

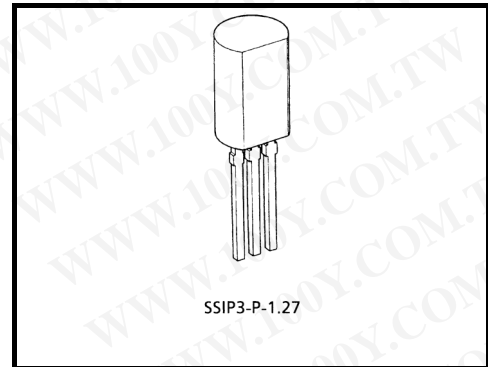
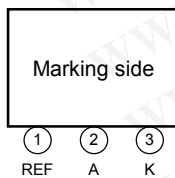
TA76431S

Adjustable Precision Shunt Regulator

Features

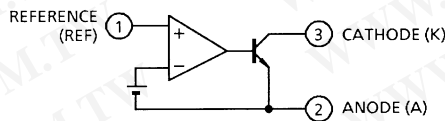
- Precision reference voltage: $V_{REF} = 2.495\text{ V} \pm 2.2\%$
- Small temperature coefficient: $|\alpha V_{REF}| = 46\text{ ppm}/^\circ\text{C}$
- Adjustable output voltage: $V_{REF} \leq V_{OUT} \leq 36\text{ V}$
- Low dynamic output impedance: $|Z_{KA}| = 0.15\ \Omega$ (Typ.)

Pin Assignment

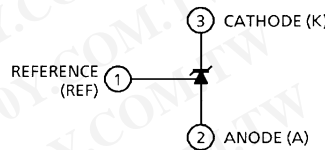


Weight: 0.36 g (typ.)

Functional Block Diagram

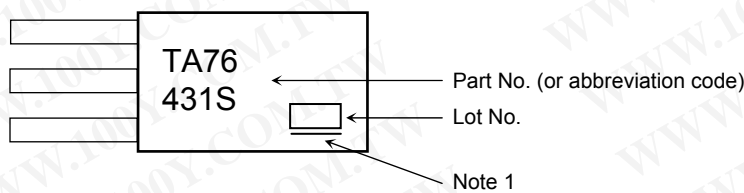


Circuit Symbol



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

Marking

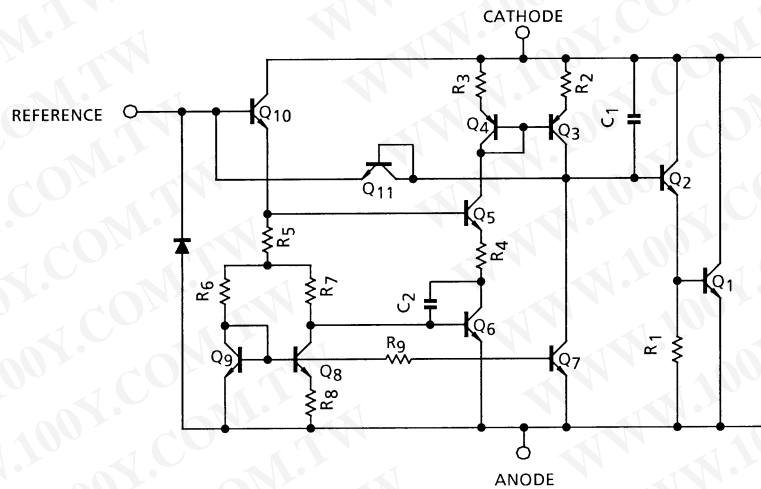


Note 1: A line under a Lot No. identifies the indication of product Labels.
 Not underlined: $[[\text{Pb}]]/\text{INCLUDES} > \text{MCV}$
 Underlined: $[[\text{G}]]/\text{RoHS COMPATIBLE}$ or $[[\text{G}]]/\text{RoHS} [[\text{Pb}]]$

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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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	μA
Reference-anode reverse current	$-I_{REF}$	10	mA
Power dissipation	$T_a = 25^\circ C$ P_D	800	mW
Operating temperature	T_{opr}	-40 to 85	$^\circ C$
Storage temperature	T_{stg}	-55 to 150	$^\circ C$

Note 2: 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	$^\circ C$

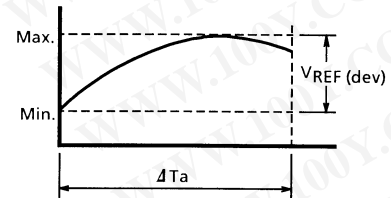
Electrical Characteristics (Unless otherwise specified, Ta = 25°C, I_K = 10 mA)

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 (dev)} (Note 3)	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 3)	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 3: 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.

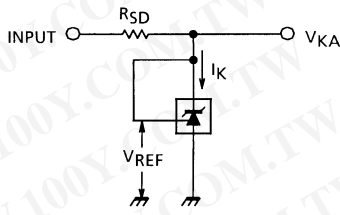
The average temperature coefficient of the V_{REF} is defined as:

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

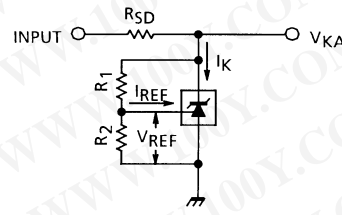


Test Parameter

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

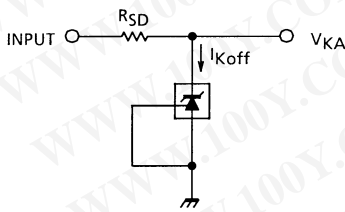


(2) $V_{KA} > V_{REF}$ mode



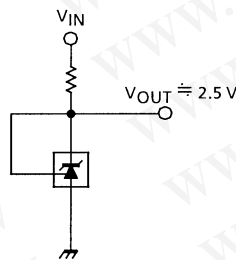
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) Off-state mode

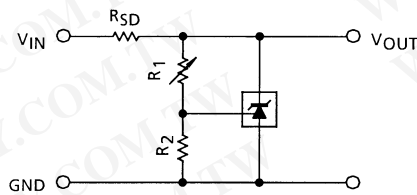


Typical Applications

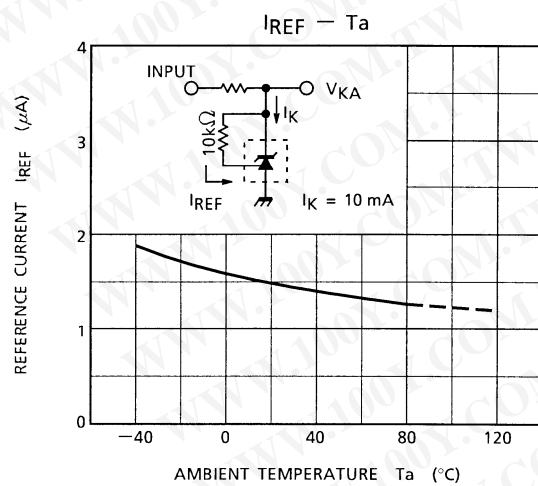
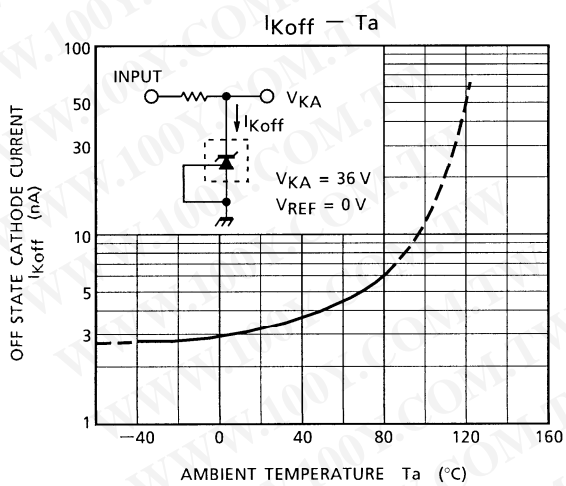
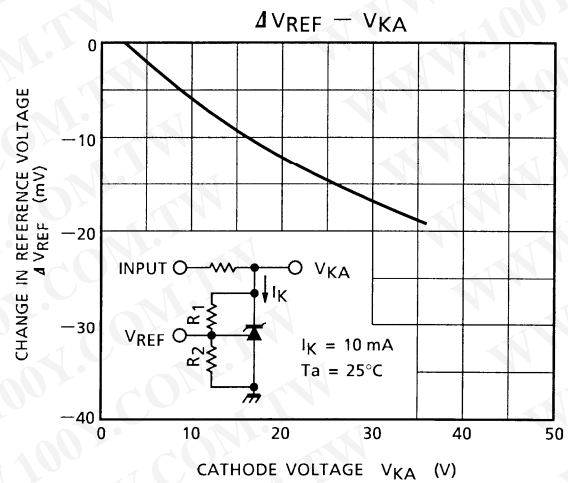
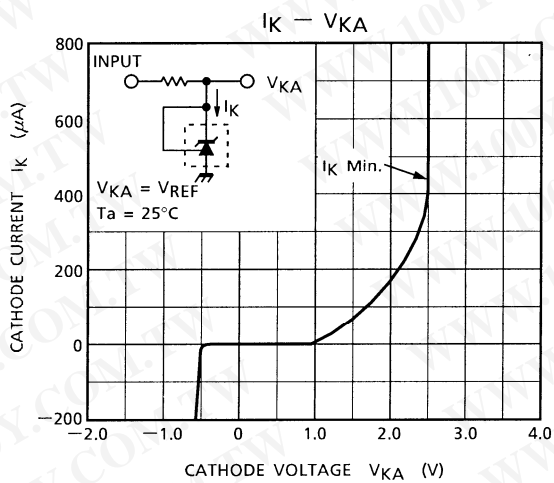
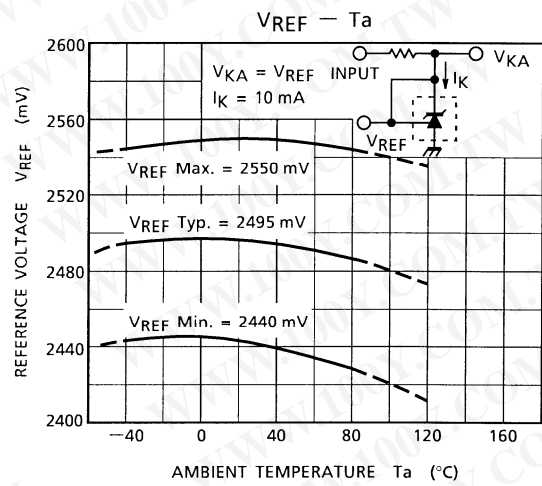
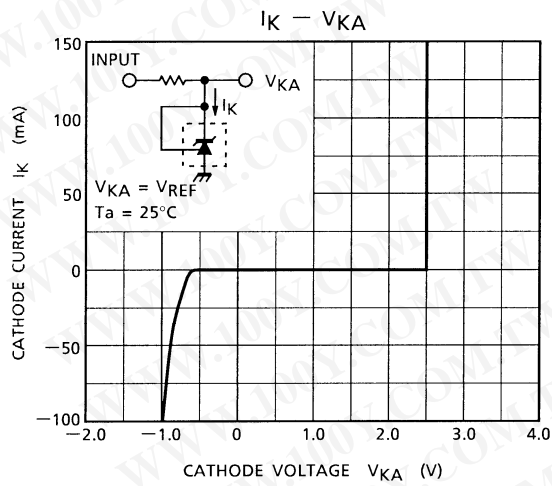
(1) 2.5 V reference

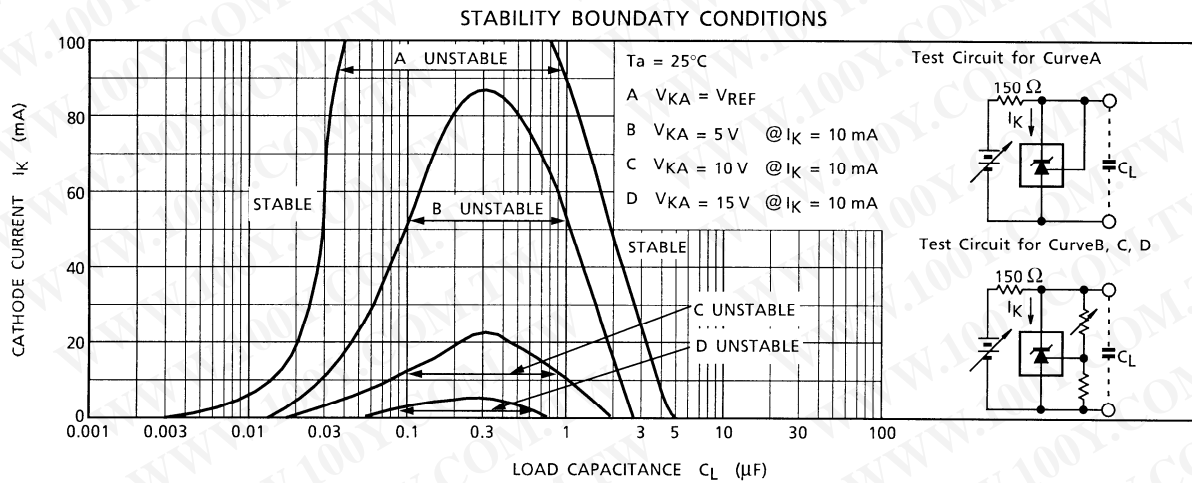
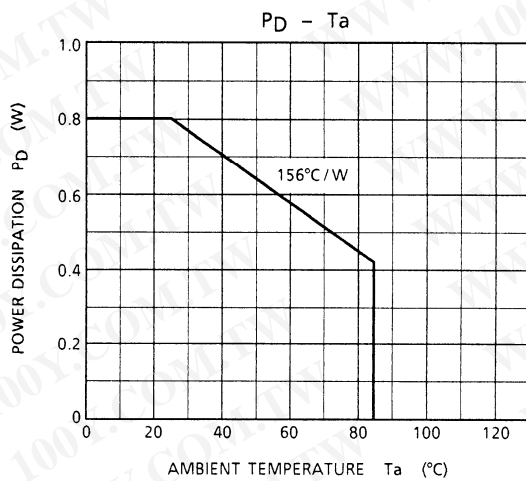
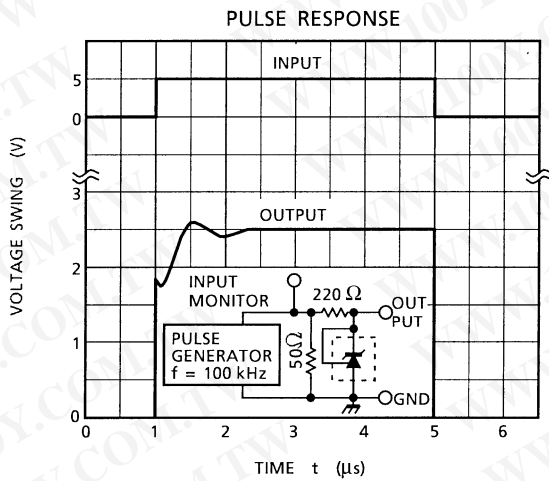
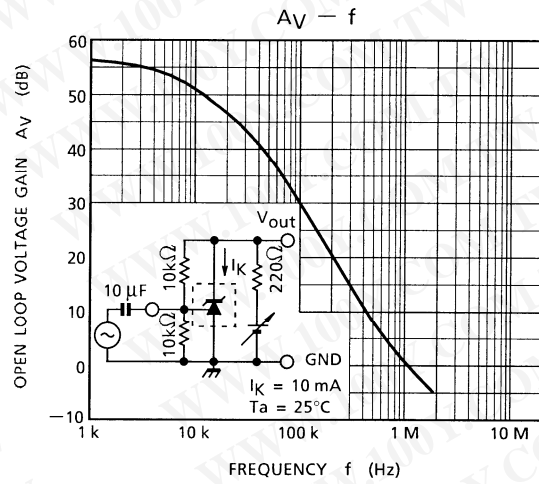
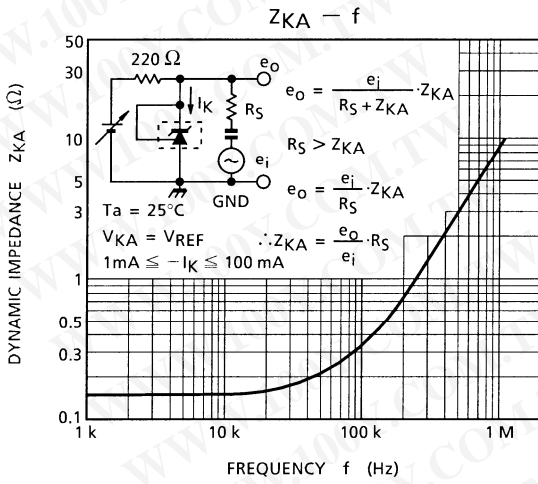


(2) Shunt regulator



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

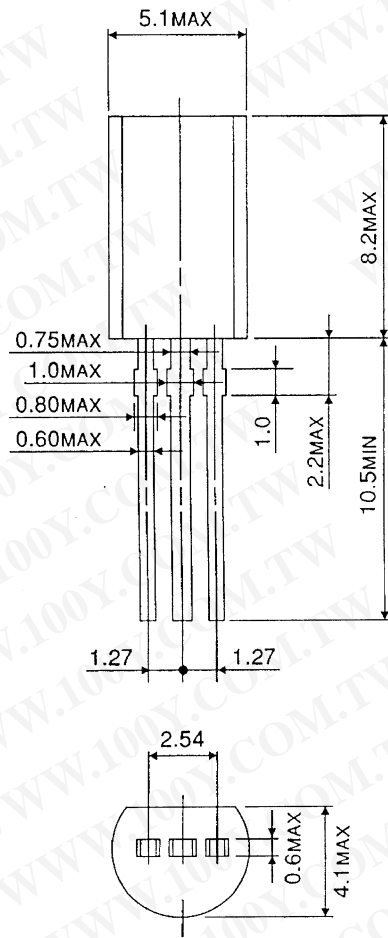




Package Dimensions

SSIP3-P-1.27

Unit : mm



Weight : 0.36 g (Typ.)

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