

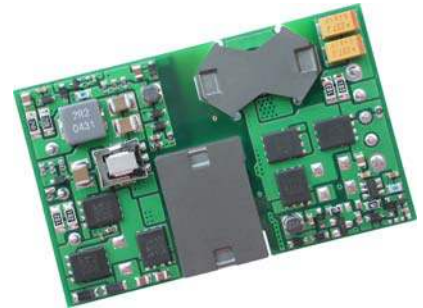
ISOLATED DC/DC CONVERTERS

48 Vdc Input, 12 Vdc/8.35 A Output

bel
POWER PRODUCTS

0RQB-C0U12C RoHS Compliant PRELIMINARY Rev.A

- Isolated
- High Efficiency
- High Power Density
- Low Cost
- Input Under Voltage Lockout
- Fixed Frequency (285 kHz)
- Input Over Voltage Lockout
- Output Over Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Remote On/Off
- Positive/Negative Remote Sense
- Basic Isolation
- Output Voltage Trim



Description

The 0RQB-C0U12C is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 100 W of output power from a nominal 48 Vdc input. This unit is designed to be highly efficient and low cost. Typical efficiency at 48 Vdc input at full load is 91%. Features include over current protection and under-voltage lockout. These converters are provided in an industry standard quarter brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low
12 Vdc	18 Vdc - 75 Vdc	8.35 A	100 W	91%	0RQB-C0U12C

- Notes:** 1. Add "G" suffix at the end of the model number to indicate Tray Packaging.
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	80 V	No Operating
	-	-	75 V	Operating
Remote On/Off	-0.3 V	-	18 V	
I/O Isolation Voltage	-	-	2000 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

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

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	18 V	48 V	75 V	
Input Current (full load)	-	-	7.0 A	
Input Current (no load)	-	100 mA	180 mA	
Remote Off Input Current		10 mA	15 mA	
Input Reflected Ripple Current (pk-pk)	-	20 mA	40 mA	Tested with simulated source impedance of 10 uH, 5 Hz to 20 MHz BW; use a 0.47 uf/100 V ceramic cap and a 100 uF /100 V electrolytic cap with ESR = 1 ohm max. at 200 kHz at 25 °C.
Input Reflected Ripple Current (rms)	-	5 mA	10 mA	
I ² t Inrush Current Transient	-	0.05 A ² s	0.1 A ² s	
Turn-on Voltage Threshold	16.5 V	17.0 V	17.5 V	
Turn-off Voltage Threshold	15.5 V	16.0 V	16.5 V	
Input over voltage Lockout	76 V	78 V	80 V	

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

Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point	11.820 V	12.00 V	12.180 V	Vin=48 V, Io=50% full load		
Line Regulation		±24 mV	±120 mV			
Load Regulation	-	±30 mV	±80 mV			
Regulation Over Temperature (-40 °C to +85 °C)	-	±60 mV	±100 mV			
Output Current Range	0 A	-	8.35 A			
Current Limit Threshold	9.2 A	10.5 A	13 A			
Short Circuit Surge Transient	-	3 A ² s	5 A ² s			
Vin=48 V ; Ripple and Noise (rms)	-	30 mV	50 mV	Test conditions: 0-20 MHz BW, with a 1 uF ceramic capacitor and a 10 uF Tantalum capacitor at the output.		
Vin=24 V ; Ripple and Noise (rms)	-	25 mV	40 mV			
Vin=48 V ; Ripple and Noise (pk-pk)	-	100 mV	150 mV			
Vin=24 V ; Ripple and Noise (pk-pk)	-	75 mV	120 mV			
Turn on Time	10 mS	-	100 mS			
Overshoot at Turn on	-	0%	5%			
Output Capacitance	0 uF	-	1200 uF			
Transient Response						
50% ~ 75% Max Load	Overshoot	Vo=12.0 V	-	360 mV	480 mV	di/dt = 0.1 A/uS, Vin=48 V, with a 1 uF ceramic capacitor and a 10 uF Tantalum capacitor at the output.
	Settling Time		-	100 uS	250 uS	
75% ~ 50% Max Load	Overshoot		-	360 mV	480mV	
	Settling Time		-	150 uS	250 uS	

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

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	88%	91%	-	Vin=48 V, full load, Ta=25 °C
Efficiency	-	92%	-	Vin=24 V, full load, Ta=25 °C
Switching Frequency	240 kHz	285 kHz	320 kHz	
Isolation capacitance	-	1500 pF	-	
Input to Output Isolation Voltage	-	-	2000 V	
Remote Sense Compensation	-	-	10% Vo	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Output Voltage Trim Range	80% Vo	-	110% Vo	
Over Temperature Protection	-	125 °C	-	
Over Voltage Protection	-	130% Vo	-	Vin=48 V, full load, Hiccup mode
MTBF	TBD			Calculated Per Bell Core SR-332 (Io = Nominal; Ta = 25 °C)
Dimensions	Inches millimeters 2.30 x 1.45 x 0.395 58.42 x 36.83 x 10.04			
Weight	-	40 g	-	

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

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	-	
Current Sink	0 mA	-	0.75 mA	

Output Trim Equations

Equations for calculating the trim resistor are shown below (Unit: kΩ). The Trim Down resistor should be connected between the Trim pin and Ground pin. The Trim Up resistor should be connected between the Trim pin and the Vout. Only one of the resistors should be used for any given application.

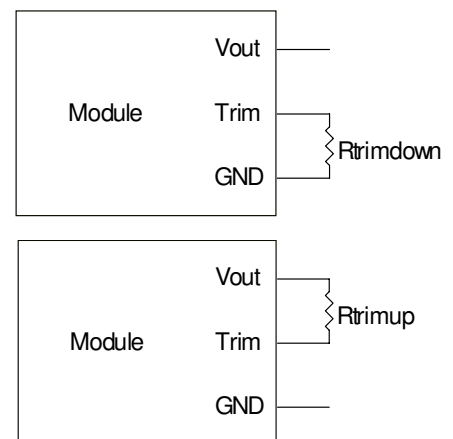
$$R_{trimdown} = \frac{511}{|\delta|} - 10.22$$

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

Notes:

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

V_{o_req}=Desired (trimmed) output voltage [V]; V_o=output voltage

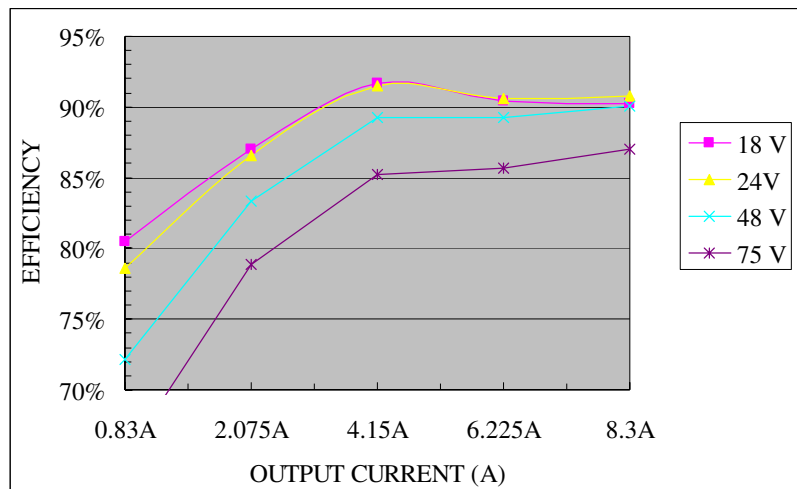


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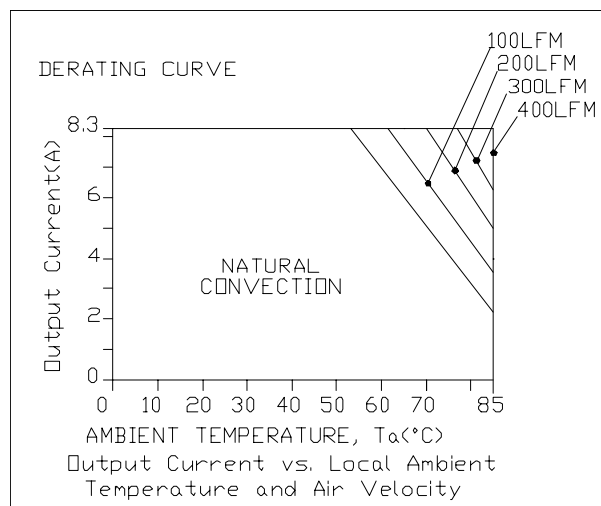


Efficiency Data



Vo=12 V

Thermal Derating Curve



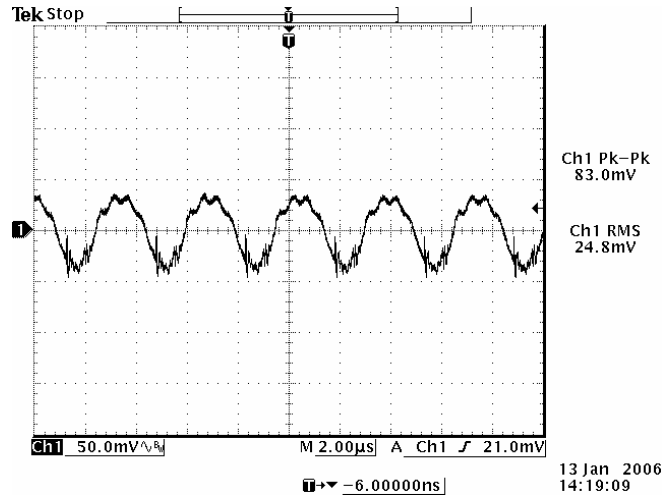
Vo=12 V, Vin=48 V

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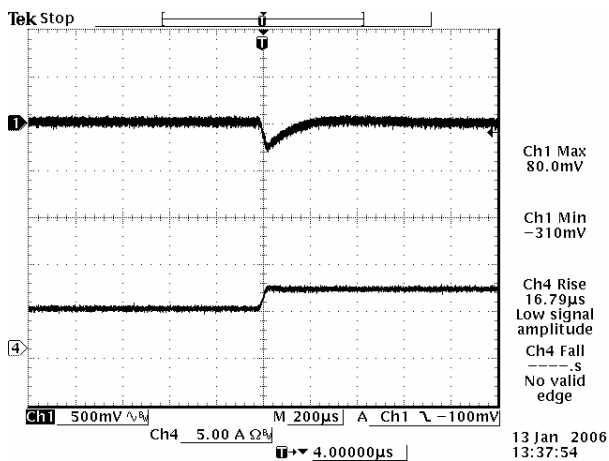
Ripple and Noise Waveform



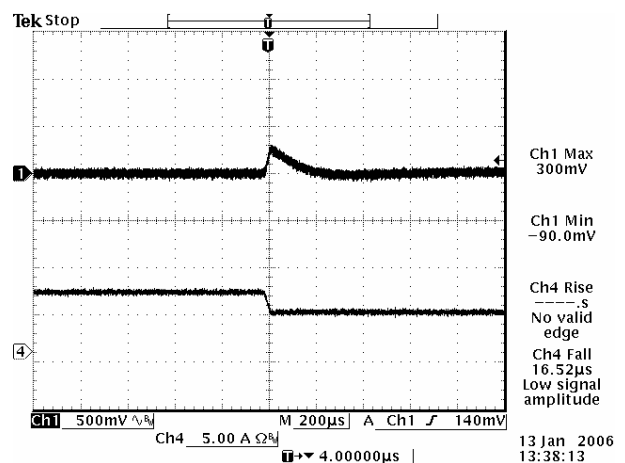
12 V/8.35 A output

Note: Ripple and noise at full load, 48 V input, with a 1 uF ceramic capacitor and a 10 uF tantalum capacitor at the output, and $T_a=25$ deg C.

Transient Response Waveforms



Vout= 12 V 50%-75% Load Transients at Vin=48 V



Vout= 12 V 75%-50% Load Transients at Vin=48 V

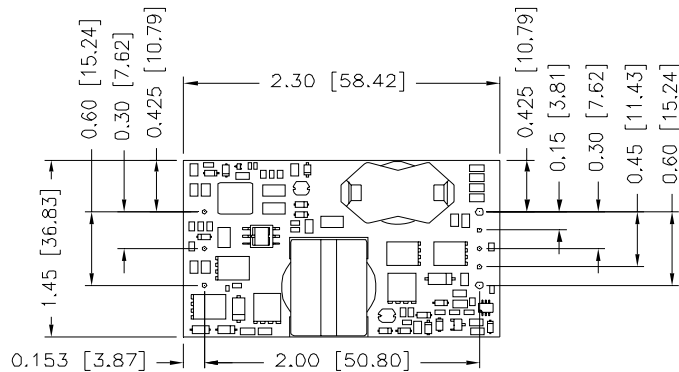
Note: Transients at $di/dt = 0.1$ A/uS, $V_{in}=48$ V, with a 1 uF ceramic capacitor and a 10 uF Tantalum capacitor at the output, $T_a=25$ deg C.

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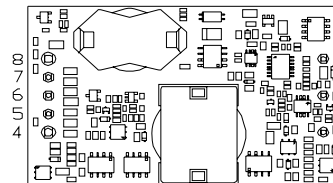
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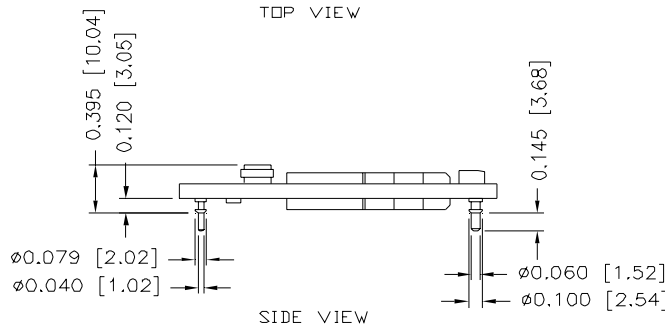
Mechanical Outline



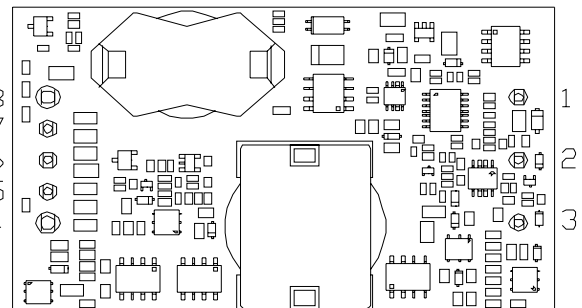
TOP VIEW



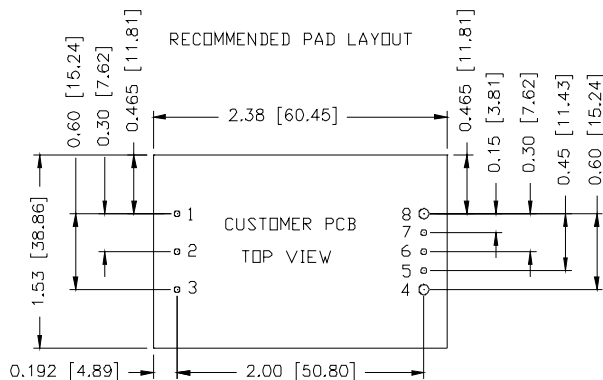
BOTTOM VIEW



SIDE VIEW



BOTTOM VIEW



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

Pin Connections

Pin	Function	Pin Size
1	Vin (+)	0.04"
2	Remote On/Off	0.04"
3	Vin (-)	0.04"
4	Vout (-)	0.062"
5	Remote Sense (-)	0.04"
6	Trim	0.04"
7	Remote Sense (+)	0.04"
8	Vout (+)	0.062"

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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