TP431R0001S3
TP431R0002S3
TP431R0003S3

Precision adjustable reference source

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Features

- Adjustable output voltage range: 2.5V~36V
- Low Dynamic Output Resistance: 0.15Ω(typ)
- Low Temperature Deviation: 5mV(typ)
- Low Output Noise
- High Stability under Capacitive Load
- Current capacity range 1-100 mA

Applications

- Adjustable voltage and current reference
- Zener diode replacement products
- Voltage monitoring
- A comparator with an integrated benchmark
- Secondary side voltage regulation in flyback switch mode power supply (SMPS)

General Description

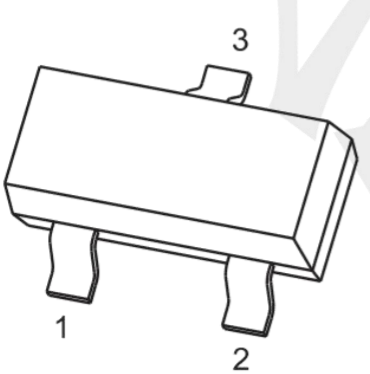
Precision adjustable reference source

The is a three terminal adjustable parallel regulator that can Set the output voltage through two external resistors Between Vref (approximately 2.5V) and 36V Any value. These devices have an output of 0.15 Ω (typ) Output impedance. Active output circuits can provide very sharp The conductivity characteristics of these devices enable them to be used in many applications Becoming an excellent substitute for Zener diodes in use, this Some applications include onboard voltage regulation, adjustable power supply, and power on/off Power off.

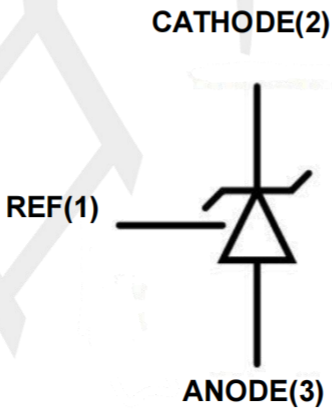
Ordering Information

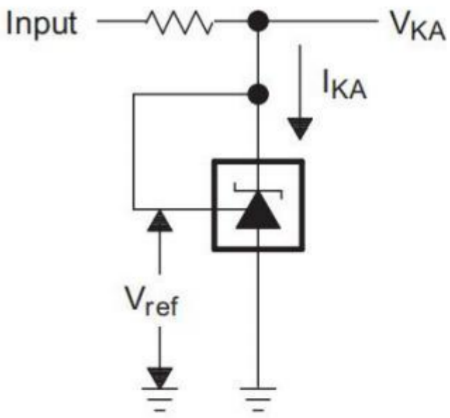
ORDER NUMBER	ACCURACY	PACKAGE DESCRIPTION	PACKAGE OPTION
TP431R0001S3	±0.1%	SOT23	Tape and Reel,3000
TP431R0002S3	±0.2%	SOT23	Tape and Reel,3000
TP431R0003S3	±0.3%	SOT23	Tape and Reel,3000

Circuit diagram and pin information



SOT23





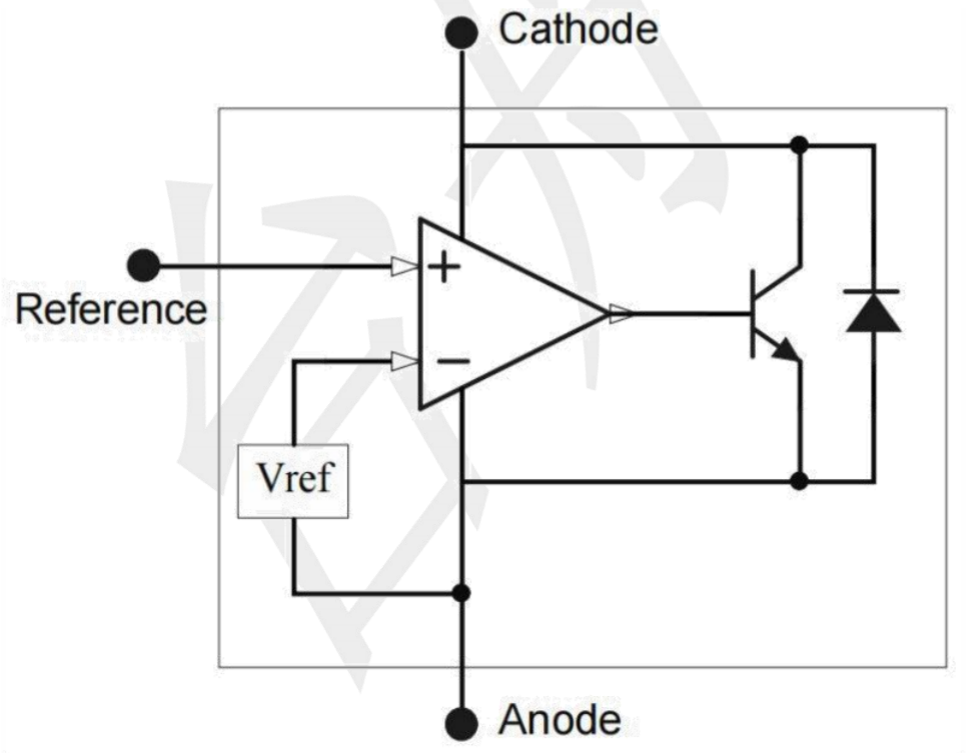
Absolute Maximum Ratings

Within the range of TA=25 ℃ (unless otherwise specified)

Parameter		Value	UNIT
P_M	Power Rating	0.25	**W**
V_{KA}	Cathode voltage	36	**V**
I_{KA}	Continuous cathode current range	-100 ~ +150	**mA**
$I_{I(ref)}$	Reference input current range	10	**mA**
T_{OA}	Operating Ambient Temperature Range	-40 ~ +125	℃
T_J	Operating virtual junction temperature	+150	℃
T_{stg}	Storage temperature range	-55 ~ +150	℃
ESD	Human Body Model	6	**KV**
ESD	Machine Model	0.4	**KV**

(1) Exceeding the absolute maximum rated pressure listed may result in permanent damage to the equipment. These are only rated stresses and do not imply any of them or any of them
The functional operation of the equipment under his conditions (beyond the conditions indicated under the 'recommended working conditions'). Long term exposure to absolute maximum rated conditions can It can affect the reliability of the equipment.
(2) Unless otherwise specified, all voltage values are related to the anode.

BLOCK DIAGRAM



Electrical Characteristics

Under recommended working conditions, TA=25 ℃ (unless otherwise specified)

PARAMETER	SYMBOL	TEST Conditions		MIN	TYP	MAX	UNIT
Reference voltage (Fig.1)	V_{REF}	$V_{KA}=V_{REF}$, I_K=10mA	0.1%	2.4975	2.5000	2.5025	V
			0.2%	2.4950	2.5000	2.5050	
			0.3%	2.4925	2.5000	2.5075	
Continuous cathode current range	I_{KA}	Operating Conditions		1.0	--	100	mA
Deviation of reference input voltage over full temperature (1)(Fig.1)	V_{REF} （DEV）	$V_{KA}=V_{REF}$, I_K=10mA, T_A=-20°C~110°C		--	5.0	10	mV
Ratio of change in reference input voltage to the change in cathode voltag (Fig.2)	$\triangle V_{REF}$ /$\triangle V_{KA}$	I_K=10mA, $\triangle V_{KA}$ =10V~V_{REF}		--	0.4	--	mV/V
		I_K=10mA, $\triangle V_{KA}$ =36V~10V		--	-0.4	--	mV/V
Reference input current (Fig.2)	I_{REF}	I_K=10mA, R1=10KΩ, R2=∞		--	0.7	4.0	uA
Deviation Of reference input current over full temperature range (Fig.2)	$\triangle I_{REF}$	I_K=10mA, R1=10KΩ, R2=∞, T_A=-10°C~125°C		--	0.4	1.2	uA
Minimum cathode current for regulation (Fig.1)	I_{KMIN}	$V_{KA}=V_{REF}$		--	0.35	1.0	mA
Off-state cathode current (Fig.3)	I_{OFF}	V_{KA}=12V, V_{REF}=0		--	0.05	1.0	uA
Dynamic impedance	Z_{KA}	$V_{KA}=V_{REF}$, I_K=1mA~100 mA, f ≤1KHz		--	0.15	0.5	Ω
Thermal Resistance	θ_{JC}			--	115	--	°C/W

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

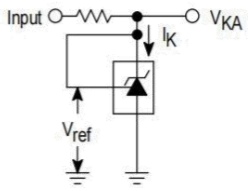


Figure 2. Test Circuit for $V_{KA} > V_{ref}$

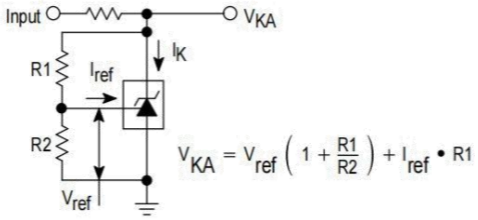
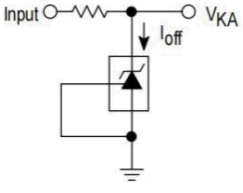
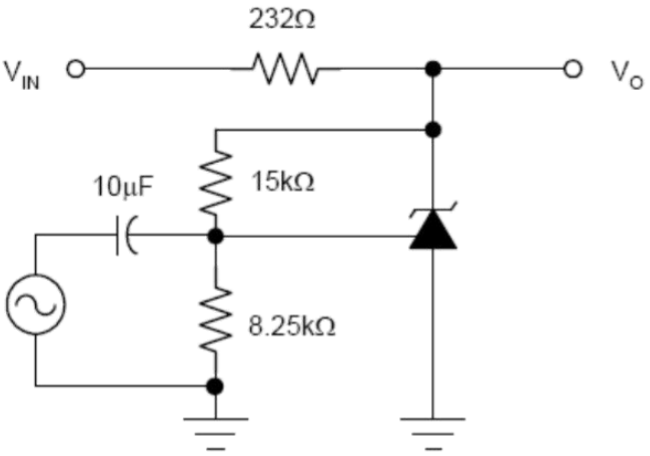


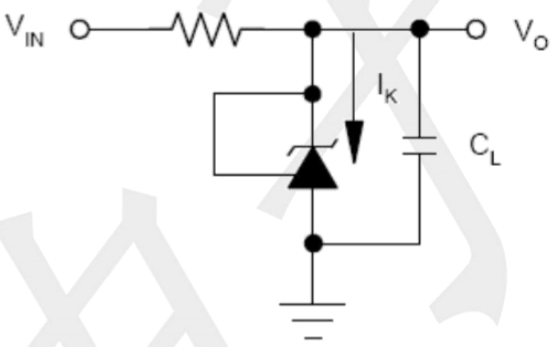
Figure 3. Test Circuit for I_{off}



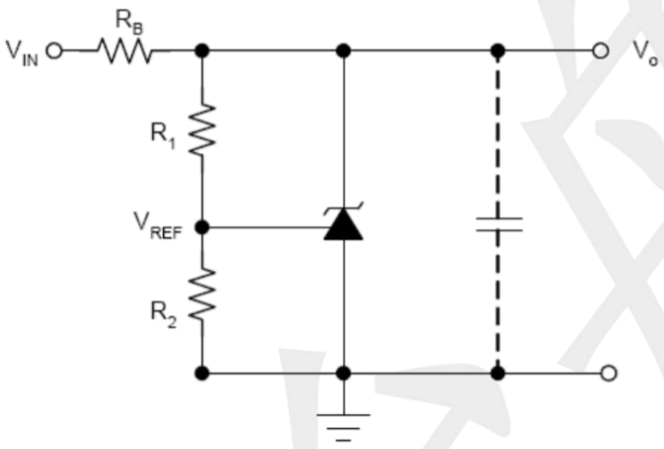
Typical Application Circuits



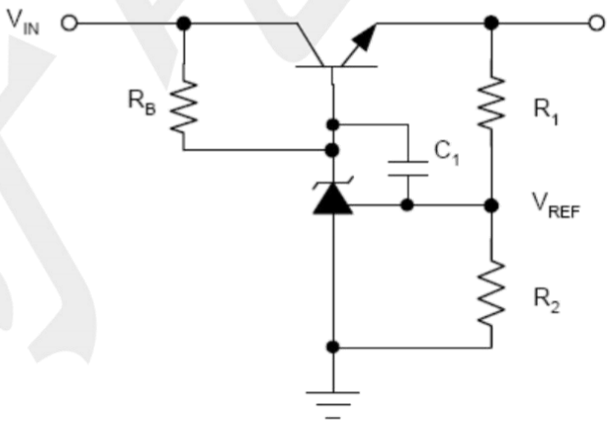
Voltage Amplification Test Circuit



Stability Test Circuit for $V_{KA}=V_{REF}$



Precision Voltage Reference



Precision High-Current Series Regulator

Notes for Typical Application Circuits:

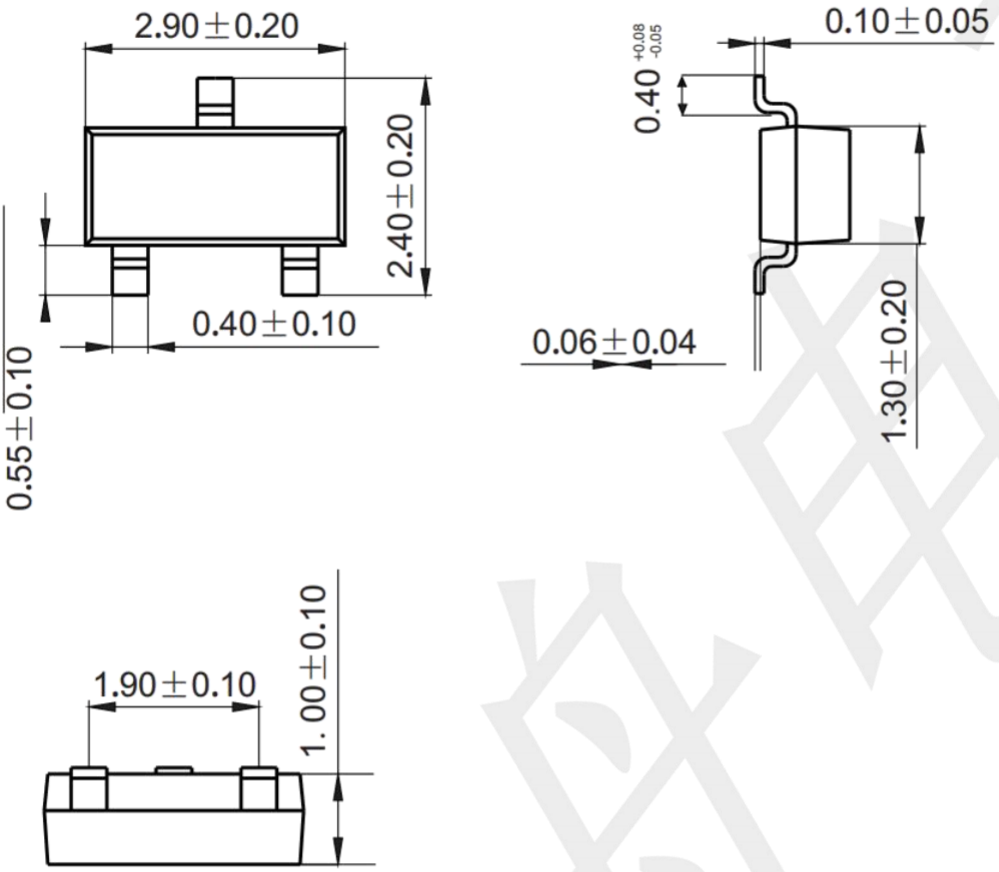
1. For the series regulator applications, add a compensation capacitor C1 between CATHODE and REF is strongly recommended to improve the stability of output voltage.
2. Set Vo according to the following equation: Vo=VREF(1+R1/R2)+IREFxR1.
3. Choose the Value for RB as below:

(1). The maximum limit for RB should be such that the cathode current (IK) is greater than the minimum operating current (1mA) at VIN(MIN).

(2). The minimum limit for RB should be such that the cathode current (IK) does not exceed 100mA under all load conditions, and the instantaneous turn-on value for IK does not exceed 120mA.

Package Outline Dimensions (unit: mm)

SOT23



Mounting Pad Layout (unit: mm)

