

## 400mA Adjustable Voltage High Speed LDO Regulators ME6119 Series

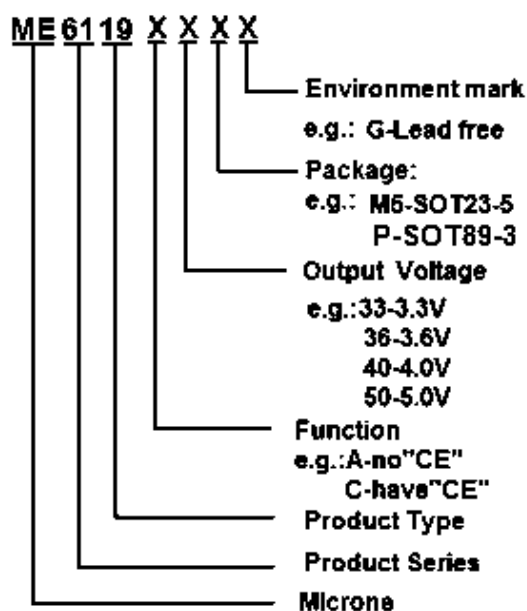
### General Description

The ME6119 series are highly accurate, low noise, LDO Voltage Regulators. On chip trimming adjusts the reference/output voltage to within  $\pm 2\%$  accuracy. Internal protection features consist of output current limiting, safe operating area compensation, and thermal shutdown. The current limiter's feedback circuit also operates as a short protect for the output current limiter and the output pin. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption. The ME6119 series can operate with up to 18V input.

### Features

- Maximum Output Current: 400mA
- Dropout Voltage: 104mV @  $I_{OUT} = 100mA$
- Operating Voltage Range: 2.5V~18V
- Highly Accuracy:  $\pm 2\%$
- Adjustable Output Voltage Option
- Standby Current: 60uA (TYP.)
- Line Regulation: 30mV (TYP.)
- Temperature Stability  $\leq 0.5\%$
- Thermal Shutdown Protection: 164°C
- Packages: SOT23-5, SOT89-3

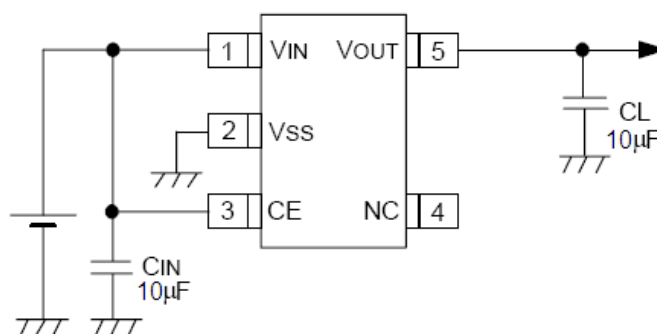
### Selection Guide



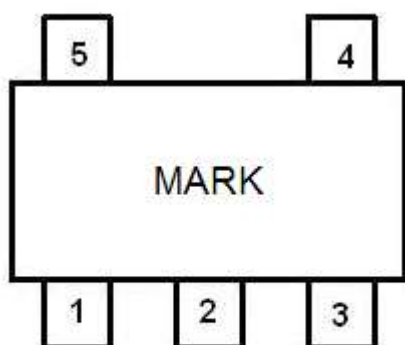
### Typical Application

- Consumer and Industrial Equipment Point of Regulation
- Switching Power Supply Post Regulation
- Hard Drive Controllers
- Battery Chargers

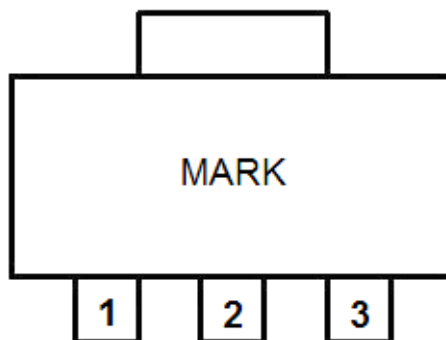
### Typical Application Circuit



## Pin Configuration



SOT23-5



SOT89-3

## Pin Assignment

ME6119CXX

Pin Number	Pin Name	Functions
SOT23-5		
1	$V_{IN}$	Power Input
2	$V_{SS}$	Ground
3	CE	ON / OFF Control
4	NC	No Connect
5	$V_{OUT}$	Output

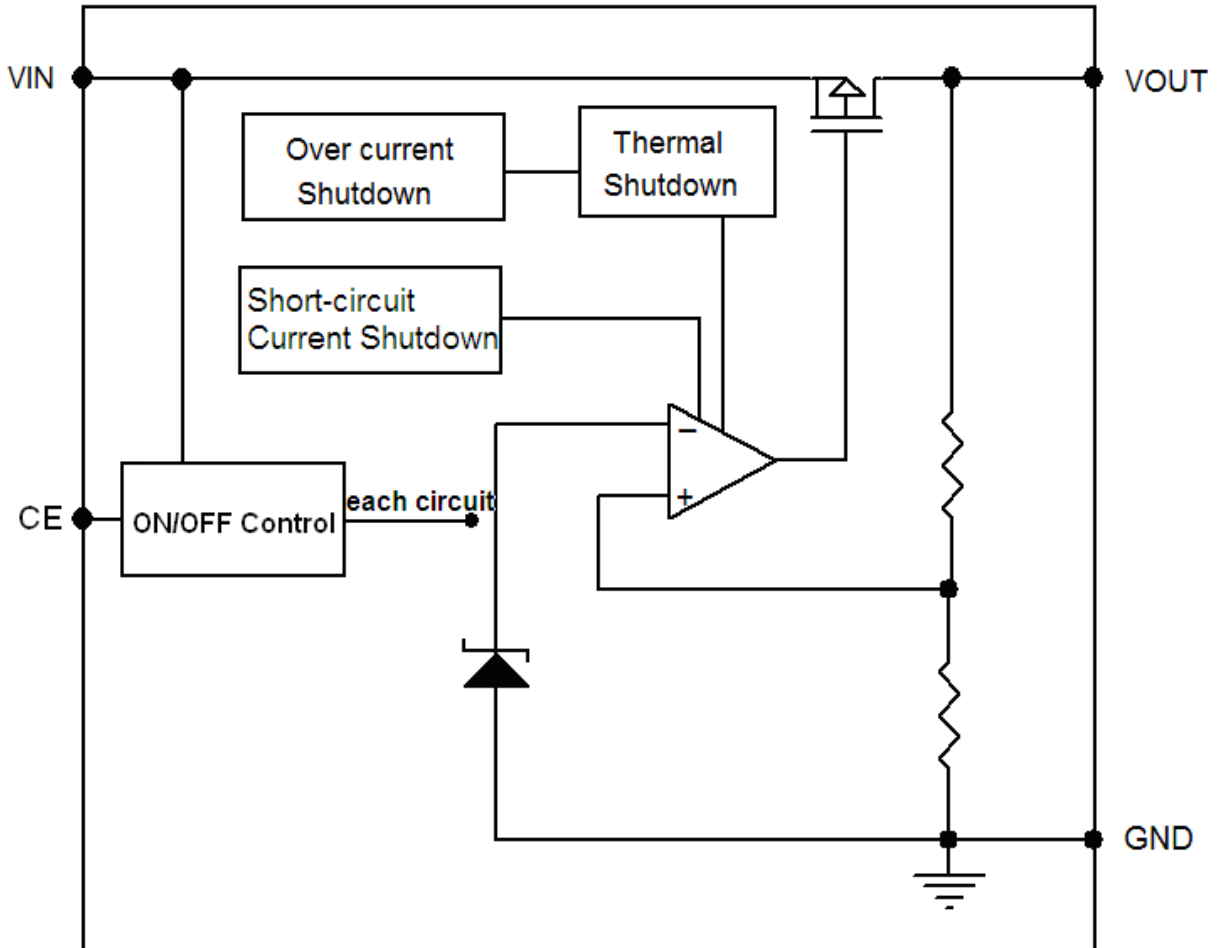
ME6119AXX

Pin Number	Pin Name	Functions
SOT89-3		
1	$V_{SS}$	Ground
2	$V_{IN}$	Power Input
3	$V_{OUT}$	Output

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units	
Input Voltage	$V_{IN}$	18	V	
Output Current	$I_{OUT}$	500	mA	
Output Voltage	$V_{OUT}$	$V_{SS}-0.3 \sim V_{IN} + 0.3$	V	
CE Pin Voltage	$V_{CE}$	$V_{SS}-0.3 \sim V_{IN} + 0.3$	V	
Power Dissipation	SOT23-5	$P_D$	250	mW
	SOT89	$P_D$	500	mW
Operating Temperature Range	$T_{OPR}$	$-40 \sim +125$	$^{\circ}C$	
Storage Temperature Range	$T_{STG}$	$-40 \sim +150$	$^{\circ}C$	
Lead Temperature		$260^{\circ}C, 4sec$		

Block Diagram



## Electrical Characteristics

### ME6119A33/C33

( $V_{IN} = V_{OUT} + 1V$ ,  $V_{CE} = V_{IN}$ ,  $C_{IN} = C_L = 10\mu F$ ,  $T_a = 25^\circ C$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 30mA$ , $V_{IN} = V_{OUT} + 1V$	X 0.98	$V_{OUT(T)}$ (Note 1)	X 1.02	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = V_{OUT} + 1V$		400		mA
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = V_{OUT} + 1V$ , $1mA \leq I_{OUT} \leq 100mA$		8		mV
Dropout Voltage (Note 1)	$V_{DIF1}$	$I_{OUT} = 100mA$		130		mV
	$V_{DIF2}$	$I_{OUT} = 200mA$		260		mV
Supply Current	$I_{SS}$	$V_{IN} = V_{OUT} + 1V$		60		$\mu A$
Stand-by Current	$I_{CEL}$	$V_{CE} = 0V$		0		$\mu A$
Line Regulation	$\Delta V_{OUT}$	$I_{OUT} = 30mA$ $V_{OUT} + 1V \leq V_{IN} \leq 18V$		20		mV
CE "High" Voltage	$V_{CEH}$	Start up	1.20			V
CE "Low" Voltage	$V_{CEL}$	Shut down			0.8	V
Short-circuit Current	$I_{SHORT}$	$V_{IN} = V_{OUT} + 1V$ , $V_{CE} = V_{IN}$ , $V_{OUT} = 0V$		60		mA
Thermal Shutdown Protection	$T_{sd}$	$I_{OUT} = 1mA$ , $V_{IN} = V_{OUT} + 1V$		164		$^\circ C$
Over Current Protection	$I_{limit}$	$V_{IN} = 4.3V$		550		mA

## ME6119A50/C50

( $V_{IN} = V_{OUT} + 1V$ ,  $V_{CE} = V_{IN}$ ,  $C_{IN} = C_L = 10\mu F$ ,  $T_a = 25^\circ C$ , unless otherwise noted)

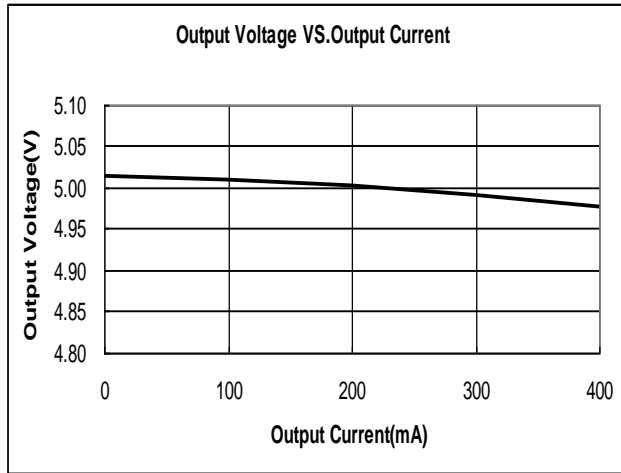
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 30mA$ , $V_{IN} = V_{OUT} + 1V$	X 0.98	$V_{OUT(T)}$ (Note 1)	X 1.02	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = V_{OUT} + 1V$		400		mA
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = V_{OUT} + 1V$ , $1mA \leq I_{OUT} \leq 100mA$		8		mV
Dropout Voltage (Note 1)	$V_{DIF1}$	$I_{OUT} = 100mA$		104		mV
	$V_{DIF2}$	$I_{OUT} = 200mA$		210		mV
Supply Current	$I_{SS}$	$V_{IN} = V_{OUT} + 1V$		60		$\mu A$
Stand-by Current	$I_{CEL}$	$V_{CE} = 0V$		0		$\mu A$
Line Regulation	$\Delta V_{OUT}$	$I_{OUT} = 30mA$ $V_{OUT} + 1V \leq V_{IN} \leq 18V$		30		mV
CE "High" Voltage	$V_{CEH}$	Start up	1.20			V
CE "Low" Voltage	$V_{CEL}$	Shut down			0.8	V
Short-circuit Current	$I_{SHORT}$	$V_{IN} = V_{OUT} + 1V$ , $V_{CE} = V_{IN}$ , $V_{OUT} = 0V$		50		mA
Thermal Shutdown Protection	$T_{sd}$	$I_{OUT} = 1mA$ , $V_{IN} = V_{OUT} + 1V$		164		$^\circ C$
Over Current Protection	$I_{limit}$	$V_{IN} = 6.0V$		510		mA

Note :

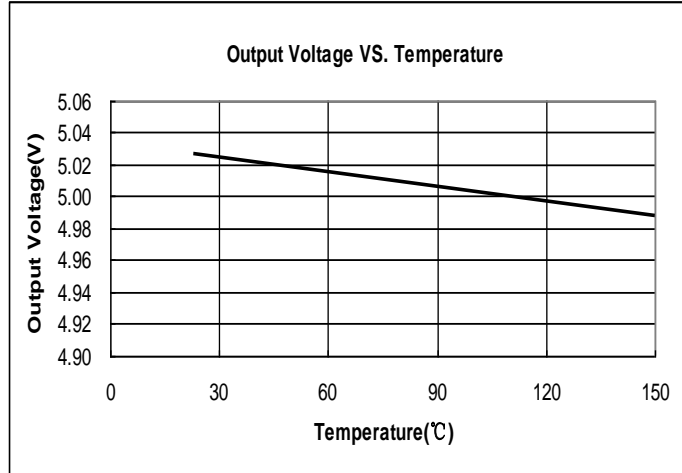
- $V_{OUT(T)}$  : Specified Output Voltage
- $V_{OUT(E)}$  : Effective Output Voltage ( i.e. The output voltage when " $V_{OUT(T)} + 1.0V$ " is provided at the Vin pin while maintaining a certain  $I_{OUT}$  value.)
- $V_{DIF}$ :  $V_{IN1} - V_{OUT(E)'$   
 $V_{IN1}$  : The input voltage when  $V_{OUT(E)'$  appears as input voltage is gradually decreased.  
 $V_{OUT(E)'$  = A voltage equal to 98% of the output voltage whenever an amply stabilized  $I_{OUT} \{V_{OUT(T)} + 1.0V\}$  is input.

## Type Characteristics ( $V_{OUT}=5.0V$ )

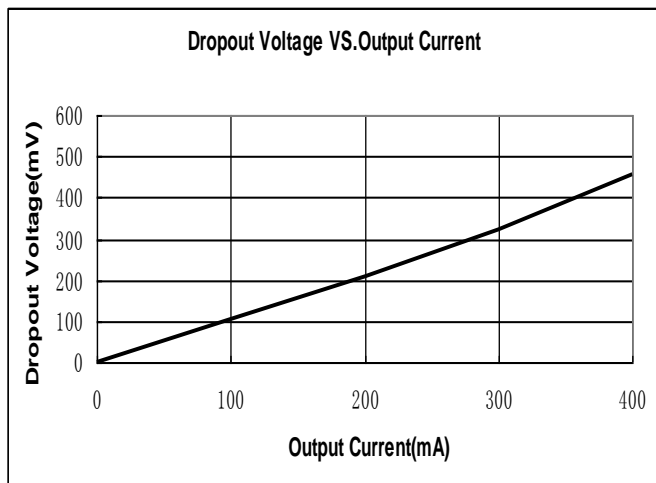
(1) Output Voltage VS. Output Current  
( $V_{IN}=V_{OUT}+1V$ )



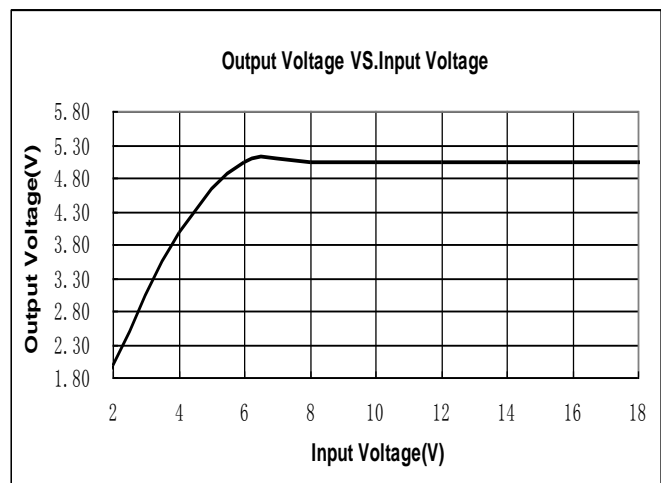
(2) Output Voltage VS. Temperature  
( $V_{IN}=V_{OUT}+1V, I_{OUT}=1mA$ )



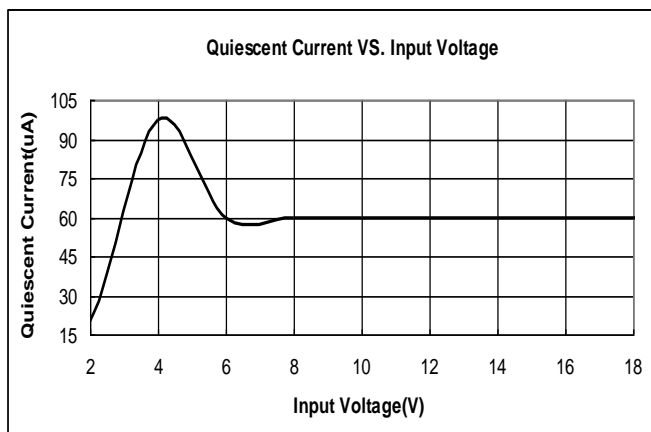
(3) Dropout Voltage VS. Output Current ( $T_a = 25^\circ C$ )



(4) Output Voltage VS. Input Voltage ( $I_{OUT}=10mA$ )  
( $T_a = 25^\circ C$ )



(5) Quiescent Current VS. Input Voltage



## Applications Information

### 1. Input Bypass Capacitor

An input capacitor is recommended. A 10uF tantalum on the input is a suitable input bypassing for almost all applications.

### 2. Output Capacitor

The output capacitor is critical in maintaining regulator stability, and must meet the required conditions for both minimum amount of capacitance and ESR (Equivalent Series Resistance). The minimum output capacitance required by the ME6119 is 10μF, if a tantalum capacitor is used. Any increase of the output capacitance will merely improve the loop stability and transient response. The ESR of the output capacitor should be less than 0.5Ω.

### 3. Load Regulation

The ME6119 regulates the voltage that appears between its output and ground pins, or between its output and adjust pins. In some cases, line resistances can introduce errors to the voltage across the load. To obtain the best load regulation, a few precautions are needed. Figure1, shows a typical application using a fixed output regulator. The  $R_{t1}$  and  $R_{t2}$  are the line resistances. It is obvious that the  $V_{LOAD}$  is less than the  $V_{OUT}$  by the sum of the voltage drops along the line resistances. In this case, the load regulation seen at the  $R_{LOAD}$  would be degraded from the datasheet specification. To improve this, the load should be tied directly to the output terminal on the positive side and directly tied to the ground terminal on the negative side.

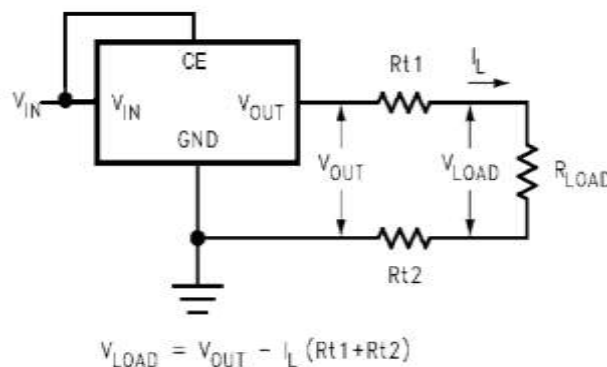
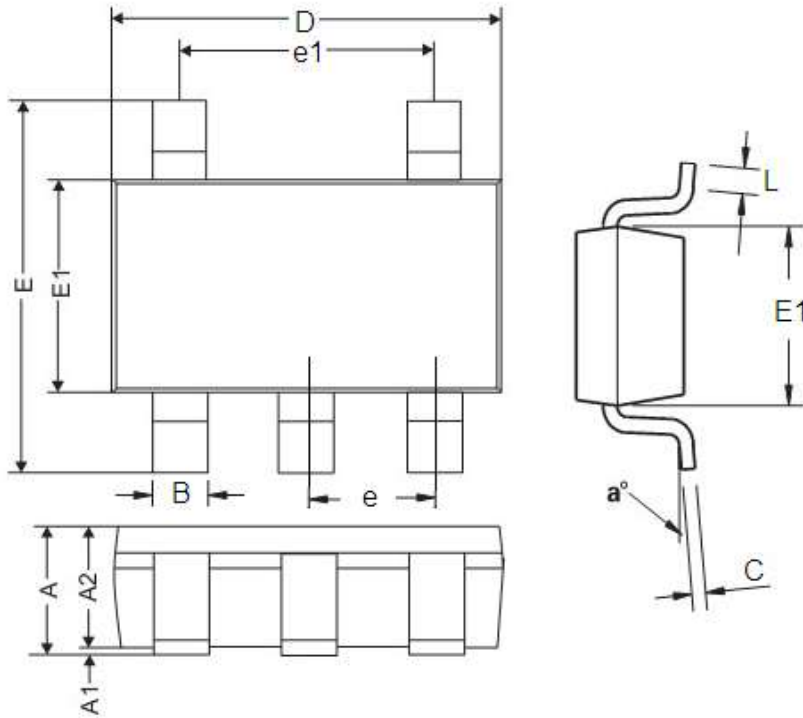


FIGURE 1. Typical Application using Fixed Output Regulator

## Packaging Information

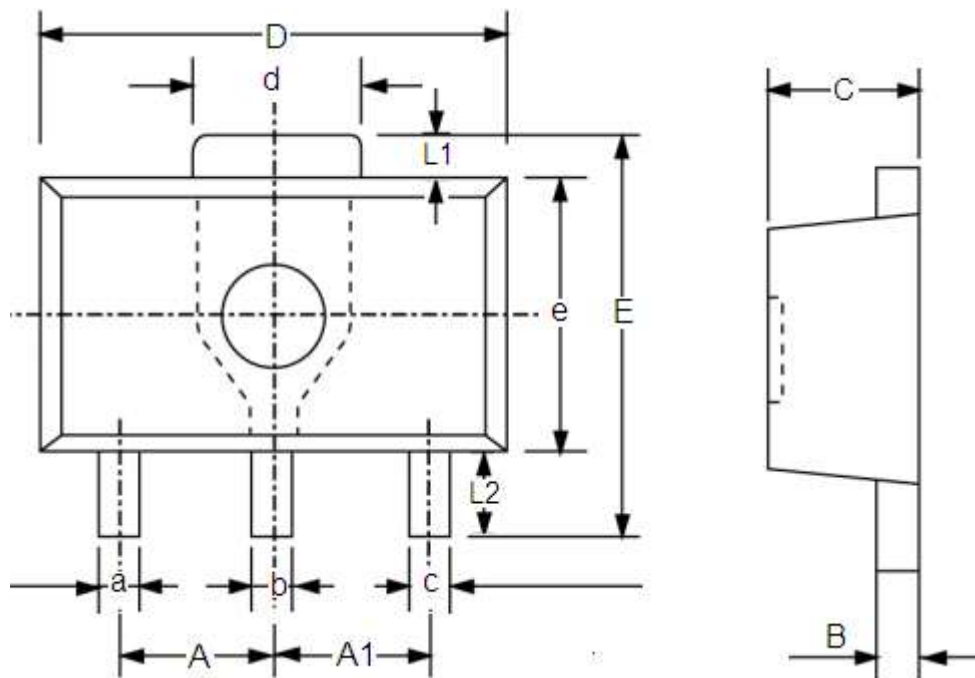
● SOT23-5 Unit: mm (inch)



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.45	0.0354	0.0570
A1	0	0.15	0	0.0059
A2	0.9	1.3	0.0354	0.0511
B	0.2	0.5	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.7	3.10	0.1062	0.1220
E	2.2	3.2	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95REF		0.0374REF	
e1	1.90REF		0.0748REF	
L	0.10	0.60	0.0039	0.0236
a°	0°	30°	0°	30°



● SOT89-3 Unit: mm (inch)



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
A1	1.4	1.6	0.0551	0.0630
a	0.36	0.48	0.0142	0.0189
b	0.41	0.53	0.0161	0.0209
c	0.36	0.48	0.0142	0.0189
d	1.4	1.75	0.0551	0.0689
B	0.38	0.43	0.015	0.0169
C	1.4	1.6	0.0551	0.0630
D	4.4	4.6	0.1732	0.181
E	-	4.25	-	0.1673
e	2.4	2.6	0.0945	0.1023
L1	0.4	-	0.0157	-
L2	0.8	-	0.0315	-

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