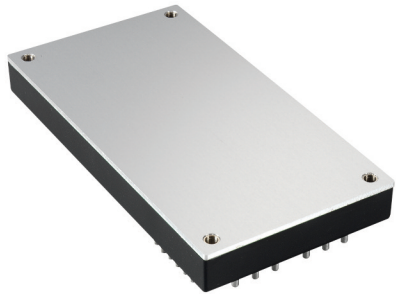


## QSB Series



- Up to 92% Efficiency
- Industry Standard Full Brick Package
- -40 °C to +100 °C Operating Temperature
- High Power Density
- Baseplate-cooled
- Remote On/Off & Remote Sense
- 3 Year Warranty

## Specification

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### Input

Input Voltage Range	• 24 V (18-36V), 48 V (36-75V)
Input Current	• See table
Idle Current	• 50 mA
Input Reverse Voltage Protection	• None
Input Filter	• Pi network
Undervoltage Lockout	• 24 Vin: turn on 17.0V, turn off 16.0V 48 Vin: turn on 35.0V, turn off 33.0V

### Output

Output Voltage Trim	• 40 - 110% of nominal output, see application notes
Initial Set Accuracy	• $\pm 1.5\%$ max
Line Regulation	• $\pm 0.2\%$ max measured from high line to low line
Load Regulation	• $\pm 0.5\%$ max measured from 0-100% load
Transient Response	• 5% max deviation, recovery to within 1% in 500 $\mu$ s, 25% step load change
Ripple & Noise	• 12 V models: 120 mV pk-pk 28 V models: 280 mV max pk-pk 32 V models: 320 mV max pk-pk 48 V models: 480 mV max pk-pk 20 MHz bandwidth (see note 1)
Overvoltage Protection	• 115-140%
Short Circuit Protection	• Continuous
Current Limit	• 110-150% nominal output
Thermal Shutdown Temperature Coefficient	• Case temperature $> 110$ °C typical • $\pm 0.03\%/^{\circ}\text{C}$
Remote On/Off	• Isolated input, can be controlled via primary or secondary side. Module on 1-10 mA. Internal 1K $\Omega$ resistor fitted, Module off $< 1$ mA 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

### General

Efficiency	• See tables
Isolation Voltage	• 1500 VDC Input to Output 1500 VDC Input to Case 1500 VDC Output to Case
Isolation Resistance	• 10 $^7$ $\Omega$
Isolation Capacitance	• 4000 pF typical
Switching Frequency	• 48 Vin: 12 V, 28 V, 32 V: 300 kHz typical Others: 250 kHz
DC OK Signal	• DC OK TTL low, not OK TTL high, connect IOC pin to Aux pin through a resistor (see note 3)
Power Density	• 108.7 W/in $^3$
MTBF	• 381 kHrs typical to MIL-HDBK-217F at 25 °C, GB

### Environmental

Operating Base Plate Temperature	• -40 °C to +100 °C, see derating curve
Storage Temperature	• -55 °C to +105 °C
Operating Humidity	• Up to 90% non-condensing
Cooling	• Baseplate-cooled, see derating curve

### EMC & Safety

Emissions	• EN55022, level A conducted, with external components. Contact sales for details.
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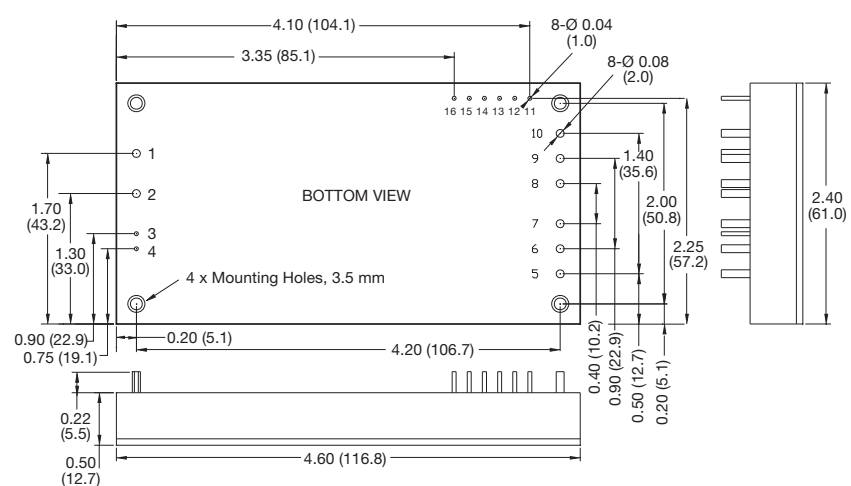
**Models & Ratings**

Input Voltage	Output Voltage	Output Current	Input Current		Efficiency	Model Number <sup>2</sup>
			No Load	Full Load		
18-36 V	12.0 V	50.0 A	150 mA	28.09 A	89.0%	QSB60024S12
	28.0 V	21.5 A	150 mA	27.87 A	90.0%	QSB60024S28
	32.0 V	19.0 A	150 mA	27.84 A	91.0%	QSB60024S32
	48.0 V	12.5 A	200 mA	27.47 A	91.0%	QSB60024S48
36-75 V	12.0 V	50.0 A	90 mA	13.89 A	90.0%	QSB60048S12
	28.0 V	25.0 A	105 mA	16.03 A	91.0%	QSB60048S28
	32.0 V	19.0 A	90 mA	13.77 A	92.0%	QSB60048S32
	48.0 V	12.5 A	130 mA	13.59 A	92.0%	QSB60024S48

**Notes**

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

**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**

- All dimensions are in inches (mm)
- Weight: 0.49 lbs (220 g) approx
- Tolerances: X.XX = ±0.02 (X.X = ±0.5)  
X.XXX = ±0.01 (X.XX = ±0.25)

**Output Voltage Adjustment - QSB600**

The trim pin permits the user to adjust the output voltage up or down according to the trim range specification (-60% to +10% of nominal output). This is accomplished by connecting resistor R<sub>V</sub> between the +Vout and +Sense pins and a resistor R<sub>Trim</sub> between the trim and -Sense pins. See longform datasheet for connection diagram. The trim pin should be left open if trimming is not being used. The trim resistor can be determined by the following equations:

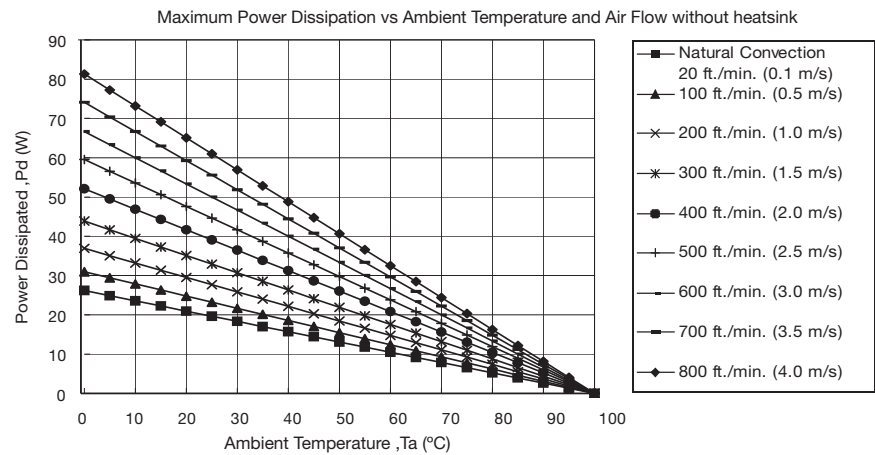
$$V_f = \frac{1.24 \times \left( \frac{R_{trim} \times 33}{R_{trim} + 33} \right)}{7.68 + \frac{R_{trim} \times 33}{R_{trim} + 33}}$$

$$V_{trim} = (V_o + R_v) \times V_f$$

R<sub>V</sub> : Variable Resistor, KΩ  
 R<sub>trim</sub>: KΩ, 6.2 kΩ recommended  
 V<sub>o</sub>: Nominal Output Voltage

**Thermal Resistance Information**

**Derating Curve**



Air Flow Rate	Typical R <sub>ca</sub>
Natural Convection	3.82 °C/W
20 ft./min (0.1 ms)	3.23 °C/W
100 ft./min (0.5 ms)	2.71 °C/W
200 ft./min (1.0 ms)	2.28 °C/W
300 ft./min (1.5 ms)	1.92 °C/W
400 ft./min (2.0 ms)	1.68 °C/W
500 ft./min (2.5 ms)	1.50 °C/W
600 ft./min (3.0 ms)	1.35 °C/W
700 ft./min (3.5 ms)	1.23 °C/W
800 ft./min (4.0 ms)	1.23 °C/W

R<sub>ca</sub> = Thermal resistance from case to ambient

