

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

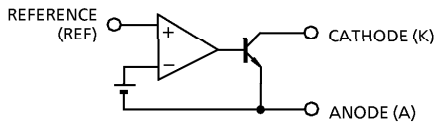
TA76431AF

ADJUSTABLE PRECISION SHUNT REGULATOR

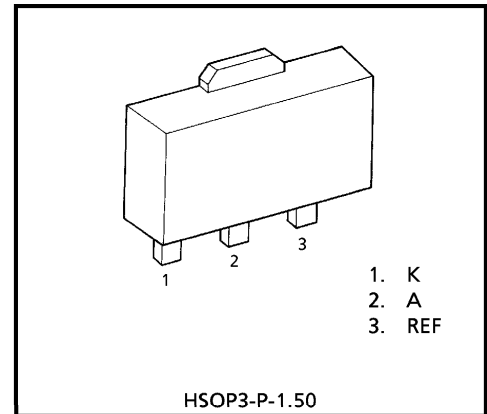
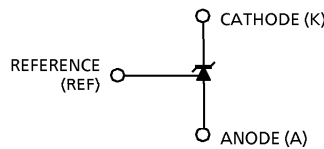
FEATURES

- Precision Reference Voltage : $V_{REF} = 2.495\text{ V} \pm 1\%$
- 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.)
- Small Flat Package

FUNCTIONAL BLOCK DIAGRAM

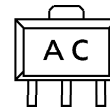


CIRCUIT SYMBOL



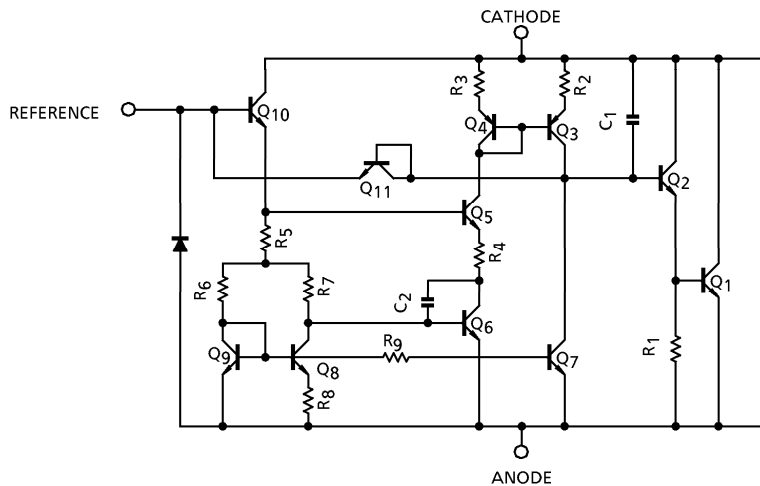
Weight : 0.05 g (Typ.)

Marking



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

EQUIVALENT CIRCUIT



980910EBA1

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MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

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	$T_a = 25^\circ\text{C}$	P_D	500	mW
	*		1000	
Operating Temperature	T_{opr}	- 40~85	$^\circ\text{C}$	
Storage Temperature	T_{stg}	- 55~150	$^\circ\text{C}$	

* : Mounted on ceramic substrate ($250\text{ mm}^2 \times 0.8\text{ t}$)

RECOMMENDED OPERATING CONDITIONS

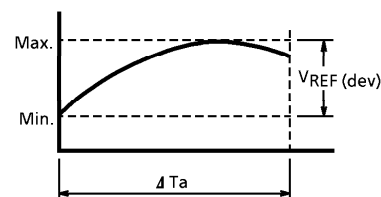
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V_{KA}	V_{REF}	—	36	V
Cathode Current	I_K	1	—	100	mA
Operating Temperature	T_{opr}	- 40	—	85	$^\circ\text{C}$

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

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage	V _{REF}	—	V _{KA} = V _{REF}	2.470	2.495	2.520	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} ≤ 10 V	—	0.8	2.7	mV / V
		—	10 V ≤ V _{KA} ≤ 36 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} (dev) (Note)	—	0°C ≤ Ta ≤ 70°C, V _{KA} = V _{REF} R ₁ = 10 kΩ, 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} = 36 V, V _{REF} = 0 V	—	—	1.0	μA
Dynamic Impedance	Z _{KA}	—	V _{KA} = V _{REF} , f ≤ 1 kHz 1 mA ≤ I _K ≤ 100 mA	—	0.15	0.5	Ω

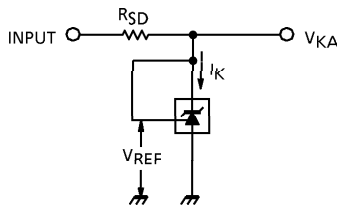
Note : The deviation parameters V_{REF} (dev) and I_{REF} (dev) are defined as the maximum variation of the V_{REF} and I_{REF} over the rated temperature range.
The average temperature coefficient of the V_{REF} is defined as ;

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

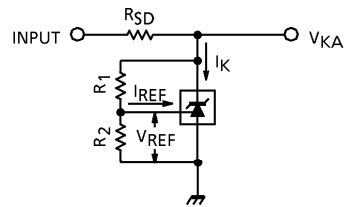


TEST PARAMETER

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

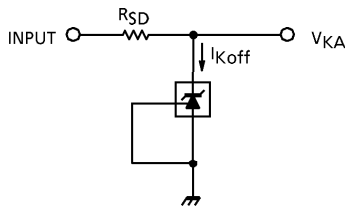


(2) $V_{KA} > V_{REF}$ MODE



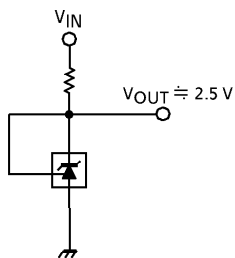
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) OFF-STATE MODE

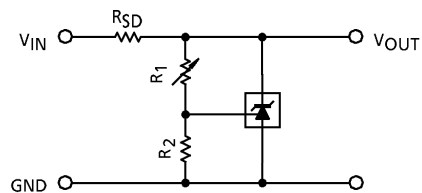


TYPICAL APPLICATIONS

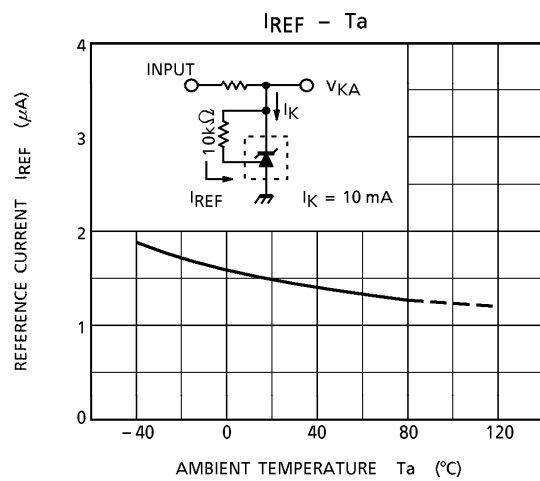
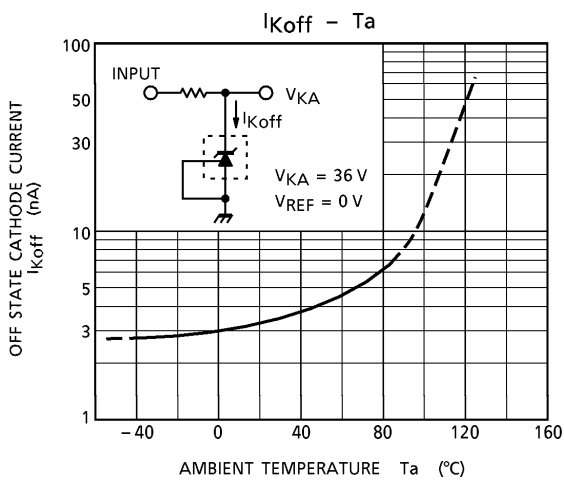
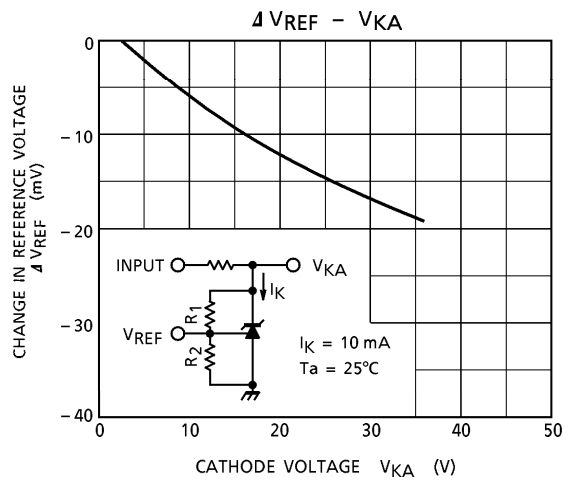
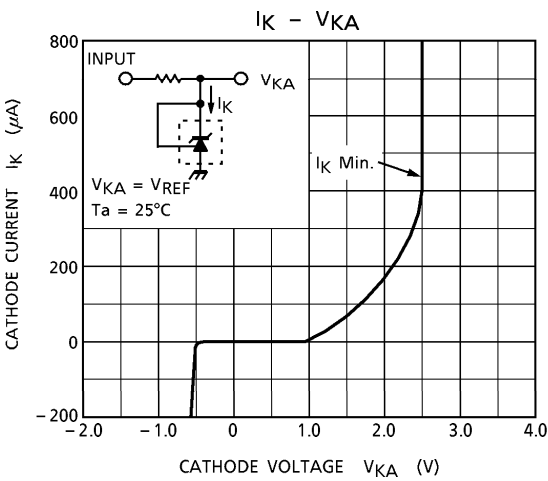
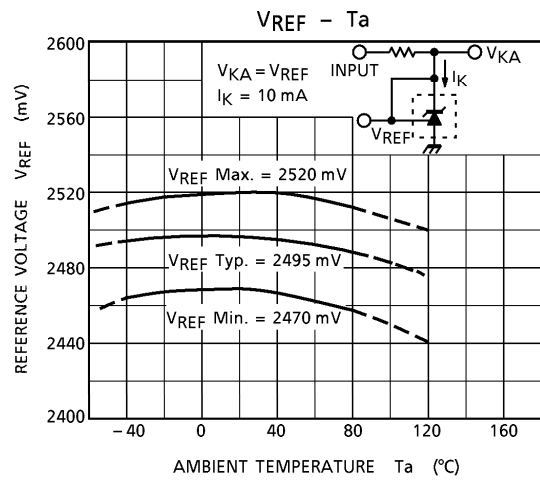
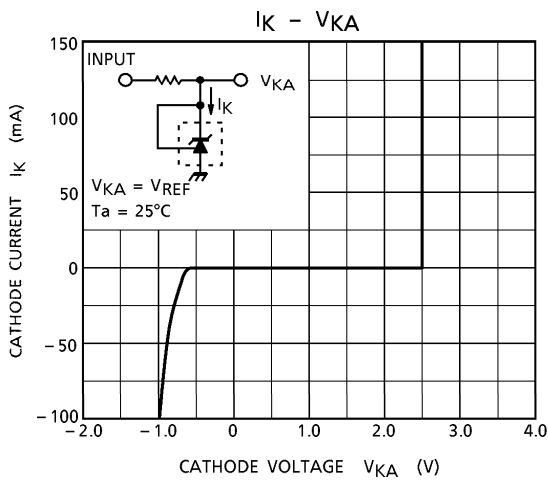
(1) 2.5 V REFERENCE

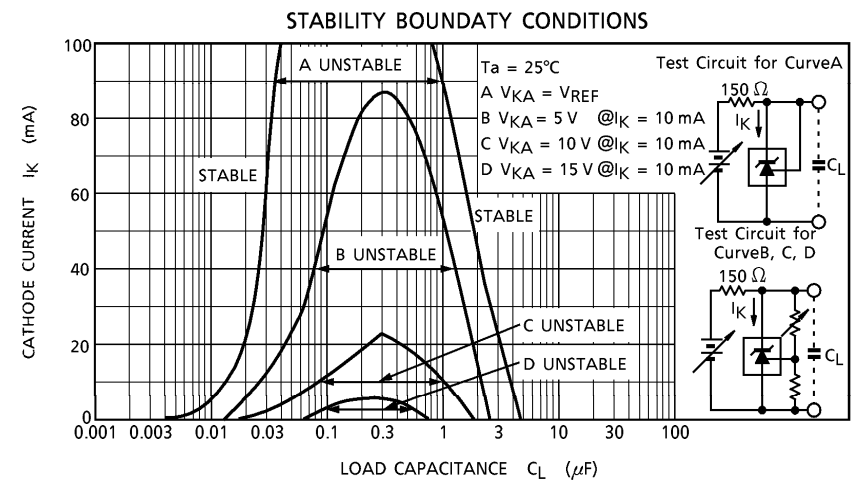
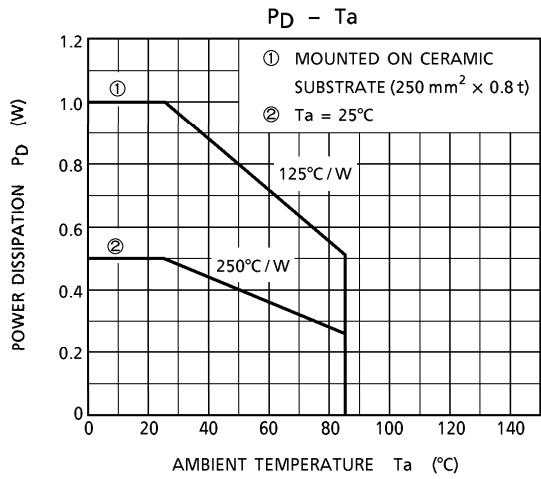
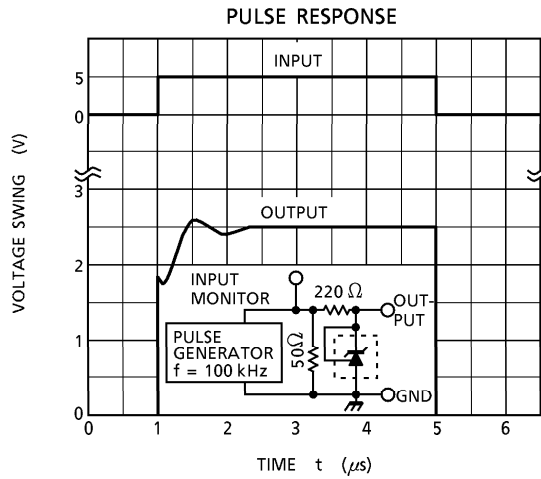
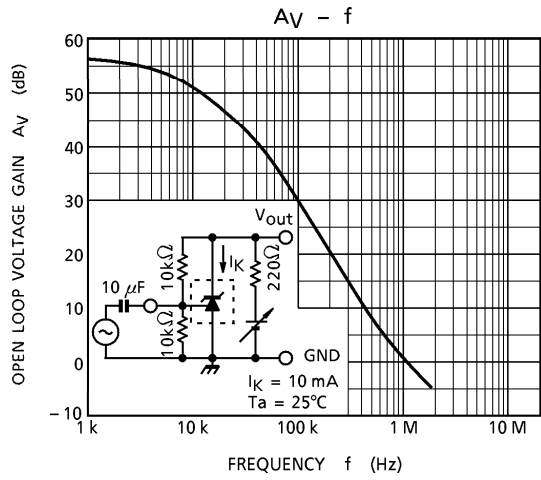
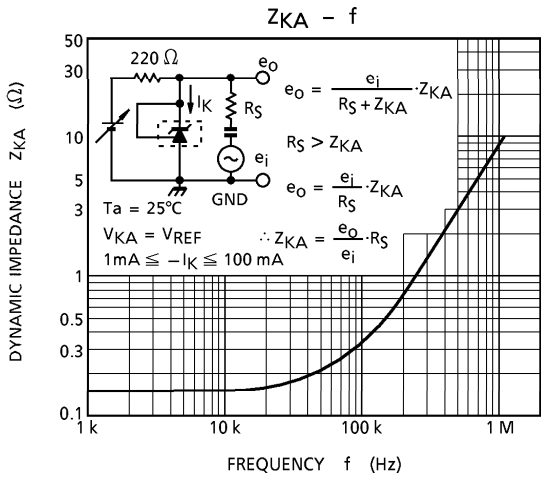


(2) SHUNT REGULATOR



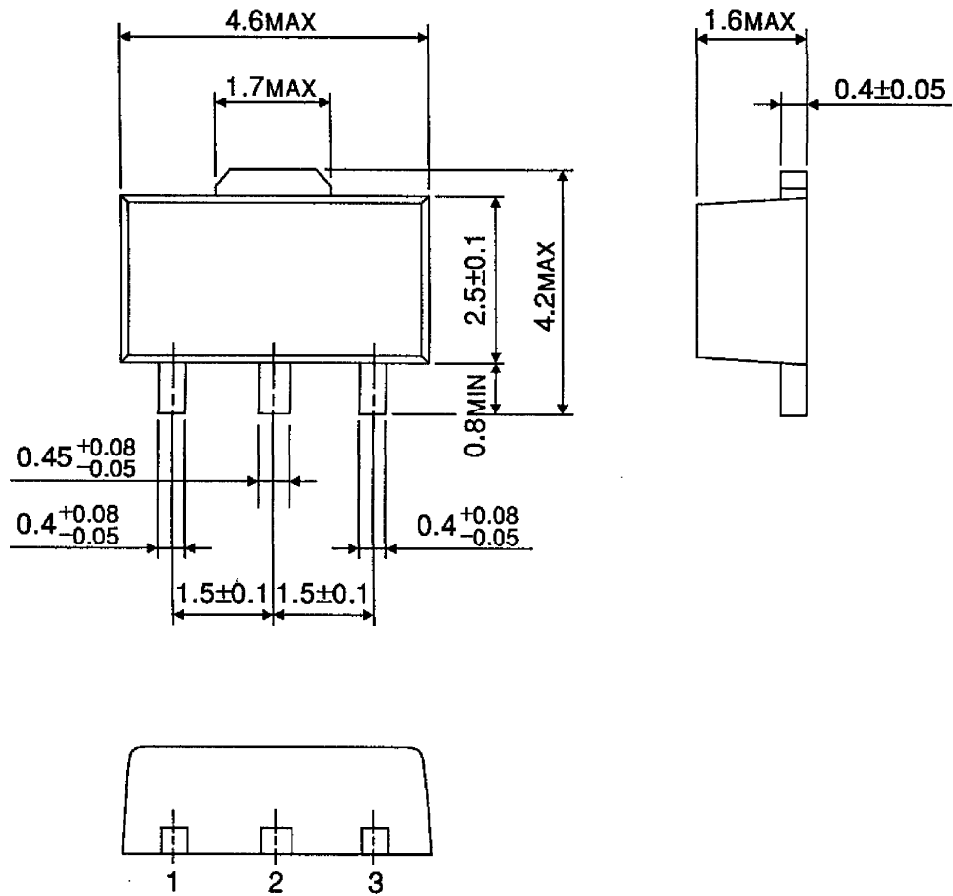
$$V_{OUT} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$





OUTLINE DRAWING
HSOP3-P-1.50

Unit : mm



Weight : 0.05 g (Typ.)