Adjustable Precision Shunt Regulator

General Description

The CYT431A is a programmable shunt voltage reference with guaranteed temperature stability over the entire temperature range of operation.

The output voltage may be set to any value between 2.5V and 36V with two external resistors. This device has a typical output impedance of 0.2Ω. Active output circuitry provides a very sharp turn on characteristic, making this device excellent replacement for Zener diodes in many applications.

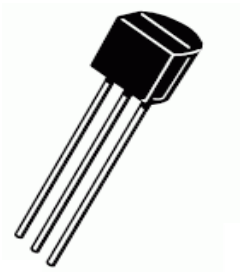
The CYT431A is characterized for operation from -40°C to 125°C.

Features

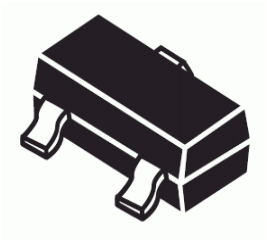
- Adjustable output voltage V_0 =2.5V to 36V.
- Wide operating current range 1.0 to 100mA.
- Low dynamic output impedance 0.2Ω (Typ.).
- Voltage Reference Tolerance: ±0.5%.
- ESD rating is 2.5KV(Per MIL-STD-883G).
- Available in Lead Free Packages.

Applications

- Adjustable Supplies
- Battery Operated Computers
- Computer Disk Drives
- Linear Regulators
- Instrumentation
- Switching Power Supplies



TO-92 Package

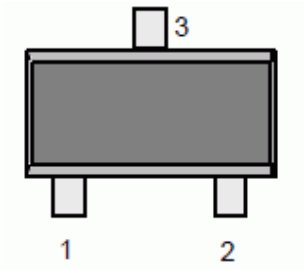


SOT-23 Package

Pin Configuration

1. Ref
2. Anode
3. Cathode

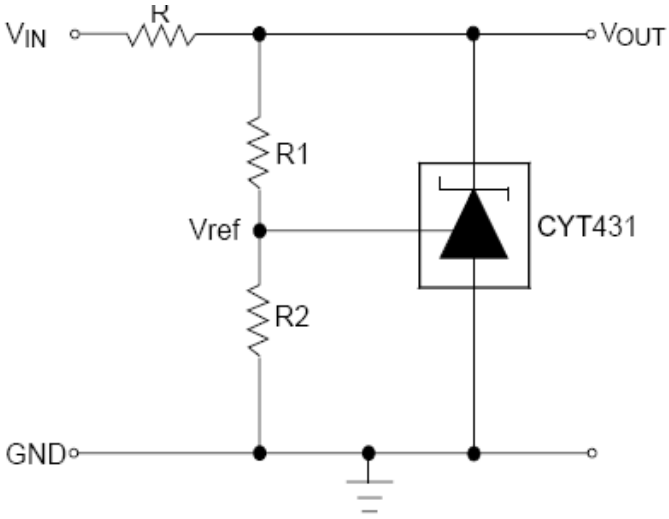
TO-92



1. Ref
2. Cathode
3. Anode

SOT-23

Application Diagram



$$V_{OUT} = V_{ref}\left(1+\frac{R1}{R2}\right)$$

Marking Information

Package	Marking	Production Year Code	Production Week Code	Lead-Free Package
SOT-23-3 SC59-3L	CYT431A	Starting with S,a bar on top of S is for production year 2001,and underlined S is for year 2002.The next character is marked on top for 2003, and underlined for 2004.The naming pattem continues with consecutive characters for later years.	A-Z:1-26 a-z:27-52	Lead-free package is indicated by a dot on top of the week code.
TO-92	CYT/TL431A YYWW	YY is the year of production. 04 means the product is manufactured in year of 2004.	WW is the week of production. 26 means the product is manufactured in the 26th week.	Lead-free package is indicated by LF after YYWW.

Absolute Maximum Ratings

CHARACTERISTICS	SYMBOL	VALUE		UNITS
Cathode Voltage	V_{KA}	37		V
Cathode Current Range(Continuous)	I_{KA}	-100~+100		mA
Reference Input Current Range	Iref	0.05~+10		mA
Power Dissipation	P_D	TO-92	770	mW
		SOT-23-3	370	
Operating temperature	Topr	-40~125		°C
Storage temperature 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}	1.0	-	100	mA

Electrical Characteristics

ELECTRICALYHARACTERISTICS(Ta=25.C,unlessytherwiseypecified)

Characteristic		Symbol	Test conditions		MIN	TYP	MAX	UNIT
Reference Input Voltage 1	0.4%	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$		2.490	2.50	2.510	V
	0.5%				2.488	2.50	2.512	
	1%				2.475	2.50	2.525	
Reference Input Voltage 2*	0.4%	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$		2.485	2.495	2.505	V
	1%				2.483	2.495	2.507	
	2%				2.470	2.495	2.520	
Deviation of reference Input Voltage Over temperature(note 1)		ΔVref（ΔT）	$V_{KA}=V_{REF}, I_{KA}=10mA$ $T_{MIN}\leq T_A\leq T_{MAX}$		-	4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA}=10mA$	$\Delta V_{KA}=10V\sim V_{REF}$	-	-1.0	-2.7	mV/V
				$\Delta V_{KA}=36V\sim 10V$	-	-0.5	-2.0	
Reference Input Current		Iref	$I_{KA}=10mA, R1=10k\Omega, R2=\infty$		-	0.5	1	μA
Deviation of Reference Input Current Over Ful l Temperature Range		ΔIref（ΔT）	$I_{KA}=10mA, R1=10k\Omega, R2=\infty$, TA= full Temperature		-	0.4	1.2	μA
Minimum cathode current for regulation		I_{KA}(min)	$V_{KA}=V_{REF}$		-	0.05	0.08	mA
Off-state cathode Current		I_{KA}(OFF)	$V_{KA}=36V, V_{REF}=0$		-	0.05	1.0	μA
Dynamic Impedance		Z_{KA}	$V_{KA}=V_{REF}, I_{KA}=1$ to 100mA f≤1.0kHz		-	0.15	0.5	Ω

Note: T_{MIN}=-40°C, T_{MAX}=125°C

*In order to match the special request of customer

Typical Performance Characteristics

Fig 1 Cathode Current Vs Cathode Voltage

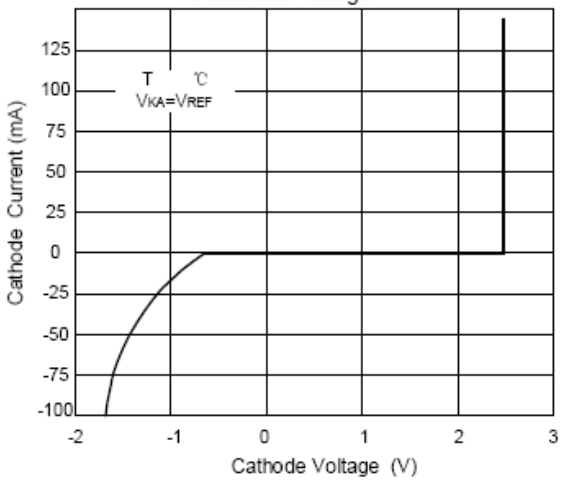


Fig 2 Cathode Current Vs Cahode Voltage

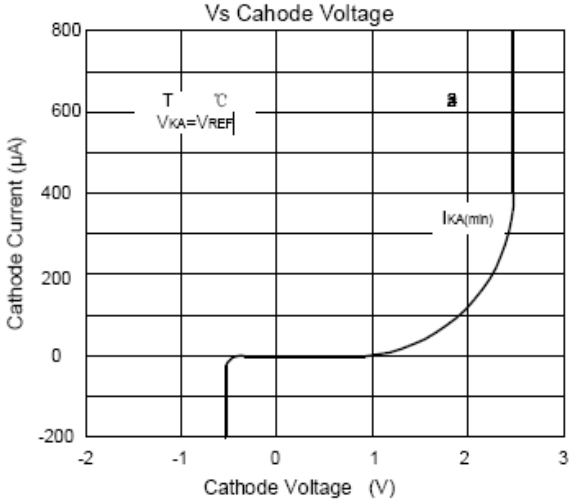


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

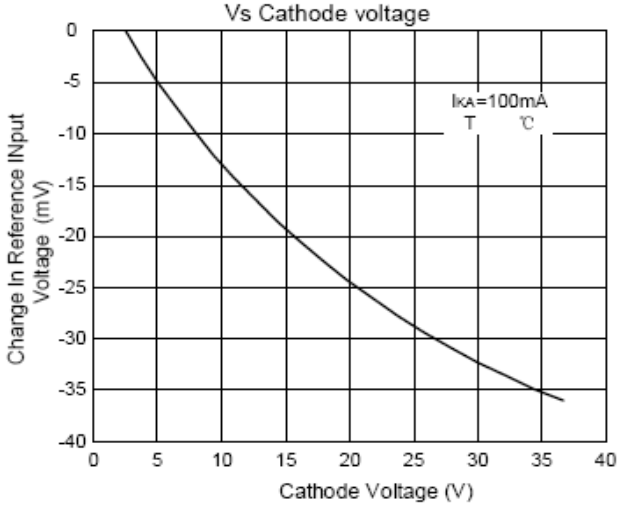


Fig 4 Pulse Response

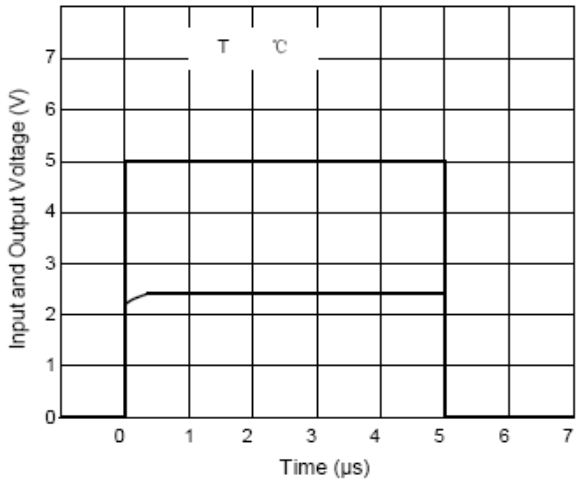


Fig 5 Dynamic Impedance Vs Frequency

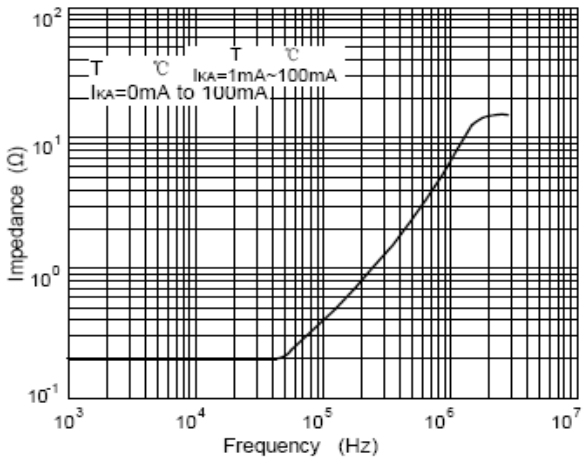
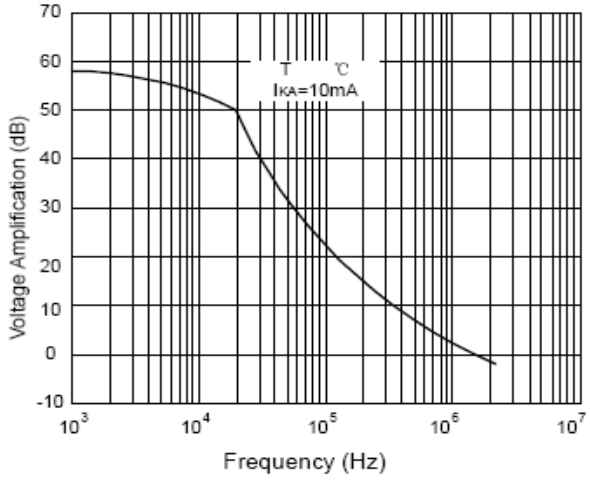
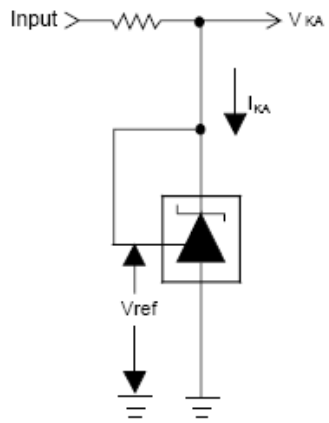
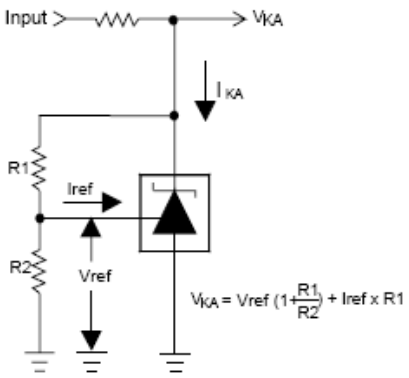
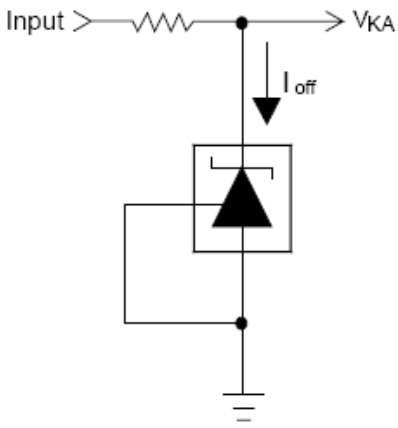


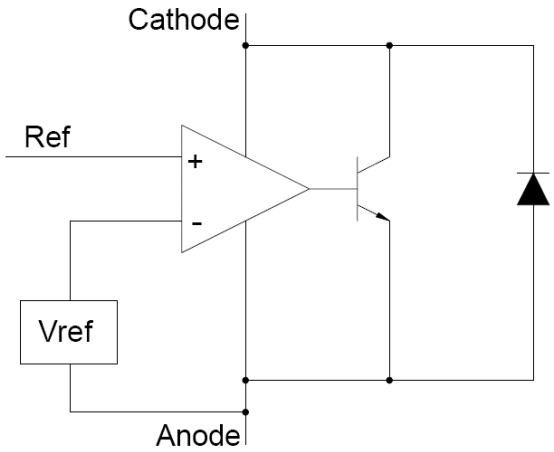
Fig 6 Small Signal Voltage Amplification Vs Frequency



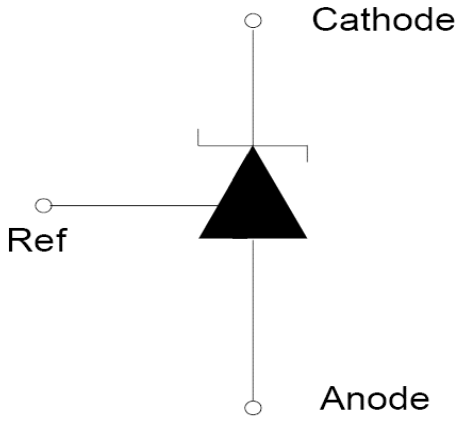
Test Circuits

		
Test Circuit 1: **$V_{KA} = V_{REF}$**	**Test Circuit 2:** **$V_{KA} > V_{REF}$**	**Test Circuit 3:** **Off State Current**

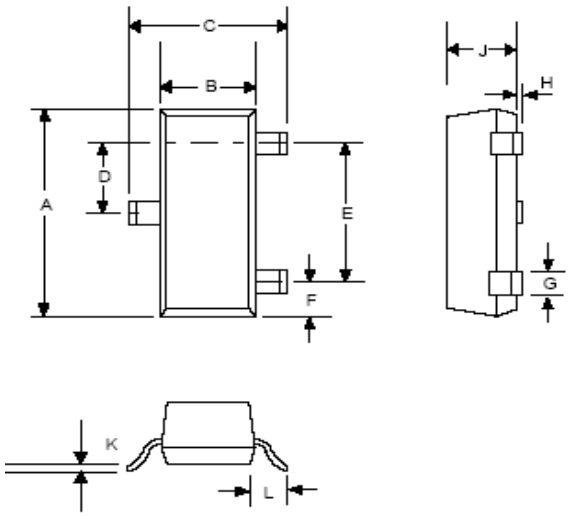
Block Diagram



Symbol Diagram

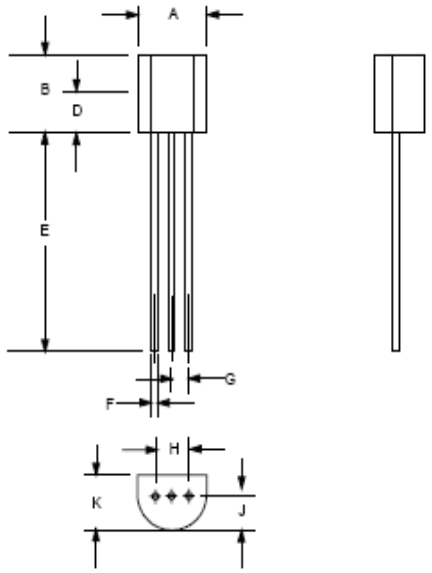


OUTLINE DRAWING SOT-23



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.04
B	0.047	0.055	1.20	1.40
C	0.083	0.104	2.10	2.64
D	0.035	0.040	0.89	1.03
E	0.070	0.080	1.78	2.05
F	0.018	0.024	0.45	0.60
G	0.015	0.020	0.37	0.51
H	0.0005	0.004	0.013	0.10
J	0.034	0.040	0.887	1.02
K	0.003	0.007	0.085	0.18
L	-	0.027	-	0.69

OUTLINE DRAWING TO-92



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.445	5.207
B	0.170	0.210	4.318	5.334
E	0.500	0.610	12.70	15.50
F	0.016	0.021	0.407	0.533
G	0.045	0.055	1.143	1.397
H	0.095	0.105	2.413	2.667
J	0.080	0.105	2.032	2.667
K	0.125	0.165	3.175	4.191

SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD.

IMPORTANT NOTICE

SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD. reserves the right to make changes without further notice to any products or specifications herein. SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD. does not assume any responsibility for use of any its products for any particular purpose, nor does SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD. assume any liability arising out of the application or use of any its products or circuits. SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD. does not convey any license under its patent rights or other rights nor the rights of others.

MAIN SITE(China):

SHENZHEN CYT OPTO-ELECTRONIC TECHNOLOGY CO.,LTD.

Address: Rm201-205, Building 4, Software park, Gaoxin center 2nd Rd, Nanshan District, Shenzhen

TEL:+86-755-86168222 FAX:+86-755-86168622 Technical support:+86-755-86169530

Business mail address: cyt@szcyt.com Website: www.szcyt.com