

Low Dropout Regulators

Description

The SL9400 is a high accuracy, low noise, high speed CMOS Linear regulator with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small. The devices offer a new level of cost effective performance in cellular phones, laptop and notebook computers, and other portable devices.

The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin.

Standard products are Pb-free and Halogen-free.

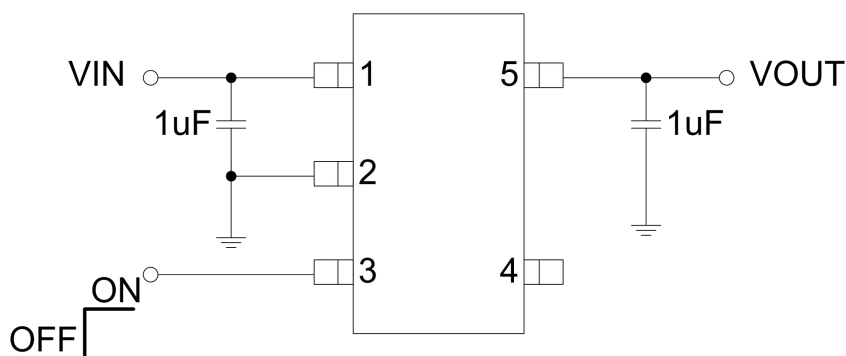
Features

- Low Quiescent Current: 0.5 μ A(Typ.)
- Wide Input Voltage Range: 1.5V~8V
- Output Voltage Range: 1.2V~5V(customized by every 0.1V step)
- Maximum Output Current: 400mA @ $V_{OUT}=3.3V$
- Low Dropout : 180mV @ $I_{OUT}=100mA$
- Low Output Voltage Accuracy: $\pm 2\%$
- Shut-down Current: <1 μ A
- Short Circuit Protection
- Current Limiting Protection
- Available Packages: SOT-89, SOT-23-3, SOT-23-5 and DFN1x1-4L Packages

Applications

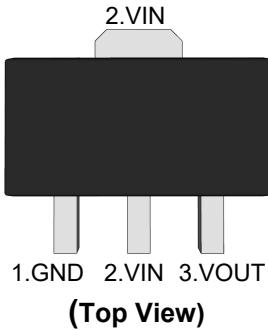
- Radio Control Systems
- Cellphones, Radiophone, Digital Cameras
- Bluetooth, Wireless Handsets

Typical Application Circuit

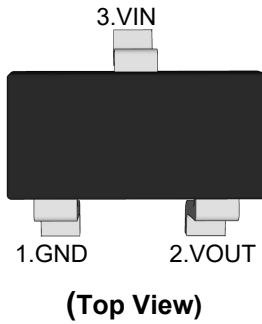


Pin Distribution

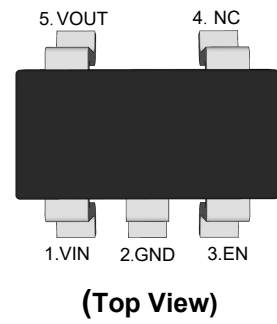
SOT-89



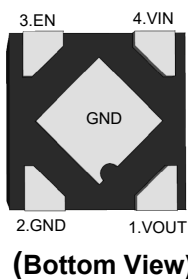
SOT-23-3



SOT-23-5



DFN1x1-4L



Functional Pin Description

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

Ordering Information

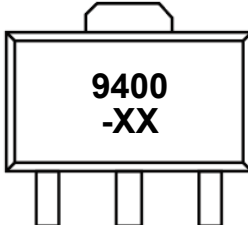
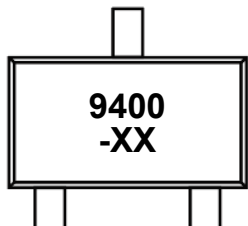
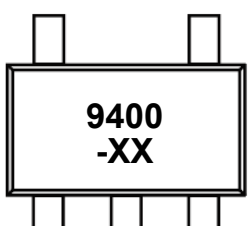
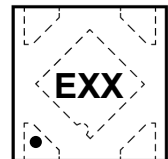
SL9400 □ □ □ □

Package Type
 SQ:SOT-89 SC:SOT-23-3 SE:SOT-23-5
 DE:DFN1x1-4L

Output Voltage
 1.2V~5.0V by 0.1V step.
 For example, 28 means product outputs 2.8V

Output current tap
 L : 400mA

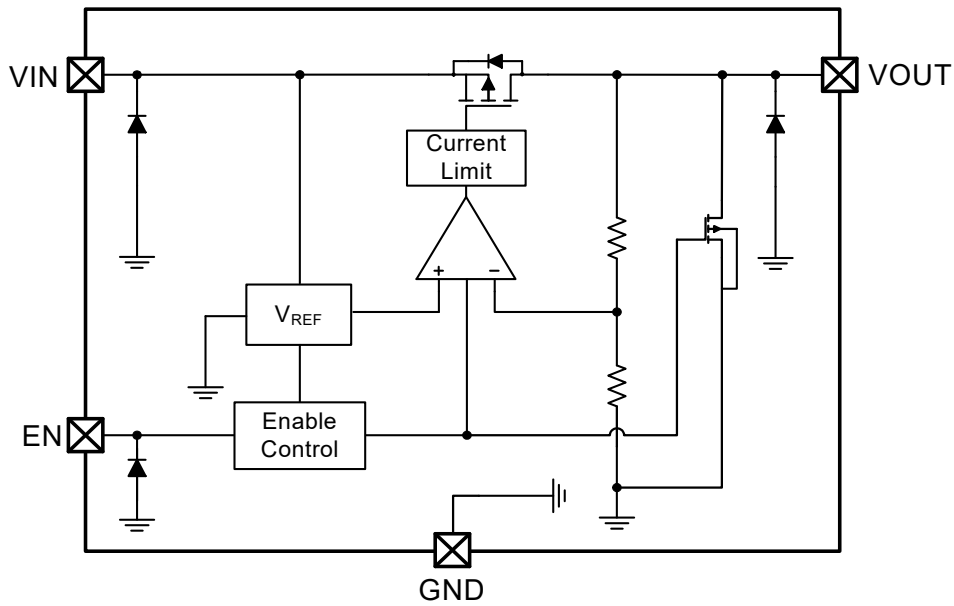
Ordering Information Continue

| Orderable Device | Package | Reel (inch) | Package Qty (PCS) | Eco Plan ^{Note1} | MSL Level | Marking Code |
|------------------------------|-----------|-------------|-------------------|---------------------------|-----------|--|
| SL9400LXXSQ ^{Note2} | SOT-89 | 7/13 | 1000/3000 | RoHS & Green | MSL1 |  <p>9400 -XX</p> <p>XX:Output Voltage e.g. 3.0:3.0V</p> |
| SL9400LXXSC ^{Note2} | SOT-23-3 | 7 | 3000 | RoHS & Green | MSL3 |  <p>9400 -XX</p> <p>XX:Output Voltage e.g. 3.0:3.0V</p> |
| SL9400LXXSE ^{Note2} | SOT-23-5 | 7 | 3000 | RoHS & Green | MSL3 |  <p>9400 -XX</p> <p>XX:Output Voltage e.g. 3.0:3.0V</p> |
| SL9400LXXDE ^{Note2} | DFN1x1-4L | 7 | 1000 | RoHS & Green | MSL1 |  <p>EXX</p> <p>E:Product Code e.g. E: SL9400 Series XX:Output Voltage e.g. 30:30V</p> |

Note:

- RoHS: SL defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials.
Green: SL defines "Green" to mean Halogen-Free and Antimony-Free.
- XX indicates 1.2V~5.0V by 0.1V step. For example, 28 means product outputs 2.8V

Function Block Diagram



Absolute Maximum Ratings ^{Note3}

Ratings at 25°C ambient temperature unless otherwise specified.

| Parameter | | Value | Unit |
|---|-----------|------------|------|
| Input Voltage | V_{IN} | -0.3 ~ +9 | V |
| Maximum Load Current | | 450 | mA |
| Power Dissipation | SOT-89 | 600 | mW |
| | SOT-23-3 | 400 | mW |
| | SOT-23-5 | 400 | mW |
| | DFN1x1-4L | 400 | mW |
| Thermal Resistance, Junction-to-Ambient | SOT-89 | 250 | °C/W |
| | SOT-23-3 | 400 | °C/W |
| | SOT-23-5 | 400 | °C/W |
| | DFN1x1-4L | 400 | °C/W |
| Operating Ambient Temperature | | -40 ~ +85 | °C |
| Junction Temperature | | -40 ~ +125 | °C |
| Storage temperature range | | -55 ~ +150 | °C |
| Lead Temperature | | 260°C, 10S | -- |

Note3: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect.

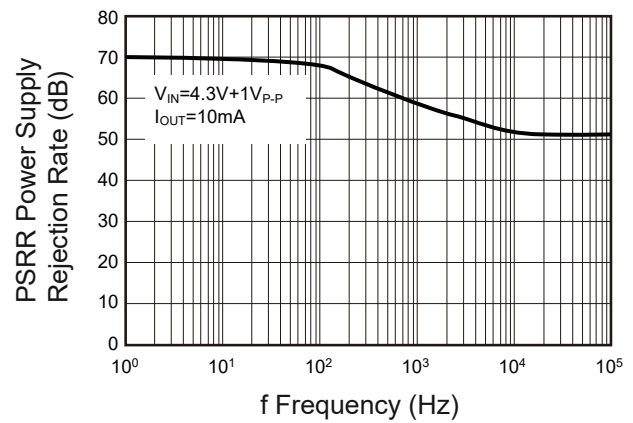
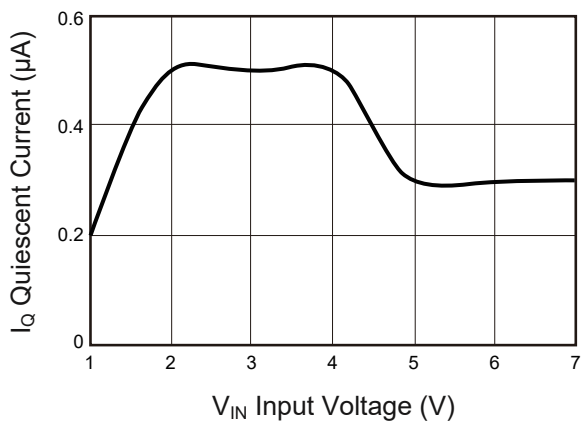
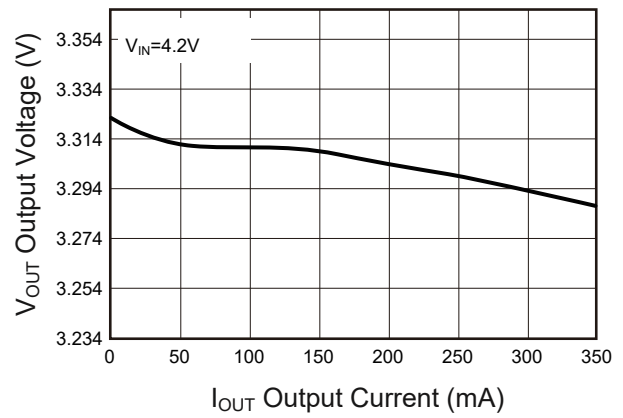
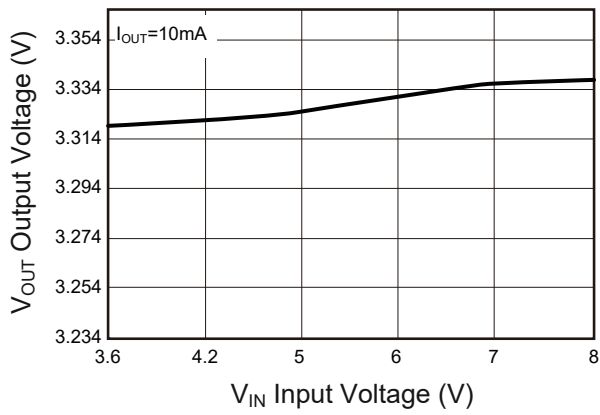
Electrical Characteristics

($V_{OUT}=3.3V$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $T_A=25^\circ C$, unless otherwise noted.)

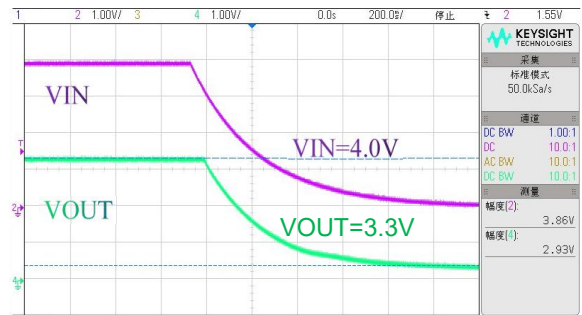
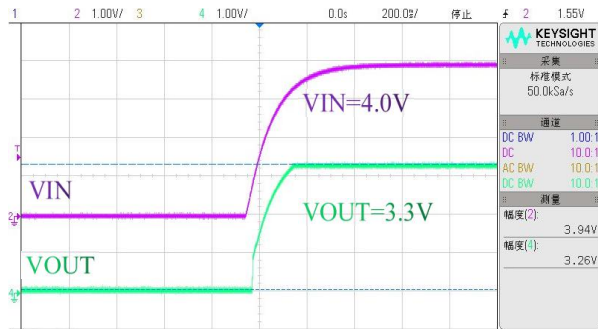
| Parameter | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------|------------|-------------------|--|------|------|----------|---------|
| Input Voltage | | V_{IN} | | 1.5 | -- | 8 | V |
| Output Voltage Accuracy | | ΔV_{OUT} | $I_{OUT}=1mA$ | -2 | -- | +2 | % |
| Quiescent Current | | I_Q | $V_{OUT}=3.3V, I_{OUT}=0$ | -- | 0.5 | -- | μA |
| Shut-down Current | | I_{SHDN} | $V_{EN}=0V$ | -- | -- | 1 | μA |
| Dropout Voltage | | V_{DROP} | $V_{OUT}=3.3V, I_{OUT}=100mA$ | -- | 180 | -- | mV |
| | | | $V_{OUT}=3.3V, I_{OUT}=200mA$ | -- | 400 | -- | |
| Line Regulation | | ΔV_{LINE} | $V_{IN}=2.7V\sim 5.5V, I_{OUT}=1mA$ | -- | 0.01 | 0.15 | % |
| Load Regulation | | ΔV_{LOAD} | $1mA < I_{OUT} < 300mA, V_{OUT}=3.3V$ | -- | 200 | -- | mV |
| Current Limit | | I_{LIM} | $V_{IN}=V_{EN}=4.5V$ | -- | 400 | -- | mA |
| Short Current | | I_{SHORT} | $V_{EN}=V_{IN}$, V_{OUT} Short to GND with 1Ω | -- | 35 | -- | mA |
| EN Input Current | | I_{EN} | $V_{EN}=0\sim 5.5V$ | -- | -- | 1 | μA |
| EN Input Threshold | Logic Low | V_{IL} | $V_{IN}=5.5V, V_{OUT}=0V$ | -- | -- | 0.4 | V |
| | Logic High | V_{IH} | $V_{IN}=5.5V, I_{OUT}=1mA$ | 1.2 | -- | V_{IN} | |
| Power Supply Rejection Rate | | PSRR | $V_{IN}=5V_{DC}+0.5V_{P-P}$ $f=1KHz, I_{OUT}=10mA$ | -- | 60 | -- | dB |

Typical Electrical Curves

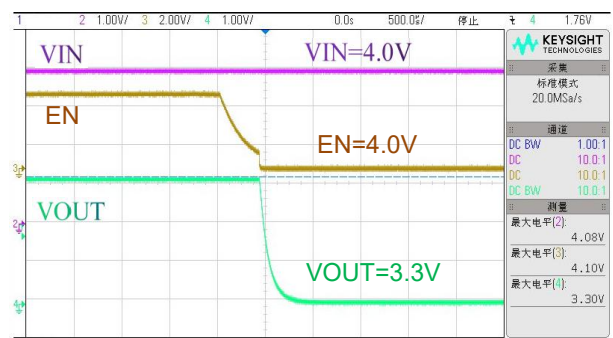
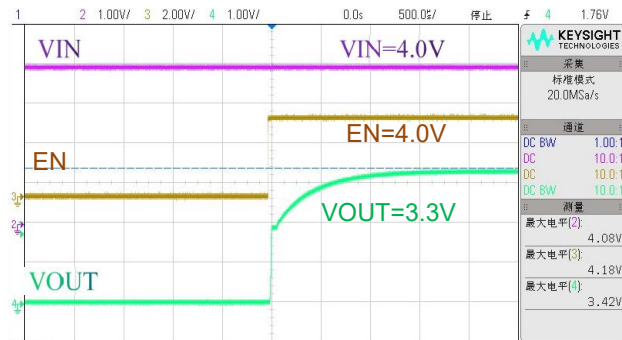
($V_{IN}=4.5V, V_{OUT}=3.3V, C_{IN}=1\mu F, C_{OUT}=1\mu F, T_A=25^\circ C$, unless otherwise noted, Package:SOT-23-5)



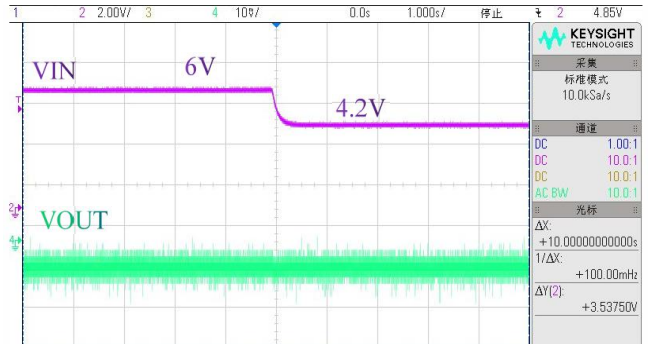
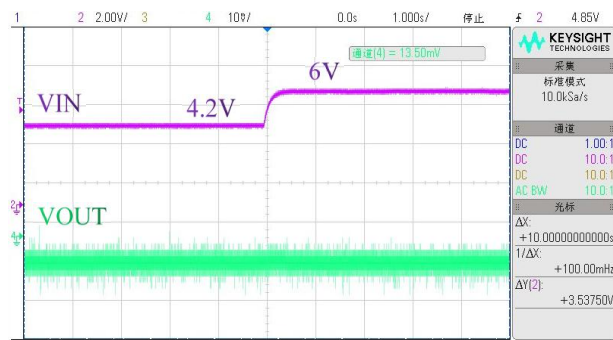
Power ON / OFF



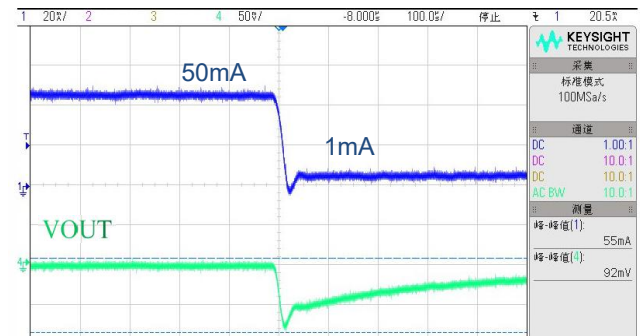
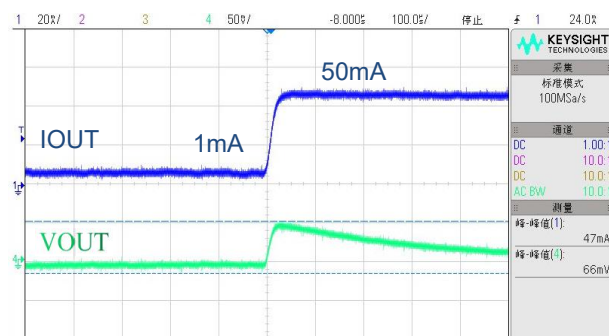
EN ON/OFF



Line Transient



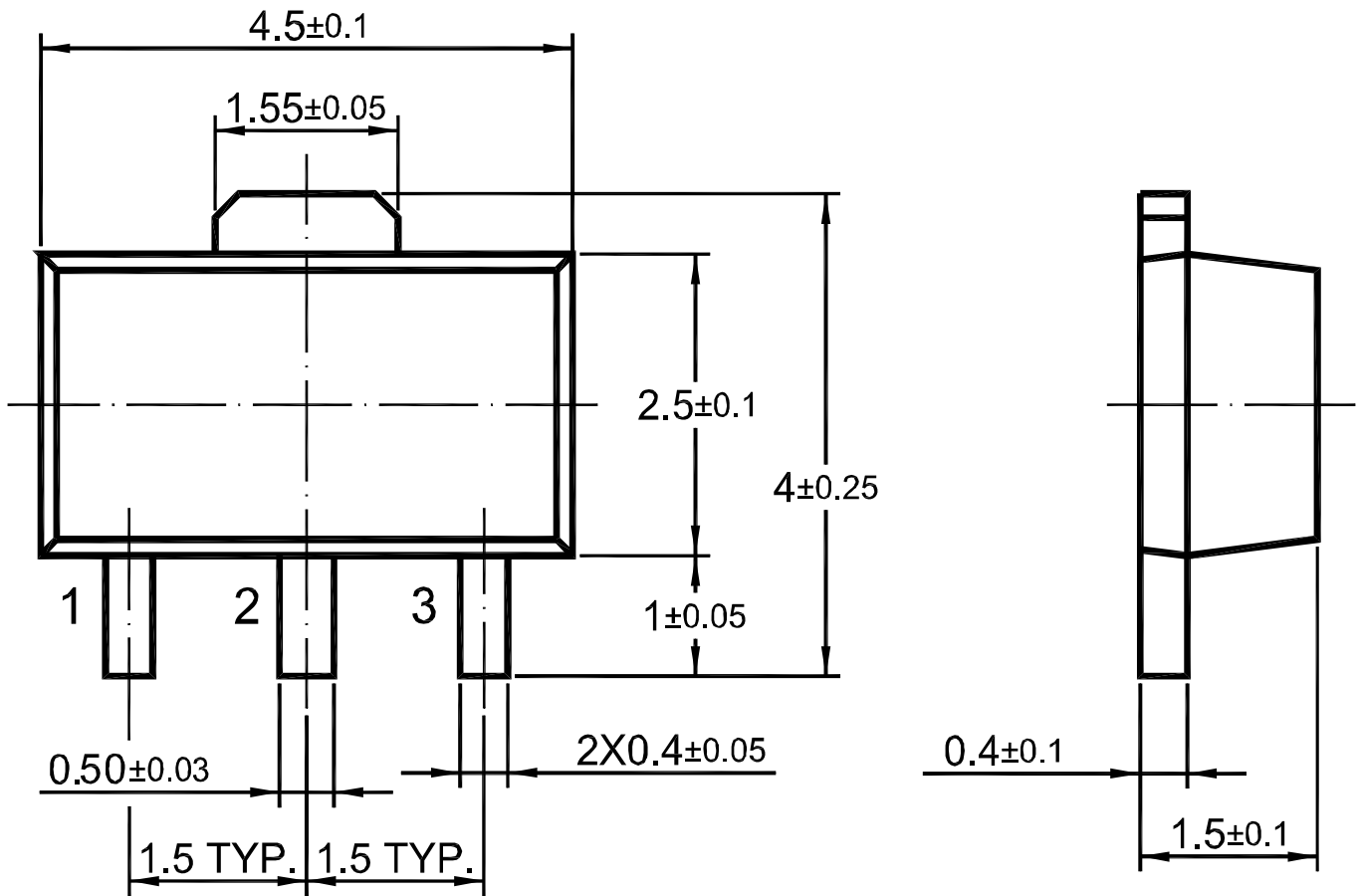
Load Transient



Package Outline

SOT-89

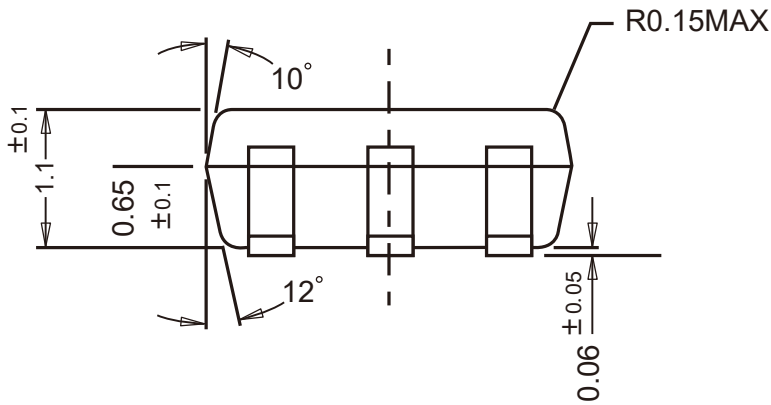
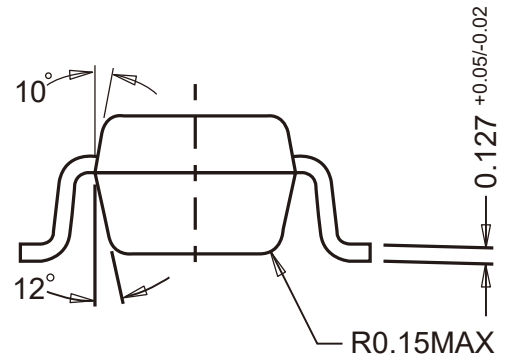
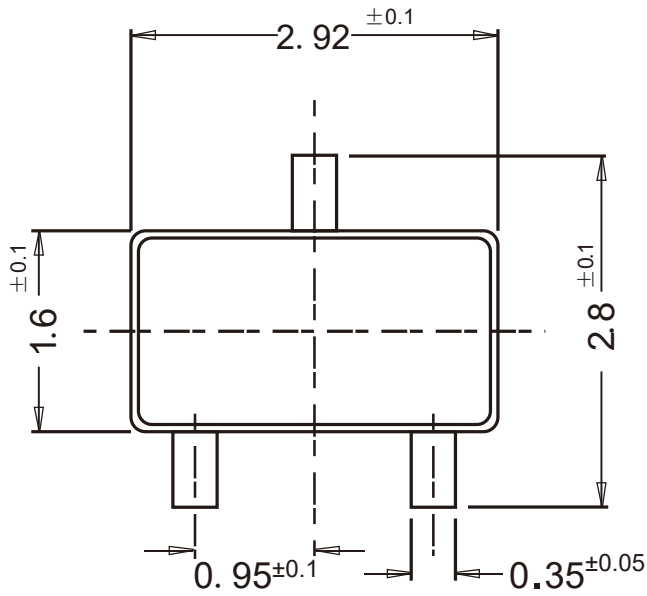
Dimensions in mm



Package Outline

SOT-23-3

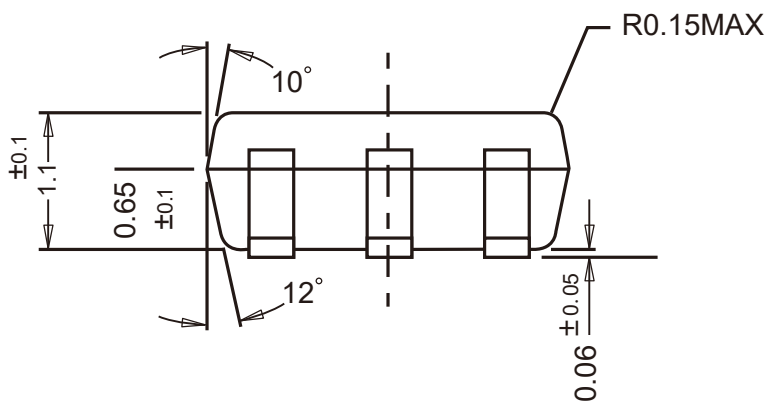
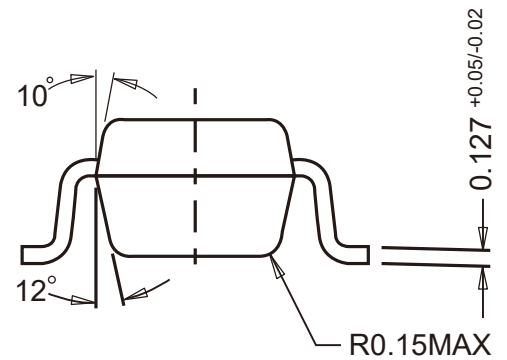
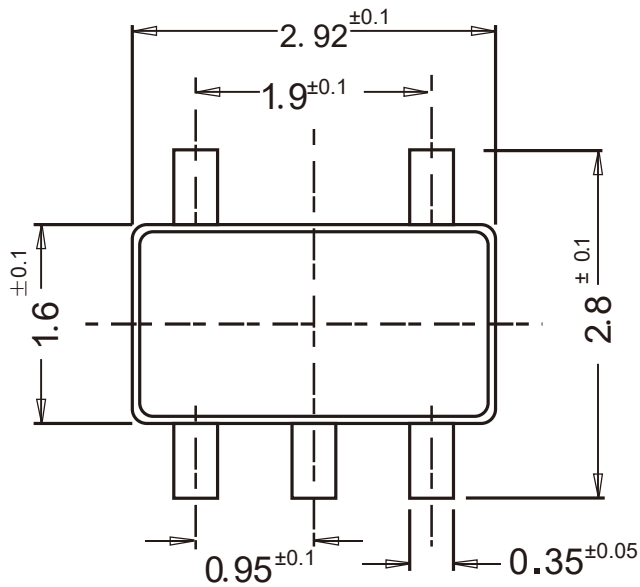
Dimensions in mm



Package Outline

SOT-23-5

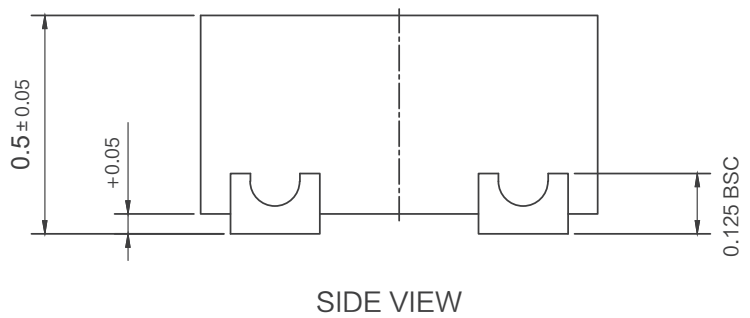
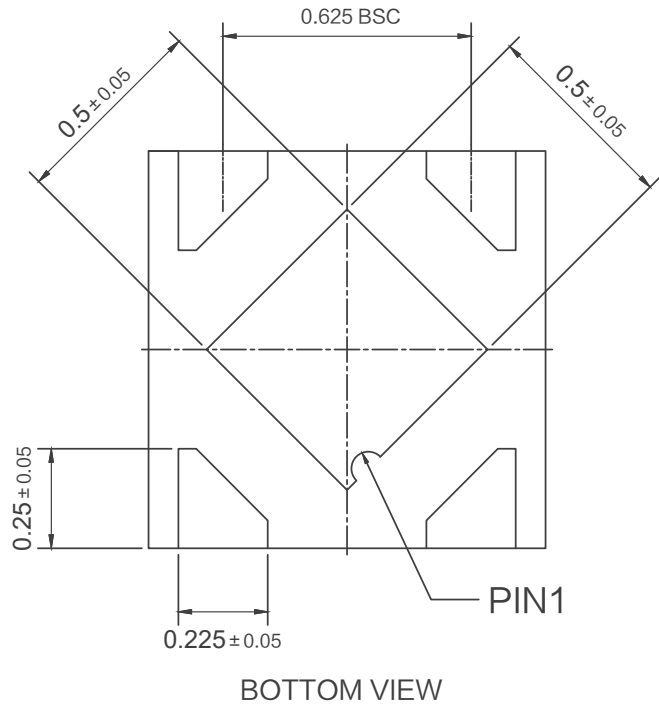
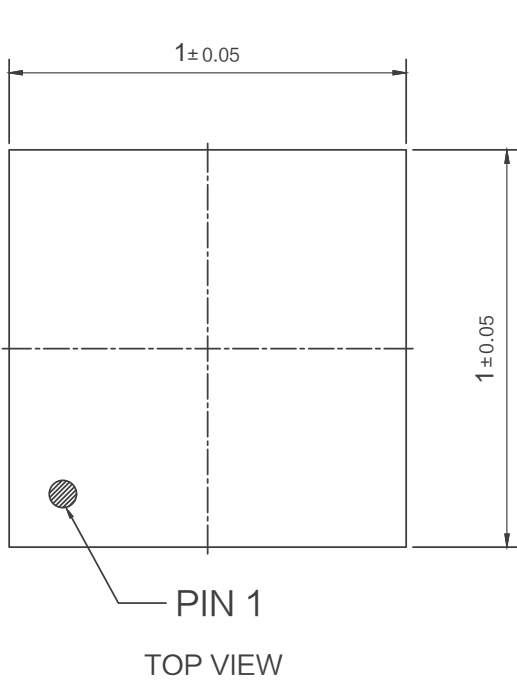
Dimensions in mm



Package Outline

DFN1x1-4L

Dimensions in mm



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