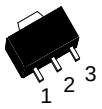
H432 Series

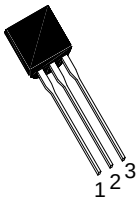
Adjustable Shunt Regulator

H432 Series Pin Assignment

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



3-Lead Plastic **SOT-89**
Package Code: M
Pin 1: Reference
Pin 2: Anode
Pin 3: Cathode



3-Lead Plastic **TO-92**
Package Code: A
Pin 1: Reference
Pin 2: Anode
Pin 3: Cathode

Description

The H432 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 1.24 or 1.25 volts) and 30 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 output voltage
- Temperature coefficient is 50ppm/^{o}C typical
- Temperature compensated for operation over full temperature range
- Low output noise voltage
- Fast turn on response

Ordering Information

Package	V_{REF} 1.24V±2%	V_{REF} 1.24V±1%	V_{REF} 1.24V±0.5%	V_{REF} 1.25V±2%	V_{REF} 1.25V±1%	V_{REF} 1.25V±0.5%
SOT-23	H432AN	H432BN	H432CN	H432DN	H432EN	H432FN
SOT-89	H432AM	H432BM	H432CM	H432DM	H432EM	H432FM
TO-92	H432AA	H432BA	H432CA	H432DA	H432EA	H432FA

Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified)

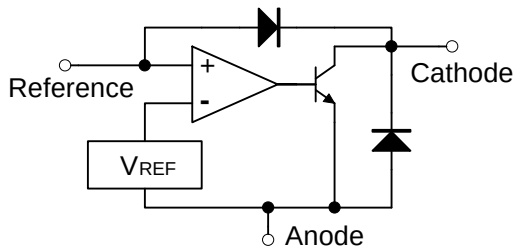
Characteristics	Symbol	Value		Unit
Cathode Voltage	V_{KA}	30		V
Cathode Current Range (Continuous)	I_K	50		mA
Reference Input Current Range	I_{REF}	0.05~+10		mA
Power Dissipation	P_D	SOT-23	280	mW
		SOT-89	770	
		TO-92	770	
Operating Temperature Range	T_{opr}	-25~+85		^{o}C
Junction Temperature	T_J	150		^{o}C
Storage Temperature Range	T_{stg}	-65~+150		^{o}C

Operating Conditions

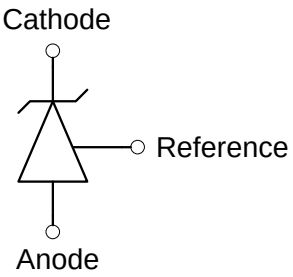
Characteristics	Symbol	Min.	Typ.	Max.	Unit
Cathode Voltage	V_{KA}	V_{REF}	-	30	V
Cathode Current Range (Continuous)	I_K	1	10	-	mA

Functional Block Diagram & Symbol

Functional Block Diagram



Symbol



Test Circuits

Fig 1. $V_K=V_{REF}$

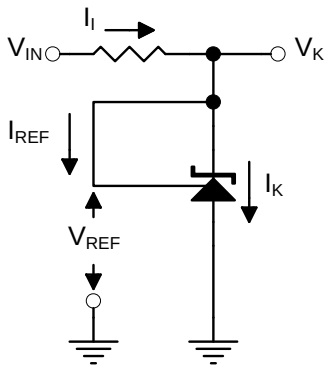
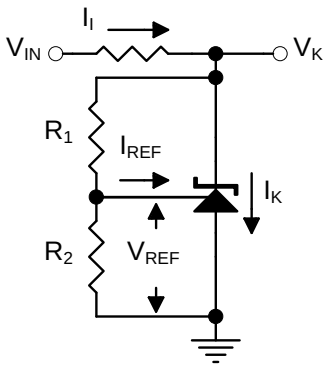
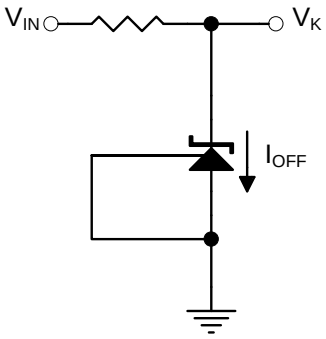


Fig 2. $V_K>V_{REF}$



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

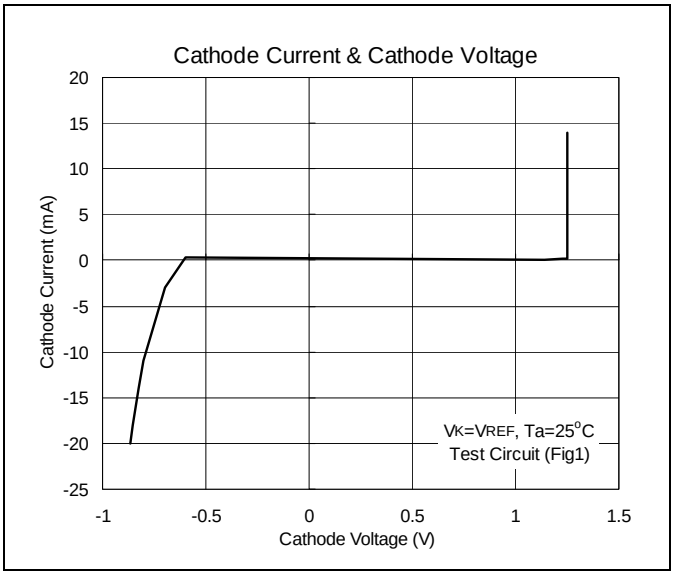
Fig 3. Off-State Current

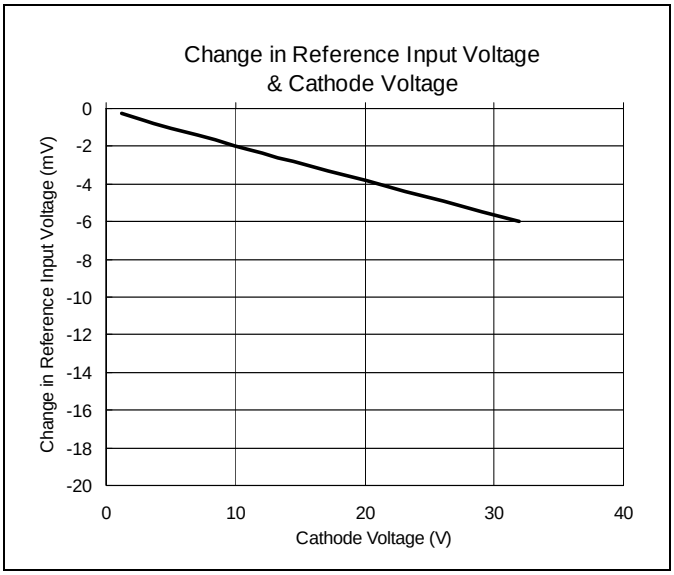


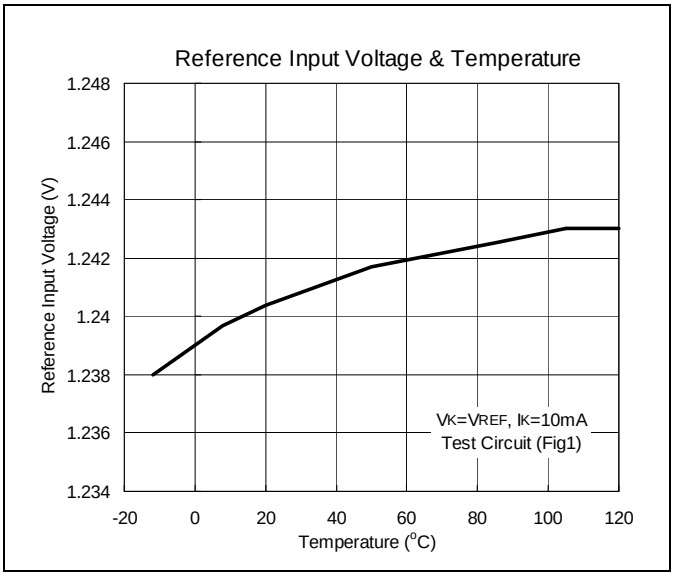
Electrical Characteristics ($T_A=25^oC$ unless otherwise specified)

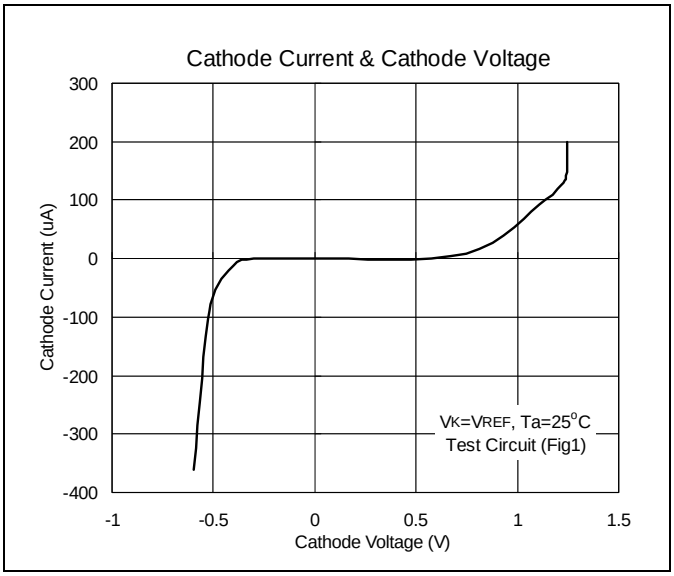
Characteristics		Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Input Voltage (Fig1)	H432AN/AM/AA	V_{REF}	$V_K=V_{REF}$, I_K=10mA	1.215	1.24	1.265	V
	H432BN/BM/BA			1.228	1.24	1.252	
	H432CA/CM/CA			1.234	1.24	1.246	
	H432DN/DM/DA			1.225	1.25	1.275	
	H432EN/EM/EA			1.238	1.25	1.262	
	H432FN/FM/FA			1.244	1.25	1.256	
Deviation of Reference Input Voltage Over-Temperature (Fig1)		$V_{REF(dev)}$	$V_K=V_{REF}$, I_K=10mA $T_{min}\le T_a\le T_{max}$	-	4	17	mV
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=10V to V_{REF}	-	-1.4	-2.7	mV/V
			I_K=10mA, ΔV_K=30V to 10V	-	-1	-2	mV/V
Reference Input Current (Fig2)		I_{REF}	I_K=10mA, R_1=10kΩ, R_2=∞	-	1	4	uA
Deviation of Reference Input Current Over Full Temperature Range (Fig2)		$I_{REF(dev)}$	I_K=10mA, R_1=10kΩ, R_2=∞, T_a=Full Range	-	0.4	1.2	uA
Minimum Cathode Current for Regulation (Fig1)		$I_{K(min)}$	$V_K=V_{REF}$	-	0.4	1	mA
Off-State Cathode Current (Fig3)		$I_{K(off)}$	V_K=30V, V_{REF}=0	-	0.1	1	uA

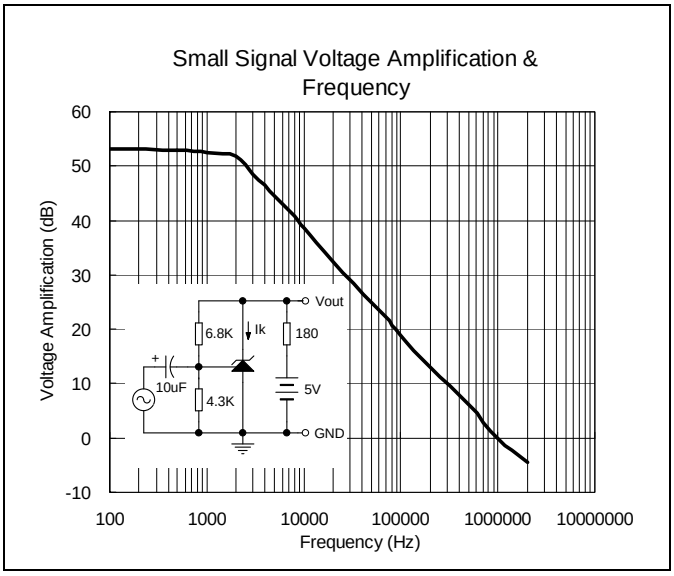
Characteristics Curve





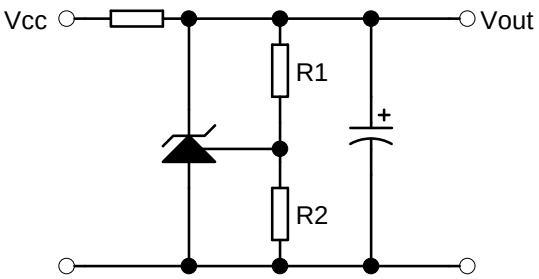






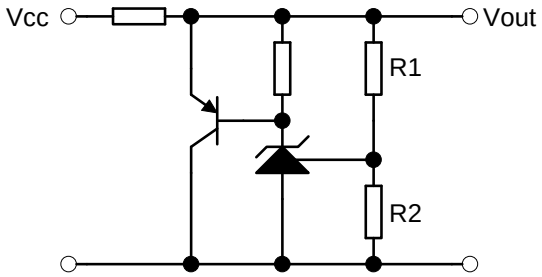
Typical Application

Fig 4. Shunt Regulator



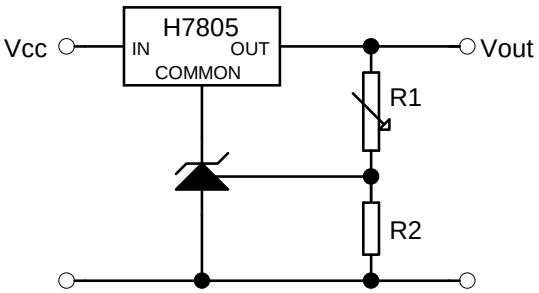
$Vout=(1+R_1/R_2)V_{REF}$

Fig 5. High Current Shunt Regulator



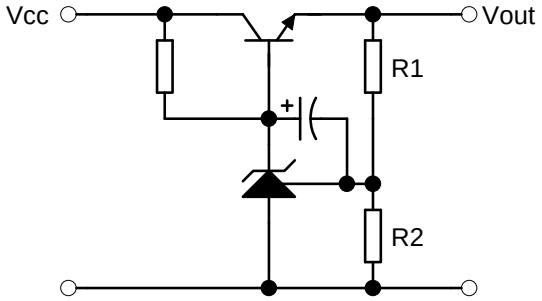
$Vout=(1+R_1/R_2)V_{REF}$

Fig 6. Output Control of a Three-Terminal Fixed Regulator



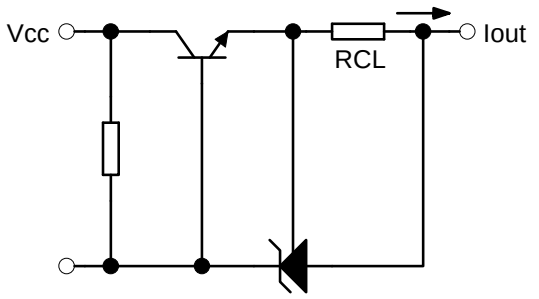
$Vout=(1+R_1/R_2)V_{REF}$; $V_{out(min)}=V_{REF}+5V$

Fig 7. Series Pass Regulator



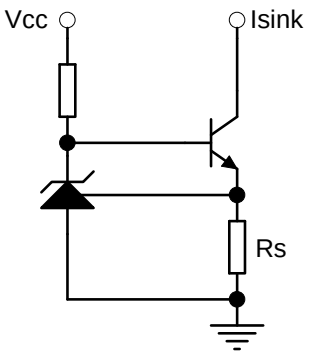
$Vout=(1+R_1/R_2)V_{REF}$; $V_{out(min)}=V_{REF}+V_{BE}$

Fig 8. Current Limiter or Current Source



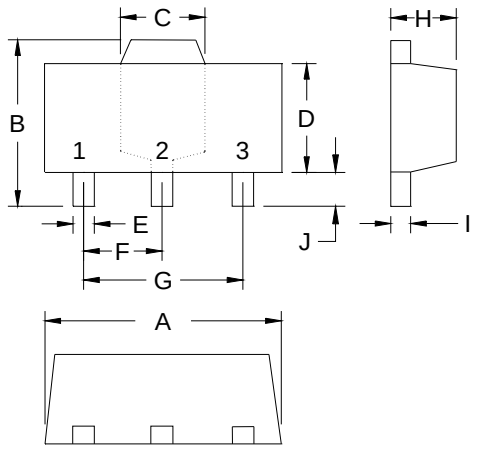
$Iout=V_{REF}/R_{CL}$

Fig 9. Constant Current Sink



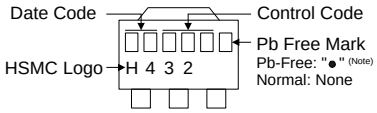
$Isink=V_{REF}/R_S$

SOT-89 Dimension



3-Lead SOT-89 Plastic
Surface Mounted Package
HSMC Package Code: M

Marking:



Note: Green label is used for pb-free packing

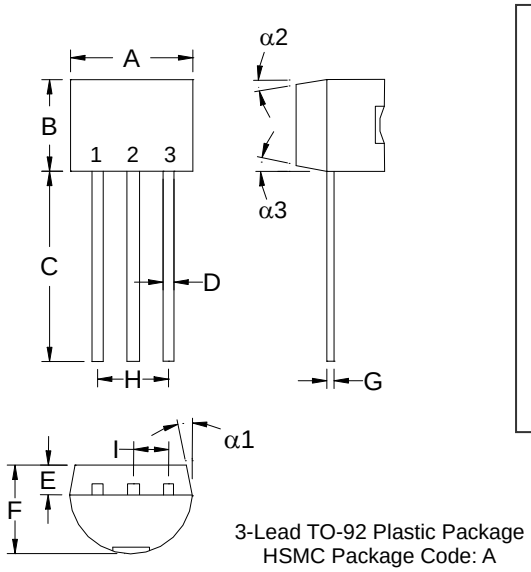
Pin Style: 1.Reference 2.Anode 3.Cathode

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	4.40	4.60
B	4.05	4.25
C	1.50	1.70
D	2.40	2.60
E	0.36	0.51
F	*1.50	-
G	*3.00	-
H	1.40	1.60
I	0.35	0.41

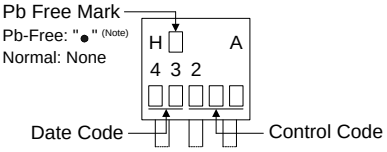
*: Typical, Unit: mm

TO-92 Dimension



3-Lead TO-92 Plastic Package
HSMC Package Code: A

Marking:



Note: Green label is used for pb-free packing

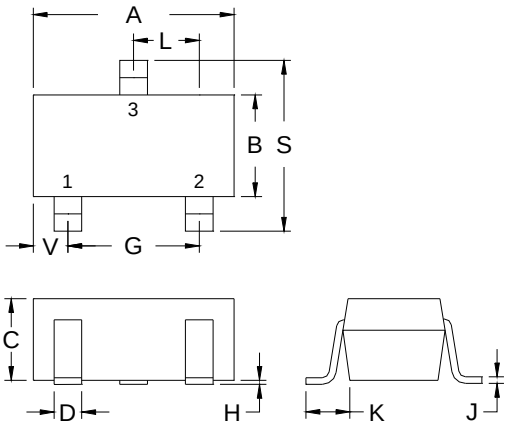
Pin Style: 1.Reference 2.Anode 3.Cathode

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	4.33	4.83
B	4.33	4.83
C	12.70	-
D	0.36	0.56
E	-	*1.27
F	3.36	3.76
G	0.36	0.56
H	-	*2.54
I	-	*1.27
α1	-	*5°
α2	-	*2°
α3	-	*2°

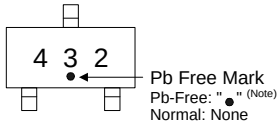
*: Typical, Unit: mm

SOT-23 Dimension



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

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

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