Elektronische Bauelemente

TL431BL

Adjustable Accurate Reference Source

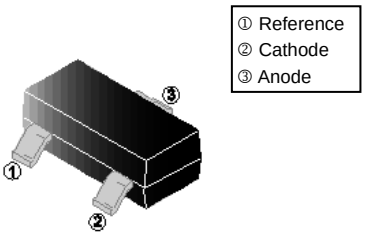
RoHS Compliant Product
A suffix of "-C" specifies halogen or lead -free

DESCRIPTION

The TL431BL is a three-terminal adjustable shunt regulators with a specified thermal stability. The output voltage may be set to any value between V_{ref} (approx. 2.5V) and 36V with two external resistors.

The active output circuitry provides a very sharp turn on characteristic making these devices an excellent replacement for Zener diodes in many applications.

SOT-23

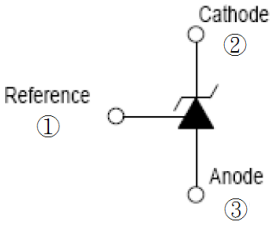


FEATURES

- On-Wafer V_{ref} Trimming ±0.3%
- Low Dynamic Output Impedance 0.1Ω (Typ.)
- Adjustable Output Voltage
- Fast Turn-on Response
- Sink Current Capability of 0.1mA~100mA
- Low Output Noise
- Industrial Temperature Range
- Improved Temperature Compensation
- Excellent Temperature Coefficient 25ppm/°C
- Electrostatic Discharge Voltage 2.5kV

APPLICATIONS

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



MARKING

431B

CLASSIFICATION OF V_{ref}

Rank	0.5%
Range	2.483~2.508

PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-23	3K	7 inch

ORDER INFORMATION

Part Number	Type
TL431BL	Lead (Pb)-free
TL431BL-C	Lead (Pb)-free and Halogen-free

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

Parameter	Symbol	Ratings	Unit
Cathode Voltage	V_{KA}	40	V
Cathode Current Range (Continuous)	I_{KA}	-100~150	mA
Reference Input Current Range	I_{ref}	0.05~10	mA
Power Dissipation	P_D	300	mW
Thermal Resistance from Junction-Ambient	$R_{\theta JA}$	417	°C/W
Operating Temperature	T_{Lead}	260	°C
Operating Junction Temperature Range	T_J	-40~125	°C
Storage Temperature Range	T_{STG}	-65~150	
ESD HBM (Human Body Mode)	V_{ESD}	2.5	kV

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Reference Input Voltage (Fig.1)	V_{ref}	2.483	2.495	2.508	V	$V_{KA}=V_{ref}$, I_{KA}=10mA
Deviation of Reference Input Voltage Over Temperature [1] (Fig.1)	$\triangle V_{ref}/\triangle T$	-	8	17	mV	$V_{KA}=V_{ref}$, I_{KA}=10mA $T_{Min} \leqq T_A \leqq T_{Max}$
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage (Fig.2)	$\triangle V_{ref}/\triangle V_{KA}$	-	-1	-2.7	mV/V	I_{KA}=10mA, $\triangle V_{KA}$=10V~V_{ref}
		-	-0.4	-2		I_{KA}=10mA, $\triangle V_{KA}$=10V~36V
Reference Input Current (Fig.2)	I_{ref}	-	0.5	1.2	μA	I_{KA}=10mA, R_1=10kΩ, R_2=∞
Deviation of Reference Input Current Over Full Temperature Range (Fig.2)	$\triangle I_{ref}/\triangle T$	-	0.4	1.2	μA	I_{KA}=10mA, R_1=10kΩ, R_2=∞ T_A=Full Range
Minimum Cathode Current for Regulation (Fig.1)	$I_{KA(min)}$	-	0.08	0.3	mA	$V_{KA}=V_{ref}$
Off-State Cathode Current (Fig.3)	$I_{KA(OFF)}$	-	0.01	0.8	μA	V_{KA}=36V, V_{ref}=0
Dynamic Impedance	Z_{KA}	-	0.1	0.37	Ω	$V_{KA}=V_{ref}$, I_{KA}=0.2~100mA, f≦1kHz

Note:
1. T_{MIN}= -25°C, T_{MAX}=125°C.

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

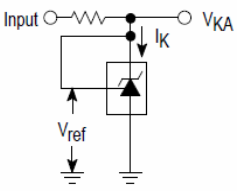


Figure 2. Test Circuit for $V_{KA} > V_{ref}$

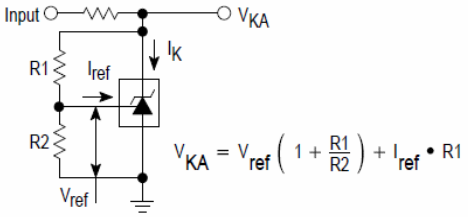
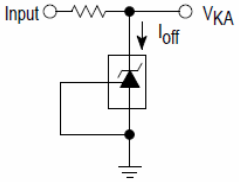
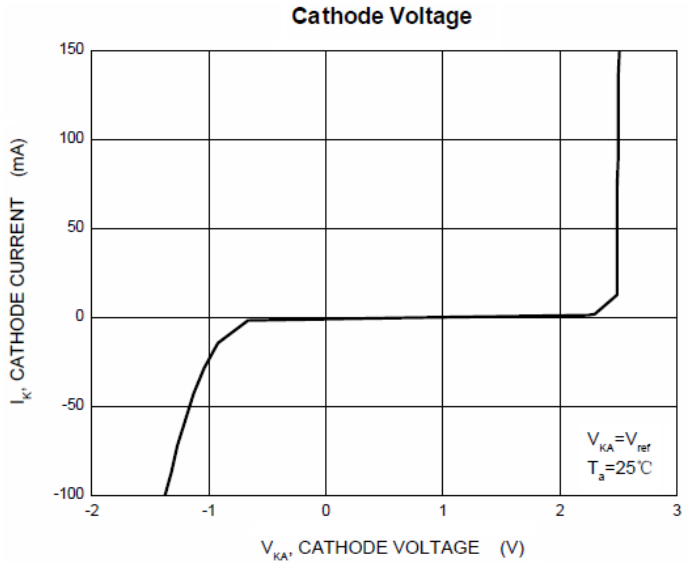
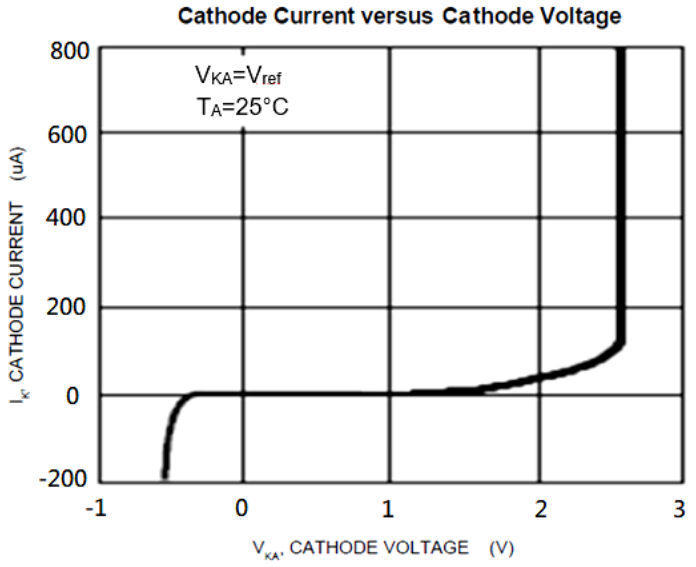


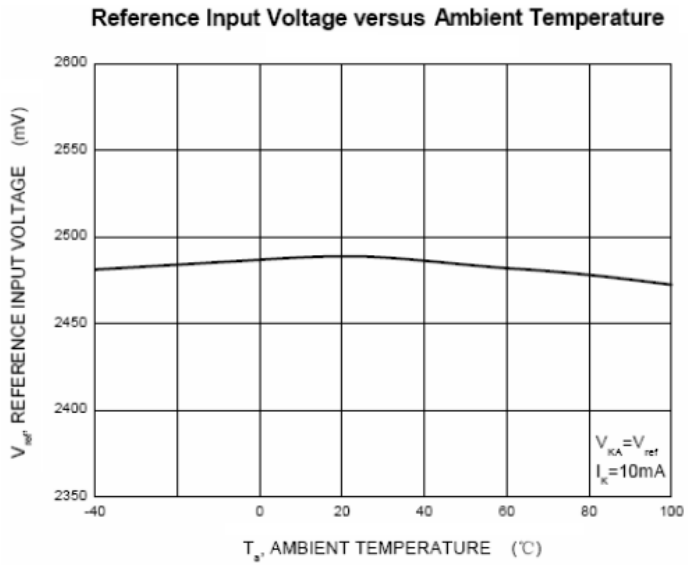
Figure 3. Test Circuit for I_{off}

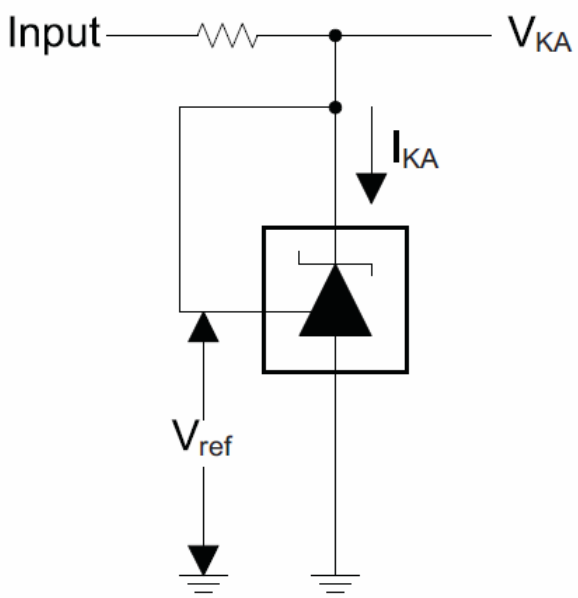


CHARACTERISTIC CURVE



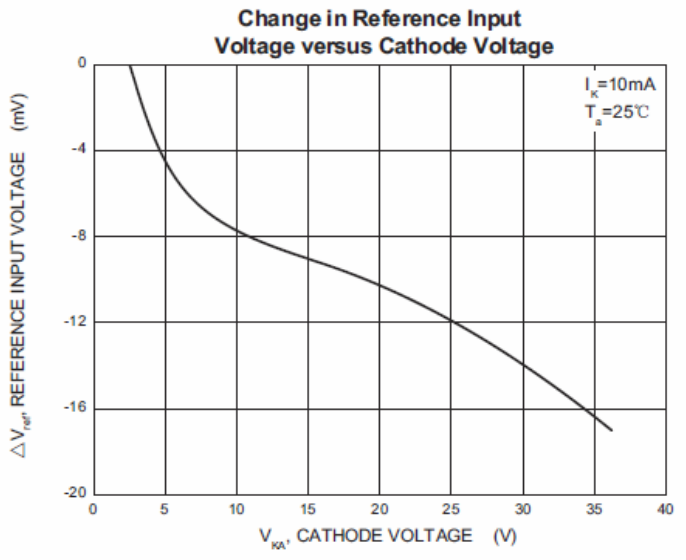


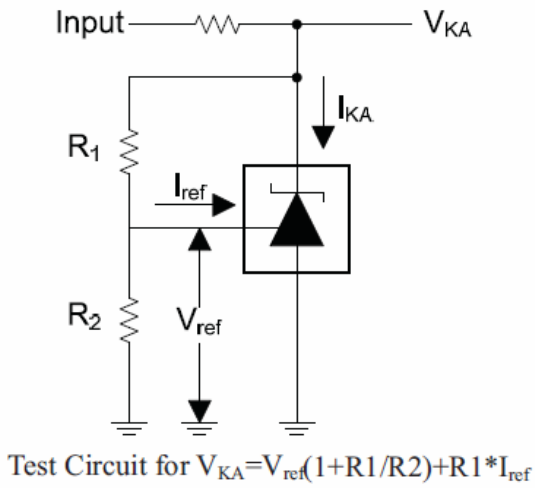




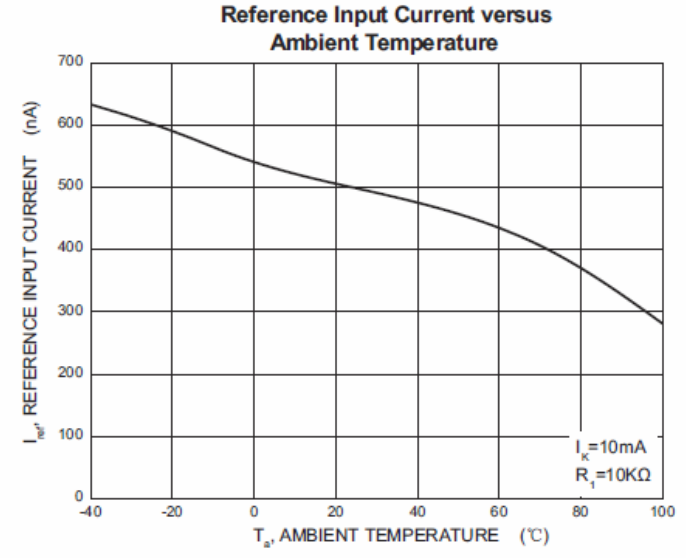
Test Circuit for $V_{KA}=V_{ref}$

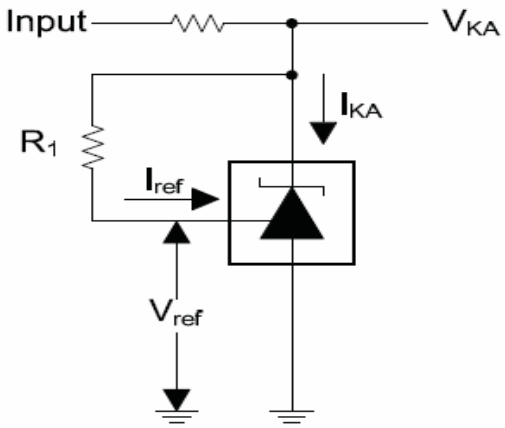
CHARACTERISTIC CURVE



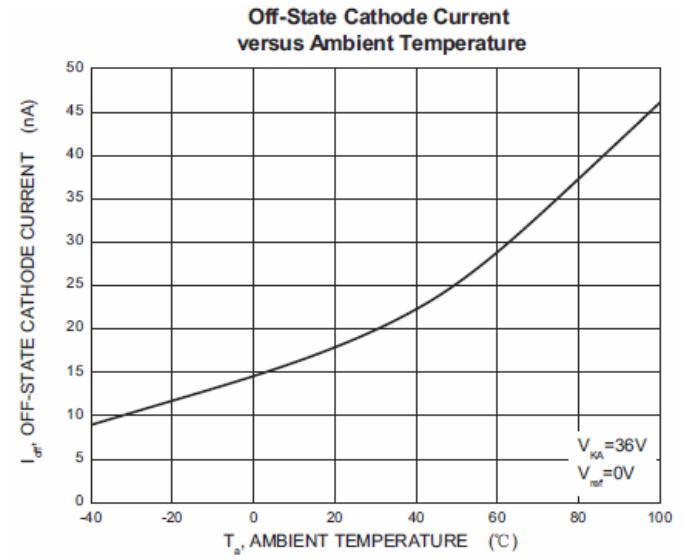


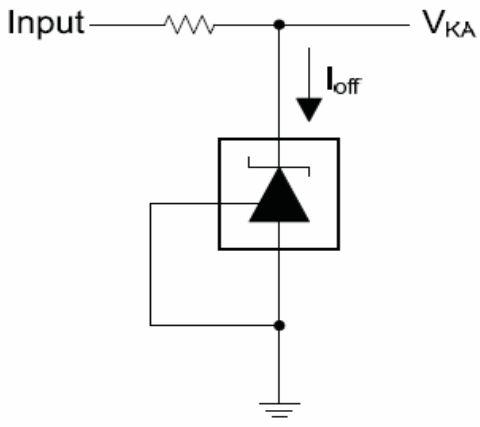
Test Circuit for $V_{KA}=V_{ref}(1+R1/R2)+R1*I_{ref}$





Test Circuit for I_{ref}

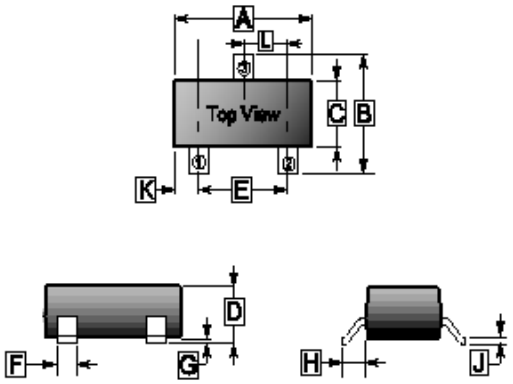




Test Circuit for I_{off}

PACKAGE OUTLINE DIMENSIONS

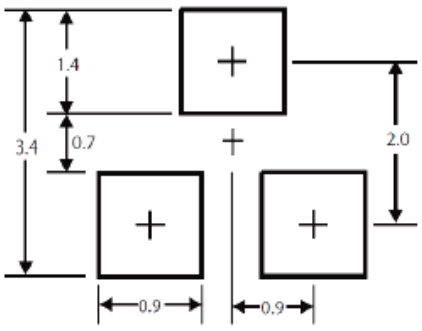
SOT-23



REF.	Millimeter	
	Min.	Max.
A	2.65	3.10
B	2.10	3.00
C	1.10	1.80
D	0.89	1.40
E	1.70	2.30
F	0.28	0.55
G	0	0.18
H	0.55 REF.	
J	0.05	0.26
K	0.60 REF.	
L	0.95 TYP.	

MOUNTING PAD LAYOUT

SOT-23



*Dimensions in millimeters