

# Low Power, Low Dropout, 500mA RF Linear Regulators

## FEATURES

- Low Dropout Voltage
- Thermal-Overload Protection
- Output Current Limit
- 10nA Logic-Controlled Shutdown
- 20 $\mu$ A Low Supply Current
- 1.7V to 7.5V Input Voltage Range
- 500mA Output Current
- -40°C to +85°C Operating Temperature Range
- Available in Green UTDFN-1x1-4, SOT23-5, SOT23-3, SOT353(SC70-5) and SOT89-3L (L-Type) Package

## APPLICATIONS

- Cellular Telephones
- Camera Modules
- Modems
- HiFi Audio Radio Transceivers
- PLL/Synthesizer, Clocking
- Medium-Current, Noise-Sensitive Applications

## DESCRIPTION

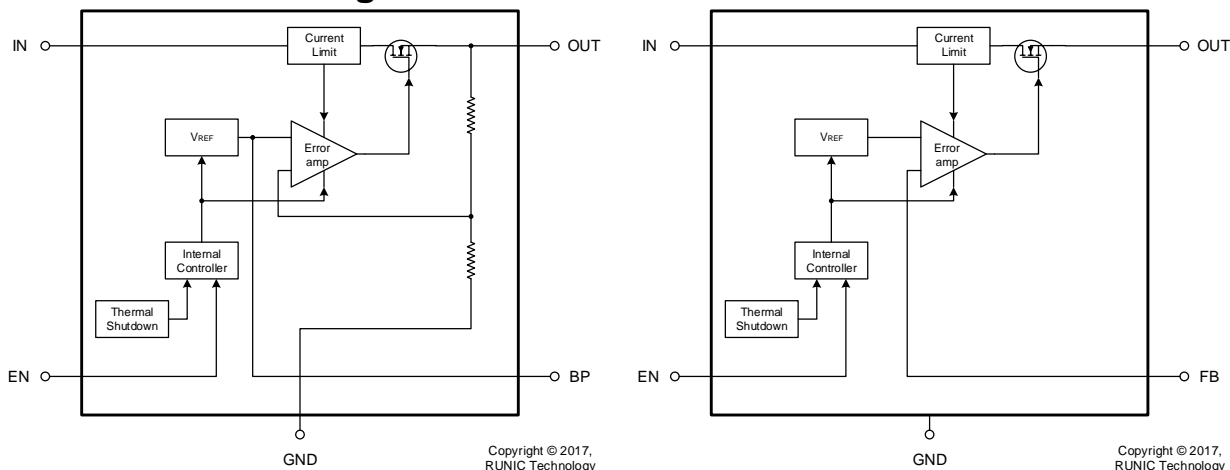
The RS3236 series low-power, low-dropout, CMOS LDO operate from 1.7V to 7.5V input voltage that can supply up to 500 mA of output current. Designed to meet the requirements of RF and analog circuits, the RS3236 series device provides low noise, high PSRR, low quiescent current, and low line and load transient response.

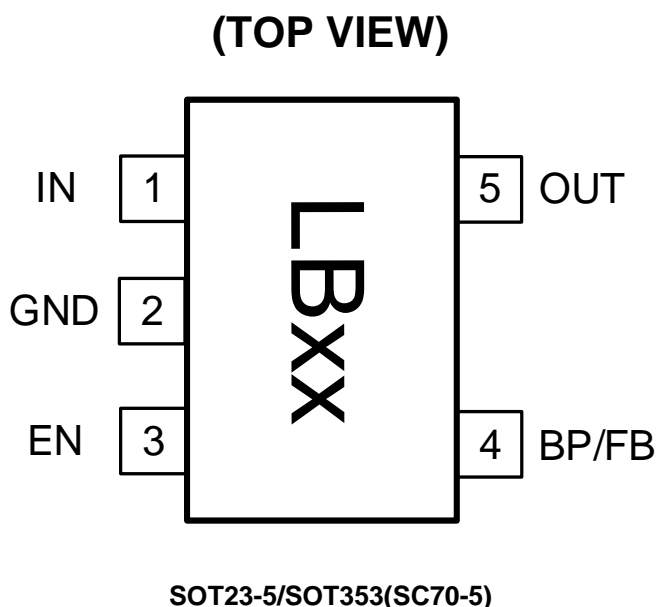
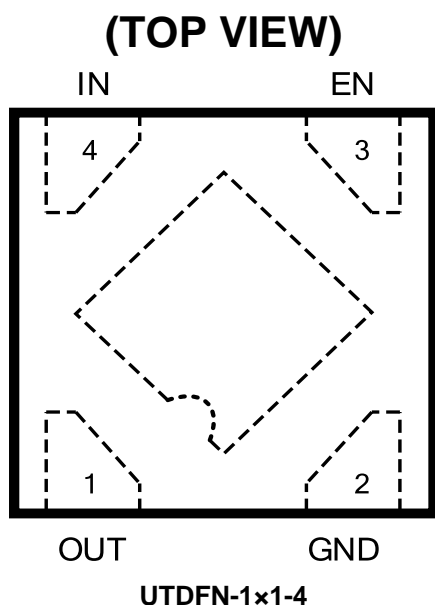
The device is designed to work with a 1- $\mu$ F input and a 1- $\mu$ F output ceramic capacitor (no separate noise bypass capacitor required). An external noise bypass capacitor connected to the device's BP pin can further reduce the noise level.

Other features include a 10nA logic-controlled shutdown mode, foldback current limit and thermal shutdown protection.

The RS3236 series is available in Green UTDFN-1x1-4, SOT23-3, SOT23-5, SOT353(SC70-5) and SOT89-3L(L-Type) package. It operates over an ambient temperature range of -40°C to +85°C.

## Functional Block Diagram

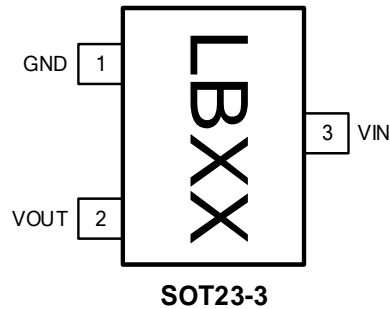


**Pin Configuration and Functions (Top View)**


| <b>UTDFN-1x1-4</b> |             | <b>I/O</b> | <b>DESCRIPTION</b>   |
|--------------------|-------------|------------|--|
| <b>NUMBER</b>      | <b>NAME</b> |            |  |
| 1                  | OUT         | O          | Regulator Output.  |
| 2                  | GND         | G          | Ground.  |
| 3                  | EN          | I          | Enable Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.                    |
| 4                  | IN          | I          | Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND.               |
| Thermal Pad        | -           | -          | Connect the thermal pad to a large-area ground plane. This pad is not an electrical connection to the device ground. |

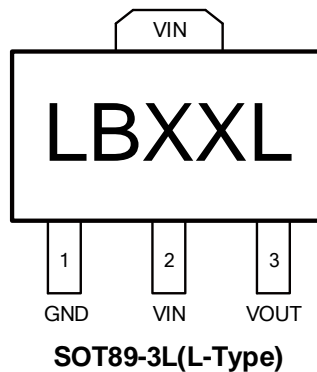
| <b>SOT23-5<br/>/SOT353(SC70-5)</b> |             | <b>I/O</b> | <b>DESCRIPTION</b>  |
|------------------------------------|-------------|------------|---|
| <b>NUMBER</b>                      | <b>NAME</b> |            |   |
| 1                                  | IN          | I          | Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND.  |
| 2                                  | GND         | G          | Ground.   |
| 3                                  | EN          | I          | Enable Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.   |
| 4                                  | BP          | O          | Reference-Noise Bypass (fixed voltage version only). Bypass with a low-leakage 0.01 $\mu$ F ceramic capacitor for reduced noise at the output. The capacitor is recommended to be placed very close to the pin for high PSRR. |
|                                    | FB          |            | Feedback Pin (adjustable voltage version only). This is used to set the output voltage of the device.   |
| 5                                  | OUT         | O          | Regulator Output.   |

### (TOP VIEW)



NOTE: XX indicate Output Voltage, xx indicate DataCode  
 For example: LB33 ( $V_{OUT}=3.3V$ )

| SOT23-3 |      | I/O | DESCRIPTION  |
|---------|------|-----|--|
| NUMBER  | NAME |     |  |
| 1       | GND  | G   | Ground.  |
| 2       | OUT  | O   | Regulator Output.  |
| 3       | IN   | I   | Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND. |



| SOT89-3L(L-Type) |      | I/O | DESCRIPTION  |
|------------------|------|-----|--|
| NUMBER           | NAME |     |  |
| 1                | GND  | G   | Ground.  |
| 2                | IN   | I   | Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND. |
| 3                | OUT  | O   | Regulator Output.  |

**PACKAGE/ORDERING INFORMATION**

| MODEL       | VOUT (V) | PIN-PACKAGE    | ORDERING NUMBER   | PACKAGE MARKING | PACKAGE OPTION       |
|-------------|----------|----------------|-------------------|-----------------|----------------------|
| RS3236-0.8  | 0.8V     | UTDFN-1x1-4    | RS3236-0.8YUTDN4  | BA              | Tape and Reel, 10000 |
| RS3236-1.0  | 1.0V     | UTDFN-1x1-4    | RS3236-1.0YUTDN4  | BB              | Tape and Reel, 10000 |
| RS3236-1.2  | 1.2V     | UTDFN-1x1-4    | RS3236-1.2YUTDN4  | BC              | Tape and Reel, 10000 |
| RS3236-1.5  | 1.5V     | UTDFN-1x1-4    | RS3236-1.5YUTDN4  | BD              | Tape and Reel, 10000 |
| RS3236-1.8  | 1.8V     | UTDFN-1x1-4    | RS3236-1.8YUTDN4  | BE              | Tape and Reel, 10000 |
| RS3236-2.05 | 2.05V    | UTDFN-1x1-4    | RS3236-2.05YUTDN4 | BF              | Tape and Reel, 10000 |
| RS3236-2.5  | 2.5V     | UTDFN-1x1-4    | RS3236-2.5YUTDN4  | BG              | Tape and Reel, 10000 |
| RS3236-2.8  | 2.8V     | UTDFN-1x1-4    | RS3236-2.8YUTDN4  | BH              | Tape and Reel, 10000 |
| RS3236-3.0  | 3.0V     | UTDFN-1x1-4    | RS3236-3.0YUTDN4  | BI              | Tape and Reel, 10000 |
| RS3236-3.3  | 3.3V     | UTDFN-1x1-4    | RS3236-3.3YUTDN4  | BJ              | Tape and Reel, 10000 |
| RS3236-3.6  | 3.6V     | UTDFN-1x1-4    | RS3236-3.6YUTDN4  | BK              | Tape and Reel, 10000 |
| RS3236-4.0  | 4.0V     | UTDFN-1x1-4    | RS3236-4.0YUTDN4  | BL              | Tape and Reel, 10000 |
| RS3236-5.0  | 5.0V     | UTDFN-1x1-4    | RS3236-5.0YUTDN4  | BM              | Tape and Reel, 10000 |
| RS3236-0.8  | 0.8V     | SOT23-5        | RS3236-0.8YF5     | LB08            | Tape and Reel, 3000  |
| RS3236-1.0  | 1.0V     | SOT23-5        | RS3236-1.0YF5     | LB10            | Tape and Reel, 3000  |
| RS3236-1.2  | 1.2V     | SOT23-5        | RS3236-1.2YF5     | LB12            | Tape and Reel, 3000  |
| RS3236-1.5  | 1.5V     | SOT23-5        | RS3236-1.5YF5     | LB15            | Tape and Reel, 3000  |
| RS3236-1.8  | 1.8V     | SOT23-5        | RS3236-1.8YF5     | LB18            | Tape and Reel, 3000  |
| RS3236-2.05 | 2.05V    | SOT23-5        | RS3236-2.05YF5    | LB205           | Tape and Reel, 3000  |
| RS3236-2.5  | 2.5V     | SOT23-5        | RS3236-2.5YF5     | LB25            | Tape and Reel, 3000  |
| RS3236-2.8  | 2.8V     | SOT23-5        | RS3236-2.8YF5     | LB28            | Tape and Reel, 3000  |
| RS3236-3.0  | 3.0V     | SOT23-5        | RS3236-3.0YF5     | LB30            | Tape and Reel, 3000  |
| RS3236-3.3  | 3.3V     | SOT23-5        | RS3236-3.3YF5     | LB33            | Tape and Reel, 3000  |
| RS3236-3.6  | 3.6V     | SOT23-5        | RS3236-3.6YF5     | LB36            | Tape and Reel, 3000  |
| RS3236-4.0  | 4.0V     | SOT23-5        | RS3236-4.0YF5     | LB40            | Tape and Reel, 3000  |
| RS3236-5.0  | 5.0V     | SOT23-5        | RS3236-5.0YF5     | LB50            | Tape and Reel, 3000  |
| RS3236-0.8  | 0.8V     | SOT353(SC70-5) | RS3236-0.8YC5     | LB08            | Tape and Reel, 3000  |
| RS3236-1.0  | 1.0V     | SOT353(SC70-5) | RS3236-1.0YC5     | LB10            | Tape and Reel, 3000  |
| RS3236-1.2  | 1.2V     | SOT353(SC70-5) | RS3236-1.2YC5     | LB12            | Tape and Reel, 3000  |
| RS3236-1.5  | 1.5V     | SOT353(SC70-5) | RS3236-1.5YC5     | LB15            | Tape and Reel, 3000  |
| RS3236-1.8  | 1.8V     | SOT353(SC70-5) | RS3236-1.8YC5     | LB18            | Tape and Reel, 3000  |
| RS3236-2.05 | 2.05V    | SOT353(SC70-5) | RS3236-2.05YC5    | LB205           | Tape and Reel, 3000  |
| RS3236-2.5  | 2.5V     | SOT353(SC70-5) | RS3236-2.5YC5     | LB25            | Tape and Reel, 3000  |
| RS3236-2.8  | 2.8V     | SOT353(SC70-5) | RS3236-2.8YC5     | LB28            | Tape and Reel, 3000  |
| RS3236-3.0  | 3.0V     | SOT353(SC70-5) | RS3236-3.0YC5     | LB30            | Tape and Reel, 3000  |
| RS3236-3.3  | 3.3V     | SOT353(SC70-5) | RS3236-3.3YC5     | LB33            | Tape and Reel, 3000  |
| RS3236-3.6  | 3.6V     | SOT353(SC70-5) | RS3236-3.6YC5     | LB36            | Tape and Reel, 3000  |
| RS3236-4.0  | 4.0V     | SOT353(SC70-5) | RS3236-4.0YC5     | LB40            | Tape and Reel, 3000  |
| RS3236-5.0  | 5.0V     | SOT353(SC70-5) | RS3236-5.0YC5     | LB50            | Tape and Reel, 3000  |

| MODEL       | VOUT (V) | PIN-PACKAGE      | ORDERING NUMBER   | PACKAGE MARKING | PACKAGE OPTION       |
|-------------|----------|------------------|-------------------|-----------------|----------------------|
| RS3236-1.35 | 1.35V    | UTDFN-1x1-4      | RS3236-1.35YUTDN4 | BN              | Tape and Reel, 10000 |
| RS3236-1.85 | 1.85V    | UTDFN-1x1-4      | RS3236-1.85YUTDN4 | BO              | Tape and Reel, 10000 |
| RS3236-3.3  | 3.3V     | UTDFN-1x1-4      | RS3236-3.3AYUTDN4 | BJ              | Tape and Reel, 10000 |
| RS3236-2.7  | 2.7V     | SOT23-5          | RS3236-2.7YF5     | LB27            | Tape and Reel, 3000  |
| RS3236-2.85 | 2.85V    | SOT23-5          | RS3236-2.85YF5    | LB285           | Tape and Reel, 3000  |
| RS3236-0.8  | 0.8V     | SOT23-3          | RS3236-0.8YF3     | LB08            | Tape and Reel, 3000  |
| RS3236-1.0  | 1.0V     | SOT23-3          | RS3236-1.0YF3     | LB10            | Tape and Reel, 3000  |
| RS3236-1.2  | 1.2V     | SOT23-3          | RS3236-1.2YF3     | LB12            | Tape and Reel, 3000  |
| RS3236-1.5  | 1.5V     | SOT23-3          | RS3236-1.5YF3     | LB15            | Tape and Reel, 3000  |
| RS3236-1.8  | 1.8V     | SOT23-3          | RS3236-1.8YF3     | LB18            | Tape and Reel, 3000  |
| RS3236-2.05 | 2.05V    | SOT23-3          | RS3236-2.05YF3    | LB205           | Tape and Reel, 3000  |
| RS3236-2.5  | 2.5V     | SOT23-3          | RS3236-2.5YF3     | LB25            | Tape and Reel, 3000  |
| RS3236-2.8  | 2.8V     | SOT23-3          | RS3236-2.8YF3     | LB28            | Tape and Reel, 3000  |
| RS3236-3.0  | 3.0V     | SOT23-3          | RS3236-3.0YF3     | LB30            | Tape and Reel, 3000  |
| RS3236-3.3  | 3.3V     | SOT23-3          | RS3236-3.3YF3     | LB33            | Tape and Reel, 3000  |
| RS3236-3.6  | 3.6V     | SOT23-3          | RS3236-3.6YF3     | LB36            | Tape and Reel, 3000  |
| RS3236-4.0  | 4.0V     | SOT23-3          | RS3236-4.0YF3     | LB40            | Tape and Reel, 3000  |
| RS3236-5.0  | 5.0V     | SOT23-3          | RS3236-5.0YF3     | LB50            | Tape and Reel, 3000  |
| RS3236-1.8  | 1.8V     | SOT89-3L(L-Type) | RS3236-1.8YE3L    | LB18L           | Tape and Reel, 1000  |
| RS3236-3.3  | 3.3V     | SOT89-3L(L-Type) | RS3236-3.3YE3L    | LB33L           | Tape and Reel, 1000  |

| MODEL       | V <sub>FB</sub> (V) | PIN-PACKAGE    | ORDERING NUMBER | PACKAGE MARKING | PACKAGE OPTION      |
|-------------|---------------------|----------------|-----------------|-----------------|---------------------|
| RS3236-ADJ8 | 0.81                | SOT23-5        | RS3236-ADJ8YF5  | LBAD8           | Tape and Reel, 3000 |
|             |                     | SOT353(SC70-5) | RS3236-ADJ8YC5  | LBAD8           | Tape and Reel, 3000 |
| RS3236-ADJC | 1.21                | SOT23-5        | RS3236-ADJCYF5  | LBADC           | Tape and Reel, 3000 |
|             |                     | SOT353(SC70-5) | RS3236-ADJCYC5  | LBADC           | Tape and Reel, 3000 |

## Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) <sup>(1)(2)</sup>

|                  |   | MIN                | MAX             | UNIT |
|------------------|---|--------------------|-----------------|------|
| V <sub>IN</sub>  | Input voltage                               | -0.3               | 8               | V    |
| V <sub>EN</sub>  | Enable input voltage                        | -0.3               | V <sub>IN</sub> | V    |
| T <sub>J</sub>   | Junction temperature                        |                    | 150             | °C   |
| P <sub>D</sub>   | Continuous power dissipation <sup>(3)</sup> | Internally Limited |                 | W    |
| T <sub>stg</sub> | Storage temperature                         | -65                | 150             | °C   |

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltages are with respect to the GND pin.
- (3) Internal thermal shutdown circuitry protects the device from permanent damage.

## ESD Ratings

|                    |                         | VALUE                  | UNIT  |   |
|--------------------|-------------------------|------------------------|-------|---|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human-body model (HBM) | ±6000 | V |
|                    |                         | Machine model (MM)     | ±400  | V |

## Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup>

|                  |                      | MIN | MAX             | UNIT |
|------------------|----------------------|-----|-----------------|------|
| V <sub>IN</sub>  | Input supply voltage | 1.7 | 7.5             | V    |
| V <sub>EN</sub>  | Enable input voltage | 0   | V <sub>IN</sub> | V    |
| I <sub>OUT</sub> | Output current       | 0   | 500             | mA   |
| T <sub>J</sub>   | Junction temperature | -40 | +85             | °C   |

- (1) All voltages are with respect to the GND pin.

## Thermal Information

| THERMAL METRIC (1)    |  | RS3236      | RS3236          | RS3236  | RS3236  | RS3236            | UNIT |
|-----------------------|--|-------------|-----------------|---------|---------|-------------------|------|
|                       |  | UTDFN-1x1-4 | SOT353 (SC70-5) | SOT23-5 | SOT23-3 | SOT89-3L (L-Type) |      |
|                       |  | 4 PINS      | 5 PINS          | 5 PINS  | 3 PINS  | 3 PINS            |      |
| R <sub>θJA</sub>      | Junction-to-ambient thermal resistance       | 144.1       | 268             | 185.6   | 185.6   | 165               | °C/W |
| R <sub>θJC(top)</sub> | Junction-to-case (top) thermal resistance    | 137.9       | 171.8           | 104.3   | 104.3   | 88.5              | °C/W |
| R <sub>θJB</sub>      | Junction-to-board thermal resistance         | 83.5        | 64.5            | 54.5    | 54.5    | 39.6              | °C/W |
| ψ <sub>JT</sub>       | Junction-to-top characterization parameter   | 5.3         | 40.5            | 31.0    | 31.0    | 26.5              | °C/W |
| ψ <sub>JB</sub>       | Junction-to-board characterization parameter | 83.8        | 62.9            | 54.5    | 54.5    | 49.7              | °C/W |
| R <sub>JC(bot)</sub>  | Junction-to-case (bottom) thermal resistance | 71.8        | N/A             | N/A     | N/A     | 77.7              | °C/W |

**ELECTRICAL CHARACTERISTICS**

 ( $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  <sup>(1)</sup>, Full = -40°C to +85°C, unless otherwise noted.)

| PARAMETER                              | SYMBOL   | CONDITIONS  | TEMP        | MIN                | TYP  | MAX  | UNITS         |
|--|--|---|-------------|--------------------|------|------|---------------|
| Input Voltage                          | $V_{IN}$   |   | +25°C       | 1.7 <sup>(1)</sup> |      | 7.5  | V             |
| Output Voltage Accuracy <sup>(1)</sup> |  | $I_{OUT} = 0.1mA$   | +25°C       | -2.5               |      | 2.5  | %             |
|  |  | $I_{OUT} = 0.1mA$ , RS3236-3.3AYUTDN4   | +25°C       | -1                 |      | 1    | %             |
| Feedback Voltage                       | $V_{FB}$   | $I_{OUT} = 0.1mA$ , RS3236-ADJ8   | +25°C       | 0.79               | 0.81 | 0.83 | V             |
|  |  | $I_{OUT} = 0.1mA$ , RS3236-ADJC   | +25°C       | 1.18               | 1.21 | 1.24 | V             |
| Maximum Output Current <sup>(1)</sup>  |  |   | +25°C       | 500                |      |      | mA            |
| Current Limit <sup>(1)</sup>           | $I_{LIM}$  |   | +25°C       | 500                | 800  |      | mA            |
| Ground Pin Current                     | $I_Q$  | No load   | +25°C       |                    | 15   | 20   | $\mu A$       |
| Dropout Voltage <sup>(2)</sup>         | $V_{DROP}$   | $I_{OUT} = 500mA$   | +25°C       | $V_{OUT}=1.2V$     |      | 900  | mV            |
|  |  |   |             | $V_{OUT}=1.5V$     |      | 630  |               |
|  |  |   |             | $V_{OUT}=3.3V$     |      | 450  |               |
| Line Regulation <sup>(1)</sup>         | $\Delta V_{LNR}$                                   | $V_{IN} = (V_{OUT} + 0.5V)$ to 7.5V,<br>$I_{OUT} = 1mA$   | +25°C       |                    | 0.1  | 0.2  | %/V           |
| Load Regulation                        | $\Delta V_{OUT}$                                   | $I_{OUT} = 0.1mA$ to 500mA, $C_{OUT} = 1\mu F$ ,  | +25°C       |                    | 25   | 50   | mV            |
| Output Voltage Noise                   | $e_n$  | $f = 10Hz$ to 100kHz, $C_{BP} = 0.01\mu F$ ,<br>$C_{OUT} = 10\mu F$ , $I_{OUT}=30mA$                                    | +25°C       |                    | 80   |      | $\mu V_{RMS}$ |
| Output Voltage Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T_A \times V_{OUT}}$ | $I_{LOAD} = 0.1mA$  | FULL        |                    | 35   |      | ppm/°C        |
| Power Supply Rejection Ratio           | PSRR   | $C_{BP} = 0\mu F$ , $I_{LOAD} = 30mA$ ,<br>$C_{OUT} = 1\mu F$ , $V_{IN} = V_{OUT}+1V$<br>$\Delta V_{RIPPLE}=0.2V_{P-P}$ | $f = 217Hz$ | +25°C              |      | 72   | dB            |
|  |  |   | $f = 1kHz$  |                    |      | 70   |               |
|  |  | $C_{BP} = 10nF$ , $I_{LOAD} = 30mA$ ,<br>$C_{OUT} = 1\mu F$ , $V_{IN} = V_{OUT}+1V$<br>$\Delta V_{RIPPLE}=0.2V_{P-P}$   | $f = 217Hz$ | +25°C              |      | 74   | dB            |
|  |  |   | $f = 1kHz$  |                    |      | 70   |               |
| <b>SHUTDOWN</b>                        |  |   |             |                    |      |      |               |
| EN Input Threshold                     | $V_{IH}$   | $V_{IN} = 1.7V$   | Full        | 1.4                |      |      | V             |
|  | $V_{IL}$   |   |             |                    |      |      |               |
| EN Input Threshold                     | $V_{IH}$   | $V_{IN} = 7.5V$   | Full        | 2.3                |      |      | V             |
|  | $V_{IL}$   |   |             |                    |      |      |               |
| EN Input Bias Current                  | $I_{BH}$   | $EN = 7.5V$   | +25°C       |                    | 0.01 | 1    | $\mu A$       |
|  | $I_{BL}$   | $EN = 0V$   | Full        |                    | 0.01 |      |               |
| Shutdown Supply Current                | $I_{Q(SHDN)}$                                      | $EN = 0V$   | Full        |                    | 0.01 | 1    | $\mu A$       |
| Start-Up Time <sup>(4)</sup>           | $t_{STR}$  | $C_{OUT} = 1\mu F$ , No Load  | +25°C       |                    | 180  |      | $\mu s$       |
| <b>THERMAL PROTECTION</b>              |  |   |             |                    |      |      |               |
| Thermal Shutdown Temperature           | $T_{SHDN}$   |   |             |                    | 140  |      | °C            |

**NOTES:**

- $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or 1.7V, whichever is greater.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT} + 0.5V$ .
- Time needed for  $V_{OUT}$  to reach 90% of final value.

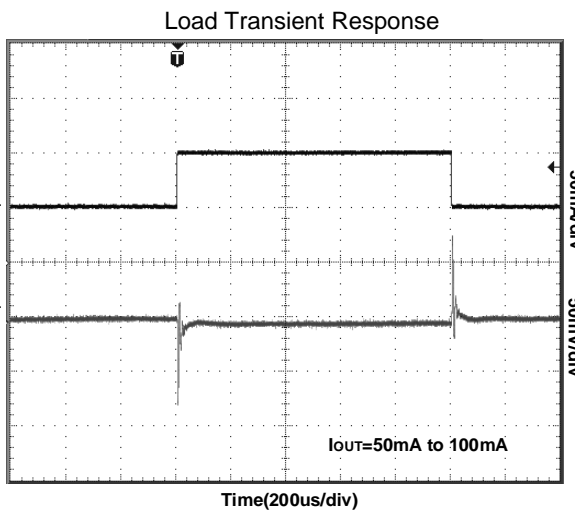
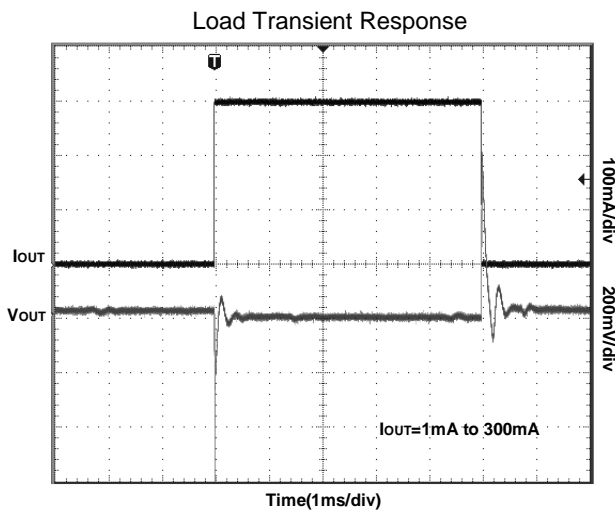
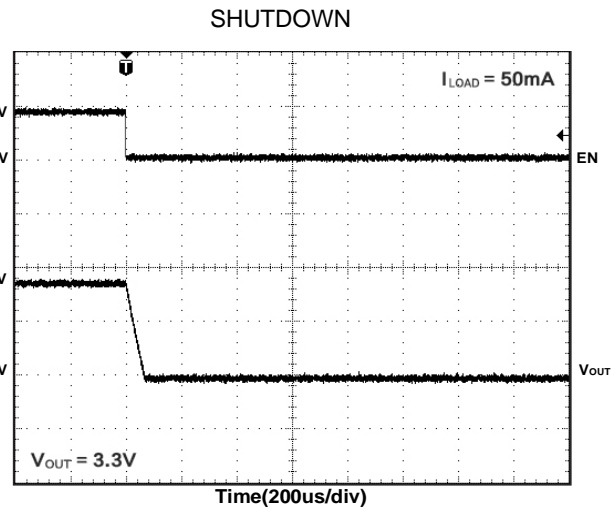
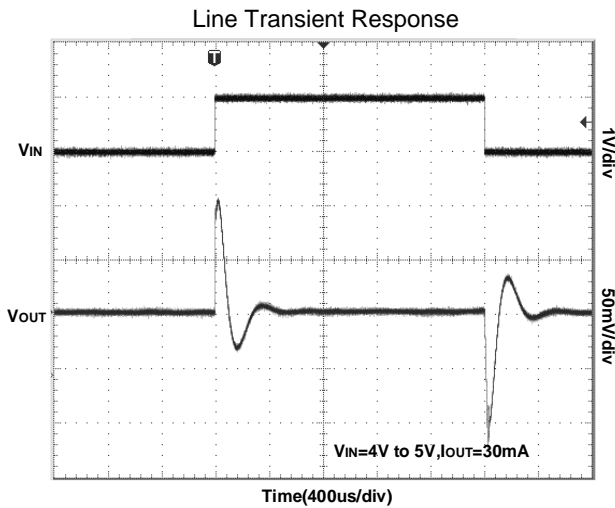
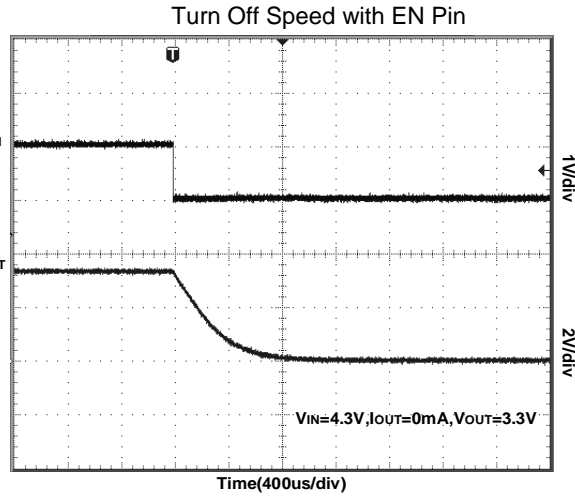
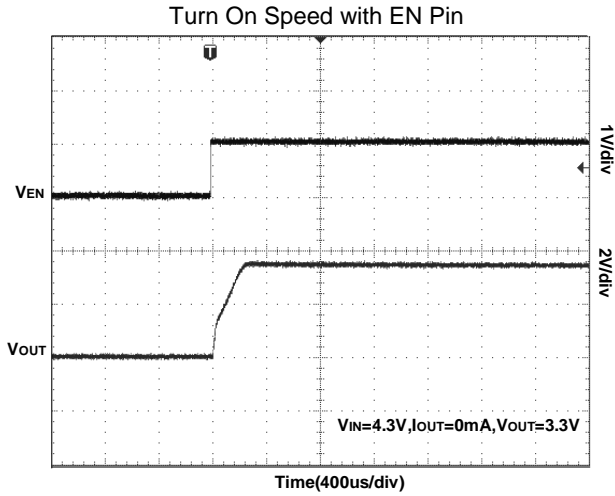
**TYPICAL APPLICATION CIRCUIT**

|  |  |
|--|--|
| <p style="text-align: center;">Typical Circuit</p> <p style="text-align: center;"><b>RS3236</b></p> <p style="text-align: center;">SOT23-5/SOT353(SC70-5)</p>  | <p style="text-align: center;">Typical Circuit</p> <p style="text-align: center;"><b>RS3236</b></p> <p style="text-align: center;">UTDFN-1x1-4</p>   |
| <p style="text-align: center;">Typical Circuit</p> <p style="text-align: center;"><b>RS3236-ADJ8</b></p> <p style="text-align: center;">SOT23-5/SOT353(SC70-5)</p>   | <p style="text-align: center;">Typical Circuit</p> <p style="text-align: center;"><b>RS3236-ADJC</b></p> <p style="text-align: center;">SOT23-5/SOT353(SC70-5)</p>   |
| <p>NOTE: Choose <math>R_2 = 160k\Omega</math> to maintain a <math>5\mu A</math> minimum load. Calculate the value for <math>R_1</math> using the following equation:</p> $R_1 = R_2 * \left( \frac{V_{OUT}}{0.81} - 1 \right)$ | <p>NOTE: Choose <math>R_2 = 240k\Omega</math> to maintain a <math>5\mu A</math> minimum load. Calculate the value for <math>R_1</math> using the following equation:</p> $R_1 = R_2 * \left( \frac{V_{OUT}}{1.21} - 1 \right)$ |



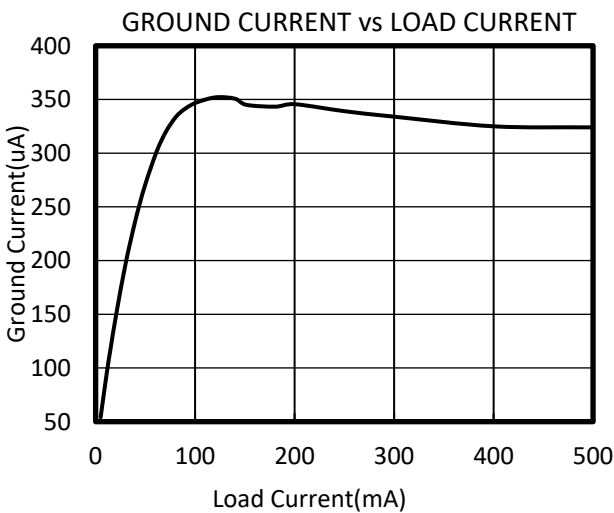
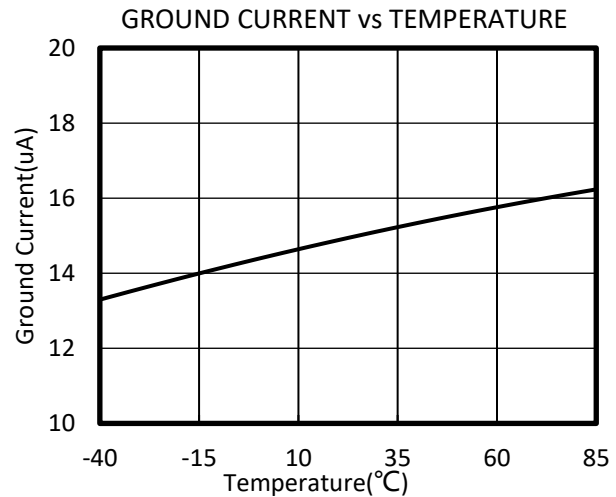
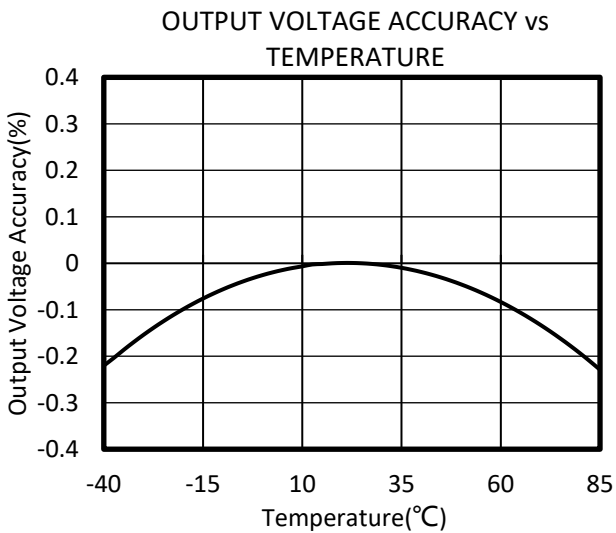
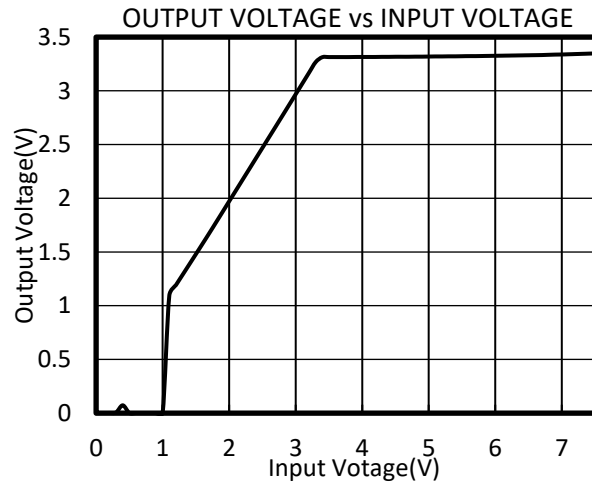
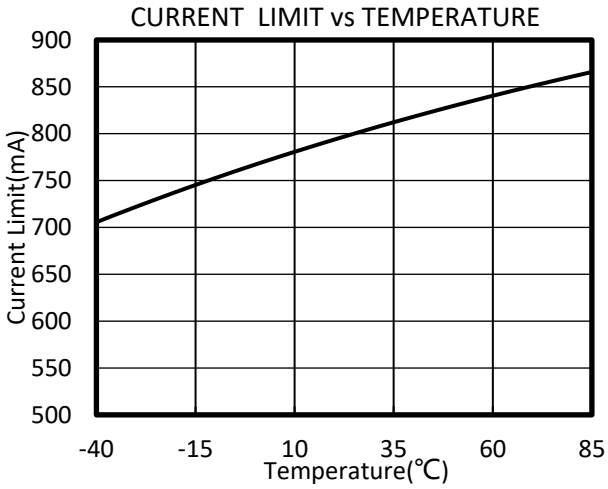
# TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT (NOMINAL)} + 0.5V$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ ,  $C_{BP} = 0\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



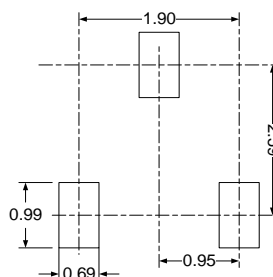
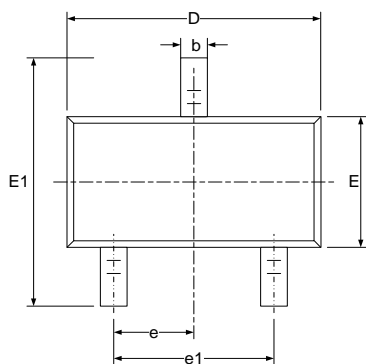
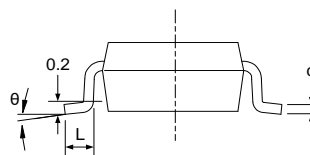
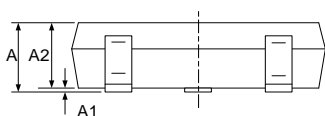
## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT (NOMINAL)} + 0.5V$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ ,  $C_{BP} = 0.1\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



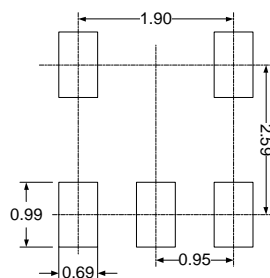
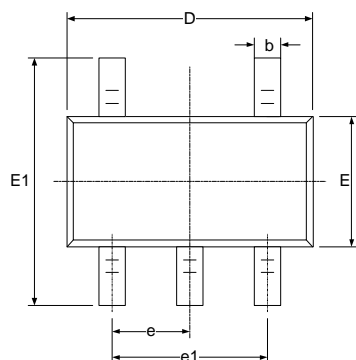
# PACKAGE OUTLINE DIMENSIONS

## SOT23-3

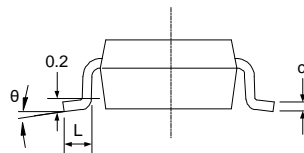
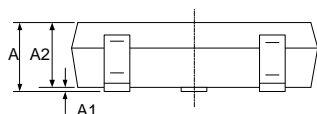

**RECOMMENDED LAND PATTERN (Unit: mm)**


| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

# SOT23-5

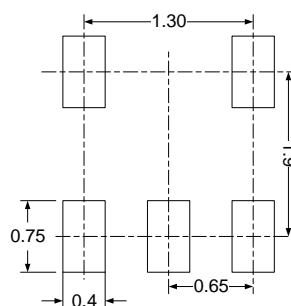
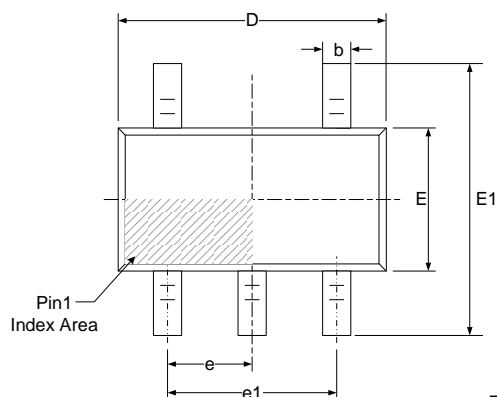
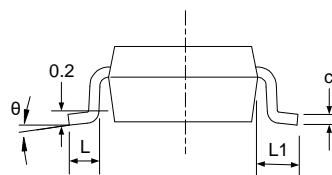
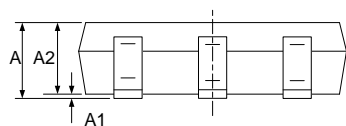


**RECOMMENDED LAND PATTERN (Unit: mm)**



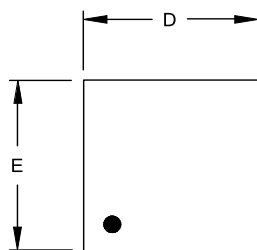
| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

# SOT353(SC70-5)

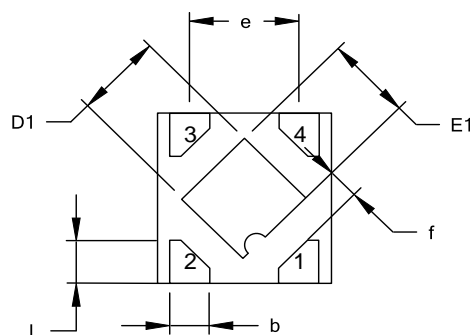

**RECOMMENDED LAND PATTERN (Unit: mm)**


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.100 | 0.035                | 0.043 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.000 | 0.035                | 0.039 |
| b      | 0.150                     | 0.350 | 0.006                | 0.014 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.000                     | 2.200 | 0.079                | 0.087 |
| E      | 1.150                     | 1.350 | 0.045                | 0.053 |
| E1     | 2.150                     | 2.450 | 0.085                | 0.096 |
| e      | 0.650(BSC)                |       | 0.026(BSC)           |       |
| e1     | 1.300(BSC)                |       | 0.051(BSC)           |       |
| L      | 0.260                     | 0.460 | 0.010                | 0.018 |
| L1     | 0.525                     |       | 0.021                |       |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

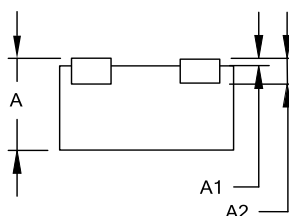
# UTDFN-1x1-4



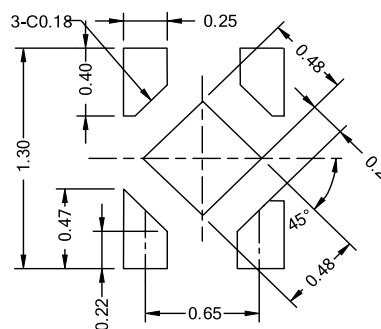
TOP VIEW



BOTTOM VIEW



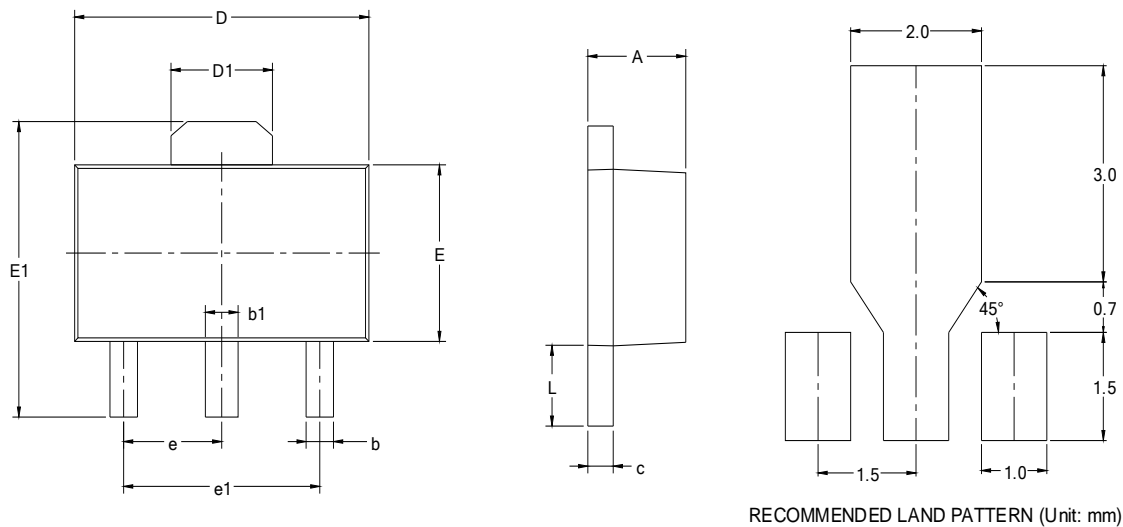
SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol | Dimensions<br>In Millimeters |       |       |
|--------|------------------------------|-------|-------|
|        | MIN                          | MOD   | MAX   |
| A      | 0.340                        | 0.370 | 0.400 |
| A1     | 0.000                        | 0.020 | 0.050 |
| A2     | 0.100REF                     |       |       |
| D      | 0.950                        | 1.000 | 1.050 |
| D1     | 0.430                        | 0.480 | 0.530 |
| E      | 0.950                        | 1.000 | 1.050 |
| E1     | 0.430                        | 0.480 | 0.530 |
| b      | 0.170                        | 0.220 | 0.270 |
| e      | 0.600                        | 0.650 | 0.700 |
| f      | 0.195REF                     |       |       |
| L      | 0.200                        | 0.250 | 0.300 |

# SOT89-3L



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.400                     | 1.600 | 0.055                | 0.063 |
| b      | 0.320                     | 0.520 | 0.013                | 0.020 |
| b1     | 0.400                     | 0.580 | 0.016                | 0.023 |
| c      | 0.350                     | 0.440 | 0.014                | 0.017 |
| D      | 4.400                     | 4.600 | 0.173                | 0.181 |
| D1     | 1.550 REF                 |       | 0.061 REF            |       |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500 BSC                 |       | 0.060 BSC            |       |
| e1     | 3.000 BSC                 |       | 0.118 BSC            |       |
| L      | 0.900                     | 1.200 | 0.035                | 0.047 |