

### 150 Watts

- Wide 4:1 Input Range
- Single Output
- Industry Standard 1/4 Brick
- -40 °C to +105 °C Operation
- 2250 VDC Isolation
- Output Trim  $\pm 10\%$
- Remote On/Off
- 3 Year Warranty



#### Dimensions:

##### QSC150:

2.28 x 1.45 x 0.5" (57.9 x 36.8 x 12.7 mm)

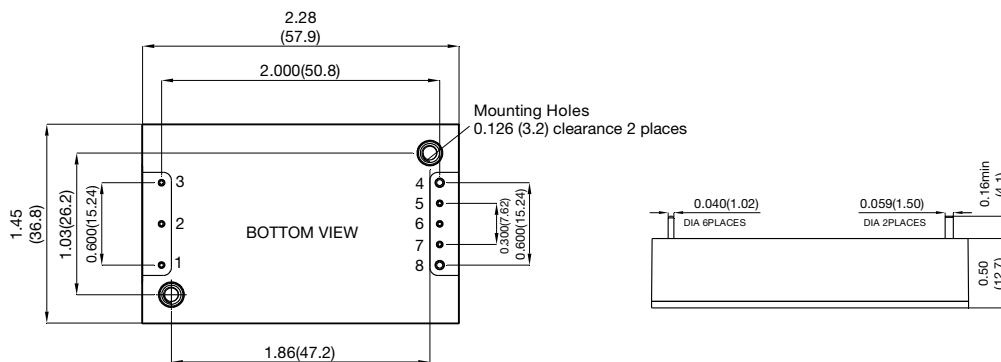
### Models & Ratings

Input Voltage	Output Voltage	Output Current	Input Current <sup>(1)</sup>		Ripple & noise <sup>(2)</sup>	Efficiency <sup>(3)</sup>	Max. capacitive load	Model Number
			No Load	Full Load				
9-36 V	5 V	30.0 A	10 mA	18.1 A	100 mV	92.0%	30000 $\mu$ F	QSC15024S05
	12 V	12.5 A	10 mA	18.1 A	150 mV	92.0%	12500 $\mu$ F	QSC15024S12
	24 V	6.3 A	10 mA	18.3 A	280 mV	91.0%	6300 $\mu$ F	QSC15024S24
	28 V	5.4 A	10 mA	18.2 A	280 mV	91.5%	5400 $\mu$ F	QSC15024S28
	48 V	3.2 A	10 mA	18.1 A	480 mV	92.0%	1000 $\mu$ F	QSC15024S48
18-75 V	5 V	30.0 A	8 mA	9.1 A	100 mV	92.0%	30000 $\mu$ F	QSC15048S05
	12 V	12.5 A	8 mA	9.2 A	150 mV	91.0%	12500 $\mu$ F	QSC15048S12
	24 V	6.3 A	8 mA	9.2 A	280 mV	90.5%	6300 $\mu$ F	QSC15048S24
	28 V	5.4 A	8 mA	9.2 A	280 mV	90.5%	5400 $\mu$ F	QSC15048S28
	48 V	3.2 A	8 mA	9.1 A	480 mV	91.5%	1000 $\mu$ F	QSC15048S48

### Notes

1. At lowest input voltage.
2. Measured at 20MHz bandwidth and 10 $\mu$ F tant/1 $\mu$ F ceramic capacitors on output (10 $\mu$ F electrolytic/1 $\mu$ F ceramic capacitors for 48V output).
3. Measured at nominal input.

### Mechanical Details



Pin Connections	
Pin	Function
1	+Vin
2	Remote On/Off
3	-Vin
4	-Vout
5	-Sense
6	Trim
7	+Sense
8	+Vout

### Notes

1. All dimensions are in inches (mm)
2. Weight: 0.15 lbs (68 g) approx.
3. Tolerance: x.xx =  $\pm 0.02$  (x.x =  $\pm 0.5$ )  
x.xxx =  $\pm 0.01$  (x.xx =  $\pm 0.25$ )

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	9		36	VDC	24 V nominal
	18		75		48 V nominal
Input Current		20/10		A	QSC15024 at 9 V / QSC15048 at 18V
Input Surge			50/100	VDC for 100 ms	QSC15024 / QSC15048
Undervoltage Lockout	>8.0/16.5	8.5/17.0	8.8/17.5	VDC	On: 24 V/48 V
	<7.7/15.5	8.0/16.0	8.3/16.5		Off: 24 V/48 V
Lockout Hysteresis		0.6/0.9		VDC	24 V/48 V
Idle Current		5	10	mA	When output is remotely turned off
Inrush Current			0.1	A <sup>2</sup> s	As per ETS300 132-2
Recommended Input Fuse		30/15		A	Time delay fuse - 24 V/48 V
Input Reflected Ripple Current		30		mA pk-pk	Through 12 µH inductor

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5		48	VDC	See Models and Ratings table
Output Trim	±10			%	
Initial Set Accuracy			±1	%	At full load and nominal input
Minimum Load	0			%	No minimum load required
Line Regulation			±0.2	%	From minimum to maximum input at full load
Load Regulation			±0.2	%	From 0% to full load
Transient Response			±5.0	%	Maximum deviation, recovering to less than 1% in 250 µs for 25% step load change.
Start Up Time		30		ms	
Output Voltage Rise Time		30		ms	
Ripple & Noise				mV pk-pk	See models and ratings table
Overload Protection	110	125	160	%	
Short Circuit Protection					Continuous hiccup mode, with auto recovery
Maximum Capacitive Load					See Models and Ratings table
Temperature Coefficient			0.02	%/°C	
Overvoltage Protection	115		140	%	
Remote On/Off	Output is on if remote on/off (pin 2) is open or high (3.5-75 VDC) Output turns off if remote on/off (pin 2) is low (<1.2 VDC max)				

### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		92		%	See Models and Ratings table
Isolation: Input to Output	2250			VDC	60 s
Isolation: Input and output to Case	2250			VDC	60 s
Switching Frequency		285/300		kHz	48S12 model / All other models
Isolation Resistance	10 <sup>9</sup>			Ω	
Isolation Capacitance		1500		pF	
Power Density			90.7	W/in <sup>3</sup>	
Mean Time Between Failure		309/667		kHrs	S05/S48, MIL-HDBK-217F, +25 °C GB
Weight		0.15 (68.0)		lb (g)	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Base Plate Temperature	-40		+105	°C	
Storage Temperature	-55		+125	°C	
Thermal Protection		+110		°C	
Operating Altitude			3000	m	
Humidity			95	%RH	Non-condensing
Cooling					Base plate cooled

### Safety Approvals

Agency	Standard	Notes & Conditions
UL	cUL60950-1	ITE
CE	LVD	EN62368-1

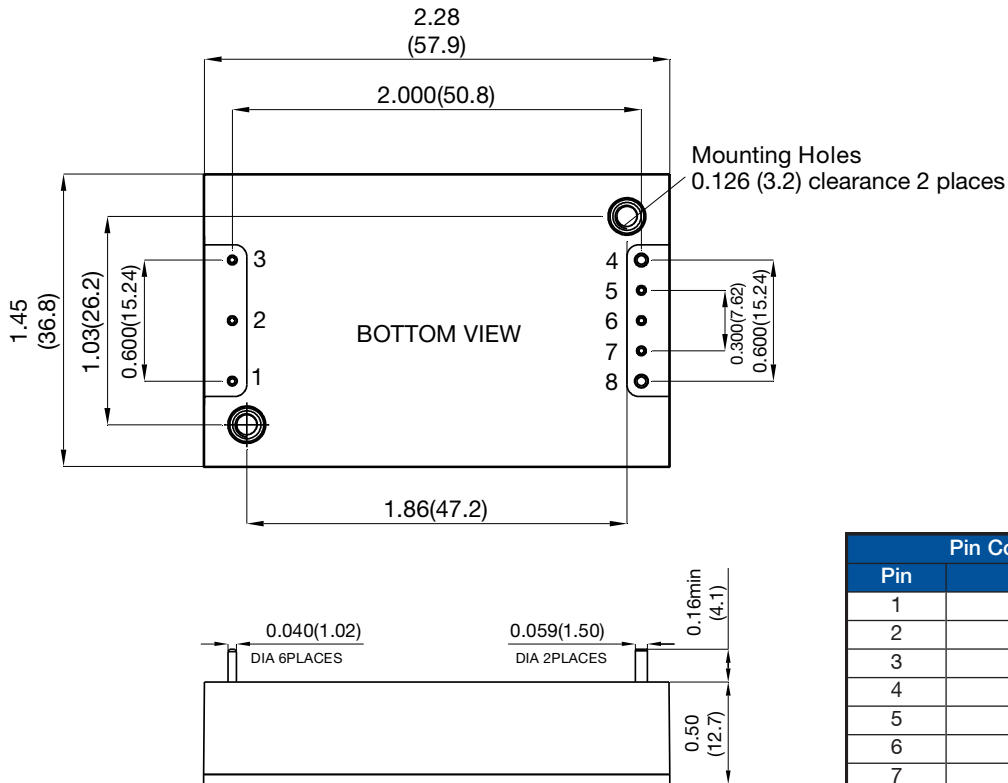
### EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class A	See Application Notes
Radiated	EN55032	Class A	

### EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD Immunity	EN61000-4-2	±6 kV/±8 kV	A	Contact Discharge/Air Discharge
Radiated Immunity	EN61000-4-3	20 V/m	A	
EFT/Burst	EN61000-4-4	1 kV	A	With 470 μF/100 V electrolytic on input
Surge	EN61000-4-5	2 kV	A	External TVS, SMCJ78A and 470 μF/100 V on input
Conducted Immunity	EN61000-4-6	10 V rms	A	
Magnetic Fields	EN61000-4-8	3 A/m	A	

### Mechanical Details



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8	+Vout

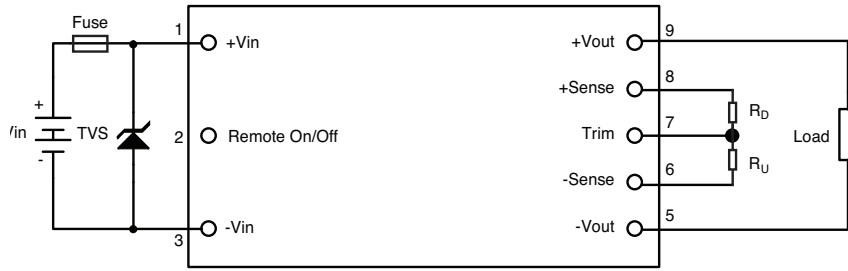
### Notes

- All dimensions are in inches (mm)
- Weight: 0.15 lbs (68 g) approx.
- Tolerance: x.xx = ±0.02 (x.x = ±0.5)  
x.xxx = ±0.01 (x.xx = ±0.25)

### Application Notes

#### Input Fusing and Safety Considerations

The QSC150 series converters have no internal fuse. In order to achieve maximum safety and system protection, always use an input line fuse. We recommended a 30 A time delay fuse for nominal 24 V and 15 A time delay fuse for nominal 48 V. It is recommended that the circuit has a transient voltage suppressor diode (TVS) across the input terminals to protect the unit against surge or spike voltages and input reverse voltage (as shown). A suitable part would be SMCJ78A.



#### Output Voltage Adjustment

The Trim input permits the user to adjust the output voltage up or down 10%. This is accomplished by connecting an external resistor between the Trim pin and either the +Sense pin or the -Sense pin.

##### To Trim Down

Connecting an external resistor ( $R_D$ ) between the Trim pin and the Vout (+) (or +Sense) pin decreases the output voltage. The following table can be used to determine the required external resistor ( $R_D$ ) value to obtain a percentage output voltage change of  $\Delta\%$ .

Trim Down %	RD (k $\Omega$ )				
	5 V	12 V	24 V	28 V	48 V
1%	110.400	660.30	1671.00	1984.00	3106.00
2%	52.380	300.10	775.80	905.50	1400.00
3%	33.050	180.00	477.20	545.80	831.50
4%	23.380	120.00	327.90	365.90	547.10
5%	17.580	83.99	238.30	258.00	376.50
6%	13.710	59.97	178.60	186.00	262.80
7%	10.950	42.82	136.00	134.60	181.50
8%	8.880	29.95	104.00	96.10	120.60
9%	7.269	19.95	79.07	66.12	73.17
10%	5.980	11.94	59.17	42.14	32.25

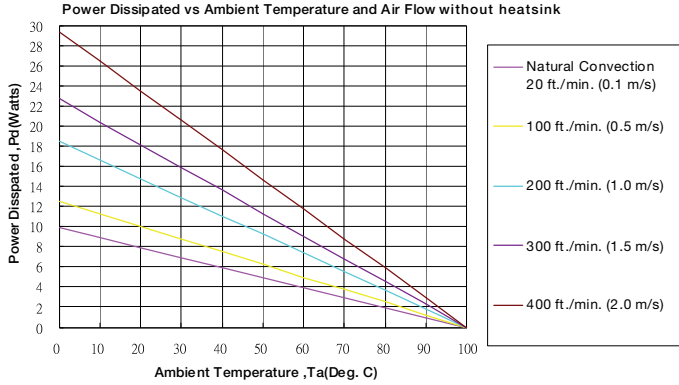
##### To Trim Up

Connecting an external resistor ( $R_U$ ) between the Trim pin and the Vout (-) (or -Sense) pin increases the output voltage. The following table can be used to determine the required external resistor ( $R_U$ ) value to obtain a percentage output voltage change of  $\Delta\%$ .

Trim Up %	RU (k $\Omega$ )				
	5 V	12 V	24 V	28 V	48 V
1%	112.700	153.20	165.70	168.30	148.60
2%	54.700	74.30	79.36	81.16	71.81
3%	35.370	47.99	50.58	52.12	46.21
4%	25.700	34.83	36.19	37.60	33.40
5%	19.900	26.94	27.56	28.86	25.72
6%	16.030	21.68	21.80	23.08	20.60
7%	13.270	17.92	17.69	18.93	16.94
8%	11.200	15.10	14.61	15.82	14.20
9%	9.589	12.91	12.21	13.40	12.07
10%	8.300	11.15	10.29	11.47	10.36

### Thermal Resistance Information

#### Airflow Derating Graph - Without Heatsink



Air Flow Rate	Typical Rca
Natural Convection 20 ft/min (0.1 m/s)	10.1 °C/W
100 ft/min (0.5 m/s)	8.0 °C/W
200 ft/min (1.0 m/s)	5.4 °C/W
300 ft/min (1.5 m/s)	4.4 °C/W
400 ft/min (2.0 m/s)	3.4 °C/W

#### Example (Without Heatsink)

To determine the minimum airflow necessary for a QS15048S12 operating at an input voltage of 48 V, an output current of 12.5 A, and a maximum ambient temperature of 40°C:

Determine Power dissipation (Pd):  $Pd = Pi - Po = Po(1-\eta)/\eta$ ,

$$Pd = 12V \times 12.5A \times (1-0.9)/0.9 = 16.67 \text{ Watts}$$

Where  $Pi$  = Input power,  $Po$  = Output Power and  $\eta$  = Efficiency

Determine airflow from airflow derating graph using data points for  $Pd=16.67W$  and  $Ta = 40^\circ C$

Minimum airflow= 400 ft./min.

To check that the maximum case temp of 105 °C is not exceeded:

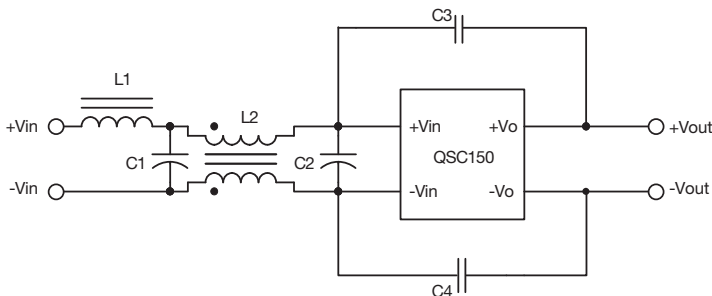
Maximum temperature rise is  
 $\Delta T = Pd \times Rca = 16.67 \times 3.4 = 56.65^\circ C$ .

Maximum case temperature is

$$Tc = Ta + \Delta T = 96.68^\circ C < 105^\circ C$$

Where: Rca is the thermal resistance from case to ambient environment. Ta is ambient temperature and Tc is case temperature.

#### Conducted Emissions



Model Number	C1	C2	C3	C4	L1	L2
QSC15024S05	470 μF/50V	470 μF/50V	2200 pF	2200 pF	Short	0.5mH
QSC15024S12	470 μF/50V	470 μF/50V	2200 pF	2200 pF	Short	0.5mH
QSC15024S24	470 μF/50V	470 μF/50V	2200 pF	2200 pF	Short	0.5mH
QSC15024S28	470 μF/50V	470 μF/50V	2200 pF	2200 pF	Short	0.5mH
QSC15024S48	470 μF/50V	470 μF/50V	4700 pF	4700 pF	Short	0.5mH
QSC15048S05	220 μF/100V	220 μF/100V	2200 pF	2200 pF	Short	0.5mH
QSC15048S12	220 μF/100V	220 μF/100V	2200 pF	2200 pF	Short	0.5mH
QSC15048S24	220 μF/100V	220 μF/100V	2200 pF	2200 pF	Short	0.5mH
QSC15048S28	220 μF/100V	220 μF/100V	2200 pF	2200 pF	Short	0.5mH
QSC15048S48	220 μF/100V	220 μF/100V	4700 pF	4700 pF	Short	0.5mH

Note: C1, C2 are NIPPON CHEMI-CON KY series aluminum capacitors, C3, C4 are ceramic capacitors.