

ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 12 Vdc /10 A, 3.3 Vdc/30 A Outputs

bel
POWER PRODUCTS

0RCY-80Rxxx RoHS Compliant PRELIMINARY Rev. D

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Input Under-Voltage Lockout
- Output Over-Voltage Shutdown
- Basic Insulation
- Low Cost
- OCP/SCP
- Over Temperature Protection
- Output Voltage Trim
- Remote On/Off
- Positive/Negative Remote Sense



Description

The 0RCY-80Rxxx series are isolated dc/dc converters that operate from a nominal 24 Vdc source. These units will provide up to 120 W of output power and 30 A of output current from a nominal 24 Vdc input. The 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
1.8 Vdc	18 Vdc - 36 Vdc	30 A	54 W	90%	0RCY-80RV80	0RCY-80RV8L
3.3 Vdc	18 Vdc - 36 Vdc	30 A	99 W	91%	0RCY-80R033	0RCY-80R03L
12 Vdc	18 Vdc - 36 Vdc	10 A	120 W	93%	0RCY-80R120	0RCY-80R12L

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 numbers to indicate Tray Packaging.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	40 V	
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	18 V	24 V	36 V	
Input Current (full load)				
Vo=1.8 V	-	-	3.5 A	
Vo=3.3 V	-	-	6.2 A	
Vo=12 V	-	-	8.0 A	
Input Current (no load)	-	100 mA	200 mA	
Remote Off Input Current	-	10 mA	15 mA	

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Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Input Reflected Ripple Current (rms)		5 mA	10 mA	Tested with simulated source impedance of 10 μ H, 5 Hz to 20 MHz; use a 100 μ F/100 V electrolytic cap with ESR = 1 ohm max. at 200 kHz at 25 °C.
Input Reflected Ripple Current (pk-pk)	-	25 mA	40 mA	
I ² t Inrush Current Transient	-	0.1 A ² s	0.5 A ² s	
Turn-on Voltage Threshold	16 V	16.5 V	17 V	
Turn-off Voltage Threshold	15 V	15.5 V	16 V	

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

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point				Vin=24 V, Io=50% load
Vo=1.8 V	1.773 V	1.80 V	1.827 V	
Vo=3.3 V	3.250 V	3.30 V	3.350 V	
Vo=12 V	11.76 V	12.0 V	12.24 V	
Load Regulation				
Vo=1.8 V	-	±6 mV	±12 mV	
Vo=3.3 V	-	±8 mV	±16 mV	
Vo=12 V	-	±12 mV	±24 mV	
line Regulation				
Vo=1.8 V	-	±6 mV	±12 mV	
Vo=3.3 V	-	±8 mV	±16 mV	
Vo=12 V	-	±12 mV	±24 mV	
Regulation Over Temperature (-40deg.C ~ +85deg.C)				
Vo=1.8 V	-	±15 mV	±30 mV	
Vo=3.3 V	-	±20 mV	±40 mV	
Vo=12 V	-	±30 mV	±60 mV	
Ripple and Noise (rms)				0-20 MHz BW, with a 1 μ F ceramic cap and a 10 μ F tantalum cap at the output.
Vo=1.8 V	-	30 mV	50 mV	
Vo=3.3 V	-	30 mV	50 mV	
Vo=12 V	-	30 mV	50 mV	
Ripple and Noise (pk-pk)				
Vo=1.8 V	-	60 mV	100 mV	
Vo=3.3 V	-	80 mV	120 mV	
Vo=12 V	-	100 mV	150 mV	
Output Current Range				
Vo=1.8 V	0 A	-	30 A	
Vo=3.3 V	0 A	-	30 A	
Vo=12 V	0 A	-	10 A	
Output DC Current Limit				
Vo=1.8 V	33 A	39 A	45 A	
Vo=3.3 V	33 A	39 A	45 A	
Vo=12 V	11 A	13 A	15 A	
Short Circuit Surge Transient	-	2 A ² s	4 A ² s	
Turn on Time	-	60 mS	100 mS	
Overshoot at Turn on	-	0%	5%	
Output Capacitance				
Vo=1.8 V	0 μ F	-	20000 μ F	
Vo=3.3 V	0 μ F	-	10000 μ F	
Vo=12 V	0 μ F	-	1500 μ F	

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Output Specifications (continued)

Parameter		Min	Typ	Max	Notes		
Transient Response							
50% ~ 75% Max Load	Overshoot	Vo=1.8 V	-	140 mV	180 mV	di/dt=0.1 A/us, Vin=24 Vdc, Ta=25 °C, with a 1 µF ceramic cap and a 10 uF tantalum cap at output.	
	Settling Time		-	150 uS	250 uS		
75% ~ 50% Max Load	Overshoot		-	140 mV	180 mV		
	Settling Time		-	150 uS	250 uS		
50% ~ 75% Max Load	Overshoot		Vo=3.3 V	-	200 mV		300 mV
	Settling Time			-	200 uS		300 uS
75% ~ 50% Max Load	Overshoot	-		200 mV	300 mV		
	Settling Time	-		200 uS	300 uS		
50% ~ 75% Max Load	Overshoot	Vo=12 V		-	350 mV		500 mV
	Settling Time			-	200 uS		300 uS
75% ~ 50% Max Load	Overshoot		-	350 mV	500 mV		
	Settling Time		-	200 uS	300 uS		

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				
	Vo=1.8 V	88%	90%	Vin=24 V, full load
	Vo=3.3 V	90%	91%	
	Vo=12 V	91%	93%	
Switching Frequency	270 kHz	300 kHz	330 kHz	
Isolation capacitance	-	3900 pF	-	
Remote Sense Compensation	-	-	10%	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Output Voltage Trim Range	80%	-	110%	
Over Temperature Protection	-	125 °C	-	
Over Voltage Protection	-	125%Vo	-	Vin=24 V, full load, in Hiccup mode.
MTBF	TBD			Calculated Per Bell Core SR-332 (Io=80%load, Ta = 25 °C)
Dimensions				
	Inches (L × W × H)	2.30 x 0.896 x 0.50		0RCY-80RV8x
	Millimeters (L × W × H)	58.42 x 22.76 x 12.70		
Dimensions				
	Inches (L × W × H)	2.30 x 0.90 x 0.50		0RCY-80R03x & 0RCY-80R12x
	Millimeters (L × W × H)	58.42 x 22.91 x 12.70		
Weight	-	TBD	-	

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	-0.3 V	-	The remote on/off pin open, Unit off.
Signal High (Unit Off)		2.4 V	-	
Signal Low (Unit Off)	Active High	-0.3 V	-	The remote on/off pin open, Unit on.
Signal High (Unit On)		2.4 V	-	
Current Sink	0 mA	-	1 mA	

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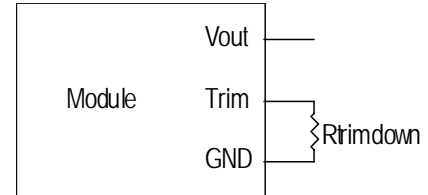
18 Vdc - 36 Vdc Input 12 Vdc /10 A, 3.3 Vdc/30 A Outputs



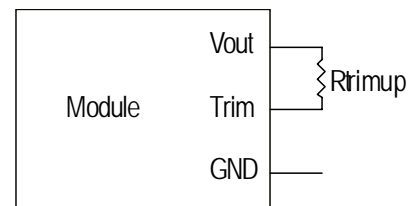
Output Trim Equations

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.

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



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



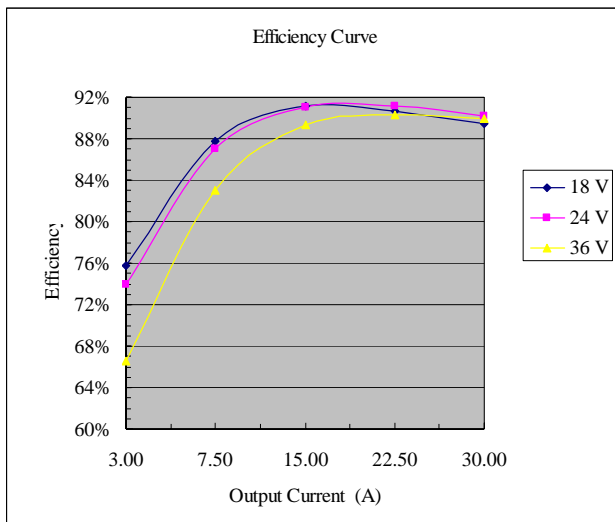
Note:

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

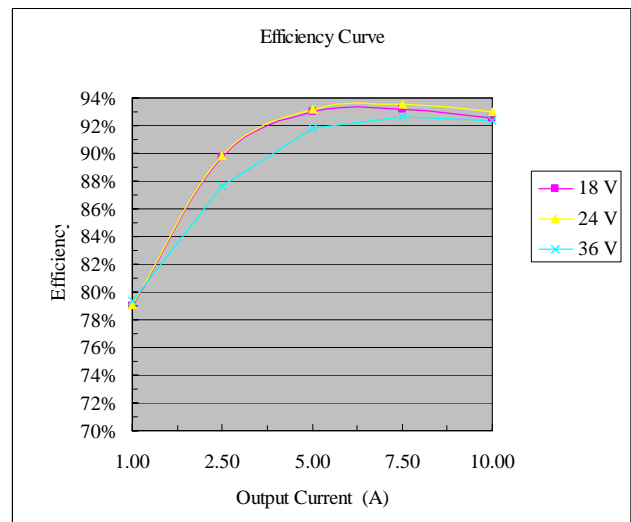
V_o_{req} = Desired (trimmed) output voltage [V]

For 0RCY-80RV8x, Output voltage V_o = 1.8 V; For 0RCY-80R03x, Output voltage V_o = 3.3 V; For 0RCY-80R12x, Output voltage V_o = 12 V;

Efficiency Data



$V_o = 1.8 \text{ V}$



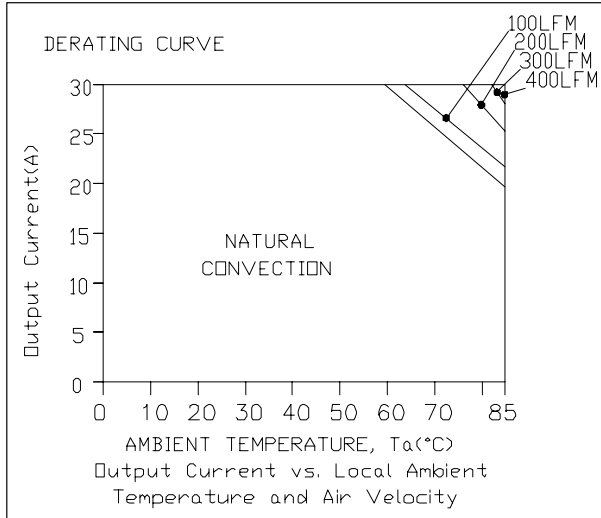
$V_o = 12 \text{ V}$

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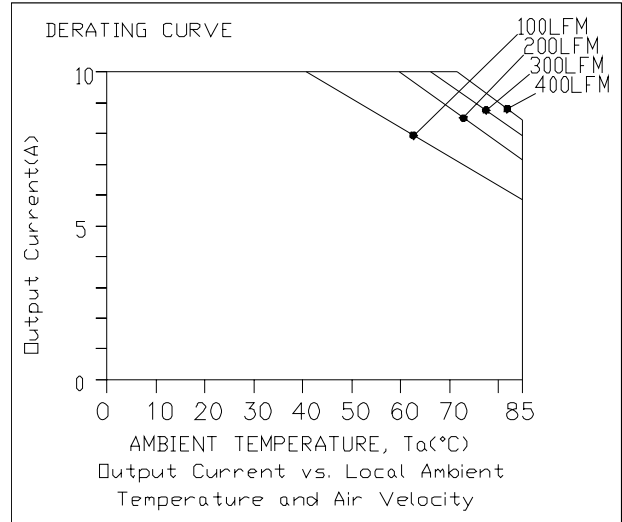
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Thermal Derating Curves



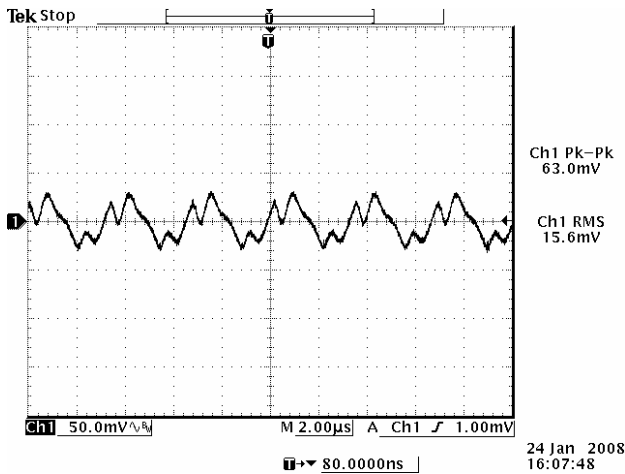
$V_o=1.8$ V



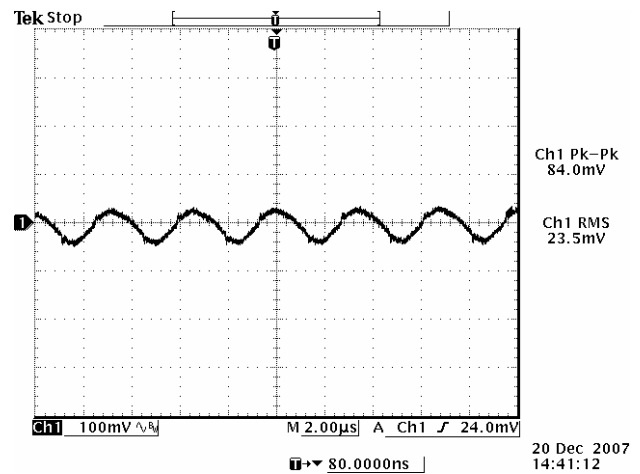
$V_o=12$ V

Note: $V_{in}=24$ V, with maximum junction temperature of semiconductors derated to 120 degree C.

Ripple and Noise Waveforms



24 Vdc input, 1.8 Vdc/30 A output



24 Vdc input, 12 Vdc/10 A output

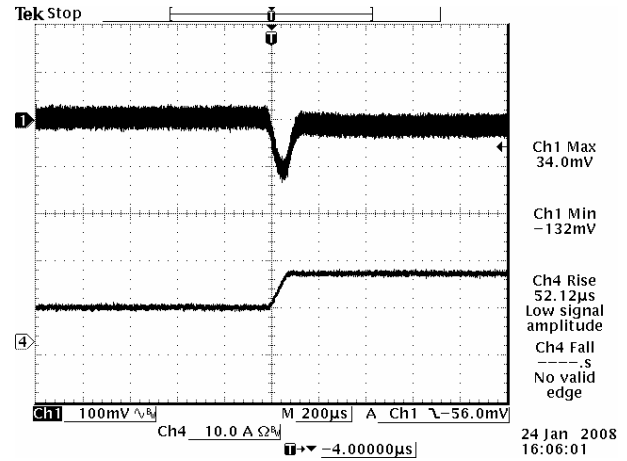
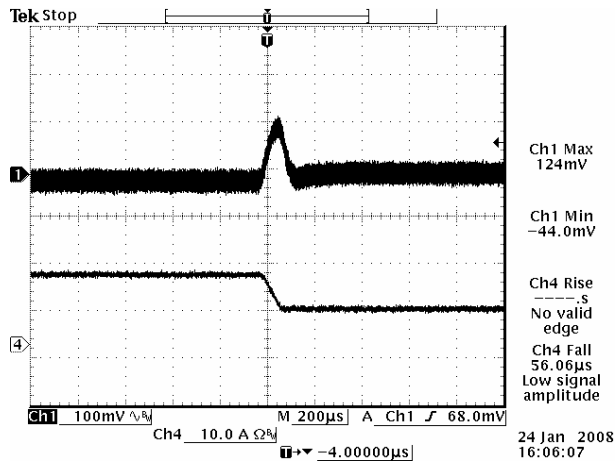
Note: Ripple and noise at full load, with a 1uF ceramic cap and a 10 uF Tantalum cap at output, and $T_a=25$ deg C.

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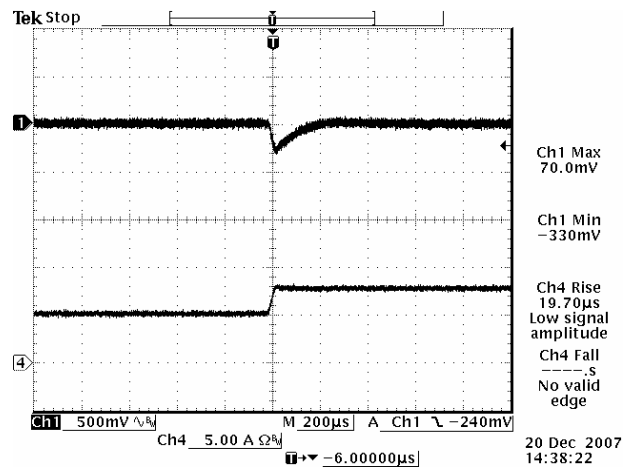
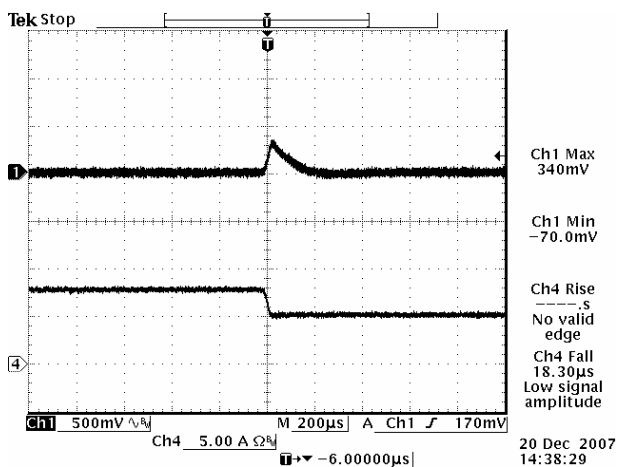


Transient Response Waveforms



Vo=1.8 V 75% to 50% Load Transients

Vo=1.8 V 50% to 75% Load Transients



Vo=12 V 75% to 50% Load Transients

Vo=12 V 50% to 75% Load Transients

Note: Transients Response at $di/dt=0.1 \text{ A}/\mu\text{s}$, with a 10 μF Tantalum Cap and 1 μF Ceramic Cap at output, and $T_a=25 \text{ deg C}$.

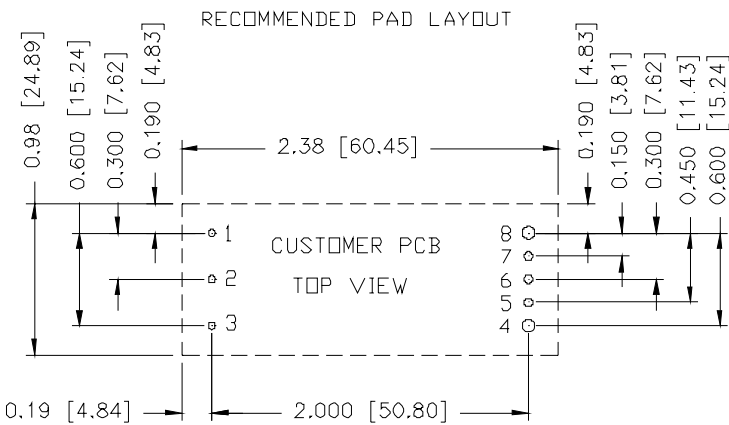
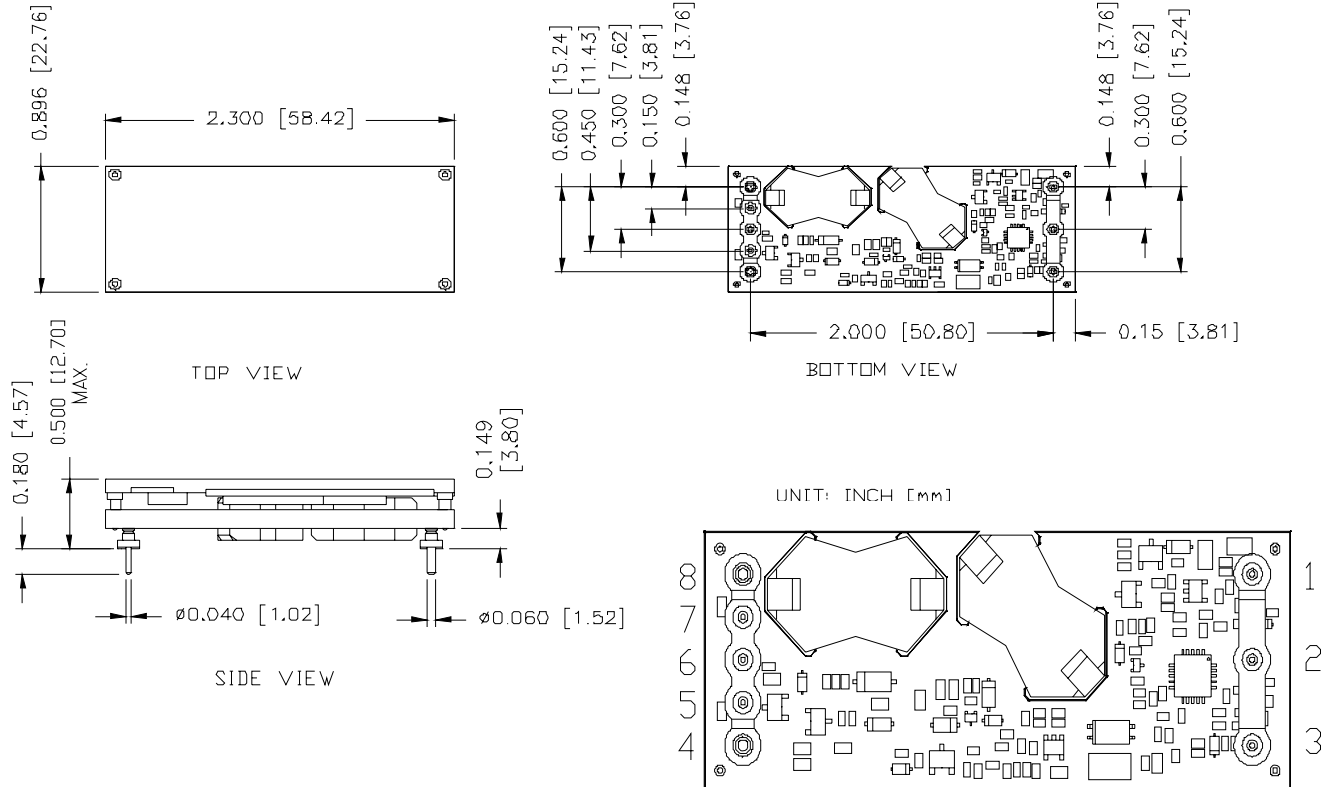
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Mechanical Outline

ORCY-80RV8x



1,2,3,5,6,7 ϕ 0.047 HOLE SIZE, ϕ 0.08 min PAD SIZE
 4,8 ϕ 0.07 HOLE SIZE, ϕ 0.10 min PAD SIZE

BOTTOM VIEW

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"

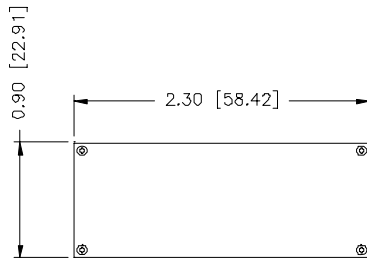
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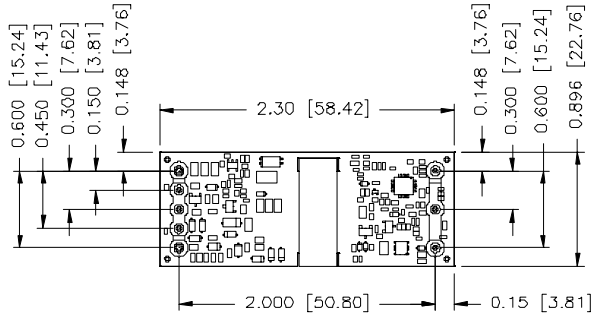


Mechanical Outline

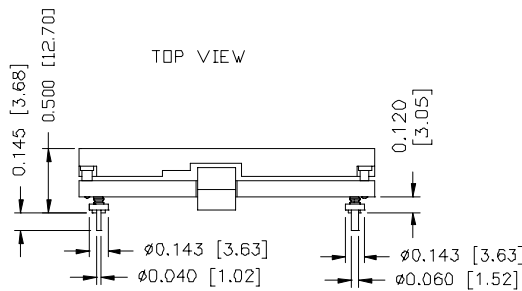
ORCY-80R03x & ORCY-80R12x



TOP VIEW

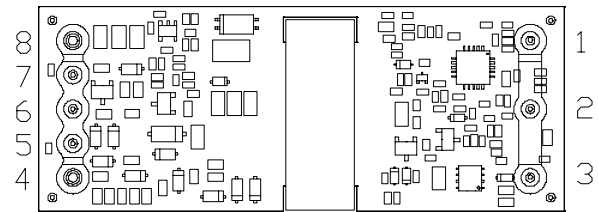


BOTTOM VIEW



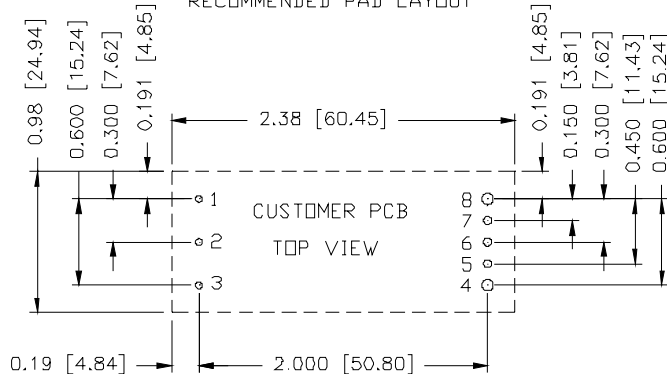
SIDE VIEW

UNIT: INCH [mm]



BOTTOM VIEW

RECOMMENDED PAD LAYOUT



1,2,3,5,6,7 $\phi 0.047$ HOLE SIZE, $\phi 0.08$ min PAD SIZE
4,8 $\phi 0.07$ HOLE SIZE, $\phi 0.10$ min PAD SIZE

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"

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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