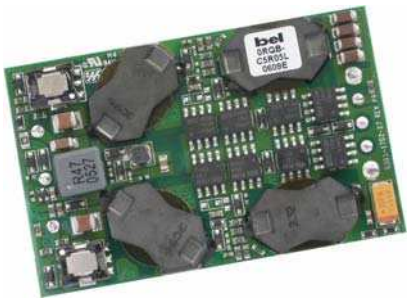
ISOLATED DC/DC CONVERTERS

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

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/OCP
- 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^2t Inrush Current Transient	-	0.05 A^2s	0.1 A^2s	
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

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Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	4.900 V	5.004 V	5.100 V	V_{in}=24 V, Io=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^2s	5 A^2s	
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	300 mV	di/dt=0.1A/us, Vin=24 Vdc, with a 1 µF ceramic capacitor and a 10 uF Tantalum capacitor at output, Ta=25 ℃.
	Settling Time		-	100 uS	200 uS	
75% ~ 50% Max Load	Overshoot		-	200 mV	300 mV	
	Settling Time		-	100 uS	200 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%Vo.
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 (Vin=24 V, Io=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.

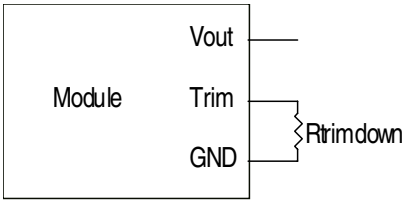
Control Specifications

Parameter		Min	Typ	Max	Notes
Remote On/Off					
Signal Low (Unit On)	Active Low	-0.3 V	-	0.8 V	The remote on/off pin open, Unit Off.
Signal High (Unit Off)		2.4 V	-	18 V	
Signal Low (Unit On)	Active High	-0.3 V	-	0.8 V	The remote on/off pin open, Unit On.
Signal High (Unit Off)		2.4 V	-	18 V	
Current Sink		0 mA	-	0.75 mA	

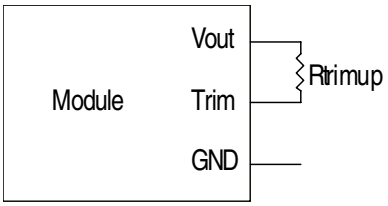
Output Trim Equations

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.

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



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

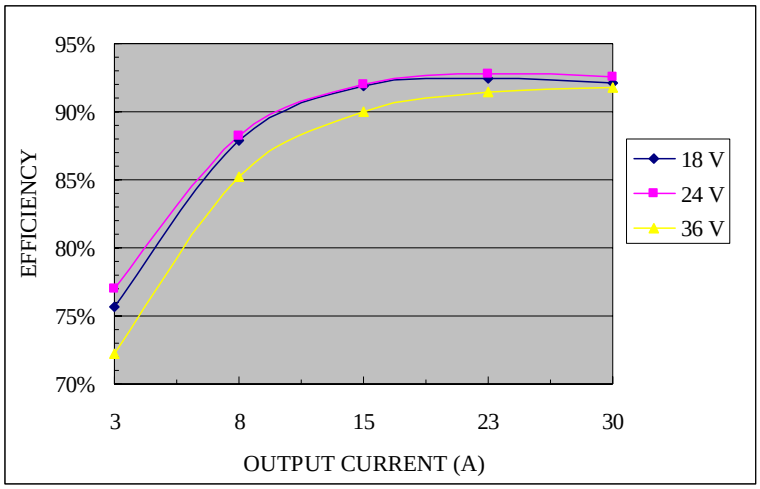


Note:

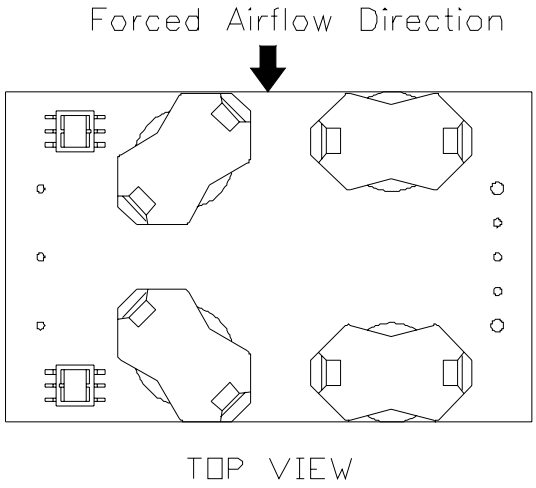
$$delta = \frac{(Vo\_req - Vo)}{Vo} \times 100[\%]$$

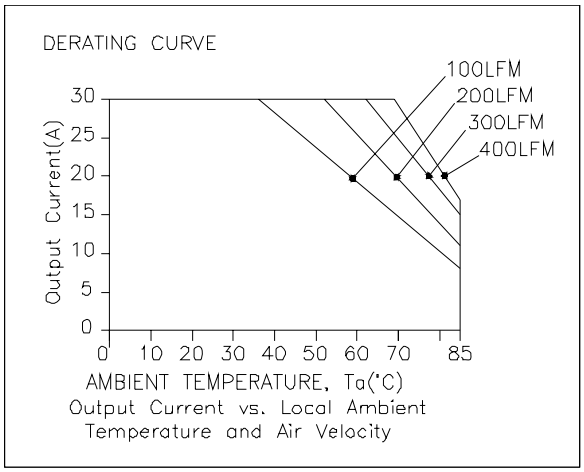
Vo_req=Desired (trimmed) output voltage [V]
Output voltage Vo=5.004 V

Efficiency Data



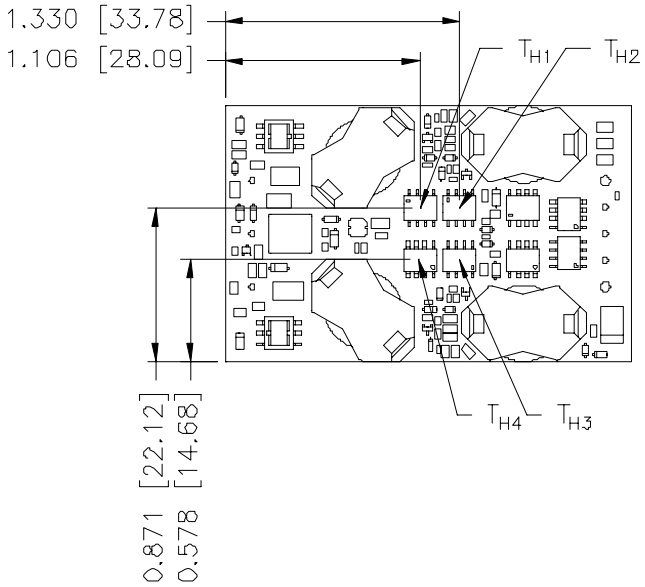
Thermal Derating Curve





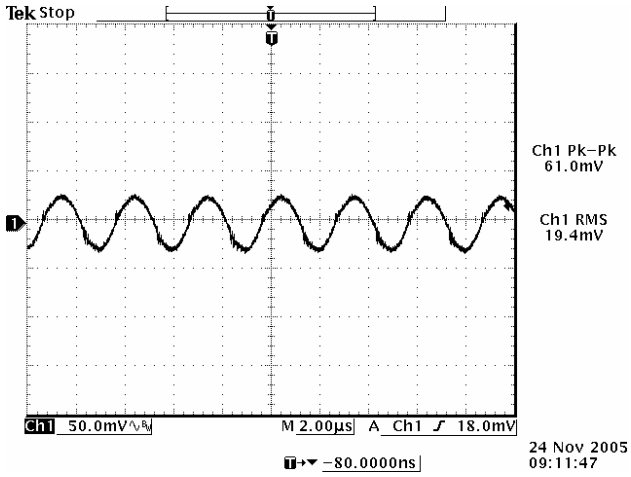
Vin=24 V, with maximum junction temperature of semiconductors derated to 120 degree C.

Thermal reference



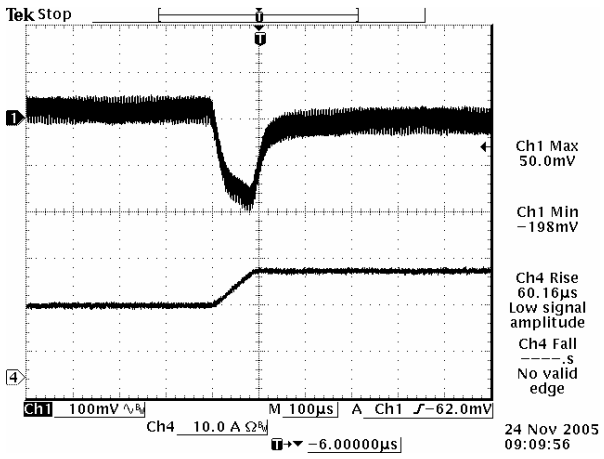
Note: TH1, TH2, TH3 and TH4 are hot spots which should not exceed 115 degree C.

Ripple and Noise Waveform

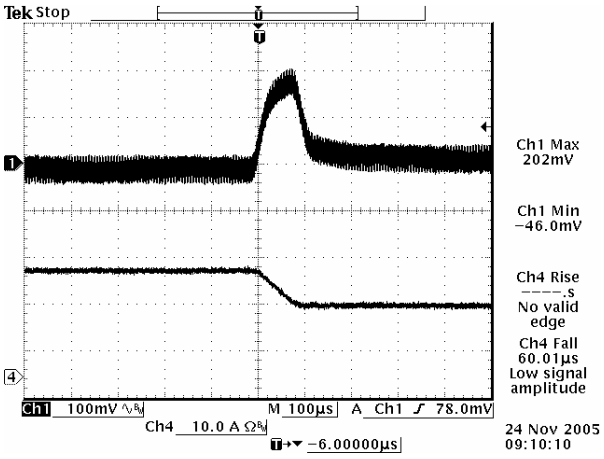


Note: Ripple and noise at full load, 24 Vdc input, 5 Vdc/30 A output, with a 1uF ceramic capacitor and a 10 uF tantalum capacitor at the output, and Ta=25 deg C. .

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 uF tantalum capacitor at the output, Ta=25 deg C.

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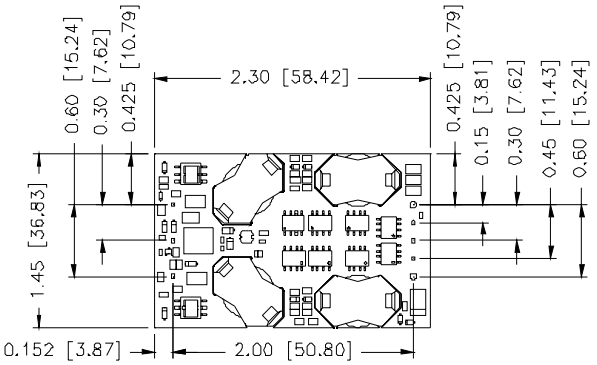
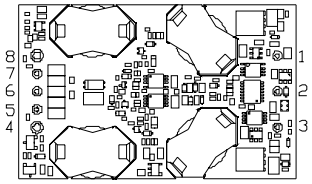
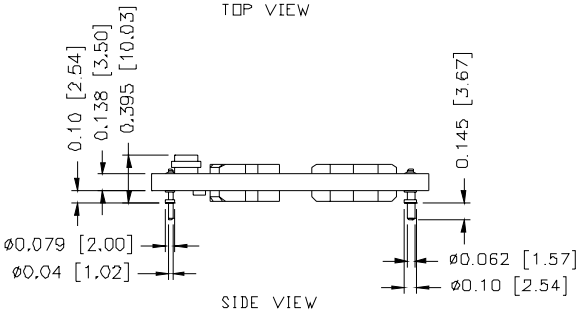
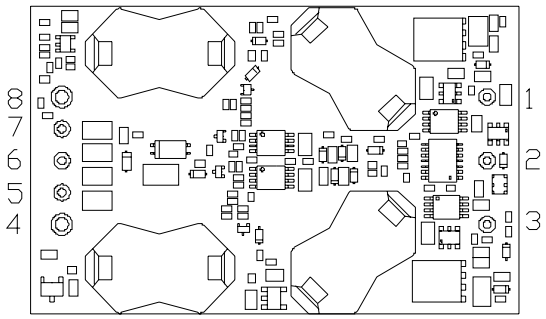
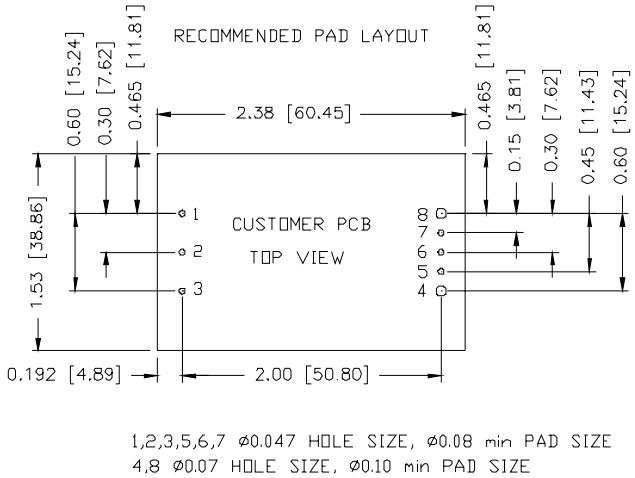
Mechanical Outline











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.

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