

## High Output Current LDO Regulator , High PSRR , Low Dropout, ME6207 Series

### General Description

The ME6207 Series is a positive voltage regulator with a low dropout voltage, high output voltage accuracy, and low current consumption developed based on CMOS technology.

A built-in low on-resistance transistor provides a low dropout voltage and large output current, a built-in overcurrent protector prevents the load current from exceeding the current capacitance of the output transistor. An ON/OFF circuit ensures a long battery life. Compared with the voltage regulators using the conventional CMOS process, a larger variety of capacitors are available, including small ceramic capacitors.

### Features

- Maximum Output Current: 800 mA ( $V_{IN} \geq V_{OUT(T)} + 1.0V$ )
- Dropout Voltage: 100mV @  $I_{OUT} = 300mA, V_{OUT} = 5.0V$
- Operating Voltage Range: 2V ~ 6.5V
- Highly Accuracy:  $\pm 1\%$
- Low Current Consumption:  
During Operation: 82uA (TYP.)  
During Shutdown: 0.1uA (TYP.)
- High Ripple Rejection: 65dB @ 1KHz (ME6207C50)
- Line Regulation: 0.05% (TYP.)

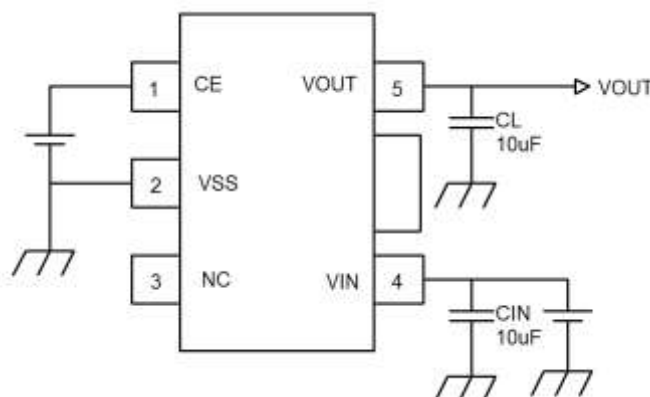
### Typical Application

- Power supply for DVD and CD-ROM drives
- Power supply for personal communication device
- Power supply for battery-powered devices
- Power supply for note PCs

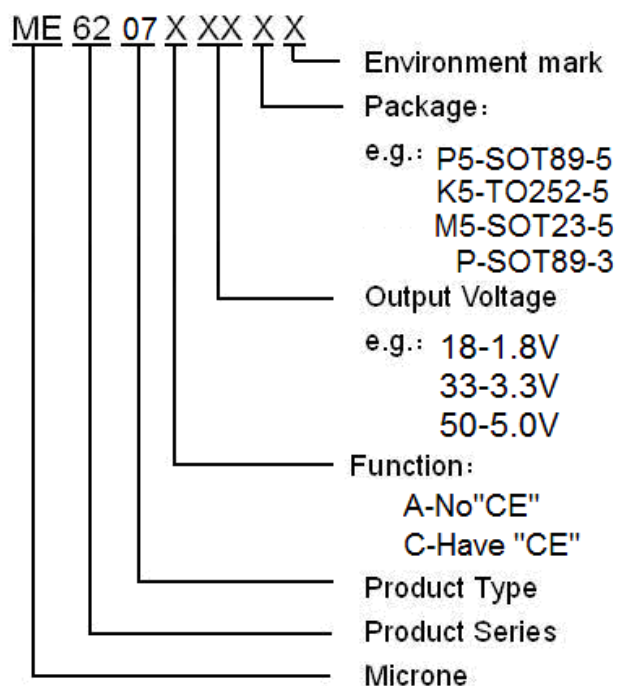
### Package

- 3-pin SOT89-3
- 5-pin SOT89-5, SOT23-5, TO252-5

### Typical Application Circuit

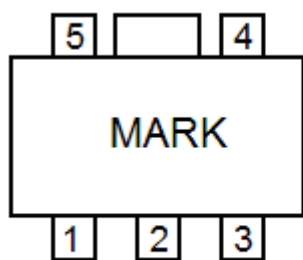


## Selection Guide

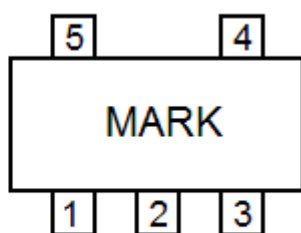


product series	product description
ME6207A50PG	$V_{OUT} = 5.0V$ ; no enable function; Package: SOT89-3
ME6207C18M5G	$V_{OUT} = 1.8V$ ; have enable function; Package: SOT23-5
ME6207C33M5G	$V_{OUT} = 3.3V$ ; have enable function; Package: SOT23-5
ME6207C50K5G	$V_{OUT} = 5.0V$ ; have enable function; Package: TO252-5
ME6207C50M5G	$V_{OUT} = 5.0V$ ; have enable function; Package: SOT23-5
ME6207C50P5G	$V_{OUT} = 5.0V$ ; have enable function; Package: SOT89-5

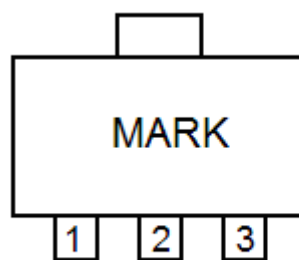
## Pin Configuration



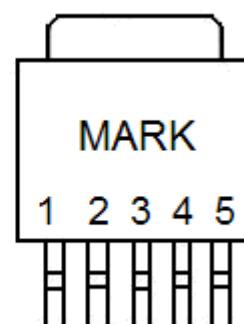
SOT-89-5



SOT23-5



SOT89-3



TO252-5

## Pin Assignment

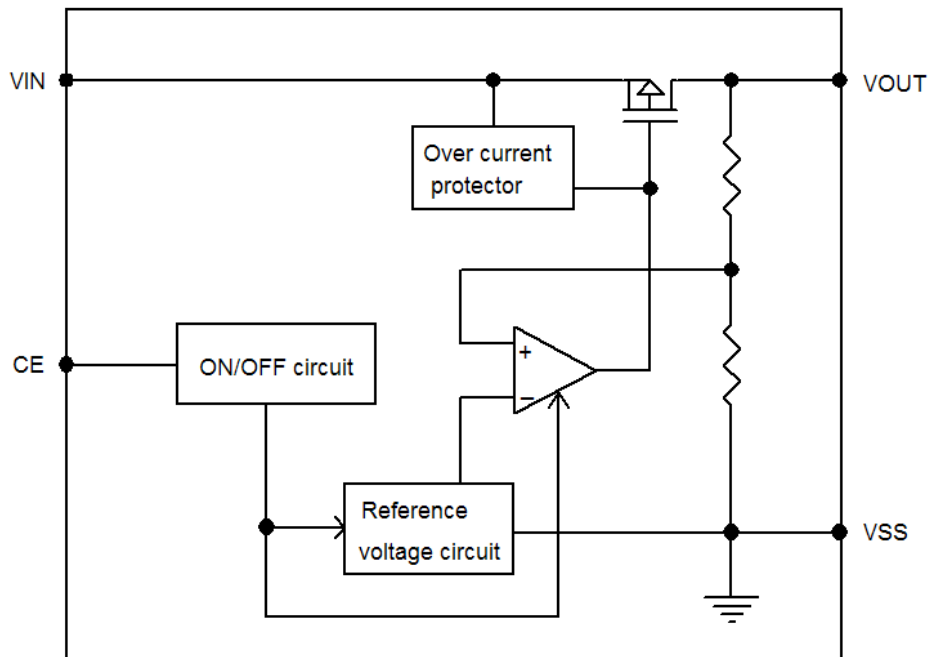
### ME6207AXX

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

### ME6207CXX

Pin Number			Pin Name	Functions
SOT89-5	SOT23-5	TO252-5		
1	3	5	CE	ON / OFF Control
2	2	3	$V_{SS}$	Ground
3	4	1	NC	No Connect
4	1	2	$V_{IN}$	Input Voltage
5	5	4	$V_{OUT}$	Output Voltage

## Block Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units	
Input Voltage	$V_{IN}$	7.0	V	
Output Current	$I_{OUT}$	800	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	SOT-89-5	$P_D$	1000	mW
	TO252-5		1000	mW
	SOT-23-5		250	mW
	SOT-89-3		500	mW
Operating Temperature Range	$T_{OPR}$	$-40 \sim +85$	$^{\circ}C$	
Storage Temperature Range	$T_{STG}$	$-40 \sim +125$	$^{\circ}C$	

## Electrical Characteristics

( $V_{IN} = V_{OUT(T)} + 1.0V$ ,  $V_{CE} = V_{IN}$ ,  $C_{IN} = C_L = 10\mu F$ ,  $T_a = 25^\circ C$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 100mA$	X 0.99	$V_{OUT(T)}$ (Note 1)	X 1.01	V	
Input voltage	$V_{IN}$	-	2.0	-	6.5	V	
Maximum Output Current	$I_{OUTMAX}$ (Note 4)	$V_{IN} \geq V_{OUT(T)} + 1.0V$	-	800	-	mA	
Load Regulation	$\Delta V_{OUT}$	$1mA \leq I_{OUT} \leq 300mA$	-	10	100	mV	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 100mA$ $V_{OUT(T)} + 0.5V \leq V_{IN} \leq 6.5V$	-	0.05	0.3	%/V	
Dropout Voltage	$V_{DIF}$ (Note 3)	$I_{OUT} = 300mA$	$1.8V \leq V_{OUT(T)} \leq 2.0V$	-	200	260	mV
			$3.0V \leq V_{OUT(T)} \leq 5.5V$	-	100	180	
Current consumption during operation	$I_{SS1}$	CE pin = ON, no load	-	82	160	$\mu A$	
Current consumption during shutdown	$I_{SS2}$	CE pin = OFF, no load	-	0.1	1.0	$\mu A$	
CE "High" Voltage	$V_{CEH}$	Start up, $R_L = 1.0K\Omega$	1.5	-	-	V	
CE "Low" Voltage	$V_{CEL}$	Shut down, $R_L = 1.0K\Omega$	-	-	0.3	V	
CE "High" Current	$I_{CEH}$	$V_{IN} = 6.5V, V_{CE} = 6.5V$	-0.1	-	0.1	$\mu A$	
CE "Low" Current	$I_{CEL}$	$V_{IN} = 6.5V, V_{CE} = 0V$	-0.1	-	0.1	$\mu A$	
Ripple Rejection Rate	RR	$V_{IN} = 6V$ , $\Delta V_{rip} = 0.5V_{rms}$ , $I_{OUT} = 100mA$ , $f = 1kHz$	$1.8V \leq V_{OUT(T)} \leq 2.0V$	-	70	-	dB
			$3.0V \leq V_{OUT(T)} \leq 5.5V$	-	65	-	
Short-circuit current	$I_{short}$	CE pin = ON, $V_{OUT} = 0V$	-	350	-	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  $V_{in}$  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.
- $I_{OUTMAX}$ : Due to restrictions on the package power dissipation, this value may not be satisfied. Attention should be paid to the power dissipation of the package when the output current is large. This specification is guaranteed by design.

## Operation

### 1. Basic operation

Figure 1 shows the block diagram of the ME6207 Series.

The error amplifier compares the reference voltage ( $V_{ref}$ ) with  $V_{fb}$ , which is the output voltage resistance-divided by feedback resistors  $R_s$  and  $R_f$ . It supplies the output transistor with the gate voltage necessary to ensure a certain output voltage free of any fluctuations of input voltage and temperature.

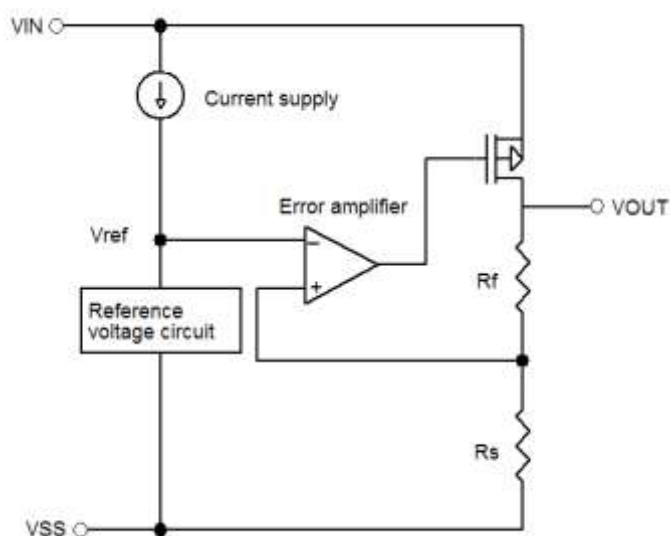


Figure 1

### 2. Output transistor

The ME6207 Series uses a low on-resistance P-channel MOS FET as the output transistor. Be sure that  $V_{OUT}$  does not exceed  $V_{IN} + 0.3\text{ V}$  to prevent the voltage regulator from being damaged due to inverse current flowing from  $V_{OUT}$  pin through a parasitic diode to  $V_{IN}$  pin.

### 3. Shutdown pin (CE pin)

This pin starts and stops the regulator.

When the CE pin is set to the shutdown level, the operation of all internal circuits stops, and the built-in P-channel MOS FET output transistor between the  $V_{IN}$  pin and  $V_{OUT}$  pin is turned off to substantially reduce the current consumption. The  $V_{OUT}$  pin becomes the  $V_{SS}$  level due to the internally divided resistance of several hundreds  $k\Omega$  between the  $V_{OUT}$  pin and  $V_{SS}$  pin. Since the CE pin is neither pulled down nor pulled up internally, do not use it in the floating state. In addition, note that the current consumption increases if a voltage of  $0.3\text{ V}$  to  $V_{IN} - 0.3\text{ V}$  is applied to the CE pin.

Table 1

CE Pin	Internal Circuits	$V_{OUT}$ Pin Voltage	Current Consumption
"H" Power on	Operating	Set value	$I_{SS1}$
"L" Power off	Stopped	$V_{SS}$ level	$I_{SS2}$

## Precautions

1. Wiring patterns for the VIN, VOUT and GND pins should be designed so that the impedance is low. When mounting an output capacitor between the VOUT and VSS pins (CL) and a capacitor for stabilizing the input between VIN and VSS pins (CIN), the distance from the capacitors to these pins should be as short as possible.
2. Note that the output voltage may increase when a series regulator is used at low load current (1.0 mA or less).
3. Generally a series regulator may cause oscillation, depending on the selection of external parts. The following conditions are recommended for this IC. However, be sure to perform sufficient evaluation under the actual usage conditions for selection, including evaluation of temperature characteristics.

Input capacitor (CIN): 4.7  $\mu$ F or more

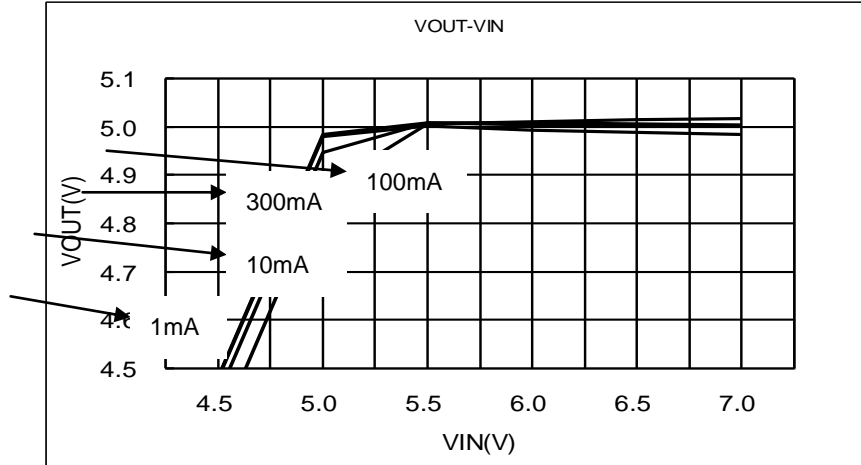
Output capacitor (CL): 4.7  $\mu$ F or more

Equivalent series resistance (ESR): 0.5  $\Omega$  or less

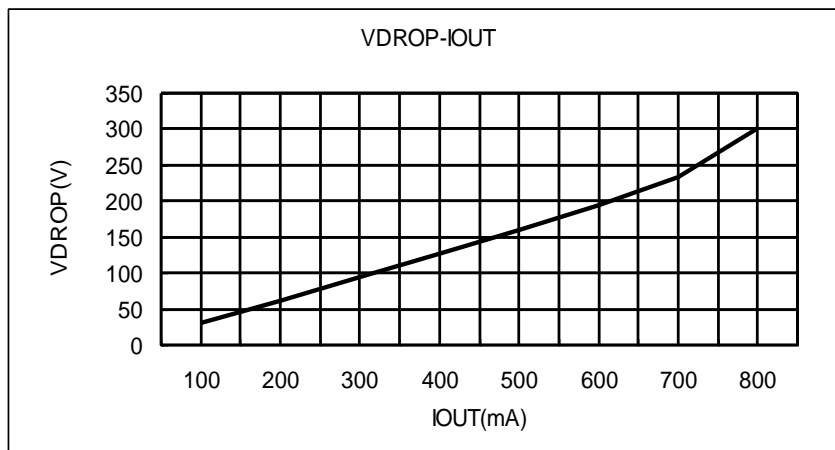
4. The voltage regulator may oscillate when the impedance of the power supply is high and the input capacitor is small or an input capacitor is not connected.
5. The application conditions for the input voltage, output voltage, and load current should not exceed the package power dissipation.
6. Do not apply an electrostatic discharge to this IC that exceeds the performance ratings of the built-in electrostatic protection circuit.
7. SII claims no responsibility for any disputes arising out of or in connection with any infringement by products including this IC of patents owned by a third party.

Type Characteristics

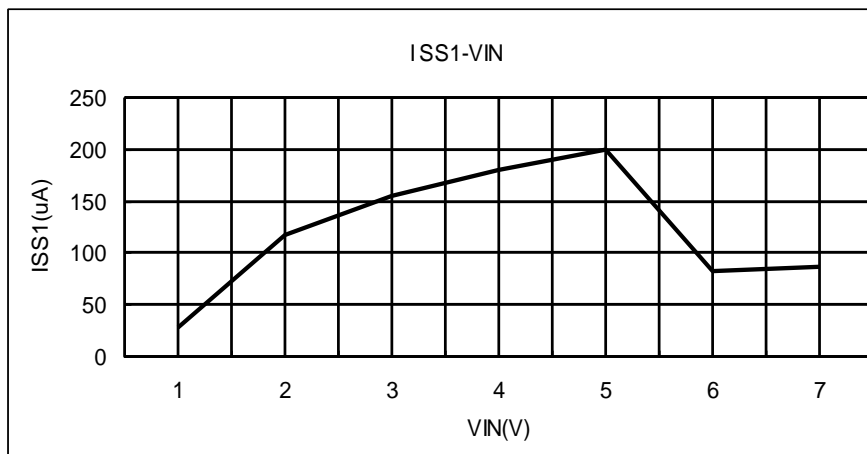
- (1) Input Voltage VS. Output Voltage (Ta = 25 °C)  
ME6207C50P5G



- (2) Output Current VS. Dropout Voltage (VIN = VOUT (T) + 1.0V, Ta = 25 °C)  
ME6207C50P5G

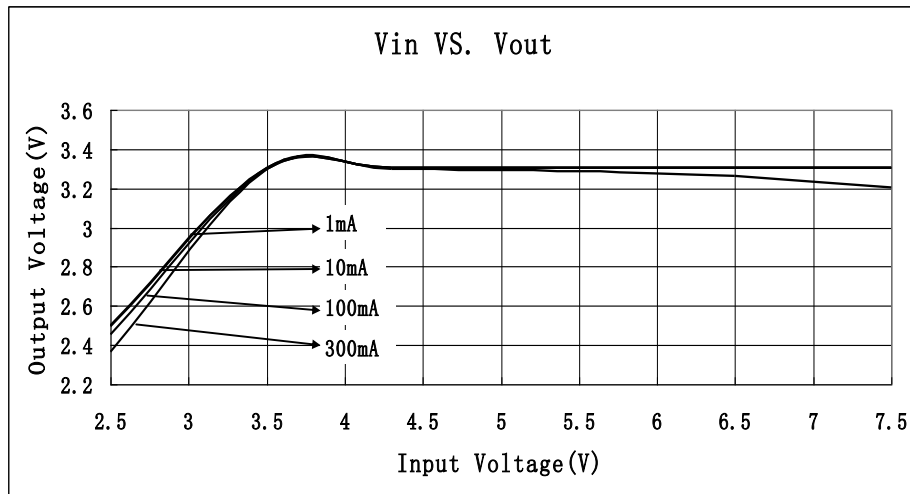


- (3) Input Voltage VS. Current Consumption (Ta = 25 °C)  
ME6207C50P5G

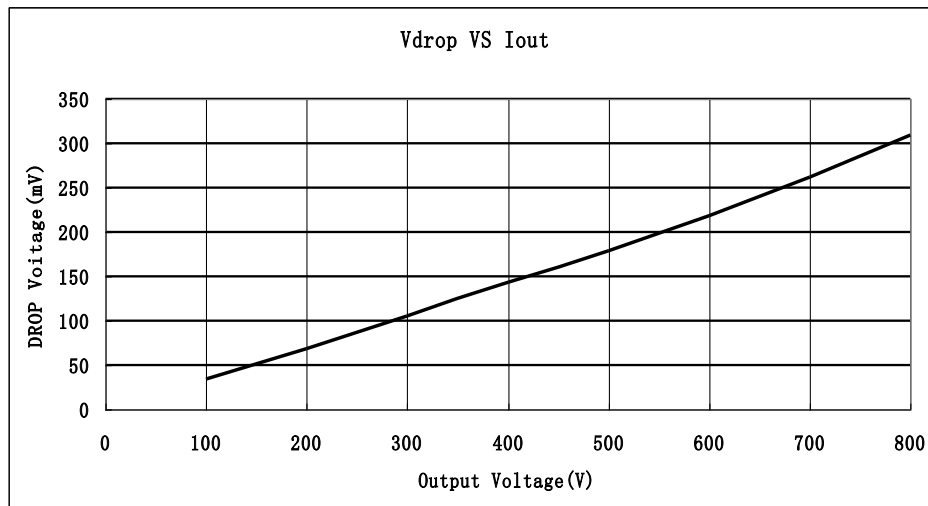




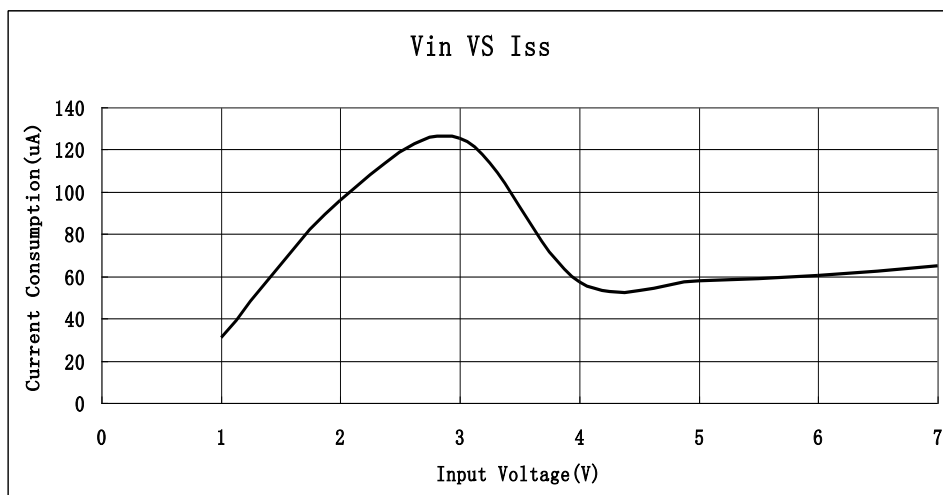
(4) Input Voltage VS. Output Voltage ( $T_a = 25\text{ }^\circ\text{C}$ )  
ME6207C33M5G



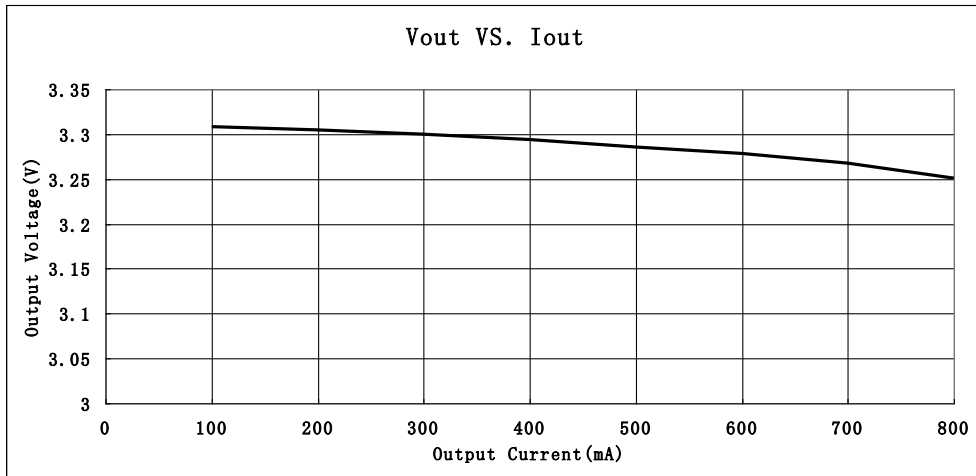
(5) Output Current VS. Dropout Voltage ( $V_{IN} = V_{OUT} (T) + 1.0V, T_a = 25\text{ }^\circ\text{C}$ )  
ME6207C33M5G



(6) Output Current VS. Current Consumption ( $V_{IN} = V_{OUT} (T) + 1.0V, T_a = 25\text{ }^\circ\text{C}$ )  
ME6207C33M5G

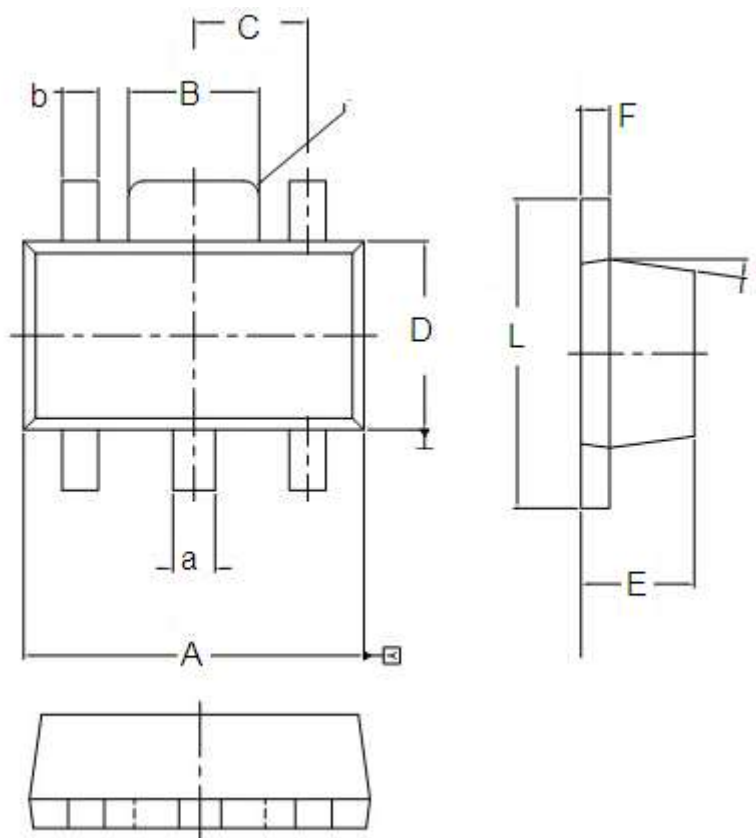


(7) Output Current VS. Output Voltage ( $V_{IN} = V_{OUT} (T) + 1.0V, T_a = 25^\circ C$ )  
ME6207C33M5G



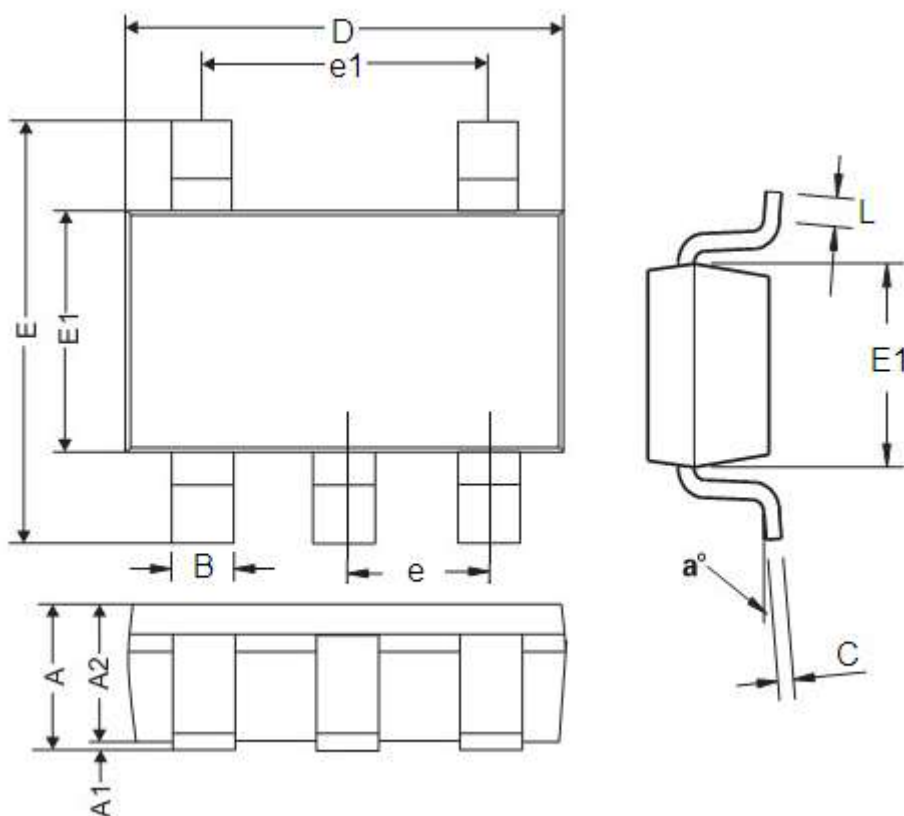
## Package Information:

- SOT89-5



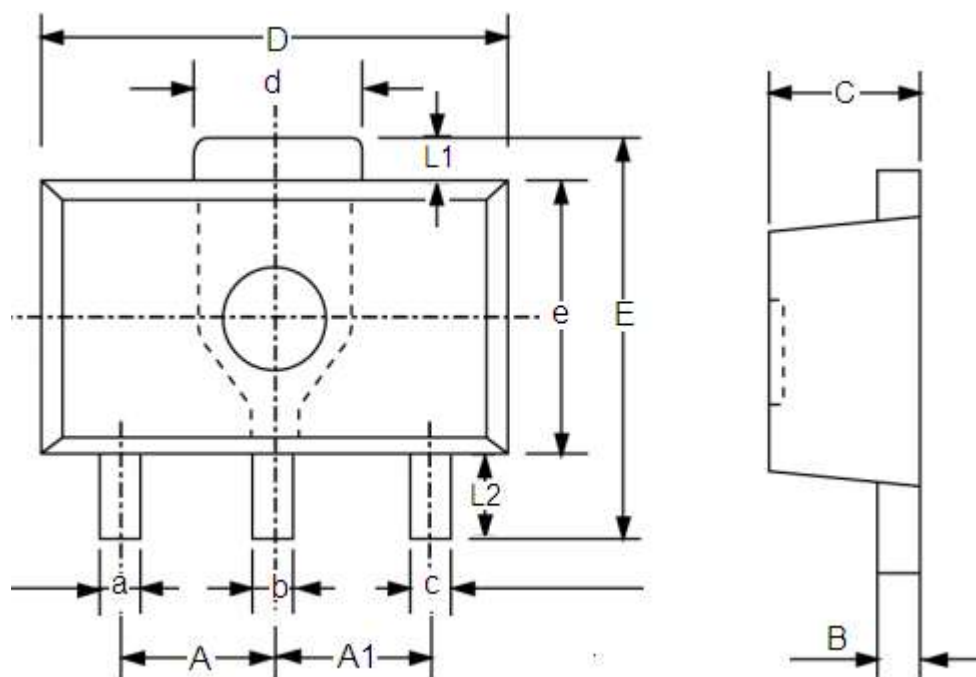
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.4	4.6	0.173	0.181
a	0.5	0.62	0.02	0.024
B	1.63	1.83	0.064	0.072
b	0.44	0.54	0.017	0.021
C	Type:1.5		Type:0.059	
D	2.4	2.6	0.094	0.102
E	1.4	1.6	0.054	0.063
F	0.35	0.43	0.013	0.017
L	3.95	4.25	0.155	0.167
r	Type:8 <sup>0</sup>		Type:8 <sup>0</sup>	

● SOT23-5



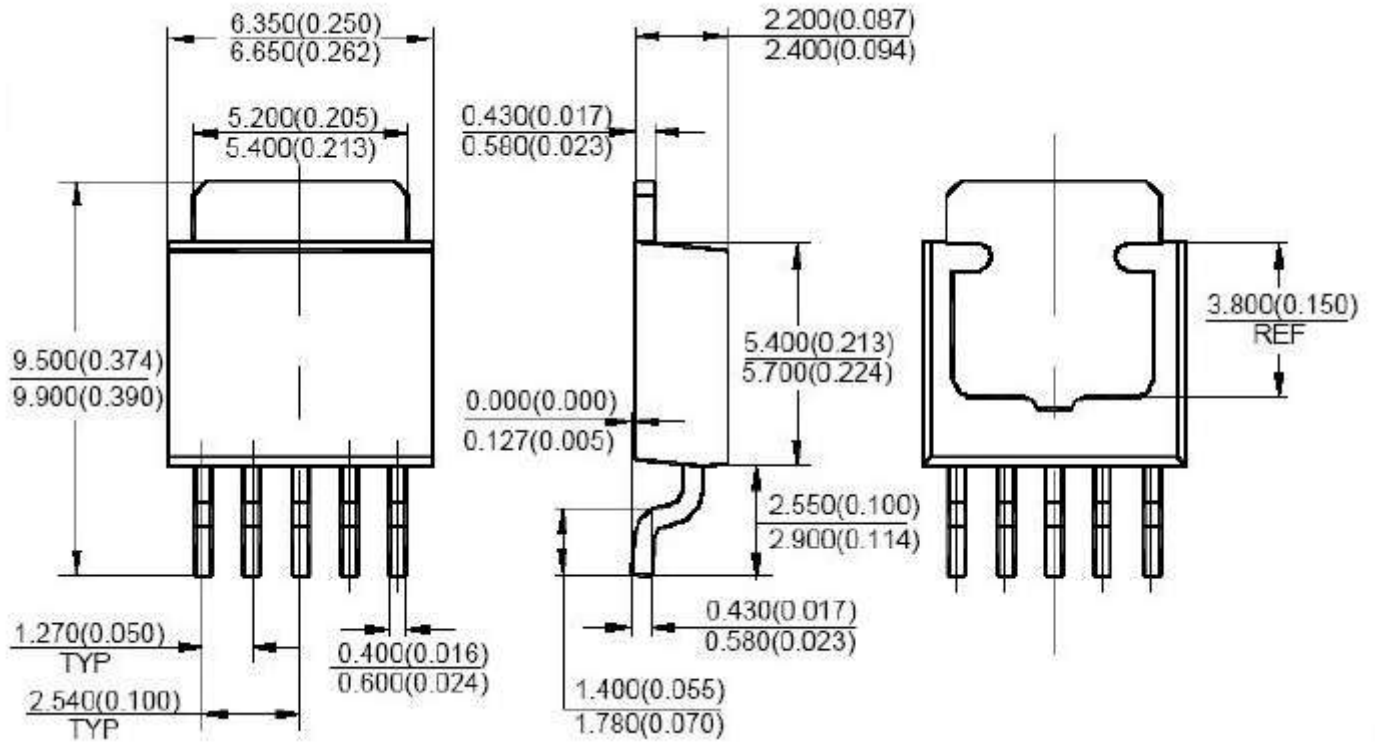
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.45	0.0354	0.0570
A1	0	0.15	0	0.0059
A2	0.9	1.3	0.0354	0.0511
B	0.2	0.5	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.7	3.10	0.1062	0.1220
E	2.2	3.2	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95REF		0.0374REF	
e1	1.90REF		0.0748REF	
L	0.10	0.60	0.0039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

● SOT89-3



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	-

● TO252-5



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