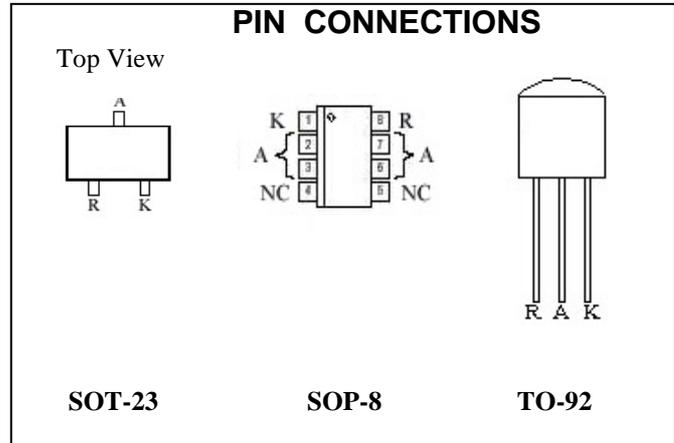


### Programmable Precision Reference

**KK431**

#### FEATURES

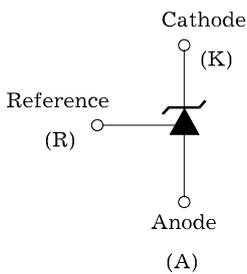
- Programmable Output Voltage to 40V
- Low Dynamic Output Impedance 0.2Ω
- Sink Current Capability of 0.1 mA to 100 mA
- Equivalent Full-Range Temperature Coefficient of 50 ppm/°C
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn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



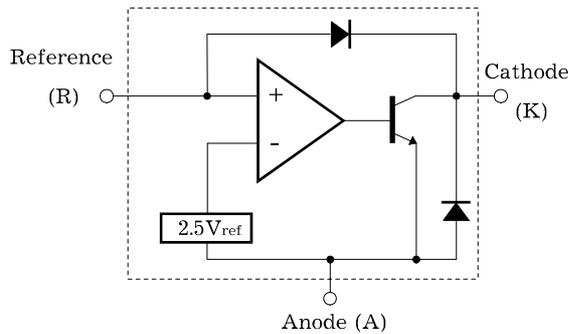
#### DESCRIPTION

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 Vref (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  $V_{KA} = V_{REF}$

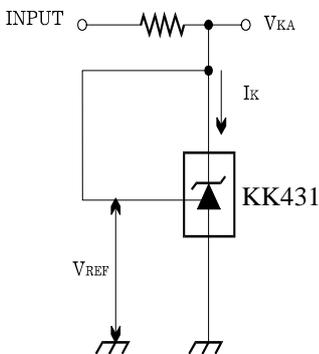


Fig.2. Test Circuit for  $V_{KA} \geq V_{REF}$

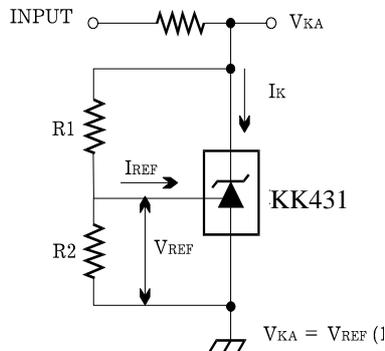
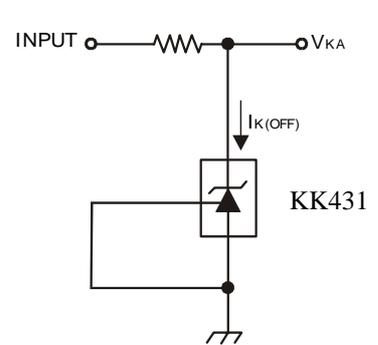


Fig.3. Test Circuit for  $I_{\text{off}}$

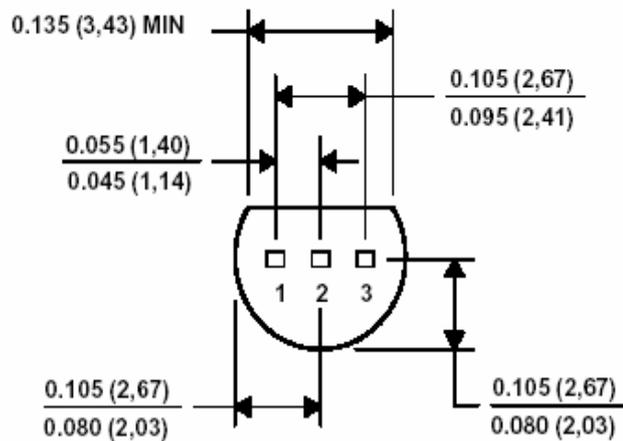
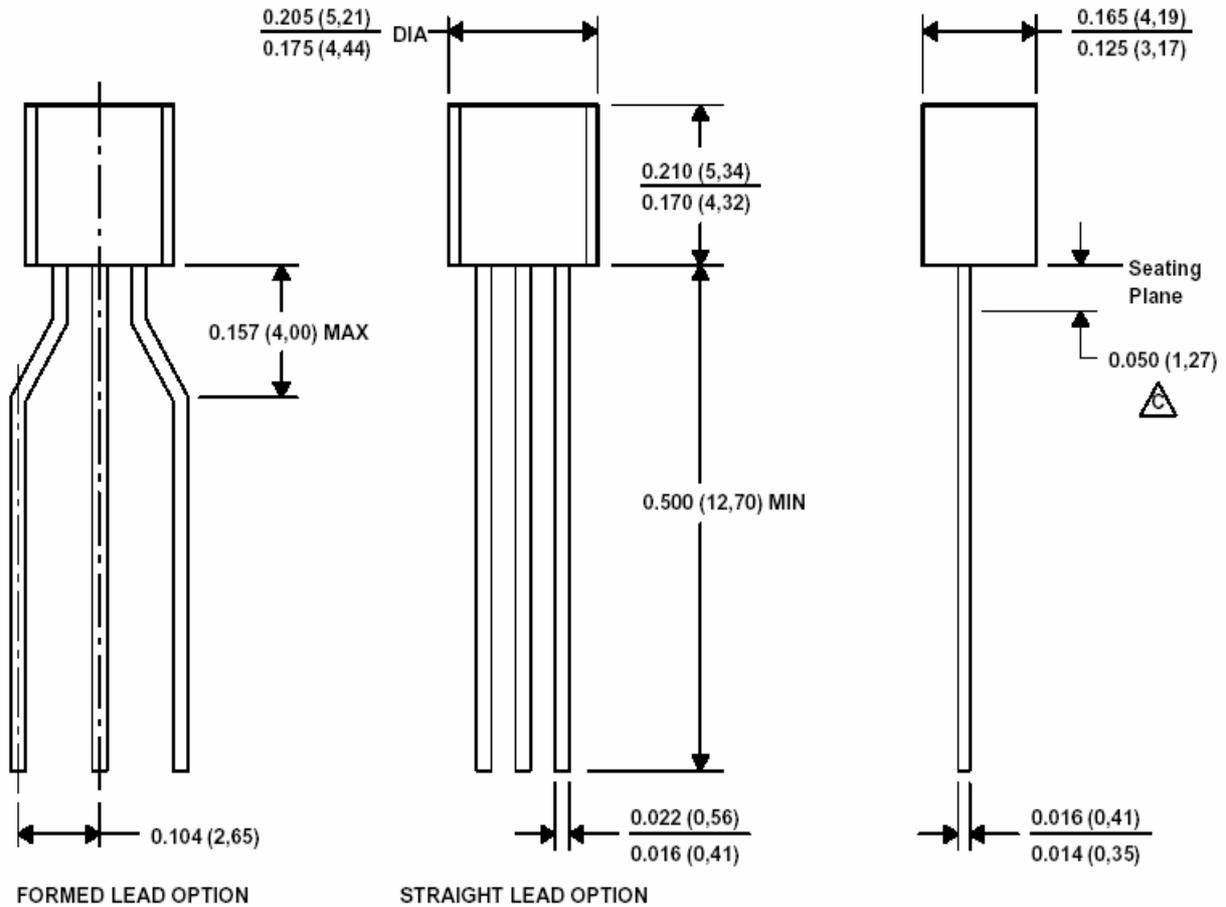


**Ordering Information**

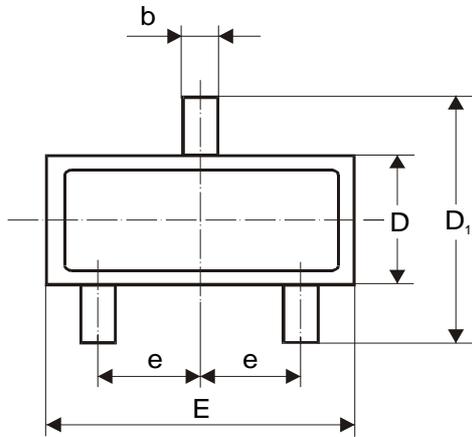
<b>Product Number</b>	<b>Reference Input Voltage</b>	<b>Package</b>
KK431CLF KK431CLS	0.5%	TO-92
KK431CD		8-SOP
KK431CS		SOT-23
KK431ALF KK431ALS	1%	TO-92
KK431AD		8-SOP
KK431AS		SOT-23
KK431LF KK431LS	2%	TO-92
KK431D		8-SOP
KK431S		SOT-23

**Package Dimensions**

**TO-92**

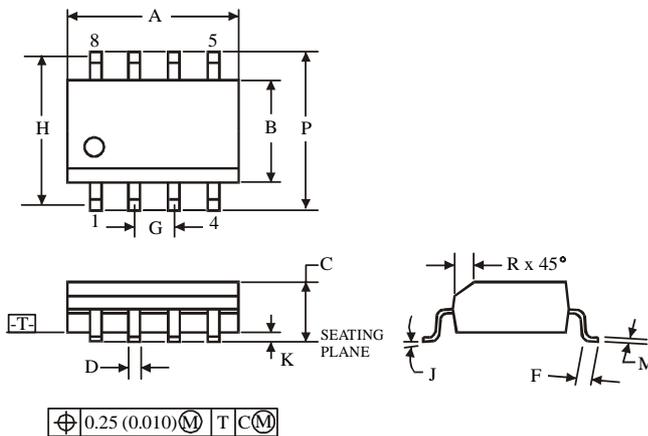
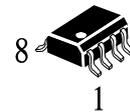


**SOT-23**



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.