Description

The AMS431LV is a low voltage three terminal adjustable shunt regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage can be set to any value between V_{REF} (approximately 2.5 V) to 18V with two external resistors. This device has a typical output impedance of 0.08Ω. Active output circuitry provides a very sharp turn on characteristic, making this device excellent replacement for Zener diodes in many applications.

The AMS431LV is characterized for operation from -40°C to 125°C, and five package options (SOT-23-3, SOT-23-5, SOP-8, TO-92 and SOT-89) allow the designer the opportunity to select the proper package for their applications.

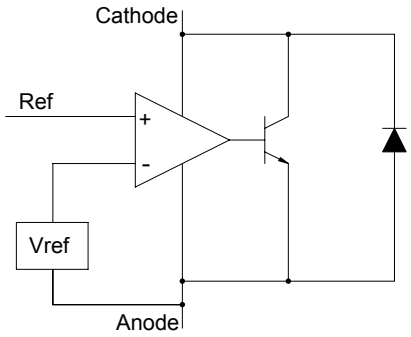
Features

- Low voltage operation (2.5V)
- Adjustable output voltage $V_0 = V_{REF}$ to 18V
- Wide operating current range 150μA to 90mA
- Low dynamic output impedance 0.08Ω (Typ.).
- Trimmed bandgap design up to + 0.5%.
- ESD rating is 6KV(Per MIL-STD-883D).
- RoHS Compliant and 100% Lead (Pb)-Free.

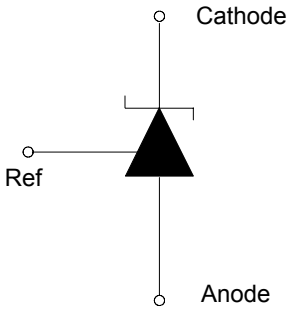
Application

- Linear Regulators
- Adjustable Supplies
- Switching Power Supplies
- Battery Operated Computers
- Instrumentation
- Computer Disk Drives

Block Diagram



Symbol Diagram

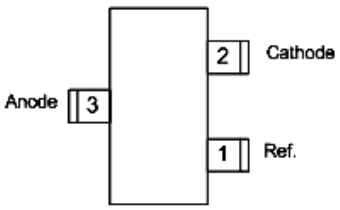


Marking Information

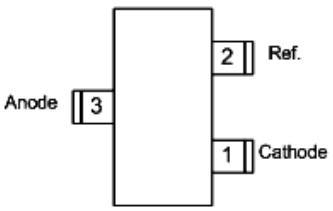
Package	Marking	Production Batch Number	Lead-Free Package
SOT-23-3 SC59-3L	431x●	The last character is the batch number.	Lead-free package is indicated by a dot on top of the last character.
SOT-23-3	431Sx● (AMS431LV)		
SOT-23-5L	431x●		
SOP-8	AMS431LV **XXXX-LF**	XXXX is the batch number.	Lead-free package is indicated by LF after XXXX.
SOT-89	AMS431LV **XXXX-LF**		
TO-92	AMS431LV **XXXX-LF**		

Pin Configuration

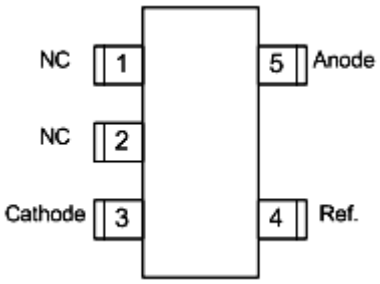
SOT-23-3
SOT-23-3L (SC59-3L)



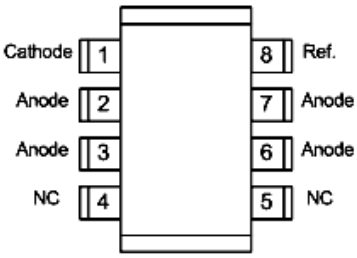
SOT-23-3
(Order as AMS431LV)



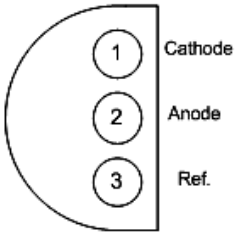
SOT-23-5L



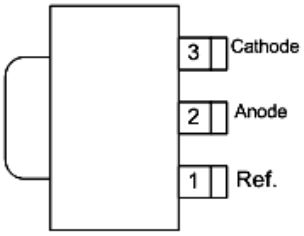
SOP-8



TO-92
(Top View)



SOT-89



Absolute Maximum Ratings

Parameter	Symbol	Maximum	Units
Cathode Voltage	V_{KA}	18	V
Continuous Cathode Current	I_{KA}	90	mA
Reference Current	I_{REF}	1	mA
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Thermal Resistance	θ_{JA}	120 (SOT-89)	°C/W
		230 (SOT-23-3)	
		230 (SOT-23-5L)	
		150 (SOP-8)	
		220 (TO-92)	
Lead Temperature (Soldering) 10 seconds	T_{LEAD}	260	°C

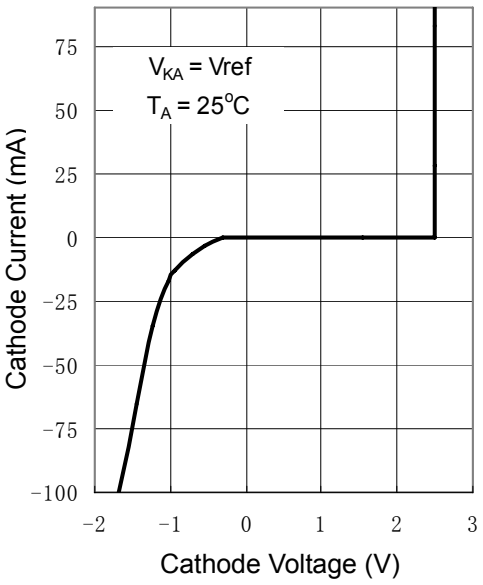
Electrical Characteristics

T_A=25℃, unless otherwise specified.

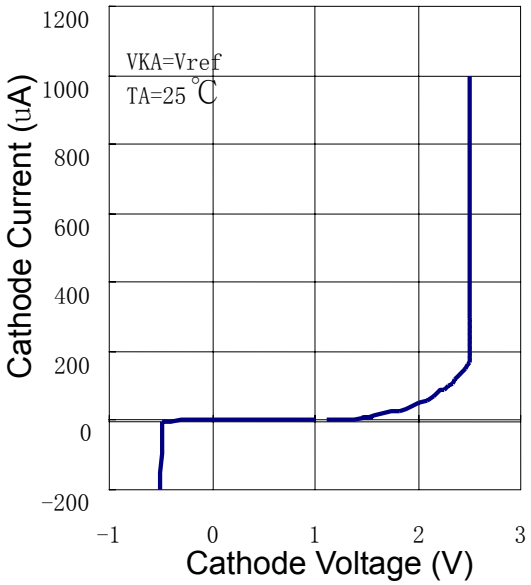
PARAMETER		SYMBOL	TEST CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	0.5%	V_{REF}	1	V_{KA} = V_{REF}, I_{KA} = 10mA	2483	2495	2507	mV
	1%				2470	2495	2520	
	2%				2445	2495	2545	
Deviation of reference voltage over full temperature range		$V_{I(dev)}$	1	V_{KA} = V_{REF}, I_{KA} = 10mA T_A = -40°C to 125°C	--	-14	--	mV
Ratio of change in reference voltage to the change in cathode voltage		$\left\|\frac{\Delta V_{REF}}{\Delta V_{KA}}\right\|$	2	I_{KA} = 3mA, ΔV_{KA} = 10 V - V_{REF}	--	0.2	2.7	mV/V
Reference current		I_{REF}	2	I_{KA} = 10mA, R1=10kΩ, R2 = ∞	--	0.3	4	μA
Deviation of Reference current over full temperature range		$I_{I(dev)}$	2	I_{KA} = 10mA, R1=10kΩ, R2 = ∞, T_A = 0°C to 125°C	--	-0.13	--	μA
Minimum cathode current for regulation		I_{MIN}	1	V_{KA} = V_{REF}	--	0.15	0.3	mA
Off-state cathode current		I_{OFF}	3	V_{KA} = 18V, V_{REF} = 0	--	0.4	1	μA
Dynamic impedance		Z_{KA}	1	I_{KA} = 1mA to 90mA, V_{KA} = V_{REF}, f ≤ 1kH$_Z$	--	0.08	0.7	Ω

Typical Performance Characteristics

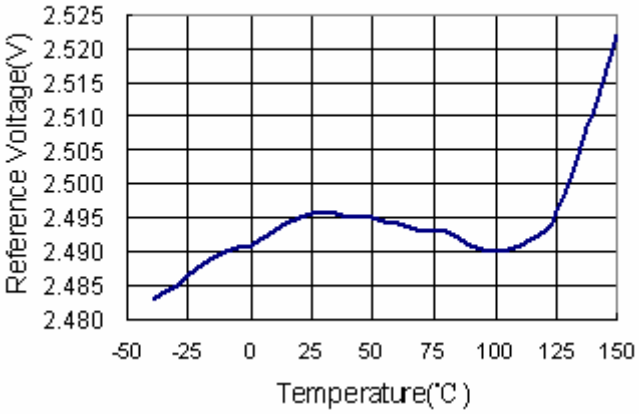
CATHODE CURRENT
Vs.
CATHODE VOLTAGE



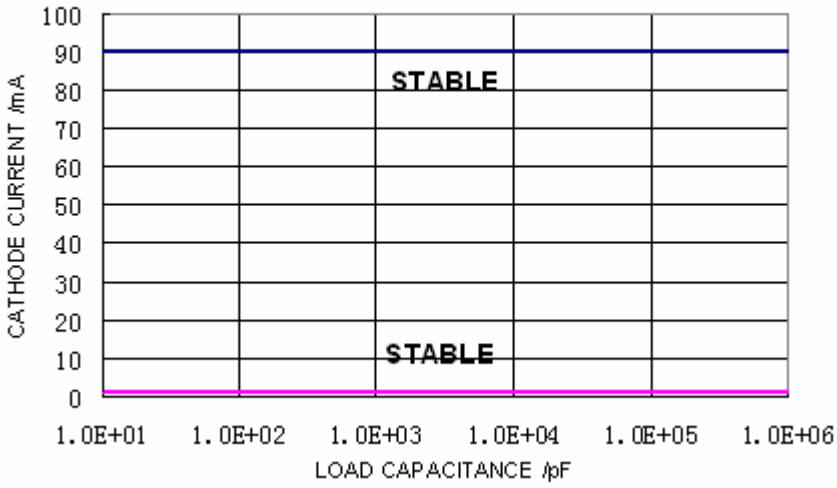
Cathode Current
VS.
Cathode Voltage



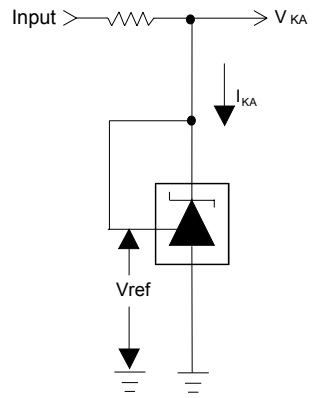
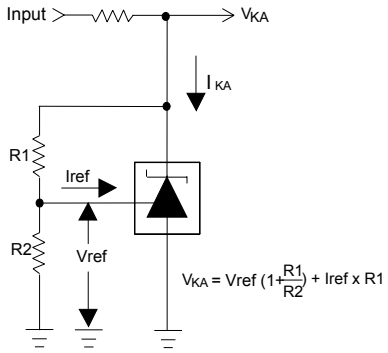
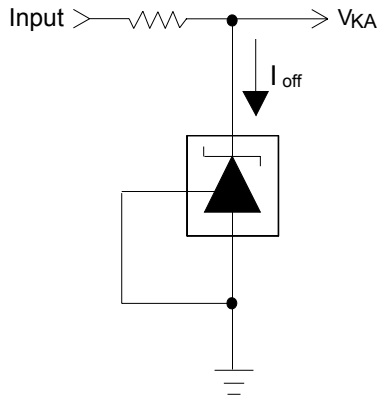
Reference Voltage VS Temprature



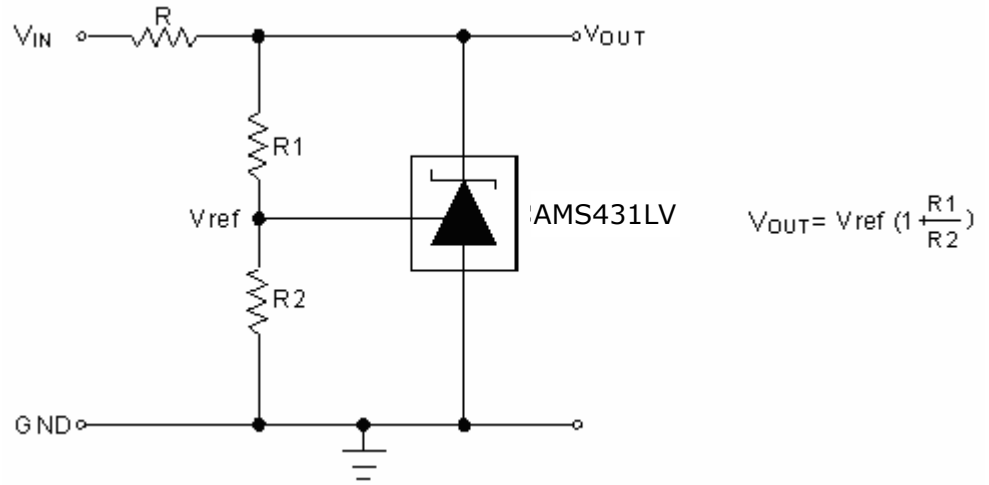
Stability Boundry Conditions



Test Circuits

		
Test Circuit 1: **$V_{KA} = V_{REF}$**	**Test Circuit 2:** **$V_{KA} > V_{REF}$**	**Test Circuit 3:** **Off State Current**

Application Diagram



Thermal Consideration

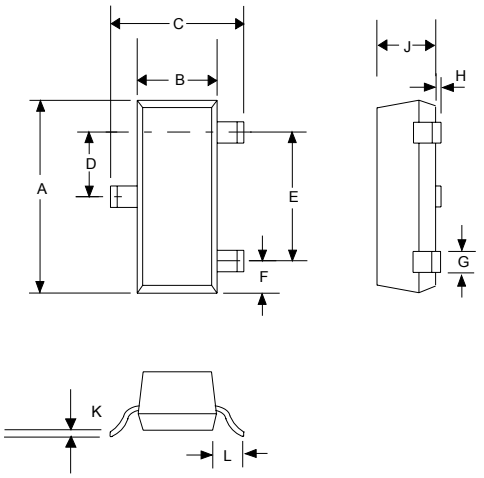
Package	Power Rating (T_A=25°C)	Power Rating (T_A=50°C)	Power Rating (T_A=70°C)
SOT-23-3 (θ_{JA}=230°C/W)	435mW	326mW	239mW
SOT-23-5L (θ_{JA}=230°C/W)	435mW	326mW	239mW
TO-92 (θ_{JA}=220°C/W)	455mW	341mW	250mW

1. Maximum junction temperature is 125°C

2. θ_{JA} is measured with packages mounted onboard under still-air condition with 1W power applied.

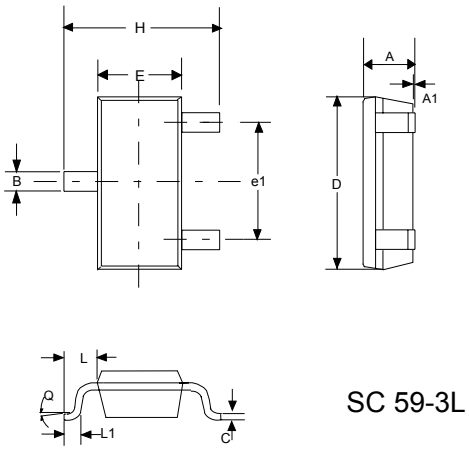
3. Power rating is calculated using $P_D = (T_J - T_A) / \theta_{JA}$, where T_J denotes junction temperature and T_A denotes ambient temperature.

OUTLINE DRAWING SOT-23-3



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.04
B	0.047	0.055	1.20	1.40
C	0.083	0.104	2.10	2.64
D	0.035	0.040	0.89	1.03
E	0.070	0.080	1.78	2.05
F	0.018	0.024	0.45	0.60
G	0.015	0.020	0.37	0.51
H	0.0005	0.004	0.013	0.10
J	0.034	0.040	0.887	1.02
K	0.003	0.007	0.085	0.18
L	-	0.027	-	0.69

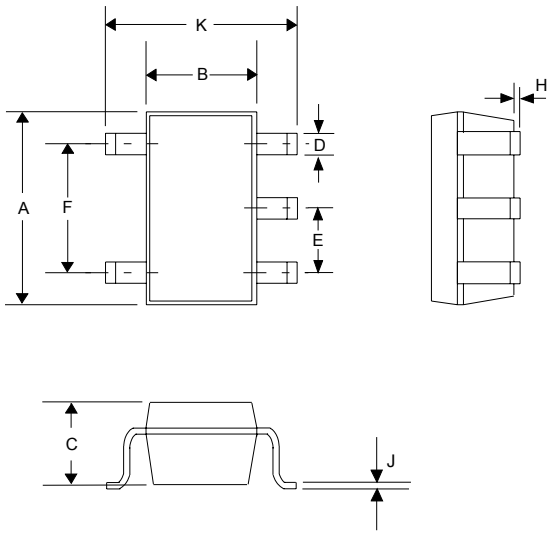
OUTLINE DRAWING SC59-3L (SOT-23-3L)



SC 59-3L

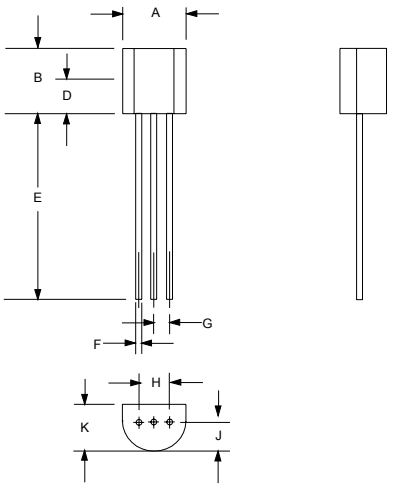
DIMENSIONS				
DIM[N]	INCHE		MM	
	MIN	MAX	MIN	MAX
A	0.035	0.043	0.90	1.10
A1	0.0004	0.005	0.01	0.13
B	0.012	0.020	0.30	0.50
C	0.004	0.008	0.09	0.20
D	0.110	0.122	2.80	3.10
H	0.098	0.122	2.50	3.10
E	0.059	0.067	1.50	1.70
e	0.037REF		0.95REF	
e1	0.075REF		1.90REF	
L1	0.008	0.022	0.20	0.55
L	0.014	0.031	0.35	0.80
Q	0℃	10℃	0℃	10℃

OUTLINE DRAWING SOT-23-5L



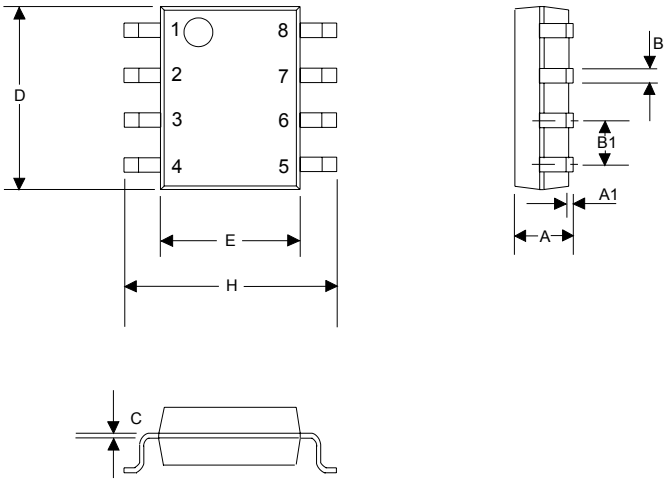
DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.05
B	0.059	0.070	1.50	1.75
C	0.036	0.051	0.90	1.30
D	0.014	0.020	0.35	0.50
E	-	0.037	-	0.95
F	-	0.075	-	1.90
H	-	0.006	-	0.15
J	0.0035	0.008	0.090	0.20
K	0.102	0.118	2.60	3.00

OUTLINE DRAWING TO-92



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.445	5.207
B	0.170	0.210	4.318	5.334
E	0.500	0.610	12.70	15.50
F	0.016	0.021	0.407	0.533
G	0.045	0.055	1.143	1.397
H	0.095	0.105	2.413	2.667
J	0.080	0.105	2.032	2.667
K	0.125	0.165	3.175	4.191

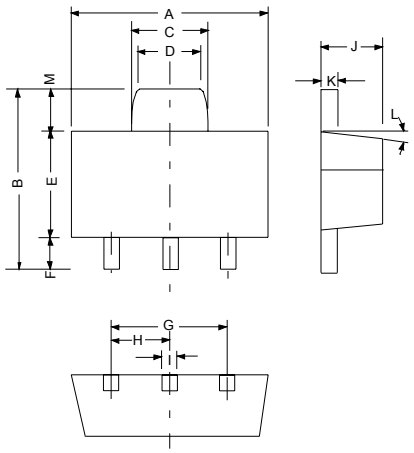
OUTLINE DRAWING SOP-8



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.0532	0.0688	1.35	1.75
A1	0.0040	0.0098	0.10	0.25
B	0.0130	0.0200	0.33	0.51
B1	0.050 BSC		1.27 BSC	
C	0.0075	0.0098	0.19	0.25
D	0.1890	0.1968	4.80	5.00
H	0.2284	0.2440	5.80	6.20
E	0.1497	0.1574	3.80	4.00

OUTLINE DRAWING SOT-89

SOT-89



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.173	0.181	4.400	4.600
B	0.159	0.167	4.050	4.250
C	0.067	0.075	1.700	1.900
D	0.051	0.059	1.300	1.500
E	0.094	0.102	2.400	2.600
F	0.035	0.047	0.890	1.200
G	0.118REF		3.00REF	
H	0.059REF		1.50REF	
I	0.016	0.020	0.400	0.520
J	0.055	0.063	1.400	1.600
K	0.014	0.016	0.350	0.410
L	10°TYP		10°TYP	
M	0.028REF		0.70REF	

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