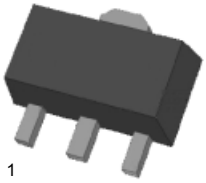
TL431B

DESCRIPTION

The 431 is three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output Voltage may be set to any value between Vref(approximately 2.5V) and 36 V with two external resistors.These devices have provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

SOT-89



1.REFERENCE

2.ANODE

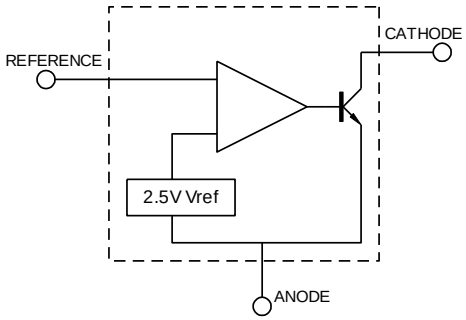
3.CATHODE

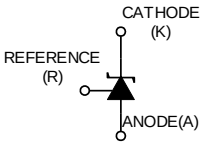
*Chip Size(before saw)：0.68*0.62 $(mm)^2$
*Wafer Size ：5 inch
*PAD Size：85*85$(\mu m)^2$
*Top Metal：AlSi，Thickness：2 μm
*Backside: Si
*Surface Passvation：PESiO2+PESiN
*Chip Thickness：before grind :525±15 (μm);
after grind:230±20 (μm)
*Scribe Line：30μm

FEATURE

*Programmable output Voltage to 36V
*Low dynamic output impedance 0.2Ω
*Sink current capability of 0.5 to 100mA
*Equivalent full-range temperature coefficient of 50ppm/°C typical
*Temperature compensated for operation over full rated operating temperature range
*Low output noise voltage
*Fast turn on response

BLOCK DIAGRAM





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

CHARACTERISTICS	SYMBOL	VALUE		UNITS
Cathode Voltage	V_{KA}	37		V
Cathode Current Range(Continuous)	I_{KA}	-100~+150		mA
Reference Input Current Range	Iref	-0.05~+10		mA
Power Dissipation	P_D	TO-92	770	mW
		SOT-23-3	370	
Operating Junction temperature	Topr	-40~+125		°C
Storage temperature	Tstg	-65~+150		°C

RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Min	Typ	Max	Unit
Cathode Voltage	V_{KA}	V_{REF}		36	V
Cathode Current	I_{KA}	0.5		100	mA

ELECTRICAL CHARACTERISTICS (Ta=25℃,unless otherwise specified)

Characteristic		Symbol	Test conditions		MIN	TYP	MAX	UNIT
Reference Input Voltage	0.5%	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$		2.488	2.50	2.512	V
	1%				2.475	2.50	2.525	
	2%				2.450	2.50	2.550	
Deviation of reference Input Voltage Over temperature		ΔVref	$V_{KA}=V_{REF}, I_{KA}=10mA$ $T_{MIN}\leq T_A\leq T_{MAX}$			4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		$\Delta V_{ref}/\Delta V_{KA}$	I_{KA}=10mA	ΔV_{KA}=10V~V_{REF}		-1.0	-2.7	mV/V
				ΔV_{KA}=36V~10V		-0.5	-2.0	
Reference Input Current		Iref	I_{KA}=10mA,R1=10kΩ,R2=∞			1.5	4	μA
Deviation of Reference Input Current Over Ful l Temperature Range		ΔIref/ΔT	I_{KA}=10mA,R1=10kΩ,R2=∞, T_A=full Temperature			0.2	0.4	μA
Minimum cathode current for regulation		I_{KA}(min)	$V_{KA}=V_{REF}$			0.3	0.5	mA
Off-state cathode Current		I_{KA}(OFF)	V_{KA}=36V,V_{REF}=0			0.05	0.5	μA
Dynamic Impedance		Z_{KA}	$V_{KA}=V_{REF}, I_{KA}$=1 to 100mA f≤1.0kHz			0.15	0.5	Ω

TEST CIRCUITS

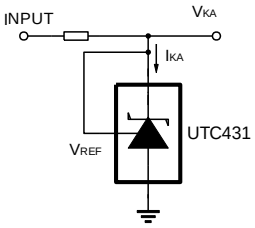


Fig 7 Test Circuit For $V_{KA}=V_{REF}$

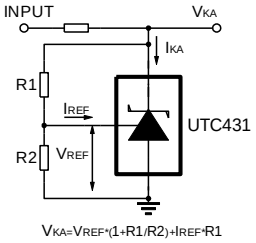


Fig 8 Test Circuit for $V_{KA}\geqslant V_{REF}$

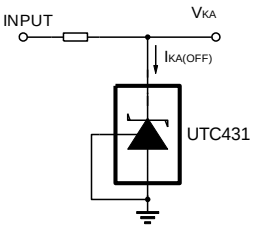


Fig 9 Test Circuit For $I_{KA(OFF)}$

TYPICAL APPLICATION

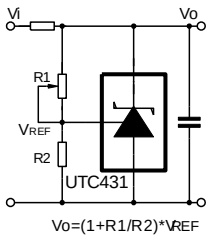


Fig 10 Shutdown Regulator

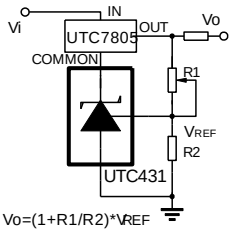


Fig 11 Output Control of a Three -Terminal Fixed Regulator

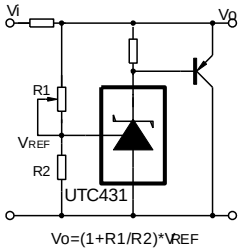


Fig 12 Higher-current Shunt Regulator

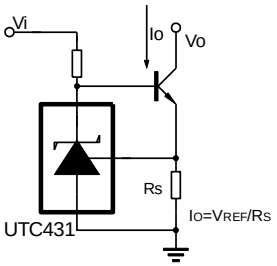


Fig 13 Constant-current Sink

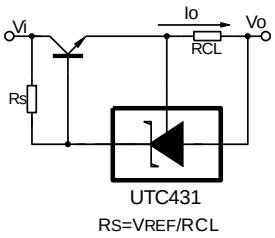


Fig 14 Current Limiting or Current Source

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1 Cathode Current Vs Cathode Voltage

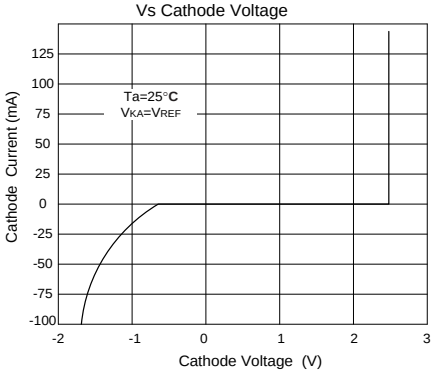


Fig 2 Cathode Current Vs Cahode Voltage

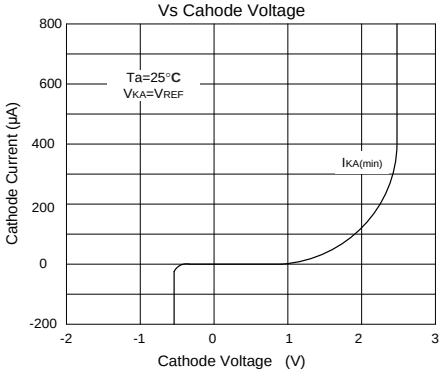


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

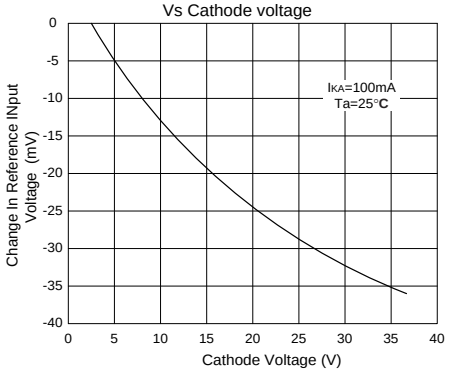


Fig 4 Pulse Response

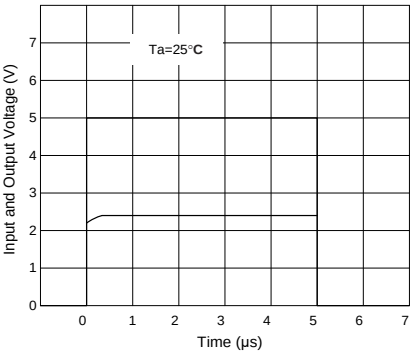


Fig 5 Dynamic Impedance Vs Frequency

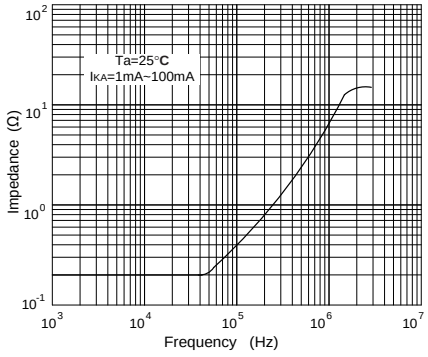


Fig 6 Small Signal Voltage Amplification Vs Frequency

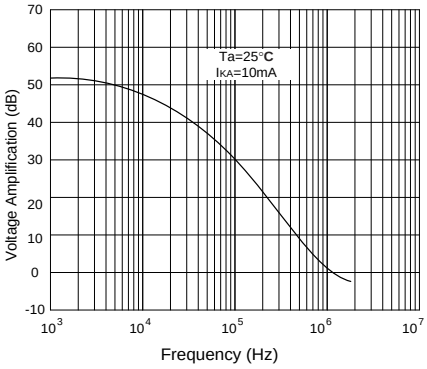
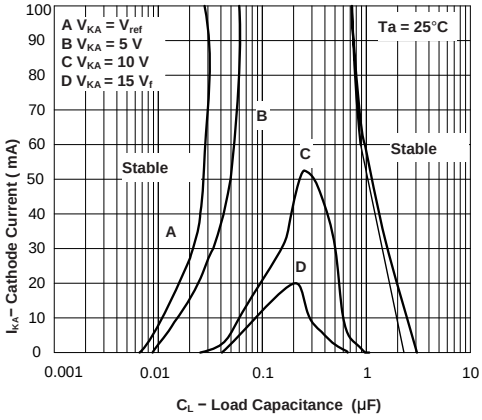
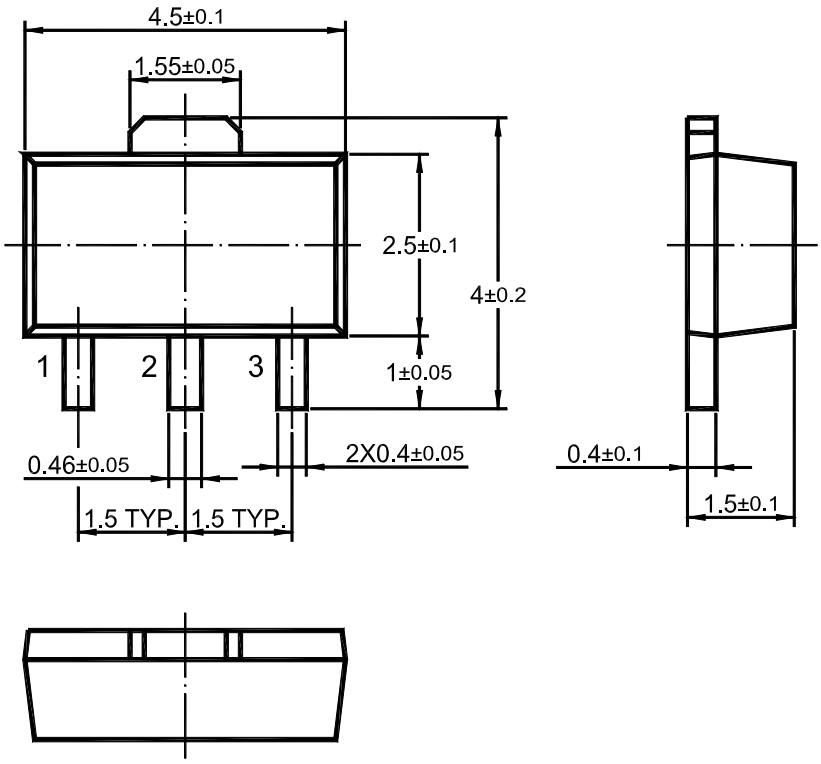


Fig 7 Cathode Current Vs Load Capacitance



SOT-89 PACKAGE OUTLINE



Dimensions in mm