

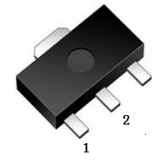
### FEATURES

- The output voltage can be adjusted to 36V
- Low dynamic output impedance ,its typical value is 0.2
- 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

### TL431



SOT-23  
1. REFERENCE  
2. CATHODE  
3. ANODE



SOT-89  
1. REFERENCE  
2. ANODE  
3. CATHODE



TO-92  
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	$P_D$	300	mW
	$P_D$	500	mW
	$P_D$	770	mW
Operating temperature	$T_{opr}$	0-70	°C
Storage temperature Range	$T_{stg}$	-65~+150°C	°C

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

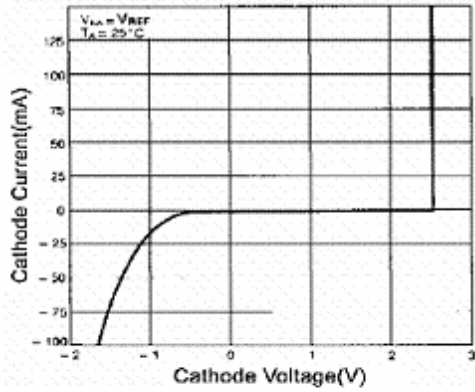
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Reference Input Voltage	$V_{ref}$	$V_{KA}=V_{REF}, I_{KA}=10mA$	2.450	2.5	2.550	V
Deviation of reference input Voltage Over temperature (note)	$V_{ref} / T$	$V_{KA} = V_{REF}, I_{KA} = 10mA$ $T_{min} \quad T_a \quad T_{max}$		4.5	17	mV
Ratio Of Change in Reference Input Voltage to the change in Cathode Voltage	$V_{ref} / V_{KA}$	$V_{KA} = 10V \sim V_{REF}$ $I_{KA}=10mA$		-1.0	-2.7	m V/V
		$V_{KA} = 36V \sim 10V$ $I_{KA}=10mA$		-0.5	-2.0	m V/V
Reference Input Current	$I_{ref}$	$I_{KA} = 10mA, R_1=10K$ $R_2=$		1.5	4	$\mu A$
Deviation Of Reference Input Current Over Full Temperature Range	$I_{ref} / T$	$I_{KA}=10mA, R_1=10K$ $R_2=$ $T_A=full \text{ Temperature}$		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	$Z_{KA}$	$V_{KA}=V_{REF}, I_{KA}=1 \text{ to } 100mA$ $f \text{ 1.0KHz}$		0.15	0.5	

Note:  $T_{MIN}=0^{\circ}C$  ,  $T_{MAX}=+70^{\circ}C$

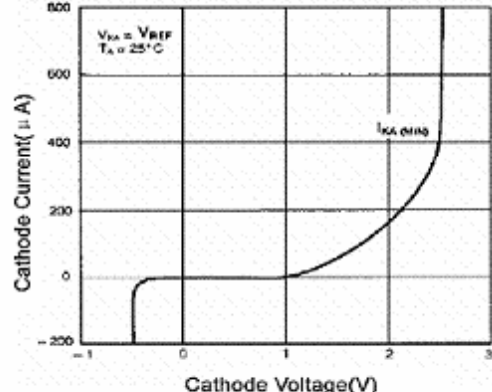
### CLASSIFICATION OF $V_{ref}$

Rank	0.5%	1%	2%
Range	2.487-2.512	2.475-2.525	2.450-2.550

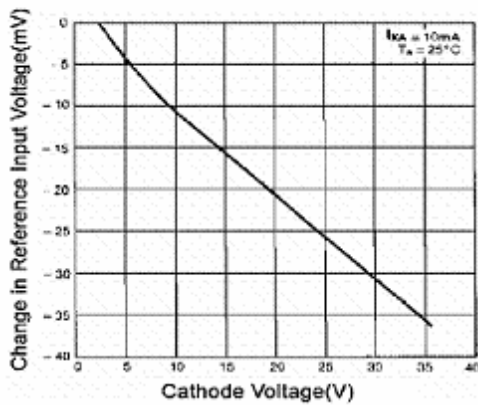
**TL431** Typical Characteristics



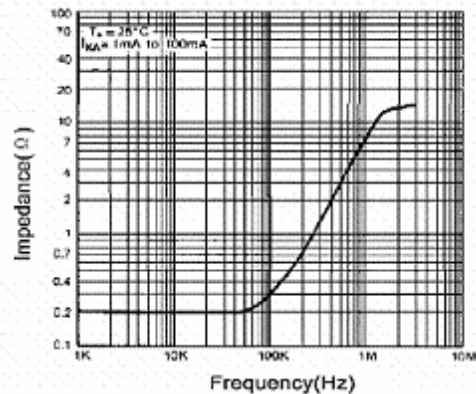
Cathode Current vs. Cathode Voltage



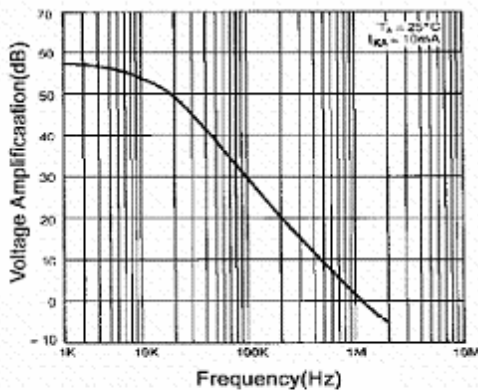
Cathode Current vs. Cathode Voltage



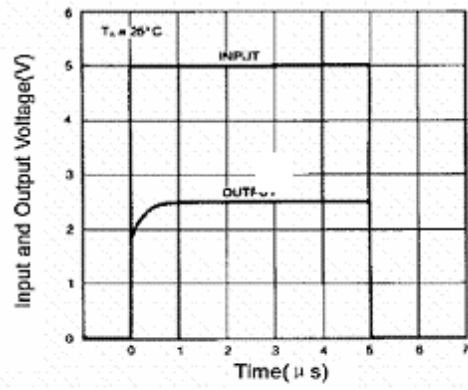
Change in reference input voltage vs. Cathode Voltage



Dynamic Impedance Frequency



Small Signal Voltage Amplification vs. Frequency



Pulse Response