ISOLATED DC/DC CONVERTERS

36 - 75 Vdc Input 3.3 Vdc /45 A Output

0RQ1-C5T03x RoHS Compliant PRELIMINARY Rev.D

- Isolated
- Fixed Frequency (300 kHz)
- High Efficiency
- High Power Density
- Input Under Voltage Lockout
- Output Voltage Trim
- Positive/Negative Remote Sense
- Low Cost
- Output Over-Voltage Shutdown
- Over Temperature Protection
- SCP/OCP
- Remote On/Off
- Basic Isolation

Description

The 0RQ1-C5T03x is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 148.5 W of output power from a nominal 48 Vdc input. This unit is designed to be highly efficient and low cost. Features include remote on/off, over current protection and under-voltage lockout. This converter is provided in an industry standard quarter brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active High	Model Number Active Low
3.3 Vdc	36 Vdc - 75 Vdc	45 A	148.5 W	92%	0RQ1-C5T03A	0RQ1-C5T03B
3.3 Vdc	36 Vdc - 75 Vdc	45 A	148.5 W	92%	0RQ1-C5T033	0RQ1-C5T03L

Notes: 1. Add “G” suffix at the end of the model number to indicate Tray Packaging.
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Continuous Input Voltage	-0.3 V	-	80 V	
Remote On/Off	-0.3 V	-	18 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Note: All specifications are typical at 25 °C unless otherwise stated.

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	5.2 A	
Input Current (no load)	-	80 mA	120 mA	
Remote Off Input Current	-	10 mA	15 mA	
Input Reflected Ripple Current (pk-pk)	-	25 mA	40 mA	With simulated source impedance of 10 uH, 5 Hz to 20 MHz; use a 100 uF/100 V electrolytic capacitor with ESR = 1 ohm max at 200 kHz
Input Reflected Ripple Current (rms)	-	5 mA	10 mA	
I^2t Inrush Current Transient	-	0.1 A^2s	0.5 A^2s	
Turn-on Voltage Threshold	33 V	34.5 V	36 V	
Turn-off Voltage Threshold	31 V	32.5 V	34 V	

Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

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Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	3.234 V	3.3 V	3.366 V	V_{in}=48 V, half load
Load Regulation	-	±4 mV	±9 mV	
Line Regulation	-	±3 mV	±6.6 mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±15 mV	±30 mV	
Output Current Range	0 A	-	45 A	
Output DC Current Limit	48 A	53 A	60 A	
Ripple and Noise (rms)	-	12 mV	25 mV	0-20MHz BW, with a 1µF ceramic capacitor and a 10µF tantalum capacitor at output
Ripple and Noise (pk-pk)	-	45 mV	90 mV	
Short Circuit Surge Transient	-	3 A^2s	5 A^2s	
Turn on time		100 mS	150 mS	
Overshoot at Turn on	-	-	3%	
Output Capacitance	0 uF	-	15000 uF	

Transient Response

50% ~ 75% Max Load	Overshoot	V_O=3.3 V	-	120 mV	250 mV	di/dt=0.1A/us, Vin=48 Vdc, Ta=25 °C, with a 1µF ceramic capacitor and a 10uF Tantalum cap at output.
	Settling Time		-	100 uS	200 uS	
75% ~ 50% Max Load	Overshoot		-	120 mV	250 mV	
	Settling Time		-	100 uS	200 uS	

Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	90%	92%	-	V_{in}=48 V, full load
Switching Frequency	270 kHz	300 kHz	330 kHz	
Input to Output Isolation Voltage	1500 V	-	-	
Isolation Capacitance	-	3900 pF	-	
Output Voltage Protection	-	125%Vo	-	Vin=48 V, full load, in hiccup mode
Remote Sense Compensation	-	-	10%Vo	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Output Voltage Trim Range	80%Vo	-	110%Vo	
Over Temperature Protection	-	125 °C	-	
MTBF	TBD			Calculated Per Bell Core SR-332 (Vin=48 V, Io=normal , T_a = 25 °C)
Dimensions Inches millimeters	2.34 x 1.51 x 0.53 59.49 x 38.40 x 13.49			0RQ1-C5T03A & 0RQ1-C5T03B
Dimensions Inches millimeters	2.28 x 1.45 x 0.402 57.88 x 36.83 x 10.21			0RQ1-C5T033 & 0RQ1-C5T03L
Weight	-	TBD	-	

Note: All specifications are typical at 25 °C unless otherwise stated.

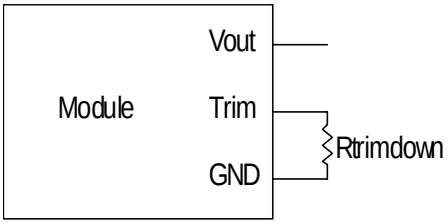
Control Specifications

Parameter		Min	Typ	Max	Notes
Remote On/Off					
Signal Low (Unit On)	Active Low	-0.3 V	-	0.8 V	0RQ1-C5T03B and 0RQ1-C5T03L, The remote on/off pin open, Unit Off.
Signal High (Unit Off)		2.4 V	-	18 V	
Signal Low (Unit Off)	Active High	-0.3 V	-	0.8 V	0RQ1-C5T03A and 0RQ1-C5T033, The remote on/off pin open, Unit On.
Signal High (Unit On)		2.4 V	-	18 V	
Current Sink		0 mA	-	1 mA	

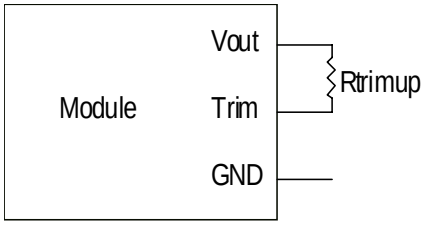
Output Trim Equations

Equations for calculating the trim resistor are shown below. The Trim Down resistor should be connected between the Trim pin and GND pin. The Trim Up resistor should be connected between the Trim pin and Vout pin. Only one of the resistors should be used for any given application.

$$Rtrimdown = \frac{511}{|delta|} - 10.22[k\Omega]$$



$$Rtrimup = \frac{(100 + delta) \cdot Vo \cdot 5.11 - 626}{1.225 \cdot delta} - 10.22[k\Omega]$$

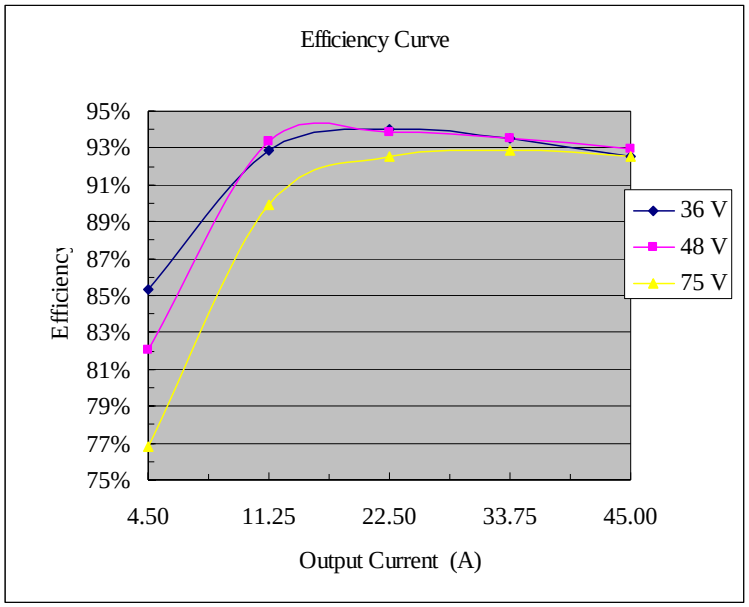


Note:

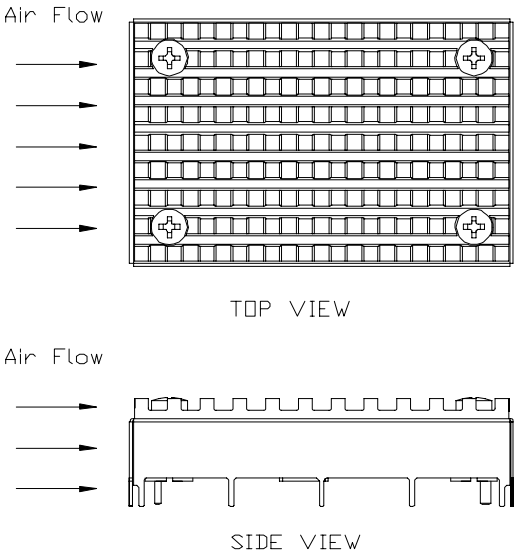
$$delta = \frac{(Vadj - Vo)}{Vo} \times 100\,[\%]$$

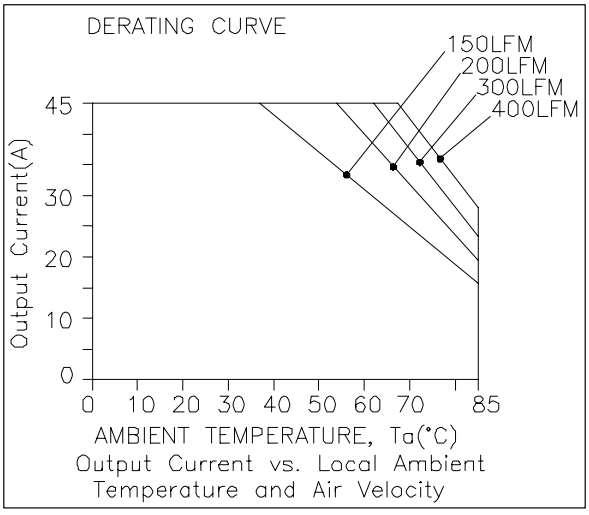
Vadj is the desired output voltage
Vo =3.308V @Iout=0

Efficiency Data



Thermal Derating Curve

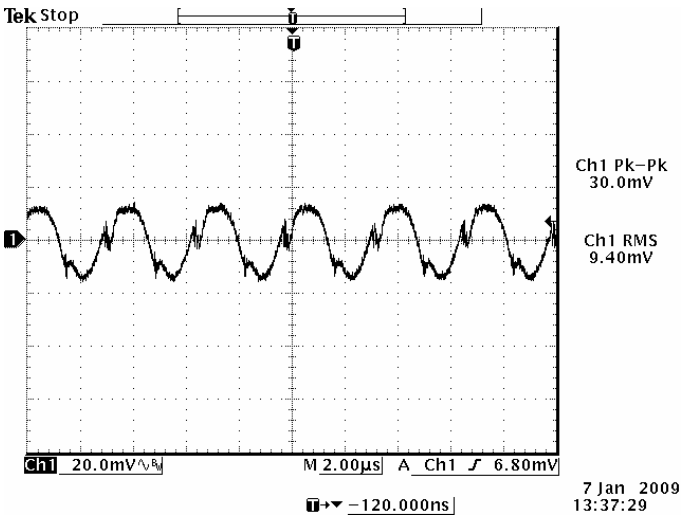




0RQ1-C5T03A and 0RQ1-C5T03B

Vin=48V, with maximum junction temperature of semiconductors derated to 120 degree C.

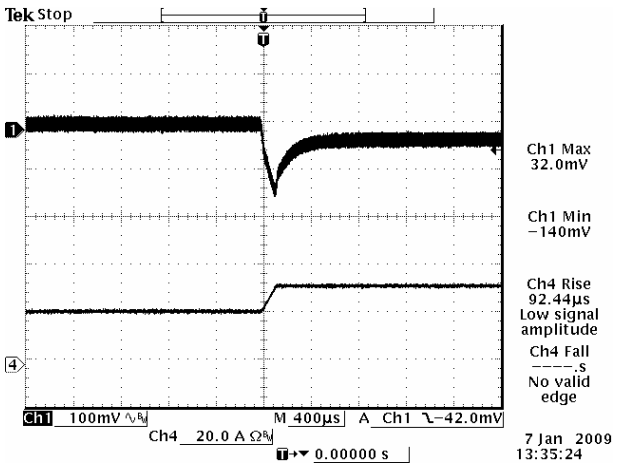
Ripple and Noise Waveform



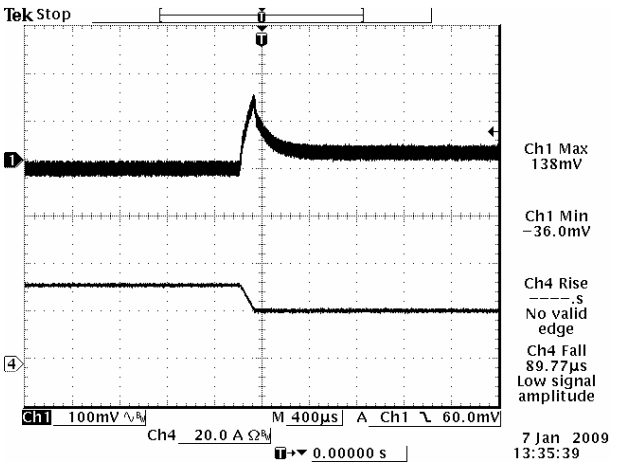
48Vdc input, 3.3Vdc/45A output

Note: Ripple and noise at full load, with a 1uF ceramic cap and a 10 uF Tantalum cap at output, Ta=25 deg C.

Transient Response Waveforms



50% to 75% Load Transients



75% to 50% Load Transients

Note: Transient Response at Vin=48V, di/dt=0.1A/uS, with external 10uF Tantalum Cap and 1uF Ceramic Cap, Ta=25 deg C.

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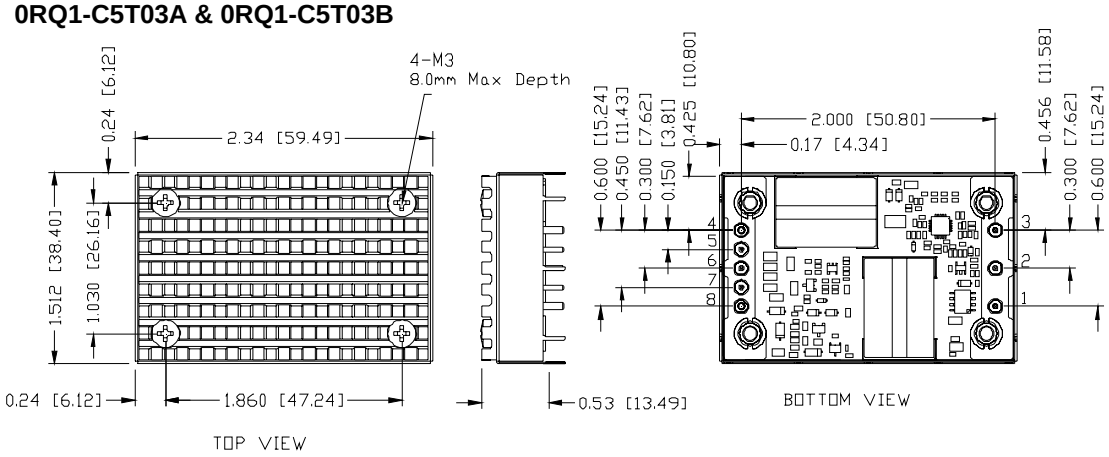
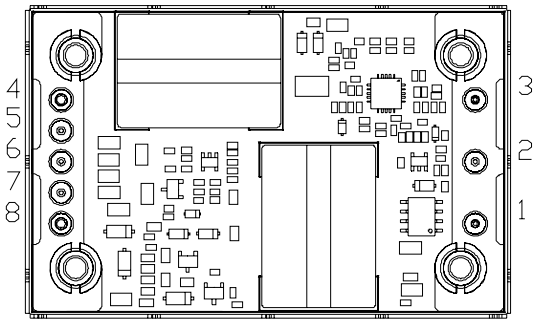
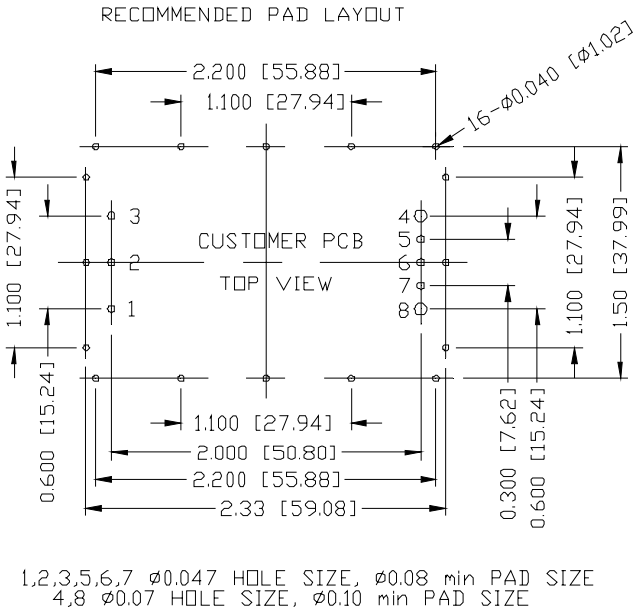
Mechanical Outline

0RQ1-C5T03A & 0RQ1-C5T03B







1,2,3,5,6,7 ø0.047 HOLE SIZE, ø0.08 min PAD SIZE
4,8 ø0.07 HOLE SIZE, ø0.10 min PAD SIZE

Pin Connections

Pin	Function	Pin Size
1	Vin(-)	0.040"
2	On/Off	0.040"
3	Vin(+)	0.040"
4	Vo(+)	0.060"
5	Sense(+)	0.040"
6	Trim	0.040"
7	Sense(-)	0.040"
8	Vo(-)	0.060"

Notes: 1. Pin 5 must be connected to Vo(+).
2. Pin 7 must be connected to Vo(-).

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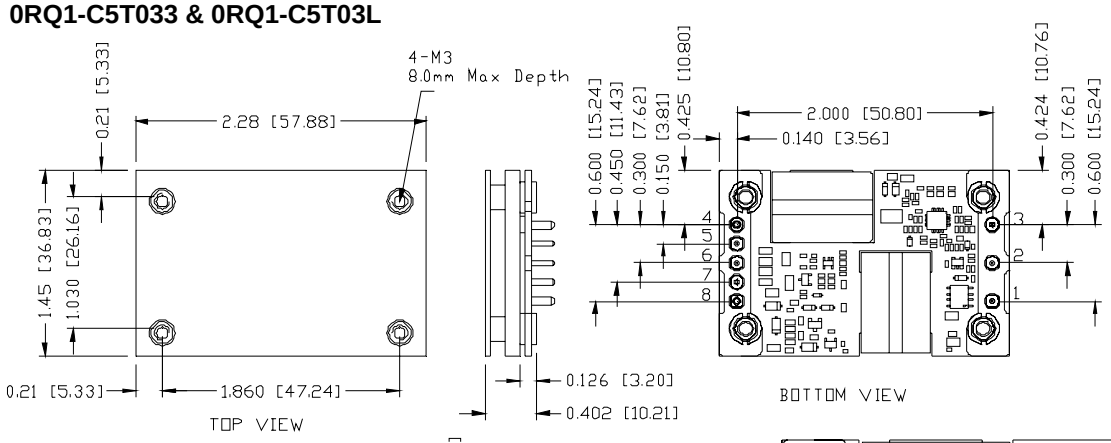
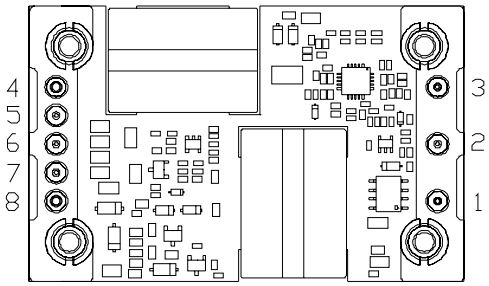
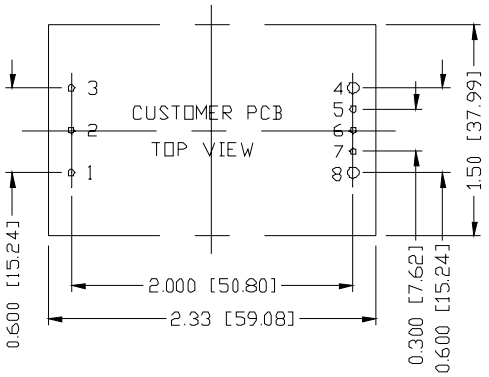
Mechanical Outline

0RQ1-C5T033 & 0RQ1-C5T03L





RECOMMENDED PAD LAYOUT



1,2,3,5,6,7 Ø0.047 HOLE SIZE, Ø0.08 min PAD SIZE
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4	Vo(+)	0.060"
5	Sense(+)	0.040"
6	Trim	0.040"
7	Sense(-)	0.040"
8	Vo(-)	0.060"

Notes: 1. Pin 5 must be connected to Vo(+).
2. Pin 7 must be connected to Vo(-).

RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.

CORPORATE

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