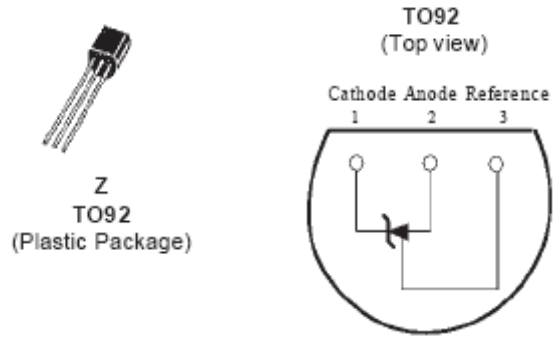


- ADJUSTABLE OUTPUT VOLTAGE : 2.5 to 36V
- SINK CURRENT CAPABILITY : 1 to 100mA
- TYPICAL OUTPUT IMPEDANCE : 0.22Ω
- 1% AND 2% VOLTAGE PRECISION

DESCRIPTION

The TL431 is a programmable shunt voltage reference with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set to any value between V_{ref} (approximately 2.5V) and 36V with two external resistors. The TL431 operates with a wide current range from 1 to 100mA with a typical dynamic impedance of 0.22Ω.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{KA}	Cathode to Anode Voltage	37	V
I_K	Continuous Cathode Current Range	-100 to +150	mA
I_{ref}	Reference Input Current Range	-0.05 to +10	mA
T_{oper}	Operating Free-air Temperature Range TL431C/AC	0 to +70	°C
T_{stg}	Storage Temperature Range	-65 to +150	°C

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{KA}	Cathode to Anode Voltage	V_{ref} to 36	V
I_K	Cathode Current	1 to 100	mA

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	TL431C			TL431AC			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{ref}	Reference Input Voltage - (figure 1) $V_{KA} = V_{ref}, I_K = 10mA$ $T_{min.} \leq T_{amb} \leq T_{max.}$ $T_{amb} = 25^{\circ}C$	2.44 2.423	2.495	2.55 2.567	2.47 2.453	2.495	2.52 2.537	V
ΔV_{ref}	Reference Input Voltage Deviation Over Temperature Range - (figure 1, note 1) $V_{KA} = V_{ref}, I_K = 10mA, T_{min.} \leq T_{amb} \leq T_{max.}$		3	17		3	15	mV
$\frac{\Delta V_{ref}}{\Delta V_{KA}}$	Ratio of Change in Reference Input Voltage to Change in Cathode to Anode Voltage - (figure 2) $I_K = 10mA$ $\Delta V_{KA} = 10V \text{ to } V_{ref}$ $\Delta V_{KA} = 36V \text{ to } 10V$		-1.4 -1	-2.7 -2		-1.4 -1	-2.7 -2	mV/V
I_{ref}	Reference Input Current - (figure 2) $I_K = 10mA, R_1 = 10k\Omega, R_2 = \infty$ $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		1.8	4 5.2		1.8	4 5.2	μA
ΔI_{ref}	Reference Input Current Deviation Over Temperature Range - (figure 2) $I_K = 10mA, R_1 = 10k\Omega, R_2 = \infty$ $T_{min.} \leq T_{amb} \leq T_{max.}$		0.4	1.2		0.4	1.2	μA
I_{min}	Minimum Cathode Current for Regulation - (figure 1) $V_{KA} = V_{ref}$		0.5	1		0.5	0.6	mA
I_{off}	Off-State Cathode Current - (figure 3)		2.6	1000		2.6	1000	nA
$ Z_{KA} $	Dynamic Impedance - (figure 1, note 2) $V_{KA} = V_{ref}, \Delta I_K = 1 \text{ to } 100mA, f \leq 1kHz$		0.22	0.5		0.22	0.5	Ω

Notes : 1. ΔV_{ref} is defined as the difference between the maximum and minimum values obtained over the full temperature range.

$$\Delta V_{ref} = V_{refmax} - V_{refmin}$$

2. The dynamic Impedance is defined as $|Z_{KA}| = \frac{\Delta V_{KA}}{\Delta I_K}$

