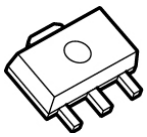
Automotive NJM1431A

ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

■FEATURES

- ●Operating Temperature -40ºC ≤ Ta ≤ +105ºC
- ● Operating Voltage V_{REF} to 36V
- ● Precision Voltage Reference 2.465V±2% (-40ºC ≤ Ta ≤ +105ºC)
- ● Adjustable Output Voltage
- ● Bipolar Technology
- ● Package Outline NJM1431AU : SOT89 (3pin)
  NJM1431AF : SOT-23-5 (MTP5)

■PACKAGE OUTLINE



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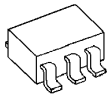

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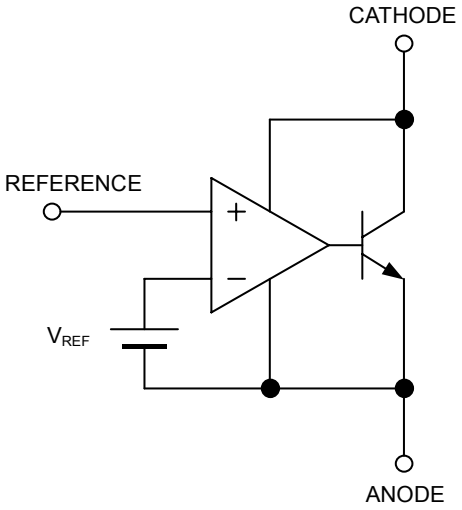
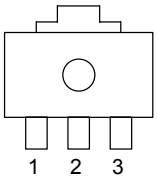
■BLOCK DIAGRAM



■PIN CONFIGURATION



1. REFERENCE
2. ANODE
3. CATHODE

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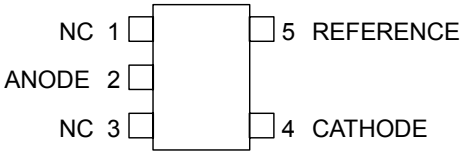

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■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Cathode Voltage	V_{KA}	+37	V
Continuous Cathode Current	I_K	-100 ~ 150	mA
Reference Input Current	I_{REF}	-0.05 ~ 10	mA
Power Dissipation	P_D	SOT89 (3pin) 625 (*1) SOT-23-5 480 (*2)	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-40 ~ +150	°C

(*1): Mounted on glass epoxy board based on EIA/JEDEC STANDARD.
(76.2 × 114.3 × 1.6mm: 2Layers, copper area 100mm^2)
(*2): Mounted on glass epoxy board based on EIA/JEDEC STANDARD.
(76.2 × 114.3 × 1.6mm: 2Layers)

■RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V_{KA}	V_{REF}	–	36	V
Cathode Current	I_K	1	–	100	mA

■ELECTRICAL CHARACTERISTICS (I_K=10mA, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_{REF}	$V_{KA}=V_{REF}$	(*3)	2.440	2.465	2.490	V
Reference Voltage Change vs. Cathode Voltage Change	$\Delta V_{REF}/\Delta V_{KA}$	$\lvert V_{REF} \rvert \le V_{KA} \le 10V$	(*4)	–	±1.4	±2.7	mV/V
		$10V \le V_{KA} \le 36V$	(*4)	–	±1.0	±2.0	mV/V
Reference Input Current	I_{REF}	R1=10kΩ, R2=∞	(*4)	–	2	4	uA
Minimum Input Current	I_{MIN}	$V_{KA}=V_{REF}$, ΔV_{REF}=1%	(*3)	–	0.4	1.0	mA
Cathode Current (Off Cond.)	I_{OFF}	V_{KA}=36V, V_{REF}=0V	(*5)	–	0.1	1.0	uA
Dynamic Impedance	$\lvert Z_{KA} \rvert$	$V_{KA}=V_{REF}$, f≤1kHz $1mA \le I_K \le 100mA$	(*3)	–	0.2	0.5	Ω

■ELECTRICAL CHARACTERISTICS (I_K=10mA, -40ºC ≤ Ta ≤ +105ºC)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_{REF}	$V_{KA}=V_{REF}$	(*3)	2.415	–	2.515	V
Reference Input Current	I_{REF}	R1=10kΩ, R2=∞	(*4)	–	–	6	uA
Minimum Input Current	I_{MIN}	$V_{KA}=V_{REF}$, ΔV_{REF}=1%	(*3)	–	–	1.0	mA

$\lvert V_{REF} \rvert$ ···Reference voltage includes error.
(*3): Test Circuit (Fig.1)
(*4): Test Circuit (Fig.2)
(*5): Test Circuit (Fig.3)

■TEST CIRCUIT

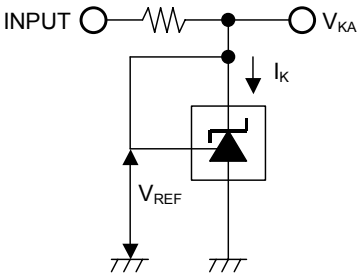


Fig.1 $V_{KA}=V_{REF}$ to test circuit

$V_O=V_{KA}=V_{REF}$

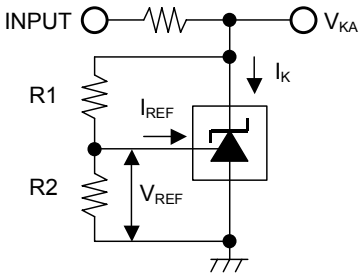


Fig.2 $V_{KA}>V_{REF}$ to test circuit

$$V_O = V_{KA} = V_{REF}\left(1+\frac{R1}{R2}\right)+I_{REF}\times R1$$

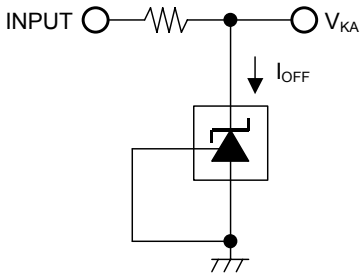
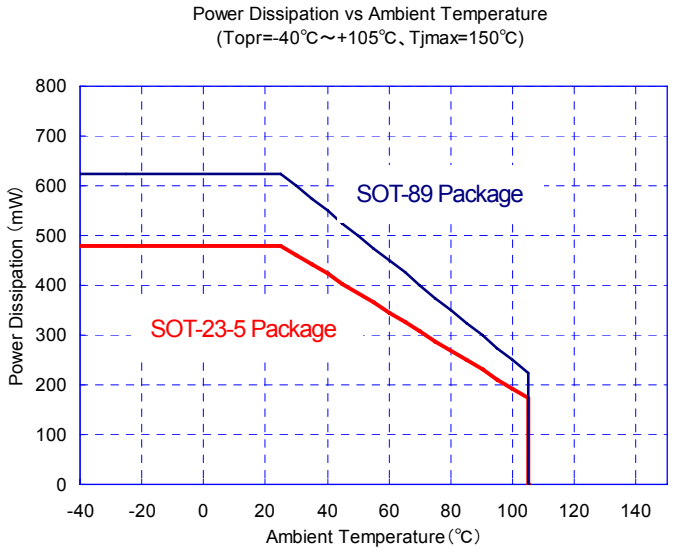


Fig.3 I_{OFF} to test circuit

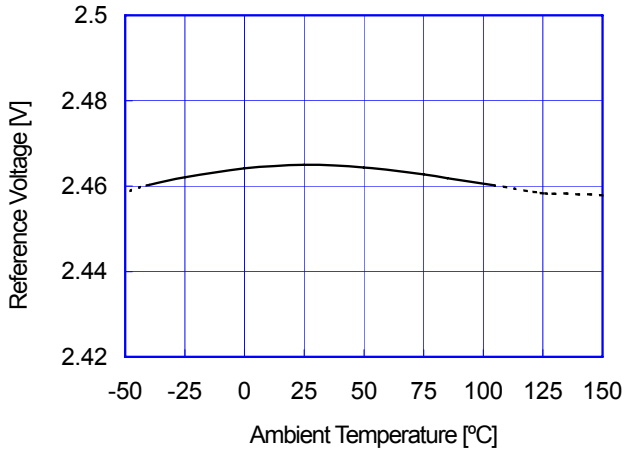
■POWER DISSIPATION VS. AMBIENT TEMPERATURE



■TYPICAL CHARACTERISTICS

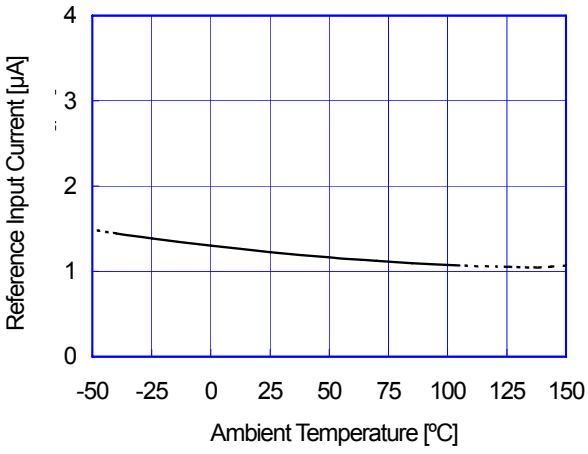
Reference Voltage vs Temperature

(V_{KA}=V_{REF}, I_K=10mA)



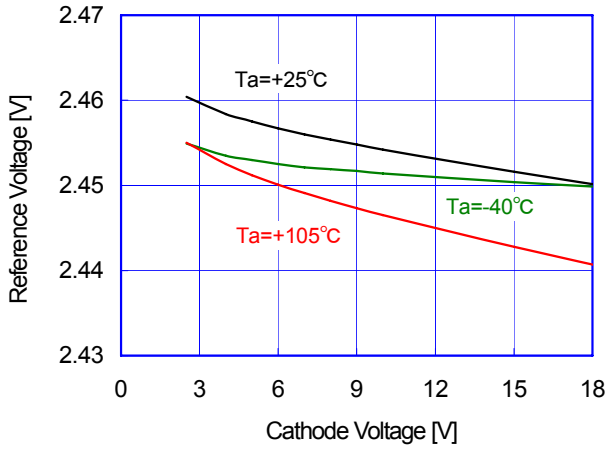
Reference Input Current vs Temperature

(I_K=10mA, R1=10kΩ, R2=OPEN)



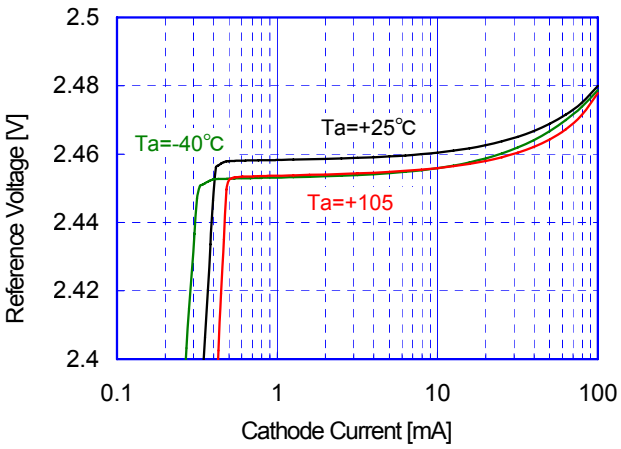
Reference Voltage vs T Cathode Voltage

(IK=10mA, R1=Variable, R2=10kΩ)



Reference Voltage vs T Cathode Current

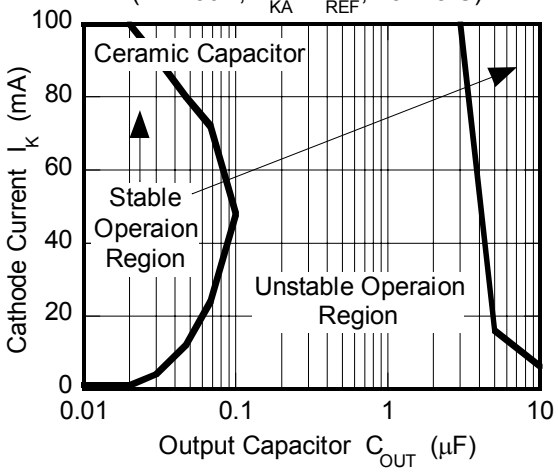
(V_{KA}=V_{REF})



■TYPICAL CHARACTERISTICS

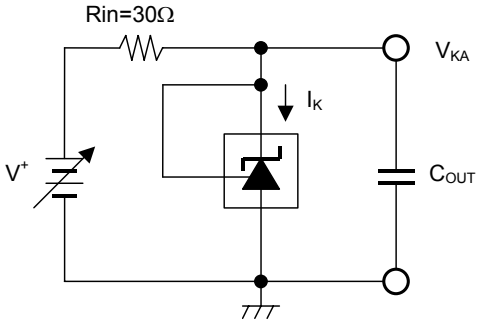
Safety Operating Boundary Condition

(Rin=30Ω, $V_{KA}=V_{REF}$, Ta=25°C)



Safety Operating Boundary Condition

Test Circuit

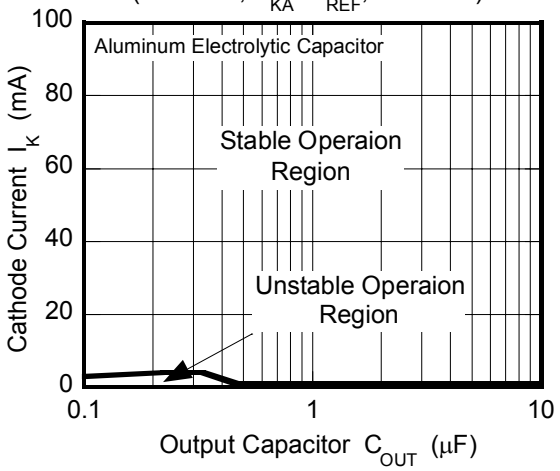


Note) Oscillation might occur while operating within the range of safety curve.

So that, it is necessary to make ample margins by taking considerations of fluctuation of the device.

Safety Operating Boundary Condition

(Rin=30Ω, $V_{KA}=V_{REF}$, Ta=25°C)



[CAUTION]
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