Programmable Precision Referenc

Description

The TL431-KRA 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.

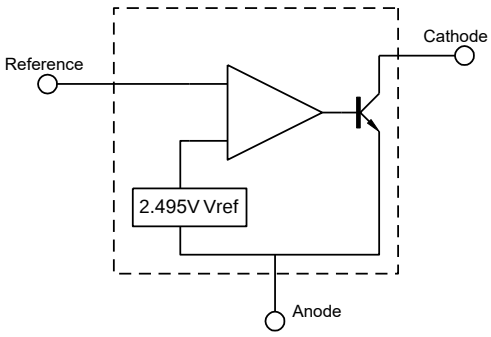
Features

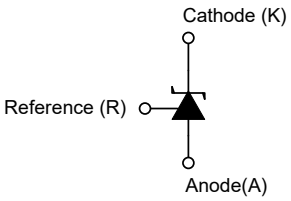
- Wide programmable prise output voltage from 2.495V to 36V
- Sink current capability from 1mA to 100mA
- Low output noise
- Wide Operating Range of -40 to 125℃

Application

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

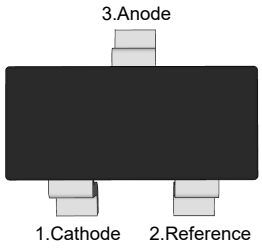
Functional block diagram





Pin Distribution

SOT-23



(Top View)

Ordering Information

TL431□-KRA

V_{REF} tolerance
□(Blank): 1%
A: 0.5%

Orderable Device	Voltage Tolerance	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TL431-KRA	1%	SOT-23	7	3000	RoHS & Green	MSL1	.431
TL431A-KRA	0.5%	SOT-23	7	3000	RoHS & Green	MSL1	.431A

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
Maximum Power Dissipation	P_D	350	mW
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

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-KRA(1%)	2.47	2.495	2.52	V
			TL431A-KRA(0.5%)	2.483	2.495	2.507	V
Deviation of Reference Input Voltage Over Temperature Fig1	ΔV_{REF}	$V_{KA}=V_{REF}$,$I_{KA}=10mA$ -25°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=∞, -25°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 $V_{KA} = V_{REF}$

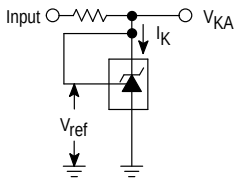


Figure 2. Test Circuit for $V_{KA} > V_{REF}$

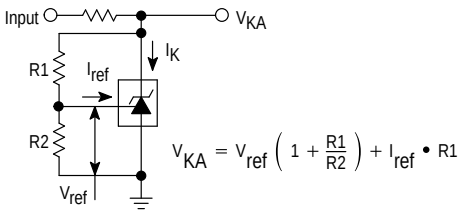
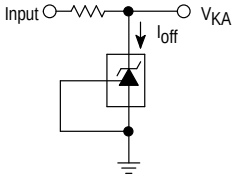
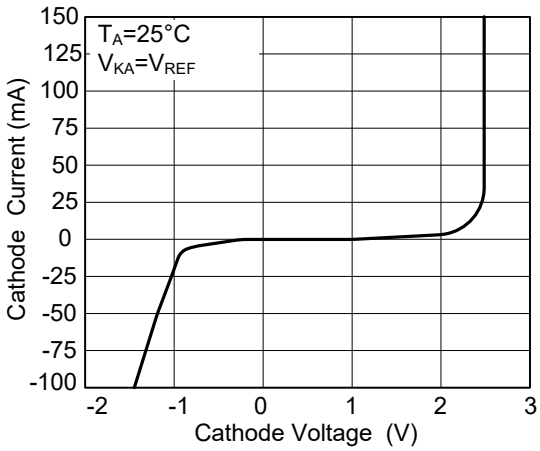
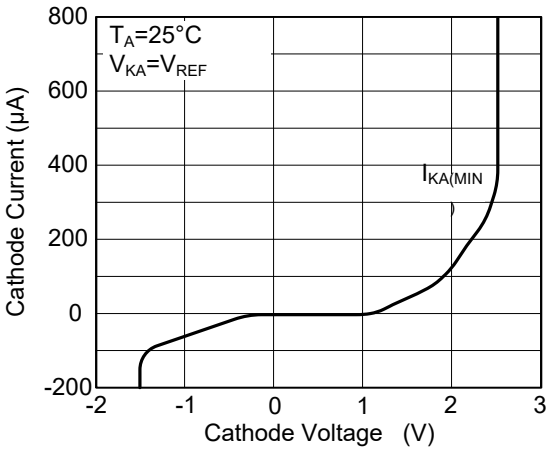


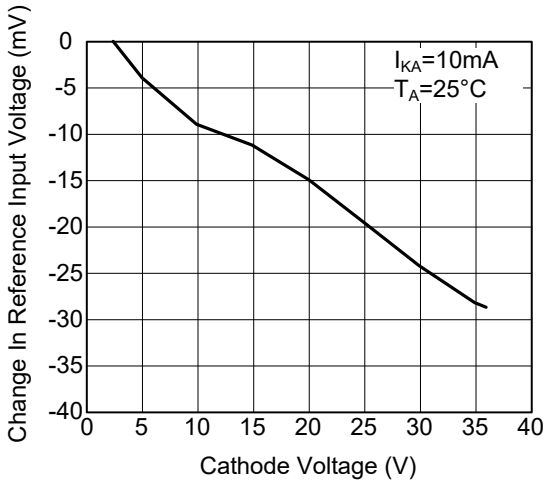
Figure 3. Test Circuit for I_{OFF}

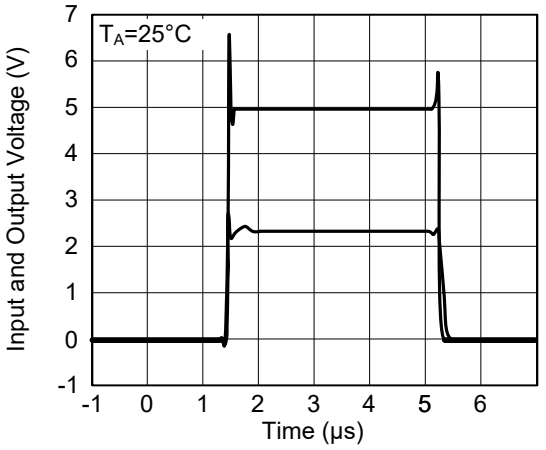


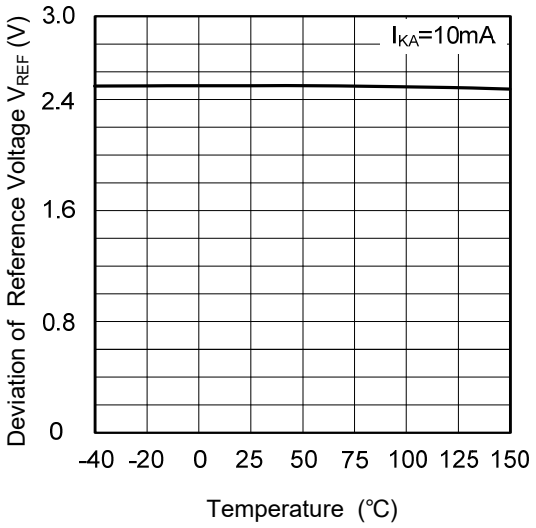
Typical Characteristic Curves

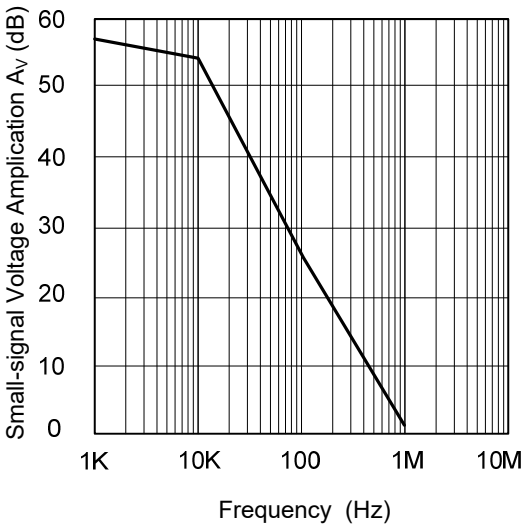








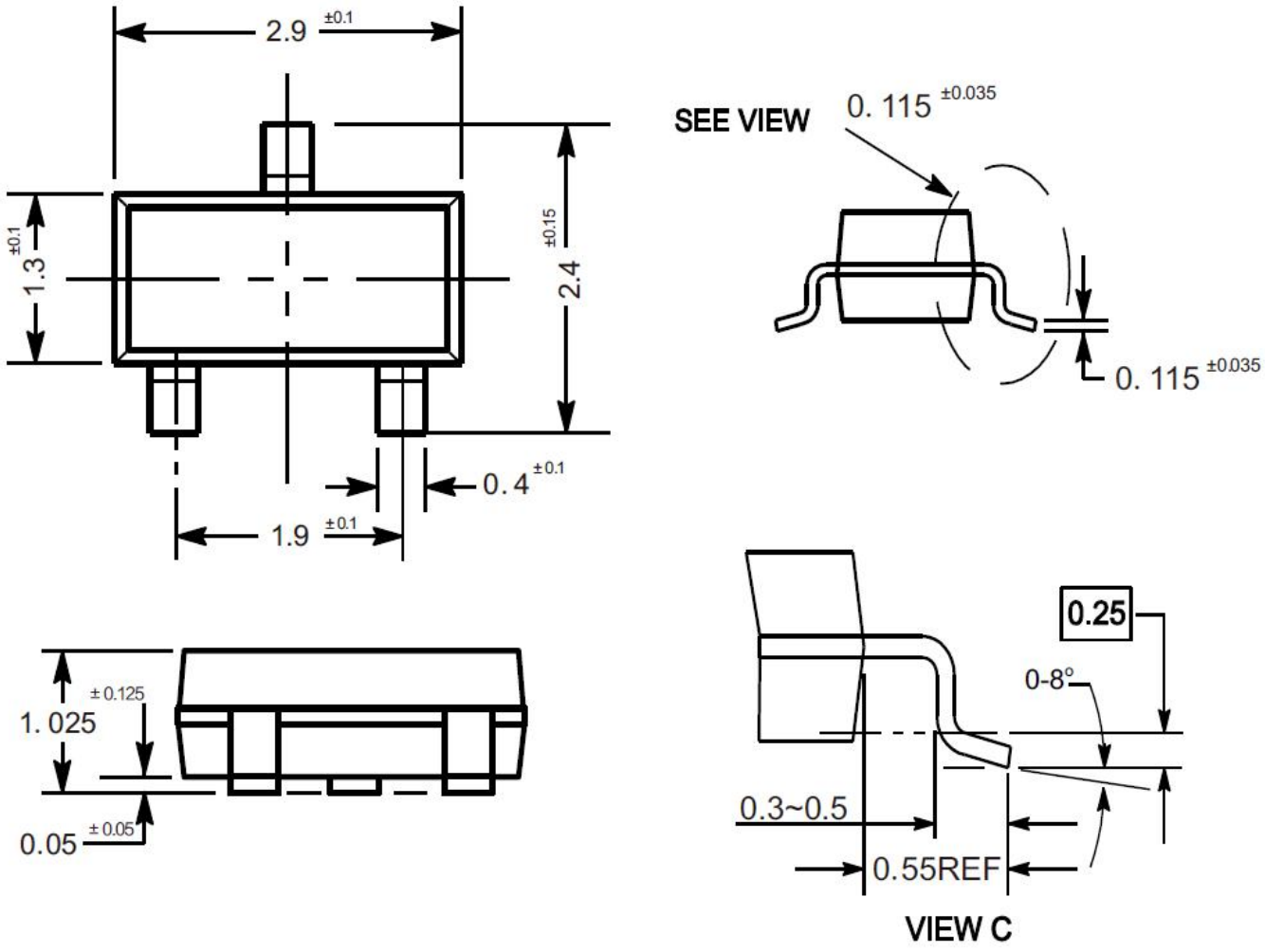




Package Outline

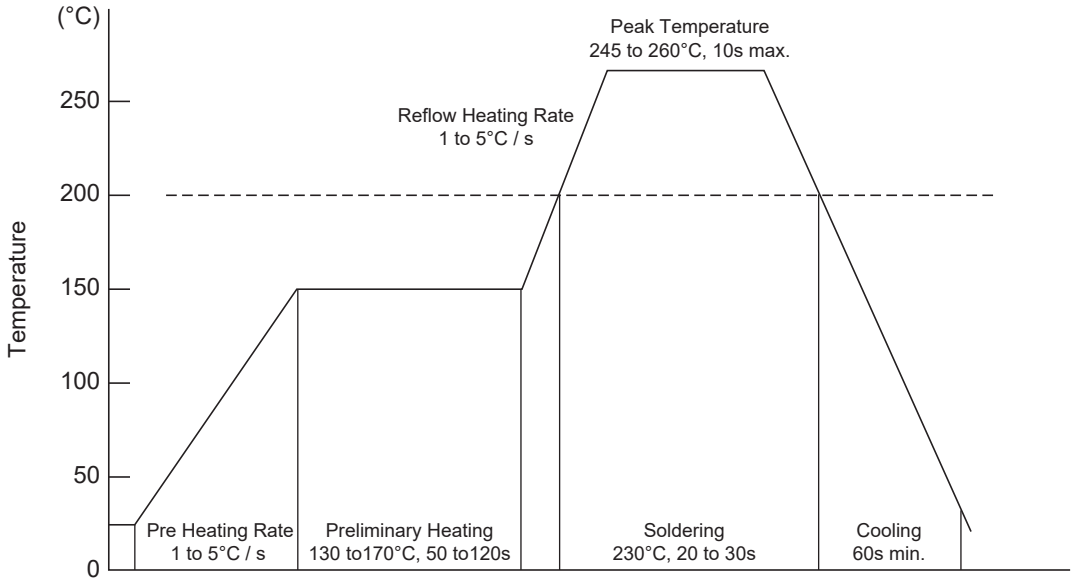
SOT-23

Dimensions in mm



Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

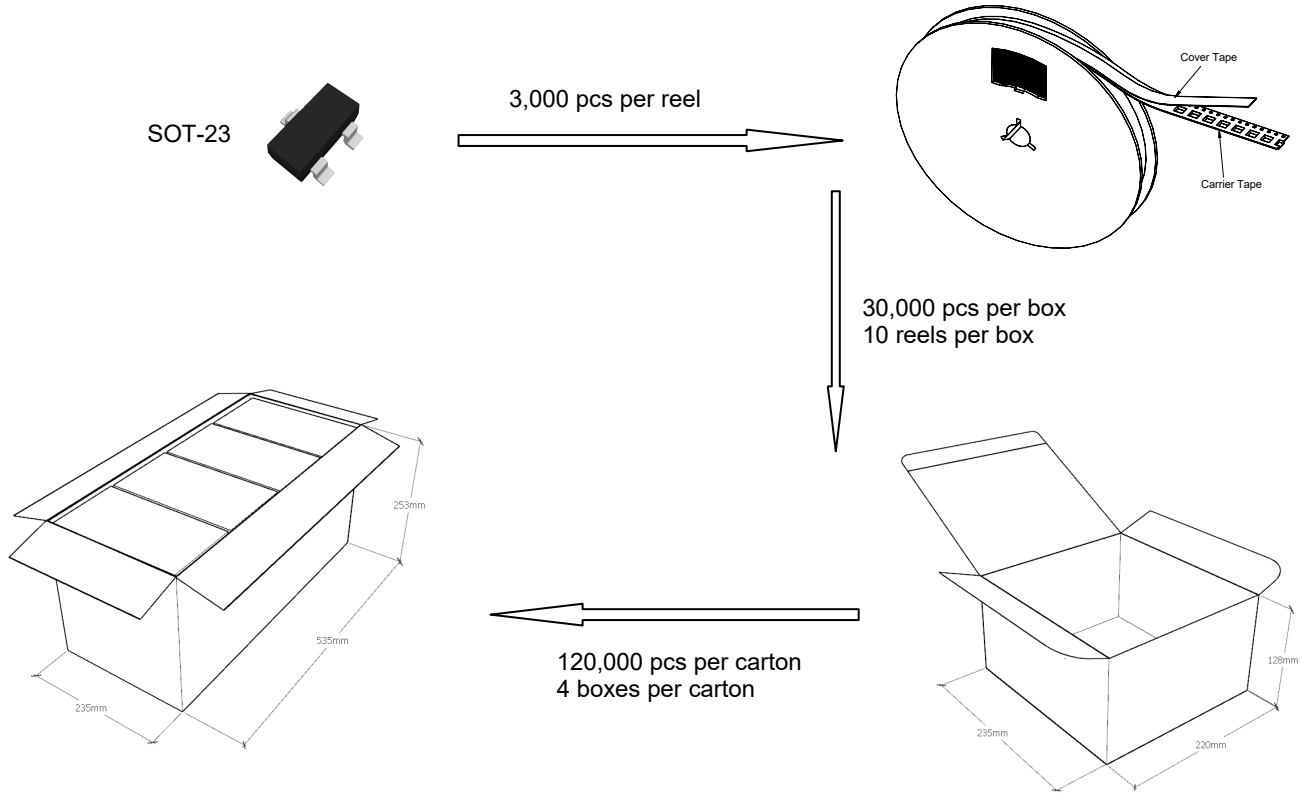
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

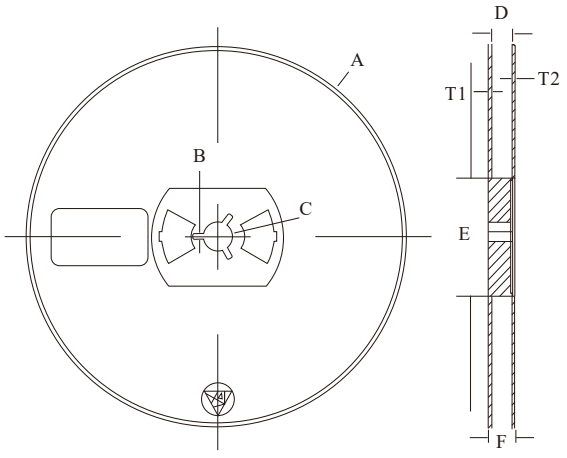
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications

- The method of packaging

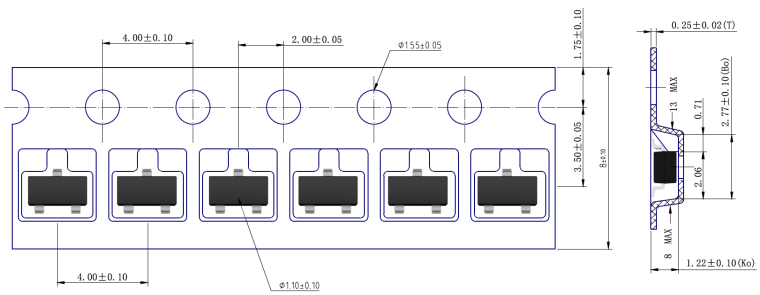


◆ Embossed tape and reel data



Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

Reel (7")



Contact Information

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For additional information, please contact your local Sales Representative.

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