TL432 Series

Adjustable Precision Shunt Regulator

TL432 Series Pin Assignment

3-Lead Plastic **SOT-23**
Package Code: N
Pin 1: Reference
Pin 2: Cathode
Pin 3: Anode

Description

The TL432 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} (1.24 or 1.25 volts) and 18 volts with two external resistors. These devices have a typical dynamic output impedance of 0.2Ω. Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

Features

- Programmable Precise Output Voltage from 1.24 or 1.25V to 16V
- High Stability under Capacitive Load
- Fast turn on response
- Low Dynamic Output Resistance: 0.2Ω Typical
- SOT-23 Packages
- Low Output Noise
- Wide Operating Range of -40 to 125 °C
- Low Equivalent Full-range Temperature Coefficient with 50PPM/ °C Typical

Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified)

Characteristics	Symbol	Value		Unit
Cathode Voltage	V_{KA}	18		V
Cathode Current Range (Continuous)	I_K	20		mA
Reference Input Current Range	I_{REF}	10		mA
Power Dissipation	P_D	SOT-23	370	mW
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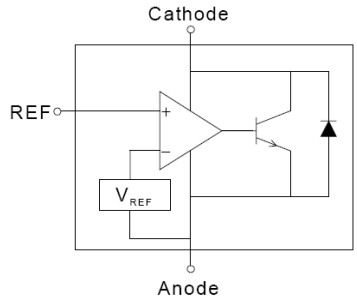
Operating Temperature Range (Max.)	T_{opr}	-40~+125		°C
Storage Temperature Range	T_{stg}	-65~+150		°C

Operating Conditions

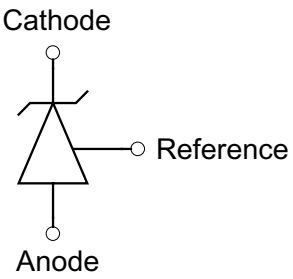
Characteristics	Symbol	Min.	Max.	Unit
Cathode Voltage	V_{KA}	V_{REF}	16	V
Cathode Current Range (Continuous)	I_K	0.1	20	mA
Operating Ambient Temperature Range	T_{OPB}	-40	125	°C

Functional Block Diagram & Symbol

Functional Block Diagram



Symbol



Test Circuits

Fig 1. $V_K=V_{REF}$

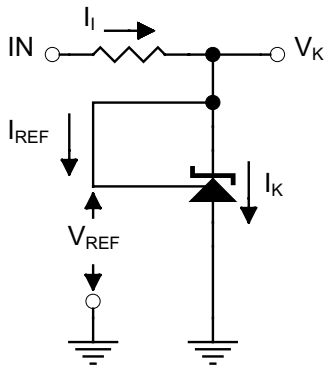
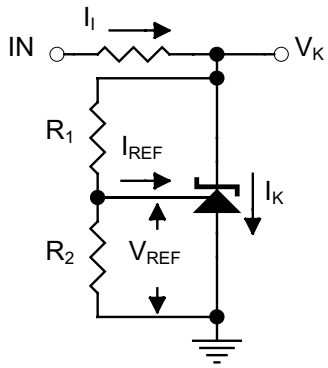
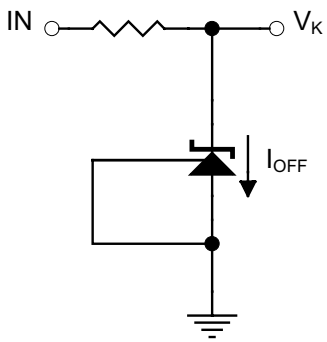


Fig 2. $V_K>V_{REF}$



Note: $V_K=V_{REF}(1+R_1/R_2)+I_{REF}xR_1$

Fig 3. Off-State Current



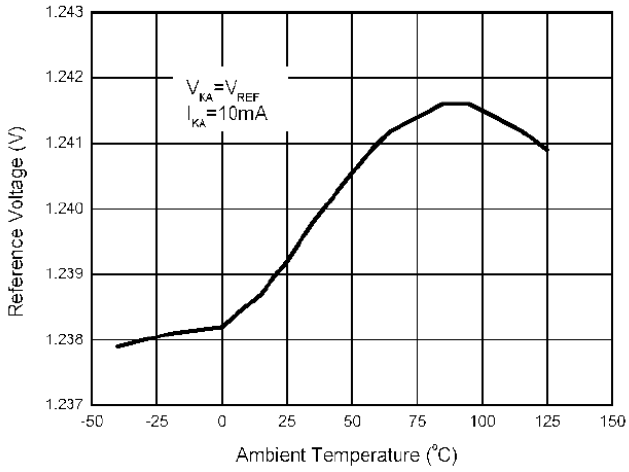
Electrical Characteristics (T_A=25°C unless otherwise specified)

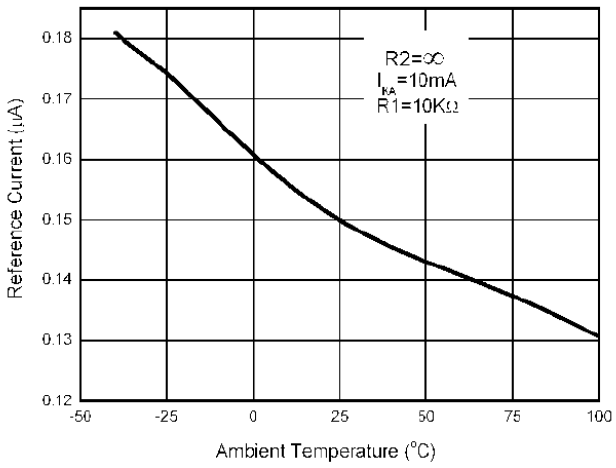
Characteristics		Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Input Voltage (Fig1)	1.24V ±2.0%	V_{REF}	$V_K=V_{REF}$, I_K=10mA	1.215	1.24	1.265	V
	1.24V ±1.0%			1.228	1.24	1.252	
	1.24V ±0.5%			1.234	1.24	1.246	
	1.25V ±2.0%			1.225	1.25	1.275	
	1.25V ±1.0%			1.238	1.25	1.262	
	1.25V ±0.5%			1.244	1.25	1.256	
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage (Fig2)		$\Delta V_{REF}/\Delta V_K$	I_K=10mA,, ΔV_K=18V to V_{REF}	-	1.0	2.7	mV/V
Reference Input Current (Fig2)		I_{REF}	I_K=10mA, R1=10KΩ, R2=∞	-	0.15	0.5	uA
Minimum Cathode Current for Regulation (Fig1)		$I_{K(min)}$	$V_K=V_{REF}$	-	20	80	uA
Off-State Cathode Current (Fig3)		$I_{K(off)}$	V_K=6V, V_{REF}=0	-	0.01	0.05	uA
			V_K=16V, V_{REF}=0		0.04	0.15	
Dynamic Output Impedance (Fig1)		Z_K	$V_K=V_{REF}$, f≤1kHz, I_K=100uA to 20mA	-	0.2	0.4	Ω

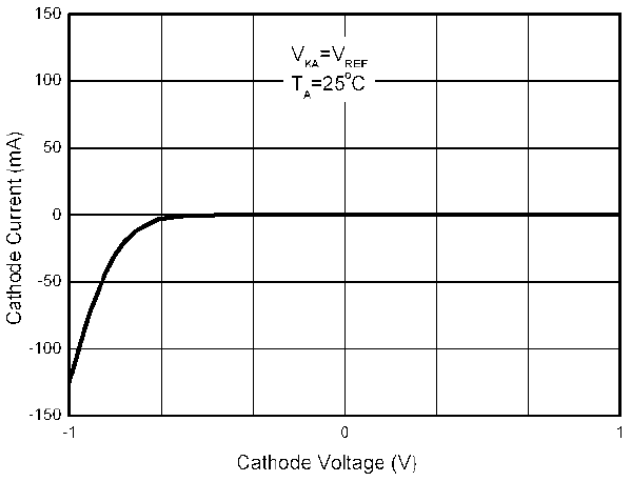
Ordering Information

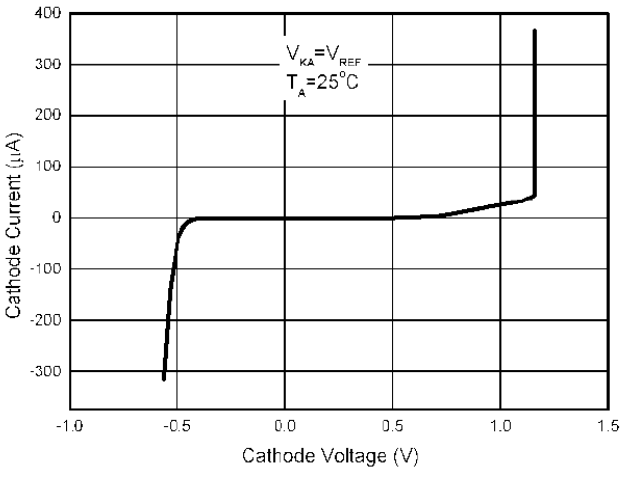
DEVICE	DEVICE CODE
TL432 XY ●	**X** is Reference voltage precision designator: A: 1.24V ±2.0% B: 1.24V ±1.0% C: 1.24V ±0.5% D: 1.25V ±2.0% E: 1.25V ±1.0% F: 1.25V ±0..5% **Y** is package designator : N: SOT-23 Pb Free Mark Pb-Free: "●" Normal: None

Typical Performance Characteristics

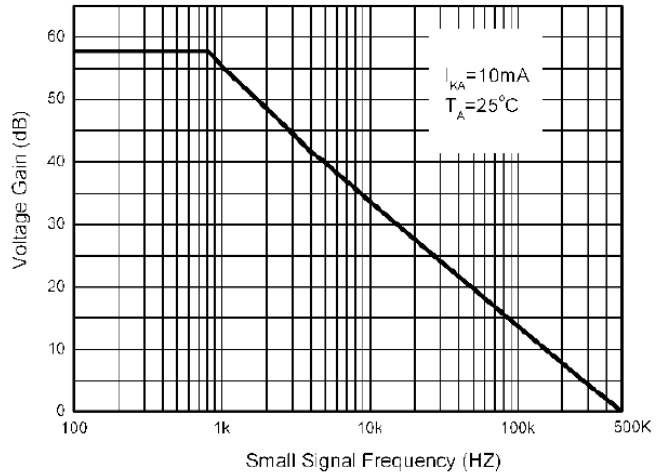


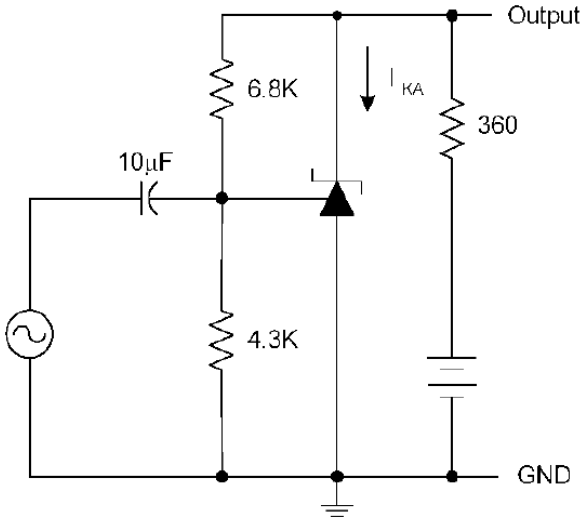


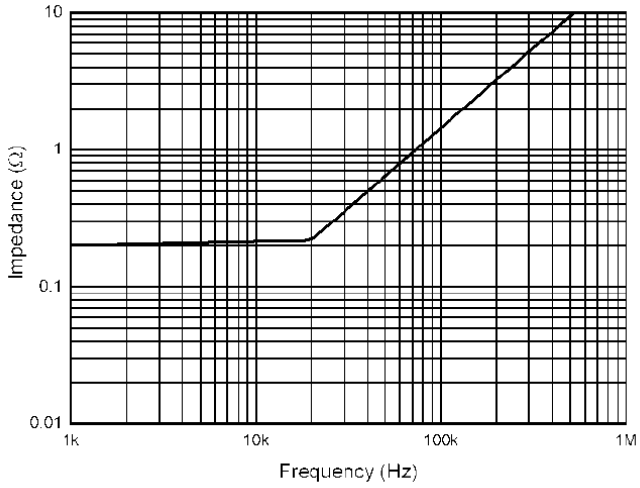


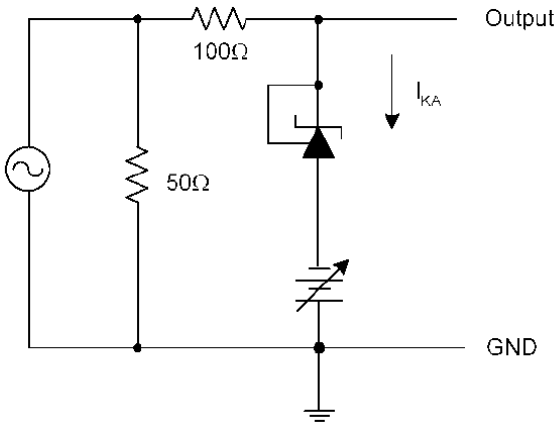


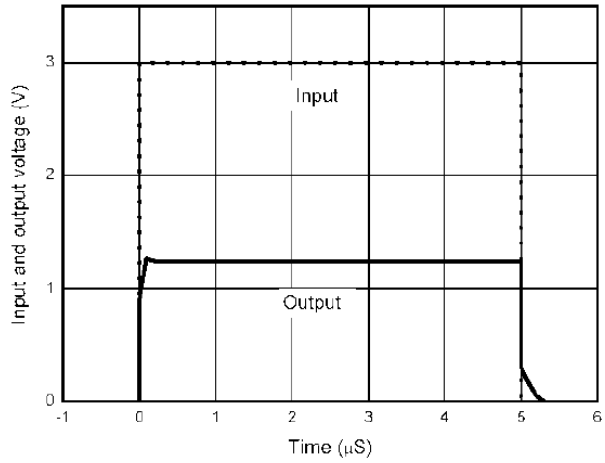
Typical Performance Characteristics (Continued)

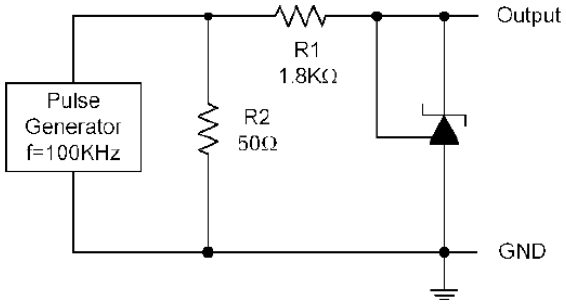




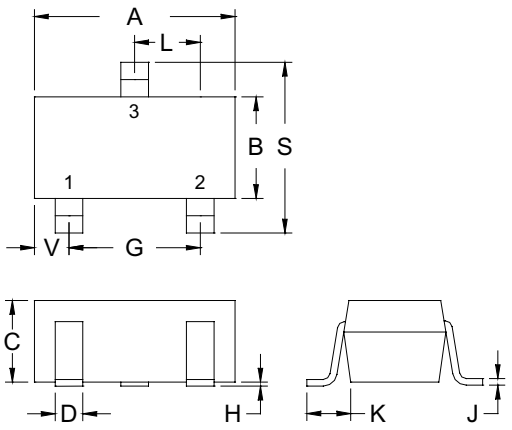




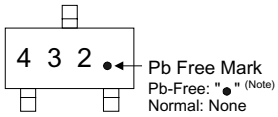




SOT-23 Dimension



Marking:



Note: Pb-free product can distinguish by the green label or the extra description on the right side of the label.

Pin Style: 1.Reference 2.Cathode 3.Anode

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	2.80	3.04
B	1.20	1.60
C	0.89	1.30
D	0.30	0.50
G	1.70	2.30
H	0.013	0.10
J	0.085	0.177
K	0.32	0.67
L	0.85	1.15
S	2.10	2.75
V	0.25	0.65

*: Typical, Unit: mm

3-Lead SOT-23 Plastic
Surface Mounted Package
Package Code: N

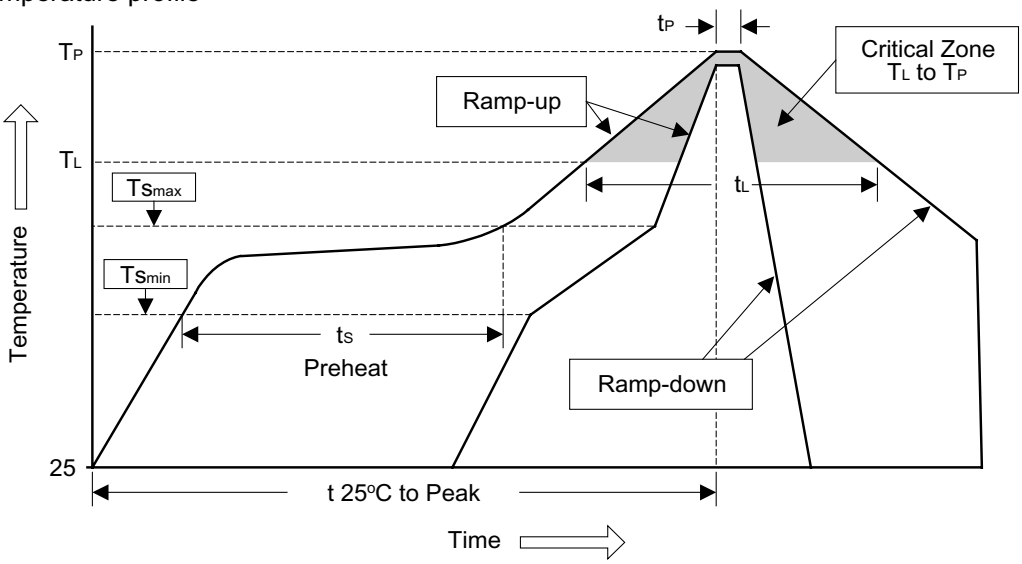
Pin style: 1.Reference 2.Cathode 3.Anode

Soldering Methods for CTC Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec