling	15..33 cm/s
Physical	
Dimensions basic version	40.64 x 25.4 x 10.9 mm
Dimensions heat sink version	40.64 x 25.4 x 17.2 mm
Weight basic version	29 g
Weight heat sink version	36 g
Case material	Copper
Potting material	Epoxy (UL94V-0 rated)
Base material	Non conductive plastic (UL94V-0 rated)
Absolute maximum ratings	
Input voltage P15E24xxBx	50 V_{DC}, 100 ms, max.
Input voltage P15E48xxBx	100 V_{DC}, 100 ms, max.
Pin soldering temperature 1.5 mm distance from body	260 °C max., 10 s max., ≥1.5 mm distance from body

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Ordering information									
Output power	Series	Input voltage		Output voltage		Revision	Output		Heat sink	
P15	E	24		05		B	S		K	
15 Watt		24	9…36 V_{DC}	3R3	3.3 V_{DC}		S	Single	blank	Standard
		48	18…75 V_{DC}	05	5 V_{DC}		D	Dual ±	K	With heat sink
				12	12 V_{DC}					
				15	15 V_{DC}					

Notes:

1. All parameter are typical specified at 25 °C ambient temperature, nominal input voltage and full load, unless otherwise noted.
2. Capacitive load tested by minimal input voltage and constant resistive load.
3. An external filter is required to meet EFT standard IEC 61000-4-4 and IEC 61000-4-5. (see Figue 4)

Figure 2 Measure circuit input ripple current

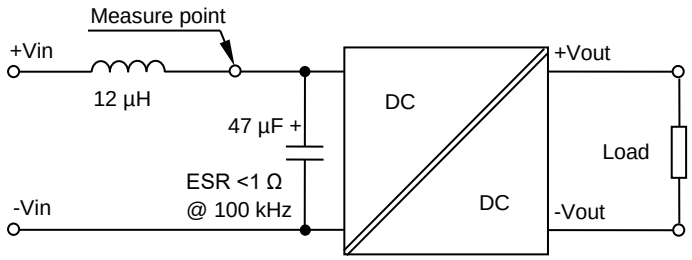


Figure 3a Single output measure circuit output ripple & noise voltage

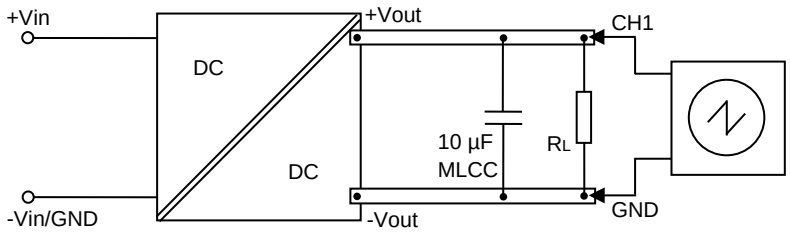
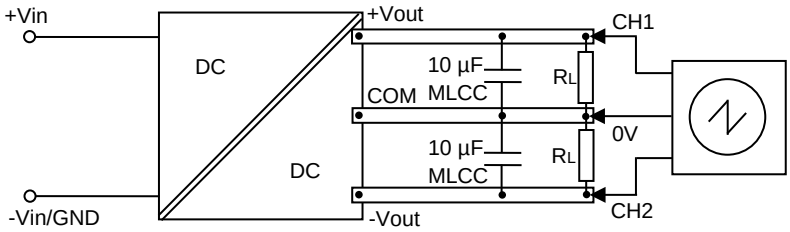


Figure 3b Dual output measure circuit output ripple & noise voltage

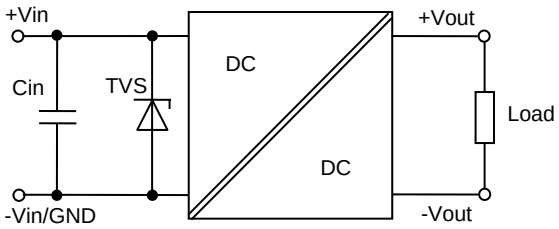


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Figure 4 Application circuit to meet EFT standard IEC61000-4-4 and IEC61000-4-5



Type	Cin	TVS Diode
P15E24xxBx	330 µF	58 V, 3 kW
P15E48xxBx	330 µF	120 V, 3 kW

Figure 5 Output voltage trimming application

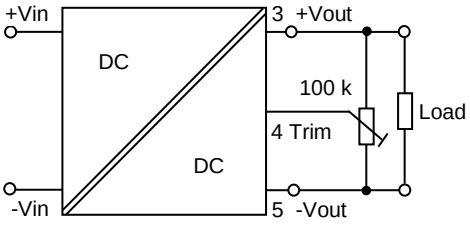


Figure 6a ON/OFF remote control application circuit

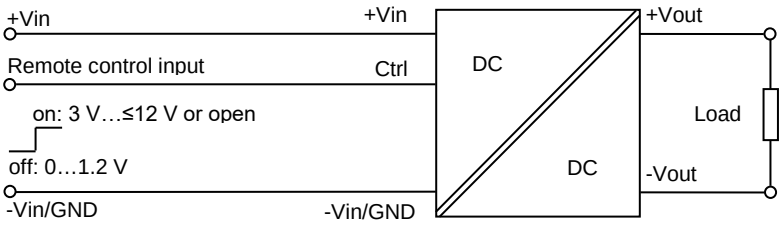
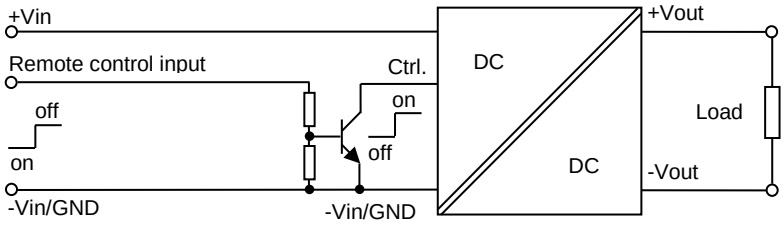


Figure 6b ON/OFF remote control application circuit for inverse logic and higher input level possibility



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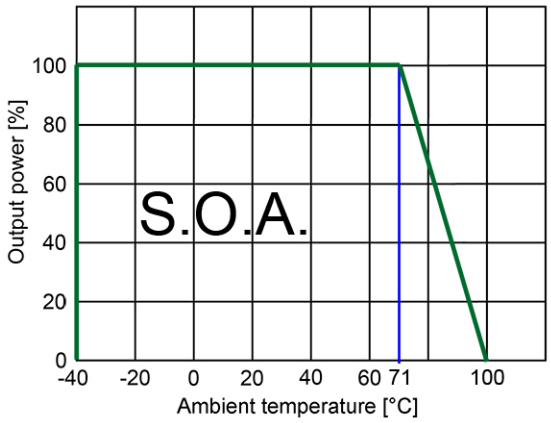
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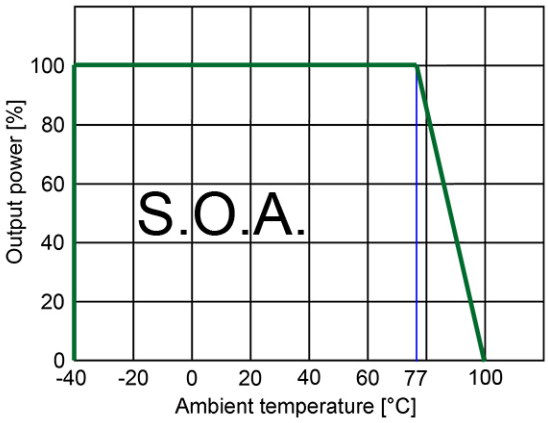
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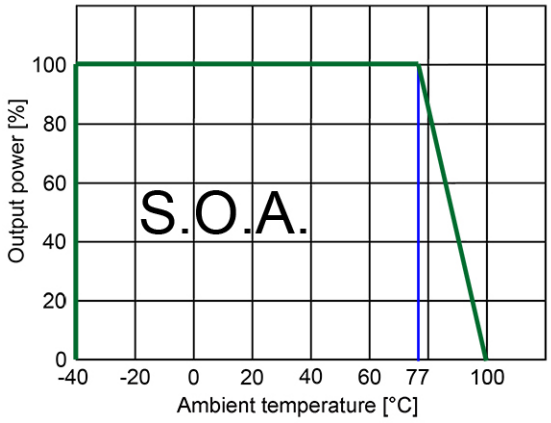
P15Exx05Bx derating diagram without heat sink



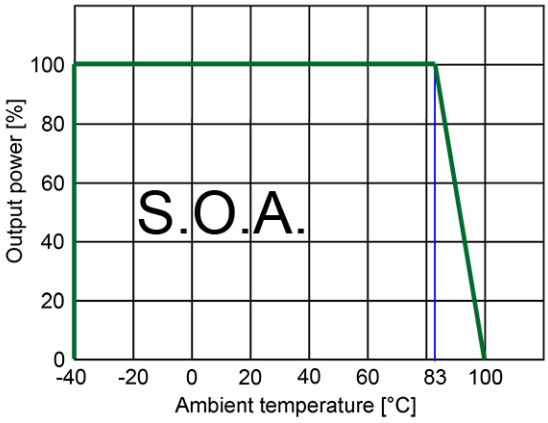
P15ExxxxBx derating diagram without heat sink



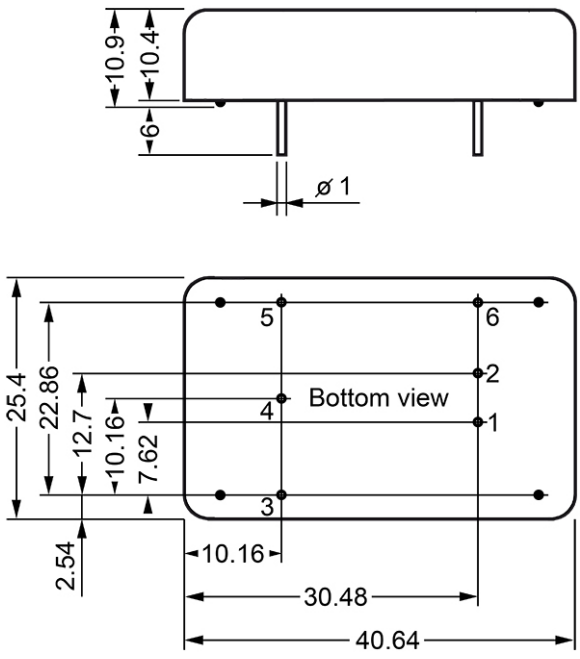
P15Exx05BxK derating diagram with heat sink

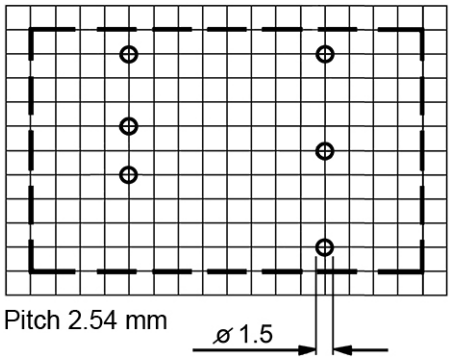


P15ExxxxBxK derating diagram with heat sink



Dimensions standard version





Pin assignment		
Pin	Single out	Dual out
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Rem. Ctrl.	Rem. Ctrl.

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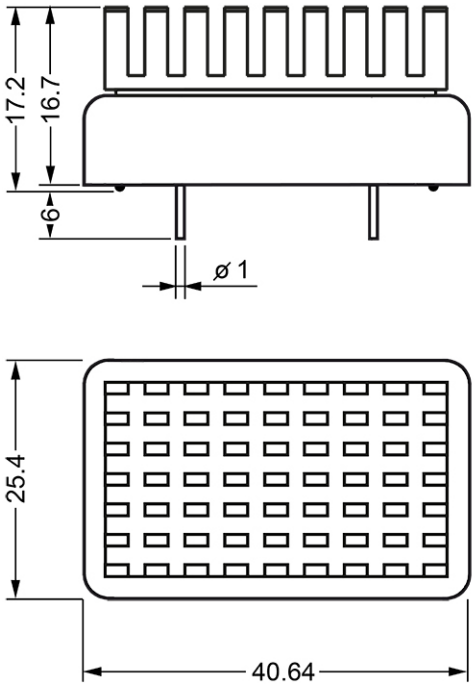
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Dimensions heat sink version suffix “K”



Note:All dimensions in mm

1. Pin diameter tolerance ±0.05 mm
2. Pin pitch tolerance ±0.35 mm
3. Pin to case tolerance ±0.5 mm
4. Case tolerance ±0.5 mm
5. Stand off tolerance ±0.1 mm
6. Recommented Pin hole diameter 1.5 mm

Pin assignment		
Pin	Single out	Dual out
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Rem. Ctrl.	Rem. Ctrl.



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