QSB600 series

XP Power

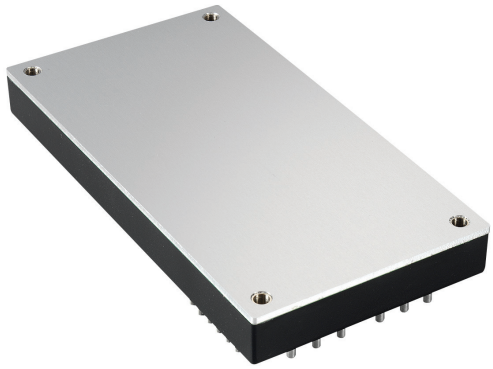
600W Baseplate cooled

DC-DC converters

The QSB600 series offers a compact 600W DC-DC converter solution in an industry standard full brick package, with integral baseplate for conduction cooling. Available in two input ranges, covering 18V to 36VDC and 36V to 75VDC.

Standard features are: output voltage trim, remote sense, remote On/Off, a wide operating temperature range and includes protection for over current, over temperature and over voltage.

The QSB600 is highly suited to telecommunications, distributed power architectures, battery operated equipment, industrial electronics, mobile equipment and many other applications.



Features

- Regulated single outputs 12V to 48VDC
- 4:1 input ranges 18V to 36VDC & 36V to 75VDC
- Baseplate cooled full brick package
- 1.5kVDC isolation
- Output trim ±10%
- Remote sense
- Remote On/Off
- -40°C to +100°C operating temperature
- 3 year warranty

Applications

Technology

Autonomous equipment

Industrial printing

Instrumentation

Process control

Robotics

Dimensions

116.8 x 61.0 x 12.7 mm (4.6" x 2.5" x 0.5")
Full brick package

Documentation

Click the link or scan the code

⟶ xppower.com

Models & ratings

Model number[2]	Input voltage	Output voltage	Output current	Input current		Efficiency
				No load	Full load	
QSB60024S12	18-36VDC	12.0VDC	50.0A	150mA	28.09A	89.0%
QSB60024S28		28.0VDC	21.5A	150mA	27.87A	90.0%
QSB60024S32		32.0 VDC	19.0A	150mA	27.84A	91.0%
QSB60024S48		48.0VDC	12.5A	200mA	27.47A	91.0%
QSB60048S12	36-75VDC	12.0VDC	50.0A	90mA	13.89A	90.0%
QSB60048S28		28.0VDC	25.0A	105mA	16.03A	91.0%
QSB60048S32		32.0VDC	19.0A	90mA	13.77A	92.0%
QSB60048S48		48.0VDC	12.5A	130mA	13.59A	92.0%

Notes:

1. Output Ripple and Noise measured with 10µF tantalum and 1µF ceramic capacitor across output.
2. Add suffix 'P' to the model number to receive the unit with positive logic remote On/Off.
3. The auxiliary supply output is within 7-13VDC with max of 20mA (auxiliary pin 16). Ground reference is -Sense.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage range	18		36	VDC	24VDC
	36		75		48VDC
Undervoltage lockout		17		VDC	On (24VDC)
		16			Off (24VDC)
		35			On (48VDC)
		33			Off (48VDC)
Idle current		50		mA	
Input reverse voltage protection	None				
Input filter	Pi type				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage	12		48	VDC	
Output trim	60		110	%	Of nominal output, see application notes
Initial set accuracy			±1.5	%	
Minimum load	No minimum load required				
Line regulation			±0.2	%	Measured from high line to low line
Load regulation			±0.5	%	Measured from 0-100% load
Transient response			±5.0	%	Maximum deviation, recovery to within 1% in 500µs, 25% step load change
Start up delay		100		ms	
Ripple and noise			120	mV pk-pk	12VDC, 20MHz bandwidth
			280		28VDC, 20MHz bandwidth
			320		32VDC, 20MHz bandwidth
			480		48VDC, 20MHz bandwidth
Overvoltage protection	115		140	%	
Short circuit protection	Continuous				
Current limit	110		150	%	Nominal output
Thermal shutdown		>110		°C	Case temperature
Temperature coefficient		±0.03		%/°C	
Maximum capacitive load	See models and ratings table				
Remote On/Off	Isolated input, can be controlled via primary or secondary side. Module on 1-10mA. Internal 1KΩ resistor fitted, Module off <1mA or open circuit				
Remote Sense	Compensates up to 10% of Vout nominal, total of output trim and remote sense				
Current Share	Parallel up to 4 modules using the PC pin 14				

QSB600 series

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency				%	See models & ratings table
Isolation: input to output	1500			VDC	60s, reinforced
Isolation: input to case	1500			VDC	60s, basic
Isolation: output to case	1500			VDC	60s, basic
Isolation resistance	10^7			Ω	
Isolation capacitance		4000		pF	
Switching frequency		300		kHz	48Vin (12VDC, 28VDC, 32VDC)
		250			Other models
Power density		6.63 (108.7)		W/cm³ (W/in³)	
Mean time between failure		382		khrs	MIL-HDBK-217F, +25°C GB

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating base plate temperature	-40		+100	°C	See derating curve
Storage temperature	-55		+105	°C	
Operating humitidy			90	%RH	Non-condensing
Cooling	Baseplate cooled				

EMC: emissions

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55032	A	With external components
Radiated	EN55032	A	With external components

Safety approvals

Safety agency	Standard	Test level	Notes & conditions
UL	UL62368-1		
EN	EN62368-1		
CE	Meets all applicable directives		
UKCA	Meets all applicable legislation		

Application notes

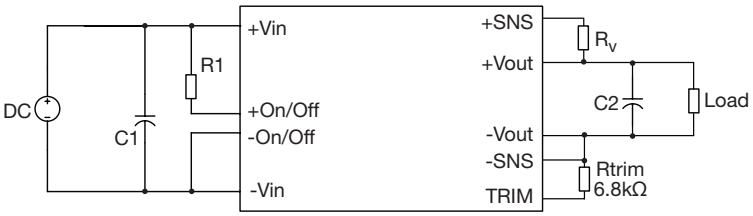
Output Voltage Adjustment

The trim pin permits the user to adjust the output voltage up or down according to the trim range specification (60% to 110% of nominal output). This is accomplished by connecting resistor Rv between the +Vout and +Sense pins and a resistor Rtrim of value 6.8kΩ between the trim and -Sense pins. The trim pin should be left open if trimming is not being used. The trim resistor can be determined by the following equations:

$$Vf = \frac{1.24 \times \left(\frac{6.8 \times 33}{6.8 + 33}\right)}{7.68 + \frac{6.8 \times 33}{6.8 + 33}}$$

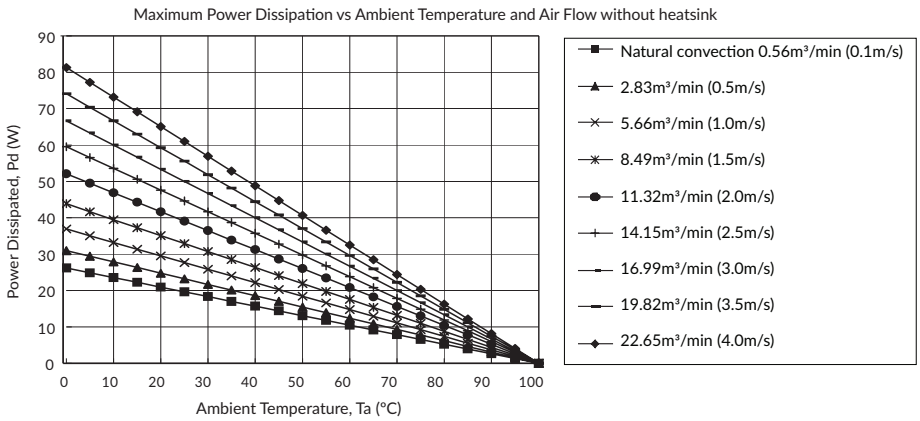
$$Vtrim = (Vo + R_v) \times Vf$$

R_v : Variable Resistor, KΩ
Rtrim: KΩ, 6.8 kΩ recommended
Vo: Nominal Output Voltage
Vtrim: Desired Output Voltage



C1: 220µF/100V
C2: 470µF/100V
Low ESR electrolytic capacitors are recommended

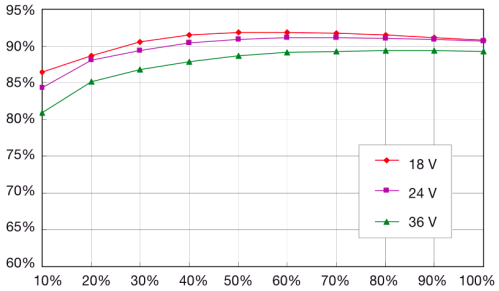
Derating curve



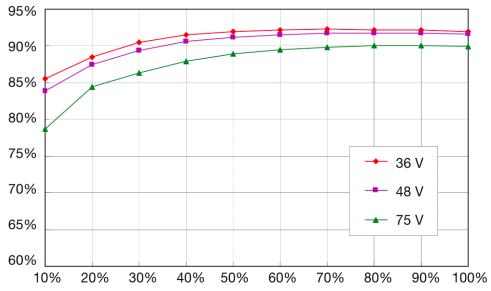
Air Flow Rate	Typical Rca
Natural Convection 0.56m³/min (0.1ms)	3.82°C/W
2.83m³/min (0.5ms)	3.23°C/W
5.66m³/min (1.0ms)	2.71°C/W
8.49m³/min (1.5ms)	2.28°C/W
11.32m³/min (2.0ms)	1.92°C/W
14.15m³/min (2.5ms)	1.68°C/W
16.99m³/min (3.0ms)	1.50°C/W
19.82m³/min (3.5ms)	1.35°C/W
22.65m³/min (4.0ms)	1.23°C/W

Rca = Thermal resistance from case to ambient

Efficiency vs Load



QSB60024S28

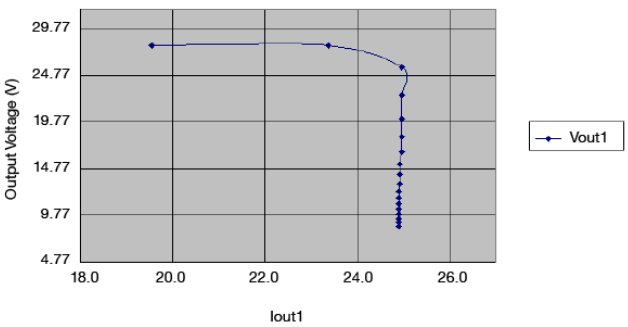


QSB60048S28

Overload Protection

After reaching the limit between 110% to 140% of Inom (current or power limit point), the output voltage will reduce and the unit will enter trip and restart mode.

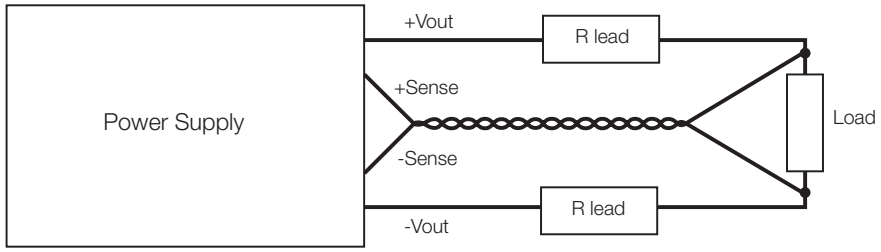
Automatic recovery when overload is removed (see graph right).



Application notes

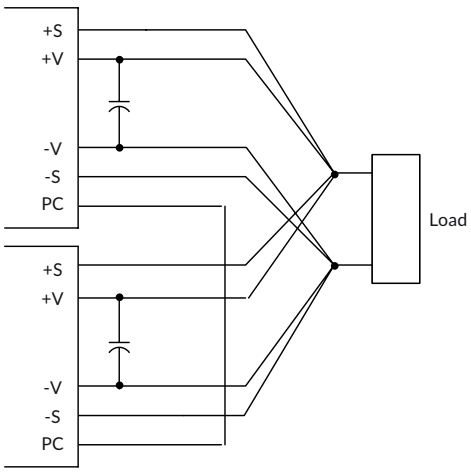
Remote sensing

The QSB600 series converter has the capability to remotely sense both output lines. This automatically adjusts the output voltage in order to compensate for voltage drops in distribution and maintain a regulated voltage at the point of load. The remote sense voltage range is: ≤ 10% of Vo_nominal. If the remote sense is not used, the sense pins should be connected locally where +Sense pin should be connected to +Vout pin and -Sense pin to -Vout pin.

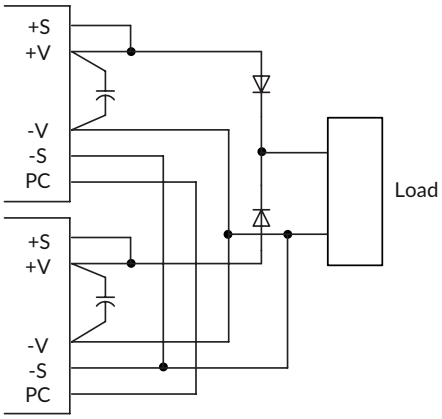


Parallel configuration

Up to 4 converters to share within 90% max power.



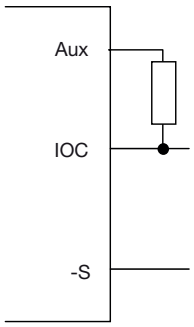
Redundant configuration



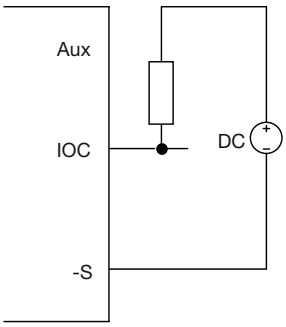
DC OK Signal

Normal and abnormal operation of the converter can be monitored by using the DC OK signal. This is an open collector output, and it can be connected to the internal aux power supply or to an external DC supply. The ground reference is the –Sense and the current must be limited to 20 mA. This signal is LOW when the converter is ON and HIGH when the converter is disabled or OFF.

By internal Aux



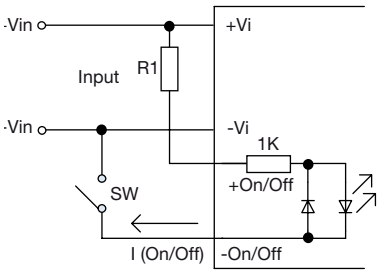
By internal DC Supply



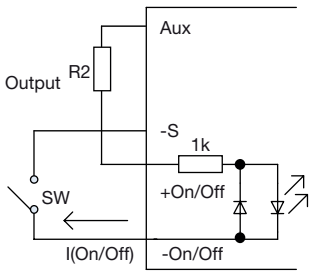
Application notes

Remote On/Off

Output voltage turns on when current flows through the ON/OFF pins by closing the switch. The max current through the On/Off pin is 10 mA max.

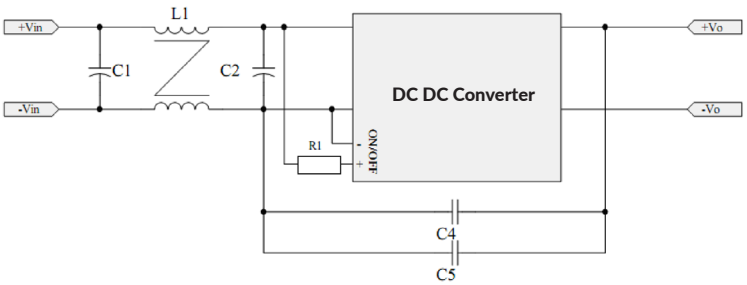


Controlling the ON/OFF terminal from the input side, recommended values for R1 are 30k (0.5W) for 48 Vin and 15 k (0.25 W) for 24 Vin.



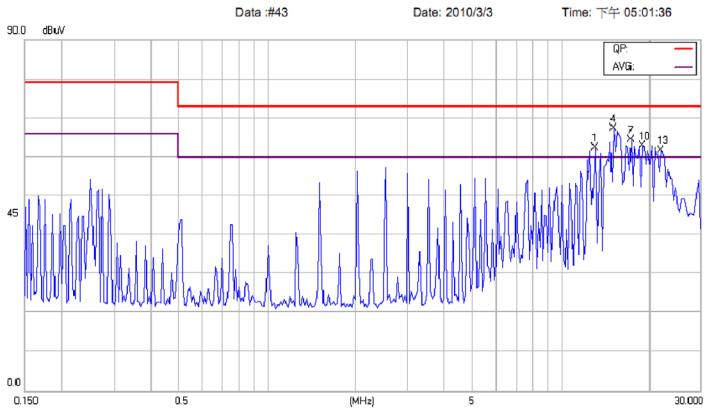
Controlling the ON/OFF terminal from the output side, recommended R2 value is 5.1k (0.1W).

EMC Connection Diagram and Performance Curve Examples



C1	C2	C4	C5	L1	R1
330µF/50V	330µF/50V	1000pF/2KV	220pF/2KV	0.8mH	15K

L1: Common mode choke, core p/n T60006-L2025-L0380-05, 4 turns per side, 2 mm or larger diameter wire.

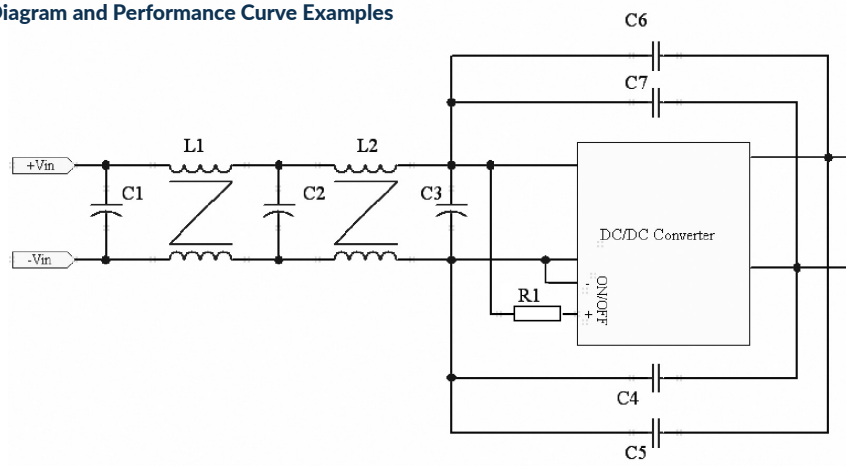


QSB60024S32 connection diagram and conducted emissions test results for EN55022 class A

No.	Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	13.1966	52.51	10.00	62.51	73.00	-10.49	peak
4	15.2665	57.47	10.00	67.47	73.00	-5.53	peak
7	17.4287	54.37	10.00	64.37	73.00	-8.63	peak
10	19.1220	53.00	10.00	63.00	73.00	-10.00	peak
13	22.1214	51.86	10.00	61.86	73.00	-11.14	peak

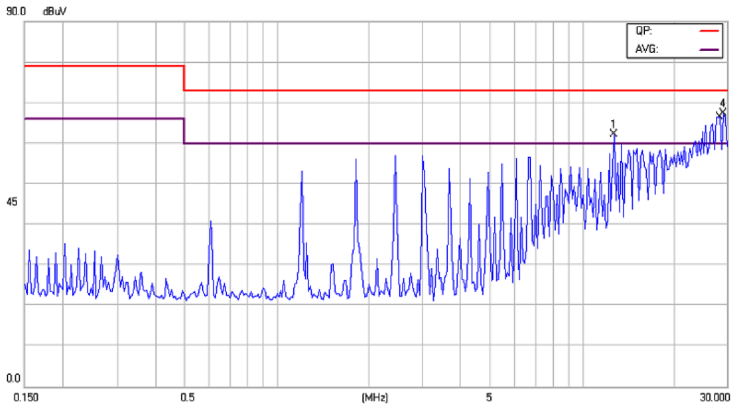
Application notes

EMC Connection Diagram and Performance Curve Examples



C1	C2	C3	C4	C5	C6	C7	L1	L2	R1
470 µF/100 V	470 µF/100 V	470 pF/100 V	2200 pF/2 KV	NC	1000 pF/2 KV	NC	0.8 mH	8 mH	30 K

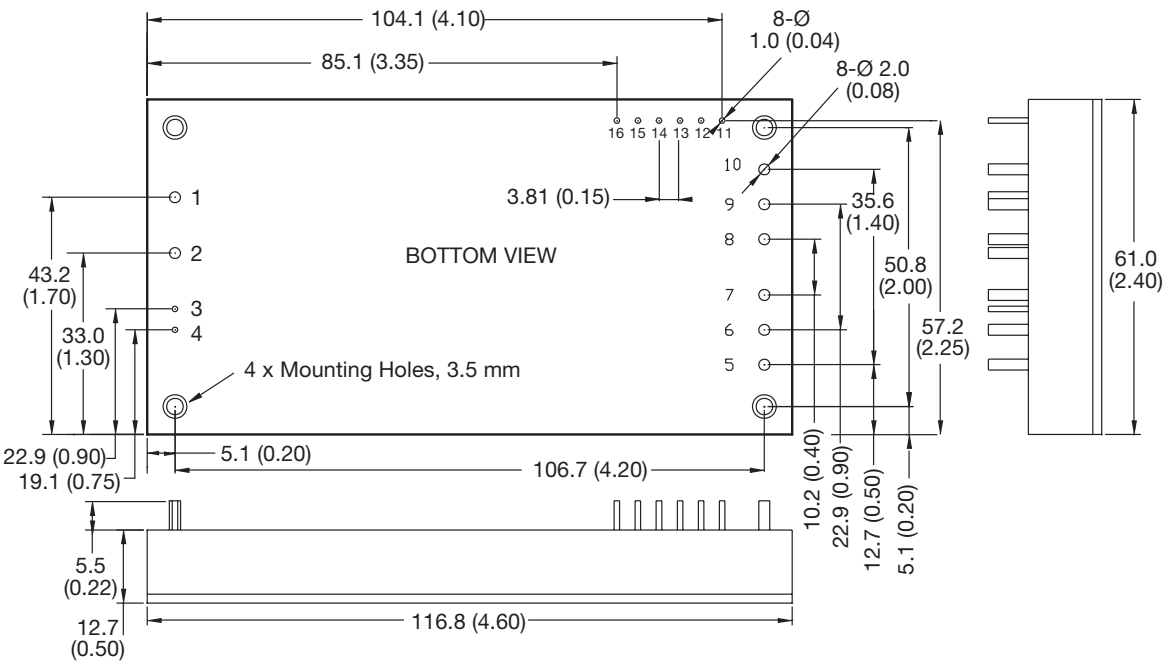
L1: Common mode choke, core p/n T60006-L2025-L0380-05, 4 turns per side, 2 mm or larger diameter wire.
L2: Common mode choke, core p/n T60006-L2030-W517-03, 9 turns per side, 2 mm or larger diameter wire.



QSB60048S32 connection diagram and conducted emissions test results for EN55022 class A

No.	Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	12.8516	52.51	10.00	62.31	73.00	-10.49	peak
4	29.2157	57.43	10.00	67.43	73.00	-5.57	peak

Mechanical details



Pin connections	
Pin	**Function**
1	-Vin
2	+Vin
3	-On/Off
4	+On/Off
5-7	+Vout
8-10	-Vout
11	-Sense
12	+Sense
13	Trim
14	PC
15	IOC
16	Aux

Notes:

1. All dimensions are in mm (inches)
2. Weight: 220g (0.49lbs) approx
3. Tolerances: x.xx (x.x) = ±0.5 (±0.02). x.xxx (x.xx) = ±0.25 (±0.01)
4. Small or large pin diameter: ±0.1 (±0.004)
5. Small pin pitch: 3.81mm (0.15")