

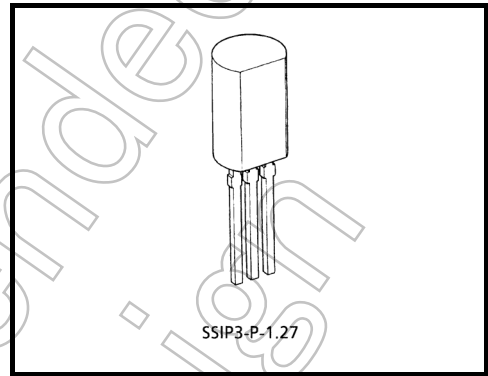
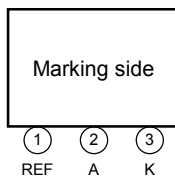
TA76431S

Adjustable Precision Shunt Regulator

Features

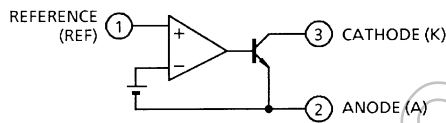
- Precision reference voltage: $V_{REF} = 2.495\text{ V} \pm 2.2\%$
- Small temperature coefficient: $|\alpha V_{REF}| = 46\text{ ppm}/^\circ\text{C}$
- Adjustable output voltage: $V_{REF} \leq V_{OUT} \leq 36\text{ V}$
- Low dynamic output impedance: $|Z_{KA}| = 0.15\ \Omega$ (Typ.)

Pin Assignment

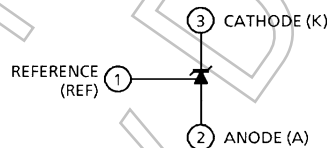


Weight: 0.36 g (typ.)

Functional Block Diagram

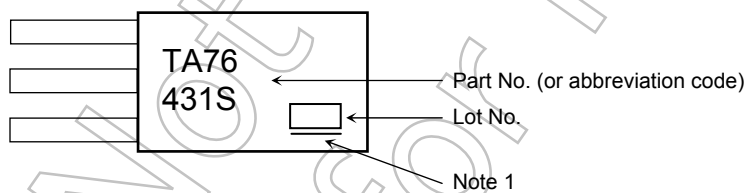


Circuit Symbol



This IC contains electrostatic sensitive elements.
Please handle with caution.

Marking



Note 1: A line under a Lot No. identifies the indication of product Labels.
Not underlined: $[[Pb]]/INCLUDES > MCV$
Underlined: $[[G]]/RoHS\ COMPATIBLE$ or $[[G]]/RoHS\ [[Pb]]$

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

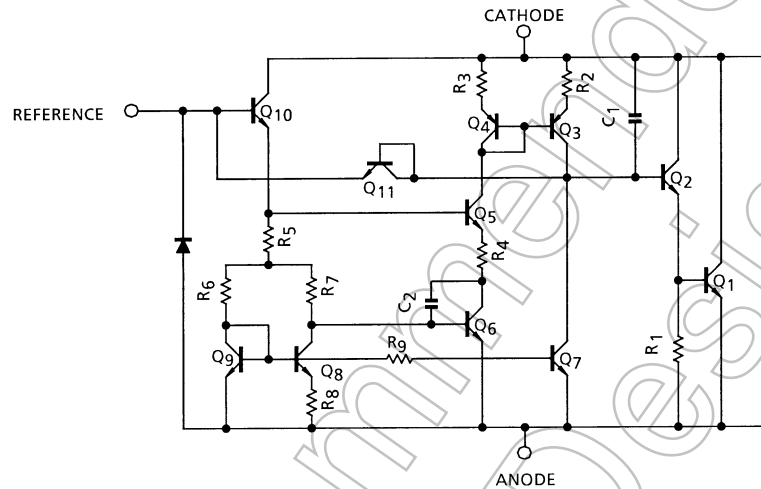
Start of commercial production
1998-11

How to Order

| Product No. | Package Type | Packing Type and Capacity |
|-------------------|--------------|----------------------------|
| TA76431S (F) | LSTM | Loose in bag: 200 pcs/bag |
| TA76431S (TPE6,F) | (lead type) | Radial tape: 2000 pcs/reel |

Note 2: The product supplied as TA76431S(TPE6,F) is different from TA76431S(F) in the lead pitch between the terminal.

Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---------------------------------|------------|-------------|---------|
| Cathode voltage | V_{KA} | 37 | V |
| Cathode current | I_K | -100 to 150 | mA |
| Reference voltage | V_{REF} | 7 | V |
| Reference current | I_{REF} | 50 | μ A |
| Reference-anode reverse current | $-I_{REF}$ | 10 | mA |
| Power dissipation | P_D | 800 | mW |
| Operating temperature | T_{opr} | -40 to 85 | °C |
| Storage temperature | T_{stg} | -55 to 150 | °C |

Note 3: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Operating Ranges

| Characteristics | Symbol | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----------|------|-----|------|
| Cathode voltage | V_{KA} | V_{REF} | – | 36 | V |
| Cathode current | I_K | 1 | – | 100 | mA |
| Operating temperature | T_{opr} | -40 | – | 85 | °C |

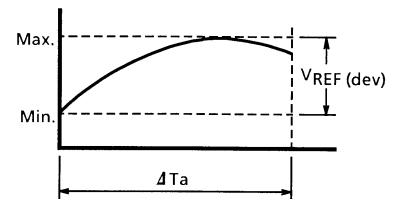
Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$, $I_K = 10\text{ mA}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------------------------------|---|-------|-------|-------|---------------|
| Reference voltage | V_{REF} | $V_{KA} = V_{REF}$ | 2.440 | 2.495 | 2.550 | V |
| Deviation of reference input voltage over temperature | $V_{REF}(\text{dev})$ (Note 4) | $0^\circ\text{C} \leq T_a \leq 70^\circ\text{C}$, $V_{KA} = V_{REF}$ | – | 8 | 17 | mV |
| Ratio of change in reference input voltage to the change in cathode voltage | $\Delta V_{REF}/\Delta V$ | $V_{REF} \leq V_{KA} \leq 10\text{ V}$ | – | 0.8 | 2.7 | mV/V |
| | | $10\text{ V} \leq V_{KA} \leq 36\text{ V}$ | – | 0.5 | 2.0 | |
| Reference input current | I_{REF} | $V_{KA} = V_{REF}$ | – | 1.4 | 4 | μA |
| Deviation of reference input current over temperature | $I_{REF}(\text{dev})$ (Note 4) | $0^\circ\text{C} \leq T_a \leq 70^\circ\text{C}$, $V_{KA} = V_{REF}$ $R_1 = 10\text{ k}\Omega$, $R_2 = \infty$ | – | 0.3 | 1.2 | μA |
| Minimum cathode current for regulation | I_{Kmin} | $V_{KA} = V_{REF}$ | – | 0.4 | 1.0 | mA |
| Off-state cathode current | I_{Koff} | $V_{KA} = 36\text{ V}$, $V_{REF} = 0\text{ V}$ | – | – | 1.0 | μA |
| Dynamic impedance | $ Z_{KA} $ | $V_{KA} = V_{REF}$, $f \leq 1\text{ kHz}$ $1\text{ mA} \leq I_K \leq 100\text{ mA}$ | – | 0.15 | 0.5 | Ω |

Note 4: The deviation parameters $V_{REF}(\text{dev})$ and $I_{REF}(\text{dev})$ are defined as the maximum variation of the V_{REF} and I_{REF} over the rated temperature range.

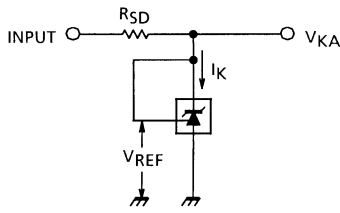
The average temperature coefficient of the V_{REF} is defined as:

$$|\alpha_{V_{REF}}| = \frac{\frac{V_{REF}(\text{dev})}{V_{REF@25^\circ\text{C}}} \times 10^6}{\Delta T_a} \quad (\text{ppm}/^\circ\text{C})$$

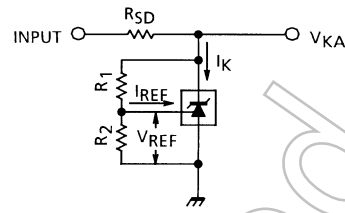


Test Parameter

(1) $V_{KA} = V_{REF}$ mode

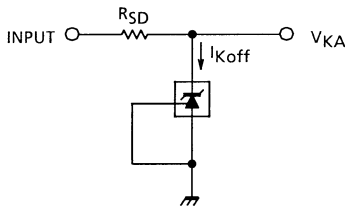


(2) $V_{KA} > V_{REF}$ mode



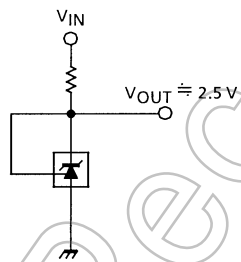
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) Off-state mode

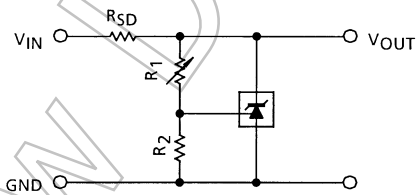


Typical Applications

(1) 2.5 V reference

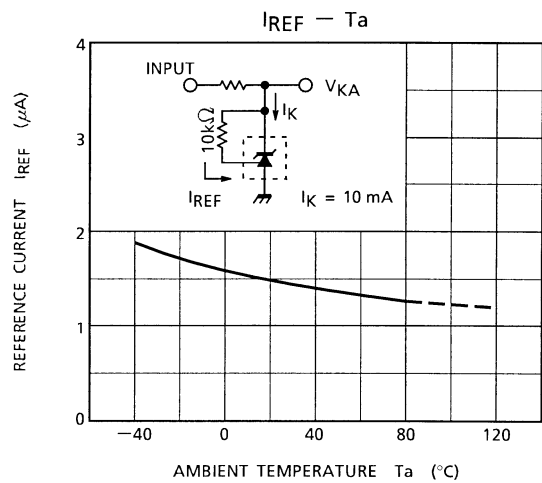
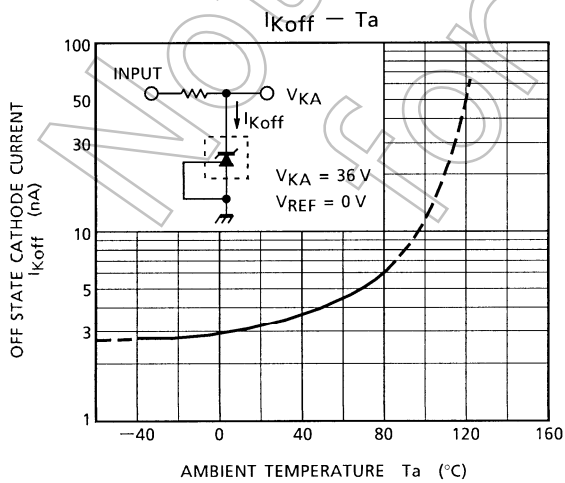
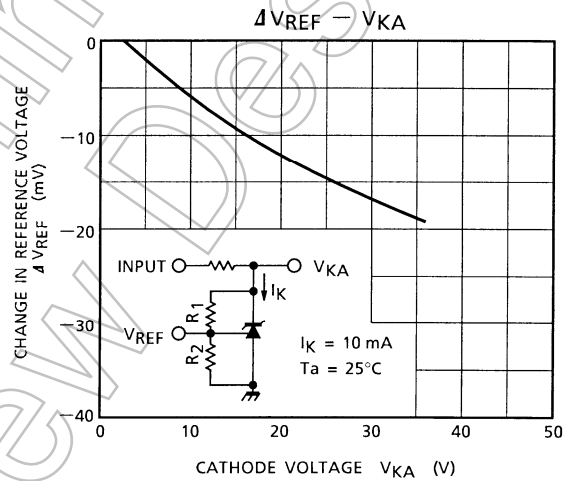
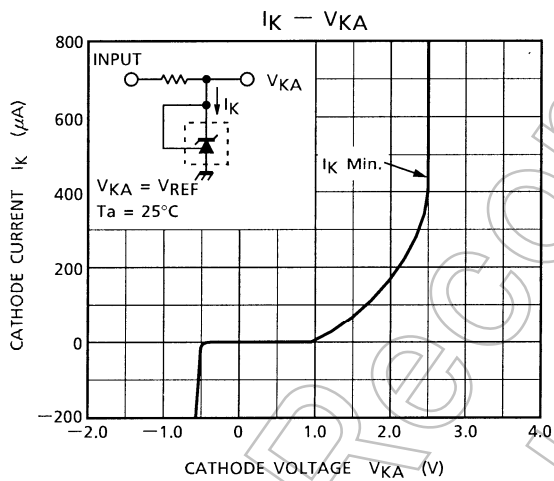
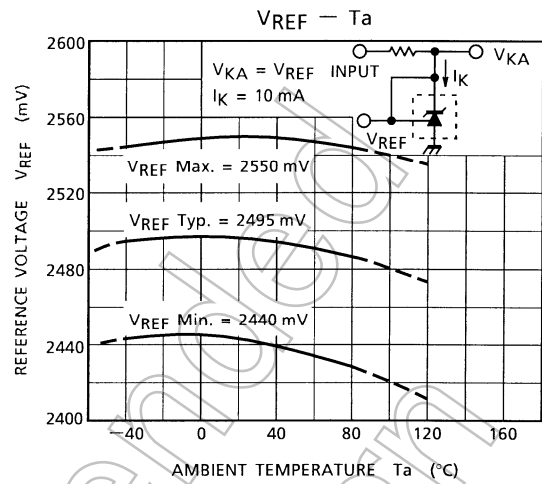
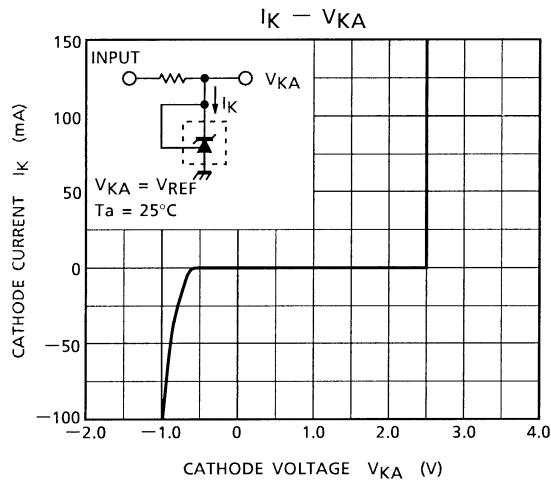


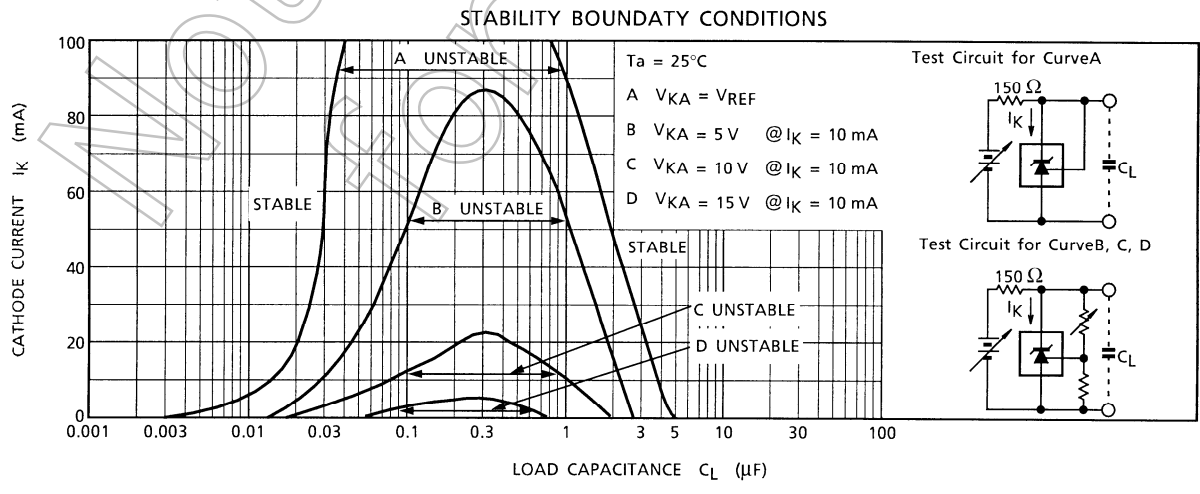
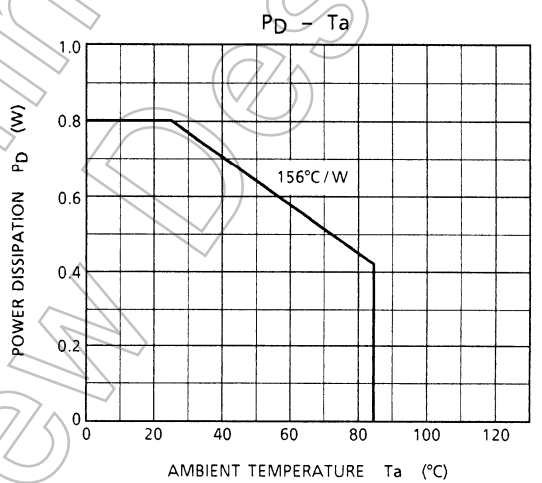
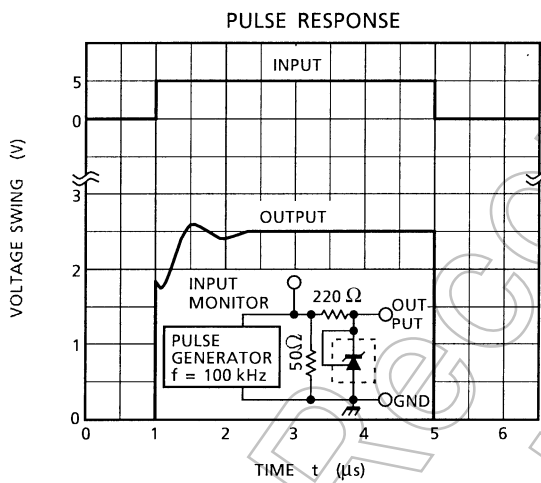
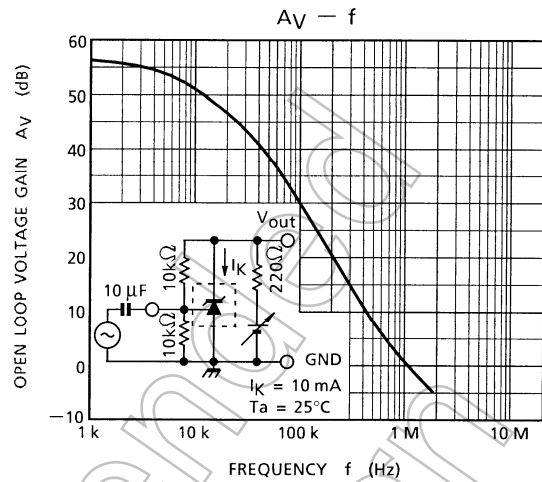
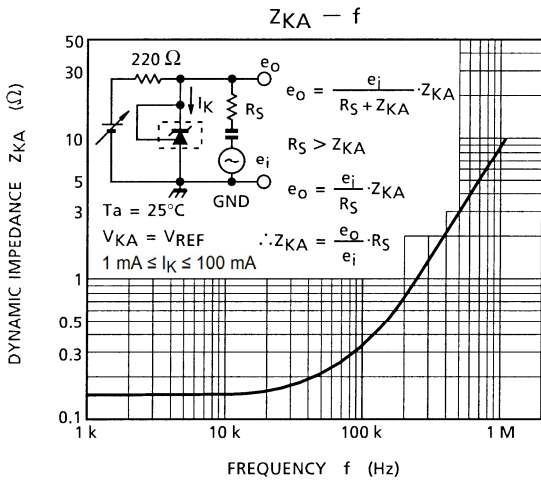
(2) Shunt regulator



$$V_{OUT} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

Not Recommended for New Design

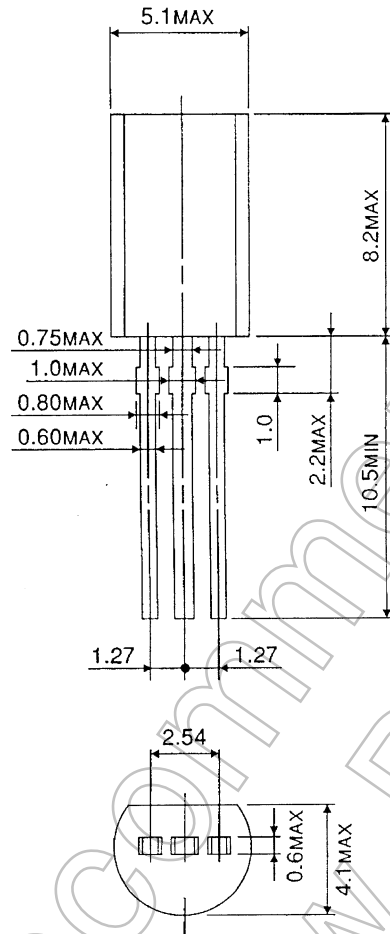




Package Dimensions

SSIP3-P-1.27

Unit : mm



Weight : 0.36 g (Typ.)

Not Recommended for New Design

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