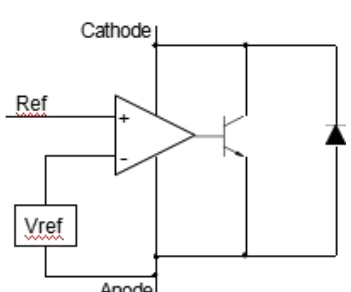
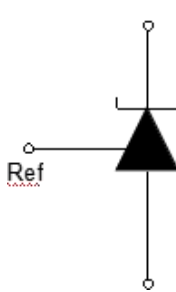
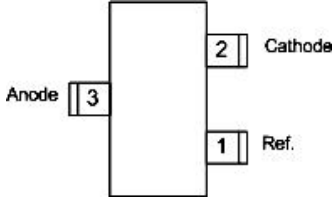
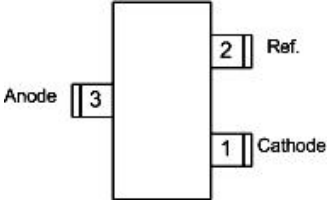
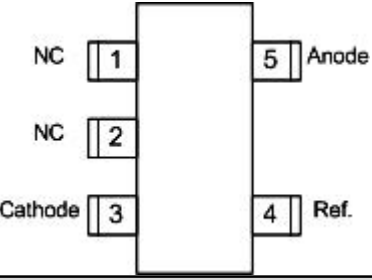
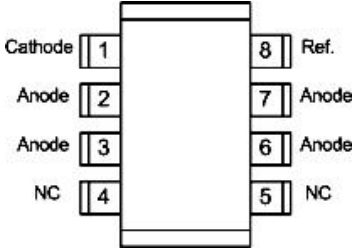
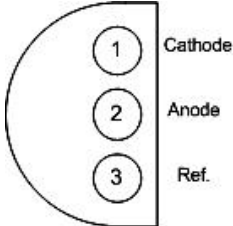
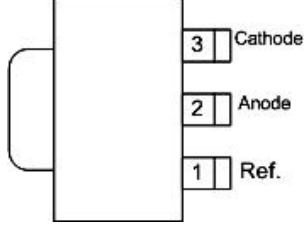


<p>Features</p> <ul style="list-style-type: none"> ● Low voltage operation (2.5V) ● Wide operating current range 150mA to 150 mA ● Low dynamic output impedance 0.08(Typ.). ● Trimmed bandgap design up to + 0.5%. ● Electrostatic discharge voltage 2.5kV. ● RoHS Compliant and 100% Lead (Pb)-Free. <p>Applications</p> <ul style="list-style-type: none"> ● Linear Regulators ● Adjustable Supplies ● Switching Power Supplies ● Battery Operated Computers ● Instrumentation ● Computer Disk Drives 	<p>Description</p> <p>The SE431 is a low voltage three terminal adjustable shunt regulator with a guaranteed thermal stability over applicable temperature ranges.</p> <p>The output voltage can be set to any value between V_{REF} (approximately 2.5 V) to 36V 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.</p> <p>The SE431 is characterized for operation from -40°C to 125°C, and is available in five package options (SOT-23-3, SOT-23-5, SOP-8, TO-92 and SOT-89)</p>
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<p>Block Diagram</p> 	<p>Symbol Diagram</p> 
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Package	Marking	Production Batch Number	Lead-Free Package
SOT-23-3L SC59-3L	431x (SE431DS3L)	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 (SE431DS3)		
SOT-23-5L	431x (SE431DS5L)		
SOP-8	SE431 XXXX-LF (SE431S8)	XXXX --> batch number.	Lead-free package is indicated by LF after XXXX.
SOT-89	SE431 XXXX-LF (SE431K)		
TO-92	SE431 XXXX-LF (SE431P)		

Pin Configuration

SOT-23-3L (SC59-3L) (SE431DS3L)	SOT-23-3 (SE431DS3)	SOT-23-5L (SE431DS5L)
		
SOP-8 (SE431S8)	TO-92 (Top View) (SE431P)	SOT-89 (SE431K)
		

Absolute Maximum Ratings (Over operating free-air temperature range, unless otherwise noted)

PARAMETER	SYMBOL	MAXIMUM	UNIT
Cathode Voltage (The voltage values are with respect to the anode terminal unless otherwise noted.)	V_{KA}	40	V
Continuous Cathode Current	I_{KA}	150	mA
Reference Current	I_{REF}	10	mA
Operating Junction Temperature Range	T_J	-40 to 125	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering) 10 seconds	T_{LEAD}	260	°C

Recommended operating conditions

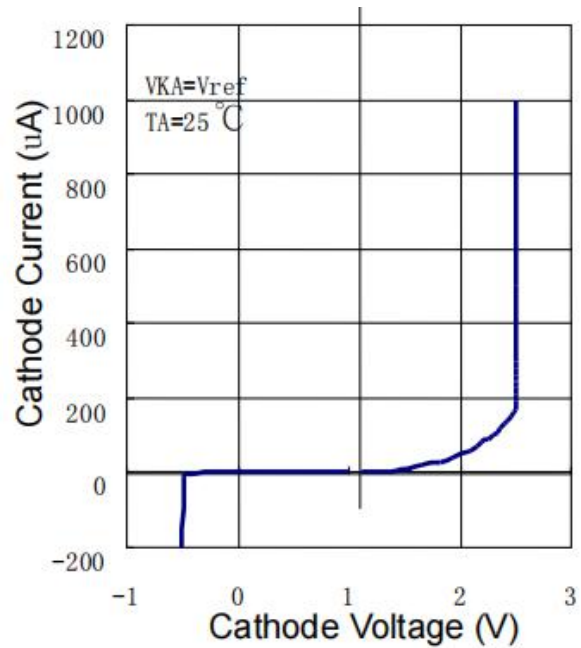
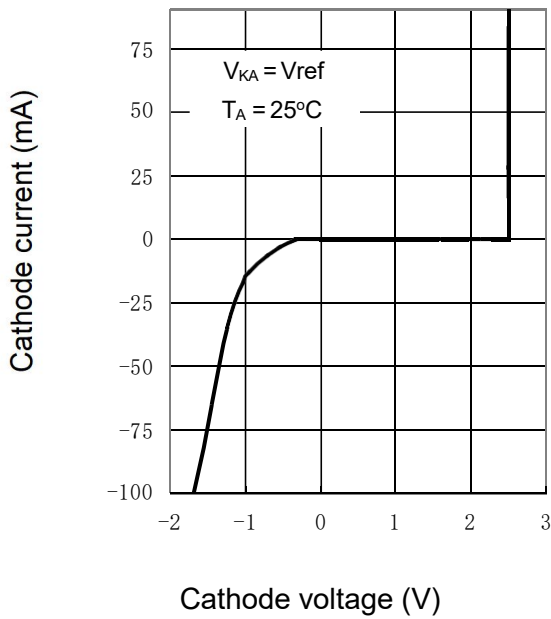
PARAMETER	MIN	MAX	UNIT
Cathode Voltage, V_{KA}	V_{REF}	36	V
Cathode Current, I_K (for regulation)	0.3	100	mA

Electrical Characteristics ($T_A=25^\circ\text{C}$, unless otherwise specified)

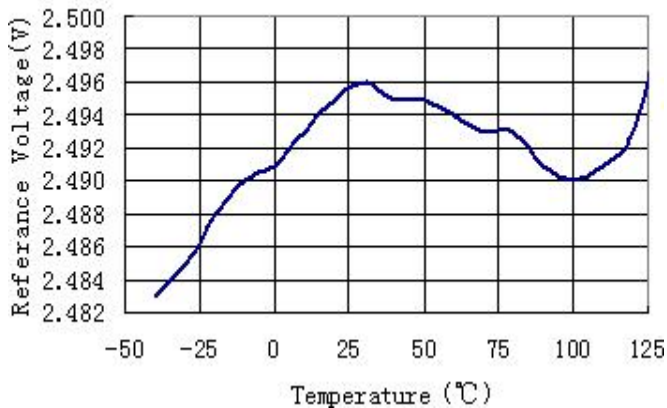
PARAMETER		SYMBOL	TEST CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	0.5%	VREF	1	$V_{KA} = V_{REF}, I_{KA} = 10\text{mA}$	2483	2495	2507	mV
	1%				2470	2495	2520	
	2%				2445	2495	2545	
Deviation of reference voltage over full temperature range		VI(dev)	1	$V_{KA} = V_{REF}, I_{KA} = 10\text{mA}$ $T_A = 0^\circ\text{C to } 125^\circ\text{C}$	--	8	17	mV
Ratio of change in reference voltage to the change in cathode voltage		$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	2	$I_{KA} = 3\text{mA}$, $\Delta V_{KA} = 10\text{V} - V_{REF}$	--	0.2	2.7	mV/V
Reference current		IREF	2	$I_{KA} = 10\text{mA}$, $R1=10\text{k}\Omega, R2 = \infty$	--	0.3	4	A
Deviation of Reference current over full temperature range		II(dev)	2	$I_{KA} = 10\text{mA}, R1 = 10\text{k}\Omega$, $R2 = \infty, T_A = 0^\circ\text{C to } 125^\circ\text{C}$	--	0.13	4	A
Minimum cathode current for regulation		IMIN	1	$V_{KA} = V_{REF}$	--	0.15	0.3	mA
Off-state cathode current		IOFF	3	$V_{KA} = 36\text{V}, V_{REF} = 0$	--	0.4	1	A
Dynamic impedance		ZKA	1	$I_{KA} = 1\text{mA to } 100\text{mA}$, $V_{KA} = V_{REF}, f \leq 1\text{kHz}$	--	0.08	0.7	Ω

Typical Performance Characteristics

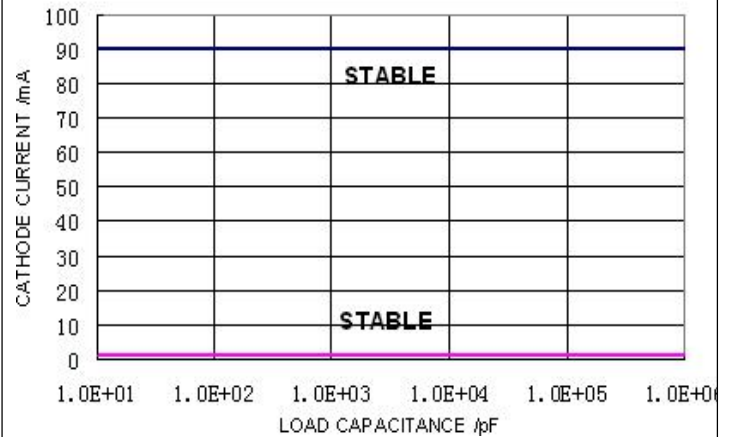
CATHODE CURRENT VS CATHODE VOLTAGE



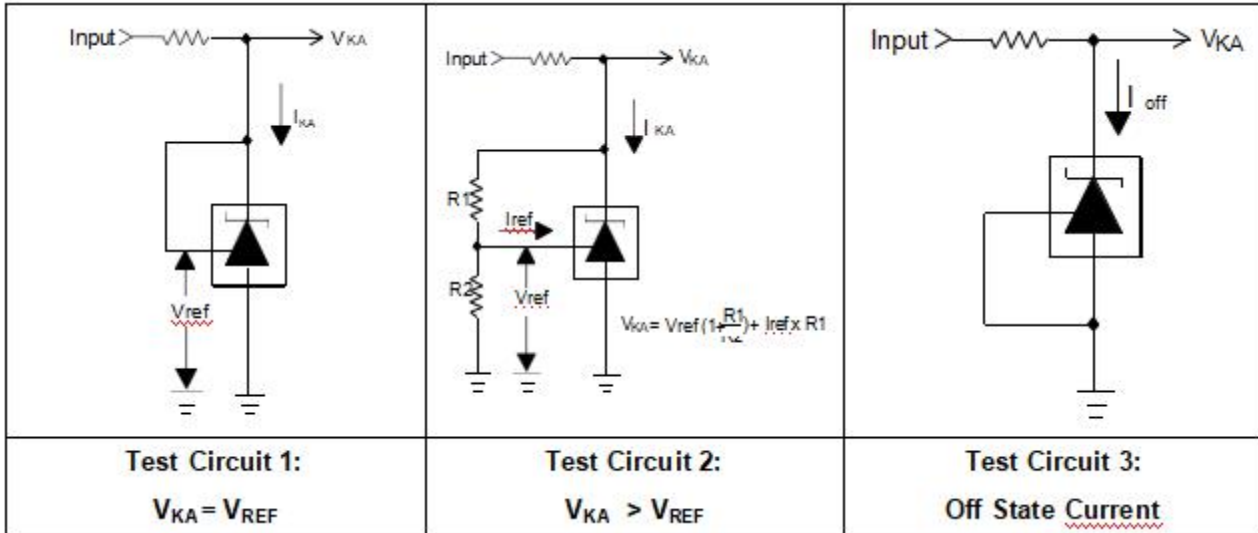
Reference Voltage VS Temperature



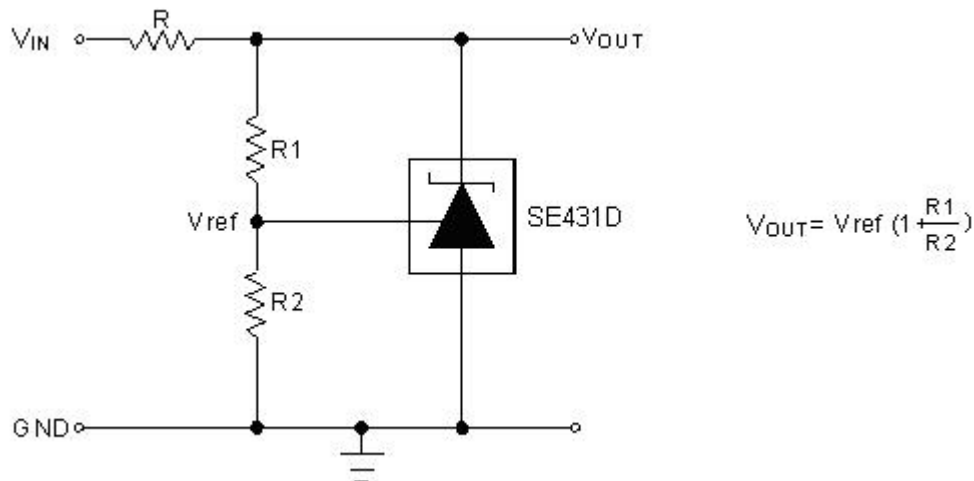
Stability Boundry Conditions



Test Circuit



Application diagram

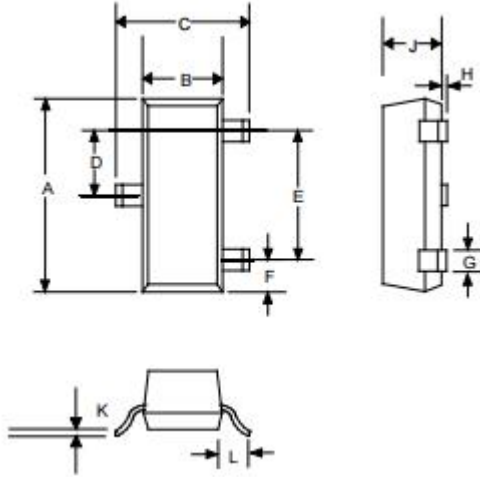


Thermal consideration

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

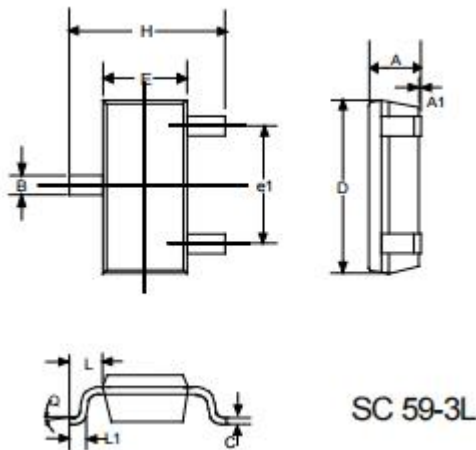
1. Maximum junction temperature is 125°C
2. θ_{JA} is measured with packages mounted onboard under still-air condition with 1W power applied.
3. Power rating is calculated using $PD = (T_J - T_A) / \theta_{JA}$, where T_J denotes junction temperature and T_A denotes ambient temperature

Outline drawing SOT23-3



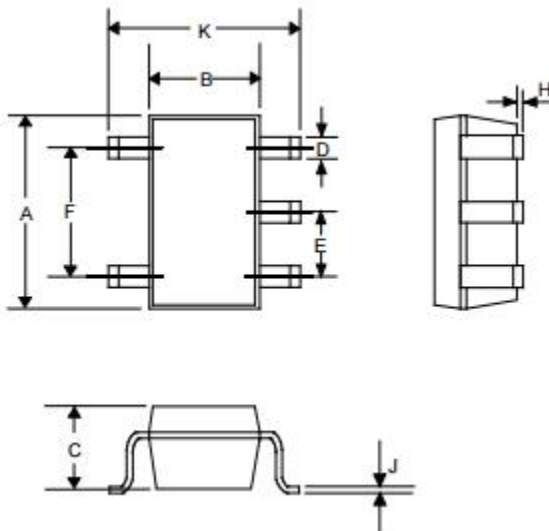
DIM ^N	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.04
B	0.047	0.055	1.20	1.40
C	0.083	0.104	2.10	2.64
D	0.035	0.040	0.89	1.03
E	0.070	0.080	1.78	2.05
F	0.018	0.024	0.45	0.60
G	0.015	0.020	0.37	0.51
H	0.0005	0.004	0.013	0.10
J	0.034	0.040	0.887	1.02
K	0.003	0.007	0.085	0.18
L	-	0.027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

Outline drawing SC59-3L (SOT23-3L)



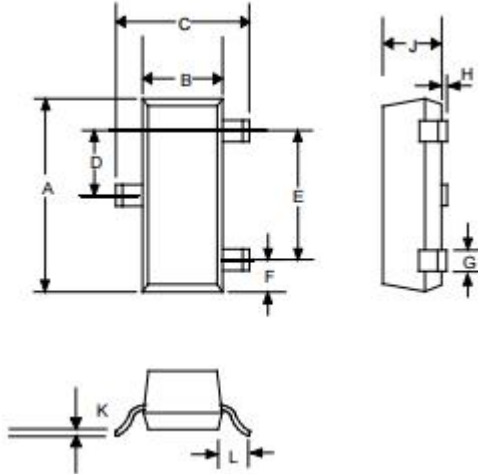
DIM ^N	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.035	0.043	0.90	1.10
A1	0.0004	0.005	0.01	0.13
B	0.012	0.020	0.30	0.50
C	0.004	0.008	0.09	0.20
D	0.110	0.122	2.80	3.10
H	0.098	0.122	2.50	3.10
E	0.059	0.067	1.50	1.70
e	0.037REF		0.95REF	
e1	0.075REF		1.90REF	
L1	0.008	0.022	0.20	0.55
L	0.014	0.031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

Outline drawing SOT23-5L



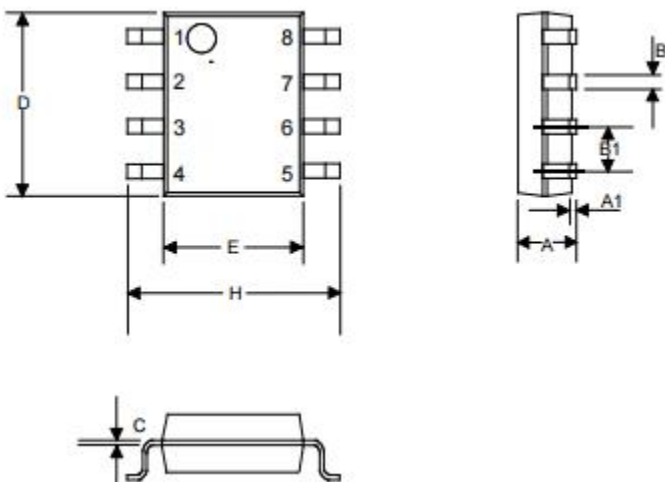
DIM ^N	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.05
B	0.059	0.070	1.50	1.75
C	0.036	0.051	0.90	1.30
D	0.014	0.020	0.35	0.50
E	-	0.037	-	0.95
F	-	0.075	-	1.90
H	-	0.006	-	0.15
J	0.0035	0.008	0.090	0.20
K	0.102	0.118	2.60	3.00

Outline drawing TO-92



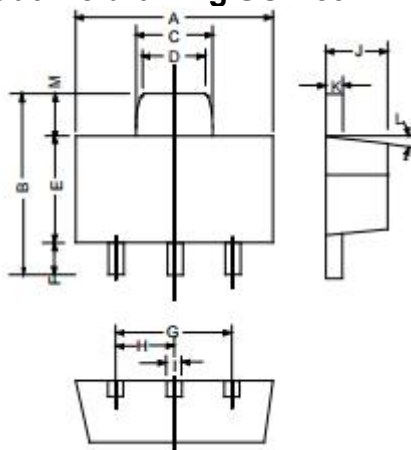
DIMENSIONS				
DIM ^N	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.445	5.207
B	0.170	0.210	4.318	5.334
E	0.500	0.610	12.70	15.50
F	0.016	0.021	0.407	0.533
G	0.045	0.055	1.143	1.397
H	0.095	0.105	2.413	2.667
J	0.080	0.105	2.032	2.667
K	0.125	0.165	3.175	4.191

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



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	



SE431

Adjustable precision shunt regulator,

2.495V to 36V,

SOT-23-3(L), SOT-23-5L, SOP-8, TO-92 and SOT-89

All contents are subject to change without prior notice.

The information in this document is given to the best of ARTronik's knowledge, based on laboratory testing and practical experience. ARTronik reserves the right to change the given data without further notice.

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