ISOLATED DC/DC CONVERTERS

48 Vdc Input 1.2 Vdc /50 A Output

0RCY-C0TV2x RoHS Compliant PRELIMINARY Rev.B

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Low Cost
- Basic Insulation
- Start-up into Pre-biased Load
- Output Over-Voltage Protection with Auto-recovery
- Secondary Side Control for Fast Transient Response and High Reliability
- Input Under-Voltage Lockout
- Output Voltage Trim
- OCP/SCP
- Over Temperature Protection
- Remote On/Off
- Positive/Negative Remote Sense

Description

The 0RCY-C0TV2x is isolated dc/dc converter that operates from a nominal 48 Vdc source. This secondary side control unit will provide up to 60 W of output power from a nominal 48 Vdc input. Features include start-up into pre-biased load, 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
1.2 Vdc	48 Vdc	50 A	60 W	86%	0RCY-C0TV20	0RCY-C0TV2L

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	
Input Voltage (transient)	-	-	100 V	100 mS
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 Voltage Transient Rate	-	-	7 V/mS	
Input Current (full load)	-	-	3.0 A	
Input Current (no load)	-	30 mA	50 mA	
Remote Off Input Current	-	2 mA	5 mA	
Back Drive Current Limit from Pre-biased Output while Pin On-Off is Enabled (Pk)	-	-	500 mA	

Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Back Drive Current Limit from Pre-biased Output while Pin On-Off is Disabled (Pk)	-	-	50 mA	
Input Reflected Ripple Current (rms)	-	-	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℃.
Input Reflected Ripple Current (pk-pk)	-	-	30 mA	
I^2t Inrush Current Transient	-	-	0.1 A^2s	
Turn-on Voltage Threshold	33 V	-	35.5 V	
Turn-off Voltage Threshold	32 V	-	34.5 V	
Lockout Hysteresis Voltage	1 V	-	2 V	
Start up Time	-	-	25 mS	converter start-up time with ON/OFF input settled ON
Rise time	-	-	15 mS	

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

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	1.176 V	1.20 V	1.224 V	Vin=48 V, Io=50%load
Load Regulation	-	±3 mV	±5 mV	
line Regulation	-	±3 mV	±5 mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±4 mV	±9 mV	
Ripple and Noise (rms)	-	-	15 mV	Vin=72 V, 0-20MHz BW, with a 1µF ceramic capacitor and a 100 µF Tantalum cap at output.
Ripple and Noise (pk-pk)	-	-	60 mV	
Output Current Range	0 A	-	50 A	
Output DC Current Limit	52 A	-	70 A	
Short Circuit Surge Transient	-	2 A^2s	4 A^2s	
Resistor Between Sense(+) and Vout(+) Pins	90 ohm	-	110 ohm	
Resistor Between Sense(-) and Vout(-) Pins	10 ohm	-	110 ohm	
Overshoot at Turn on	-	0%	-	
Output Capacitance	0 uF	-	20,000 uF	

Transient Response						
25% ~ 50% Max Load	Overshoot	Vo=1.2 V	-	-	60 mV	di/dt=1A/us, Vin=48Vdc, with a 1µF ceramic capacitor and a 600 µF ESR≤4.8mOhm cap at output.
	Settling Time		-	-	50 uS	
50% ~ 25% Max Load	Overshoot		-	-	60 mV	
	Settling Time		-	-	50 uS	

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

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	85%	86%	-	Measured at Vin=48 V, full load.
Switching Frequency	270 kHz	300 kHz	330 kHz	
Isolation capacitance	-	2200 pF	-	
Output Voltage Trim Range	80%	-	110%	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Remote Sense Compensation	-	-	10%	
Over Temperature Protection	-	125 °C	-	
Over Voltage Protection	1.416 V	-	1.8 V	Vin=48 V, full load, in hiccup Mode
MTBF	TBD			Calculated Per Bell Core SR-332 (Io=50%load, 400 LFM, T_a = 25 °C)
Dimensions Inches (L × W × H) Millimeters (L × W × H)	2.30 x 0.90 x 0.40 58.42 x 22.86 x 10.17			
Weight	-	30 g	-	

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

Control Specifications

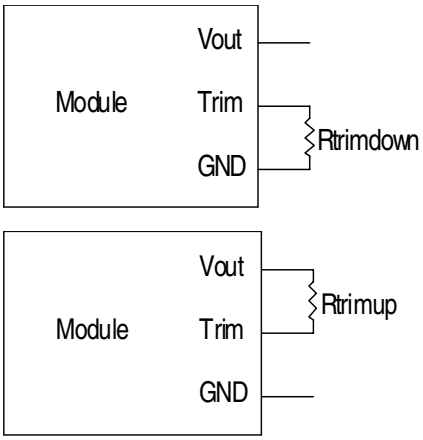
Parameter		Min	Typ	Max	Notes
Remote On/Off					
Signal Low (Unit On)	Active Low	-0.7 V	-	0.8 V	When Remote On/Off pin is open, unit is off.
Signal High (Unit Off)		3.0 V	-	18 V	
Signal Low (Unit Off)	Active High	-0.7 V	-	0.8 V	When Remote On/Off pin is open, unit is on.
Signal High (Unit On)		2.4 V	-	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 the Vout pin. Only one of the resistors should be used for any given application.

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

$$Rtrimup = \frac{(100 + delta) \cdot Vo \cdot 5.11}{0.6125 \cdot delta} - \frac{511}{delta} - 10.22[k\Omega]$$

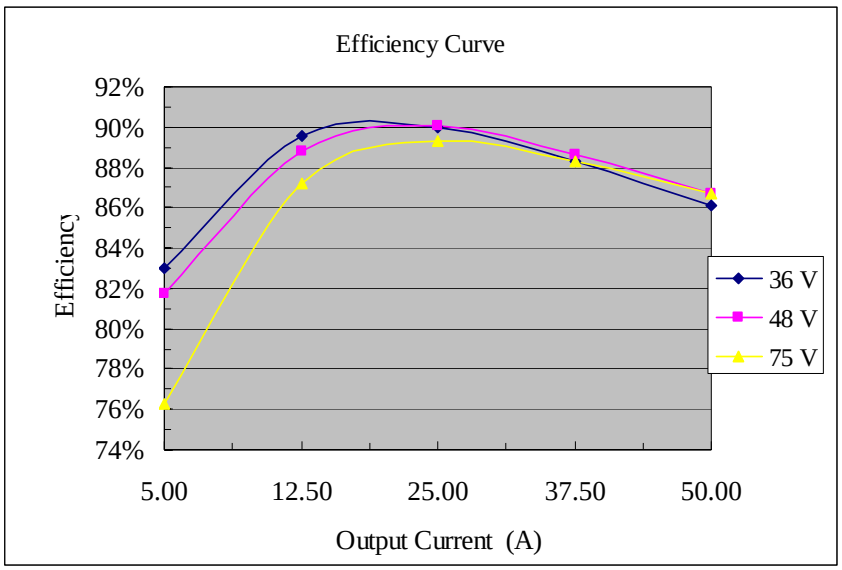


Note:

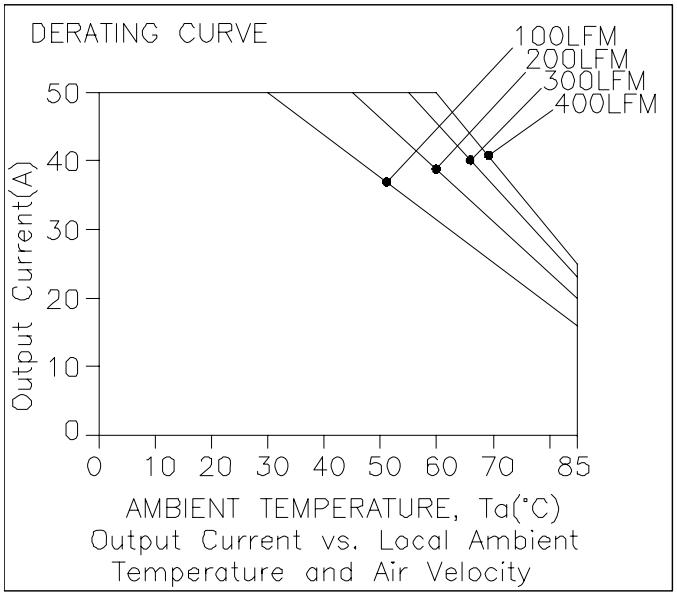
$$delta = \frac{(Vo\_req - Vo)}{Vo} \times 100[\%]$$

Vo_req=Desired (trimmed) output voltage [V]
Output voltage Vo=1.2 V

Efficiency Data

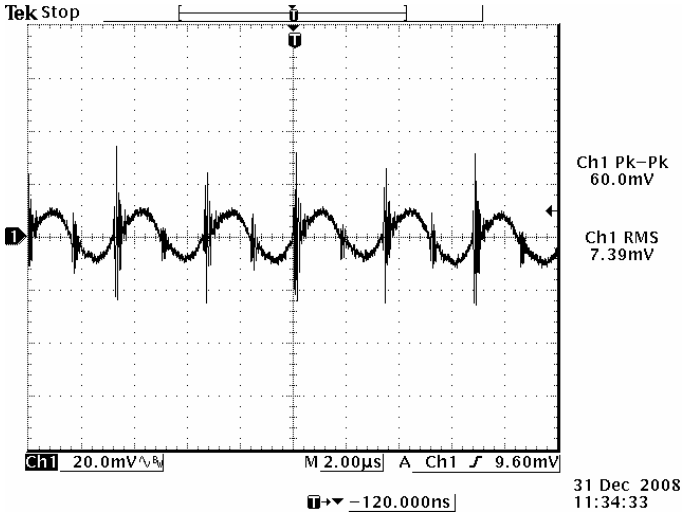


Thermal Derating Curve



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

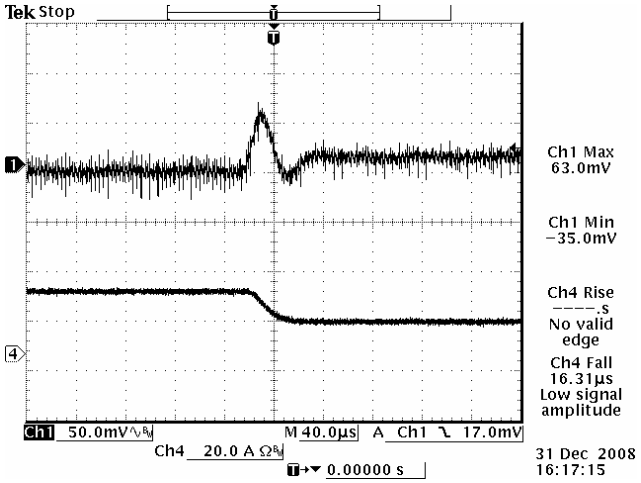
Ripple and Noise Waveform



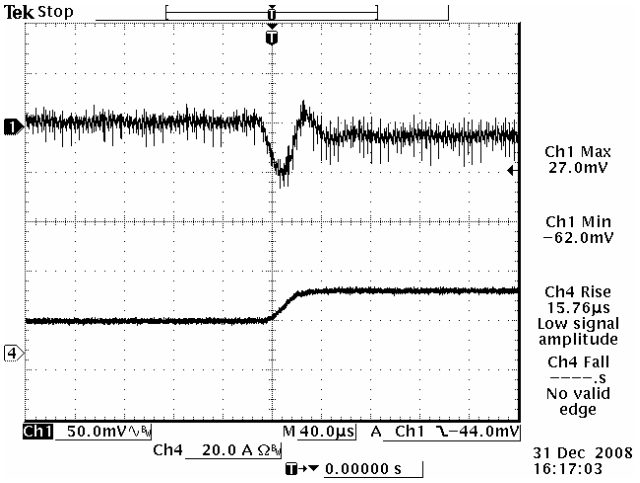
48Vdc input, 1.2Vdc/50A output

Note: Ripple and noise at full load, with a 1uF ceramic cap and a 100 uF Tantalum cap at output, Ta=25deg C.

Transient Response Waveforms



75% to 50% Load Transients



50% to 75% Load Transients

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

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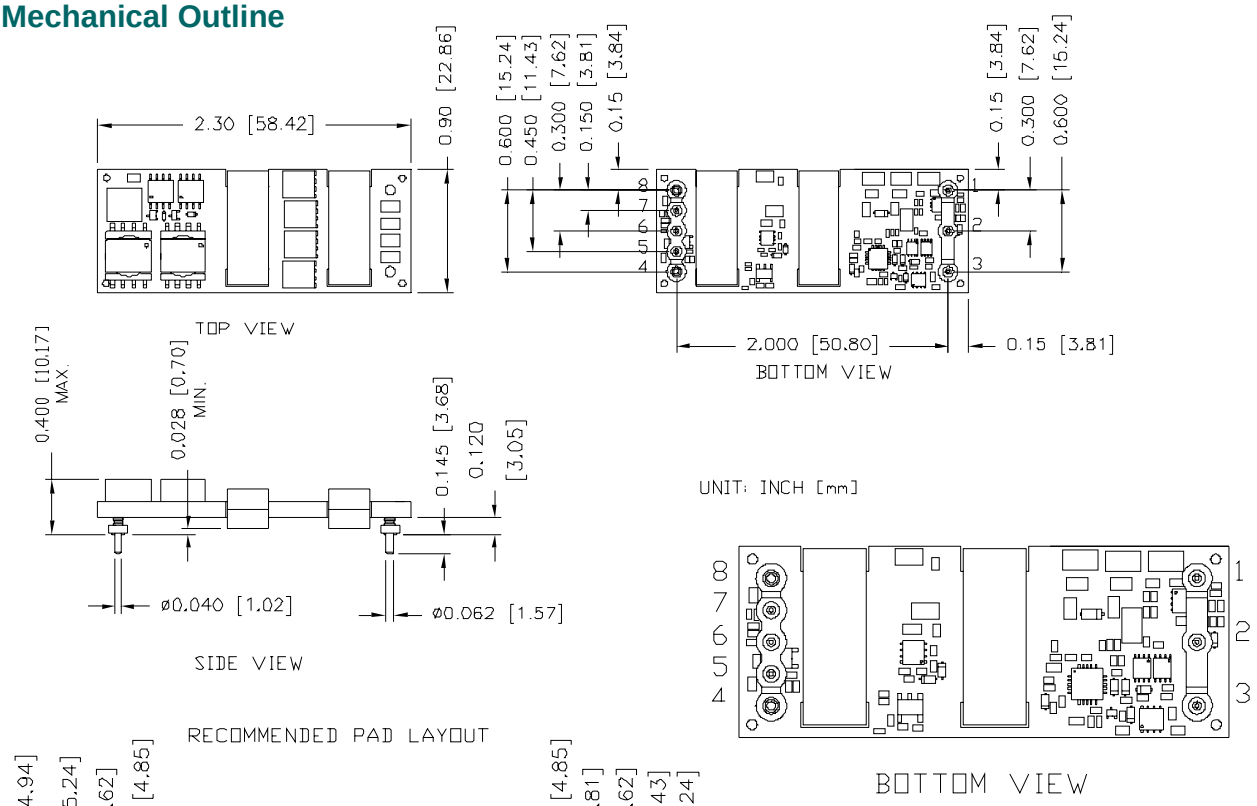
Mechanical Outline



Pin Connections

Pin	Name	Pin Dia
1	Vin+	0.040”
2	On/Off	0.040”
3	Vin-	0.040”
4	Vout-	0.062”
5	Sense-	0.040”
6	Trim	0.040”
7	Sense+	0.040”
8	Vout+	0.062”

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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