

ISOLATED DC/DC CONVERTERS

48 Vdc Input 28 Vdc /25 A Output

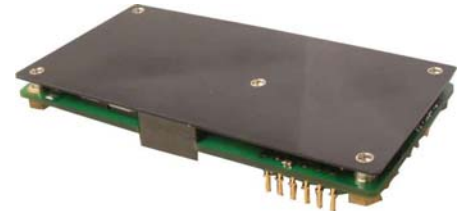
bel
POWER PRODUCTS

0RFB-S0T280

RoHS Compliant

Rev.C

- Isolated
- Fixed Frequency (300 kHz)
- High Efficiency
- High Power Density
- Low Cost
- Input Over-Voltage Lockout
- Input Under-Voltage Lockout
- Basic Isolation
- Over Temperature Protection Lockout
- Output Over-Voltage Latch Off
- SCP/OCP (Hiccup Mode)
- Isolation Remote On/Off
- Auxiliary Bias Power
- Inverter Operation Good (Power Good)
- Heatsink for Extended Operation (Option)
- Parallel Operation Using Forced Current Sharing (Option)



Description

The 0RFB-S0T280 is an isolated dc/dc converter that operates from a nominal 48 Vdc source. These units will provide up to 700 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, input under-voltage and over-voltage lockout. This converter is provided in an industry standard full brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number
28 Vdc	48 Vdc	25 A	700 W	91%	0RFB-S0T280

- Notes:** 1. Add "G" suffix at the end of the model number to indicate Tray Packaging.
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage	-0.3 V	-	80 V	
Remote On/Off	-10 mA	-	5 mA	
I/O isolation voltage	-	-	1500 V	
Ambient Temperature	-40 °C	-	100 °C	It's the temperature of baseplate.
Storage Temperature	-55 °C	-	125 °C	

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

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	76 V	
Input Current (no load)	-	100 mA	150 mA	
Input Current (full load)	-	-	23 A	
Remote Off Input Current	-	40 mA	60 mA	
Input Reflected Ripple Current (pk-pk)	-	30 mA	-	With simulated source impedance of 15 uH, 5 Hz to 20 MHz; use 2* 220 uF/100 V electrolytic capacitor with ESR = 1 ohm max at 200 kHz
Input Reflected Ripple Current (rms)	-	10 mA	-	
I ² t Inrush Current Transient	-	-	1 A ² s	
Turn-on Voltage Threshold	33 V	34.5 V	35.5 V	
Turn-off Voltage Threshold	31 V	33 V	34 V	
Input Over Voltage Lockout	76 V	78 V	80 V	

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

Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point	27.72 V	28.00 V	28.28 V	V _{in} =48 V, full load		
Load Regulation	-	-	56 mV			
Line Regulation	-	-	56 mV			
Regulation Over Temperature (-40deg.C-85deg.C)	-	-	300 mV			
Output Current Range	0 A	-	25 A			
Output Voltage Trim Range	16.8 V	-	32.2 V			
Output DC Current Limit	26.25 A	30 A	35 A			
Ripple and Noise (rms)	-	-	80 mV	Over all load, line and temperature conditions.		
Ripple and Noise (pk-pk)	-	-	280 mV			
Turn on Time	20 mS	40 mS	80 mS			
Overshoot at Turn on	-	0%	2%			
Output Capacitance	0 uF	-	5000 uF			
Transient Response						
50% ~ 75% Max Load	Overshoot	V _O =28 V	-	800 mV	di/dt=0.1A/us, V _{in} =48 Vdc, with a 1 uF ceramic capacitor and a 470 uF low ESR aluminum load capacitor at output, T _a =25 °C.	
	Settling Time		-	500 uS		800 uS
75% ~ 50% Max Load	Overshoot		-	800 mV		1200 mV
	Settling Time		-	500 uS		800 uS

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

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	88%	91%	-	V _{in} =48 V, full load
Switching Frequency	-	300 kHz	-	
Isolation Capacitance	-	1500 pF	-	
Isolation Resistance	10 M Ohm	-	-	
Input to Output	-	-	1500 V	
Input to Case	-	-	1500 V	
Output to Case	-	-	500 V	
Auxiliary Output Voltage ¹	7 V	-	10 V	
I _{OG} Pin Max Applied Voltage ²	-	-	35 V	
Remote Sense compensation	0 V		2 V	
Over Temperature Protection	-	105 °C	-	It's the temperature of baseplate.
Over Voltage Protection	33 V	-	35.8 V	
Temperature Limits for Power Derating Curves				
Semiconductor Junction Temperature	-	-	120 °C	
PCB Board Temperature	-	-	125 °C	
Transformer Temperature	-	-	125 °C	
MTBF	TBD			Calculated Per Bell Core SR-332 (V _{in} =48 V, I _o =normal, T _a = 25 °C)
Dimensions	Inches millimeters			4.60 x 2.40 x 0.50 116.8 x 61.0 x 12.69
Weight	-	150 g	-	

Notes: 1. Aux pin source current ≤20 mA, ground for the AUX terminal is -S terminal.

2. The signal is low when inverter is normally operating and HIGH when inverter stops or operating abnormally, maximum sink current is 5 mA.

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

Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
The Converter ON	I _{sink}	1 mA	-	5 mA
The Converter Off		-10 mA	-	0 mA

Note: +ON/OFF, -ON/OFF terminal, Isolation withstand voltage to input or output or baseplate:500 Vdc.

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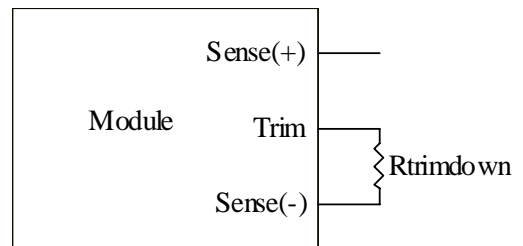
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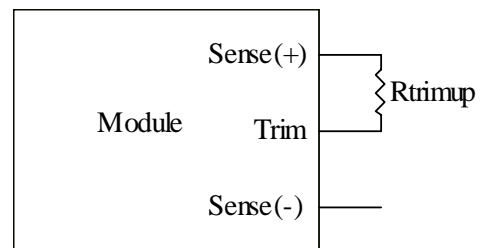
Output Trim Equations

1. 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(+) pin. Only one of the resistors should be used for any given application.

$$R_{trimdown} = \frac{600}{|\delta|} - 6 [k\Omega]$$



$$R_{trimup} = \frac{(100 + \delta) \cdot V_o \cdot 6 - 600}{\delta} - 6 [k\Omega]$$



Note:

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

V_{o_req}=Desired(trimmed) output voltage[V], Output voltage V_o=28 V

2. Output Voltage Adjustment by applying external voltage:

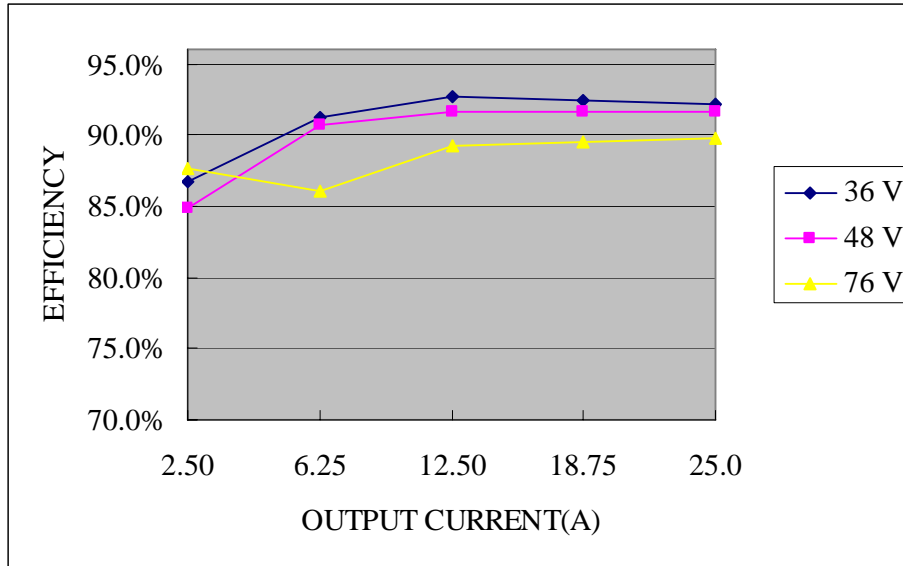
V_{out}=Trim Terminal Voltage X Nominal Output Voltage.

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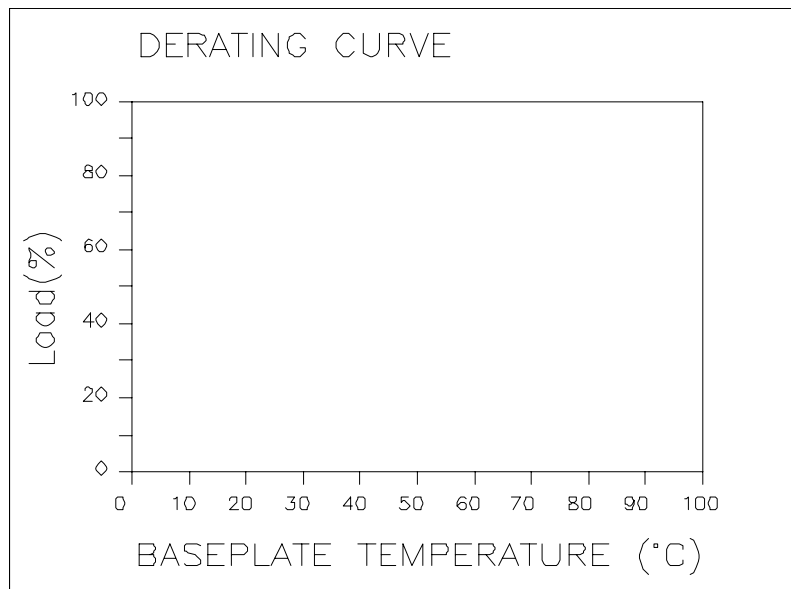
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Efficiency Data



Thermal Derating Curve



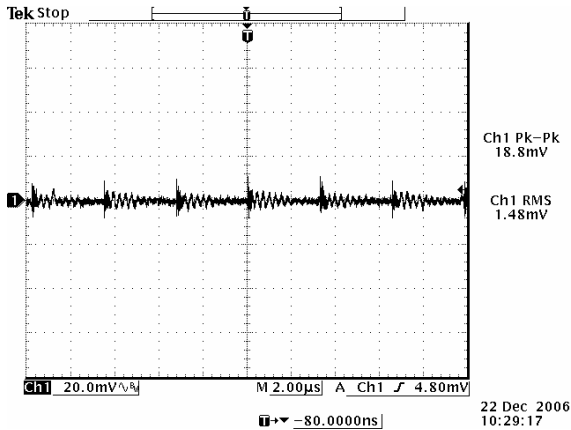
- Notes:**
1. VIN=48 V, with maximum junction temperature of semiconductors derated to 120C.
 2. Custom need to add extended heatsink to keep the baseplate temperature.

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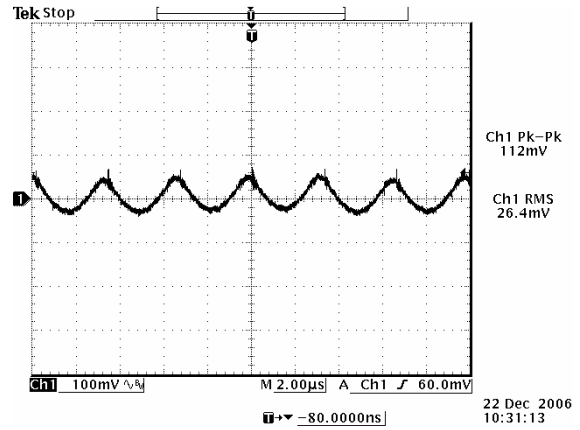
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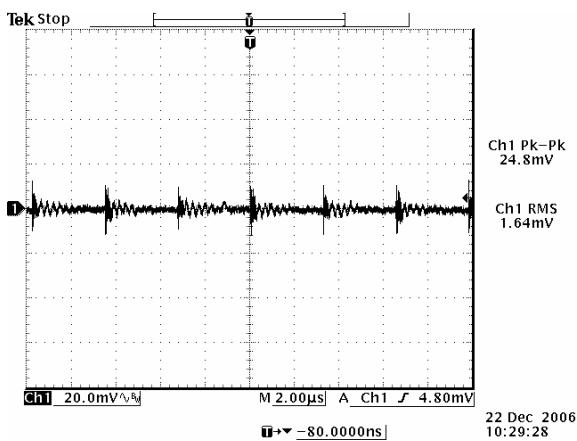
Ripple and Noise Waveforms



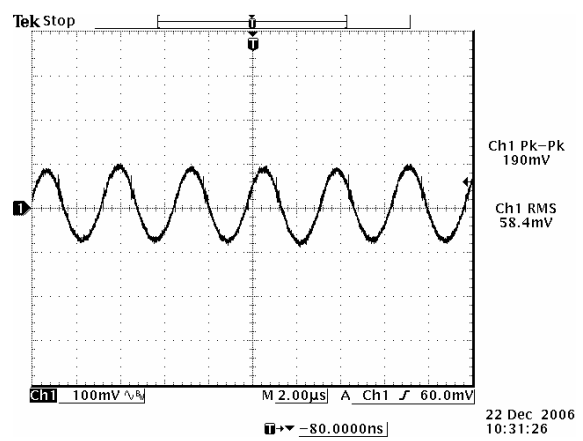
Ripple and noise at no load, 36 Vdc input



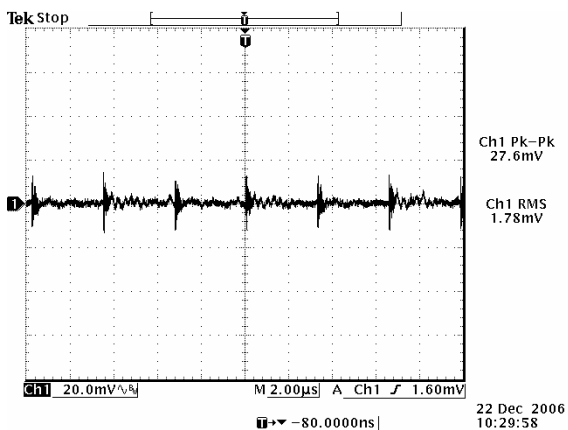
Ripple and noise at full load, 36 Vdc input



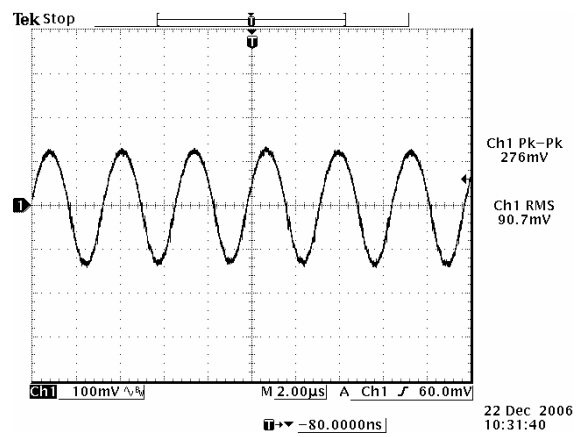
Ripple and noise at no load, 48 Vdc input



Ripple and noise at full load, 48 Vdc input



Ripple and noise at no load, 76 Vdc input



Ripple and noise at full load, 76 Vdc input

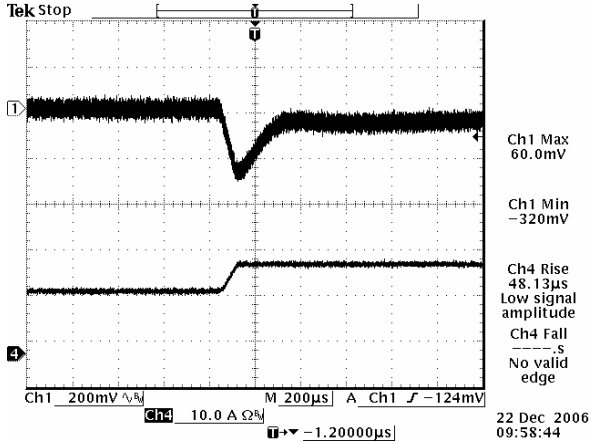
Note: Ripple and noise at 0-20MHz BW, with a 10 uF and a 1 uF ceramic cap, 28 Vdc output, Ta=25 deg C.

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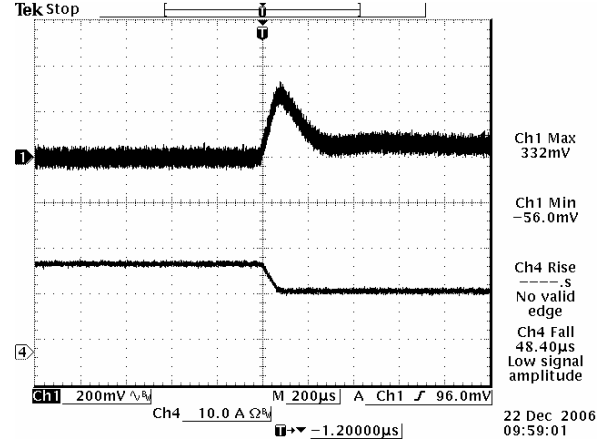
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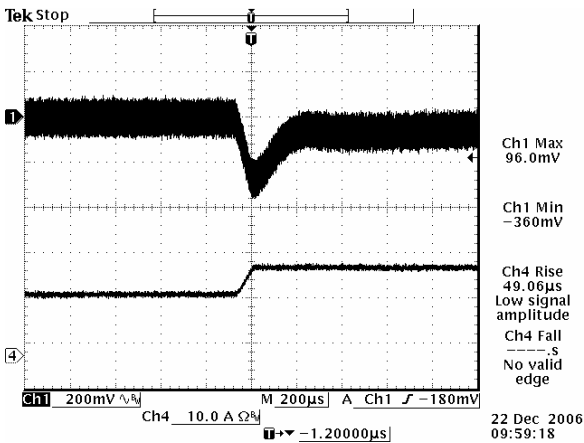
Transients Response Waveforms



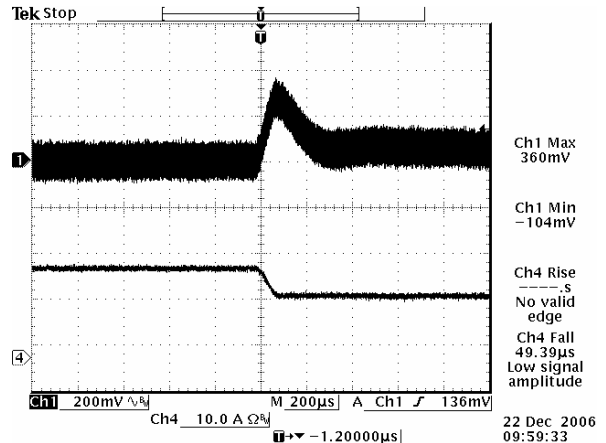
50%-75% Load Transients at Vin=36 V



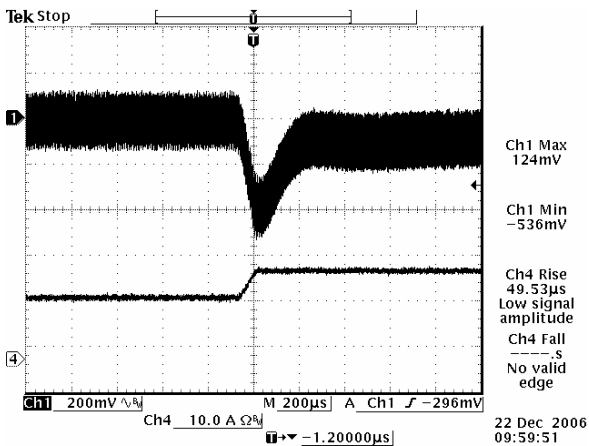
75%-50% Load Transients at Vin=36 V



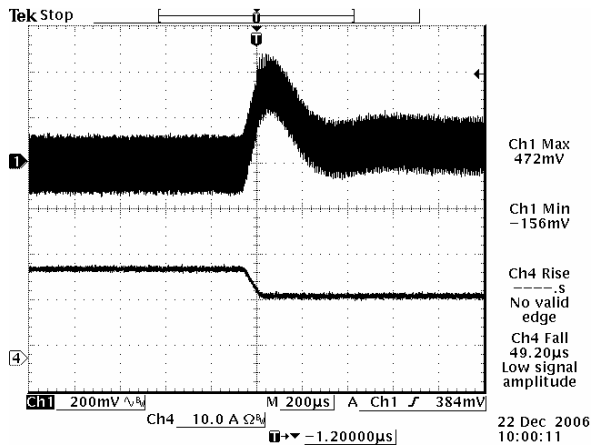
50%-75% Load Transients at Vin=48 V



75%-50% Load Transients at Vin=48 V



50%-75% Load Transients at Vin=76 V



75%-50% Load Transients at Vin=76 V

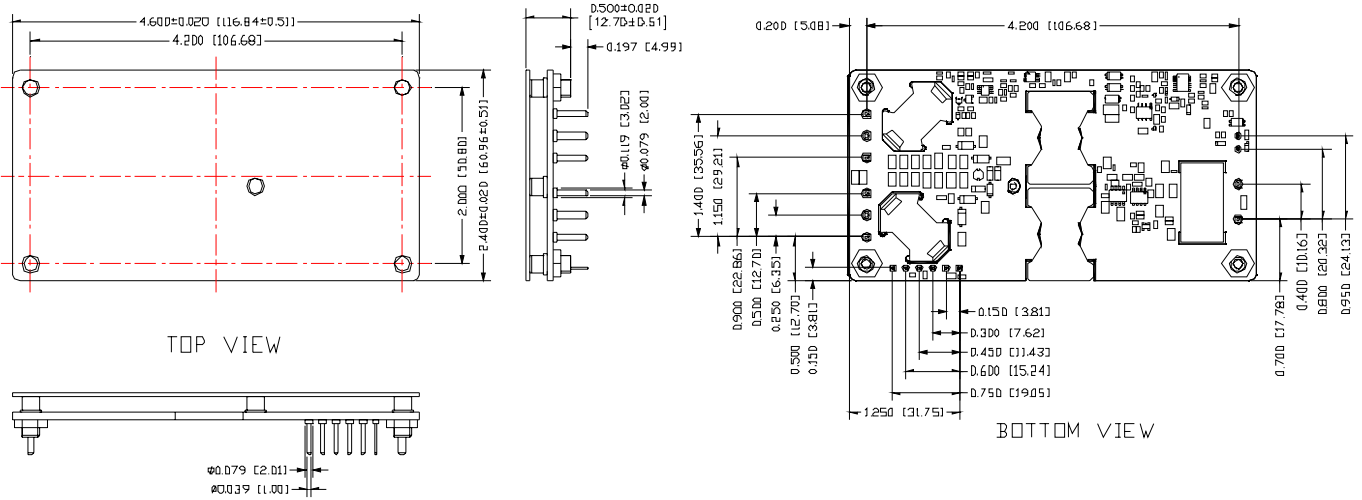
Note: Transient response with external electrolytic cap 4700 uF, Ta=25 deg C.

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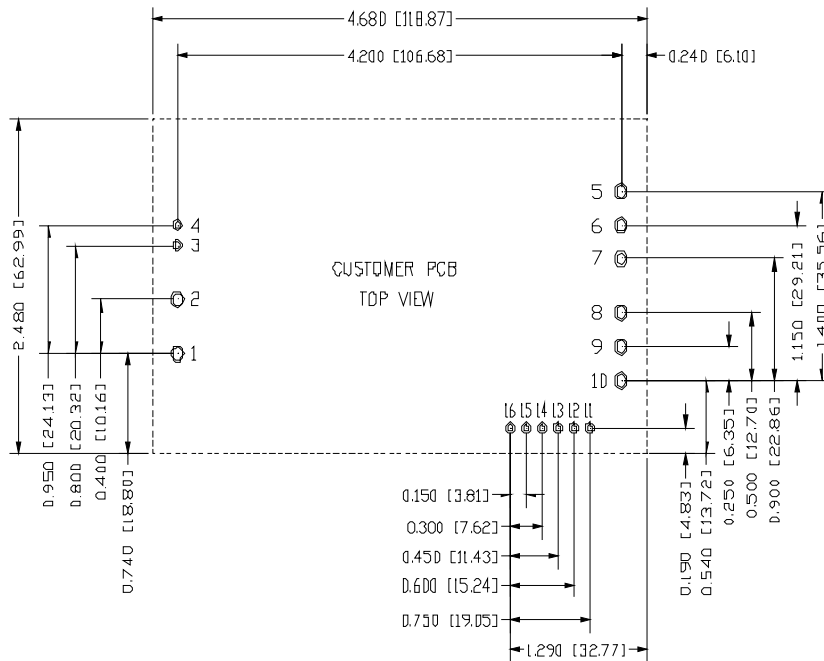
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Mechanical Outline



RECOMMENDED PAD LAYOUT



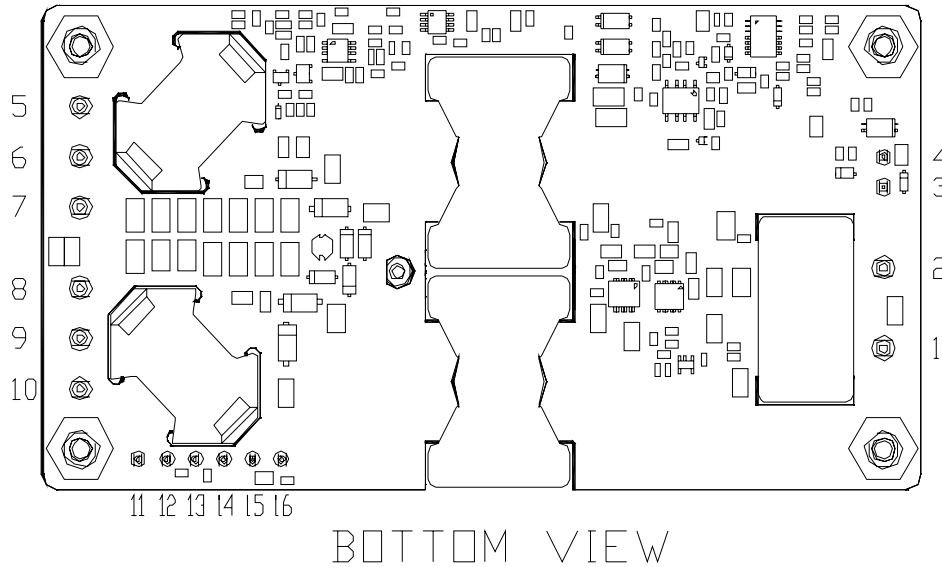
1,2,5,6,7,8,9,10 $\phi 0.047$ PAD HOLE SIZE,
 $\phi 0.08$ min PAD SIZE, BOTH SIDE,
 3,4,11,12,13,14,15,16 $\phi 0.093$ HOLE SIZE,
 $\phi 0.12$ min PAD SIZE, BOTH SIDE.

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Mechanical Outline (continued)



Pin Connections

Pin	Function	Pin Size	Pin	Function	Pin Size
1	Vin(-)	0.079"	9	Vout(-)	0.079"
2	Vin(+)	0.079"	10	Vout(-)	0.079"
3	On/Off(-)	0.039"	11	SENSE(-)	0.039"
4	On/Off(+)	0.039"	12	SENSE(+)	0.039"
5	Vout(+)	0.079"	13	TRIM	0.039"
6	Vout(+)	0.079"	14	PC	0.039"
7	Vout(+)	0.079"	15	IOG	0.039"
8	Vout(-)	0.079"	16	AUX	0.039"

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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