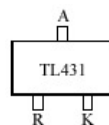


FEATURES

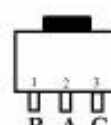
- Programmable Output Voltage to 40V
- Low Dynamic Output Impedance 0.2Ω
- Sink Current Capability of 0.1 mA to 100 mA
- Equivalent Full-Range Temperature Coefficient of 50 ppm/°C
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn on Respons
- TO-92, SOP- 8, SOT-89 or SOT-23 packages

Top View

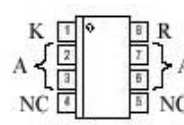


SOT-23

PIN CONNECTIONS



SOT-89



SOP-8

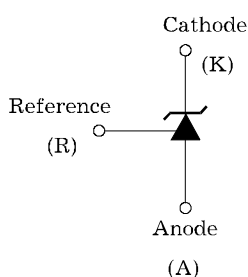


TO-92

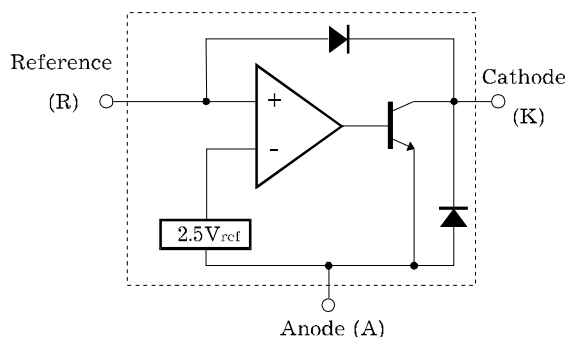
DESCRIPTION

The TL431A 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 TL431A is characterized for operation from -0°C to $+85^{\circ}\text{C}$.

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 : TO – 92 Package ($R_{\theta JA} = 178^{\circ}\text{C/W}$) SOT – 23 Package ($R_{\theta JA} = 625^{\circ}\text{C/W}$)	P_D	0.7 0.2	W W
Junction Temperature Range	T_J	0 ~ 150	$^{\circ}\text{C}$
Operating Temperature Range	T_g	0 ~ 70	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-65 ~ +150	$^{\circ}\text{C}$

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}	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$	2.475	2.495	2.505	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	μA
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	μA
Minimum Cathode Current for Regulation	$I_{K(\min)}$			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	μA
Dynamic Impedance	Z_{KA}	$I_K = 1\text{mA}$ to 100mA , $f \leq 1.0\text{KHz}$		0.22	0.5	Ω

TEST CIRCUITS

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

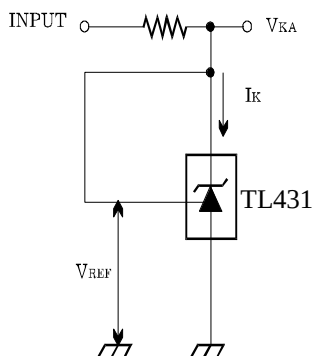


Fig.2. Test Circuit for $V_{KA} \neq V_{REF}$

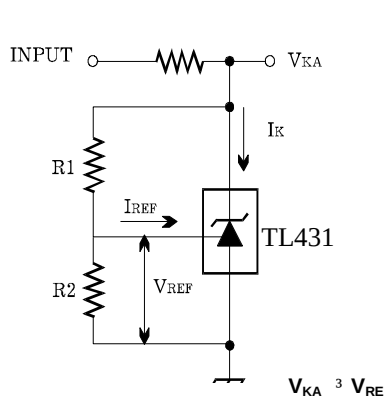
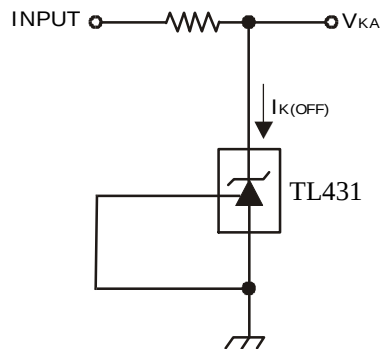
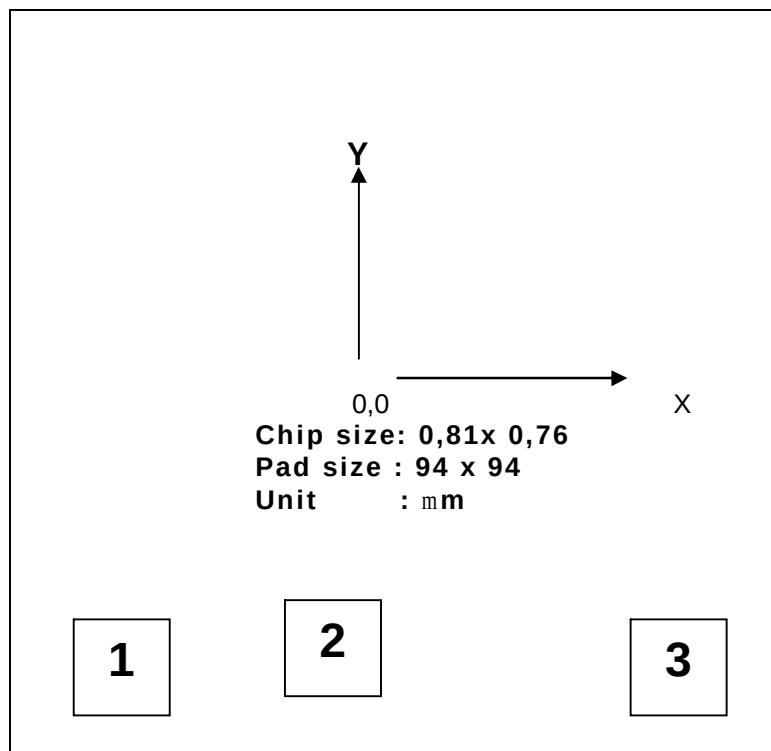


Fig.3. Test Circuit for I_{off}



PAD LAYOUT



PAD LOCATION

Unit: μm

Pad No.	Pad Name	Description	X	Y
1	R	Reference	-314	-299
2	A	Anode	-75	-275
3	K	Cathode	231	-299

PHYSICAL CHARACTERISTIC

Wafer dia	100 mm (4")
* Wafer thickness	280 ... 420 ±20 μm
Scribe width	90 μm
Passivation	PSG
Backside metallization	Without metallization
Min. lot yield	75%
Min. wafer yield	60%

* The wafer thickness shall be specified in a PO or Contract