

ISOLATED DC/DC CONVERTERS

48 Vdc Input 3.3 Vdc /30 A Output

bel
POWER PRODUCTS

0RCY-C2T03x

RoHS Compliant

Rev.B

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

Description

The 0RCY-C2T03x is isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 99 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 eighth 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	48 Vdc	30 A	99 W	93%	0RCY-C2T030	0RCY-C2T03L

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

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	80 V	
Remote On/Off	-0.3 V	-	18 V	
I/O Isolation Voltage	1500 V	-	-	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	4.5 A	
Input Current (no load)	-	70 mA	120 mA	
Remote Off Input Current	-	10 mA	15 mA	
Input Reflected Ripple Current (rms)	-	5 mA	10 mA	With simulated source impedance of 10 uH, 5Hz to 20MHz. Use a 100 uF/100 V electrolytic cap with ESR=1 ohm max, at 200 KHz @25°C.
Input Reflected Ripple Current (pk-pk)	-	-	30 mA	
I ² t Inrush Current Transient	-	-	0.1 A ² s	
Turn-on Voltage Threshold	33 V	-	35.5 V	
Turn-off Voltage Threshold	32 V	-	34.5 V	

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

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Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point	3.234 V	3.30 V	3.366 V	Vin=48 V, Io=50%load		
Load Regulation	-	±4 mV	±9 mV			
line Regulation	-	±8 mV	±16.5 mV			
Regulation Over Temperature (-40deg.C-85deg.C)	-	±30 mV	±50 mV			
Ripple and Noise (rms)	-	10 mV	20 mV	0-20MHz BW, with a 1µF ceramic capacitor and the minimum external Tantalum cap at output.		
Ripple and Noise (pk-pk)	-	55 mV	90 mV			
Output Current Range	0 A	-	30 A			
Output DC Current Limit	33 A	-	44 A			
Short Circuit Surge Transient	-	2 A ² s	4 A ² s			
Turn on Time	-	-	25 mS			
Overshoot at Turn on	-	0%	-			
Output Capacitance	470 uF	-	5600 uF			
Transient Response						
25% ~ 50% Max Load	Overshoot	Vo=3.3 V	-	50 mV	100 mV	di/dt=0.1 A/us, Vin=48 Vdc, with a 1µF ceramic capacitor and the minimum external Tantalum cap at output.
	Settling Time		-	150 uS	250 uS	
50% ~ 25% Max Load	Overshoot		-	50 mV	100 mV	
	Settling Time		-	150 uS	250 uS	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	90%	93%	-	Measured at Vin=48 V, full load.
Switching Frequency	270 kHz	300 kHz	330 kHz	
Isolation capacitance	-	2200 pF	-	
Output Voltage Trim Range	90%	-	110%	Vin=48V, full load and short feedback optocoupler.
Remote Sense Compensation	-	-	10%	
Over Temperature Protection	-	125 °C	-	
Over Voltage Protection	3.8 V	-	4.5 V	Vin=48 V, full load, in hiccup Mode
MTBF	TBD			Calculated Per Bell Core SR-332 (Io=80%load, Ta = 25 °C)
Dimensions	Inches (L × W × H)			
	2.30 x 0.90 x 0.37			
	Millimeters (L × W × H)			
	58.42 x 22.78 x 9.50			
Weight	-	28 g	-	

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	-0.7 V	-	When Remote On/Off pin is open, unit is off.
Signal High (Unit Off)		2.4 V	-	
Signal Low (Unit Off)	Active High	-0.7 V	-	When Remote On/Off pin is open, unit is on.
Signal High (Unit On)		2.4 V	-	
Current Sink		0 mA	-	1 mA

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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 the Vout pin. Only one of the resistors should be used for any given application.

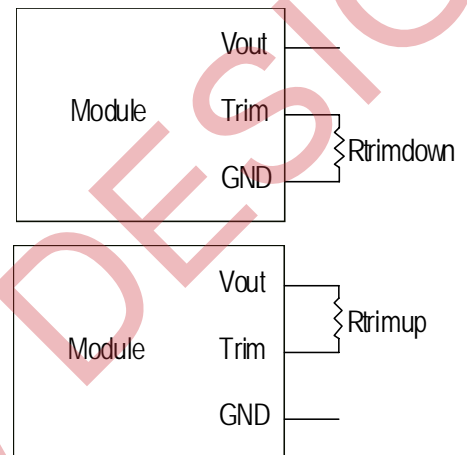
$$R_{trimdown} = \frac{511}{|\delta|} - 10.22 [k\Omega]$$

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

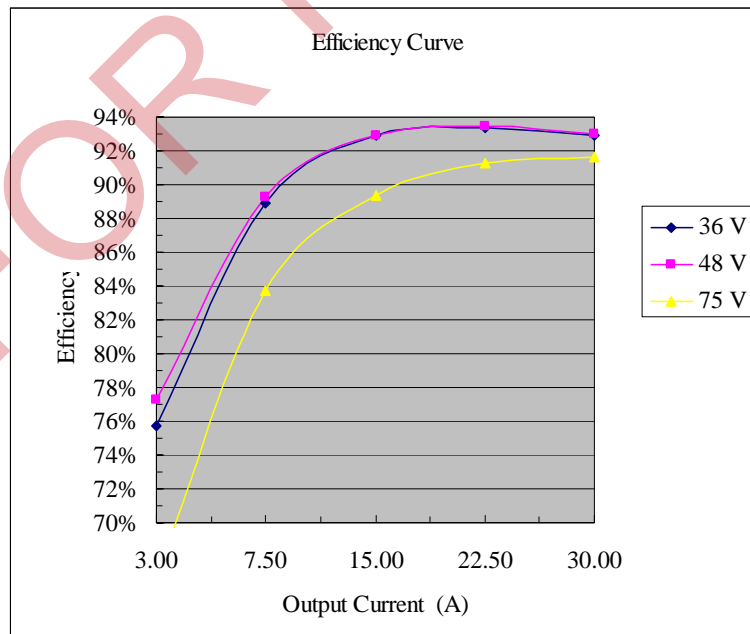
Note:

$$\delta = \frac{(V_o - req - V_o)}{V_o} \times 100 [\%]$$

$V_o - req$ = Desired (trimmed) output voltage [V]
Output voltage $V_o = 3.3$ V



Efficiency Data



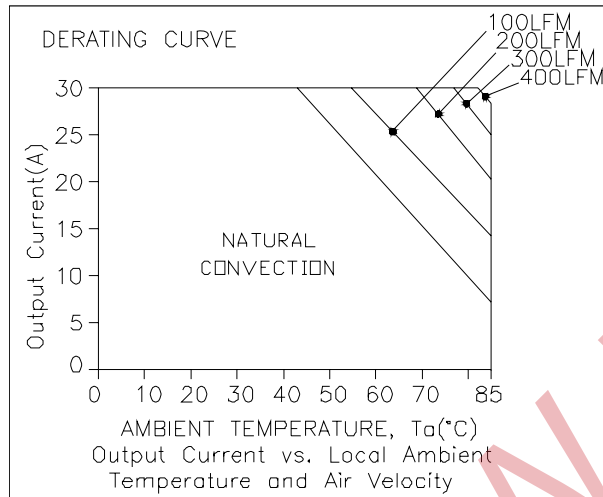
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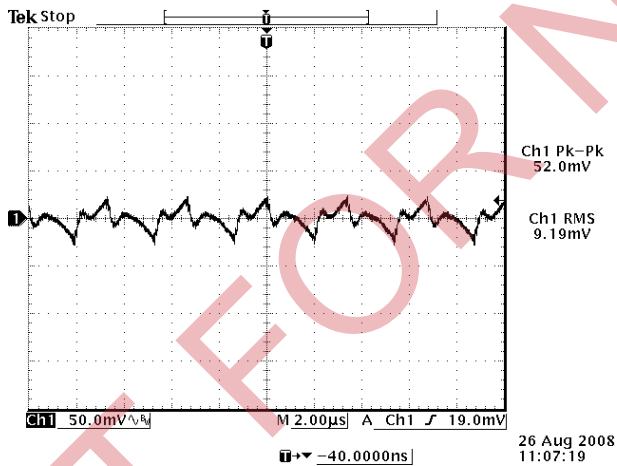


Thermal Derating Curve

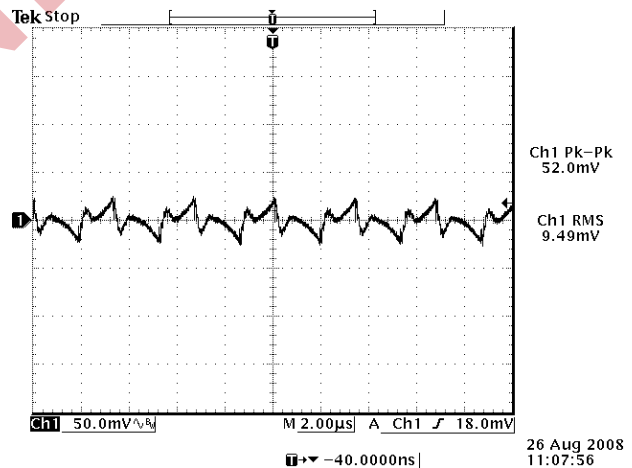
Vin=48V, with maximum junction temperature of semiconductors derated to 120 degree C



Ripple and Noise Waveforms



Io=0A Vin=48V



Io=30A Vin=48V

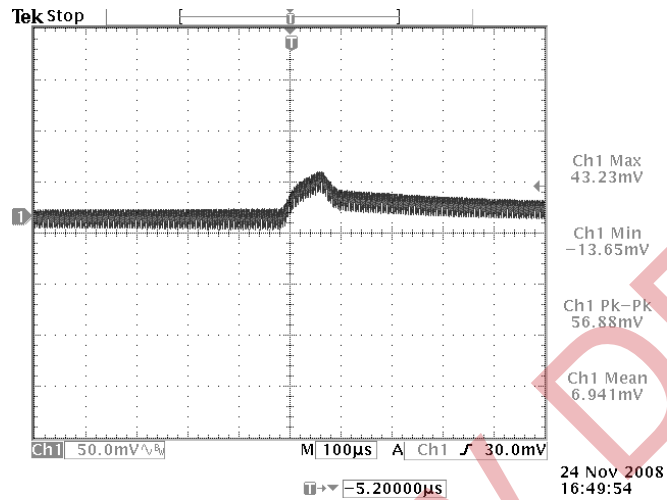
Note: Ripple and noise with a 1uF ceramic cap and a 10 uF Tantalum cap at output, and Ta=25 deg C.

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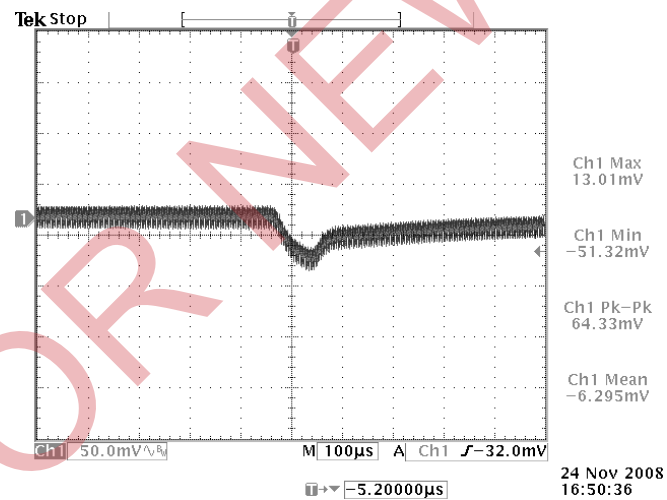
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Transient Response Waveforms



Vout=3.3V 75% to 50% Load Transients at Vin=48V



Vout=3.3V 50% to 75% Load Transients at Vin=48V

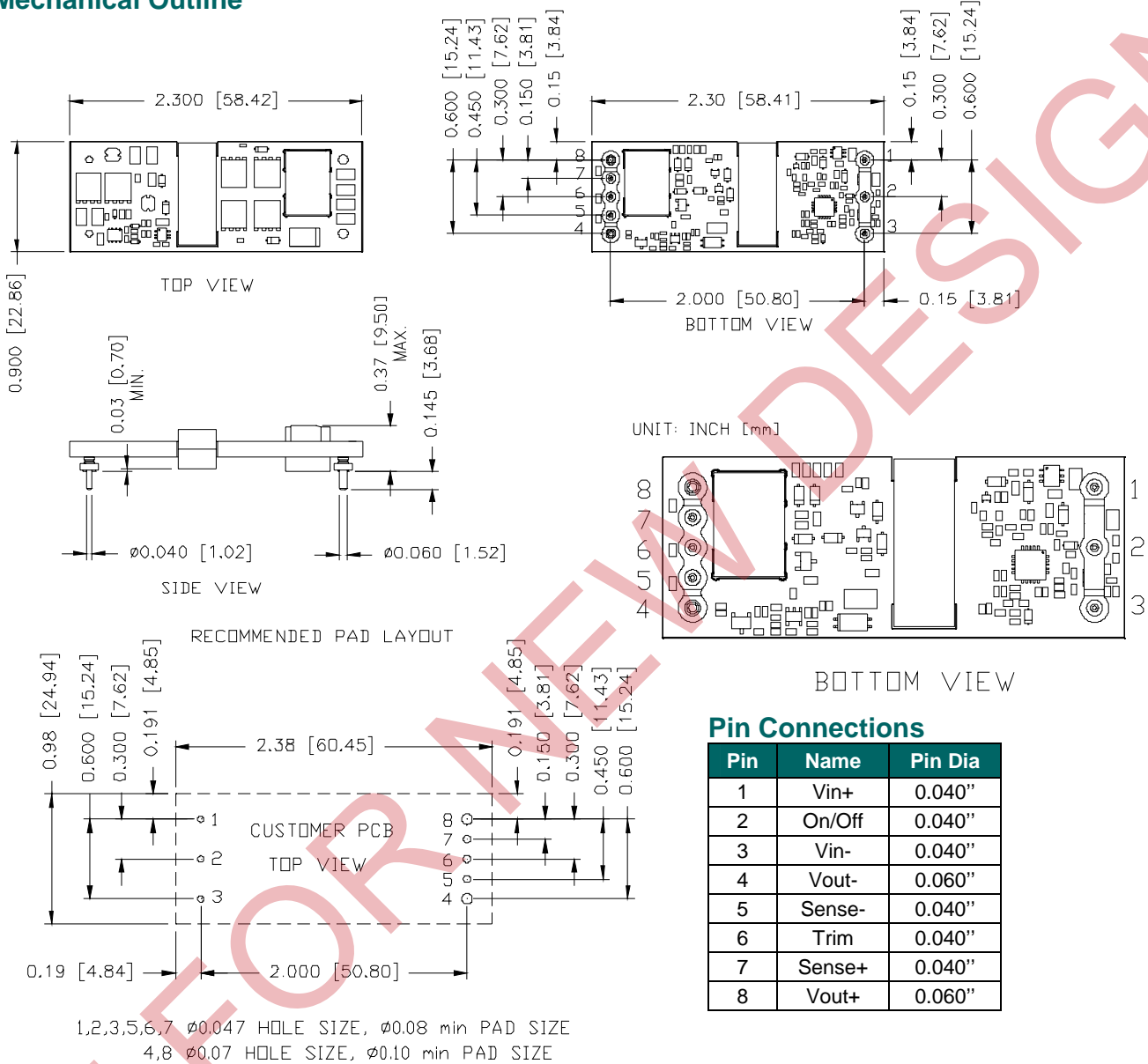
Note: Transient Response at $di/dt=0.1A/\mu S$, External 330uF Tantalum Cap, $T_a=25\text{deg C}$.

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Mechanical Outline



RoHS Compliance

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



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