

General Description

The LTP3559 is a high voltage, low power consumption and high performance LDO. The family uses an advanced CMOS process and a P-MOSFET pass device to achieve fast start-up, with high output voltage accuracy. The LTP3559 is stable with a 1.0 μ F~10 μ F ceramic output capacitor, and uses a precision voltage reference and feedback loop to achieve a worst-case accuracy of 2% over all load, line, process, and temperature variations.

Features

- Wide Input Voltage Range : up to 45V
- Output Current : 350mA
- Standard Fixed Output Voltage Options : 1.8V, 2.5V, 3.0V, 3.3V, 3.6V, and 5.0V
- More Output Voltage Options Available on Request
- Low I_Q : 2.5 μ A Typically
- Low Dropout Voltage
- Short current protection:150mA
- Excellent Load and Line Transient Response
- Line Regulation : 0.01%/V Typically
- Normal Version Available in SOT23-3L, SOT23-5L and SOT-89 Packages
- Shutdown Version Available in SOT23-5L and Tiny DFN1 \times 1-4L Packages

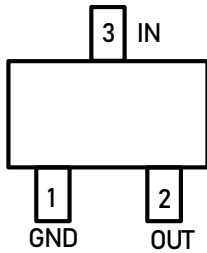
Order Information

| Model | Package | Ordering Number ^{Note1} | Packing Option |
|---------|--------------------|----------------------------------|----------------------|
| LTP3559 | SOT23-3L | LTP3559-xxXT3 | Tape and Reel, 3000 |
| | SOT23-5L | LTP3559-xxNXT5 | Tape and Reel, 3000 |
| | SOT23-5L | LTP3559-xxXT5 | Tape and Reel, 3000 |
| | SOT-89 | LTP3559-xxXT4 | Tape and Reel, 1000 |
| | DFN1 \times 1-4L | LTP3559-xxNXF4 | Tape and Reel, 10000 |

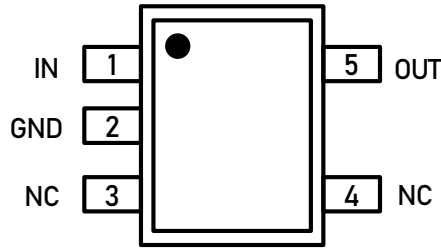
Note1: xx stands for output voltage, e.g. if xx = 18, the output voltage is 1.8V; if xx = 30, the output voltage is 3.0V. The device with suffix "N" is shutdown version with enable control input.

Pin Description

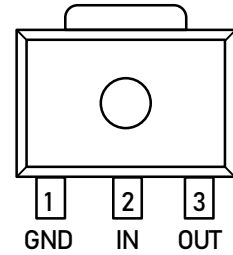
Normal Version Without Enable (Top View)



SOT23-3L

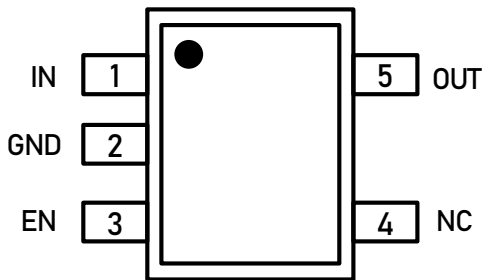


SOT23-5L

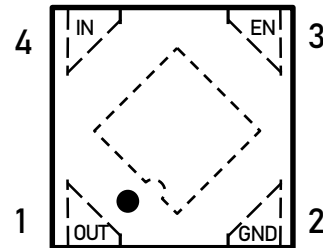


SOT-89

Shutdown Version With Enable (Top View)



SOT23-5L

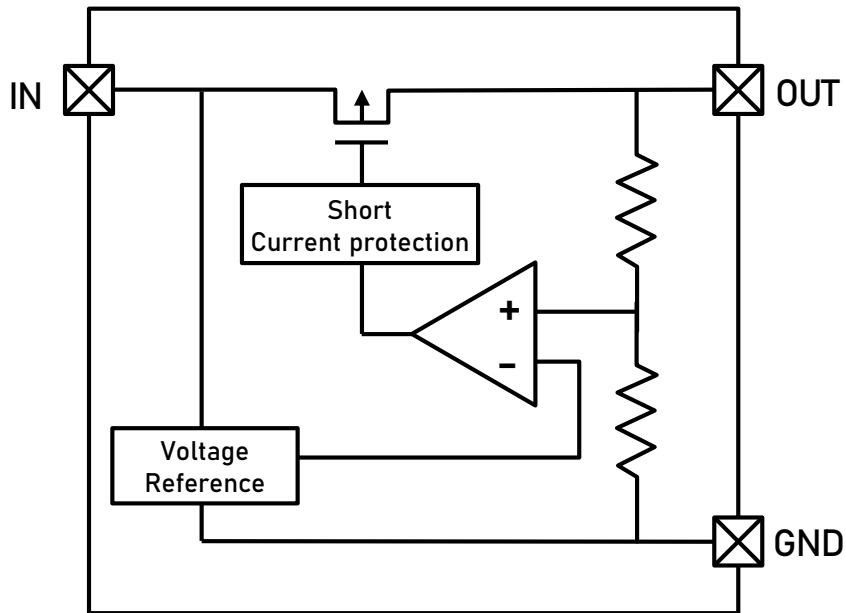


DFN1x1-4L

Pin Function

| Pin No. | | | | | Pin Name | Pin Function |
|---------------|---------------|---------------|----------------|----------------|----------|------------------------------------|
| SOT23-3L | SOT23-5L | SOT-89 | SOT23-5L | DFN1x1-4L | | |
| LTP3559-xxXT3 | LTP3559-xxXT5 | LTP3559-xxXT4 | LTP3559-xxNXT5 | LTP3559-xxNXF4 | | |
| 1 | 2 | 1 | 2 | 2 | GND | Ground. |
| | 1 | 2 | 1 | 4 | IN | Supply input pin. |
| | 5 | 3 | 5 | 1 | OUT | Output pin. |
| | | | 3 | 3 | EN | Enable control input, active high. |
| | 3, 4 | | 4 | | NC | No connection. |

Block Diagram



Functional Description

Input Capacitor

A $1\mu\text{F}$ - $10\mu\text{F}$ ceramic capacitor is recommended to connect between V_{IN} 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 V_{IN} and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is from 1 μ F to 10 μ F, Equivalent Series Resistance (ESR) is from 5m Ω to 100m Ω , 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 OUT and GND pins.

Low Quiescent Current

The LTP3559, consuming only around 2.5 μ A for all input range and output loading, provides great power saving in portable and low power applications.

Short Current Limit Protection

When output current at the OUT pin is higher than current limit threshold or the OUT pin is short-circuit to GND, the short current limit protection will be triggered and clamp the output current to approximately 100mA to prevent over-current and to protect the regulator from damage due to overheating.

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|--|---------------------------|--------------|
| IN pin to GND pin | -0.3 to 48 | V |
| OUT pin to GND pin | -0.3 to 6 | V |
| Thermal Resistance (Junction to Ambient) | SOT-89 | 135 |
| | SOT23-5L | 250 |
| | SOT23-3L | 360 |
| | DFN1 \times 1-4L | 250 |
| Operating Junction Temperature | -40 to 125 | $^{\circ}$ C |
| Storage Temperature | -65 to 150 | $^{\circ}$ C |
| Lead Temperature (Soldering, 10 sec) | 300 | $^{\circ}$ C |
| ESD (HBM mode) | ESDA/JEDEC JS-001-2017 | \pm 2000V |

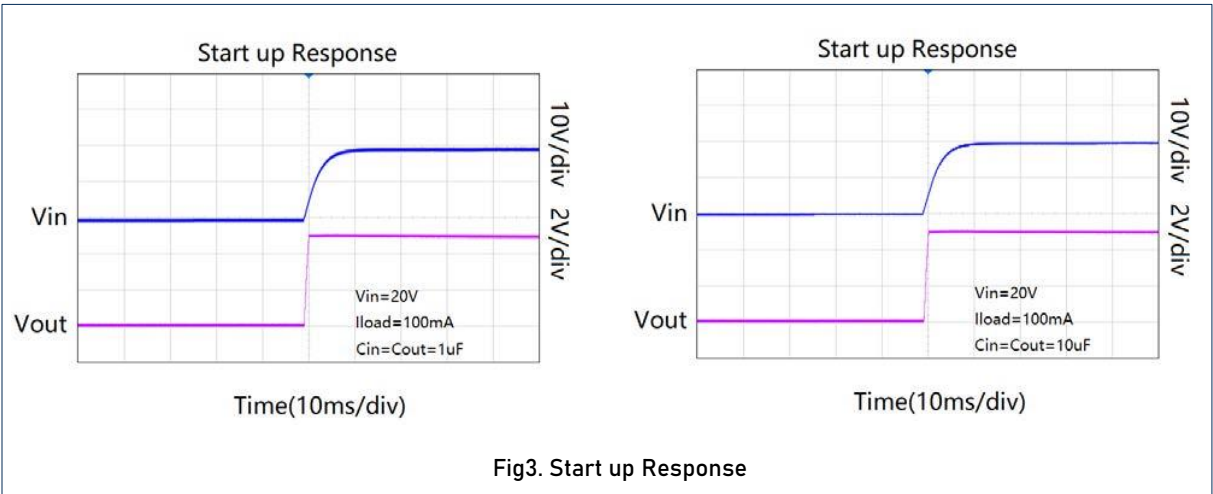
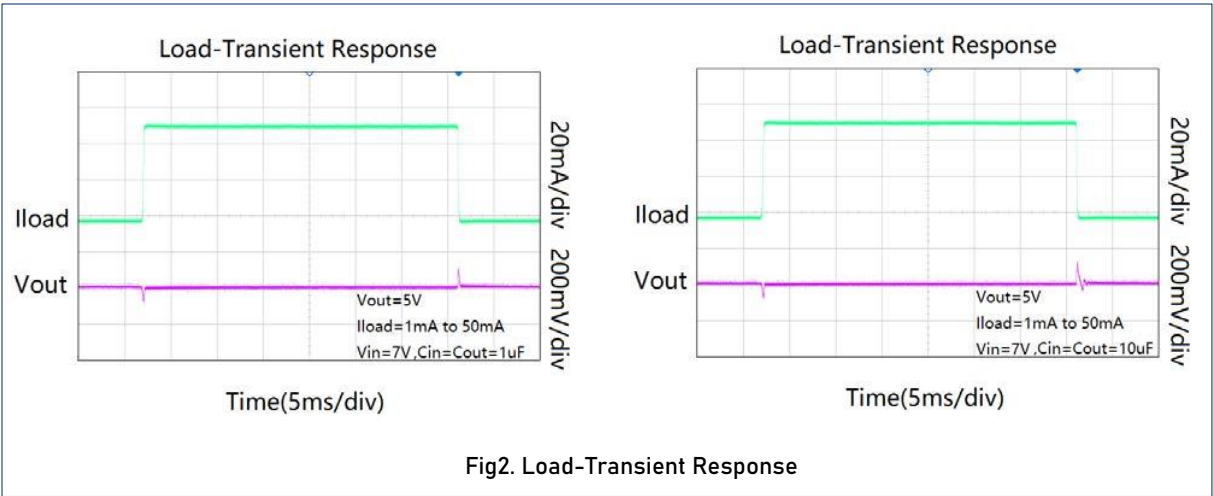
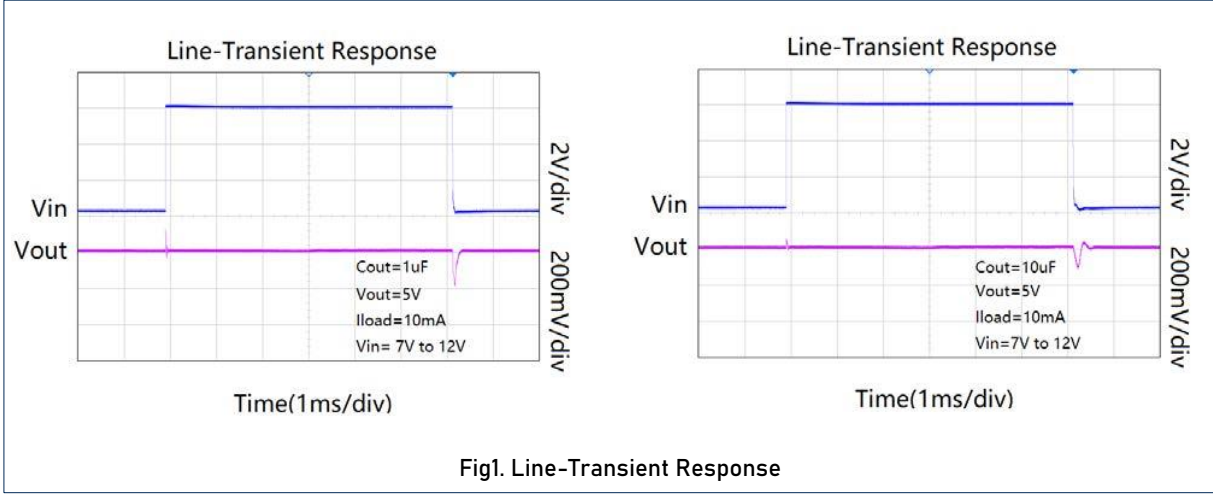
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Electrical Characteristics

($V_{IN} = V_{OUT} + 2V$; $I_{OUT} = 10mA$, $C_{IN} = C_{OUT} = 1.0\mu F$, unless otherwise noted. Typical values are at $T_A = +25^\circ C$.)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------------|---|--|-----|------------|------|---------------|
| V_{IN} | Operating Input Voltage | | | | 45 | V |
| $Line_{REG}$ | Line Regulation | $2.5V \leq V_{IN} \leq 36V$, $I_{OUT} = 10mA$ | | 0.01 | 0.04 | %/V |
| V_{DROP} | Dropout Voltage | $V_{OUT} = 3.0V$, $I_{OUT} = 100mA$ $V_{OUT} = 3.0V$, $I_{OUT} = 200mA$ | | 330 690 | | mV |
| $Load_{REG}$ | Load Regulation | $1mA \leq I_{OUT} \leq 300mA$, $V_{IN} = V_{OUT} + 2V$ | | | 40 | mV |
| I_{OUT} | Maximum Output Current | $V_{IN} = V_{OUT} + 1V$ | | 350 | | mA |
| I_Q | Quiescent Current | $I_{OUT} = 0mA$ | | 2.5 | 4 | μA |
| I_{Q_OFF} | Standby Current | $V_{EN} = 0V$, $T_A = 25^\circ C$ | | 0.1 | 1 | μA |
| V_{ENH} | EN Pin Threshold Voltage | EN Input Voltage "H" | 1.2 | | | V |
| V_{ENL} | EN Pin Threshold Voltage | EN Input Voltage "L" | | | 0.4 | V |
| I_{EN} | EN Pin Current | $V_{EN} = 0-36V$ | | 1 | | μA |
| PSRR | Power Supply Rejection Ratio $V_{IN} = V_{OUT} + 1V$ $I_{OUT} = 20mA$ | $f = 1 kHz$ | | 60 | | dB |
| e_N | Output Noise Voltage | $V_{IN} = V_{OUT} + 2V$, $I_{OUT} = 1mA$, $f = 10Hz$ to $100KHz$, ($V_{OUT} = 3V$) $C_{OUT} = 1\mu F$ | | 100 | | μV_{rms} |
| T_{SD} | Thermal Shutdown Temperature | Temperature Increasing from $T_A = +25^\circ C$ | | 155 | | $^\circ C$ |
| T_{SDH} | Thermal Shutdown Hysteresis | Temperature Falling From TSD | | 20 | | $^\circ C$ |

TYPICAL PERFORMANCE CHARACTERISTICS



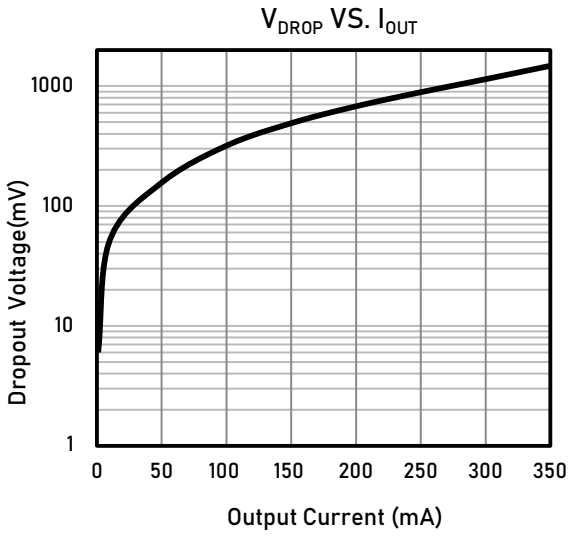


Fig4. Dropout Voltage VS Output Current

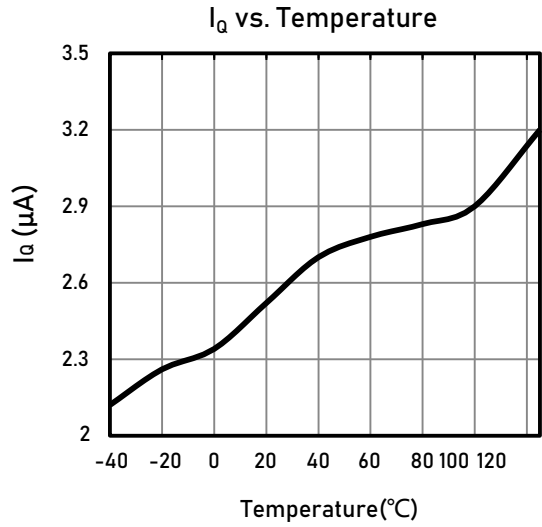
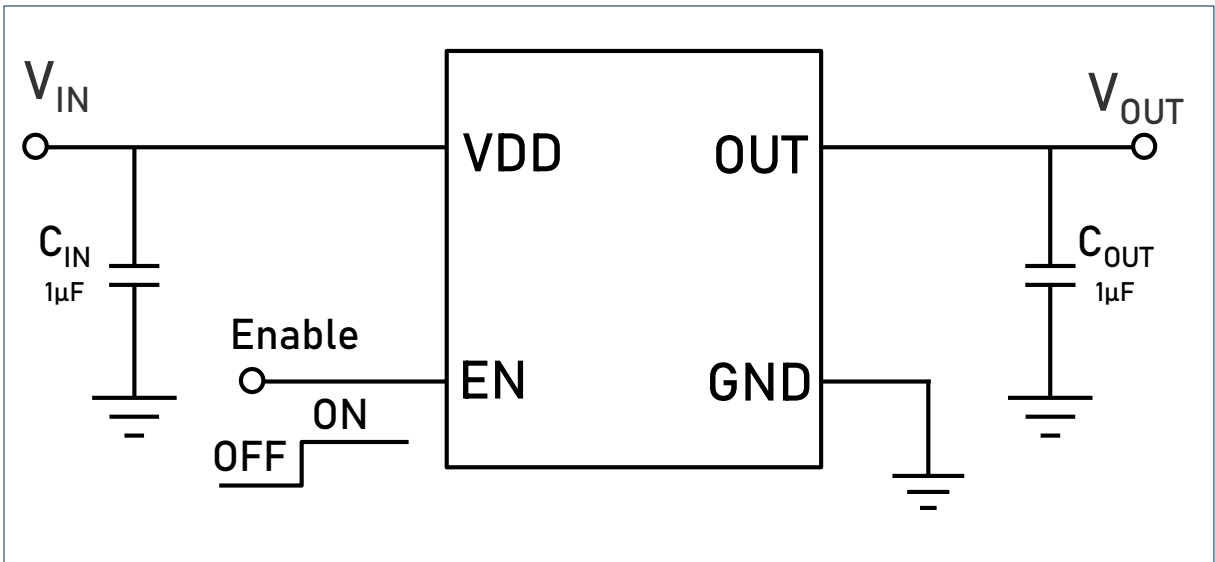


Fig5. I_Q VS Temperature

Application Circuits



CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.

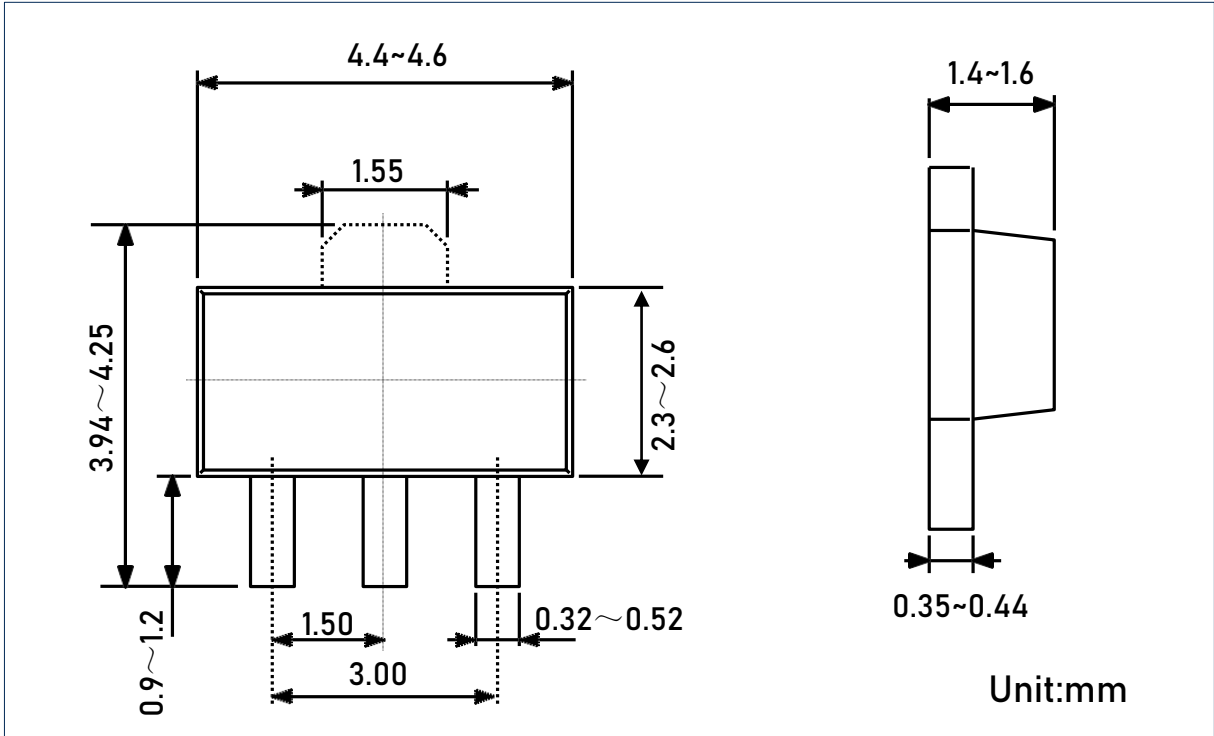
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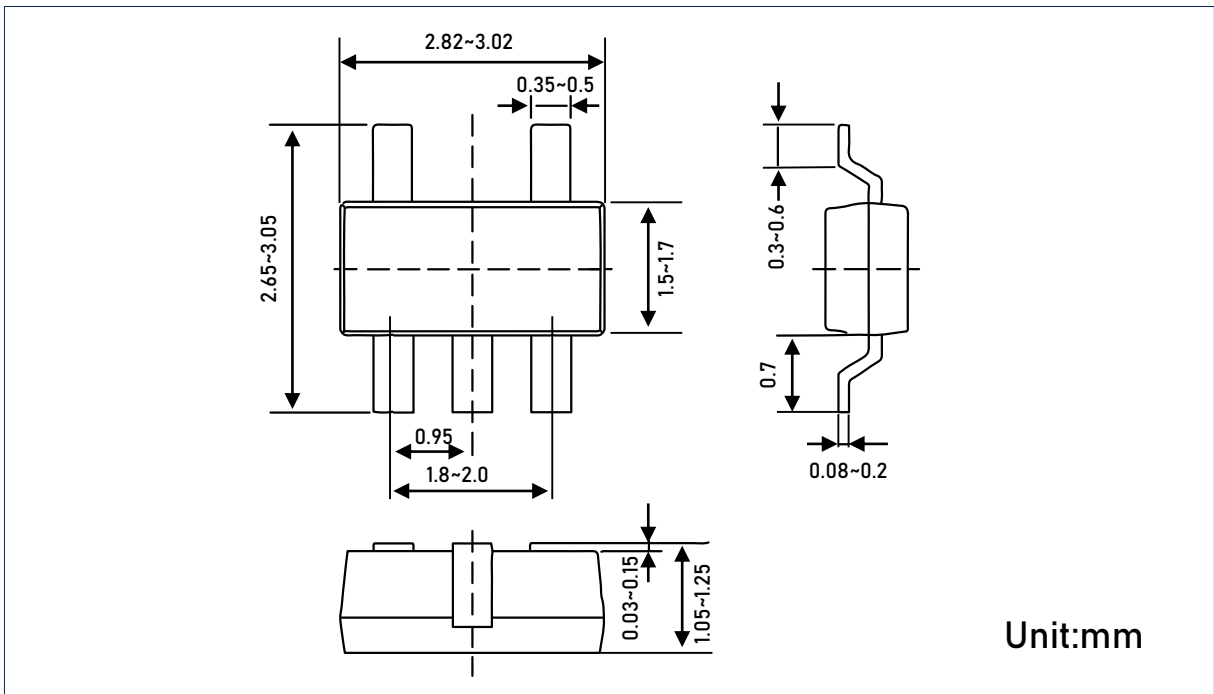
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Package Dimension

SOT-89



SOT23-5L



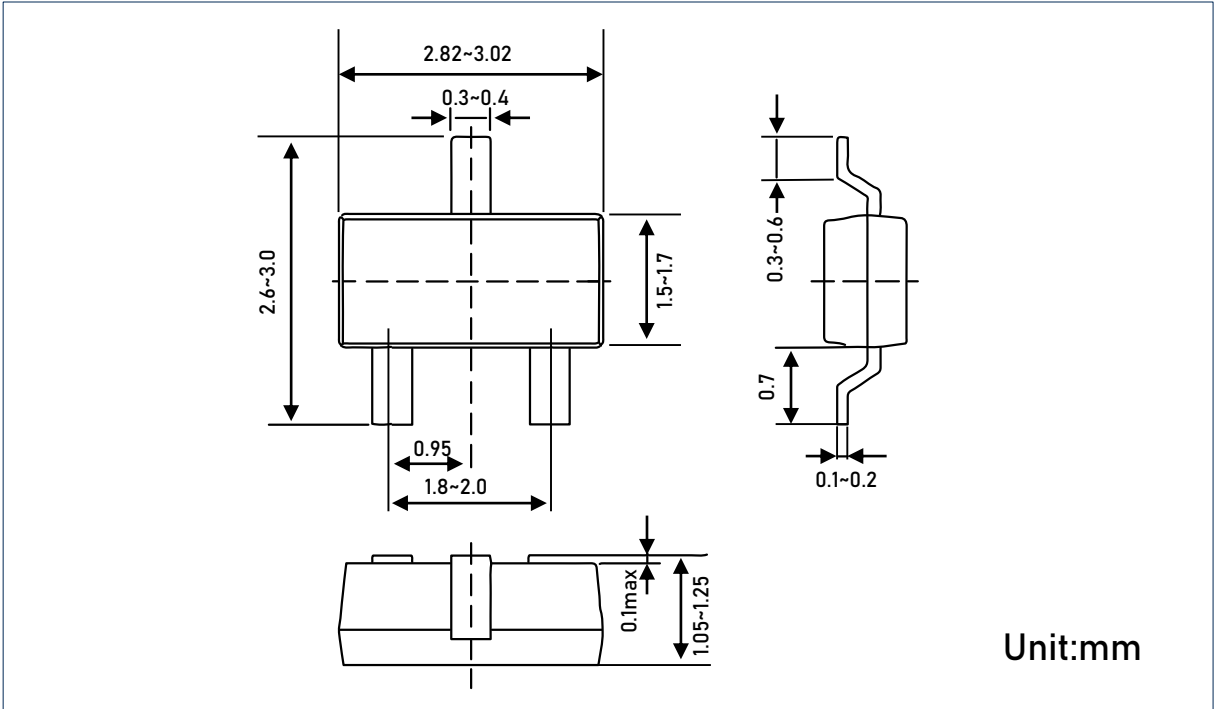
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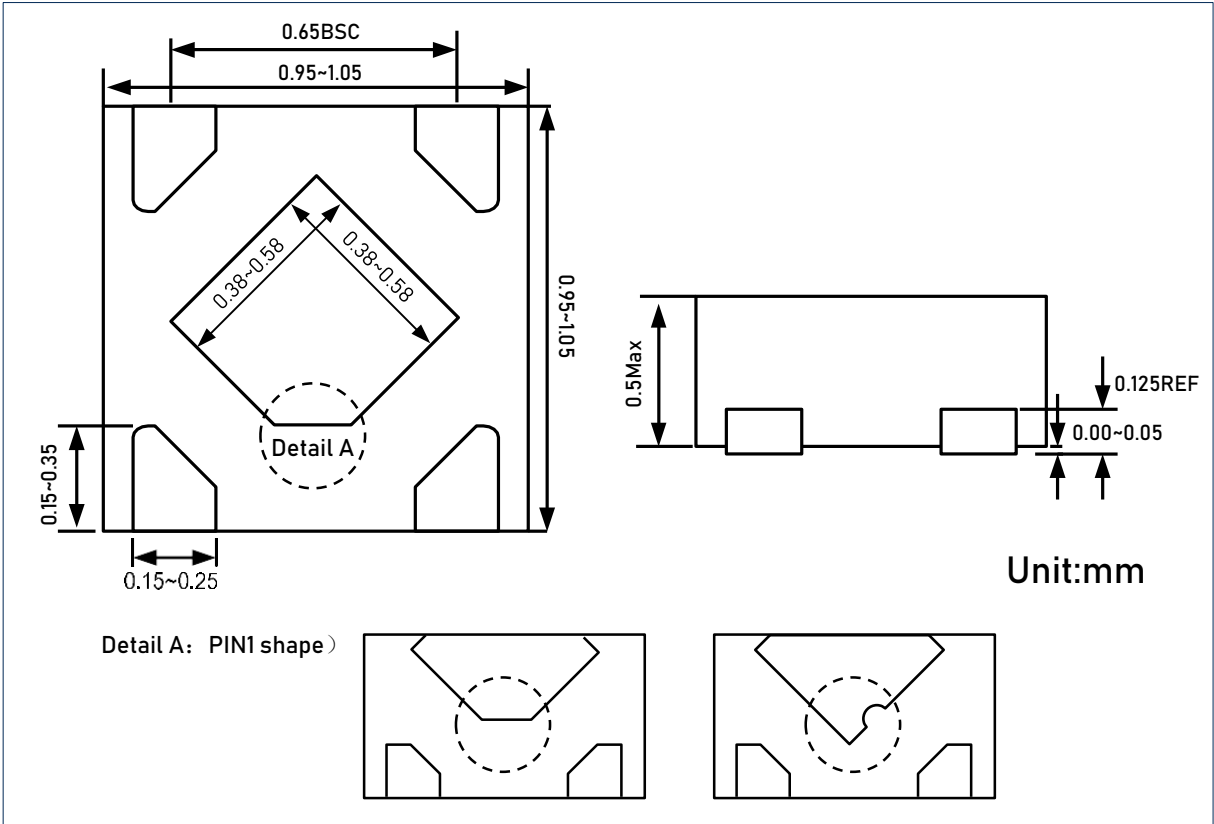
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SOT23-3L



DFN1×1-4



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