

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc /12 A Output

Sep. 24, 2010

Bel Power Inc., a subsidiary of Bel Fuse Inc.

0RCY-C2T12x

RoHS Compliant

Rev.C

Features

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Low Cost
- Input Under-Voltage Lockout
- Basic Insulation
- Class 1, Category 2, Isolated DC/DC Converter (refer to IPC-9592)
- UL60950-1 Recognized (UL/cUL) (Pending)
- Output Over-Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Output Voltage Trim
- Remote On/Off
- Positive/Negative Remote Sense



Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The 0RCY-C2T12x is isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 144 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
12 Vdc	36 Vdc - 75 Vdc	12 A	144 W	93%	0RCY-C2T120	0RCY-C2T12L

Notes: Add "G" suffix at the end of the model number to indicate Tray Packaging.

Part Number Explanation

$\frac{0}{1} \frac{R}{2} \frac{CY}{3} - \frac{C2}{4} \frac{T}{5} \frac{12}{6} \frac{x}{7}$

1---Through hole

2---RoHS 6, change "R" to "7" means RoHS 5

3---Series name

4---Series code

5---Input range (36-75V)

6---Output voltage 12V

7--- Suffix

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Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Notes
Continuous Input Voltage	-0.3	-	80	V	
Input Transient Voltage	-	-	100	V	100 mS maximum
Remote On/Off	-0.3	-	18	V	
Input to baseplate isolation voltage	1500	-	-	V	
output to baseplate isolation voltage	500	-	-	V	
I/O Isolation Voltage	1500	-	-	V	
Ambient Temperature	-40	-	85	°C	
Storage Temperature	-55	-	125	°C	

Note: Ratings used beyond the maximum ratings may cause a reliability degradation of the converter or may permanently damage the device.

Input Specifications

Parameter	Min	Typ	Max	Unit	Notes
Operating Input Voltage	36	48	75	V	
Input Current (full load)	-	-	5.0	A	
Input Current (no load)	-	60	120	mA	
Remote Off Input Current	-	10	15	mA	
Input Reflected Ripple Current (rms)	-	5	10	mA	Tested 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 at 25 °C.
Input Reflected Ripple Current (pk-pk)	-	25	40	mA	
I ² t Inrush Current Transient	-	0.1	0.5	A ² s	
Turn-on Voltage Threshold	33	34	36	V	
Turn-off Voltage Threshold	31	32	34	V	

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

Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output Voltage Set Point	11.76	12.00	12.24	V	V _{in} =48V, I _o =50% load
Load Regulation	-	±12	±24	mV	
Line Regulation	-	±12	±24	mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±30	±60	mV	
Total Regulation	-	±60	±100	mV	
Ripple and Noise (pk-pk)	-	90	150	mV	0-20 MHz BW, with a 1µF ceramic capacitor and a 10uF Tantalum cap at output.
Ripple and Noise (rms)	-	30	50	mV	
Output Current Range	0	-	12	A	
Output DC Current Limit	13	15	17	A	

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Output Specifications (continued)

Parameter	Min	Typ	Max	Unit	Notes	
Short Circuit Surge Transient	-	2	4	A ² s		
Turn on Time	-	60	100	mS		
Overshoot at Turn on	-	0	-	%		
Output Capacitance	0	-	680	uF		
Transient Response						
ΔV25%~50% of Max Load	Overshoot	-	400	600	mV	di/dt=0.1A/us, Vin=48Vdc, Ta=25°C, with a 1μF ceramic capacitor and a 10uF Tantalum cap at the output.
	Settling Time	-	200	300	uS	
ΔV50%~25% of Max Load	Overshoot	-	400	600	mV	
	Settling Time	-	200	300	uS	

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

General Specifications

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	91	93	-	%	Vin=48V, full load
Switching Frequency	270	300	330	kHz	
Isolation Capacitance	-	3900	-	pF	
Output Voltage Trim Range	80	-	110	%Vo	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Remote Sense Compensation	-	-	10	%Vo	
Over Temperature Protection	-	125	-	°C	
Over Voltage Protection	-	125	-	%	Vin=48V, full load, in hiccup mode
Weight	-	47	-	g	
FIT	TBD			-	Calculated Per Bell Core SR-332 (Vin=48 V, Vo=12 V, Io=12 A, Ta = 25 °C, FIT=10 ⁹ /MTBF)
Dimensions	Inches (L x W x H) Millimeters (L x W x H)			-	2.30 x 0.90 x 0.50 58.41 x 22.91 x 12.70

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

Control Specifications

Parameter	Min	Typ	Max	Unit	Notes
Remote On/Off					
Signal Low (Unit On)	-0.3	-	0.8	V	0RCY-C2T12L. The remote on/off pin open, Unit off.
Signal High (Unit Off)					
Signal Low (Unit Off)	2.4	-	18	V	
Signal High (Unit On)					
Current Sink	0	-	1	mA	

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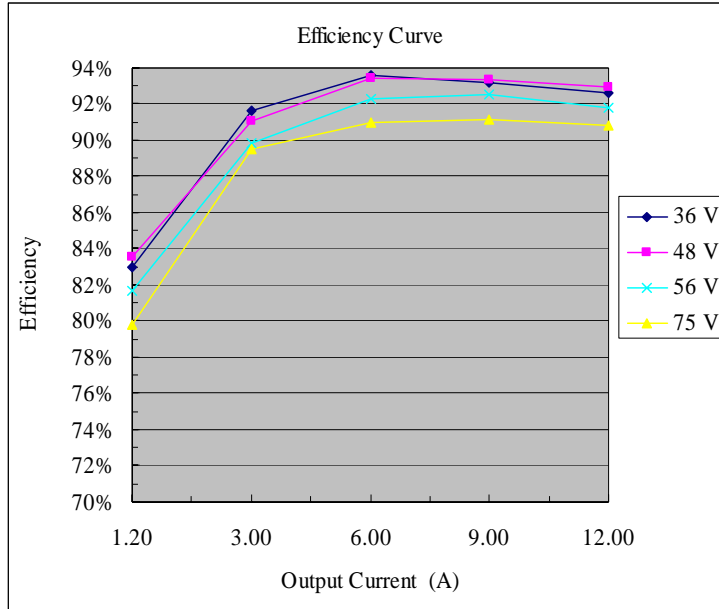
48 Vdc Input 12 Vdc /12 A Output



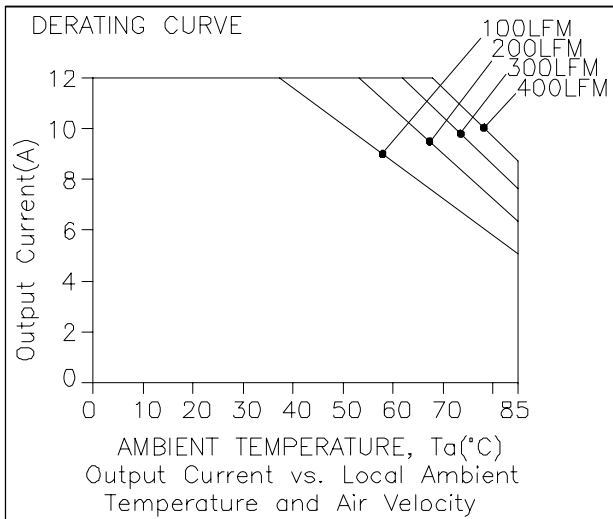
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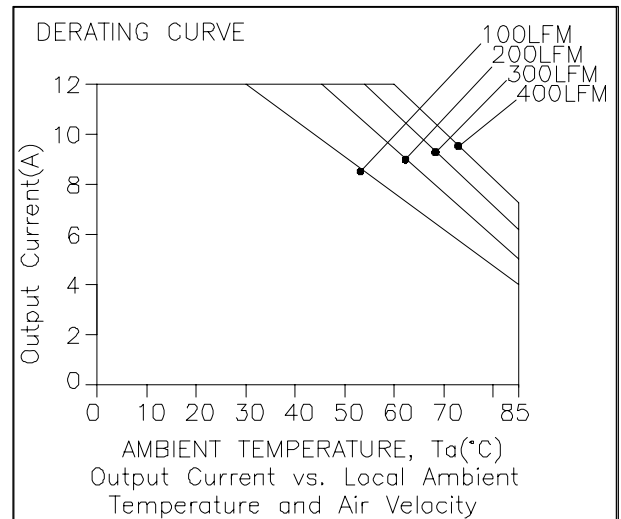
Efficiency Data



Thermal Derating Curve



Vin=48 V



Vin=56 V

With maximum junction temperature of semiconductors derated to 120 degree C

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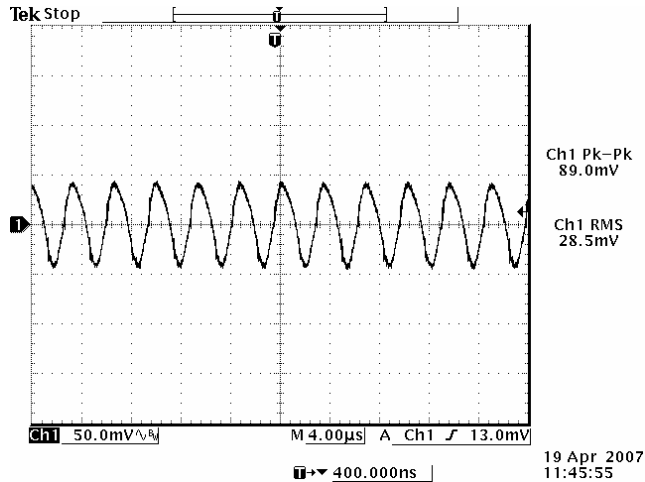
48 Vdc Input 12 Vdc /12 A Output



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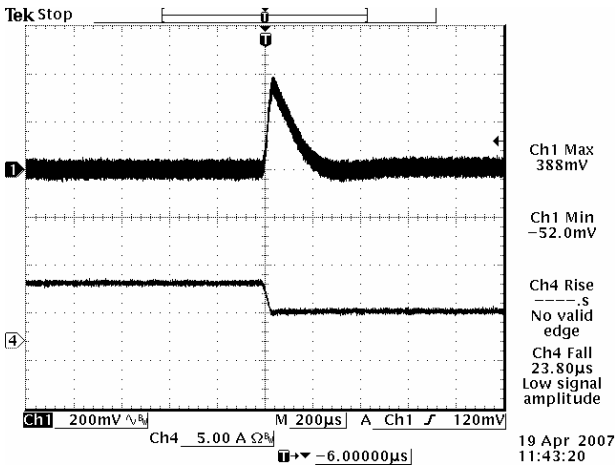
Ripple and Noise Waveform



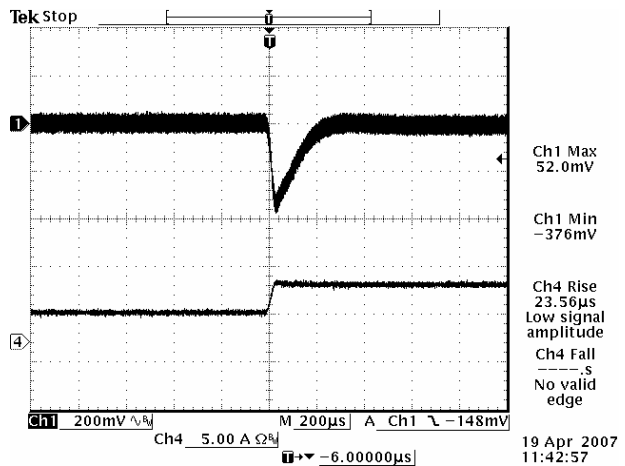
48 Vdc input, 12.0 Vdc/12 A output

Note: Ripple and noise at full load, 0-20 MHz BW, $T_a=25$ deg C, with a 1µF ceramic cap and a 10 µF Tantalum cap at output.

Transient Response Waveforms



Vout=12.0 V, 50%-25% Load Transient



Vout=12.0 V, 25%-50% Load Transient

Note: Transient Response at $V_{in}=48$ V, $di/dt=0.1$ A/uS, external 10 µF tantalum Cap and 1µF ceramic Cap at the output, $T_a=25$ deg C.

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48 Vdc Input 12 Vdc /12 A Output



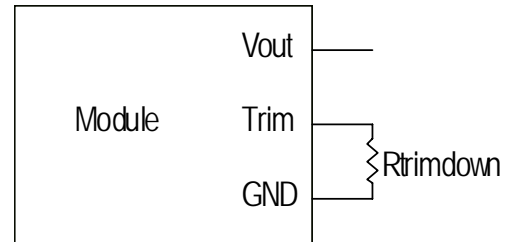
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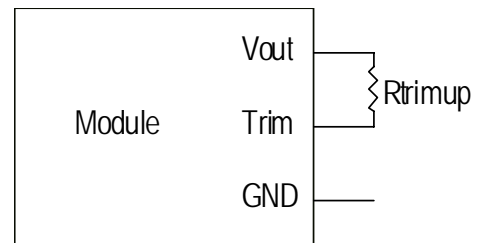
Output Trim Equations

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.

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

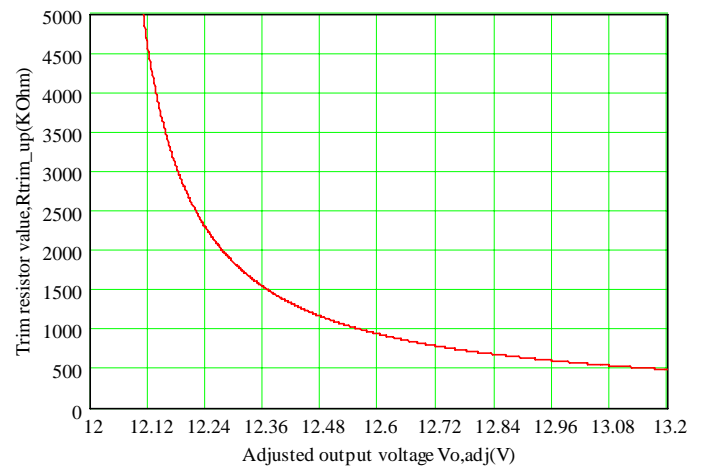
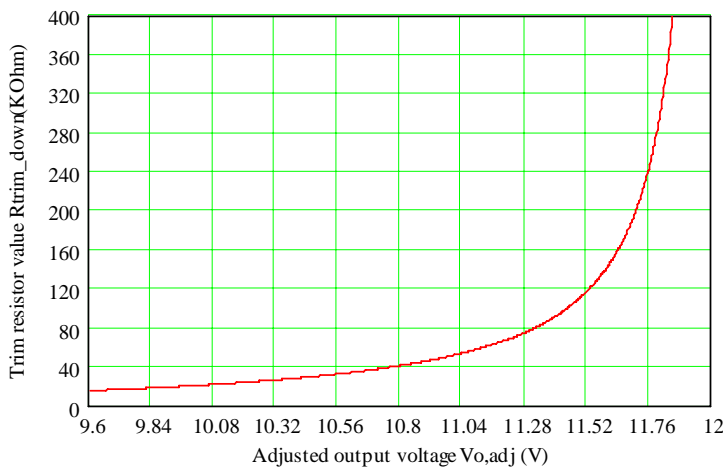


$$R_{trimup} = \frac{(100 + \delta) \cdot V_o \cdot 5.11 - 626}{1.225 \cdot \delta} - 10.22 [k\Omega]$$



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

V_o_{req} = Desired (trimmed) output voltage [V]
 V_o = 12.000 V



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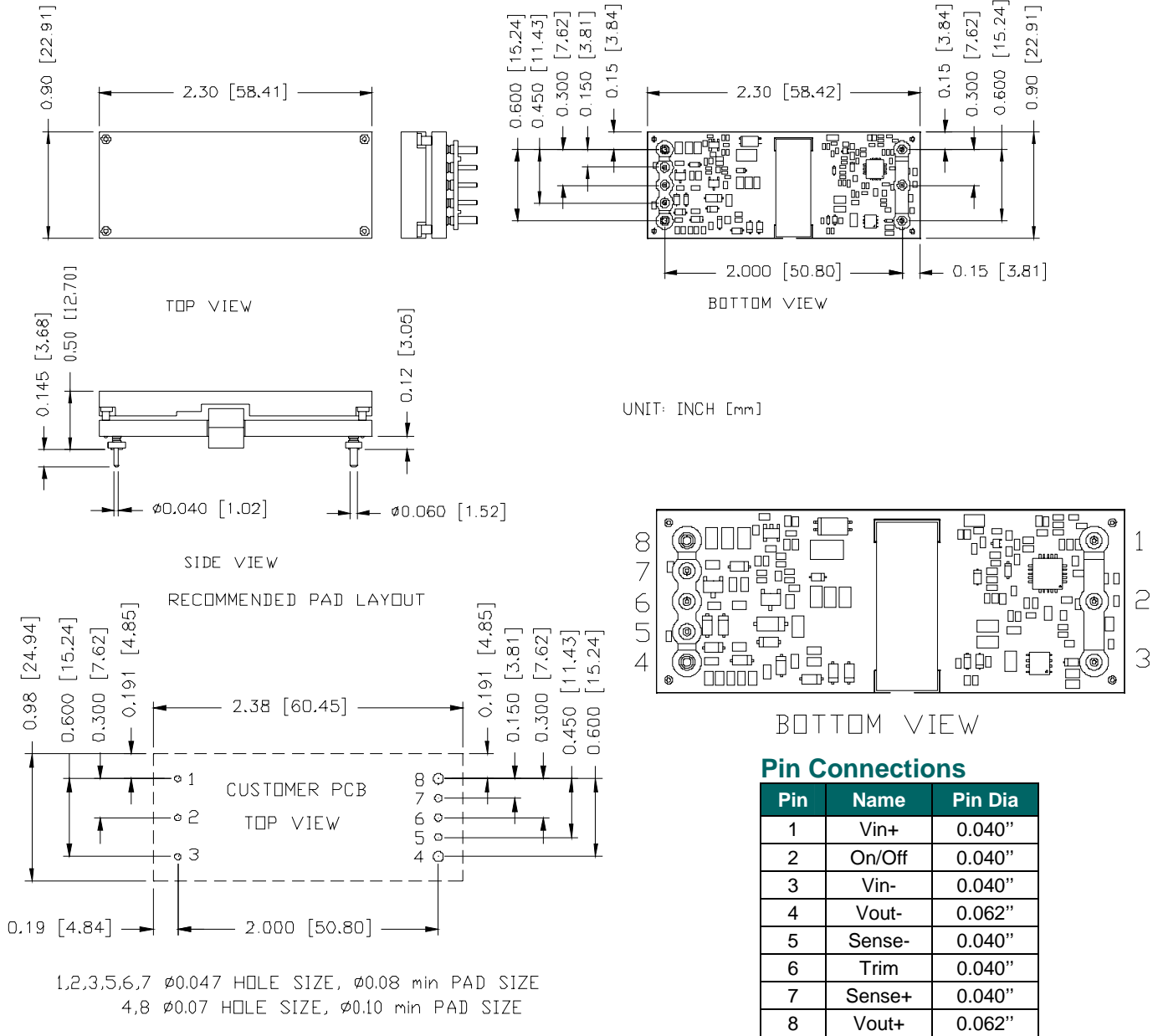
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Mechanical Outline



Note: This module is recommended and compatible with Pb-Free Wave Soldering and must be soldered using a peak solder temperature of no more than 260 °C for less than 5 seconds.

Note:

- 1) All Pins: Material - Copper Alloy;
Finish – 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.
- 2) Undimensioned components are shown for visual reference only.
- 3) All dimensions in inches (mm); Tolerances: x.xx +/-0.02 in. (x.x +/-0.5mm) x.xxx +/-0.010 in. (x.xx +/-0.25mm).

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Revision History

Date	Revision	Changes Detail	Approval
2007-06-29	PA	First release.	HF Fan
2009-06-18	B	1. Add 100ms transient and input/output pin to heatsink voltage. 2. Change mechanical outline.	HF Fan
2010-09-24	C	Add efficiency data and TD chart in 56Vin condition.	JZ Wang

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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