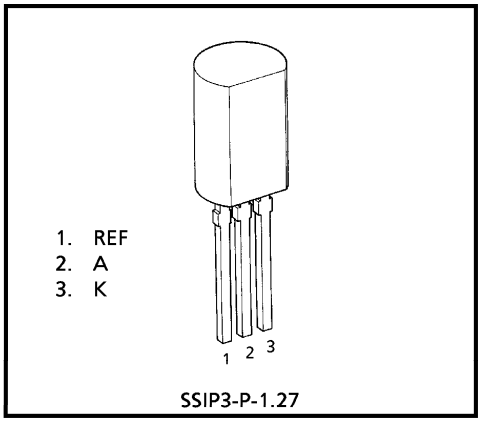
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA76431AS

ADJUSTABLE PRECISION SHUNT REGULATOR

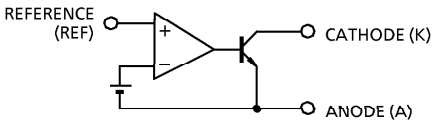
FEATURES

- Precision Reference Voltage : V_{REF} = 2.495 V ± 1%
- Small Temperature Coefficient : $|\alpha V_{REF}|$ = 46 ppm / °C
- Adjustable Output Voltage : $V_{REF} \leqq V_{OUT} \leqq 36$ V
- Low Dynamic Output Impedance : $|Z_{KA}| = 0.15\ \Omega$ (Typ.)

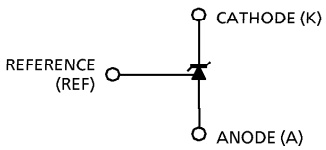


Weight : 0.36 g (Typ.)

FUNCTIONAL BLOCK DIAGRAM

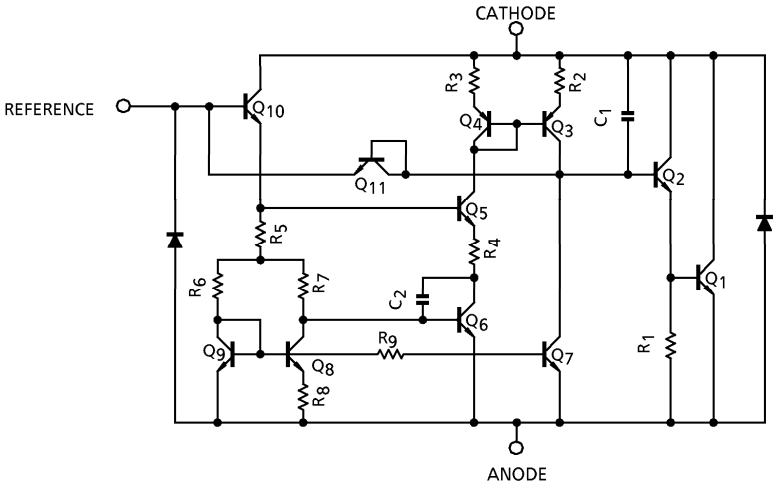


CIRCUIT SYMBOL



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

EQUIVALENT CIRCUIT



980910EBA1

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	800	mW
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

RECOMMENDED OPERATING CONDITIONS

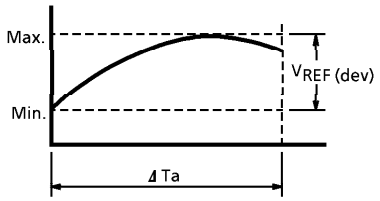
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V_{KA}	V_{REF}	—	36	V
Cathode Current	I_K	1	—	100	mA
Operating Temperature	T_{opr}	−40	—	85	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta = 25°C, I_K = 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	$\Delta V_{REF} / \Delta V$	—	$V_{REF} \leqq V_{KA} \leqq 10$ 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	$\lvert Z_{KA} \rvert$	—	$V_{KA} = V_{REF}$, f ≦ 1 kHz 1 mA ≦ I_K ≦ 100 mA	—	0.15	0.5	Ω

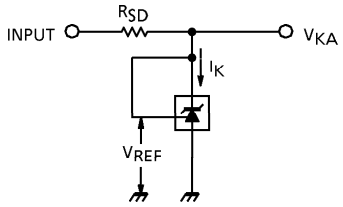
Note : The deviation parameters V_{REF} (dev) and I_{REF} (dev) are defined as the maximum variation of the V_{REF} and I_{REF} over the rated temperature range.
The average temperature coefficient of the V_{REF} is defined as ;

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

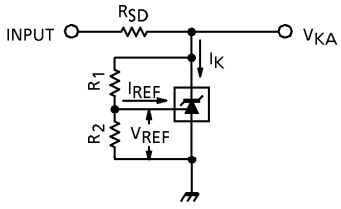


TEST PARAMETER

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

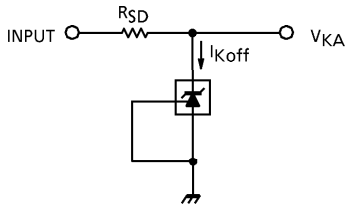


(2) $V_{KA} > V_{REF}$ MODE



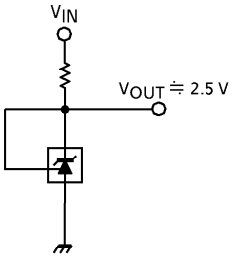
$$V_{KA} = V_{REF}\left(1 + \frac{R_1}{R_2}\right) + I_{REF} \cdot R_1$$

(3) OFF-STATE MODE

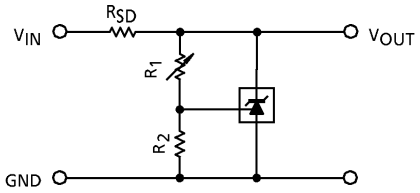


TYPICAL APPLICATIONS

(1) 2.5 V REFERENCE

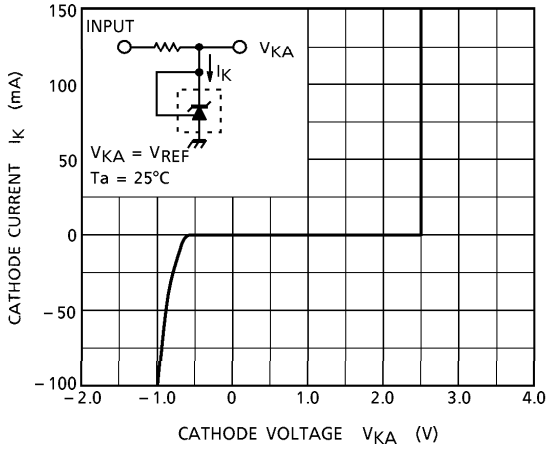


(2) SHUNT REGULATOR

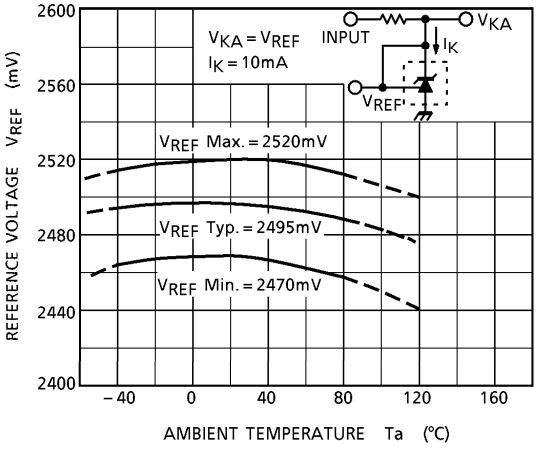


$$V_{OUT} = V_{REF}\left(1 + \frac{R_1}{R_2}\right) + I_{REF} \cdot R_1$$

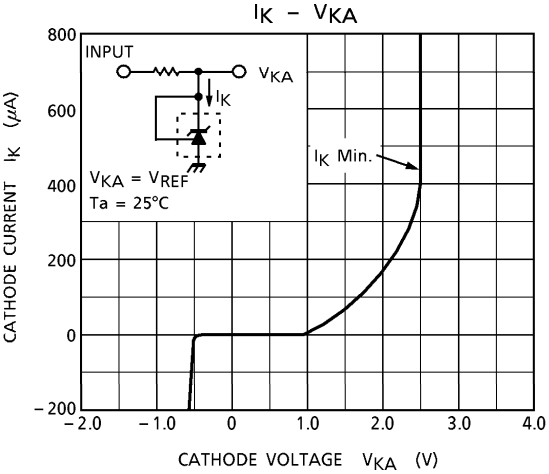
I_K – V_{KA}



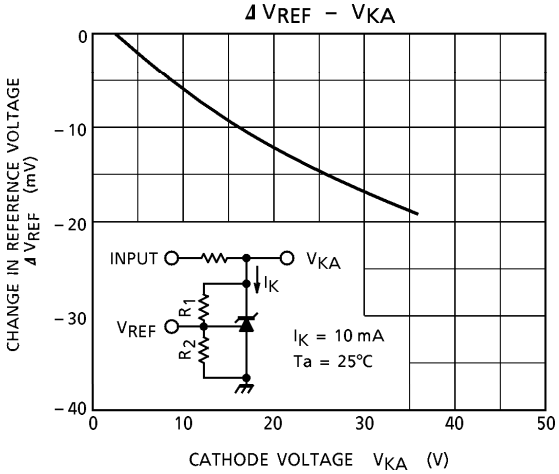
V_{REF} – Ta



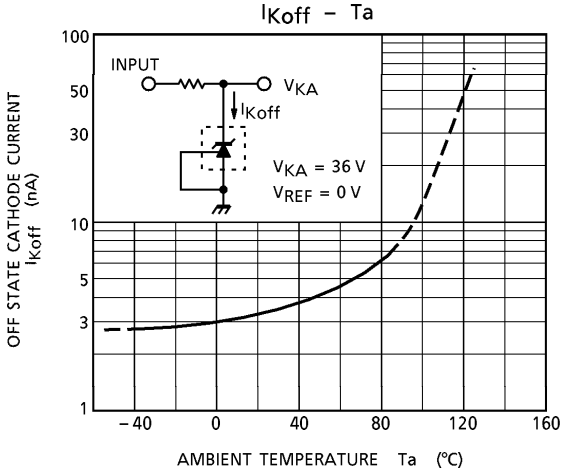
I_K – V_{KA}



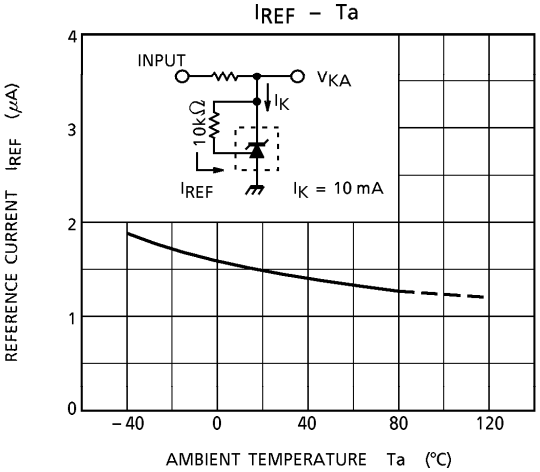
ΔV_{REF} – V_{KA}



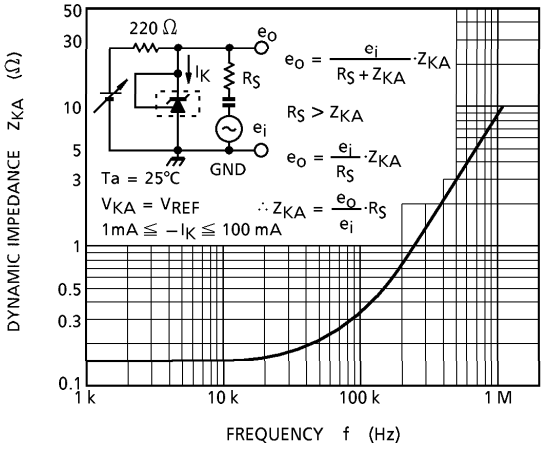
I_{Koff} – Ta



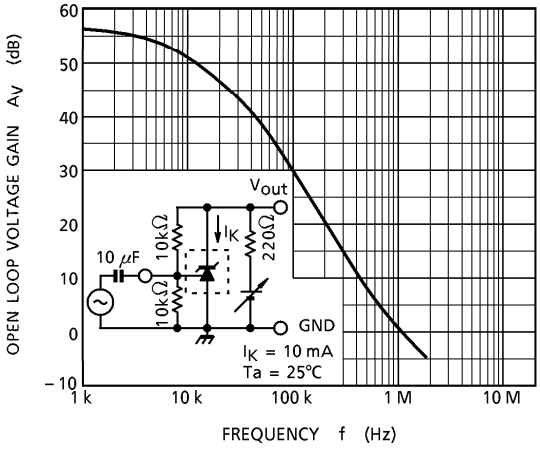
I_{REF} – Ta



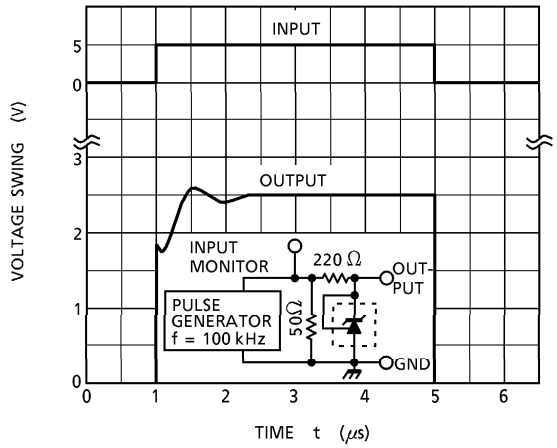
Z_{KA} – f



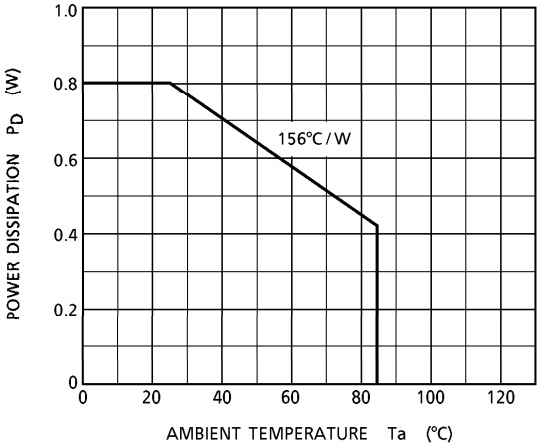
A_V – f



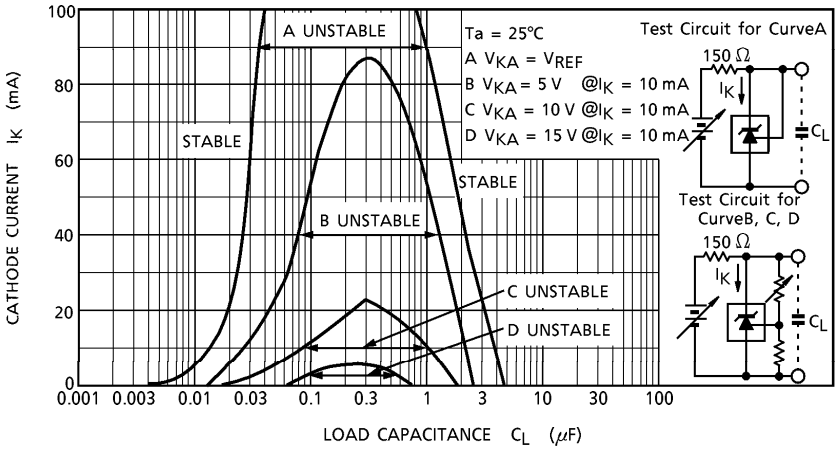
PULSE RESPONSE



P_D – Ta



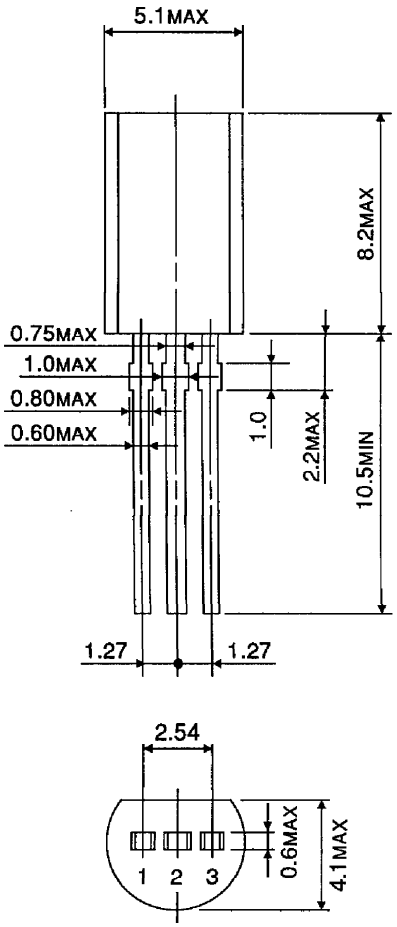
STABILITY BOUNDATY CONDITIONS



OUTLINE DRAWING

SSIP3-P-1.27

Unit : mm



Weight : 0.36 g (Typ.)