■ INTRODUCTION

The SML102 series are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The SML102 series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The SML102 series consume less than 0.1μA in shutdown mode and have fast turn-on time less than 50μS.The series are very suitable for the battery-powered equipments, such as RF applications and other systems requiring a quiet voltage source.

■ FEATURES

- Low Output Noise:

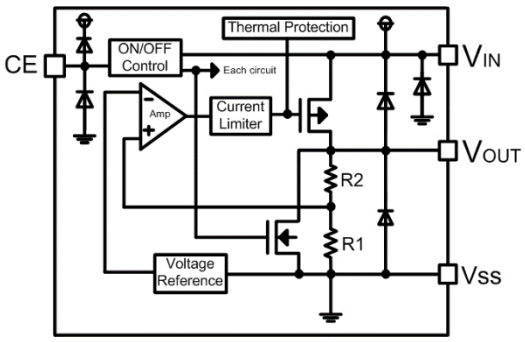
  $40\mu V_{RMS}$ (10Hz ~ 100kHz)
- Low Dropout Voltage: 50mV @ 100mA
- Low Quiescent Current: 45μA
- High Ripple Rejection: 85dB @ 1kHz
- Excellent Line and Load Transient Response
- Operating Voltage Range:

  1.8V ~ 6.0V
- Output Voltage Range: 0.85V ~ 5.0V
- High Accuracy: ±2% (Typ.)
- Built-in Current Limiter, Thermal shutdown and Short-Circuit Protection
- TTL- Logic-Controlled Shutdown Input

■ APPLICATIONS

- Cellular and Smart Phones
- Laptop, Palmtops and PDA
- Digital Still and Video Cameras
- Portable Audio Video Equipments
- Radio control systems
- Battery-Powered Equipments

■ BLOCK DIAGRAM



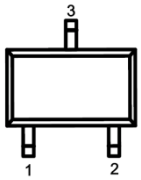
■ ORDER INFORMATION

SML102①②③④

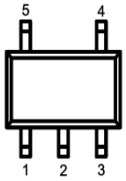
DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
	B	High Active, pull-down resistor built in, with C_{OUT} discharge resistor
②③	Integer	Output Voltage e.g.1.8V=②: 1, ③: 8
④	M/MA/MC/MY	Package: SOT-23-3
	M/MF/ML	Package: SOT-23-5
	P/PT	Package: SOT-89-3/5
	F	Package: DFN1X1-4

■ PIN CONFIGURATION(Top View)

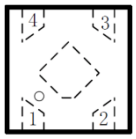
SOT-23-3



SOT-23-5



DFN1X1-4



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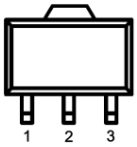

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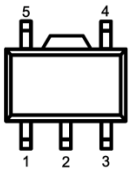


SOT-23-3

PIN NUMBER				SYMBOL	FUNCTION
M	MA	MC	MY		
1	2	3	3	V_{SS}	Ground
2	1	2	1	V_{OUT}	Output
3	3	1	2	V_{IN}	Power Input Pin

SOT-23-5

PIN NUMBER			SYMBOL	FUNCTION
M	MF	ML		
1	1	5	V_{IN}	Power Input Pin
2	2	2	V_{SS}	Ground
3	—	1	CE	Chip Enable Pin
4	3/4	3	NC	No Connection
5	5	4	V_{OUT}	Output Pin

DFN1X1-4

PIN NUMBER	SYMBOL	FUNCTION
F		
1	V_{OUT}	Output Pin
2	V_{SS}	Ground
3	CE	Chip Enable Pin
4	V_{IN}	Power Input Pin
EP	Thermal PAD	Ground

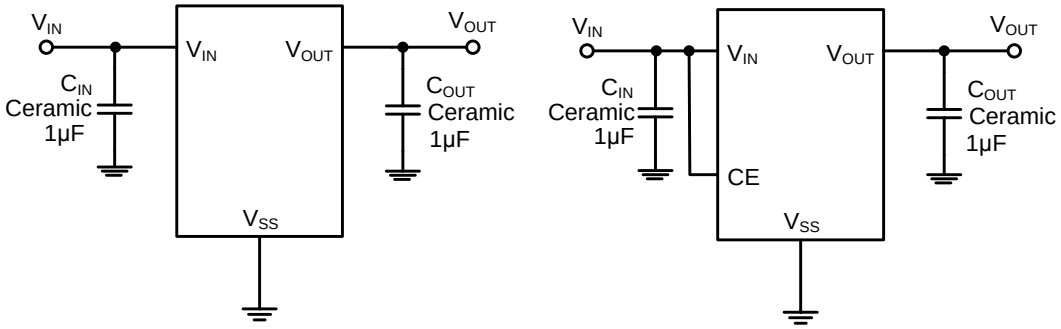
SOT-89-3

PIN NUMBER		SYMBOL	FUNCTION
P	PT		
1	2	V_{SS}	Ground
3	1	V_{OUT}	Output
2	3	V_{IN}	Power Input Pin

SOT-89-5

PIN NUMBER	SYMBOL	FUNCTION
P		
1	V_{OUT}	Output Pin
2	V_{SS}	Ground
3	NC	No Connection
4	CE	Chip Enable Pin
5	V_{IN}	Power Input Pin

■ TYPICAL APPLICATION



■ ABSOLUTE MAXIMUM RATINGS(1)

(Unless otherwise specified, T_A = 25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage(2)		V_{IN}	-0.3 ~ 7	V
Output Voltage(2)		V_{OUT}	-0.3 ~ V_{IN} + 0.3	V
Output Current		I_{OUT}	750	mA
Power Dissipation	SOT-23-3/5	P_D	400	mW
	DFN1X1-4		400	mW
	SOT-89-3/5		600	mW
Operating free air temperature range		T_A	-40 ~ +85	°C
Operating Junction Temperature Range		T_j	-40 ~ +150	°C
Storage Temperature		T_{stg}	-55 ~ +150	°C
Lead Temperature(Soldering, 10sec)		T_{solder}	260	°C
ESD rating		Human Body Model-(HBM)	≥ 2	kV
		Machine Model-(MM)	≥ 200	V

(1) Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.

(2) All voltages are with respect to network ground terminal.

■ ELECTRICAL CHARACTERISTICS

SML102 Series (V_{IN} = V_{OUT} + 1V, C_{IN} = C_{OUT} = 1μF, T_A = 25℃, unless otherwise specified)

PARAMETER		SYMBOL	CONDITIONS	MIN.	TYP. (3)	MAX.	UNITS
Output Voltage		V_{OUT}(E) (4)	I_{OUT} = 1mA	V_{OUT}(5) *0.98	V_{OUT}(5)	V_{OUT}(5) *1.02	V
Supply Current		I_{SS}	I_{OUT} = 0		45	90	μA
Standby Current		I_{STBY}	CE = V_{SS}		0.1	1	μA
Output Current Limit		I_{LIM}	V_{OUT} = 90% $V_{OUT(Normal)}$	500	750		mA
Dropout Voltage		V_{DO}(6)	I_{OUT} = 100mA V_{OUT} ≥ 3.3V		50		mV
Load Regulation		ΔV_{OUT}	V_{IN} = V_{OUT} + 1V, 1mA ≤ I_{OUT} ≤ 100mA		10		mV
Line Regulation		$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT} = 10mA, V_{OUT} + 1V ≤ V_{IN} ≤ 6V		0.01	0.2	%/V
Output Voltage Temperature Characteristics		$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	I_{OUT} = 10mA -40 ≤ T ≤ +85		50		ppm
Short Current		I_{Short}	V_{OUT} = V_{SS}		120		mA
Input Voltage		V_{IN}	—	1.8		6.0	V
Power Supply Rejection Rate	100Hz	PSRR	I_{OUT} = 50mA		75		dB
	1kHz				85		
	10kHz				70		
CE "High" Voltage		V_{CE}"H"		1.5		V_{IN}	V
CE "Low" Voltage		V_{CE}"L"				0.3	V
Thermal Shutdown Threshold		T_{SD}			160		℃
Thermal Shutdown Hysteresis		ΔT_{SD}			20		℃
C_{OUT} Auto-Discharge Resistance		$R_{DISCHRG}$	V_{IN} = 5V, V_{OUT} = 3.0V, V_{CE} = V_{SS}		100		Ω

(3) Typical numbers are at 25°C and represent the most likely norm.

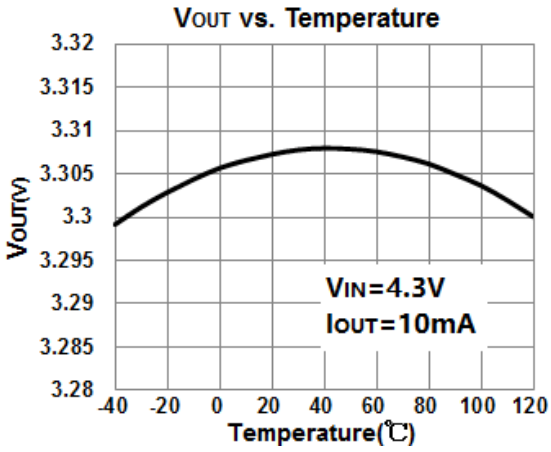
(4) V_{OUT}(E) : Effective Output Voltage (Ie. The output voltage when V_{IN} = (V_{OUT} + 1.0V) and maintain a certain I_{OUT} Value).

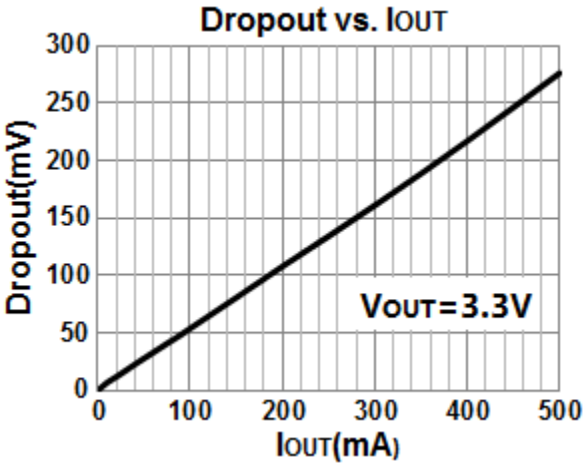
(5) V_{OUT}: Specified Output Voltage.

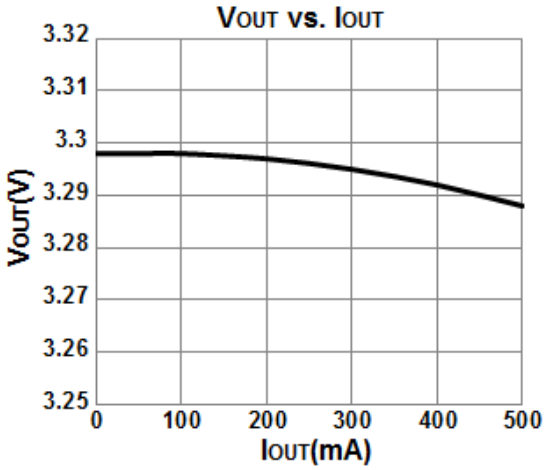
(6) V_{DO}: The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of V_{OUT}(E).

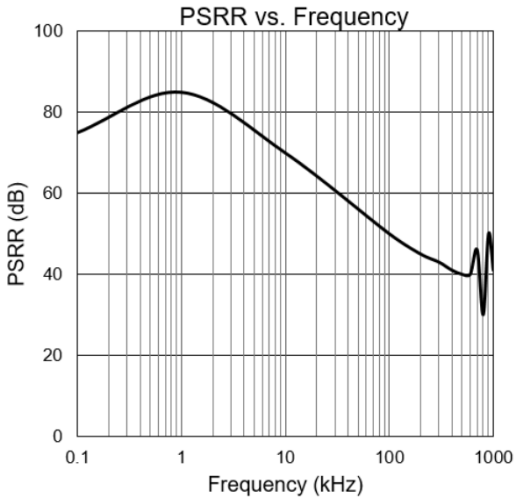
■ TYPICAL PERFORMANCE CHARACTERISTICS

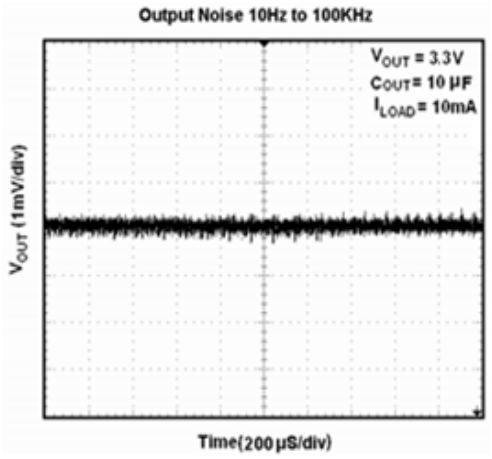
(V_{CE} = V_{IN} = V_{OUT} + 1V, C_{IN} = C_{OUT} = 1μF, T_A = 25℃, unless otherwise specified)

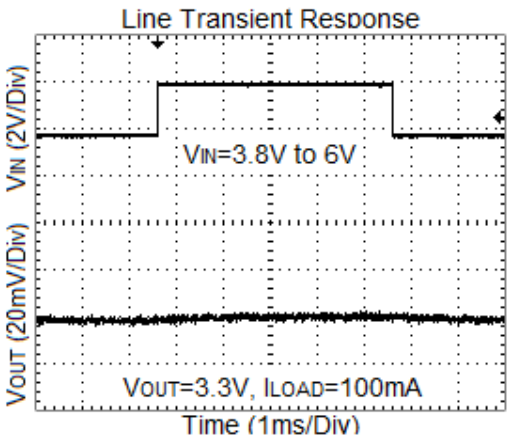




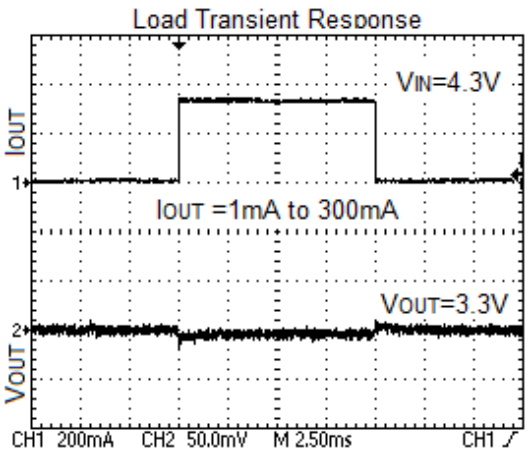


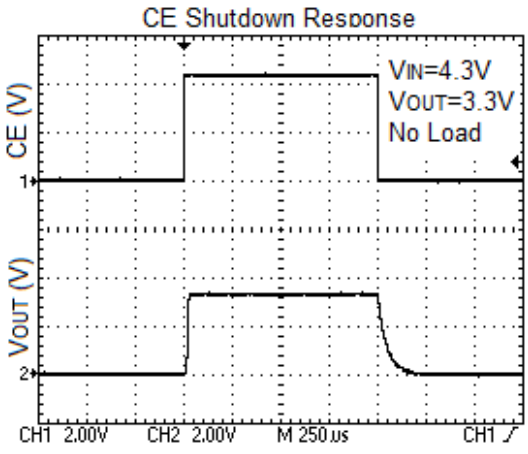






■ TYPICAL PERFORMANCE CHARACTERISTICS





COUT Auto-Discharge Function

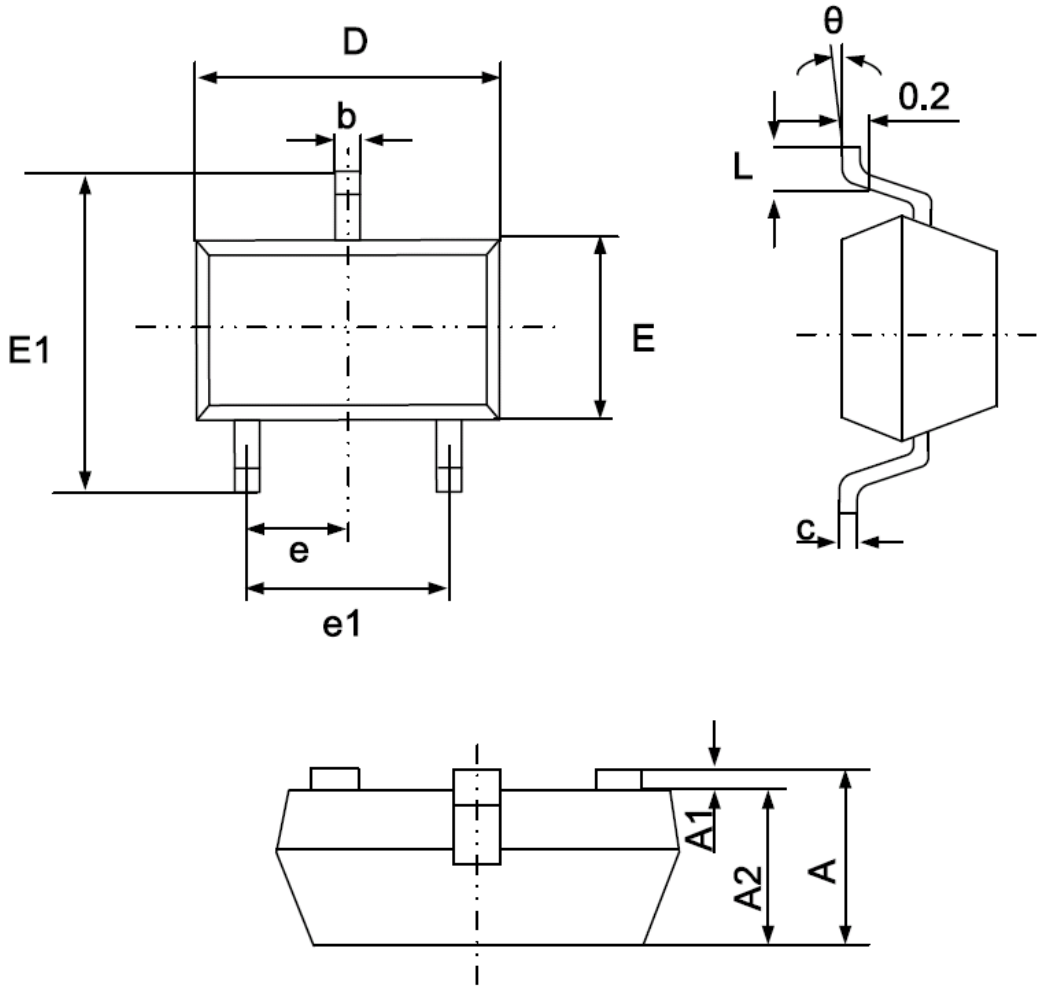
SML102B series can discharge the electric charge in the output capacitor (C_{OUT}), when a low signal to the CE pin, which enables a whole IC circuit turn off, is inputted via the N-channel transistor located between the V_{OUT} pin and the V_{SS} pin (cf. BLOCK DIAGRAM). The C_{OUT} auto-discharge resistance value is set at 60Ω (V_{OUT} = 3.0V @ V_{IN} = 5.0V at typical). The discharge time of the output capacitor (C_{OUT}) is set by the C_{OUT} auto-discharge resistance (R) and the output capacitor (C_{OUT}). By setting time constant of a C_{OUT} auto-discharge resistance value [$R_{DISCHRG}$] and an output capacitor value (C_{OUT}) as τ ($\tau = C \times R_{DISCHRG}$), the output voltage after discharge via the N-channel transistor is calculated by the following formulas.

$$V = V_{OUT(E)} \times e^{-t/\tau}, \text{ or } t = \tau \ln (V / V_{OUT(E)})$$

(V: Output voltage after discharge, $V_{OUT(E)}$: Output voltage, t: Discharge time, τ: C_{OUT} auto-discharge resistance $R_{DISCHRG}$ × Output capacitor (C_{OUT}) value C)

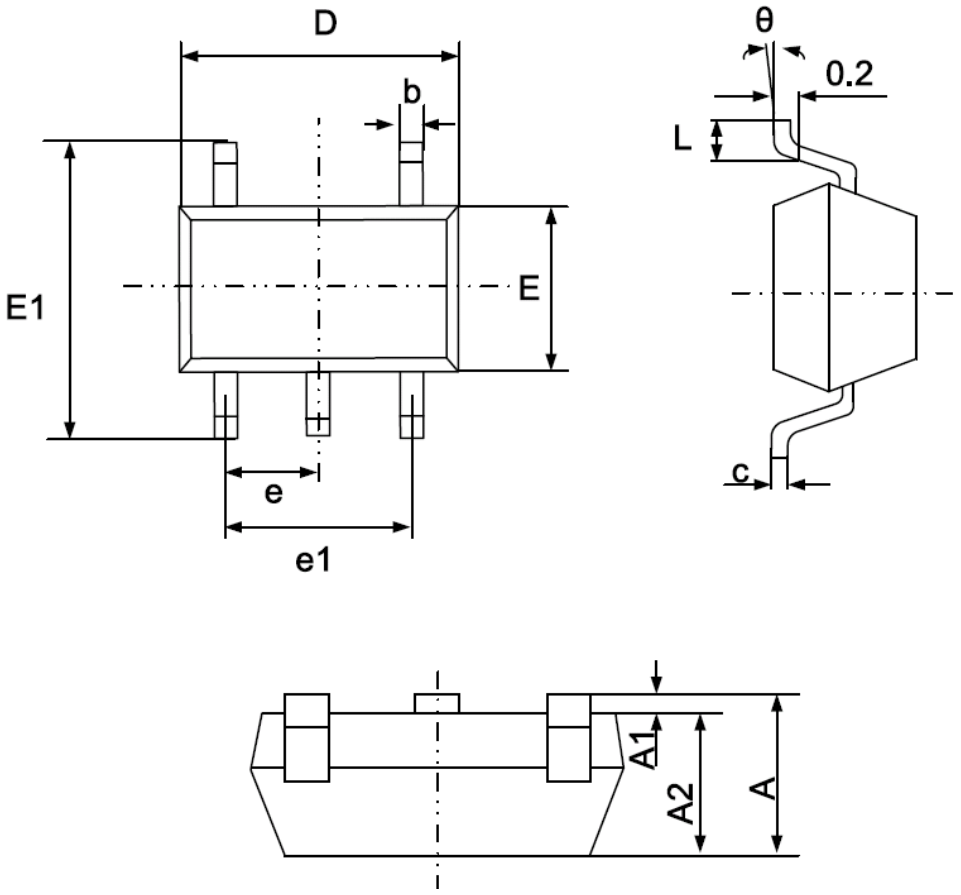
■ PACKAGING INFORMATION

• SOT-23-3 PACKAGE OUTLINE DIMENSIONS



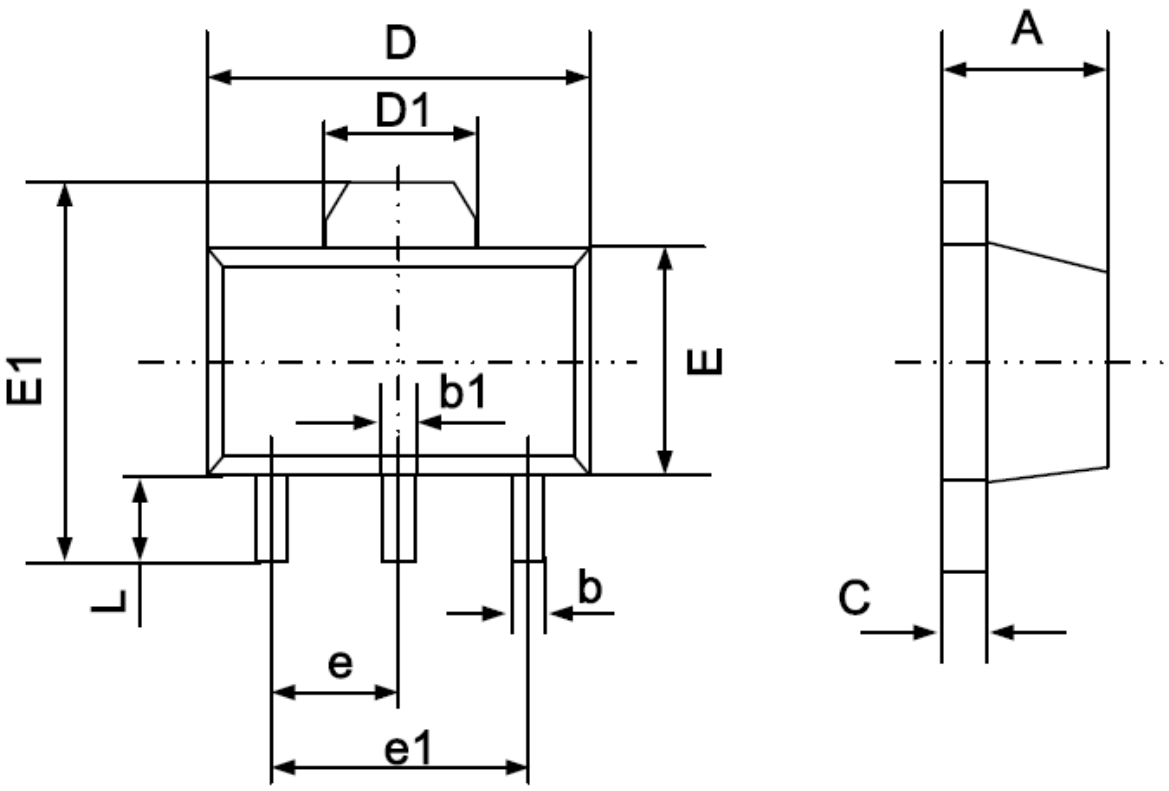
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

● **SOT-23-5 PACKAGE OUTLINE DIMENSIONS**



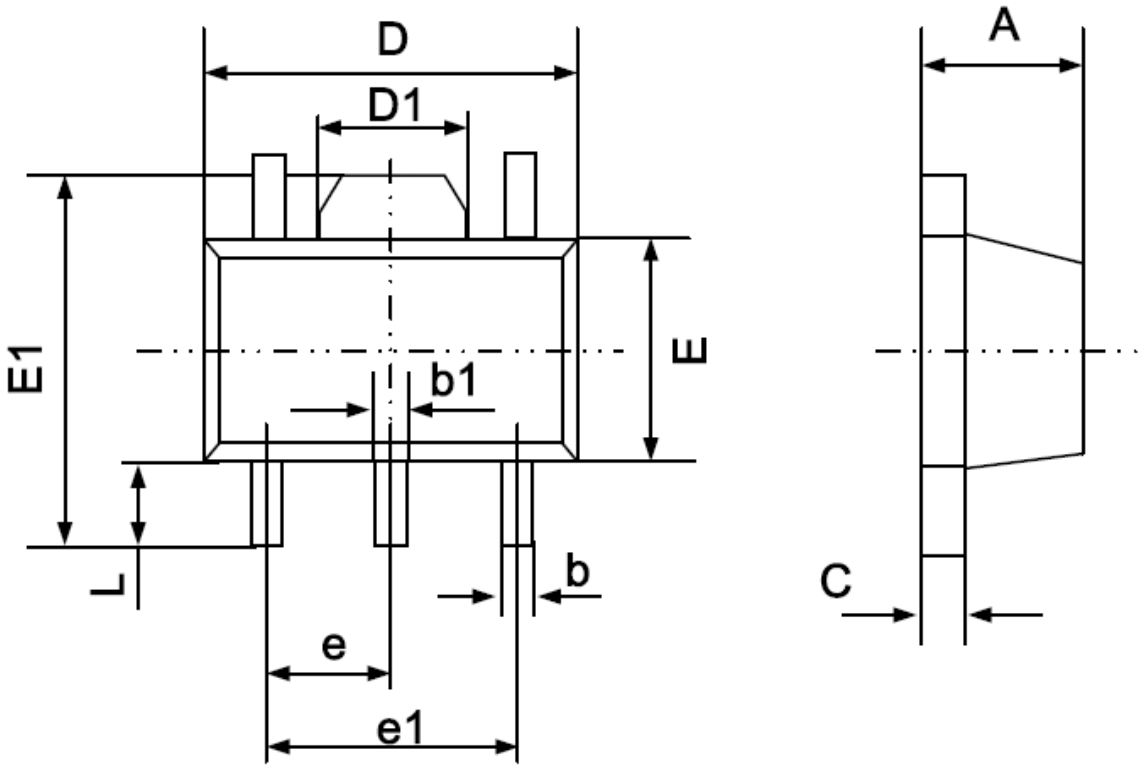
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

● **SOT-89-3 PACKAGE OUTLINE DIMENSIONS**



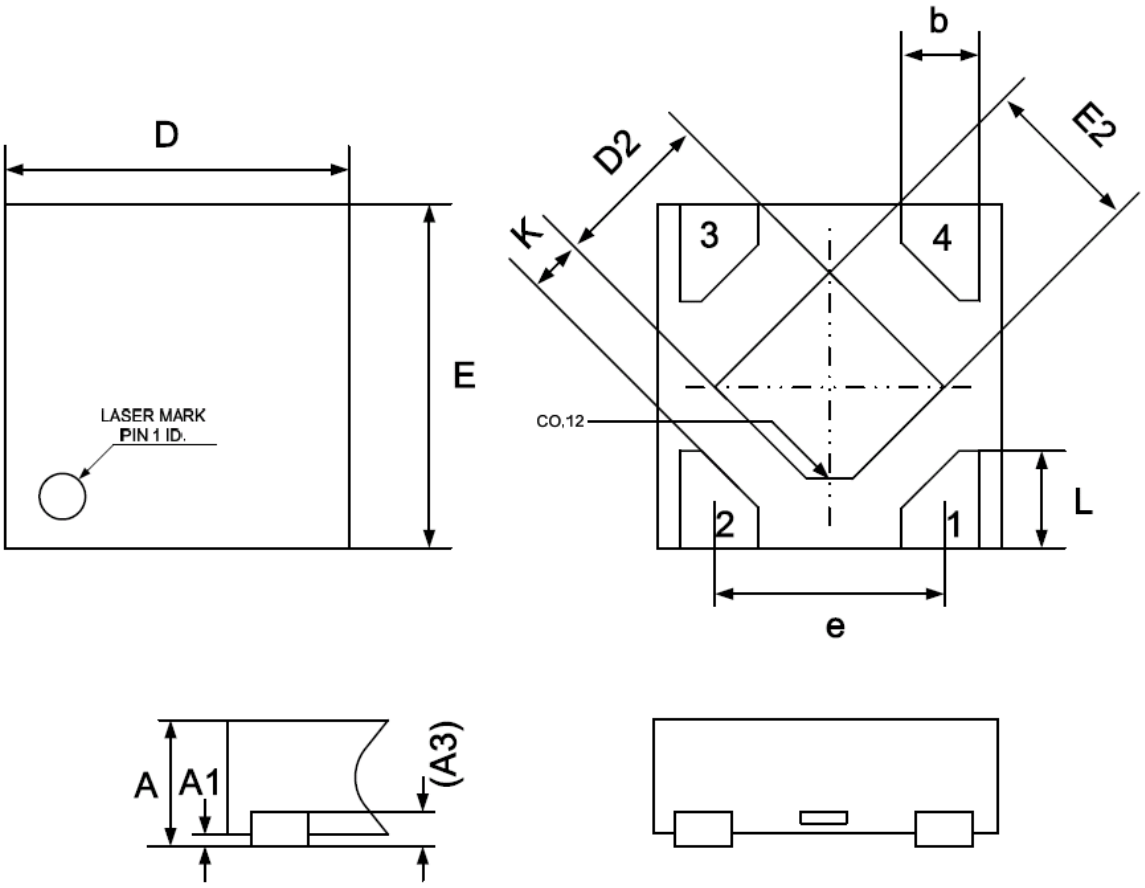
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

● **SOT-89-5 PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043

● **DFN1X1-4 PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.340	0.370	0.400
A1	0.000	0.020	0.050
A3		0.100REF	
b	0.170	0.220	0.270
D	0.950	1.000	1.050
E	0.950	1.000	1.050
D2	0.430	0.480	0.530
E2	0.430	0.480	0.530
L	0.200	0.250	0.300
e	-	0.650	-
K	0.150	-	-