

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

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

0RQB-Q0T12x, -D, -F

RoHS Compliant

Rev. H

Features

- 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



Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The 0RQB-Q0T12x 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	Model Number Active Low
12 Vdc	36 Vdc - 75 Vdc	33 A	400 W	95%	0RQB-Q0T12D	0RQB-Q0T12F

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

Part Number Explanation

0 R QB - Q0 T 12 x
1 2 3 4 5 6 7

1---Through hole

2---RoHS 6, change "R" to "7" means RoHS 5

3---Series name

4---Series code

5---Input range (36-75V)

6---Output voltage 12V

7---Suffix: "D" indicates 0.154" pin length.

"F" indicates 0.145" pin length and add an extra 6.35mm heatsink.

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

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

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage (continuous)	-0.3	-	75	V	
Input voltage Transient protection	-	-	100	V	Operating for 100mS
Remote On/Off	-0.3	-	18	V	
I/O Isolation Voltage	-	-	1500	V	
Ambient Temperature	-40	-	85	°C	
Storage Temperature	-55	-	125	°C	

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

Input Specifications

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage	36	48	75	V	
Input Current (full load)	-	-	13	A	
Input Current (no load)	-	80	150	mA	
Remote Off Input Current	-	10	20	mA	
Input Reflected Ripple Current (pk-pk)	-	20	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	10	mA	
I ² t Inrush Current Transient	-	-	1	A ² s	
Turn-on Voltage Threshold	33	34.5	35.5	V	
Turn-off Voltage Threshold	32.5	33.5	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.

Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output Voltage Set Point	11.5	12	12.5	V	V _{in} =48 V, I _o =50%Load.
Load Regulation	-	±150	±300	mV	
Line Regulation	-	±80	±130	mV	
Regulation Over Temperature (-40 °C to 85 °C)	-	±150	±250	mV	
Ripple and Noise (pk-pk)	-	85	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	50	mV	
Output Current Range	0	-	33	A	
Output DC Current Limit	34	38	44	A	
Short Circuit Surge Transient	-	-	5	A ² s	
Turn on Time	-	30	60	mS	Enable form Vin
	-	10	35	mS	Enable form ON/OFF

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

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

Output Specifications (continued)

Parameter	Min	Typ	Max	Unit	Notes	
Overshoot at Turn on	-	0	3	%		
Output Capacitance	0	-	10000	uF		
Transient Response						
50% ~ 75% Max Load	Overshoot	-	300	600	mV	di/dt=0.1A/us, Vin=48 Vdc, Ta=25 °C, with a 1 uF ceramic capacitor and a 10 uF tantalum capacitor at the output.
	Settling Time	-	300	500	uS	
75% ~ 50% Max Load	Overshoot	-	300	600	mV	
	Settling Time	-	300	500	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	93	95	-	%	Vin=48 V, full load.
Switching Frequency	-	300	-	kHz	
Isolation characteristics					
Input to Output	-	-	1500	V	
Isolation Resistance	10M	-	-	Ohm	
Isolation Capacitance	-	2200	-	pF	
Over Voltage Protection	13	15.5	17	V	
Over Temperature Protection	-	125	130	°C	Vin=48 V, full load, in Hiccup mode.
MTBF	1,745,053			hours	Calculated Per Bell Core SR-332 (Vin=48 V, Vo=12 V, Io=80%load, Ta = 25 °C)
Dimensions Inches (L x W x H) Millimeters (L x W x H)	2.30 x 1.45 x 0.53 58.42 x 36.83 x 13.46			-	0RQB-Q0T12D
Dimensions Inches (L x W x H) Millimeters (L x W x H)	2.30 x 1.45 x 0.79 58.42 x 36.83 x 20.00			-	0RQB-Q0T12F
Weight	-	70	-	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	-0.3	-	0.8	V	The Remote On/Off pin is open, Unit off.
Signal High (Unit Off)		2.4	-	18	V	
Current Sink	0	-	0.75	mA		

ISOLATED DC/DC CONVERTERS

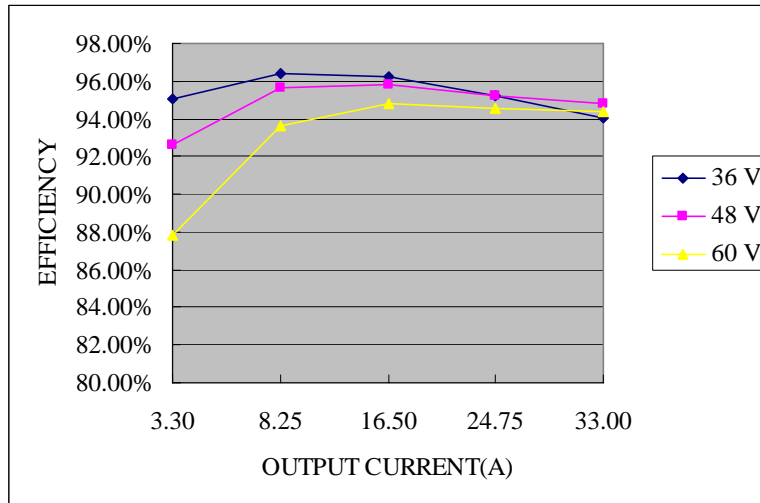
48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

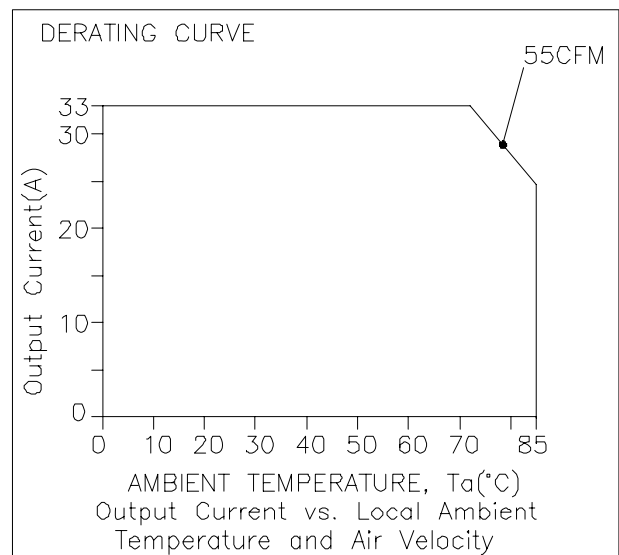
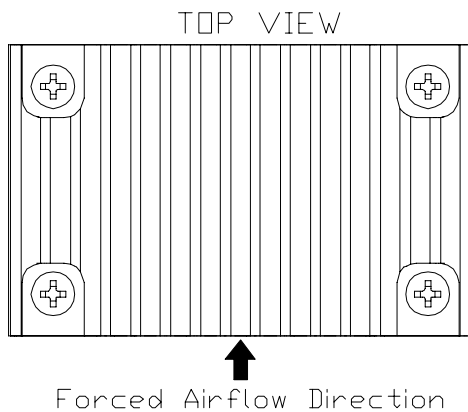
Bel Power Inc., a subsidiary of Bel Fuse Inc.

Efficiency Data



Thermal Derating Curve

0RQB-Q0T12F



ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



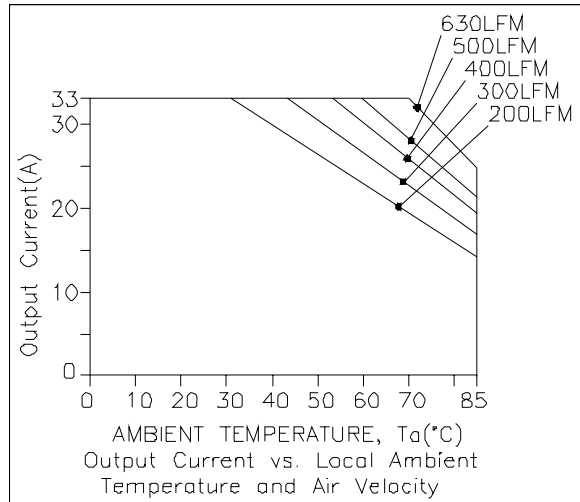
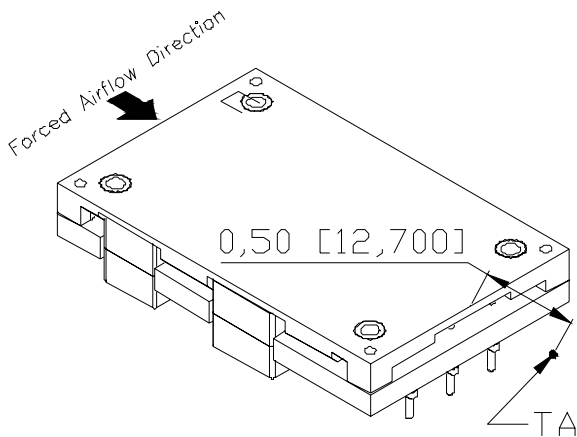
Dec. 10, 2010

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

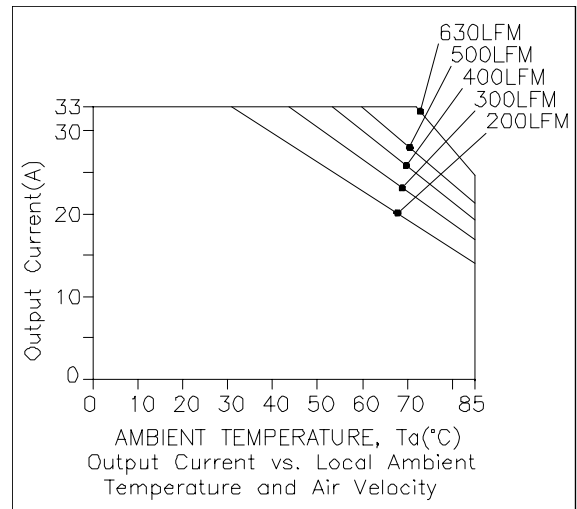
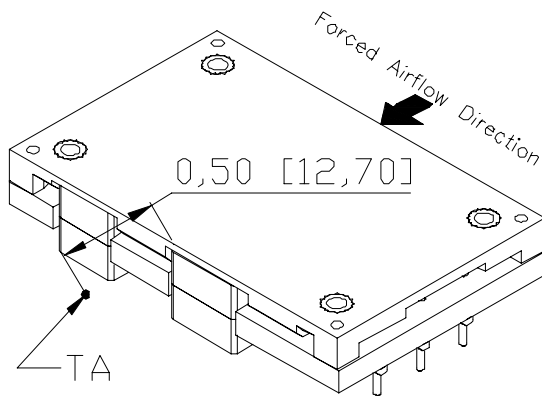
Thermal Derating Curve (Continued)

0RQB-Q0T12D

Longitudinal air flow conditions



Transversal air flow conditions



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

ISOLATED DC/DC CONVERTERS

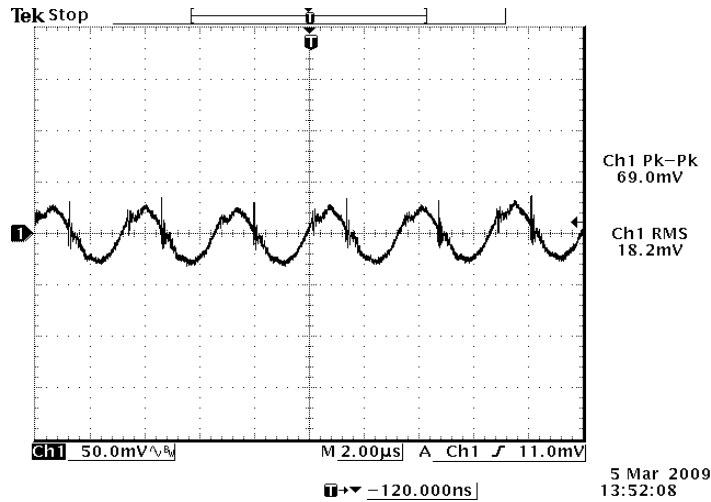
48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

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

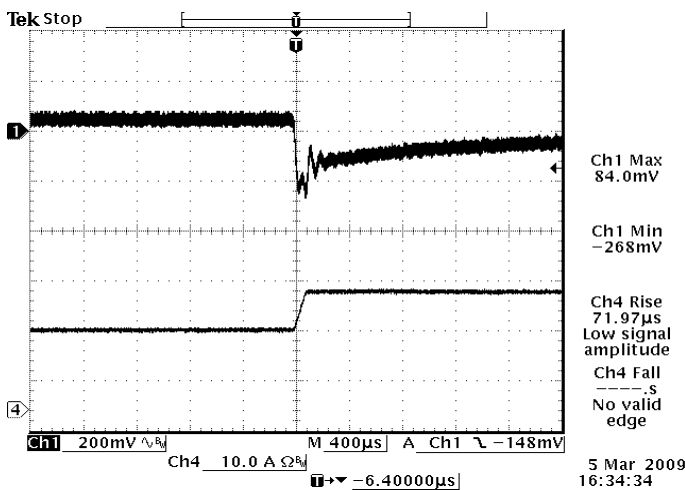
Ripple and Noise Waveform



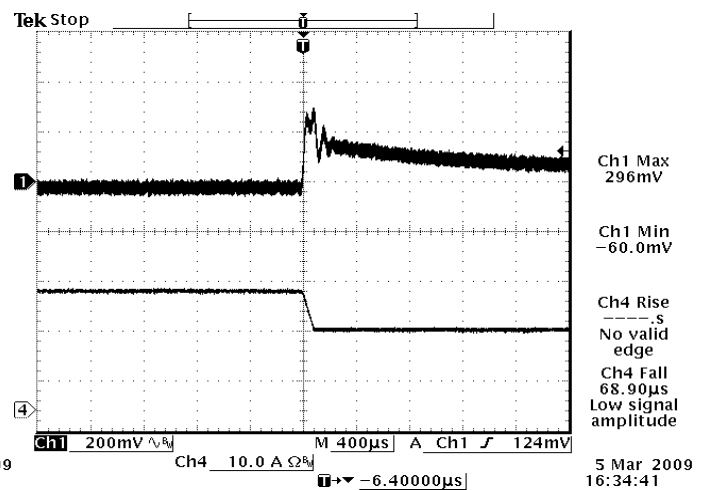
48 Vdc input, 12 Vdc/33 A output

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/us, with a 1 µF ceramic capacitor and a 10 µF tantalum capacitor at the output, Ta=25 °C

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output

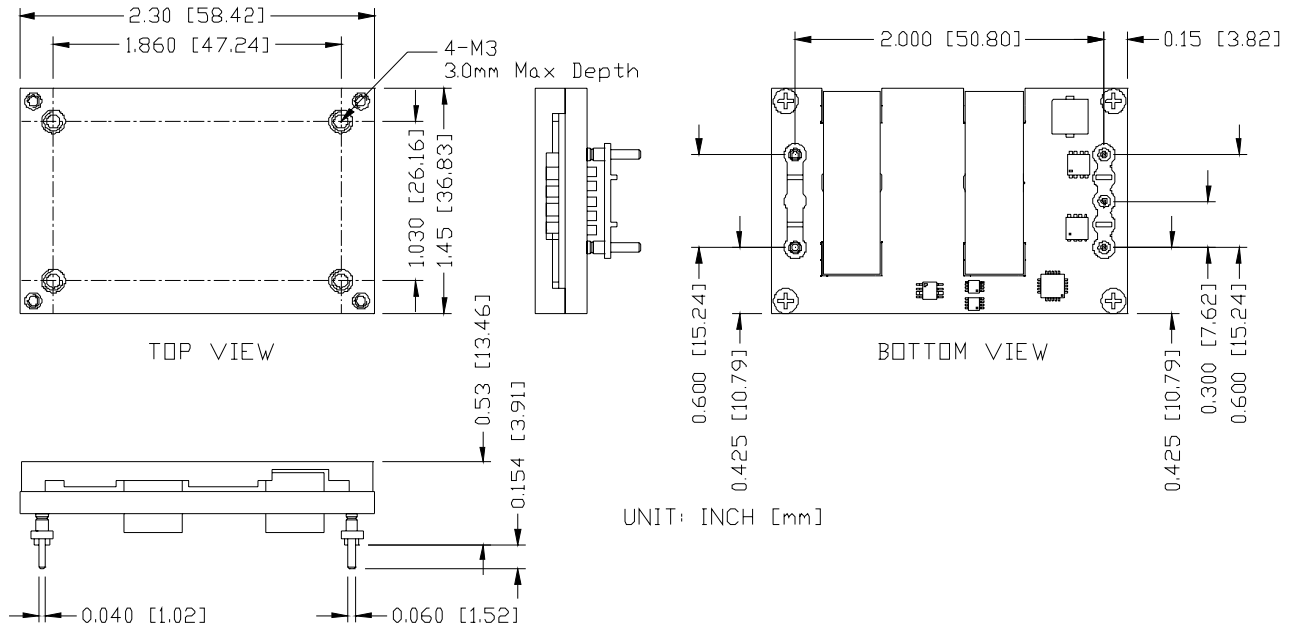


Dec. 10, 2010

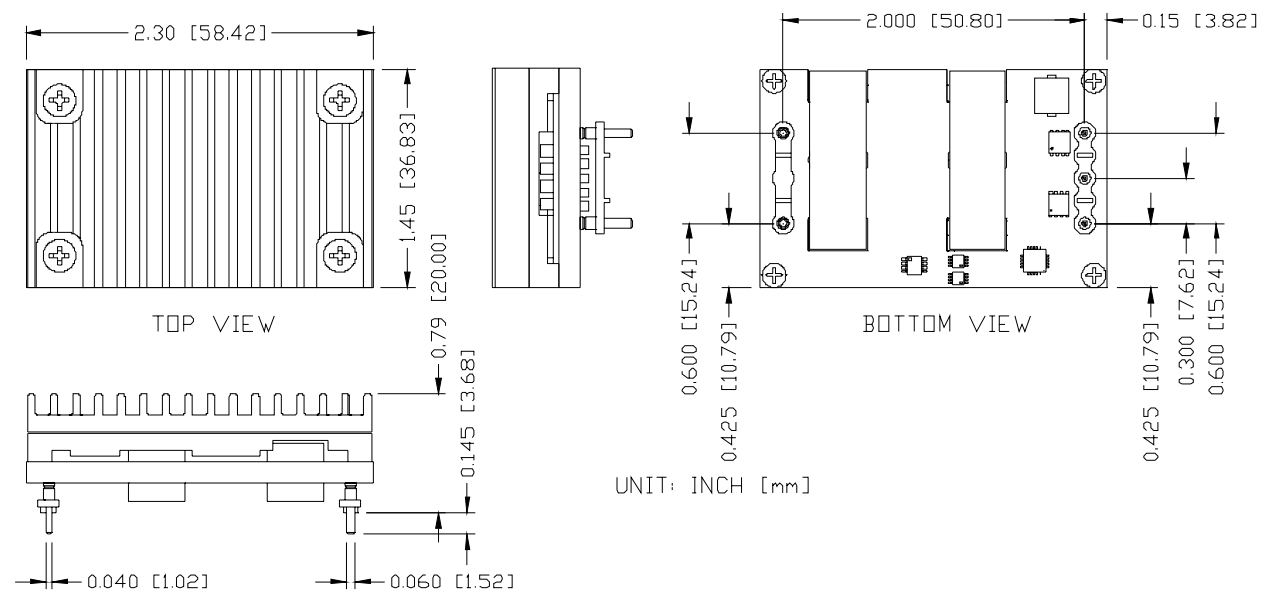
Bel Power Inc., a subsidiary of Bel Fuse Inc.

Mechanical Outline

0RQB-Q0T12D



0RQB-Q0T12F



ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output

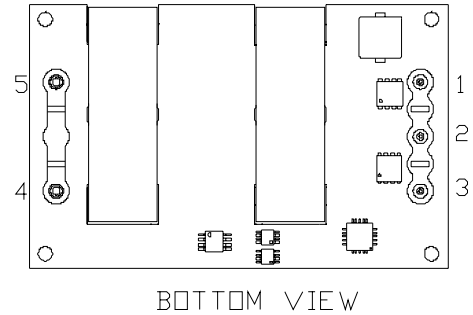
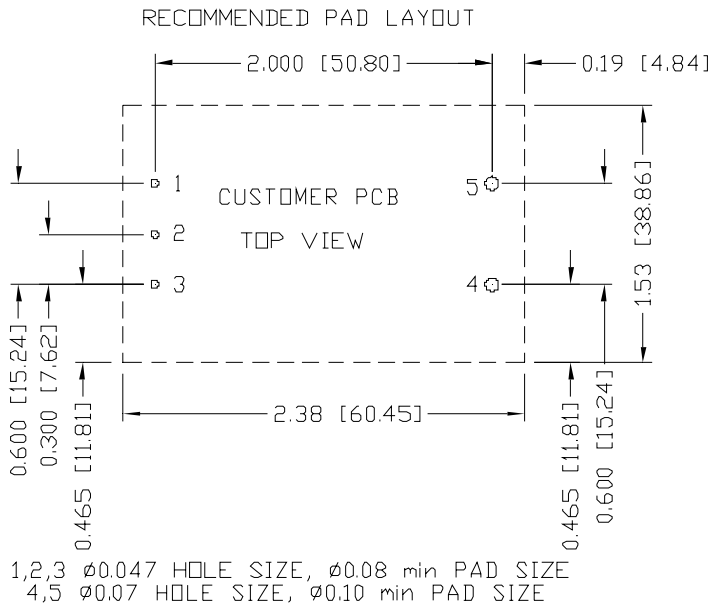


Dec. 10, 2010

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

Mechanical Outline (Continued)

0RQB-Q0T12D & 0RQB-Q0T12F



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"

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 °C 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).

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc / 33 A Output



Dec. 10, 2010

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

Revision History

Date	Revision	Changes Detail	Approval
2010-01-21	B	Add recommended Reflow Profile.	XF Jiang
2010-03-19	C	Update thermal derating curve.	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
2010-11-30	G	Update TD.	XF Jiang
2010-12-10	H	Add TD and MD of 0RQB-Q0T12F.	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.



©2010 Bel Fuse Inc. Specifications subject to change without notice. 121010

9

CORPORATE

Bel Fuse Inc.
206 Van Vorst Street
Jersey City, NJ 07302
Tel 201-432-0463
Fax 201-432-9542
www.belfuse.com

FAR EAST

Bel Fuse Ltd.
8F/ 8 Luk Hop Street
San Po Kong
Kowloon, Hong Kong
Tel 852-2328-5515
Fax 852-2352-3706
www.belfuse.com

EUROPE

Bel Fuse Europe Ltd.
Preston Technology Management Centre
Marsh Lane, Suite G7, Preston
Lancashire, PR1 8UD, U.K.
Tel 44-1772-556601
Fax 44-1772-888366
www.belfuse.com