

Description

Programmable Precision Reference

The TL431J 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} and 36 V with two external resistors. These devices have provides a very sharp turn-on characteristic, making these device excellent replacement for zener diodes in many applications.

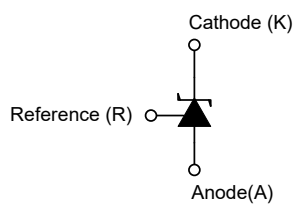
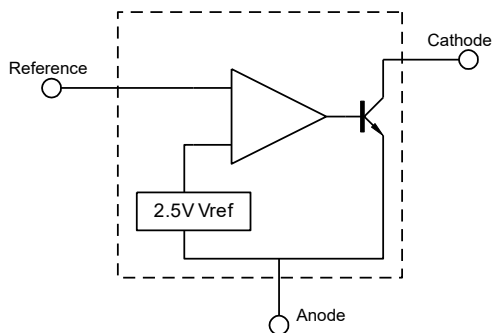
Features

- Wide programmable prise output voltage from 2.5V to 36V
- Sink current capability from 0.5mA to 100mA.
- Low output noise
- Wide Operating Range of -40 to 125°C

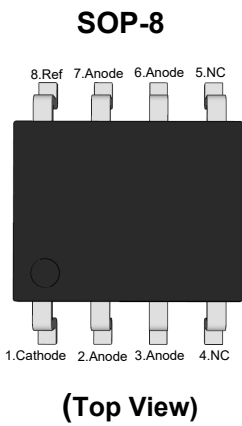
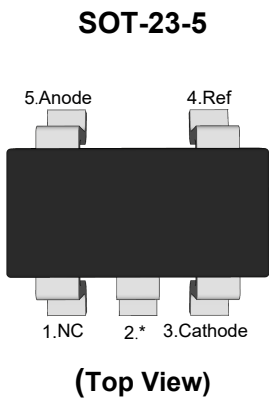
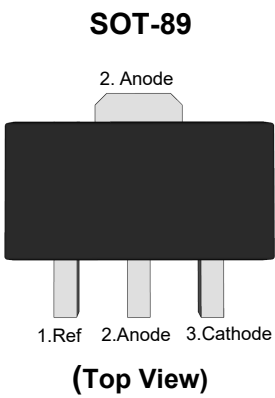
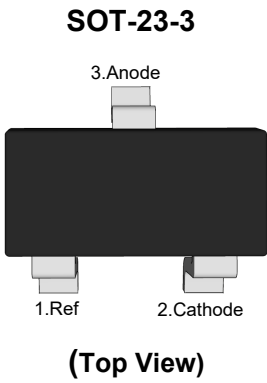
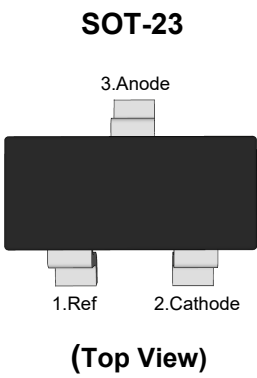
Application

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

Functional block diagram



Pin Distribution



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

Ordering Information

TL431J □□

└ 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
TL431J	1%	SOT-23	7	3000	RoHS & Green	MSL1	431J
TL431JA	0.5%	SOT-23	7	3000	RoHS & Green	MSL1	431JA
TL431JB	0.4%	SOT-23	7	3000	RoHS & Green	MSL1	431JB
TL431JSC	1%	SOT-23-3	7	3000	RoHS & Green	MSL3	431JC
TL431JASC	0.5%	SOT-23-3	7	3000	RoHS & Green	MSL3	431JAC
TL431JBSC	0.4%	SOT-23-3	7	3000	RoHS & Green	MSL3	431JBC
TL431JSQ	1%	SOT-89	7 / 13	1000 / 3000	RoHS & Green	MSL1	431J
TL431JASQ	0.5%	SOT-89	7 / 13	1000 / 3000	RoHS & Green	MSL1	431JA
TL431JBSQ	0.4%	SOT-89	7 / 13	1000 / 3000	RoHS & Green	MSL1	431JB
TL431JSE	1%	SOT-23-5	7	3000	RoHS & Green	MSL3	431JE
TL431JASE	0.5%	SOT-23-5	7	3000	RoHS & Green	MSL3	431JAE
TL431JBSE	0.4%	SOT-23-5	7	3000	RoHS & Green	MSL3	431JBE
TL431JPA	1%	SOP-8	13	4000	RoHS & Green	MSL3	431JP
TL431JAPA	0.5%	SOP-8	13	4000	RoHS & Green	MSL3	431JAP
TL431JBPA	0.4%	SOP-8	13	4000	RoHS & Green	MSL3	431JBP

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°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 Temperature	T _{OPR}	-40 ~ +125	°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}	0.5	100	mA

Thermal Information

Parameter	Symbol	Value		Units
Junction-to-Ambient thermal resistance	R _{θJA}	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	TL431JB(0.4%)	2.490	2.5	2.510	V
			TL431JA(0.5%)	2.488	2.5	2.512	V
			TL431J(1%)	2.475	2.5	2.525	V
Deviation of Reference Input Voltage Over Temperature ^{Fig1}	ΔV _{REF}	V _{KA} =V _{REF} , I _{KA} =10mA T _{MIN} ≤ T _A ≤ T _{MAX}		--	4.5	25	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	2	μA
Deviation of Reference Input Current Over Full Temperature Range ^{Fig2}	ΔI _{REF}	I _{KA} =10mA, R1=10KΩ, R2=∞, T _A =full Temperature		--	0.2	0.4	μA
Minimum Cathode Current for Regulation ^{Fig1}	I _{KA(MIN)}	V _{KA} =V _{REF}		--	50	85	μA
Off-State Cathode Current ^{Fig3}	I _{KA(OFF)}	V _{KA} =36V, V _{REF} =0		--	0.05	0.5	μA
Dynamic Impedance	Z _{KA}	V _{KA} =V _{REF} , I _{KA} =1mA~ 100mA, f≤1.0KHz		--	0.15	0.5	Ω

Figure 1. Test Circuit for VKA = VREF

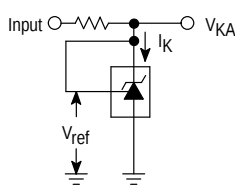


Figure 2. Test Circuit for VKA > VREF

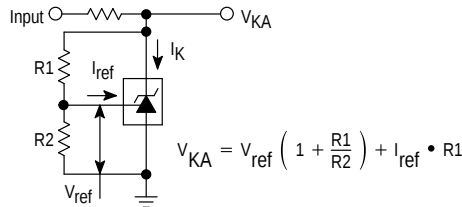
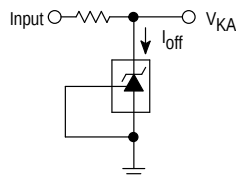
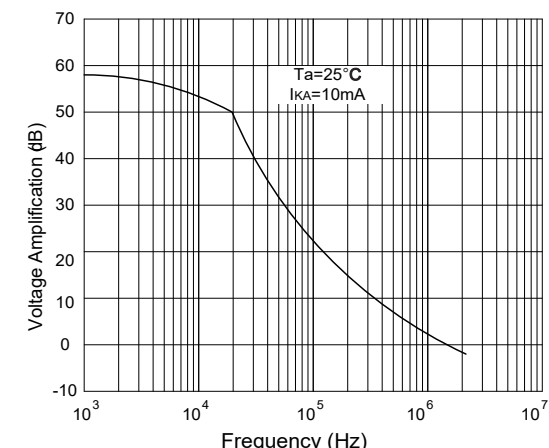
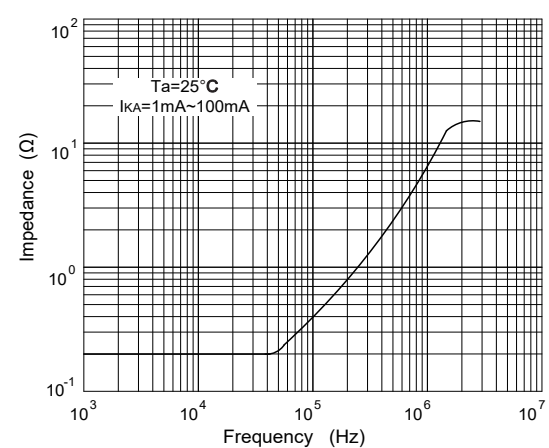
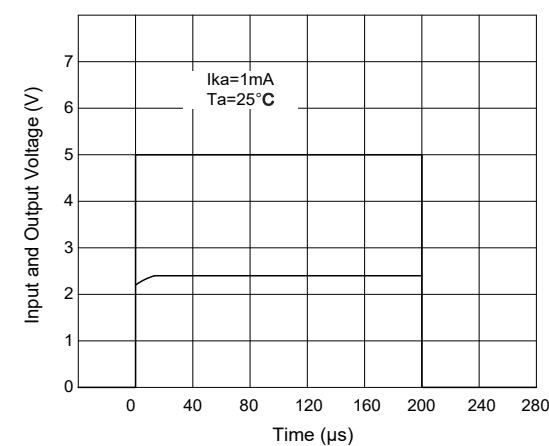
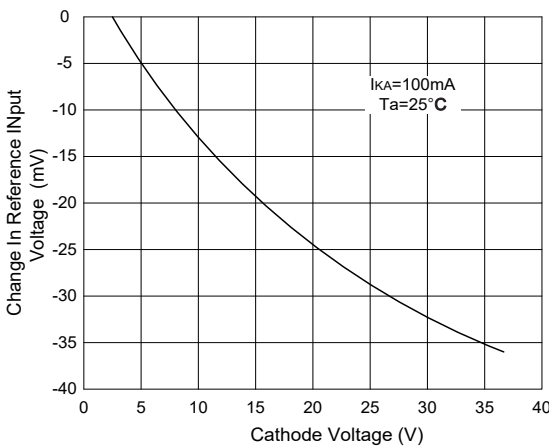
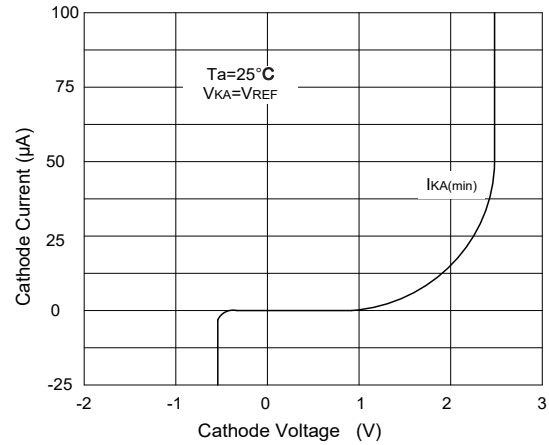
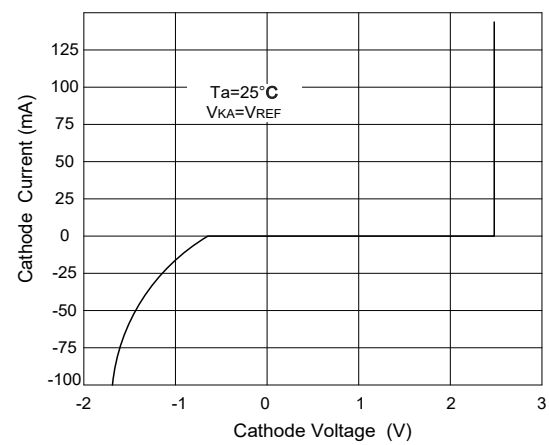


Figure 3. Test Circuit for IOFF



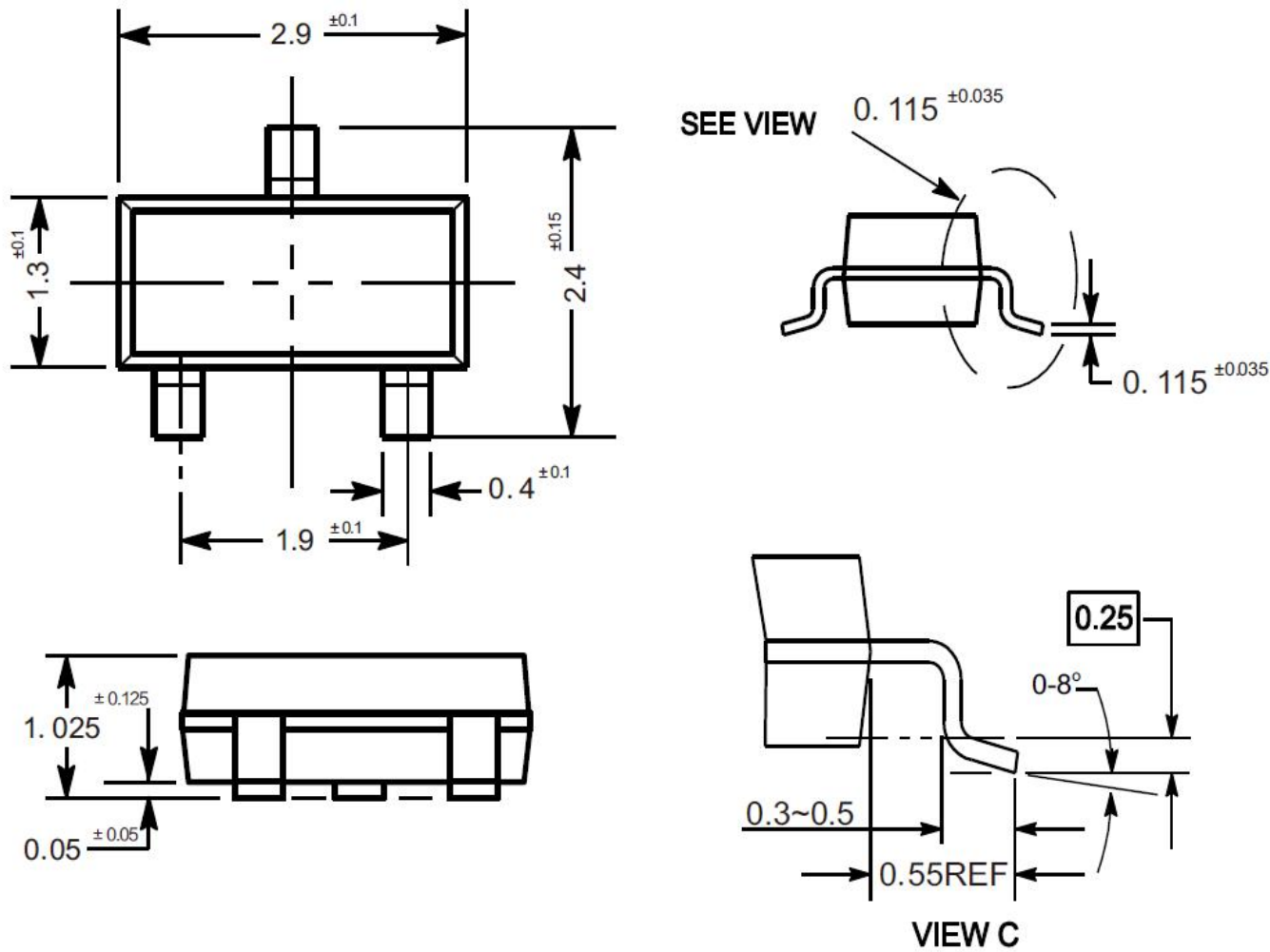
Typical Characteristic Curves



Package Outline

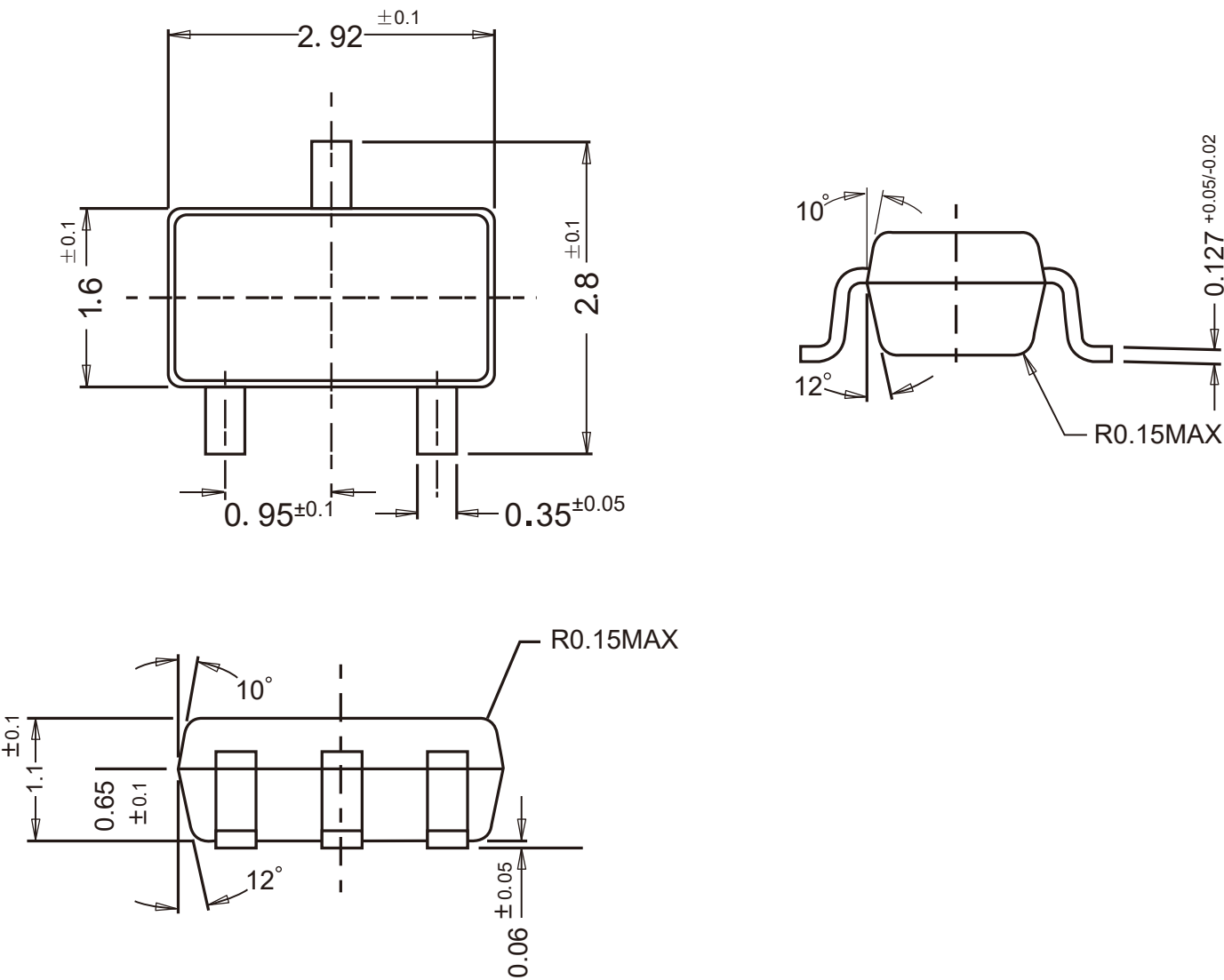
SOT-23

Dimensions in mm



Package Outline

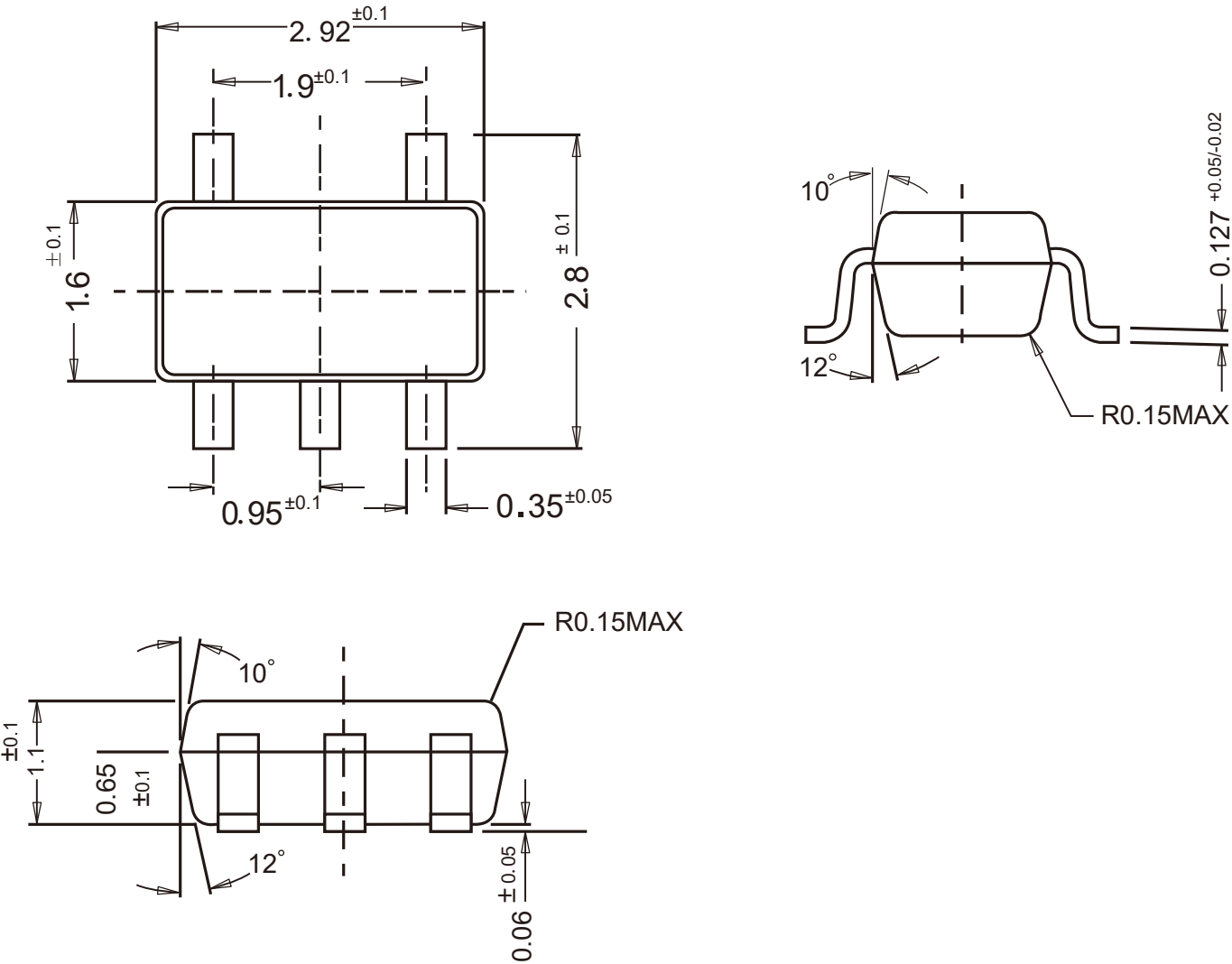
SOT-23-3
Dimensions in mm



Package Outline

SOT-23-5

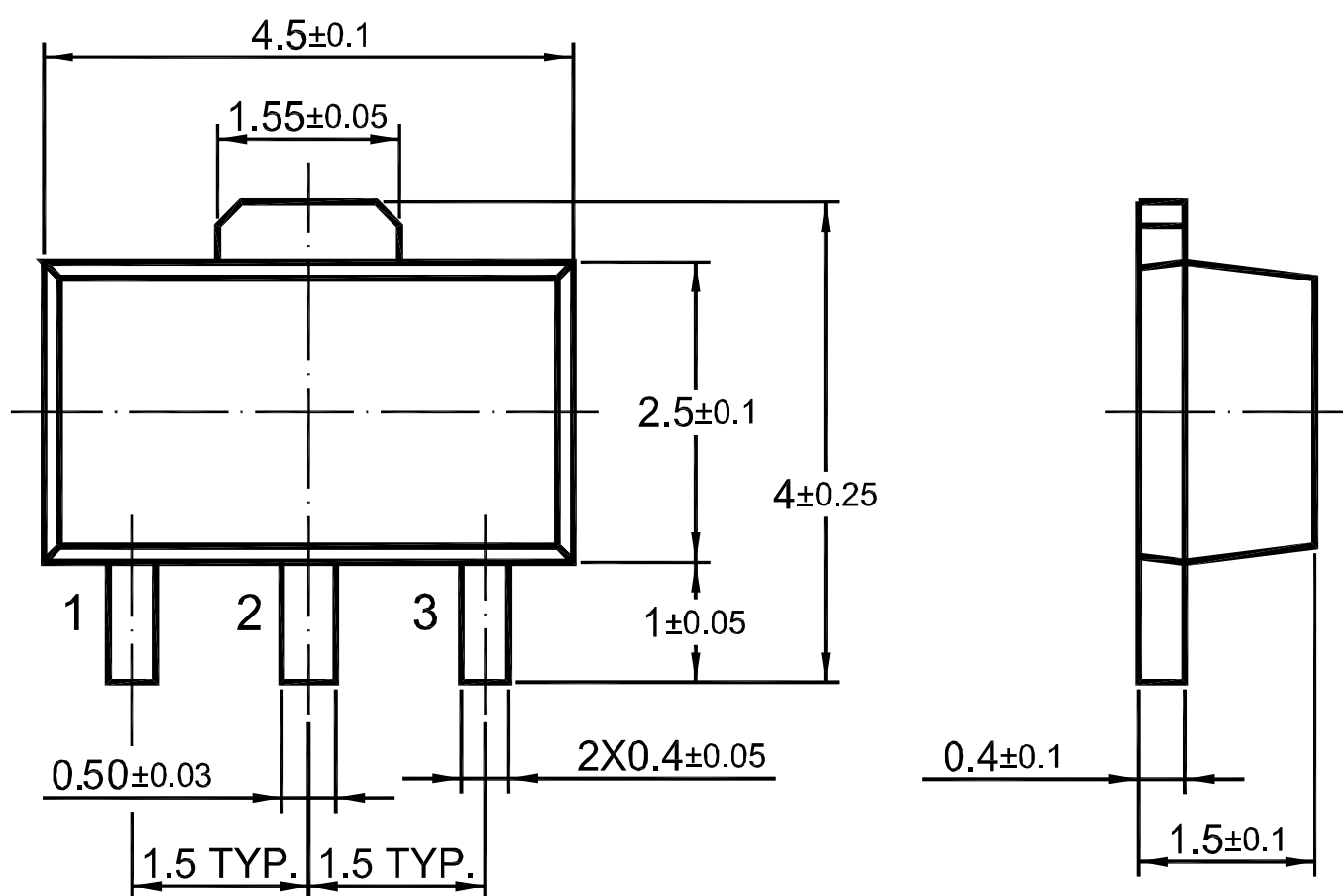
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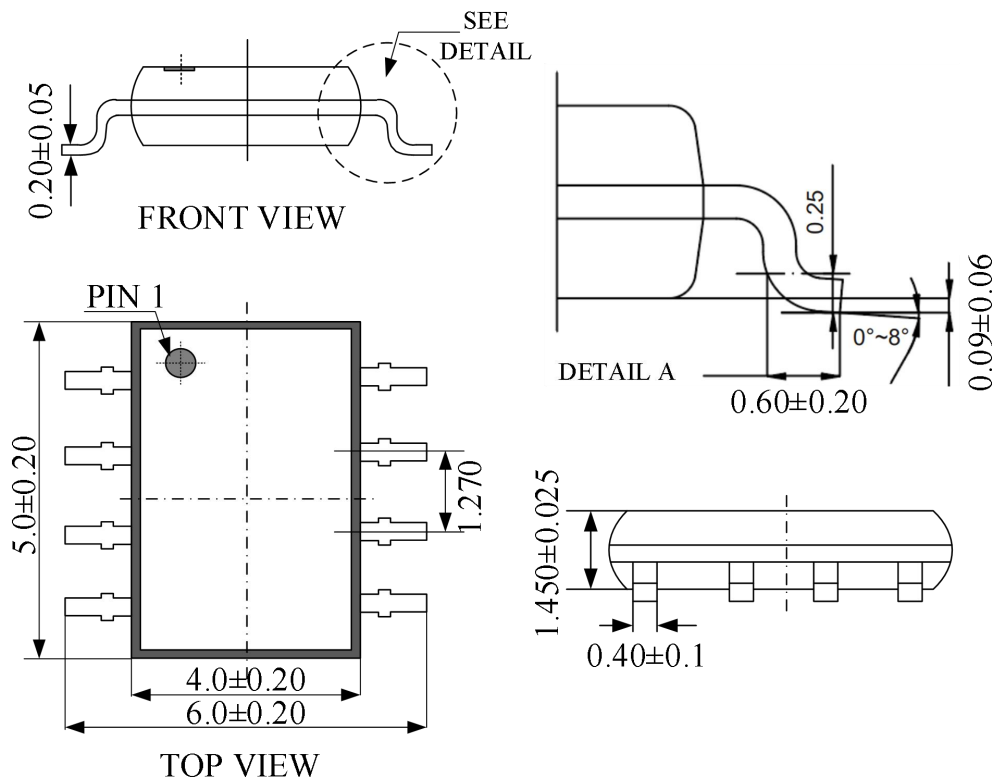
Package Outline

SOT-89

Dimensions in mm



Outline Drawing – SOP-8(Dimensions in mm)



Package Information

Package Type	Description	Quantity (pcs)	Standard
SOP-8	Reel -13" tape	4000	EIA-481

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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