# GS431

## Adjustable Precision Shunt Regulators

### Product Description

The GS431 is a three-terminal adjustable shunt regulator with specified thermal stability.

The output voltage may be set to any value between $V_{REF}$ and 36V with two external resistors.

This device has a typical output impedance of 0.2Ω. Active output circuitry provides very sharp turn-on characteristics, making this device excellent replacement for Zener diodes in many applications.

GS431 is available in SOT-23 package.

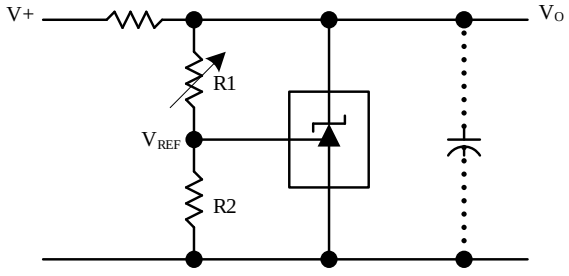
### Features

- Temperature-Compensated for Operation over Full Rated Operating Temperature Range.
- Adjustable Output Voltage
- Low (0.2Ω Typ.) Dynamic Output Impedance
- Low Output Noise
- Fast Turn-on Response
- RoHS Compliant & Halogen Free

### Applications

- Battery Operated Computer
- Switching Power Supplies
- Adjustable Power Supplies
- Linear Regulators
- Instrumentation
- Computer Disk Drivers

### Typical Application




$$V_O = (1+R1/R2)V_{REF}$$

**Figure 1. Shunt Regulator**

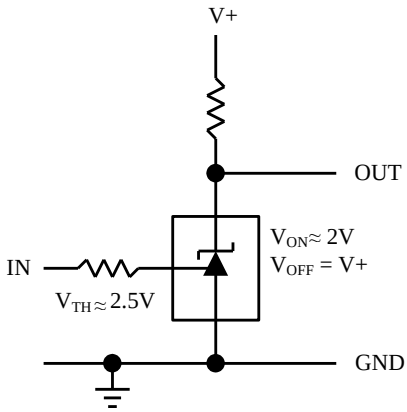
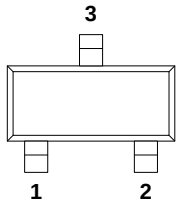
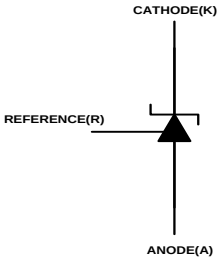



**Figure 2. Single Supply Comparator with Temperature Compensated Threshold**

## Packages & Pin Assignments

| SOT-23 | Equivalent Circuit |
|---|---|
|  |  |





| GS431JZF | | GS431JWF | |
|---|---|---|---|
| **Pin** | **Function** | **Pin** | **Function** |
| **1** | REF | **1** | CATHODE |
| **2** | CATHODE | **2** | REF |
| **3** | ANODE | **3** | ANODE |

## Ordering and Marking Information

**Ordering Information**

| Device | Package | Quantity/Reel |
|---|---|---|
| GS431JZF | SOT-23 | 3000PCS |
| GS431JWF | SOT-23 | 3000PCS |

GS431 1 1 F

**Product Code:**
GS431

**Package Code:**
1 1 is JZ and JW
- Both are SOT-23
- Pin Assignment please refer to Pin Assignments section

**Green Level:**
**F** stands for RoHS Compliant and Halogen Free

**Marking Information**

**4** 1 2 2 2 2

**Product Code:**
- 4

**Pin Assignment:**
1 is C or D
- C for GS431JWF
- D for GS431JZF

**GS Code:**
2 2 2 2 is GS Code

## Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $V_{KA}$ | Cathode Voltage (**Note 1**) | 37 | V |
| $I_K$ | Continuous Cathode Current Range | -10 to +150 | mA |
| $I_{REF}$ | Reference Current Range | -50μA to 10mA | mA |
| $P_D$ | Power Dissipation | 0.23 | W |
| $T_{OPR}$ | Operating Temperature Range | -40 to 125 | ºC |
| $T_J$ | Junction Temperature | +150 | ºC |
| $T_{STG}$ | Storage Temperature Range | -65 to 150 | ºC |
| $T_{LEAD}$ | Lead Temperature Range(Soldering, 10sec) | 260 | ºC |

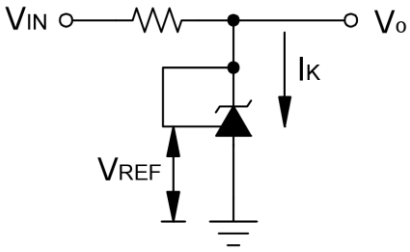
**Note 1:** Voltage values are with respect to the anode terminal unless otherwise noted.

## Electrical Characteristics

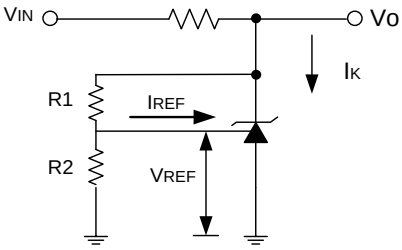
Electrical Characteristics at 25ºC free-air temperature (unless otherwise noted).

| Symbol | Parameter | Conditions | GS431 | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $V_{REF}$ | Reference Voltage | $V_{KA}=V_{REF}$, $I_K$=10mA | 2.483 | 2.495 | 2.507 | V |
| $V_{DEV}$ | Deviation of reference input voltage over full temperature range | $V_{KA}=V_{REF}$, $I_K$=10mA, $T_A$ = Full range (Test circuit 1) | | 6.0 | 16 | mV |
| $\frac{\triangle V_{REF}}{\triangle V_{KA}}$ | Ratio of change in reference input voltage to the change in cathode voltage | $I_K$=10mA, $\triangle V_{KA}$=10V to $V_{REF}$<br>$\triangle V_{KA}$=36V to 10V | -2.7<br>-2 | -1.4<br>-1 | | mV/V |
| $I_{REF}$ | Reference input current | $I_K$=10mA, R1=10KΩ, R2=∞ (Test circuit 2) | | 1 | 4.0 | μA |
| $I_{REF}$ (DEV) | Deviation of reference input current over full temperature range | $I_K$=10mA, R1=10KΩ, R2=∞, $T_A$ = Full range (Test circuit 2) | | 0.4 | 1.2 | μA |
| $I_K$ (min) | Minimum cathode current for regulation | $V_{KA}$ = $V_{REF}$ (Test circuit 1) | | 0.4 | 1.0 | mA |
| $I_K$ (off) | Off-state cathode current | $V_{KA}$=36V, $V_{REF}$=0 (Test circuit 3) | | 0.1 | 1.0 | μA |
| $\lvert Z_{KA} \rvert$ | Dynamic impedance | f < 1KHz, $V_{KA}$ = $V_{REF}$<br>$I_K$ =1mA to 100mA | | 0.2 | 0.5 | Ω |

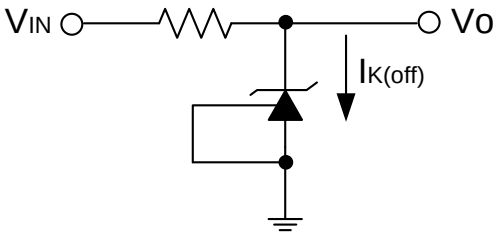
## Test Circuits




**Test Circuit 1.**
$V_{KA}=V_{REF}$

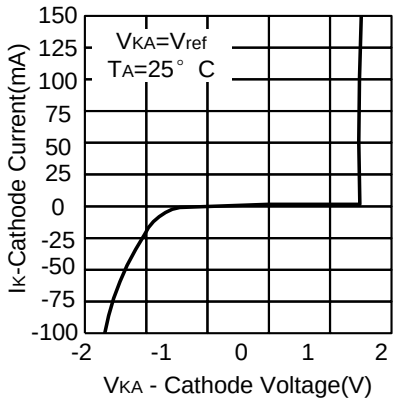



**Test Circuit 2.**
$V_{KA} > V_{REF}$

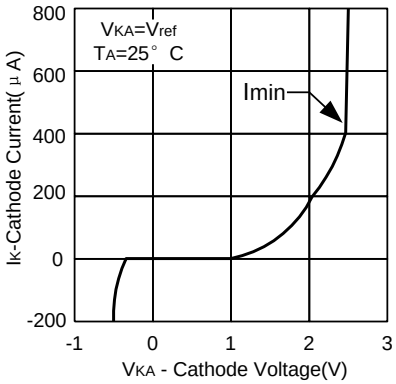



**Test Circuit 3.**
Off-State Current

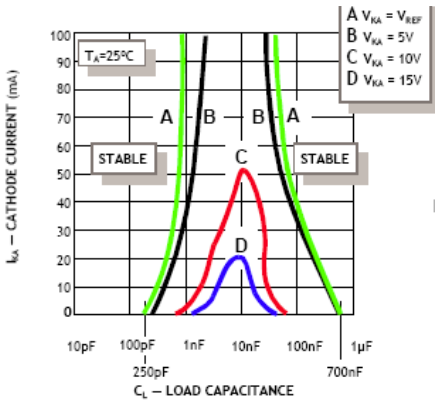
## Typical Performance Characteristics




**Cathode current vs. cathode voltage**



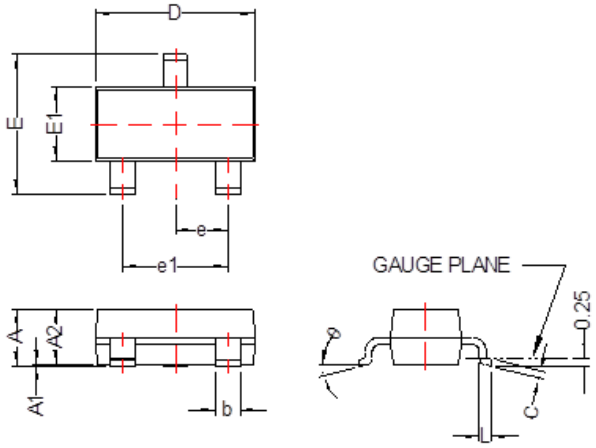

**Cathode current vs. cathode voltage**



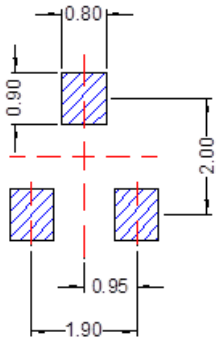

**Stability Boundary Conditions**

# SOT-23

## Package Dimension




## Recommended Land Pattern




## Dimensions

| SYMBOL | Millimeters | | Inches | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.75 | 1.17 | 0.030 | 0.046 |
| A1 | 0.01 | 0.15 | 0.000 | 0.006 |
| A2 | 0.70 | 1.02 | 0.028 | 0.040 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.08 | 0.20 | 0.003 | 0.008 |
| D | 2.80 | 3.04 | 0.110 | 0.120 |
| E | 2.10 | 2.64 | 0.083 | 0.104 |
| E1 | 1.20 | 1.40 | 0.047 | 0.055 |
| e | 0.95 BSC | | 0.037 BSC | |
| e1 | 1.90 BSC | | 0.075 BSC | |
| L | 0.3 | 0.6 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |

**NOTE:**
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

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