0RCB-60T05x Series

Isolated DC-DC Converter

The 0RCB-60T05x 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.

RoHS Compliant

Key Features & Benefits

- 36 VDC - 75 VDC Input
- 5 VDC / 10 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

1. MODEL SELECTION

OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY	MODEL NUMBER ACTIVE HIGH	MODEL NUMBER ACTIVE LOW
5 VDC	36 VDC - 75 VDC	10 A	50 W	90%	0RCB-60T050	0RCB-60T05L

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.
3. All part numbers above indicate RoHS 6.

PART NUMBER EXPLANATION

0	R	CB	-	60	T	05	x	x
Mounting Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Active Logic	Package
0 - Through hole mount	RoHS	1/8th Brick		50W	36 – 75 V	5 V	0-Active high L-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

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)		-	-	1.8	A
Input Current (no load)		-	-	80	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.	-	-	15	mA
Input Fuse (not internally)		-	-	5.0	A
I^2t Inrush Current Transient		-	-	0.1	A^2s
Turn-on Voltage Threshold		32	-	35	V
Turn-off Voltage Threshold		28.5	-	33	V

NOTE: Should place at least 47 µF / 100 V electrolytic capacitor directly adjacent to the input pin of the module.

4. OUTPUT SPECIFICATIONS

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
Output Voltage Range		Over all line, load & temperature conditions, should short sense+ to Vout+, and sense- to Vout-.	4.85	5.0	5.15	V
Output Voltage Trim Range			4.0	-	5.5	V
Output Over-Voltage Clamp		Non-Latching	5.5	-	6.5	V
Output Current			-	-	10	A
Current Limit Threshold			10.2	-	15	A
External Admissible Capacitive Load			0	-	3000	µF
Ripple and Noise (pk-pk)		Vin = 72 V, max load on output, 20 MHz BW, 10 µF tantalum and 1 µF ceramic capacitor.	-	-	10	mV
Turn on Time			-	-	220	ms
Rise Time			-	-	13	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		-	-	300	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.	87	90	-	%
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	130	°C
MTBF	Calculated Per Bell Core SR-332 (Vin = 48 V, Vo = 5 V, Io = 8 A, Ta = 25 °C)		2,370,000		hours
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. CONTROL SPECIFICATIONS

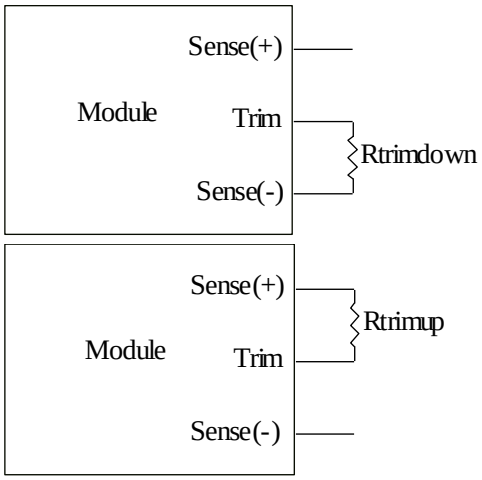
PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
REMOTE ON/OFF						
Signal Low (Unit On)	Active Low	0RCB-60T05L. The remote on/off pin open, Unit off.	-0.3	-	0.8	V
Signal High (Unit Off)			2.4	-	18	
Signal Low (Unit Off)	Active High	0RCB-60T050. The remote on/off pin open, Unit on.	-0.3	-	0.8	
Signal High (Unit On)			2.4	-	18	
Current Sink			0	-	1	mA

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.

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

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



Note:

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

Vo_req = Desired (trimmed) output voltage [V]
Output voltage Vo = 5.0 V

8. EFFICIENCY DATA

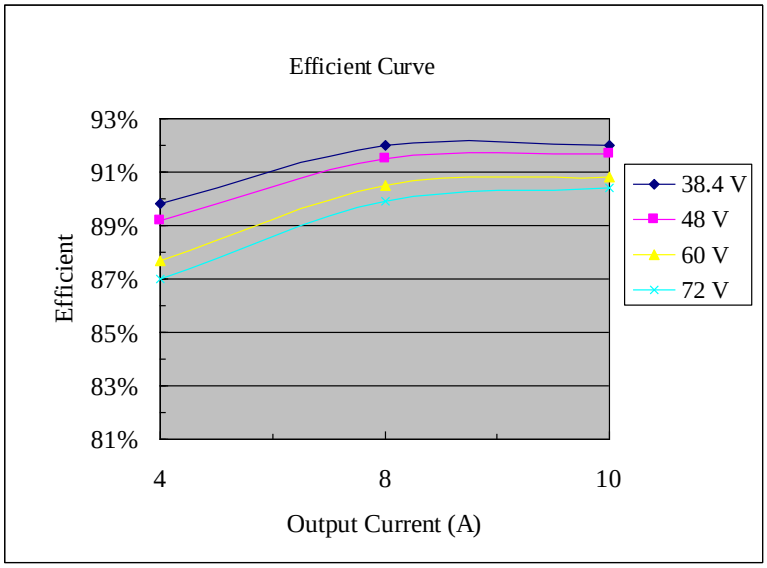
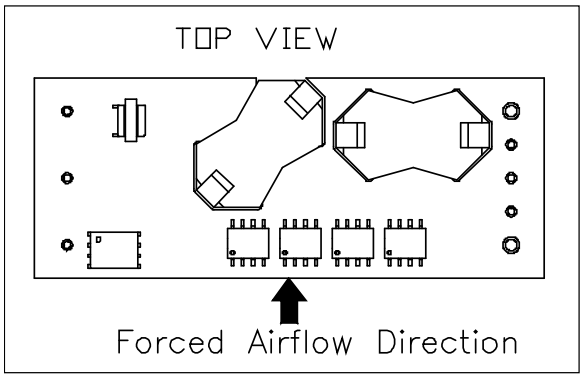


Figure 1. 0RCB-60T05x

9. THERMAL DERATING CURVES

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



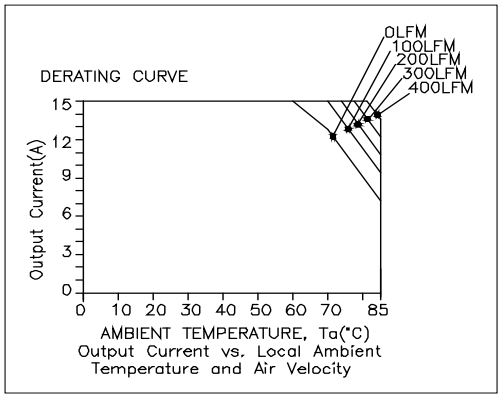


Figure 2. 0RCB-60T05x

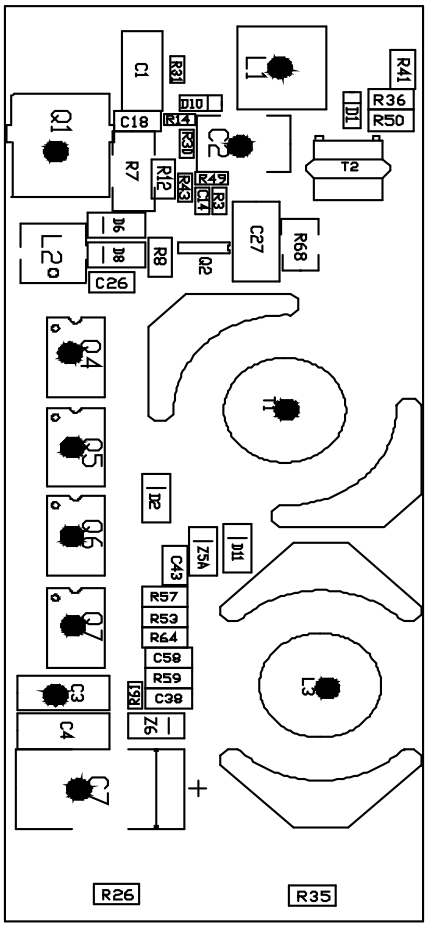


Figure 3. Temperature reference points on top side

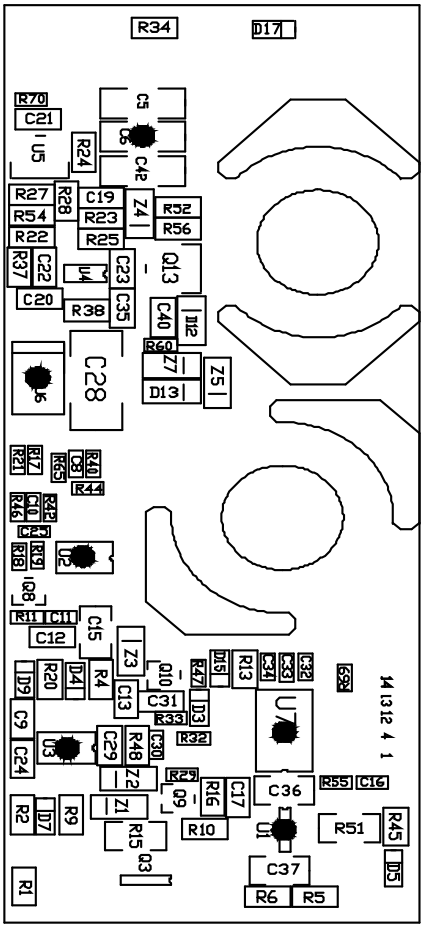
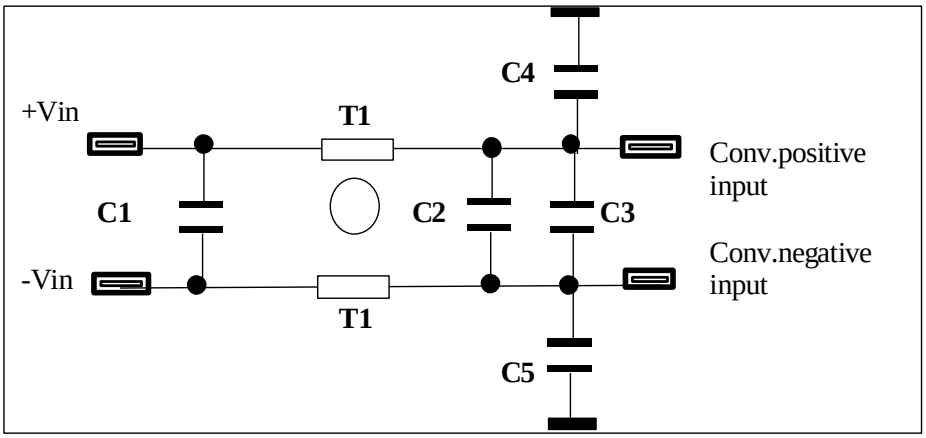


Figure 4. Temperature reference points on bottom side

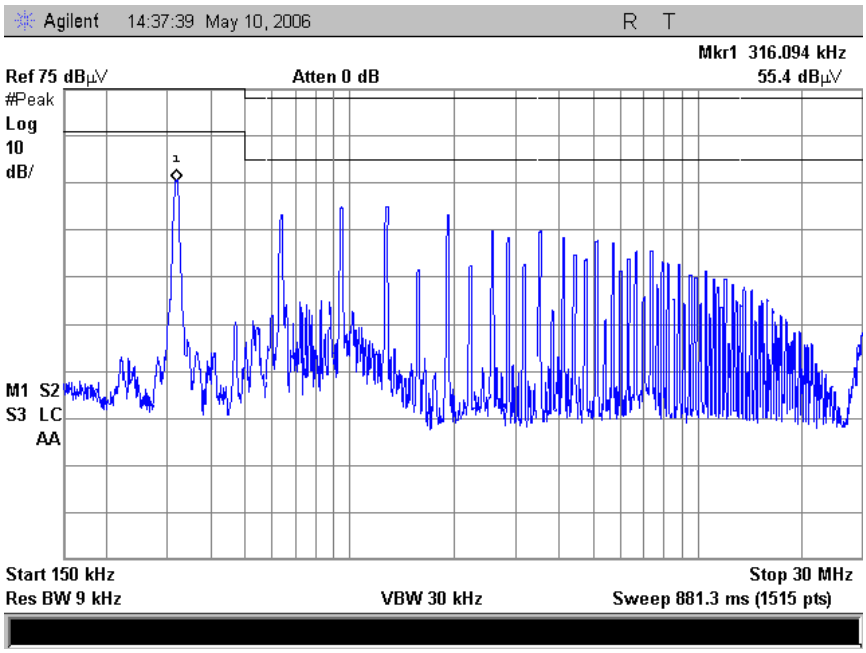
10. SAFETY

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 µF /100 V;
C2=C3= 47 µF/100 V;
C4=C5=1000 pF/250 Volt;
T1=3 mH



11. TRANSIENT RESPONSE WAVEFORMS

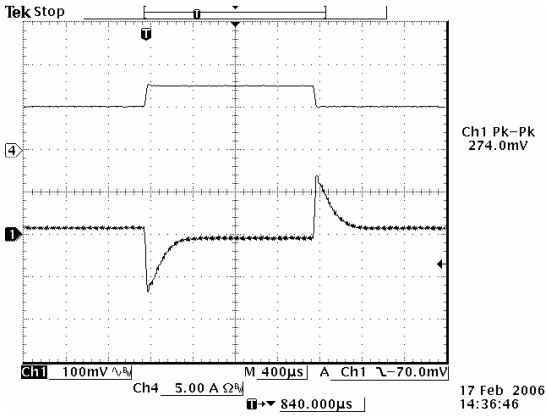


Figure 7.

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

12. RIPPLE AND NOISE WAVEFORM

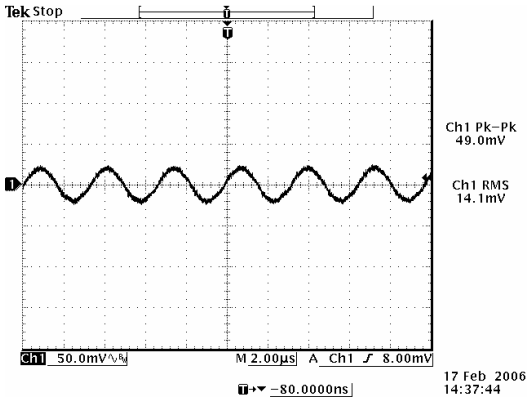


Figure 8. Vin =38.4 V and Iout = 10 A

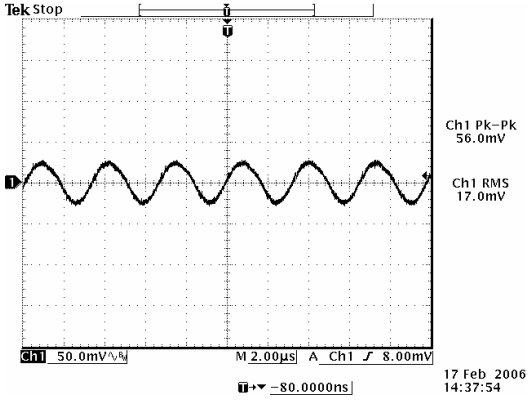


Figure 9. Vin =48 V and Iout = 10 A

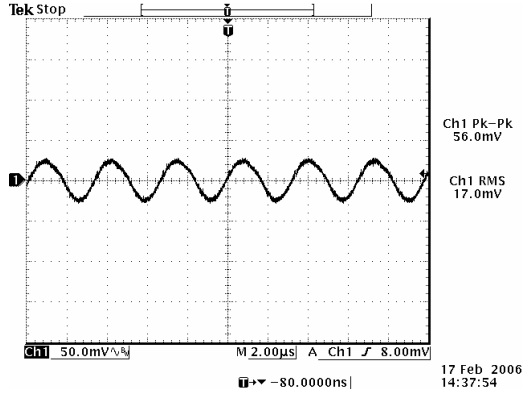
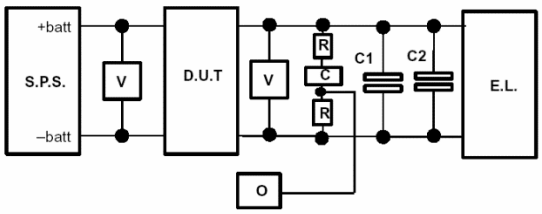
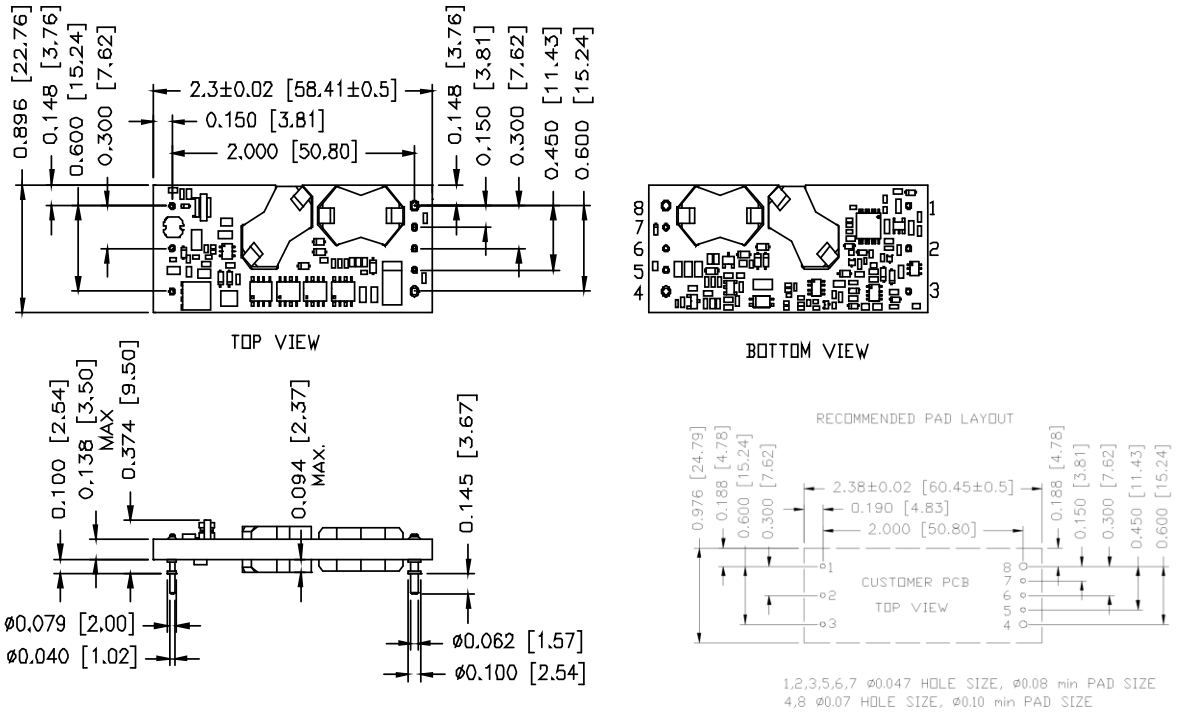


Figure 9. Vin =72 V and Iout = 10 A

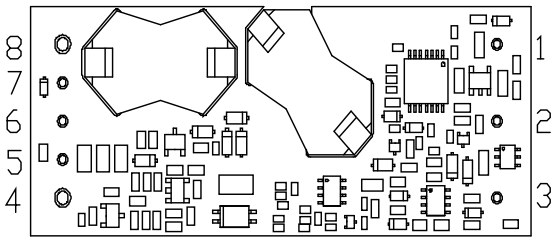


C1=10 µF tantalum;
C2=1 µF ceramic;
R=50 ohm;
C=220 nF

13. MECHANICAL DIMENSIONS



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.



PIN CONNECTIONS

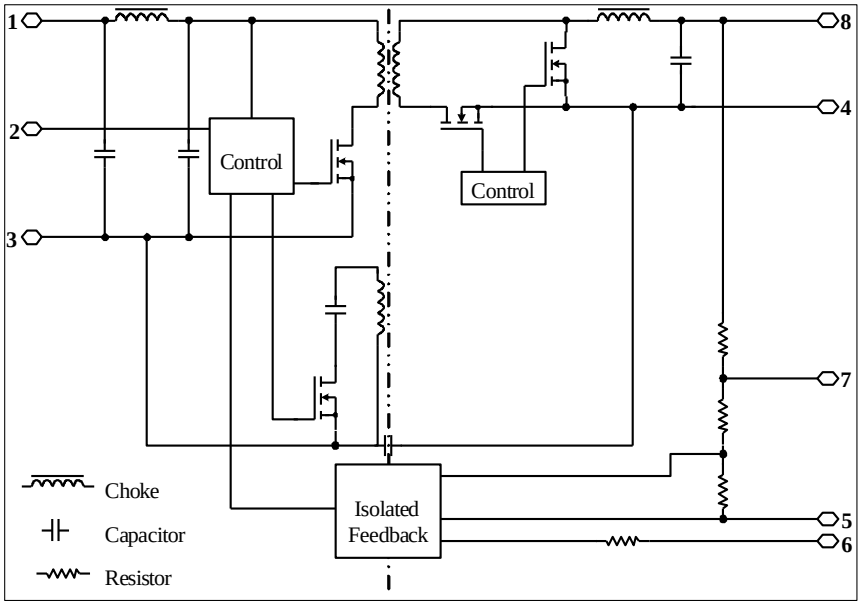
PIN	NAME	FUNCTION	PIN SIZE
1	Vin+	Positive input voltage	0.040''
2	On/Off	Input to turn converter on and off, referenced to Vin-	0.040''
3	Vin-	Negative input voltage	0.040''
4	Vout-	Negative output voltage	0.062''
5	Sense-	Negative remote sense	0.040''
6	Trim	Output voltage trim	0.040''
7	Sense+	Positive output voltage	0.040''
8	Vout+	Positive output voltage	0.062''

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+.

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 °C 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).

14. FUNDAMENTAL CIRCUIT DIAGRAM



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

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Asia-Pacific +86 755 298 85888
Europe, Middle East +353 61 225 977
North America +1 408 785 5200