

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc /25 A Output



Jul. 05, 2012

Bel Power Inc., a subsidiary of Bel Fuse Inc.

0RCY-T0T12L Preliminary RoHS Compliant Rev.A

Features

- Basic Isolated
- High Efficiency
- High Power Density
- Fixed Frequency (350kHz)
- Input Under-Voltage Lockout
- Input Over-Voltage Lockout
- Class 2, Category 2, Isolated DC/DC Converter (refer to IPC-9592A)
- UL60950-1, 2nd Recognized (UL/cUL) (Pending)
- Output Over-Voltage Protection
- OCP/SCP
- Over Temperature Protection
- Low Cost
- Basic Insulation
- Remote On/Off

Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The 0RCY-T0T12L is an isolated DC/DC converter that operate from a nominal 48V source. This unit provides up to 300W of output power from a nominal 48V input. This unit is designed to be highly efficient and low cost . Features include remote on/off, short circuit protection, over current protection, undervoltage lockout and over-temperature protection. The 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
12 Vdc	48Vdc	25 A	300 W	95.2%	0RCY-T0T12L

Notes: Add "G" suffix at the end of the model number to indicate Tray Packaging.

Part Number Explanation

$\frac{0}{1} \frac{R}{2} \frac{CY}{3} - \frac{T0}{4} \frac{T}{5} \frac{12}{6} \frac{L}{7}$

1---Through hole

2---RoHS 6, change "R" to "7" means RoHS 5

3---Series name

4---Series code

5---Input range (48V)

6---Output voltage (12V)

7---Option, "x" of the model part number to be 0-9, A-Z, which will represent the special request of customer.

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Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Notes
Continuous non-operating Input Voltage	-0.3	-	80	V	
Input Transient Voltage	-	-	100	V	100 mS maximum
Remote On/Off	-0.3	-	18	V	
I/O Isolation Voltage	-	-	1500	V	
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.

Input Specifications

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage	36	48	72	V	
Input Current	-	-	9	A	
Input Current (no load)	-	60	100	mA	
Remote Off Input Current	-	3	6	mA	
Input Reflected Ripple Current (rms)	-	2	-	mA	With simulated source impedance of 10uH, 5Hz to 20MHz. Use a 100uF/100V electrolytic capacitor with ESR=1 ohm max, at 200KHz@25°C.
Input Reflected Ripple Current (pk-pk)	-	10	-	mA	
I ² t Inrush Current Transient	-	-	TBD	A ² s	
Turn-on Voltage Threshold	-	34	35	V	
Turn-off Voltage Threshold	32	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 15A on system board. Refer to the fuse manufacturer's datasheet for further information.

Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output Voltage Set Point	11.94	12.00	12.06	V	Vin=48V, Io=50% load at 25C ambient.
Load Regulation	-	500	650	mV	Vin=36-40V, Io=0~100% load at 25C ambient.
	-	20	40	mV	Vin=40-72V, Io=0~100% load at 25C ambient.
Line Regulation	-	700	850	mV	Vin=36-40V, Io=100% load at 25C ambient.
	-	20	40	mV	Vin=40-72V, Io=100% load at 25C ambient.
Regulation Over Temperature (-40deg.C-85deg.C)	-	150	300	mV	Vin=36-40V, Io=100% load at 25C ambient.
	-	20	40	mV	Vin=40-72V, Io=100% load at 25C ambient.

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Output Specifications (continued)

Parameter		Min	Typ	Max	Unit	Notes
Output Ripple and Noise(pk-pk)		-	50	100	mV	0-20MHz BW, with a 1 μ F ceramic capacitor, a 10 μ F Tantalum cap and a 270 μ F Tantalum cap at output.
Output Ripple and Noise(rms)		-	10	20	mV	
Output Ripple and Noise(pk-pk) under worst case		-	-	150	mV	
Output Current Range		0	-	25	A	
Output DC Current Limit		25	28	31	A	
Short Circuit Surge Transient		-	-	TBD	A ² s	loutsurge
Rise time		-	12	15	mS	
Turn on Time	Enable form Vin	-	25	30	mS	
	Enable form ON/OFF	-	25	30	mS	
Overshoot at Turn on		-	0	3	%	
Output Capacitance		270	-	10000	μ F	
Transient Response						
ΔV 50% ~ 75% of Max Load		-	300	-	mV	di/dt=0.1A/ μ s, Vin=48Vdc, Ta=25°C, with a 1 μ F ceramic capacitor, a 10 μ F Tantalum cap and a 270 μ F Tantalum cap at output.
Settling Time		-	500	-	μ S	
ΔV 75% ~ 50% of Max Load		-	300	-	mV	
Settling Time		-	500	-	μ S	

Note: All specifications are typical at nominal input, full load at 25°C unless noted.

General Specifications

Parameter	Min	Typ	Max	Unit	Notes
Efficiency(Vin =48V; Io=Io, max)	-	95.2	-	%	The efficiency is measured at Vin=48V, full load and Ta=25°C.
Switching Frequency	-	350	-	kHz	
Over Temperature Protection	-	135	-	°C	
Dimensions Inches (L x W x H) Millimeters (L x W x H)	2.30 x 0.900 x 0.51 58.42 x 22.86 x 12.95			-	
Weight	-	43	-	g	
Isolation characteristics					
Input to Output	-	-	1500	V	
Input to Case	-	-	1500	V	
Output to Case	-	-	500	V	
Isolation Resistance	10M	-	-	Ohm	
Isolation Capacitance	-	1000	-	pF	

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

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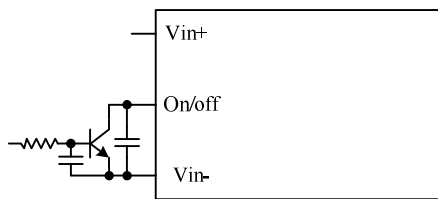
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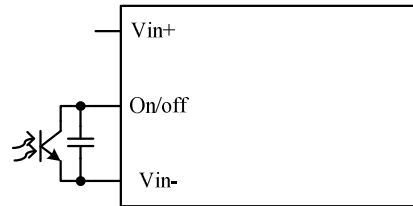
Remote On/Off

Parameter		Min	Typ	Max	Unit	Notes
Signal Low (Unit On)	Active Low	-0.3	-	0.8	V	Remote On/Off pin is open, the module is off.
Signal High (Unit Off)		2.4	-	18	V	
Current Sink		0	-	1	mA	

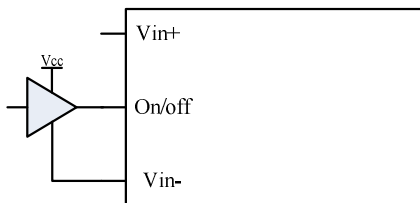
Recommended remote on/off circuit for active low



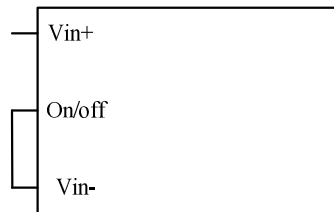
Control with open collector/drain circuit



Control with photocoupler circuit

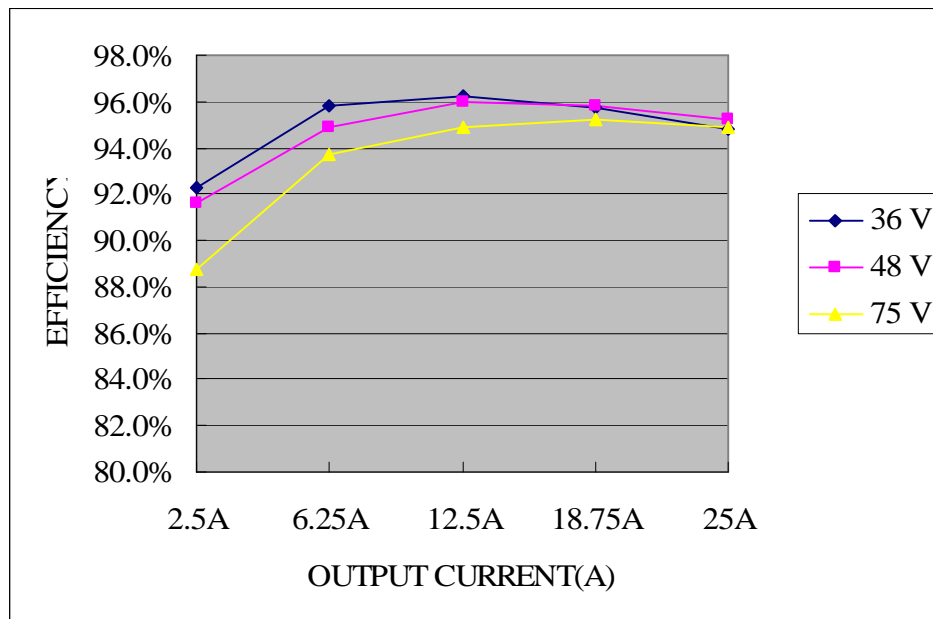


Control with logic circuit



Permanently on

Efficiency Data



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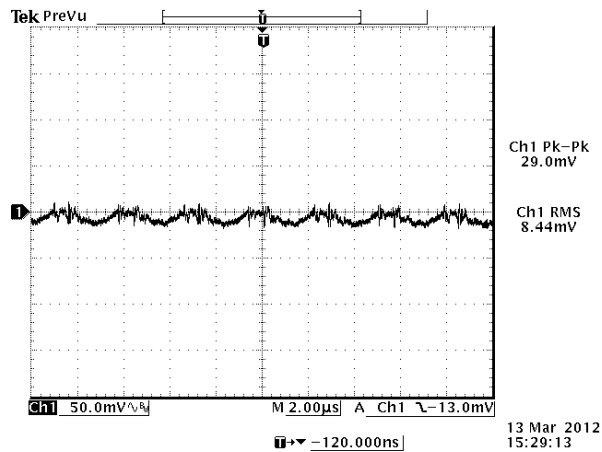
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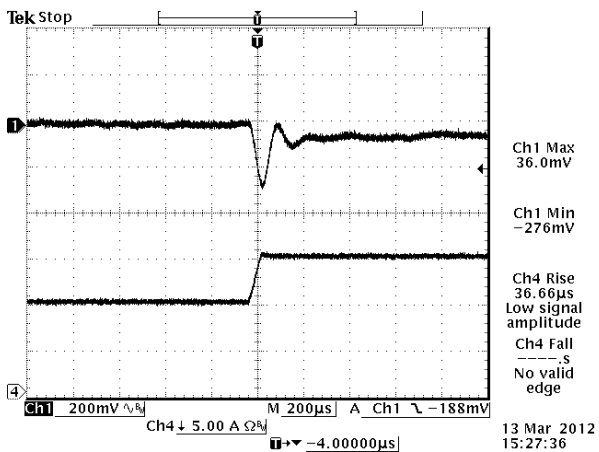
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Ripple and Noise Waveforms

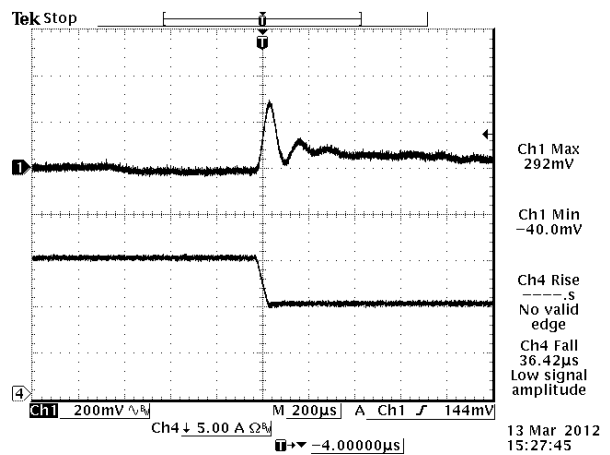


Notes: Ripple and noise at full load, 48Vdc input, 12Vdc/25A output and $T_a=25$ deg C, and with a 1µF ceramic cap and a 270 µF Tantalum cap at output.

Transient Response Waveforms



$V_{out}= 12V$ 50%-75% Load Transients at
 $V_{in}=48 V$ @ $T_a=25^{\circ}C$



$V_{out}= 12V$ 75%-50% Load Transients at $V_{in}=48 V$
 $V_{in}=48 V$ @ $T_a=25^{\circ}C$

Note: Transient Response: $di/dt=0.1A/\mu S$, 1µF ceramic cap and 270µF Tantalum cap at output.

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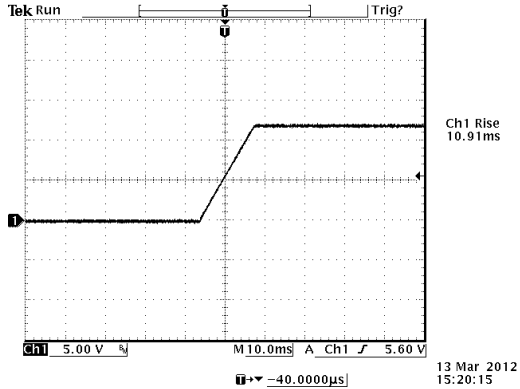


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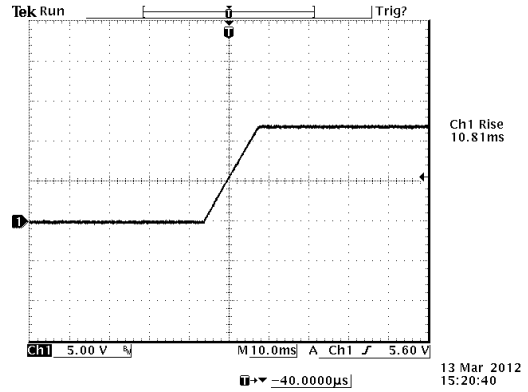
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Startup & Shutdown

Rise time

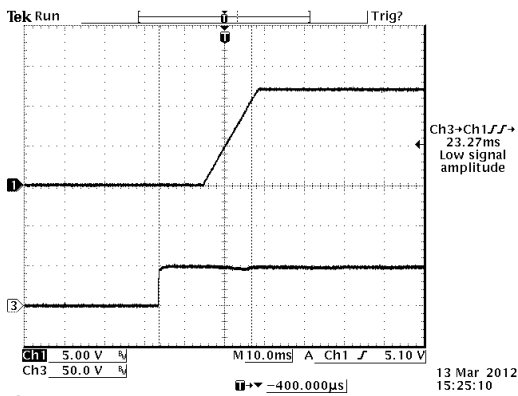


Vout=12V/25A at Vin=48V @ Ta=25°C
Cext =270µF

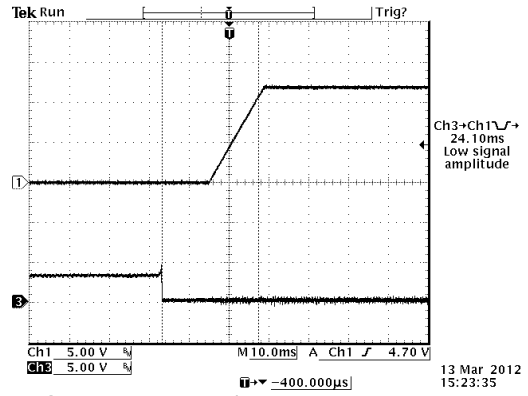


Vout=12V/25A at Vin=48V @ Ta=25°C
Cext =10000µF

Startup time

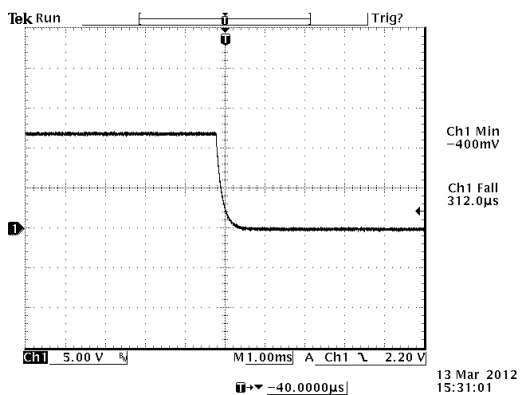


Startup from Vin
Ch1: Vo
Ch3: Vin
Vout=12V/25A at Vin=48V @ Ta=25°C

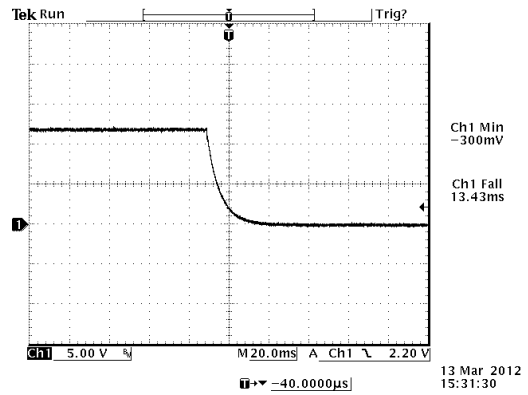


Startup from on/off
Ch1: Vo
Ch3: on/off
Vout=12V/25A at Vin=48V @ Ta=25°C

Shutdown



Vout= 12V/25A at Vin=48V @ Ta=25°C
Cext =270µF



Vout=12V/25A at Vin=48V @ Ta=25°C
Cext =10000µF

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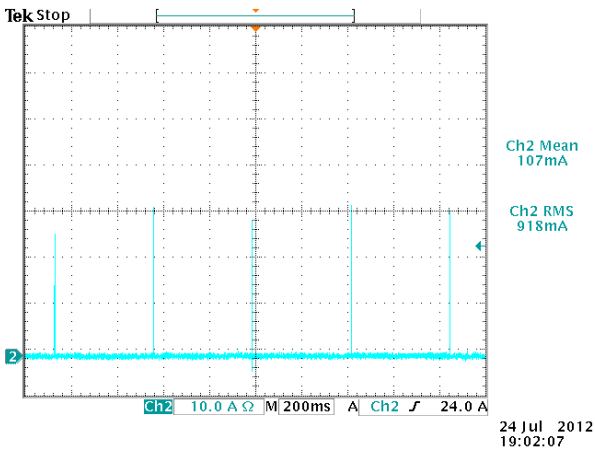


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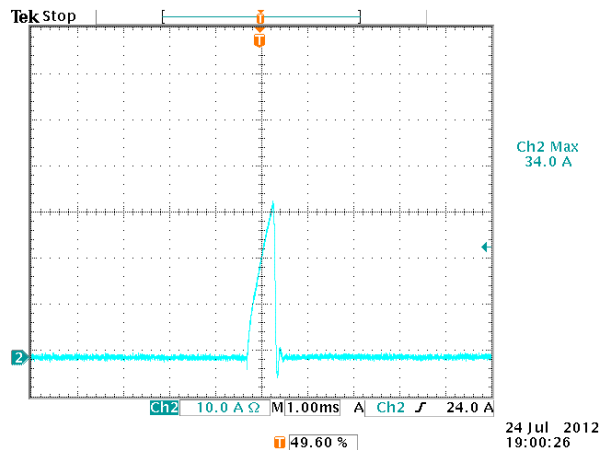
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Over Current Protection

To provide protection in a fault output overload condition, the module is equipped with internal over current protection circuitry. If the overcurrent condition occurs, the module will shut down into hiccup mode and restart once every 400mS. The module operates normally when the output current goes into specified range.

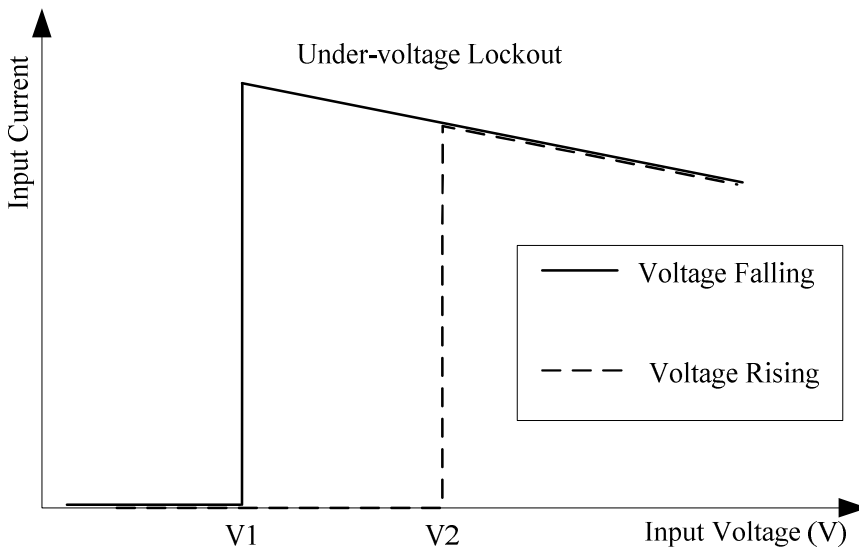


Vin=48V@Ta=25°C



Expansion of on time portion of above figure
CH1: Output Voltage
CH2: Output current waveform

Input under-voltage lockout



V1=33V
V2=34.5V

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Safety

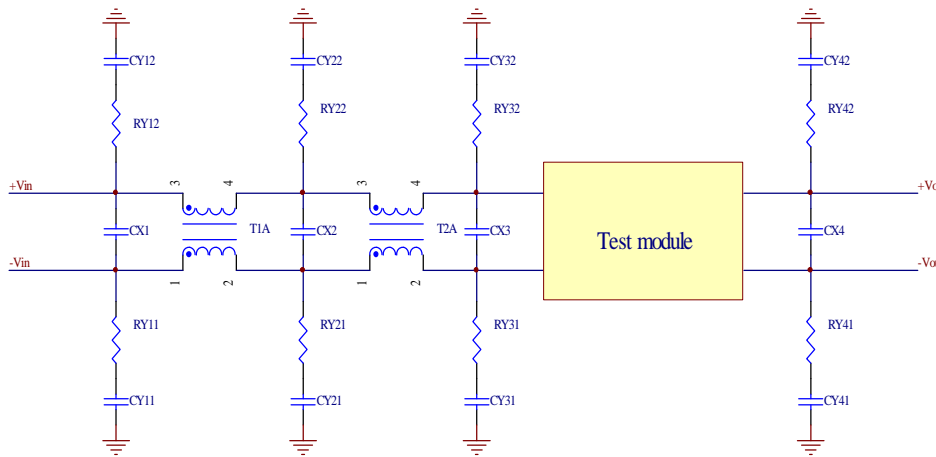
Safety :

Material flammability: UL94V-0
TUV certification to EN60950-1
UL certification to UL60950-1

EMC:

1. Surge: IEC61000-4-5
 2. DC-DIP: IEC61000-4-29
 3. Conductive EMI: EN55022 class A
- Compliance to EN55022 class A (both q.peak and average) with the following inductive and capacitive filter.

Setup:



Item	Designator	Parameter	Vendor	Vendor P/N
1	CX2	100uF/100V, AL cap		
2	CX3	220uF/100V, AL cap		
3	CY31	2*6.8nF/1000V,ceramic		
4	CY32	2*6.8nF/1000V,ceramic		
5	CY41	6.8nF/1000V,ceramic		
6	CY42	6.8nF/1000V,ceramic		
7	RY31	1206,0R,Resistor		
8	RY32	1206,0R,Resistor		
9	RY41	1206,0R,Resistor		
10	RY42	1206,0R,Resistor		
11	T2A	0.81mH, common mode		
12	T1A,CX1,CX2 RY11,RY21,RY12 RY22,CY11, CY12,CY22	NIL		

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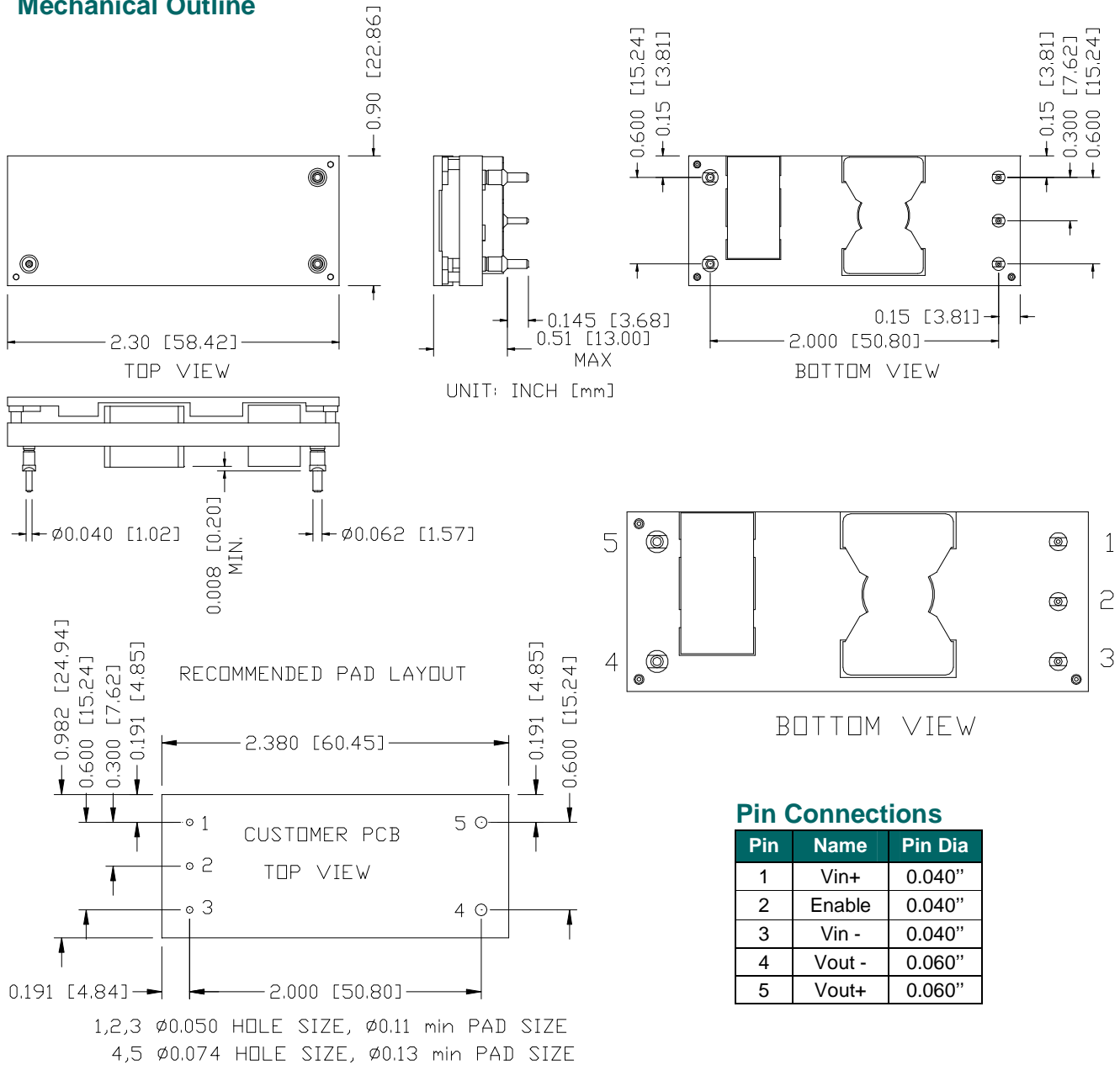
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Mechanical Outline



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.

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).

ISOLATED DC/DC CONVERTERS

48 Vdc Input 12 Vdc /25 A Output



Jul. 25, 2012

Bel Power Inc., a subsidiary of Bel Fuse Inc.

Revision History

Date	Revision	Changes Detail	Approval
2012-7-25	A	First release	Zhao Tang

RoHS Compliance

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



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