

## 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.

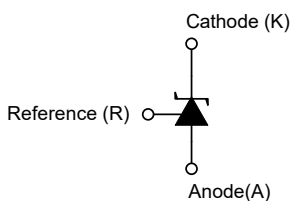
## Feature

- 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

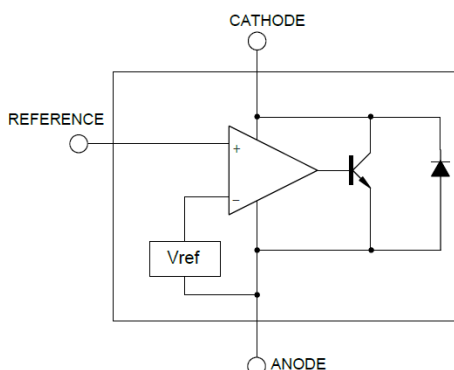
## Application

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

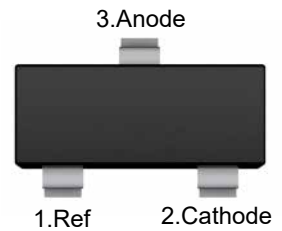
## Schematic diagram



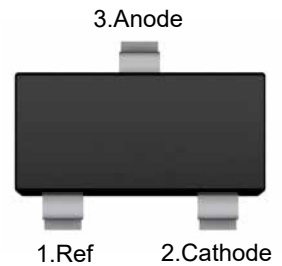
## Functional block diagram



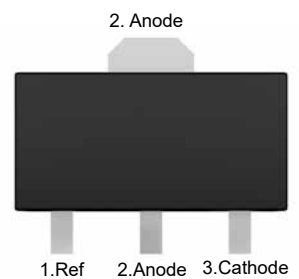
### SOT-23



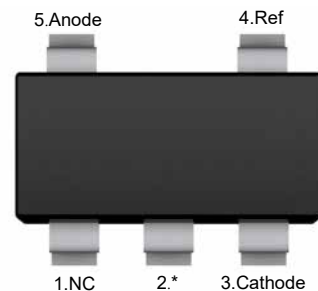
### SOT-23-3



### SOT-89

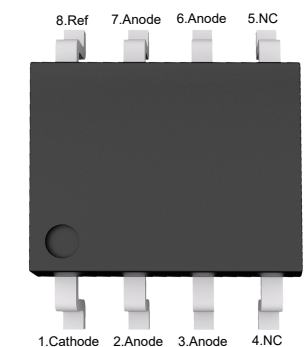


### SOT-23-5



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
- └  $V_{REF}$  tolerance
  - (Blank): 1%
  - C: 0.5%

### Absolute Maximum Ratings (Ta=25°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	°C
Storage Temperature Range	$T_{STG}$	-65 ~ +150	°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	°C

### Thermal Information

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

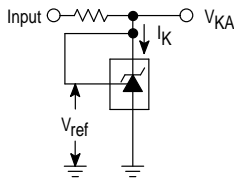


Figure 2. Test Circuit for V<sub>KA</sub> > V<sub>REF</sub>

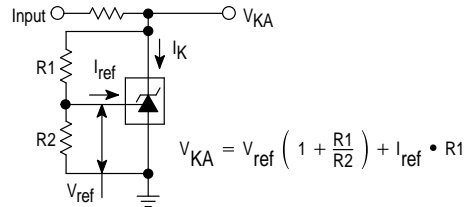
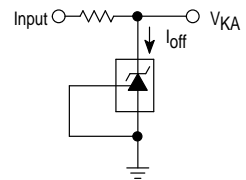
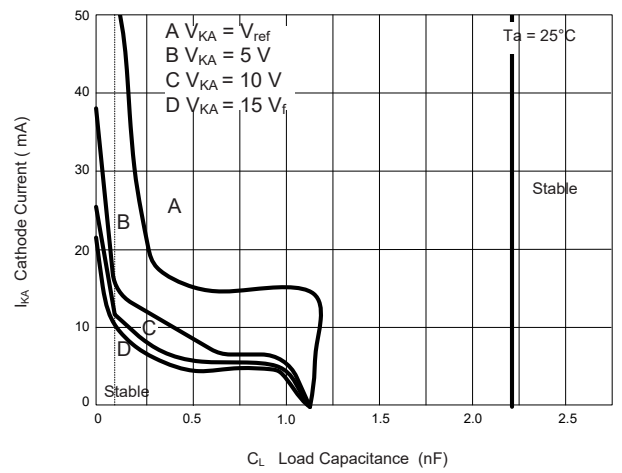
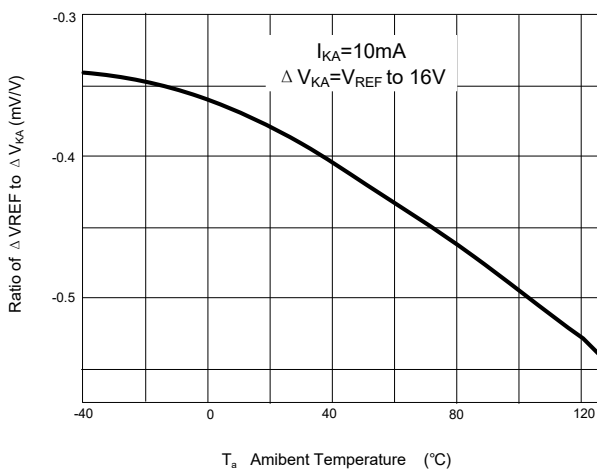
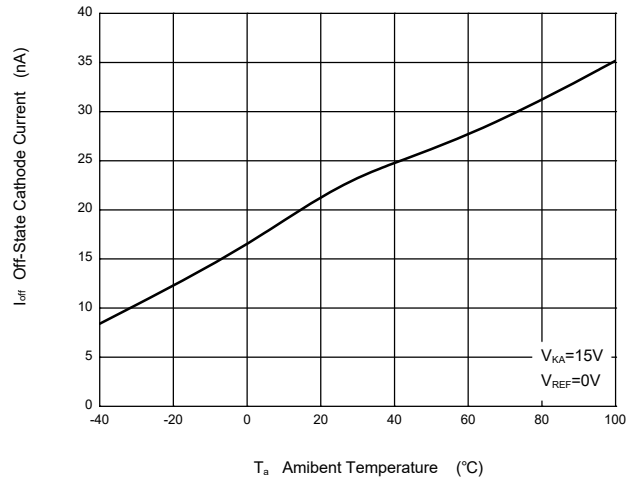
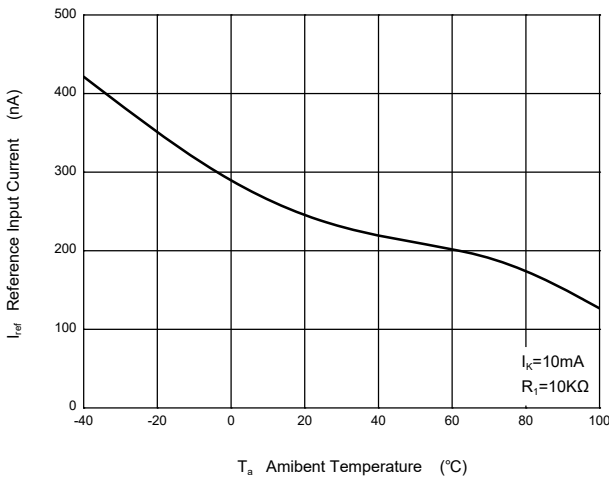
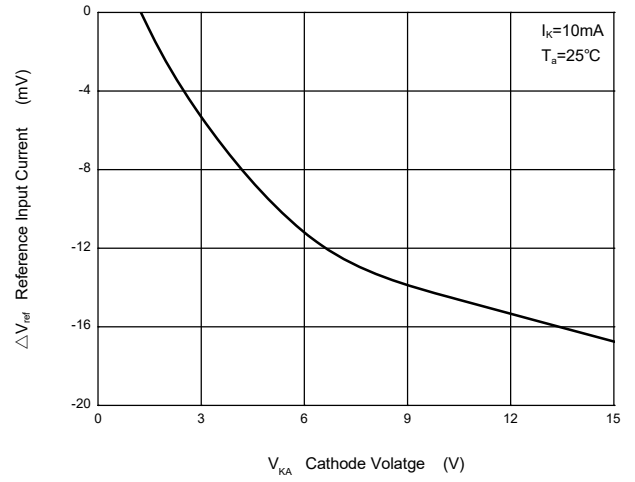
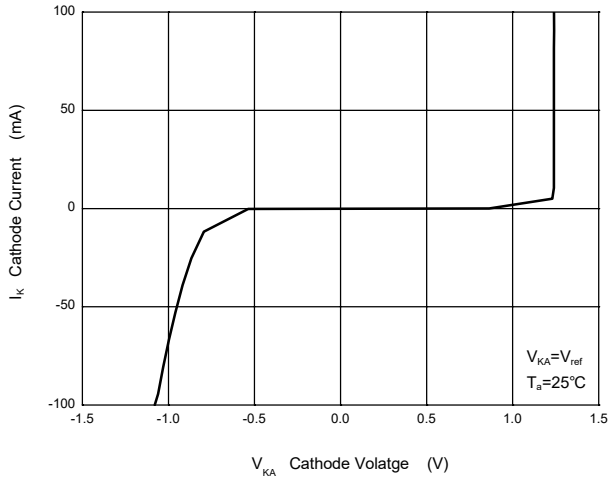


Figure 3. Test Circuit for I<sub>OFF</sub>



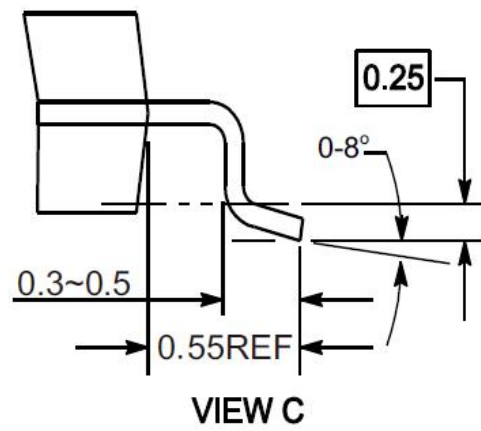
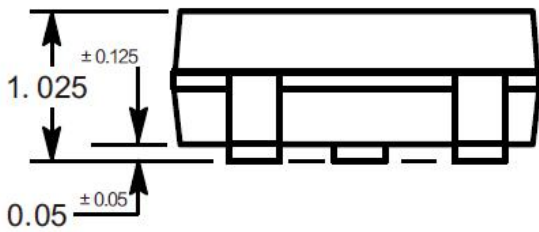
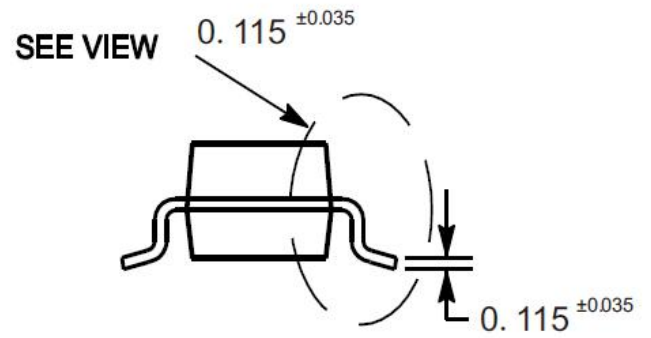
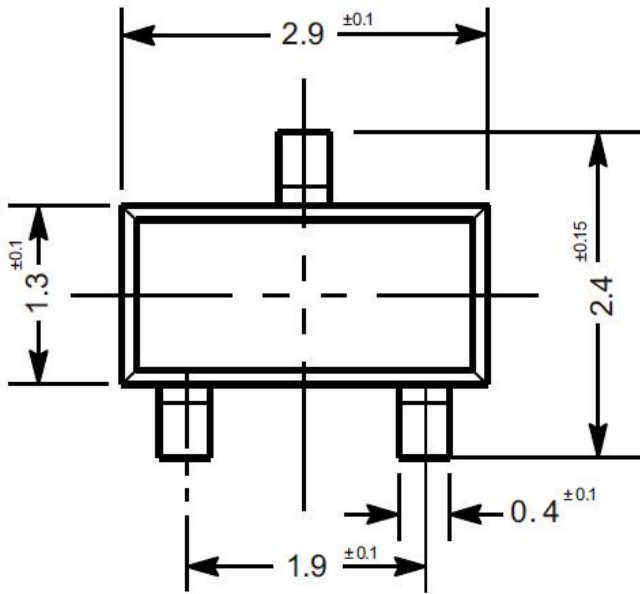
## Typical Characteristic Curves



### Package Outline

SOT-23

Dimensions in mm



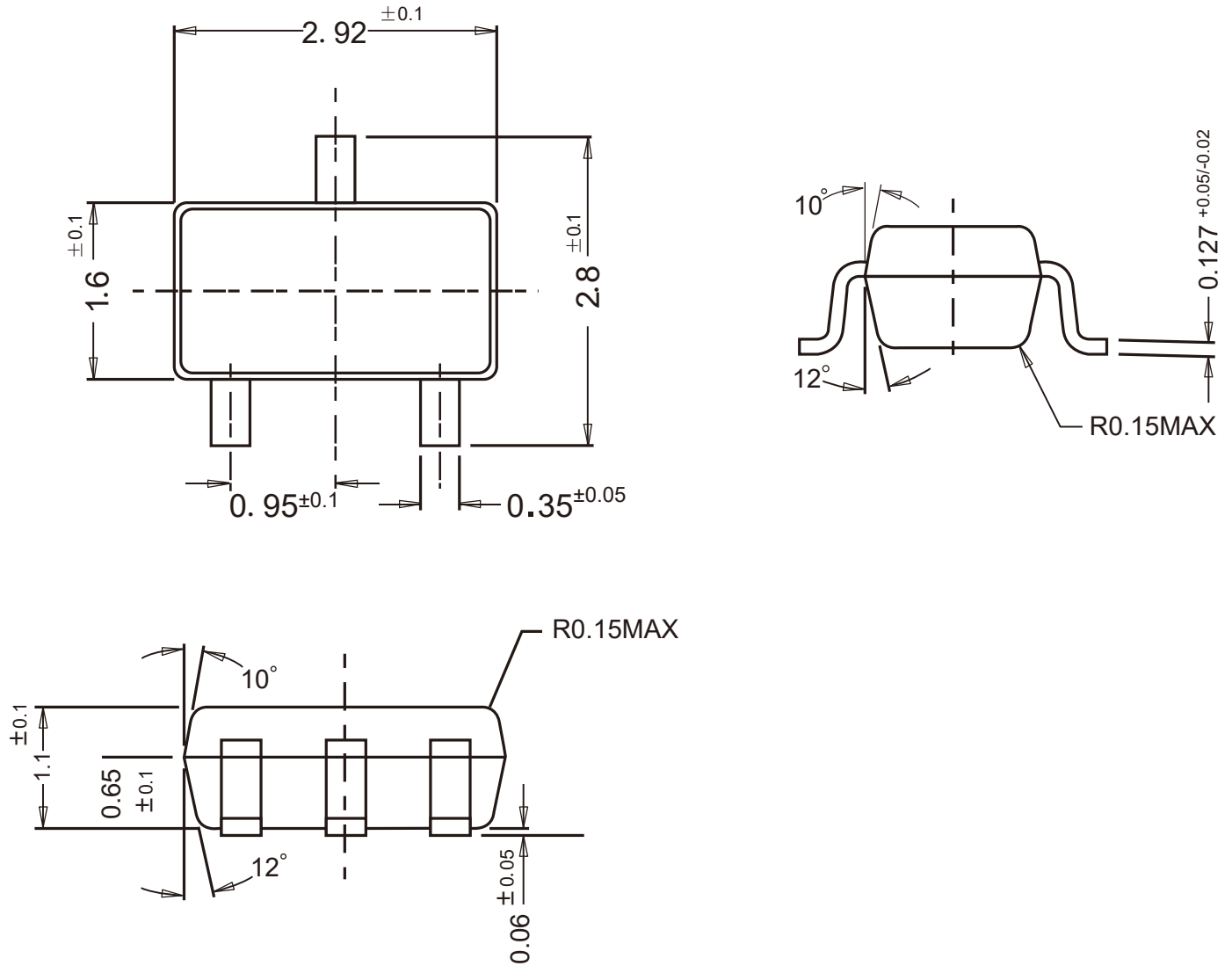
### Ordering Information

Device	Package	Shipping
TL432/TL432C	SOT-23	3,000PCS/Reel&7inches

## Package Outline

SOT-23-3

Dimensions in mm



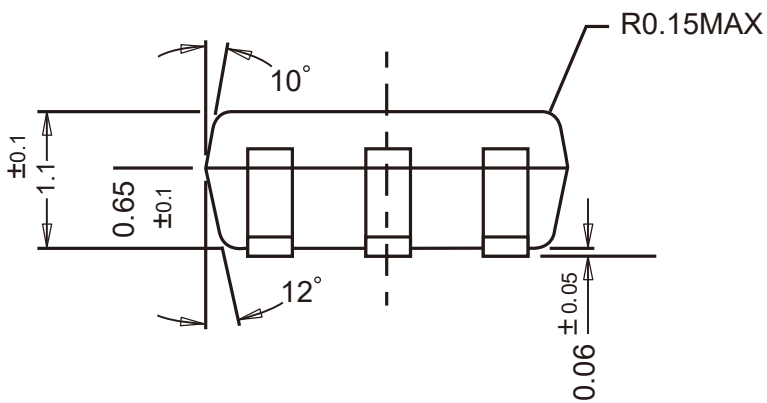
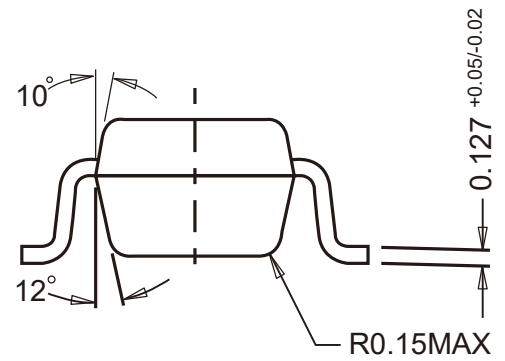
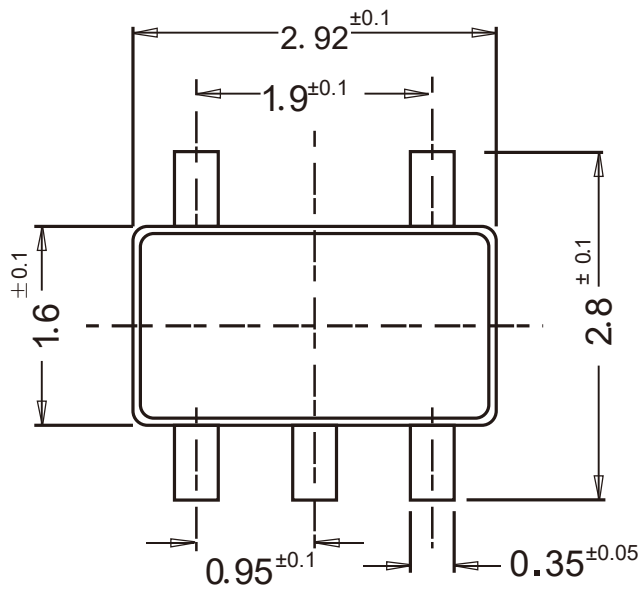
## Ordering Information

Device	Package	Shipping
TL432SC/TL432CSC	SOT-23-3	3,000PCS/Reel&7inches

## Package Outline

SOT-23-5

Dimensions in mm



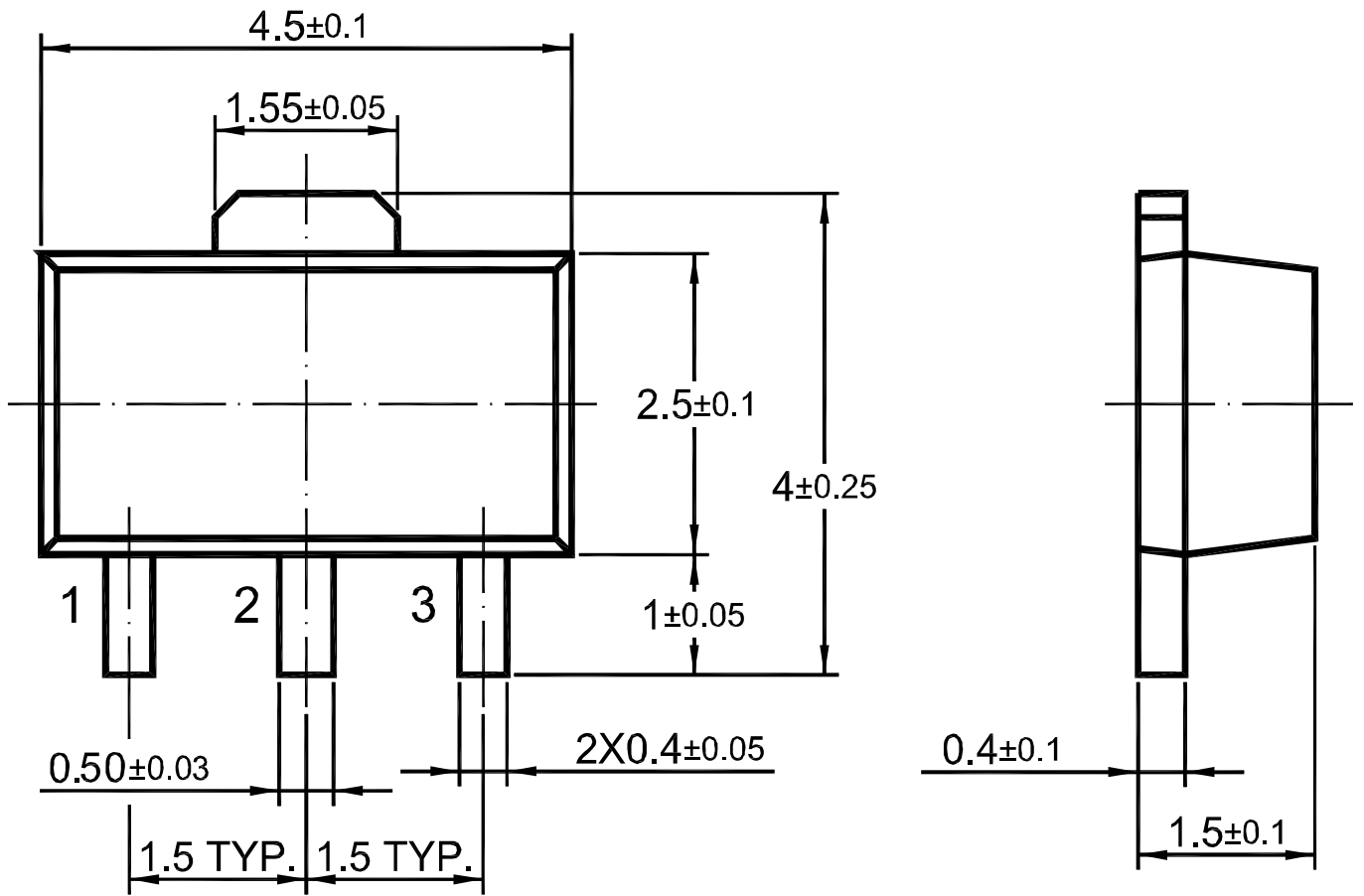
## Ordering Information

Device	Package	Shipping
TL432SE/TL432CSE	SOT-23-5	3,000PCS/Reel&7inches

### Package Outline

SOT-89

Dimensions in mm



### Ordering Information

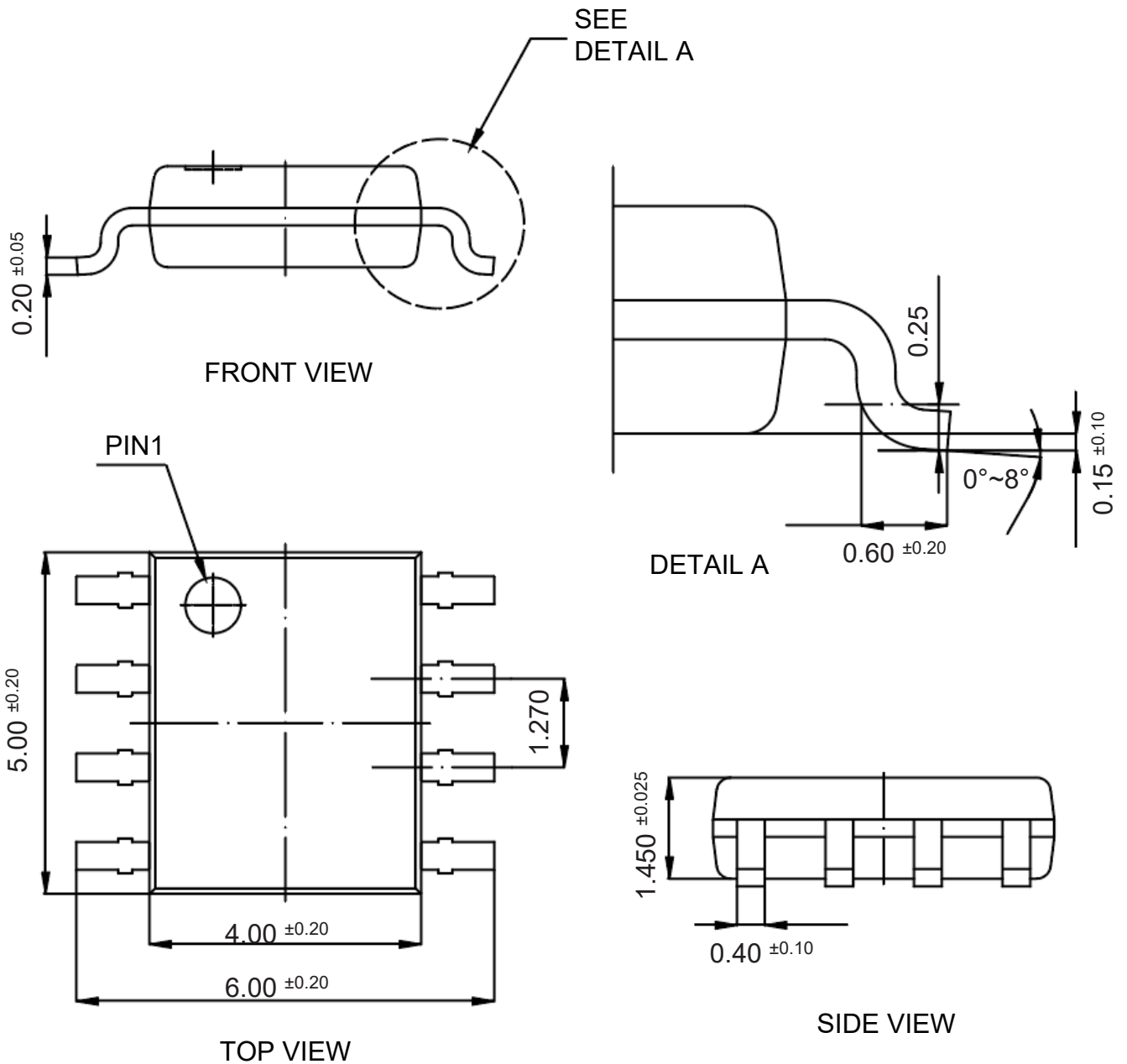
Device	Package	Shipping
TL432SQ/TL432CSQ	SOT-89	1,000PCS/Reel&7inches
		3,000PCS/Reel&13inches



## Package Outline

SOP-8

Dimensions in mm



## Ordering Information

Device	Package	Shipping
TL432PA/TL432CPA	SOP-8	4,000PCS/Reel&13inches