

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

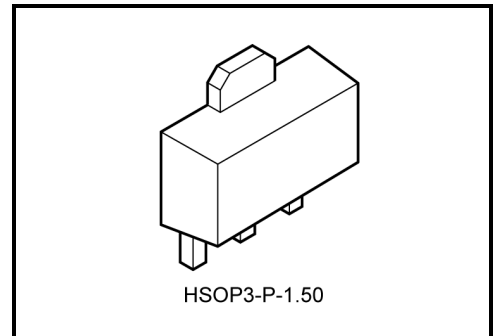
TA76431F, TA76431FR

Adjustable Precision Shunt Regulator

Features

- Precision Reference Voltage: $V_{REF} = 2.495\text{ V} \pm 2\%$
- 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.)
- Small Flat Package
- TA76431FR is a new Toshiba shunt regulator.

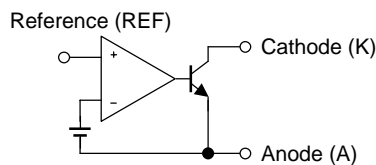
This device's pin assignment is the reverse of that of the TA76431F.



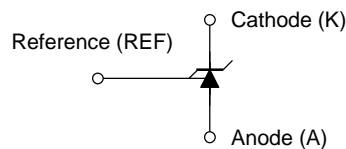
HSOP3-P-1.50

Weight: 0.05 g (typ.)

Functional Block Diagram

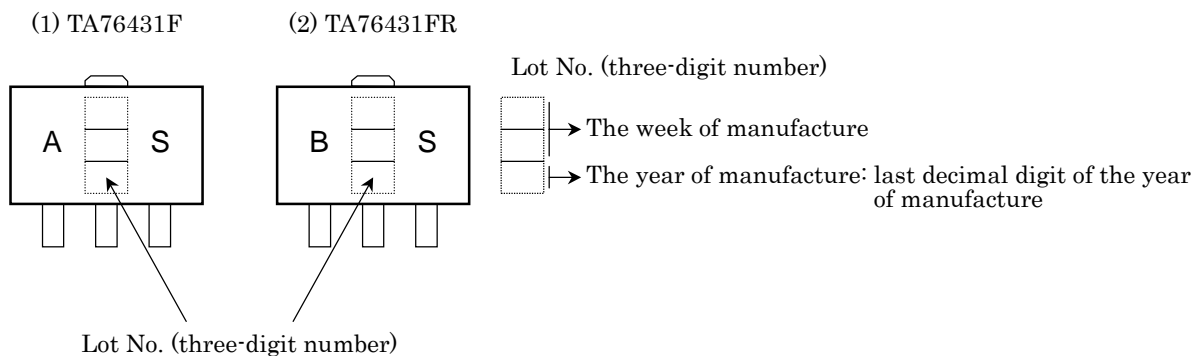


Circuit Symbol

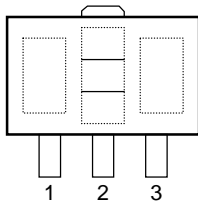


This IC contains electrostatic sensitive elements. Please take care to avoid generating static electricity when handling these devices.

Marking



Pin Assignment

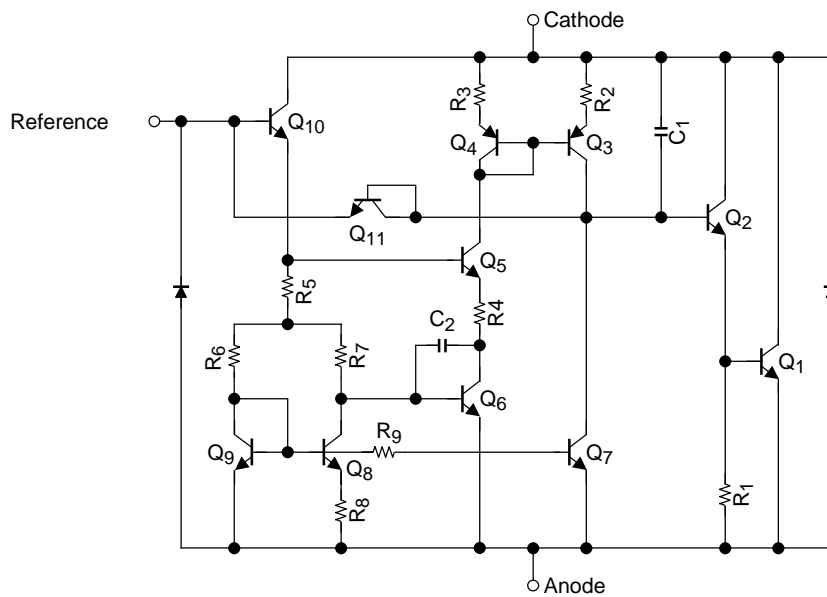


No.	(1) TA76431F	(2) TA76431FR
1	Cathode (K)	Reference (REF)
2	Anode (A)	Anode (A)
3	Reference (REF)	Cathode (K)

How to Order

No.	Product No.	Package Type	Packing Type	Minimum Order
(1)	TA76431F	PW-MINI (SOT-89) (surface-mount type)	On cut tape (TE12L): 100/tape section	100
	TA76431F (TE12L)		Embossed tape: 1000/tape	1 tape
(2)	TA76431FR		On cut tape (TE12L): 100/tape section	100
	TA76431FR (TE12L)		Embossed tape: 1000/tape	1 tape

Equivalent Circuit



Maximum Ratings (Ta = 25°C)

Characteristics	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	500	mW
		1000 (Note)	
Operating temperature	T _{opr}	-40~85	°C
Storage temperature	T _{stg}	-55~150	°C

Note: Mounted on ceramic substrate (250 mm² × 0.8 mm t)

Recommended Operating Conditions

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

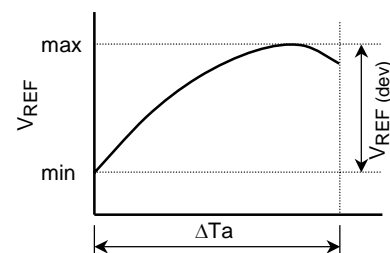
Electrical Characteristics (Unless otherwise specified, Ta = 25°C, I_K = 10 mA)

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)}	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)}	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

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.

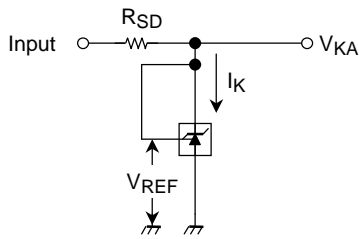
The average temperature coefficient of the V_{REF} is defined as:

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

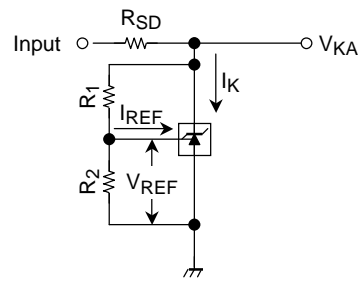


Test Parameter

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

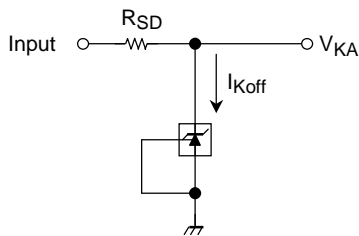


(2) $V_{KA} > V_{REF}$ Mode



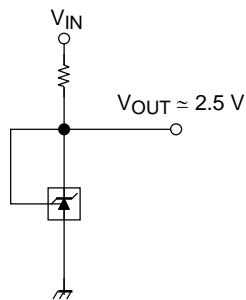
$$V_{KA} = V_{REF} \left(1 + \frac{R_1}{R_2} \right) + I_{REF} \cdot R_1$$

(3) OFF-State Mode

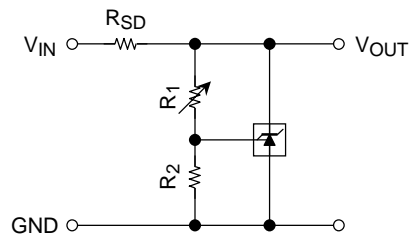


Typical Application Circuits

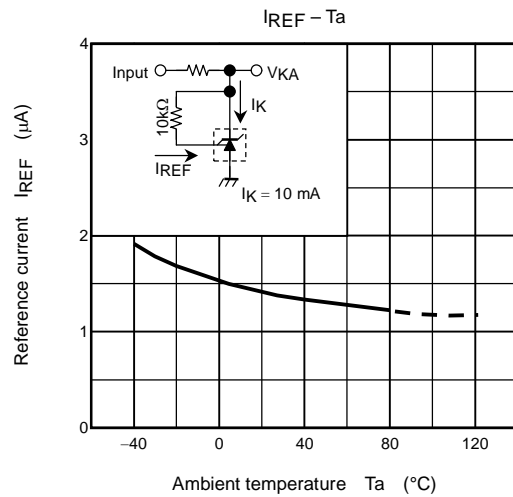
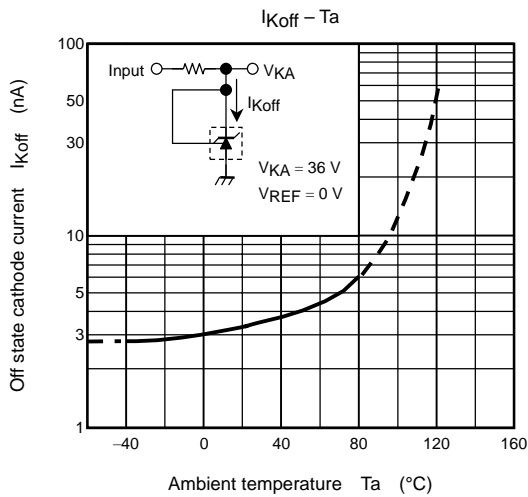
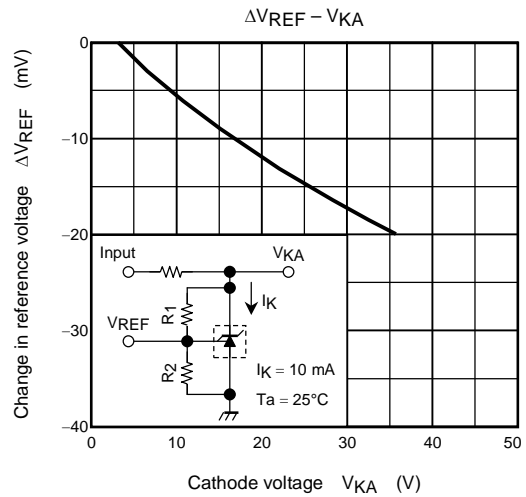
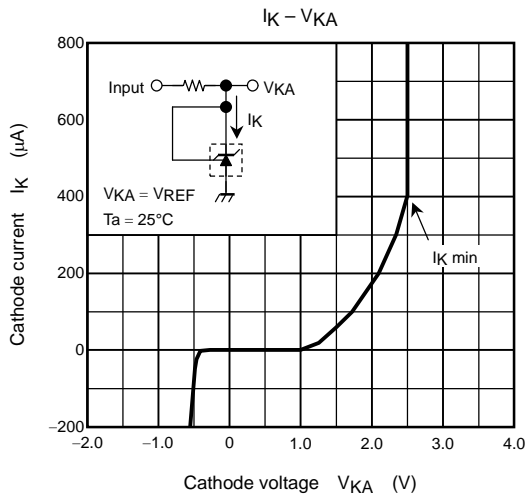
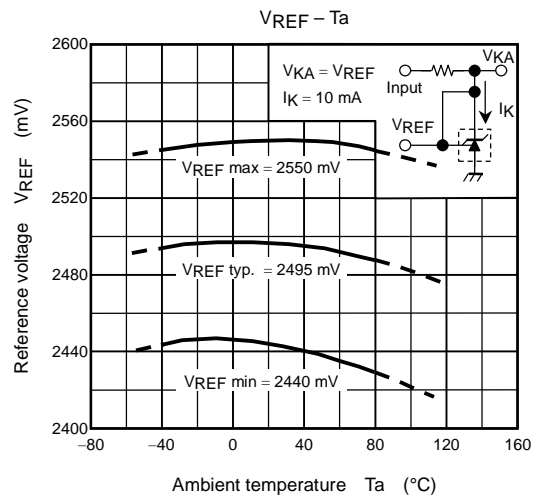
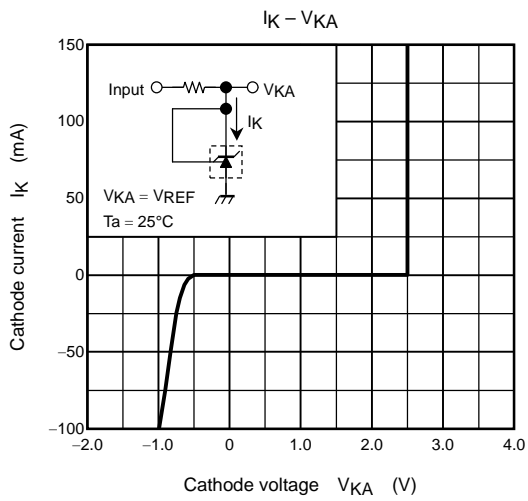
(1) 2.5 V Reference

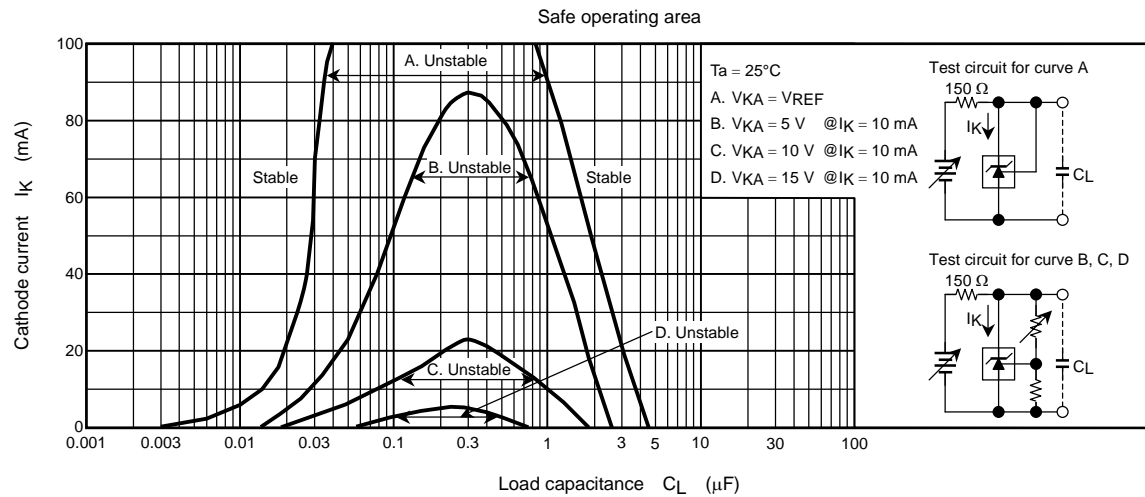
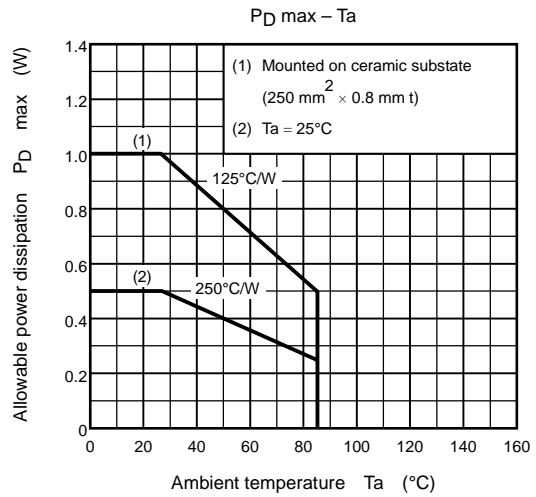
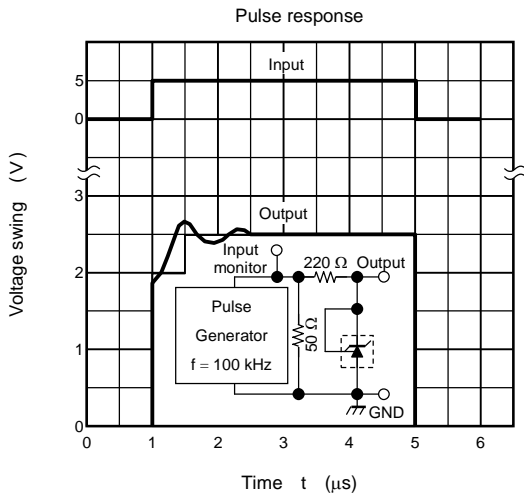
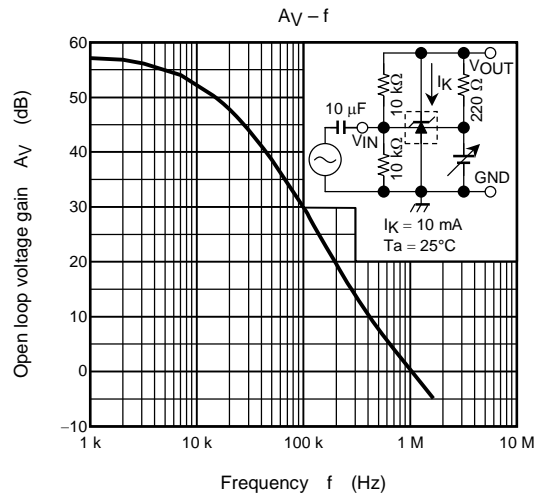
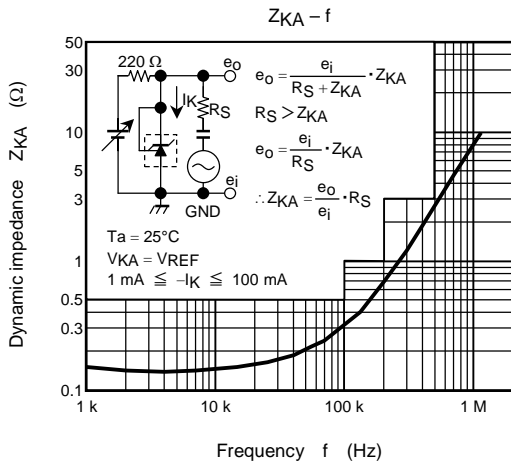


(2) Shunt Regulator



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

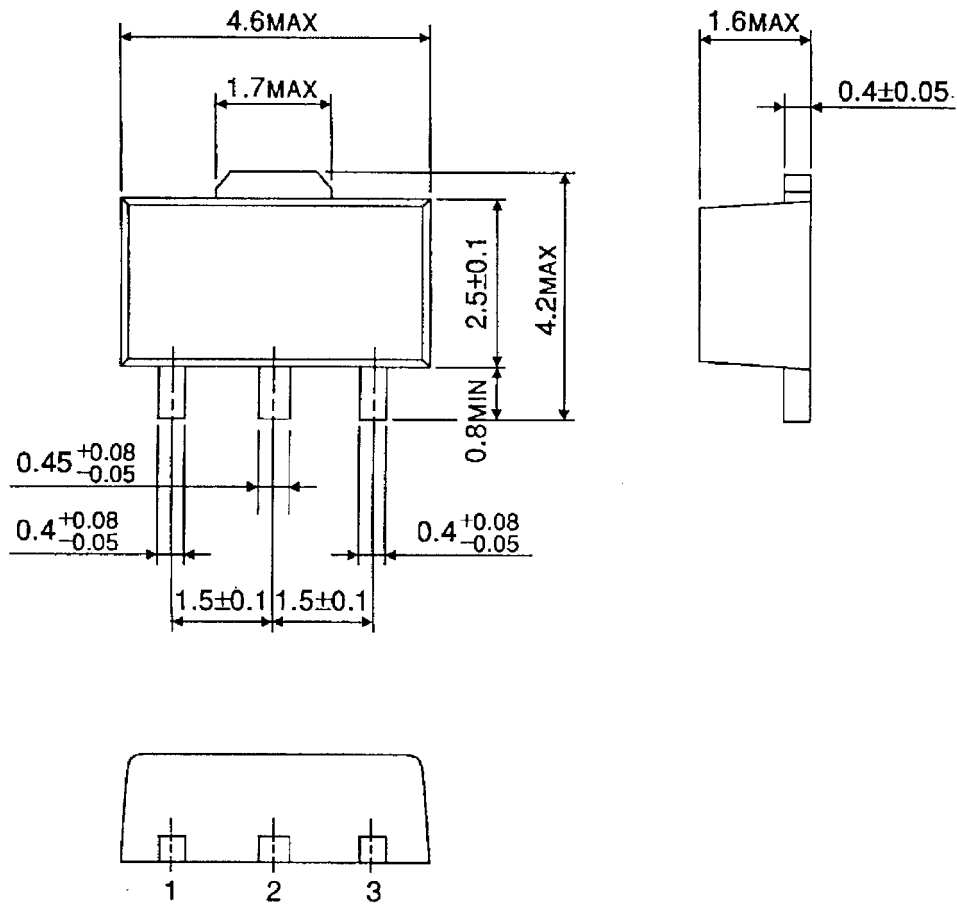




Package Dimensions

HSOP3-P-1.50

Unit : mm



Weight: 0.05 g (typ.)

RESTRICTIONS ON PRODUCT USE

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