

# SOT-89 Encapsulate Adjustable Reference Source

## TL431U Adjustable Accurate Reference Source

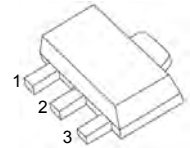
### FEATURES

- The output voltage can be adjusted to 36V
- Low dynamic output impedance, its typical value is 0.2Ω
- Trapping current capability is 1 to 100mA
- The typical value of the equivalent temperature factor in the whole temperature scope is 50 ppm/°C
- The effective temperature compensation in the working range of full temperature
- Low output noise voltage
- Fast on-state response

**MARKING:**431

### SOT-89

- 1.REFERENCE  
2.ANODE  
3.CATHODE



### ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

Parameter	Symbol	Value	Unit
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
Power Dissipation	$P_D$	500	mW
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	250	°C/W
Operating Ambient Temperature Range	$T_{opr}$	-25~+85	°C
Storage temperature Range	$T_{stg}$	-65~+150	°C
Operating Junction Temperature	$T_j$	150	°C

### ELECTRICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Reference input voltage	$V_{ref}$	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.475	2.5	2.525	V
Deviation of reference Input voltage over temperature (note)	$\Delta V_{ref}/\Delta T$	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$ $T_{MIN}\leq T_a\leq T_{MAX}$		4.5	17	mV
Ratio of change in reference Input voltage to the change in cathode voltage	$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA}=10\text{mA}$	$\Delta V_{KA}=10\text{V}\sim V_{REF}$	-1.0	-2.7	mV/V
			$\Delta V_{KA}=36\text{V}\sim 10\text{V}$	-0.5	-2.0	mV/V
Reference input current	$I_{ref}$	$I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$		1.5	4	$\mu\text{A}$
Deviation of reference input current over full temperature range	$\Delta I_{ref}/\Delta T$	$I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$ $T_A=-25\text{ to }85^{\circ}\text{C}$		0.4	1.2	$\mu\text{A}$
Minimum cathode current for regulation	$I_{KA(min)}$	$V_{KA}=V_{REF}$		0.45	1.0	mA
Off-state cathode current	$I_{KA(OFF)}$	$V_{KA}=36\text{V}, V_{REF}=0$		0.05	1.0	$\mu\text{A}$
Dynamic impedance	$Z_{KA}$	$V_{KA}=V_{REF}, I_{KA}=1\text{ to }100\text{mA}$ $f\leq 1.0\text{kHz}$		0.15	0.5	$\Omega$

Note:  $T_{MIN}=-55^{\circ}\text{C}$ ,  $T_{MAX}=+175^{\circ}\text{C}$

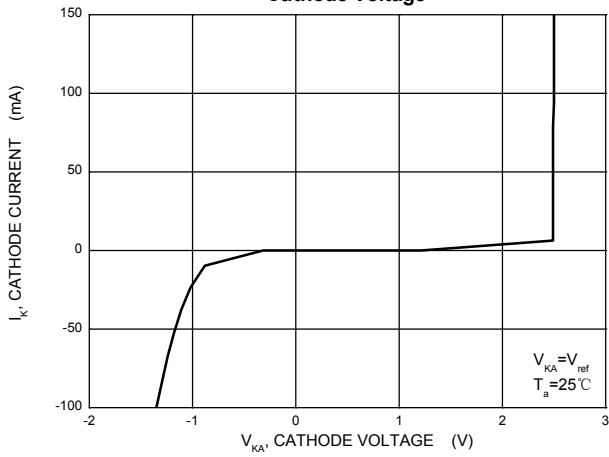
### CLASSIFICATION of $V_{ref}$

Rank	0.5%	1%
Range	2.487-2.513	2.475-2.525

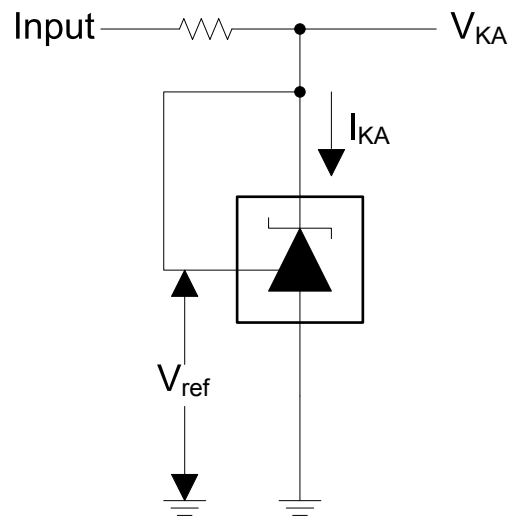
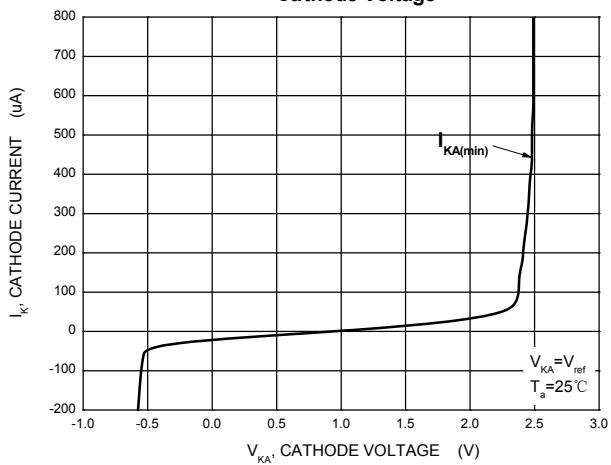


## Typical Characteristics

Cathode Current versus Cathode Voltage

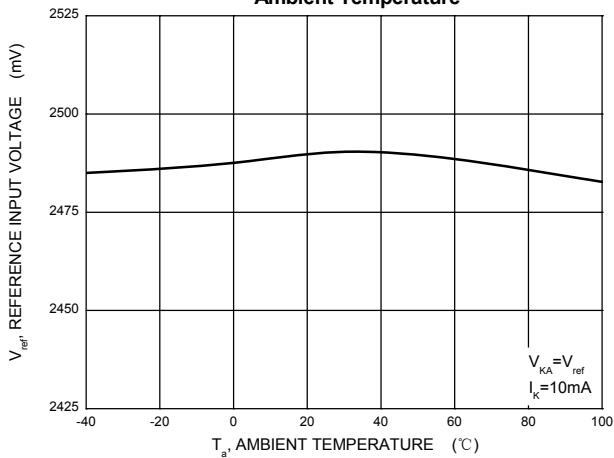


Cathode Current versus Cathode Voltage

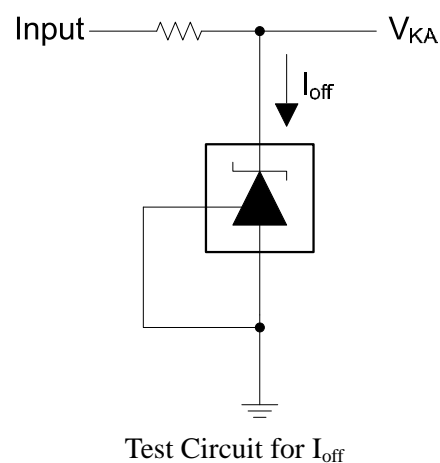
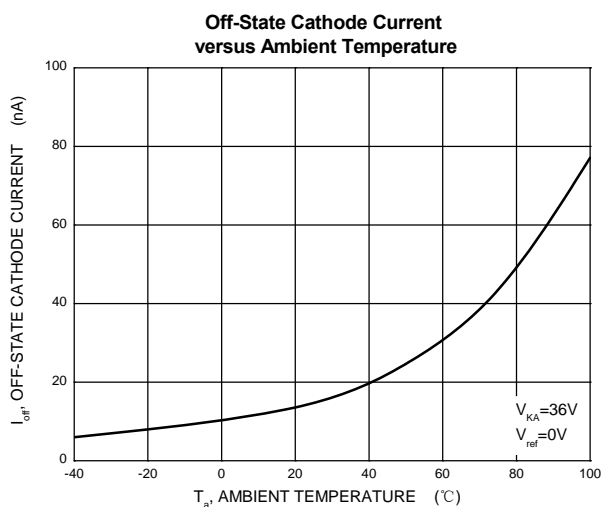
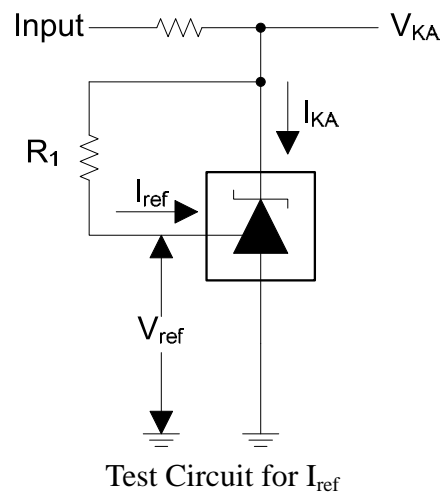
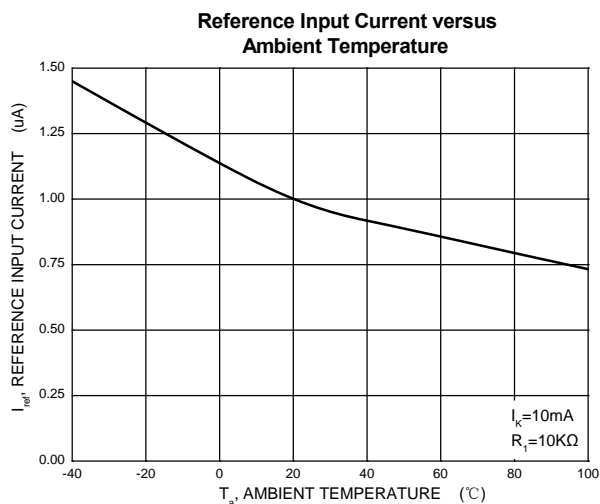
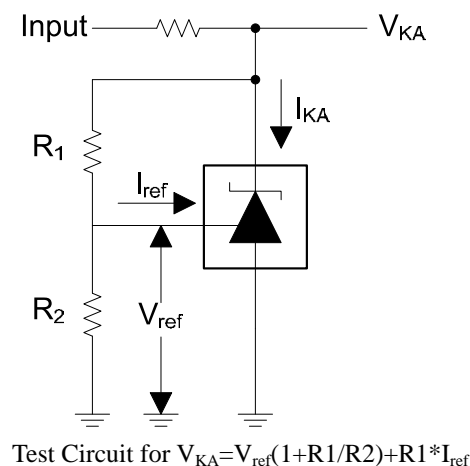
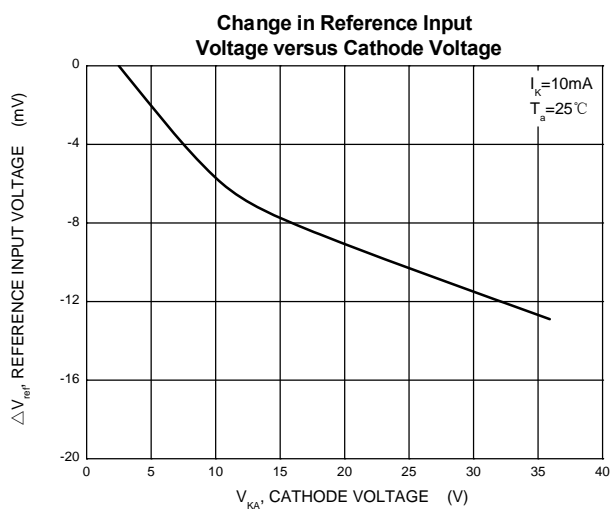


Test Circuit for  $V_{KA} = V_{ref}$

Reference Input Voltage versus Ambient Temperature

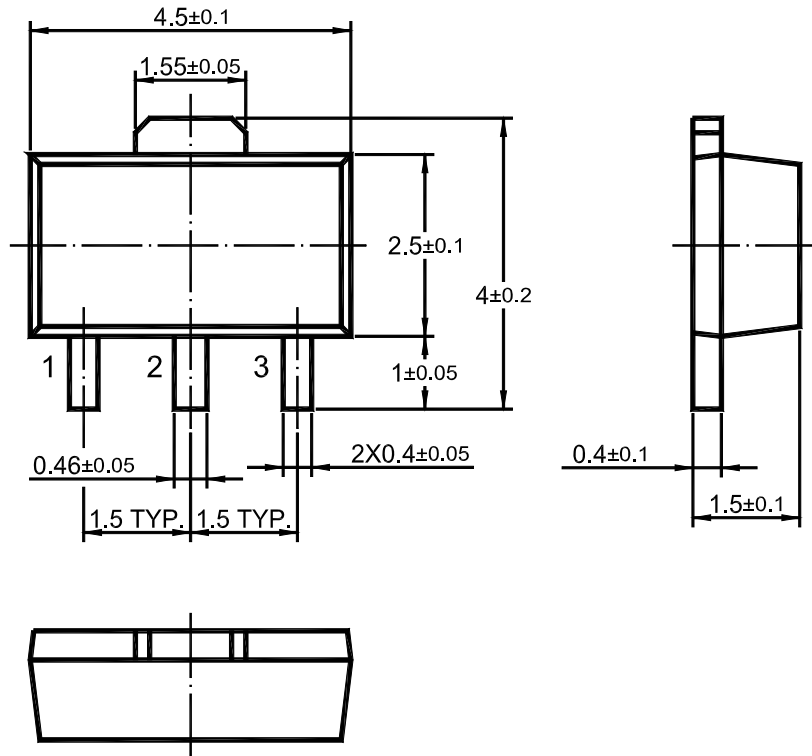


## Typical Characteristics





## SOT-89 PACKAGE OUTLINE



Dimensions in mm

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