

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

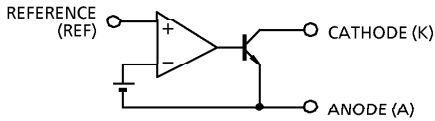
TA76431F

ADJUSTABLE PRECISION SHUNT REGULATOR

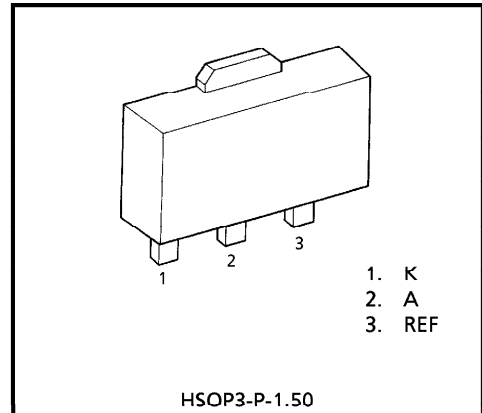
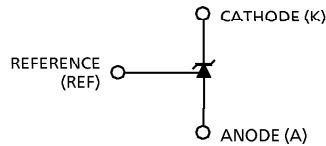
FEATURES

- Precision Reference Voltage : $V_{REF} = 2.495V \pm 2\%$
- Small Temperature Coefficient : $|\alpha V_{REF}| = 46ppm / ^\circ C$
- Adjustable Output Voltage : $V_{REF} \leq V_{OUT} \leq 36V$
- Low Dynamic Output Impedance : $|Z_{KA}| = 0.15\Omega$ (Typ.)
- Small Flat Package

FUNCTIONAL BLOCK DIAGRAM

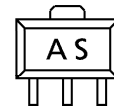


CIRCUIT SYMBOL



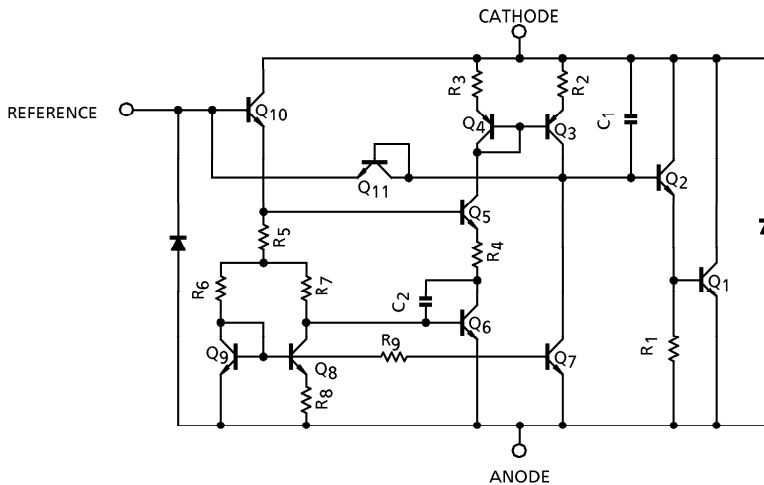
Weight : 0.05g (Typ.)

Marking



THIS IC CONTAINS ELECTROSTATIC SENSITIVE ELEMENT.
PLEASE HANDLE WITH CAUTION.

EQUIVALENT CIRCUIT



961001EBA2

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MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---------------------------------|-----------|------------|-----------|---------|
| Cathode Voltage | | V_{KA} | 37 | V |
| Cathode Current | | I_K | - 100~150 | mA |
| Reference Voltage | | V_{REF} | 7 | V |
| Reference Current | | I_{REF} | 50 | μA |
| Reference-Anode Reverse Current | | $-I_{REF}$ | 10 | mA |
| Power Dissipation | Ta = 25°C | P_D | 500 | mW |
| | * | | 1000 | |
| Operating Temperature | | T_{opr} | - 40~85 | °C |
| Storage Temperature | | T_{stg} | - 55~150 | °C |

* : Mounted on ceramic substrate (250mm² × 0.8t)

RECOMMENDED OPERATING CONDITIONS

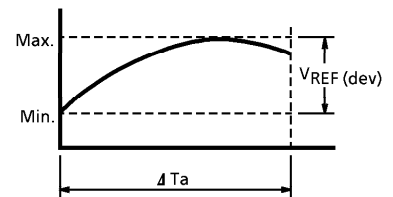
| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------|-----------|-----------|------|------|------|
| Cathode Voltage | V_{KA} | V_{REF} | — | 36 | V |
| Cathode Current | I_K | 1 | — | 100 | mA |
| Operating Temperature | T_{opr} | - 40 | — | 85 | °C |

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta = 25°C, I_K = 10mA)

| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | 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} (dev) (Note) | — | 0°C ≤ Ta ≤ 70°C V _{KA} = V _{REF} | — | 8 | 17 | mV |
| Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage | ΔV _{REF} / ΔV | — | V _{REF} ≤ V _{KA} ≤ 10V | — | 0.8 | 2.7 | mV/V |
| | | — | 10V ≤ V _{KA} ≤ 36V | — | 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} (dev) (Note) | — | 0°C ≤ Ta ≤ 70°C, V _{KA} = V _{REF} R ₁ = 10kΩ, R ₂ = ∞ | — | 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} = 36V, V _{REF} = 0V | — | — | 1.0 | μA |
| Dynamic Impedance | Z _{KA} | — | V _{KA} = V _{REF} , f ≤ 1kHz 1mA ≤ I _K ≤ 100mA | — | 0.15 | 0.5 | Ω |

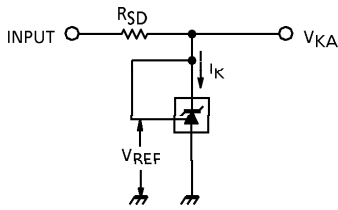
Note : The deviation parameters V_{REF} (dev) and I_{REF} (dev) are defined as the maximum variation of the V_{REF} and I_{REF} over the rated temperature range.
The average temperature coefficient of the V_{REF} is defined as ;

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

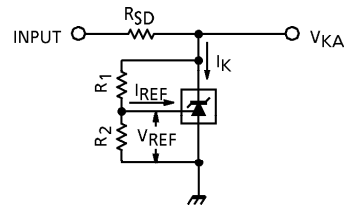


TEST PARAMETER

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

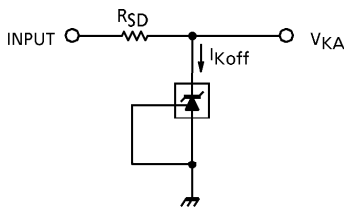


(2) $V_{KA} > V_{REF}$ MODE



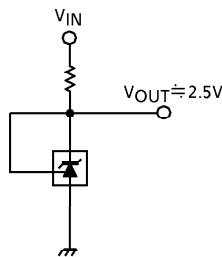
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) OFF-STATE MODE

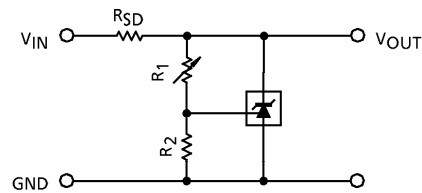


TYPICAL APPLICATIONS

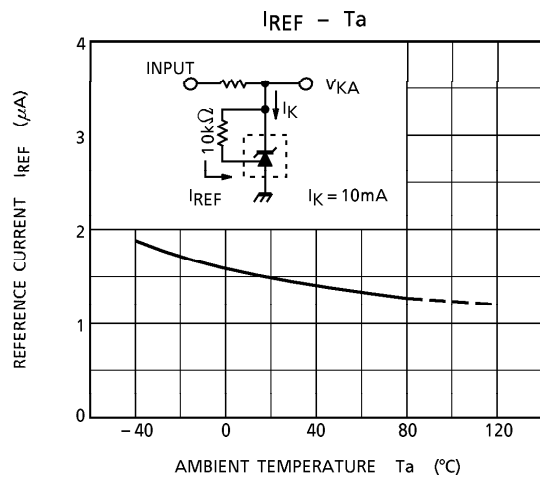
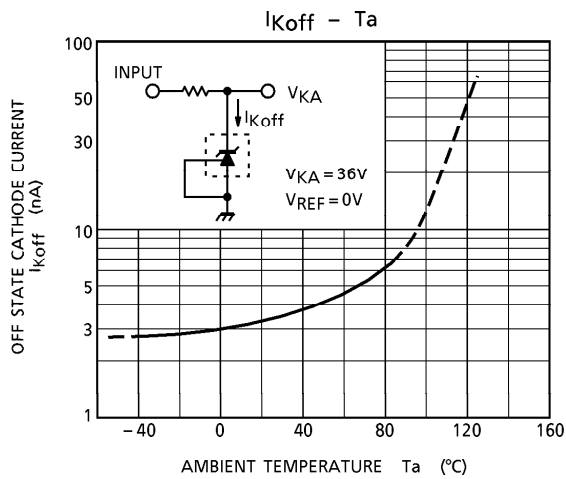
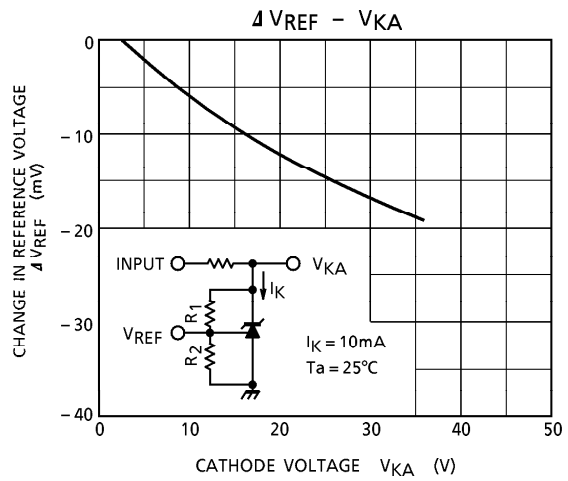
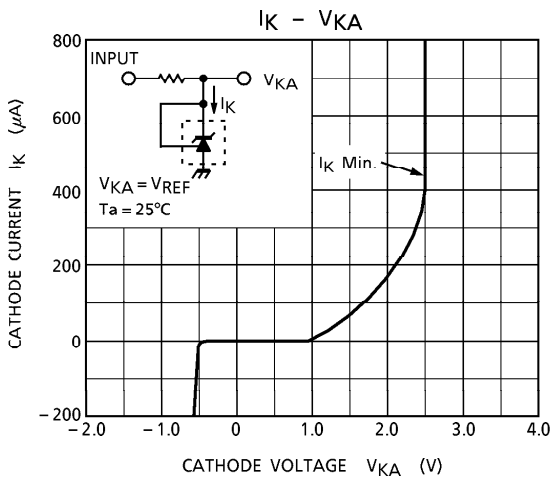
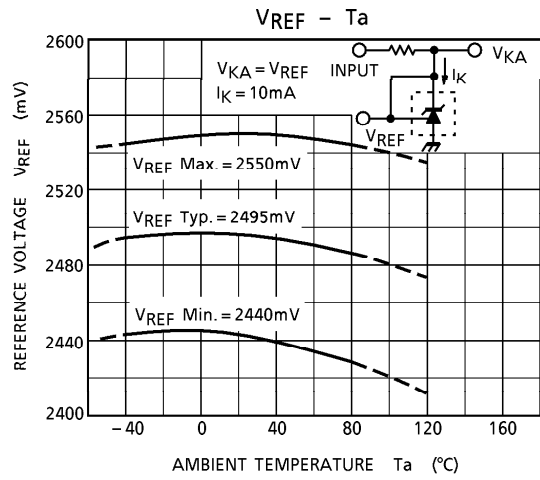
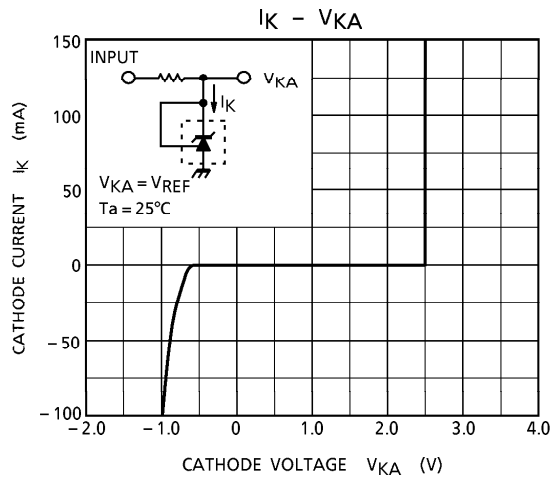
(1) 2.5V REFERENCE

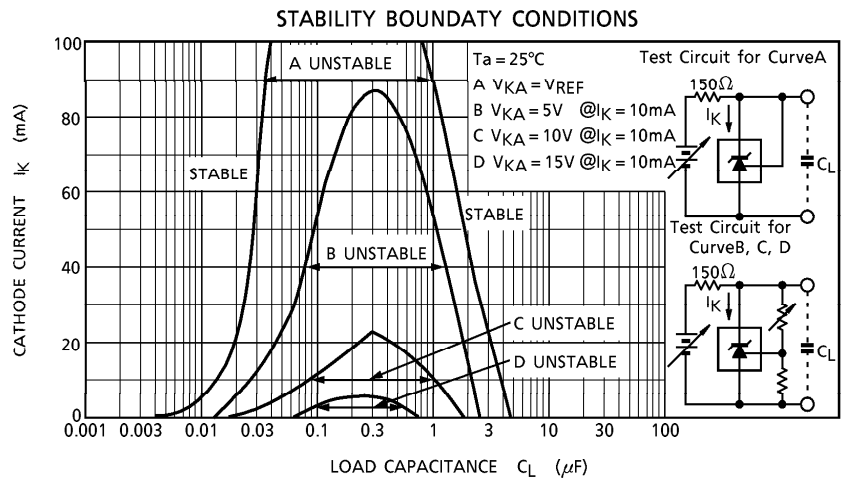
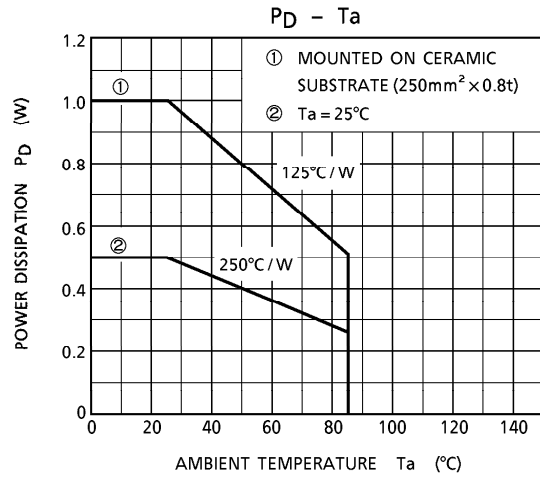
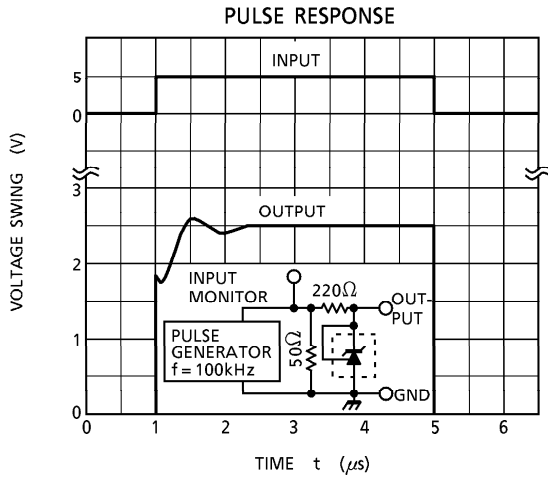
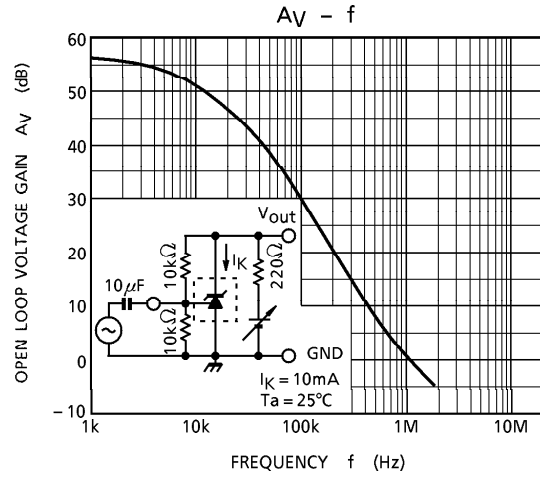
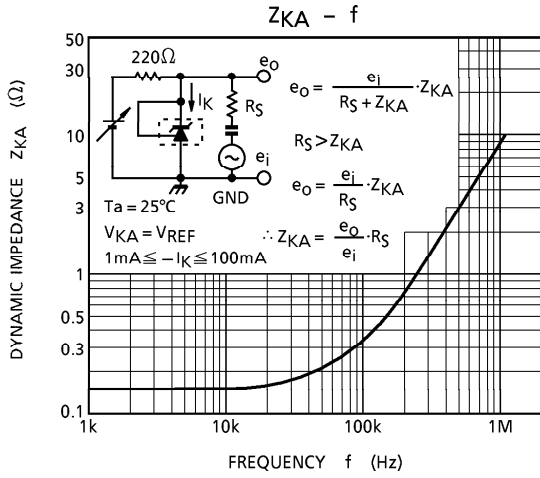


(2) SHUNT REGULATOR



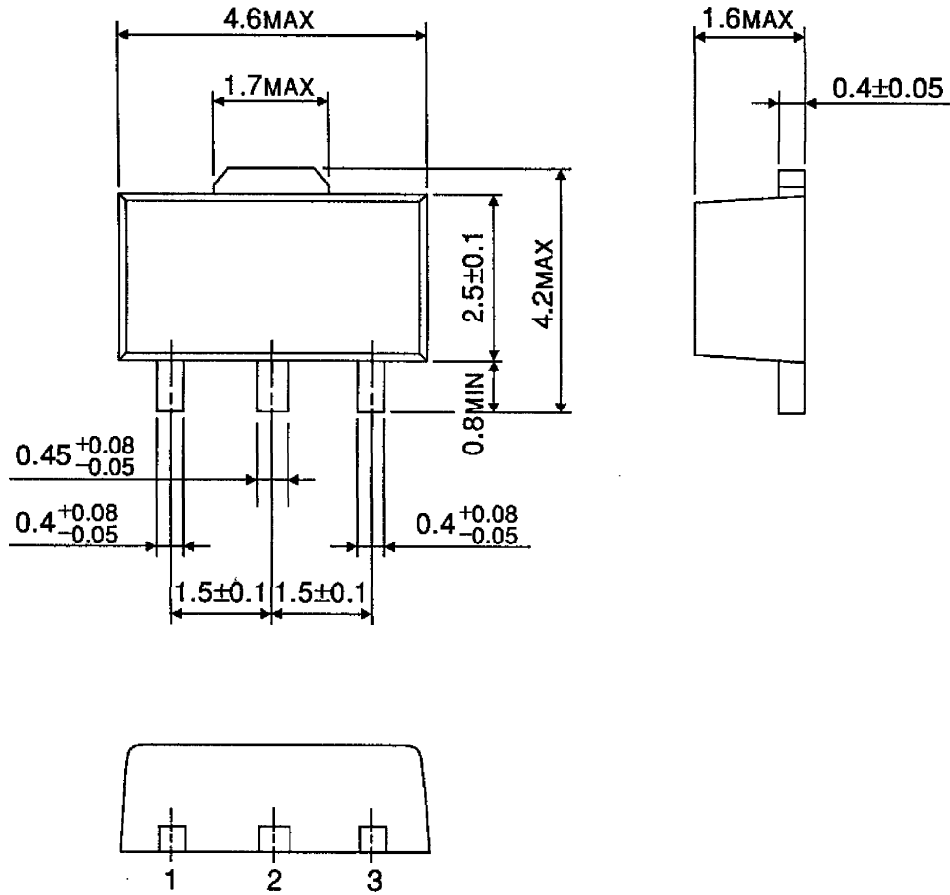
$$V_{OUT} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$





OUTLINE DRAWING
HSOP3-P-1.50

Unit : mm



Weight : 0.05g (Typ.)