# Low Power, Low Dropout, 200mA Linear Regulators

## FEATURES

- **Low Dropout Voltage**
- **Thermal-Overload Protection**
- **Output Current Limit**
- **10nA Logic-Controlled Shutdown**
- **1μA Low Supply Current**
- **1.7V to 7.5V Input Voltage Range**
- **200mA 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

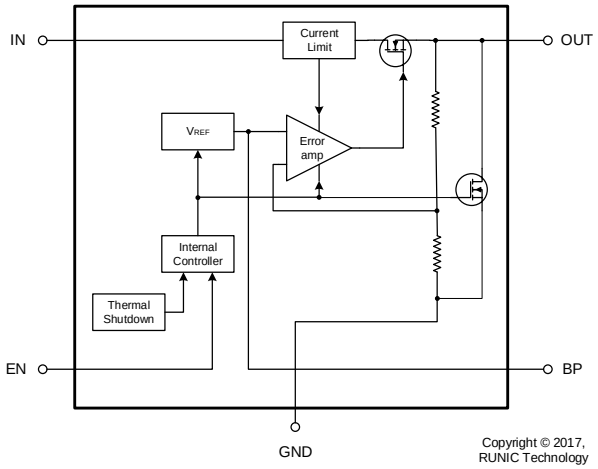
The RS3221 series low-power, low-dropout, CMOS LDO operate from 1.7V to 7.5V input voltage that can supply up to 200 mA of output current. Designed to meet the requirements of analog circuits, the RS3221 series device provides low noise, high PSRR, low quiescent current, and low line and load transient response.

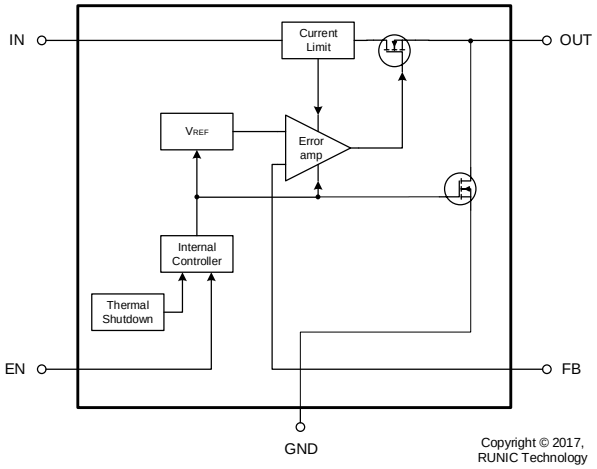
The device is designed to work with a 1-μF input and a 1-μF output ceramic capacitor (no separate noise bypass capacitor required). An external noise bypass capacitor connected to the device's BP pin can further reduce the noise level.

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

The RS3221 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.

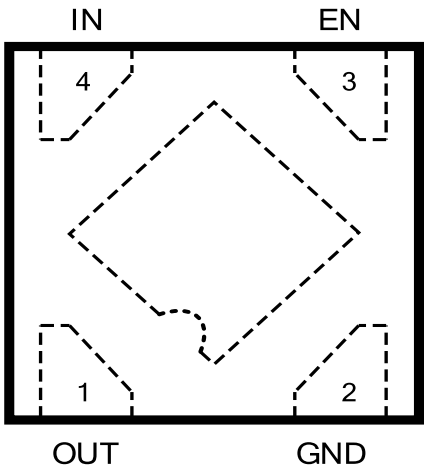
## Functional Block Diagram



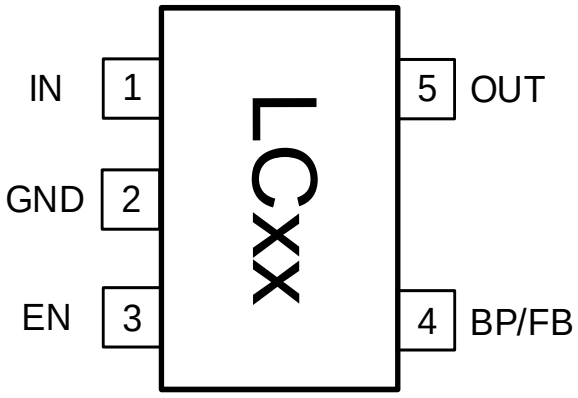
## Pin Configuration and Functions (Top View)

(TOP VIEW)




UTDFN-1×1-4

(TOP VIEW)

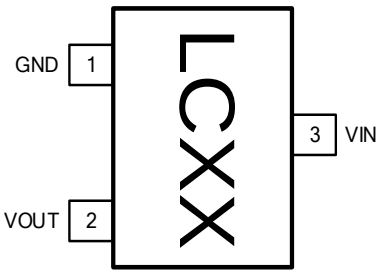



SOT23-5/SOT353(SC70-5)

| UTDFN-1×1-4 | | I/O | DESCRIPTION |
|---|---|---|---|
| NUMBER | NAME | | |
| 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 1μF 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. |

| SOT23-5 /SOT353(SC70-5) | | I/O | DESCRIPTION |
|---|---|---|---|
| NUMBER | NAME | | |
| 1 | IN | I | Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1μF 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 0.01μF 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)

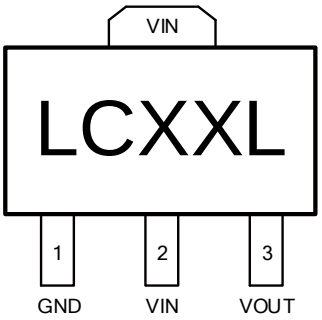



**SOT23-3**

NOTE: XX indicate Output Voltage, xx indicate DataCode

For example: LC33 ($V_{OUT}$=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 1μF capacitor to GND. |




**SOT89-3L(L-Type)**

| 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 1μF capacitor to GND. |
| 3 | OUT | O | Regulator Output. |

## PACKAGE/ORDERING INFORMATION

| MODEL | VOUT (V) | PIN-PACKAGE | ORDERING NUMBER | PACKAGE MARKING | PACKAGE OPTION |
|---|---|---|---|---|---|
| RS3221-0.8 | 0.8V | UTDFN-1x1-4 | RS3221-0.8YUTDN4 | CA | Tape and Reel, 10000 |
| RS3221-1.0 | 1.0V | UTDFN-1x1-4 | RS3221-1.0YUTDN4 | CB | Tape and Reel, 10000 |
| RS3221-1.2 | 1.2V | UTDFN-1x1-4 | RS3221-1.2YUTDN4 | CC | Tape and Reel, 10000 |
| RS3221-1.5 | 1.5V | UTDFN-1x1-4 | RS3221-1.5YUTDN4 | CD | Tape and Reel, 10000 |
| RS3221-1.8 | 1.8V | UTDFN-1x1-4 | RS3221-1.8YUTDN4 | CE | Tape and Reel, 10000 |
| RS3221-2.05 | 2.05V | UTDFN-1x1-4 | RS3221-2.05YUTDN4 | CF | Tape and Reel, 10000 |
| RS3221-2.5 | 2.5V | UTDFN-1x1-4 | RS3221-2.5YUTDN4 | CG | Tape and Reel, 10000 |
| RS3221-2.8 | 2.8V | UTDFN-1x1-4 | RS3221-2.8YUTDN4 | CH | Tape and Reel, 10000 |
| RS3221-3.0 | 3.0V | UTDFN-1x1-4 | RS3221-3.0YUTDN4 | CI | Tape and Reel, 10000 |
| RS3221-3.3 | 3.3V | UTDFN-1x1-4 | RS3221-3.3YUTDN4 | CJ | Tape and Reel, 10000 |
| RS3221-3.6 | 3.6V | UTDFN-1x1-4 | RS3221-3.6YUTDN4 | CK | Tape and Reel, 10000 |
| RS3221-4.0 | 4.0V | UTDFN-1x1-4 | RS3221-4.0YUTDN4 | CL | Tape and Reel, 10000 |
| RS3221-5.0 | 5.0V | UTDFN-1x1-4 | RS3221-5.0YUTDN4 | CM | Tape and Reel, 10000 |
| RS3221-0.8 | 0.8V | SOT23-5 | RS3221-0.8YF5 | LC08 | Tape and Reel, 3000 |
| RS3221-1.0 | 1.0V | SOT23-5 | RS3221-1.0YF5 | LC10 | Tape and Reel, 3000 |
| RS3221-1.2 | 1.2V | SOT23-5 | RS3221-1.2YF5 | LC12 | Tape and Reel, 3000 |
| RS3221-1.5 | 1.5V | SOT23-5 | RS3221-1.5YF5 | LC15 | Tape and Reel, 3000 |
| RS3221-1.8 | 1.8V | SOT23-5 | RS3221-1.8YF5 | LC18 | Tape and Reel, 3000 |
| RS3221-2.05 | 2.05V | SOT23-5 | RS3221-2.05YF5 | LC205 | Tape and Reel, 3000 |
| RS3221-2.5 | 2.5V | SOT23-5 | RS3221-2.5YF5 | LC25 | Tape and Reel, 3000 |
| RS3221-2.8 | 2.8V | SOT23-5 | RS3221-2.8YF5 | LC28 | Tape and Reel, 3000 |
| RS3221-3.0 | 3.0V | SOT23-5 | RS3221-3.0YF5 | LC30 | Tape and Reel, 3000 |
| RS3221-3.3 | 3.3V | SOT23-5 | RS3221-3.3YF5 | LC33 | Tape and Reel, 3000 |
| RS3221-3.6 | 3.6V | SOT23-5 | RS3221-3.6YF5 | LC36 | Tape and Reel, 3000 |
| RS3221-4.0 | 4.0V | SOT23-5 | RS3221-4.0YF5 | LC40 | Tape and Reel, 3000 |
| RS3221-5.0 | 5.0V | SOT23-5 | RS3221-5.0YF5 | LC50 | Tape and Reel, 3000 |
| RS3221-0.8 | 0.8V | SOT353(SC70-5) | RS3221-0.8YC5 | LC08 | Tape and Reel, 3000 |
| RS3221-1.0 | 1.0V | SOT353(SC70-5) | RS3221-1.0YC5 | LC10 | Tape and Reel, 3000 |
| RS3221-1.2 | 1.2V | SOT353(SC70-5) | RS3221-1.2YC5 | LC12 | Tape and Reel, 3000 |
| RS3221-1.5 | 1.5V | SOT353(SC70-5) | RS3221-1.5YC5 | LC15 | Tape and Reel, 3000 |
| RS3221-1.8 | 1.8V | SOT353(SC70-5) | RS3221-1.8YC5 | LC18 | Tape and Reel, 3000 |
| RS3221-2.05 | 2.05V | SOT353(SC70-5) | RS3221-2.05YC5 | LC205 | Tape and Reel, 3000 |
| RS3221-2.5 | 2.5V | SOT353(SC70-5) | RS3221-2.5YC5 | LC25 | Tape and Reel, 3000 |
| RS3221-2.8 | 2.8V | SOT353(SC70-5) | RS3221-2.8YC5 | LC28 | Tape and Reel, 3000 |
| RS3221-3.0 | 3.0V | SOT353(SC70-5) | RS3221-3.0YC5 | LC30 | Tape and Reel, 3000 |
| RS3221-3.3 | 3.3V | SOT353(SC70-5) | RS3221-3.3YC5 | LC33 | Tape and Reel, 3000 |
| RS3221-3.6 | 3.6V | SOT353(SC70-5) | RS3221-3.6YC5 | LC36 | Tape and Reel, 3000 |
| RS3221-4.0 | 4.0V | SOT353(SC70-5) | RS3221-4.0YC5 | LC40 | Tape and Reel, 3000 |
| RS3221-5.0 | 5.0V | SOT353(SC70-5) | RS3221-5.0YC5 | LC50 | Tape and Reel, 3000 |

| MODEL | VOUT (V) | PIN-PACKAGE | ORDERING NUMBER | PACKAGE MARKING | PACKAGE OPTION |
|---|---|---|---|---|---|
| RS3221-1.35 | 1.35V | UTDFN-1x1-4 | RS3221-1.35YUTDN4 | CN | Tape and Reel, 10000 |
| RS3221-1.85 | 1.85V | UTDFN-1x1-4 | RS3221-1.85YUTDN4 | CO | Tape and Reel, 10000 |
| RS3221-3.3 | 3.3V | UTDFN-1x1-4 | RS3221-3.3AYUTDN4 | $C\bar{J}$ | Tape and Reel, 10000 |
| RS3221-2.7 | 2.7V | SOT23-5 | RS3221-2.7YF5 | LC27 | Tape and Reel, 3000 |
| RS3221-2.85 | 2.85V | SOT23-5 | RS3221-2.85YF5 | LC285 | Tape and Reel, 3000 |
| RS3221-0.8 | 0.8V | SOT23-3 | RS3221-0.8YF3 | LC08 | Tape and Reel, 3000 |
| RS3221-1.0 | 1.0V | SOT23-3 | RS3221-1.0YF3 | LC10 | Tape and Reel, 3000 |
| RS3221-1.2 | 1.2V | SOT23-3 | RS3221-1.2YF3 | LC12 | Tape and Reel, 3000 |
| RS3221-1.5 | 1.5V | SOT23-3 | RS3221-1.5YF3 | LC15 | Tape and Reel, 3000 |
| RS3221-1.8 | 1.8V | SOT23-3 | RS3221-1.8YF3 | LC18 | Tape and Reel, 3000 |
| RS3221-2.05 | 2.05V | SOT23-3 | RS3221-2.05YF3 | LC205 | Tape and Reel, 3000 |
| RS3221-2.5 | 2.5V | SOT23-3 | RS3221-2.5YF3 | LC25 | Tape and Reel, 3000 |
| RS3221-2.8 | 2.8V | SOT23-3 | RS3221-2.8YF3 | LC28 | Tape and Reel, 3000 |
| RS3221-3.0 | 3.0V | SOT23-3 | RS3221-3.0YF3 | LC30 | Tape and Reel, 3000 |
| RS3221-3.3 | 3.3V | SOT23-3 | RS3221-3.3YF3 | LC33 | Tape and Reel, 3000 |
| RS3221-3.6 | 3.6V | SOT23-3 | RS3221-3.6YF3 | LC36 | Tape and Reel, 3000 |
| RS3221-4.0 | 4.0V | SOT23-3 | RS3221-4.0YF3 | LC40 | Tape and Reel, 3000 |
| RS3221-5.0 | 5.0V | SOT23-3 | RS3221-5.0YF3 | LC50 | Tape and Reel, 3000 |
| RS3221-1.8 | 1.8V | SOT89-3L(L-Type) | RS3221-1.8YE3L | LC18L | Tape and Reel, 1000 |
| RS3221-2.5 | 2.5V | SOT89-3L(L-Type) | RS3221-2.5YE3L | LC25L | Tape and Reel, 1000 |
| RS3221-3.3 | 3.3V | SOT89-3L(L-Type) | RS3221-3.3YE3L | LC33L | Tape and Reel, 1000 |

| MODEL | $V_{FB}$ (V) | PIN-PACKAGE | ORDERING NUMBER | PACKAGE MARKING | PACKAGE OPTION |
|---|---|---|---|---|---|
| RS3221-ADJ8 | 0.81 | SOT23-5 | RS3221-ADJ8YF5 | LCAD8 | Tape and Reel, 3000 |
| | | SOT353(SC70-5) | RS3221-ADJ8YC5 | LCAD8 | Tape and Reel, 3000 |
| RS3221-ADJC | 1.21 | SOT23-5 | RS3221-ADJCYF5 | LCADC | Tape and Reel, 3000 |
| | | SOT353(SC70-5) | RS3221-ADJCYC5 | LCADC | Tape and Reel, 3000 |

## Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) (1)(2)

| | | MIN | MAX | UNIT |
|---|---|---|---|---|
| $V_{IN}$ | Input voltage | -0.3 | 8 | V |
| $V_{EN}$ | Enable input voltage | -0.3 | $V_{IN}$ | V |
| $T_J$ | Junction temperature | | 150 | °C |
| $P_D$ | Continuous power dissipation (3) | Internally Limited | | W |
| $T_{stg}$ | 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 |
|---|---|---|---|---|
| $V_{(ESD)}$ | 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) (1)

| | | MIN | MAX | UNIT |
|---|---|---|---|---|
| $V_{IN}$ | Input supply voltage | 1.7 | 7.5 | V |
| $V_{EN}$ | Enable input voltage | 0 | $V_{IN}$ | V |
| $I_{OUT}$ | Output current | 0 | 300 | mA |
| $T_A$ | Operating temperature | -40 | +85 | °C |

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

### Thermal Information

| THERMAL METRIC (1) | | RS3221 UTDFN-1x1-4 4 PINS | RS3221 SOT353 (SC70-5) 5 PINS | RS3221 SOT23-5 5 PINS | RS3221 SOT23-3 3 PINS | RS3221 SOT89-3L (L-Type) 3 PINS | UNIT |
|---|---|---|---|---|---|---|---|
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 312.5 | 312.5 | 250 | 312.5 | 208.3 | °C/W |
| $R_{\theta JC(top)}$ | Junction-to-case (top) thermal resistance | 137.9 | 141.8 | 84.3 | 134.3 | 88.5 | °C/W |
| $R_{\theta JB}$ | Junction-to-board thermal resistance | 83.5 | 84.5 | 39.5 | 84.5 | 39.6 | °C/W |
| $\psi_{JT}$ | Junction-to-top characterization parameter | 5.3 | 3.9 | 2.86 | 4.8 | 26.5 | °C/W |
| $\psi_{JB}$ | Junction-to-board characterization parameter | 83.8 | 82.1 | 58.5 | 81.5 | 49.7 | °C/W |
| $R_{JC(bot)}$ | Junction-to-case (bottom) thermal resistance | 71.8 | N/A | N/A | N/A | 77.7 | °C/W |
| Pd | Power Dissipation | 0.4 | 0.4 | 0.5 | 0.4 | 0.6 | |

## ELECTRICAL CHARACTERISTICS

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

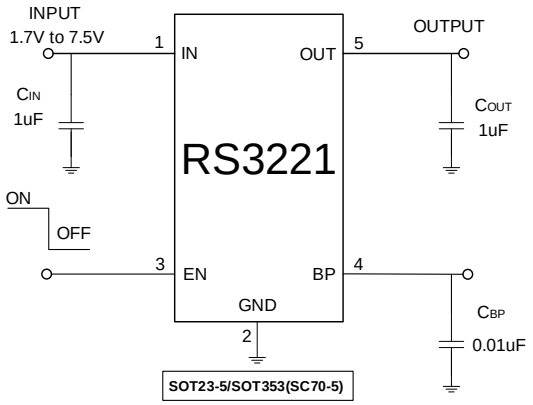
| PARAMETER | SYMBOL | CONDITIONS | | TEMP | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | | +25°C | 1.7(1) | | 7.5 | V |
| Output Voltage Accuracy (1) | | $I_{OUT}$ = 0.1mA | | +25°C | -2.5 | | 2.5 | % |
| | | $I_{OUT}$ = 0.1mA， RS3221-3.3AYUTDN4 | | +25°C | -1 | | 1 | % |
| Feedback Voltage | $V_{FB}$ | $I_{OUT}$ = 0.1 mA, RS3221-ADJ8 | | +25°C | 0.79 | 0.81 | 0.83 | V |
| | | $I_{OUT}$ = 0.1 mA, RS3221-ADJC | | +25°C | 1.18 | 1.21 | 1.24 | V |
| Maximum Output Current (1) | | | | +25°C | 200 | | | mA |
| Current Limit (1) | $I_{LIM}$ | | | +25°C | | 300 | | mA |
| Ground Pin Current | $I_Q$ | No load | | +25°C | | 1.0 | | μA |
| Dropout Voltage (2) | $V_{DROP}$ | $I_{OUT}$ = 200mA | $V_{OUT}$=1.2V | +25°C | | 900 | | mV |
| | | | $V_{OUT}$=1.5V | | | 630 | | |
| | | | $V_{OUT}$=3.3V | | | 160 | | |
| Line Regulation (1) | $\Delta V_{LNR}$ | $V_{IN}$ = ($V_{OUT}$ + 0.5V) to 7.5V, $I_{OUT}$ = 1mA | | +25°C | | 0.1 | 0.2 | %/V |
| Load Regulation | $\Delta V_{OUT}$ | $I_{OUT}$ =0.1mA to 200mA, $C_{OUT}$ = 1μF | | +25°C | | 15 | 30 | mV |
| | | $I_{OUT}$ =0.1mA to 200mA, $C_{OUT}$ = 1μF, RS3221-ADJ | | +25°C | | 0.5 | 10 | mV |
| Output Voltage Noise | $e_n$ | f = 10Hz to 100kHz, $C_{BP}$ = 0.01μF, $C_{OUT}$ = 10μF, $I_{OUT}$=30mA | | +25°C | | NA | | $\mu V_{RMS}$ |
| Output Voltage Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T_A \times V_{OUT}}$ | $I_{LOAD}$ = 0.1mA | | FULL | | 65 | | ppm/℃ |
| Power Supply Rejection Ratio | PSRR | $C_{BP}$ = 0μF, $I_{LOAD}$ = 30mA, $C_{OUT}$ = 1μF, $V_{IN}$ = $V_{OUT}$+1V $\Delta V_{RIPPLE}$=0.2$V_{P-P}$ | f = 217Hz | +25°C | | 46 | | dB |
| | | | f = 1kHz | | | 34 | | |
| | | $C_{BP}$ = 10nF, $I_{LOAD}$ = 30mA, $C_{OUT}$ = 1μF, $V_{IN}$ = $V_{OUT}$+1V $\Delta V_{RIPPLE}$=0.2$V_{P-P}$ | f = 217Hz | +25°C | | 48 | | dB |
| | | | f = 1kHz | | | 36 | | |
| **SHUTDOWN** | | | | | | | | |
| EN Input Threshold | $V_{IH}$ | $V_{IN}$ = 1.7V | | Full | 1.4 | | | V |
| | $V_{IL}$ | | | Full | | | 0.4 | |
| EN Input Threshold | $V_{IH}$ | $V_{IN}$ = 7.5V | | Full | 2.3 | | | V |
| | $V_{IL}$ | | | Full | | | 0.8 | |
| EN Input Bias Current | $I_{BH}$ | EN = 7.5V | | +25°C | | 0.01 | 1 | μA |
| | $I_{BL}$ | EN = 0V | | Full | | 0.01 | | |
| Shutdown Supply Current | $I_{Q(SHDN)}$ | EN = 0V | | Full | | 0.01 | 1 | μA |
| Start-Up Time (4) | $t_{STR}$ | $C_{OUT}$ = 1μF, No Load | | +25°C | | 180 | | μs |
| $R_{ON}$ of Discharge MOSFET | | $V_{IN}$ = 4.0V, $V_{EN}$ = 0V | | +25°C | | 25 | | Ω |
| **THERMAL PROTECTION** | | | | | | | | |
| Thermal Shutdown Temperature | $T_{SHDN}$ | | | | | 140 | | °C |

NOTES:

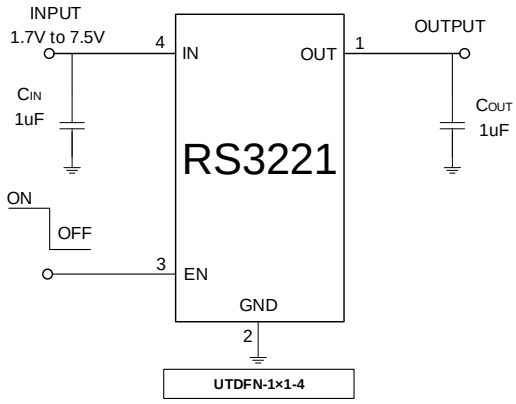
1. $V_{IN}$ = $V_{OUT\ (NOMINAL)}$ + 0.5V or 1.7V, whichever is greater.
2. The dropout voltage is defined as $V_{IN}$ - $V_{OUT}$, when $V_{OUT}$ is 100mV below the value of $V_{OUT}$ for $V_{IN}$ = $V_{OUT}$ + 0.5V.
3. Time needed for $V_{OUT}$ to reach 90% of final value.

## TYPICAL APPLICATION CIRCUIT

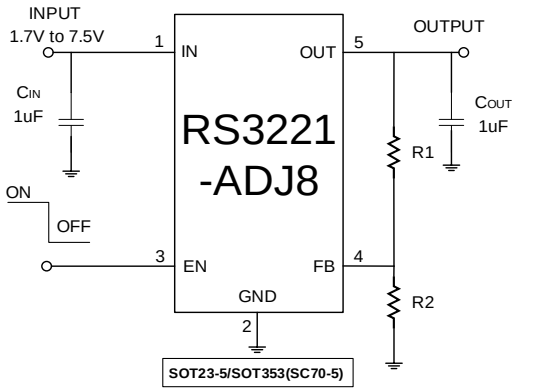
Typical Circuit




Typical Circuit



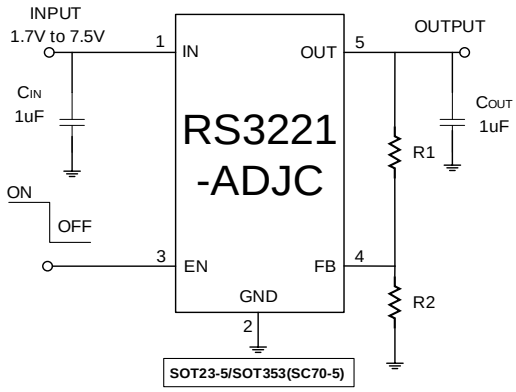

Typical Circuit




NOTE: Choose $R_2$ = 160kΩ to maintain a 5μA minimum load. Calculate the value for $R_1$ using the following equation:

$$R1 = R2 * (\frac{V_{OUT}}{0.81} - 1)$$

Typical Circuit



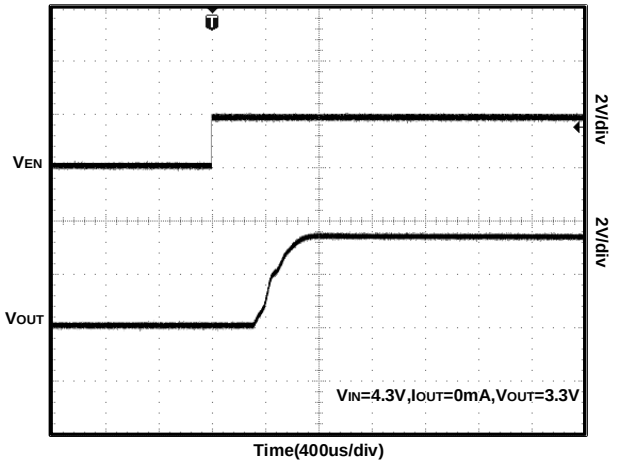

NOTE: Choose $R_2$ = 240kΩ to maintain a 5μA minimum load. Calculate the value for $R_1$ using the following equation:

$$R1 = R2 * (\frac{V_{OUT}}{1.21} - 1)$$

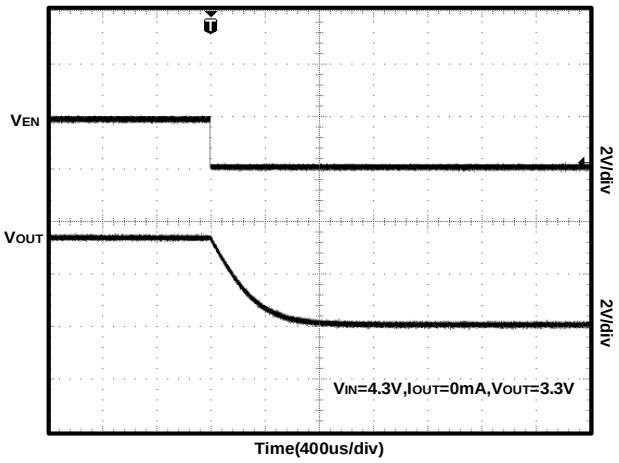
# TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}$ = $V_{OUT\ (NOMINAL)}$ + 0.5V, $C_{IN}$ = 1μF, $C_{OUT}$ = 1μF, $C_{BP}$ = 0μF, $T_A$ = +25℃, unless otherwise noted.

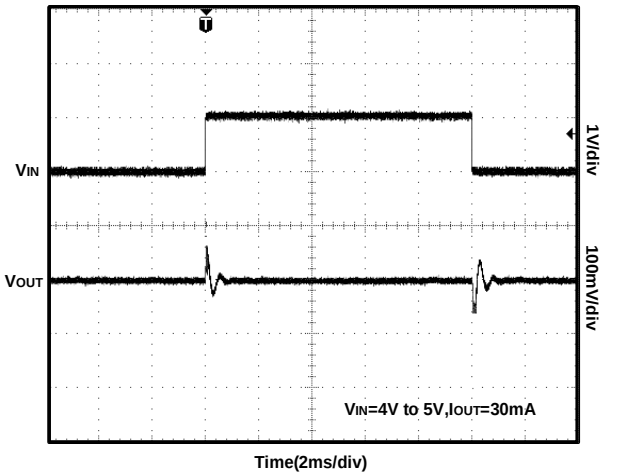
Turn On Speed with EN Pin



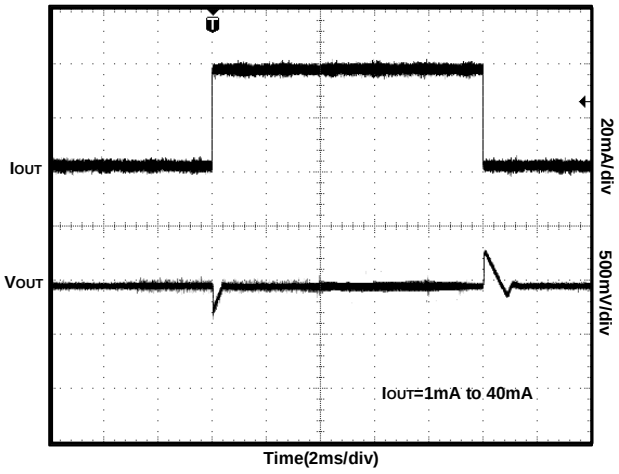

Turn Off Speed with EN Pin



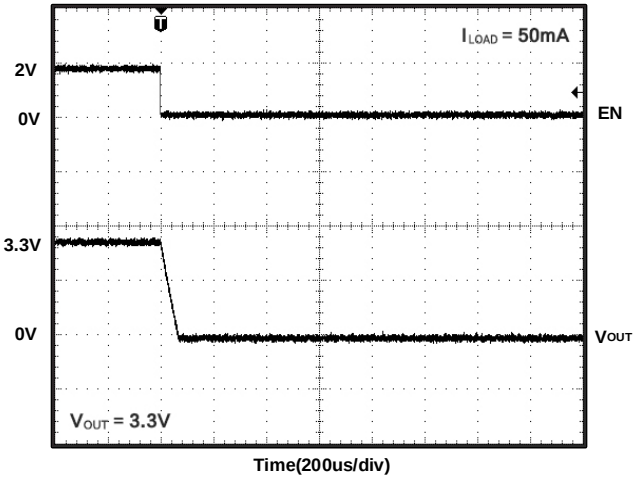

Line Transient Response




Load Transient Response



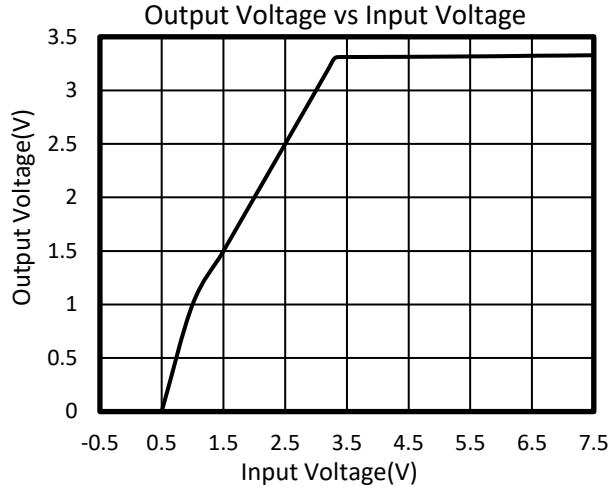

SHUTDOWN



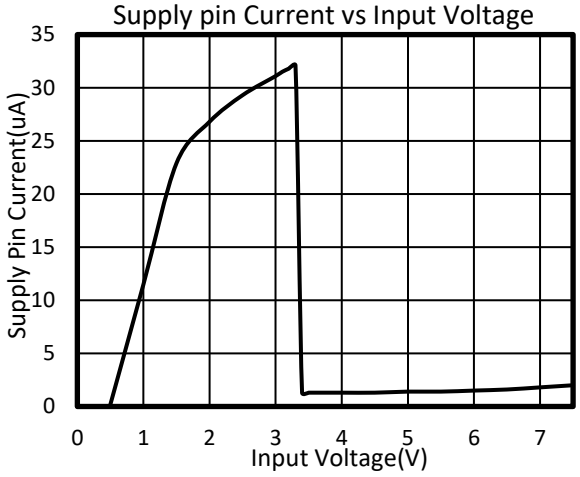
## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}$ = $V_{OUT\ (NOMINAL)}$ + 0.5V, $C_{IN}$ = 1μF, $C_{OUT}$ = 1μF, $C_{BP}$ = 0μF, $T_A$ = +25℃, unless otherwise noted.

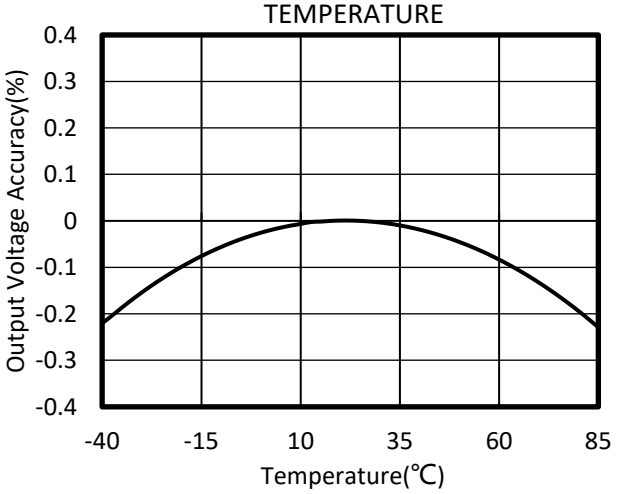
Output Voltage vs Input Voltage



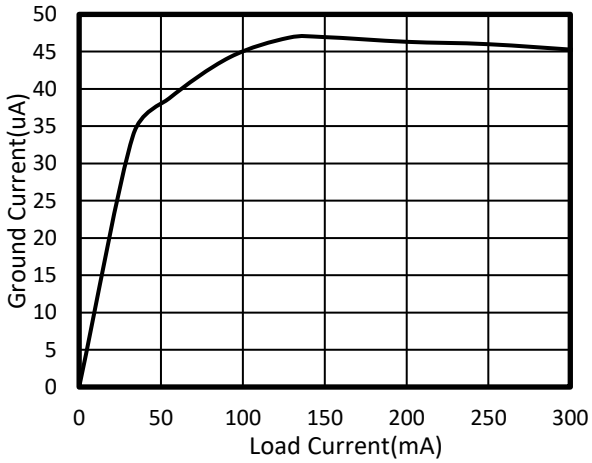

Supply pin Current vs Input Voltage



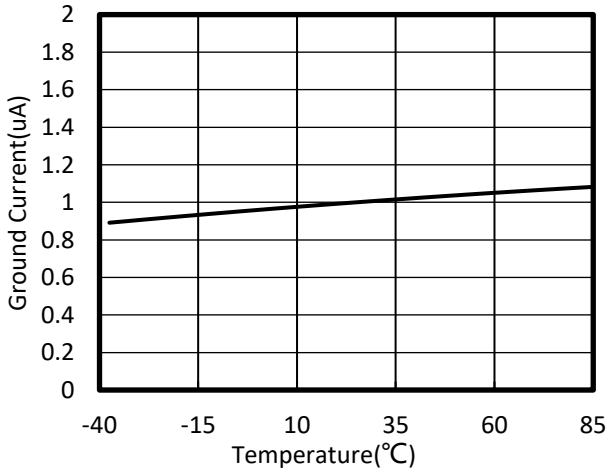

OUTPUT VOLTAGE ACCURACY vs TEMPERATURE




Ground Current vs Load Current

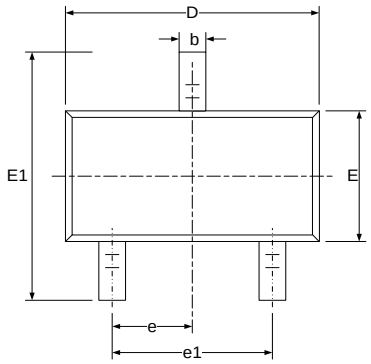


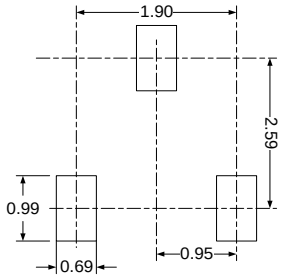

GROUND CURRENT vs TEMPERATURE



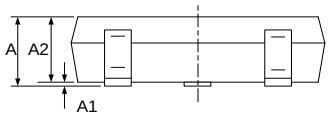
# PACKAGE OUTLINE DIMENSIONS

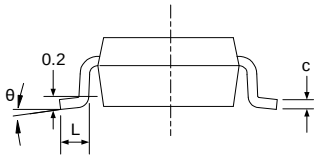
# SOT23-3



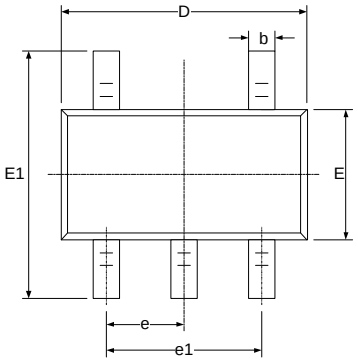

**RECOMMENDED LAND PATTERN (Unit: mm)**

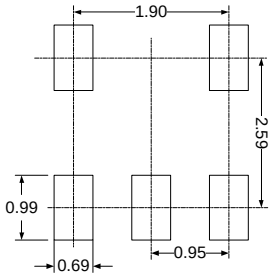


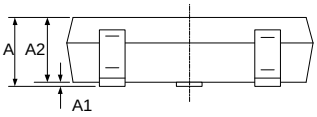

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| 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 |
| θ | 0° | 8° | 0° | 8° |

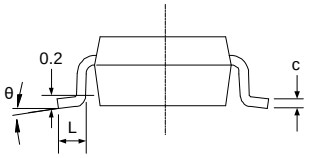
# SOT23-5



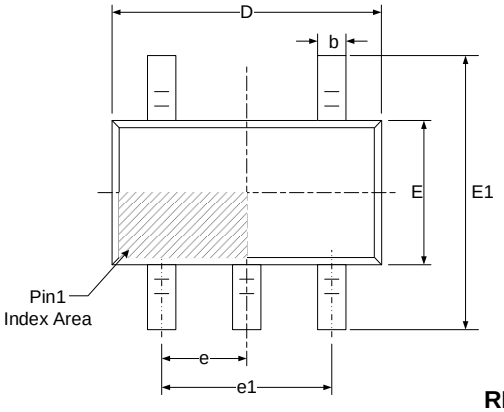

**RECOMMENDED LAND PATTERN (Unit: mm)**

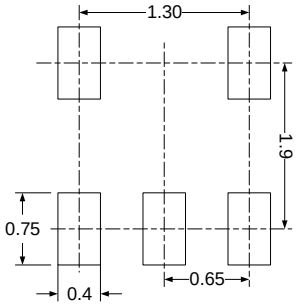


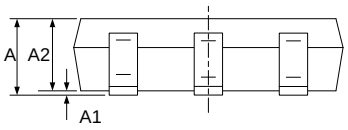

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| 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 |
| θ | 0° | 8° | 0° | 8° |

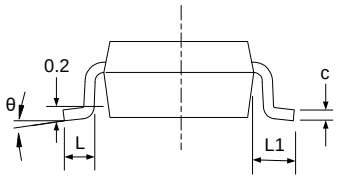
# SOT353(SC70-5)



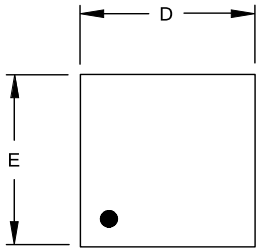

**RECOMMENDED LAND PATTERN (Unit: mm)**



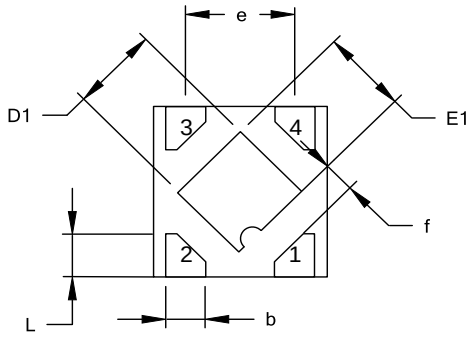




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.150 | 0.350 | 0.006 | 0.014 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| 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° |

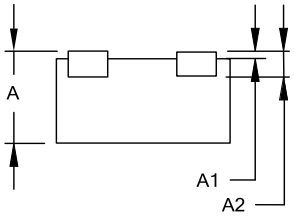
# UTDFN-1x1-4



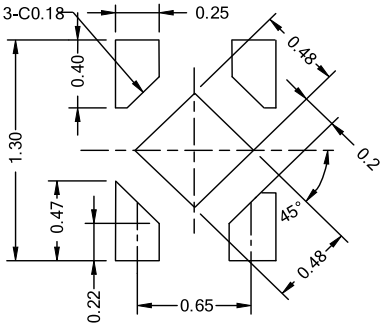

TOP VIEW




BOTTOM VIEW



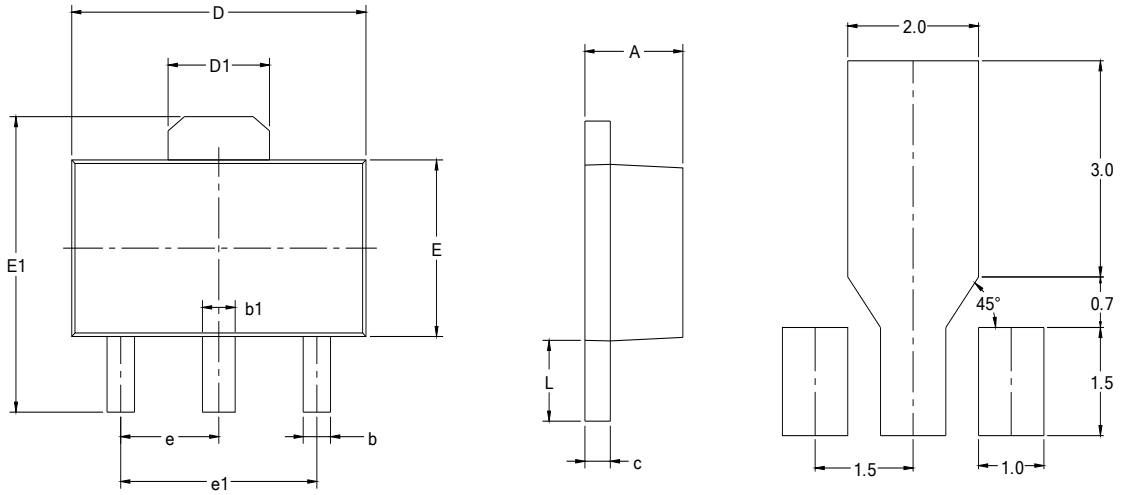

SIDE VIEW




RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol | Dimensions 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




RECOMMENDED LAND PATTERN (Unit: mm)

| 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 |

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