

ISOLATED DC/DC CONVERTERS

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



May 17, 2011

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

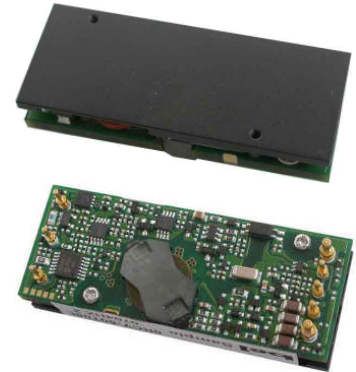
0RCY-50T12x

RoHS Compliant

Rev.E

Features

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



Applications

- Networking
- Computers and peripherals
- Telecommunications

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 High	Model Number Active Low
12 Vdc	36 Vdc - 75 Vdc	6 A	72 W	92%	0RCY-50T12L	0RCY-50T120

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

Part Number Explanation

$\frac{0}{1} \frac{R}{2} \frac{CY}{3} - \frac{50}{4} \frac{T}{5} \frac{12}{6} \frac{x}{7}$

1---Through hole mount

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---Option, "x" of the model part number to be 0-9, A-Z, which will represent the special request of customer.

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Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage (continuous)	-0.3	-	80	V	
Remote On/Off	-0.3	-	18	V	
I/O Isolation Voltage	-	-	1500	V	
Input to Each Output Resistance	10M	-	-	ohm	
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
Input Voltage	36	48	75	V	
Max Input Current (full load)	-	-	2.4	A	
Input Current (no load)	-	50	100	mA	
Remote Off Input Current	-	20	30	mA	
Input Reflected Ripple Current (pk-pk)	-	20	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 ² t Inrush Current Transient	-	-	0.1	A ² s	
Input Fuse (not internally)	-	-	5	A	
Turn-on Voltage Threshold	33	34	35	V	
Turn-off Voltage Threshold	31	32	33	V	
Input Over Voltage Lockout	76	78	80	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	12.0	12.24	V	
Load Regulation	-	±12	±24	mV	
line Regulation	-	±12	±24	mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±80	±120	mV	
Ripple and Noise (rms)	-	12	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	80	mV	
Output Current Range	0	-	6	A	

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Output Specifications (continued)

Parameter		Min	Typ	Max	Unit	Notes	
Output DC Current Limit		7.0	-	10	A		
Output Over Voltage Clamp		13.6	-	15.6	V	Non-latching	
Turn on Time		-	50	80	mS		
Rise Time		-	30	40	mS		
External Admissible Capacitive Load		0	-	1000	uF		
Transient Response							
50% ~ 75% Max Load	Overshoot	Vo= 12V	-	200	300	mV	di/dt=0.1 A/us, Vin=48 Vdc, Ta=25 °C, with a 1 uF ceramic cap and a 10 uF tantalum cap at output.
	Settling Time		-	150	250	uS	
75% ~ 50% Max Load	Overshoot		-	200	300	mV	
	Settling Time		-	150	250	uS	

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

General Specifications

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	90	92	-	%	Measured at Vin=48 V, full load
Switching Frequency	310	330	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	-	13.2	V	
Over Temperature Protection	-	120	-	°C	
Weight	-	40	-	g	
MTBF	TBD			-	Calculated Per Bell Core SR-332 (Io=80%load, Ta = 25 °C)
Dimensions				-	
	Inches (L x W x H)	2.30 x 0.896 x 0.490			
	Millimeters (L x W x H)	58.41 x 22.76 x 12.44			

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

Remote On/Off

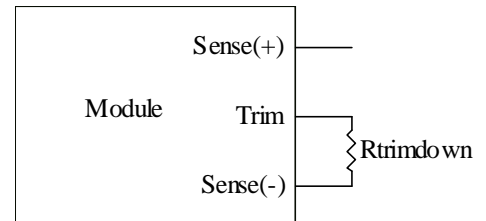
Parameter	Min	Typ	Max	Unit	Notes
Signal Low (Unit On)	-0.3	-	0.8	V	0RCY-50T12L. The remote on/off pin open, Unit off.
Signal High (Unit Off)				2.4	
Signal Low (Unit Off)	-0.3	-	0.8	V	0RCY-50T120. The remote on/off pin open, Unit on.
Signal High (Unit On)				2.4	
Current Sink	0	-	1	mA	

Output Trim Equations

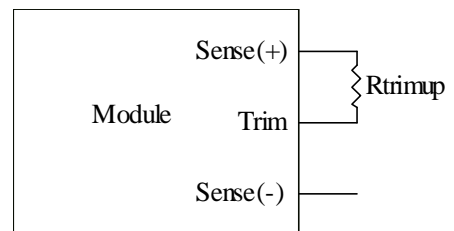
Trim Resistor Calculate

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.

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



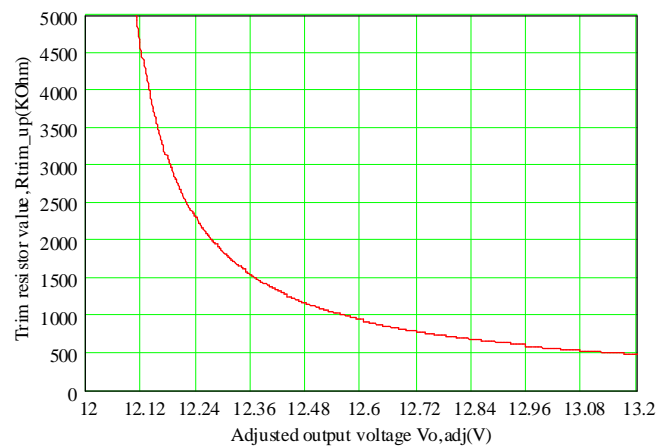
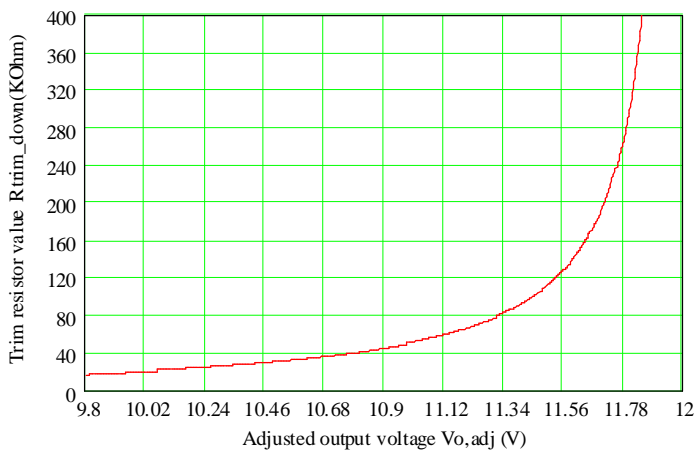
$$R_{trimup} = \left(\frac{(100 + \delta) \cdot V_o \cdot 5.11}{1.225 \cdot \delta} - \frac{511}{\delta} - 10.22 \right) [k\Omega]$$



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



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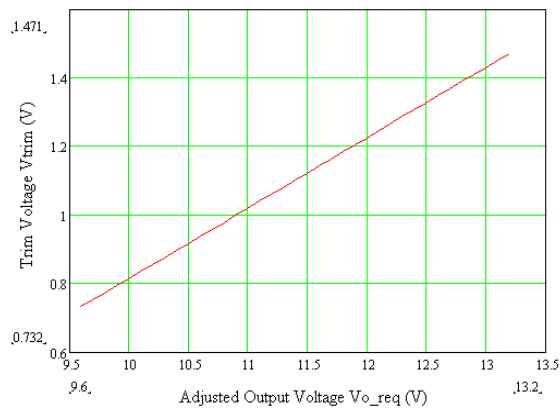
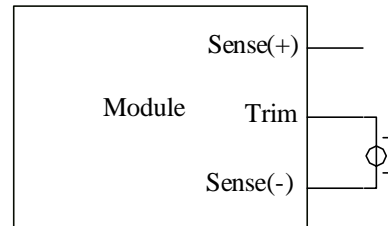
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Output Trim Equations (continued)

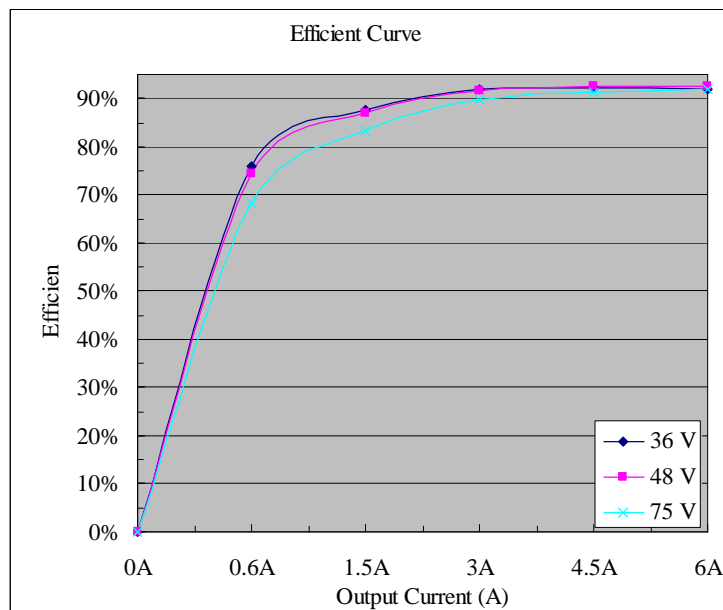
Trim Voltage Calculate

Equations for calculating the trim voltage are shown below. V_{trim} is the required voltage between TRIM and Sense(-).

$$V_{trim} = \left(\frac{V_{o_req}}{V_o} \bullet 2.464 - 1.24 \right) [V]$$



Efficiency Data



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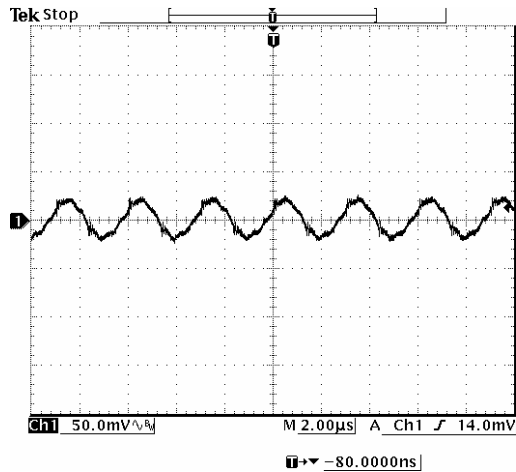
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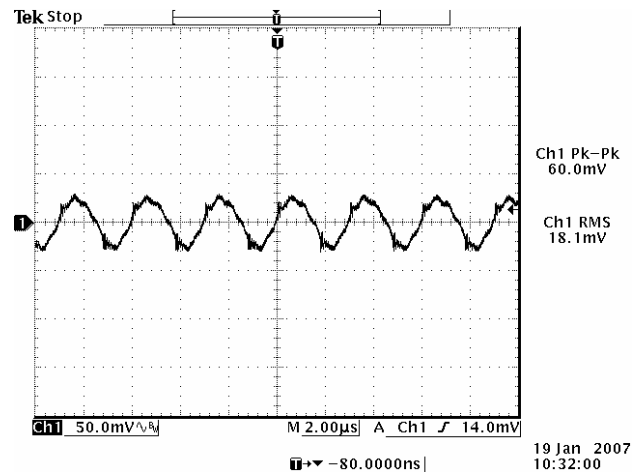
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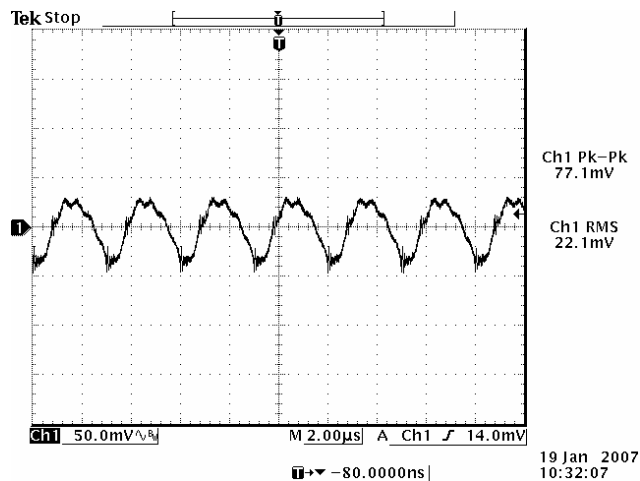
Ripple and Noise Waveforms



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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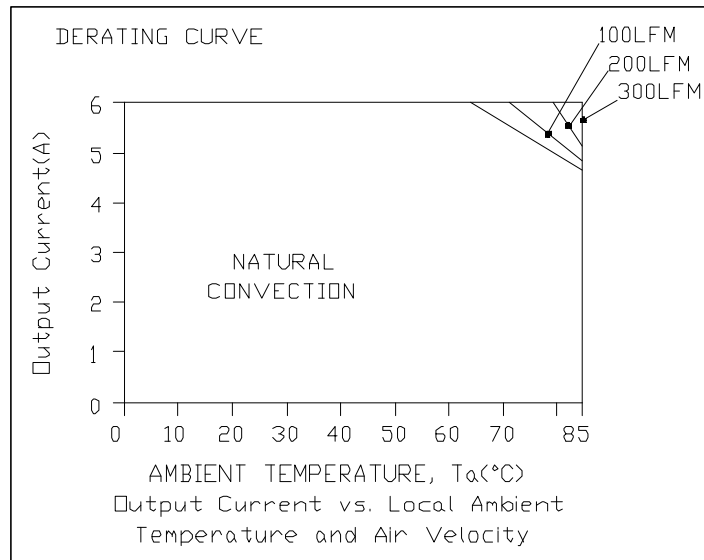
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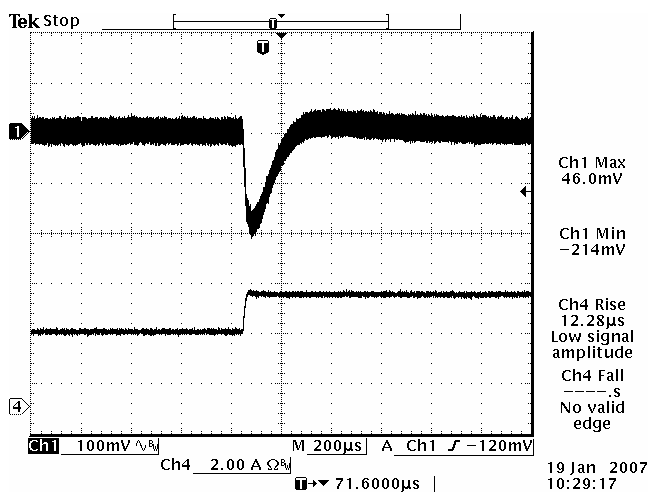
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Thermal Derating Curve

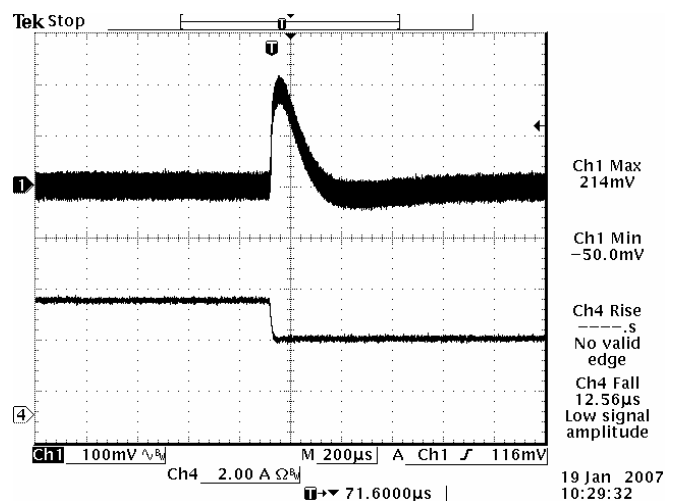


$V_{in}=48$ V, with maximum junction temperature of semiconductors derated to 120 degree C.

Transient Response Waveforms



50%-75% Load



75%-50% Load

Note: Transients at $V_{in}=48$ V, $di/dt=0.1$ A/ μ s@ $T_a=25^\circ$ C

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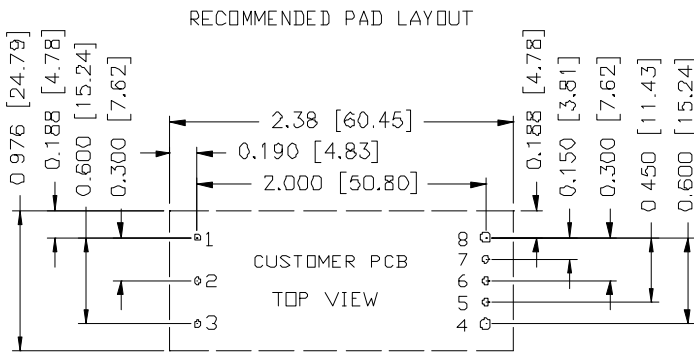
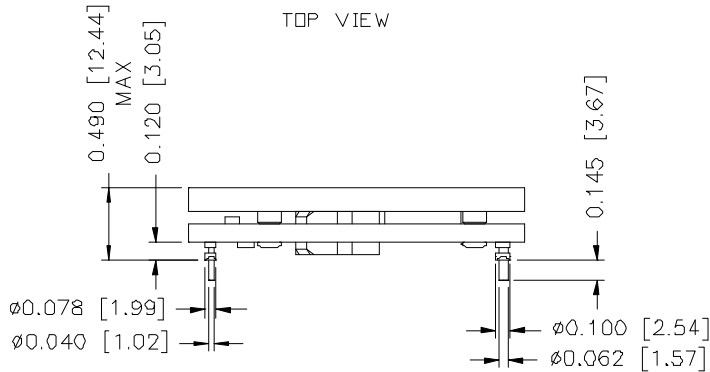
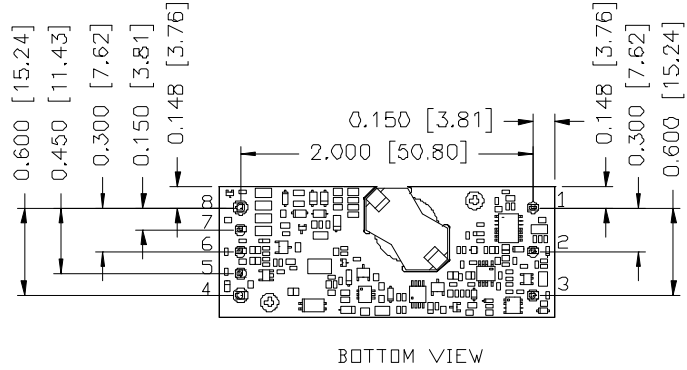
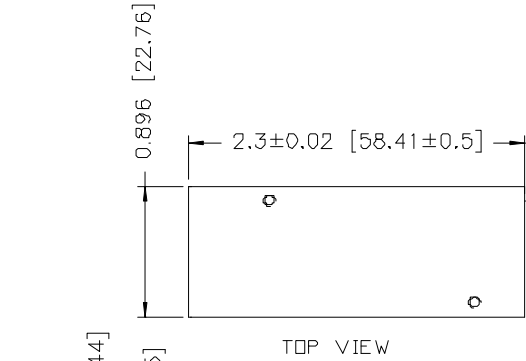
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Mechanical Outline



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+.

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:

- All Pins: Material - Copper Alloy;
Finish – 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.
- Undimensioned components are shown for visual reference only.
- 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
2011-05-17	E	Add trim equation for trim voltage.	XF Jiang

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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9

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