

**Modify Record :**

版次	新版本	旧版本	修改单位	修改内容
2016-06-01	1.0	NA	研发部	新文件制成（因工程产品，故 RD 开头）
2020-06-29	1.1	1.0	研发部	增加 SOT89（导电胶）封装
2020-07-28	1.2	1.1	研发部	更新 SOT23-5 脚位
2020-08-03	1.3	1.2	研发部	增加应用信息，更新联系方式
2020-08-11	1.4	1.3	研发部	增加典型性能特性
2020-08-13	1.5	1.4	研发部	增加典型应用电路，更新SOT23-5脚位
2022-10-09	1.6	1.5	研发部	更新电压

## General Description

SE85XX series is designed for power-sensitive applications. It includes a precision and high voltage input stage, an ultra-low-power bias current branch, and results in a ultra-low-power and low-dropout linear regulator.

The SE85XX operates from an input voltage of  $V_{OUT}+1V$  to 35V, consumes only 2.5  $\mu$  A of quiescent current, and offers 1% initial accuracy and low dropout voltage, 300mV typical at 100mA.

SE85XX has 1.8V, 2.8V, 3.0V, 3.3V, 3.6V, 5.0V fixed voltage versions.

Other features include short-circuit protection and thermal shutdown.

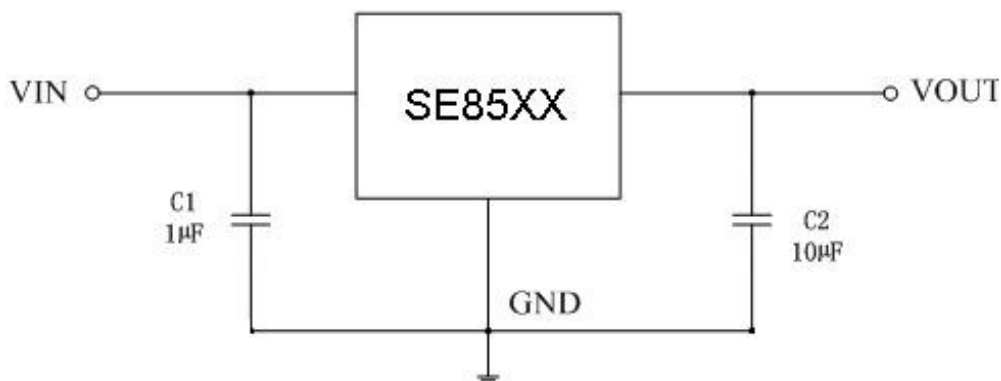
## Features

- Ultra Low Quiescent Current: 2.5  $\mu$  A(Typ.)
- Wide Operating Voltage:  $V_{OUT}+1V$  to 35V
- High output current:  $\geq 200mA$
- System startup with no overshoot
- Short circuit protection is designed with no overshoot
- UVLO 1.8V
- Low Dropout Voltage
- High Accuracy Output Voltage:  $\pm 1\%$
- Excellent power / load transient response
- Low temperature coefficient:  $\pm 100ppm/^{\circ}C$
- Thermal and Short-Circuit Protection
- SOT-89、SOT-23、SOT23-5 package
- Customer Pin Assignments are available

## Applications

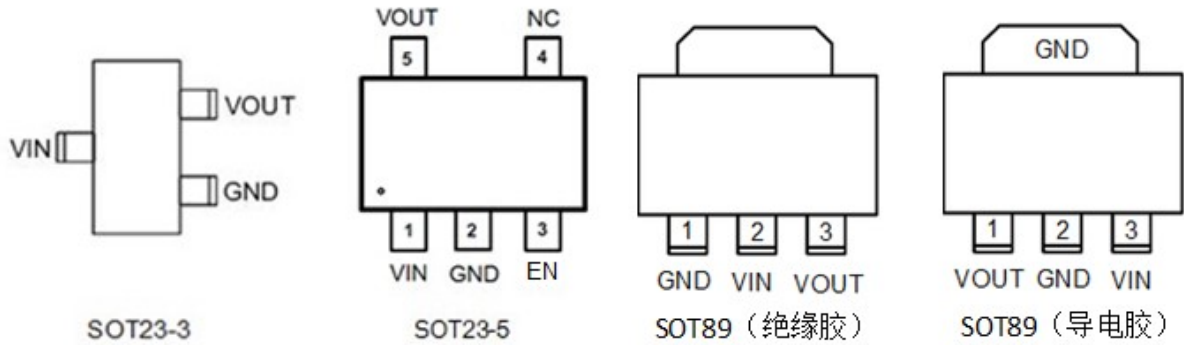
- Battery-powered Smoke sensor
- Smoke sensor
- Microcontrollers
- Household appliances and instruments

## Application Diagram



## Pin Configuration

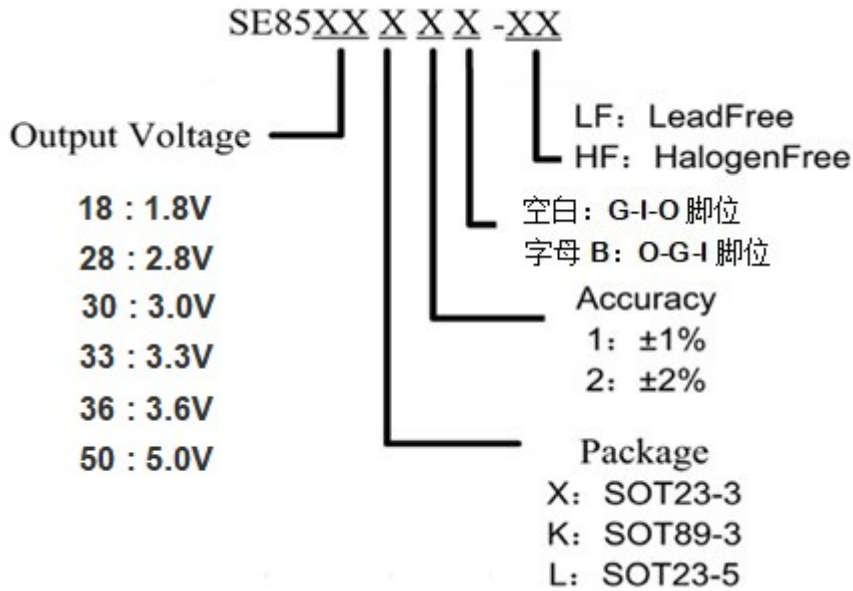
(Customer pin assignments are available)



## Absolute Maximum Rating

Symbol	Parameter	Value	Units
$V_{IN}$	Input Supply Voltage	40	V
$V_{OUT}$	Output Voltage	6	
$T_A$	Operating Temperature	-40---105	°C
$T_{STG}$	Storage Temperature	-40---150	
$T_J$	Maximum Junction Temperature	150	
$T_{LEAD}$	Lead Temperature (Soldering) 10 seconds	260	
$\theta_{JA}$	Thermal Resistance, Junction-to-Ambient	165(SOT89)	°C/W
		280(SOT23)	
$P_D$	Power Consumption	750 (SOT89)	mW
		250 (SOT23)	
Electrostatic discharge rating	Human Body Model (HBM)	4	kV
	Charged Device Model (MM)	100	V

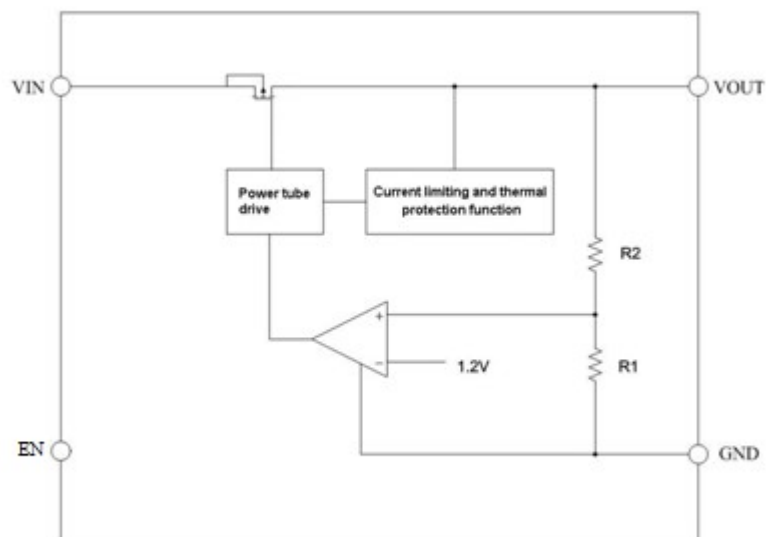
## Ordering Information



## Operating Rating

Parameter	Value	Units
Operating Temperature	-20 $^{\circ}$ C ~ 85	$^{\circ}$ C
Storage Temperature	-40 $^{\circ}$ C ~ 125	$^{\circ}$ C
Lead Temperature (Soldering) 10 seconds	260 $\pm$ 5	$^{\circ}$ C

## Block Diagram

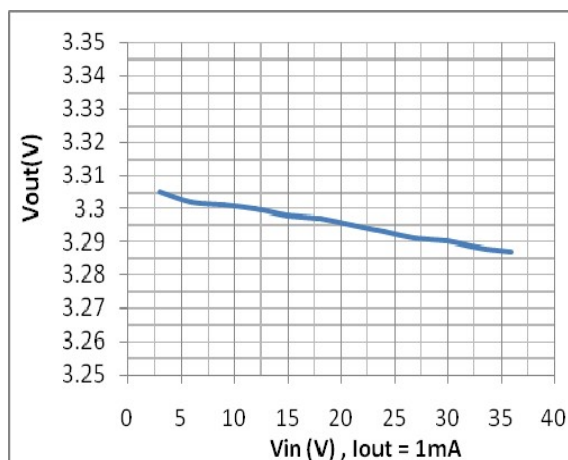


## Electrical Characteristics

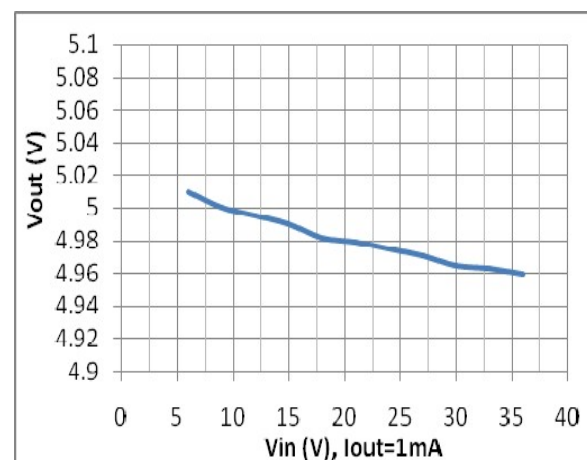
( $V_{IN}=V_{OUT}+1V$  ;  $T_j=25^{\circ}C$  unless otherwise noted.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{IN}$	Input Supply Voltage		1.8		36	V
$V_{OUT}$	Output Voltage Accuracy	$I_{OUT}=10mA$	-1%		1%	V
			-2%		2%	V
$I_Q$	Quiescent Current			2.5	6.0	$\mu A$
$I_{OUT}$	Output Current		200	250		mA
$V_{DROP}$	Dropout Voltage	$I_{OUT}=10mA$ $\Delta V_{OUT} = -V_{OUT} * 2\%$		30		mV
		$I_{OUT}=100mA$ $\Delta V_{OUT} = -V_{OUT} * 2\%$		300		mV
		$I_{OUT}=200mA$ $\Delta V_{OUT} = -V_{OUT} * 2\%$		600		mV
$V_{LR}$	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$		40		mV
$V_{SR}$	Line Regulation	$I_{OUT}=1mA$ , $V_{IN}=(V_{OUT}+1V)$ to 30V		0.02		%/V
PSRR	Power Supply Rejection Ratio	$V_{in}=12V$ , $I_{out}=10mA$ $F=1KHz, V_{out}=3.3V$	—	80	—	dB
$V_{ENH}$	Enable High Level	Enabled	1	—	—	V
$V_{ENL}$	Enable Low Level	Disabled		—	0.4	V
$I_{EN}$	EN Current	$EN=0 \sim V_{IN}(R_{EN}=100K)$		1		$\mu A$
$I_{LIMIT}$	Current Limit	$V_{IN}=(V_{OUT}+1V)$ to 30V $R_{LOAD}=V_{OUT}/1A$		450		mA
$T_{SHDN}$	Thermal Protection			150		$^{\circ}C$
$TC_{VOUT}$	Output Voltage Temperature Coefficient	$I_{OUT}=10mA$ $-40^{\circ}C \leq T_{AMB} \leq 100^{\circ}C$		$\pm 100$		ppm/ $^{\circ}C$

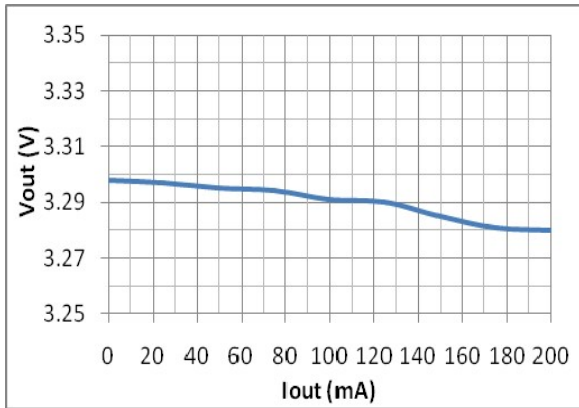
## Typical Performance Characteristics



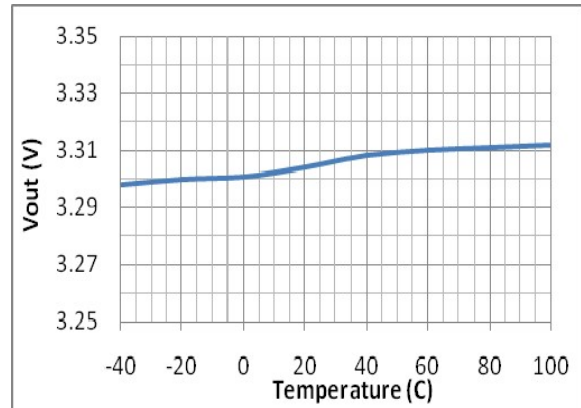
$V_{OUT}: 3.3V$



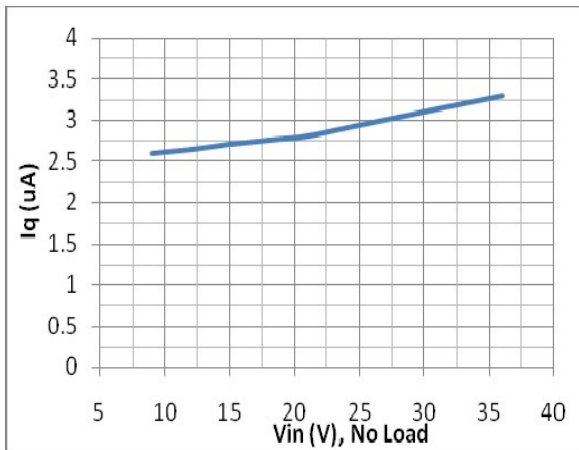
$V_{OUT}: 5.0V$



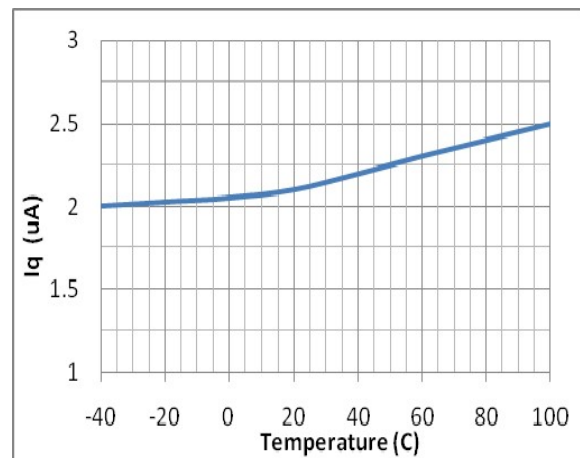
V<sub>OUT</sub>: 3.3V



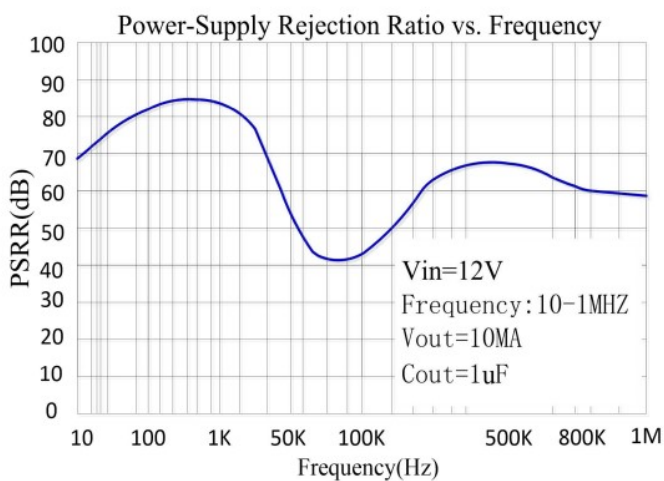
V<sub>OUT</sub>: 3.3V



V<sub>OUT</sub>: 3.3V

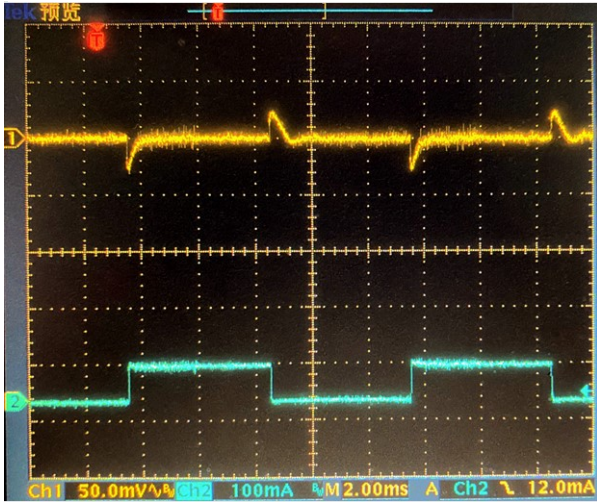


V<sub>OUT</sub>: 5.0V



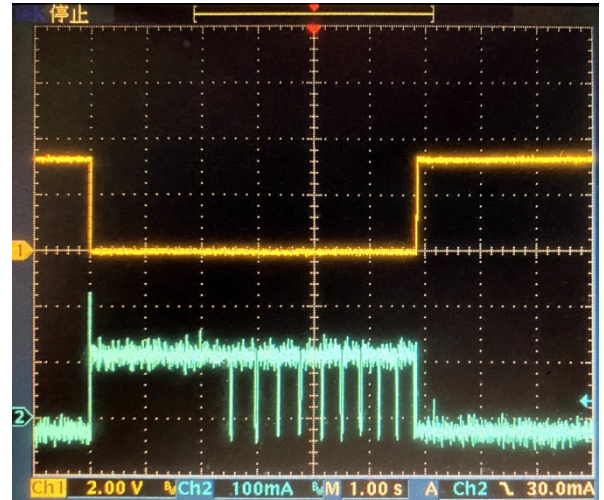


Load Transient ( $V_{in}=12V$ )  
10mA~100mA

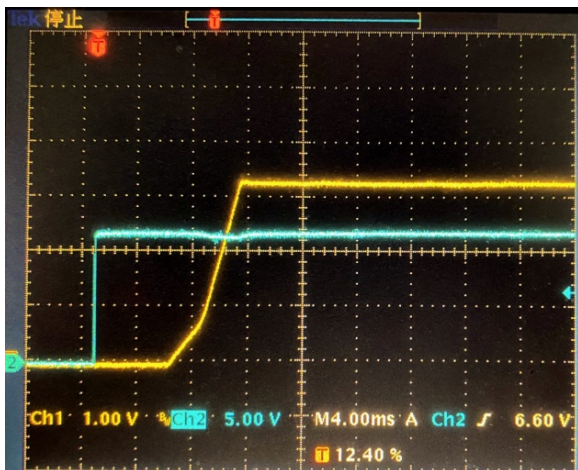


EN OFF  $\rightarrow$  ON

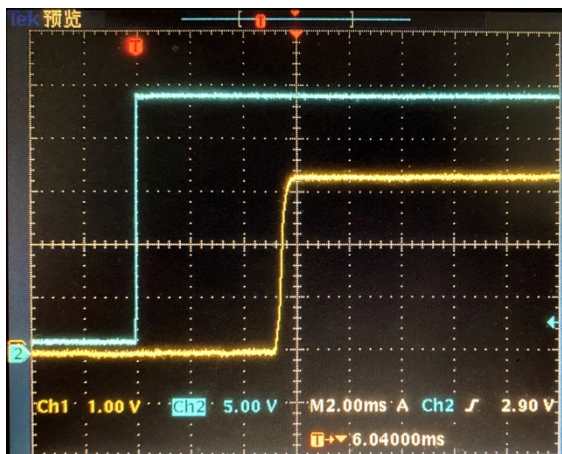
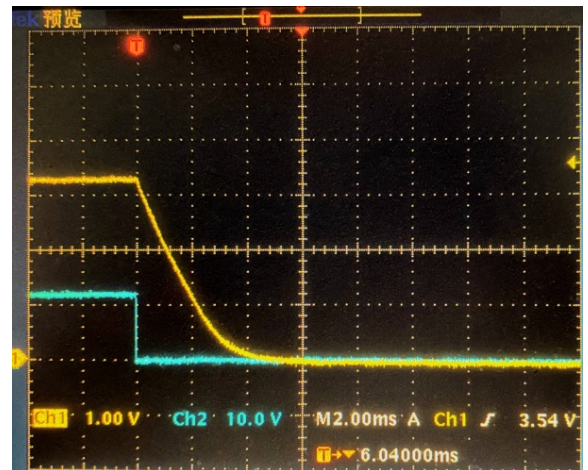
Short-Circuit and OTP ( $V_{in}=24V$ )



EN ON  $\rightarrow$  OFF (No Load)  
Discharge



VCC Power ON



## APPLICATION INFORMATION

### INPUT CAPACITOR

An input ceramic capacitor of 1 $\mu$ F is required between the VIN and GND pin. The capacitor shall be placed as close as possible to VIN pin, and the wide copper trace is also recommended.

### OUTPUT CAPACITOR

The recommended is 10 $\mu$ F ceramic capacitor. The minimum capacitance for stable and correct operation is 1 $\mu$ F. The higher the value of this output capacitor, the lower the ripple during the operations. The output capacitor should be placed as close to the Output Pin as possible. The wide copper trace is recommended.

### NO-LOAD STABILITY

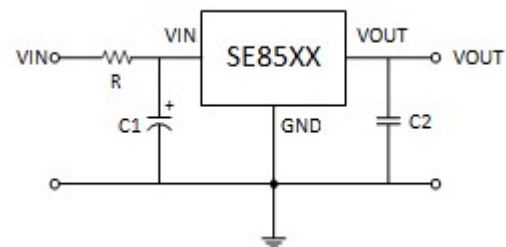
The SE85XX will remain stable and in regulation with no external load. This is especially important in CMOS RAM keep-alive applications.

### FOLD-BACK SHORT-CIRCUIT PROTECTION

When short-circuit occurs, SE85XX will fold back the short-circuit currents to a pre-determined lower level, This will reduce excessive heat in otherwise large current conditions. This feature provides another level of protection to IC itself and also the whole system.

### IN-RUSH CURRENT AND VOLTAGE

The following figure shows a typical application circuit for the SE85XX devices. Please keep in mind that in-rush current can push up the Vin overshoot by as much as 50%. For example, when Vin=30V, the in-rush caused spike voltage can be as high as 45V. Therefore the voltage rating of Cin needs to be higher than 50% of the application.

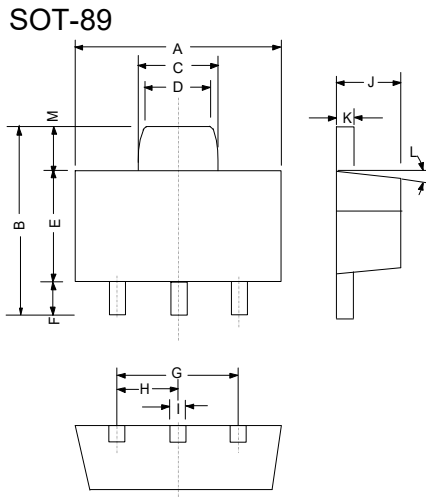


In live insertion application, it is suggested that R, C1 are selected as following:

1. C1=10 $\mu$ F ~ 100 $\mu$ F ceramic or electrolytic capacitor with maximum voltage greater than 50V, R=0
2. If the average current is known, for example a t 10mA, then for an input voltage of 20V, the C1 =1 $\mu$ F ~ 10 $\mu$ F ceramic or electrolytic with maximum voltage greater than 40V and R=1K $\Omega$  in the type of 1206 at 1/4W rating can be selected.

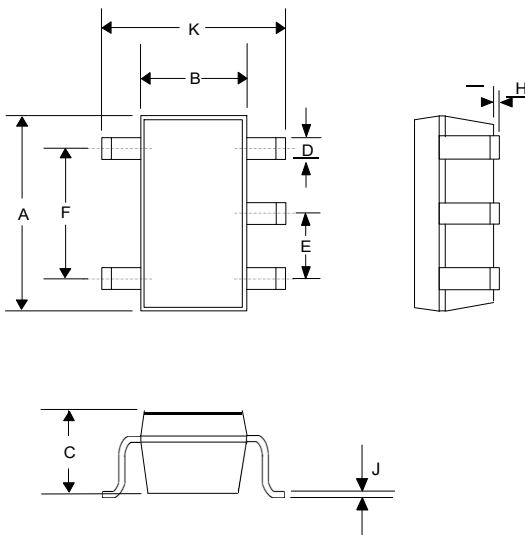


### Outline Drawing for SOT-89



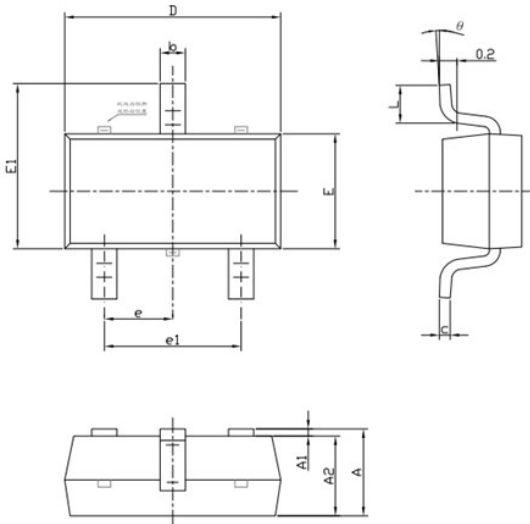
DIMENSIONS				
DIM <sup>N</sup>	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.173	0.181	4.400	4.600
B	0.159	0.167	4.050	4.250
C	0.067	0.075	1.700	1.900
D	0.051	0.059	1.300	1.500
E	0.094	0.102	2.400	2.600
F	0.035	0.047	0.890	1.200
G	0.118REF		3.00 REF	
H	0.059REF		1.50 REF	
I	0.016	0.020	0.400	0.520
J	0.055	0.063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

### Outline Drawing for SOT-23-5



DIMENSIONS				
DIM <sup>N</sup>	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 for SOT-23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

### Customer Support

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