

## Features

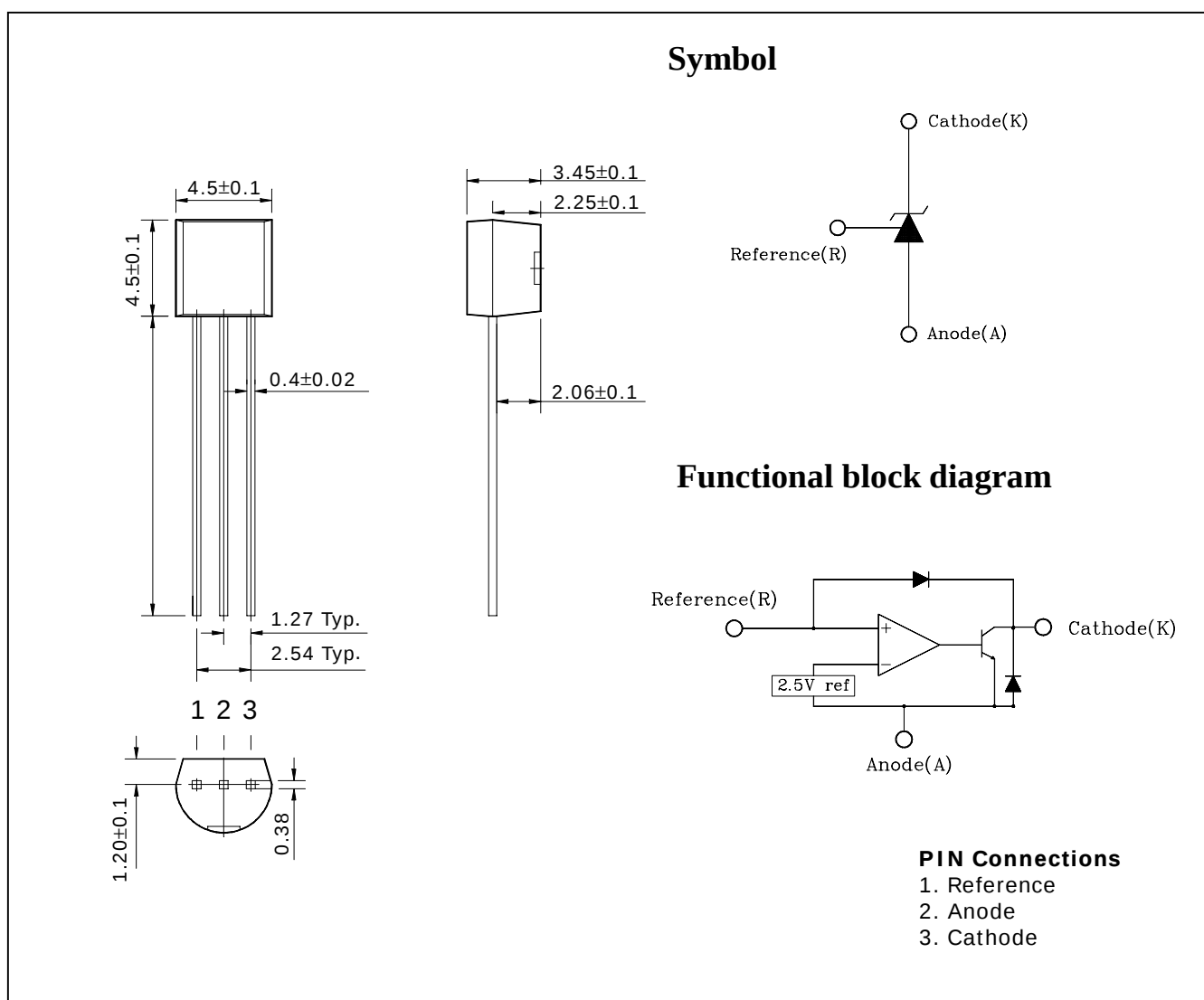
- Programmable output voltage to 36 volts
- Sink current capability of 1.0mA to 100mA
- Low dynamic impedance 0.15Ω typical
- Temperature compensated for operation over full rated operating temperature
- Equivalent full-range temperature coefficient of 50ppm/°C (Typical)
- Low output Noise voltage
- Voltage reference tolerance :  $\pm 1.0\%$  ( $T_a = 25^\circ\text{C}$ )

## Ordering Information

| Type NO. | Marking | Package Code |
|----------|---------|--------------|
| SL431A   | SL431A  | TO-92        |

## Outline Dimensions

unit : mm



## Absolute maximum ratings

(Operating ambient temperature range applies unless other specified)

| Parameter                                 | Symbol    | Ratings     | Unit |
|-------------------------------------------|-----------|-------------|------|
| Cathode to anode voltage                  | $V_{KA}$  | 37          | V    |
| Cathode current range(Continuous)         | $I_K$     | -100 ~ +150 | mA   |
| Reference input current range(Continuous) | $I_{ref}$ | -0.05 ~ +10 | mA   |
| Power dissipation                         | $P_D^*$   | 700         | mW   |
| Operating temperature range               | $T_{opr}$ | -40 ~ +85   | °C   |
| Storage temperature range                 | $T_{stg}$ | -65 ~ +150  | °C   |

## Recommended operating conditions

| Parameter                         | Symbol   | Ratings   |      | Unit |
|-----------------------------------|----------|-----------|------|------|
|                                   |          | Min.      | Max. |      |
| Cathode to Anode voltage          | $V_{KA}$ | $V_{ref}$ | 36   | V    |
| Cathode current range(Continuous) | $I_K$    | 1.0       | 100  | mA   |

## Electrical Characteristics

(Ambient temperature at 25°C, unless otherwise noted.)

| Parameter                                                                                 | Symbol                                 | Condition                                                                                        | Min. | Typ.       | Max.       | Unit          |
|-------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------|------|------------|------------|---------------|
| Reference input voltage<br>(Fig. 1, Note 1)                                               | $V_{ref}$                              | $V_{KA}=V_{ref}$ , $I_K=10\text{mA}$                                                             | 2.47 | 2.495      | 2.52       | V             |
| Deviation of reference input voltage<br>Over temperature(Fig. 1, Note 1,2)                | $\Delta V_{ref}$                       | $V_{KA}=V_{ref}$ , $I_K=10\text{mA}$<br>@ $T_a=T_{LOW}$ to $T_{HIGH}$                            | -    | 7.0        | 30         | mV            |
| Ratio of change in reference input<br>Voltage to the change in cathode<br>Voltage(Fig. 2) | $\frac{\Delta V_{ref}}{\Delta V_{KA}}$ | $I_K=10\text{mA}$<br>$\Delta V_{KA}=10\text{V}-V_{ref}$<br>$\Delta V_{KA}=36\text{V}-10\text{V}$ | -    | 1.2<br>0.7 | 2.7<br>2.0 | mV/V          |
| Reference input current(Fig. 2)                                                           | $I_{ref}$                              | $I_K=10\text{mA}$<br>$R1=10\text{K}\Omega$ , $R2=\infty$                                         | -    | 1.8        | 4.0        | $\mu\text{A}$ |
| Deviation of reference input voltage<br>over temperature(Fig. 2)                          | $\Delta I_{ref}$                       | $I_K=10\text{mA}$<br>$R1=10\text{K}\Omega$ , $R2=\infty$                                         | -    | 0.4        | 2.5        | $\mu\text{A}$ |
| Minimum cathode current for<br>Regulation(Fig. 1)                                         | $I_{MIN}$                              | $V_{KA}=V_{ref}$                                                                                 | -    | 0.35       | 1.0        | mA            |
| Off-state cathode current(Fig. 3)                                                         | $I_{OFF}$                              | $V_{KA}=36\text{V}$ , $V_{ref}=0\text{V}$                                                        | -    | 2.7        | 1000       | nA            |
| Dynamic impedance(Fig. 1, Note 3)                                                         | $Z_{KA}$                               | $V_{KA}=V_{ref}$ , $f \leq 1.0\text{KHz}$<br>$I_{KA}=1.0\text{mA}-100\text{mA}$                  | -    | 0.14       | 0.5        | $\Omega$      |

Fig. 1

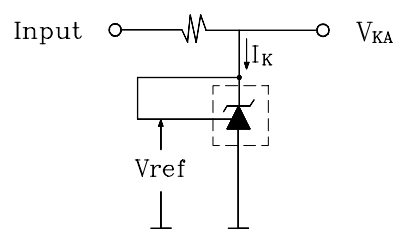


Fig. 2

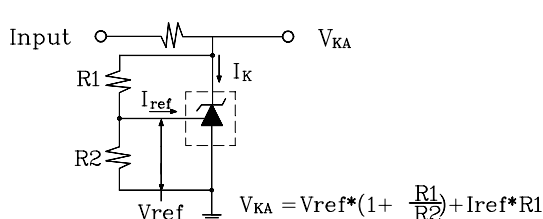
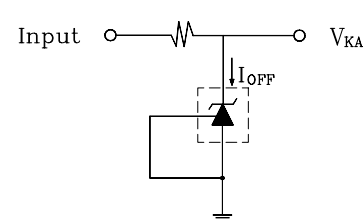


Fig. 3



<Note 1> :  $T_{LOW}=-40^{\circ}\text{C}$ ,  $T_{HIGH}=+85^{\circ}\text{C}$  , <Note 2> :  $\Delta V_{ref}=V_{ref}\text{ Max.} - V_{ref}\text{ Min.}$  , <Note 3> :  $Z_{KA}=\Delta V_{KA}/\Delta I_K$

## Characteristic diagrams

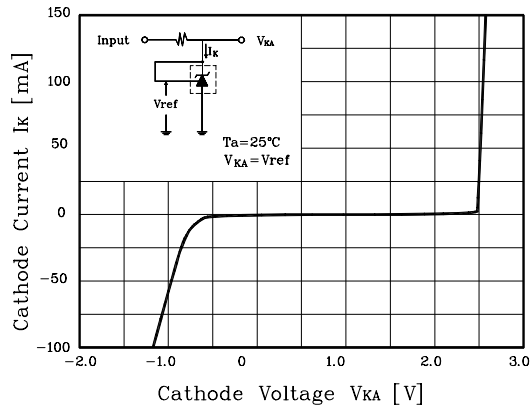
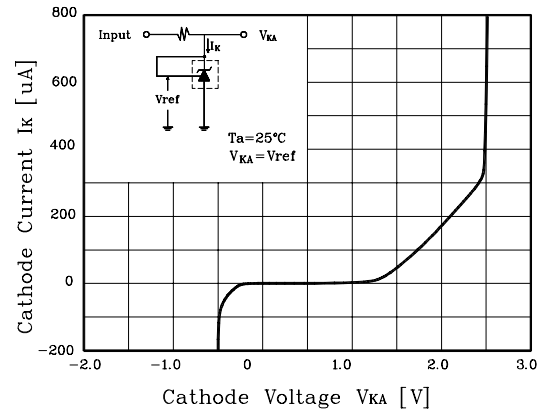
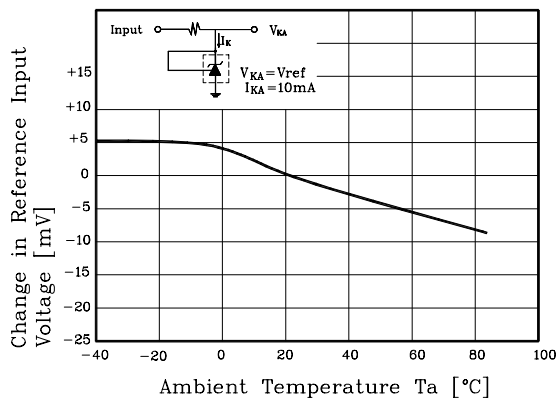
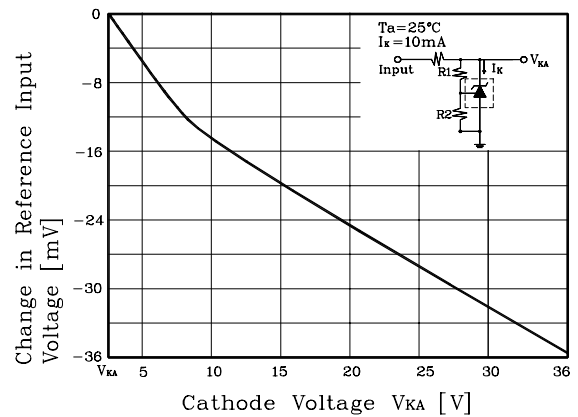
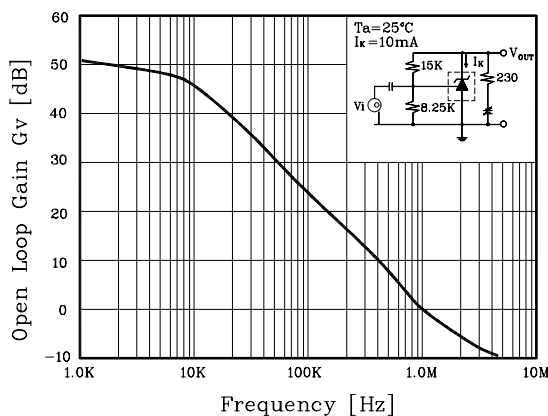
Fig. 4  $I_K$  vs.  $V_{KA}$ Fig. 5  $I_{MIN}$  vs.  $V_{KA}$ Fig. 6  $\Delta V_{ref}$  vs.  $T_a$ Fig. 7  $\Delta V_{ref}$  vs.  $V_{KA}$ Fig. 8  $G_v$  vs. frequency

Fig. 9 Pulse reponse

