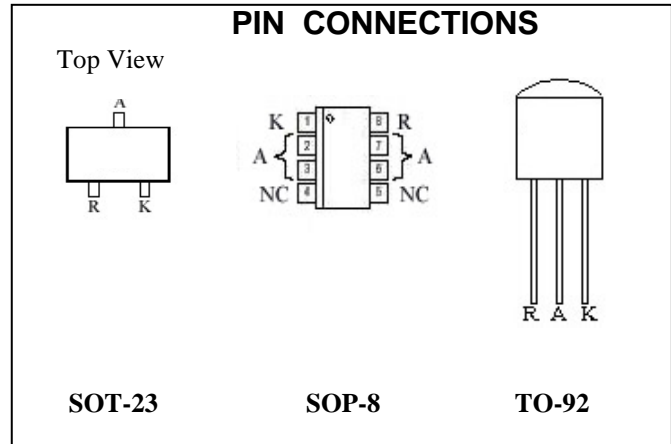


## Programmable Precision Reference

**KK431**

### FEATURES

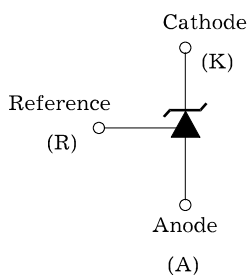
- Programmable Output Voltage to 40V
- Low Dynamic Output Impedance 0.2Ω
- Sink Current Capability of 0.1 mA to 100 mA
- Equivalent Full-Range Temperature Coefficient of 50 ppm/°C
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn on Response
- TO-92, SOP- 8 or SOT-23 packages



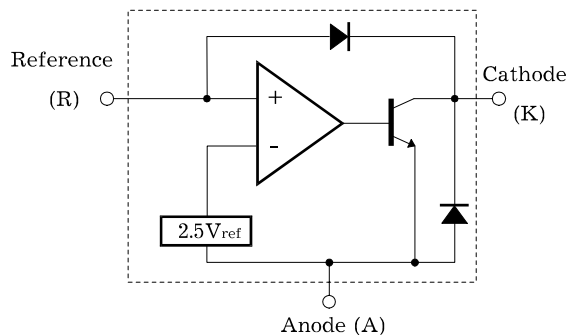
### DESCRIPTION

The KK431 is a three-terminal adjustable regulator series with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between  $V_{ref}$  (approximately 2.5 volts) and 40 volts with two external resistors. These devices have a typical dynamic output impedance of 0.2Ω. Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications. The KK431 is characterized for operation from -25°C to +85°C.

### SYMBOL



### FUNCTIONAL BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

Characteristic	Symbol	Value	Unit
Cathode Voltage	$V_{KA}$	40	V
Cathode Current Range (Continuous)	$I_K$	-100 ~ 150	mA
Reference Input Current Range	$I_{REF}$	0.05 ~ 10	mA
Power Dissipation at 25°C: SOP, TO – 92 Package ( $R_{\theta JA} = 178^\circ\text{C/W}$ ) SOT Package ( $R_{\theta JA} = 625^\circ\text{C/W}$ )	$P_D$	0.7 0.2	W
Junction Temperature Range	$T_J$	0 ~ 150	°C
Operating Temperature Range	$T_g$	-25 ~ +85	°C
Storage Temperature Range	$T_{stg}$	-65 ~ +150	°C

## RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Cathode Voltage	$V_{KA}$		$V_{REF}$		40	V
Cathode Current	$I_K$		0.5		100	mA

## ELECTRICAL CHARACTERISTICS

( $T_a = 25^\circ\text{C}$ ,  $V_{KA} = V_{REF}$ ,  $I_K = 10\text{mA}$  unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Reference Input Voltage	$V_{REF}$	$V_{KA} = V_{REF}$ , $I_K = 10\text{mA}$ KK431 KK431-A KK431-C	2.440 2.470 2.482	2.495 2.495 2.495	2.550 2.520 2.508	V
Deviation of Reference Input Voltage Over Full Temperature Range	$V_{REF(\text{dev})}$	$T_{\min} \leq T_a \leq T_{\max}$		3	17	MV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$\Delta V_{KA} = 10\text{V} - V_{REF}$ $\Delta V_{KA} = 36\text{V} - 10\text{V}$		-1.4 -1.0	-2.7 -2.0	mV/V
Reference Input Current	$I_{REF}$	$R_1 = 10\text{K}\Omega$ , $R_2 = \infty$		1.8	4	$\mu\text{A}$
Deviation of Reference Input Current Over Full Temperature Range	$I_{REF(\text{dev})}$	$R_1 = 10\text{K}\Omega$ , $R_2 = \infty$		0.4	1.2	$\mu\text{A}$
Minimum Cathode Current for Regulation	$I_{K(\text{min})}$			0.25	0.5	mA
Off-State Cathode Current	$I_{K(\text{off})}$	$V_{KA} = 40\text{V}$ , $V_{REF} = 0$		0.26	0.9	$\mu\text{A}$
Dynamic Impedance	$Z_{KA}$	$I_K = 10\text{mA}$ to $100\text{mA}$ , $f \leq 1.0\text{KHz}$		0.22	0.5	$\Omega$

## TEST CIRCUITS

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

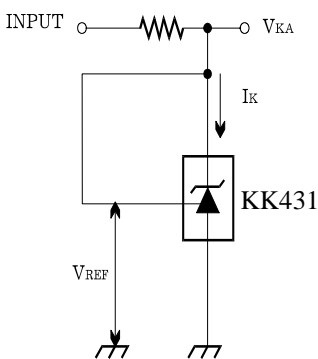


Fig.2. Test Circuit for  $V_{KA} \geq V_{REF}$

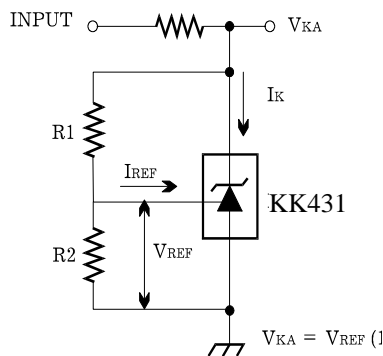
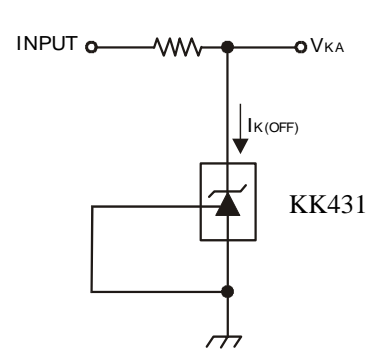


Fig.3. Test Circuit for  $I_{\text{off}}$

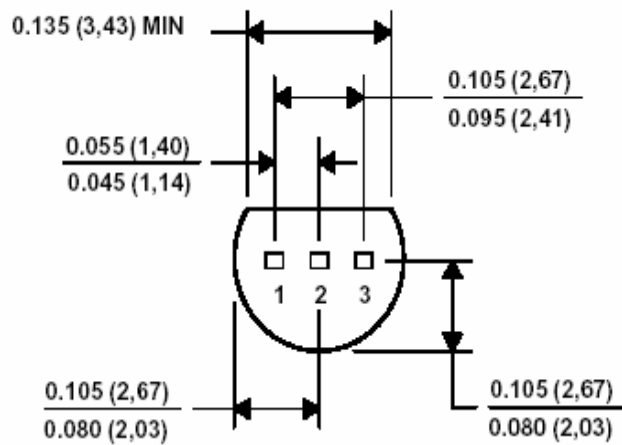
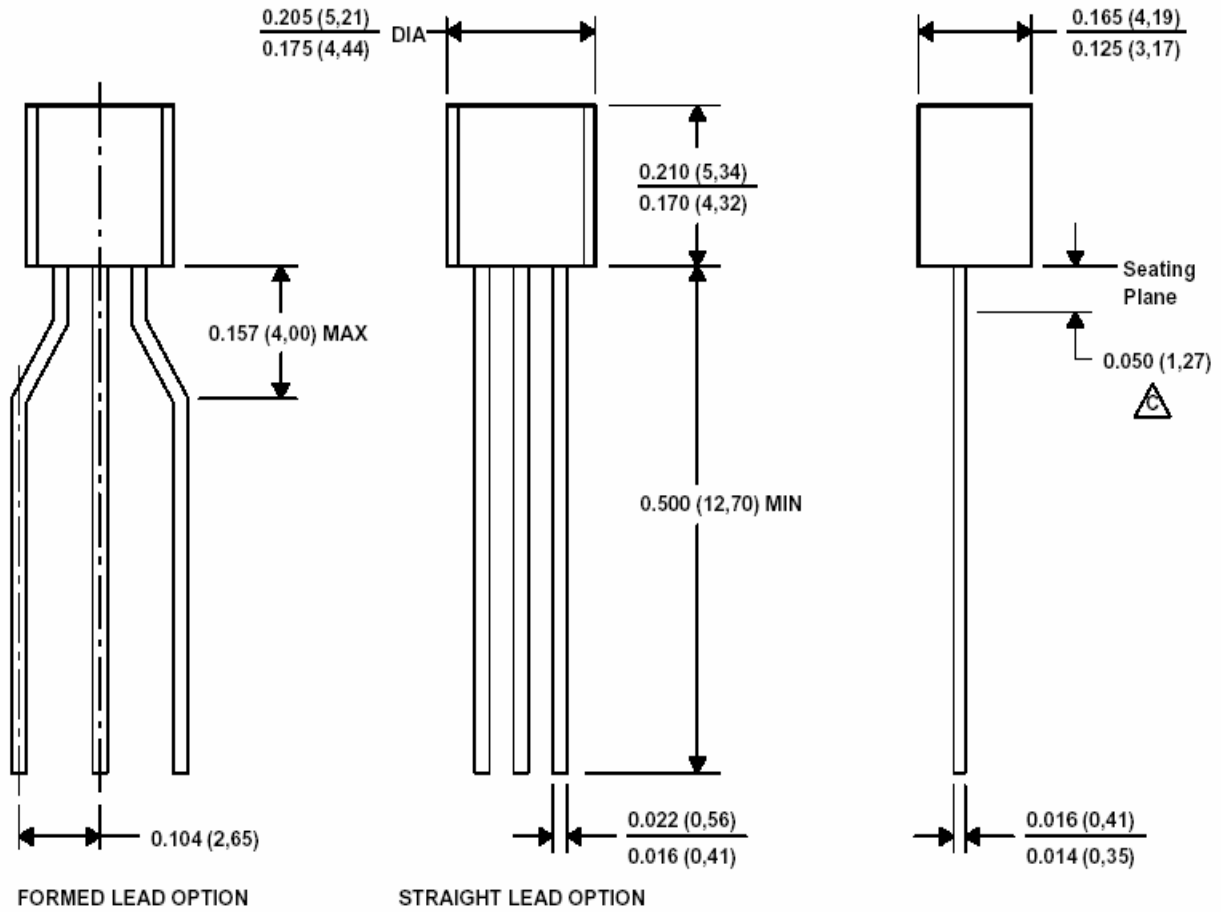


**Ordering Information**

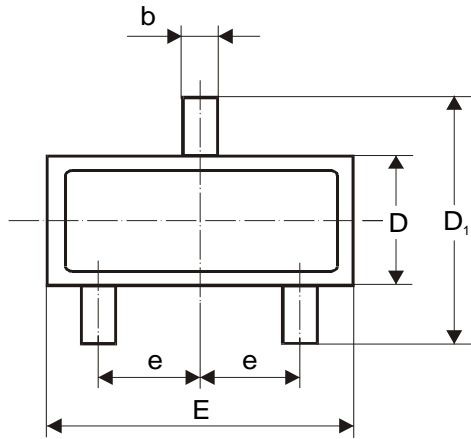
<b>Product Number</b>	<b>Reference Input Voltage</b>	<b>Package</b>
KK431CLF KK431CLS	0.5%	TO-92
KK431CD		8-SOP
KK431CS		SOT-23
KK431ALF KK431ALS	1%	TO-92
KK431AD		8-SOP
KK431AS		SOT-23
KK431LF KK431LS	2%	TO-92
KK431D		8-SOP
KK431S		SOT-23

**Package Dimensions**

**TO-92**

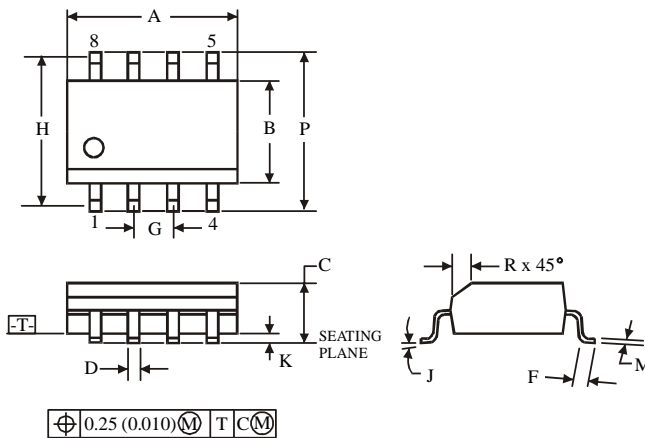
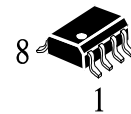


**SOT-23**



Dimension	mm	
	min	max
A	0.75	0.95
A <sub>1</sub>	0.25	1.10
b	0.38	0.46
C	0.50	0.65
D	1.20	1.40
D <sub>1</sub>	2.10	2.50
E	2.80	3.00
e	0.85	1.05
L	0.40	0.60
Q	0.09	0.15

**D SUFFIX SOIC  
(MS - 012AA)**



Symbol	Dimension, mm	
	MIN	MAX
A	4.8	5
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

**NOTES:**

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.