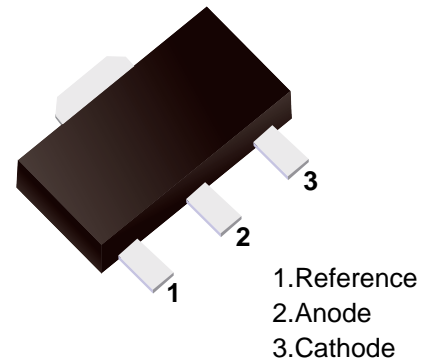
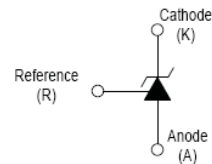


**Adjustable Accurate Reference Source**
**DEVICE DESCRIPTION**

The TL431 is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of 0.2Ω. The device can be used as a replacement for zener diodes in many applications.


**Simplified outline(SOT-89)**

**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
- Low output noise voltage
- Fast on-state response
- The effective temperature compensation in the working range of full temperature
- The typical value of the equivalent temperature factor in the whole temperature scope is 50 ppm/°C

**APPLICATION**

- Shunt Regulator
- High-Current Shunt Regulator
- Precision Current Limiter

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

Parameter	Symbol	Value	Unit
Cathode Voltage	$V_{KA}$	36	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 Temperature	$T_{opr}$	-25~+85	°C
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-65~+150	°C

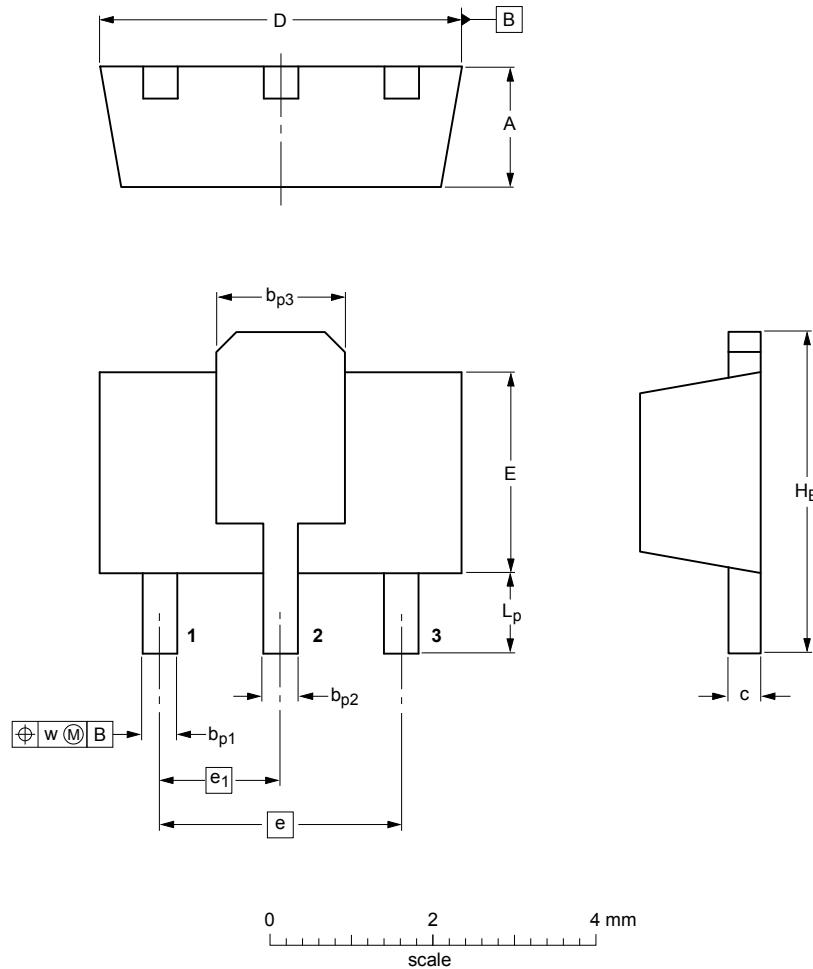
**■ ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Reference input voltage	$V_{ref}$	$V_{KA}=V_{REF}, I_{KA}=10mA$	2.487	2.5	2.513	V
Deviation of reference Input voltage over temperature (note)	$\Delta V_{ref} / \Delta T$	$V_{KA} = V_{REF}, I_{KA} = 10mA$ $T_{MIN} \leq T_a \leq T_{MAX}$		4.5	17	mV
Ratio of change in reference Input voltage to the change in cathode voltage	$\Delta V_{ref} / \Delta V_{KA}$	$I_{KA}=10mA$		-1.0	-2.7	mV/V
				-0.5	-2.0	mV/V
Reference input current	$I_{ref}$	$I_{KA} = 10mA, R_1=10k\Omega$ $R_2=\infty$		1.5	4	$\mu A$
Deviation of reference input current over full temperature range	$\Delta I_{ref} / \Delta T$	$I_{KA}=10mA, R_1=10k\Omega$ $R_2=\infty$ $T_A=-25$ to $85^\circ C$		0.4	1.2	$\mu A$
Minimum cathode current for regulation	$I_{KA(min)}$	$V_{KA}=V_{REF}$		0.45	1.0	mA
Off-state cathode current	$I_{KA(OFF)}$	$V_{KA}=36V, V_{REF}=0$		0.05	1.0	$\mu A$
Dynamic impedance	$Z_{KA}$	$V_{KA}=V_{REF}, I_{KA}=1$ to $100mA$ $f \leq 1.0kHz$		0.15	0.5	$\Omega$

 Note:  $T_{MIN}=-25^\circ C$  ,  $T_{MAX}=+85^\circ C$

### Package Outline

### SOT-89



DIMENSIONS (mm are the original dimensions)

UNIT	A	$b_{p1}$	$b_{p2}$	$b_{p3}$	c	D	E	e	$e_1$	$H_E$	$L_p$	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

### Summary of Packing Options

Package	Package Description	Packing Quantity	Industry Standard
SOT-89	Tape/Reel, 7" reel	1000	EIA-481-1