

30W DC-DC Converter P30F-Series



- Wide 4:1 input range
- Efficiency up to 90%
- Adjustable output voltage
- Remote control on/off
- 1500 V_{DC} isolation
- Continuous short circuit protection
- Over voltage protection
- Standard package 2" x 1.6 x 0.4"
- MTBF > 1 Mio. hours
- -40...+85°C operating temperature range



Model guide

Type	Input nominal voltage [V _{DC}]	Input current		Output voltage [V _{DC}]	Output current		Efficiency @ full load typ. [%]	Capacitive load (see note 3) [μF] max.
		no load [mA]	full load [mA]		minimum load [mA]	maximum load [A]		
Single output								
P30F2405S	9...36	120	1420	5	300	6000	88	6000
P30F2412S	9...36	30	1420	12	125	2500	88	2500
P30F2415S	9...36	30	1420	15	100	2000	90	1100
P30F4805S	18...75	100	710	5	300	6000	88	6000
P30F4812S	18...75	30	710	12	125	2500	88	2500
P30F4815S	18...75	30	702	15	100	2000	89	1100
Dual output								
P30F2405D	9...36	30	1450	±5	±150	±3000	86	2 x 2000
P30F2412D	9...36	30	1420	±12	±63	±1250	89	2 x 1250
P30F2415D	9...36	30	1420	±15	±50	±1000	90	2 x 680
P30F4805D	18...75	30	715	±5	±150	±3000	86	2 x 2000
P30F4812D	18...75	30	718	±12	±63	±1250	87	2 x 1250
P30F4815D	18...75	30	718	±15	±50	±1000	87	2 x 680

With suffix "K" heatsink version

1) Recommended circuit

The P30F series is been tested according to the following recommended test circuit before leaving the factory (see Figures 1). If you want to further decrease the input / output ripple, you can increase a capacitance values properly or choose capacitors with low ESR, but the total capacitance of the filter capacitor must not exceed the maximum load capacitance value (see Model guide table).

Figure 1a

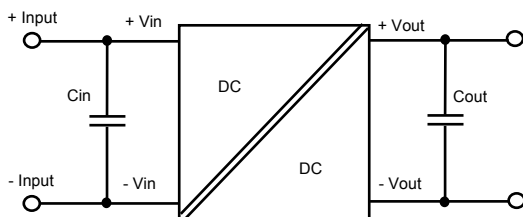
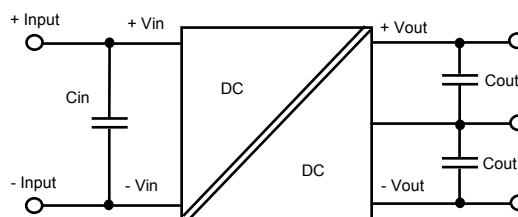


Figure 1b



Recommended peripheral components to figure 1a		
	Cin	Cout
P30Fxx05S	10 μF	10 μF
P30Fxx12S	10 μF	4.7 μF
P30Fxx15S	10 μF	4.7 μF

Recommended peripheral components to figure 1b		
	Cin	Cout
P30Fxx05D	10 μF	10 μF
P30Fxx12D	10 μF	4.7 μF
P30Fxx15D	10 μF	4.7 μF

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Specifications

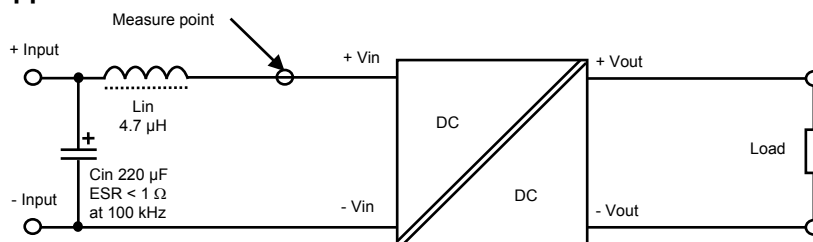
Input	
Under Voltage lockout Vin 24V types Vin 48V types	on @ 9 V _{DC} , off @ 7.8 V _{DC} on @ 17.8 V _{DC} , off @ 16 V _{DC}
Filter	π - type
Reflected ripple current *6	30 mA _{p-p} , typ.
Remote control threshold	
On state	2.5...12 V _{DC} , or open input
Off state	0...1.2 V _{DC}
Input idle current	1 mA, typ.
Isolation input - output:	
Rated voltage (tested for 1 min.)	1500 V _{DC}
Resistance	> 10 ⁹ Ω, measured @ 500 V _{DC}
Capacitance	2000 pF, typ.
Output	
Voltage tolerance	± 3 %, max.
Voltage load regulation	± 1 % @ 5 %...100 % load
Output voltage trim range	± 10 %
Voltage cross balance (dual outputs)	±5 %, max. @ 10 % / 100 % load difference
Voltage regulation	± 0.5 %, max @ full Vin range
Temperature coefficient	± 0.02 % / °C
Transient recovery time	<500 μs, @ 25 % load steps
Transient response deviation	<5 %, @ 25 % load steps
Short circuit protection	Continuous, hiccup
Short circuit restart	Automatic
Over load protection	150 % of full load, typ.
Rippel & noise, BW 20MHz	100 mV _{p-p} , max.
Over voltage protection via integrated TVS Diode	
P30Fxx05x	6.1 V _{DC}
P30Fxx12x	15 V _{DC}
P30Fxx55x	18 V _{DC}

General	
Start up time	10 ms, typ @ R-load
Switching frequency	400 kHz, typ.
Safety standard in accordance with	IEC / EN 60950-2001
Reliability Calculated MTBF MIL-HDBK-217F @ 25 °C	> 1 Mio. hours
EMC characteristics	
Radiated emissions	CISPR22 / EN55022 Class A
Radiated emissions, with Fig. 2	CISPR22 / EN55022 Class B
Conducted emissions	CISPR22 / EN55022 Class A
Conducted emissions, with Fig. 2	CISPR22 / EN55022 Class B
ESD, with Fig. 2	EN61000-4-2 perf. crit. B
RS	EN61000-4-3 perf. crit. A
EFT, with Fig. 2	EN61000-4-4 perf. crit. B
Surge, with Fig. 2	EN61000-4-5 perf. crit. B
CS	EN61000-4-6 perf. crit. A
Environmental	
Operating temperatur (ambient)	-40 °C to +85 °C with derating -40 °C to +60 °C full load
Case temperature	105 °C, max.
Storage temperature	-55 °C to +125 °C
Over temp. protection	t-case 110 °C, typ
Humidity	5...95 %, non-condensing
Cooling	Free air convection
Physical	
Dimensions without heatsink	50.80 x 40.60 x 11.8 mm
Dimensions with heatsink	50.80 x 40.60 x 16.3 mm
Weight without heatsink	50 g
Weight with heatsink	70 g
Case material	Aluminium Alloy
Potting Material	Epoxy (UL94V-0 rated)
Absolute max. ratings	
Pin soldering temperature 1.5 mm distance from body	300°C for 10 sec
Max. input voltage for 1 s	
Vin 24 V types	-0.7...50 V _{DC}
Vin 48 V types	-0.7...100 V _{DC}

Note:

1. Min. load should not be less than 5 %, otherwise ripple maybe increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. The recommended unbalanced load of dual output converter should be low than 5%. If the load asymmetry greater than 5%, it may not be guaranteed to meet all specifications listed. Please contact our technical support for more details.
3. Maximum capacitive load is tested at input voltage range and full load.
4. All specifications measured at Ta=25°C, humidity <75 %, nominal input voltage and rated output load unless otherwise specified.
5. In this datasheet, all test methods are based on our corporate standards.
6. All characteristics are for listed models, and non standard models may perform differently. Please contact our technical support for more details.
7. Please contact our technical support for any specific requirement.
8. Specifications of this product are subject to changes without prior notice.
9. It is not recommended to increase the output power capability by connecting two or more converters in parallel. The converters are not hot swappable

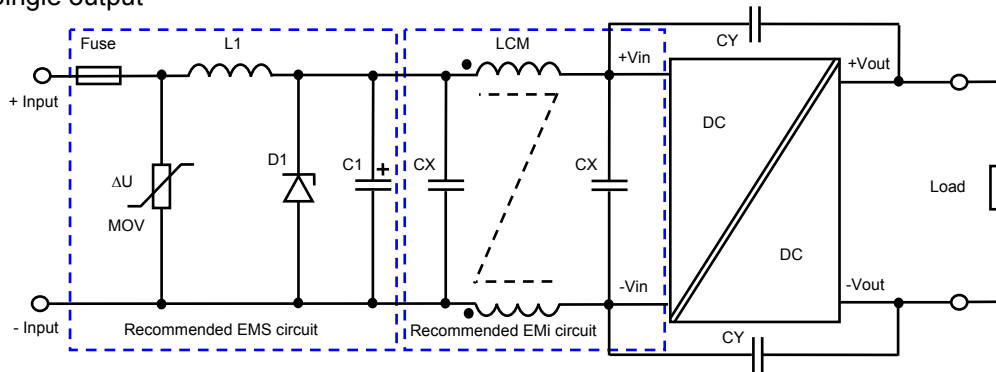
Input reflected ripple measure circuit



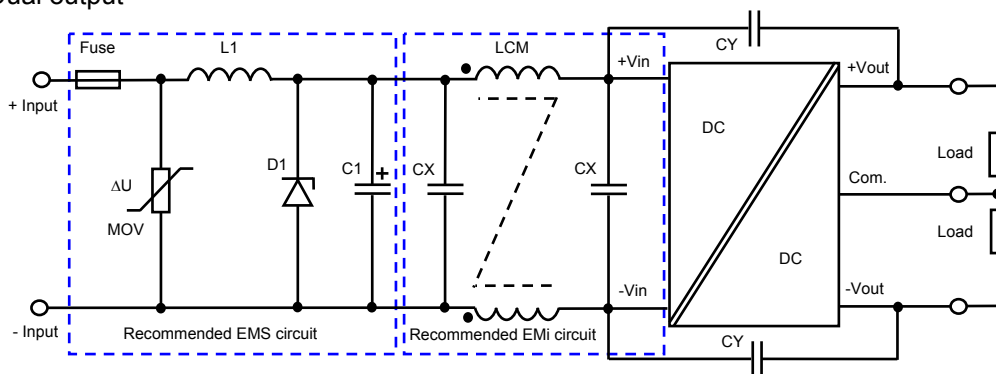
The input reflected ripple current is measured with inductor L_{in} and capacitor C_{in} to simulate source impedance.

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Figures 2, Recommended EMC circuit
Single output



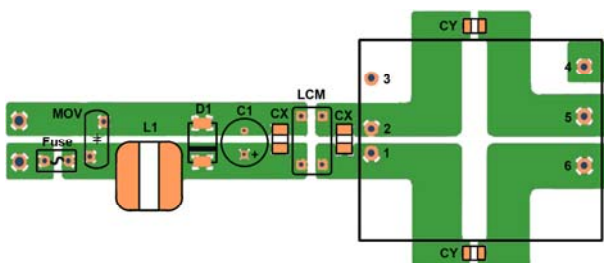
Dual output



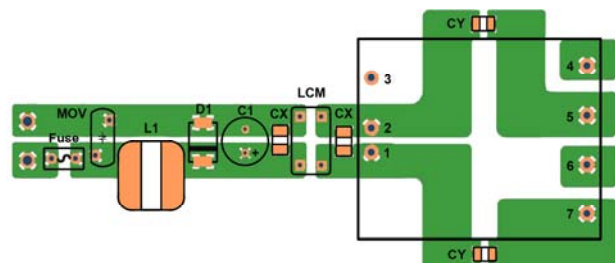
Recommended peripheral components to circuits in figures 2								
	Fuse Slow bolw	MOV Type	L1	D1 Type	C1	CX	LCM	CY
P30F24xxS	2.5 A	10D560K	56 μH	SMCJ48A	120 μF, 50 V	4.7μF	2.2 mH	1nF, 2 kV
P30F24xxD	2.5 A	10D560K	56 μH	SMCJ48A	120 μF, 50 V	4.7μF	2.2 mH	1nF, 2 kV
P30F48xxS	1.5 A	10D101K	56 μH	SMCJ90A	120 μF; 100 V	2.2μF	2.2 mH	1nF, 2 kV
P30F48xxD	1.5 A	10D101K	56 μH	SMCJ90A	120 μF, 100 V	2.2μF	2.2 mH	1nF, 2 kV

Recommended layout with EMC periphery

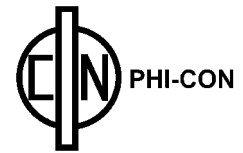
Single output



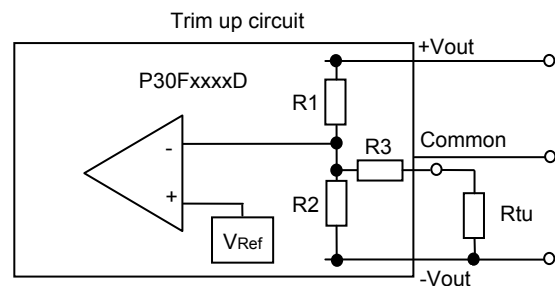
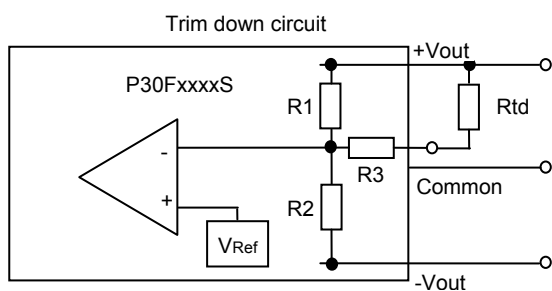
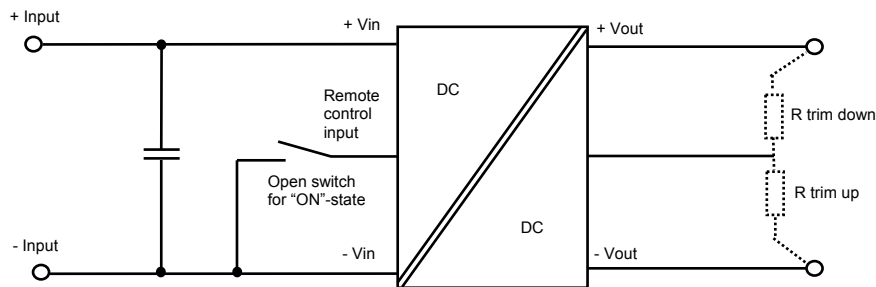
Dual output



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Application note to remote control / trim function



Calculation for trim down resistor (Rtd) or trim up resistor (Rtu)

Model series	R1 [kΩ]	R2 [kΩ]	R3 [kΩ]	V _{Ref} [V]	Rtd min. [kΩ]	Rtu min. [kΩ]
P30Fxx05S	2.883	2.864	10	2.5	1.16	4.9
P30Fxx12S	10.971		17.8	2.5	53.5	6.6
P30Fxx15S	14.497			2.5	78.6	9.1

Maximum output voltage adjust range ± 10 % of Vout nominal, see min. Rtd / Rtu

Trim down resistor formula

$$b = \frac{V_{out} - V_{ref}}{V_{ref}} * R2$$

$$R_{td} = \frac{R1 * b}{R1 - b} - R3$$

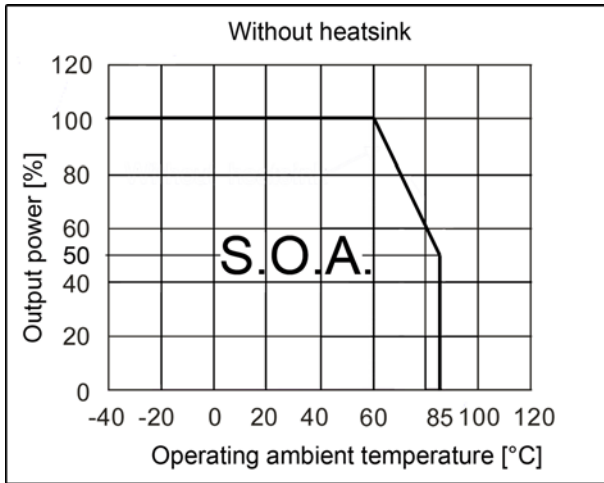
Trim up resistor formula

$$a = \frac{V_{ref}}{V_{out} - V_{ref}} * R1$$

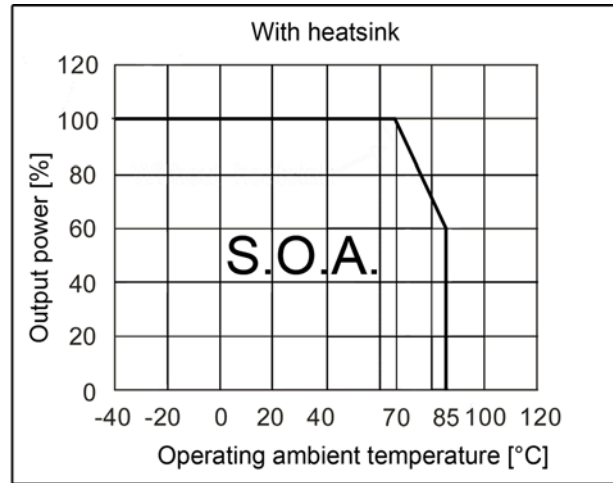
$$R_{tu} = \frac{R2 * a}{R2 - a} - R3$$

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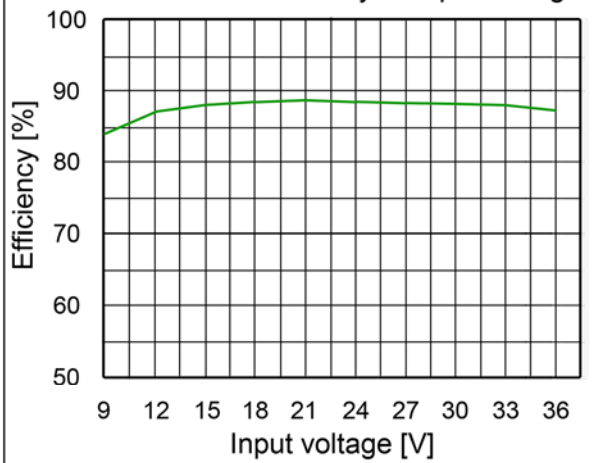
P30Fxxxxx



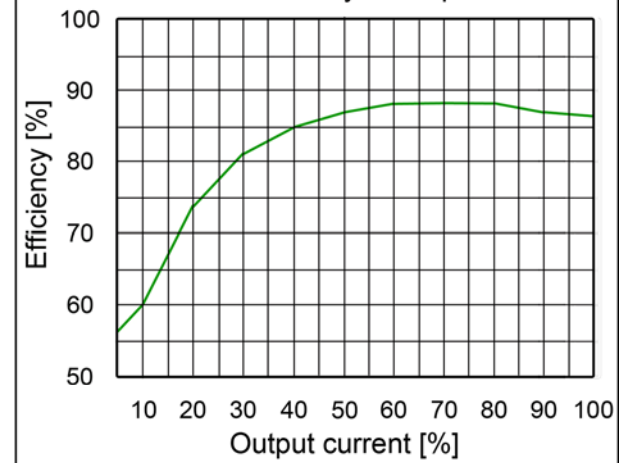
P30FxxxxxK



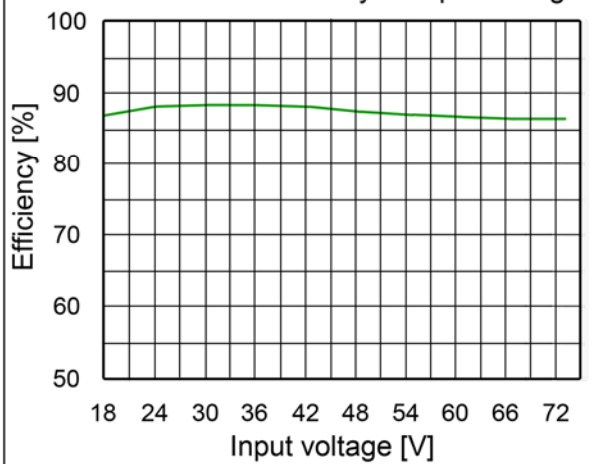
P30F2405S Efficiency vs input Voltage



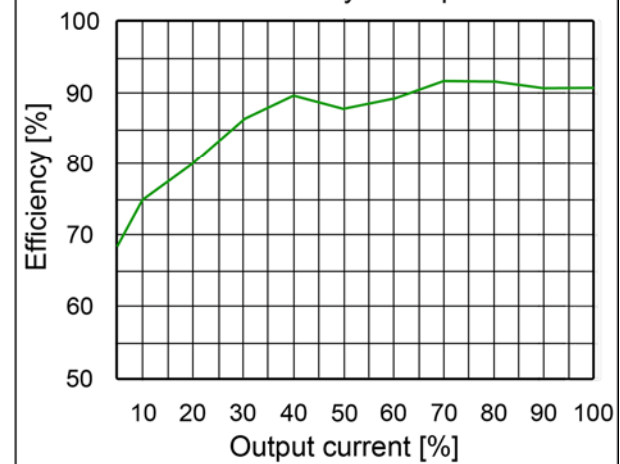
P30F2405S Efficiency vs output load



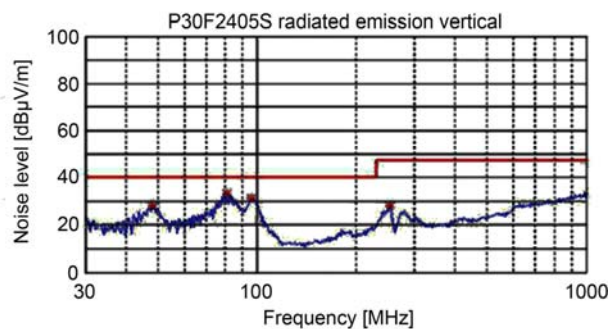
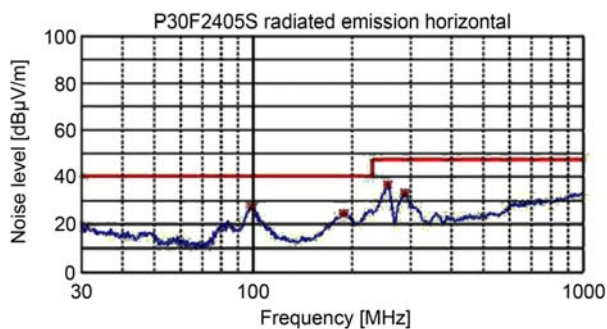
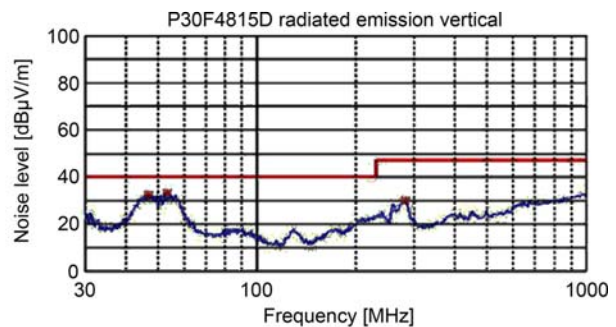
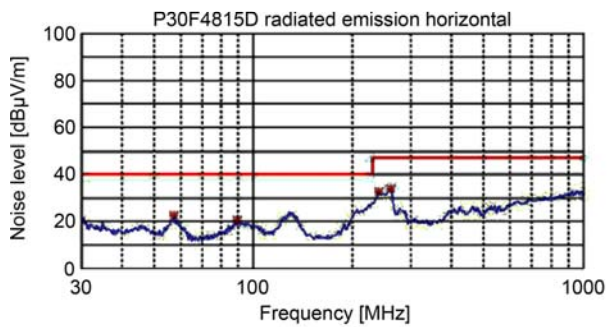
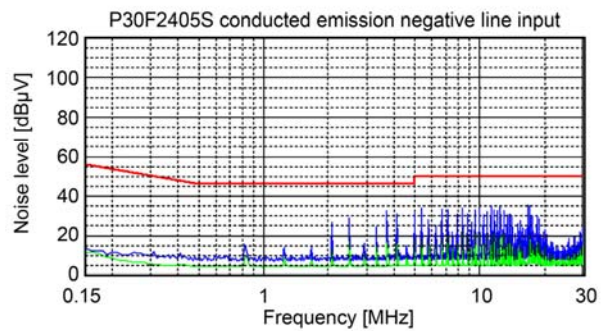
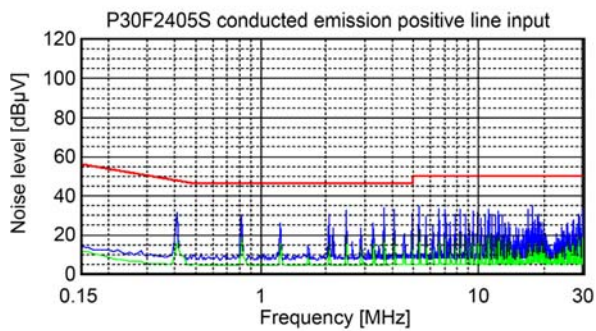
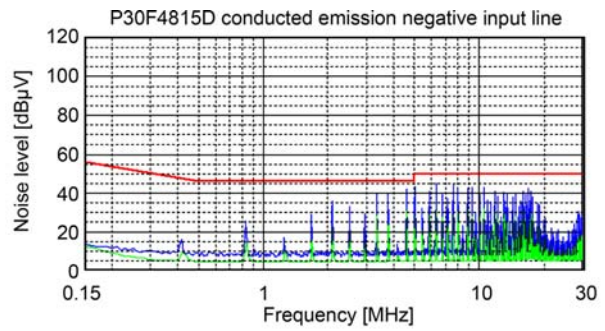
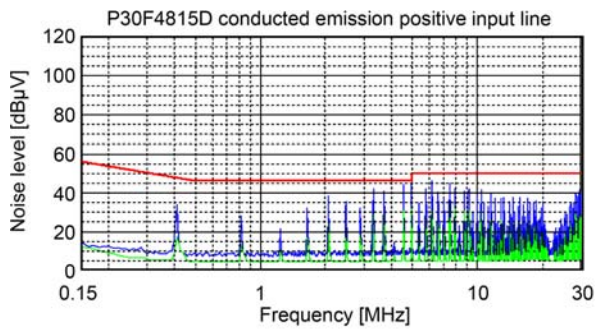
P30F4815D Efficiency vs input Voltage



P30F4815D Efficiency vs output load



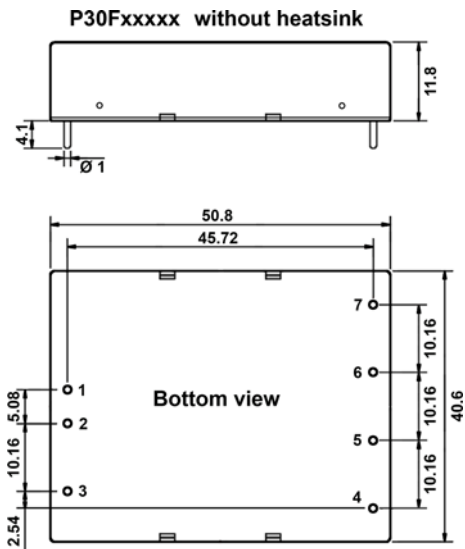
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Red: limit value, Green: average value, Blue: peak value

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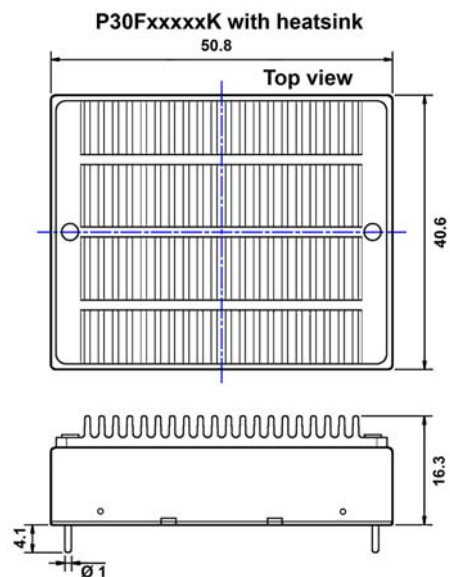
Dimensions



Pin configuration

Pin	Single	Dual
1	+ Vin	+ Vin
2	- Vin	- Vin
3	Rem ctrl	Rem ctrl
4	Trim	Trim
5	- Vout	- Vout
6	+ Vout	Common
7	No pin	+ Vout

Unit: mm
 Pin diameter tolerance: 0.1 mm
 Pin height tolerance: 0.5 mm
 General tolerances: 0.30 mm



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