

ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 5 Vdc /30 A Output

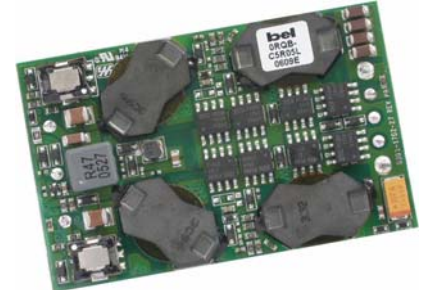
bel
POWER PRODUCTS

0RQB-C5R05x

RoHS Compliant

Rev.A

- Isolated
- Fixed Frequency (330 kHz)
- High Efficiency
- High Power Density
- Input Under-Voltage Lockout
- Input Over-Voltage Lockout
- Output Over-Voltage Shutdown
- Over Temperature Protection
- SCP/OCF
- Low Cost
- Remote On/Off
- Basic Isolation
- Positive/Negative Remote Sense
- Output Voltage Trim



Description

The 0RQB-C5R05x series are isolated dc/dc converters that operate from a nominal 24 Vdc source. These units will provide up to 150 W of output power from a nominal 24 Vdc input. These units are designed to be highly efficient and low cost. Features include remote on/off, 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 High	Model Number Active Low
5 Vdc	24 Vdc	30 A	150 W	92.5%	0RQB-C5R050	0RQB-C5R05L

- 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	-0.3 V	-	48 V	
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 25 °C unless otherwise stated.

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	18 V	24 V	36 V	
Input Current (no load)	-	180 mA	250 mA	
Input Current (full load)	-	-	9.5 A	
Remote Off Input Current	-	10 mA	15 mA	
Input Reflected Ripple Current (pk-pk)	-	20 mA	40 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 ² t Inrush Current Transient	-	0.05 A ² s	0.1 A ² s	
Turn-on Voltage Threshold	16 V	16.8 V	17.6 V	
Turn-off Voltage Threshold	15.2 V	16 V	16.8 V	
Input Over Voltage Lockout	38 V	39 V	40 V	

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

ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 5 Vdc /30 A Output



Output Specifications

Parameter	Min	Typ	Max	Notes	
Output Voltage Set Point	4.900 V	5.004 V	5.100 V	V _{in} =24 V, I _o =50% load	
Load Regulation	-	±10 mV	±20 mV		
Line Regulation	-	±5 mV	±15 mV		
Regulation Over Temperature (-40deg.C-85deg.C)	-	±40 mV	±65 mV		
Output Current Range	0 A	-	30 A		
Output DC Current Limit	35 A	42 A	48 A		
Ripple and Noise (rms)	-	25 mV	40 mV	0 - 20 MHz BW, with 1 uF ceramic load capacitor and a 10 uF tantalum capacitor at output	
Ripple and Noise (pk-pk)	-	75 mV	100 mV		
Short Circuit Surge Transient	-	3 A ² s	5 A ² s		
Turn on Time	5 mS	15 mS	25 mS		
Overshoot at Turn on	-	0%	3%		
Output Capacitance	0 uF	-	10000 uF		
Transient Response					
50% ~ 75% Max Load	Overshoot	V _o =5 V	-	200 mV	di/dt=0.1A/us, V _{in} =24 Vdc, with a 1 µF ceramic capacitor and a 10 uF Tantalum capacitor at output, T _a =25 °C.
	Settling Time		-	100 uS	
75% ~ 50% Max Load	Overshoot		-	200 mV	
	Settling Time		-	100 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	89%	92.5%	-	V _{in} =24 V, full load
Switching Frequency	280 kHz	330 kHz	380 kHz	
Isolation Capacitance	-	1500 pF	-	
Input to Output Isolation Voltage	-	-	2000 V	
Remote Sense Compensation	-	-	10%	The total voltage increased by trim and remote sense should not exceed 10%V _o .
Output Voltage Trim Range	80%	-	110%	
Over Temperature Protection	-	125 °C	-	
Over Voltage Protection	-	130%	-	V _{in} =24 V, full load. Hiccup mode
MTBF	TBD			Calculated Per Bell Core SR-332 (V _{in} =24 V, I _o =normal, T _a = 25 °C)
Dimensions	Inches millimeters			2.30 x 1.45 x 0.395 58.42 x 36.83 x 10.03
Weight	-	41 g	-	

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

ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 5 Vdc /30 A Output



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 On)	Active High	-0.3 V	-	The remote on/off pin open, Unit On.
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. 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. Only one of the resistors should be used for any given application.

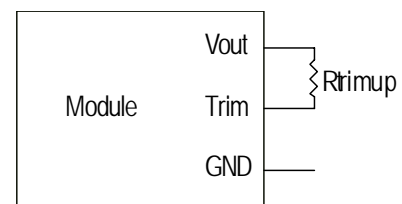
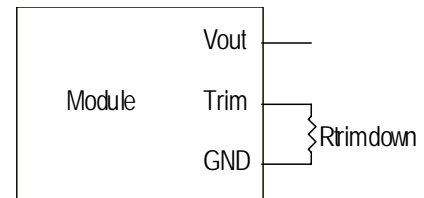
$$R_{trimdown} = \frac{511}{|\delta|} - 10.22 [k\Omega]$$

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

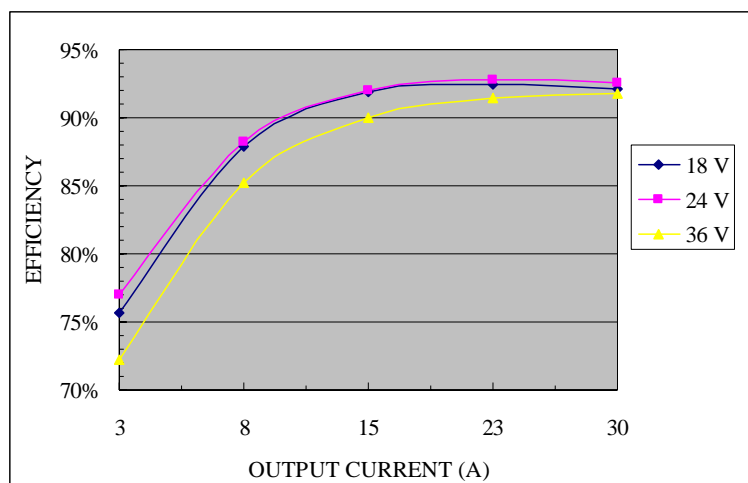
Note:

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

V_o_{req} = Desired (trimmed) output voltage [V]
Output voltage V_o = 5.004 V



Efficiency Data

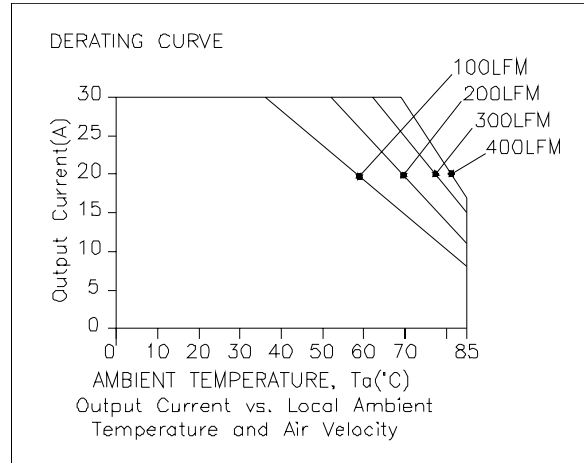
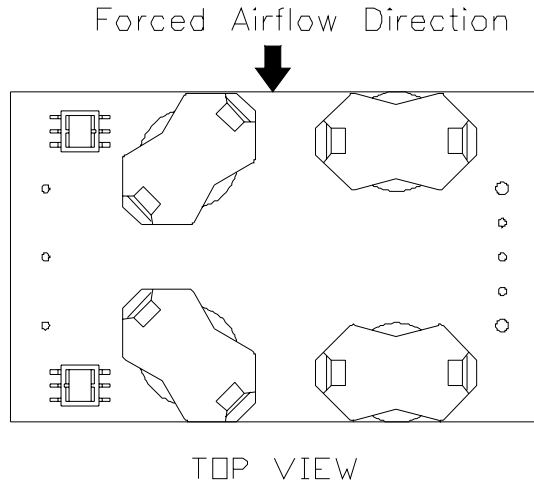


ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 5 Vdc /30 A Output

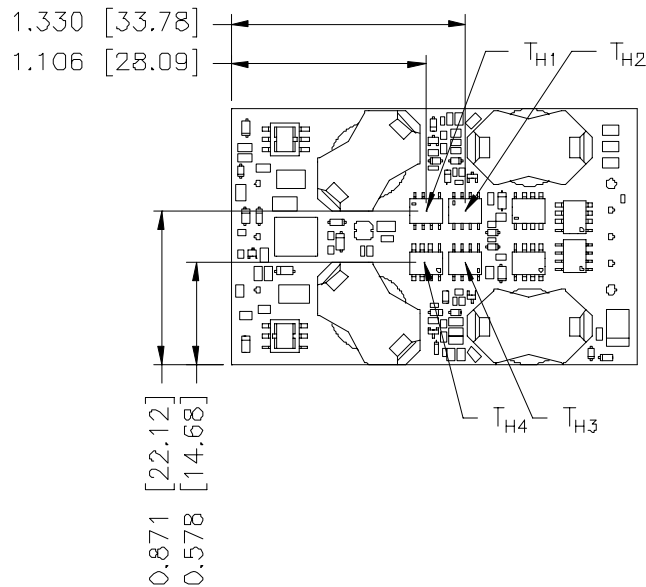


Thermal Derating Curve



Vin=24 V, with maximum junction temperature of semiconductors derated to 120 degree C.

Thermal reference



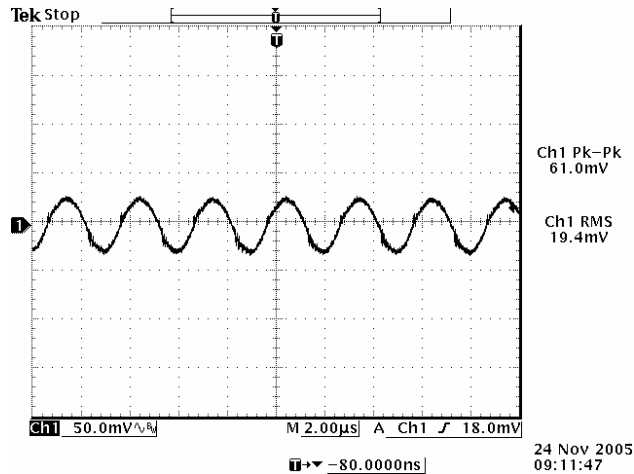
Note: TH1, TH2, TH3 and TH4 are hot spots which should not exceed 115 degree C.

ISOLATED DC/DC CONVERTERS

18 Vdc - 36 Vdc Input 5 Vdc /30 A Output

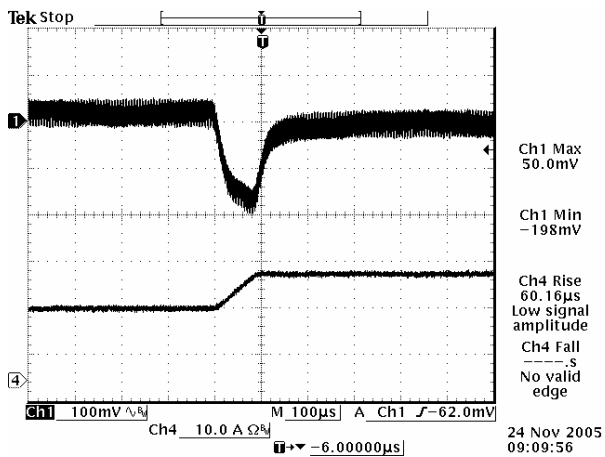


Ripple and Noise Waveform

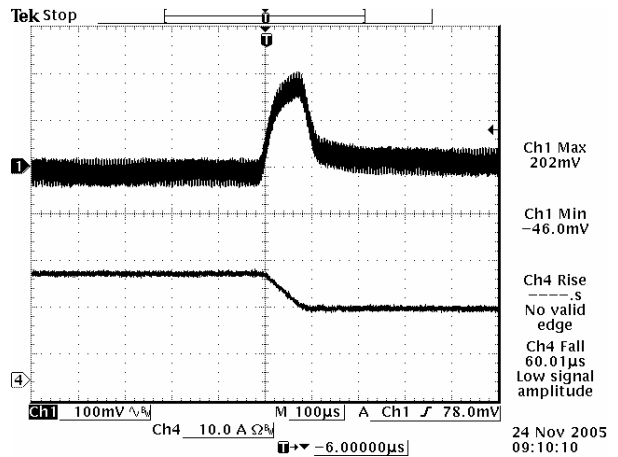


Note: Ripple and noise at full load, 24 Vdc input, 5 Vdc/30 A output, with a 1µF ceramic capacitor and a 10 µF tantalum capacitor at the output, and Ta=25 deg C. .

Transients Responses Waveforms



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



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

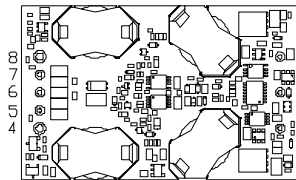
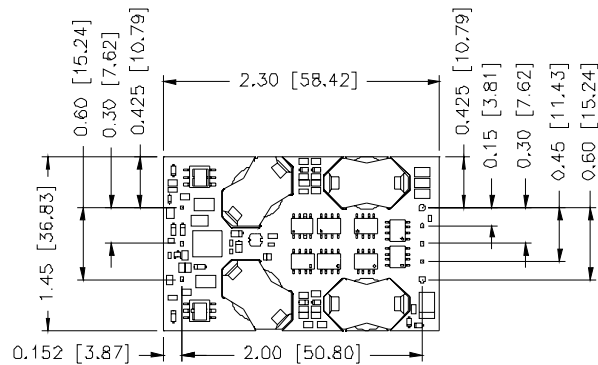
Note: Transients response at di/dt=0.1 A/us, Vin=24 Vdc, with a 1 µF ceramic capacitor and a 10 µF tantalum capacitor at the output, Ta=25 deg C.

ISOLATED DC/DC CONVERTERS

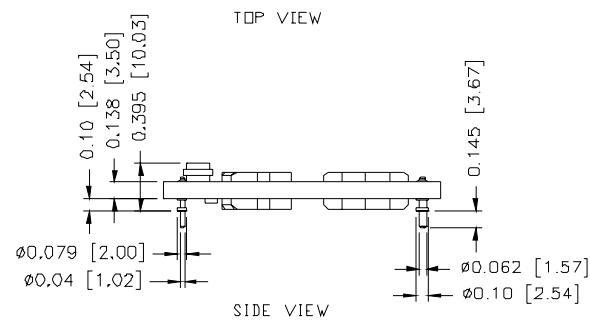
18 Vdc - 36 Vdc Input 5 Vdc /30 A Output



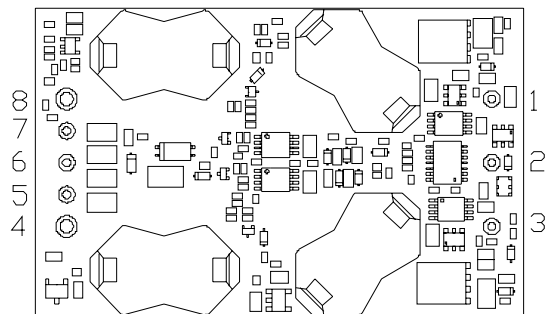
Mechanical Outline



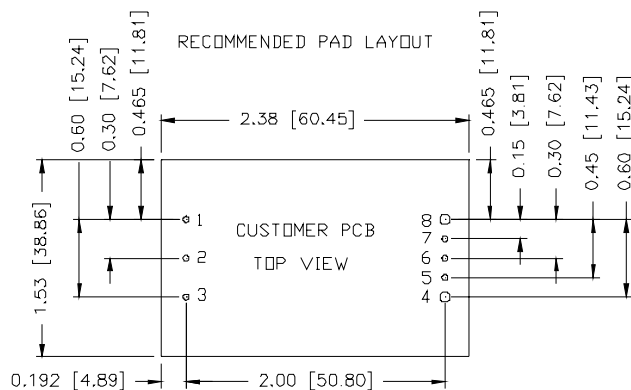
BOTTOM VIEW



SIDE VIEW



BOTTOM VIEW



1,2,3,5,6,7 Ø0.047 HOLE SIZE, Ø0.08 min PAD SIZE
4,8 Ø0.07 HOLE SIZE, Ø0.10 min PAD SIZE

Pin Connections

Pin	Function	Pin Size
1	Vin(+)	0.040"
2	On/Off	0.040"
3	Vin(-)	0.040"
4	Vo(-)	0.062"
5	Sense(-)	0.040"
6	TRIM	0.040"
7	Sense(+)	0.040"
8	Vo(+)	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.



©2007 Bel Fuse Inc. Specifications subject to change without notice. 031307

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