

ISOLATED DC/DC CONVERTERS

36 - 75 Vdc Input 1.2 Vdc /100 A Output

bel
POWER PRODUCTS

0RQB-C8TV2x

RoHS Compliant

Rev.C

- Isolated
- Fixed Frequency (310 kHz)
- High Efficiency
- High Power Density
- Input Under-Voltage Protection
- Low Cost
- Output Over-Voltage Protection
- Over Temperature Protection
- SCP/OCP
- Remote On/Off



Description

The 0RQB-C8TV2x is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This converter provides up to 120 W of output power. Features include remote on/off, short circuit protection, over current protection, over-temperature protection, output over-voltage protection, input under-voltage protection. This converter is provided in a compact, through-hole package that is easy to use and provides good thermal performance.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active High	Model Number Active Low
1.2 Vdc	36 Vdc - 75 Vdc	100 A	120 W	87%	0RQB-C8TV20	0RQB-C8TV2L

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	-	80 V	100 V for 100 mS Max
Remote On/Off	-0.3 V	-	15 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)	-	-	4.5 A	
Input Current (no load)	-	-	100 mA	
Remote Off Input Current	-	5 mA	10 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 47 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	-	-	0.1 A ² s	
Turn-on Voltage Threshold	32 V	34 V	35 V	
Turn-off Voltage Threshold	30 V	32 V	34 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	1.176 V	1.2 V	1.224 V	V _{in} =48 V, half load		
Load Regulation	-	5 mV	10 mV	V _{in} =36-75 V, full load		
Line Regulation	-	2 mV	5 mV	V _{in} =48 V, I _{out} =0-120 A		
Regulation Over Temperature (-40deg.C-85deg.C)	-	-	0.01%Vo/C			
Output Current Range	0 A	-	100 A			
Output DC Current Limit	110 A	120 A	130 A			
Ripple and Noise (rms)	-	15 mV	30 mV	0 - 20 MHz BW, with a 10 uF ceramic cap and a 330 uF tantalum cap at output		
Ripple and Noise (pk-pk)	-	50 mV	100 mV			
Rise time		4 mS	8 mS	Power up		
		4 mS	8 mS	Remote on/off		
Start-up time		70 mS	100 mS	Power up		
	-	70 mS	100 mS	Remote on/off		
Overshoot at Turn on	-	-	3%			
Output Capacitance	0 uF	-	400,000 uF			
Transient Response						
50% ~ 75% Max Load	Overshoot	Vo=1.2 V	-	80 mV	di/dt=0.1A/us, Vin=48 Vdc, Ta=25 °C.	
	Settling Time		-	200 uS		300 uS
75% ~ 50% Max Load	Overshoot		-	80 mV		150 mV
	Settling Time		-	200 uS		300 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	-	87%	-	V _{in} =48 V, full load
Switching Frequency	290 kHz	310 kHz	330 kHz	
Input to Output Isolation Voltage	1500 V	-	-	
Isolation Capacitance	-	1500 pF	-	
Isolation Resistance	10 Mohm	-	-	
Output Voltage Protection	1.40 V	-	1.54 V	Hiccup Mode
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	-	120 °C	-	No Latch; PCB Temperature
MTBF	TBD			Calculated Per Bell Core SR-332 (V _{in} =48 V, I _o =normal, T _a = 25 °C)
Dimensions	Inches millimeters			
	2.30 x 1.45 x 0.500 58.42 x 36.83 x 12.70			
Weight	-	60.7 g	-	

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

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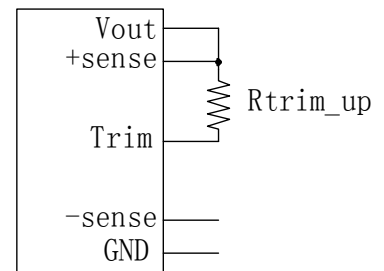
Control Specifications

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 Off)	Active High	-0.3 V	-	0.8 V	The remote on/off pin open, Unit On.
Signal High (Unit On)		2.4 V	-	18 V	

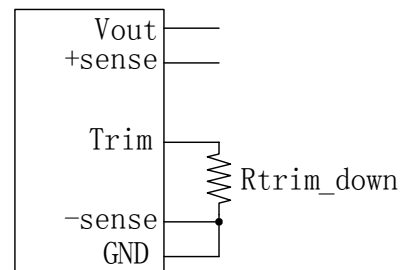
Output Trim Equations

Equations for calculating the trim resistor are shown below. The Trim Down resistor should be connected between the Trim pin, GND pin and -sense pin. The Trim Up resistor should be connected between the Trim pin, Vout pin and the +sense pin. Only one of the resistors should be used for any given application.

$$R_{\text{trim_up}}(V_{\text{adj}}) := \frac{6.25 - 0.1 \cdot (1 + \delta) \cdot V_o}{0.51 \cdot (1 + \delta) \cdot V_o - 0.6125}$$



$$R_{\text{trim_down}}(V_{\text{adj}}) := \frac{8.13 + 20 \cdot (1 + \delta) \cdot V_o}{10.2 - 7.86 \cdot (1 + \delta) \cdot V_o}$$



Note:

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

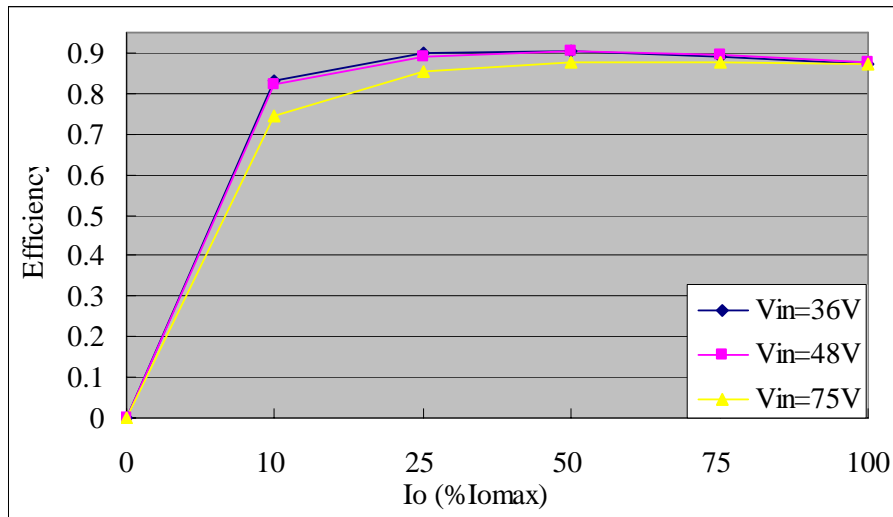
Vadj is the desired output voltage
Vo = 1.201V @Iout=0

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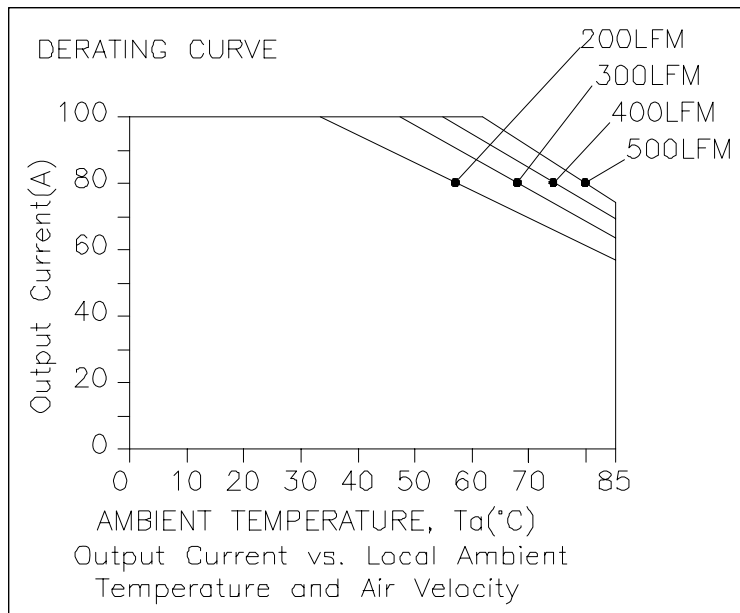
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Efficiency Data



Thermal Derating Curve

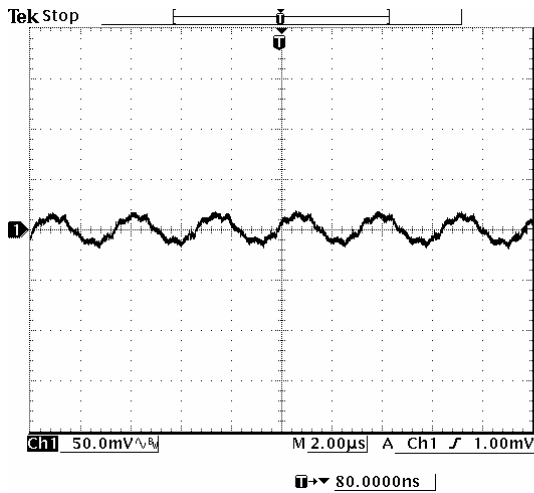


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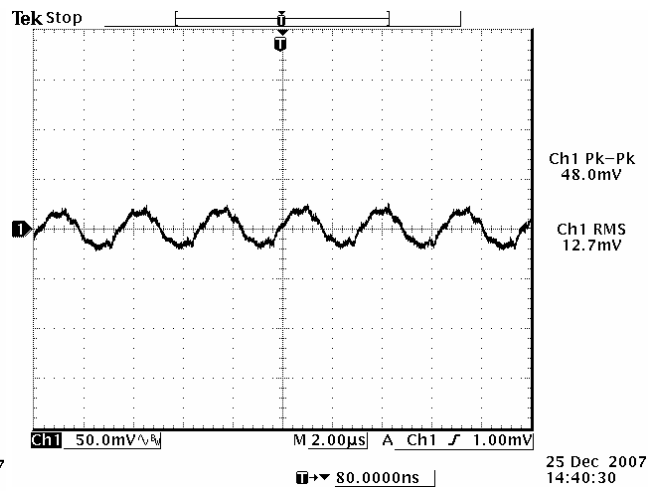
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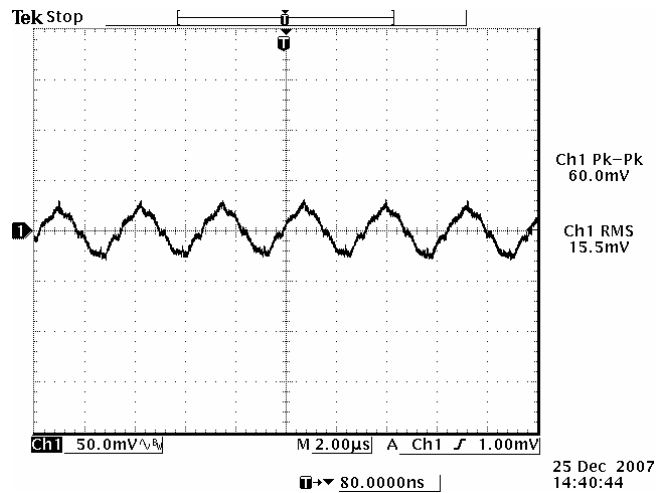
Ripple and Noise Waveforms



36 Vdc input



48 Vdc input



75 Vdc input

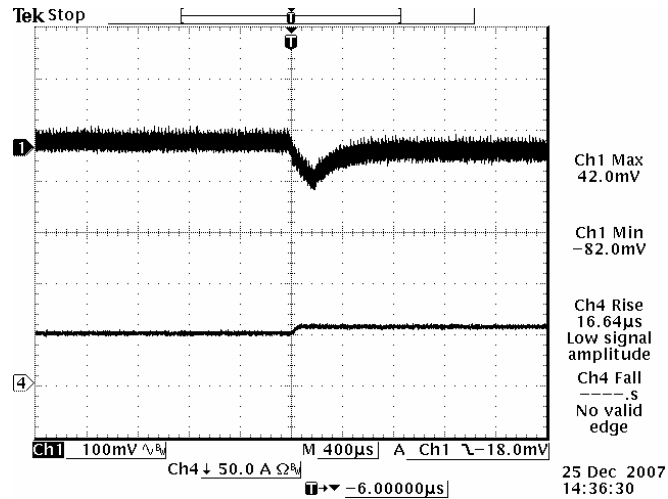
Note: Ripple and noise at full load, with a 10 uF ceramic cap and a 330 uF tantalum cap at the output, and $T_a=25$ deg C.

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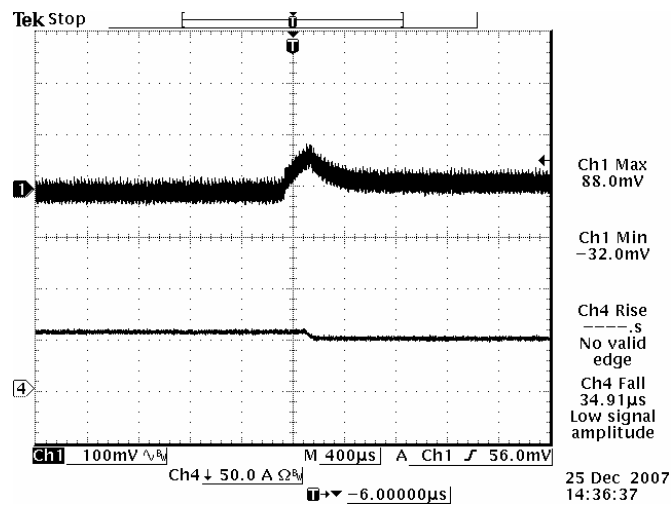
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Transients Responses Waveforms



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



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

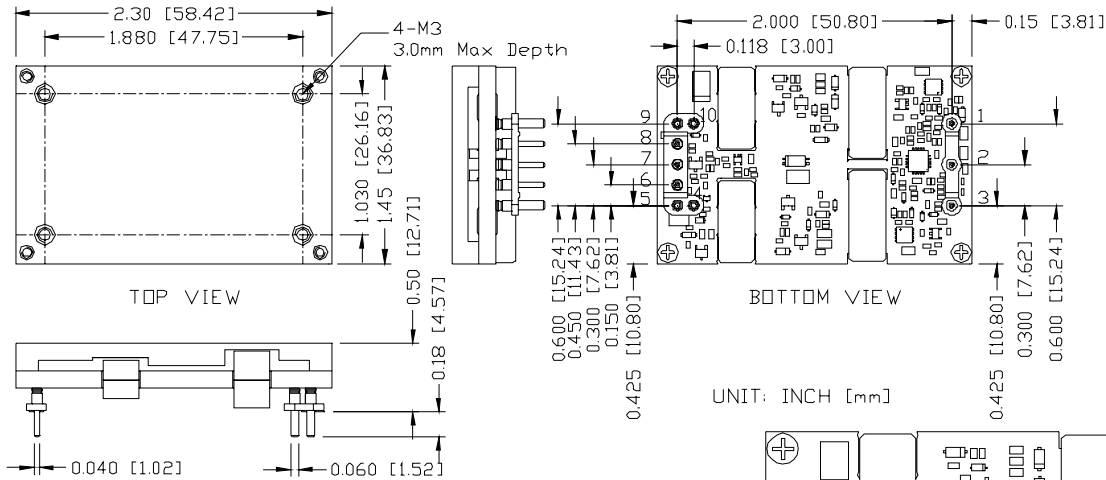
Note: Transients response at di/dt=0.1 A/us, Vin=48 Vdc, Ta=25 deg C.

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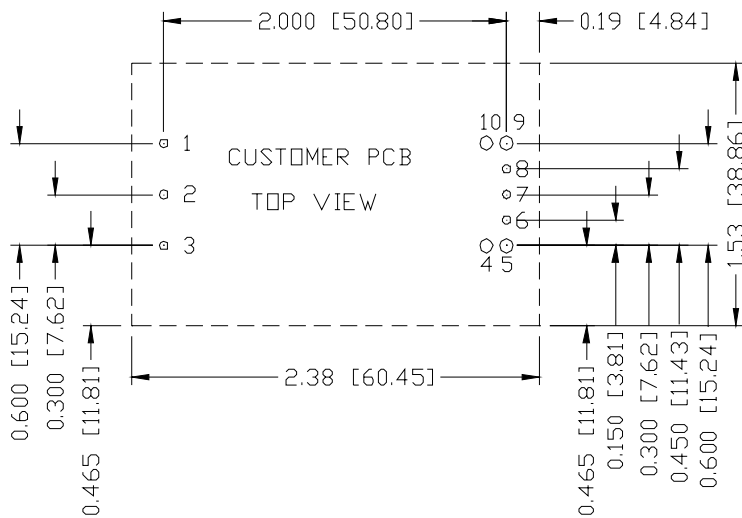
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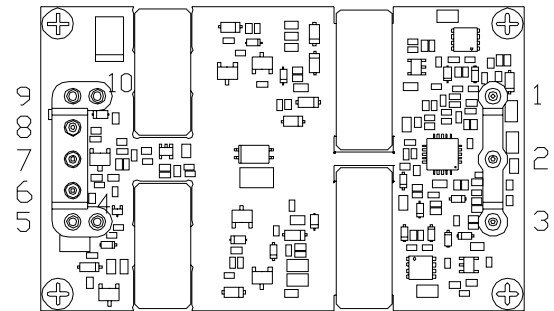
Mechanical Outline



RECOMMENDED PAD LAYOUT



1,2,3,6,7,8 ϕ 0.047 HOLE SIZE, ϕ 0.08 min PAD SIZE
4,5,9,10 ϕ 0.07 HOLE SIZE, ϕ 0.10 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	Vo(-)	0.062"
6	Sense(-)	0.040"
7	Trim	0.040"
8	Sense(+)	0.040"
9	Vo(+)	0.062"
10	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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