

## ISOLATED DC/DC CONVERTERS

36 - 75 Vdc Input 48.5 Vdc /3 A Output

**bel**  
POWER PRODUCTS

0RXW-C5T48L

RoHS Compliant

Rev.A

- Isolated
- Fixed Frequency (300 kHz)
- High Efficiency
- High Power Density
- Input Under-Voltage Lockout
- Input Over-Voltage Protection
- Output Over-Voltage Protection
- Over Temperature Protection
- SCP/OCP
- Low Cost
- Remote On/Off



### Description

The 0RXW-C5T48L is an isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit provides up to 150 W of output power from a nominal 48 Vdc input. Features include remote on/off, short circuit protection, over current protection, over-temperature protection, output over-voltage protection, input over-voltage protection and input under-voltage lockout. This converter is provided in a compact, through-hole package that is easy to use and provides good thermal performance.

### Part Selection

| Output Voltage | Input Voltage   | Max. Output Current | Max. Output Power | Typical Efficiency | Model Number |
|----------------|-----------------|---------------------|-------------------|--------------------|--------------|
| 48.5 Vdc       | 36 Vdc - 75 Vdc | 3 A                 | 150 W             | 91%                | 0RXW-C5T48L  |

**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   | 100 V for 100 mS Max |
| Remote On/Off       | -0.3 V | -   | 15 V   |                      |
| Ambient Temperature | -40 °C | -   | 85 °C  |                      |
| Storage Temperature | -55 °C | -   | 125 °C |                      |

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

### Input Specifications

| Parameter                                 | Min  | Typ    | Max                | Notes                                                                                                                              |
|-------------------------------------------|------|--------|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage                             | 36 V | 48 V   | 75 V               |                                                                                                                                    |
| Input Current (no load)                   | -    | -      | 50 mA              |                                                                                                                                    |
| Input Current (full load)                 | -    | -      | 5 A                |                                                                                                                                    |
| Remote Off Input Current                  | -    | 5 mA   | 10 mA              |                                                                                                                                    |
| Input Reflected Ripple Current (pk-pk)    | -    | 10 mA  | 30 mA              | With simulated source impedance of 12 uH, 5 Hz to 20 MHz; use a 47 uF/100 V electrolytic capacitor with ESR = 1 ohm max at 200 kHz |
| Input Reflected Ripple Current (rms)      | -    | 2 mA   | 5 mA               |                                                                                                                                    |
| I <sup>2</sup> t Inrush Current Transient | -    | -      | 1 A <sup>2</sup> s |                                                                                                                                    |
| Turn-on Voltage Threshold                 | 34 V | 35 V   | 36 V               |                                                                                                                                    |
| Turn-off Voltage Threshold                | 33 V | 34.5 V | 35.5 V             |                                                                                                                                    |

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

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### Output Specifications

| Parameter                | Min       | Typ    | Max        | Notes                                                                                       |                                    |
|--------------------------|-----------|--------|------------|---------------------------------------------------------------------------------------------|------------------------------------|
| Output Voltage Set Point | 50.2 V    | 50.5 V | 50.8 V     | V <sub>in</sub> =48 V, no load                                                              |                                    |
|                          | 48.2 V    | 48.5 V | 48.8 V     | V <sub>in</sub> =48 V, full load                                                            |                                    |
| Line Regulation          | -         | 50 mV  | 200 mV     |                                                                                             |                                    |
| Temperature Coefficient  | -         | -      | 0.02%Vo/°C |                                                                                             |                                    |
| Output Current Range     | 0 A       | -      | 3 A        |                                                                                             |                                    |
| Output DC Current Limit  | 5.4 A     | -      | 6.8 A      | Hiccup Mode                                                                                 |                                    |
| Ripple and Noise (rms)   | -         | 50 mV  | 100 mV     | 0 - 20 MHz BW, with 1 uF ceramic load capacitor and a 47uF electrolytic capacitor at output |                                    |
| Ripple and Noise (pk-pk) | -         | 150 mV | 250 mV     |                                                                                             |                                    |
| Start-Up Time            | -         | 30 mS  | 100 mS     | Power up                                                                                    |                                    |
|                          | -         | 30 mS  | 100 mS     | Remote on/off                                                                               |                                    |
| Rise Time                | -         | 20 mS  | 30 mS      | Power up                                                                                    |                                    |
|                          | -         | 20 mS  | 30 mS      | Remote on/off                                                                               |                                    |
| Overshoot at Turn on     | -         | -      | 3%         |                                                                                             |                                    |
| Output Capacitance       | 47 uF     | -      | 1200 uF    |                                                                                             |                                    |
| Transient Response       |           |        |            |                                                                                             |                                    |
| DV 25% - 50% of Max Load | Vo=48.5 V | -      | 750 mV     | 1000 mV                                                                                     | di/dt=0.1A/us, Vin=48Vdc, Ta=25°C. |
| DV 50% - 25% of Max Load |           | -      | 750 mV     | 1000 mV                                                                                     |                                    |
| DV 50% - 75% of Max Load |           | -      | 750 mV     | 1000 mV                                                                                     |                                    |
| DV 75% - 50% of Max Load |           | -      | 750 mV     | 1000 mV                                                                                     |                                    |

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

### General Specifications

| Parameter                   | Min                                           | Typ     | Max     | Notes                                                                                                   |
|-----------------------------|-----------------------------------------------|---------|---------|---------------------------------------------------------------------------------------------------------|
| Efficiency                  | 87%                                           | 91%     | -       | V <sub>in</sub> =48 V, full load                                                                        |
| Switching Frequency         | 270 kHz                                       | 300 kHz | 330 kHz |                                                                                                         |
| I/O Isolation Voltage       | 1500 V                                        | -       | -       |                                                                                                         |
| Isolation Capacitance       | -                                             | 2300 pF | -       |                                                                                                         |
| Isolation Resistance        | 10 MΩ                                         | -       | -       |                                                                                                         |
| Remote Sense Compensation   | -                                             | -       | 500 mV  |                                                                                                         |
| Output Voltage Trim Range   | -5%Vo                                         | -       | +1%Vo   |                                                                                                         |
| Over Temperature Protection | 110 °C                                        | -       | 120 °C  | PCB temperature, NO LATCH                                                                               |
|                             | 5 °C                                          | 10 °C   | -       | Hysteresis                                                                                              |
| Over Voltage Protection     | 53 V                                          | 55 V    | 56 V    | LATCH                                                                                                   |
| MTBF                        | -                                             | TBD     | -       | Calculated Per Bell Core SR-332 (V <sub>in</sub> =48 V, I <sub>o</sub> =normal, T <sub>a</sub> = 25 °C) |
| Dimensions                  | Inches (L × W × H)<br>Millimeters (L × W × H) |         |         | 2.28 x 2.4 x 0.5<br>57.91 x 60.96 x 12.70                                                               |
| Weight                      | -                                             | 100 g   | -       |                                                                                                         |

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

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### Control Specifications

| Parameter              | Min        | Typ | Max   | Notes                                 |
|------------------------|------------|-----|-------|---------------------------------------|
| <b>Remote On/Off</b>   |            |     |       |                                       |
| Signal Low (Unit On)   | Active Low | -   | 1.2 V | The remote on/off pin open, Unit Off. |
| Signal High (Unit Off) |            |     | 15 V  |                                       |

### Output Trim 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 pin. Only one of the resistors should be used for any given application.

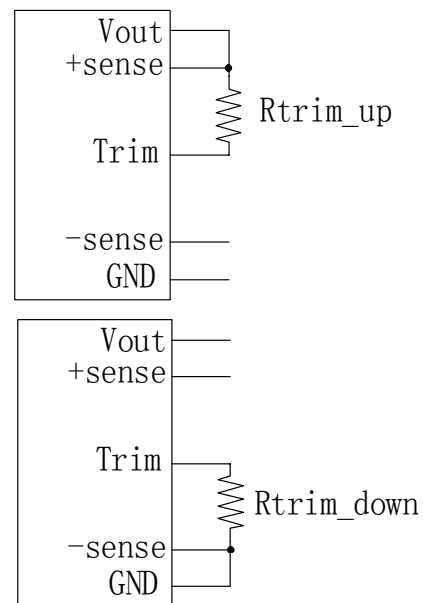
$$R_{trim\_up} = \frac{(100 + \delta) \times V_o - 124}{1.24 \times |\delta|} - 2$$

$$R_{trim\_down} = \frac{100}{|\delta|} - 2$$

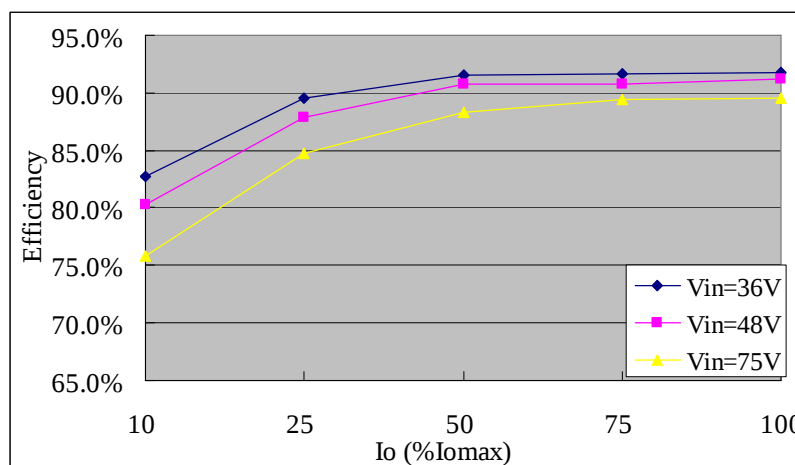
Note:

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

V<sub>adj</sub> is the desired output voltage  
V<sub>o</sub>=50.481 V @I<sub>out</sub>=0



### Efficiency Data

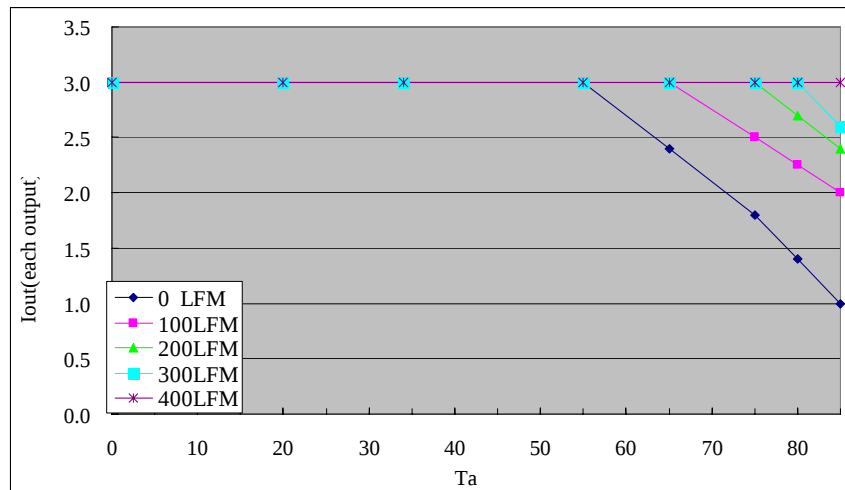


## ISOLATED DC/DC CONVERTERS

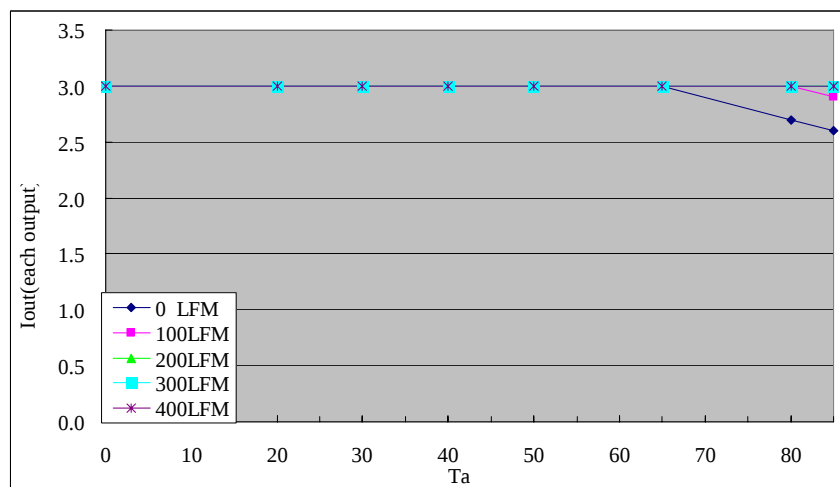
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### Thermal Derating Curves



Test condition:  $V_{in}=48V$  without heatsink



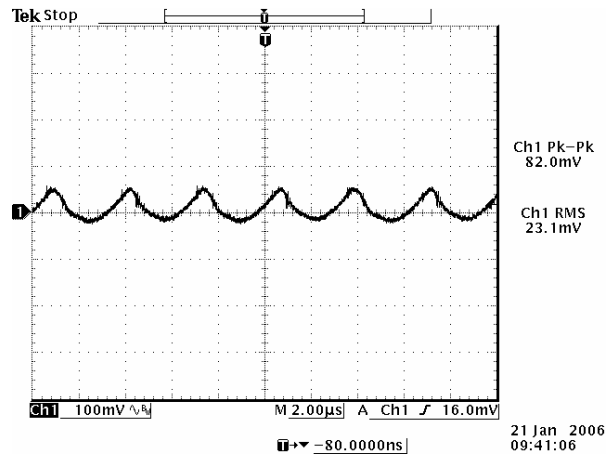
Test condition:  $V_{in}=48V$  with heatsink

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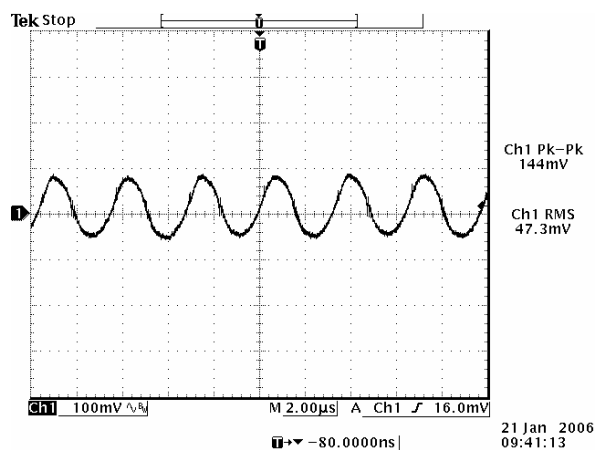
36 - 75 Vdc Input 48.5 Vdc /3 A Output



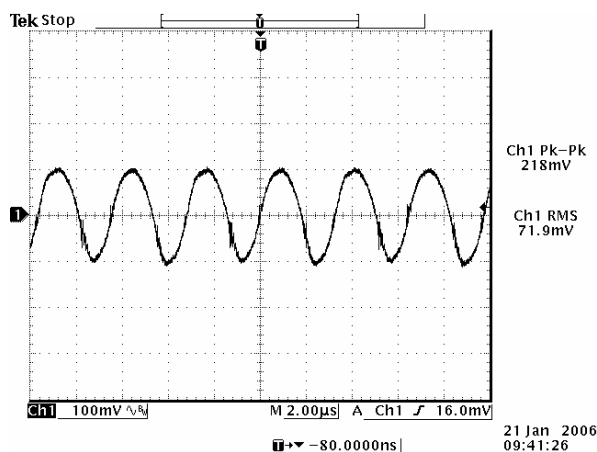
### Ripple and Noise



Vin=36 V



Vin=48 V



Vin=75 V

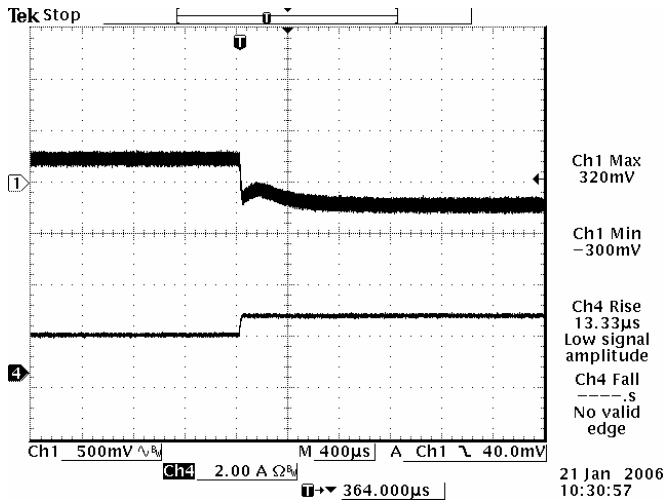
**Note:** Ripple and noise at full load, with a 1µF ceramic capacitor and 47µF electrolytic capacitor, Ta=25 deg C.

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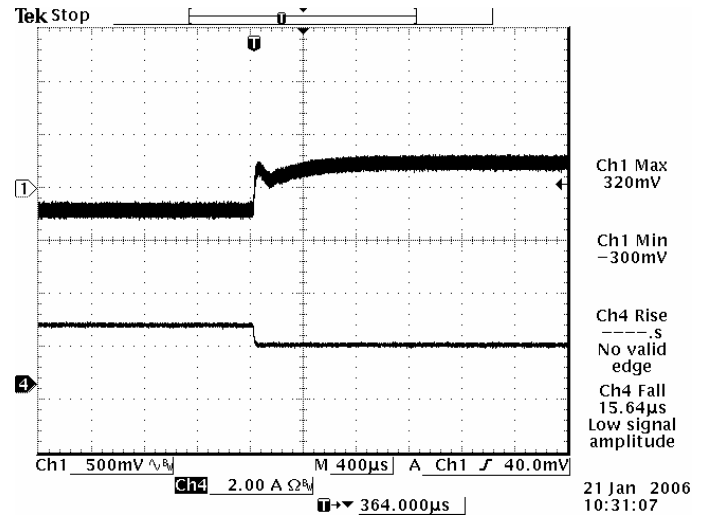
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### Transients Responses

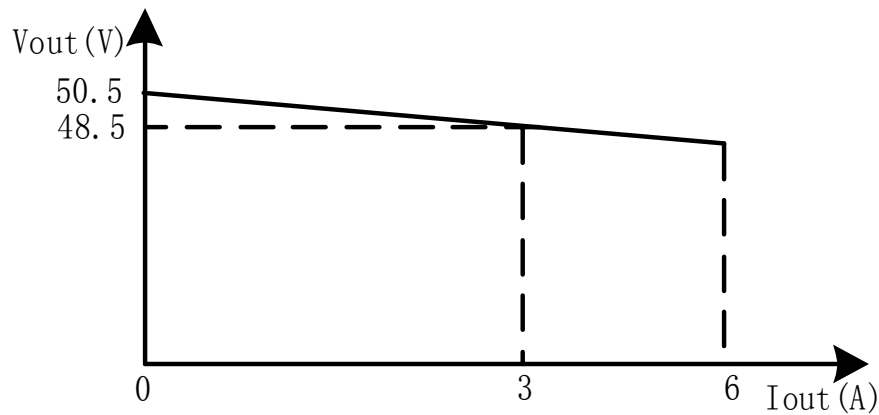


50%-75% Load Transients at Vin=48 V@Ta=25°C



75%-50% Load Transients at Vin=48 V@Ta=25°C

### Load Characteristic



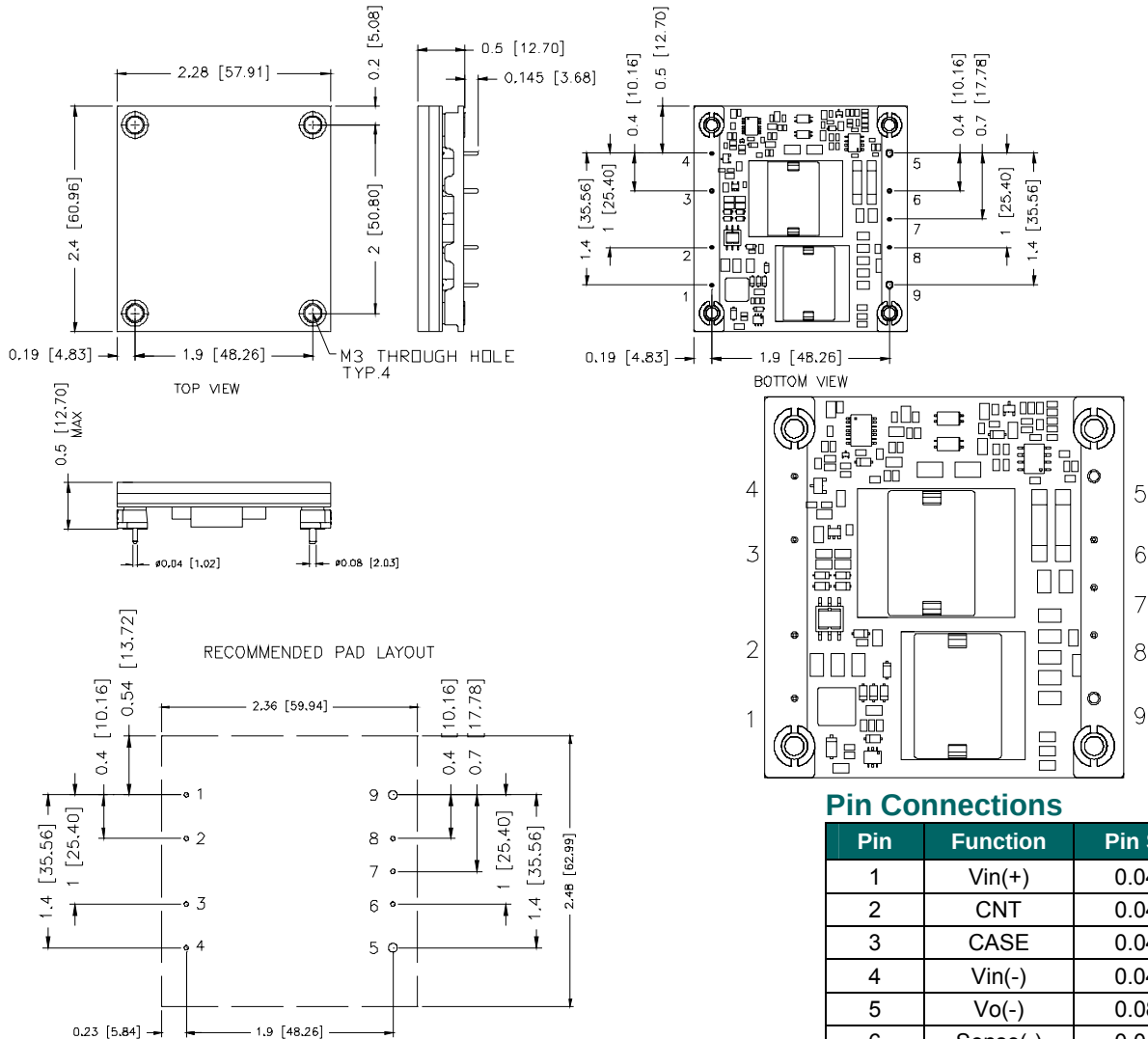
$$V_{out} = 40.711 \times (1.24 - I_{out} \times 16.5 \times 10^{-3})$$

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## Mechanical Outline



1,2,3,4,6,7,8 Ø 0.047 HOLE SIZE, Ø 0.08 min PAD SIZE, BOTH SIDE  
5,9 Ø 0.093 HOLE SIZE, Ø 0.12 min PAD SIZE, BOTH SIDE

## Pin Connections

| Pin | Function | Pin Size |
|-----|----------|----------|
| 1   | Vin(+)   | 0.040"   |
| 2   | CNT      | 0.040"   |
| 3   | CASE     | 0.040"   |
| 4   | Vin(-)   | 0.040"   |
| 5   | Vo(-)    | 0.080"   |
| 6   | Sense(-) | 0.040"   |
| 7   | Trim     | 0.040"   |
| 8   | Sense(+) | 0.040"   |
| 9   | Vo(+)    | 0.080"   |

## 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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