TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

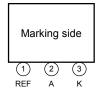
TA76431S

Adjustable Precision Shunt Regulator

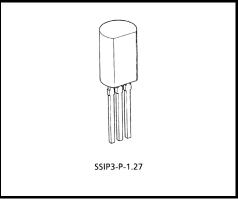
Features

- Precision reference voltage: $V_{REF} = 2.495 V \pm 2\%$
- Small temperature coefficient: $|\alpha V_{REF}| = 46 \text{ ppm/°C}$
- Adjustable output voltage: $V_{REF} \le V_{OUT} \le 36 V$
- Low dynamic output impedance: $|Z_{KA}| = 0.15 \Omega$ (Typ.)

Pin Assignment

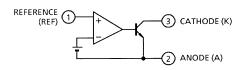


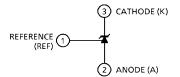
Functional Block Diagram



Weight: 0.36 g (Typ.)

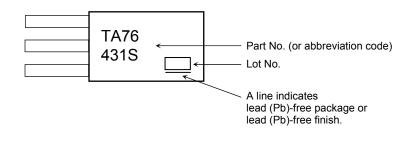
Circuit Symbol



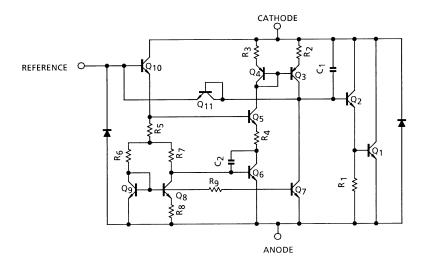


This IC contains electrostatic sensitive elements. Please handle with caution.

Marking



Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Cathode voltage		V _{KA}	37	V	
Cathode current		١ _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	PD	800	mW	
Operating temperature		T _{opr}	-40~85	°C	
Storage temperature		T _{stg}	-55~150	°C	

Note: 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 Range

Characteristics	Symbol	Min	Тур.	Max	Unit
Cathode voltage	V _{KA}	V_{REF}	_	36	V
Cathode current	١ _K	1	_	100	mA
Operating temperature	T _{opr}	-40	-	85	°C

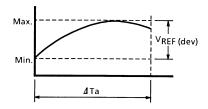
Electrical Characteristics (Unless otherwise specified, Ta = 25° C, I_K = 10 mA)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	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 1)	_	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	$m \rangle / \rangle /$	
		_	10 V ≤ V _{KA} ≤ 36 V		0.5	2.0	mV/V	
Reference input current	I _{REF}	_	V _{KA} = V _{REF}		1.4	4	μA	
Deviation of reference input current over temperature	I _{REF (dev)} (Note 1)	_	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 1: 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.

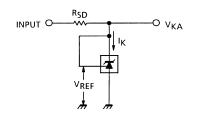
The average temperature coefficient of the $\mathsf{V}_{\mathsf{REF}}$ is defined as:

$$|\alpha V_{\text{REF}}| = \frac{\frac{V_{\text{REF}} (\text{dev})}{V_{\text{REF}} @25^{\circ}\text{C}} \times 10^{6}}{4 \text{ Ta}} \text{ (ppm / °C)}$$

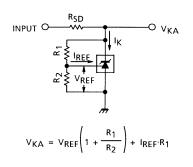


Test Parameter

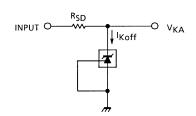
(1) $V_{KA} = V_{REF}$ mode



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

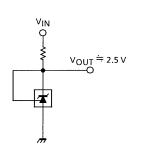


(3) Off-state mode

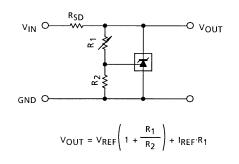


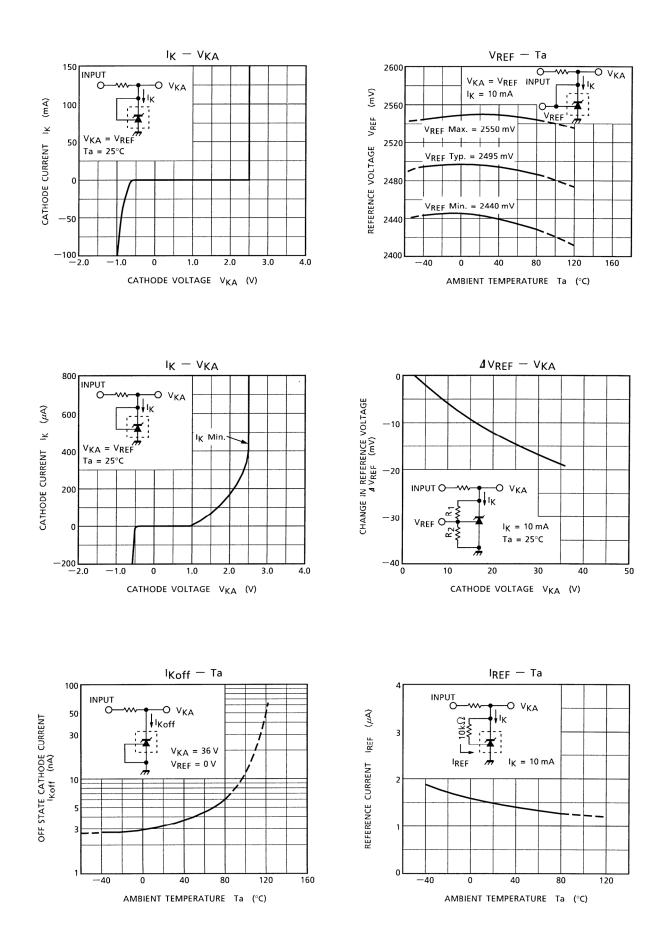
Typical Applications

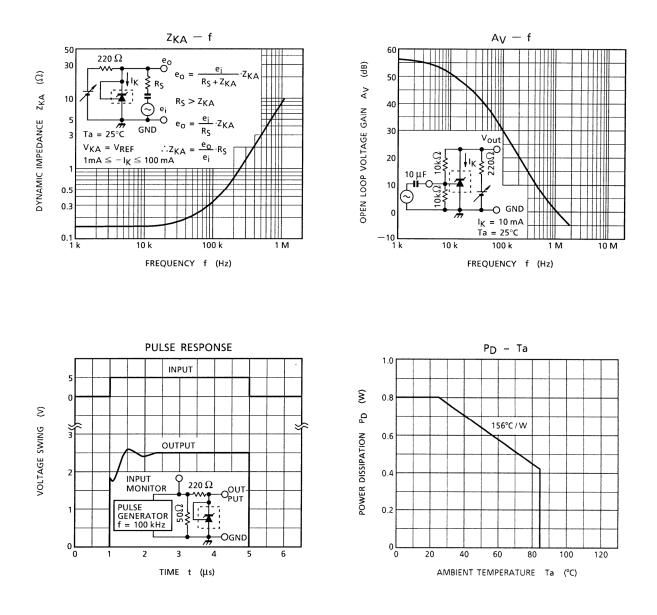
(1) 2.5 V reference



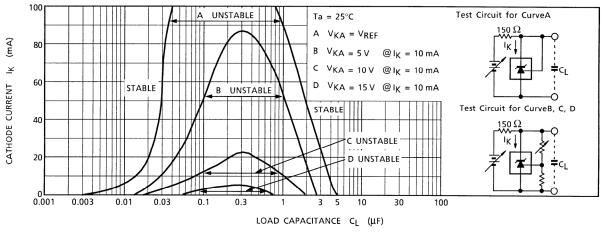
(2) Shunt regulator



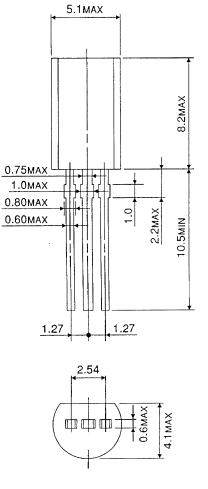




STABILITY BOUNDATY CONDITIONS



SSIP3-P-1.27



Weight : 0.36 g (Typ.)

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RESTRICTIONS ON PRODUCT USE

20070701-EN

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