

### Description

The TL432 is a Three-terminal adjustable shunt regulator highly accurate 1.24V bandgap reference. The device offers thermal stability, wide operating current and an extended temperature range of 0 to 105 °C for operation in power supply applications. The TL432 offers a wide operating voltage range of up to 18V and is an excellent choice for voltage reference requirements in an isolated feedback circuit for 3.0V to 3.3V switching mode power supplies.

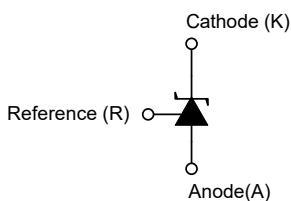
### Feature

- Wide programmable output voltage from 1.24V to 18V
- Sink current capability from 55µA to 100mA.
- Low output noise
- Wide Operating Range of -40 to 125°C

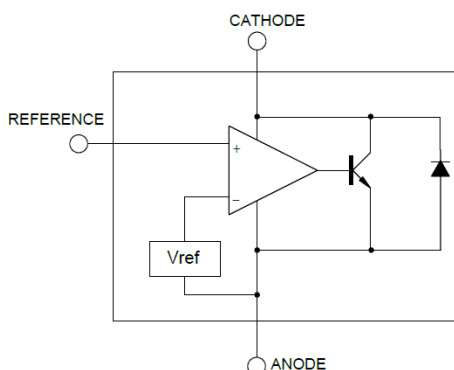
### Application

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

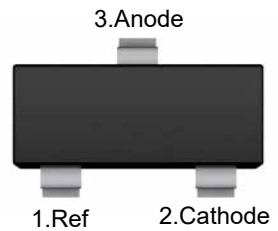
### Schematic diagram



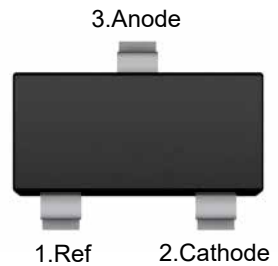
### Functional block diagram



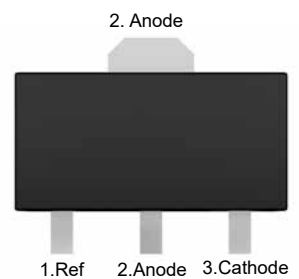
#### SOT-23



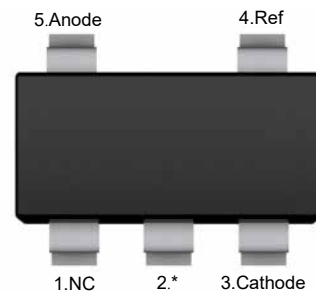
#### SOT-23-3



#### SOT-89

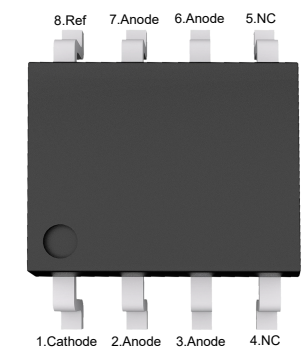


#### SOT-23-5



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

#### SOP-8



NC: No internal connection

**Ordering Information**

TL432-□ □

└ Package Type

□□(Blank): SOT-23

SC: SOT-23-3

SQ: SOT-89

SE: SOT-23-5

PA: SOP-8

└ V<sub>REF</sub> tolerance

□(Blank): 1%

C: 0.5%

Orderable Device	Voltage Tolerance	Package	Reel (inch)	Package Qty (PCS)	Eco Plan <sup>Note</sup>	MSL Level	Marking Code
TL432	1%	SOT-23	7	3000	RoHS & Green	MSL1	432
TL432C	0.5%	SOT-23	7	3000	RoHS & Green	MSL1	432C
TL432SC	1%	SOT-23-3	7	3000	RoHS & Green	MSL3	T432
TL432CSC	0.5%	SOT-23-3	7	3000	RoHS & Green	MSL3	T432C
TL432SQ	1%	SOT-89	7 / 13	1000 / 3000	RoHS & Green	MSL1	TL432
TL432CSQ	0.5%	SOT-89	7 / 13	1000 / 3000	RoHS & Green	MSL1	TL432C
TL432SE	1%	SOT-23-5	7	3000	RoHS & Green	MSL3	432E
TL432CSE	0.5%	SOT-23-5	7	3000	RoHS & Green	MSL3	432CE
TL432PA	1%	SOP-8	13	4000	RoHS & Green	MSL3	432P
TL432CPA	0.5%	SOP-8	13	4000	RoHS & Green	MSL3	432CP

**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	$V_{KA}$	20	V
Cathode Current Range(Continuous)	$I_{KA}$	-100 ~ +100	mA
Reference Input Current Range	$I_{REF}$	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**

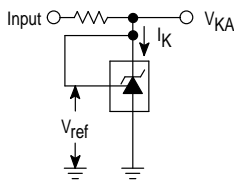
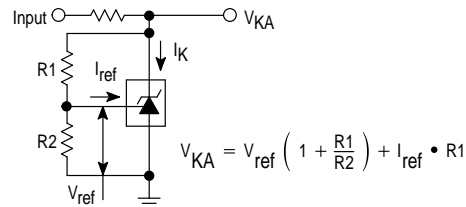
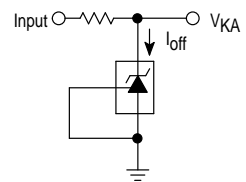
Parameter	Symbol	Min.	Max.	Units
Cathode Voltage	$V_{KA}$	$V_{REF}$	18	V
Cathode Current	$I_{KA}$	0.1	100	mA
Operating Ambient Temperature Range	$T_{OPR}$	-40	125	$^{\circ}\text{C}$

**Thermal Information**

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

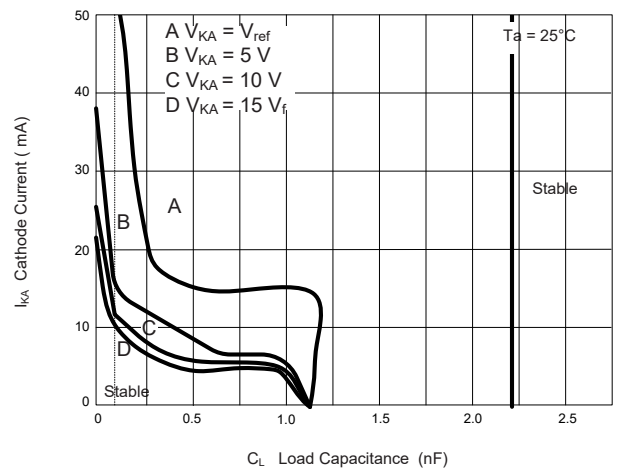
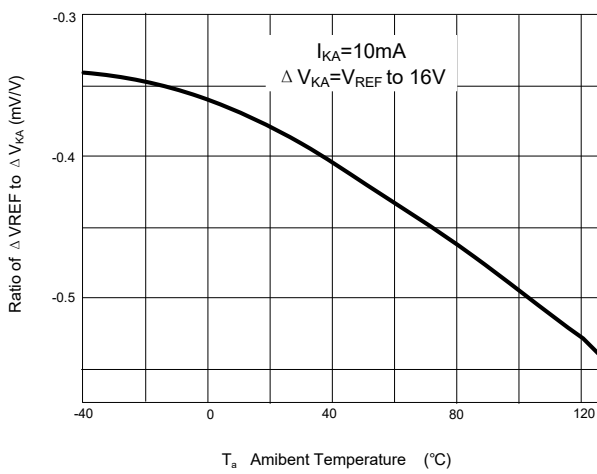
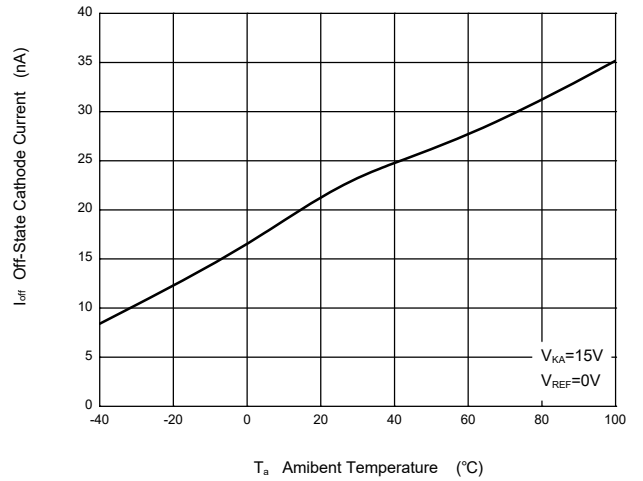
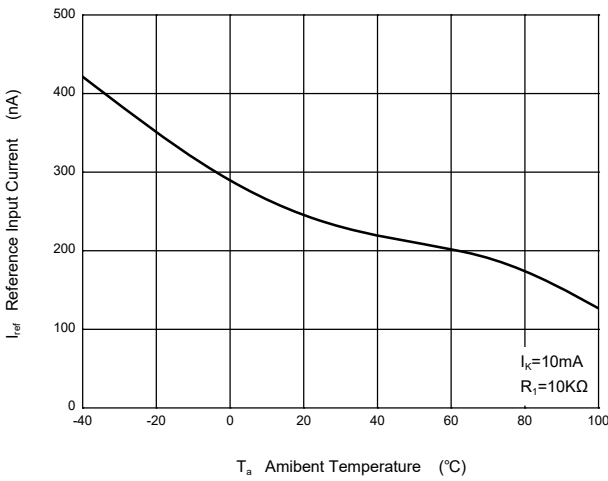
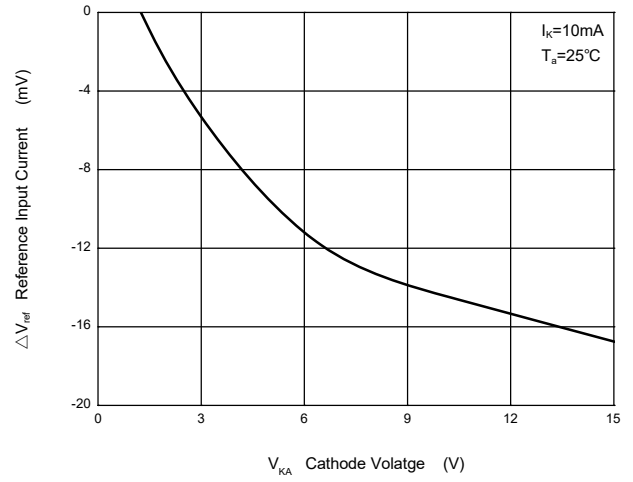
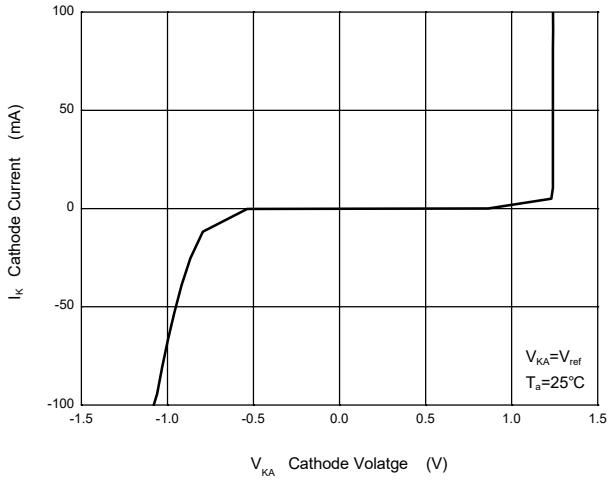
**Electrical Characteristics (Ta=25°C unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Reference Input Voltage Fig1	V <sub>REF</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA	TL432(1%)	1.228	1.24	1.252	V
			TL432C(0.5%)	1.234	1.24	1.246	V
Deviation of Reference Input Voltage Over Temperature Fig1	ΔV <sub>REF</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA	0°C ≤ T <sub>A</sub> ≤ 70°C	--	2	10	mV
			-20°C ≤ T <sub>A</sub> ≤ 125°C	--	3	15	mV
			-40°C ≤ T <sub>A</sub> ≤ 125°C	--	8	25	mV
Ratio of Change in Reference Input Voltage to The Change in Cathode Voltage Fig2	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I <sub>KA</sub> =10mA, ΔV <sub>KA</sub> =V <sub>REF</sub> ~16V	--	-0.5	-1.5	mV/V	
Reference Input Current Fig2	I <sub>REF</sub>	I <sub>KA</sub> =10mA, R1=10KΩ, R2=∞	--	0.15	0.4	μA	
Deviation of Reference Input Current Over Full Temperature Range Fig2	ΔI <sub>REF</sub>	I <sub>KA</sub> =10mA, R1=10KΩ, R2=∞, -20°C ≤ T <sub>A</sub> ≤ +85°C	--	--	0.4	μA	
Minimum Cathode Current for Regulation Fig1	I <sub>KA(MIN)</sub>	V <sub>KA</sub> =V <sub>REF</sub>	--	--	80	μA	
Off-State Cathode Current Fig3	I <sub>KA(OFF)</sub>	V <sub>KA</sub> =18V, V <sub>REF</sub> =0	--	0.04	0.5	μA	
Dynamic Impedance	Z <sub>KA</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =1~100mA, f ≤ 1.0KHz	--	0.05	0.15	Ω	

**Figure 1. Test Circuit for V<sub>KA</sub> = V<sub>REF</sub>**

**Figure 2. Test Circuit for V<sub>KA</sub> > V<sub>REF</sub>**

**Figure 3. Test Circuit for I<sub>OFF</sub>**




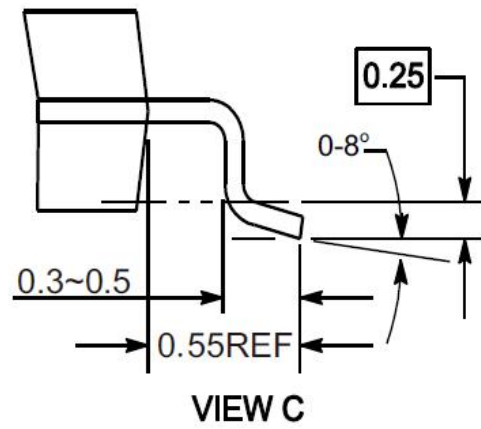
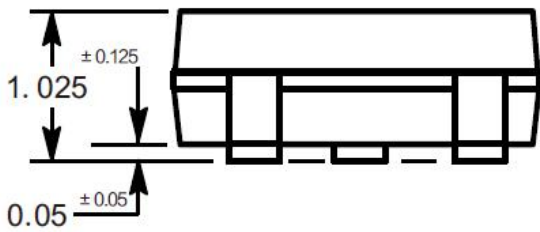
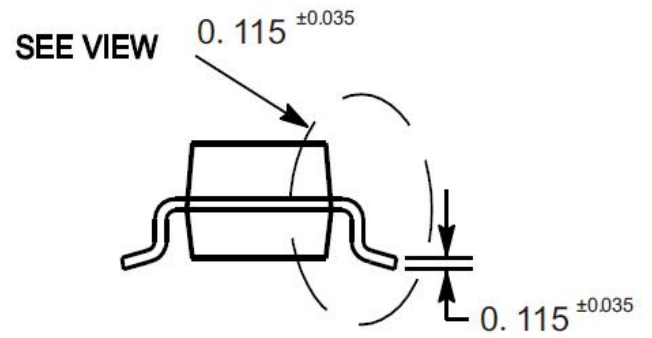
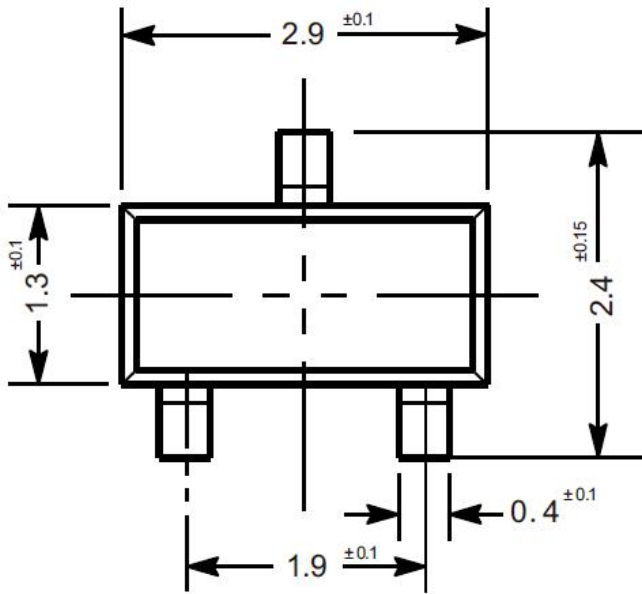
Typical Characteristic Curves



**Package Outline**

SOT-23

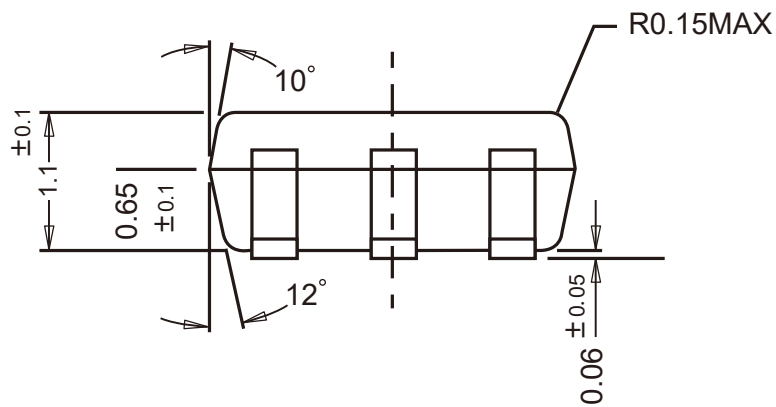
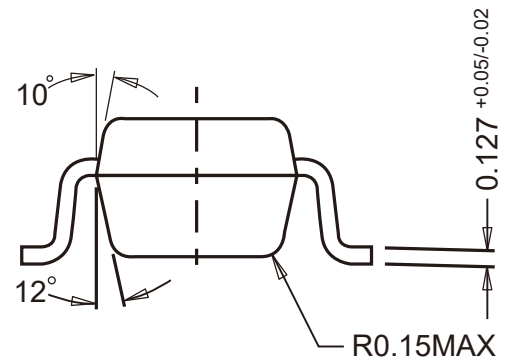
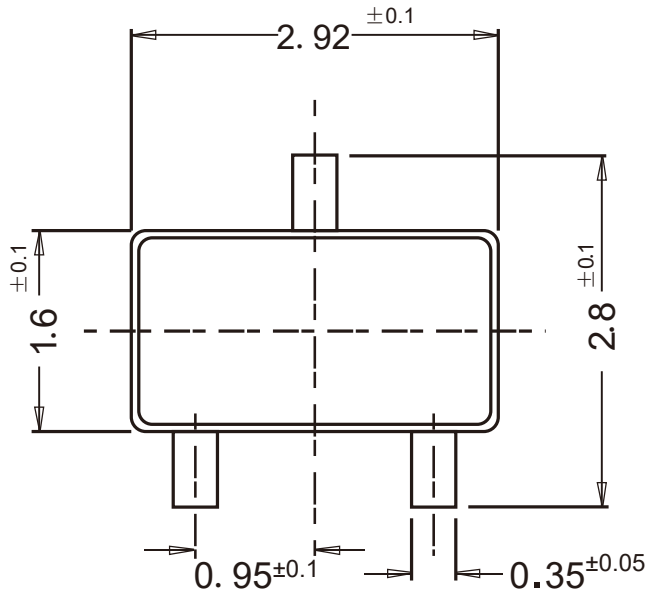
Dimensions in mm



**Package Outline**

SOT-23-3

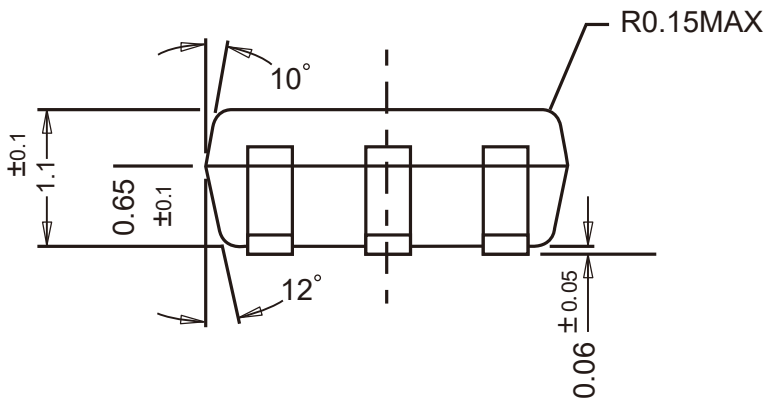
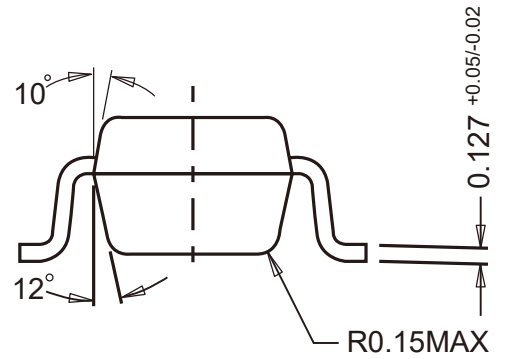
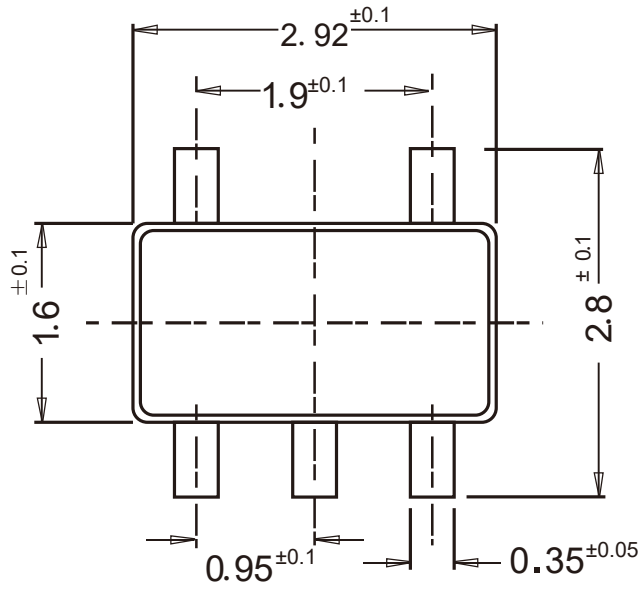
Dimensions in mm



**Package Outline**

SOT-23-5

Dimensions in mm

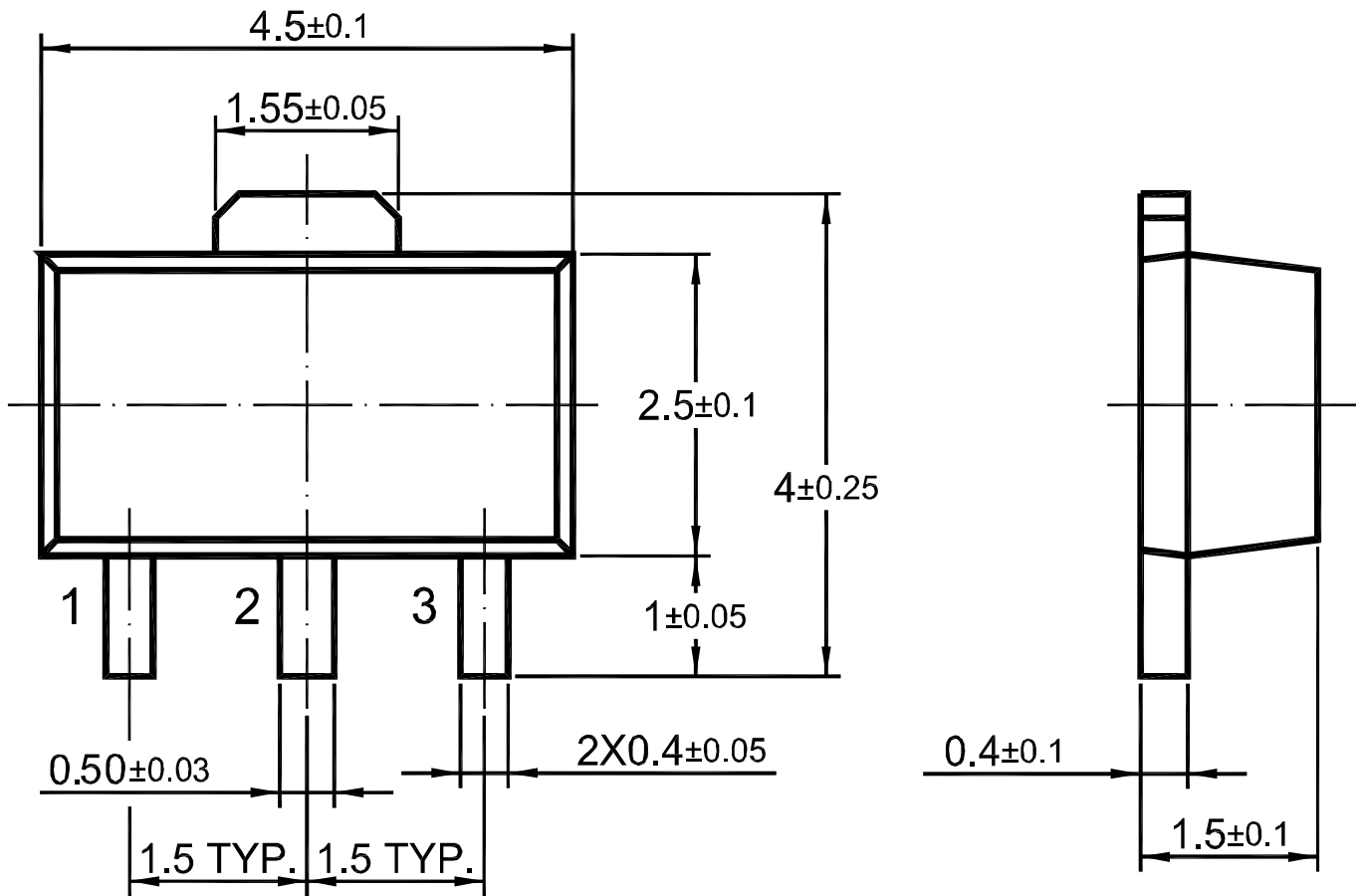




**Package Outline**

SOT-89

Dimensions in mm



**Package Outline**

SOP-8

Dimensions in mm

