0RCY-C4T03x

Isolated DC-DC Converter

The 0RCY-C4T03x is isolated DC-DC converter that operates from a nominal 48 VDC source. This unit will provide up to 132 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

- 36-75 VDC Input
- 3.3 VDC @ 40 A Output
- 1/8th Brick Converter
- Isolated
- Fixed Frequency (300kHz)
- High Efficiency
- High Power Density
- Input Under Voltage Lockout
- Output Voltage Trim
- Basic Insulation
- Output Over Voltage Protection with Auto-Recovery
- OCP/SCP
- Over Temperature Protection
- Remote On/Off
- Positive/Negative Remote Sense
- Low Cost
- Approved to IEC/EN 62368-1
- Approved to UL/CSA 62368-1
- Class II, Category 2, Isolated DC/DC Converter (refer to IPC-9592B)

Applications

- Industrial
- Computers and peripherals
- Telecommunications

1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
0RCY-C4T03L	3.3 VDC	48 VDC	40 A	132 W	92%
0RCY-C4T033	3.3 VDC	48 VDC	40 A	132 W	92%

NOTE: Add "G" suffix at the end of the model number to indicate packaging.

PART NUMBER EXPLANATION

0	R	CY	-	C4	T	03	x	G
Mounting Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Logic and Optional Features	Package Type
Through hole mount	RoHS	1/8th Brick		132 W	36 - 75 V	3.3 V	L - Active low, open frame 3 - Active high, open frame	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
Ambient Temperature (T_A)		-40	-	85	°C
Component Temperature (T_C)	Detail information refer to Thermal Derating Curves.	-40	-	120	°C
Storage Temperature		-55	-	125	°C
Altitude		-	-	5000	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

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Operating Input Voltage		36	48	75	V
Input Current (full load)		-	-	5	A
Input Current (no load)		-	70	120	mA
Remote Off Input Current		-	10	15	mA
Input Reflected Ripple Current is (rms)	With simulated source impedance of 10 µH, 5 Hz to 20 MHz. Use a 100 µF/100 V electrolytic cap with ESR = 1 ohm max, at 200 kHz @ 25°C.	-	5	10	mA
Input Reflected Ripple Current is (pk-pk)		-	–	30	mA
I^2t Inrush Current Transient		-	–	0.1	A^2s
Under-voltage Turn on Threshold		33	–	35.5	V
Under-voltage Turn off Threshold		32	–	34.5	V

CAUTION: This converter is not internally fused. An input line fuse must be used in application. Recommended input fast-acting fuse on system board.

4. OUTPUT SPECIFICATIONS

All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Output Voltage Set Point	Vin = 48 V, Io = 50% load	3.234	3.300	3.366	V
Load Regulation	Io = 0~100% load	-	±4	±9	mV
Line Regulation		-	±8	±16.5	mV
Regulation Over Temperature (-40°C - 85°C)		-	±30	±50	mV
Total Regulation		-	±36	±65.6	mV
Output Ripple and Noise (pk-pk)	Vin = 48 V, 0 – 20 MHz BW, with a 10 µF Tantalum cap at output.	-	55	90	mV
Output Ripple and Noise (rms)		-	10	20	mV
Output Current Range		0	-	40	A
Output DC Current Limit		44	-	56	A
Short Circuit Surge Transient		-	2	4	A^2s
Turn-On Time		-	-	25	ms
Overshoot at Turn on		-	-	3	%
Output Capacitance		330	-	5600	µF
Transient Response					
△V 25%~50% of Max Load	di/dt = 0.1 A/µs, Vin = 48 VDC, Ta = 25°C, with a 330 µF Tantalum cap at output.	-	100	200	mV
Settling Time		-	150	250	µs
△V 50%~25% of Max Load		-	100	200	mV
Settling Time		-	150	250	µs

5. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency (full load)	Measured at Vin = 48 V	90	92	-	%
Switching Frequency		270	300	330	kHz
FIT	Calculated Per Bell Core SR-332 (Vin = 48 V, Io = 80% load, Ta = 25 °C, FIT = 10^9/MTBF)		TBC		
Over Temperature Protection		-	125	-	°C
Output Voltage Trim Range	The total voltage increased by trim and remote sense should not exceed 10%Vo	80	-	110	%
Remote Sense Compensation		-	-	10	%
Over Voltage Protection	Vin = 48 V, full load, in hiccup mode.	3.8	-	4.5	V
Weight		-	28	-	g
Dimensions (L × W × H)			2.30 x 0.9 x 0.40		inch
			58.42 x 22.86 x 10.26		mm
Isolation Characteristics					
Isolation Capacitance		-	2200	-	pF

6. EFFICIENCY DATA

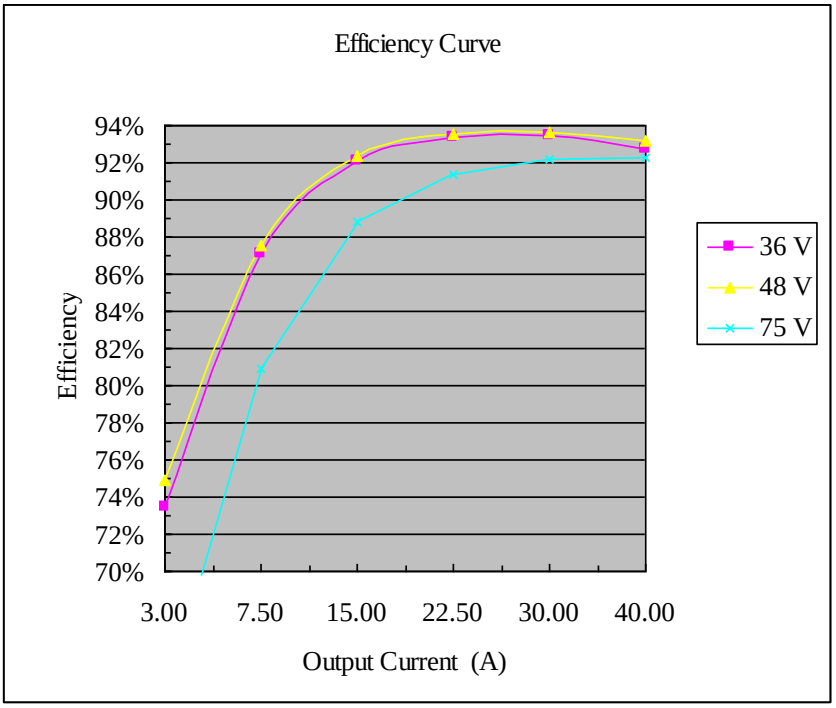

Figure 1. Efficiency data

7. REMOTE ON/OFF

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
Signal Low (Unit On)	Active Low	0RCY-C4T03L The remote on/off pin open, Unit off.	-0.7	-	0.8	V
Signal High (Unit Off)			2.4	-	18	V
Signal Low (Unit Off)	Active High	0RCY-C4T033 The remote on/off pin open, Unit on.	-0.7	-	0.8	V
Signal High (Unit On)			2.4	-	18	V
Current Sink			0	-	1	mA

Recommended remote on/off circuit for active low

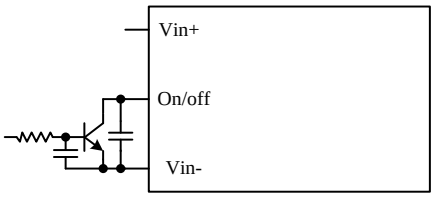

Figure 2. Control with open collector/drain circuit

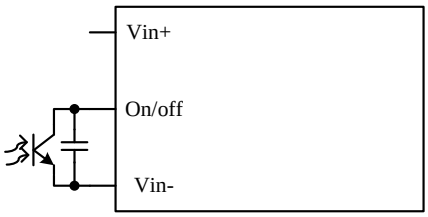

Figure 3. Control with photocoupler circuit

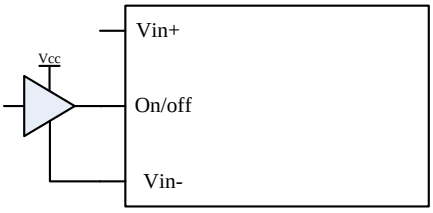

Figure 4. Control with logic circuit

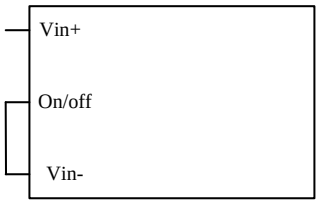

Figure 5. Permanently on

Recommended remote on/off circuit for active high

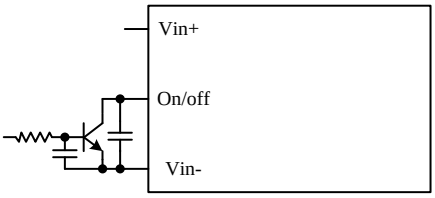

Figure 6. Control with open collector/drain circuit

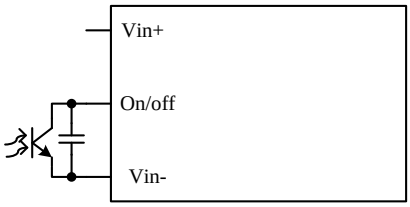

Figure 7. Control with photocoupler circuit

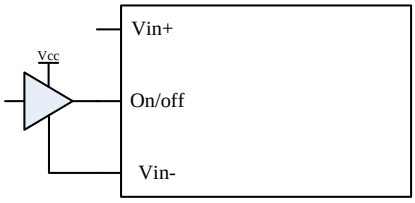

Figure 8. Control with logic circuit

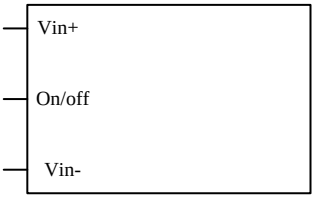

Figure 9. Permanently on

8. RIPPLE AND NOISE WAVEFORM

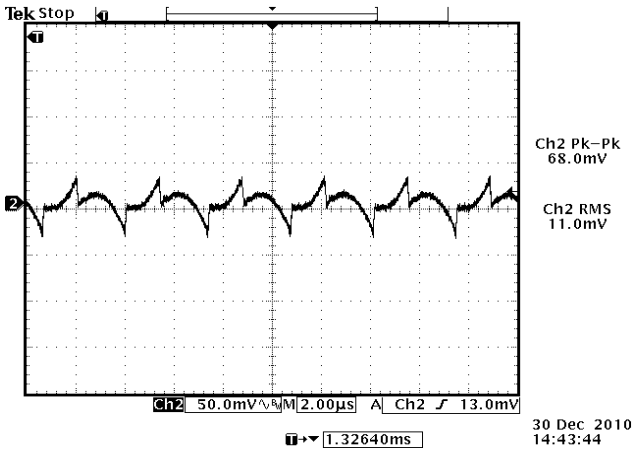

Figure 10. Lo = 0A, Vin = 48V

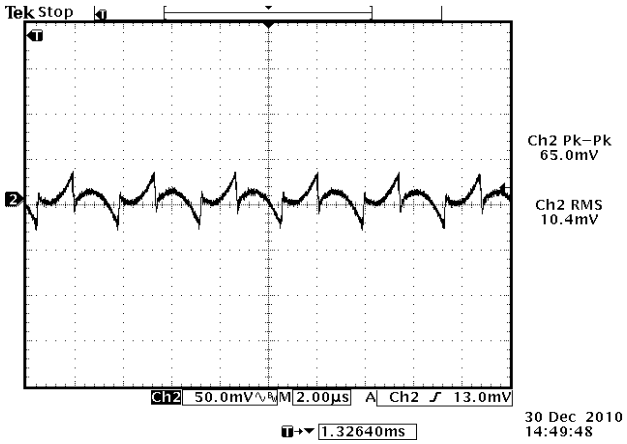

Figure 11. Lo = 40A, Vin = 48V

Note: Ripple and noise at full load, 48 VDC input, 3.3 VDC/30 A output with a 1 µF ceramic cap and a 10 µF Tantalum cap at output, and Ta = 25 °C.

9. TRANSIENT RESPONSE WAVEFORMS

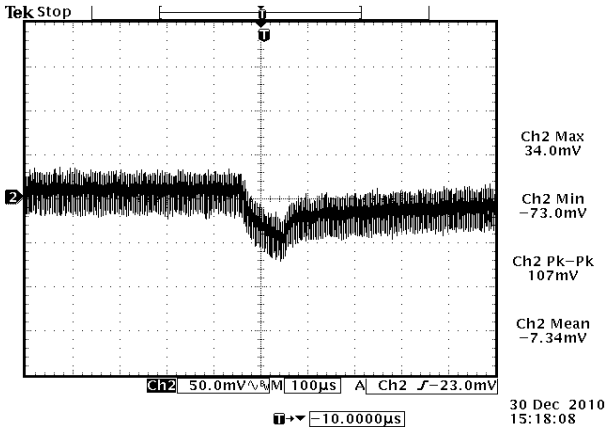

Figure 12. Vout = 3.3V, 75% to 50% Load Transients

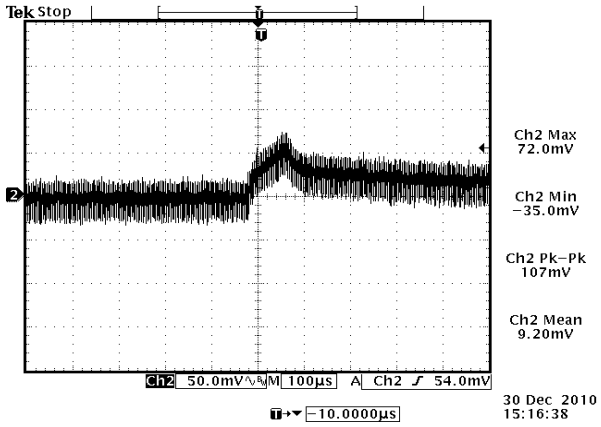

Figure 13. Vout = 3.3V, 50% to 75% Load Transients

Note: Transient response at di/dt = 0.1 A/µs, Vin = 48 VDC, Ta = 25°C, external 330 µF Tantalum Cap.

10. OUTPUT TIRM EQUATIONS

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

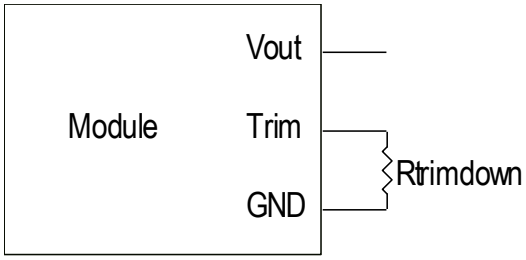

Figure 14. Trim down test circuit

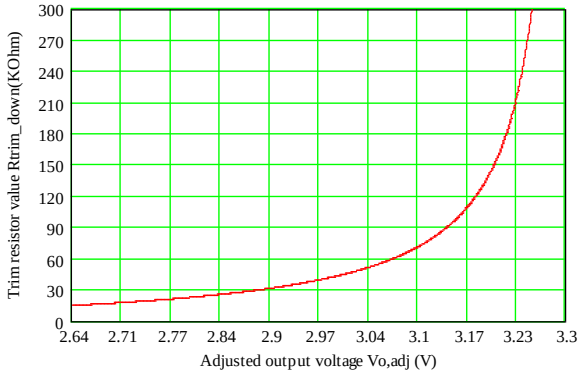

Figure 15. Trim down curve

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

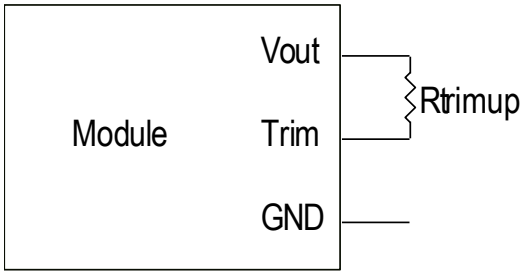

Figure 16. Trim up test circuit

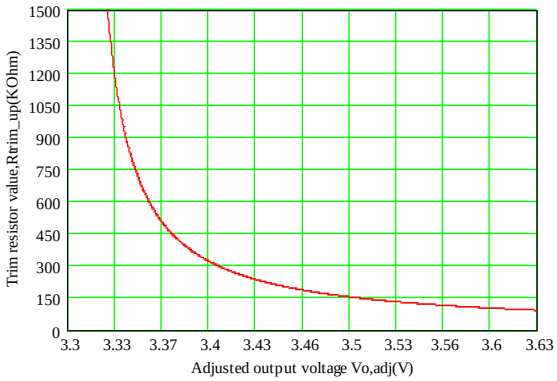

Figure 17. Trim up curve

$$Rtrimup = \frac{(100 + delta) \cdot Vo \cdot 5.11 - 626}{1.225 \cdot delta} - 10.22[k\Omega]$$

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

Note:
Vo_req = Desired (trimmed) output voltage [V]
Output voltage Vo = 3.3 V.

11. THERMAL DERATING CURVES

Maximum Tcase (TC1 & TC2) temperature of semiconductors derated to 120 °C.

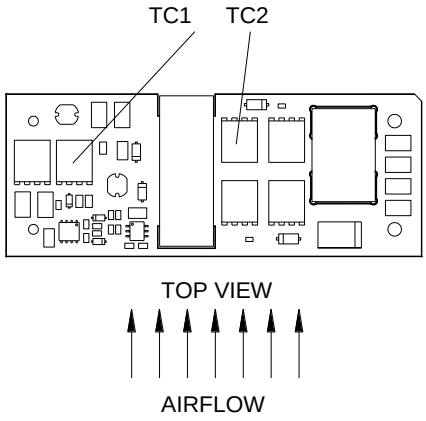

Figure 18. Airflow direction

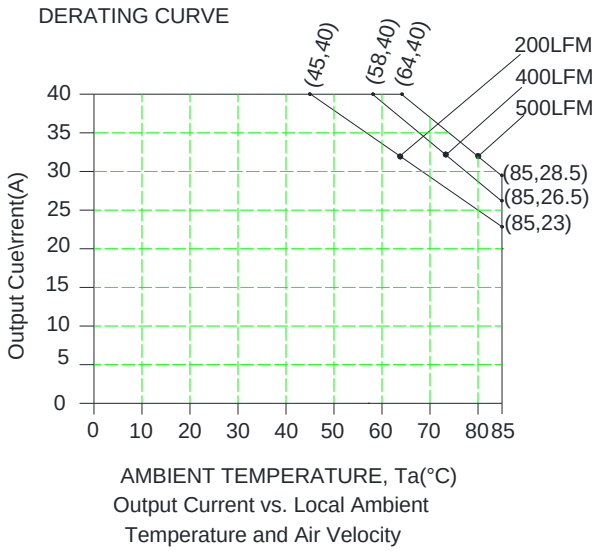

Figure 19. Thermal derating curve @ Vin = 48 V,
with maximum junction temperature of semiconductors derated to 120°C, airflow from Vo to Vin.

12. MECHANICAL DIMENSIONS

OUTLINE

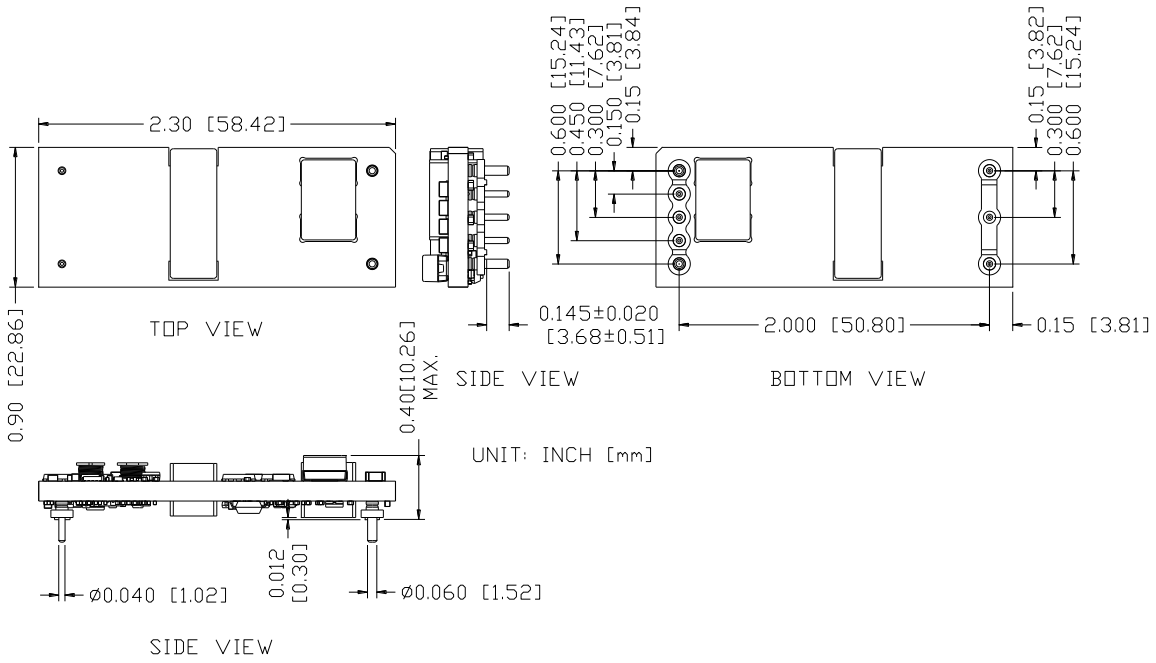

Figure 20. Outline

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.

Notes:

1) All Pins: Material - Copper Alloy;
   Finish - Gold plated.
2) Un-dimensioned components are shown for visual reference only.
3) All dimensions in inches; Tolerances: x.xx +/-0.02 in [0.5 mm]. x.xxx +/-0.010 in [0.25 mm]. Unless otherwise stated.

PIN DEFINITIONS

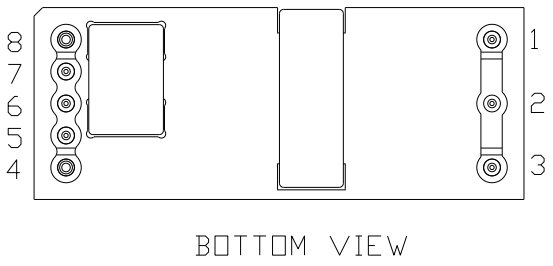

Figure 21. Pins

PIN	FUNCTION	PIN SIZE
1	Vin+	0.040''
2	On/Off	0.040''
3	Vin-	0.040''
4	Vout-	0.062''
5	Sense-	0.040''
6	Trim	0.040''
7	Sense+	0.040''
8	Vout+	0.062''

RECOMMENDED PAD LAYOUT

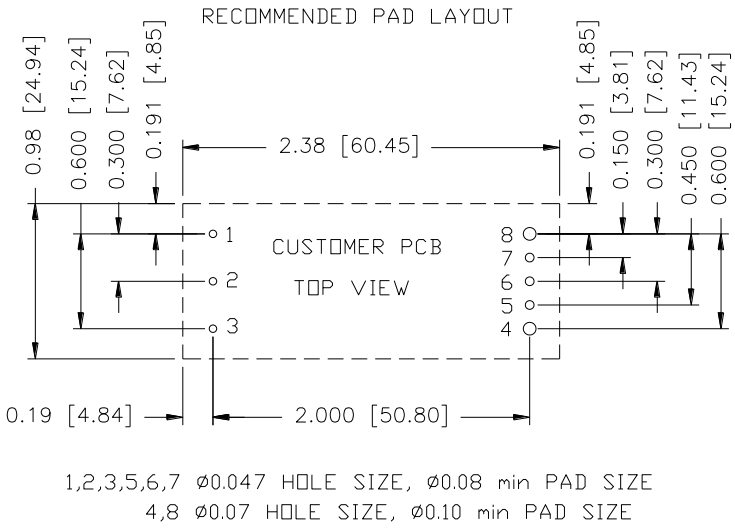

Figure 22. Recommended pad layout

13. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2011-01-04	PA	First release	JZ.Wang
2011-01-12	PB	Change max input current (full load) from 4.5A to 5A in input specifications. Change typical efficiency from 91% to 92% in general specifications.	JZ.Wang
2012-06-29	PC	Update MD.	JZ.Wang
2018-08-08	AD	Update the form and TD.	XF.Jiang
2018-11-14	AE	Update TD	XF.Jiang
2021-04-27	AF	Add object ID and safety certificate. Update mechanical outline.	XF.Jiang

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

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