

SSC431 Precision Programmable Reference

Description

The SSC431 are three-terminal adjustable shunt regulators with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitutes for Zener diodes in applications such as switching power supply, charger and other adjustable regulators.

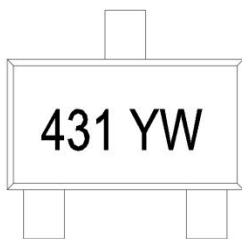
The output voltage of SSC431 can be set to any value between Vref (2.5V) and the corresponding maximum cathode voltage (36V). The SSC431 precision reference is offered in two voltage tolerance: 0.5% and 1.0%.

This IC are available in SOT-23 package.

Applications

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference

Device Information



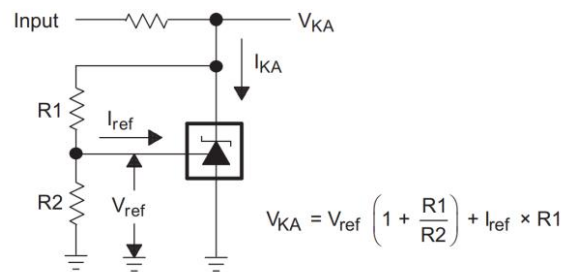
Top view

Marking (Y: year/W: week)

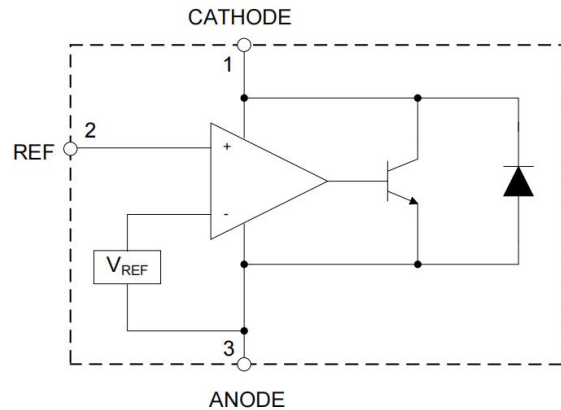
Features

- Adjustable output voltage: 2.5V to 36 V
- Wide Operating Range of -40°C to 125°C
- Low Equivalent Full-range Temperature Coefficient with 50PPM/°C Typical
- Low Output Noise
- Low Dynamic Output Resistance: 0.2Ω Typical
- Sink-current capability: 1 mA to 100 mA

Typical Application



Functional Block Diagram

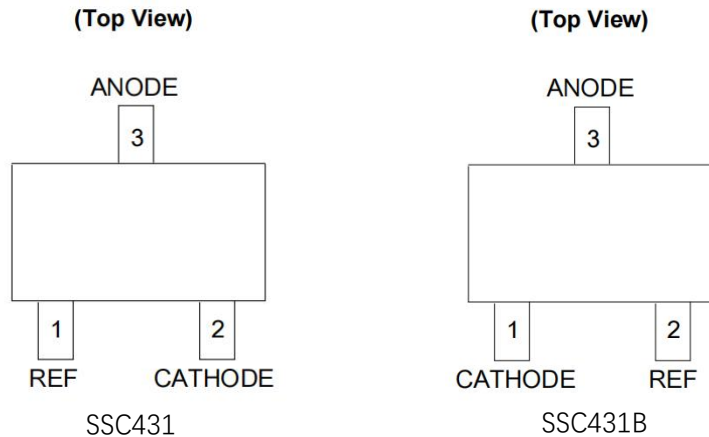




Ordering Information

Marking	Product	Package	Tape and Reel	Accuracy range
431 YW	SSC431-F	SOT23	3000 pcs	F: 2.500±1.0% K: 2.500±0.5%
	SSC431-K			
431B YW	SSC431B-F	SOT23B	3000 pcs	
	SSC431B-K			

Pin Configuration



Pin configuration

SSC431	SSC431B	Symbol	Description
1	2	REF	Threshold relative to common anode
2	1	CATHODE	Shunt Current/Voltage input
3	3	ANODE	Common pin, normally connected to ground

Absolute Maximum Ratings⁽¹⁾

(Unless otherwise specified, all voltage are with respect to GND, TA=25°C)

Symbol	Parameter	Rating	Unit
V _{KA}	Cathode Voltage ⁽²⁾	40	V
I _{KA}	Cathode Current Range (Continuous)	-100 to 150	mA
I _{REF}	Reference Input Current Range	10	mA
P _D	Power Dissipation ⁽³⁾	370	mW
T _J	Junction Temperature	+150	° C
T _{opr}	Operating Temperature	-40 to +125	° C
T _{STG}	Storage Temperature Range	-65 to +150	° C

(1). Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltage values are with respect to ANODE, unless otherwise noted.

(3) Maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_{J(max)} - T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can affect reliability.



Recommend Operating Conditions

(Ta=25°C, unless otherwise noted)

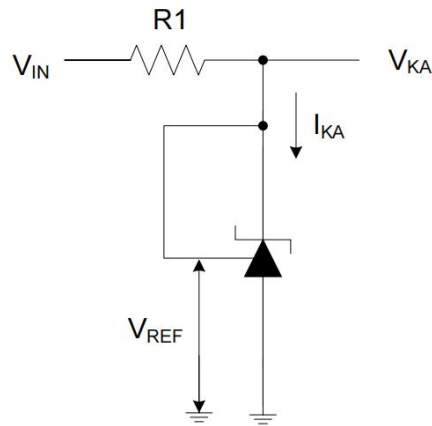
Symbol	Parameter	Min	Max	Unit
V _{KA}	Cathode Voltage	V _{REF}	36	V
I _{KA}	Cathode Current	1.0	100	mA

Electrical Characteristics

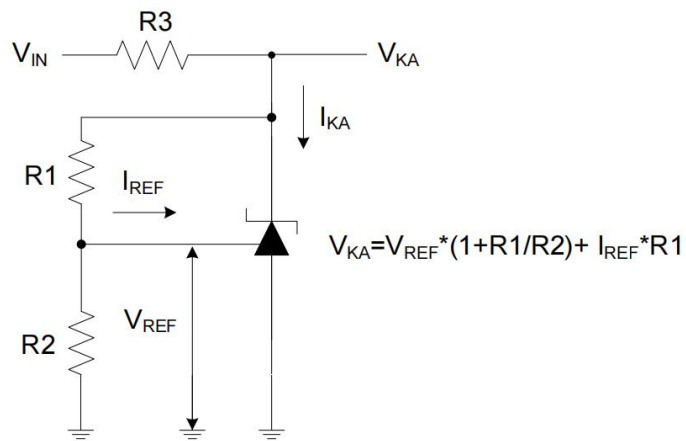
Over recommended operating conditions, TA = 25°C (unless otherwise noted)

Symbol	Parameter	Test Circuit	Conditions	Min	Typ	Max	Unit	
V _{REF}	Reference Voltage	4	V _{KA} =V _{REF} , I _{KA} =10mA	0.5%	2.487	2.500	2.512	V
				1.0%	2.475	2.500	2.525	
ΔV _{REF}	Deviation of Reference Voltage Over Full Temperature Range	4	V _{KA} =V _{REF} , I _{KA} =10mA TA= -40 to +125°C	-	8	17	mV	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in reference Voltage to the Change in Cathode Voltage	5	I _{KA} =10 mA Δ V _{KA} =10V to V _{REF} Δ V _{KA} =36V to 10V	-	-1.0	-2.7	mV/V	
I _{REF}	Reference Current	5	I _{KA} =10mA, R1=10K, R2=∞	-	2.0	4.0	μA	
ΔI _{REF}	Deviation of Reference Current Over Full Temperature Range	5	I _{KA} =10mA, R1=10K, R2=∞, TA= -40 to +125°C	-	0.4	1.2	μA	
I _{KA} (Min)	Minimum Cathode Current for Regulation	4	V _{KA} = V _{REF}	-	0.4	1.0	mA	
I _{KA} (Off)	Off-state Cathode Current	6	V _{KA} = 36V, V _{REF} = 0	-	0.05	1.0	μA	
Z _{KA}	Dynamic Impedance	4	V _{KA} =V _{REF} , I _{KA} =1 to 100 mA, f ≤ 1.0KHz	-	0.2	0.5	Ω	
θ _{JA}	Thermal Resistance	-	SOT-23	-	337	-	°C/W	

 Typical Applications Circuit

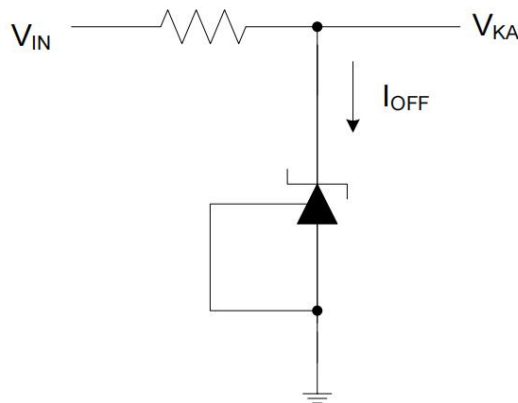


Test Circuit 4 for $V_{KA}=V_{REF}$



$$V_{KA}=V_{REF}*(1+R1/R2)+ I_{REF}*R1$$

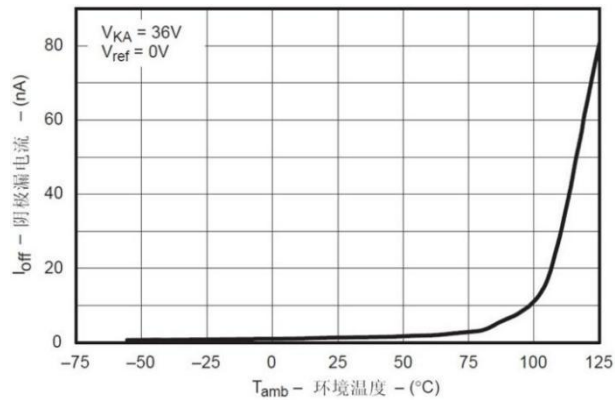
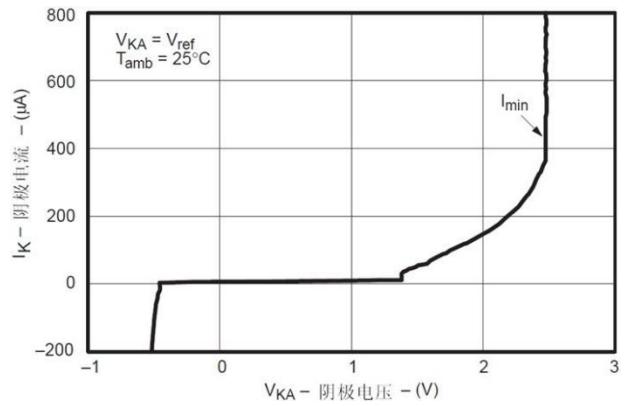
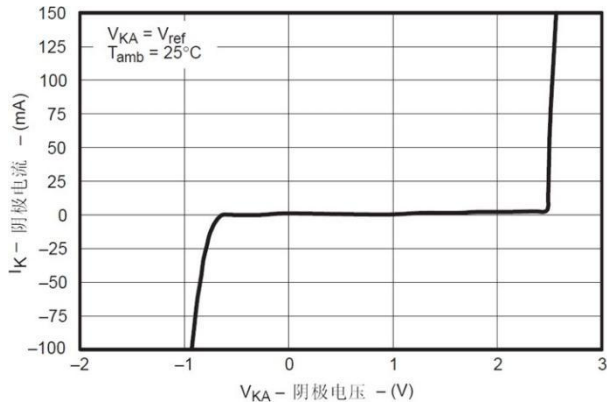
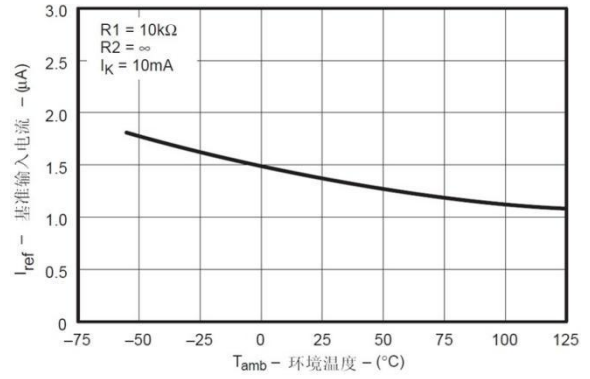
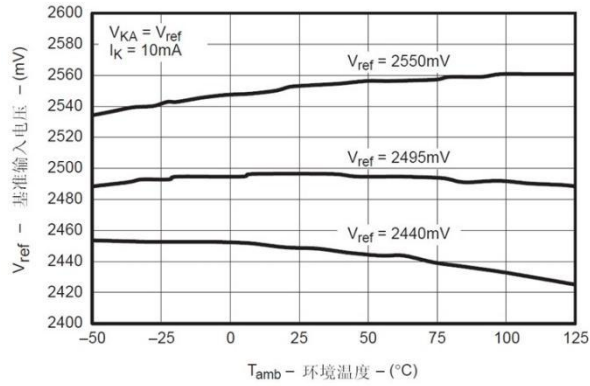
Test Circuit 5 for $V_{KA}>V_{REF}$

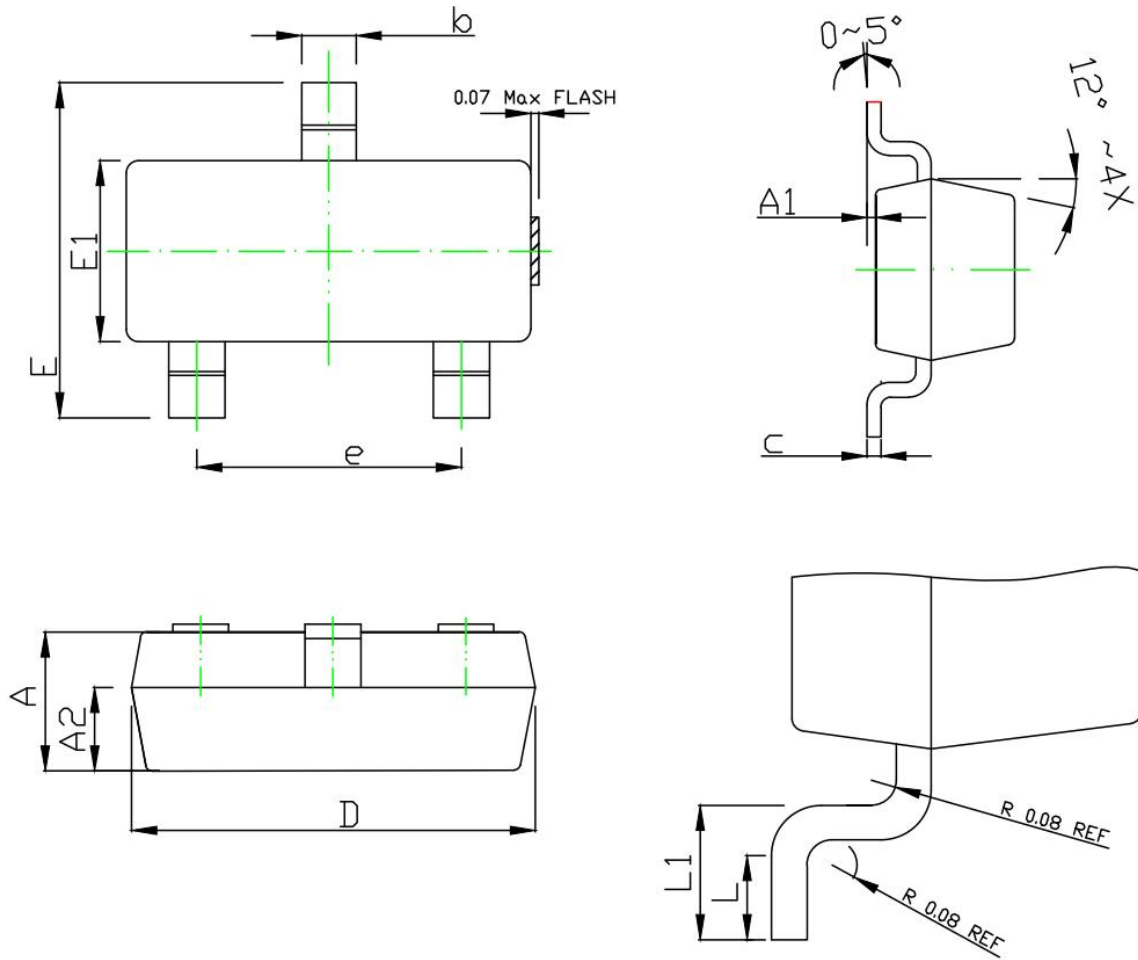


Test Circuit 6 for I_{OFF}

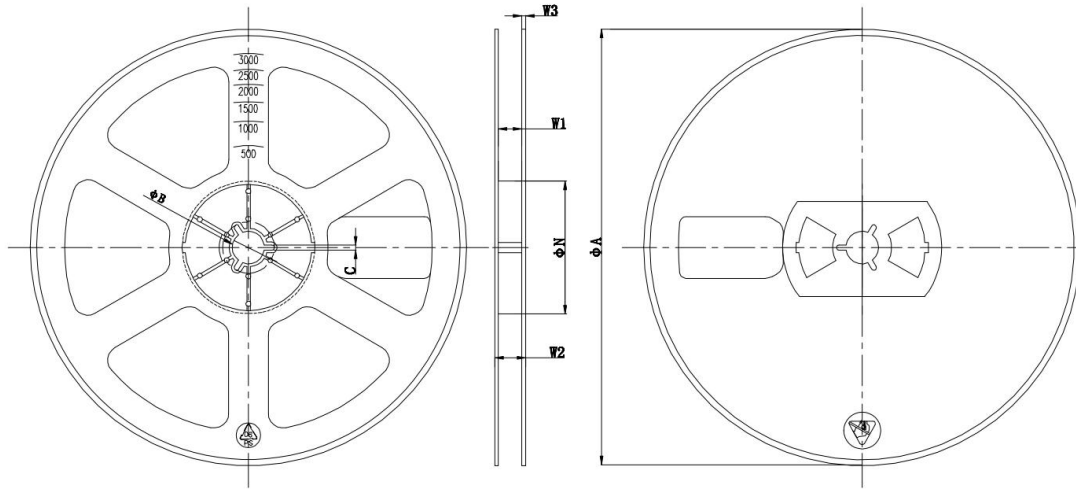


Typical characteristic

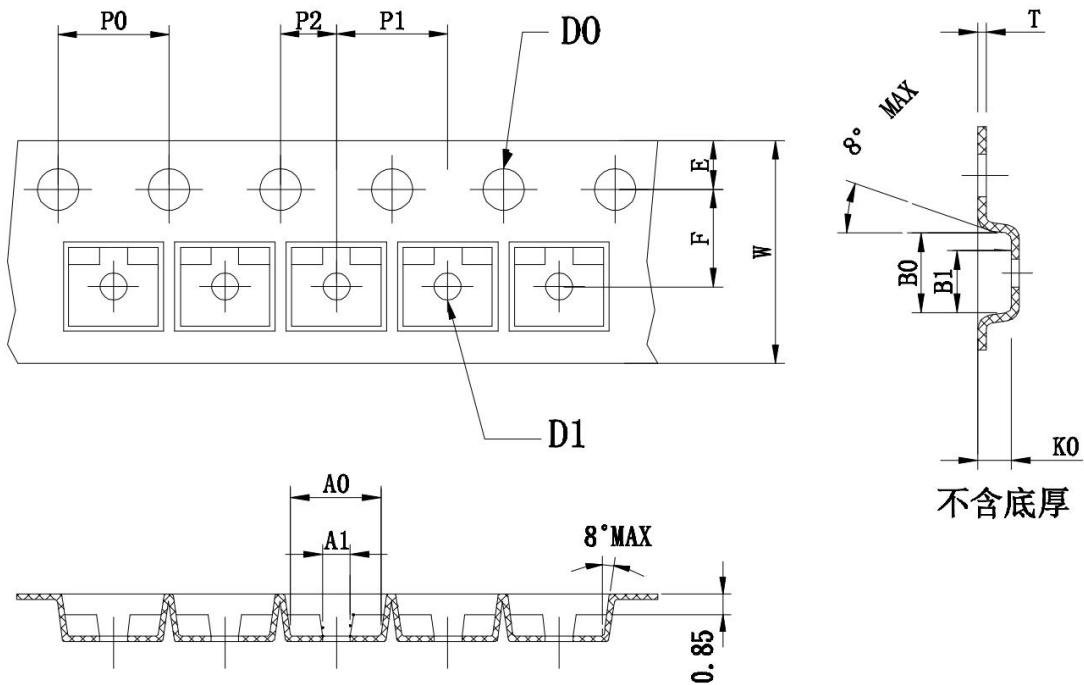


Package Outline


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.95	1.00	1.05
A1	0.01	0.05	0.10
b	0.35	0.40	0.45
c	0.11 BSC		
D	2.80	2.90	3.00
E	2.30	2.40	2.50
E1	1.20	1.30	1.40
e	1.90 BSC		
L	0.20	-	-
L1	0.30	0.40	0.50
A2	0.60 REF		

Tape and Reel


ϕA	ϕN	ϕB	C	W1	W2	W3
178 ± 2	54 ± 2	13.2 ± 0.3	2.2 ± 0.3	9.5 ± 1	13_{max}	1.4 ± 0.4



Symbol	A0	A1	B0	B1	K0	D0	D1	P0
Spec	3.15 ± 0.10	1.15 ± 0.10	2.80 ± 0.10	2.15 ± 0.10	1.30 ± 0.10	1.55 ± 0.10	1.10 ± 0.10	4.00 ± 0.10
Symbol	P1	W	E	P2	T	10*P0	F	
Spec	4.00 ± 0.10	8.00 ± 0.10	1.75 ± 0.10	2.00 ± 0.10	0.21 ± 0.02	40.00 ± 0.10	3.50 ± 0.10	



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