Features

- Programmable Precise Output Voltage from 2.5V to 36V，Single Supply: 2.0V to 36V
- High Stability under Capacitive Load
- Low Temperature Deviation: 4.5mV Typical
- Low Equivalent Full-range Temperature Coefficient with 20PPM/°C Typical
- Sink Current Capacity from 1mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to +125°C
- Small Package:
  GS431 Available in SOT23 package

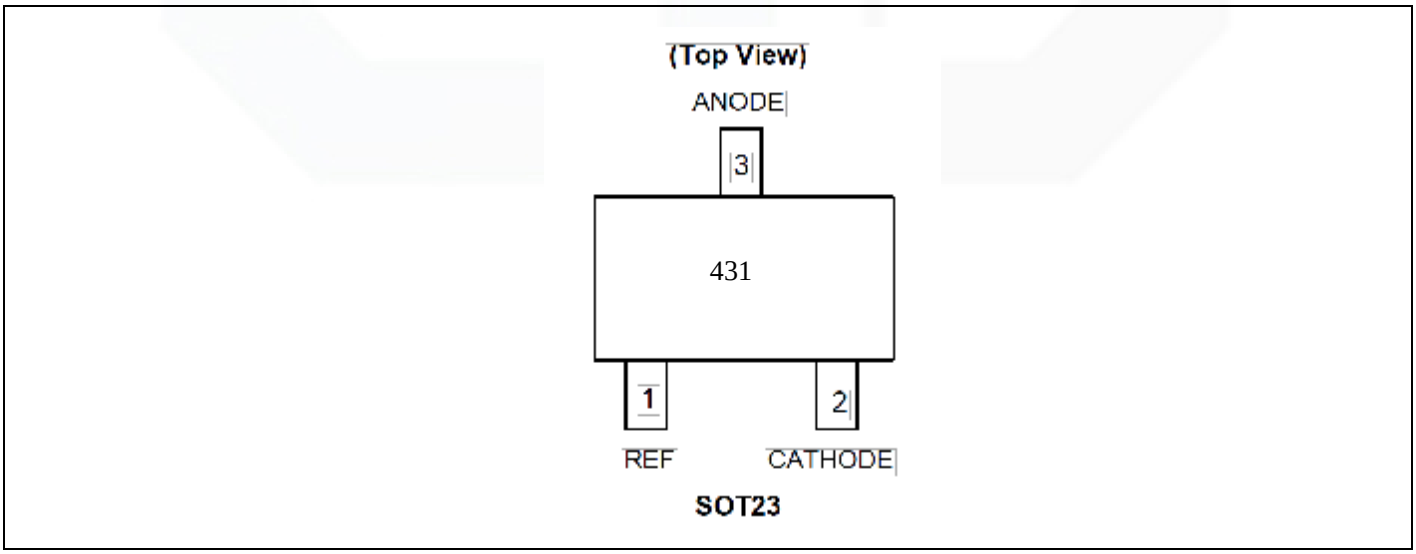
General Description

The GS431 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 GS431 can be set to any value between VREF (2.5V) and the corresponding maximum cathode voltage (36V).
The GS431 precision reference is offered in two voltage tolerance: 0.4% and 0.8%.
This IC is available in SOT23 package.

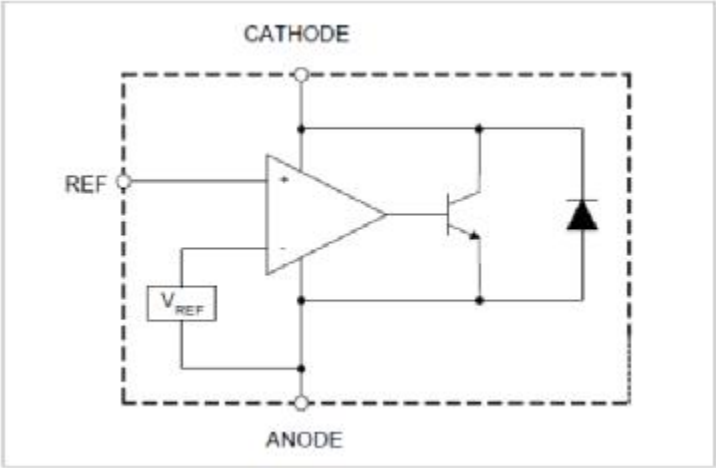
Applications

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

Pin Configuration



Functional Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Cathode Voltage	V_{KA}	40	V
Cathode Current Range (Continuous)	I_{KA}	-100 to 150	mA
Reference Input Current Range	I_{REF}	10	mA
Power Dissipation	PD	370	mW
Thermal Resistance (Junction to Ambient)	θ_{JA}	380	°C /W
Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 ~+150	°C
ESD (Human Body Model)	ESD	2000	V

Note.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	1.0	100	mA
T_A	Operating Ambient Temperature Range	-40	125	°C

Package/Ordering Information

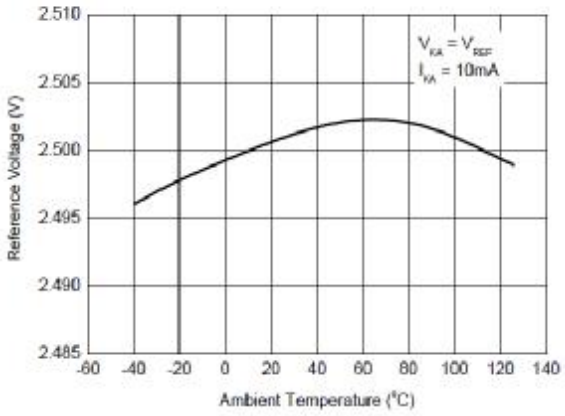
MODEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
GS431	GS431-TR	SOT23	Tape and Reel,3000	431

Electrical Characteristics(@TA = +25°C, unless otherwise specified.)

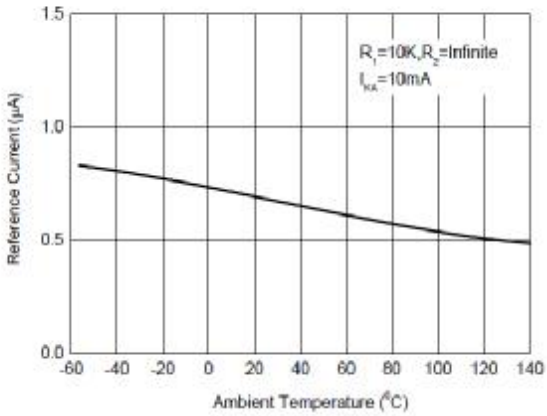
Symbol	Test Circuit	Parameter		Conditions		Min	Typ	Max	Unit
V_{REF}	4	Reference Voltage	0.4%	V_{KA} = V_{REF}, I_{KA} = 10mA		2.490	2.500	2.510	V
			0.8%			2.480	2.500	2.520	
ΔV_{REF}	4	Deviation of Reference Voltage Over Full Temperature Range		V_{KA} = V_{REF} I_{KA} = 10mA	0 to +70°C	—	4.5	8	mV
					-40 to +85°C	—	4.5	10	
					-40 to +125°C	—	4.5	16	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	5	Ratio of Change in Reference Voltage to the Change in Cathode Voltage		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}	5	Reference Current		I_{KA} = 10mA, R1 = 10kΩ, R2 = ∞		—	0.7	4	μA
ΔI_{REF}	5	Deviation of Reference Current Over Full Temperature Range		I_{KA} = 10mA, R1 = 10kΩ R2 = ∞, T_A = -40 to +125°C		—	0.4	1.2	μA
I_{KA} (Min)	4	Minimum Cathode Current for Regulation		V_{KA} = V_{REF}		—	0.4	1.0	mA
I_{KA} (Off)	6	Off-state Cathode Current		V_{KA} = 36V, V_{REF} = 0		—	0.05	1.0	μA
Z_{KA}	4	Dynamic Impedance		V_{KA} = V_{REF}, I_{KA} = 1 to 100mA, f ≤ 1.0kHz		—	0.15	0.5	Ω
θ_{JC}	—	Thermal Resistance		SOT23		—	135.48	—	°C/W

Typical Performance characteristics

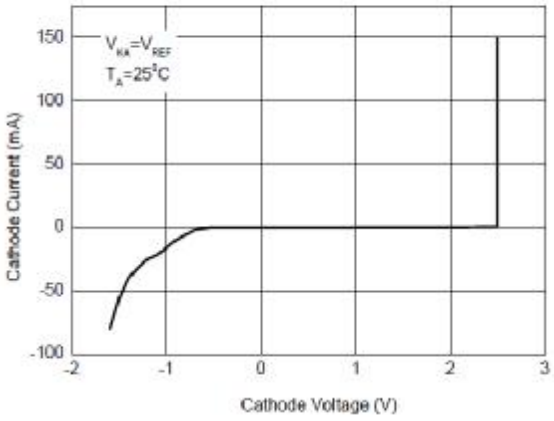
Reference Voltage vs. Ambient Temperature



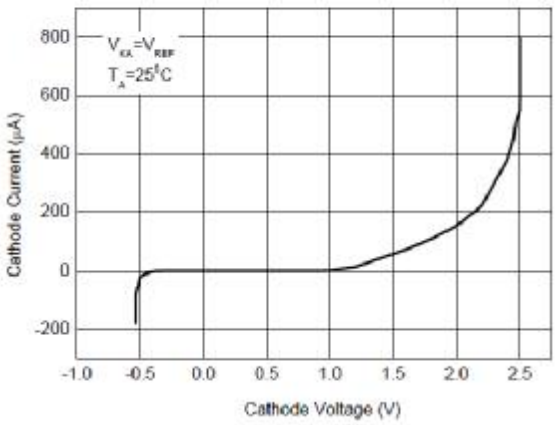
Reference Current vs. Ambient Temperature



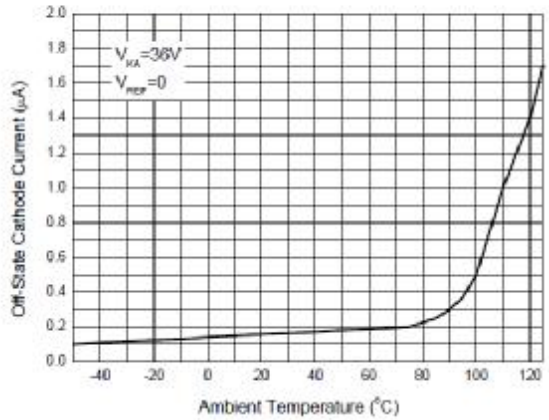
Cathode Current vs. Cathode Voltage



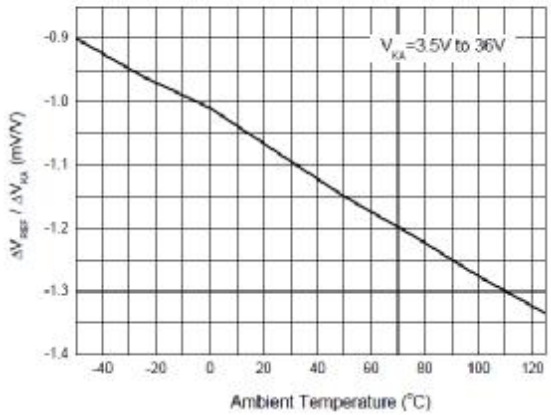
Cathode Current vs. Cathode Voltage



Off-State Cathode Current vs. Ambient Temperature

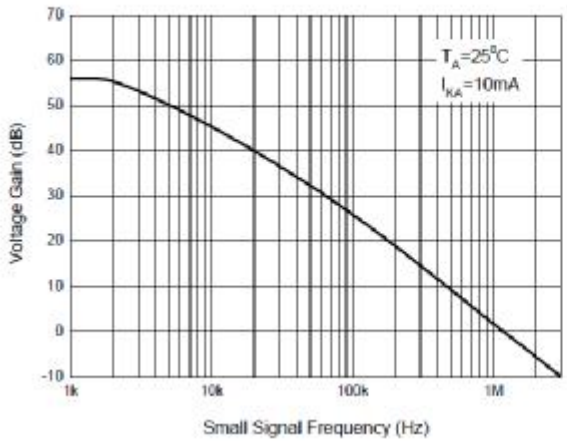


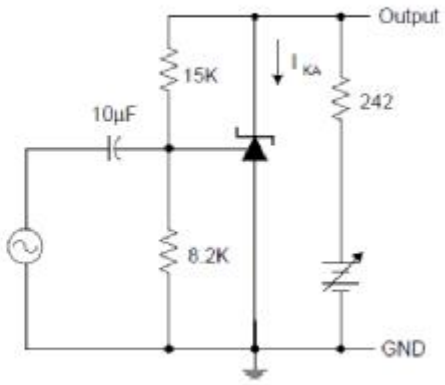
Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage



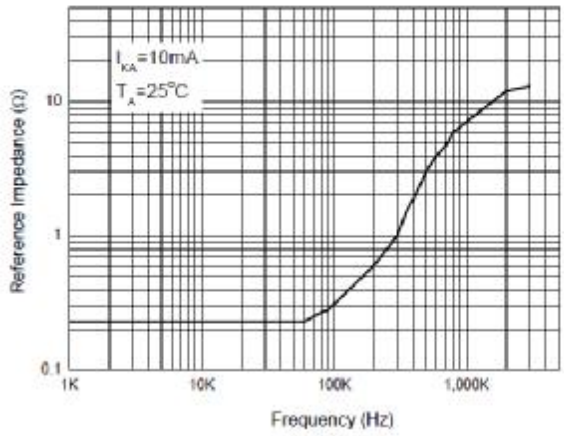
Typical Performance Characteristics (Continued)

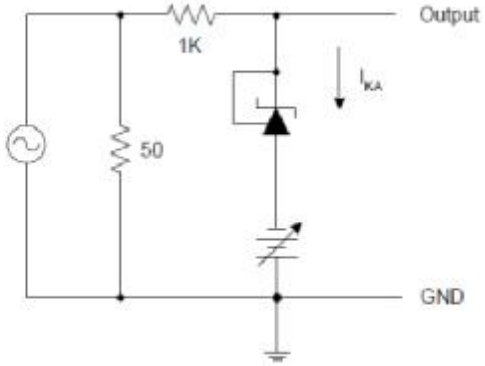
Small Signal Voltage Gain vs. Frequency



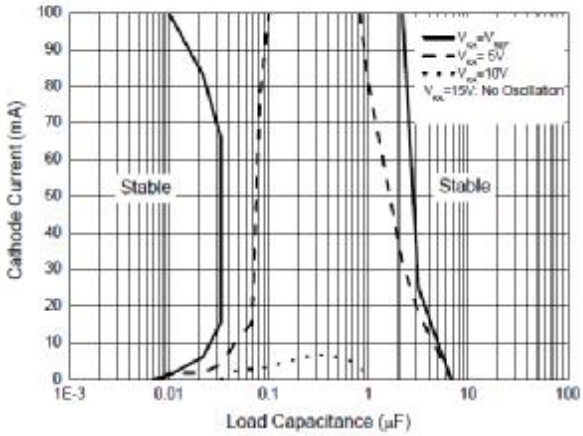


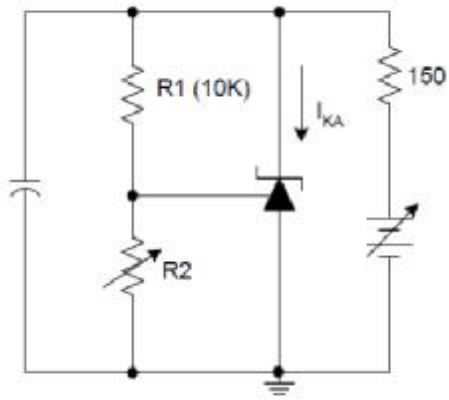
Reference Impedance vs. Frequency





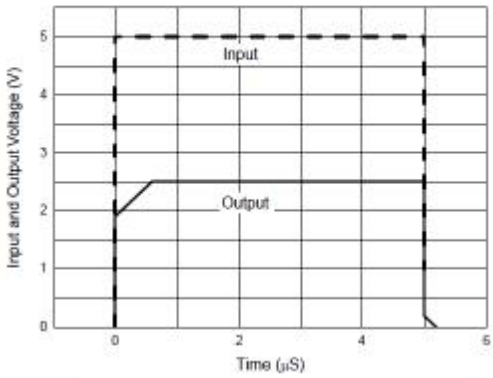
Stability Boundary Conditions vs. Load Capacitance

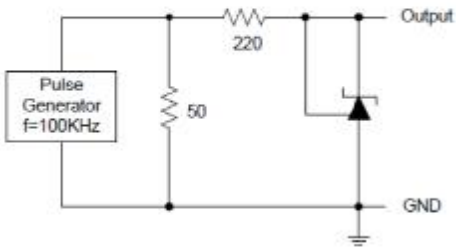




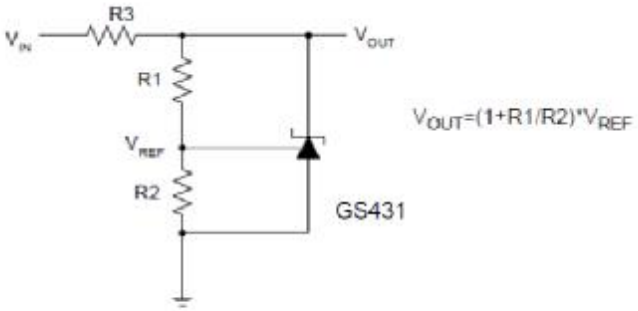
Typical Performance Characteristics (Continued)

Pulse Response of Input and Output Voltage

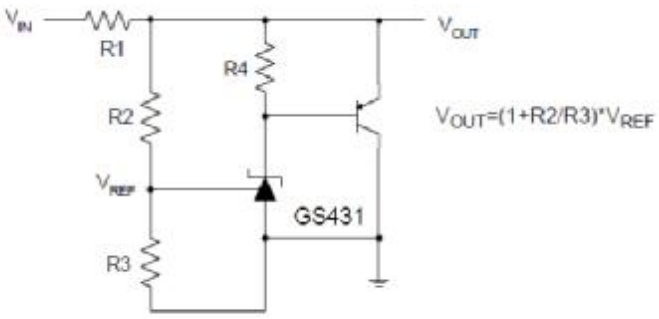




Typical Applications

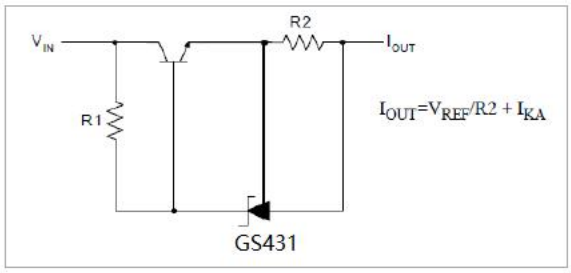


Shunt Regulator

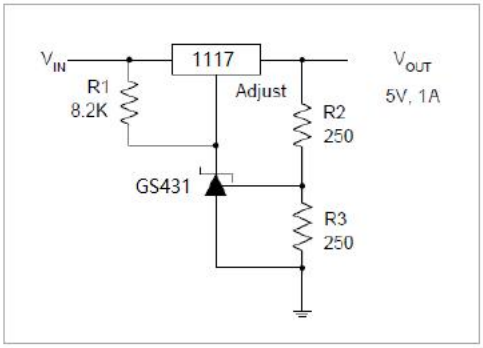


High Current Shunt Regulator

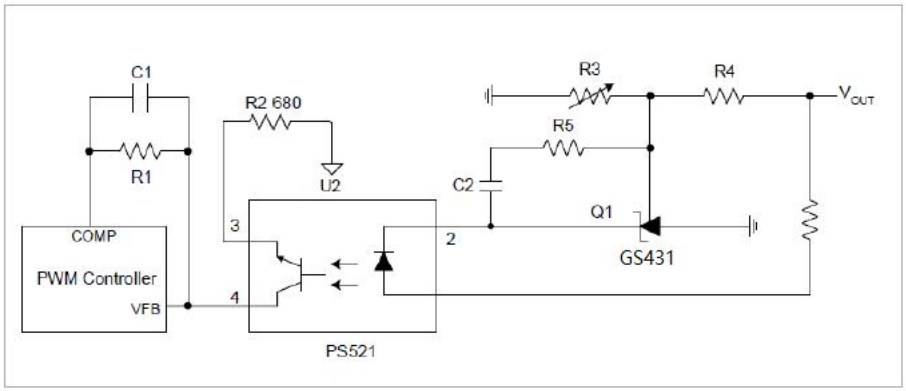
Typical Applications(Continued)



Current Source or Current Limit



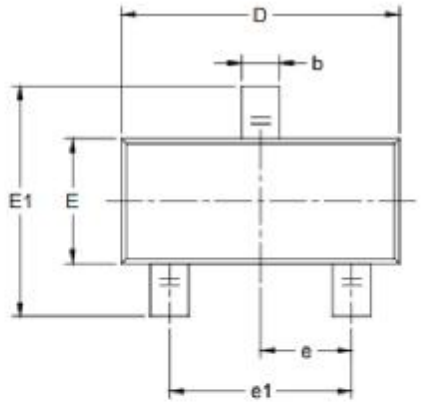
Precision 5V 1A Regulator

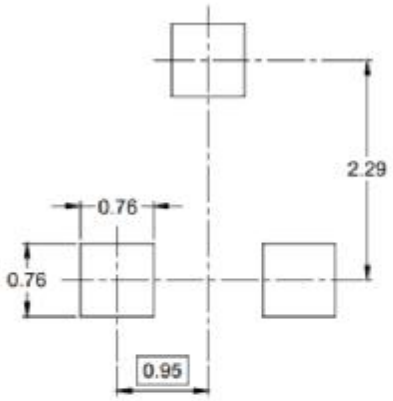


PWM Converter with Reference

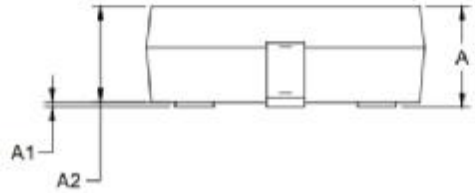
Package Information

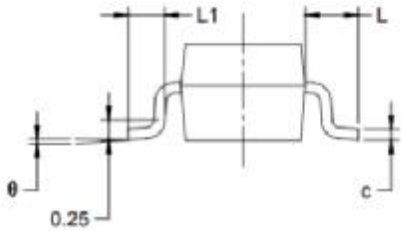
SOT23





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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