

SOT-23 Encapsulate Adjustable Reference Source

TL431

Adjustable Accurate Reference Source

Features

- The output voltage can be adjusted to 40V
- Low dynamic output impedance, its typical value is 0.27Ω (Typ)
- Trapping current capability is 1 to 100mA
- Low output noise voltage
- Fast on -state response
- The effective temperature compensation in the working range of full temperature
- The typical value of the equivalent temperature factor in the whole temperature scope is $50 \text{ ppm}/^\circ\text{C}$

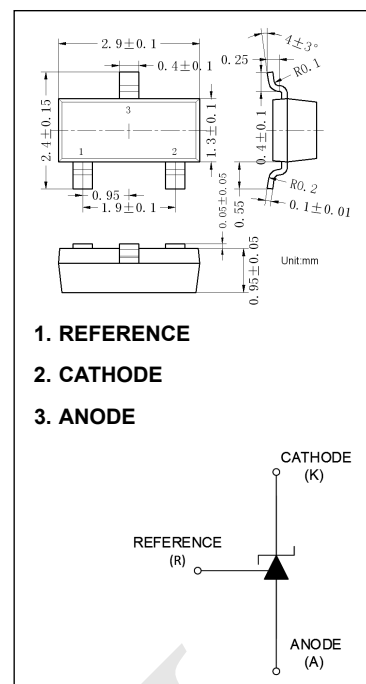
Applications

- Shunt Regulator
- High-Current Shunt Regulator
- Precision Current Limiter

Marking : 431

Description

The 431LB is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of 0.27Ω . The device can be used as a replacement for zener diodes in many applications.



Absolute Maximum Ratings (Operating temperature range applies unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{KA}	Cathode Voltage	40	V
I_{KA}	Cathode Current Range (Continuous)	-100~+150	mA
I_{ref}	Reference Input Current Range	0.05~+10	mA
P_D	Power Dissipation	200	mW
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	278	$^\circ\text{C}/\text{W}$
T_j	Operating Junction Temperature	0~+150	$^\circ\text{C}$
T_{opr}	Operating Ambient Temperature Range	0~+70	$^\circ\text{C}$
T_{stg}	Storage temperature Range	-65~+150	$^\circ\text{C}$

Electrical Characteristics (T_a=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V _{ref}	Reference input voltage (Fig.1)	V _{KA} =V _{REF} , I _{KA} =10mA	2.445	2.495	2.545	V
ΔV _{ref} / ΔT	Deviation of reference input voltage over temperature (note) (Fig.1)	V _{KA} =V _{REF} , I _{KA} =10mA T _{min} ≤ T _a ≤ T _{max}		3.0	17	mV
ΔV _{ref} / ΔV _{KA}	Ratio of change in reference input voltage to the change in cathode voltage (Fig.2)	I _{KA} =10mA ΔV _{KA} =10V~V _{REF}	-0.4		-2.7	mV/V
		ΔV _{KA} =36V~10V	-0.4		-2.0	mV/V
I _{ref}	Reference input current (Fig.2)	I _{KA} =10mA, R ₁ =10kΩ R ₂ =∞		1.8	4	μA
ΔI _{ref} / ΔT	Deviation Of reference input current over full temperature range (Fig.2)	I _{KA} =10mA, R ₁ =10kΩ R ₂ =∞ T _a =full Temperature		0.4	1.2	μA
I _{KA(min)}	Minimum cathode current for regulation (Fig.1)	V _{KA} =V _{REF}		0.25	0.5	mA
I _{KA(OFF)}	Off-state cathode Current (Fig.3)	V _{KA} =40V, V _{REF} =0		0.17	0.9	μA
Z _{KA}	Dynamic impedance	V _{KA} =V _{REF} , f ≤ 1.0kHz I _{KA} =1 to 100mA		0.27	0.5	Ω

note: T_{MIN}=0°C , T_{MAX}=+70°C

Classification of V_{ref}

Rank	±0.3	±0.5	±1.0	±2.0
Range	2.448-2.502	2.483-2.507	2.470-2.520	2.445-2.545

Figure 1. Test Circuit for V_{KA} = V_{ref}

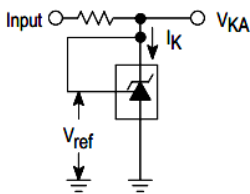


Figure 2. Test Circuit for V_{KA} > V_{ref}

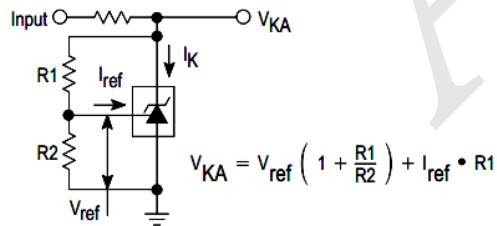
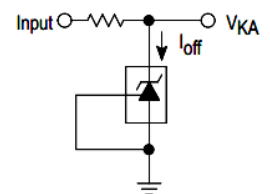
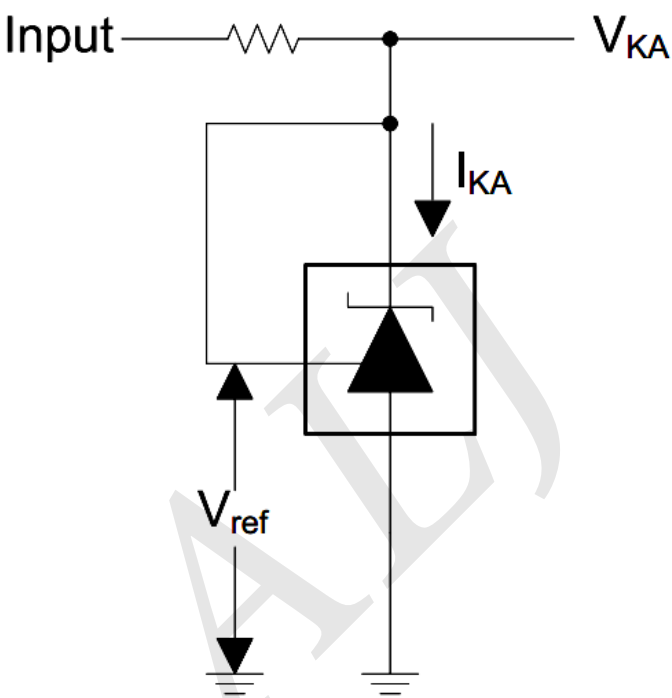
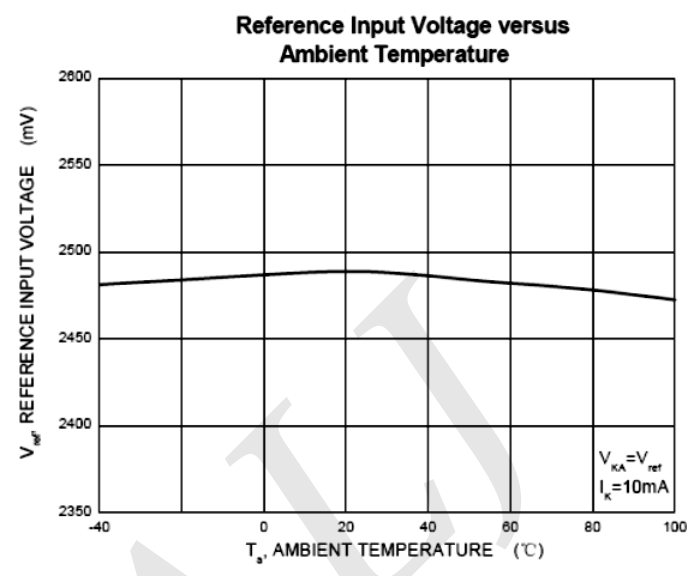
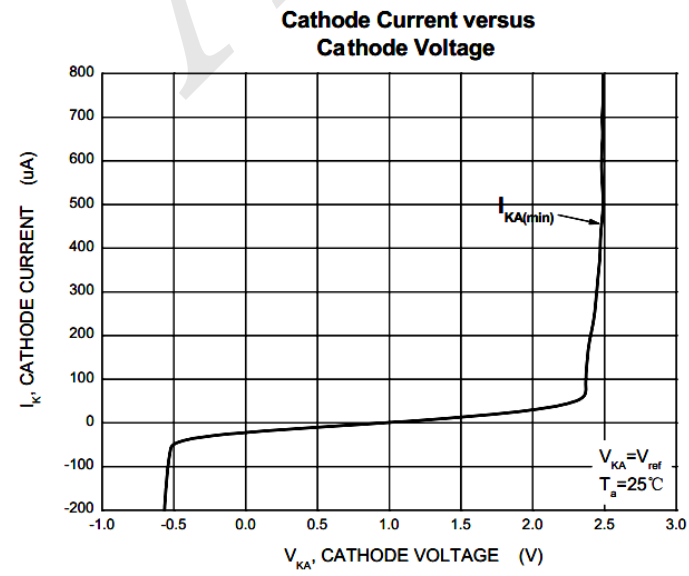
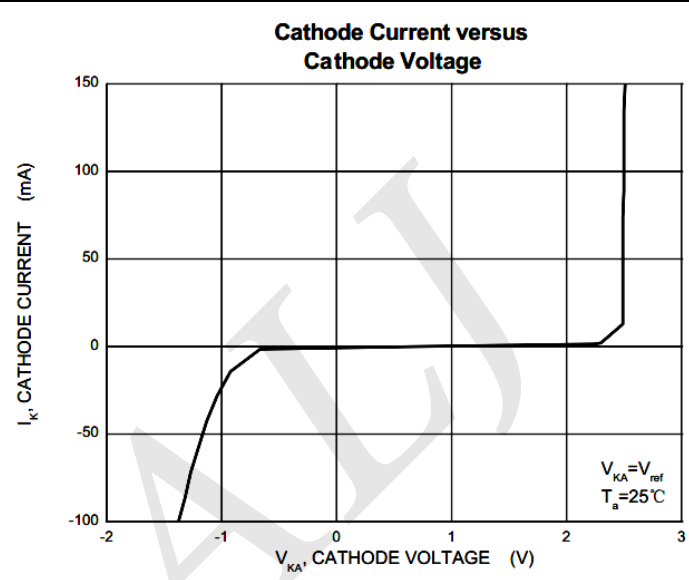


Figure 3. Test Circuit for I_{off}



Typical Electrical Characteristics



Test Circuit for $V_{KA} = V_{ref}$

Typical Electrical Characteristics (continued)

