NEW PRODUCT

Description

The AS431H is a three-terminal adjustable shunt regulator with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitute for Zener diode in applications such as switching power supply, charger and other adjustable regulators.

The output voltage of AS431H can be set to any value between V_{REF} (2.495V) and the corresponding maximum cathode voltage (36V).

The AS431H precision reference is offered in two voltage tolerance: 0.5% and 1.0%.

This IC is available in 2 packages: TO92 (Ammo Packing) and SOT23.

Features

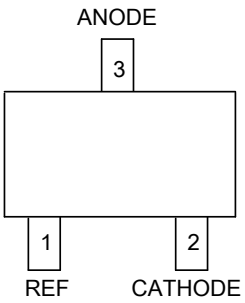
- Programmable Precise Output Voltage from 2.495V to 36V
- High Stability under Capacitive Load
- Low Temperature Deviation: 5mV Typical
- Low Equivalent Full-range Temperature Coefficient with 20PPM/°C Typical
- Sink Current Capacity from 0.5mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to +125°C
- Lead-Free Packages, Available in “Green” Molding Compound: SOT23, TO92 (Ammo Packing)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**

Applications

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference

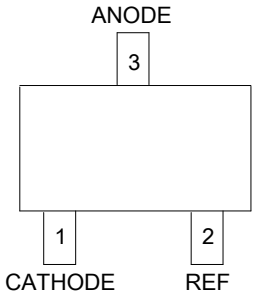
Pin Assignments

(Top View)



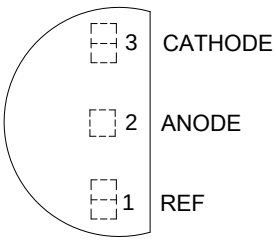
SOT23
(Normal Pin-out)

(Top View)



SOT23
(Mirror Pin-out)

(Top View)

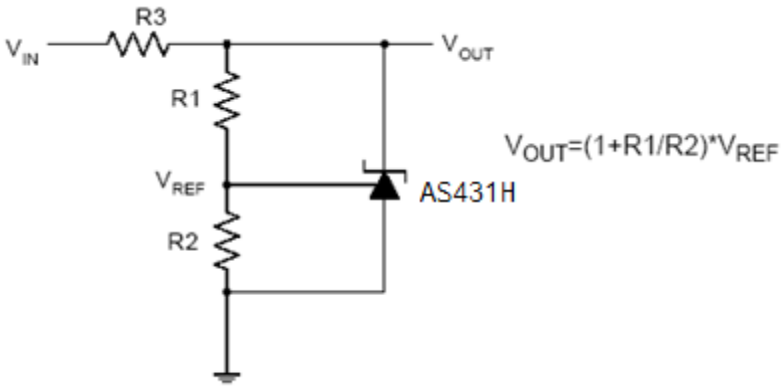


TO92 (Ammo Packing)

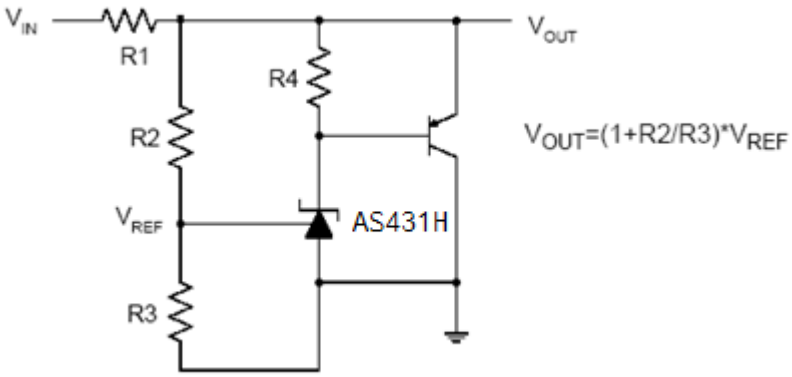
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

NEW PRODUCT

Typical Applications Circuit



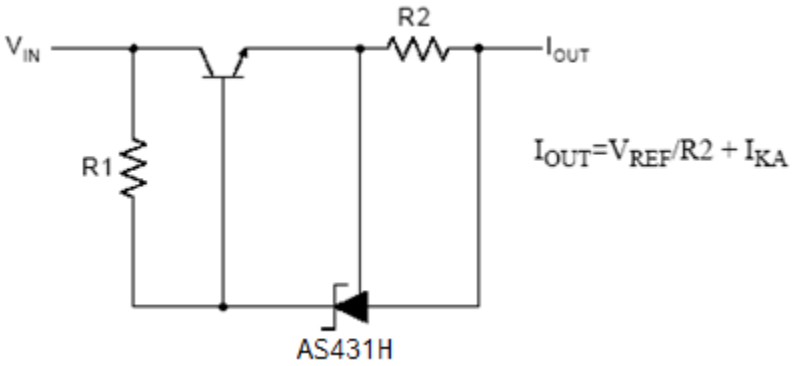
Shunt Regulator



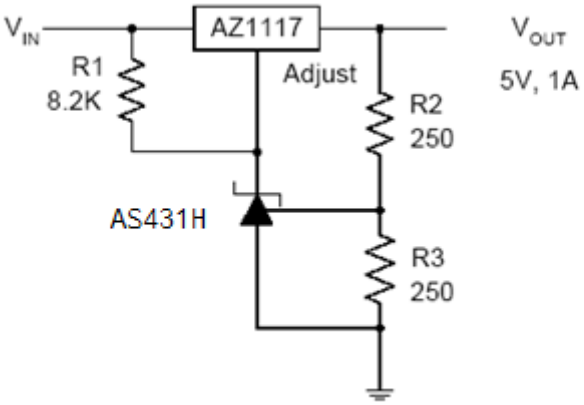
High Current Shunt Regulator

NEW PRODUCT

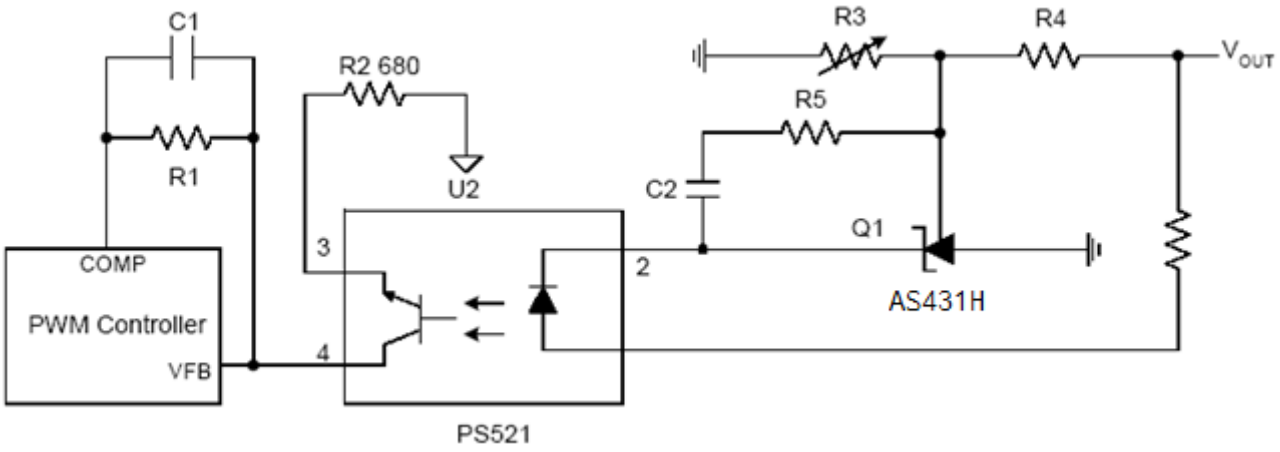
Typical Applications Circuit (Cont.)



Current Source or Current Limit



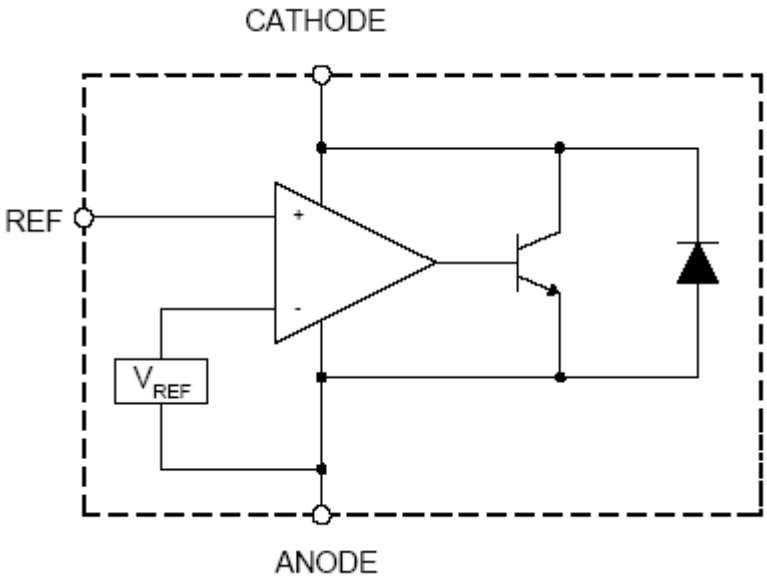
Precision 5V 1A Regulator



PWM Converter with Reference

NEW PRODUCT

Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating		Unit
V_{KA}	Cathode Voltage	40		V
I_{KA}	Cathode Current Range (Continuous)	-100 to 150		mA
I_{REF}	Reference Input Current Range	10		mA
θ_{JA}	Thermal Resistance	SOT23	380	°C/W
		TO92 (Ammo Packing)	165	
T_J	Junction Temperature	+150		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
ESD	ESD (Human Body Model)	2000		V

Note 4: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{KA}	Cathode Voltage	V_{REF}	36	V
I_{KA}	Cathode Current	0.5	100	mA
T_A	Operating Ambient Temperature Range	-40	+125	°C

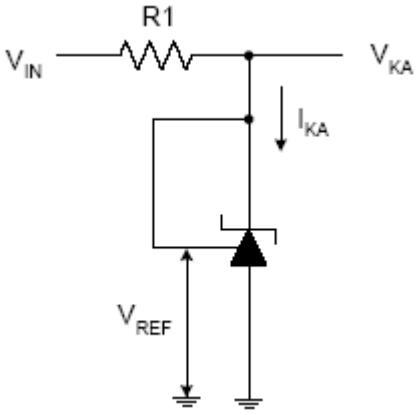
NEW PRODUCT

Electrical Characteristics (Operating Conditions: T_A = +25°C, unless otherwise specified.)

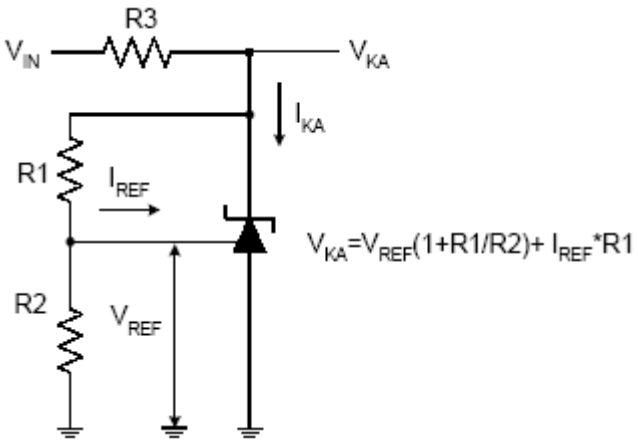
Symbol	Parameter		Test Circuit	Conditions		Min	Typ	Max	Unit
V_{REF}	Reference Voltage	0.5%	4	$V_{KA} = V_{REF}$, I_{KA} = 10mA		2.483	2.495	2.507	V
		1.0%				2.470	2.495	2.520	
ΔV_{REF}	Deviation of Reference Voltage Over Full Temperature Range		4	$V_{KA} = V_{REF}$, I_{KA} = 10mA	0 to +70°C	—	5	8	mV
					-40 to +85°C	—	5	14	
					-40 to +125°C	—	5	16	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in Reference Voltage to the Change in Cathode Voltage		5	I_{KA} = 10mA	ΔV_{KA} = 10V to V_{REF}	—	-1.0	-2.7	mV/V
					ΔV_{KA} = 36V to 10V	—	-0.5	-2.0	
I_{REF}	Reference Current		5	I_{KA} = 10mA, R1 = 10kΩ, R2 = ∞		—	0.7	4	µA
ΔI_{REF}	Deviation of Reference Current Over Full Temperature Range		5	I_{KA} = 10mA, R1 = 10kΩ, R2 = ∞, T_A = -40 to +125°C		—	0.4	1.2	µA
I_{KA} (Min)	Minimum Cathode Current for Regulation		4	$V_{KA} = V_{REF}$		—	0.35	0.5	mA
I_{KA} (Off)	Off-state Cathode Current		6	V_{KA} = 36V, V_{REF} = 0		—	0.002	0.5	µA
Z_{KA}	Dynamic Impedance		4	$V_{KA} = V_{REF}$, I_{KA} = 0.5 to 100mA, f ≤ 1.0KHz		—	0.15	0.5	Ω
θ_{JC}	Thermal Resistance		—	SOT23		—	136	—	°C/W
				TO92 (Ammo Packing)		—	80	—	

NEW PRODUCT

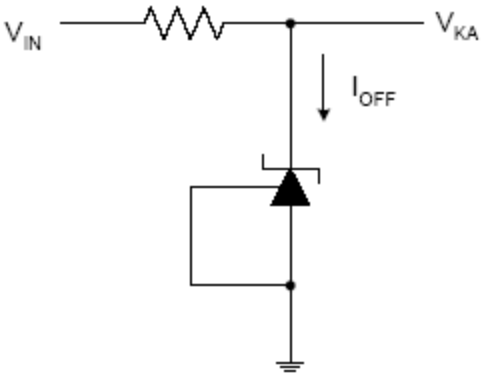
Electrical Characteristics (Cont.)



Test Circuit 4 for $V_{KA} = V_{REF}$



Test Circuit 5 for $V_{KA} > V_{REF}$

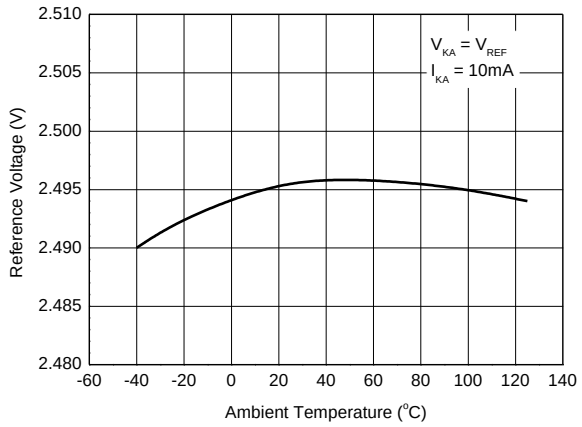


Test Circuit 6 for I_{OFF}

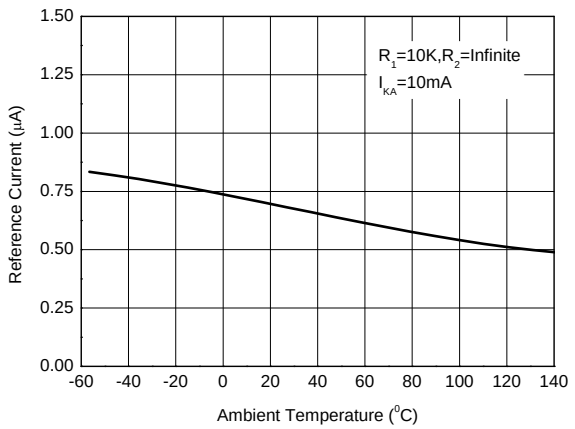
NEW PRODUCT

Performance Characteristics

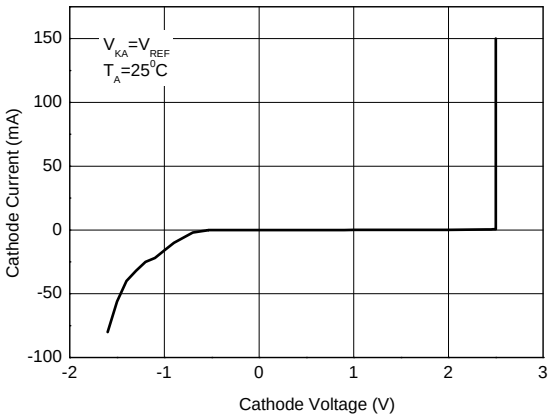
Reference Voltage vs. Ambient Temperature



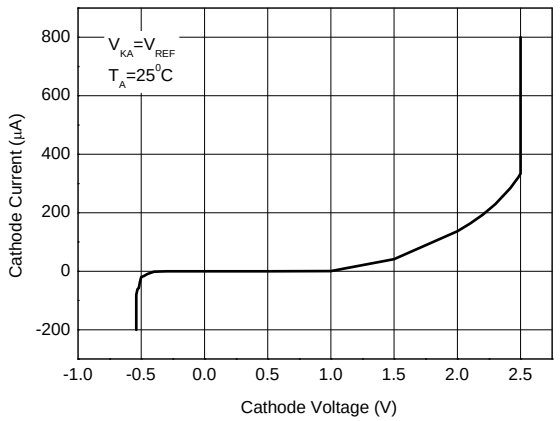
Reference Current vs. Ambient Temperature



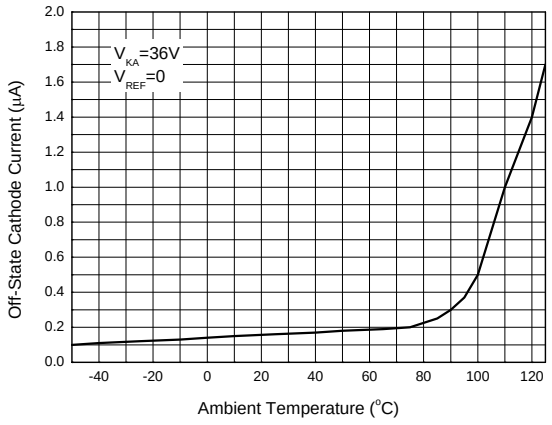
Cathode Current vs. Cathode Voltage



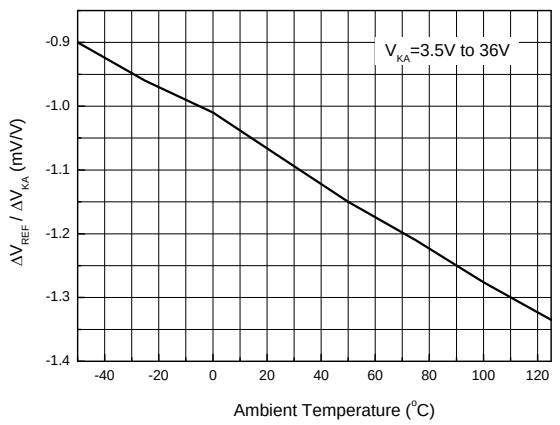
Cathode Current vs. Cathode Voltage



Off-State Cathode Current vs. Ambient Temperature



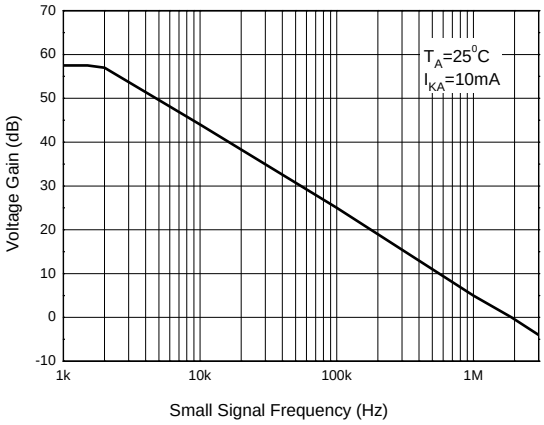
Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage

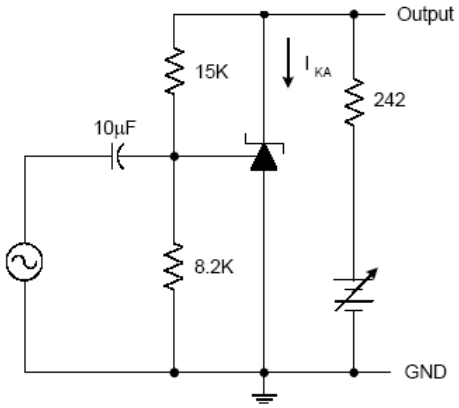


NEW PRODUCT

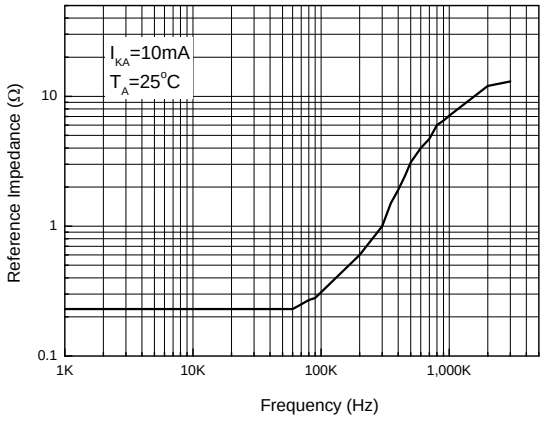
Performance Characteristics (Cont.)

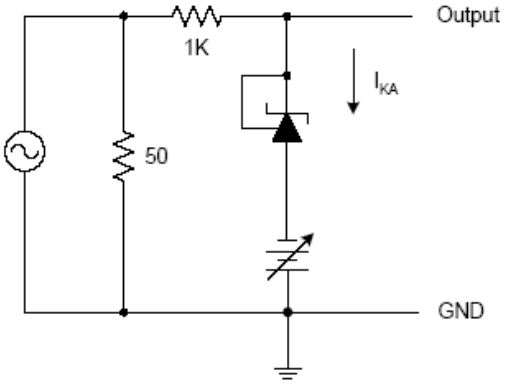
Small Signal Voltage Gain vs. Frequency



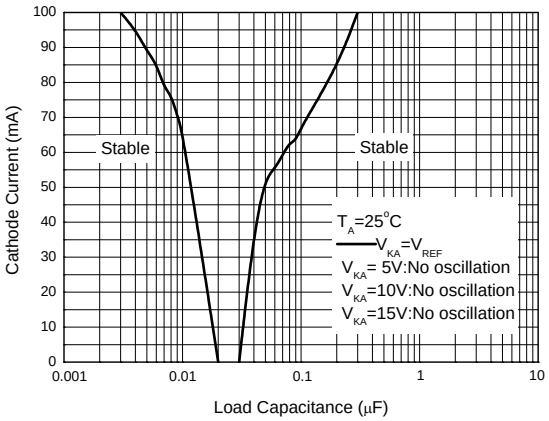


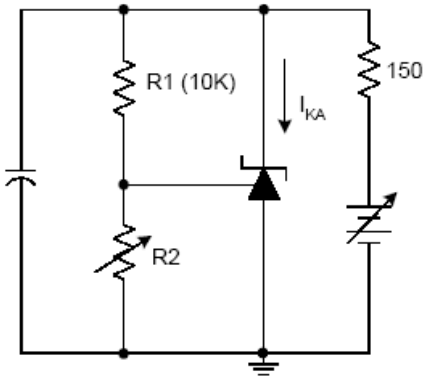
Reference Impedance vs. Frequency





Stability Boundary Conditions vs. Load Capacitance

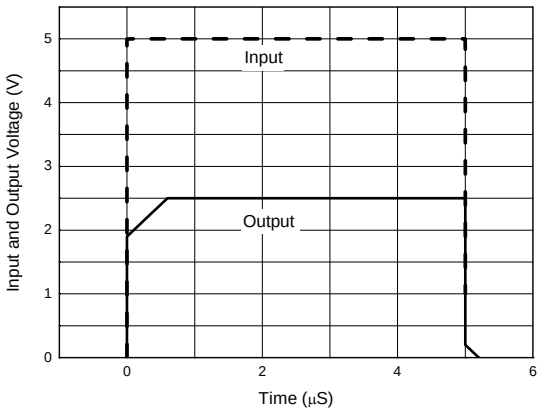


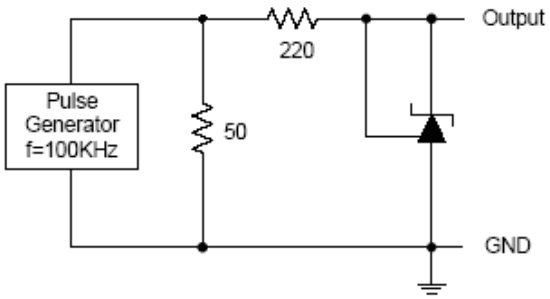


NEW PRODUCT

Performance Characteristics (Cont.)

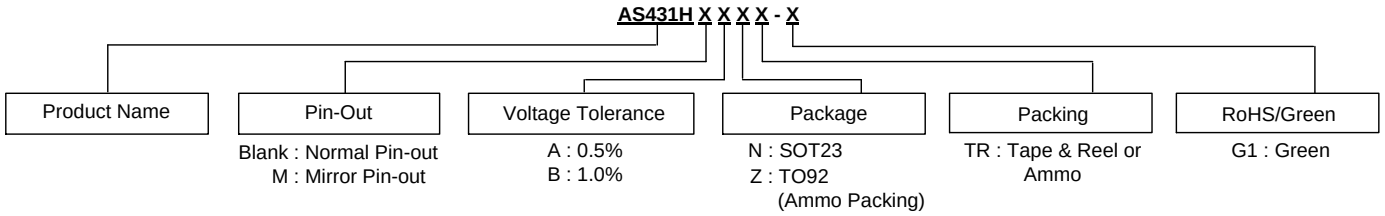
Pulse Response of Input and Output Voltage





NEW PRODUCT

Ordering Information



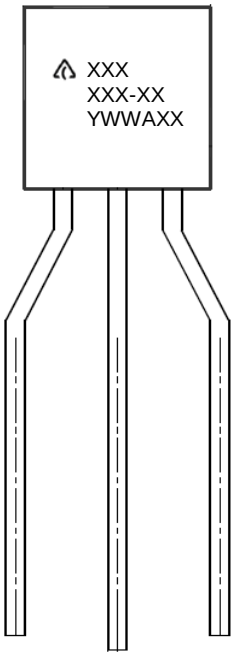
Package	Temperature Range	Pin-Out	Voltage Tolerance	Part Number	Marking ID	Packing
SOT23	-40 to +125°C	Normal Pin-out	0.5%	AS431HANTR-G1	GJA	3000/Tape & Reel
			1.0%	AS431HBNTR-G1	GJB	3000/Tape & Reel
SOT23	-40 to +125°C	Mirror Pin-out	0.5%	AS431HMANTR-G1	GM5	3000/Tape & Reel
			1.0%	AS431HMBNTR-G1	GM6	3000/Tape & Reel
TO92 (Ammo Packing)	-40 to +125°C	Normal Pin-out	0.5%	AS431HAZTR-G1	431HAZ-G1	2000/Ammo
			1.0%	AS431HBZTR-G1	431HBZ-G1	2000/Ammo

NEW PRODUCT

Marking Information

(1) TO92 (Ammo Packing)

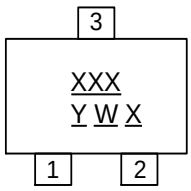
(Top View)



First and Second Line: Logo and Marking ID
(See Ordering Information)
Third Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: Internal Code.

(2) SOT23

(Top View)

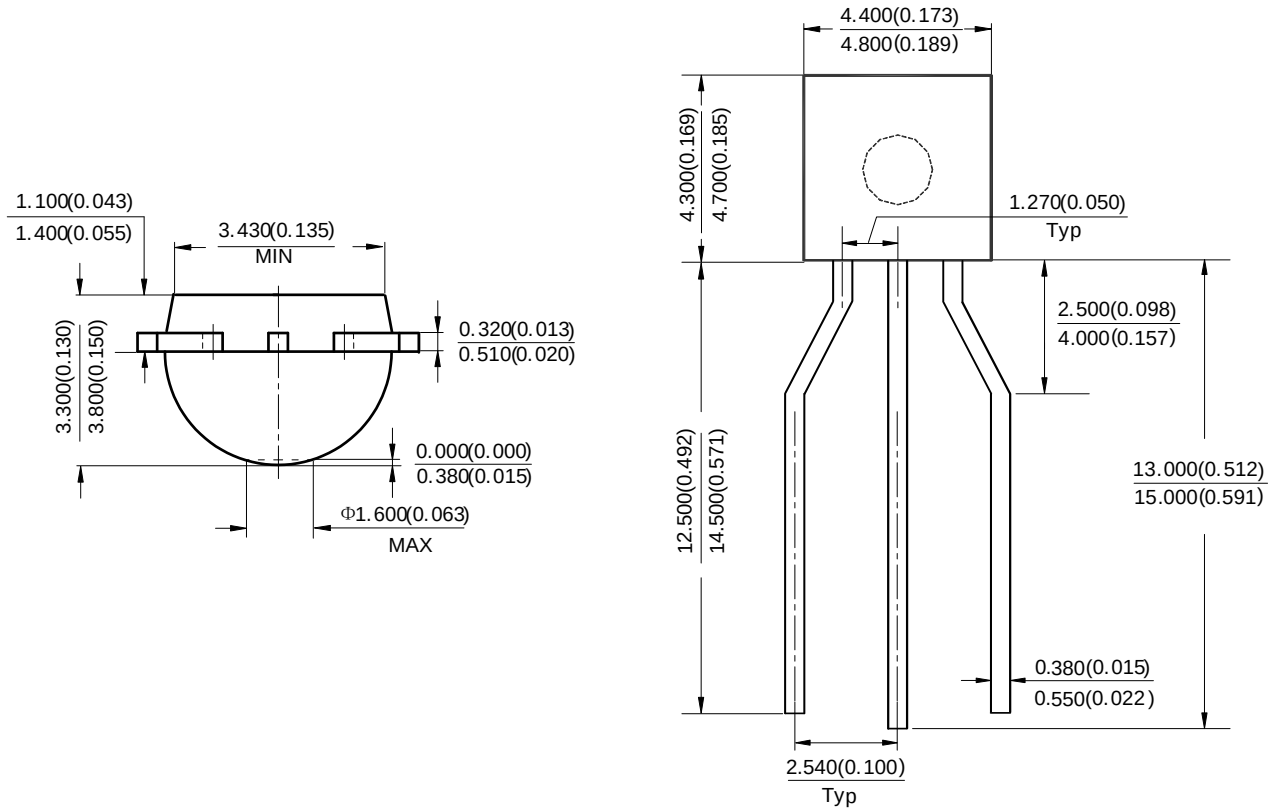


XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents
52 and 53 week
X : Internal Code

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

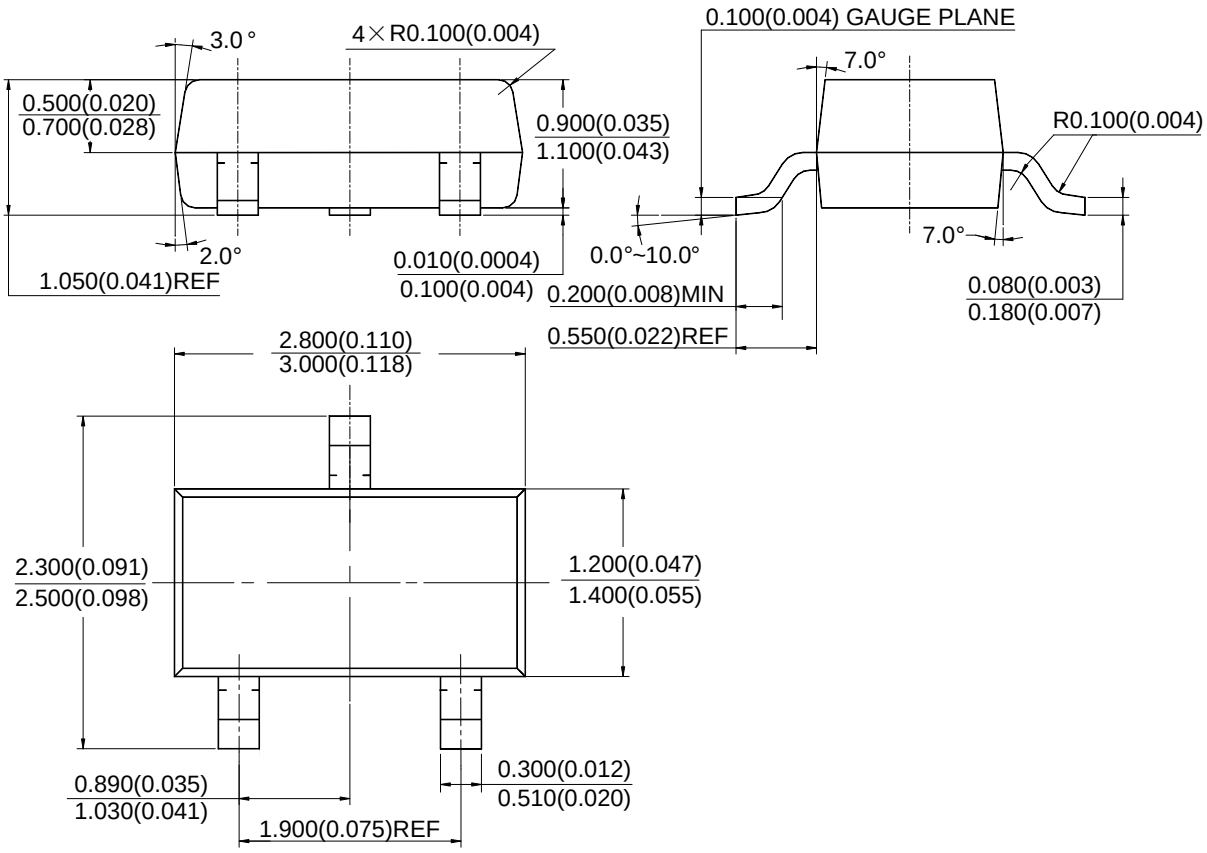
(1) TO92 (Ammo Packing)



NEW PRODUCT

Package Outline Dimensions (Cont. All dimensions in mm.)

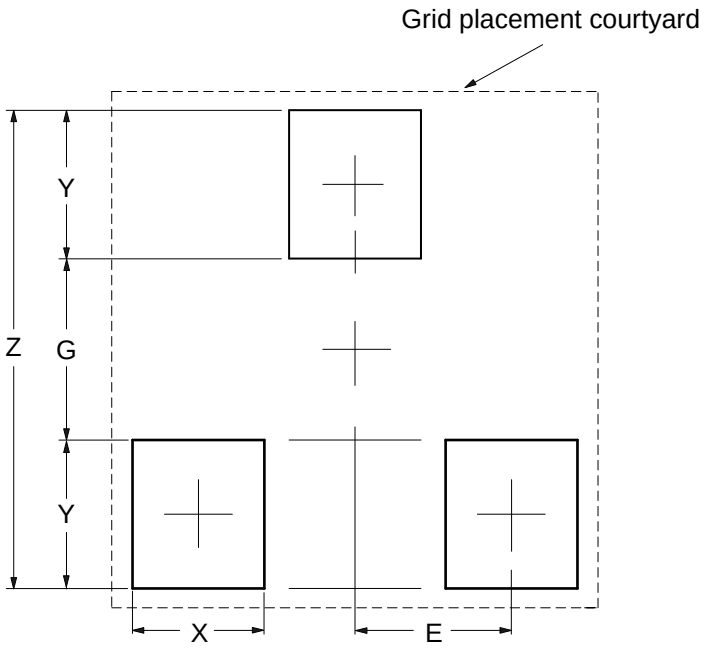
(2) SOT23



NEW PRODUCT

Suggested Pad Layout

(1) SOT23



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	2.900/0.114	1.100/0.043	0.800/0.031	0.900/0.035	0.950/0.037

NEW PRODUCT

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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