

## Description

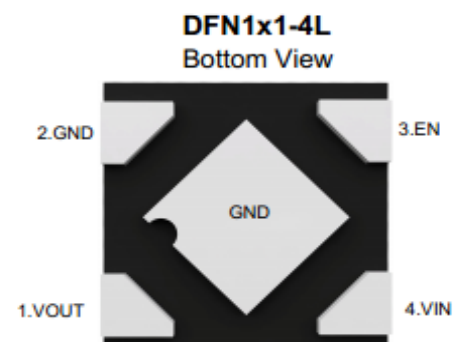
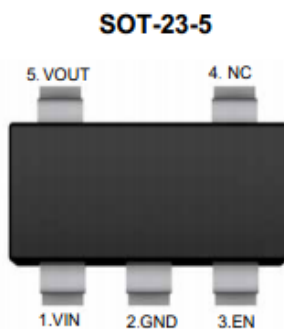
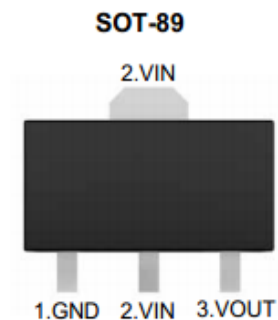
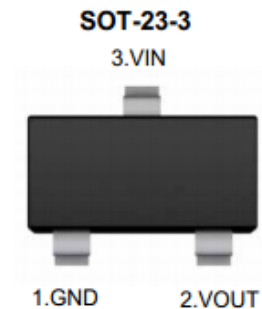
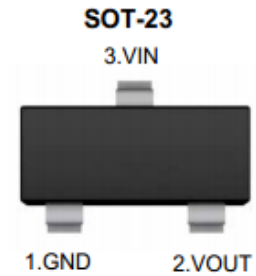
The SL54 Series is a high input voltage, low quiescent current, low-dropout linear regulator able to provide 300mA load current. The LDO features very fast response against line voltage transient and load current transient, and ensures no overshoot voltage during the LDO start up and short circuit recovery. The device features integrated short-circuit and thermal shutdown protection.

## Features

- Low Quiescent Current: 2.1uA
- High Input Voltage Rating: Up to 55V
- Maximum Output Current: 350mA
- Low Dropout : 350mV @ 100mA
- High PSRR: 85dB at 1KHz
- Fixed Output Voltages: 1.8V, 2.8V, 3V, 3.3V, 5V
- Fast Transient Response
- Current Limiting Protection
- Thermal Shutdown Protection
- Available Packages: SOT-23, SOT-23-3, SOT-89, SOT-23-5 and DFN1x1-4L Packages

## Applications

- Battery-Powered Equipment
- Smoke Detector and Sensor
- Micro Controller Applications



## Functional Pin Description

| Pin Name | Pin Function                                                    |
|----------|-----------------------------------------------------------------|
| EN       | Chip Enable (Active High). Note that this pin is high impedance |
| NC       | NO Connected                                                    |
| GND      | Ground                                                          |
| VOUT     | Output Voltage                                                  |
| VIN      | Power Input Voltage                                             |

## Ordering Information

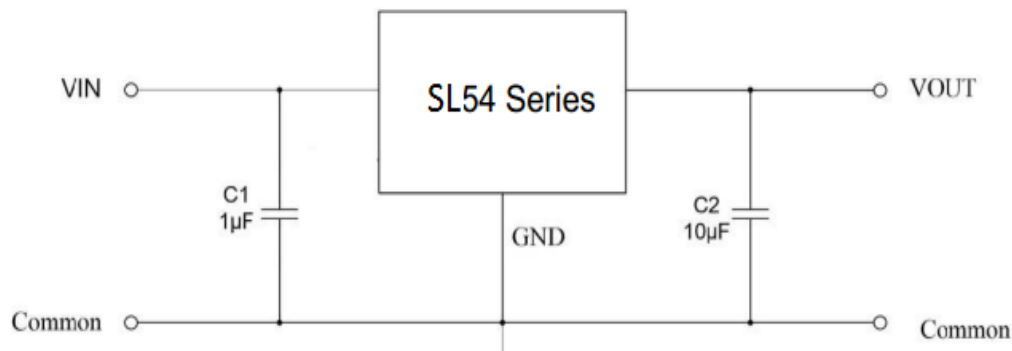
|       |      |                               |
|-------|------|-------------------------------|
| SL54- | □□□□ | Package Type                  |
|       |      | SA:SOT-23                     |
|       |      | SC:SOT-23-3                   |
|       |      | SQ:SOT-89                     |
|       |      | SE:SOT-23-5                   |
|       |      | DE:DFN1x1-4L                  |
|       |      | Output Voltage                |
|       |      | 18 : 1.8V 28 : 2.8V 30 : 3.0V |
|       |      | 33 : 3.3V 50 : 5.0V           |
|       |      | Output current tap            |
|       |      | M : 350mA                     |

## Marking Code Note

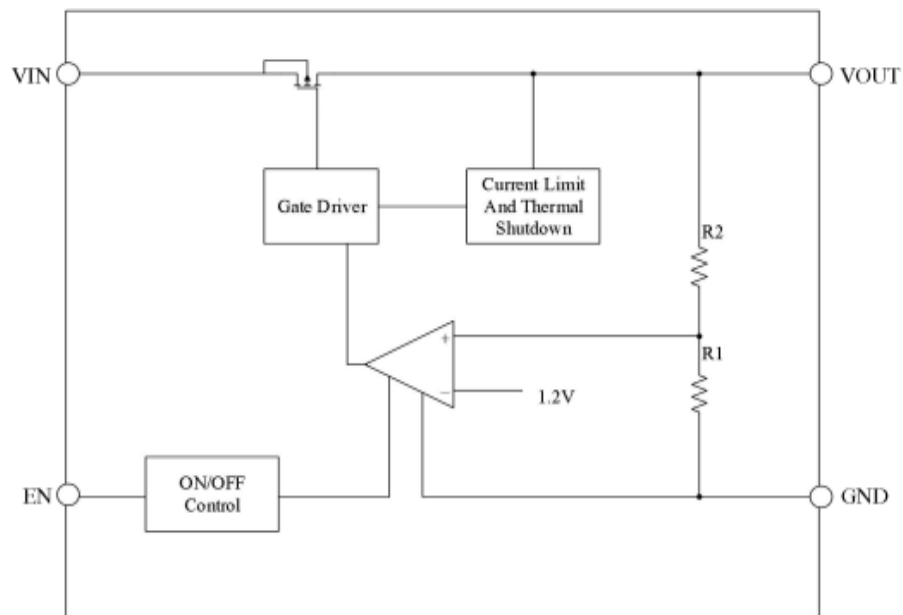
| Output Voltage | Package   | Marking Code |
|----------------|-----------|--------------|
| 1.8V~5V        | SOT-23    | 54XX         |
| 1.8V~5V        | SOT-23-3  | 54XXC        |
| 1.8V~5V        | SOT-23-5  | 54XXE        |
| 1.8V~5V        | SOT-89    | 54XX         |
| 1.8V~5V        | DFN1x1-4L | 54XX         |

**Note** . XX : Output Voltage e.g . 30:3.0V 33:3.3V

## Typical Application Circuit



## Function Block Diagram



## Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

| Parameter                               |           | Value              | Unit |
|-----------------------------------------|-----------|--------------------|------|
| VIN to GND Voltage                      |           | -0.3 ~ +55         | V    |
| VOUT to GND Voltage                     |           | -0.3 ~ +6          | V    |
| VOUT to VIN Voltage                     |           | -55 ~ +0.3         | V    |
| EN to GND Voltage                       |           | -0.3 ~ +55         | V    |
| Output Current                          |           | Internally limited | --   |
| Power Dissipation                       | SOT-23    | 300                | mW   |
|                                         | SOT-23-3  | 400                | mW   |
|                                         | SOT-89    | 600                | mW   |
|                                         | SOT-23-5  | 400                | mW   |
|                                         | DFN1x1-4L | 400                | mW   |
| Thermal Resistance, Junction-to-Ambient | SOT-23    | 380                | °C/W |
|                                         | SOT-23-3  | 300                | °C/W |
|                                         | SOT-89    | 180                | °C/W |
|                                         | SOT-23-5  | 300                | °C/W |
|                                         | DFN1x1-4L | 300                | °C/W |
| Operating Ambient Temperature           |           | -40 ~ +85          | °C   |
| Junction temperature                    |           | 150                | °C   |
| Storage temperature range               |           | -40 ~ +150         | °C   |

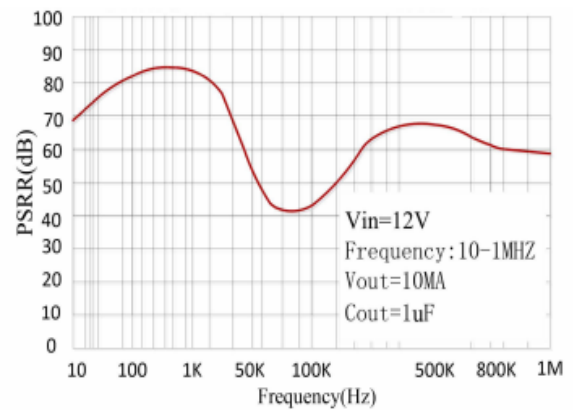
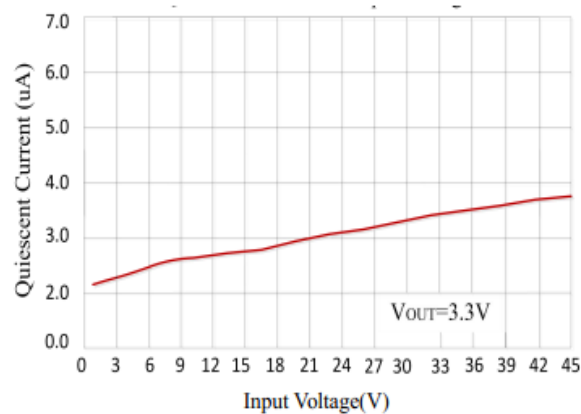
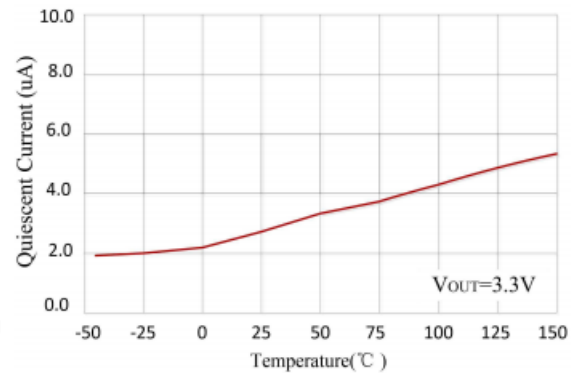
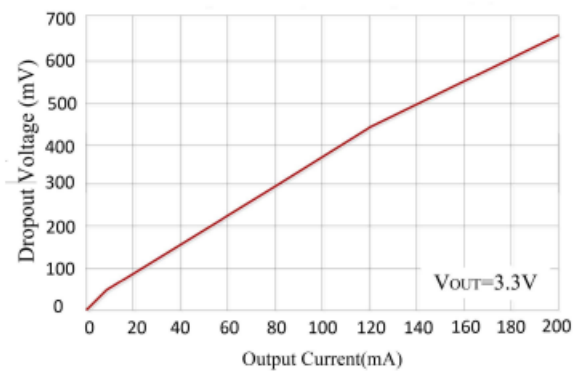
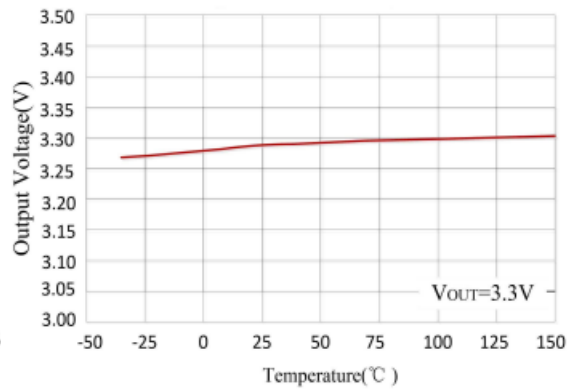
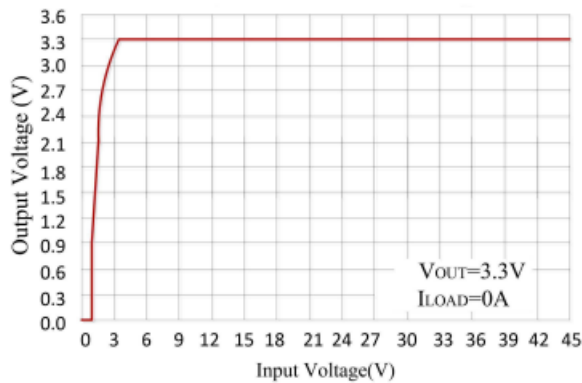
## Electrical Characteristics

( $V_{IN}=V_{OUT}+1$ ,  $C_{IN}=1\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_A=25^\circ C$ , unless otherwise noted.)

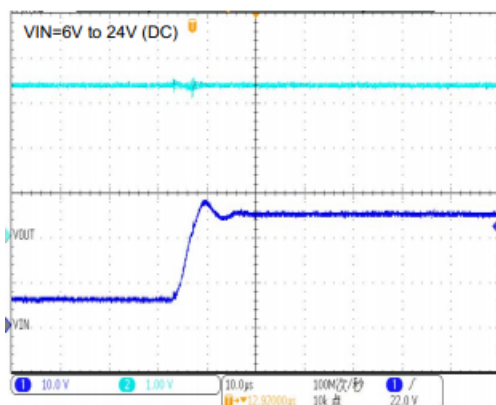
| Parameter                    |            | Symbol            | Test Conditions                                            | Min. | Typ. | Max. | Unit          |
|------------------------------|------------|-------------------|------------------------------------------------------------|------|------|------|---------------|
| Input Voltage                |            | $V_{IN}$          |                                                            | 3    | --   | 45   | V             |
| Output Voltage Accuracy      |            | $\Delta V_{OUT}$  | $V_{IN}=12V$ , $I_{OUT}=10mA$                              | -2   | --   | +2   | %             |
| Quiescent Current            |            | $I_Q$             | $V_{IN}=12V$ , $I_{OUT}=0mA$                               | --   | 2.1  | --   | $\mu A$       |
| Maximum Output Current       |            | $I_{OUT\_Max}$    |                                                            | 300  | 350  | --   | mA            |
| Dropout Voltage              |            | $V_{DROP}$        | $V_{IN}=V_{OUTNOM}-0.1V$ , $I_{OUT}=10mA$                  | --   | 35   | --   | mV            |
|                              |            |                   | $V_{IN}=V_{OUTNOM}-0.1V$ , $I_{OUT}=100mA$                 | --   | 350  | --   |               |
| Line Regulation              |            | $\Delta V_{LINE}$ | $V_{OUTNOM}+0.5V \leq V_{IN} \leq 40V$<br>$I_{OUT}=1mA$    | --   | 0.01 | --   | %/V           |
| Load Regulation              |            | $\Delta V_{LOAD}$ | $V_{IN}=12V$ ,<br>$1mA < I_{OUT} < 100mA$                  | --   | 0.02 | --   | %/mA          |
| Current Limit                |            | $I_{LIM}$         |                                                            | --   | 500  | --   | mA            |
| EN Input Threshold           | Logic Low  | $V_{IL}$          |                                                            | --   | --   | 0.4  | V             |
|                              | Logic High | $V_{IH}$          |                                                            | 1    | --   | --   | V             |
| Output Noise Voltage         |            | $V_N$             | 10Hz~100KHz, $C_{OUT}=1\mu F$<br>$V_{OUT}=3V$              | --   | 110  | --   | $\mu V_{rms}$ |
| Power Supply Rejection Ratio |            | PSRR              | $V_{IN}=12V$ , $I_{OUT}=10mA$<br>$f=1KHz$ , $V_{OUT}=3.3V$ | --   | 85   | --   | dB            |
| Thermal Shutdown Temperature |            | $T_{SHDN}$        | Shutdown, Temp increasing                                  | --   | 150  | --   | $^\circ C$    |
| Thermal Reset Temperature    |            | $T_{SHDN}$        | Reset, Temp increasing                                     | --   | 140  | --   | $^\circ C$    |

## Typical Characteristic Curves

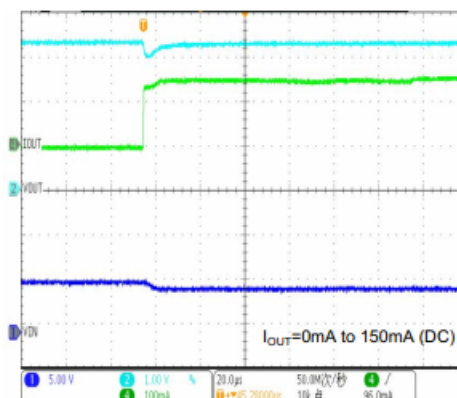
Test Condition:  $T_A=25^{\circ}\text{C}$ ,  $I_{\text{out}}=1\text{mA}$ ,  $C_{\text{OUT}}=10\mu\text{F}$ , unless otherwise noted



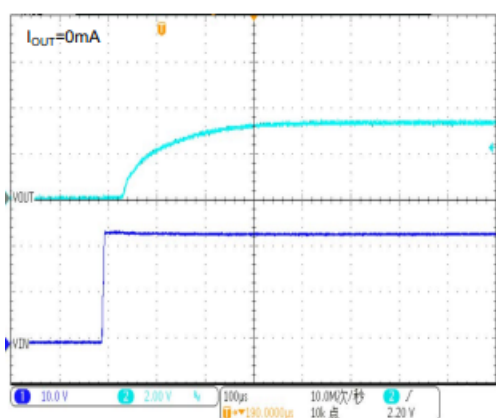
## Line transient



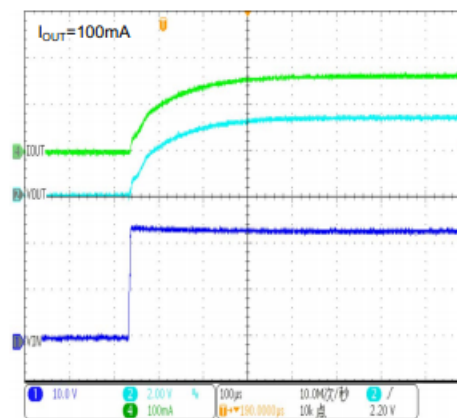
## Load transient



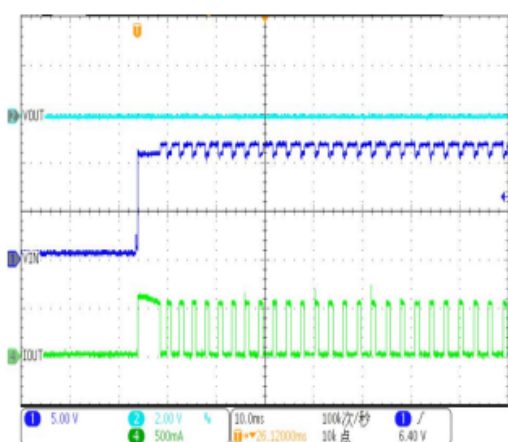
## No-load start



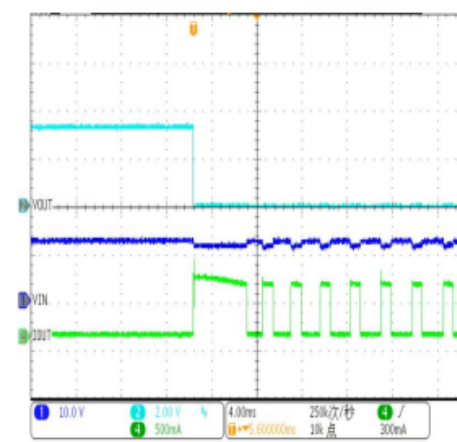
## Start with load



## Short-circuit Power-on



## Power-on short



## Functional Description

### Input Capacitor

A 1 $\mu$ F ceramic capacitor is recommended to connect between VIN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

### Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended minimum output capacitance is 1 $\mu$ F, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

### EN Pin Operation

The SL54 Series is turned on by setting the EN pin to "H". Since the EN pin is neither pulled down nor pulled up internally, do not set it in floating status. When the EN pin is not used, connect the EN pin with VIN to keep the LDO in operating mode.

### Current Limit and Short Circuit Protection

When output current at VOUT pin is higher than current limit threshold or the VOUT pin is direct short to GND, the current limit protection will be triggered and clamp the output current at a pre-designed level to prevent over-current and thermal damage.

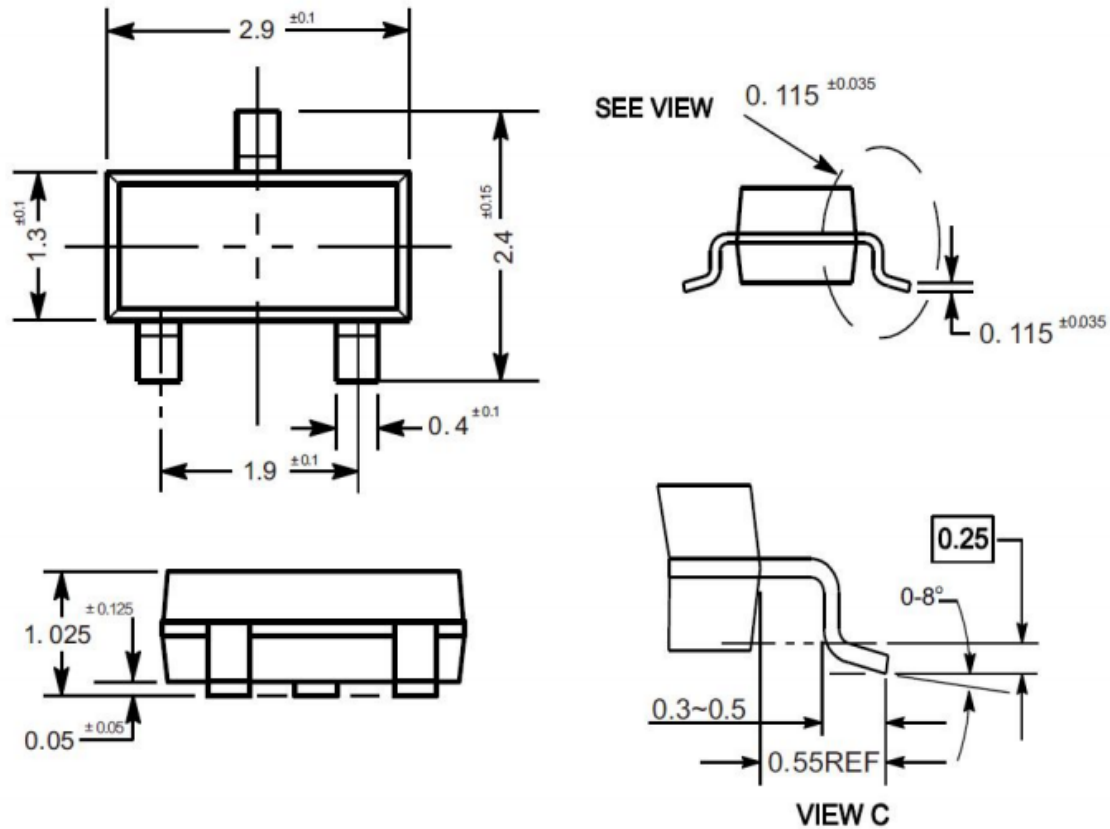
### Thermal Protection

The SL54 Series has internal thermal sense and protection circuits. When excessive power dissipation happens on the device, such as short circuit at the output pin or very heavy load current with a large voltage drop across the device, the internal thermal protection circuit will be triggered, and it will shut down the power MOSFET to prevent the LDO from damage. As soon as excessive thermal condition is removed and the temperature of the device drops down, the thermal protection circuit will lease the control of the power MOSFET, and the LDO device goes to normal operation.

## Package Outline

SOT-23

Dimensions in mm



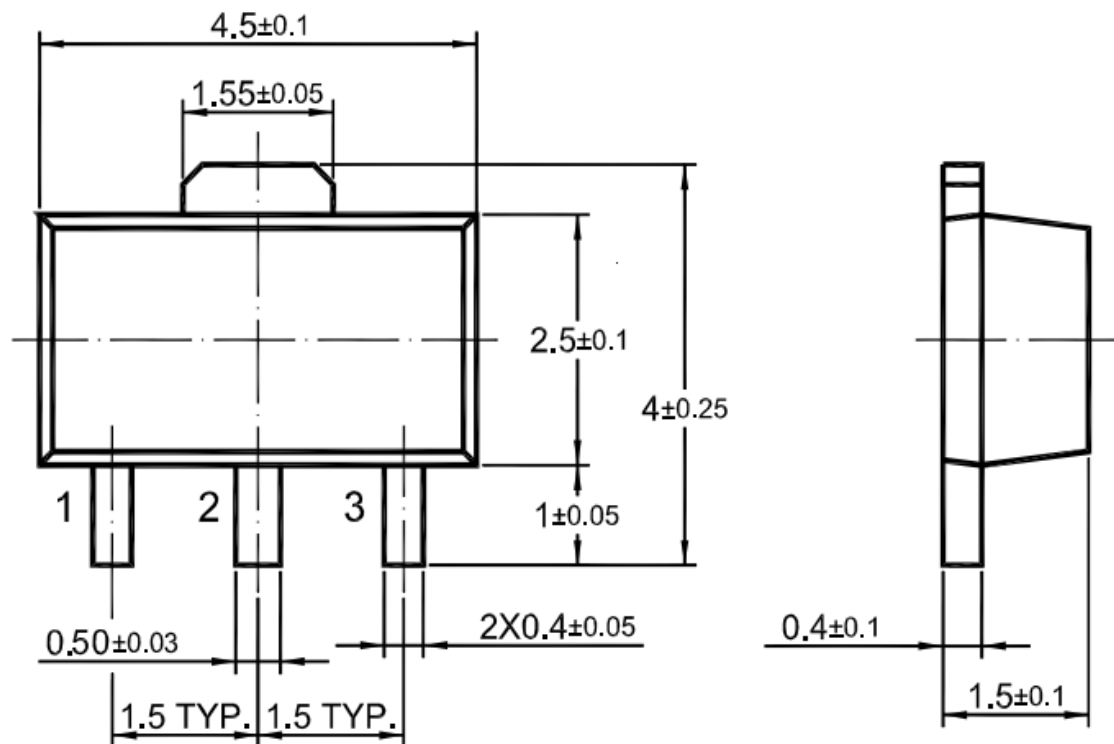
## Ordering Information

| Device      | Package | Shipping              |
|-------------|---------|-----------------------|
| SL54 Series | SOT-23  | 3,000PCS/Reel&7inches |

## Package Outline

SOT-89

Dimensions in mm



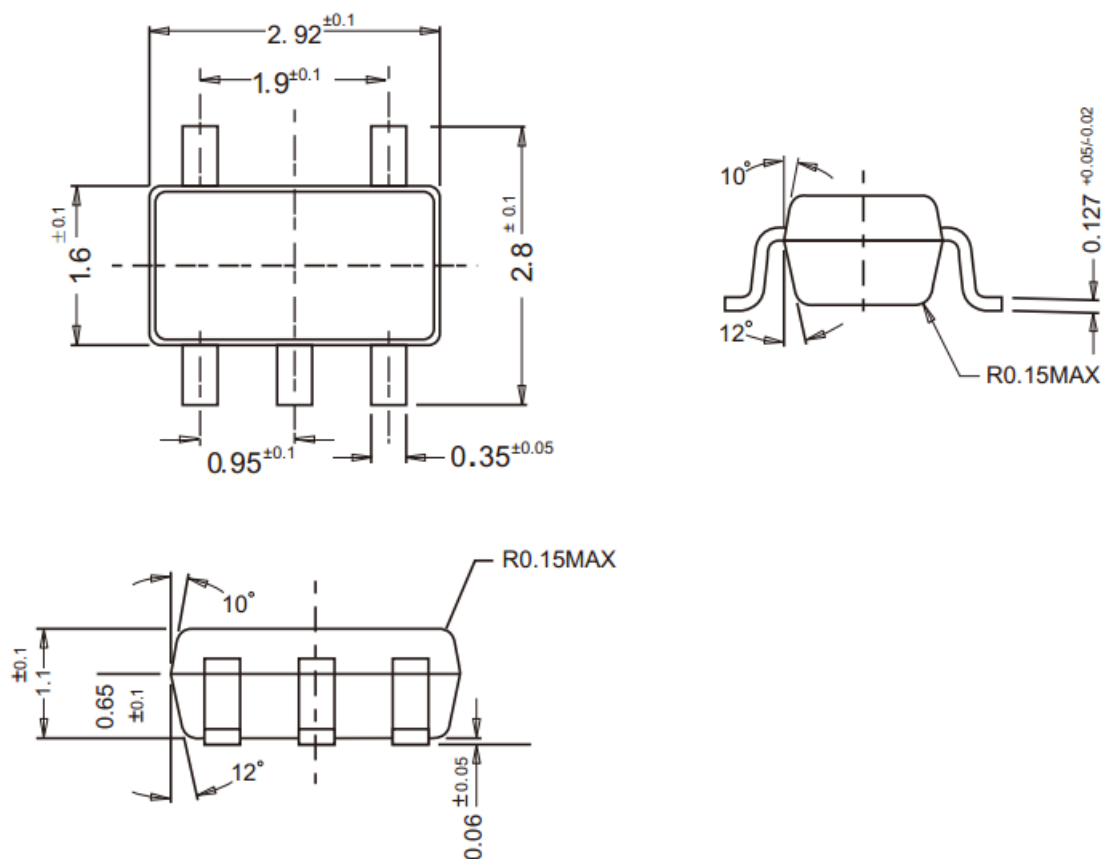
### Ordering Information

| Device      | Package | Shipping               |
|-------------|---------|------------------------|
| SL54 Series | SOT-89  | 1,000PCS/Reel&7inches  |
|             |         | 3,000PCS/Reel&13inches |

## Package Outline

SOT-23-5

Dimensions in mm



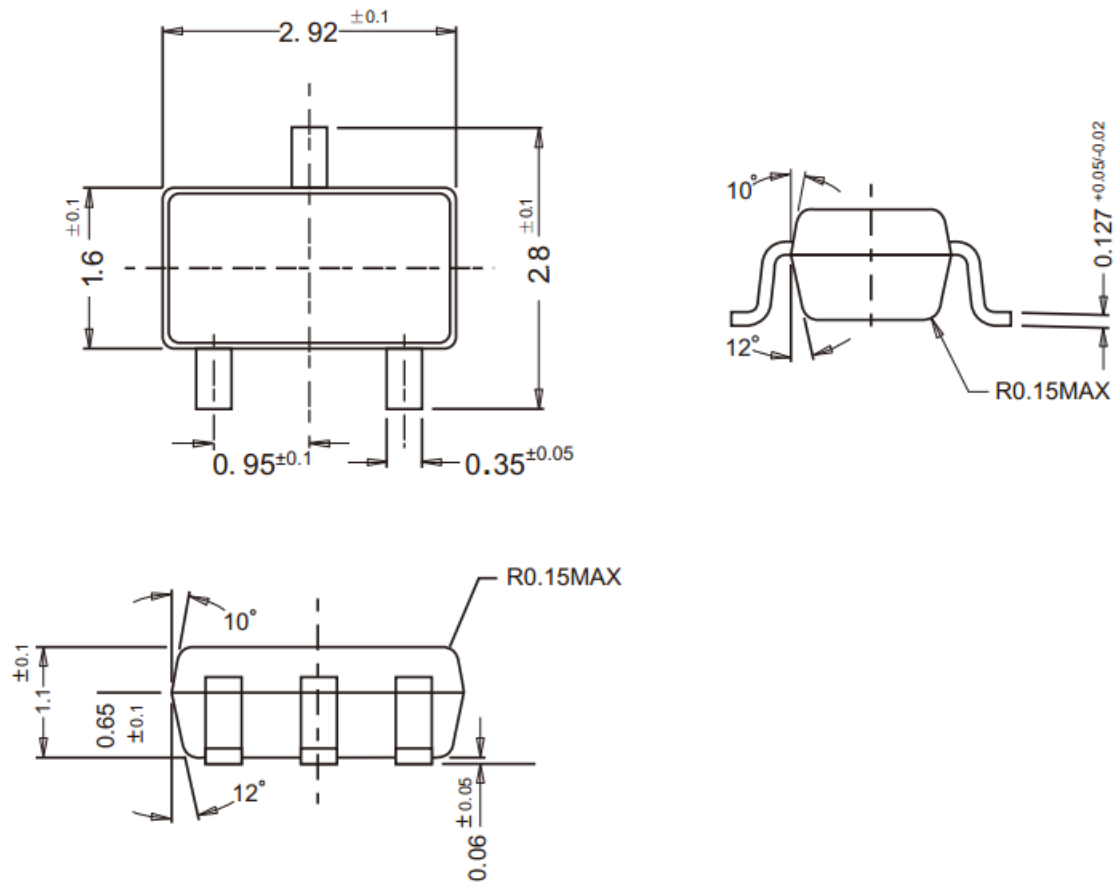
## Ordering Information

| Device      | Package  | Shipping              |
|-------------|----------|-----------------------|
| SL54 Series | SOT-23-5 | 3,000PCS/Reel&7inches |

## Package Outline

SOT-23-3

Dimensions in mm



## Ordering Information

| Device      | Package  | Shipping              |
|-------------|----------|-----------------------|
| SL54 Series | SOT-23-3 | 3,000PCS/Reel&7inches |