

Description

The TL431 is three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output Voltage may be set to any value between V_{ref} (approximately 2.495V) and 36 V with two external resistors. These devices have provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications..

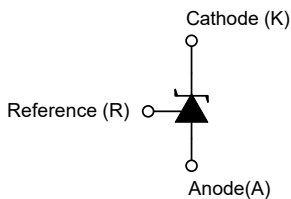
Feature

- Wide programmable rise output voltage from 2.495V to 36V
- Sink current capability from 1mA to 100mA.
- Low output noise
- Wide Operating Range of -40 to 125°C

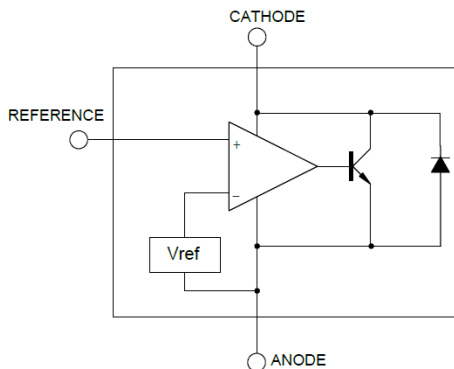
Application

- Adjustable voltage and current references
- Voltage monitoring
- Replacement of zener diode
- Comparator with integrated reference

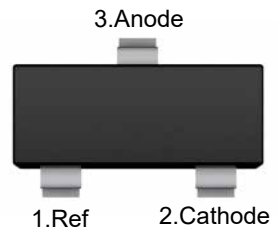
Schematic diagram



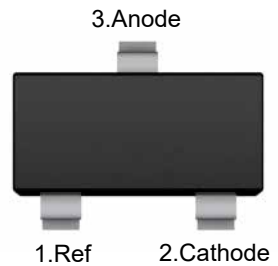
Functional block diagram



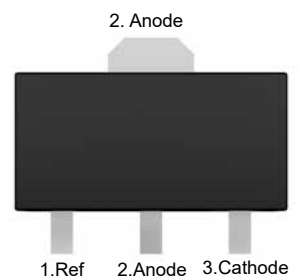
SOT-23



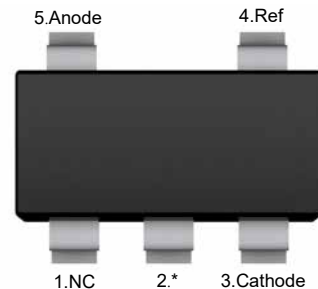
SOT-23-3



SOT-89

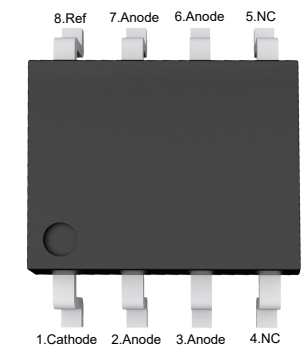


SOT-23-5



NC:No internal connection
*: Attached to substrate and must be connected to Anode or left open

SOP-8



NC:No internal connection



Ordering Information

TL431-□ □

└ Package Type

□□(Blank): SOT-23

SC: SOT-23-3

SQ: SOT-89

SE: SOT-23-5

PA: SOP-8

└ V_{REF} tolerance

□(Blank): 1%

A: 0.5%

B: 0.4%

| Orderable Device | Voltage Tolerance | Package | Reel (inch) | Package Qty (PCS) | Eco Plan ^{Note} | MSL Level | Marking Code |
|------------------|-------------------|----------|-------------|-------------------|--------------------------|-----------|--------------|
| TL431 | 1% | SOT-23 | 7 | 3000 | RoHS & Green | MSL1 | 431 |
| TL431A | 0.5% | SOT-23 | 7 | 3000 | RoHS & Green | MSL1 | 431A |
| TL431B | 0.4% | SOT-23 | 7 | 3000 | RoHS & Green | MSL1 | 431B |
| TL431SC | 1% | SOT-23-3 | 7 | 3000 | RoHS & Green | MSL3 | 431 |
| TL431ASC | 0.5% | SOT-23-3 | 7 | 3000 | RoHS & Green | MSL3 | 431A |
| TL431BSC | 0.4% | SOT-23-3 | 7 | 3000 | RoHS & Green | MSL3 | 431B |
| TL431SQ | 1% | SOT-89 | 7 / 13 | 1000 / 3000 | RoHS & Green | MSL1 | TL431 |
| TL431ASQ | 0.5% | SOT-89 | 7 / 13 | 1000 / 3000 | RoHS & Green | MSL1 | TL431A |
| TL431BSQ | 0.4% | SOT-89 | 7 / 13 | 1000 / 3000 | RoHS & Green | MSL1 | TL431B |
| TL431SE | 1% | SOT-23-5 | 7 | 3000 | RoHS & Green | MSL3 | 431E |
| TL431ASE | 0.5% | SOT-23-5 | 7 | 3000 | RoHS & Green | MSL3 | 431AE |
| TL431BSE | 0.4% | SOT-23-5 | 7 | 3000 | RoHS & Green | MSL3 | 431BE |
| TL431PA | 1% | SOP-8 | 13 | 4000 | RoHS & Green | MSL3 | 431P |
| TL431APA | 0.5% | SOP-8 | 13 | 4000 | RoHS & Green | MSL3 | 431AP |
| TL431BPA | 0.4% | SOP-8 | 13 | 4000 | RoHS & Green | MSL3 | 431BP |

Note:

RoHS: PJ 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: PJ defines "Green" to mean Halogen-Free and Antimony-Free.

**Absolute Maximum Ratings** ($T_a=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Value | Units |
|-----------------------------------|-----------|-------------|--------------------|
| Cathode Voltage | V_{KA} | 37 | V |
| Cathode Current Range(Continuous) | I_{KA} | -100 ~ +150 | mA |
| Reference Input Current Range | I_{REF} | -0.05 ~ +10 | mA |
| Operating Junction Temperature | T_J | 150 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 ~ +150 | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Recommended Operating Conditions

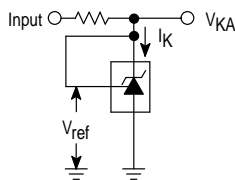
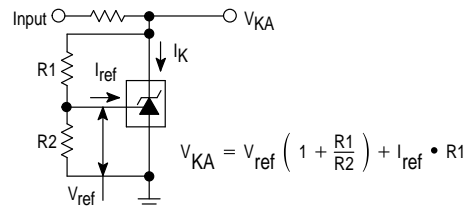
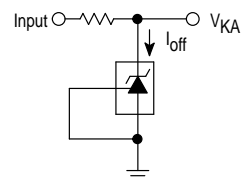
| Parameter | Symbol | Min. | Max. | Units |
|-------------------------------------|-----------|-----------|------|--------------------|
| Cathode Voltage | V_{KA} | V_{REF} | 36 | V |
| Cathode Current | I_{KA} | 1 | 100 | mA |
| Operating Ambient Temperature Range | T_{OPR} | -40 | 125 | $^{\circ}\text{C}$ |

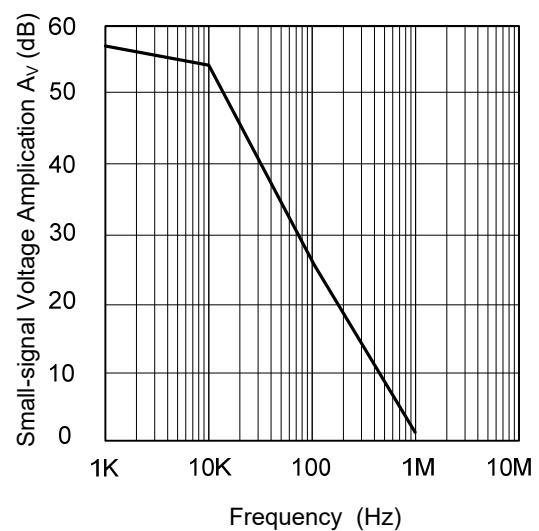
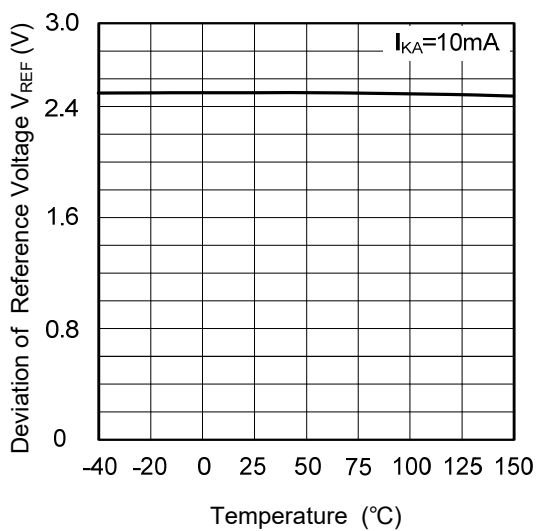
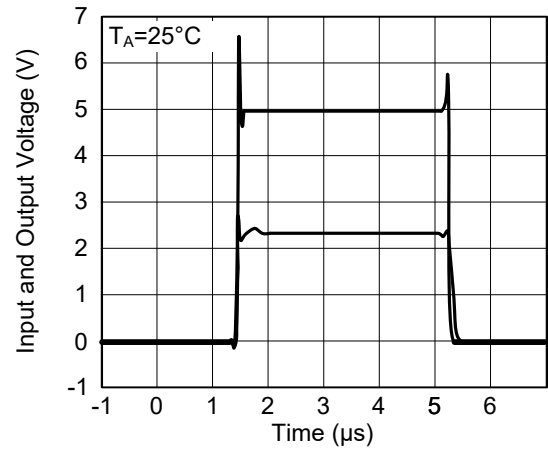
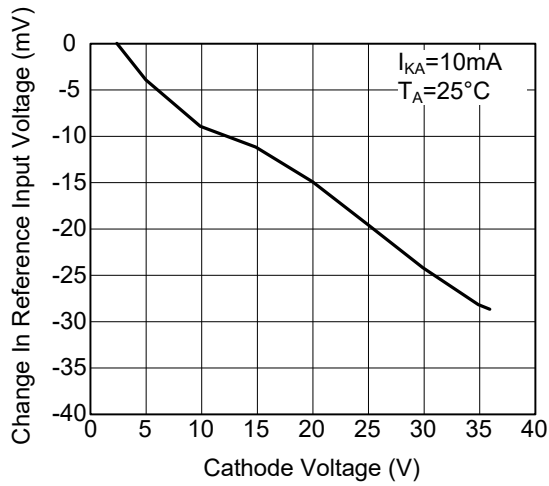
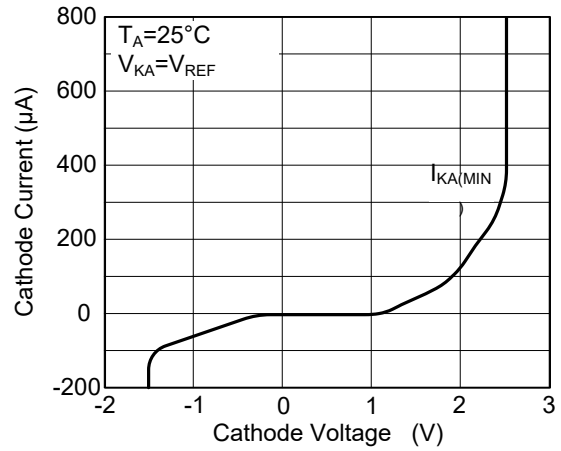
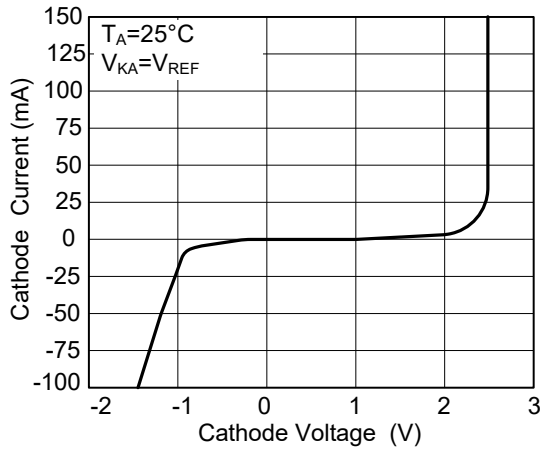
Thermal Information

| Parameter | Symbol | Value | | Units |
|--|-----------------|----------|-----|-----------------------------|
| Junction-to-Ambient thermal resistance | $R_{\theta JA}$ | SOT-23 | 416 | $^{\circ}\text{C}/\text{W}$ |
| | | SOT-23-3 | 416 | $^{\circ}\text{C}/\text{W}$ |
| | | SOT-23-5 | 416 | $^{\circ}\text{C}/\text{W}$ |
| | | SOT-89 | 156 | $^{\circ}\text{C}/\text{W}$ |
| | | SOP-8 | 208 | $^{\circ}\text{C}/\text{W}$ |

Electrical Characteristics (Ta=25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit | |
|--|--|---|--|-------|-------|-------|------|
| Reference Input Voltage Fig1 | V _{REF} | V _{KA} =V _{REF} , I _{KA} =10mA | TL431(1%) | 2.47 | 2.495 | 2.52 | V |
| | | | TL431A(0.5%) | 2.483 | 2.495 | 2.507 | V |
| | | | TL431B(0.4%) | 2.485 | 2.495 | 2.505 | V |
| Deviation of Reference Input Voltage Over Temperature Fig1 | ΔV _{REF} | V _{KA} =V _{REF} , I _{KA} =10mA -40°C ≤ T _A ≤ +85°C | -- | 4.5 | 17 | mV | |
| Ratio of Change in Reference Input Voltage to The Change in Cathode Voltage Fig2 | $\frac{\Delta V_{REF}}{\Delta V_{KA}}$ | I _{KA} =10mA | ΔV _{KA} =10V~V _{REF} | -- | -1.0 | -2.7 | mV/V |
| | | | ΔV _{KA} =36V~10V | -- | -0.5 | -2.0 | |
| Reference Input Current Fig2 | I _{REF} | I _{KA} =10mA, R1=10KΩ, R2=∞ | -- | 1.5 | 4 | μA | |
| Deviation of Reference Input Current Over Full Temperature Range Fig2 | ΔI _{REF} | I _{KA} =10mA, R1=10KΩ, R2=∞, -20°C ≤ T _A ≤ +85°C | -- | 0.4 | 1.2 | μA | |
| Minimum Cathode Current for Regulation Fig1 | I _{KA(MIN)} | V _{KA} =V _{REF} | -- | 0.45 | 1 | mA | |
| Off-State Cathode Current Fig3 | I _{KA(OFF)} | V _{KA} =36V, V _{REF} =0 | -- | 0.05 | 1.0 | μA | |
| Dynamic Impedance | Z _{KA} | V _{KA} =V _{REF} , I _{KA} =1~100mA, f≤1.0KHz | -- | 0.15 | 0.5 | Ω | |

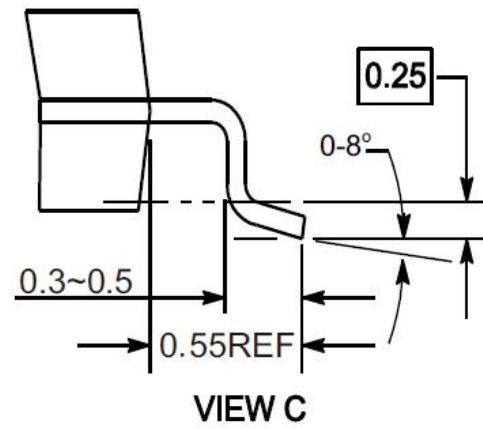
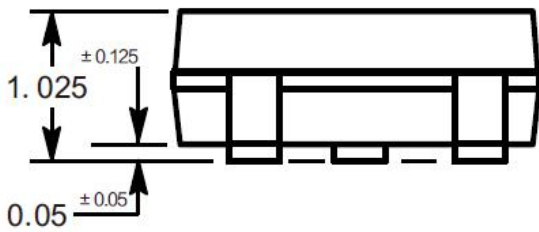
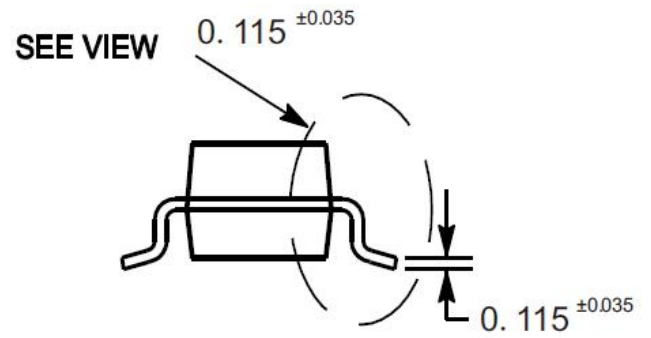
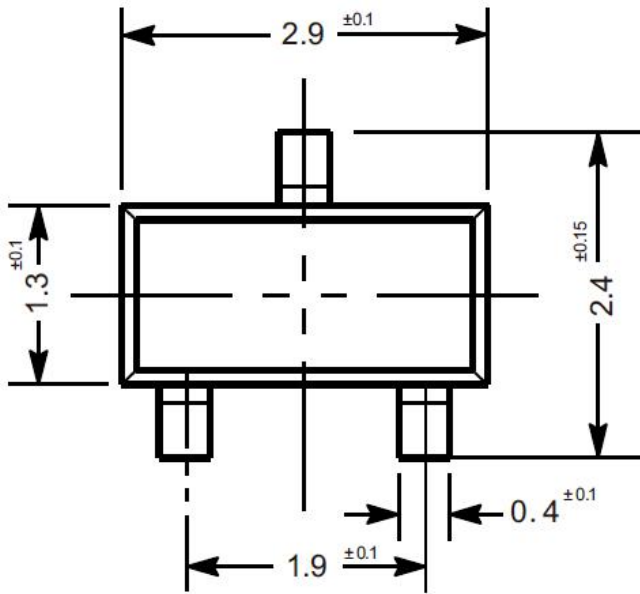
Figure 1. Test Circuit for V_{KA} = V_{REF}

Figure 2. Test Circuit for V_{KA} > V_{REF}

Figure 3. Test Circuit for I_{OFF}


Typical Characteristic Curves


Package Outline

SOT-23

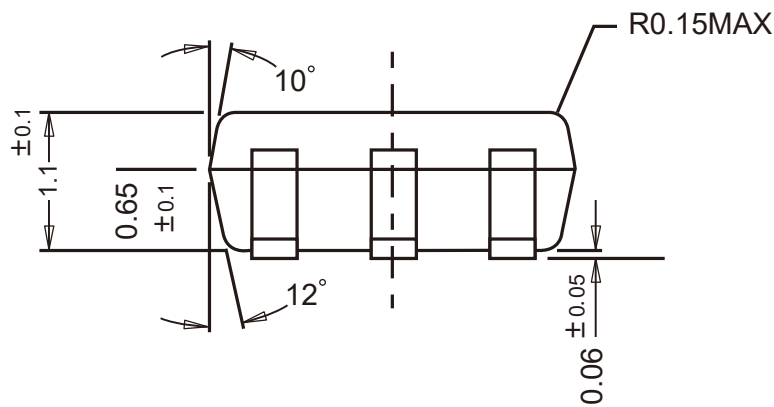
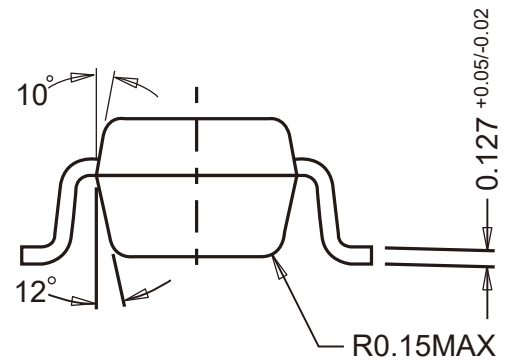
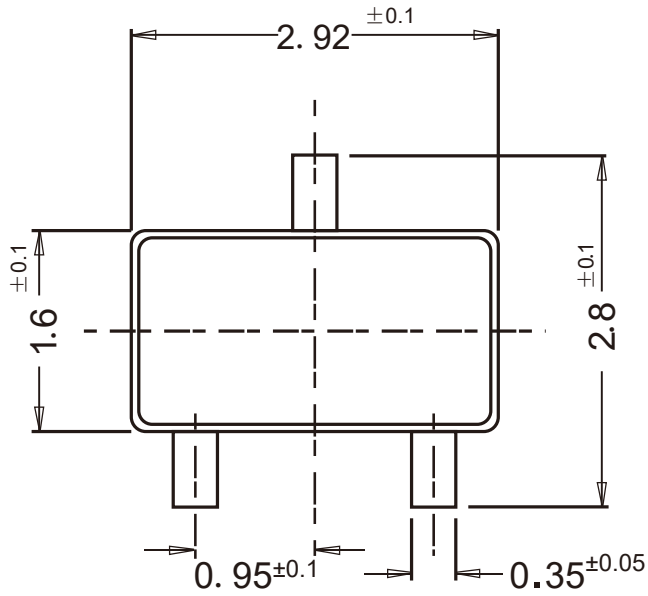
Dimensions in mm



Package Outline

SOT-23-3

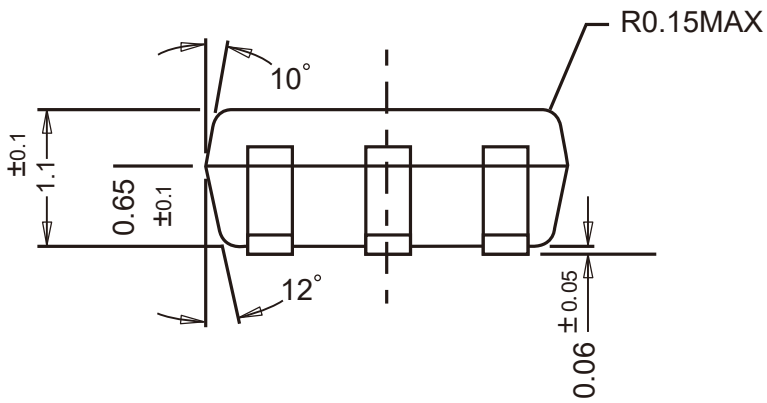
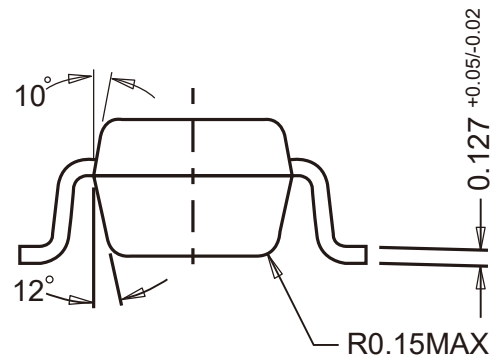
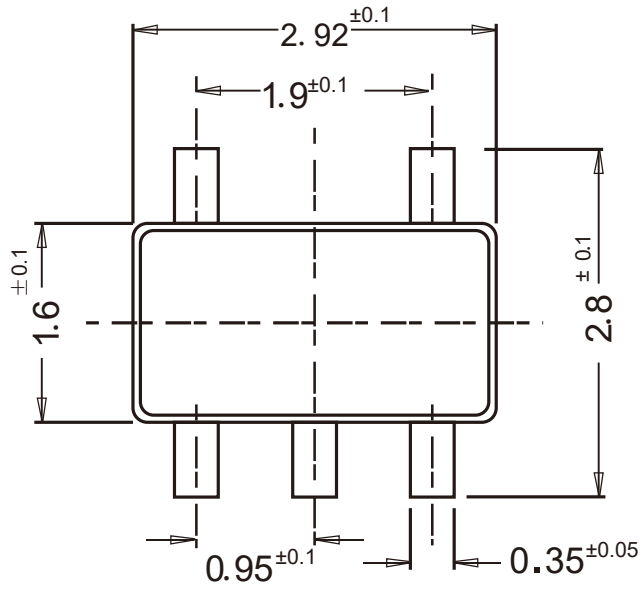
Dimensions in mm



Package Outline

SOT-23-5

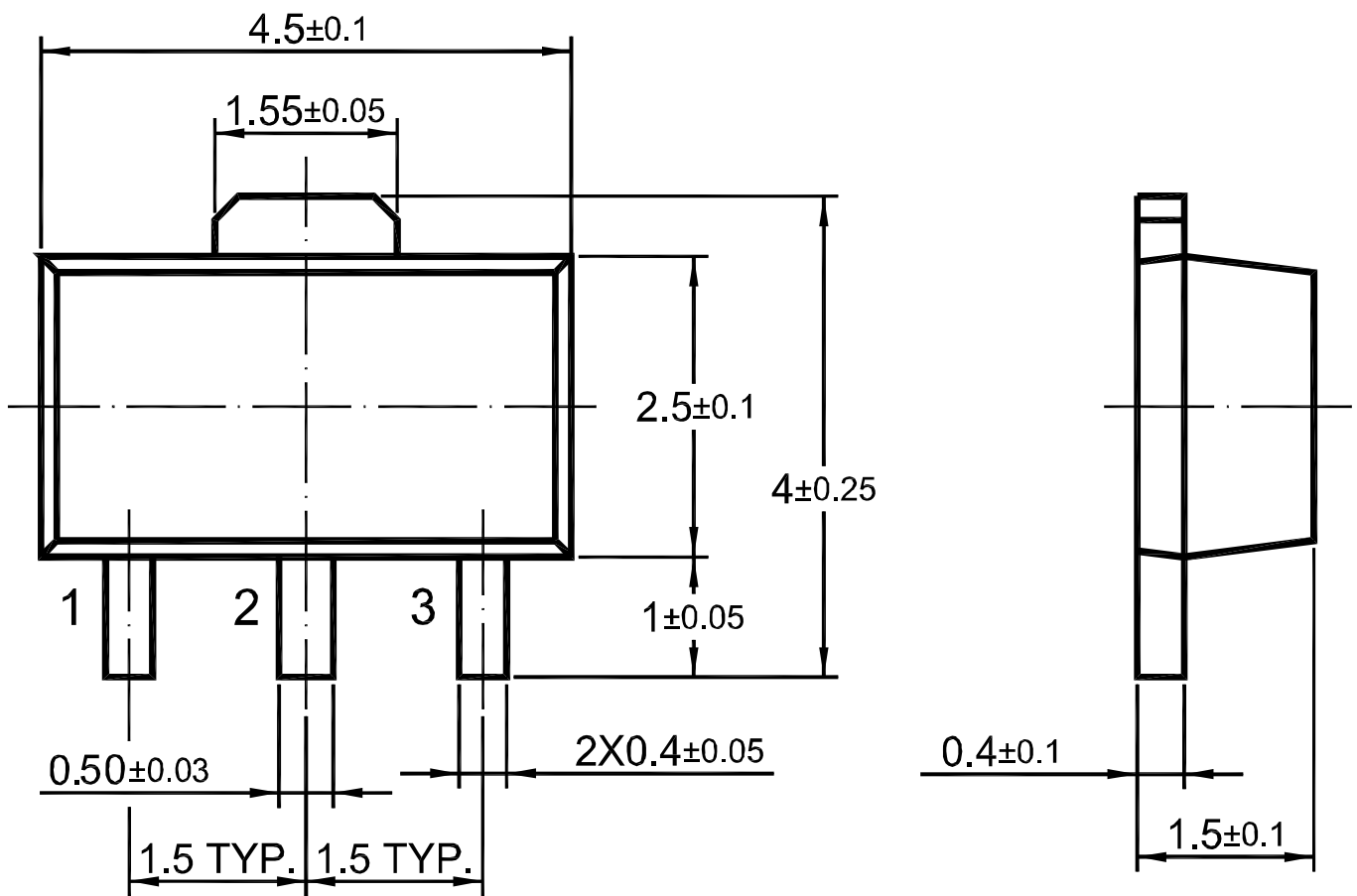
Dimensions in mm



Package Outline

SOT-89

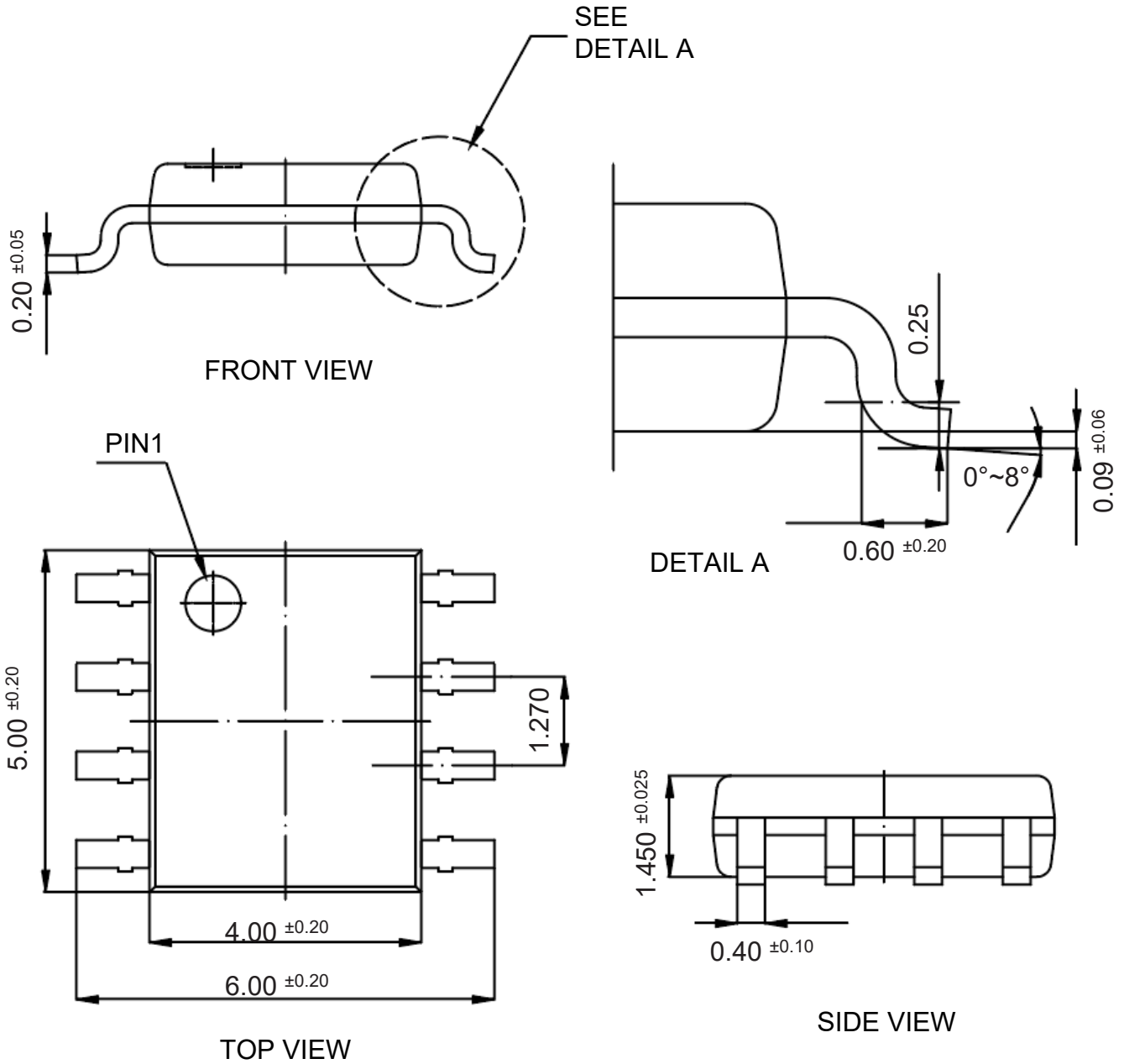
Dimensions in mm



Package Outline

SOP-8

Dimensions in mm



单击下面可查看定价，库存，交付和生命周期等信息

[>>PJSEMI\(平晶微\)](#)