

# ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



Sep. 03, 2010

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

## 0RQB-Q0T12C RoHS Compliant Rev. F

- Basic Isolation
- Fixed Frequency (300 kHz)
- High Efficiency
- High Power Density
- Input Under Voltage Lockout
- Input Over Voltage Lockout
- Low Cost
- SCP/OCP
- Remote On/Off
- Over Temperature Protection
- Output Over Voltage Protection
- Baseplate



### Description

The 0RQB-Q0T12C is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 400 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 over voltage protection. The converter is 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	36 Vdc - 75 Vdc	33 A	400 W	95%	0RQB-Q0T12C

- Notes:** 1. Add "G" suffix at the end of the model number to indicate Tray Packaging.  
2. The part number above indicates 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	-	75 V	
Input voltage Transient protection	-	-	100V	Operating for 100mS
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	

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

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	13 A	
Input Current (no load)	-	80 mA	150 mA	
Remote Off Input Current	-	10 mA	20 mA	
Input Reflected Ripple Current (pk-pk)	-	20 mA	30 mA	With simulated source impedance of 10 uH, 5 Hz to 20 MHz; use a 100 uF/100 V electrolytic capacitor with ESR = 1 ohm max, at 200 kHz.
Input Reflected Ripple Current (rms)	-	5 mA	10 mA	
I <sup>1</sup> t Inrush Current Transient	-	-	1 A <sup>2</sup> S	
Turn-on Voltage Threshold	33 V	34.5 V	35.5 V	
Turn-off Voltage Threshold	32.5 V	33.5 V	35 V	

- Notes:** 1. Should place at least 220uF/100V electrolytic capacitor directly adjacent to the input pin of the module.  
2. All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

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## Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point	11.5 V	12 V	12.5 V	V <sub>in</sub> =48 V, I <sub>o</sub> =50%Load.		
Load Regulation	-	±150 mV	±300 mV			
Line Regulation	-	±80 mV	±130 mV			
Regulation Over Temperature (-40 °C to 85 °C)	-	±150 mV	±250 mV			
Ripple and Noise (pk-pk)	-	85 mV	120 mV	0 - 20 MHz BW, with a 1 uF ceramic capacitor and a 10 uF tantalum capacitor at the output.		
Ripple and Noise (rms)	-	25 mV	50 mV			
Output Current Range	0 A	-	33 A			
Output DC Current Limit	34 A	38 A	44 A			
Short Circuit Surge Transient	-	-	5 A <sup>2</sup> s			
Turn on Time	-	30 mS	60 mS	Enable form V <sub>in</sub>		
	-	10 mS	35 mS	Enable form ON/OFF		
Overshoot at Turn on	-	0%	3%			
Output Capacitance	0 uF	-	10000 uF			
<b>Transient Response</b>						
50% ~ 75% Max Load	Overshoot	V <sub>o</sub> =12 V	-	300 mV	600 mV	di/dt=0.1A/us, V <sub>in</sub> =48 Vdc, T <sub>a</sub> =25 °C, with a 1 uF ceramic capacitor and a 10 uF tantalum capacitor at the output.
	Settling Time		-	300 uS	500 uS	
75% ~ 50% Max Load	Overshoot		-	300 mV	600 mV	
	Settling Time		-	300 uS	500 uS	

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

## General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	93%	95%	-	V <sub>in</sub> =48 V, full load.
Switching Frequency	-	300 kHz	-	
<b>Isolation characteristics</b>				
Input to Output	-	-	1500 V	
Isolation Resistance	10M Ohm	-	-	
Isolation Capacitance	-	2200 pF	-	
Over Voltage Protection (static)	13 V	15.5 V	17 V	
Over Temperature Protection	-	125 °C	130 °C	
MTBF	1,745,053 hours			Calculated Per Bell Core SR-332 (V <sub>in</sub> =48 V, V <sub>o</sub> =12 V, I <sub>o</sub> =80%load, T <sub>a</sub> = 25 °C)
Dimensions	Inches (L x W x H)			
	2.30 x 1.45 x 0.47			
	Millimeters (L x W x H)			
	58.42 x 36.83 x 11.86			
Weight	-	50.3 g	-	

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

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48 Vdc Input 12 Vdc / 33 A Output



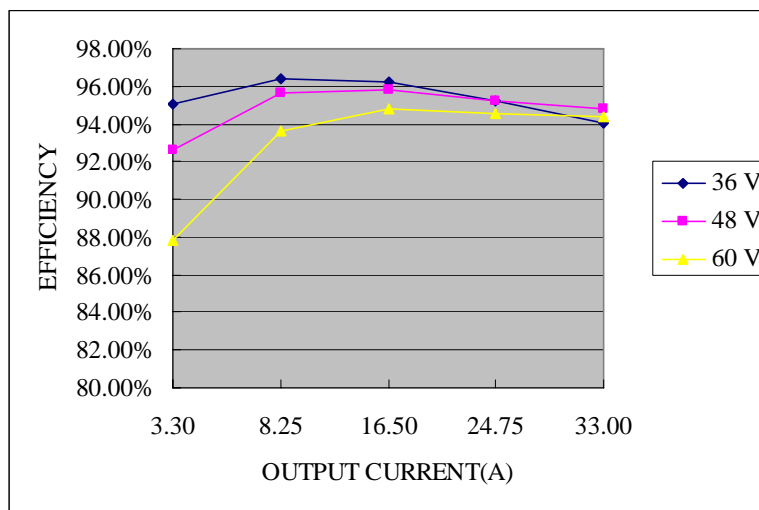
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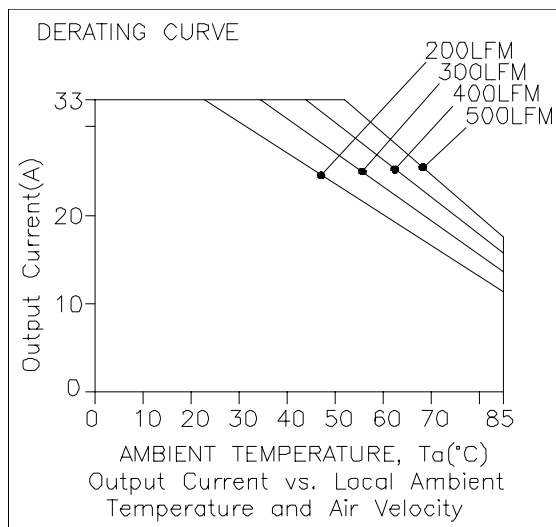
## Control Specifications

Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit On)	Active Low	-0.3 V	-	The Remote On/Off pin is open, Unit off.
Signal High (Unit Off)		2.4 V	-	
Current Sink		0 mA	-	0.75 mA

## Efficiency Data



## Thermal Derating Curve



Test @Vin=48V, with maximum junction temperature of semiconductors derated to 120°C

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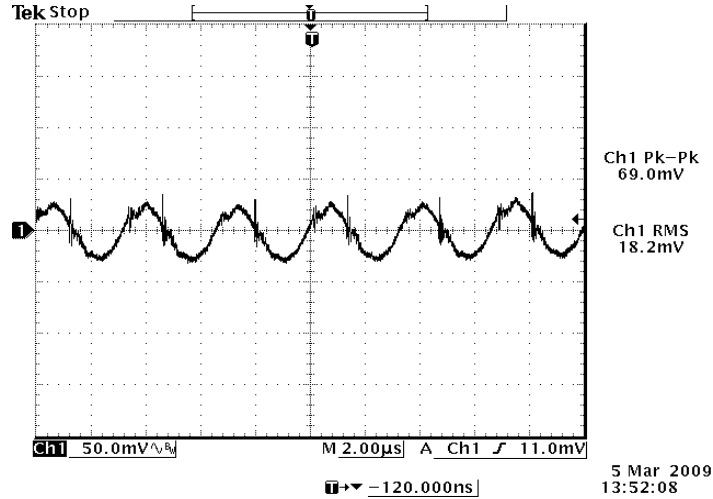
48 Vdc Input 12 Vdc / 33 A Output



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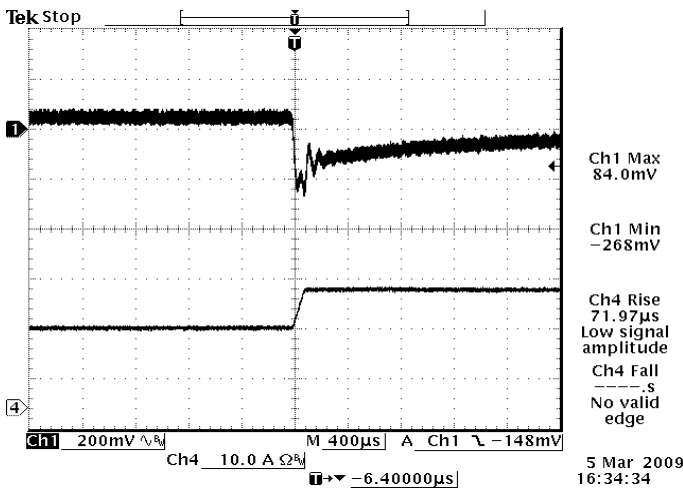
## Ripple and Noise Waveform



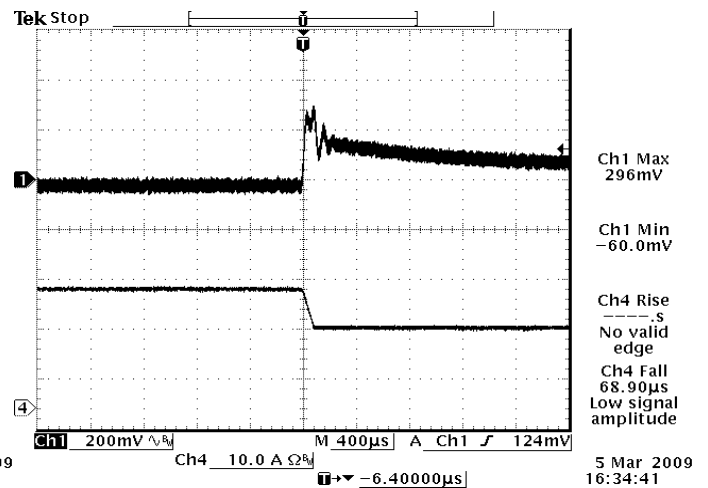
48 Vdc input, 12 Vdc/33 A output

**Note:** Ripple and noise at full load, with a 1µF ceramic cap and a 10 µF tantalum cap at output, Ta=25 deg C.

## Transient Response Waveforms



Vout= 12 V 50%-75% Load Transients



Vout= 12 V 75%-50% Load Transients

**Note:** Transients at di/dt=0.1 A/µs, with a 1 µF ceramic capacitor and a 10 µF tantalum capacitor at the output, Ta=25 °C.

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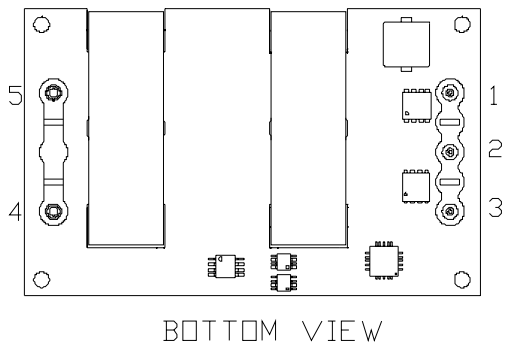
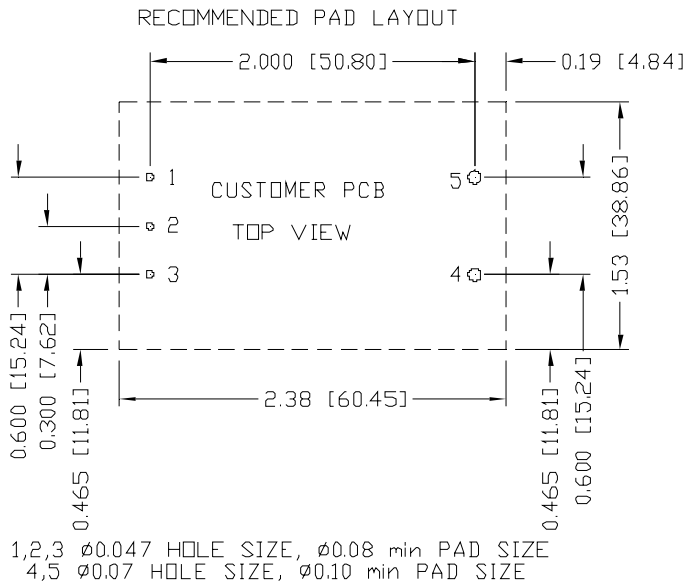
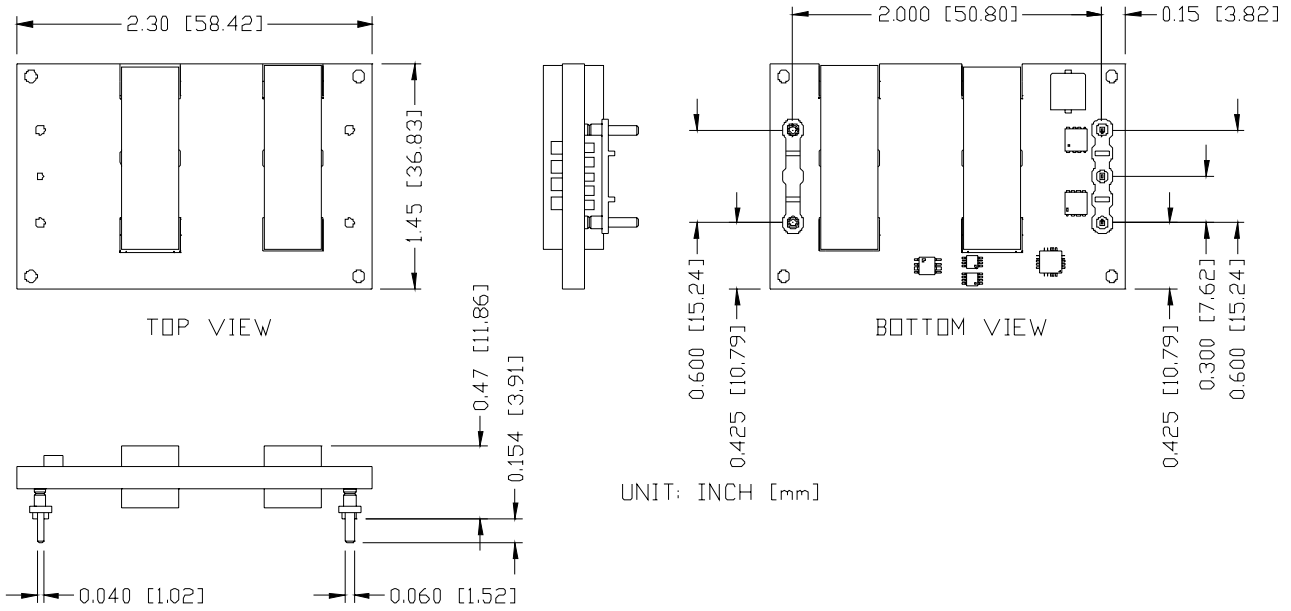
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## Mechanical Outline



### Pin Connections

pin#	function	pin size
1	Vin (+)	0.04"
2	ON/OFF	0.04"
3	Vin (-)	0.04"
4	Vout (-)	0.06"
5	Vout (+)	0.06"

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## Revision History

Date	Revision	Changes Detail	Approval
2010-01-21	C	Add recommended Reflow Profile.	XF Jiang
2010-04-21	D	1. Update load/line regulation; 2. update mechanical outline(pin header standoff height)	XF Jiang
2010-04-23	E	1. Remove the word "this product can pass through a paste in hole reflow process" from "Description". 2. Remove the page of Reflow Profile	XF Jiang
2010-09-03	F	1. Update turn-on/turn-off voltage threshold in input specifications; 2. Update ripple and noise (pk-pk) and transient response in output specifications; 3. Update over voltage protection and MTBF in general specifications; 4. Update TD, NR, TR and mechanical outline.	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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