

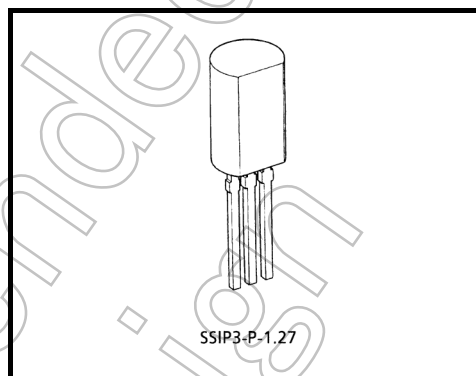
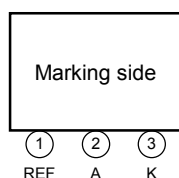
TA76431S

Adjustable Precision Shunt Regulator

Features

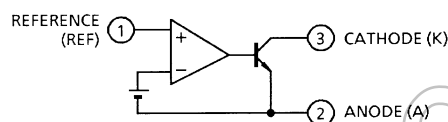
- Precision reference voltage: $V_{REF} = 2.495 \text{ V} \pm 2.2\%$
- Small temperature coefficient: $|\alpha V_{REF}| = 46 \text{ ppm}/^\circ\text{C}$
- Adjustable output voltage: $V_{REF} \leq V_{OUT} \leq 36 \text{ V}$
- Low dynamic output impedance: $|Z_{KA}| = 0.15 \Omega \text{ (Typ.)}$

Pin Assignment

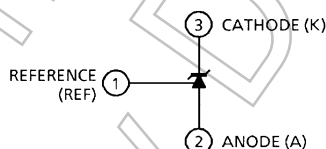


Weight: 0.36 g (typ.)

Functional Block Diagram

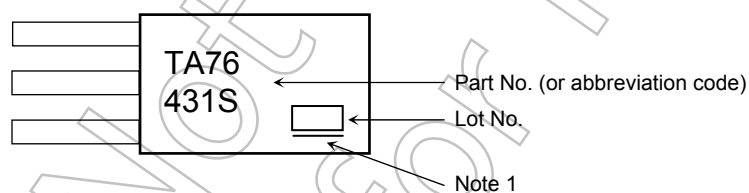


Circuit Symbol



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 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.

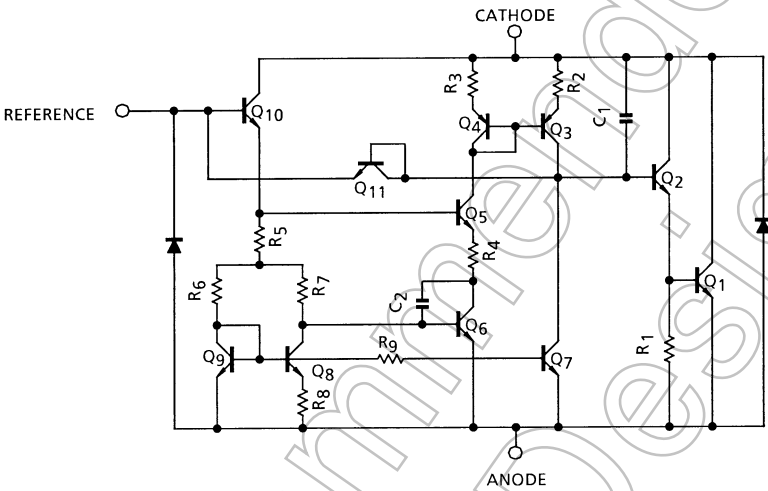
Start of commercial production
1998-11

How to Order

Product No.	Package Type	Packing Type and Capacity
TA76431S (F)	LSTM (lead type)	Loose in bag: 200 pcs/bag
TA76431S (TPE6,F)		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	μA
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

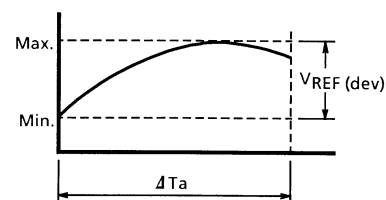
Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$, $I_K = 10\text{ mA}$)

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.

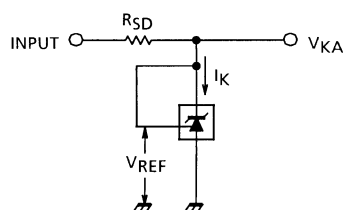
The average temperature coefficient of the V_{REF} is defined as:

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

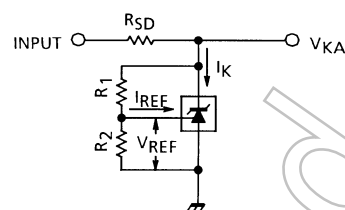


Test Parameter

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

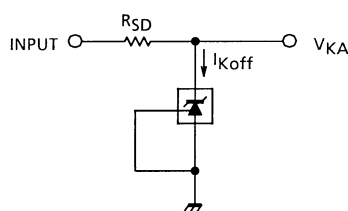


(2) $V_{KA} > V_{REF}$ mode



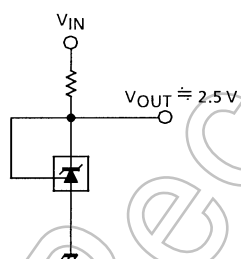
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) Off-state mode

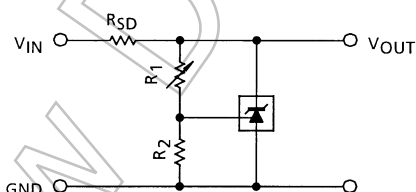


Typical Applications

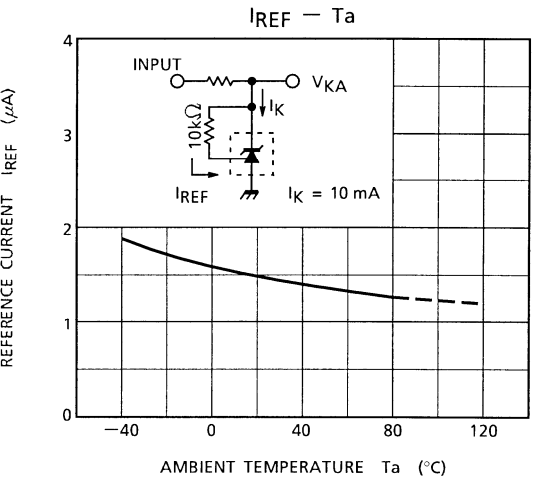
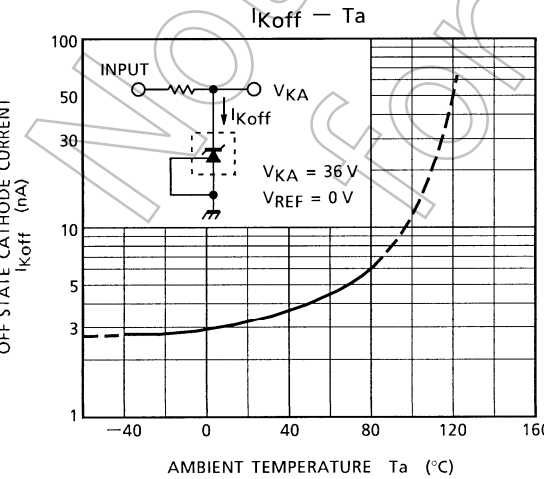
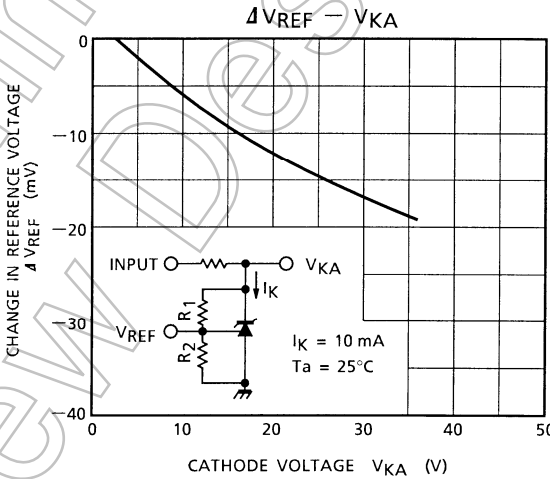
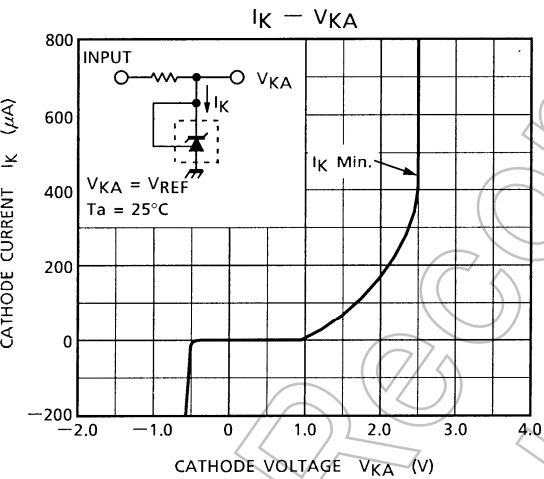
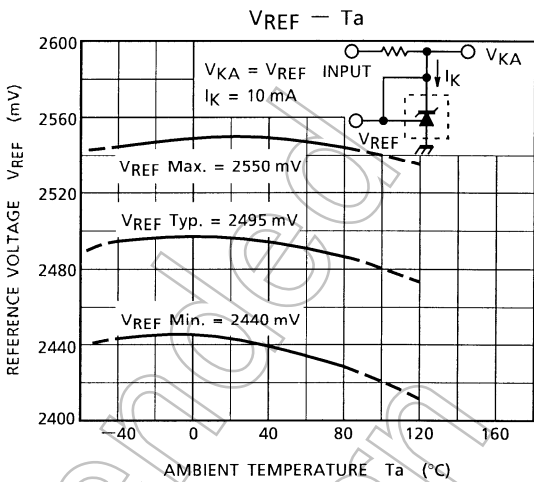
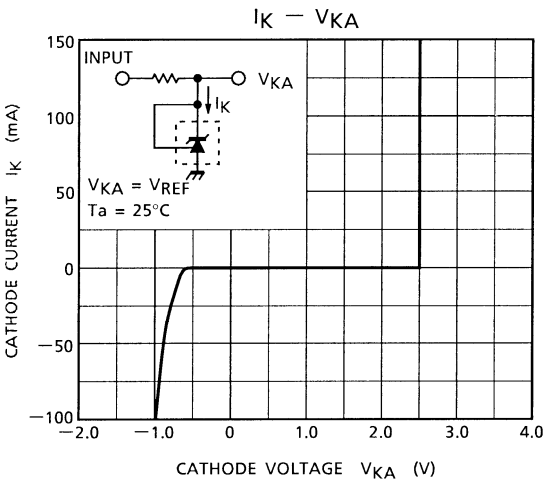
(1) 2.5 V reference

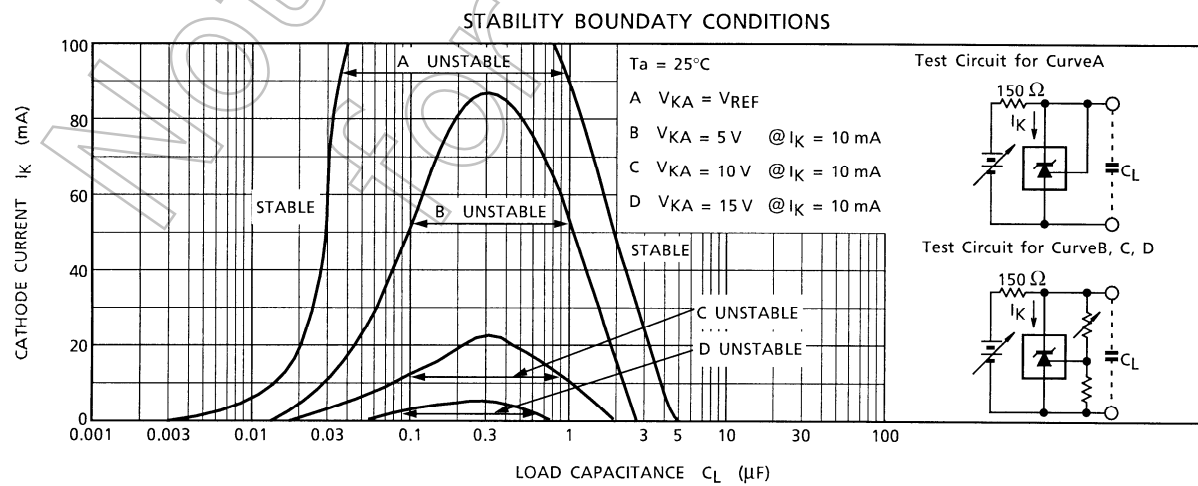
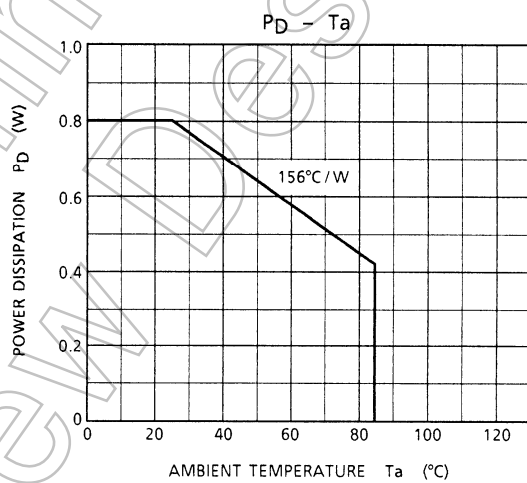
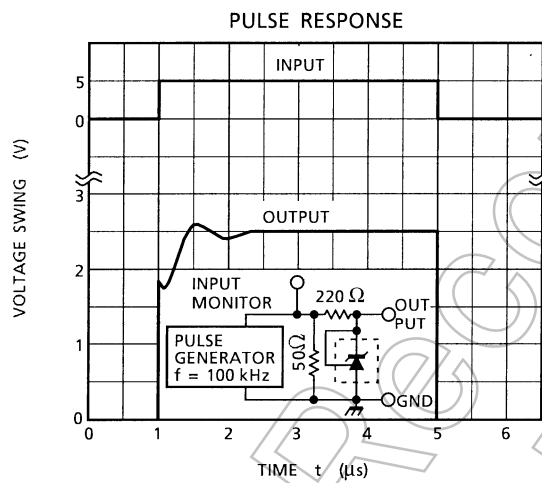
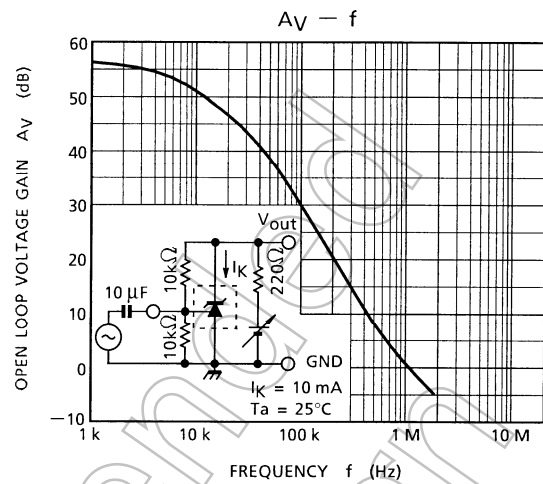
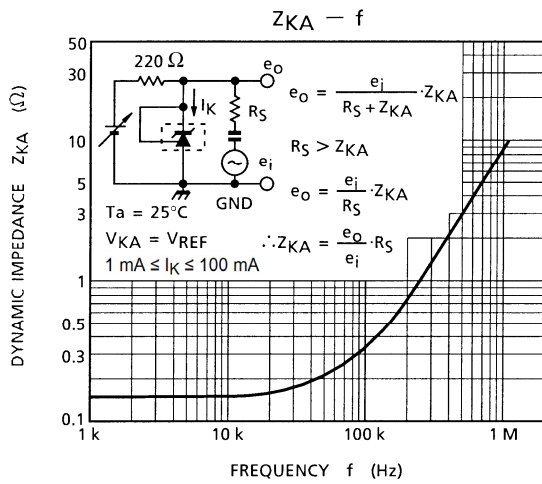


(2) Shunt regulator



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

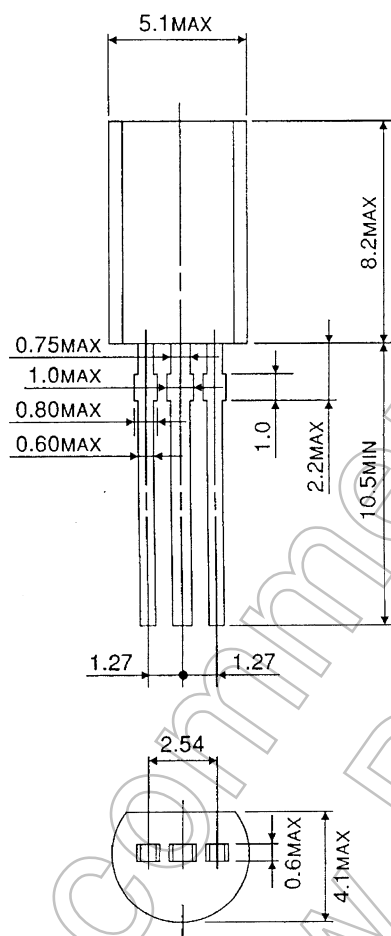




Package Dimensions

SSIP3-P-1.27

Unit : mm



Weight : 0.36 g (Typ.)

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