



Description

The SE432L 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 1.24 V) to 8V with two external resistors. This device has a typical output impedance of 0.30Ω. Active output circuitry provides a very sharp turn on characteristic, making this device excellent replacement for Zener diodes in many applications.

The SE432 is characterized for operation from -40°C to 105°C, and two package options (SOT-23 and TO-92) allow the designer the opportunity to select the proper package for their applications.

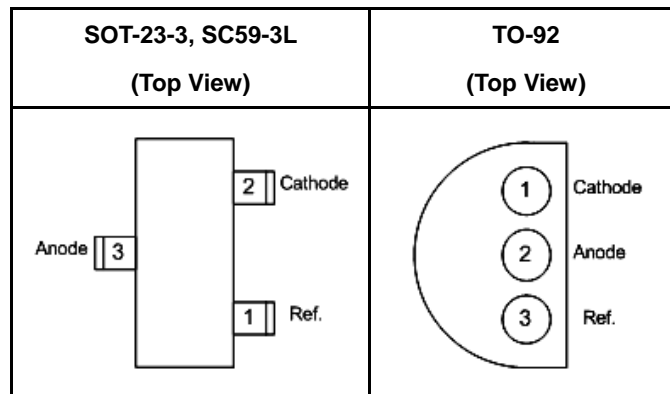
Features

- Low voltage operation (1.24V)
- Adjustable output voltage $V_0 = V_{REF}$ to 8V
- Wide operating current range 60μA to 100mA
- Low dynamic output impedance 0.30Ω (Typ.)
- Trimmed bandgap design up to ± 0.5%.
- ESD rating is 2.5KV(Per MIL-STD-883D)
- 100% Lead (Pb)-Free.

Application

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

Pin Configuration



Marking Information

Package	Marking	Production Batch Number	Lead-Free Package
SOT-23-3 SC59-3L	S432Lx	The last character is the batch number.	Lead-free package is indicated by a dot on top of the last character.
TO-92	SE432L XXXX	XXXX is the batch number.	Lead-free package is indicated by LF after XXXX.

Absolute Maximum Rating

Parameter	Symbol	Maximum	Units
Cathode Voltage	V_{KA}	8	V
Continuous Cathode Current	I_{KA}	150	mA
Reference Current	I_{REF}	3	mA
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-45 to 150	°C
Thermal Resistance	θ_{JA}	230 (SOT-23-3)	°C/W
		220 (TO-92)	
Lead Temperature (Soldering) 10 seconds	T_{LEAD}	260	°C

Electrical Characteristics

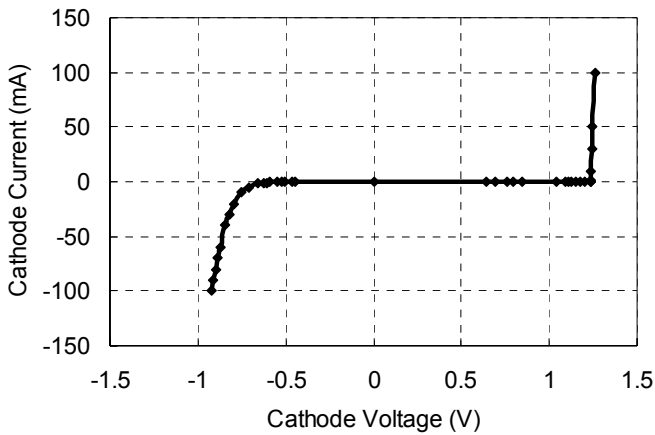
Parameter		Symbol	Test Conditions & Circuit	Min	Typ	Max	Unit
Reference Voltage	0.5%	V_{REF}	Test circuit #1 $V_{KA} = V_{REF}, I_{KA} = 10mA$	1234	1240	1246	mV
	1.0%			1228	1240	1252	
	1.5%			1221	1240	1259	
	2.0%			1215	1240	1265	
	1.25V 1% ⁽¹⁾			1237	1250	1263	
Deviation of Reference Voltage over Full Temperature Range		$V_{I(DEV)}$	Test circuit #1 $V_{KA} = V_{REF}, I_{KA} = 10mA,$ $T_A = -40^{\circ}C - 105^{\circ}C$	--	68		mV
Ratio of Change in Reference Voltage to the Change in Cathode Voltage		$ \Delta V_{REF}/\Delta V_{KA} $	Test circuit #2 $I_{KA} = 10mA, \Delta V_{KA} = 8V \text{ to } V_{REF}$	--	1.0	2.7	mV/V
Reference Current		I_{REF}	Test circuit #2 $I_{KA} = 10mA, R1=10k\Omega, R2 = \infty$	--	0.15	2	μA
Deviation of Reference Current over Full Temperature Range		$I_{I(DEV)}$	Test circuit #2 $I_{KA} = 10mA, R1=10k\Omega, R2 = \infty$ $T_A = 0^{\circ}C - 105^{\circ}C$	--	0.10		μA
Minimum Cathode Current for Regulation		I_{MIN}	Test circuit #1 $V_{KA} = V_{REF}$	--	60	100	μA
Off-state Cathode Current		I_{OFF}	Test circuit #3 $V_{KA} = 8V, V_{REF} = 0$	--	0.04	0.8	μA
Dynamic Impedance		$ Z_{KA} $	Test circuit #1 $I_{KA} = 100\mu A - 80mA,$ $V_{KA} = V_{REF}, f \leq 1KHZ$	--	0.30	1	Ω

Note 1: Upon Customer Request.

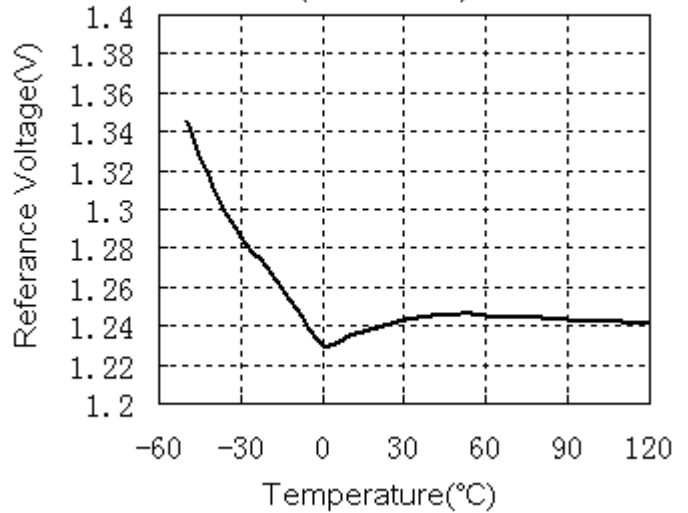


Typical Performance Characteristics

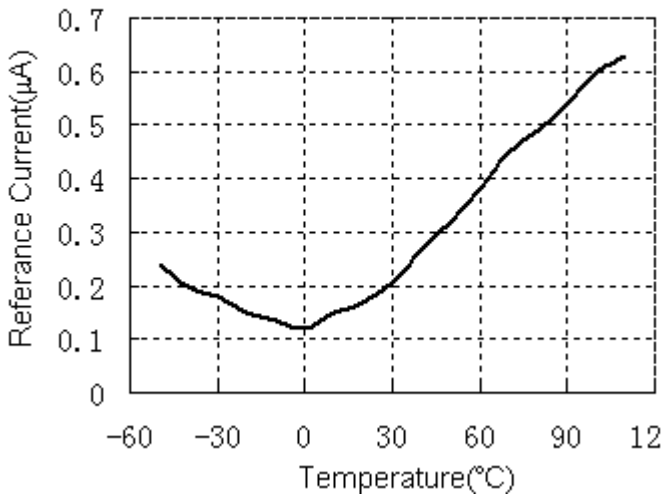
Cathode Current VS Cathode Voltage



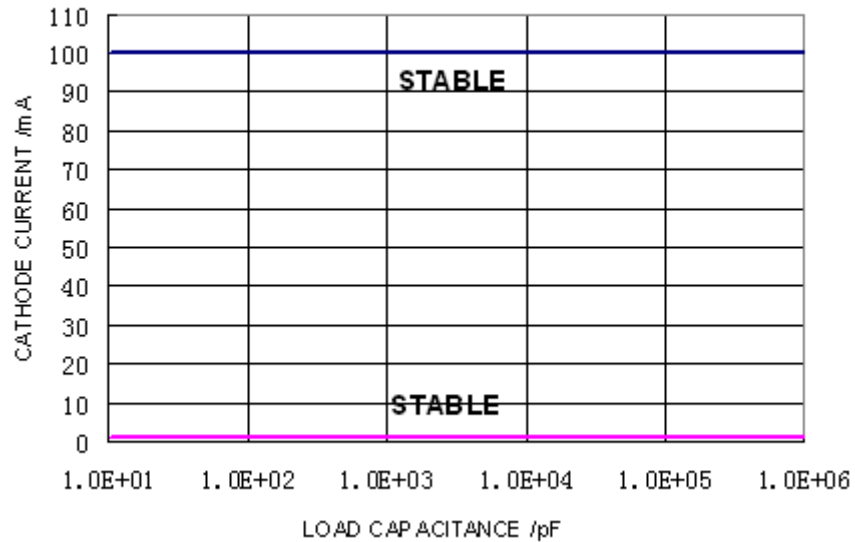
Reference Voltage VS Temperature
(Iload=10mA)



Reference Input Current VS Temperature
(R1=10k,R2=∞,Iload=10mA)

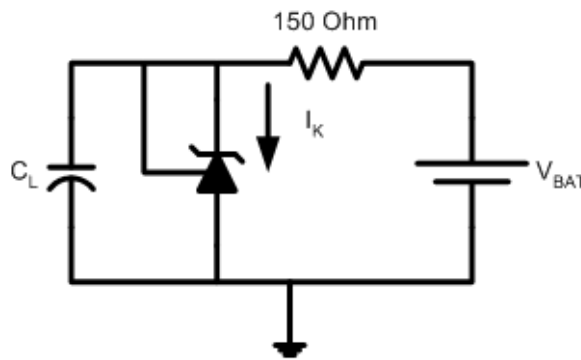
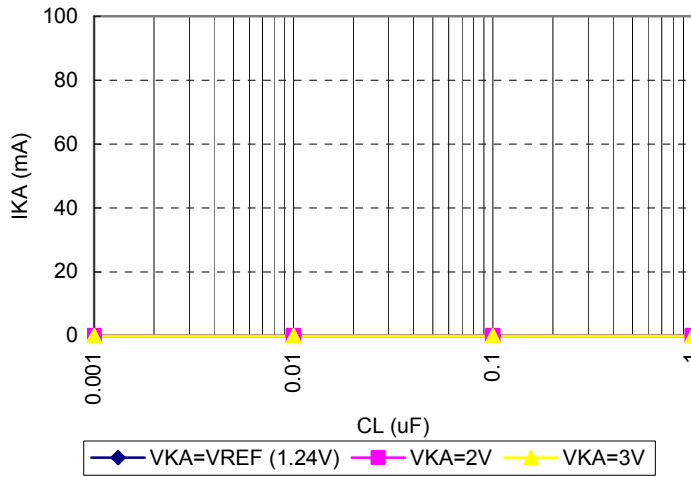


Stability Boundry Conditions

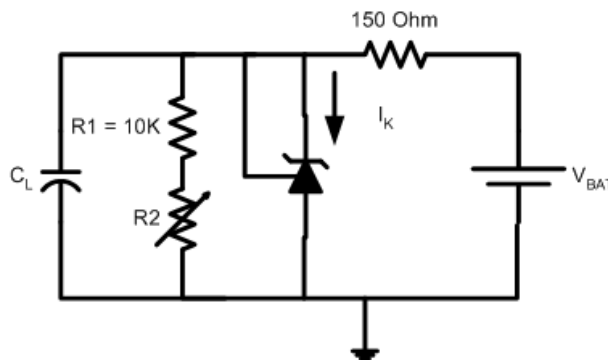




Stability Boundary Condition



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

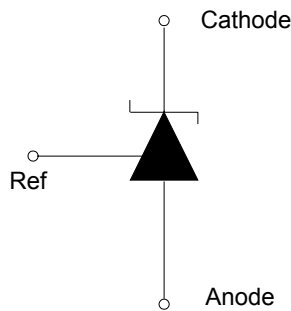


Test Circuit for $V_{KA} = 2V, 3V$

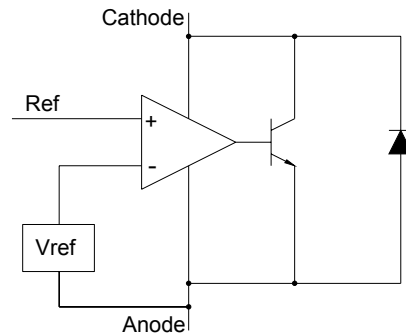
The areas under the curves represent conditions that may cause the device to oscillate. For $V_{KA} = 2V$ and $3V$ curves, R_2 and V_{BAT} were adjusted to establish the initial V_{KA} and I_K conditions with $C_L = 0$. V_{BAT} and C_L then were adjusted to determine the ranges of stability. As the graph suggested, SE432L is unconditional stable with I_K from 0 to 100mA and with C_L from 0.001uF to 1uF.



Symbol Diagram



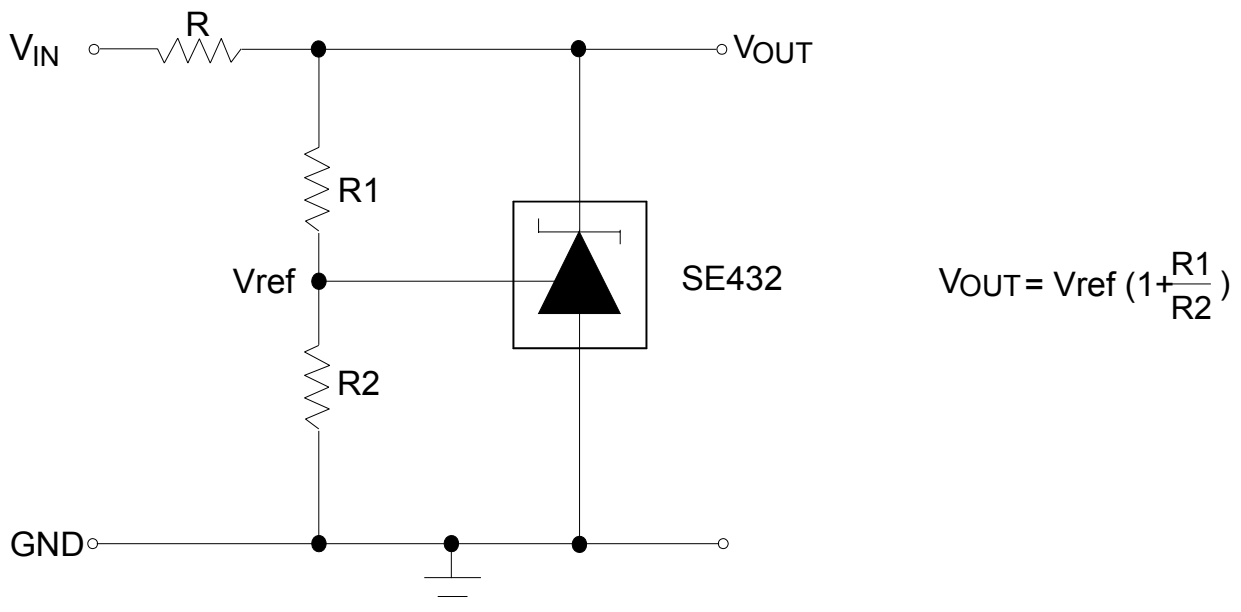
Block Diagram



Test Circuits

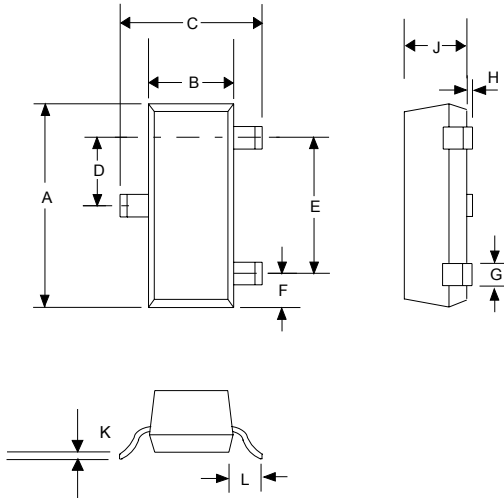
	$V_{KA} = V_{ref} \left(1 + \frac{R1}{R2}\right) + I_{ref} \times R1$	
<p>Test Circuit 1: $V_{KA} = V_{REF}$</p>	<p>Test Circuit 2: $V_{KA} > V_{REF}$</p>	<p>Test Circuit 3: Off State Current</p>

Application Circuit



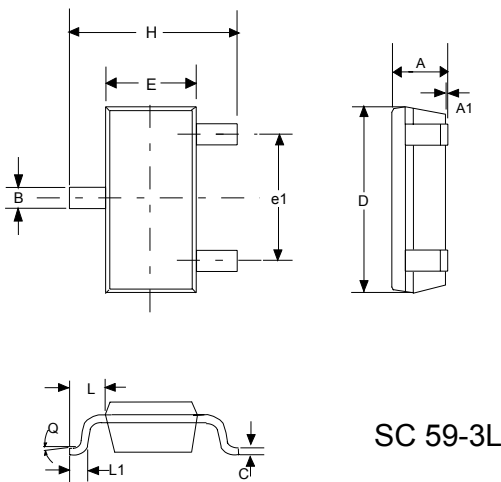


OUTLINE DRAWING SOT-23-3



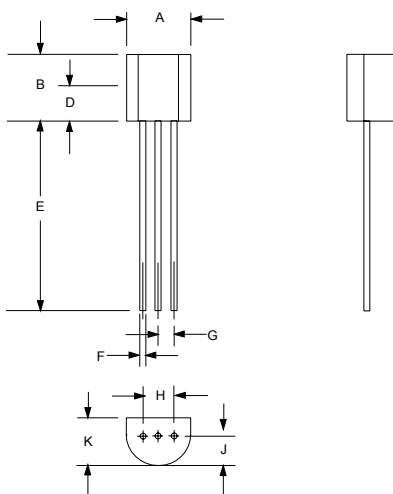
DIMENSIONS				
DIM ^N	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.04
B	0.047	0.055	1.20	1.40
C	0.083	0.104	2.10	2.64
D	0.035	0.040	0.89	1.03
E	0.070	0.080	1.78	2.05
F	0.018	0.024	0.45	0.60
G	0.015	0.020	0.37	0.51
H	0.0005	0.004	0.013	0.10
J	0.034	0.040	0.887	1.02
K	0.003	0.007	0.085	0.18
L	-	0.027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

OUTLINE DRAWING SC59-3L



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°C	10°C	0°C	10°C

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



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