

ADJUSTABLE PRECISION SHUNT REGULATORS

FEATURES

- **Reference Voltage High Accuracy at 25°C:**
 - 0.5% B Grade
 - 1.0% A Grade
- **Programmable Precise Output Voltage:**
 - TSV431/TSV432 1.25V to 18V
- **Low Temperature Deviation: 4mV (Typ)**
- **Low Output Noise**
- **Sink Current Capability: 0.1mA to 100mA**
- **Operation Junction Temperature:**
 - 40°C to +125°C
- **SOT-23-G Package**

PRODUCT DESCRIPTION

The TSV431/TSV432 series ICs are three-terminal adjustable shunt regulators offering excellent temperature stability.

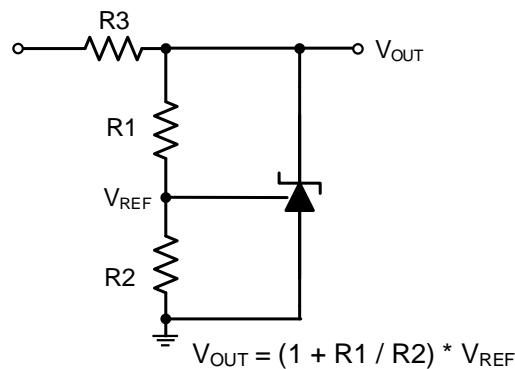
The output voltage can be programmable to any voltage between V_{ref} (1.25V) and the corresponding maximum cathode voltage by two external resistors. The TSV431/TSV432 maximum output voltage is 18V.

The TSV431/TSV432 precision reference series provide 0.5% and 1.0% initial accuracy grades. Active output circuitry provides a very sharp turn on characteristic, making these devices excellent replacements for zener diodes in many applications, such as onboard regulation, adjustable power supplies, and switching power supplies.

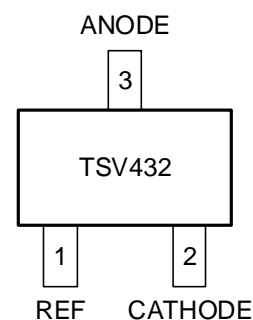
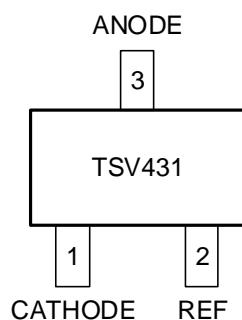
APPLICATIONS

- Precision Voltage Reference
- High Current Shunt Regulator
- Power Converter/Inverter
- Charger

TYPICAL APPLICATION



PIN CONFIGURATION AND FUNCTIONS



FUNCTIONAL BLOCK DIAGRAM AND SYMBOL

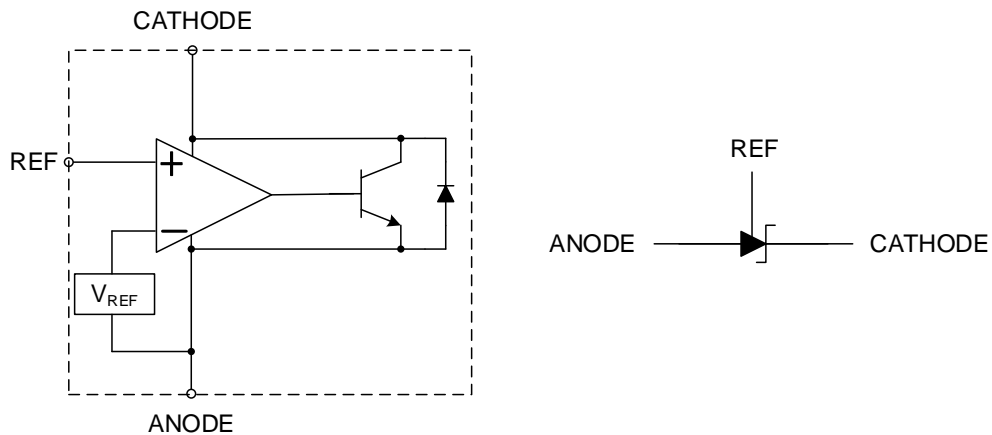


Figure 1 functional block diagram and symbol

RECOMMENDED OPERATING CONDITIONS

Parameter	Min	Max	Unit
Cathode voltage range, V_{KA}	V_{REF}	18	V
Cathode current range, I_{KA}	0.1	100	mA
Operating virtual junction temperature, T_J	-40	125	°C

ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Max	Unit
Cathode Voltage Range	-0.3	20	V
Cathode Current Range	-100	100	mA
Reference Input Current Range		10	mA
Junction Temperature		150	°C
Power Dissipation		230	mW
Storage Temperature Range	-65	150	°C
Lead Temperature (Soldering, 10s)		260	°C

ORDERING INFORMATION

Model	Part Number	Eco Plan	Package	Grade, Accuracy	Container, Pack Qty
TSV431-A	TSV431ASOT23GR	RoHS	SOT-23-G	A, 1.0%	Reel, 3000
TSV431-B	TSV431BSOT23GR	RoHS	SOT-23-G	B, 0.5%	Reel, 3000
TSV432-A	TSV432ASOT23GR	RoHS	SOT-23-G	A, 1.0%	Reel, 3000
TSV432-B	TSV432BSOT23GR	RoHS	SOT-23-G	B, 0.5%	Reel, 3000

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjects to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

ELECTRICAL CHARACTERISTICS

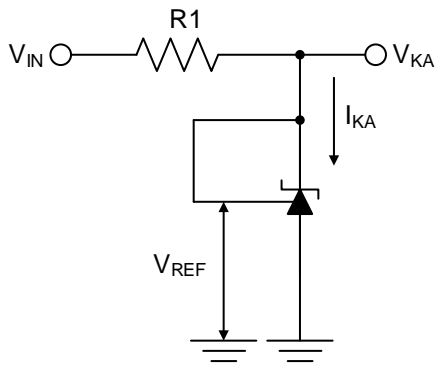
Boldface limits apply over the specified Junction temperature range, $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$.

At $T_A = +25^{\circ}\text{C}$ (unless otherwise noted)

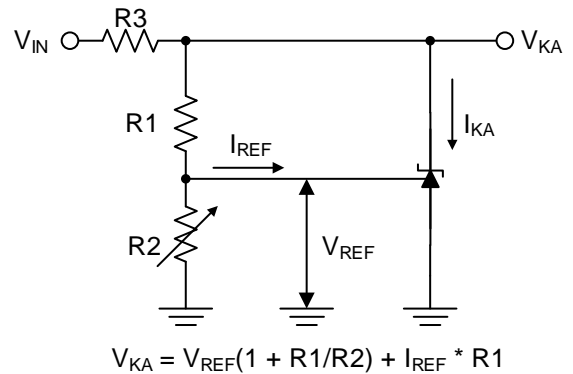
Parameter		Test Circuit	Operating Conditions		Min	Typ	Max	Unit
V_{REF}	Reference Voltage	1	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{mA}$	B Grade	1.244	1.250	1.256	V
				A Grade	1.238	1.250	1.262	
ΔV_{REF}	Deviation of Reference Voltage over Full Temperature Range	1	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{mA}$	- 40 to +125°C		0.04	0.2	mV/°C
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in Reference Voltage to The Change in Cathode Voltage	2	$I_{KA} = 10\text{mA}$	$\Delta V_{KA} = V_{REF}$ to 16V		-0.5	-1.5	mV/V
I_{REF}	Reference Current	2	$I_{KA} = 10\text{mA}$, $R1 = 10\text{k}\Omega$, $R2 = \infty$			0.15	0.4	μA
ΔI_{REF}	Deviation of Reference Current over Full Temperature Range	2	$I_{KA} = 10\text{mA}$, $R1 = 10\text{k}\Omega$, $R2 = \infty$, $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$			0.1	0.4	μA
I_{KA_MIN}	Minimum Cathode Current for Regulation	1	$V_{KA} = V_{REF}$			55	80	μA
I_{KA_OFF}	Off-State Cathode Current	3	$V_{REF} = 0$, $V_{KA} = 18\text{V}$			0.04	0.10	μA
			$V_{REF} = 0$, $V_{KA} = 6\text{V}$			0.01	0.05	
Z_{KA}	Dynamic Impedance	4	$V_{KA} = V_{REF}$, $I_{KA} = 1$ to 100mA , $f \leq 1.0\text{kHz}$			0.05	0.15	Ω
θ_{JC}	Thermal Resistance		SOT-23-G			84		°C/W

(1) Test time of each parameter is within 5ms. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

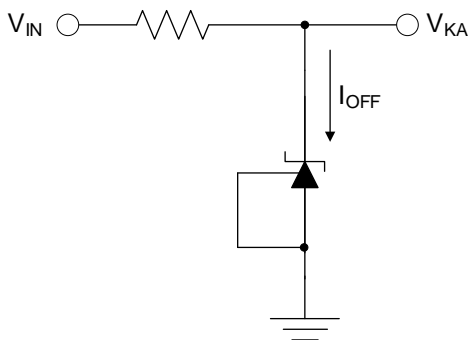
PARAMETER MEASUREMENT INFORMATION



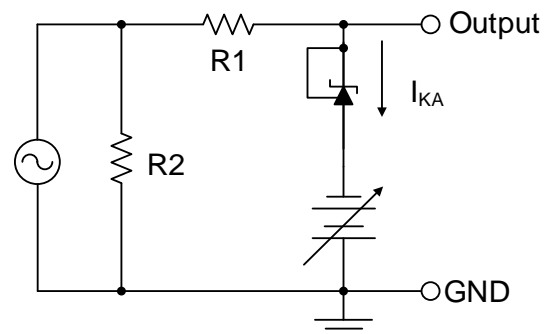
Test Circuit 1 for $V_{KA} = V_{REF}$



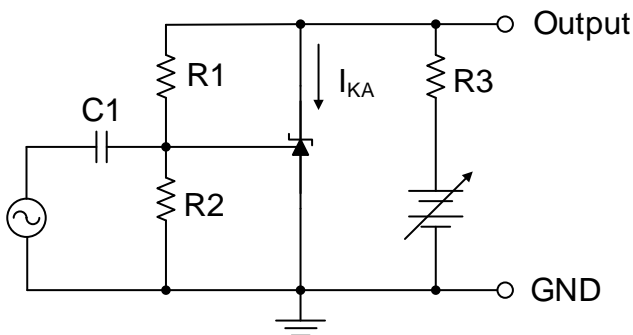
Test Circuit 2 for $V_{KA} > V_{REF}$



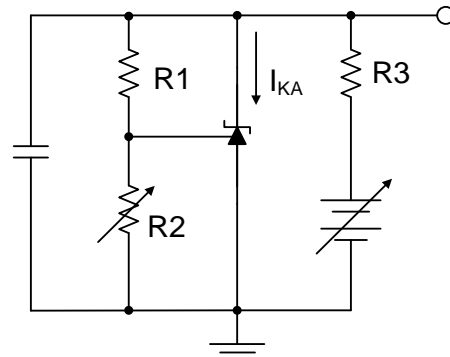
Test Circuit 3 for I_{OFF}



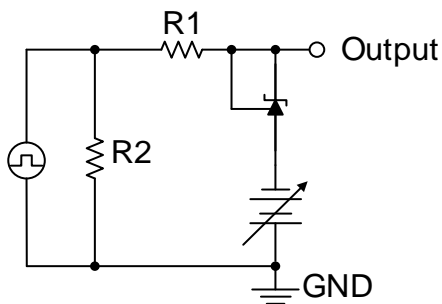
Test Circuit 4 for Z_{KA}



Test Circuit 5 for Gain



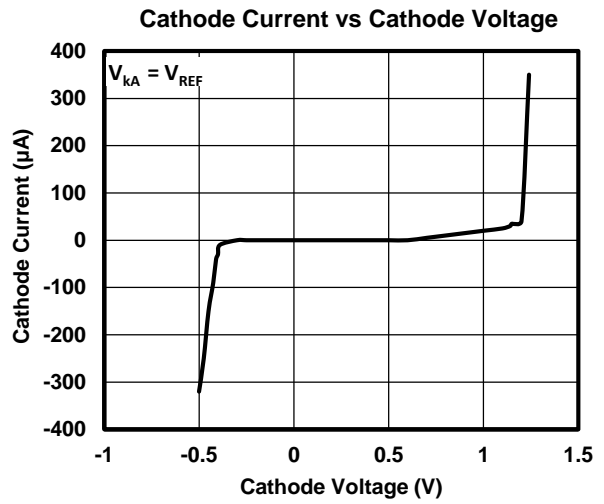
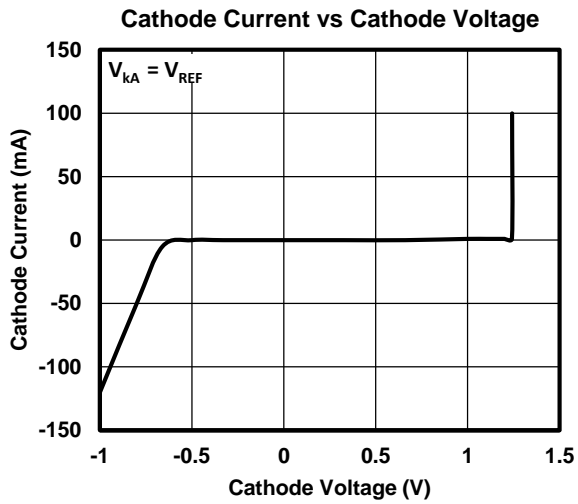
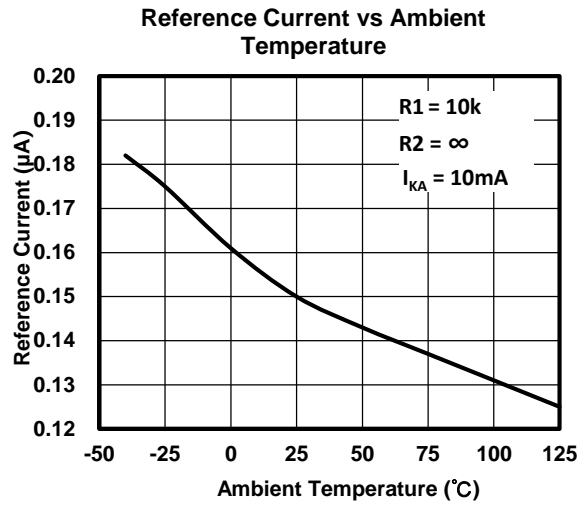
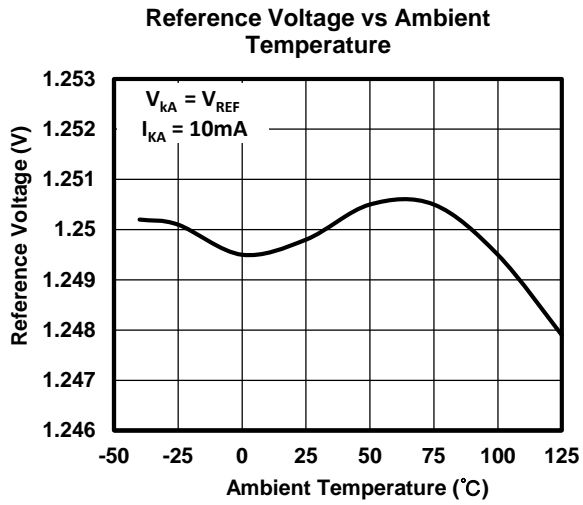
Test Circuit 6 for Stability



Test Circuit 7 for Input Response

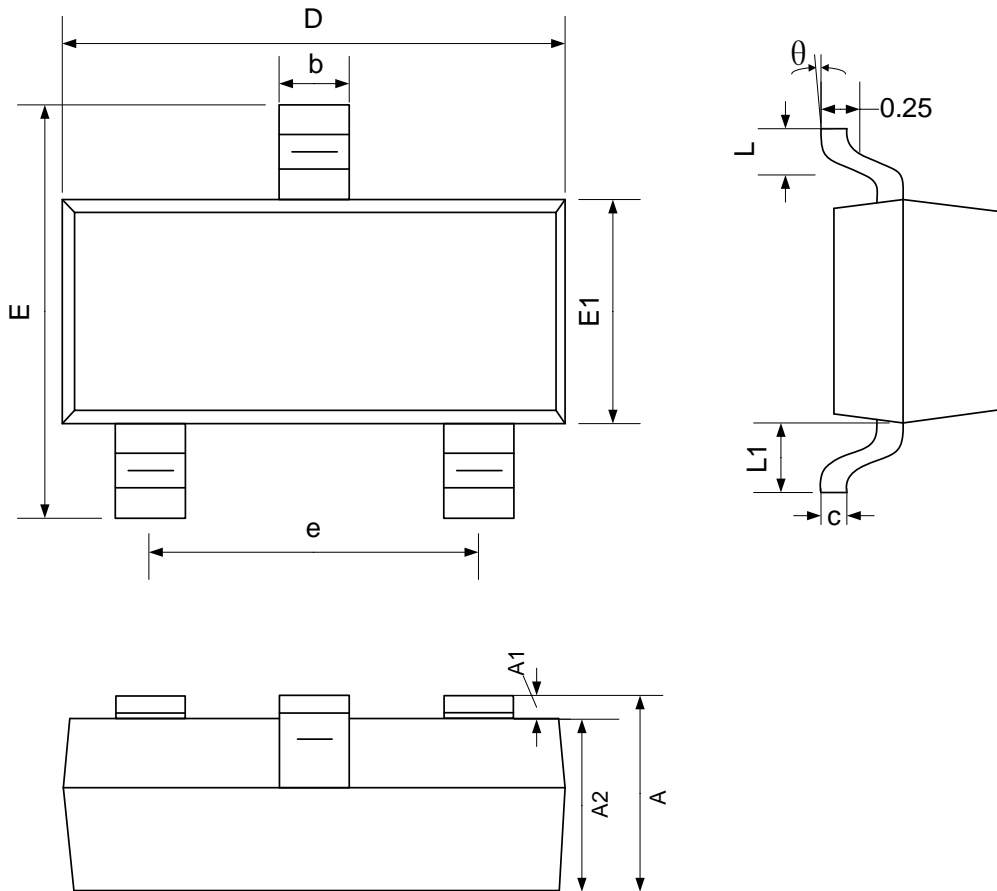
TYPICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$ (unless otherwise noted)



MECHANICAL DIMENSIONS

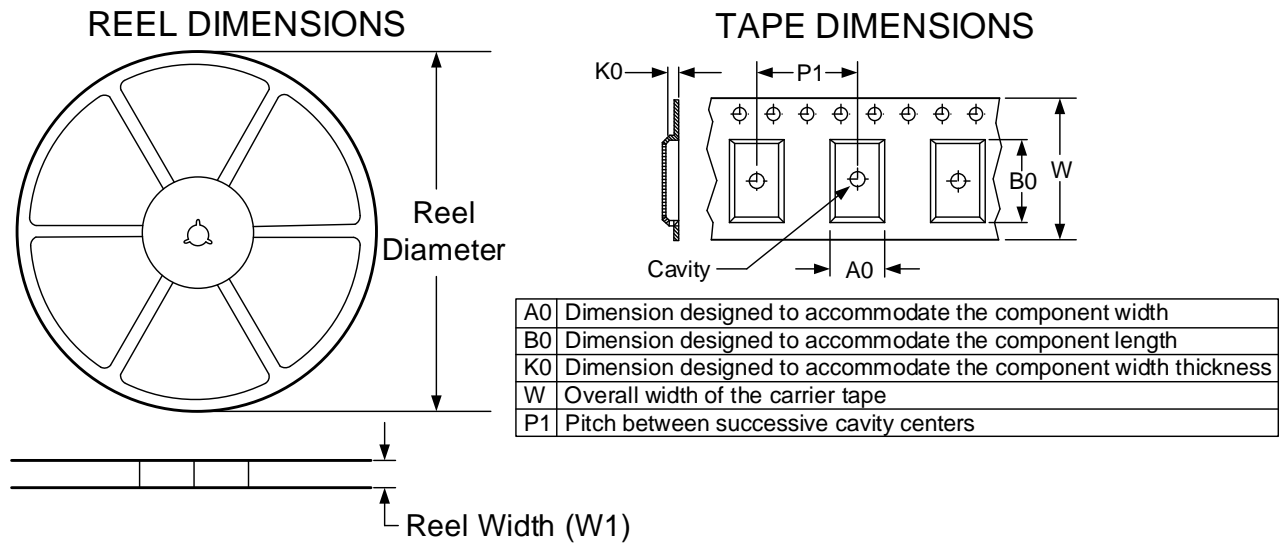
SOT-23-G PACKAGE MECHANICAL DRAWING



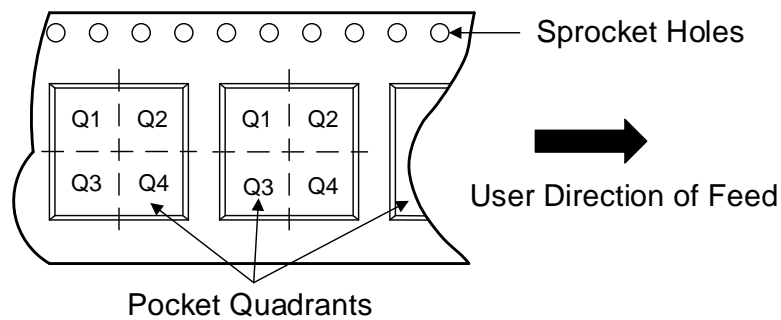
SOT-23-G PACKAGE MECHANICAL DATA

symbol	Dimensions in Millimeters		Dimensions in Inches	
	min	max	min	max
A	1.15Max		0.045Max	
A1	0	0.100	0	0.004
A2	0.900	1.100	0.035	0.043
b	0.300	0.500	0.012	0.020
c	0.132	0.202	0.005	0.008
D	2.800	3.000	0.110	0.118
E	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
θ	0	8	0	8

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TSV431ASOT23GR	SOT-23-G	3	3000	178.0	12.3	3.15	2.77	1.22	4.0	8.0	Q3
TSV431BSOT23GR	SOT-23-G	3	3000	178.0	12.3	3.15	2.77	1.22	4.0	8.0	Q3
TSV432ASOT23GR	SOT-23-G	3	3000	178.0	12.3	3.15	2.77	1.22	4.0	8.0	Q3
TSV432BSOT23GR	SOT-23-G	3	3000	178.0	12.3	3.15	2.77	1.22	4.0	8.0	Q3

REVISION HISTORY

NOTE: Page numbers for previous revisions may be different from that of the current version.

2022/11/01 — REV KY0.0.0A to REV KY0.1.0A

Update V_{REF}1、4

2023/04/03 — REV KY0.1.0A to REV KY1.1.0A

Format optimization.....All pages

CONTACT INFORMATION

Trusignal Microelectronics

Phone: +86 512-65923982

Fax: +86 512-65923995

Email: support@kunyuanic.com; sales@kunyuanic.com