

NH431AK,NH431BK

Low Dropout Regulator



VOLTAGE: 36 V

CURRENT: 100 mA

Package: SOT-23

Marking And Polarity

DESCRIPTION

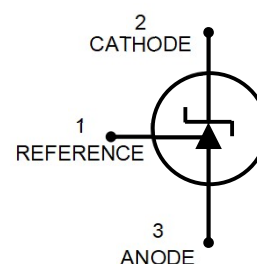
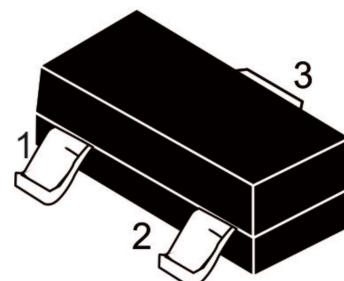
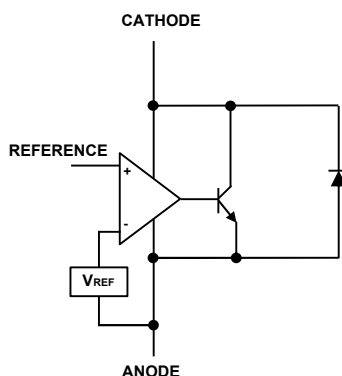
The NH431AK,NH431 is a three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value, currents even when the difference of the input-output voltage is small. The NH431AK,NH431 series can be used between V_{ref} (approximately 2.5V) and 36V with two external resistors. It provides very wide applications, including shunt regulator, series regulator, switching regulator, voltage reference and others.

FEATURES

- Programmable output Voltage to 36V.
- Low dynamic output impedance 0.2Ω.
- Sink current capability of 1 to 100mA.
- ESD: HBM 4000V

DEVICE MARKING

Device	RanK	Marking
NH431AK	±0.5%	RAS
NH431BK	±1%	RBS



ABSOLUTE MAXIMUM RATINGS(Operating temperature range applies unless otherwise specified)

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	36	V
Cathode Current Range(Continuous)	I_{KA}	-100 - 150	mA
Reference Input Current Range	I_{REF}	-0.05 - 10	mA

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Cathode Voltage	V_{KA}	2.5	-	36	V
Cathode Current	I_{KA}	0.5	-	100	mA

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance	$R_{\theta JA}$	206	°C/W
Operating Ambient Temperature	T_{opr}	-40 - 125	°C
Operating Junction Temperature	T_j	150	
Storage Temperature	T_{Stg}	-65 - 150	



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ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Characteristic		Test Condition	Symbol	Min.	Typ.	Max.	Unit
Reference Input Voltage 1	0.50%	Vka=Vref,IKA=10mA	V_{REF}	2.488	2.5	2.512	V
	1.00%			2.475	2.5	2.525	
	2.00%			2.45	2.5	2.55	
Reference Input Voltage 2	0.50%	Vka=Vref,IKA=10mA	V_{REF}	2.483	2.495	2.507	V
	1.00%			2.47	2.495	2.52	
	2.00%			2.445	2.495	2.545	
Deviation of reference Input Voltage Over Temperature		Vka=Vref,IKA=10mA, . $\leq T_a \leq T_{max}$.	ΔV_{REF}	-	4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		IKA=10mA, $\Delta V_{KA}=10V \sim V_{REF}$	$\Delta V_{REF}/$	-	-1	-2.7	mV/V
		IKA=10mA, $\Delta V_{KA}=36V \sim 10V$	ΔV_{KA}	-	-0.5	-2.0	
Reference Input Current		IKA=10mA,R1=10K Ω ,R2= ∞	I_{REF}	-	1	2	μA
Deviation of reference Input Current Over Full Temperature Range		IKA=10mA,R1=10K Ω ,R2= ∞ ,TA=full Temperature	$\Delta I_{REF}/\Delta T$	-	0.2	0.4	μA
Min. Cathode Current for regulation		VKA=Vref	$I_{KA}(min.)$	-	0.3	0.5	mA
Off-state Cathode Current		VKA=36V,Vref=0V	$I_{KA}(OFF)$		0.05	0.5	μA
Dynamic Impedance		VKA=Vref,IKA=1~100mA,f $\leq$ 1KHz	Z_{KA}		0.15	0.5	Ω

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Typical Characteristics Curves

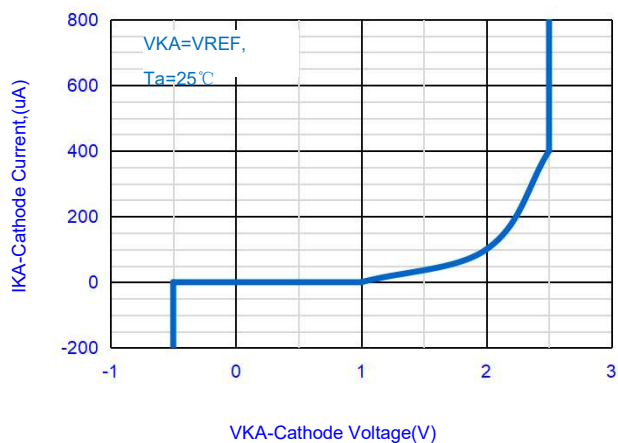


Fig.1-Cathode Current Vs Cathode Voltage

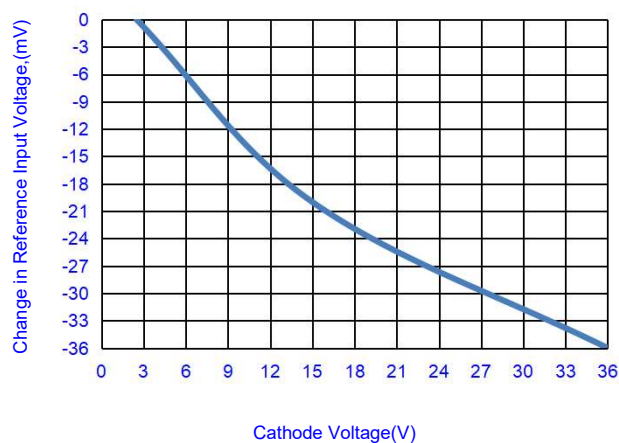


Fig.2-CHANGE IN REFERENCE INPUT VOLTAGE VS CATHODE VOLTAGE

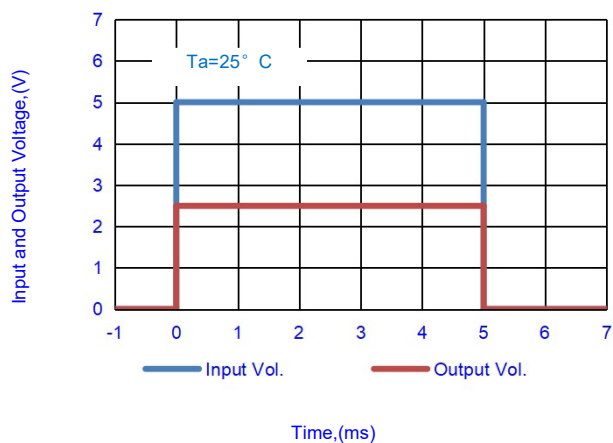


Fig.3- PULSE RESPONSE

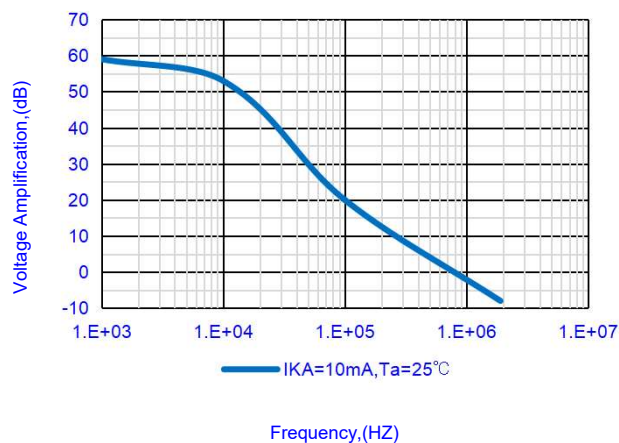


Fig.4- SMALL SIGNAL VOLTAGE AMPLIFICATION VS FREQUENCY

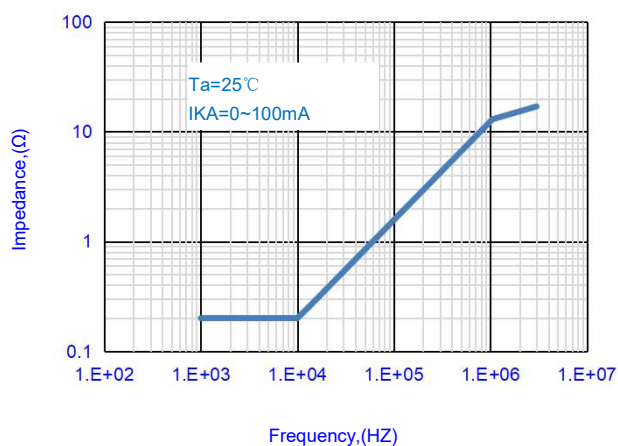


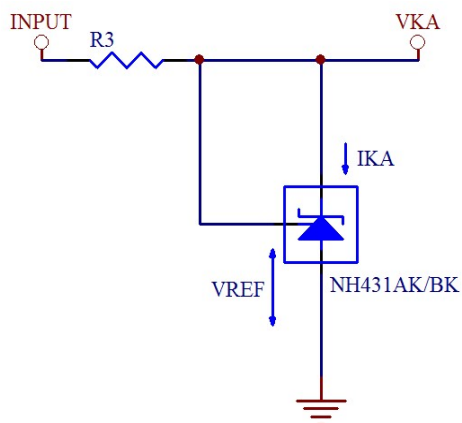
Fig.5--DYNAMIC IMPEDANCE VS FREQUENCY

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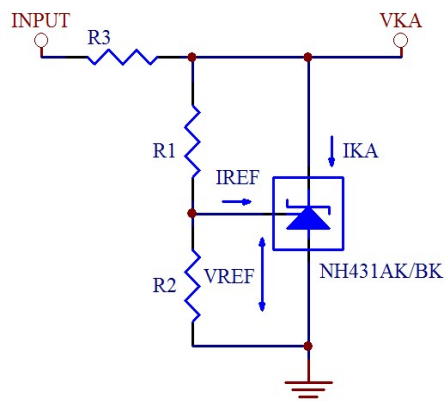


Typical Characteristics Curves



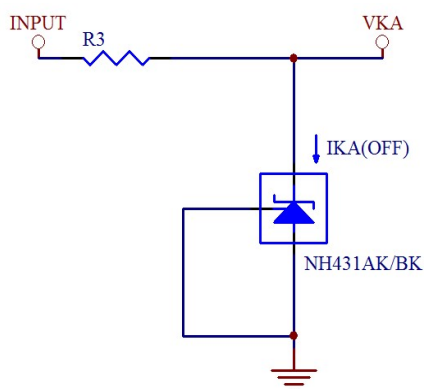
FOR $V_{KA}=V_{REF}$

Fig.6-TEST CIRCUIT



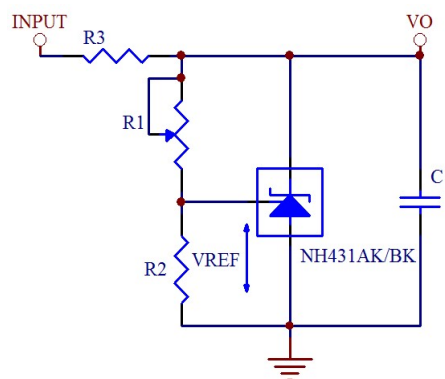
FOR $V_{KA} \geq V_{REF}$, $V_{KA}=V_{REF}(1+R1/R2)+I_{REF} \cdot R1$

Fig.7-TEST CIRCUIT



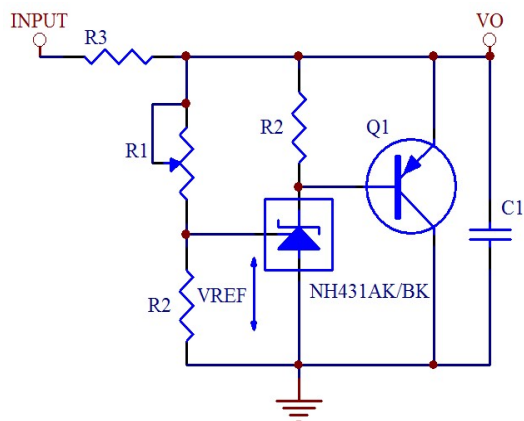
FOR $I_{KA}(\text{OFF})$

Fig.8-TEST CIRCUIT



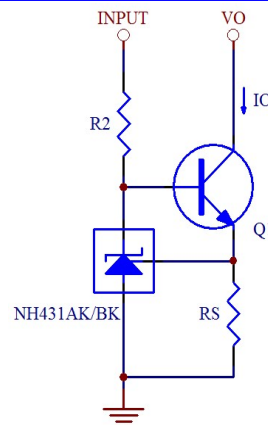
$V_O=V_{REF}(1+R1/R2)$

Fig.9- APPLICATION CIRCUIT, SHORTDOWN REGULATOR



$V_O=V_{REF}(1+R1/R2)$

Fig.10-APPLICATION CIRCUIT, HIGH-CURRENT SHORTDOWN REGULATOR



$I_O=V_{REF}/R_S$

Fig.11-APPLICATION CIRCUIT, CONSTANT-CURRENT SINK

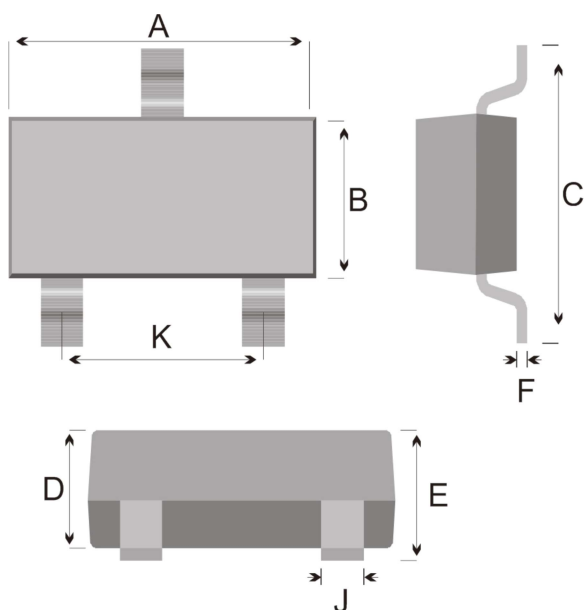
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OUTLINE DRAWINGS

SOT-23



OUTLINE DIMENSIONS

Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.800	-	3.200	0.1102	-	0.1260
B	1.150	-	1.450	0.0453	-	0.0571
C	2.250	-	2.650	0.0886	-	0.1043
D	0.850	-	1.150	0.0335	-	0.0453
E	0.900	-	1.200	0.0354	-	0.0472
F	0.080	-	0.180	0.0031	-	0.0071
J	0.300	-	0.500	0.0118	-	0.0197
K	1.700	-	2.100	0.0669	-	0.0827

PACKING INFORMATION

Package Code	Package Method	Inner Box Size L×W×H(mm)	Quantity (Pcs/Inner Box)	Outer Carton Size L×W×H(mm)	Quantity (Pcs/Carton)
SOT-23	T/R	210X208X203	15000	440X440X230	180000

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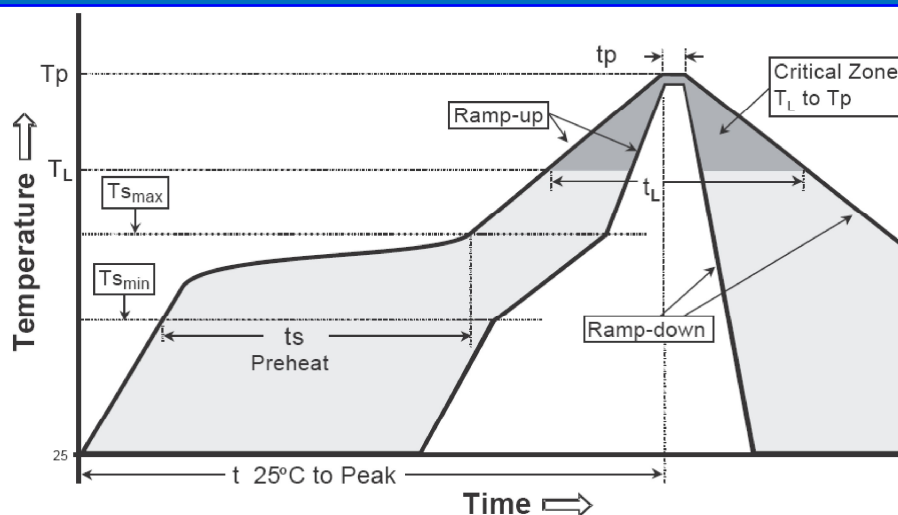
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Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T_{smax} to T_p)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_{smin} to t_{smax})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T_L) - Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_p)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t_p)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.



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