

## ISOLATED DC/DC CONVERTERS

36 Vdc - 75 Vdc Input 12 Vdc /6 A Output

**bel**  
POWER PRODUCTS

**0RCY-50T12x**

**RoHS Compliant**

**Rev.D**

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (330 kHz)
- Input Under-Voltage Lockout
- Pre-bias Start Up
- UL60950-1 Recognized (UL/cUL)
- Output Over-Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Low Cost
- Output Voltage Trim
- Positive/Negative Remote Sense
- Basic Insulation
- Remote On/Off



### Description

The 0RCY-50T12x is isolated dc/dc converter that operates from a wide input range (36 Vdc - 75 Vdc). This unit will provide up to 72 W of output power. The unit is designed to be highly efficient and low cost. Features include remote on/off, over current protection, over voltage shut down, over temperature protection and under-voltage lockout. This converter is provided in an industry standard 1/8 brick package.

### Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
12 Vdc	36 Vdc - 75 Vdc	6 A	72 W	92%	0RCY-50T12L	0RCY-50T120

**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	
Input to Each Output Resistance	10M ohm	-	-	
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	
Max Input Current (full load)	-	-	2.4 A	
Input Current (no load)	-	50 mA	100 mA	
Remote Off Input Current	-	20 mA	30 mA	
Input Reflected Ripple Current (pk-pk)	-	20 mA	30 mA	Tested with simulated source impedance of 10 uH, 5 Hz to 20 MHz; use a 47 uF/100 V electrolytic cap with ESR = 1 ohm max. at 200 kHz at 25 °C.
I <sup>2</sup> t Inrush Current Transient	-	-	0.1 A <sup>2</sup> s	
Input Fuse (not internally)	-	-	5 A	

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### Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Turn-on Voltage Threshold	33 V	34 V	35 V	
Turn-off Voltage Threshold	31 V	32 V	33 V	
Input Over Voltage Lockout	76 V	78 V	80 V	

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

### Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	11.76 V	12.0 V	12.24 V	
Load Regulation	-	±12 mV	±24 mV	
line Regulation	-	±12 mV	±24 mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±80 mV	±120 mV	
Ripple and Noise (rms)	-	12 mV	20 mV	Vin=72V, max load on output, 20MHz BW, with 10uF tantalum and 1uF ceramic cap at the output.
Ripple and Noise (pk-pk)	-	50 mV	80 mV	
Output Current Range	0 A	-	6 A	
Output DC Current Limit	7.0 A	-	10 A	
Output Over Voltage Clamp	13.6 V	-	15.6 V	Non-latching
Turn on Time	-	50 mS	80 mS	
Rise Time	-	30 mS	40 mS	
External Admissible Capacitive Load	0 uF	-	1000 uF	
<b>Transient Response</b>				
50% ~ 75% ~ 50% of Max Load	-	200 mV	300 mV	di/dt=0.1 A/us, Vin=48 Vdc, Ta=25 °C, with a 1 µF ceramic cap and a 10 uF tantalum cap at output.
Settling Time	-	150 mV	250 mV	

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

### General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	90%	92%	-	Measured at Vin=48 V, full load.
Switching Frequency	310 kHz	330 kHz	350 kHz	
Isolation capacitance	-	1500 pF	-	
Remote Sense Compensation	-	-	10%	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Output Voltage Trim Range	9.6 V	-	13.2 V	
Over Temperature Protection	-	120 °C	-	
MTBF	TBD			Calculated Per Bell Core SR-332 (Io=80%load, Ta = 25 °C)
Dimensions	Inches (L × W × H) Millimeters (L × W × H)			
	2.30 x 0.896 x 0.490 58.41 x 22.76 x 12.44			
Weight	-	40 g	-	

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

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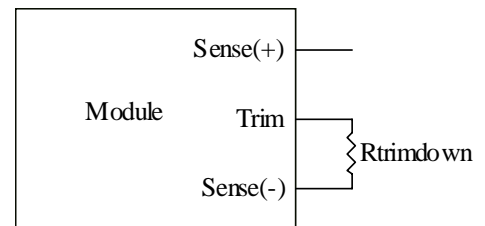
### Control Specifications

Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit On)	-0.3 V	-	0.8 V	0RCY-50T12L. The remote on/off pin open, Unit off.
Signal High (Unit Off)				
Signal Low (Unit Off)	-0.3 V	-	0.8 V	0RCY-50T120. The remote on/off pin open, Unit on.
Signal High (Unit On)				
Current Sink	0 mA	-	1 mA	

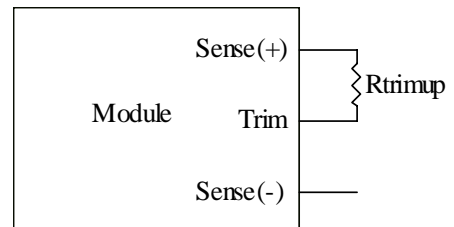
### Output Trim Equations

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

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



$$R_{trimup} = \left( \frac{(100 + \delta) \cdot V_o \cdot 5.11}{1.225 \cdot \delta} - \frac{511}{\delta} - 10.22 \right) [k\Omega]$$



**Note:**

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

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

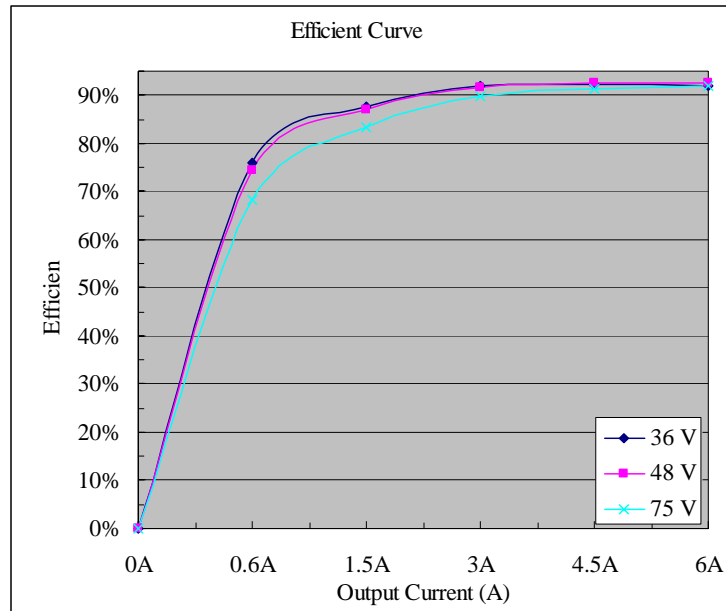
Output voltage  $V_o$  = 12 V

# ISOLATED DC/DC CONVERTERS

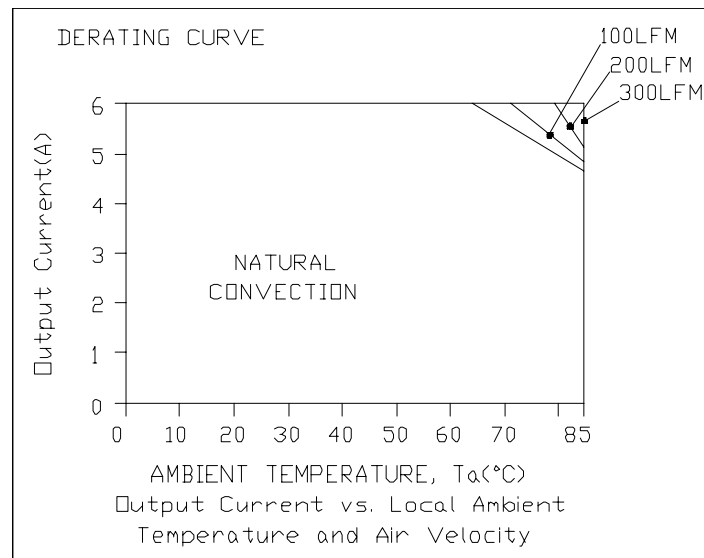
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## Efficiency Data



## Thermal Derating Curve



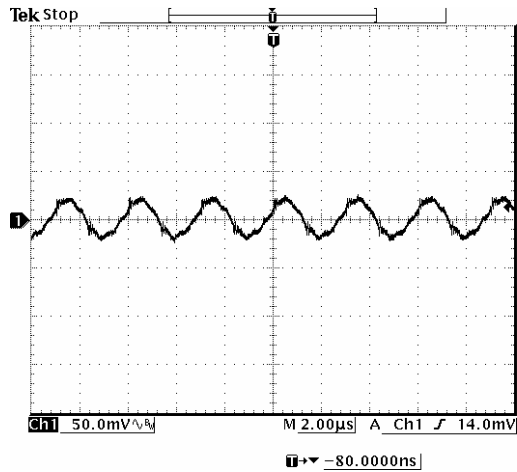
Vin=48 V, with maximum junction temperature of semiconductors derated to 120 degree C.

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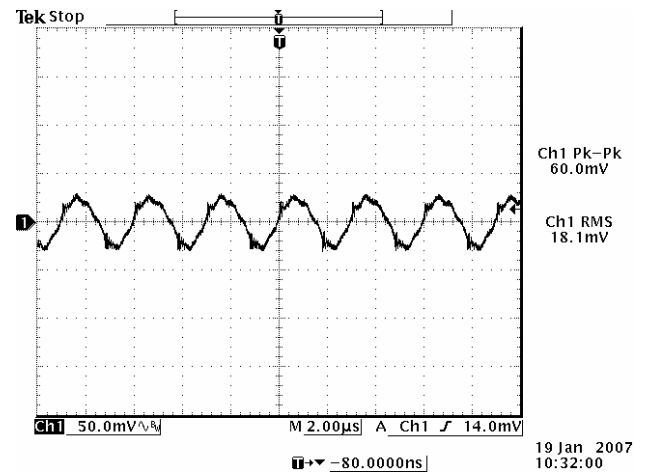
36 Vdc - 75 Vdc Input 12 Vdc /6 A Output



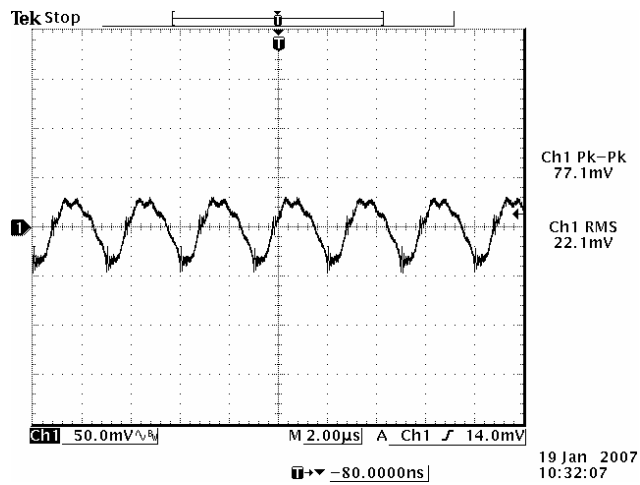
## Ripple and Noise Waveforms



36 Vdc input, 12 Vdc/6 A output



48 Vdc input, 12 Vdc/6 A output



75 Vdc input, 12 Vdc/6 A output

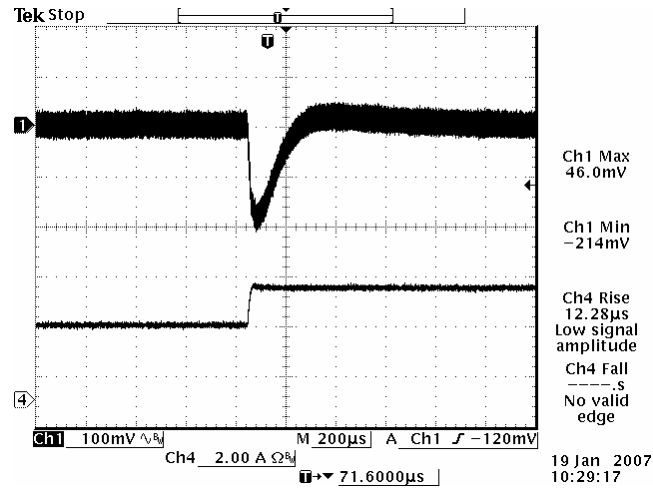
**Note:** Ripple and noise at full load, 0-20 MHz BW,  $T_a=25$  deg C, with a 0.1µF ceramic cap and a 10 µF Tantalum cap at output.

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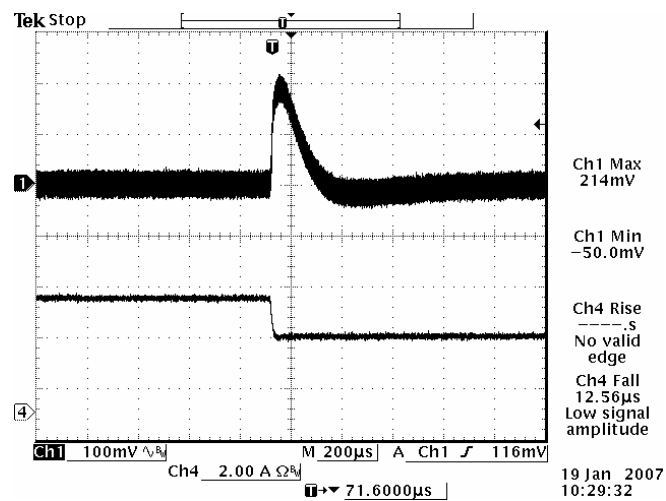
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## Transient Response Waveforms



50%-75% Load Transients at  $V_{in}=48\text{ V}$ ,  $di/dt=0.1\text{ A}/\mu\text{s}$  @  $T_a=25^\circ\text{C}$



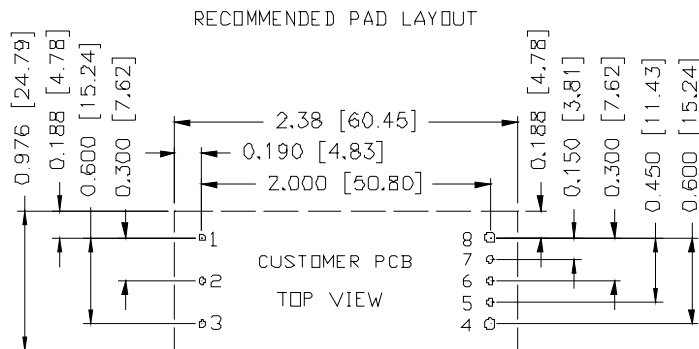
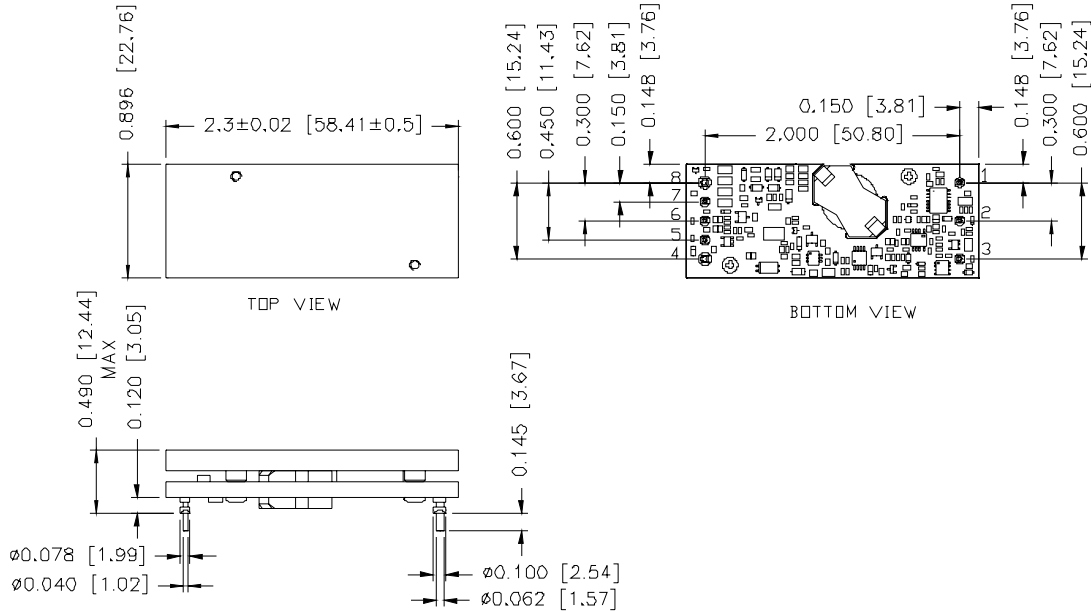
75%-50% Load Transients at  $V_{in}=48\text{ V}$ ,  $di/dt=0.1\text{ A}/\mu\text{s}$  @  $T_a=25^\circ\text{C}$

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## Mechanical Outline



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	Name	Function	Pin Dia
1	Vin+	Positive input voltage	0.040"
2	On/Off	Input to turn converter on and off, referenced to Vin-	0.040"
3	Vin-	Negative input voltage	0.040"
4	Vout-	Negative output voltage	0.062"
5	Sense-	Negative remote sense	0.040"
6	Trim	Output voltage trim	0.040"
7	Sense+	Positive output voltage	0.040"
8	Vout+	Positive output voltage	0.062"

- Notes:**
- Pin 5 must be connected to Vout-.
  - Leave Pin 6 open for nominal voltage.
  - Pin 7 must be connected to Vout+.

## 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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