

**描述 / Descriptions**

SOT-23 塑封封装精密可调基准电源。

Precision adjustable shunt regulator in a SOT-23 Plastic Package.

**特征 / Features**

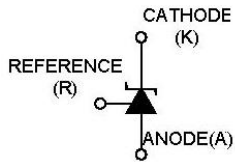
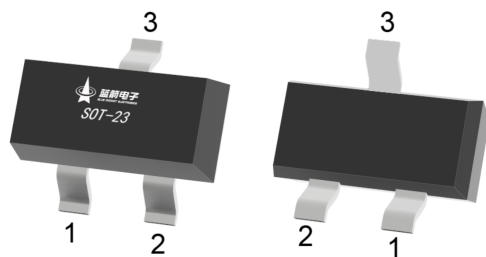
精确参照电压 2.495V;允许电压误差为 0.5%,1%或 2%;阴极电流能力为 1.0mA ~ 100mA;快速导通;可调节输出电压为  $V_O = V_{ref} \sim 36V$ ;阴极工作电流低(典型值:50 $\mu A$ );动态输出阻抗低(典型值:0.15 $\Omega$ ) , 符合 AEC-Q100 标准高可靠性要求, 无卤产品。

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, Qualified to AEC-Q100 Standards for High Reliability, HF Product.

**途 / Applications**

用于线性调整器, 可调节电源和开关电源, 满足汽车应用的严格要求。

Linear regulators, adjustable power supply, switching power supply, Meet the stringent requirements of automotive applications.

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

PIN1 : R

PIN 2 : K

PIN 3 : A

**印章代码 / Marking**

|         |      |
|---------|------|
| Marking | Q431 |
|---------|------|

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

| 参数<br>Parameter                           | 符号<br>Symbol | 数值<br>Rating | 单位<br>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                         | $P_D$        | 370          | 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<br>Parameter                                                             | 符号<br>Symbol                     | 测试条件<br>Test Conditions                                               | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|-----------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------|------------|------------|------------|------------|
| Reference Input Voltage                                                     | $V_{REF}$                        | $V_{KA}=V_{REF}$<br>$I_K=10mA(A=0.5\%)$                               | 2.483      | 2.495      | 2.507      | V          |
|                                                                             |                                  | $V_{KA}=V_{REF}$<br>$I_K=10mA(B=1\%)$                                 | 2.470      | 2.495      | 2.520      | V          |
|                                                                             |                                  | $V_{KA}=V_{REF}$<br>$I_K=10mA(2\%)$                                   | 2.445      | 2.495      | 2.545      | V          |
| Deviation of Reference Input Voltage Over-Temperature                       | $\Delta V_{REF} / \Delta T$      | $V_{KA}=V_{REF}$<br>$I_K=10mA$<br>$T_A=-40\sim 125^\circ C$           |            | 4.5        | 25         | mV         |
| Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage | $\Delta V_{REF} / \Delta V_{KA}$ | $I_K=10mA$ ,<br>$\Delta V_{KA}=10V$ to $V_{REF}$                      |            | -1         | -2.7       | mV/V       |
|                                                                             |                                  | $I_K=10mA$ ,<br>$\Delta V_{KA}=36V$ to $10V$                          |            | -0.5       | -2.0       | mV/V       |
| Reference Input Current                                                     | $I_{REF}$                        | $I_K=10mA$ $R_1=10K\Omega$<br>$R_2=open$                              |            | 0.8        | 1.0        | $\mu A$    |
| Deviation of Reference Input Current Over Full Temperature Range            | $\Delta I_{REF} / \Delta T$      | $I_K=10mA$ $R_1=10K\Omega$<br>$R_2=open$<br>$T_A=-40\sim 125^\circ C$ |            | 0.4        | 1.2        | $\mu A$    |
| 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        | $\mu A$    |
| Dynamic Impedance                                                           | $ Z_{KA} $                       | $V_{KA}=V_{REF}$ $f \leq 1.0KHz$<br>$I_K=1mA$ to $100mA$              |            | 0.15       | 0.5        | $\Omega$   |

## 电参数曲线图 / Electrical Characteristic Curve

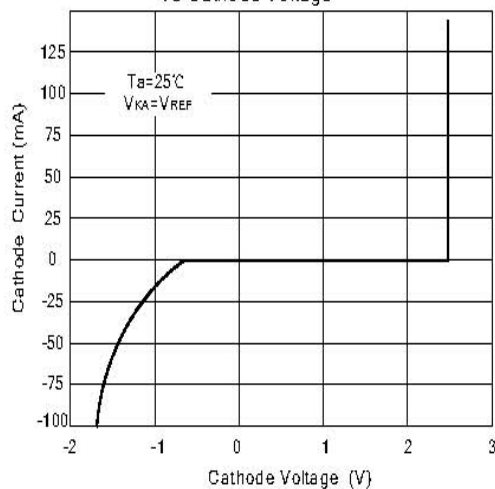
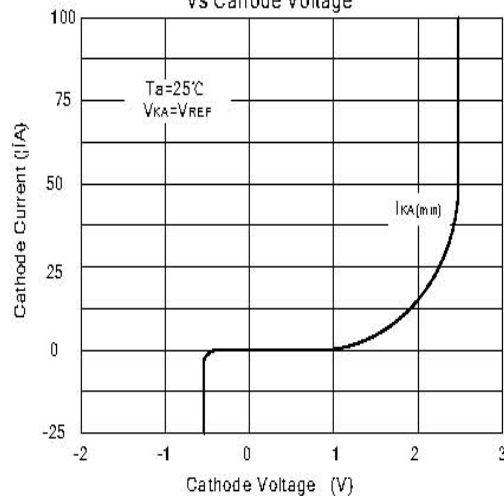
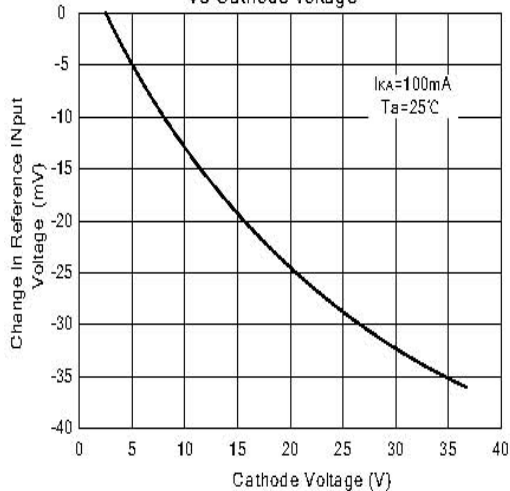
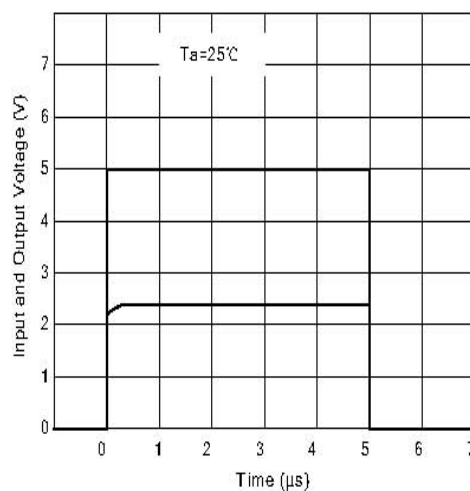
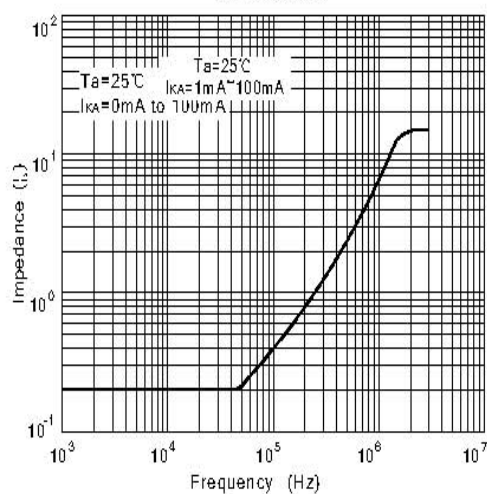
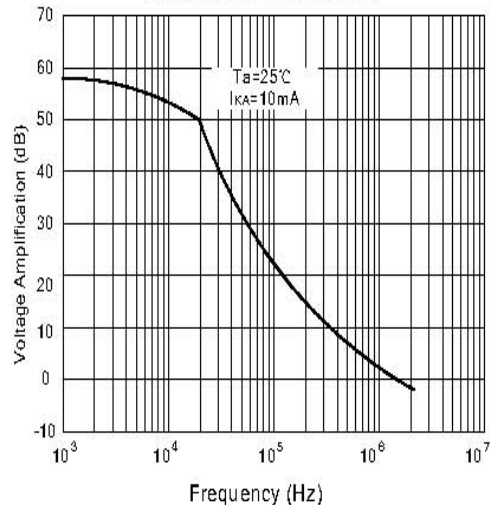
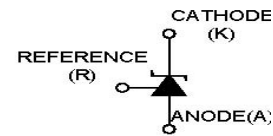
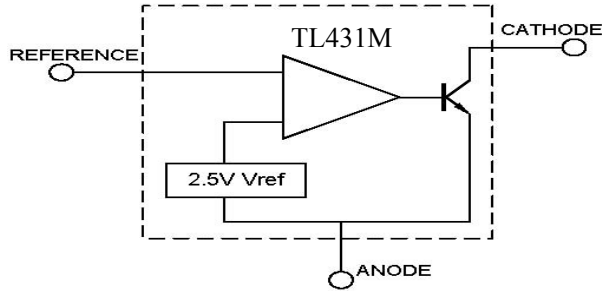
Fig 1 Cathode Current  
Vs Cathode VoltageFig 2 Cathode Current  
Vs Cathode VoltageFig 3 Change in Reference Input  
Voltage Vs Cathode voltage

Fig 4 Pulse Response

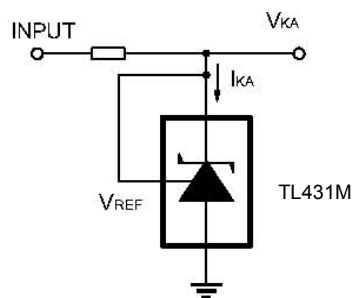
Fig 5 Dynamic Impedance  
Vs FrequencyFig 6 Small Signal Voltage  
Amplification Vs Frequency

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

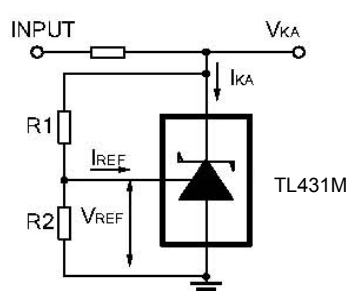
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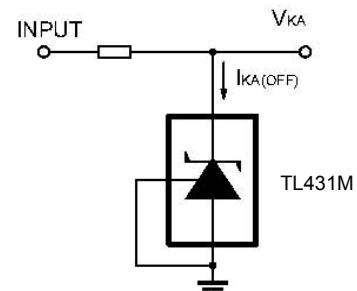
### TEST CIRCUITS:



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

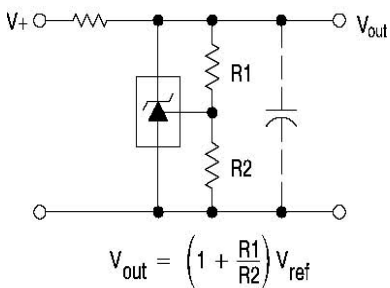


$V_{KA}=V_{REF}*(1+R1/R2)+I_{REF}*R1$   
Test Circuit for  $V_{KA} \geq V_{REF}$

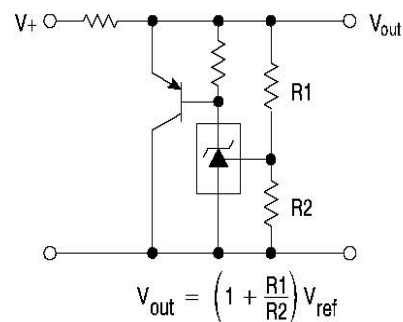


Test Circuit For  $I_{KA}(\text{OFF})$

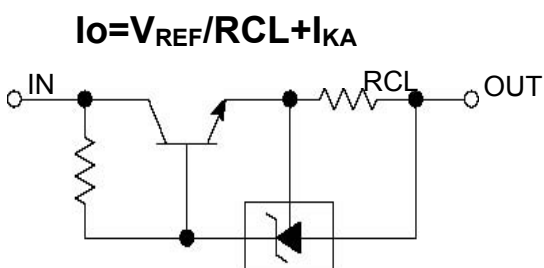
### TYPICAL APPLICATION:



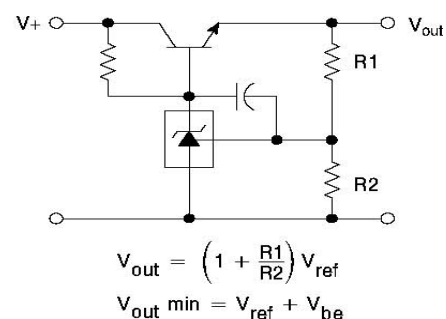
Shutdown Regulator



Higher-current Shunt



Constant Current Source TL431M

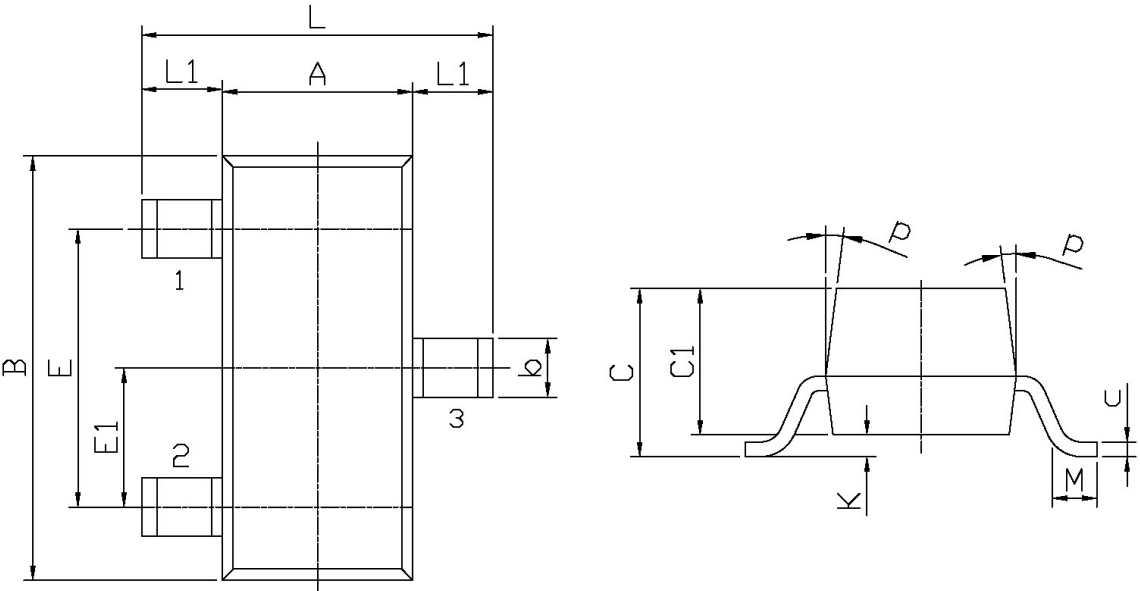


Series Pass Regulator

外形尺寸图 / Package Dimensions

SOT-23

单位：mm



| Symbol | Dimensions In Millimeters |      | Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|--------|---------------------------|------|
|        | Min                       | Max  |        | Min                       | Max  |
| L      | 2.2                       | 2.7  | C      | 1.30Max                   |      |
| L1     | 0.45                      | 0.65 | C1     | 0.90                      | 1.20 |
| A      | 1.15                      | 1.50 | c      | 0.05                      | 0.20 |
| B      | 2.70                      | 3.10 | K      | 0                         | 0.10 |
| E      | 1.70                      | 2.10 | M      | 0.20MIN                   |      |
| E1     | 0.85                      | 1.05 | P      | 7°                        |      |
| b      | 0.35                      | 0.55 |        |                           |      |

**印章说明 / Marking Instructions**



说明：

Q： 为汽车无卤产品标识

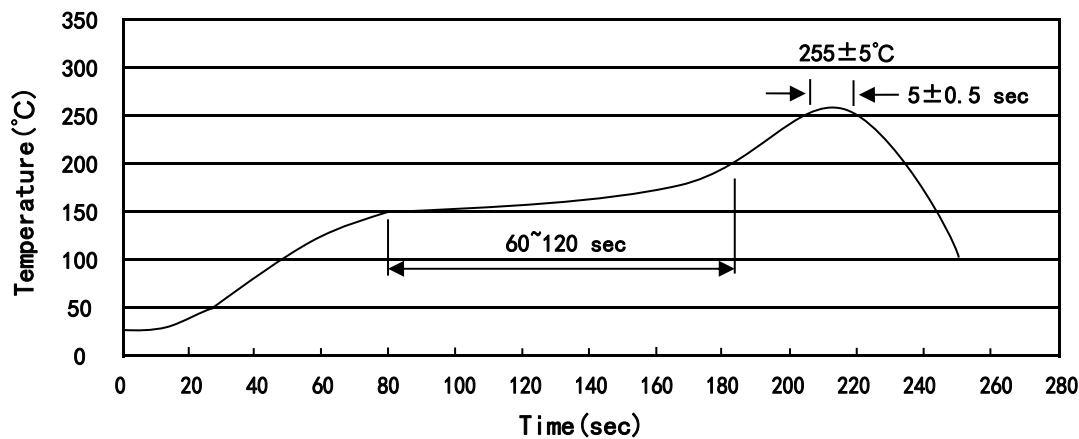
431： 为型号代码

Note:

Q: Automobile halogen-free product Code

431: Product Type

回流焊温度曲线图(无铅) / Temperature Profile for IR Reflow Soldering(Pb-Free)



- 说明 :  
1、预热温度 150 ~ 200℃ , 时间 60 ~ 120sec;  
2、峰值温度 255±5℃ , 时间持续为 5±0.5sec;  
3、焊接制程冷却速度为 2 ~ 10℃/sec.
- Note:  
1.Preheating:150~200℃, Time:60~120sec.  
2.Peak Temp.:255±5℃, Duration:5±0.5sec.  
3. Cooling Speed: 2~10℃/sec.

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

温度 : 260±5℃      时间 : 10±1 sec.      Temp.:260±5℃      Time:10±1 sec

包装规格 / Packaging SPEC.

卷盘包装 / REEL

| Package Type<br>封装形式 | Units 包装数量         |                         |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|--------------------|-------------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Reel<br>只/卷盘 | Reels/Inner Box<br>卷盘/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Reel                                    | Inner Box 盒 | Outer Box 箱 |
| SOT-23               | 3,000              | 10                      | 30,000                 | 6                            | 180,000                | 7" ×8                                   | 180×120×180 | 390×385×205 |

使用说明 / Notices