



DESCRIPTION

The JD431/JD431S are three-terminal adjustable shunt regulators with specified thermal stability. The output voltage may be set to any value between V_{ref} and 36V with two external resistors. Active output circuitry provides a very sharp turnon characteristic, making these devices excellent replacements for zener diodes in many applications.

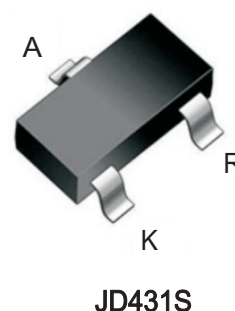
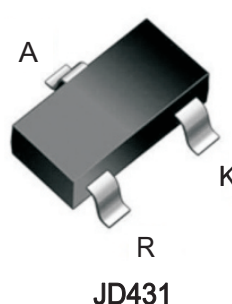
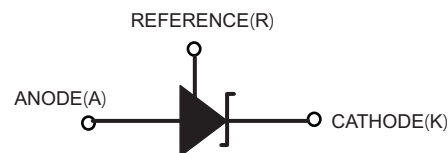
Features

- The output voltage can be adjusted 2.5V to 36V
- The JD431/JD431S precision reference is offered in two voltage tolerance: 0.5% and 1.0%.
- Fast turn-on response
- Sink current capability 1mA to 100mA
- Low output noise
- Industrial temperature range

Application

- Shunt regulator
- High-current shunt regulator
- Precision current limiter

SOT-23



Absolute Maximum Ratings (Note 1)

Symbol	Parameter		Rating	Unit
V_{KA}	Cathode Voltage		36	V
I_{KA}	Cathode Current Range (Continuous)		-100 to 150	mA
I_{REF}	Reference Input Current Range		10	mA
P_D	Power Dissipation		Z, R Package: 770	mW
			N Package: 370	
θ_{JA}	Thermal Resistance (Junction to Ambient)	SOT-23	380	$^{\circ}\text{C}/\text{W}$
T_J	Junction Temperature		+150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range		-65 to +150	$^{\circ}\text{C}$
ESD	ESD (Human Body Model)		2000	V

Note 1: Stresses greater than 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 Ratings" for extended periods may affect device reliability.



Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{KA}	Cathode Voltage	V_{REF}	36	V
I_{KA}	Cathode Current	1.0	100	mA
T_A	Operating Ambient Temperature Range	-40	+125	°C

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit		
V_{REF}	Reference Voltage	$V_{KA} = V_{REF}, I_{KA} = 10\text{mA}$	0.5%	JD431A	2.488	2.500	2.512	V
				JD431SA				
			1%	JD431B	2.475	2.500	2.525	
				JD431SB				
ΔV_{REF}	Deviation of Reference Voltage Over Full Temperature Range	$V_{KA} = V_{REF}, I_{KA} = 10\text{mA}$ $T_{min} \leq T_A \leq T_{max}$	—	14	34	mV		
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in Reference Voltage to the Change in Cathode Voltage	$I_{KA} = 10\text{mA}$	$\Delta V_{KA} = 10\text{V to } V_{REF}$	—	-1.0	-2.7	mV/V	
			$\Delta V_{KA} = 36\text{V to } 10\text{V}$	—	-0.5	-2.0		
I_{REF}	Reference Current	$I_{KA} = 10\text{mA}, R1 = 10\text{k}\Omega,$ $R2 = \infty$	—	1.5	4	μA		
ΔI_{REF}	Deviation of Reference Current Over Full Temperature Range	$I_{KA} = 10\text{mA}, R1 = 10\text{k}\Omega$ $R2 = \infty, T_A = \text{full Temperature}$	—	0.4	1.2	μA		
I_{KA} (Min)	Minimum Cathode Current for Regulation	$V_{KA} = V_{REF}$	—	0.45	1.0	mA		
I_{KA} (Off)	Off-state Cathode Current	$V_{KA} = 36\text{V}, V_{REF} = 0$	—	0.05	1.0	μA		
Z_{KA}	Dynamic Impedance	$V_{KA} = V_{REF}, I_{KA} = 1 \text{ to } 100\text{mA},$ $f \leq 1.0\text{kHz}$	—	0.3	0.5	Ω		



FIGURE 1. TEST CIRCUIT FOR $V_{KA} = V_{REF}$

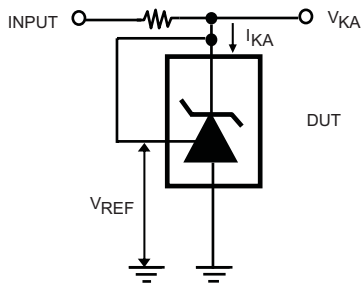


FIGURE 2. TEST CIRCUIT FOR $V_{KA} \geq V_{REF}$

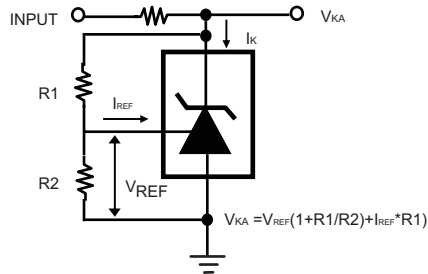


FIGURE 3. TEST CIRCUIT FOR $I_{KA} \text{ (OFF)}$

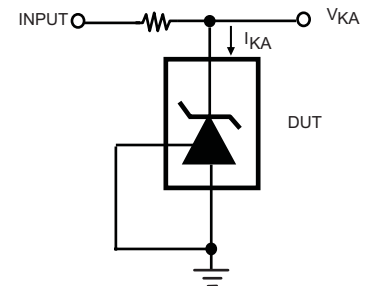


FIGURE 4. TEST CIRCUIT FOR PULSE RESPONSE

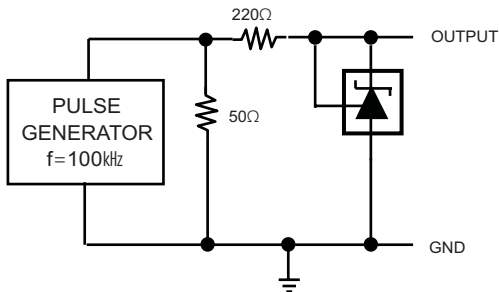
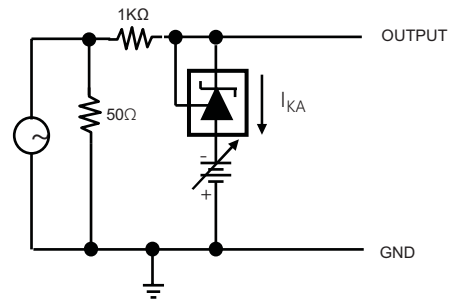


FIGURE 5. TEST CIRCUIT REFERENCE IMPEDANCE





Typical Characteristics

Fig.1 CATHODE CURRENT VS CATHODE VOLTAGE

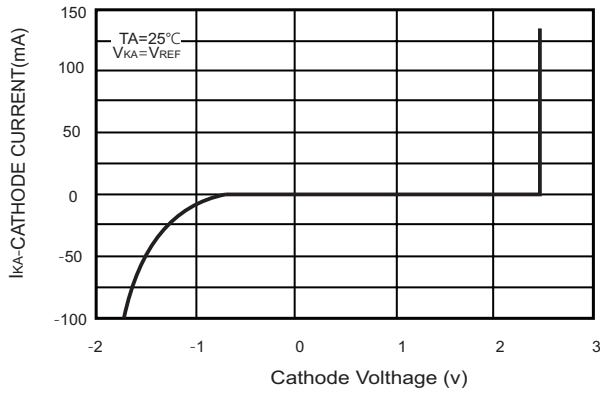


Fig.2 CATHODE CURRENT VS CATHODE VOLTAGE

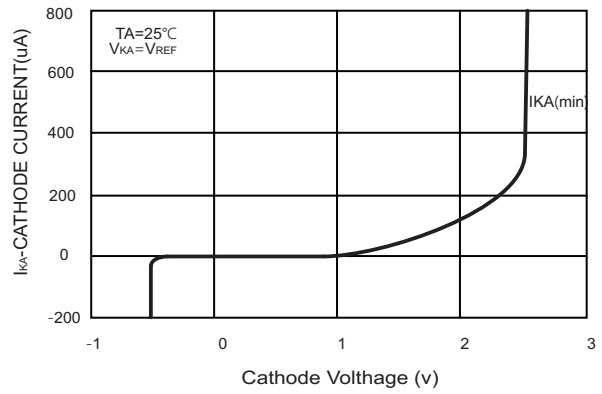


Fig.3 CHANGE IN REFERENCE INPUT VOLTAGE VS CATHODE VOLTAGE

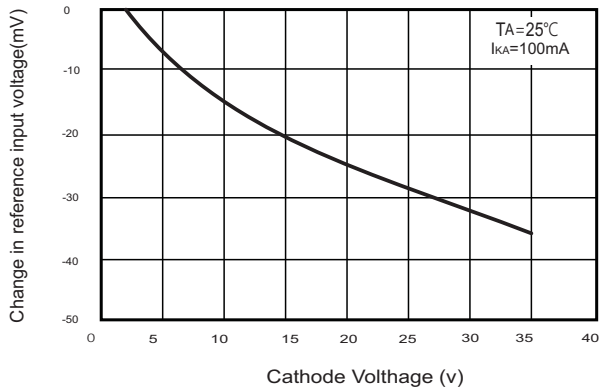


Fig.4 PULSE RESPONSE

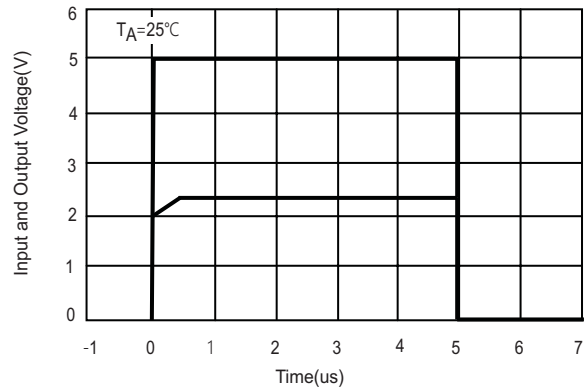


Fig.5 IMPEDANCE VS FREQUENCY

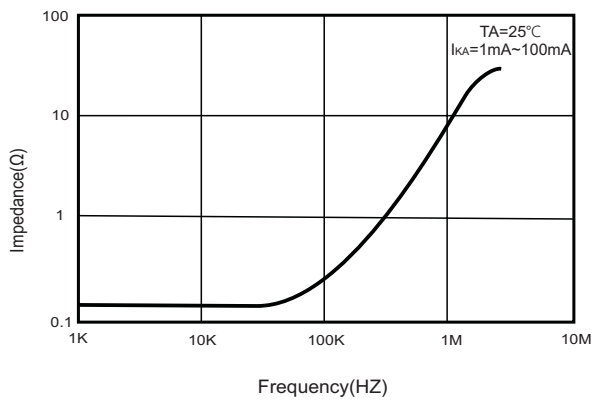
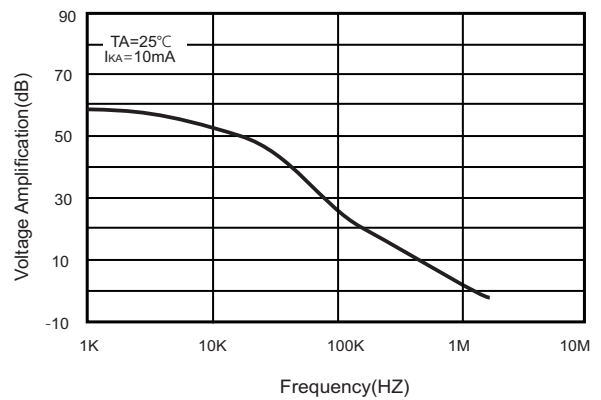
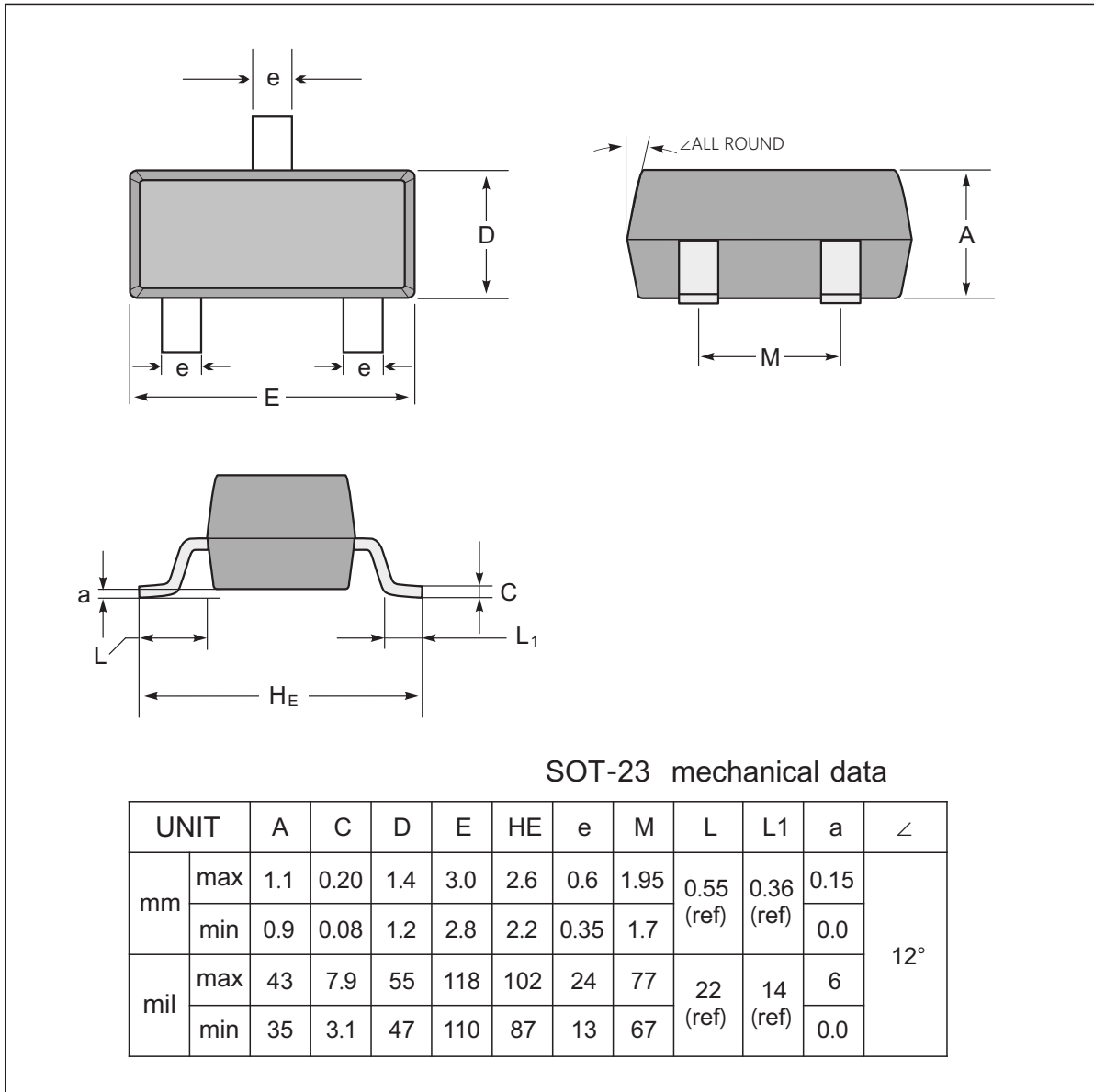


Fig.6 SMALL SIGNAL VOLTAGE AMPLIFICATION VS FREQUENCY

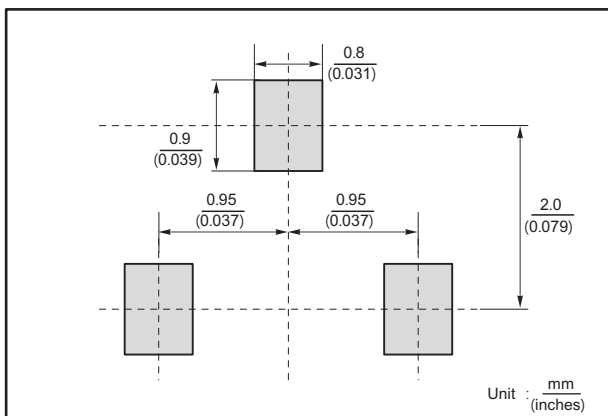




SOT-23 Package Outline Dimensions



The recommended mounting pad size



Marking

NumType er	Marking code
JD431A	J431A
JD431B	J431B
JD431SA	431JA
JD431SB	431JB

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[TL431A 0.4%](#) [ADR4520ARZ-R7](#)