



**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.

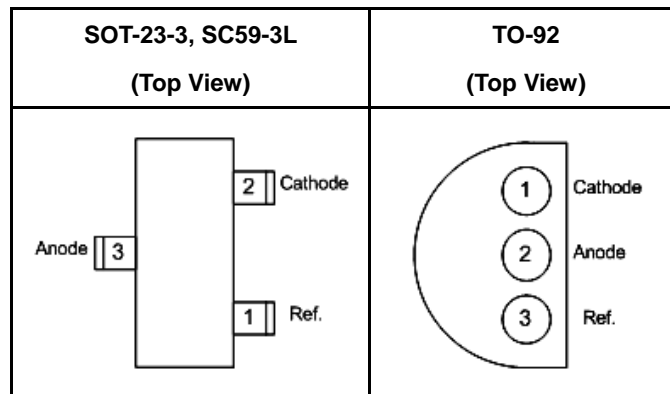
**Features**

- 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	$\theta_{JA}$	230 (SOT-23-3)	°C/W
		220 (TO-92)	
Lead Temperature (Soldering) 10 seconds	$T_{LEAD}$	260	°C

### Electrical Characteristics

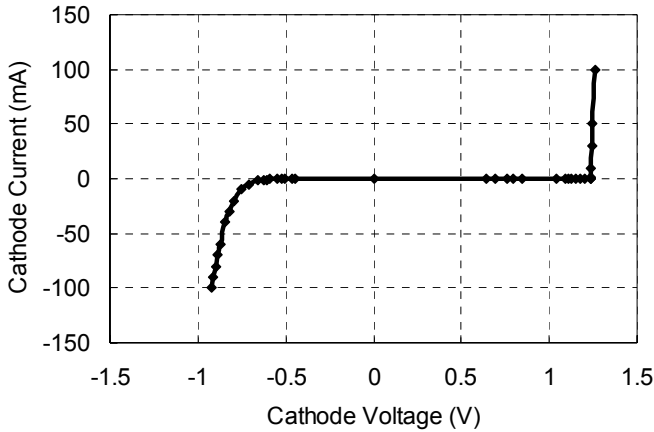
Parameter		Symbol	Test Conditions & Circuit	Min	Typ	Max	Unit
Reference Voltage	0.5%	$V_{REF}$	Test circuit #1 $V_{KA} = V_{REF}, I_{KA} = 10mA$	1234	1240	1246	mV
	1.0%			1228	1240	1252	
	1.5%			1221	1240	1259	
	2.0%			1215	1240	1265	
	1.25V 1% <sup>(1)</sup>			1237	1250	1263	
Deviation of Reference Voltage 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	$\mu A$
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		$\mu A$
Minimum Cathode Current for Regulation		$I_{MIN}$	Test circuit #1 $V_{KA} = V_{REF}$	--	60	100	$\mu A$
Off-state Cathode Current		$I_{OFF}$	Test circuit #3 $V_{KA} = 8V, V_{REF} = 0$	--	0.04	0.8	$\mu A$
Dynamic Impedance		$ Z_{KA} $	Test circuit #1 $I_{KA} = 100\mu A - 80mA,$ $V_{KA} = V_{REF}, f \leq 1KHZ$	--	0.30	1	$\Omega$

Note 1: Upon Customer Request.

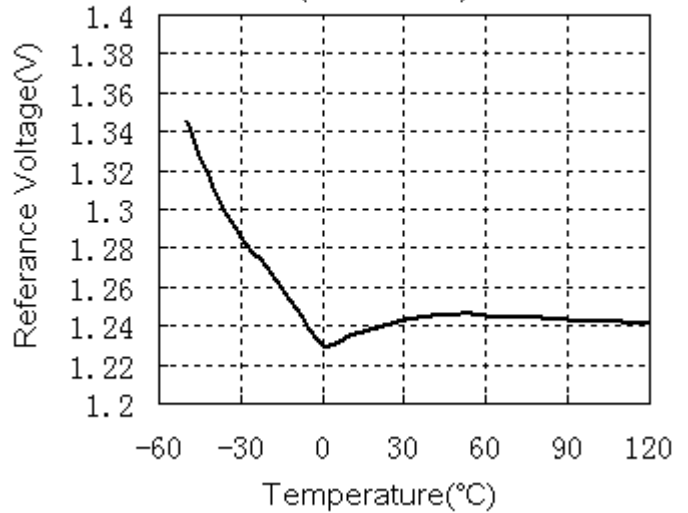


Typical Performance Characteristics

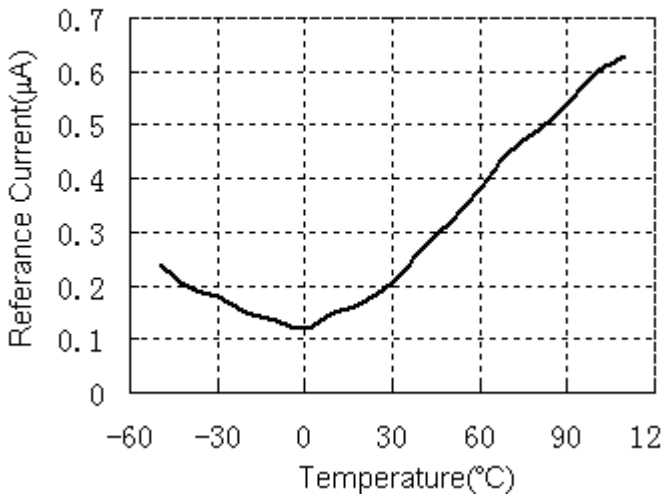
Cathode Current VS Cathode Voltage



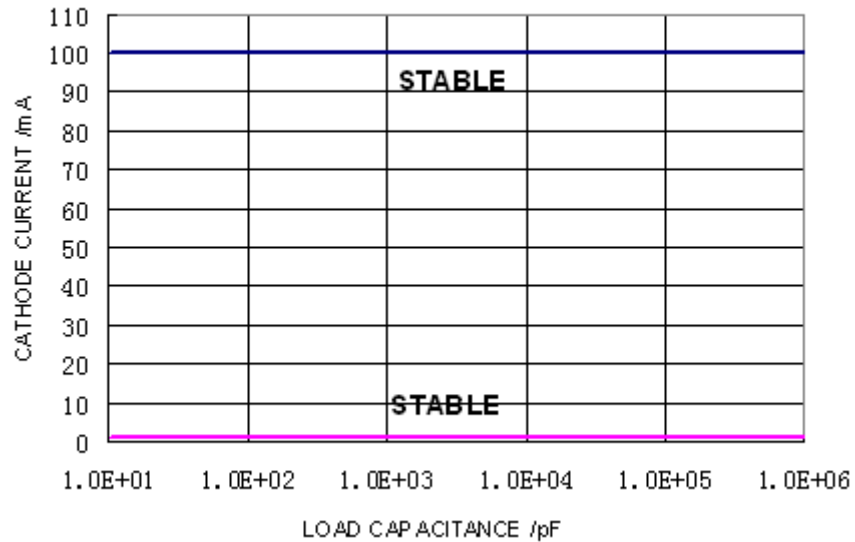
Reference Voltage VS Temperature (Iload=10mA)



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

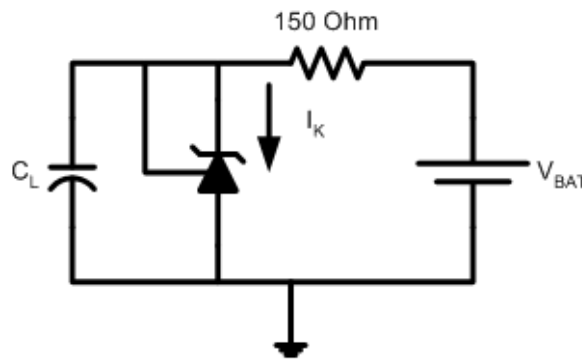
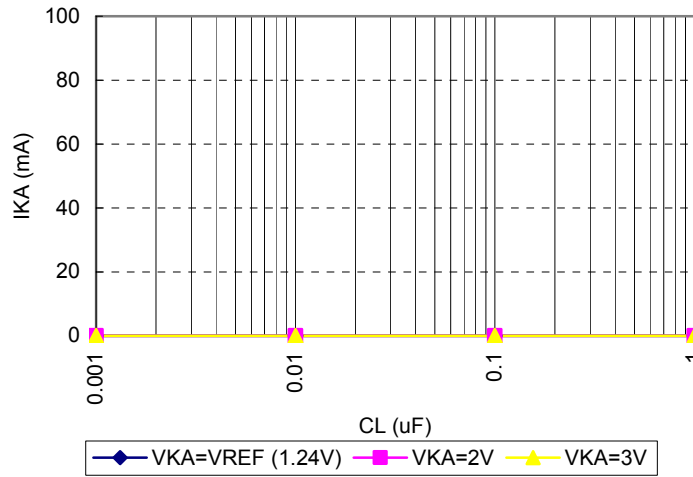


Stability Boundry Conditions

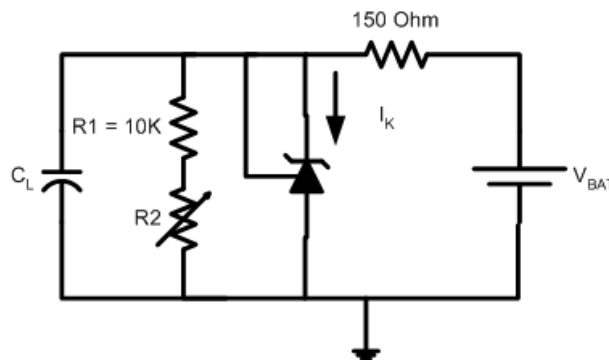




Stability Boundary Condition



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

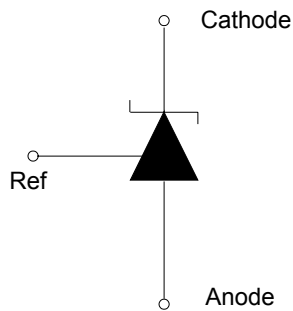


Test Circuit for  $V_{KA} = 2V, 3V$

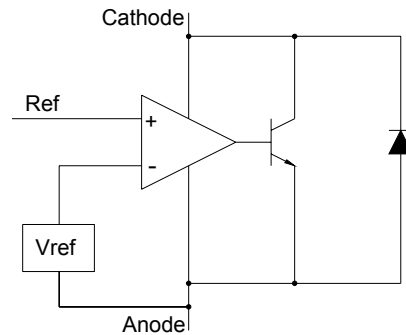
The areas under the curves represent conditions that may cause the device to oscillate. For  $V_{KA} = 2V$  and  $3V$  curves,  $R_2$  and  $V_{BAT}$  were adjusted to establish the initial  $V_{KA}$  and  $I_K$  conditions with  $C_L = 0$ .  $V_{BAT}$  and  $C_L$  then were adjusted to determine the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



Symbol Diagram



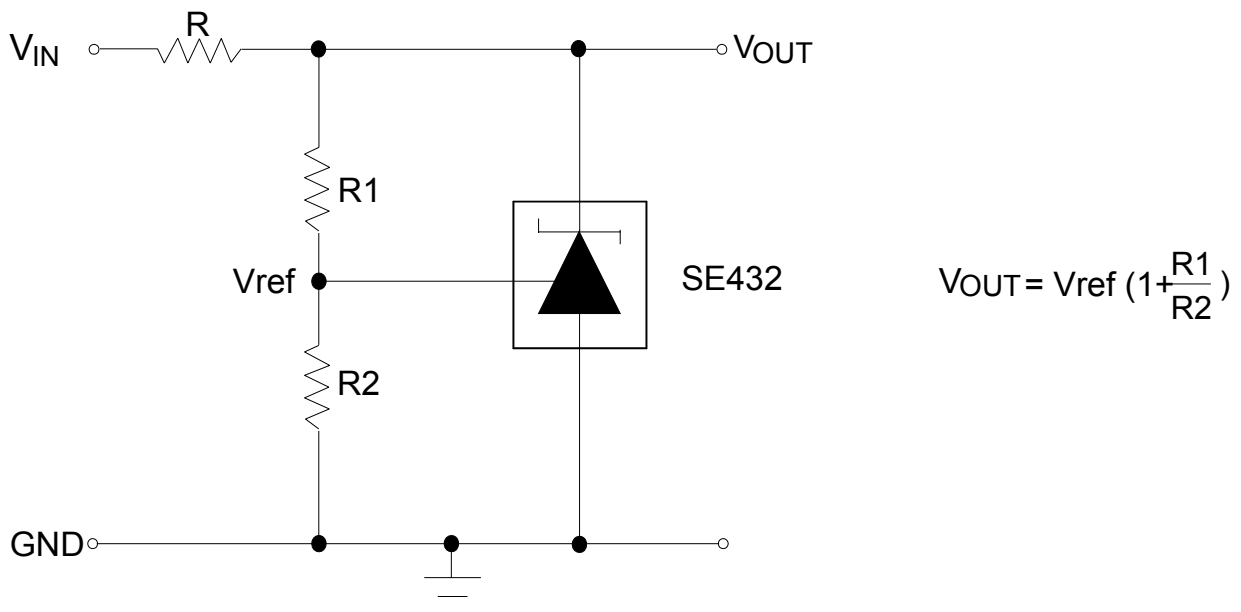
Block Diagram



Test Circuits

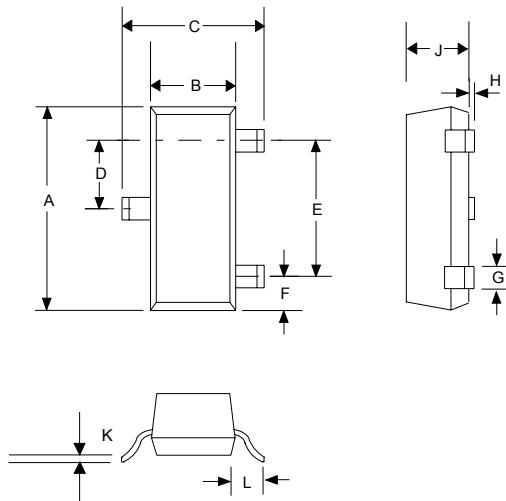
	$V_{KA} = V_{ref} \left(1 + \frac{R1}{R2}\right) + I_{ref} \times R1$	
<p><b>Test Circuit 1:</b> <math>V_{KA} = V_{REF}</math></p>	<p><b>Test Circuit 2:</b> <math>V_{KA} &gt; V_{REF}</math></p>	<p><b>Test Circuit 3:</b> <b>Off State Current</b></p>

Application Circuit



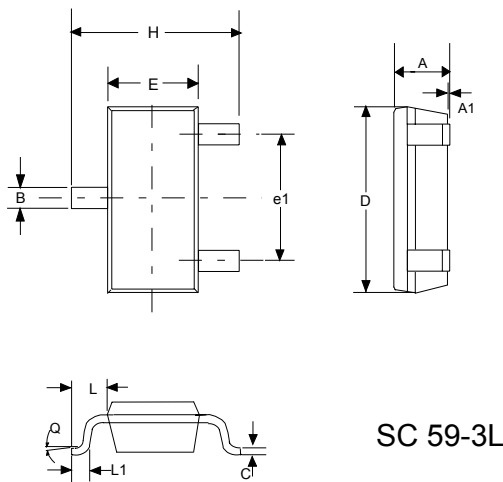


**OUTLINE DRAWING SOT-23-3**



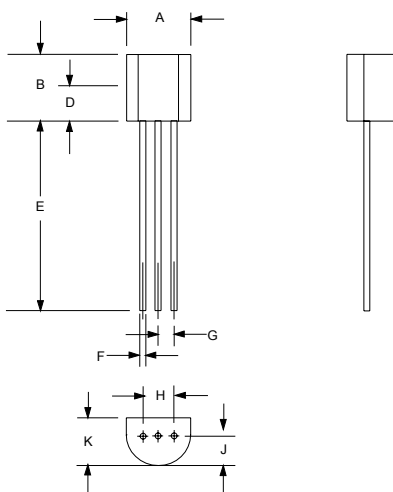
DIMENSIONS				
DIM <sup>N</sup>	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.04
B	0.047	0.055	1.20	1.40
C	0.083	0.104	2.10	2.64
D	0.035	0.040	0.89	1.03
E	0.070	0.080	1.78	2.05
F	0.018	0.024	0.45	0.60
G	0.015	0.020	0.37	0.51
H	0.0005	0.004	0.013	0.10
J	0.034	0.040	0.887	1.02
K	0.003	0.007	0.085	0.18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

**OUTLINE DRAWING SC59-3L**



DIMENSIONS				
DIM <sup>N</sup>	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 <sup>N</sup>	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



## Customer Support

### Seaward Electronics Incorporated – China

Section B, 2nd Floor, ShangDi Scientific Office Complex, #22 XinXi Road

Haidian District, Beijing 100085, China

Tel: 86-10-8289-5700/01/05

Fax: 86-10-8289-5706

### Seaward Electronics Corporation – Taiwan

2F, #181, Sec. 3, Minguan East Rd,

Taipei, Taiwan R.O.C

Tel: 886-2-2712-0307

Fax: 886-2-2712-0191

### Seaward Electronics Incorporated – North America

1512 Centre Pointe Dr.

Milpitas, CA95035, USA

Tel: 1-408-821-6600

Last Updated - 12/4/2008