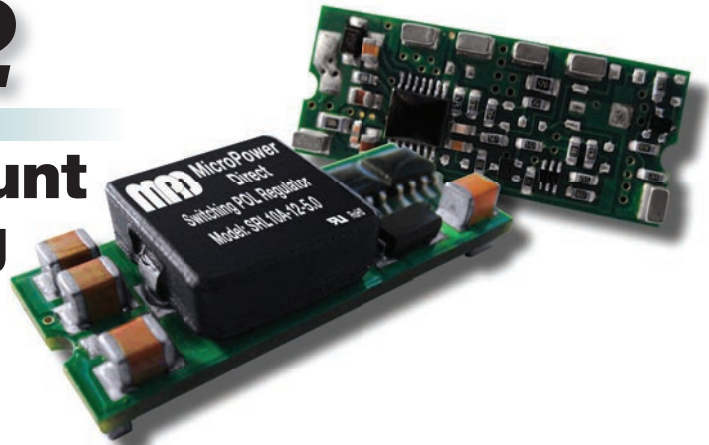


SRL10A-12

Miniature Surface Mount 10A Output, Switching POL Regulators



Key Features:

- 10A Output Current
- Wide 9.0V - 14V Input Range
- Efficiency to 95%
- EN 60950 Approved (UL)
- Miniature SMT Construction
- Short Circuit Protected
- Thermal Shutdown
- Remote On/Off Control
- Industry Standard Footprint



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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---------------------------------|--|------|------|------|--------|
| Input Voltage Range | $V_{OUT} \leq 4.5V$ | 9.0 | 12.0 | 14.0 | VDC |
| Under Voltage Lockout, Power Up | Turn On Voltage Threshold | | 8.0 | | VDC |
| | Turn Off Voltage Threshold | | 7.7 | | |
| | Lockout Hysteresis Voltage | | 0.3 | | |
| Maximum Input Current | $I_{OUT} = 100\%$, $V_{IN} = 0$ to 14 VDC | | | 7.0 | A |
| Off Input Current | Input Idle Current | | | 10 | mA |
| Turn On Delay Time | | | 3.5 | | mS |
| Input Filter | Capacitive | | | | |
| Input Reflected Ripple Current | See Note 1 | | 200 | | mA P-P |

Output

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-------------------------------------|------------------------------|------|------|-------|--------|
| Output Voltage/Current | See Model Selection Guide | | | | |
| Output Voltage Tolerance | | | | ±1.5 | % |
| Line Regulation | $V_{IN} = \text{Min to Max}$ | | | ±0.2 | % |
| Load Regulation | $I_{OUT} = 0\%$ to 100% | | | ±0.5 | % |
| Ripple & Noise (20 MHz) | See Note 2 | | | 50 | mV P-P |
| | | | | 20 | mV RMS |
| Transient Recovery Time, See Note 3 | 50% Load Change | | | 200 | µSec |
| Temperature Coefficient | | | | ±0.03 | %/°C |
| Short Circuit Protection | Continuous (Hiccup Mode) | | | | |
| Over Temperature Protection | See Note 4 | | 120 | | °C |
| Overload Protection | See Note 5 | 15 | 17 | 20 | A |

General

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---------------------|--------------|------|------|------|-------|
| Isolation Voltage | Not Isolated | | | | |
| Switching Frequency | Fixed | | 300 | | kHz |

Remote On/Off, See Note 6

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------------|-------------------------|------|------|------------------|-------|
| Unit On | Logic High | | | Open or V_{IN} | |
| Unit Off | Logic Low | 0.0 | | 0.4 | VDC |
| On/Off Current | $V_{ON}/V_{OFF} = 0.0V$ | | | 1 | mA |

Environmental

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------------------------|---|------|------|------|-------|
| Operating Temperature Range | Ambient | -40 | +25 | +85 | °C |
| Storage Temperature Range | | -55 | | +125 | °C |
| Cooling | Free Air Convection (See Derating Curves) | | | | |
| Humidity | RH, Non-condensing | | | 93 | % |

Physical

| | |
|--------|---|
| Size | 1.3 x 0.53 x 0.346 Inches (33.0 x 13.46 x 8.8 mm) |
| Weight | 0.299 Oz (8.5g) |

Reliability Specifications

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|------------------|---------------------------------|------|------|------|--------|
| MTBF | MIL HDBK 217F, 25°C, Gnd Benign | | 980 | | kHours |
| Safety Standards | UL 60950, EN 60950 | | | | |

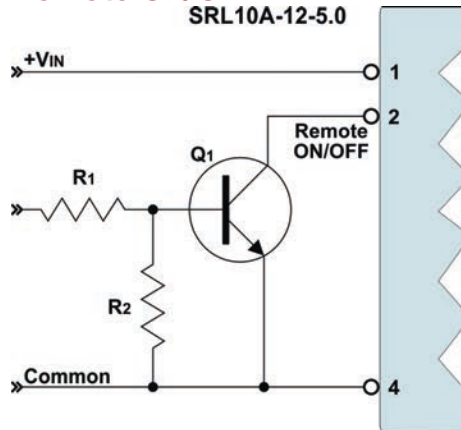
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| Model Number | Input | | Output | | | Efficiency (% Typ) | Capacitive Load (µF Max) | Fuse Rating Slow-Blow (A) |
|---------------|---------------------|-----------------------------------|---------------|------------------|------------------|--------------------|--------------------------|---------------------------|
| | Voltage (VDC) Range | Current (mA) Full-Load No-Load | Voltage (VDC) | Current (A, Max) | Current (A, Min) | | | |
| SRL10A-12-5.0 | 9.0 - 14.0 | 992 | 40 | 0.75 | 10.0 | 0.0 | 8,000 | 20 |
| | | 1,163 | 50 | 1.20 | | | | |
| | | 1,404 | 50 | 1.50 | | | | |
| | | 1,666 | 60 | 1.80 | | | | |
| | | 1,823 | 60 | 2.00 | | | | |
| | | 2,264 | 60 | 2.50 | | | | |
| | | 2,956 | 70 | 3.30 | | | | |
| | | 4,385 | 70 | 5.00 | | | | |

Notes:

1. Measured over a bandwidth of 5 Hz to 20 MHz using a 1 µH inductor.
2. Output ripple is measured at 20 MHz bandwidth using a 1.0 µF ceramic capacitor and a 10 µF tantalum capacitor connected in parallel as close to the output terminals as possible.
3. Transient recovery is measured to within a 200 mV error band for a 50% load change.
4. These units include a non-latching over temperature protection circuit. If the temperature exceeds approximately 120°C at the monitored "hot spot", the unit will be shut down. When the temperature decreases, the unit will automatically restart. See page 3 for temperature measurement information.
5. These units will provide up to 150% of rated current. In the event of an over current fault, the unit will go into hiccup mode until the fault is removed.
6. Standard units feature an active high remote control input. See the note and diagram at right.
7. These units do not include an internal fuse. It is recommended that an external slow-blow fuse be used with a rating as shown in the table above.

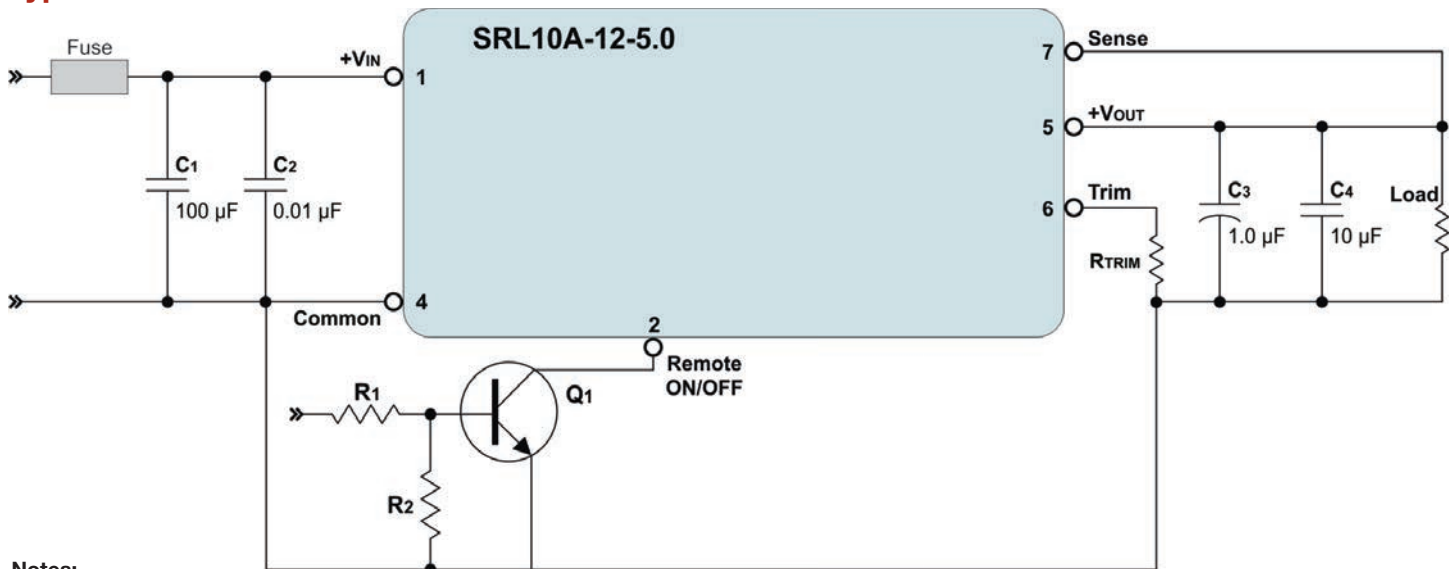
Remote On/Off



These units include an active high On/OFF control input. The unit is "ON" if the input to the control pin (pin 2) is high; or if the pin is left open (or floating). The signal level of the control input is referenced to ground. A recommended drive circuit for the control pin is shown at left. The resistors R1 & R2 have been added to help reduce possible false triggering of the control input due to leakage currents.

Units are available with an active low control input. With this input, the unit will remain off if the control input remains above 2.8 VDC. For more information on the active low option, contact the factory.

Typical Connection



Notes:

Fuse: SRL10A-12 regulators do not include an internal fuse. For safety and protection, an external slow-blow fuse should be placed in the input (+VIN) line. A 20A fuse is recommended.

Input Filter: The unit must be connected to a low AC impedance source, and to avoid loop stability issues, the source inductance should also be low. To significantly reduce ripple caused by the switching action of the POL, the SRL10A-12 includes onboard filtering. However, adding input capacitors C1 and C2 will further reduce ripple currents (C1) and high frequency noise spikes (C2). These capacitors should be placed as close to the input pins as possible (see board layout at right). It is recommended that low ESR (<100 mΩ) and low ESL ceramic capacitors be used. Recommended values are:

| C1 | C2 |
|-----------------|---------|
| 33 µF to 250 µF | 0.01 µF |

Remote ON/OFF: See note above

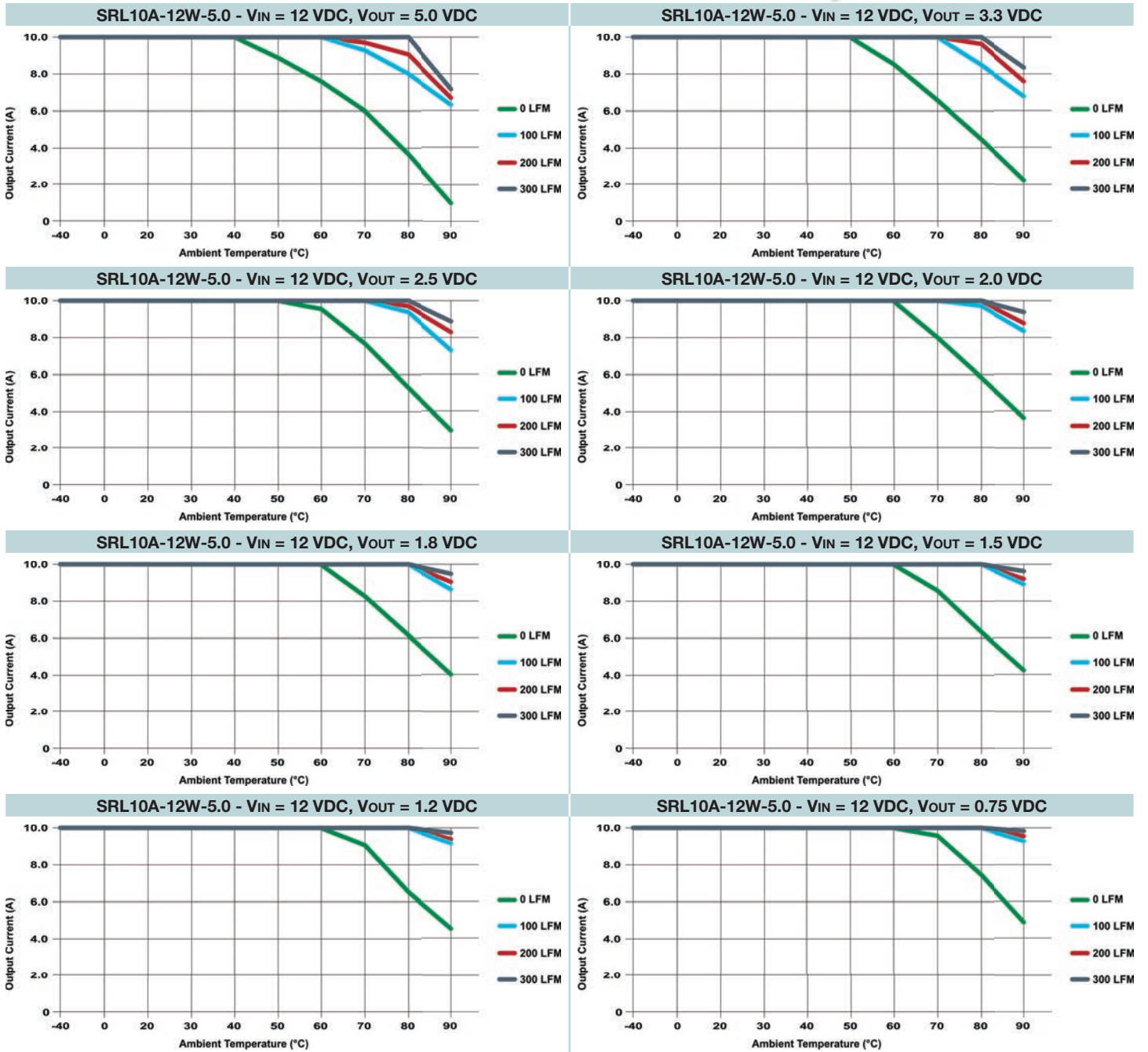
Output Trim: See note on page 4

Remote Sense: The remote sense helps regulate the output voltage at the point of load by minimizing the effects of distribution losses. The voltage between the sense pin (Pin 3) and the point of load should not exceed 500 mV. When using the remote sense function, the output voltage level may rise. Care must be taken not to exceed the maximum rated output power of the regulator. When not in use, the remote sense pin should be tied to the output pin of the regulator.

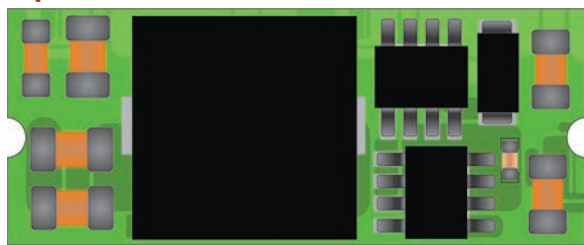
Output Filter: Output filtering is not required, but may be used to further reduce output ripple & noise; or to adjust the transient response time of the unit. Care must be taken not to exceed 8,000 µF, the maximum value of output capacitance the unit is rated for. The values given in the connection diagram are typical for light filtering.



Derating Curves



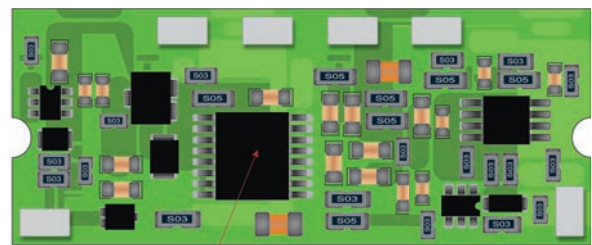
Temperature Measurement



Top



Airflow

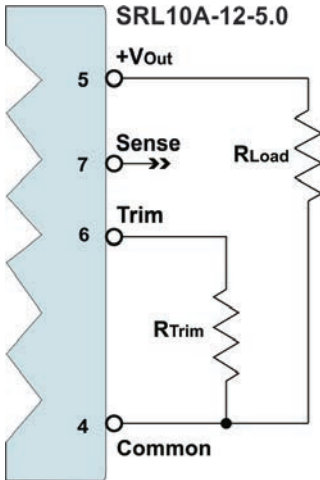


T Reference

Bottom

These switching regulators may be used in a wide variety of thermal environments, but must be properly cooled to ensure long reliable operation. The derating curves shown above are approximations of the ambient temperature and airflow required to maintain the switching regulator temperature below its maximum rating. Airflow should move across the unit, as shown above. Proper cooling can be verified by measuring the temperature at the reference point (as shown at left). The thermocouple should be mounted approximately 0.5 in. off the unit board. The temperature at this location should not exceed 120°C.

Output Voltage Trim



The output voltage level of the **SRL10A-12** series is adjustable over a wide range by the simple addition of an external resistor. This trim resistor is connected between the circuit common and the trim input, as shown in the diagram at left.

The required resistor value for various output levels is given in the table above. To calculate the correct value for a different output level, the formula is:

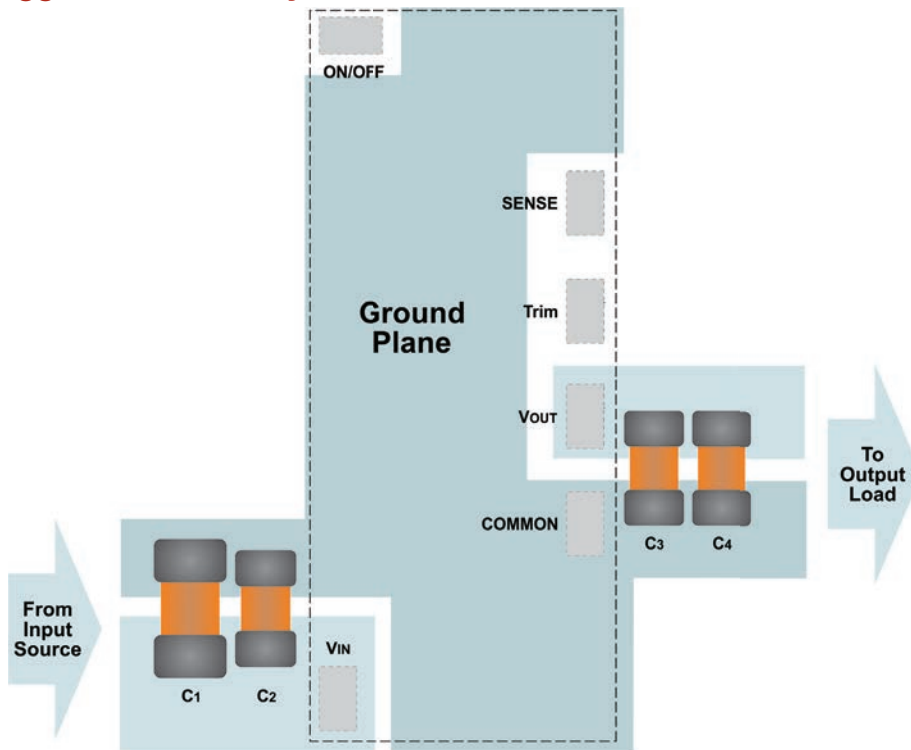
$$R_{TRIM} = \frac{10,500}{V_{OUT} - 0.75} - 1,000$$

Where: R_{TRIM} = The external trim resistor
V_{OUT} = The desired output voltage

If a trim resistor is not connected, the output is 0.75 VDC.

| SRL10A-12-5.0 | |
|------------------------|------------------------|
| V _{OUT} (VDC) | R _{TRIM} (kΩ) |
| 0.75 | Open |
| 1.20 | 22.33 |
| 1.50 | 13.00 |
| 1.80 | 9.00 |
| 2.00 | 7.40 |
| 2.50 | 5.00 |
| 3.30 | 3.12 |
| 5.00 | 1.47 |

Suggested Board Layout

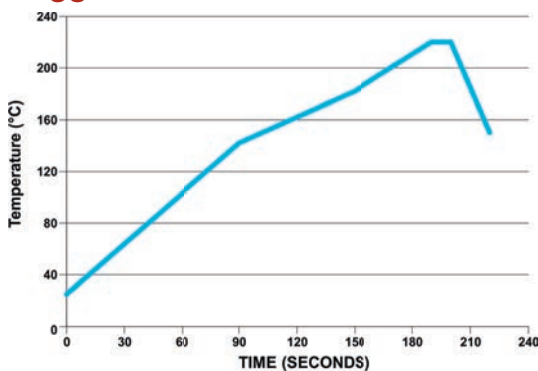


This diagram illustrates a simple board layout for use with the **SRL10A-12** series. As recommended, external components are placed as close to the unit as possible. To help shield external circuitry, the ground plane has been extended under the unit. Any signal traces should not be routed underneath the unit (unless they are on a layer under the ground plane) to avoid unwanted noise interference.

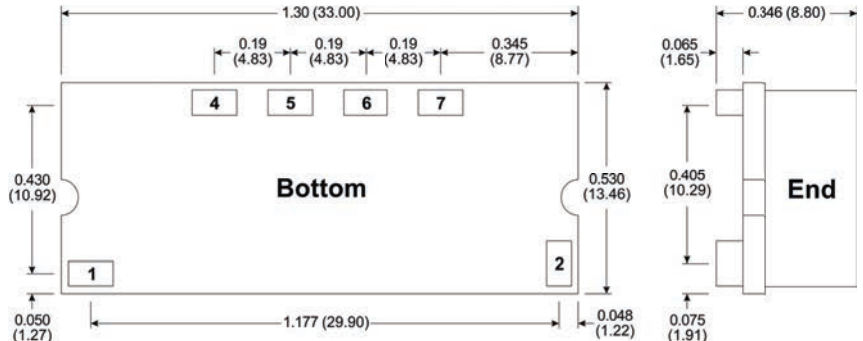
Pin Connections

| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| 1 | +V Input | 5 | +V Output |
| 2 | Sense | 6 | Trim |
| 4 | Common | 7 | Sense |

Suggested Solder Reflow Profile



Mechanical Dimensions



Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)



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