

## TL431精密可调基准电源/Precision adjustable shunt regulator

用途:用于线性调整器,可调节电源和开关电源。

Purpose: Linear regulators, adjustable power supply, switching power supply.

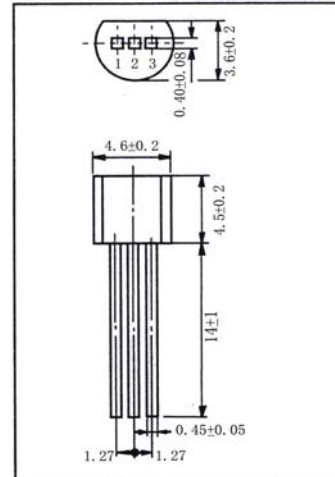
特点:精确参照电压 2.495V;允许电压误差为 0.5%, 1%或 2%;阴极电流能力为 1.0mA~100mA;快速导通;可调节输出电压为  $V_o = V_{ref} \sim 36V$ ;阴极工作电流低(典型值:50  $\mu A$ );动态输出阻抗低(典型值:0.15  $\Omega$ )。

Features: Precise reference voltage to 2.495V; guaranteed 0.5%, 1% or 2% reference voltage Tolerance; sink current capability, 1.0mA~100mA; quick turn-on; adjustable output voltage,  $V_o = V_{ref} \sim 36V$ ; low operational cathode current, 50  $\mu A$  typical; 0.15  $\Omega$  typical output impedance.

### 极限参数/Absolute maximum ratings ( $T_a = 25^\circ C$ )

参数符号 Symbol	数值 Rating	单位 Unit
$V_{KA}$	37	V
$I_K$	-100~+100	mA
$I_{REF}$	0.05~+10	mA
$P_D$	770	mW
$T_{amb}$	-40~125	$^\circ C$
$T_j$	150	$^\circ C$
$T_{stg}$	-65~150	$^\circ C$

T0-92 单位:mm



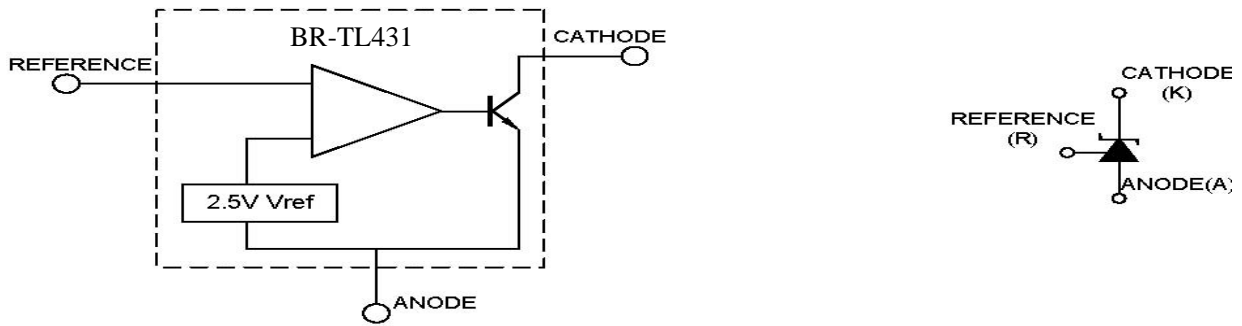
引脚: 1. R 2. A 3. K

### 电性能参数/Electrical characteristics ( $T_a = 25^\circ C$ )

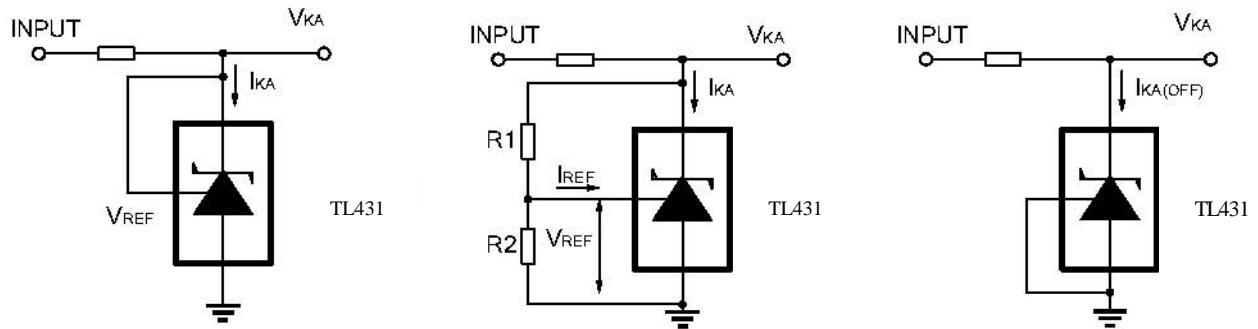
参数符号 Symbol	测试条件 Test condition	数值 Rating			单位 Unit
		最小值 Min	典型值 Typ	最大值 Max	
$V_{REF}$	$V_{KA} = V_{REF}$ $I_K = 10mA$ (A=0.5%)	2.483	2.495	2.507	V
	$V_{KA} = V_{REF}$ $I_K = 10mA$ (B=1%)	2.470	2.495	2.520	V
	$V_{KA} = V_{REF}$ $I_K = 10mA$ (2%)	2.445	2.495	2.545	V
$\Delta V_{REF}/T$	$V_{KA} = V_{REF}$ , $I_K = 10mA$ $T_A = -40 \sim 125^\circ C$		4.5	25	mV
$\Delta V_{REF}/\Delta V_{KA}$	$I_K = 10mA$ , $\Delta V_{KA} = 10V$ to $V_{REF}$		-1	-2.7	mV/V
	$I_K = 10mA$ , $\Delta V_{KA} = 36V$ to 10V		-0.5	-2.0	mV/V
$I_{REF}$	$I_K = 10mA$ , $R_1 = 10K \Omega$ , $R_2 = open$		0.8	1.0	$\mu A$
$\Delta I_{REF}/T$	$I_K = 10mA$ , $R_1 = 10K \Omega$ , $R_2 = open$ , $T_A = -40 \sim 125^\circ C$		0.4	1.2	$\mu A$
$I_{K(min)}$	$V_{KA} = V_{REF}$		0.05	0.08	mA
$I_{K(off)}$	$V_{KA} = 36V$ , $V_{REF} = 0V$		0.05	1.0	$\mu A$
$ Z_{KA} $	$V_{KA} = V_{REF}$ , $I_K = 1mA$ to 100mA, $f \leq 1.0KHz$		0.15	0.5	$\Omega$

# TL431

BLOCK DIAGRAM:



TEST CIRCUITS:

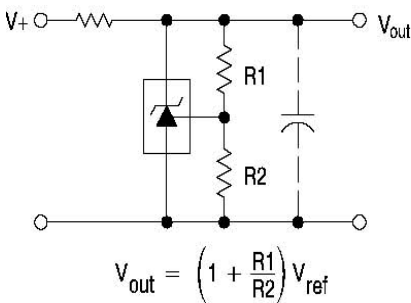


Test Circuit For  $V_{KA} = V_{REF}$

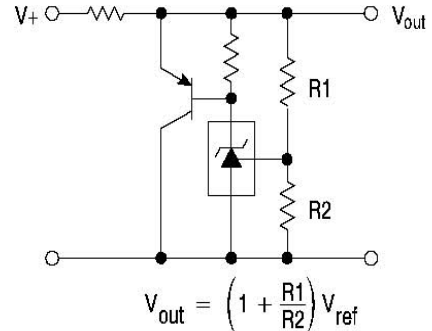
Test Circuit for  $V_{KA} \geq V_{REF}$

Test Circuit For  $I_{KA(OFF)}$

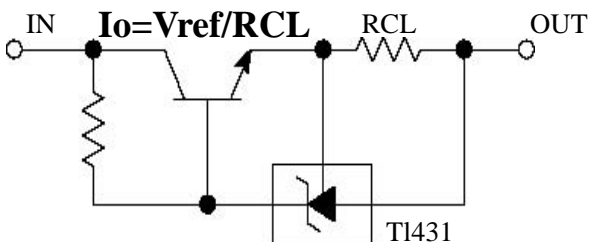
TYPICAL APPLICATION:



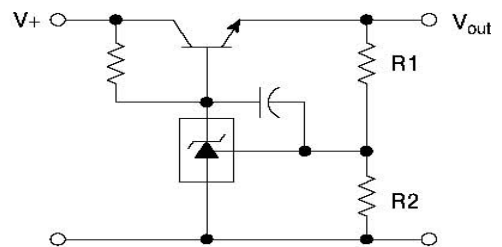
Shutdown Regulator



Higher-current Shunt



Constant Current Source



$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

$$V_{out \min} = V_{ref} + V_{be}$$

Series Pass Regulator

Fig 1 Cathode Current Vs Cathode Voltage

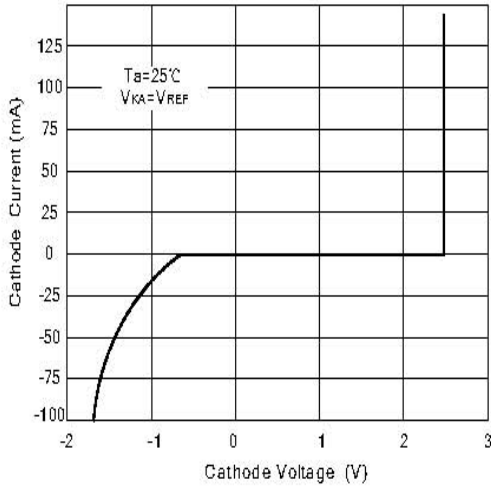


Fig 2 Cathode Current Vs Cathode Voltage

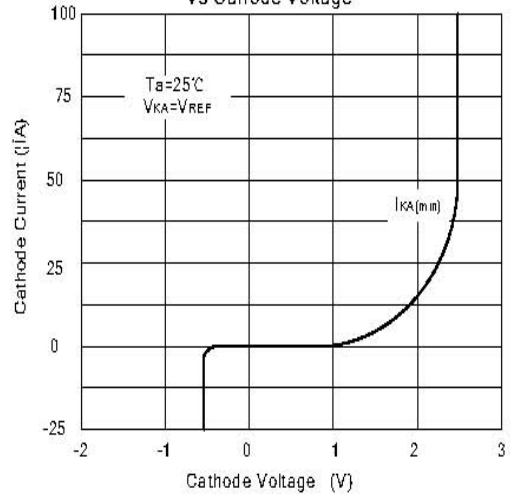


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

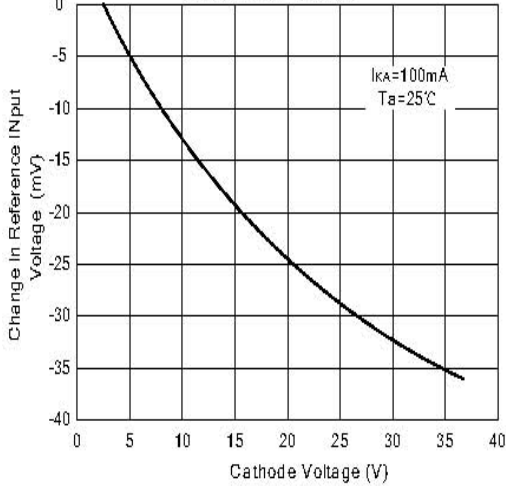


Fig 4 Pulse Response

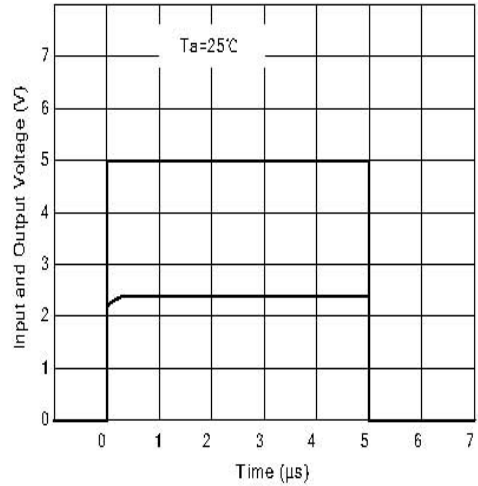


Fig 5 Dynamic Impedance Vs Frequency

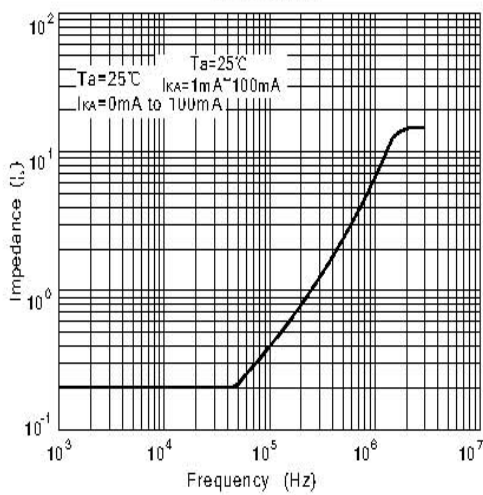


Fig 6 Small Signal Voltage Amplification Vs Frequency

