0RCB-60TV2x

Isolated DC-DC Converter

The 0RCB-60TV2x is isolated DC/DC converter that operates from a nominal 48 VDC source. This unit will provide up to 30 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

- 36 VDC - 75 VDC Input
- 1.2 VDC / 25 A Output
- 1/8 Brick Converter
- High Efficiency
- High Power Density
- Fixed Frequency (300 kHz)
- Low Cost
- Input Under-Voltage Lockout
- 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
- Approved to IEC/EN 60950-1
- Approved to IEC/EN 62368-1

RoHS Compliant

Applications

- Networking
- Computers and Peripherals
- Telecommunications

1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
0RCB-60TV2L 0RCB-60TV2A	1.2 VDC	36 VDC - 75 VDC	25 A	30 W	84%

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	03	B	x
Mounting Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Active Logic	Package
Through hole mount	RoHS	1/8th Brick		49.5 W	36 – 75 V	1.2 V	L - Active Low A - Active Low	G-Tray package

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
Altitude		-	-	2000	m

NOTE: Ratings used beyond the maximum ratings may cause a reliability degradation of the converter or may permanently damage the device.

3. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Input Voltage		36	48	75	V
Input Current (full load)		-	-	1.2	A
Input Current (no load)		-	-	37	mA
Input Reflected Ripple Current (pk-pk)	Tested with simulated source impedance of 10 µH, 5 Hz to 20 MHz; use a 47 µF/100 V electrolytic capacitor with ESR = 1 ohm max. at 200 kHz at 25°C.	-	-	37	mA
I^2t Inrush Current Transient		-	-	0.1	A^2s
Turn-on Voltage Threshold		33	-	35	V
Turn-off Voltage Threshold		31	-	33	V

CAUTION: This converter is not internally fused. An input line fuse must be used in application. Recommend a fast-acting fuse with maximum rating of 3 A on system board. Refer to the fuse manufacture's datasheet for further information.

NOTES: 1. This converter has internal C-L-C (0.47 µF -2.2 µH-1 µF) filter.

2. For recommended external input filter, please refer to Safety section (page 6).

4. OUTPUT SPECIFICATIONS

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
Output Voltage Range		Over all line, load & temperature conditions.	1.155	1.2	1.245	V
Output Voltage Trim Range			0.96	-	1.32	V
Output Over-Voltage Clamp		Non-Latching	1.4	-	1.56	V
Output Current			-	-	25	A
Current Limit Threshold			27.5	-	34	A
External Admissible Capacitive Load			0	-	20000	µF
Ripple and Noise (pk-pk)		Vin = 72 V, max load on output, 20 MHz BW, 10 µF tantalum and 1 µF ceramic capacitor.	-	-	130	mV
Turn on Time			-	-	220	ms
Rise Time			-	-	18	ms
Transient Response						
50% ~ 75% ~ 50% Max Load	Vpk-pk	di/dt = 0.1A/µs, Vin = 48 VDC, Ta = 25°C, with a 1 µF ceramic capacitor and a 10 µF Tantalum cap at the output.	-	-	150	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.	81	84	-	%
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% Vo.	-	-	10	%
Over Temperature Protection		-	125	-	°C
FIT	Calculated Per Bell Core SR-332 (Vin = 48 V, Vo = 1.2 V, Io = 20 A, Ta = 25 °C)		422		
Dimensions (L × W × 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. EFFICIENCY DATA

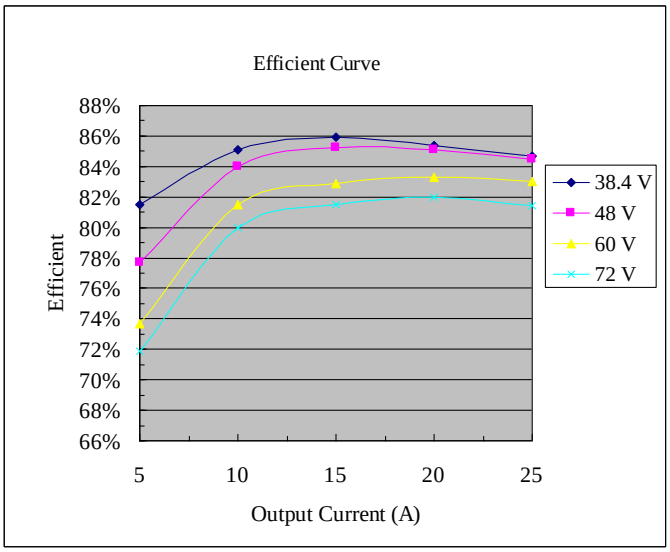


Figure 1. Efficiency data

7. CONTROL SPECIFICATIONS

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
REMOTE ON/OFF						
Signal Low (Unit On)	Active Low	The remote on/off pin open, Unit off.	-0.3	-	0.8	V
Signal High (Unit Off)			2.4	-	18	
Current Sink			0	-	1	mA

8. TRANSIENT RESPONSE WAVEFORMS

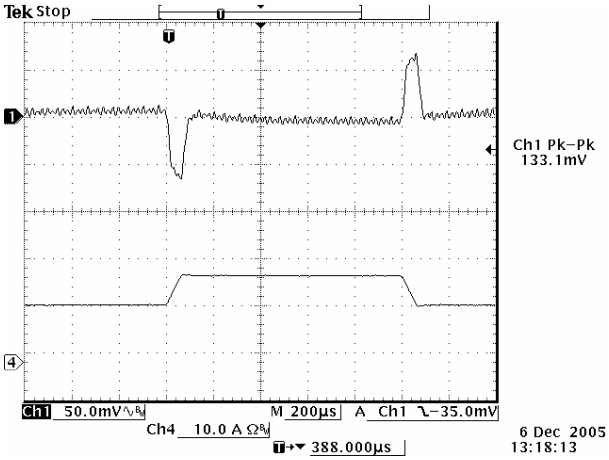


Figure 2.

NOTE: Dynamic load transient at Vin = 48 V, Ta = 25 °C, Io = (50%~75%~50%) Ionom, di/dt=0.1 A/µs.

9. RIPPLE AND NOISE WAVEFORM

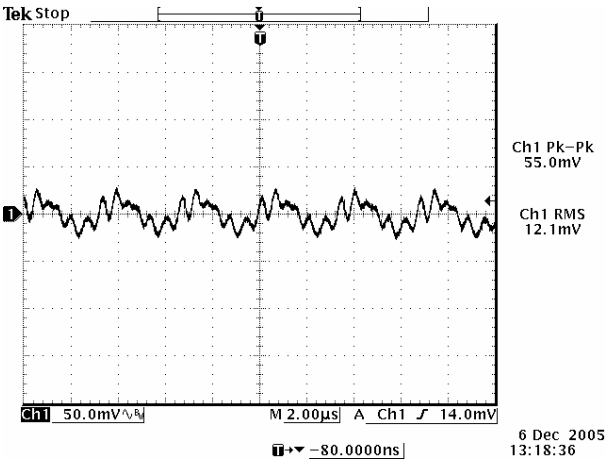


Figure 3. Vin = 38.4 V and Iout = 25 A

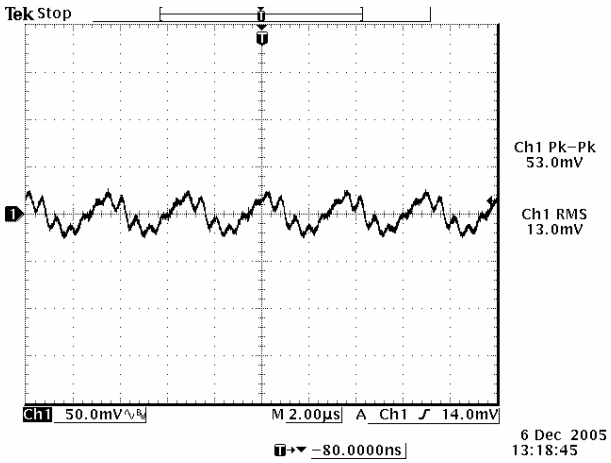


Figure 4. Vin = 48 V and Iout = 25 A

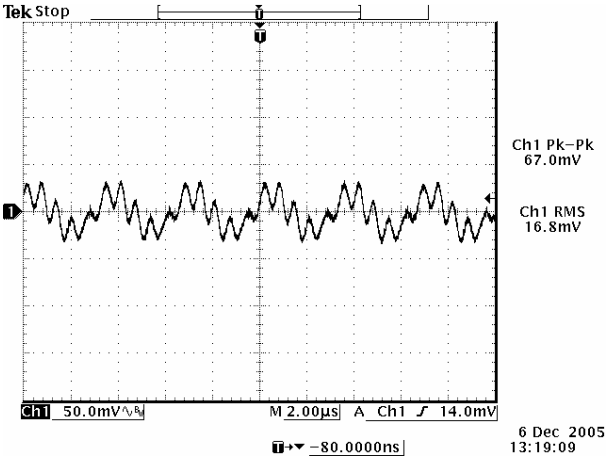


Figure 5. Vin = 72 V and Iout = 25 A

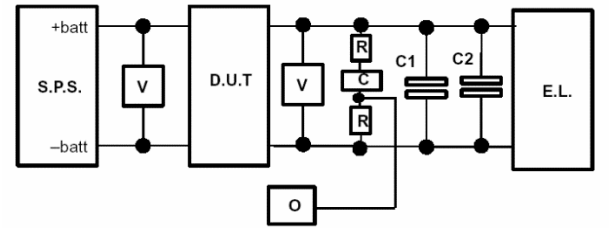


Figure 6. Test setup

C1=10 µF tantalum;
C2=1 µF ceramic;
R=50 ohm;
C=220 nF

10. 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.

$$Rtrimdown = \frac{Vo\_req}{|Vo - Vo\_req|} - 1[k\Omega]$$

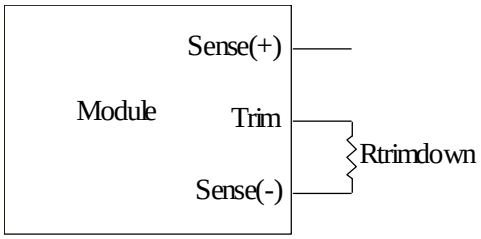


Figure 7. Trim down circuit

$$Rtrimup = \frac{Vo\_req}{|Vo - Vo\_req|} - 1[k\Omega]$$

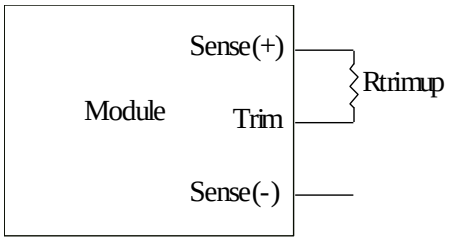


Figure 8. Trim up circuit

NOTE:

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

Vo req = Desired (trimmed) output voltage [V]

Output voltage Vo = 1.201 V

11. THERMAL DERATING CURVES

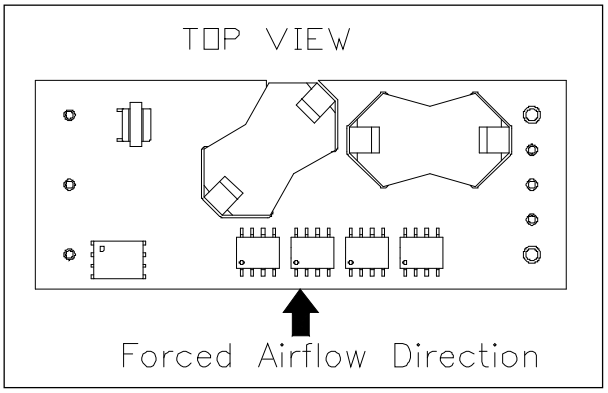


Figure 9. Forced airflow direction

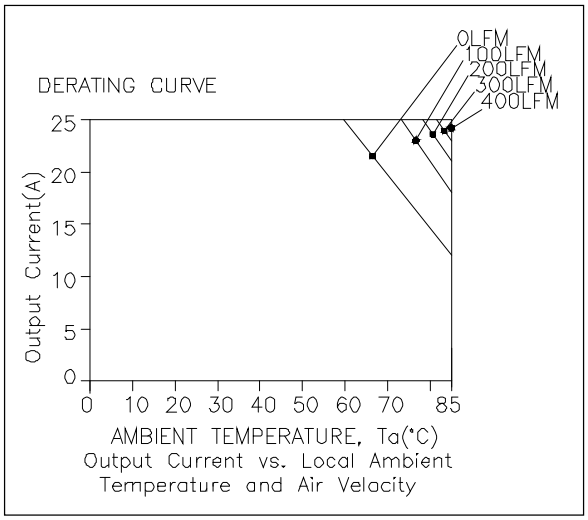


Figure 10. Thermal derating curve

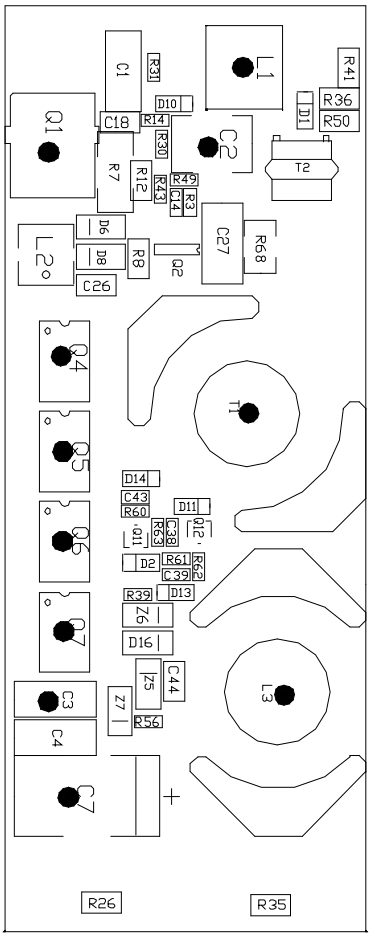


Figure 11. Temperature reference points on top side

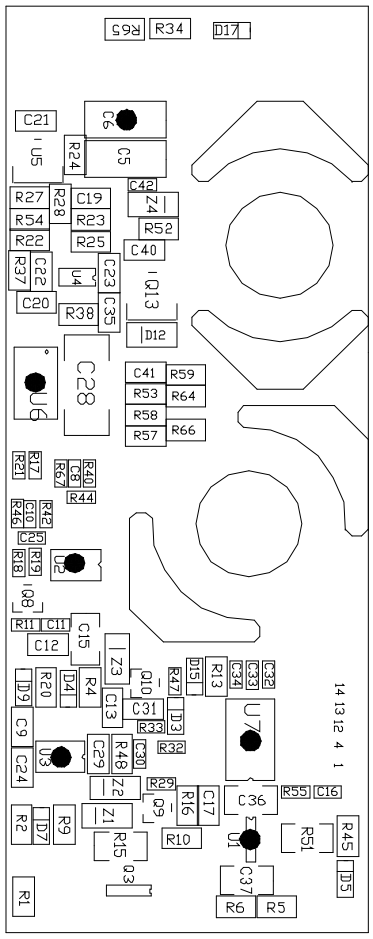


Figure 12. Temperature reference points on bottom side

12. FUNDAMENTAL CIRCUIT DIAGRAM

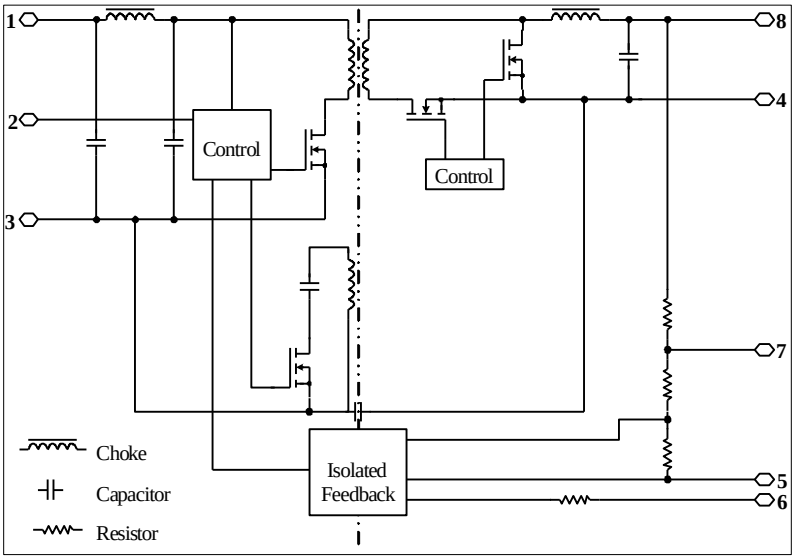


Figure 13. Fundamental circuit diagram

13. SAFETY&EMC

Material flammability: UL94V-0

Approved to IEC/EN 60950-1

Approved to IEC/EN 62368-1

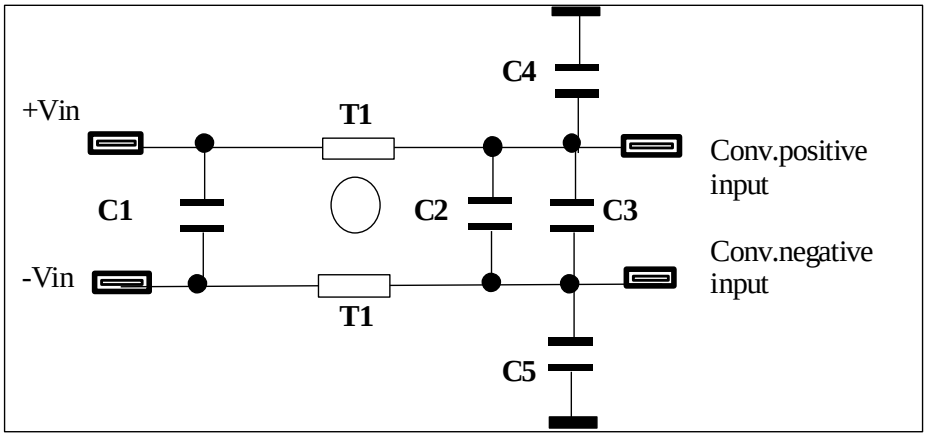
Electromagnetic Compatibility EMC

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 µF /100 V;

C2=C3= 47 µF/100 V;

C4=C5=1000 pF/250 Volt;

T1=3 mH

Figure 14. Test setup

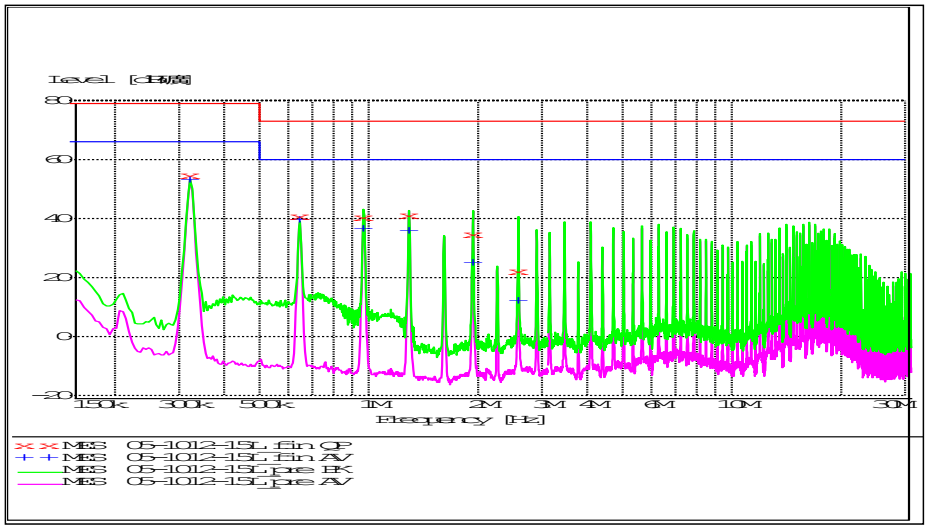


Figure 15. Derating curve

14. MECHANICAL DIMENSIONS

OUTLINE

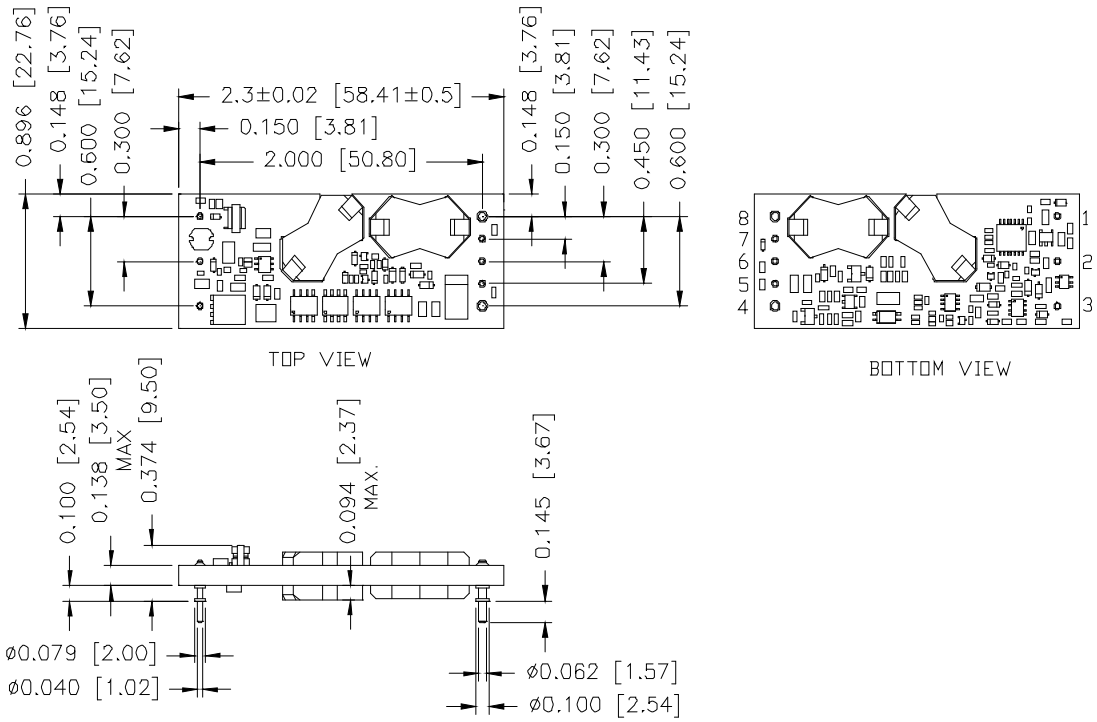


Figure 16. Outline

NOTE: The module doesn't guarantee at least 0.7 mm 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.

NOTE: 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 ºC for less than 5 seconds.

NOTE:
1) All Pins: Material - Copper Alloy;
Finish – 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.
2) Undimensioned components are shown for visual reference only.
3) All dimensions in inches (mm); Tolerances: x.xx +/-0.02 in. (x.x +/-0.5mm) x.xxx +/-0.010 in. (x.xx +/-0.25mm).

MECHANICAL DIMENSIONS(CONTINUED)

PIN DEFINITIONS

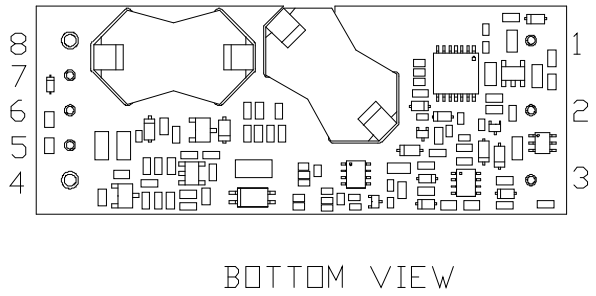


Figure 17. Pins

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''

RECOMMENDED PAD LAYOUT

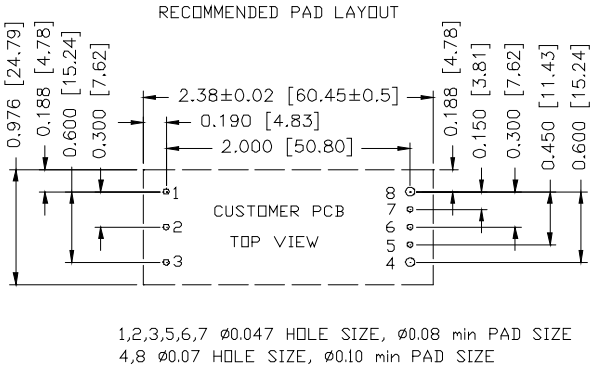


Figure 18. Recommended pad layout

15. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2006-04-14	VP2	Update "Output DC Current Limit", "Mechanical Outline", "Efficiency", MTBF, add EMI, TR, NR	DF (Y)
2006-10-30	VP3	EN60950-1 Recognized	DF (Y)
2006-11-20	VP3	Add a note under P/N	DF (Y)
2007-03-01	A	Add Rev.A	DF (Y)
2017-12-21	B	Add Rev.B	DF (Y)
2018-05-11	AC	Update Remote on/off	DF (Y)
2020-10-13	AD	Delete 0RCB-60TV20. Update safety information.	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.
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.