ISOLATED DC/DC CONVERTERS

48 Vdc Input 2.5 Vdc /20 A Output, 1/8 Brick Converter

0RCB-60T02B RoHS Compliant Rev.A

- Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Low Cost
- Input Under-Voltage Lockout
- UL60950-1 Recognized
- Pre-Bias Start Up
- Output Over-Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Remote On/Off
- Output Voltage Trim
- Positive/Negative Remote Sense
- Basic Insulation

Description

The 0RCB-60T02B is isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 50 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 under-voltage lockout. This converter is provided in an industry standard eighth brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low
2.5 Vdc	36 Vdc - 75 Vdc	20 A	50 W	91%	0RCB-60T02B

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 (continuous)	-0.3 V	-	80 V	
Input Voltage Transient Protection	-	-	100 V	Operating for 100mS
Remote On/Off	-0.3 V	-	18 V	
I/O Isolation Voltage	-	-	1500 V	
Input to Each Output Resistance	10M ohm	-	-	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	1.8 A	
Input Current (no load)	-	-	75 mA	
Input Reflected Ripple Current (pk-pk)	-	-	15 mA	Tested 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 at 25 °C.
Input Fuse (not internally)	-	-	5.0 A	
I^2t Inrush Current Transient	-	-	0.1 A^2s	
Turn-on Voltage Threshold	32 V	-	36 V	
Turn-off Voltage Threshold	28.5 V	-	33 V	

Output Specifications

Parameter		Min	Typ	Max	Notes
Output Voltage Range		2.425 V	2.5 V	2.575 V	Over all line, load & temperature conditions.
Output Voltage Trim Range		2.0 V	-	2.75 V	
Output Over-Voltage Clamp Non-Latching		2.925 V	-	3.175 V	
Output Current		-	-	20 A	
Current Limit Threshold		22 A	-	30 A	
External Admissible Capacitive Load		0 uF	-	5000 uF	
Ripple and Noise (pk-pk)		-	-	80 mV	Vin=72 V, max load on output, 20 MHz BW, 10uF tantalum and 1uF ceramic capacitor.
Turn on Time		-	-	25 mS	
Rise Time		-	-	10 mS	
Transient Response					
50% ~ 75% ~ 50% Max Load	Vpk-pk	-	-	220 mV	di/dt=0.1A/us, Vin=48Vdc, Ta=25℃, with a 1µF ceramic capacitor and a 10uF Tantalum cap at the output.
	Settling Time	-	-	200 uS	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	86%	91%	-	Measured with full load at all conditions.
Switching Frequency	270 kHz	300 kHz	330 kHz	
Isolation capacitance	-	3900 pF	-	
Remote Sense Compensation	-	-	10%	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Over Temperature Protection	-	125 °C	-	
MTBF	2,370,000 hours			Calculated Per Bell Core SR-332 (Vin=48 V, Vo=2.5 V, Io=16 A, T_a = 25 °C)
Dimensions Inches (L × W × H) Millimeters (L × W × H)	2.30 x 0.896 x 0.374 58.42 x 22.76 x 9.50			
Weight	-	26 g	-	

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

Control Specifications

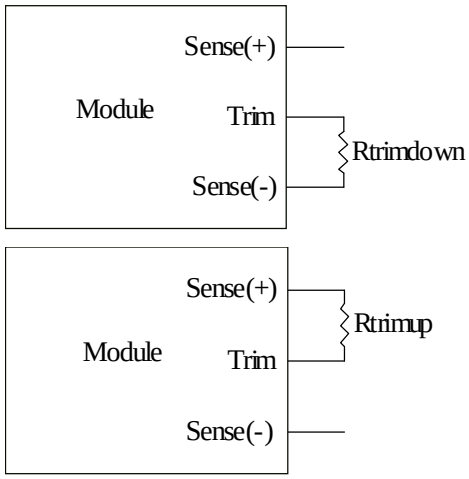
Parameter		Min	Typ	Max	Notes
Remote On/Off					
Signal Low (Unit On)	Active Low	-0.3 V	-	0.8 V	0RCB-60T02B. The remote on/off pin open, Unit off.
Signal High (Unit Off)		2.4 V	-	18 V	
Current Sink		0 mA	-	1 mA	

Output Trim Equations

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

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

$$Rtrimup = (\frac{(100 + delta) \cdot Vo \cdot 5.11}{1.225 \cdot delta} - \frac{511}{delta} - 10.22)[k\Omega]$$

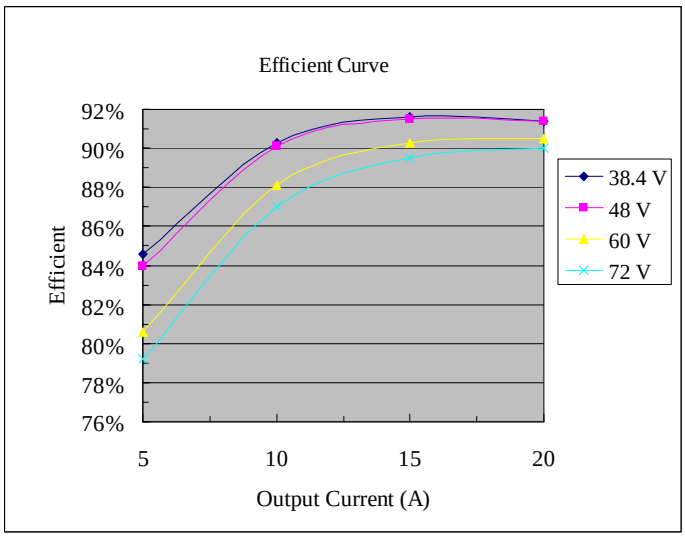


Note:

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

Vo_req=Desired (trimmed) output voltage [V]
Output voltage Vo=2.505 V

Efficiency Data



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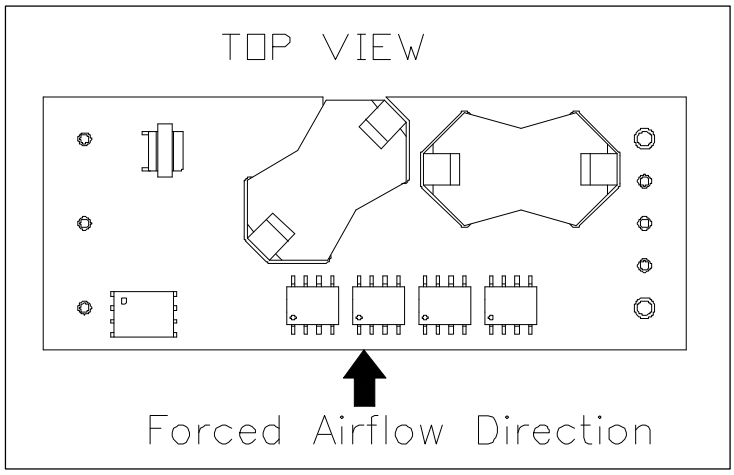
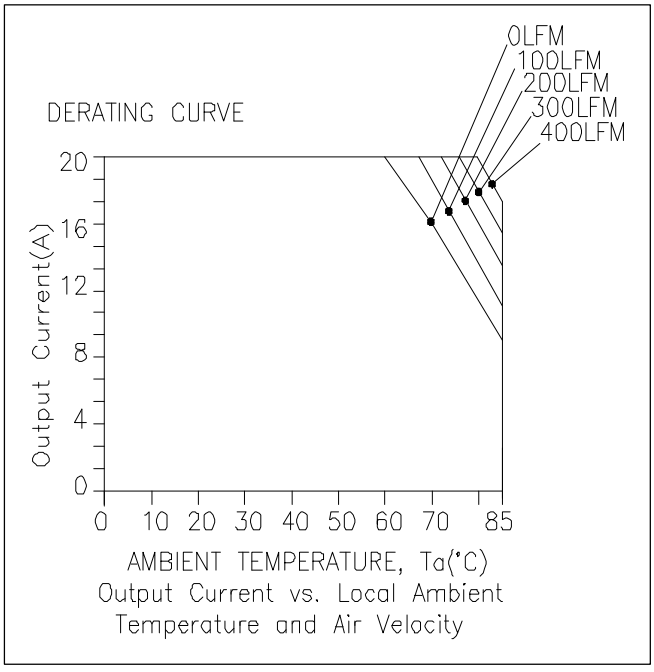
Thermal Derating Curves

Vin=48V, with maximum junction temperature of semiconductors derated to 120 degree C.





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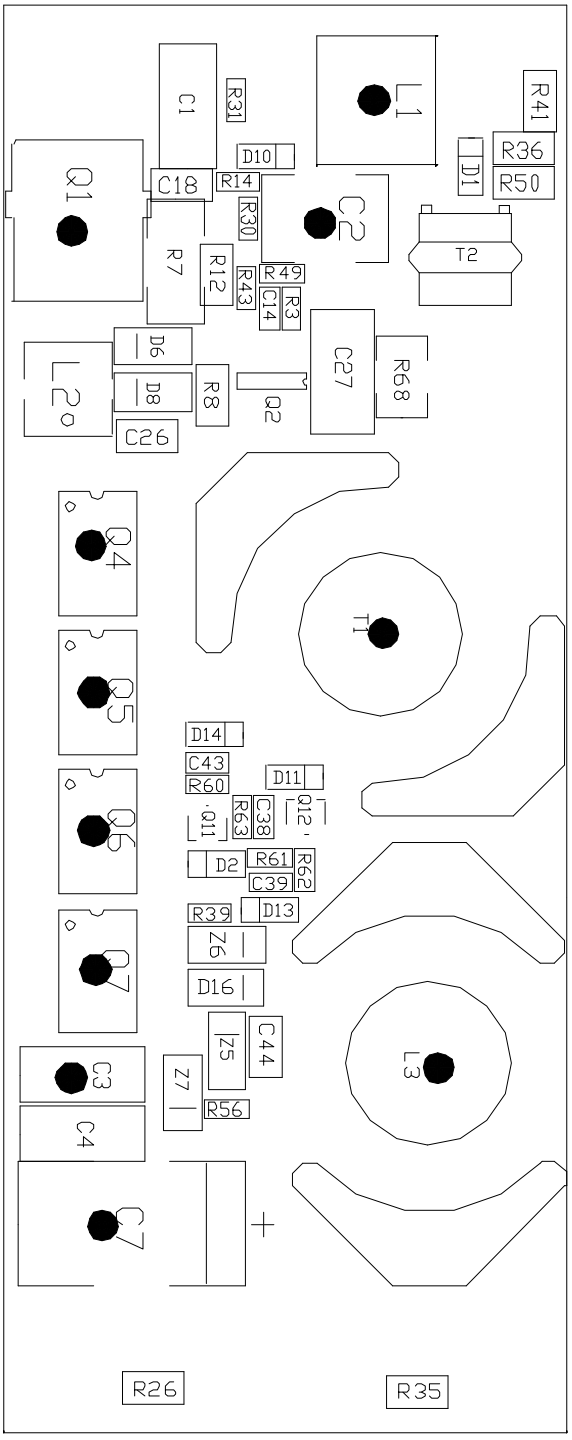
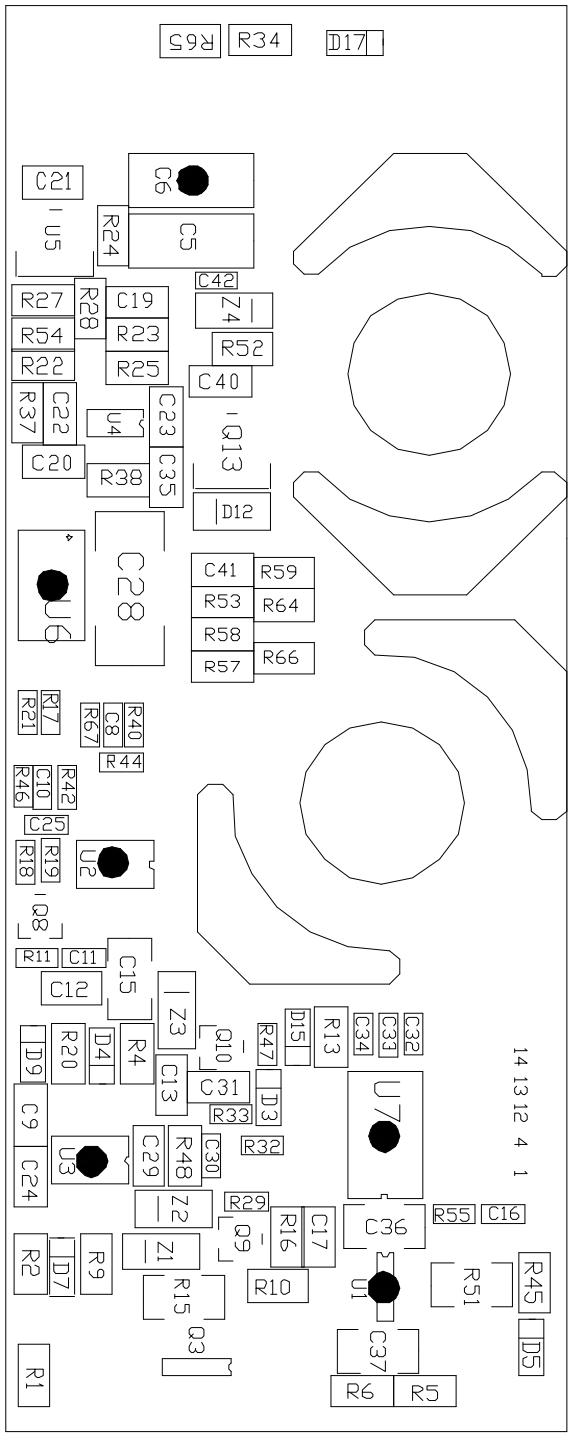
Thermal Derating Curves (continued)



Temperature reference points on top side

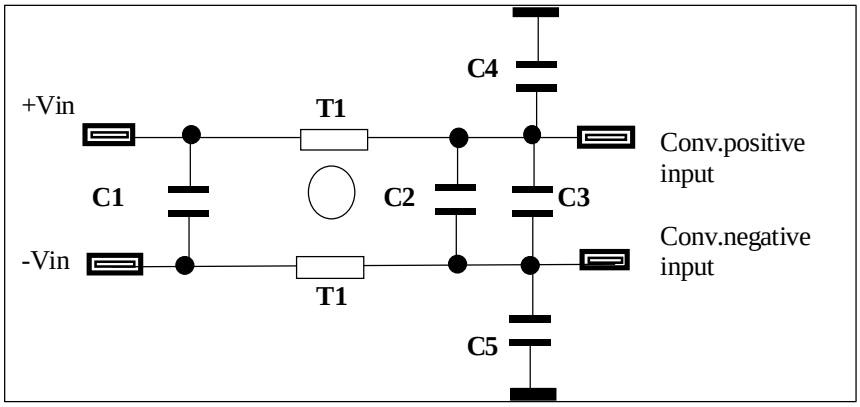


Temperature reference points on bottom side

Safety

Material flammability: UL94V-0
Electromagnetic Compatibility EMC
1. Electric field IEC801-3(1984), IEC1000-4-3
2. Fast transient/burst IEC801-4(1988), IEC1000-4-4

Input RFI level conducted and radiated (subject to test by customer)
Compliance to EN55022 class A (both q.peak and average) with the following inductive and capacitive filter

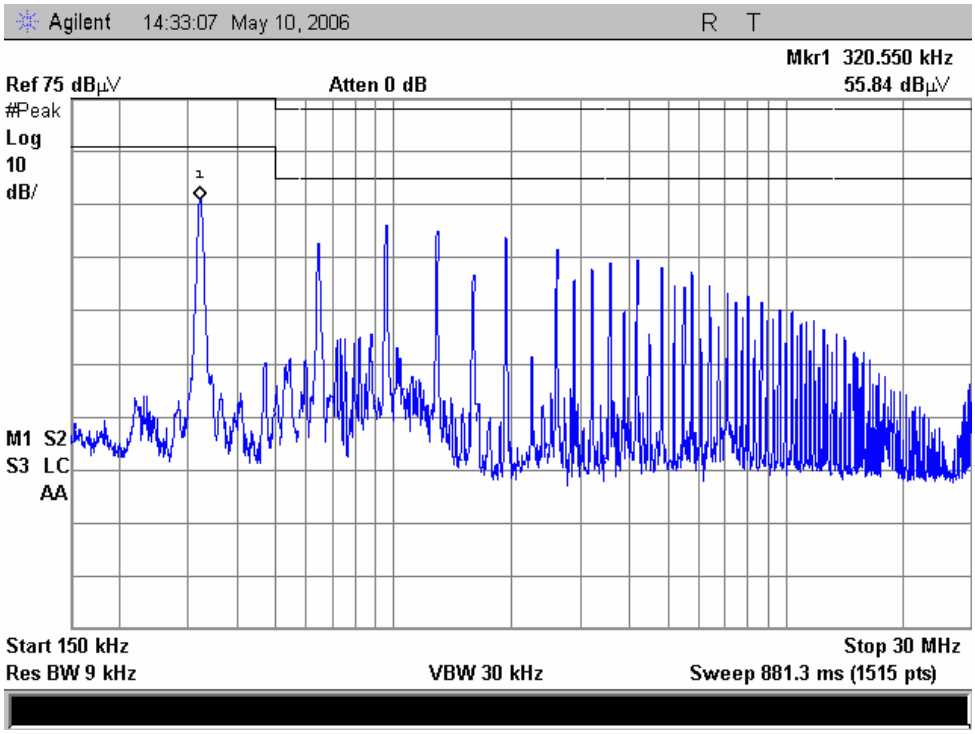


C1=3.3 uF /100 V;

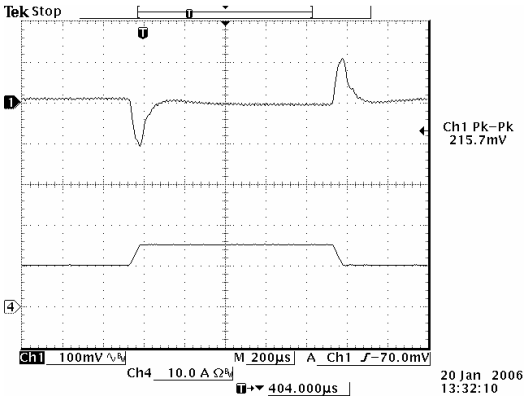
C2=C3= 47 uF/100 V;

C4=C5=1000 pF/250 Volt;

T1=3 mH.



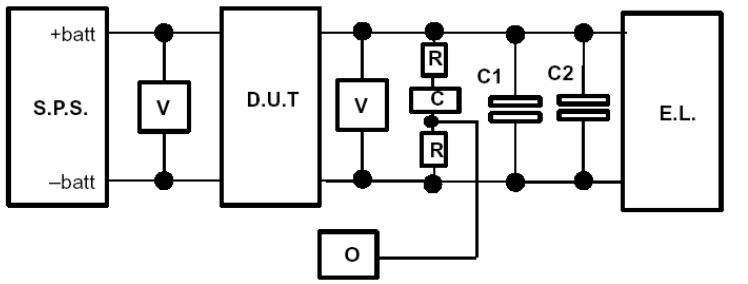
Transient Response Waveforms

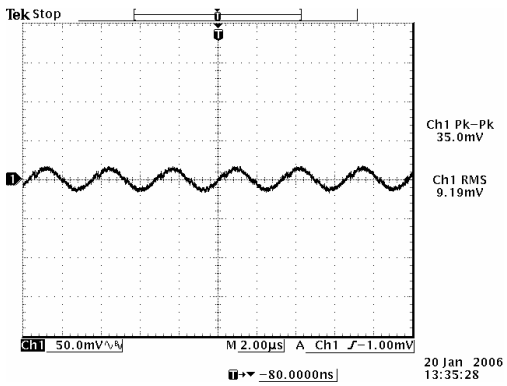


Note: Dynamic load transient at Vin = 48 V, Ta = 25 ℃ , Io=(50%~75%~50%)Ionom, di/dt=0.1A/uS.

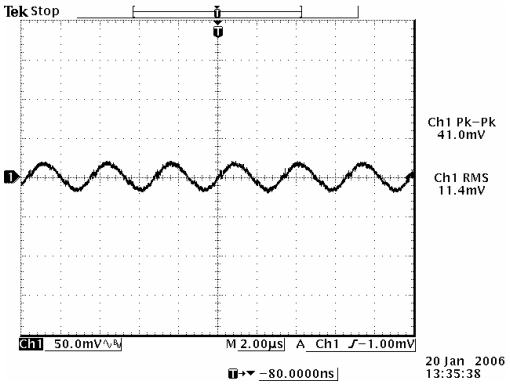
Ripple and Noise Waveforms

C1=10 uF tantalum, C2=1 uF ceramic;
R=50 ohm;
C=220 nF.

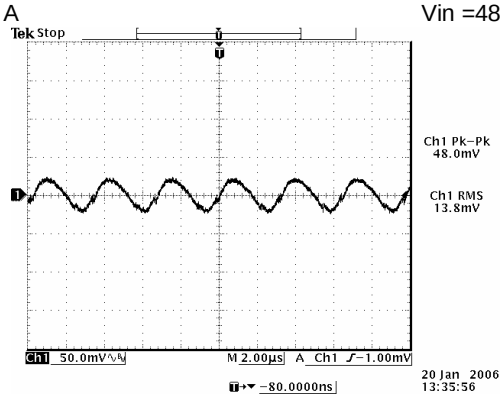




Vin =38.4 V and Iout = 20 A

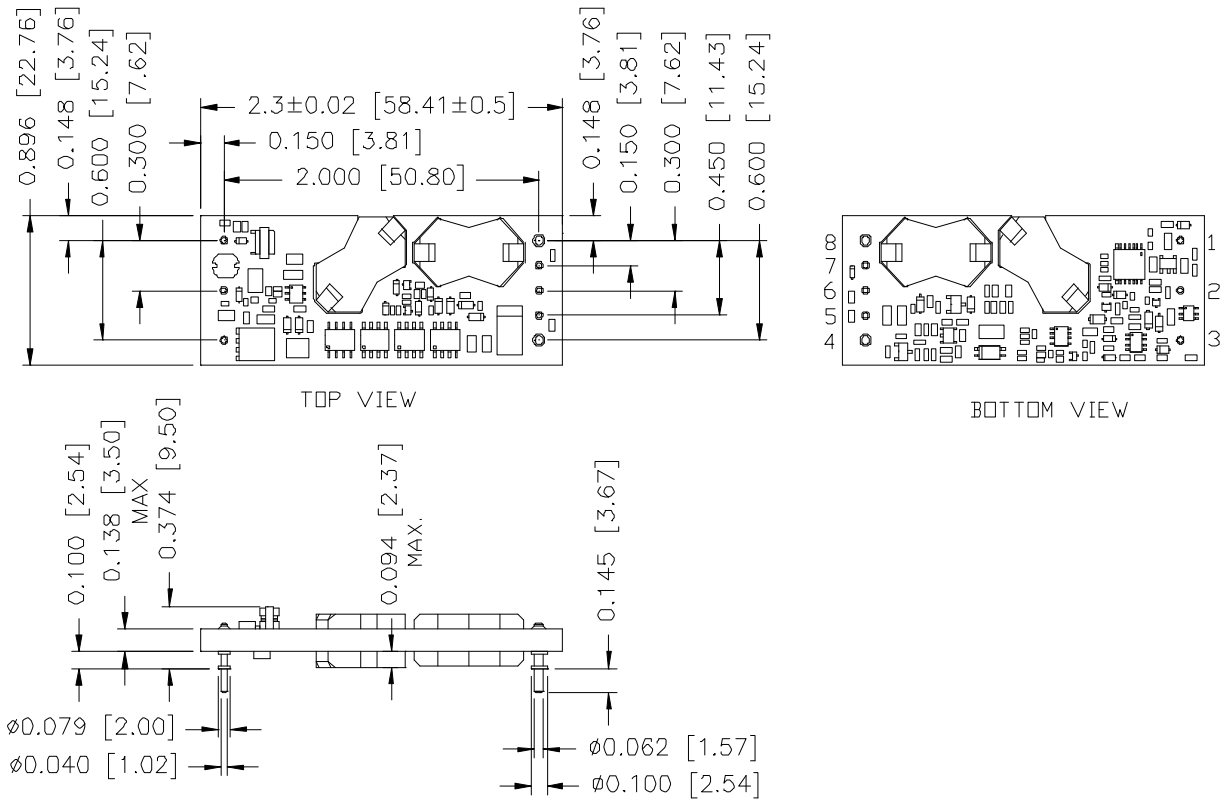


Vin =48 V and Iout = 20 A

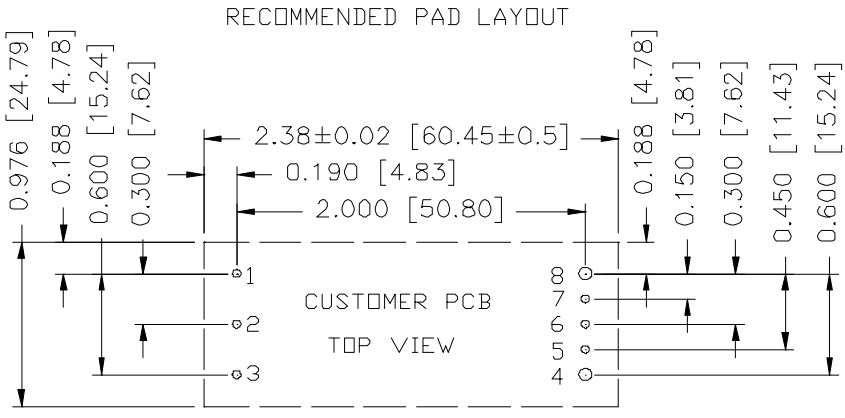


Vin =72 V and Iout = 20 A

Mechanical Outline



Note: The module doesn't guarantee at least 0.7mm as clearance distance on bottom side. This issue should be considered if any copper traces are on the top side of the user's board.



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

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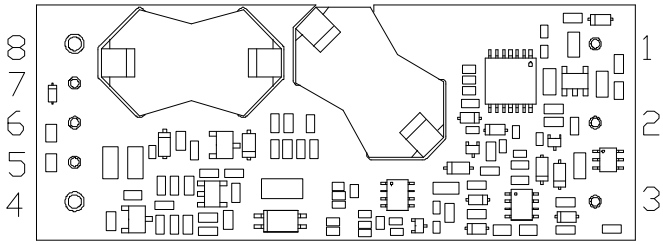
Pin Connections

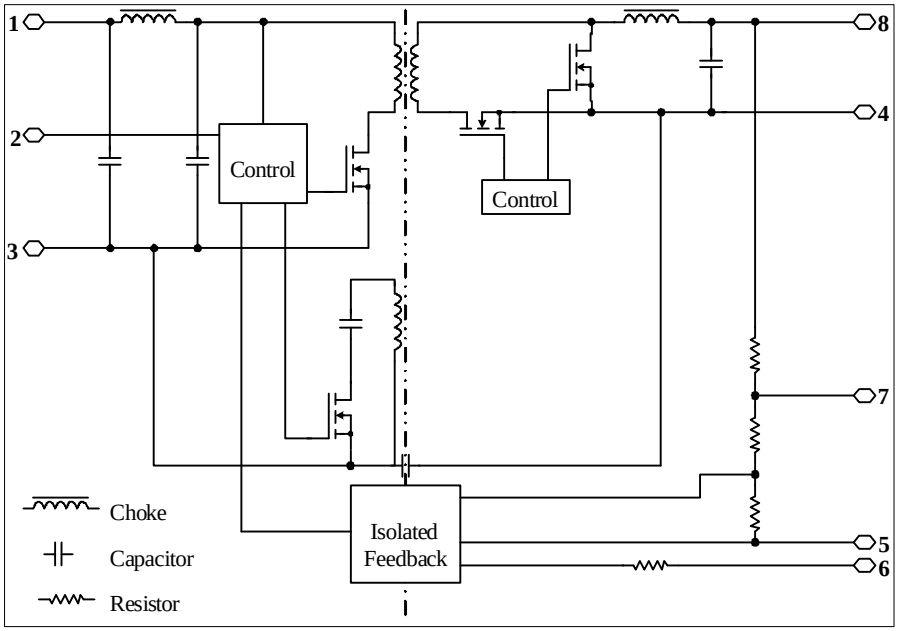
Pin	Name	Function	Pin Dia
1	Vin+	Positive input voltage	0.040”
2	On/Off	Input to turn converter on and off, referenced to Vin-	0.040”
3	Vin-	Negative input voltage	0.040”
4	Vout-	Negative output voltage	0.062”
5	Sense-	Negative remote sense	0.040”
6	Trim	Output voltage trim	0.040”
7	Sense+	Positive output voltage	0.040”
8	Vout+	Positive output voltage	0.062”



BOTTOM VIEW

Notes: 1. Pin 5 must be connected to Vout-.
2. Leave Pin 6 open for nominal voltage.
3. Pin 7 must be connected to Vout+.

Fundamental Circuit Diagram



RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.

CORPORATE

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