ISOLATED DC/DC CONVERTERS

48 Vdc Input 3.3 Vdc /30 A Output

Jun. 24, 2011

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

xRCY-C2T03x RoHS Compliant Rev.D

Features

- 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
- Class 2, Category 2, Isolated DC/DC Converter (refer to IPC-9592)

Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The xRCY-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%	xRCY-C2T033	xRCY-C2T03L

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

Part Number Explanation

x	R	CY	–	C2	T	03	x
1	2	3		4	5	6	7

1---Replace”x” with “S” to indicate SMD package, or “0” to indicate through hole package
2---RoHS 6, change “R” to “7” means RoHS 5
3---Series name
4---Series code
5---Input range (36-75V)
6---Output voltage 3.3V
7---Option, “x” of the model part number to be 0-9, A-Z, which will represent the special request of customer.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Notes
Continuous Input Voltage	-0.3	-	80	V	
Remote On/Off	-0.3	-	18	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
Input Voltage	36	48	75	V	
Input Current (full load)	-	-	3.8	A	
Input Current (no load)	-	70	120	mA	
Remote Off Input Current	-	10	15	mA	
Input Reflected Ripple Current (rms)	-	5	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^2t Inrush Current Transient	-	-	0.1	A^2s	
Turn-on Voltage Threshold	33	-	35.5	V	
Turn-off Voltage Threshold	32	-	34.5	V	

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

Output Specifications

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

Output Specifications (continued)

Parameter		Min	Typ	Max	Unit	Notes
Transient Response						
△V 25%~50% of Max Load	Overshoot	-	50	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	250	uS	
△V 50%~25% of Max Load	Overshoot	-	50	100	mV	
	Settling Time	-	150	250	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	90	93	-	%	Measured at Vin=48 V, full load.
Switching Frequency	270	300	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	-	4.5	%	Vin=48 V, full load, in hiccup Mode
MTBF	TBD			Hours	Calculated Per Bell Core SR-332 (Io=80%load, 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 10.26			-	0RCY-C2T03x
Dimensions Inches (L × W × H) Millimeters (L × W × H)	2.30 x 0.90 x 0.46 58.42 x 22.86 x 11.68			-	SRCY-C2T03x
Weight	-	28	-	g	

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

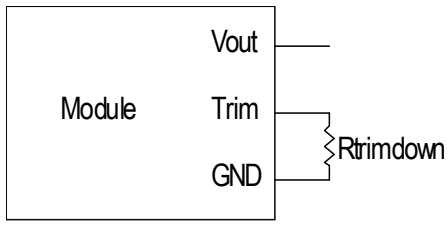
Control Specifications

Parameter		Min	Typ	Max	Unit	Notes
Remote On/Off						
Signal Low (Unit On)	Active Low	-0.7	-	0.8	V	xRCY-C2T03L Remote On/Off pin is open, unit off.
Signal High (Unit Off)		2.4	-	18	V	
Signal Low (Unit Off)	Active High	-0.7	-	0.8	V	xRCY-C2T033 Remote On/Off pin is open, unit on.
Signal High (Unit On)		2.4	-	18	V	
Current Sink		0	-	1	mA	

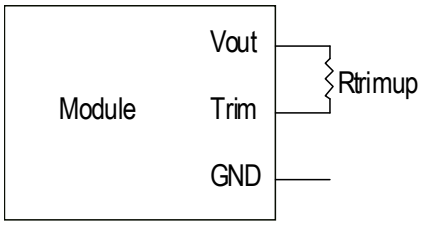
Output Trim Equations

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.

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



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

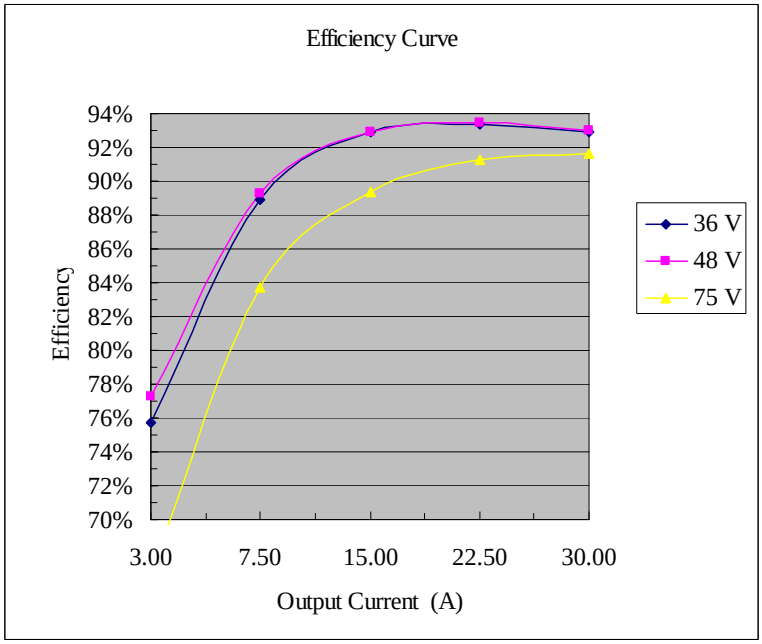


Note:

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

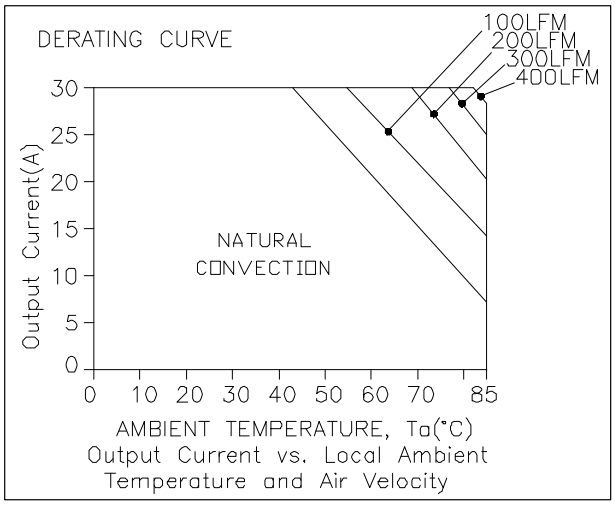
Vo_req=Desired (trimmed) output voltage [V]
Output voltage Vo=3.3 V

Efficiency Data

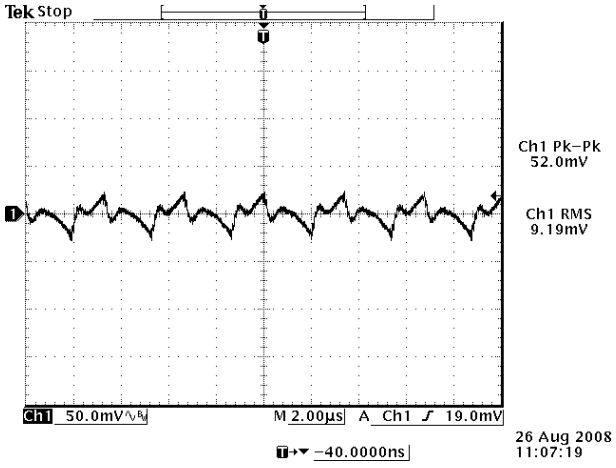


Thermal Derating Curve

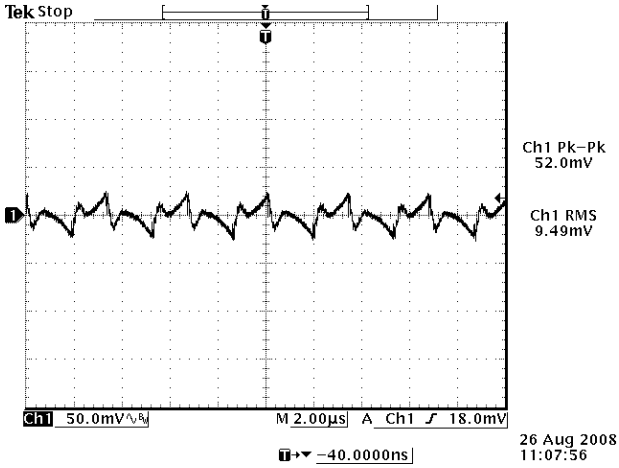
Vin=48V, with maximum junction temperature of semiconductors derated to 120 degree C



Ripple and Noise Waveforms



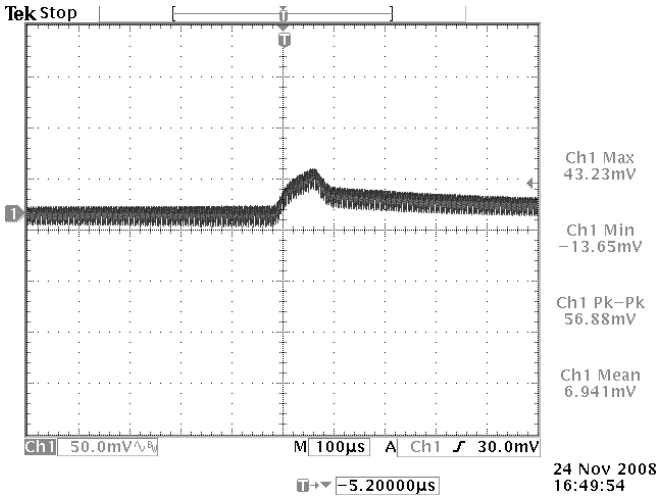
Io=0A Vin=48V



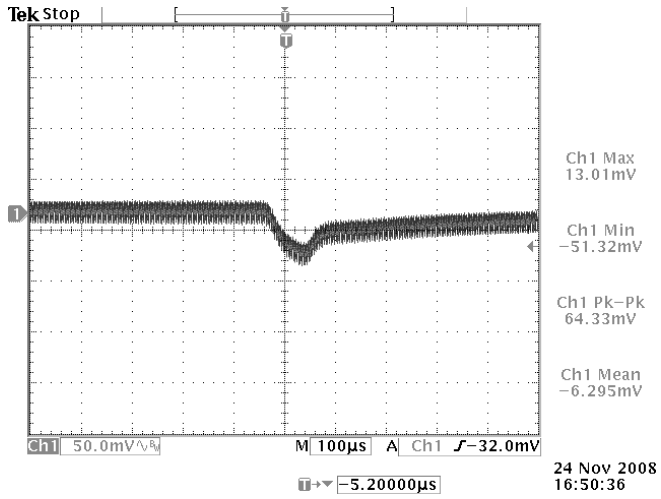
Io=30A Vin=48V

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

Transient Response Waveforms



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

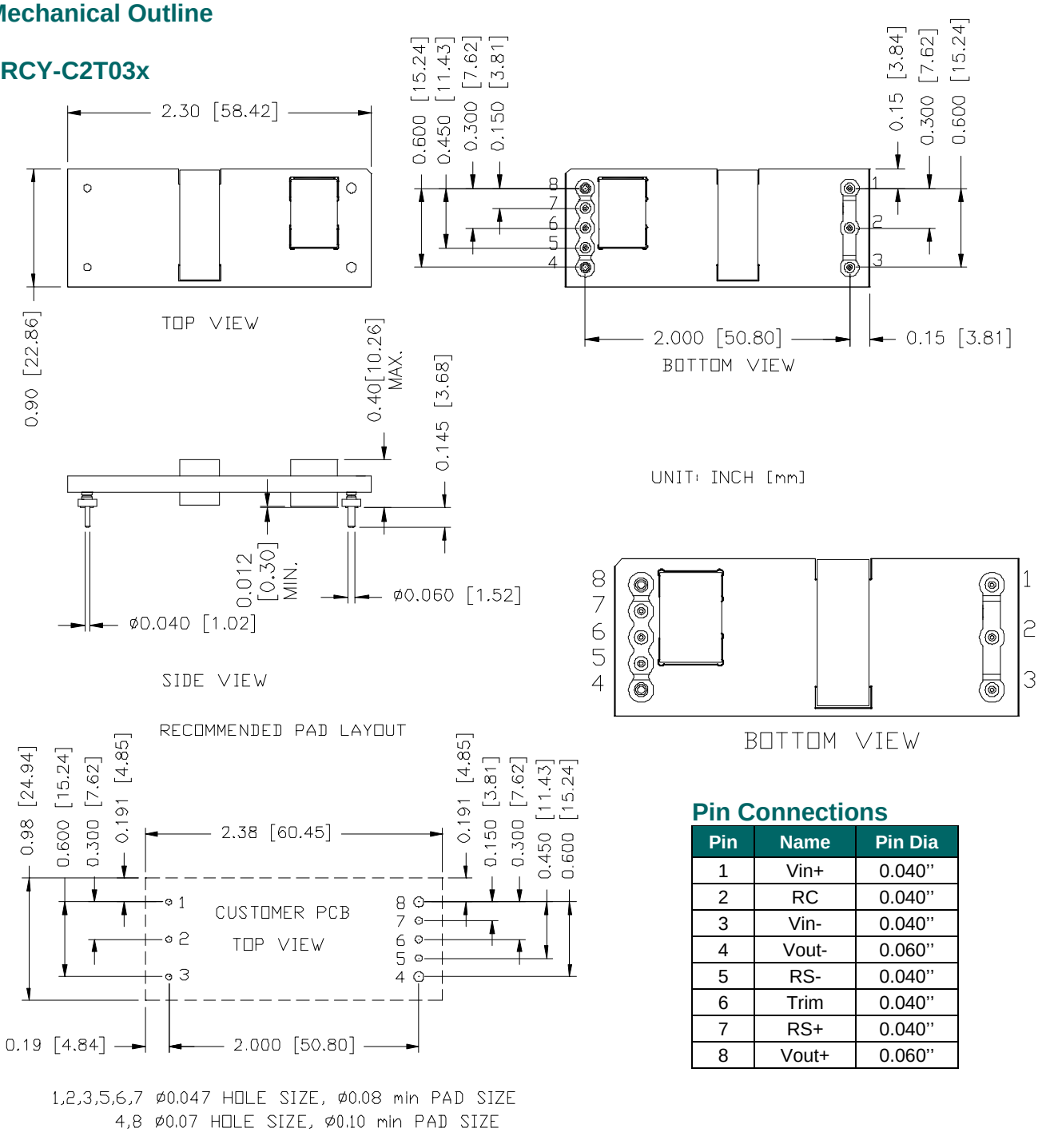


Vout=3.3V 50% to 75% Load Transients at Vin=48V

Note: Transient Response at di/dt=0.1A/uS, External 330uF Tantalum Cap, Ta=25deg C.

Mechanical Outline

0RCY-C2T03x



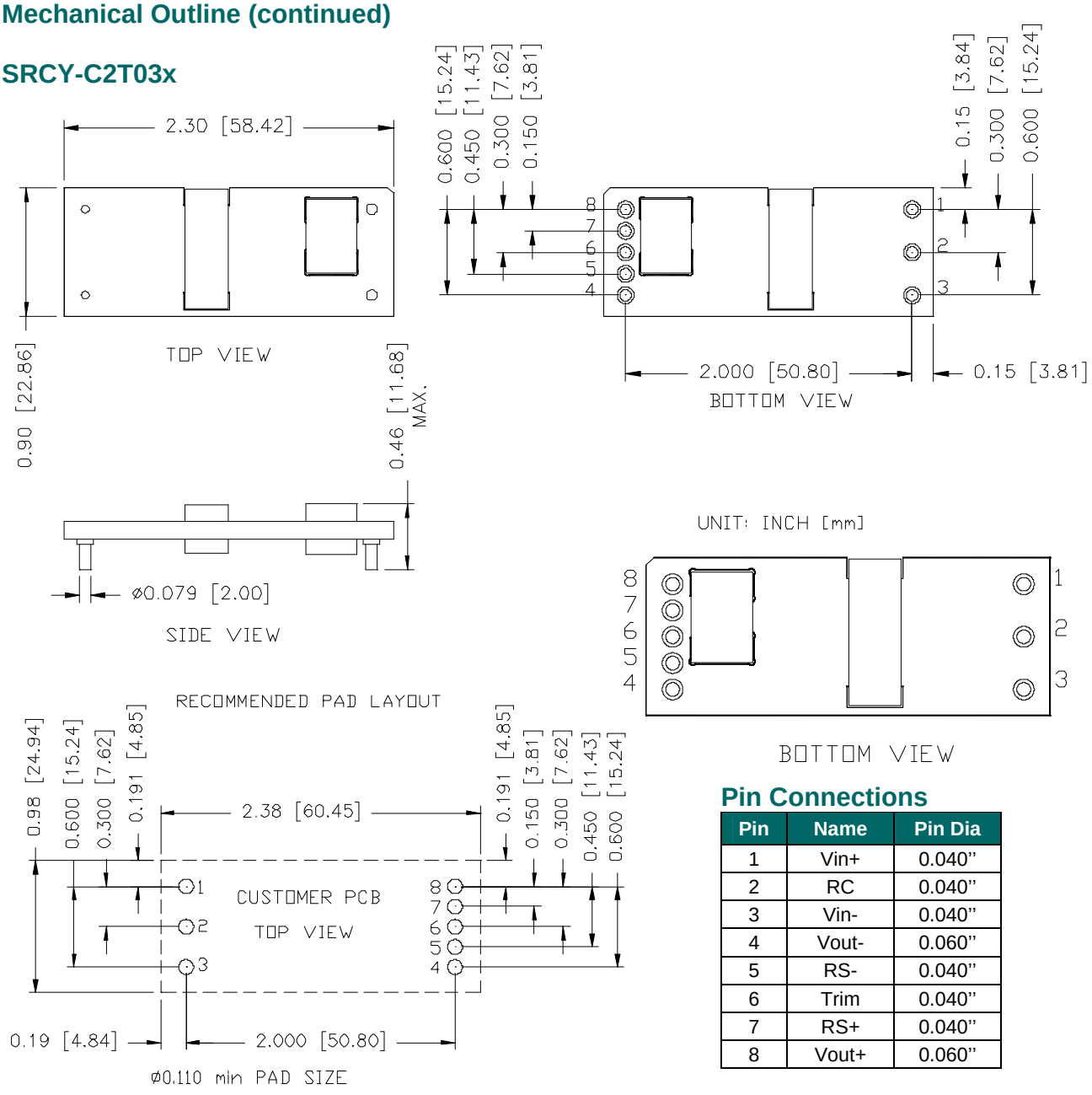
Pin Connections

Pin	Name	Pin Dia
1	Vin+	0.040”
2	RC	0.040”
3	Vin-	0.040”
4	Vout-	0.060”
5	RS-	0.040”
6	Trim	0.040”
7	RS+	0.040”
8	Vout+	0.060”

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 ºC for less than 5 seconds.

Mechanical Outline (continued)

SRCY-C2T03x



Pin Connections

Pin	Name	Pin Dia
1	Vin+	0.040”
2	RC	0.040”
3	Vin-	0.040”
4	Vout-	0.060”
5	RS-	0.040”
6	Trim	0.040”
7	RS+	0.040”
8	Vout+	0.060”

Note: This module is recommended and compatible with Pb-Free Wave Soldering and must be soldered using a reflow solder temperature of no more than 260 ºC 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).

Revision History

Date	Revision	Changes Detail	Approval
2011-01-12	C	Change max input current (full load) from 4.5A to 3.8A in input specifications.	JZ Wang
2011-06-24	D	Add P/N SRCY-C2T03x with SMD package.	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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