0RCY-50U12x

Isolated DC-DC Converter

The 0RCY-50U12x is part of the isolated dc/dc converters that operate from a wide input range (18 Vdc - 75 Vdc) and can cover both 24 Vin and 48 Vin input range. These units will provide up to 60 W of output power. They are 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. These converters are provided in an industry standard 1/8 brick package.

RoHS Compliant

Key Features & Benefits

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (330 kHz)
- Input Under Voltage Lockout
- Input Over Voltage Lockout
- Ultra Wide Input Range: 18 Vdc - 75 Vdc
- Output Over-Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Low Cost
- Output Voltage Trim
- Positive/Negative Remote Sense
- Remote On/Off
- Basic Isolation
- Approved to UL/CSA/IEC 62368-1 (TBD)
- Class II, Category 2, Isolated DC/DC Converter (refer to IPC-9592B)

Applications

- Networking
- Computers and peripherals
- Telecommunications

1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
0RCY-50U120 0RCY-50U12L	12 VDC	18 – 75 VDC	5 A	60 W	89%

NOTE: 1. Add "G" suffix at the end of the model number to indicate Tray Packaging.

PART NUMBER EXPLANATION

0	R	CY	-	50	U	12	x	G
Mounting Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Active Logic	Package Type
Through hole mount	RoHS	1/8th Brick		60 W	18 – 75 V	12 V	0 – active high, L – active low	G – Tray package

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Input Voltage(continuous)		-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
Altitude		-	-	2000	m

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

3. INPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Input Voltage		18	24/48	75	V
Input Current (full load)	Vin=18 V	-	-	3.8	A
	Vin=75 V	-	-	1.0	A
Input Current (no load)		-	100	180	mA
Remote Off Input Current		-	10	15	mA
Input Reflected Ripple Current (rms)	Tested with simulated source impedance of 10 uH, 5 Hz to 20 MHz; use a 1 uF/100 V ceramic cap and a 100 uF/100 V electrolytic cap with ESR = 1 ohm max. at 200 kHz at 25°C.	-	2	5	mA
Input Reflected Ripple Current (pk-pk)		-	15	20	mA
I2t Inrush Current Transient		-	0.05	0.1	A^2s
Turn-on Voltage Threshold		16.5	17.0	17.5	V
Turn-off Voltage Threshold		15.5	16.0	16.5	V
Input Over Voltage Lockout		76	78	80	V

CAUTION: This converter is not internally fused. An input line fuse must be used in application.

4. OUTPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Output Voltage Set Point	Vin=48V, Io=50% load	11.76	12.00	12.24	V
Load Regulation		-	±6	±12	mV
Line Regulation		-	±12	±24	mV
Regulation Over Temperature (-40deg.C ~ +85deg.C)		-	±30	±50	mV
Output Ripple and Noise (rms)	0-20 MHz BW, with a 0.1 µF ceramic cap and a 10 uF tantalum cap at the output.	-	30	50	mV
Output Ripple and Noise (pk-pk)		-	100	150	mV
Output Current Range		0	-	5	A
Output DC Current Limit		6	-	9	A
Short Circuit Surge Transient		-	3	5	A^2s
Turn-On Time		10	20	30	ms
Overshoot at Turn on		-	0	3	%
Output Capacitance		0	-	1000	uF
Transient Response					
ΔV 75%~50% of Max Load	di/dt=1 A/us, Vin=24 Vdc, Ta=25 °C, with a 0.1 µF ceramic cap and a 10 uF tantalum cap at output.	-	300	400	mV
Settling Time		-	100	150	us
ΔV 75%~50% of Max Load		-	300	400	mV
Settling Time		-	100	150	us

5. GENERAL SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency Vin=24 V	Measured at normal Vin, full load.	87.5	89	-	%
Efficiency Vin=48 V		85.5	87	-	
Switching Frequency		310	330	350	kHz
Remote Sense Compensation	The total voltage increased by trim and remote sense should not exceed 15%Vo.	-	-	10	%
Output Voltage Trim Range		80	-	110	%
Over Temperature Protection		-	125	-	°C
Over Voltage Protection	Vin=48 V, full load, in Hiccup mode.	-	-	13.8	V
MTBF	Calculated Per Bell Core SR-332 (Io=80%load, Ta = 25 °C)	-	1,867,232	-	hour
Weight		-	31.2	-	g
Dimensions Inches (L × W × H) Millimeters (L × W × H)			2.30 x 0.896 x 0.47 58.42 x 22.76 x 11.94		INCH mm
Isolation Characteristics					
I/O isolation voltage		-	-	1500	Vdc
Isolation Capacitance		-	1500	-	pF

6. EFFICIENCY DATA

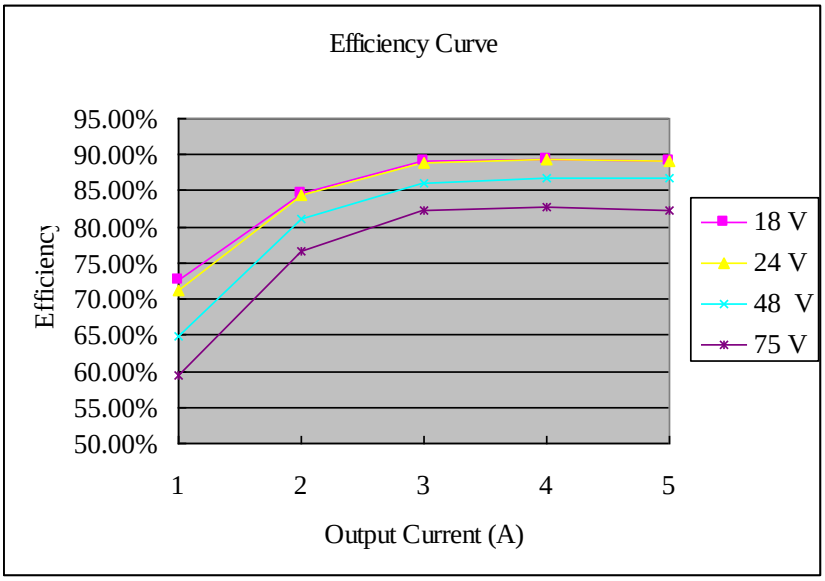

Figure 1. Efficiency curve

7. REMOTE ON/OFF

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
Signal Low (Unit On)	Active Low	0RCY-50U12L. The remote on/off pin open, Unit off.	-0.3	-	0.8	V
Signal High (Unit Off)			2.4	-	18	V
Signal Low (Unit Off)	Active High	0RCY-50U120. The remote on/off pin open, Unit on.	-0.3	-	0.8	V
Signal High (Unit On)			2.4	-	18	V
Current Sink			0	-	0.75	mA

8. 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.

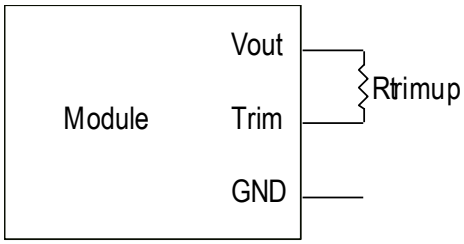

Figure 2.

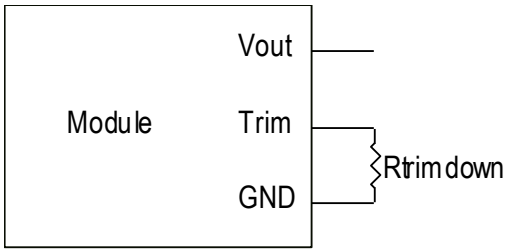

Figure 3.

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

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

Note:

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

Vo_req=Desired (trimmed) output voltage [V]

Output voltage Vo=12.00 V

9. RIPPLE AND NOISE WAVEFORM

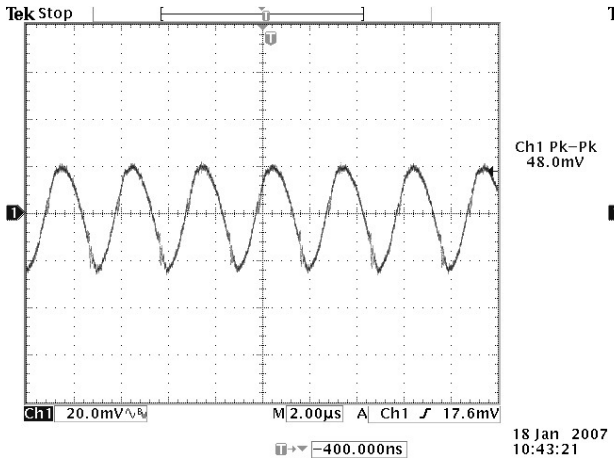

Figure 4.
24 Vdc input, 12 Vdc/5 A output

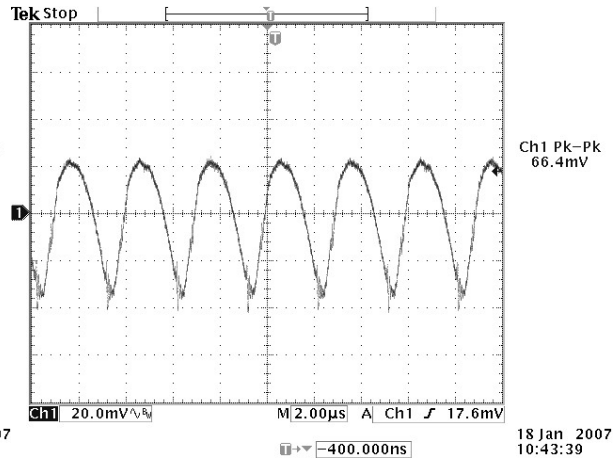

Figure 5.
48 Vdc input, 12 Vdc/5 A output

Note: Ripple and noise at full load, 0-20 MHz BW, with a 0.1 uF ceramic cap and a 10 uF tantalum cap at the output, and Ta=25 deg C.

10. THERMAL DERATING CURVES

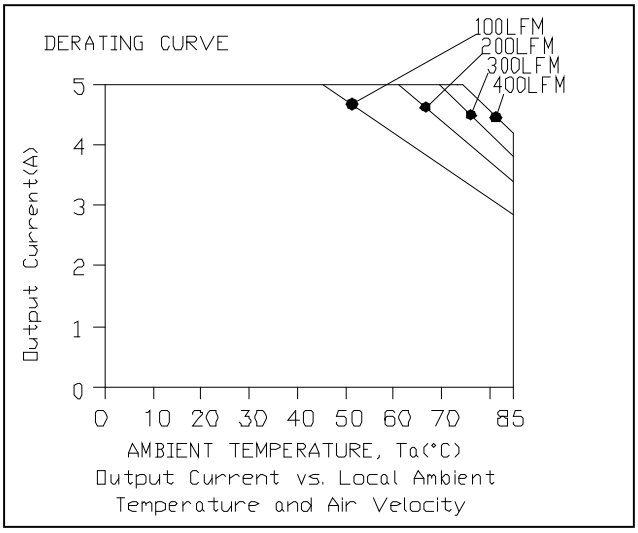

Figure 6.

Vin=24 V, Vo=12 V; Maximum FET junction temperature derated to 120 C

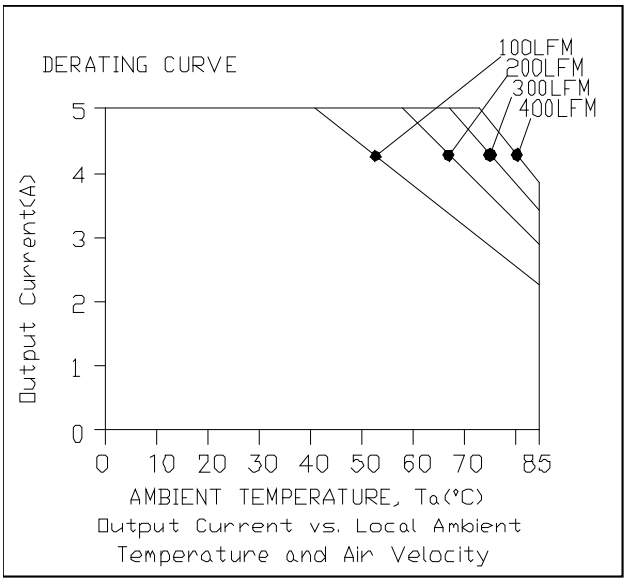

Figure 7.

Vin=48 V, Vo=12 V; Maximum FET junction temperature derated to 120 C

11. TRANSIENT RESPONSE WAVEFORMS

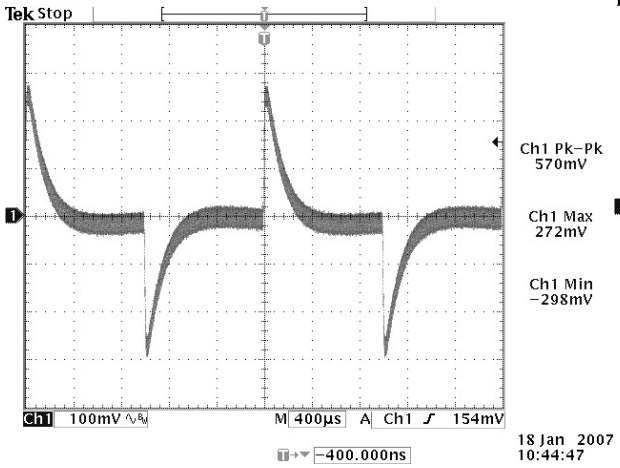

Figure 8.

50%-75%-50% Load Transients at Vin=24 V

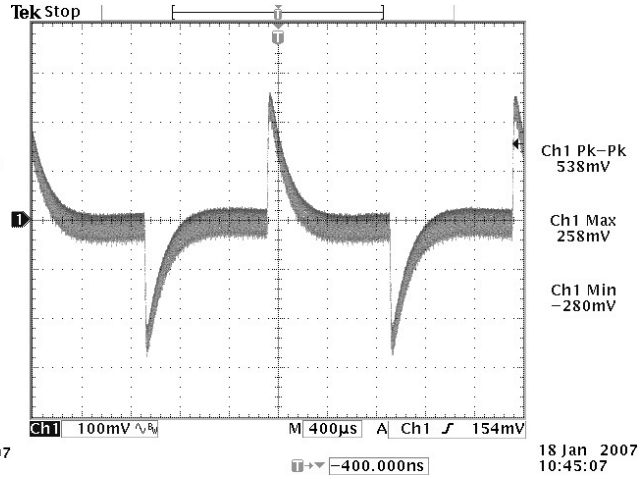

Figure 9.

50%-75%-50% Load Transients at Vin=48 V

Note: Transients Response at di/dt=1 A/us, with a 0.1 µF ceramic cap and a 10 uF tantalum cap at output, and Ta=25 deg C.

12. MECHANICAL DIMENSIONS

OUTLINE

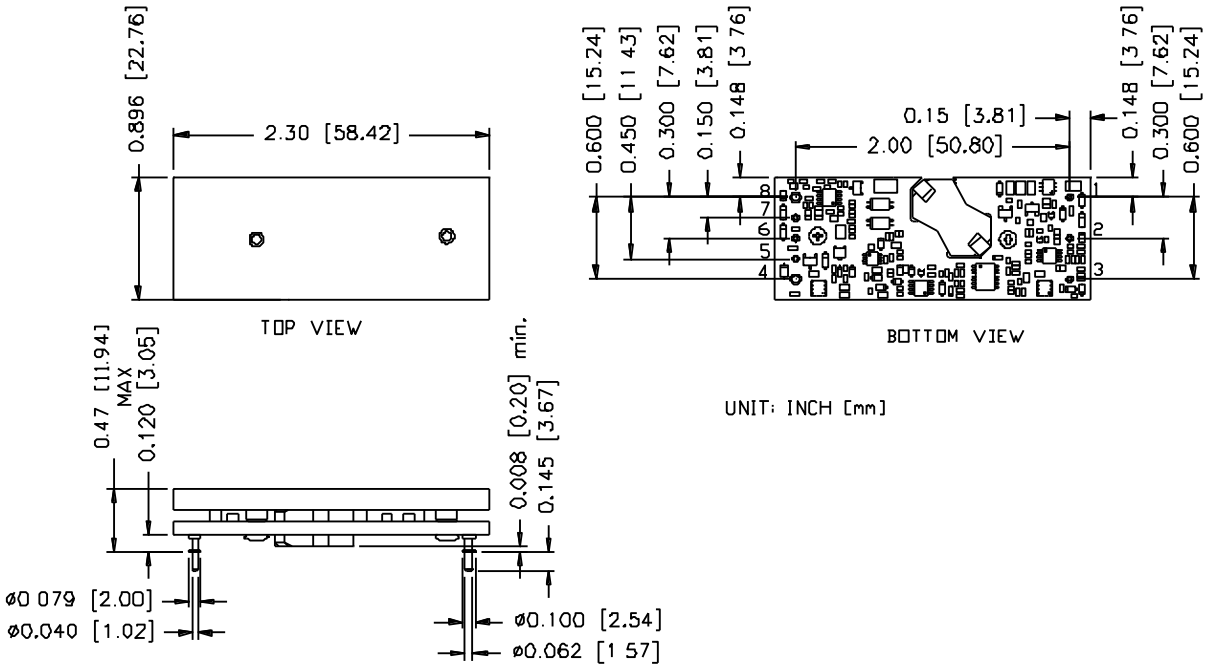

Figure 10. Outline

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 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; Tolerances: x.xx +/-0.02 in [0.51 mm]. x.xxx +/-0.010 in [0.25 mm].

MECHANICAL DIMENSIONS(CONTINUED)

PIN DEFINITIONS

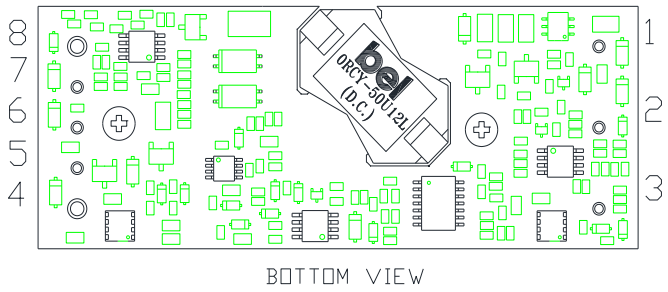

Figure 11. Bottom view

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 remote sense	0.040''
8	Vout(+)	Positive output voltage	0.062''

Notes: 1. Pin 5 must be connected to Vout-.
2. Leave Pin 6 open for nominal voltage.
3. Pin 7 must be connected to Vout+.

RECOMMENDED PAD LAYOUT

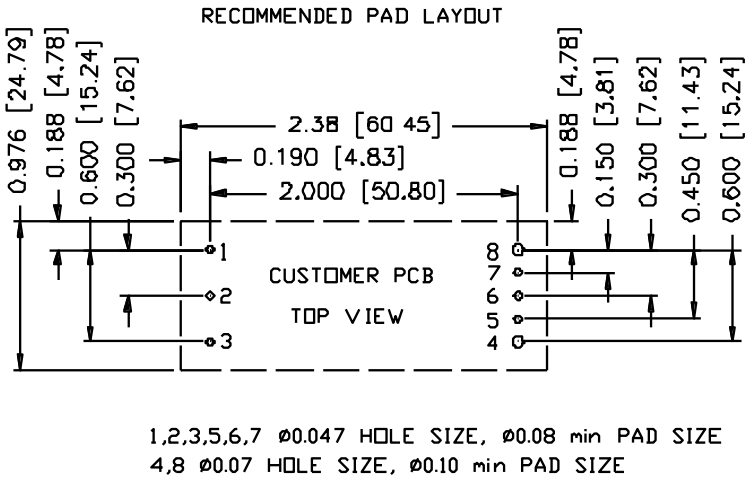

Figure 12. Recommended pad layout

13. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2006-11-27	VP1	First release	X.Ye
2007-01-19	A	1.Add efficiency data; 2. Change test condition; 3.Change output capacitance; 4.Change efficiency; 5.Add NR; 6.Add TR; 7.Add TD.	X.Ye
2007-01-23	B	1.Update the thermal derating curve.	X.Ye
2007-05-10	C	1.Continuous Input Voltage; 2.Output Ripple and Noise; 3.Output DC Current Limit; 4.Turn on Time; 5.Overshoot at Turn on; 6.Transient Response; 7.Efficiency; 8.EFFICIENCY CURVE	WQ.Zeng
2007-06-21	D	1.Test condition of input reflected ripple;2.An exchange of the TD curves;3.Input Reflected Ripple Current	WQ.Zeng
2007-06-28	E	1.Add MTBF	WQ.Zeng
2019-06-18	AF	Update to new form	F.Tao

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