

描述 / Descriptions

TO-92 塑封封装精密可调基准电源。

Precision adjustable shunt regulator in a TO-92 Plastic Package.

特征 / Features

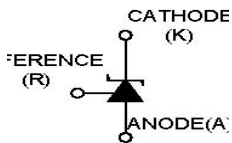
精确参考电压 2.495V;允许电压误差为 0.5%,1%或 2%;阴极电流能力为 1.0mA ~ 100mA;快速导通;可调节输出电压为 $V_O=V_{ref} \sim 36V$;阴极工作电流低(典型值:50 μ A);动态输出阻抗低(典型值:0.15 Ω)。

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 μ A typical; 0.15 Ω typical output impedance.

用途 / Applications

用于线性调整器, 可调节电源和开关电源。

Linear regulators, adjustable power supply, switching power supply.

内部等效电路 / Equivalent Circuit**引脚排列 / Pinning**

PIN 1 : K

PIN 2 : A

PIN 3 : R

印章代码 / Marking

见印章说明。 See Marking Instructions

极限参数 / Absolute Maximum Ratings(Ta=25°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Cathode to Anode Voltage	V_{KA}	37	V
Cathode Current Range, Continuous	I_K	-100~+100	mA
Reference Input Current Range, Continuous	I_{REF}	0.05~+10	mA
Power Dissipation	P_D	770	mW
Operating Ambient Temperature	T_{amb}	-40~125	°C
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	-65~150	°C

电性能参数 / Electrical Characteristics(Ta=25°C)

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Reference Input Voltage	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
Deviation of Reference Input Voltage Over-Temperature	$\Delta V_{REF} / \Delta T$	$V_{KA}=V_{REF}$ $I_K=10mA$ $T_A=-40\sim 125^\circ C$		4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{REF} / \Delta V_{KA}$	$I_K=10mA,$ $\Delta V_{KA}=10V$ to V_{REF}		-1	-2.7	mV/V
		$I_K=10mA,$ $\Delta V_{KA}=36V$ to $10V$		-0.5	-2.0	mV/V
Reference Input current	I_{REF}	$I_K=10mA$ $R_1=10K\Omega$ $R_2=open$		0.8	1.0	μA
Deviation of Reference Input Current Over Full Temperature Range	$\Delta I_{REF} / \Delta T$	$I_K=10mA$ $R_1=10K\Omega,$ $R_2=open$ $T_A=-40\sim 125^\circ C$		0.4	1.2	μA
Minimum Cathode Current for Regulation	$I_{K(min)}$	$V_{KA}=V_{REF}$		0.05	0.08	mA
Off-state cathode current	$I_{K(off)}$	$V_{KA}=36V$ $V_{REF}=0V$		0.05	1.0	μA
Dynamic impedance	$ Z_{KA} $	$V_{KA}=V_{REF}$ $f \leq 1.0KHz$ $I_K=1mA$ to $100mA$		0.15	0.5	Ω

电参数曲线图 / Electrical Characteristic Curve

Fig 1 Cathode Current Vs Cathode Voltage

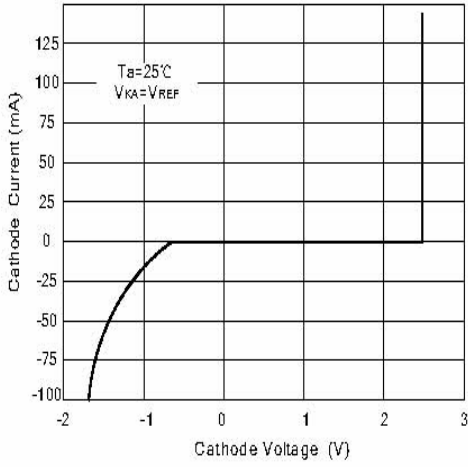


Fig 2 Cathode Current Vs Cathode Voltage

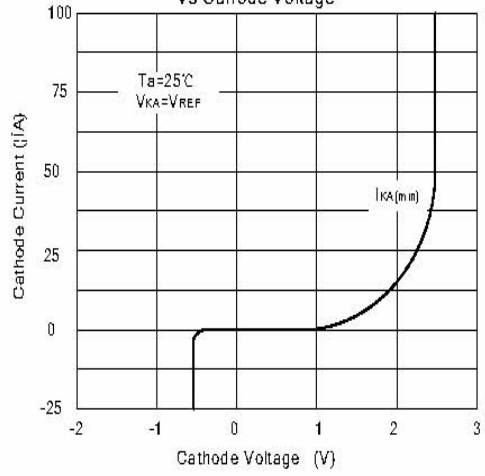


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

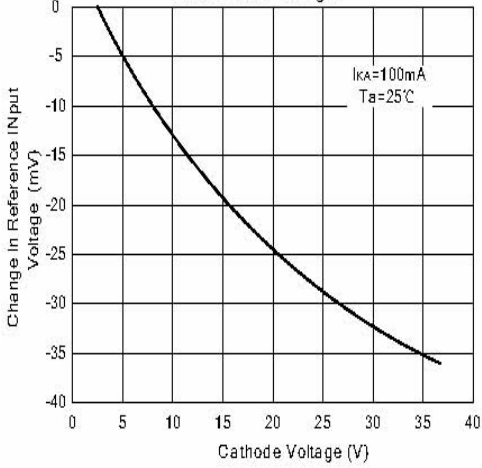


Fig 4 Pulse Response

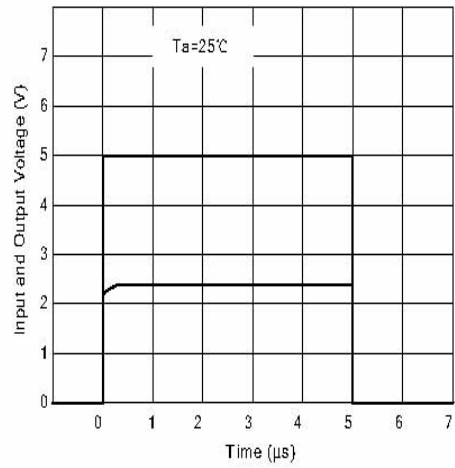


Fig 5 Dynamic Impedance Vs Frequency

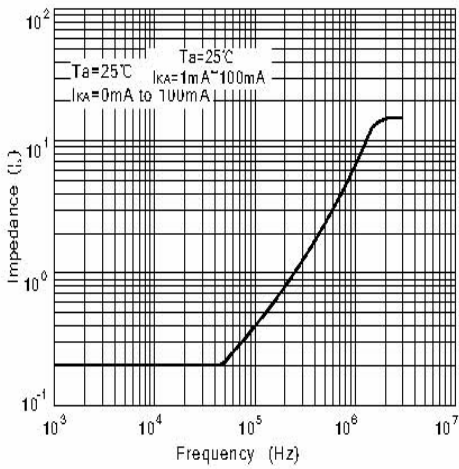
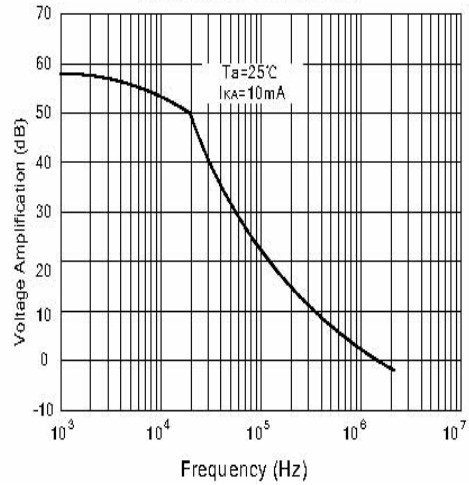


Fig 6 Small Signal Voltage Amplification Vs Frequency

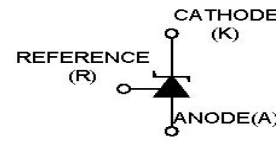
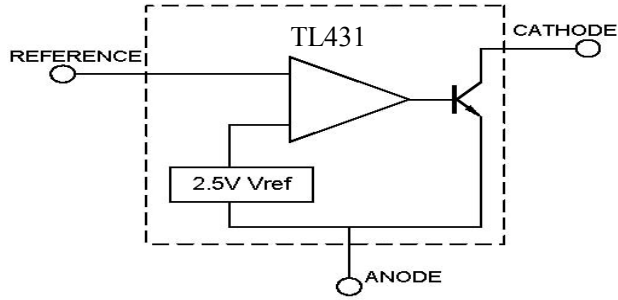


TL431

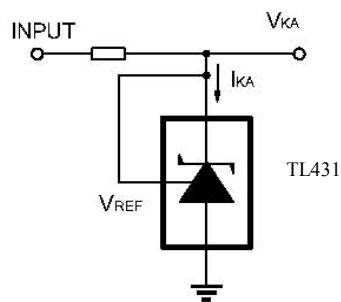
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测试电路图&典型应用图 Test circuits&Typical Application

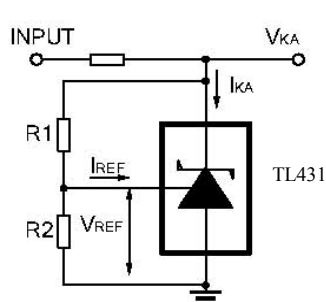
BLOCK DIAGRAM:



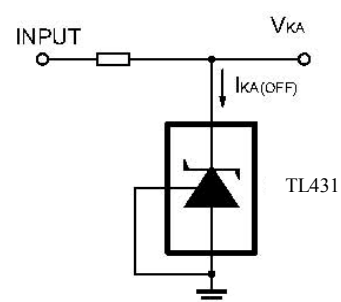
TEST CIRCUITS:



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

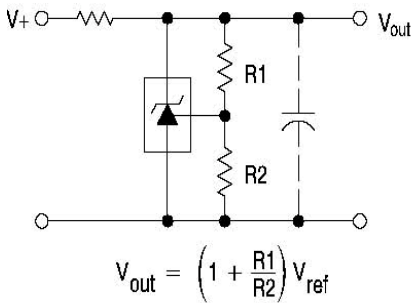


$V_{KA} = V_{REF} \cdot (1 + R1/R2) + I_{REF} \cdot R1$
Test Circuit for $V_{KA} \geq V_{REF}$



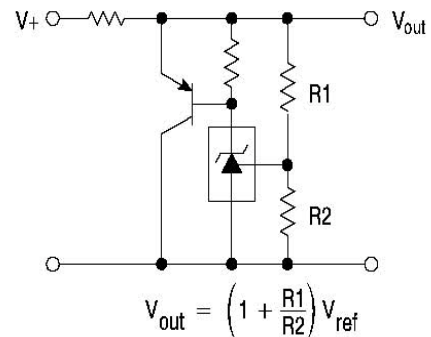
Test Circuit For $I_{KA(OFF)}$

TYPICAL APPLICATION:



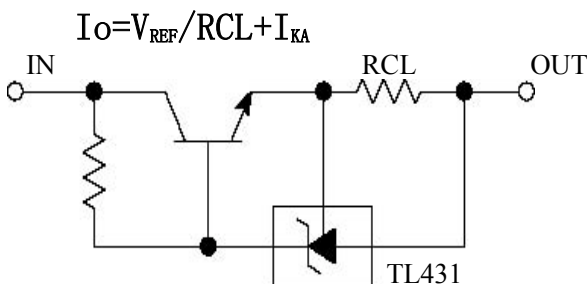
Shutdown Regulator

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



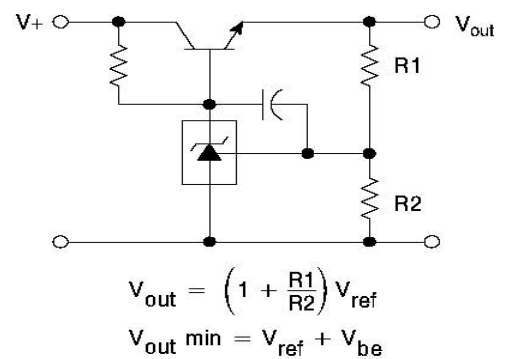
Higher-current Shunt

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



Constant Current Source

$$I_o = V_{REF} / R_{CL} + I_{KA}$$



Series Pass Regulator

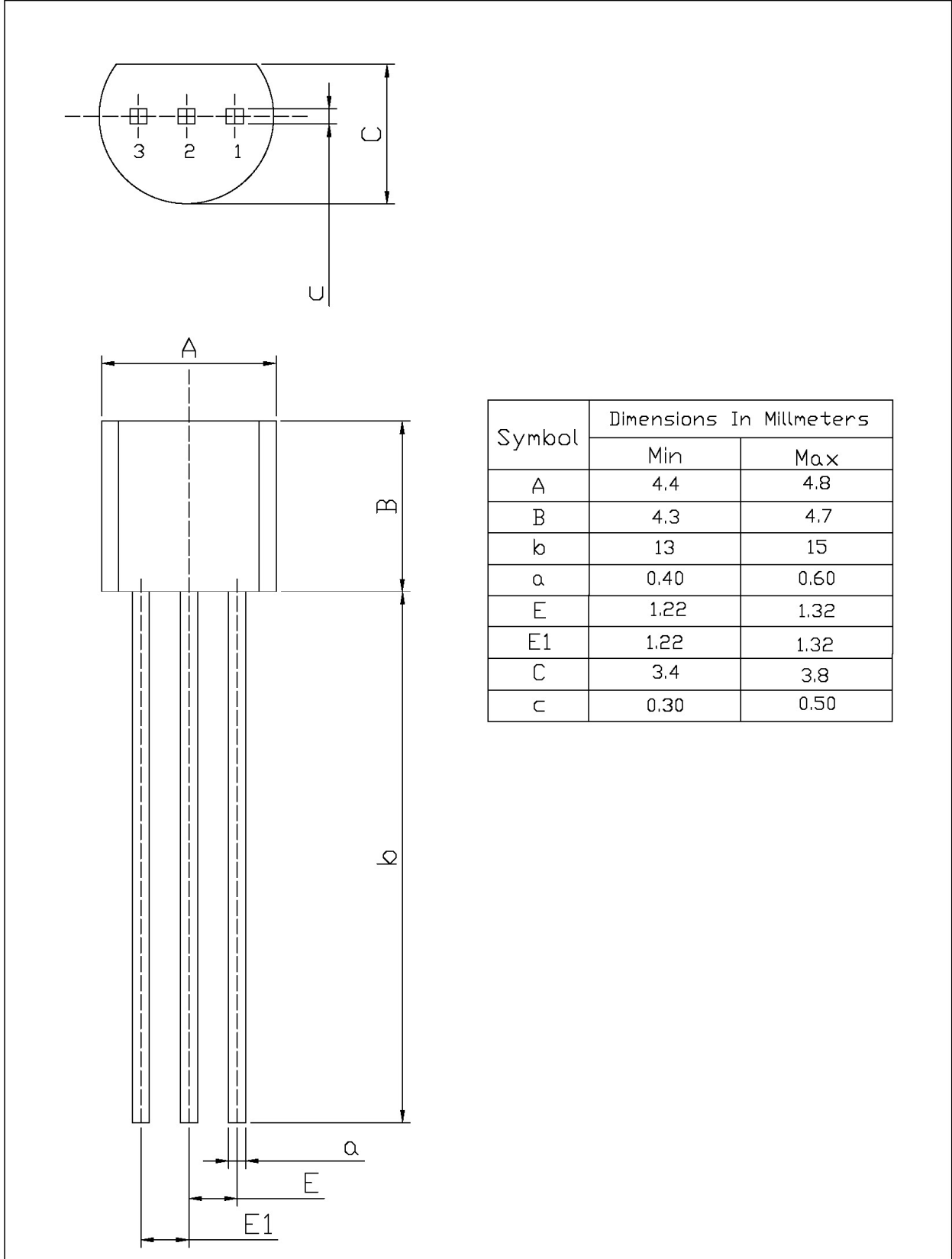
$$V_{out} = \left(1 + \frac{R1}{R2}\right) V_{ref}$$

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

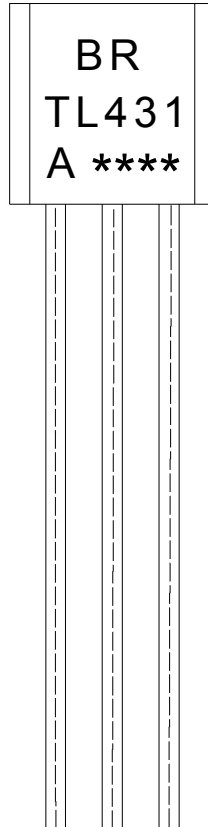
外形尺寸图 / Package Dimensions

TO-92

Unit: mm



印章说明 / Marking Instructions



说明：

BR： 为公司代码

TL431： 为产品型号

A： 为 V_{REF} 分档代码

****： 为生产批号代码，随生产批号变化。

Note:

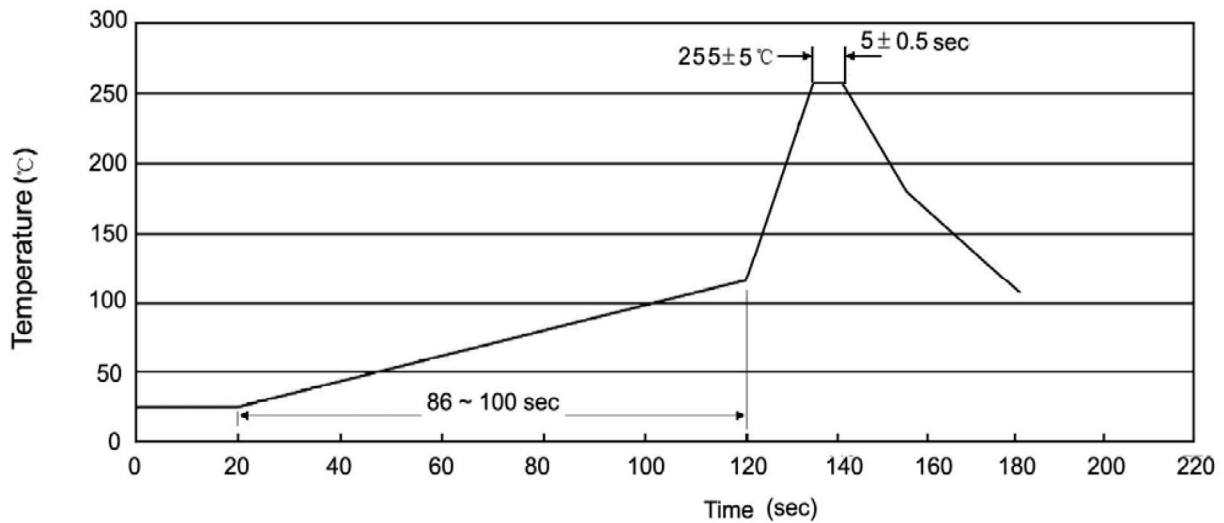
BR: Company Code.

TL431: Product Type.

A: V_{REF} Classifications Symbol

****: Lot No. Code, code change with Lot No.

波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)



说明：

- 1、预热温度 25~150°C，时间 60~90sec;
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2~10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：270±5°C 时间：10±1 sec. Temp:270±5°C Time:10±1 sec

包装规格 / Packaging SPEC.

散件包装 / BULK

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm3)		
	Units/Bag 只/袋	Bags/Inner Box 袋/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Bag 袋	Inner Box 盒	Outer Box 箱
TO-92	1,000	10	10,000	5	50,000	135×190	237×172×102	560×245×195
	1,000	10	10,000	10	100,000	135×190	237×172×102	560×245×375

编带包装 / AMMO

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm3)	
	Units/tape 只/纸带	Tape/Inner Box 纸带/盒	Rows/Inner Box 纸带层/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Inner Box 盒	Outer Box 箱
TO-92	3,000	1	120	10	30,000	328×230×42	小箱 480×346×235, 大箱 547×407×268

使用说明 / Notices