15 W DC-DC Converter P15F-Series

PHI-CON

- Wide 4:1 Input Range
- 1600 V_{DC} Isolation
- No Minimum Load Required
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Efficiency up to 89 %
- 15 mA no load Input Current
- Wide Operation Temperature Range -40...85 °C
- On / Off Remote Control Input
- Soft Start



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									
P15F243R3S	24	9...36	15	650	3.3	0	4000	86	1000
P15F2405S	24	9...36	15	730	5.0	0	3000	87	1000
P15F2412S	24	9...36	15	750	12.0	0	1300	88	330
P15F2415S	24	9...36	15	710	15.0	0	1000	89	220
P15F483R3S	48	18...75	10	330	3.3	0	4000	84	1000
P15F4805S	48	18...75	10	370	5.0	0	3000	86	1000
P15F4812S	48	18...75	10	380	12.0	0	1300	87	330
P15F4815S	48	18...75	10	360	15.0	0	1000	88	220
Dual output									
P15F2405D	24	9...36	15	750	±5.0	0	±1500	85	2 x 470
P15F2412D	24	9...36	15	720	±12.0	0	±625	88	2 x 220
P15F2415D	24	9...36	15	710	±15.0	0	±500	89	2 x 100
P15F4805D	48	18...75	10	380	±5.0	0	±1500	84	2 x 470
P15F4812D	48	18...75	10	360	±12.0	0	±625	87	2 x 220
P15F4815D	48	18...75	10	360	±15.0	0	±500	88	2 x 100

Suffix „K" for heat sink version, e.g.: P15F2415SK

Specifications

Input	
Filter	Pi Network
Start up time with R-load	20 ms, typ.
Reflected ripple current	20 mAp-p, (see fig. 2)
ON / OFF Control threshold (see fig. 5)	On: 3...12 V or open input Off: 0...1.2 V Standby current 5 mA typ.
Isolation:	
Input / output voltage Input or output to case	1600 V_{DC} 1000 V_{DC}
Resistance	10^9 Ω
Capacitance	1200 pF, max.
Output	
Voltage accuracy	± 1 %, max.
Voltage trim range (see fig. 4)	± 10 %
Voltage balance at dual outputs	± 1 % at balanced load
Line regulation	P15FxxxxS: ± 0.2 %, max. P15FxxxxD: ± 0.5 %, max.
Cross regulation @ dual outputs	± 5 % @ 75 % load difference
Load regulation 0...100 % load	P15FxxxxS: ± 0.5 %, max. P15FxxxxD: ± 1 %, max.
Transient recovery time	250 µs, typ.
Transient response drift @ 25 % load change steps	3 %, max.
Temperature coefficient	± 0.02 % / °C
Ripple and noise (at 20 MHz BW)	100 mVp-p, max., (see fig. 3)
Short circuit protection	Indefinite (hiccup), Automatic restart
Over current protection	170 % of $I_{out,}$ max.
Over voltage protection P15Fxx3R3S P15Fxx05x P15Fxx12x P15Fxx15x	Z-diode clamping 3.9 V 6.2 V 15 V 18 V

General	
Switching frequency	375 kHz, typ
Safety Standard	EN 60950-1, IEC 60950-1
Reliability calculated MTBF MIL-HDBK-217F	560 k hours at 25 °C
EMC Characteristics	
Radiated Emissions	EN55022 class A
Conducted Emissions (see fig.1)	EN55022 class A
ESD	EN61000-4-2 perf. criteria A
RS	EN61000-4-3 perf. criteria A
EFT (see fig.1)	EN61000-4-4 perf. criteria A
Surge (see fig.1)	EN61000-4-5 perf. criteria A
CS	EN61000-4-6 perf. criteria A
PFMF	EN61000-4-8 perf. criteria A
Environmental	
Operating temperature ambient	-40…66 °C -40…85 °C, with derating
Case temperature	105 °C max.
Storage temperature	-55…125 °C
Derating	see diagram
Humidity	Up to 95 %, non condensing
Free air convection cooling	15..33 cm/s
Physical	
Dimensions	25.4 x 25.4 x 10.4 mm
Weight	18 g
Case material	Nickel coated copper
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum ratings	
Input voltage P15F24xxx	50 V_{DC}, 100 ms max.
Input voltage P15F48xxx	100 V_{DC}, 100 ms max.
Pin soldering temperature 1.5 mm distance from body	260 °C max., 10 s max.

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Fig. 2 Measure circuit for input ripple current

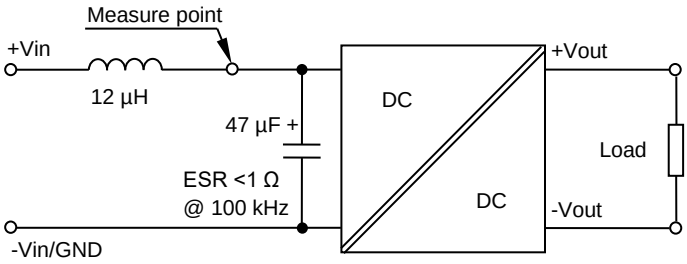
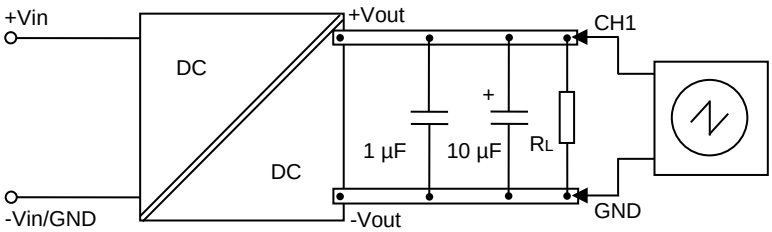


Fig. 3 Measure circuit for output ripple & noise voltage



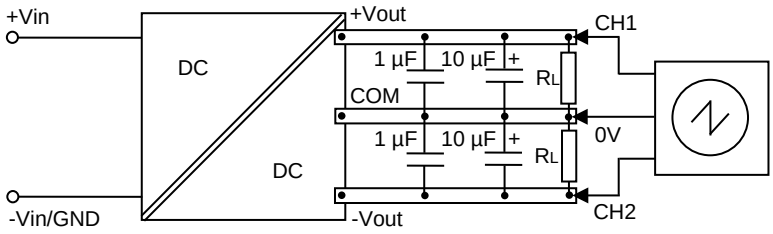
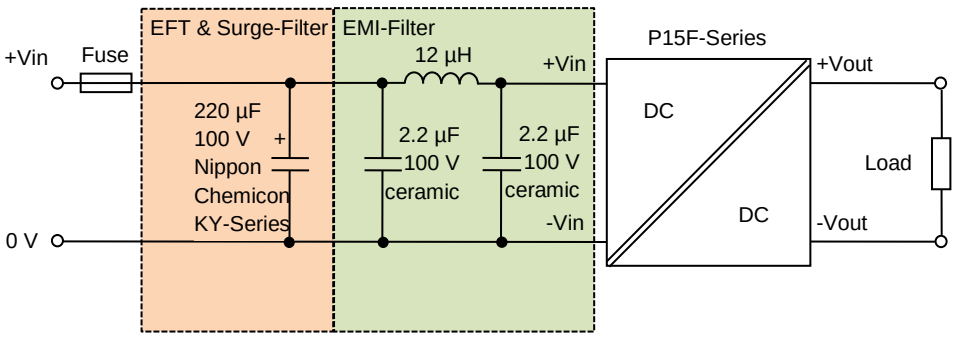


Fig.1 Typical input filter circuits



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Fig. 5 ON/OFF remote control application

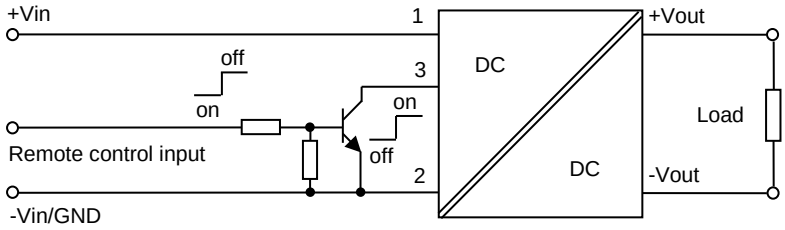


Fig. 4 Output voltage trimming application

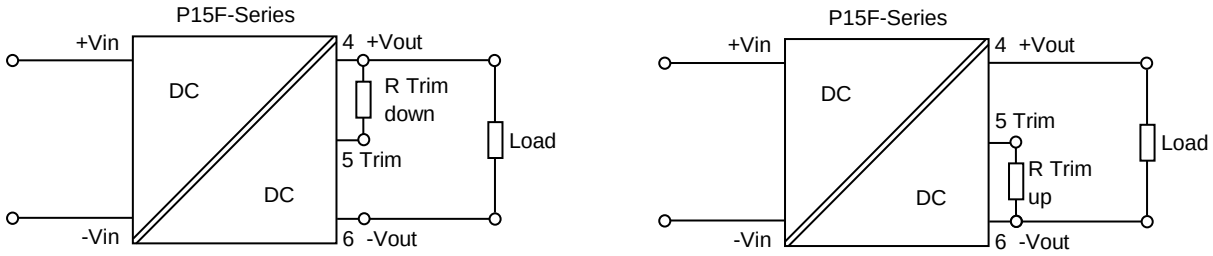


Table of trimming resistors

Vout 3.3V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970	Volts
Rtrim-down	286.268	154.699	100.178	70.355	51.546	38.601	29.147	21.940	16.264	11.678	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630	Volts
Rtrim-up	494.831	167.448	93.381	60.637	42.176	30.327	22.077	16.002	11.342	7.655	KOhms

Vout 5V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500	Volts
Rtrim-down	230.566	106.182	64.301	43.281	30.643	22.207	16.177	11.651	8.129	5.310	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500	Volts
Rtrim-up	244.547	113.776	70.631	49.142	36.274	27.707	21.592	17.010	13.447	10.598	KOhms

Vout 12V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800	Volts
Rtrim-down	273.344	135.217	84.017	57.325	40.944	29.865	21.873	15.836	11.114	7.320	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200	Volts
Rtrim-up	462.903	197.859	120.658	83.855	62.317	48.178	38.184	30.746	24.994	20.413	KOhms

Vout 15V - types											
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	%
Vout=	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500	Volts
Rtrim-down	433.811	174.916	100.946	65.907	45.468	32.077	22.625	15.596	10.165	5.842	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500	Volts
Rtrim-up	347.293	178.523	115.235	82.084	61.683	47.863	37.882	30.336	24.430	19.682	KOhms

Notes:
1. Capacitive load is specified by minimal input voltage and maximum resistive load.
2. Alle values are specified by ambient temperature 25 °C, nominal input voltage and rated output current.

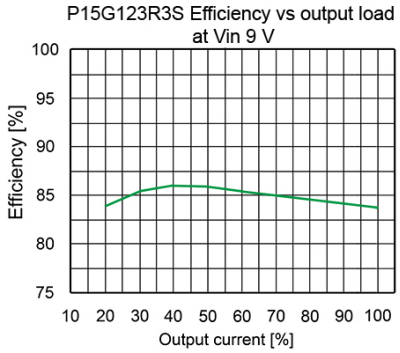
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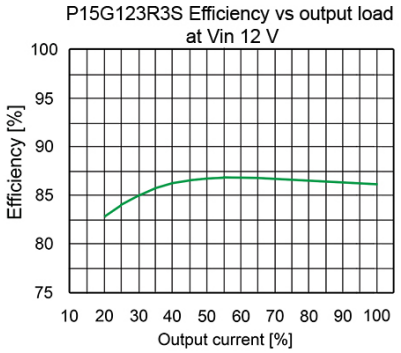
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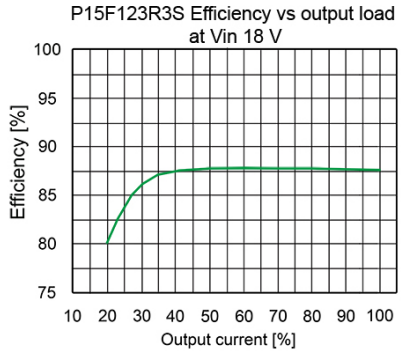
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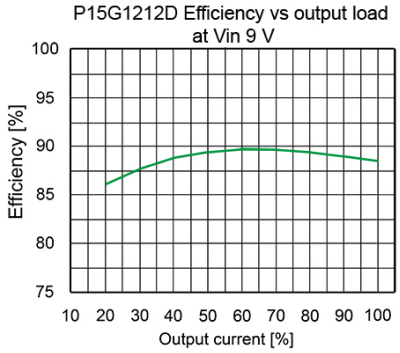
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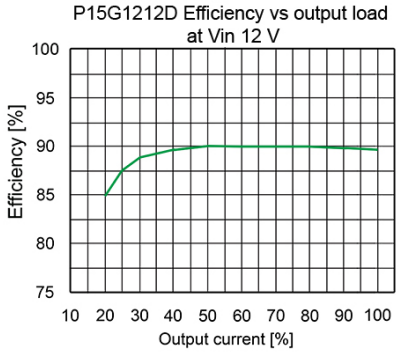
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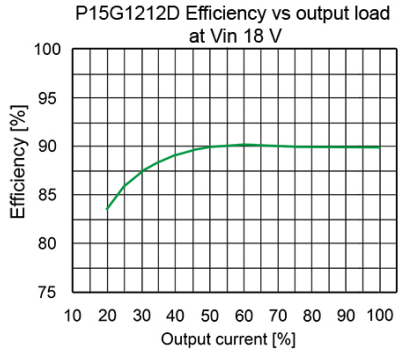


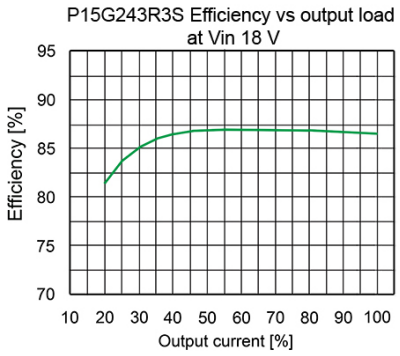


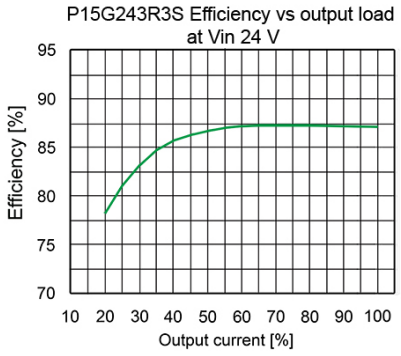


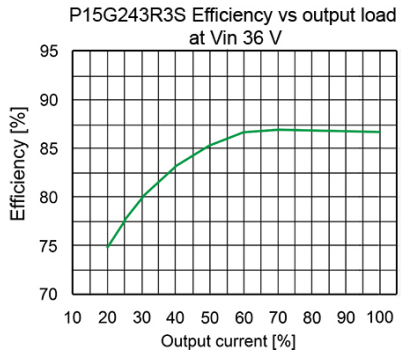


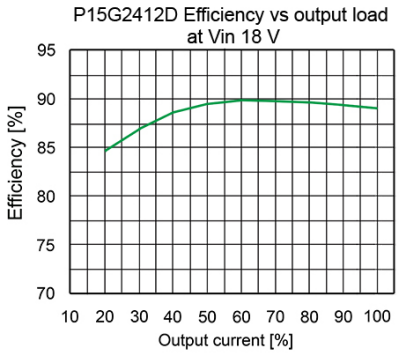


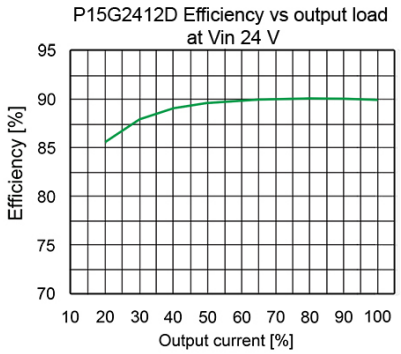


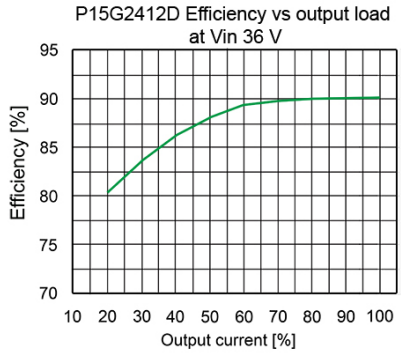








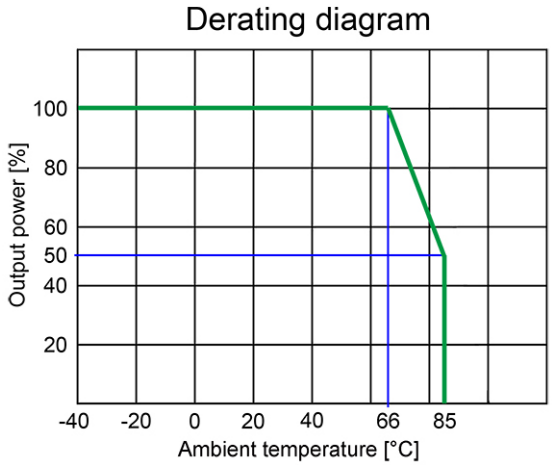




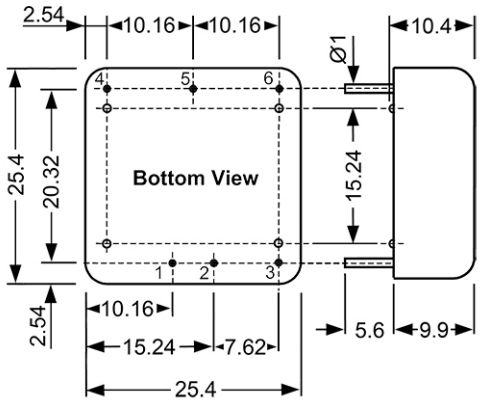
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Dimensions



Unit in mm
1. Pin pitch tolerance ± 0.35 mm
2. Pin length tolerance ± 0.35 mm
3. Case tolerance ± 0.5 mm
4. Stand off tolerance ± 0.1 mm

Pin assignment		
Pin	Single output	Dual output
1	+V Input	+V Input
2	-V Input	-V Input
3	Remote control	Remote control
4	+V Output	+V Output
5	Trim Input	Common
6	-Vout	-Vout

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