Description

Programmable Precision Referenc

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..

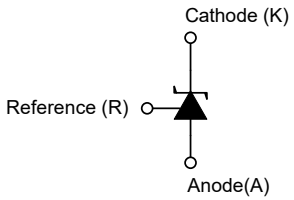
Feature

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

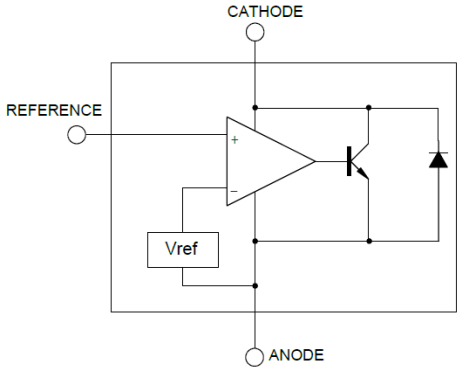
Application

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

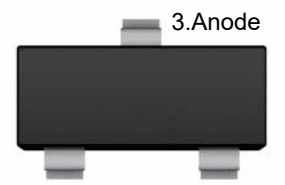
Schematic diagram



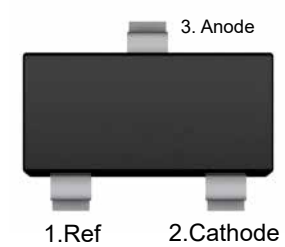
Functional block diagram



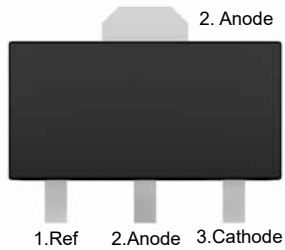
SOT-23



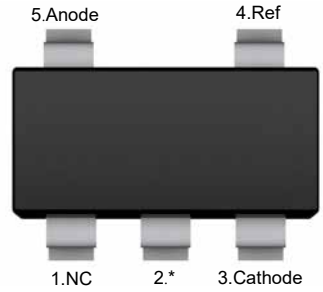
SOT-23-3



SOT-89

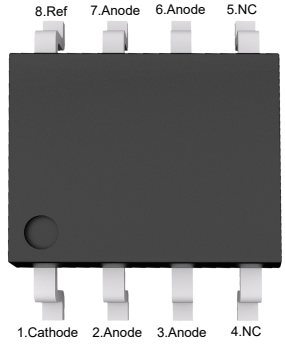


SOT-23-5



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

Absolute Maximum Ratings (Ta=25℃ 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	°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}	36	V
Cathode Current	I_{KA}	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_{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}	$V_{KA}=V_{REF}$, $I_{KA}=10mA$ $-40°C \le T_A \le +85°C$		--	4.5	17	mV
Ratio of Change in Reference Input Voltage to The Change in Cathode Voltage Fig2	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_{KA}=10mA$	$\Delta V_{KA}=10V \sim V_{REF}$	--	-1.0	-2.7	mV/V
			$\Delta V_{KA}=36V \sim 10V$	--	-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=∞, $-20°C \le T_A \le +85°C$		--	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}	$V_{KA}=V_{REF}$, $I_{KA}=1 \sim 100mA$, $f \le 1.0KHz$		--	0.15	0.5	Ω

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

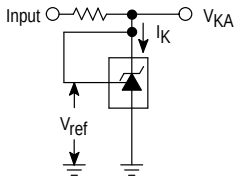


Figure 2. Test Circuit for $V_{KA} > V_{REF}$

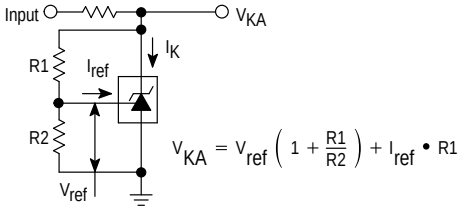
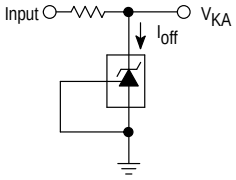
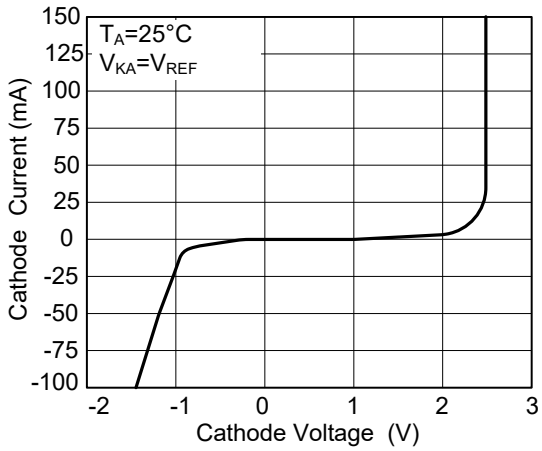
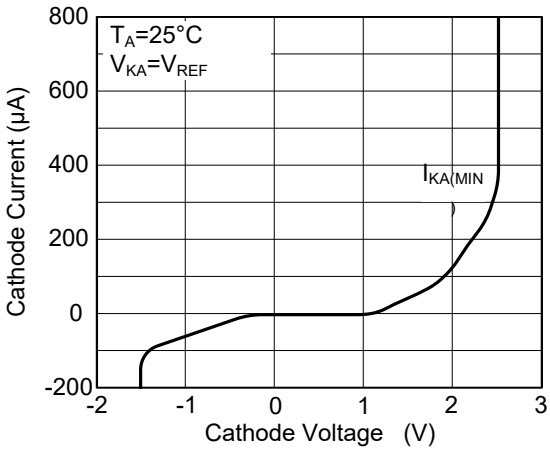


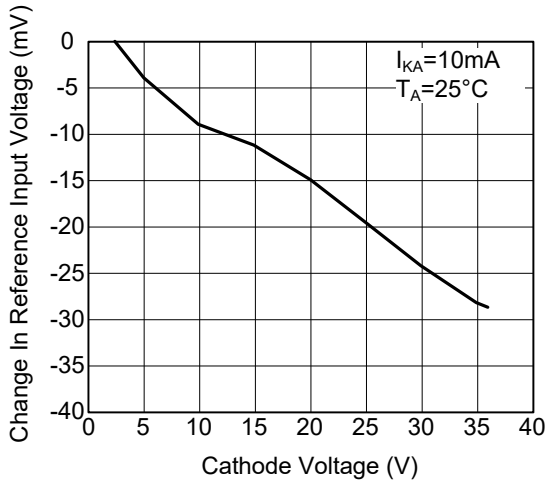
Figure 3. Test Circuit for I_{OFF}

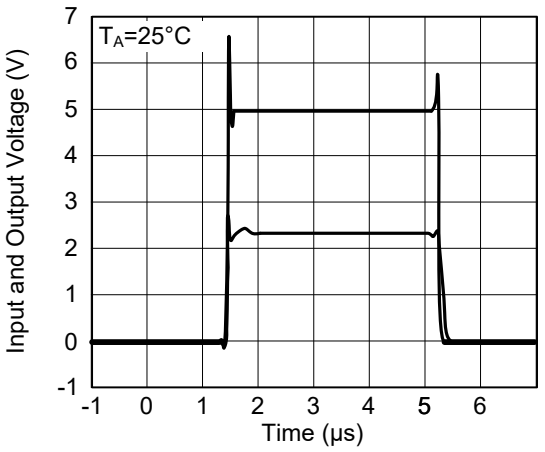


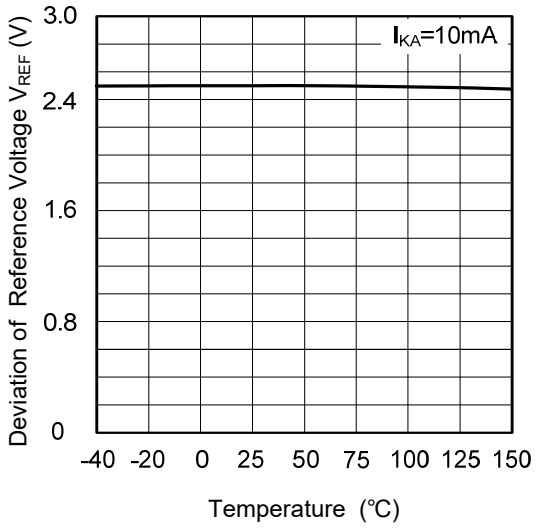
Typical Characteristic Curves

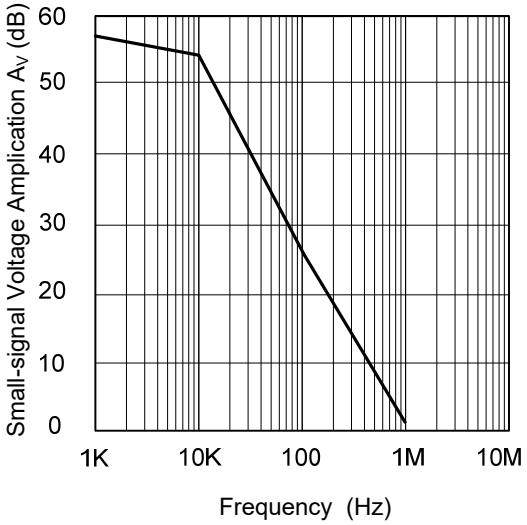








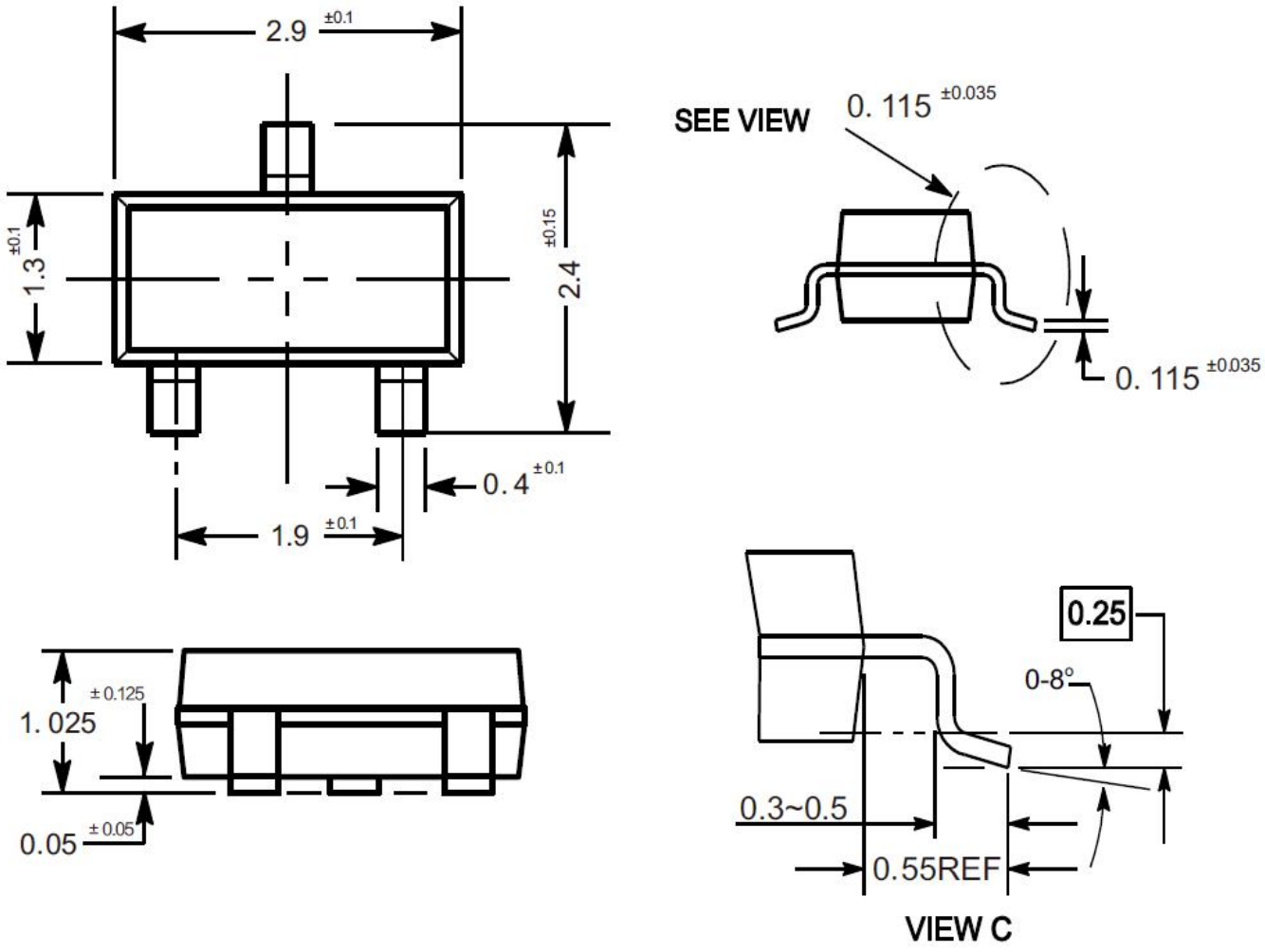




Package Outline

SOT-23

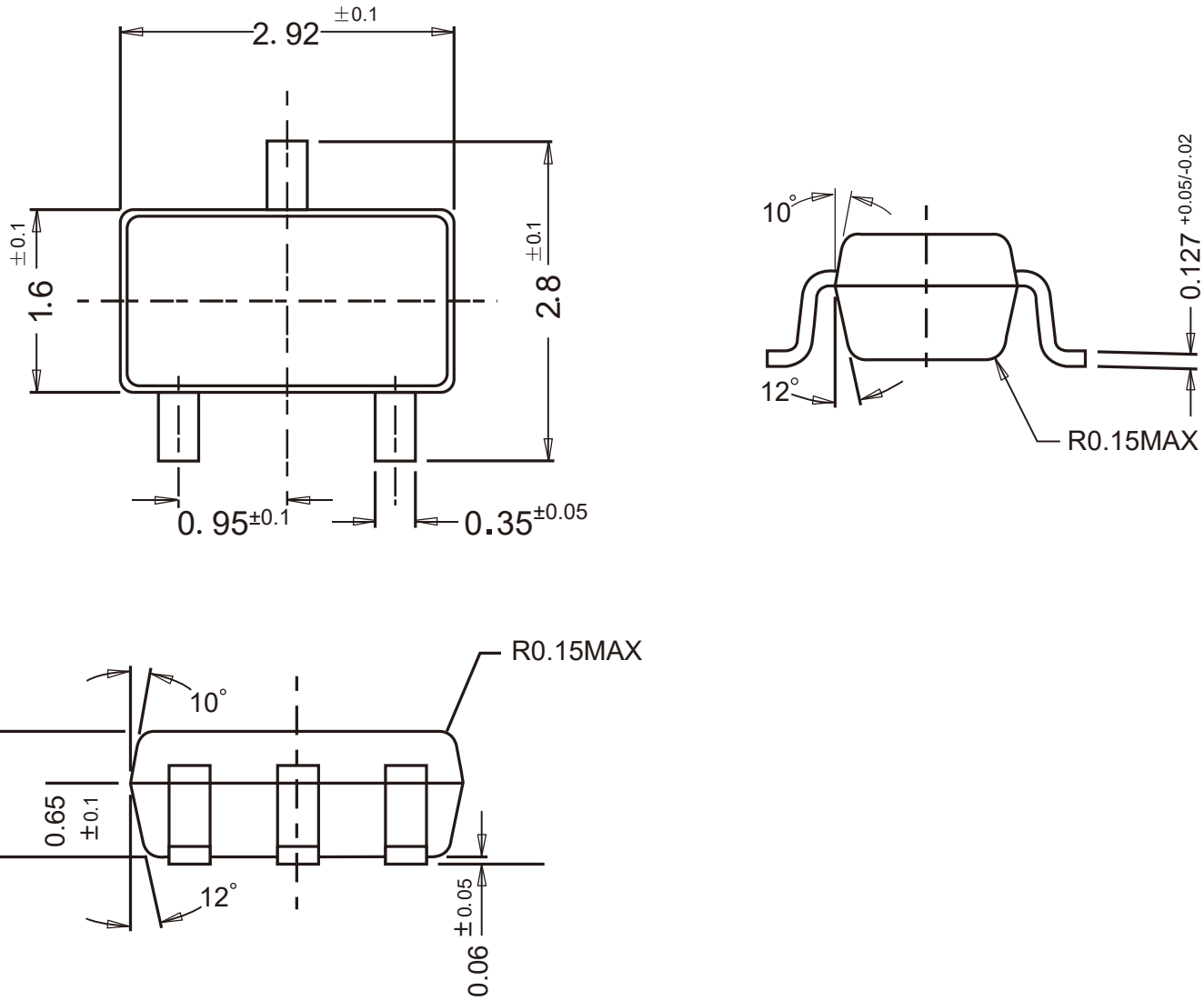
Dimensions in mm



Package Outline

SOT-23-3

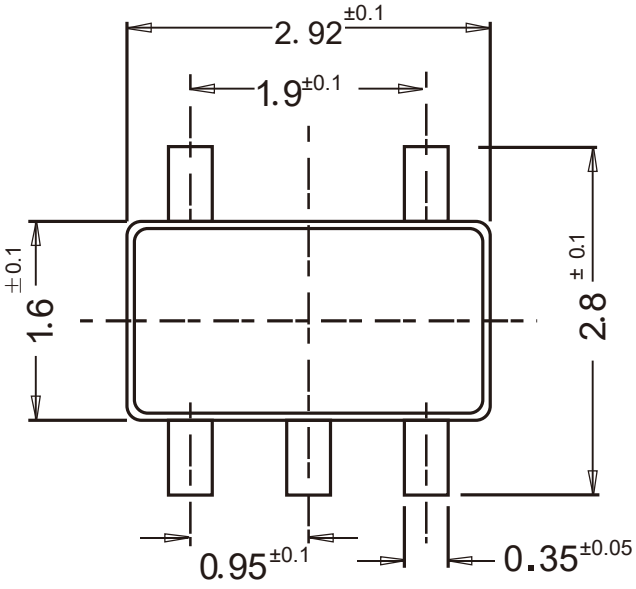
Dimensions in mm

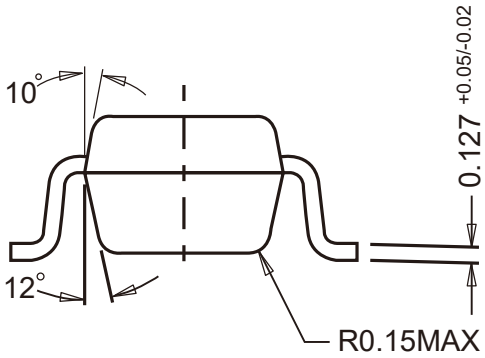


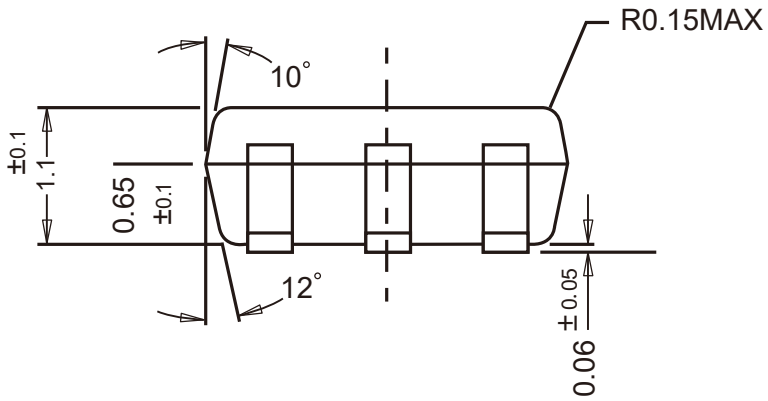
Package Outline

SOT-23-5

Dimensions in mm



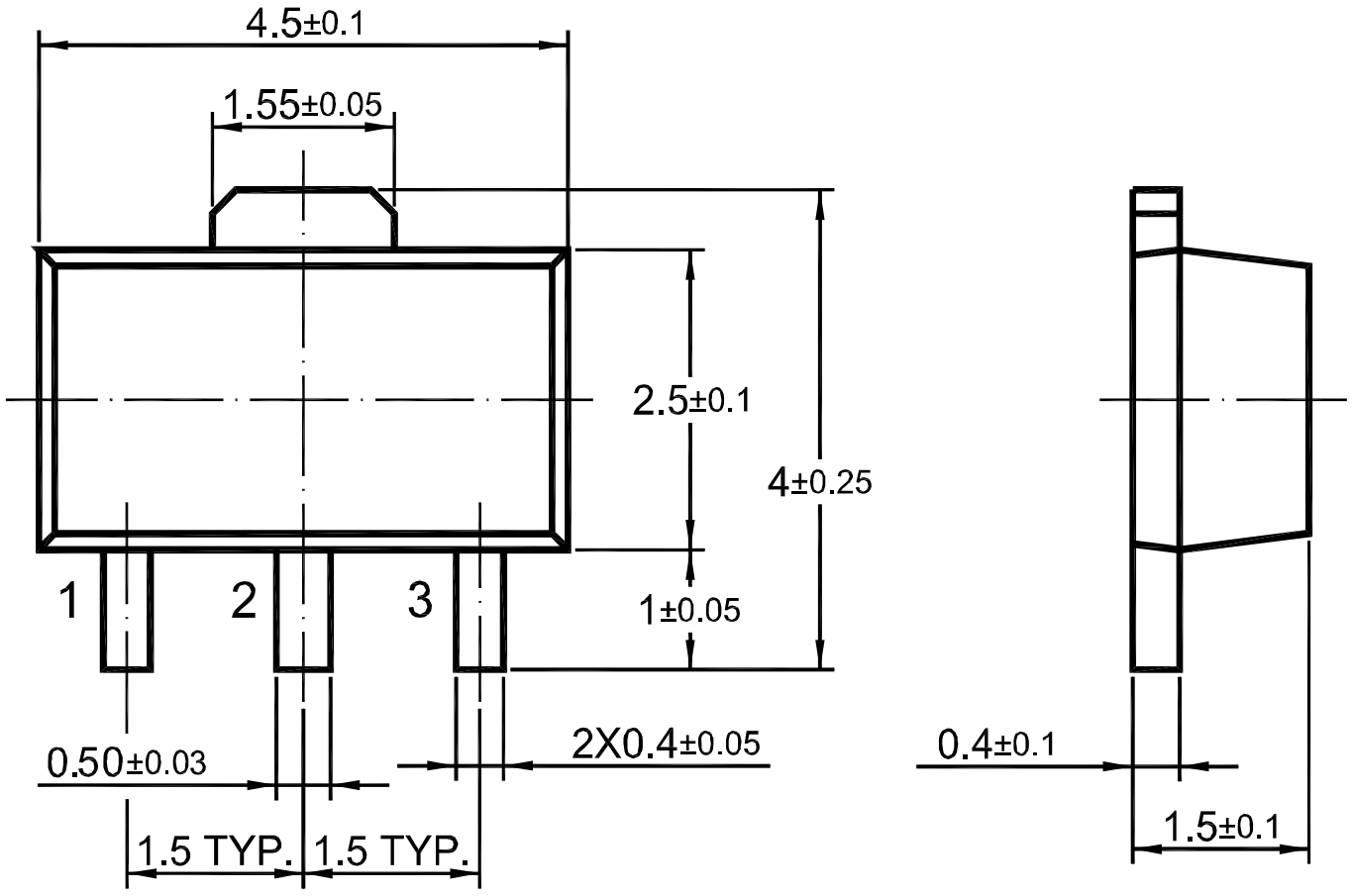




Package Outline

SOT-89

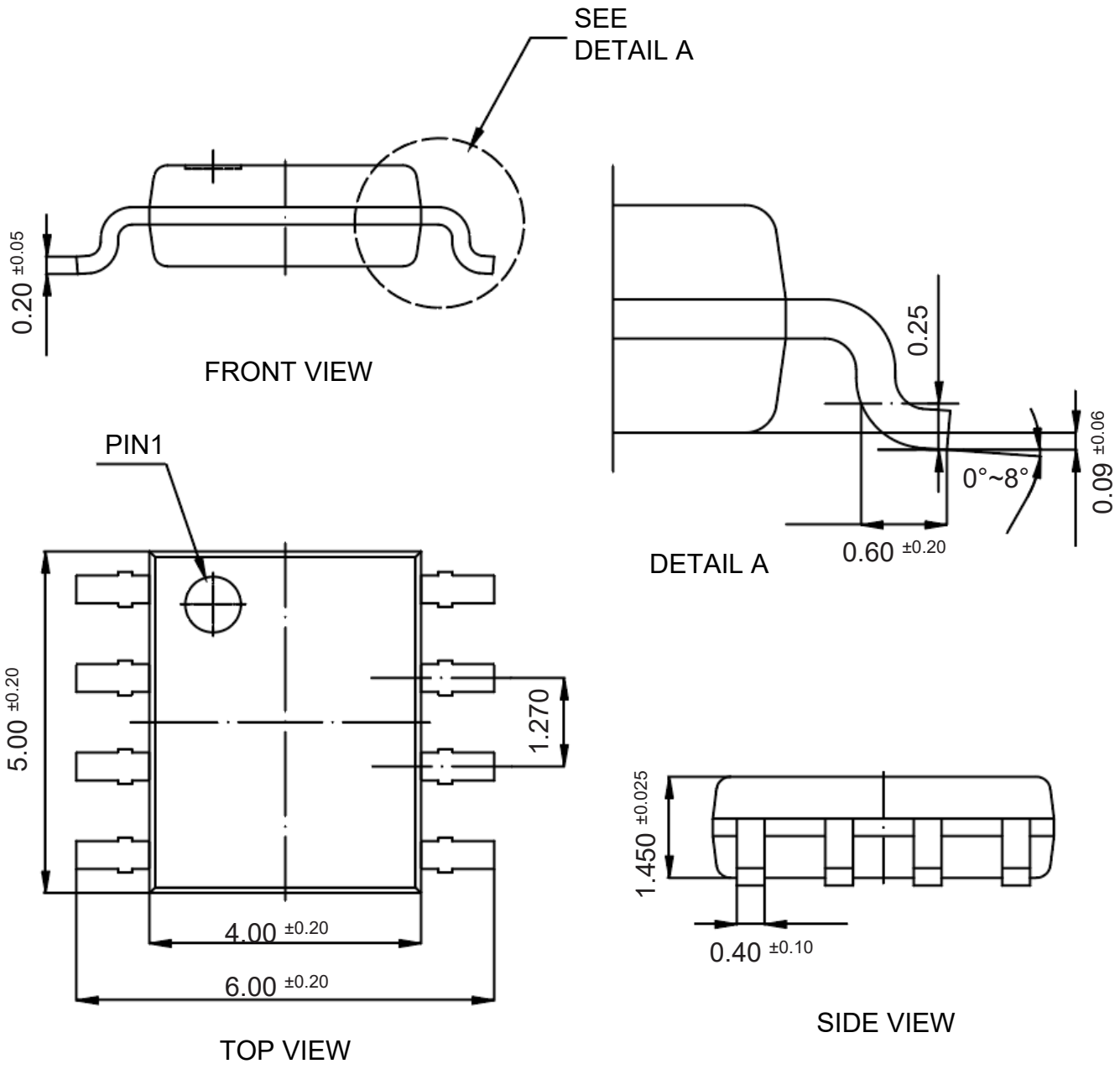
Dimensions in mm



Package Outline

SOP-8

Dimensions in mm



Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

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