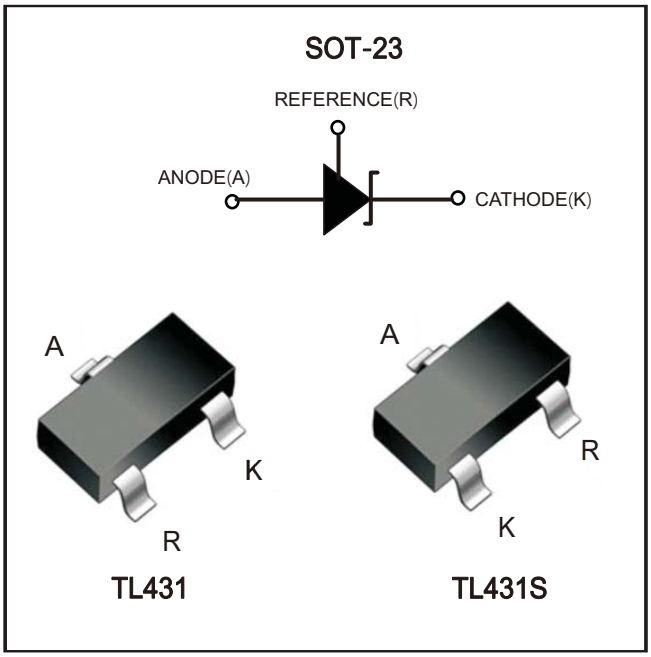
TL431/TL431S

Voltage Range : 36 V

Forward Current : -100 to 150 mA

DESCRIPTION

The TL431/TL431S are three-terminal adjustable shunt regulators with specifi ed thermal stability .The output voltage may be set to any value between Vref 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 TL431/TL431S 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 regulor
- High-current shunt regulator
- Preceision current limiter

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	°C/W
T_J	Junction Temperature		+150	°C
T_{STG}	Storage Temperature Range		-65 to +150	°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.

Email: sales@micindia.com Website: www.micindia.com

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°C, unless otherwise specified.)

Symbol	Parameter			Conditions		Min	Typ	Max	Unit
V_{REF}	Reference Voltage	0.5%	TL431A	$V_{KA} = V_{REF}$, I_{KA} = 10mA		2.488	2.500	2.512	V
			TL431SA						
		1%	TL431B			2.475	2.500	2.525	
			TL431SB						
ΔV_{REF}	Deviation of Reference Voltage Over Full Temperature Range			$V_{KA} = V_{REF}$, I_{KA} = 10mA Tmin≤ T A≤ Tmax		—	14	34	mV
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in Reference Voltage to the Change in Cathode Voltage			I_{KA} = 10mA	ΔV_{KA} = 10V to V_{REF}	—	-1.0	-2.7	mV/V
					ΔV_{KA} = 36V to 10V	—	-0.5	-2.0	
I_{REF}	Reference Current			IKA = 10mA, R1 = 10kΩ, R2 = ∞		—	1.5	4	µA
ΔI_{REF}	Deviation of Reference Current Over Full Temperature Range			I_{KA} = 10mA, R1 = 10kΩ R2 = ∞ , T_A = 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} = 36V, V_{REF} = 0		—	0.05	1.0	µA
Z_{KA}	Dynamic Impedance			$V_{KA} = V_{REF}$, I_{KA} = 1 to 100mA, f ≤ 1.0kHz		—	0.3	0.5	Ω

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

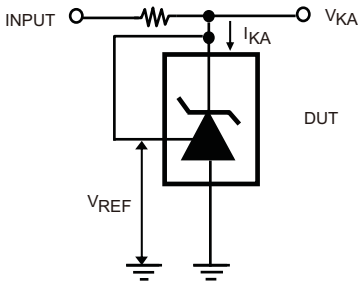


FIGURE 2. TEST CIRCUIT FOR $V_{KA} \geq V_{REF}$

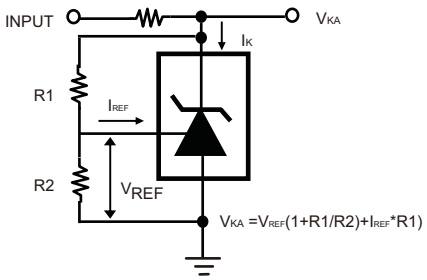


FIGURE 3. TEST CIRCUIT FOR I_{KA} (OFF)

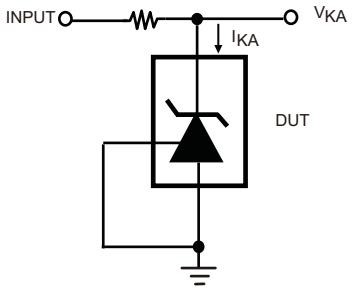


FIGURE 4. TEST CIRCUIT FOR PULSE RESPONSE

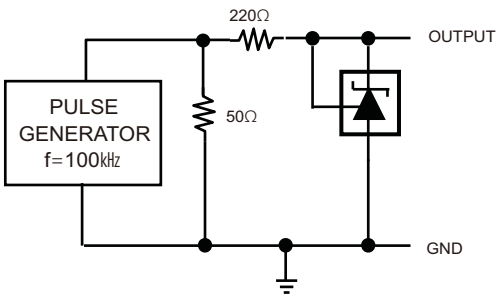
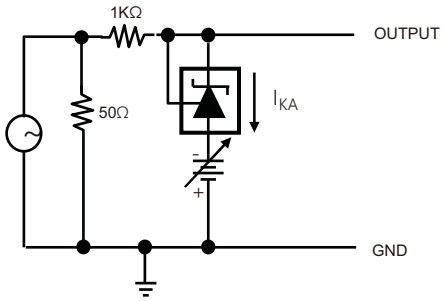


FIGURE 5. TEST CIRCUIT REFERENCE IMPEDANCE



Typical Characteristics

Fig.1 CATHODE CURRENT VS CATHODE VOLTAGE

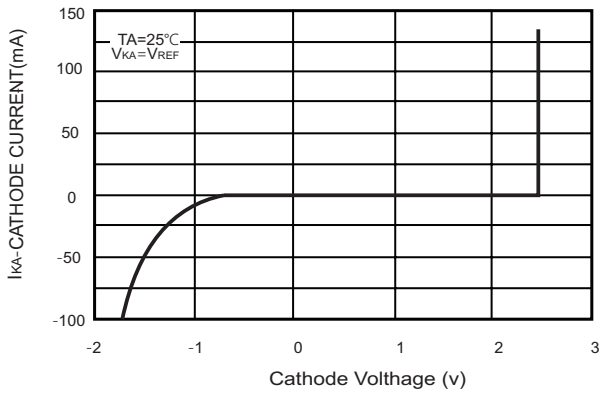


Fig.2 CATHODE CURRENT VS CATHODE VOLTAGE

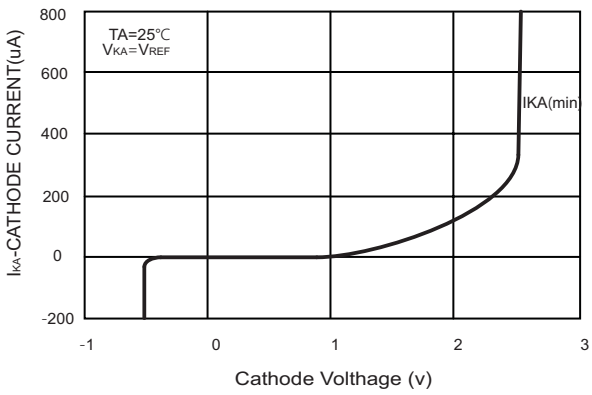


Fig.3 CHANGE IN REFERENCE INPUT VOLTAGE VS CATHODE VOLTHAGE

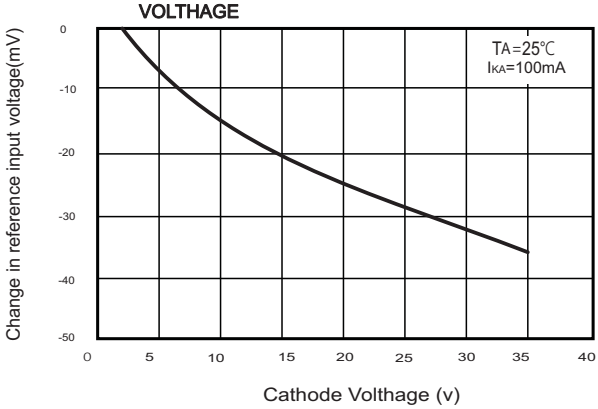


Fig.4 PULSE RESPONSE

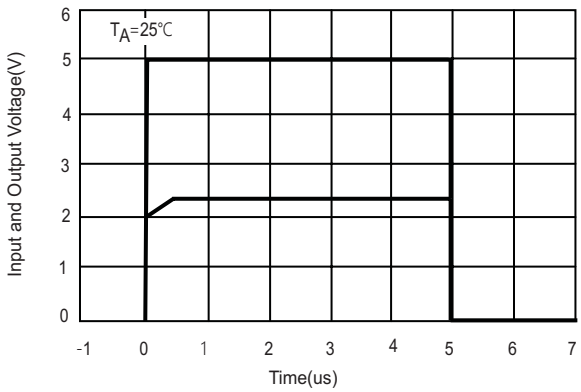


Fig.5 IMPEDANCE VS FREQUENCY

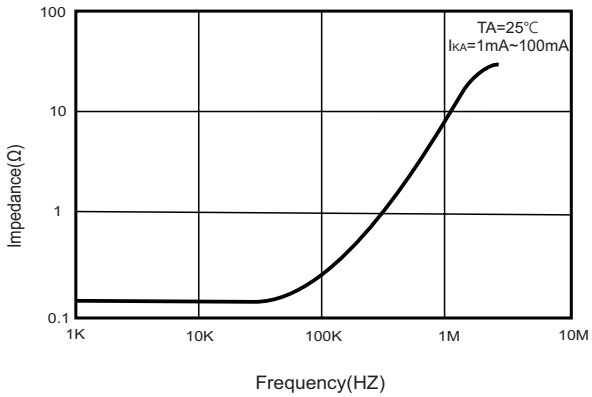
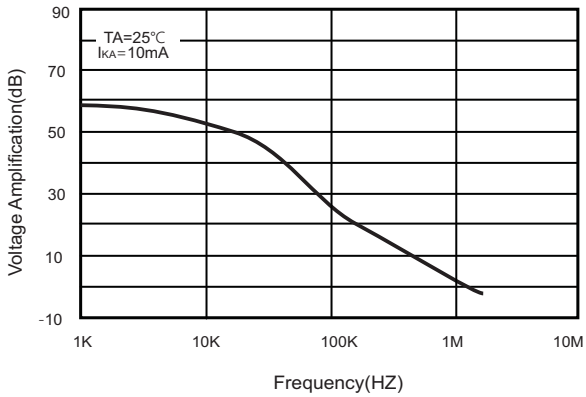
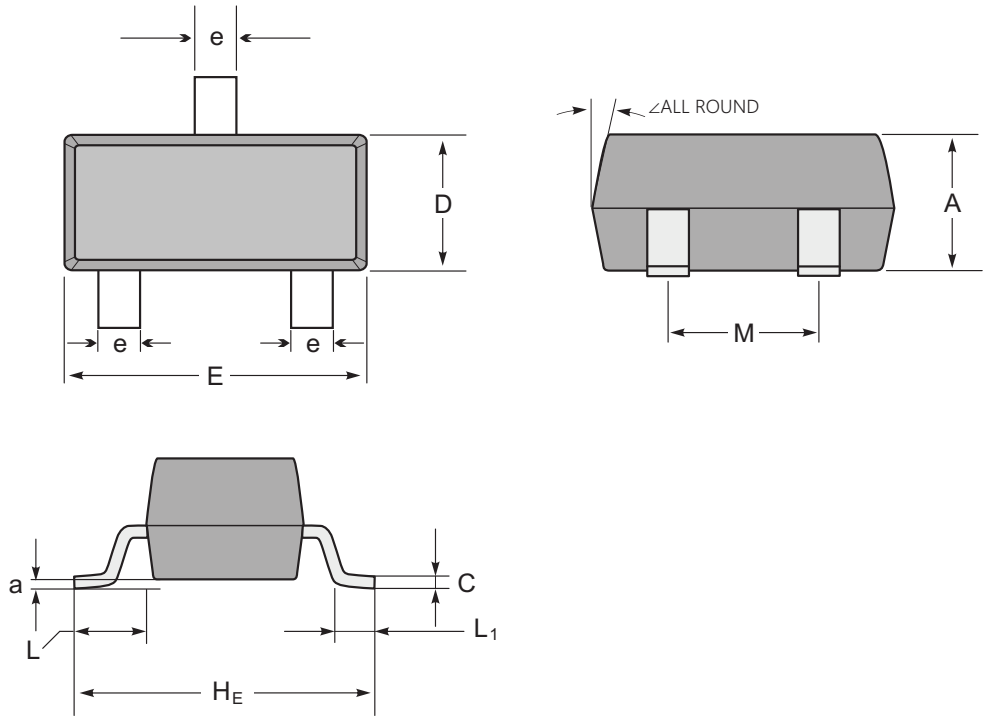


Fig.6 SMALL SIGNAL VOLTAGE AMPLIFICATIONVS FREQUENCY



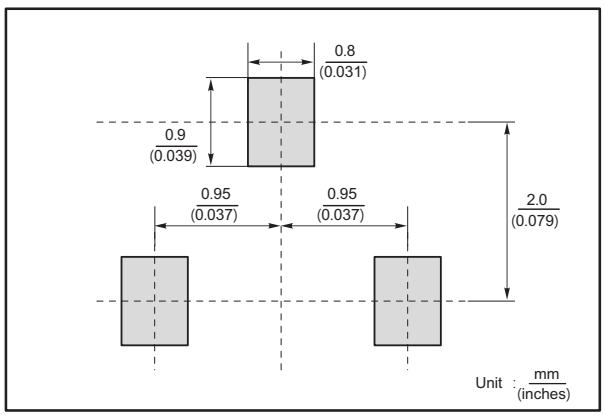
SOT-23 Package Outline Dimensions



SOT-23 mechanical data

UNIT		A	C	D	E	HE	e	M	L	L1	a	∠
mm	max	1.1	0.20	1.4	3.0	2.6	0.6	1.95	0.55 (ref)	0.36 (ref)	0.15	12°
	min	0.9	0.08	1.2	2.8	2.2	0.35	1.7			0.0	
mil	max	43	7.9	55	118	102	24	77	22 (ref)	14 (ref)	6	
	min	35	3.1	47	110	87	13	67			0.0	

The recommended mounting pad size



Marking

Number Type	Marking code
TL431A	J431A
TL431B	J431B
TL431SA	431JA
TL431SB	431JB

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Email: sales@micindia.com Website: www.micindia.com