

ORCB-60T02 Series

Isolated DC-DC Converter

The ORCB-60T02x 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.



Key Features & Benefits

- 48 VDC Input
- 2.5 VDC / 20 A Output
- 1/8 Brick Converter
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Low Cost
- Input Under-Voltage Lockout
- EN60950-1 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

Applications

- Networking
- Computers and Peripherals
- Telecommunications



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1. MODEL SELECTION

OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY	MODEL NUMBER ACTIVE HIGH	MODEL NUMBER ACTIVE LOW
2.5 VDC	36 VDC - 75 VDC	20 A	50 W	91%	0RCB-60T025	0RCB-60T02L

NOTE: 1. Change the last character to "A" to indicate 100 Ω sense resistors internally and active low.
2. Add "G" suffix at the end of the model number to indicate Tray Packaging.

PART NUMBER EXPLANATION

0	R	CB	-	60	T	02	x	x
Mount Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Active Logic	Package
Vertical mount	RoHS 6	8 th brick		50 W	36-75V	2.5 V	5 – Active high L – Active low A – Active low	G - Tray

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Input Voltage (Continuous)		-0.3	-	80	V
Remote On/Off		-0.3	-	18	V
I/O Isolation Voltage		-	-	1500	V
Input to Each Output Resistance		10	-	-	Mohm
Ambient Temperature		-40	-	85	°C
Storage Temperature		-55	-	125	°C

3. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Input Voltage		36	48	75	V
Input Current	Full load	-	-	1.8	A
	No load	-	-	75	mA
Input Reflected Ripple Current (pk-pk)	Tested with simulated source impedance of 10 μ H, 5 Hz to 20 MHz; use a 47 μ F/100 V electrolytic capacitor with ESR = 1 ohm max. at 200 kHz at 25 °C.	-	-	15	mA
Input Fuse (not internally)		-	-	5.0	A
I ² t Inrush Current Transient		-	-	0.1	A ² s
Turn-on Voltage Threshold		32	-	36	V
Turn-off Voltage Threshold		28.5	-	33	V

4. OUTPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT	
Output Voltage Range	Over all line, load & temperature conditions.	2.425	2.5	2.575	V	
Output Voltage Trim Range		2.0	-	2.75	V	
Output Over-Voltage Clamp Non-Latching		2.925	-	3.175	V	
Output Current		-	-	20	A	
Current Limit Threshold		22	-	30	A	
External Admissible Capacitive Load		0	-	5000	μF	
Ripple and Noise (pk-pk)	V _{in} =72 V, max load on output, 20 MHz BW, 10μF tantalum and 1μF ceramic capacitor.	-	-	80	mV	
Turn on Time		-	-	25	ms	
Rise Time		-	-	10	ms	
TRANSIENT RESPONSE						
50% ~ 75% ~ 50% Max Load	V _{pk} -pk	di/dt = 0.1A/us, V _{in} = 48 VDC, Ta = 25°C, with a 1 μF ceramic capacitor and a 10 μF Tantalum cap at the output.	-	-	220	mV
	Settling Time		-	-	200	μs

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

5. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency	Measured with full load at all conditions.	86	91	-	%
Switching Frequency		270	300	330	kHz
Isolation capacitance		-	3900	-	pF
Remote Sense Compensation	The total voltage increased by trim and remote sense should not exceed 10%V _o .	-	-	10	%
Over Temperature Protection		-	125	-	°C
MTBF	Calculated Per Bell Core SR-332 (V _{in} =48 V, V _o =2.5 V, I _o =16 A, Ta = 25 °C)		2,370,000		hours
Dimensions (L x W x H)			2.30 x 0.896 x 0.374 58.42 x 22.76 x 9.50		inch mm
Weight		-	26	-	g

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

6. CONTROL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT		
REMOTE ON/OFF							
Signal Low (Unit On)	Active Low	0RCB-60T02L. The remote on/off pin open, Unit off.		-0.3	-	0.8	V
Signal High (Unit Off)		2.4	-	18			
Signal Low (Unit Off)	Active High	0RCB-60T020. The remote on/off pin open, Unit on.		-0.3	-	0.8	V
Signal High (Unit On)		2.4	-	18			



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7. 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.

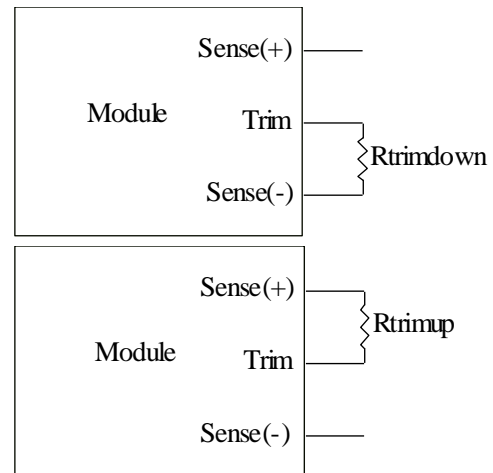
$$R_{trimdown} = \frac{511}{|\delta|} - 10.22 [k\Omega]$$

$$R_{trimup} = \left(\frac{(100 + \delta) \cdot V_o \cdot 5.11}{1.225 \cdot \delta} - \frac{511}{\delta} - 10.22 \right) [k\Omega]$$

Note:

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

V_o_{req} = Desired (trimmed) output voltage [V]
Output voltage V_o = 2.505 V



8. EFFICIENCY DATA

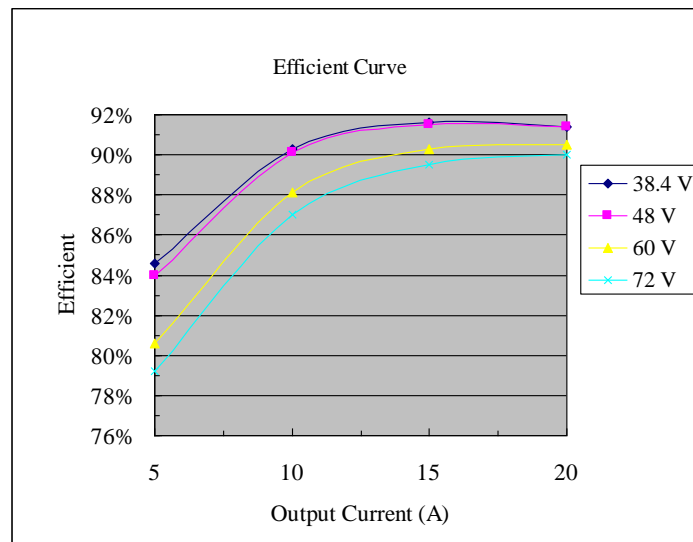


Figure 1. ORCB-60T02x

9. THERMAL DERATING CURVES

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

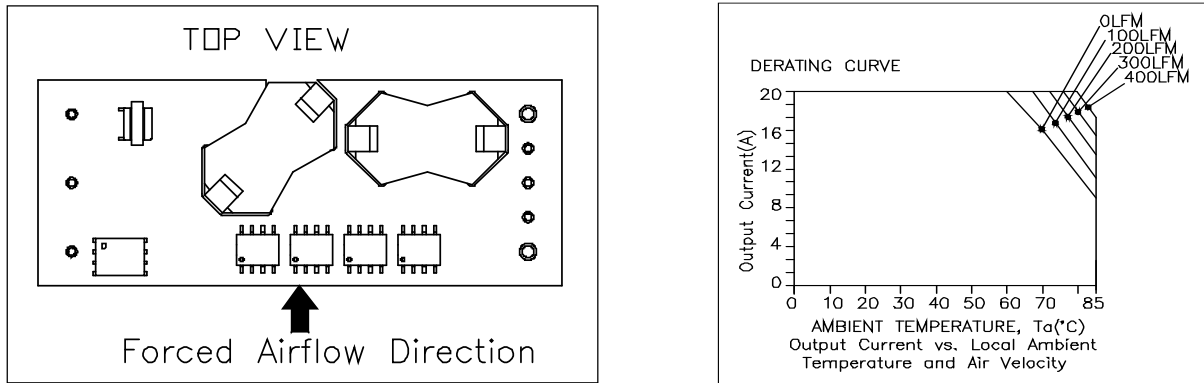


Figure 2. ORCB-60T02x

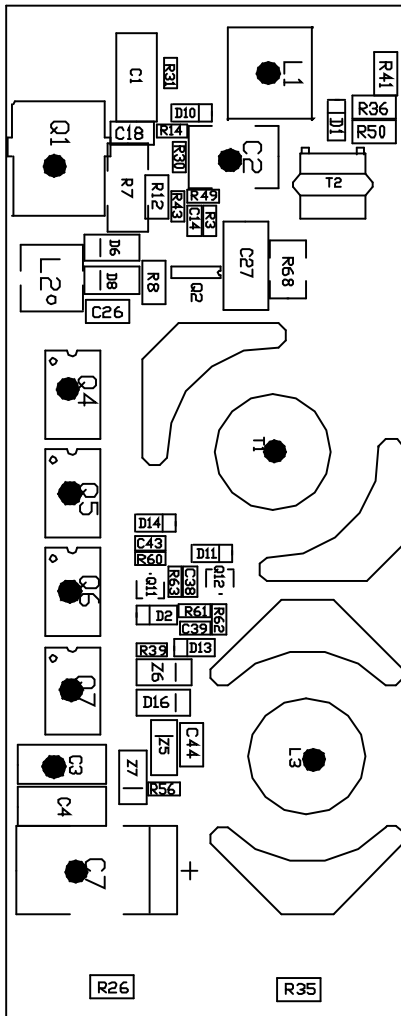


Figure 3. Temperature reference points on top side

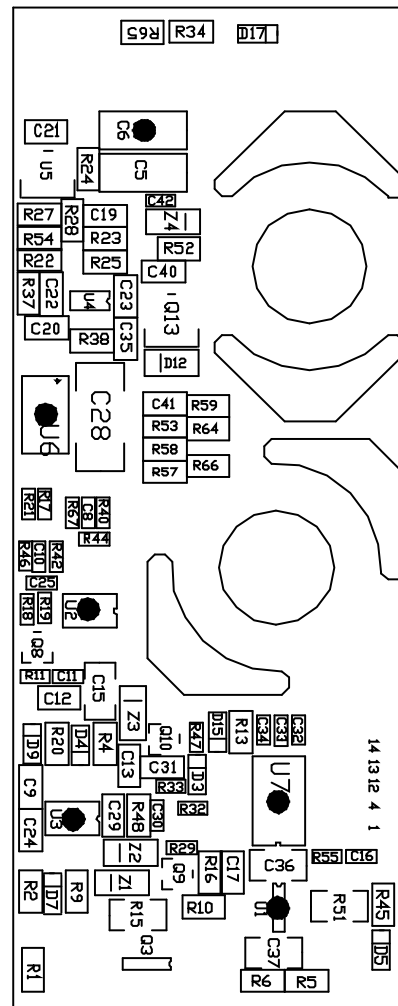
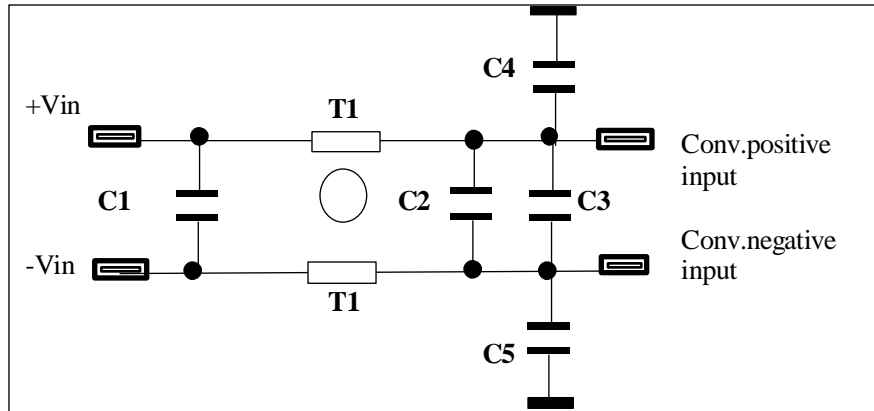


Figure 4. Temperature reference points on bottom side

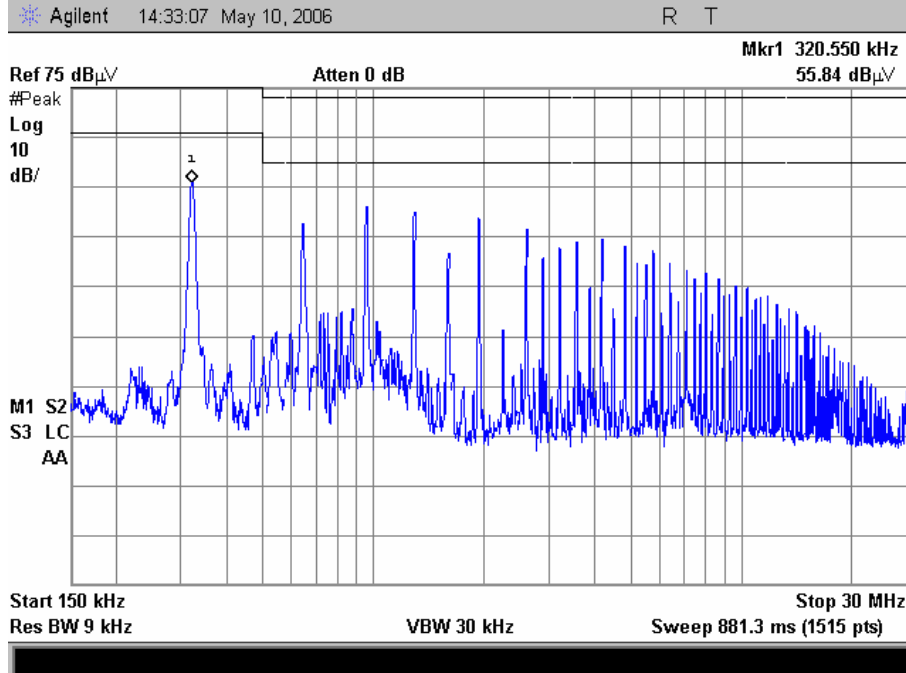
10. SAFETY

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 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.



11. TRANSIENT RESPONSE WAVEFORMS

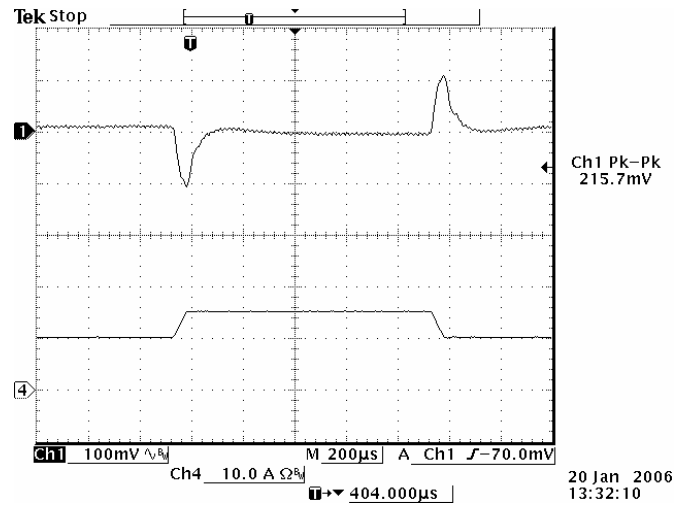


Figure 7. 12 V/8.3 A output

NOTE: Dynamic load transient at $V_{in} = 48\text{ V}$, $T_a = 25\text{ }^\circ\text{C}$, $I_o = (50\% \sim 75\% \sim 50\%) I_{onom}$, $di/dt = 0.1\text{ A}/\mu\text{s}$.

12. RIPPLE AND NOISE WAVEFORM

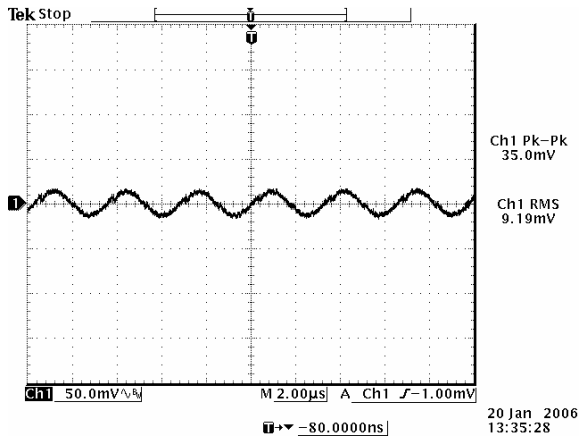


Figure 8. $V_{in} = 38.4 V$ and $I_{out} = 20 A$

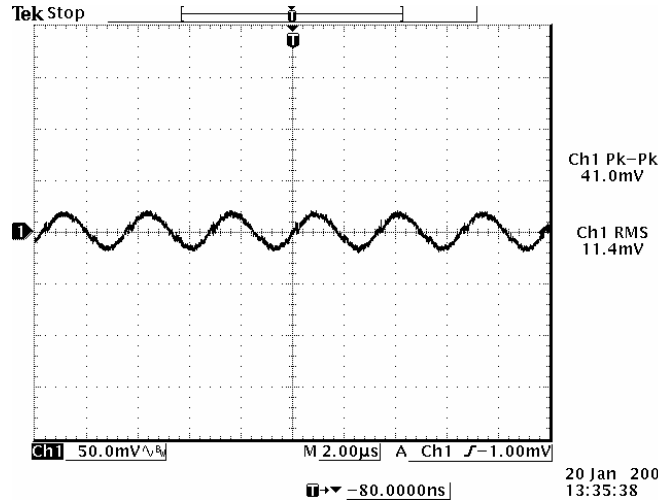


Figure 9. $V_{in} = 48 V$ and $I_{out} = 20 A$

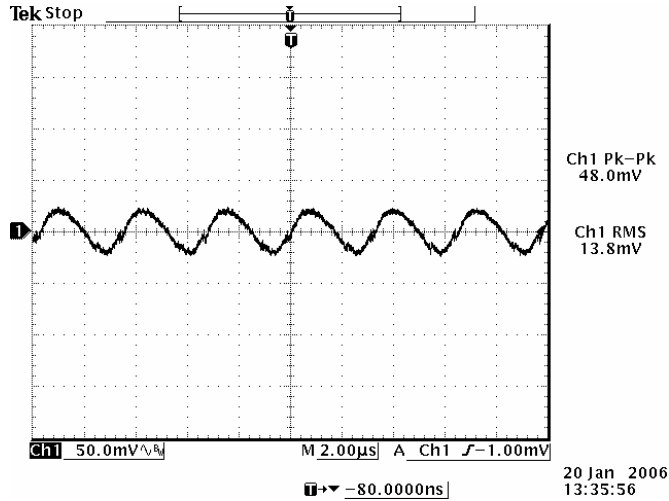
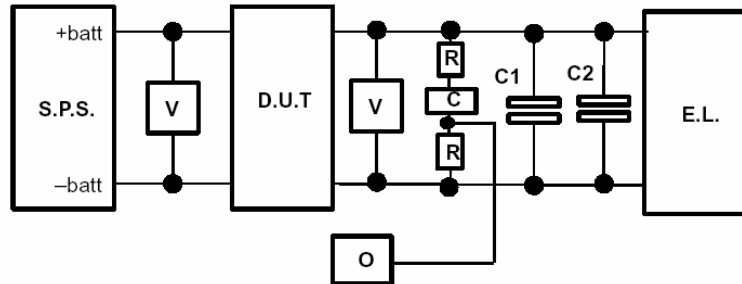
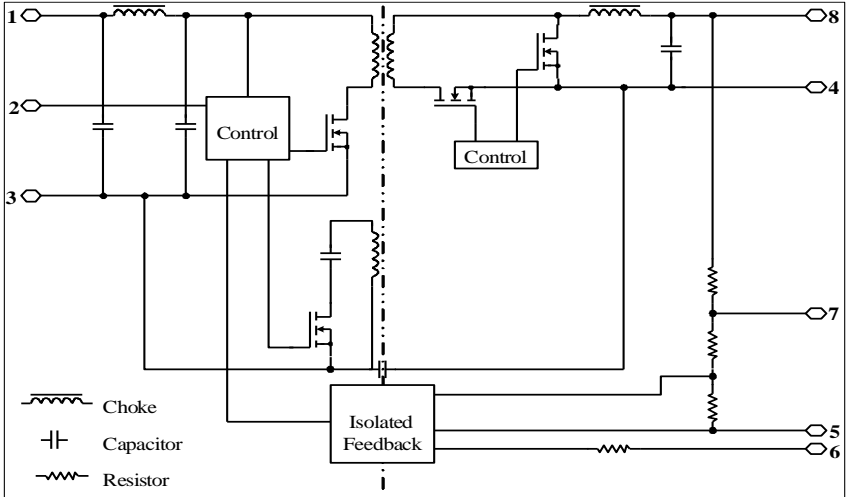


Figure 9. $V_{in} = 48 V$ and $I_{out} = 20 A$

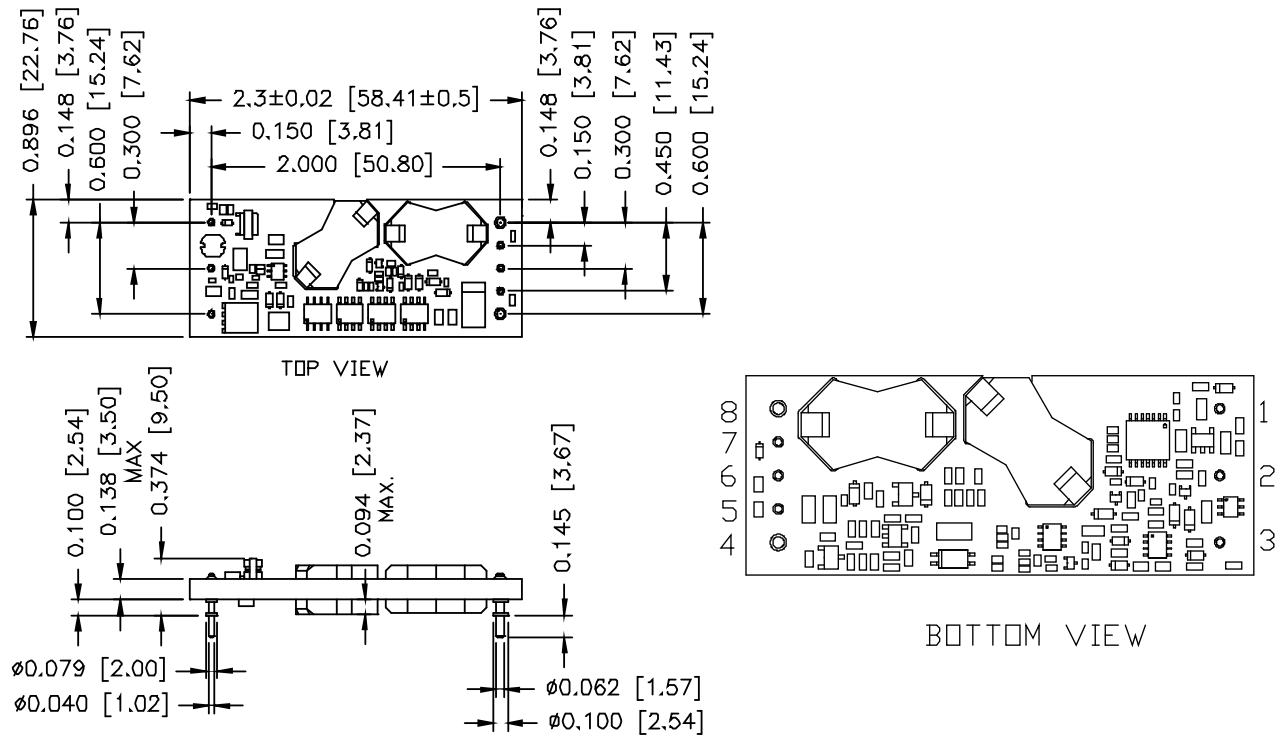
C1 = 10 uF tantalum, C2 = 1 uF ceramic;
R = 50 ohm;
C = 220 nF.



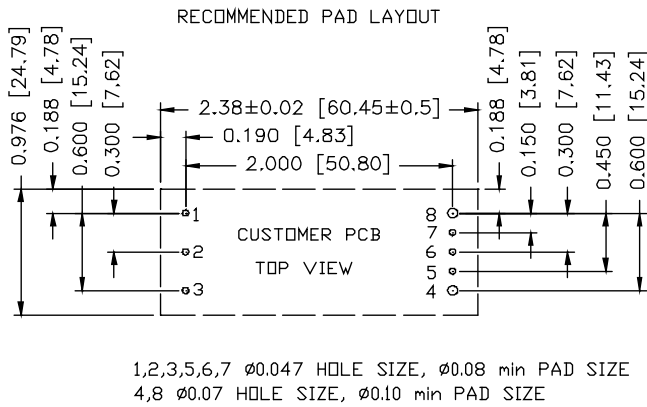
13. FUNDATMENTAL CIRCUIT DIAGRAM



14. MECHANICAL DIMENSIONS



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.



PIN CONNECTIONS

PIN	NAME	FUNCTION	PIN SIZE
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"

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) Undimensioned components are shown for visual reference only.
 2) All dimensions in inches (mm); Tolerances: x.xx +/-0.02 in [0.51 mm], x.xxx +/-0.010 in [0.25 mm].

15. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2010-04-19	B		XF Jiang

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.



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TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.