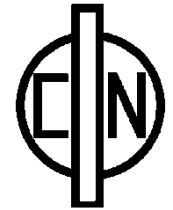


# 20 W DC-DC Converter P20F-Series



PHI-CON

- Wide 4:1 Input Range
- 1600 V<sub>DC</sub> Isolation
- No Minimum Load Required
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Efficiency up to 89 %
- Wide Operation Temperature Range -40...75 °C
- On / Off Remote Control Input
- Soft Start



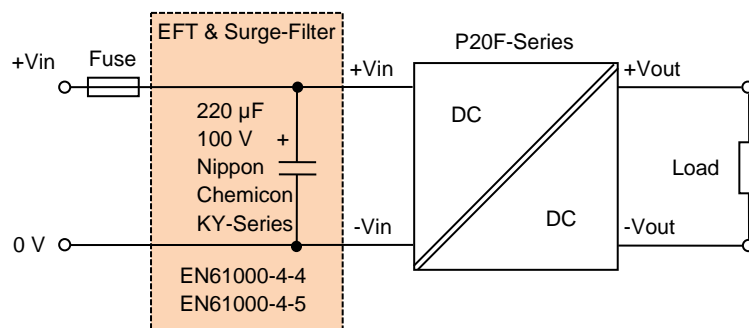
## Model guide

Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ]	Output current [mA] max.	Efficiency typ. [%]	Capacitor Load [μF] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	no load [mA] typ.	full load [mA] typ.				
Single output								
P20F243R3S	24	9...36	50	705	3.3	4500	88	10000
P20F2405S	24	9...36	50	940	5.0	4000	89	5000
P20F2412S	24	9...36	22	940	12.0	1670	89	850
P20F2415S	24	9...36	22	940	15.0	1330	89	700
P20F483R3S	48	18...75	30	350	3.3	4500	88	10000
P20F4805S	48	18...75	30	470	5.0	4000	89	5000
P20F4812S	48	18...75	15	470	12.0	1670	89	850
P20F4815S	48	18...75	15	465	15.0	1330	89	700
Dual output								
P20F2412D	24	9...36	25	940	±12.0	±833	89	2 x 470
P20F2415D	24	9...36	25	940	±15.0	±667	89	2 x 330
P20F4812D	48	18...75	15	470	±12.0	±833	89	2 x 470
P20F4815D	48	18...75	15	470	±15.0	±667	89	2 x 330

## Notes:

1. Capacitive load is specified by minimal input voltage and maximum resistive load.
2. Efficiency is specified by nominal input voltage and maximum resistive load.

Fig.1 Typical input filter circuits



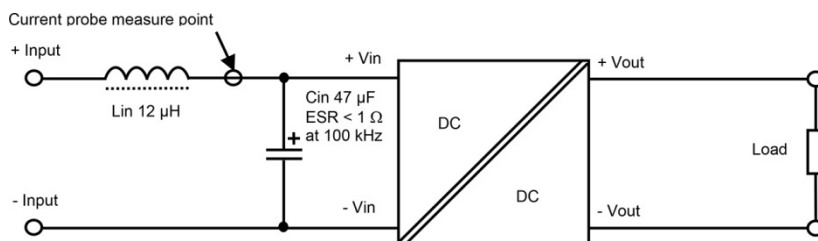
# 20 W DC-DC Converter P20F-Series

## Specifications

Input	
Under voltage shut down P20F24xxx types P20F48xxx types	lock on 8.6 V, lock out 7.9 V lock on 17.8 V, lock out 15.5 V
Filter	Pi Network
Start up time with R-load	30 ms, typ.
Reflected ripple current	30 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	1600 V <sub>DC</sub>
Input or output to case	1000 V <sub>DC</sub>
Resistance	10 <sup>9</sup> Ω
Capacitance	1500 pF, max.
Output	
Voltage accuracy	± 1 %, max.
Voltage trim range (see fig. 4)	± 10 %
Voltage balance at dual outputs	± 1 % at balanced load
Line voltage regulation	± 0.5 %, max.
Cross regulation @ dual outputs	± 5 % @ 75 % load difference
Load regulation 0...100 % load	single ± 0.5 %, max. dual ± 1 %, max.
Transient recovery time @ 25 % load change steps	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	140 % of I <sub>out</sub> , max.
Over voltage protection P20Fxx3R3S P20Fxx05x P20Fxx12x P20Fxx15x	Z-diode clamping 3.9 V 6.2 V 15 V 18 V

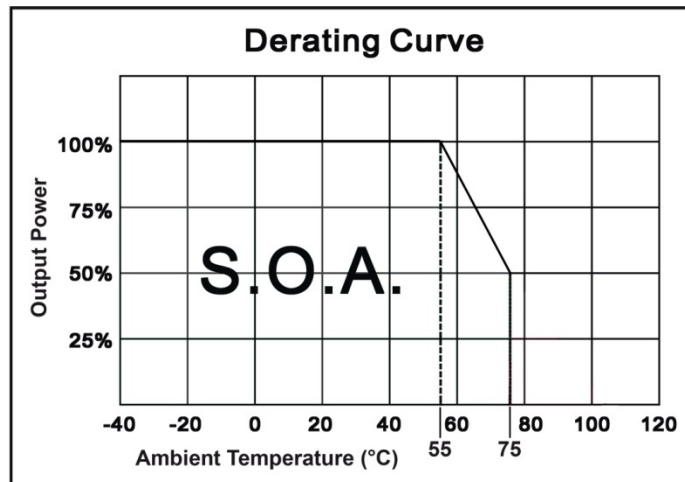
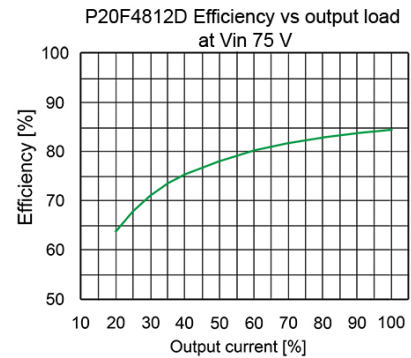
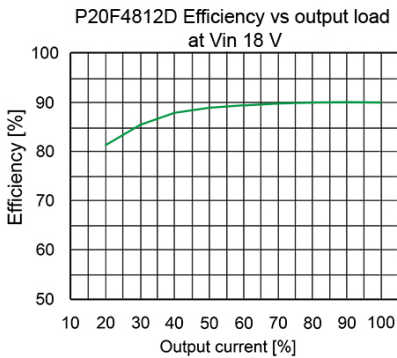
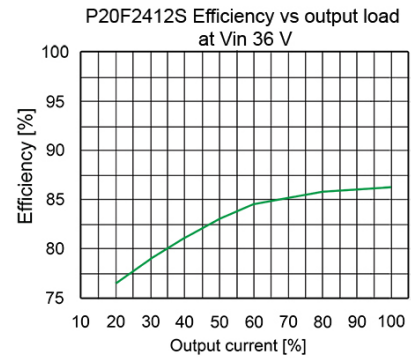
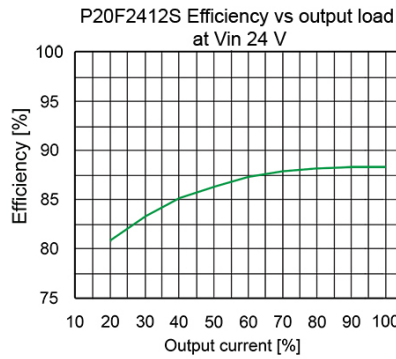
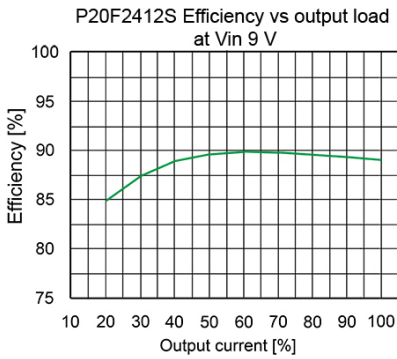
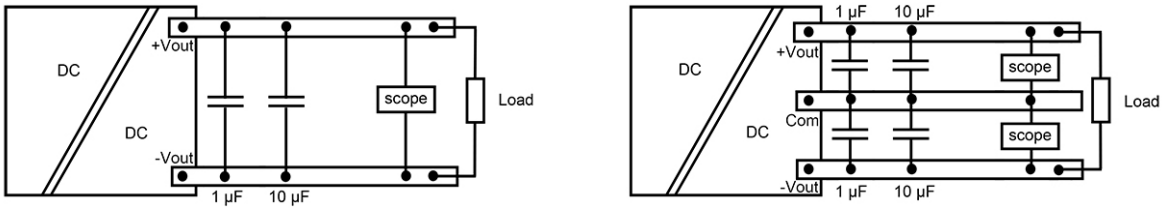
General	
Switching frequency	330 kHz, typ
Safety Standard	EN 60950-1, IEC 60950-1
Reliability calculated MTBF MIL-HDBK-217F	560 k hours at 25 °C
EMC Characteristics	
Radiated Emissions	EN55022 class A
Conducted Emissions	EN55022 class A Without external filter components
ESD	EN61000-4-2 perf. criteria 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...55 °C -40...75 °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	19 g
Case material	Nickel coated copper
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum ratings	
Input voltage P20F24xxx	50 V <sub>DC</sub> , 100 ms max.
Input voltage P20F48xxx	100 V <sub>DC</sub> , 100 ms max.
Pin soldering temperature 1.5 mm distance from body	260 °C max., 10 s max.

**Fig. 2 Measure circuit input ripple current**



# 20 W DC-DC Converter P20F-Series

Fig. 3 Measure circuit output ripple & noise voltage



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Fig. 4 Output voltage trim application

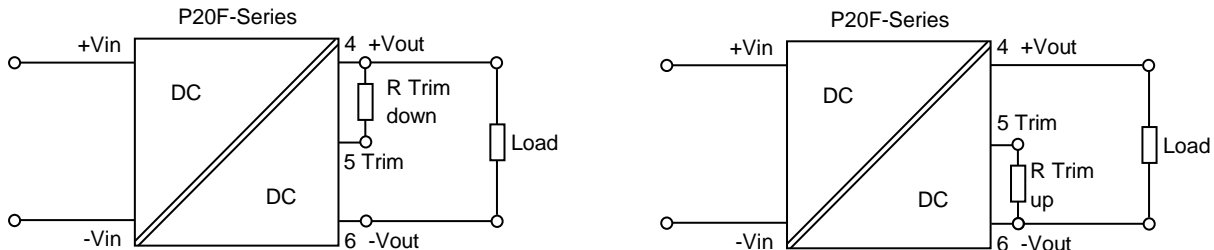


Table of trimming resistors

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

