

PROGRAMMABLE PRECISION REFERENCES

The KIA431/F/A/AF/B/BF integrated circuits are three-terminal programmable shunt regulator diodes. These monolithic IC voltage reference operate as a low temperature coefficient zener which is programmable from V_{ref} to 36 volts with two external resistors. These devices exhibit a wide operating current range of 1.0 to 100mA with a typical dynamic impedance of 0.22Ω . The characteristics of these references make them excellent replacements for zener diodes in many applications such as digital voltmeters, power supplies, and op amp circuitry. The 2.5 volt reference makes it convenient to obtain a stable reference from 5.0 volt logic supplies, and since the KIA431/F/A/AF/B/BF operates as a shunt regulator, it can be used as either a positive or negative voltage reference.

FEATURES

- Programmable Output Voltage to 36 Volts.

| ITEM | V_{ref} Tolerance (%) |
|--------------|-------------------------|
| KIA431/F | 2.2 |
| KIA431A/AF | 1.0 |
| * KIA431B/BF | 0.5 |

Note) * : Under development

- Low Dynamic Output Impedance : 0.22Ω (Typ.).
- Sink Current Capability of 1.0 to 100mA.
- Equivalent Full-Range Temperature Coefficient of $50\text{ppm}/^\circ\text{C}$ (Typ.).
- Temperature Compensated for Operation Over Full Rated Operating Temperature Range.
- Low Output Noise Voltage.

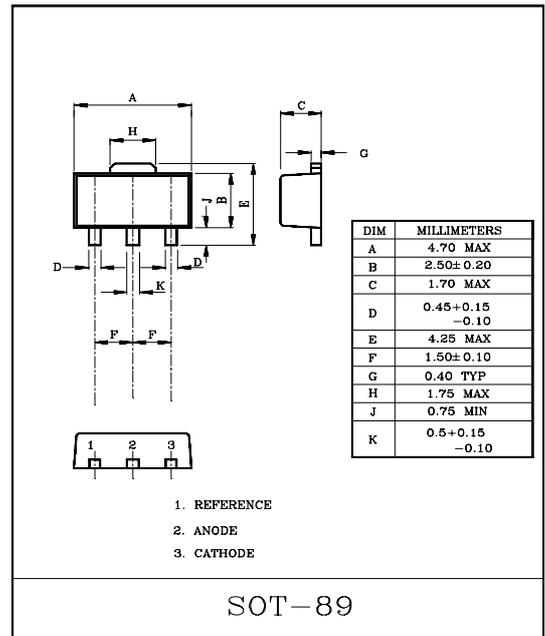
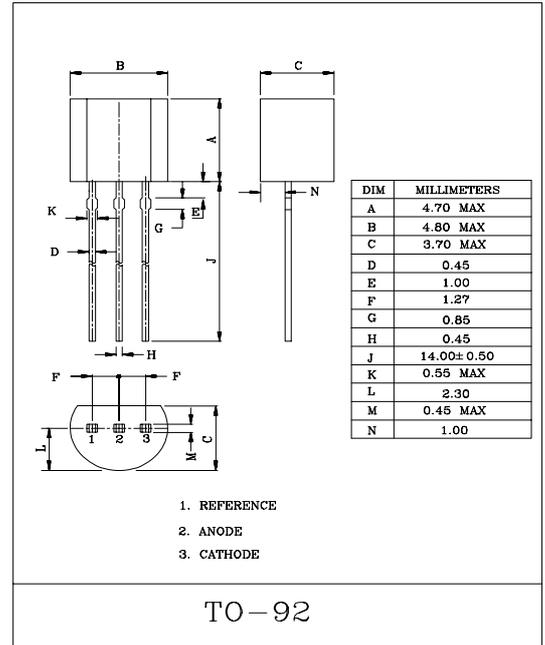
MARKING

| Type No. | Marking |
|----------|---------|
| KIA431F | 3A |
| KIA431AF | 3B |
| KIA431BF | 3C |

MAXIMUM RATINGS

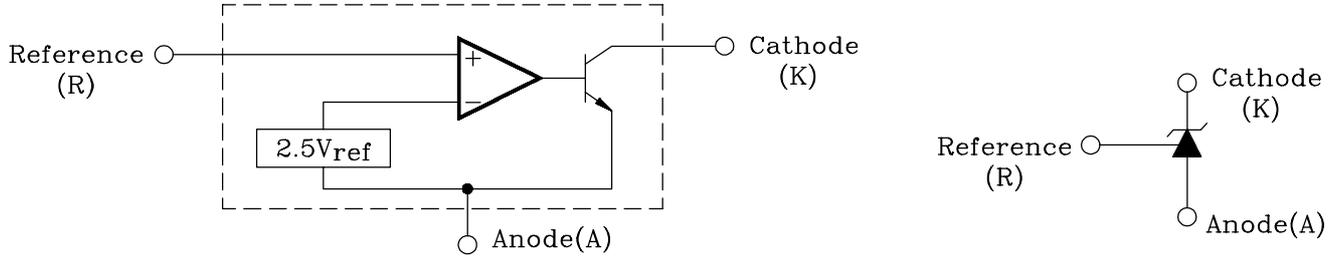
(Full operating ambient temperature range applies unless otherwise noted.)

| CHARACTERISTIC | SYMBOL | RATING | 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 |
| Operating Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Operating Temperature | T_{opr} | -40 ~ 85 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -65 ~ 150 | $^\circ\text{C}$ |
| Total Power Dissipation | KIA431/A/B | 700 | mW |
| | KIA431F/AF/BF | 800 | |



KIA431/F/A/AF/B/BF

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (Ta=25°C)

| CHARACTERISTICS | | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | |
|--|---------------------|--|-------------------|---|--|-------|--------|----------|------|
| Reference Input Voltage | KIA431/F | V_{ref} | Figure 1 | $V_{KA}=V_{ref}$, $I_K=10mA$ | 2.440 | 2.495 | 2.550 | V | |
| | KIA431A/AF | | | | 2.470 | 2.495 | 2.520 | V | |
| | KIA431B/BF | | | | 2.4825 | 2.495 | 2.5075 | V | |
| Reference Input Voltage Deviation Over Temperature Range | | ΔV_{ref} | Figure 1 (Note 1) | $V_{KA}=V_{ref}$, $I_K=10mA$ | - | 7.0 | 30 | mV | |
| Ratio of Change in Reference Input Voltage to Change in Cathode to Anode Voltage | | $\frac{\Delta V_{ref}}{\Delta V_{KA}}$ | Figure 2 | $I_K=10mA$ | $\frac{\Delta V_{KA}}{10V \sim V_{ref}}$ | - | -1.4 | -2.7 | mV/V |
| | | | | | $\frac{\Delta V_{KA}}{36V \sim 10V}$ | - | -1.0 | -2.0 | |
| Reference Input Current | Ta=25°C | I_{ref} | Figure 2 | $I_K=10mA$, $R1=10k\Omega$, $R2=\infty$ | - | 1.8 | 4.0 | μA | |
| | Ta=T _{opr} | | | | - | - | 6.5 | | |
| Reference Input Current Deviation Over Temperature Range | | ΔI_{ref} | Figure 2 | $I_K=10mA$, $R1=10k\Omega$, $R2=\infty$ | - | 0.8 | 2.5 | μA | |
| Minimum Cathode Current For Regulation | | I_{min} | Figure 1 | $V_{KA}=V_{ref}$ | - | 0.5 | 1.0 | mA | |
| Off-State Cathode Current | | I_{off} | Figure 3 | $V_{KA}=36V$, $V_{ref}=0V$ | - | 2.6 | 1000 | nA | |
| Dynamic Impedance | | Z_{ka} | Figure 1 (Note 2) | $V_{KA}=V_{ref}$, $I_K=1.0 \sim 100mA$, $f \leq 1.0kHz$ | - | 0.22 | - | Ω | |