Elektronische Bauelemente

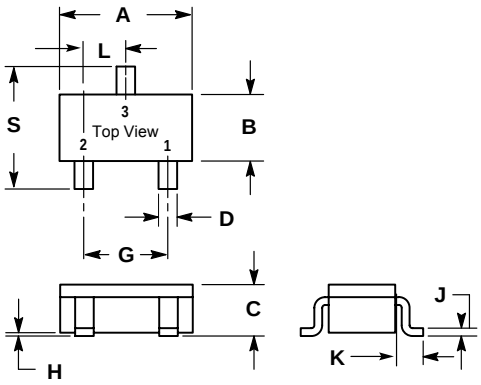
TL432K

Adjustable Shunt Regulator

RoHS Compliant Product

DESCRIPTION

The TL432K series are three-terminal adjustable regulators with guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between V_{REF} (approximately 1.24V) and 20V with two extermal resistors. Theses devices have an output impedance of 0.2Ω. In many applications, these devices make excellently improved Zener diode replacements due to their active output circuitry that provide very sharp turn-on characteristics.
Due to their precise +/- 2% referencing voltage tolerance, it is possible in many applications to avoide the use of variable resistors. This may consequently save cost and eliminate associated drifting and reliability problems.

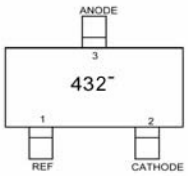


SC-59		
Dim	**Min**	**Max**
A	2.70	3.10
B	1.40	1.60
C	1.00	1.30
D	0.35	0.50
G	1.70	2.10
H	0.00	0.10
J	0.10	0.26
K	0.20	0.60
L	0.85	1.15
S	2.40	2.80
All Dimension in mm		

FEATURES

- Sink current capability: 200 mA.
- Minimum cathode current for regulation: 150 mA.
- Equivalent full-range temp coefficient: 30 ppm/℃.
- Fast turn-on response.
- Low dynamic output impedance: 0.2Ω.
- Programmable output voltage to 20V
- Low output noise.

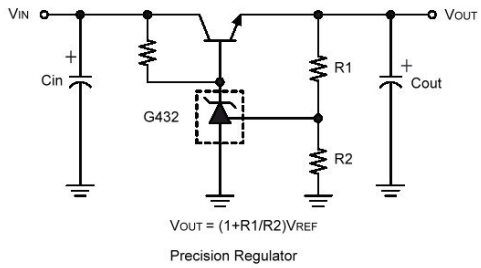
Marking:



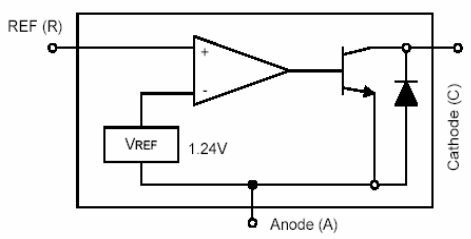
PRECISION REFERENCE VOLTAGE

Rank	A	B	C
Reference Voltage	1.24 ± 0.5%	1.24 ± 1%	1.24 ± 2%

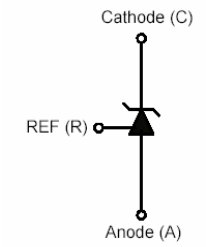
TYPICAL APPLICATION CIRCUIT



BLOCK DIAGRAM



SYMBOL

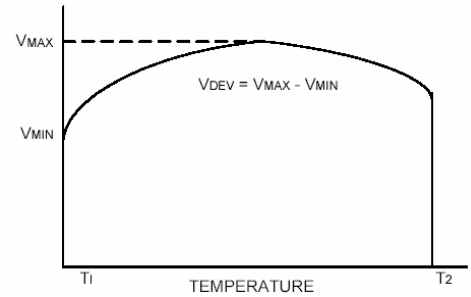


ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Units
Supply Voltage	V_{KA}	20	V
Differential Input Voltage	I_{KA}	-10 ~ +250	mA
Input Voltage	I_{REF}	-0.05 ~ +10	mA
Power Dissipation	P_D	225	mW
Opearting, Storage Temperature	T_J, T_{STG}	150, -65~150	°C

ELECTRICAL CHARACTERISTICS (V_{CC}=5V, All voltage referenced to GND unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Referencet Voltage TL432KC	V_{REF}	V_{KA} = V_{REF}, I_K = -10mA (Fig. 1)	1.215	1.24	1.265	V
TL432KB			1.228		1.252	
TL432KA			1.234		1.246	
Deviation of reference input voltage over temperature (note 1)	ΔV_{REF} /ΔT	V_{KA} = V_{REF}, I_K = -10mA, Ta = Full Range (Fig. 1)		3.0	20	mV
Ratio of Change in reference input voltage to the change in cathode voltage	ΔV_{REF} /ΔV_{KA}	I_K = -10 mA (Fig. 2); ΔV_{KA} = 20V~V_{REF}		-1.4	-2.0	mV /V
Reference Input Current	I_{REF}	I_K = 10mA, R_1 = 10KΩ, R_2 = ∞(Fig.2)		1.4	3.5	μA
Deviation of reference input current over temperature range	αI_{REF}	I_K = 10mA, R1 = 10 KW, R2 = ∞ (Fig. 2)		0.4	1.2	μA
Minimum cathode current for regulation	$I_{KA(min)}$	V_{KA} = V_{REF} (Fig. 1)		0.15	0.3	mA
Off-State Cathode Current	$I_{KA(off)}$	V_{KA} = 20V, V_{REF} = 0 (Fig.3)		0.1	1.0	μA
Dynamic Output Inpedance (note 2)	$\|Z_{kA}\|$	V_{KA} = V_{REF} , I_K = 1 ~ 100 mA F ≦ 1.0 KHz (Fig. 1)		0.2	0.5	Ω



Note 1. Deviation of reference input voltage, VDEV, is defined as the maximum variatio of the reference over the full temperature range.
The average temperature coefficient of the reference input voltage α VREF is defined as:

$$|\alpha V_{REF}| = \frac{(\frac{V_{DEV}}{V_{REF}(25°C)}) \times 10^6}{T_2 - T_1} \quad \text{.....} \quad (ppm/°C)$$

Where:
T2-T1 = full temperature change.
α VREF can be positive or negative depending on whether the slope is positive or negative.
Note 2. The dynamic output impedance, RZ, is defined as:

$$|Z_{KA}| = \frac{\Delta V_{KA}}{\Delta I_{KA}}$$

When the device is programmed with two external resistors R1 and R2 (see figure 2.), the dynamic output impedance of the overall circuit, is defined as:

$$|Z_{KA}'| = \frac{\Delta V}{\Delta I} > |Z_{KA}| \quad (1+\frac{R1}{R2})$$

TEST CIRCUITS

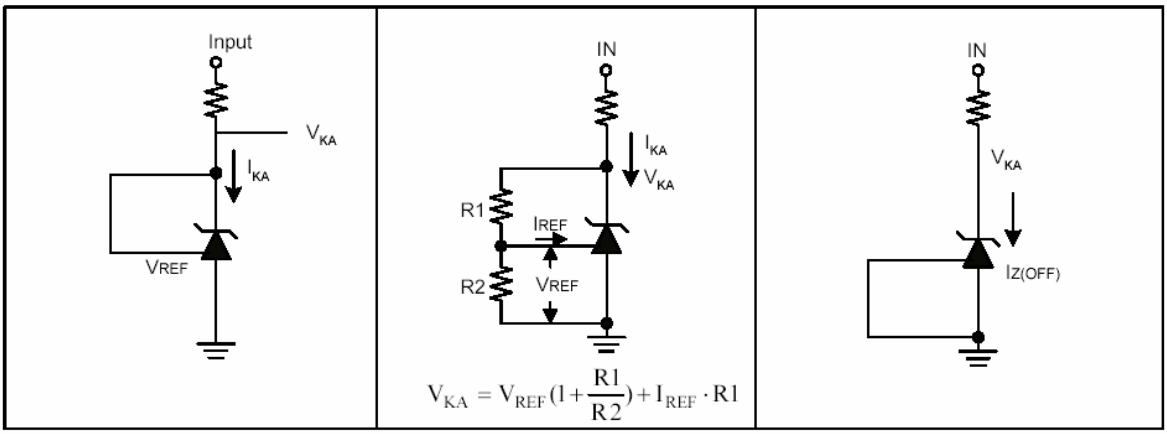
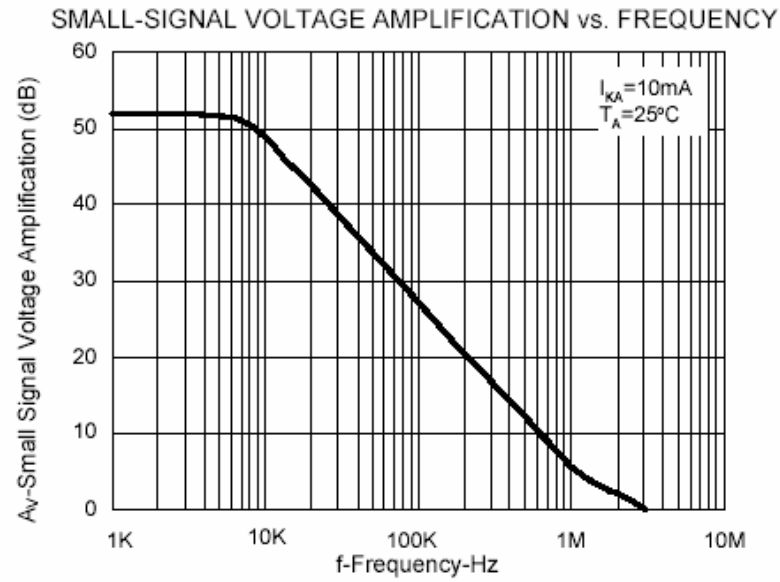
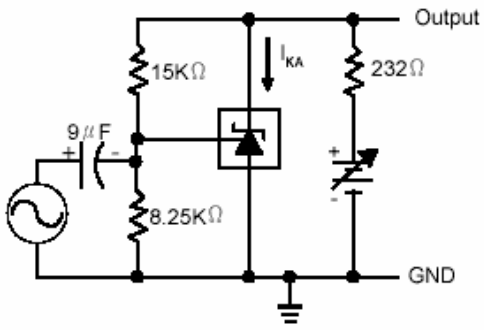


Fig1. Test Circuit for $V_{KA} = V_{REF}$ Fig2. Test circuit for $V_{KA} > V_{REF}$ Fig3. Test Circuit for off-state Current

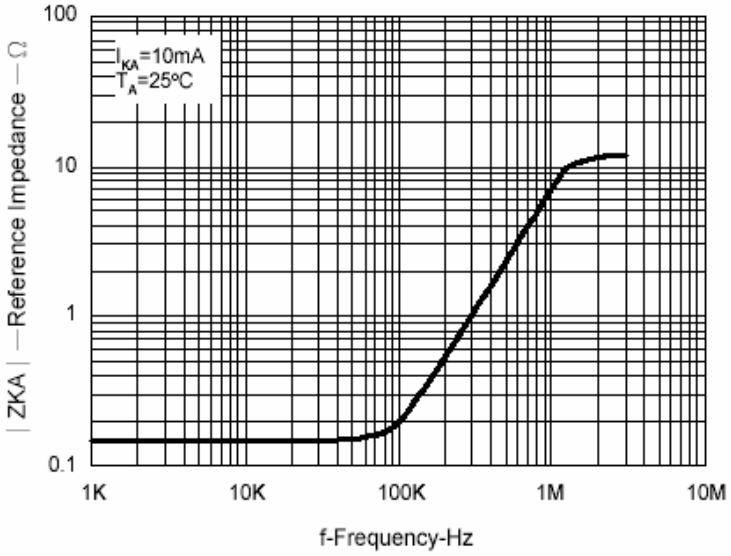
TYPICAL PERFORMANCE CHARACTERISTICS

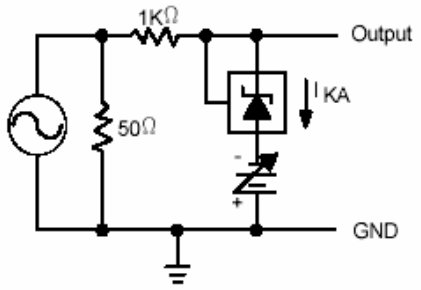




TEST CIRCUIT FOR VOLTAGE AMPLIFICATION

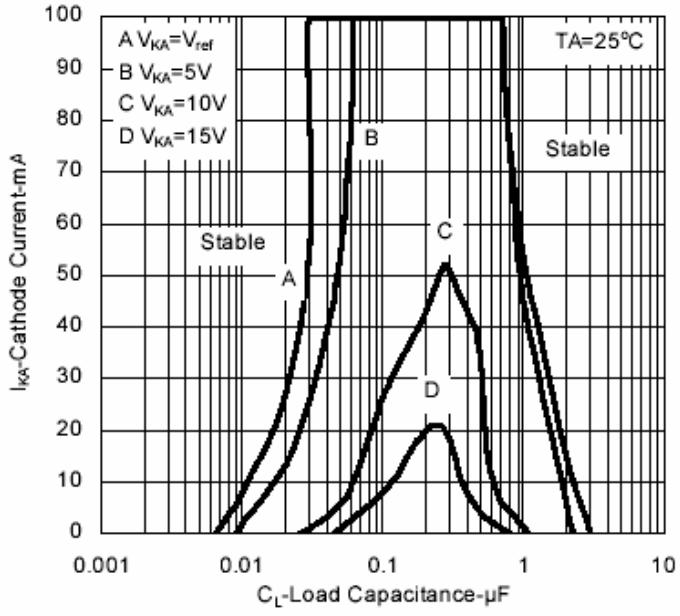
REFERENCE IMPEDANCE vs. FREQUENCY



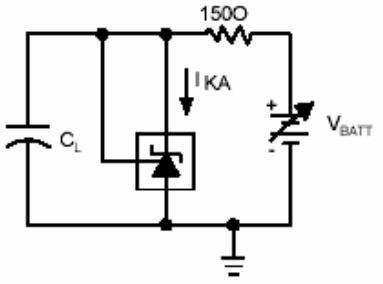


TEST CIRCUIT FOR REFERENCE IMPEDANCE

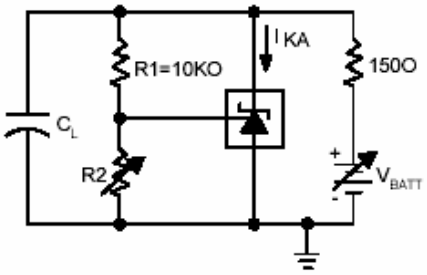
STABILITY BOUNDARY CONDITIONS†



†The areas under the curves represent conditions that may cause the device to oscillate. For curves B, C, and D, R2 and V+ were adjusted to establish the initial V_{KA} and I_{KA} conditions with C_L=0.V_{BATT} and C_L were then adjusted to determine the ranges of stability.



TEST CIRCUIT FOR CURVE A



TEST CIRCUIT FOR CURVE B, C, AND D

APPLICATION EXAMPLES

