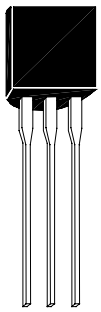
# H431AA/BA/CA

AJDUSTABLE SHUNT REGULATOR



TO-92

## Description

The H431 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 2.495 volts) and 36 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/°C typical
- Temperature compensated for operation over
- full temperature range
- Low output noise voltage
- Fast turn on response

## Classification

| Rank | A | B | C |
|---|---|---|---|
| $V_{REF}$ | 2.495±2% | 2.495±1% | 2.495±0.5% |

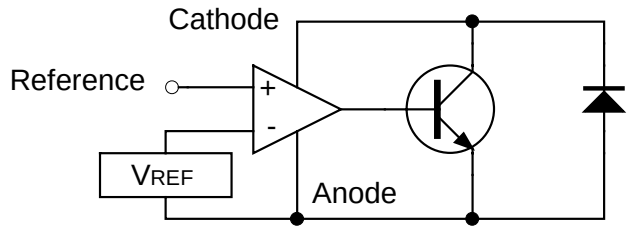
## Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified)

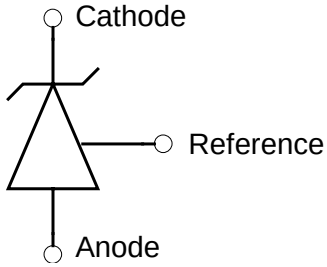
| Characteristics | Symbol | Value | Unit |
|---|---|---|---|
| Cathode Voltage | $V_{KA}$ | 37 | V |
| Cathode Current Range (Continuous) | $I_K$ | -100~+150 | mA |
| Reference Input Current Range | $I_{REF}$ | 0.05~+10 | mA |
| Power Dissipation | $P_D$ | 770 | mW |
| Operating Temperature Range | $T_{opr}$ | 0~+70 | °C |
| Storage Temperature Range | $T_{stg}$ | -65~+150 | °C |

## Functional Block Diagram & Symbol

Functional Block Diagram :




Symbol :




## Test Circuits

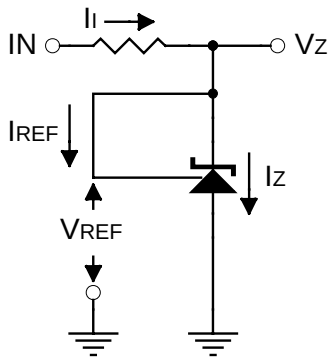



Fig1. Test Circuit for $V_Z=V_{REF}$

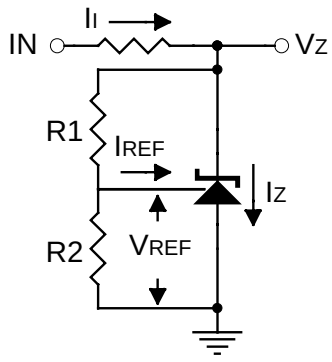



Fig 2. Test Circuit for $V_Z>V_{REF}$
Note : $V_Z=V_{REF}(1+R_1/R_2)+I_{REF}xR_1$

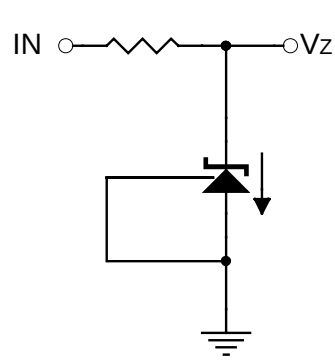
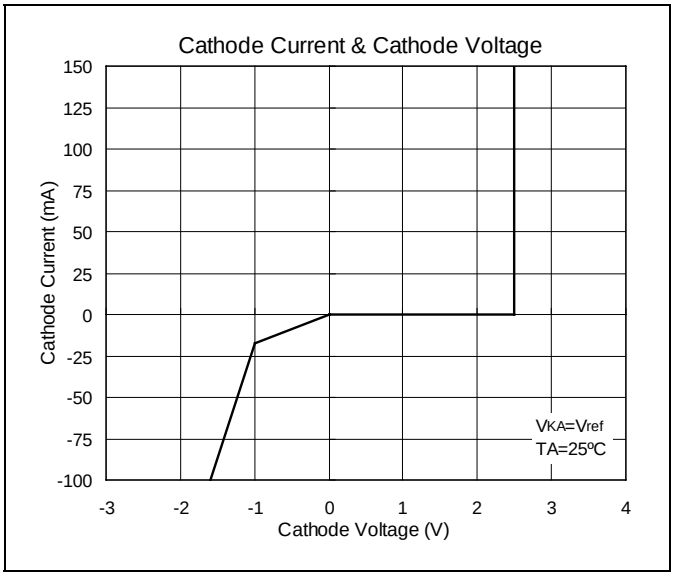


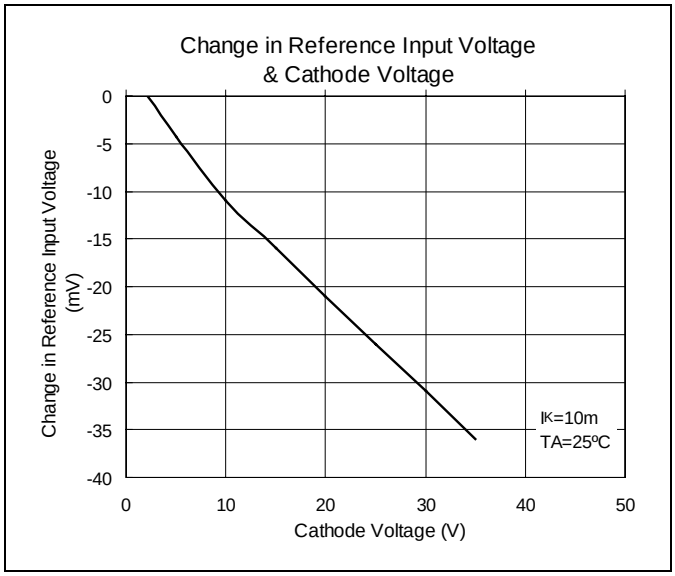

Fig3. Test Circuit for Off-State Current

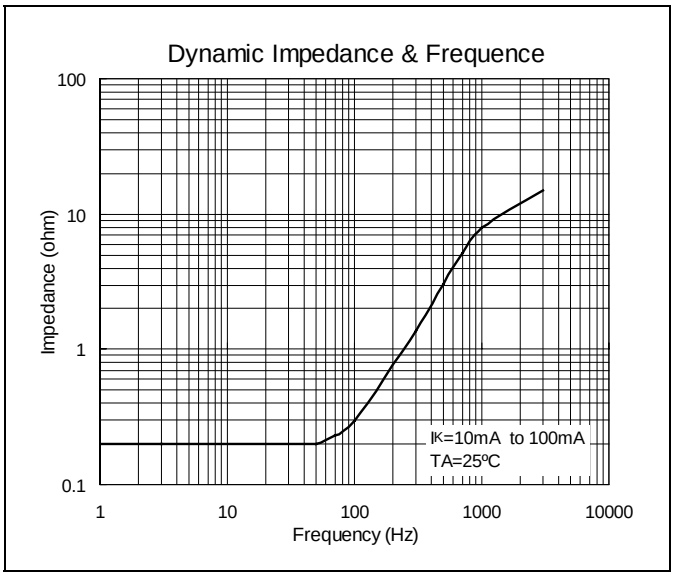
## Electrical Characteristics ( Ta=25°C unless otherwise specified )

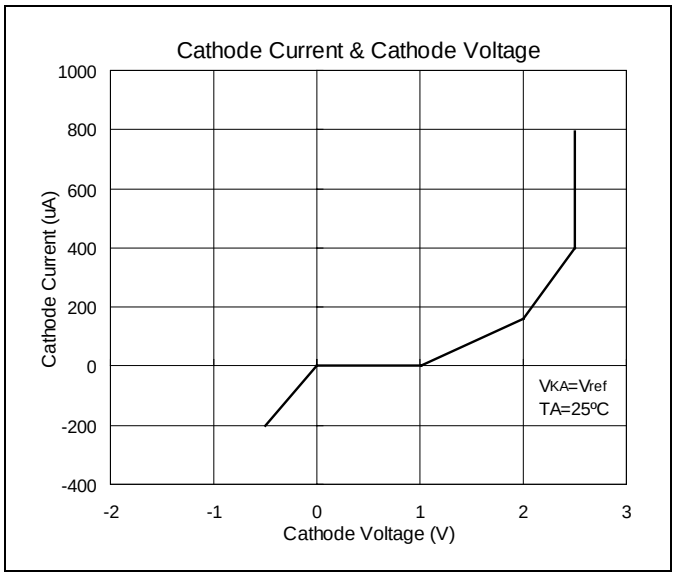
| Characteristics | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Reference Input Voltage H431AA | $V_{REF}$ | $V_{KA}=V_{REF}$, $I_K$=10mA | 2.445 | 2.495 | 2.545 | V |
| H431BA | | | 2.470 | 2.495 | 2.520 | |
| H431CA | | | 2.480 | 2.495 | 2.510 | |
| Deviation of Reference Input Voltage Over-Temperature | $V_{REF(dev)}$ | $V_{KA}=V_{REF}$, $I_K$=10mA<br>$T_{min}\leq T_a\leq T_{max}$ | - | 4 | 17 | mV |
| Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage | $\Delta V_{REF}/\Delta V_{KA}$ | $I_K$=10mA, $\Delta V_{KA}$=10V-$V_{REF}$ | - | -1.4 | -2.7 | mV |
| | | $I_K$=10mA, $\Delta K_{KA}$=36V-10V | - | -1.0 | -2.0 | V |
| Reference Input Current | $I_{REF}$ | $I_K$=10mA, $R_1$=10kΩ, $R_2$=∞ | - | 2 | 4 | uA |
| Deviation of Reference Input Current Over Full Temperature Range | $I_{REF(dev)}$ | $I_K$=10mA, $R_1$=10kΩ, $R_2$=∞, $T_a$=Full Range | - | 0.4 | 1.2 | uA |
| Minimum Cathode Current for Regulation | $I_{K(min)}$ | $V_{KA}=V_{REF}$ | - | 0.4 | 1.0 | mA |
| Off-State Cathode Current | $I_{K(off)}$ | $V_{KA}$=36V, $V_{REF}$=0 | - | 0.1 | 1.0 | uA |
| Dynamic impedance | $Z_{KA}$ | $V_{KA}=V_{REF}$, f≤1.0KHz<br>$I_K$=1 to 100mA | - | 0.2 | 0.5 | Ω |

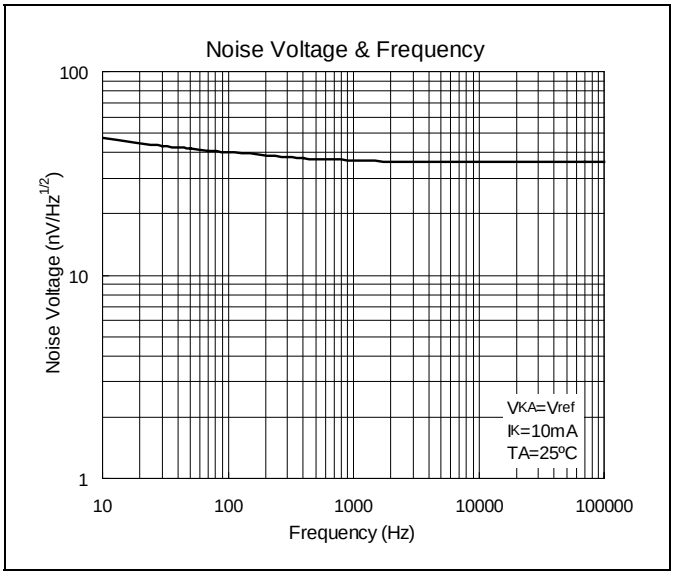
## Characteristics Curve

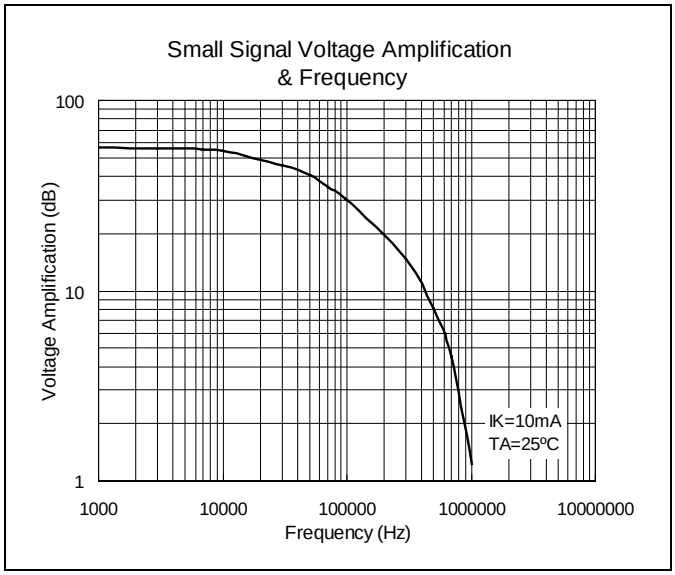


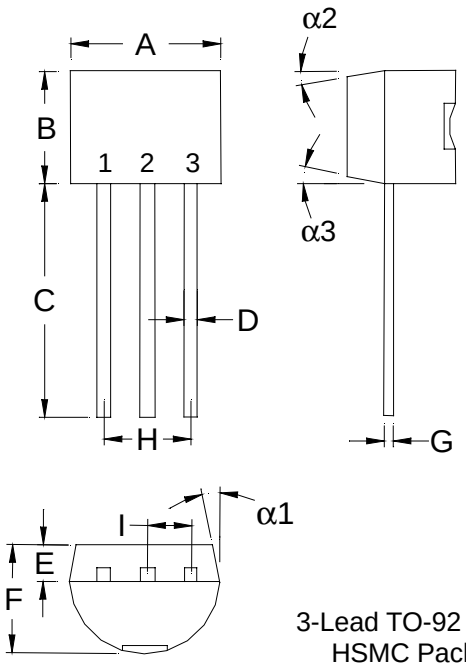



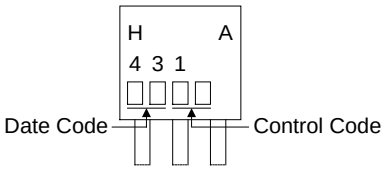



## TO-92 Dimension




Marking:




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

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

*: Typical

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.1704 | 0.1902 | 4.33 | 4.83 | G | 0.0142 | 0.0220 | 0.36 | 0.56 |
| B | 0.1704 | 0.1902 | 4.33 | 4.83 | H | - | *0.1000 | - | *2.54 |
| C | 0.5000 | - | 12.70 | - | I | - | *0.0500 | - | *1.27 |
| D | 0.0142 | 0.0220 | 0.36 | 0.56 | α1 | - | *5° | - | *5° |
| E | - | *0.0500 | - | *1.27 | α2 | - | *2° | - | *2° |
| F | 0.1323 | 0.1480 | 3.36 | 3.76 | α3 | - | *2° | - | *2° |

Notes: 1.Dimension and tolerance based on our Spec. dated Apr. 25,1996.
2.Controlling dimension: millimeters.
3.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
4.If there is any question with packing specification or packing method, please contact your local HSMC sales office.

Material:

- Lead: 42 Alloy; solder plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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