

**Ultra Fast High PSRR  
Low Noise CMOS Voltage Regulator**

**LR6205 Series**

**■ INTRODUCTION**

The LR6205 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 LR6205 series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The LR6205 series consume less than 0.1uA in shutdown mode and have fast turn-on time less than 50us. The series are very suitable for the battery-powered equipments, such as RF applications and other systems requiring a quiet voltage source.

**■ APPLICATIONS**

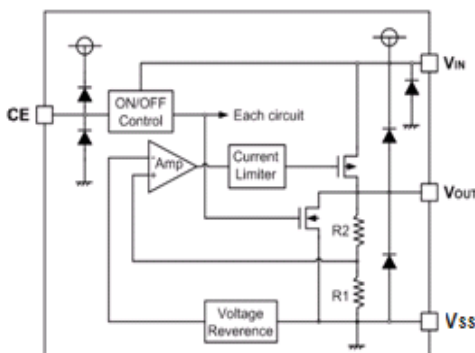
- Cellular and Smart Phones
- Laptop, Palmtops and PDA
- Digital Still and Video Cameras

**■ FEATURES**

- Low Output Noise:  $40\mu V_{RMS}$  (10Hz~100kHz)
- Low Dropout Voltage: 150mV@150mA
- Low Quiescent Current: 50uA
- High Ripple Rejection: 75dB@1kHz
- Excellent Line and Load Transient Response
- Operating Voltage: 2.0V~6.0V
- Output Voltage: 1.2 ~ 5.0V
- High Accuracy:  $\pm 2\%$  (Typ.)
- Built-in Current Limiter, Short-Circuit Protection
- TTL- Logic-Controlled Shutdown Input

- MP3, MP4 Player
- Radio control systems
- Battery-Powered Equipment

**■ BLOCK DIAGRAM**



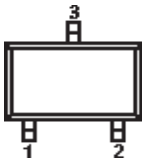
**■ ORDER INFORMATION**

LR6205①②③④

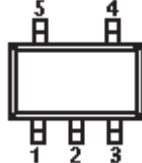
DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
	B	High Active, pull-down resistor built in, with C <sub>OUT</sub> discharge resistor
	C	High Active, No pull-down resistor, No C <sub>OUT</sub> discharge resistor
②③	Integer	Output Voltage e.g.1.8V=②:1, ③:8
④	M	Package:SOT-23-3/5
	U	Package:SC-70-5
	P	Package:SOT-89-3/5
	F	Package:DFN1X1-4

■ PIN CONFIGURATION

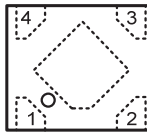
SOT-23-3



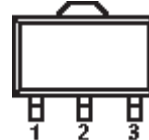
SOT-23-5/SC-70-5



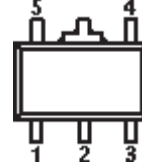
DFN1X1-4



SOT-89-3



SOT-89-5



PIN NUMBER						PIN NAME	FUNCTION
SOT-23-3			SOT-89-3				
M	MA	MC	MY	P	PT		
1	2	3	3	1	2	$V_{SS}$	Ground
2	1	2	1	3	1	$V_{OUT}$	Output
3	3	1	2	2	3	$V_{IN}$	Power input

SOT-23-5/SC-70-5

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

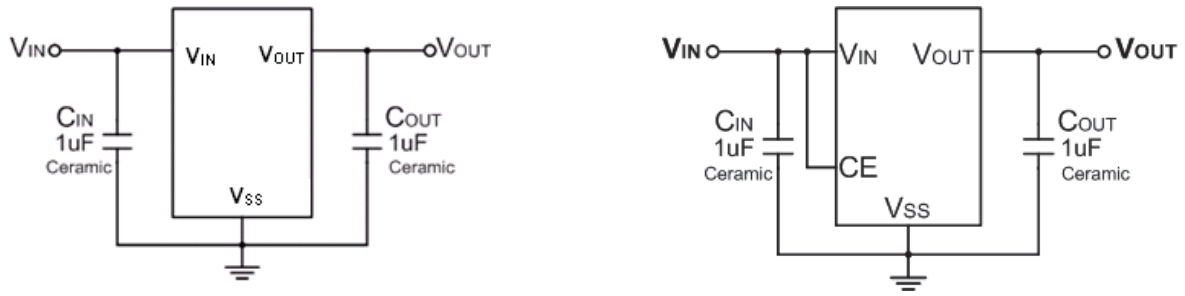
SOT-89-5

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

## ■ TYPICAL APPLICATION



## ■ ABSOLUTE MAXIMUM RATINGS

 (Unless otherwise specified,  $T_a=25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	$V_{IN}$	$V_{SS} - 0.3 \sim V_{SS} + 7$	V
Output Current	$I_{OUT}$	600	mA
Output Voltage	$V_{OUT}$	$V_{SS} - 0.3 \sim V_{IN} + 0.3$	V
Power Dissipation	SOT-23	$P_d$	370
	SC-70	$P_d$	250
	SOT-89	$P_d$	500
	DFN1x1-4	$P_d$	400
Operating Temperature	$T_{opr}$	$-40 \sim +85$	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	$-40 \sim +125$	$^\circ\text{C}$
Soldering Temperature & Time	$T_{solder}$	$260^\circ\text{C}, 10\text{s}$	

## ■ ELECTRICAL CHARACTERISTICS

**L6205 Series** ( $V_{IN}=V_{OUT}+1\text{V}$ ,  $C_{IN}=C_{OUT}=1\mu\text{F}$ ,  $T_a=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT}=1\text{mA}$	$V_{OUT}$ *0.98	$V_{OUT}$	$V_{OUT}$ *1.02	V
Supply Current	$I_{SS}$	$I_{OUT}=0$		50	100	$\mu\text{A}$
Standby Current	$I_{STBY}$	$CE = V_{SS}$			0.1	$\mu\text{A}$
Output Current	$I_{OUT}$	—	500			mA
Dropout Voltage (Note 3)	$V_{dif}$	$I_{OUT} = 150\text{mA}$ $V_{OUT} \geq 2.8\text{V}$		150		mV
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = V_{OUT} + 1\text{V}$ , $1\text{mA} \leq I_{OUT} \leq 100\text{mA}$		10		mV
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	$I_{OUT} = 10\text{mA}$ $V_{OUT} + 1\text{V} \leq V_{IN} \leq 6\text{V}$		0.01	0.2	%/V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	$I_{OUT} = 10\text{mA}$ $-40 \leq T \leq +85$		100		ppm
Short Current	$I_{Short}$	$V_{OUT} = V_{SS}$		100		mA
Input Voltage	$V_{IN}$	—	2.0		6.0	V

**ELECTRICAL CHARACTERISTICS**

LR6205 Series ( $V_{IN}=V_{OUT}+1V$ ,  $C_{IN}=C_{OUT}=1\mu F$ ,  $T_a=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Power Supply Rejection Rate	217Hz	$I_{OUT}=50mA$		80		dB
	1kHz			75		
	10kHz			70		
CE "High" Voltage	$V_{CE} "H"$		1.5		$V_{IN}$	V
CE "Low" Voltage	$V_{CE} "L"$				0.3	V

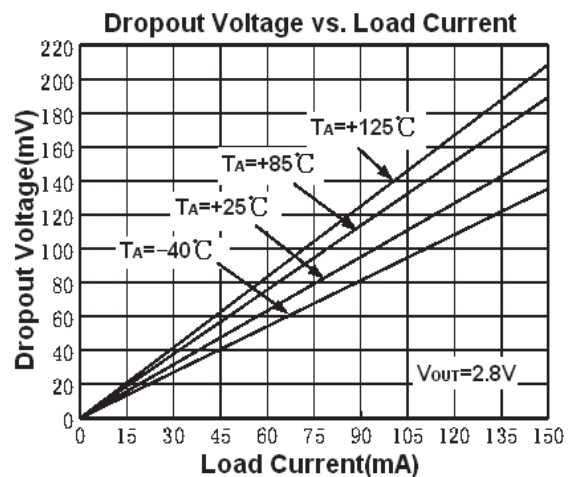
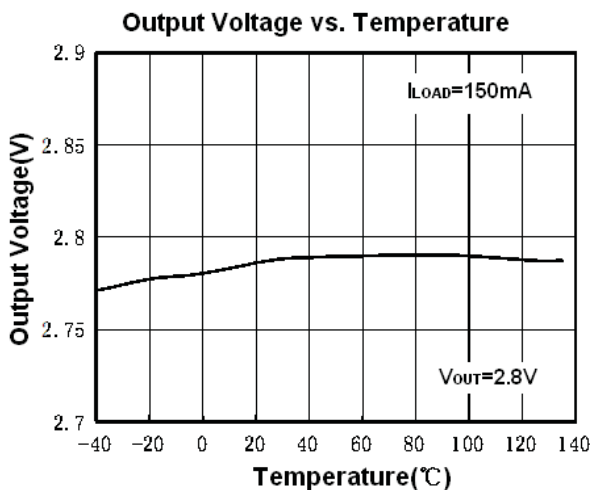
**NOTE:**

- $V_{OUT}$ : Specified Output Voltage.
- $V_{OUT} (E)$  : Effective Output Voltage ( i.e. The Output Voltage When  $V_{IN} = (V_{OUT} + 1.0V)$  And Maintain A Certain  $I_{OUT}$  Value).
- $V_{dif}$ : The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of  $V_{OUT} (E)$ .

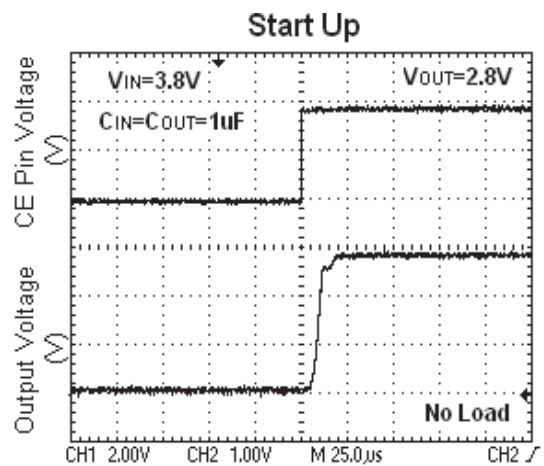
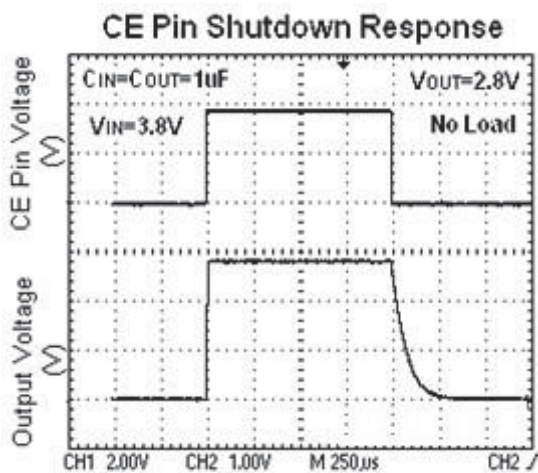
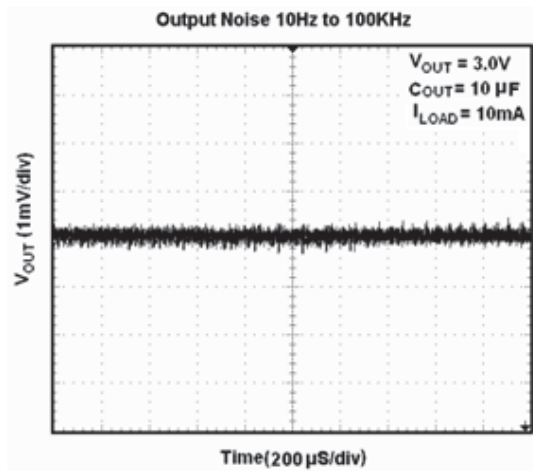
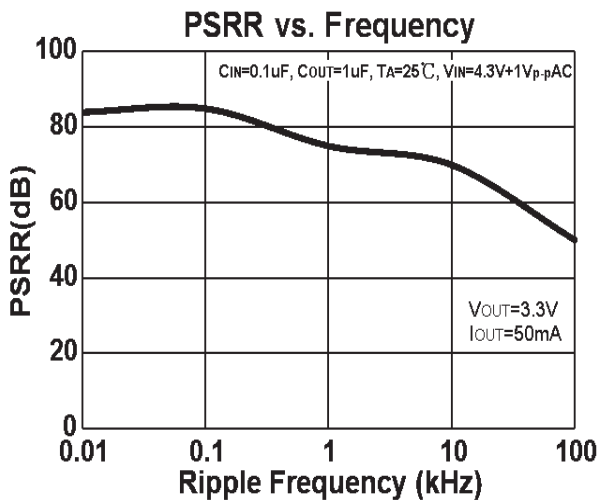
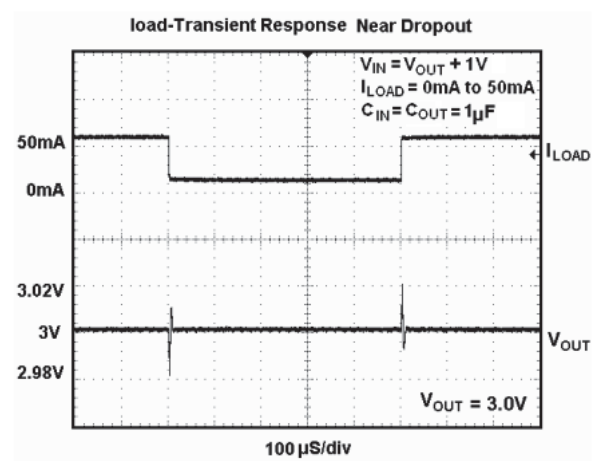
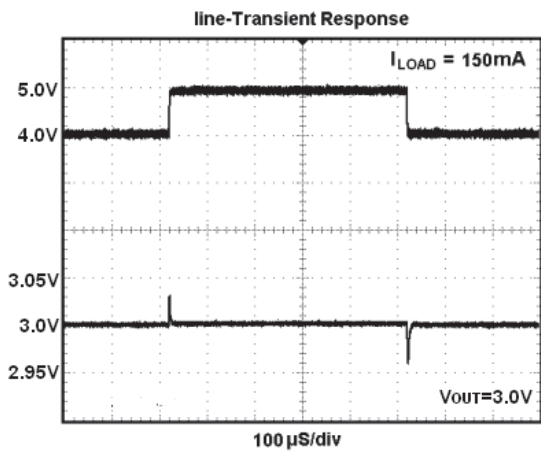
**DROPOUT VOLTAGE CHART**

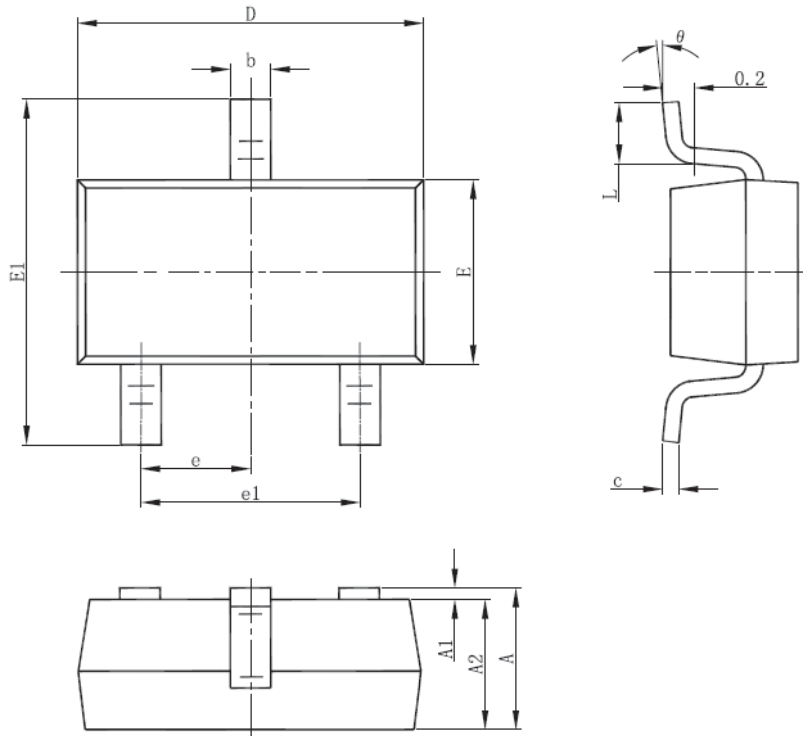
Setting Output Voltage	Dropout Voltage(mV) @ $I_{OUT}=150mA$	
$V_{OUT}(V)$	Typ.	Max.
1.2	380	600
1.5	270	600
1.8	230	600
2.5	180	400
2.8	160	220
3.0	155	220
3.3	150	220

**TYPICAL PERFORMANCE CHARACTERISTICS**

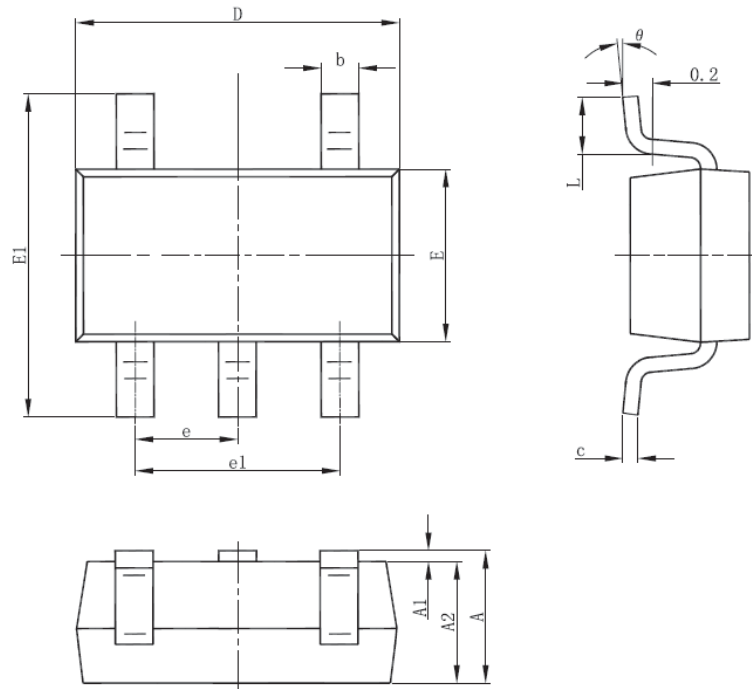


■ TYPICAL PERFORMANCE CHARACTERISTICS

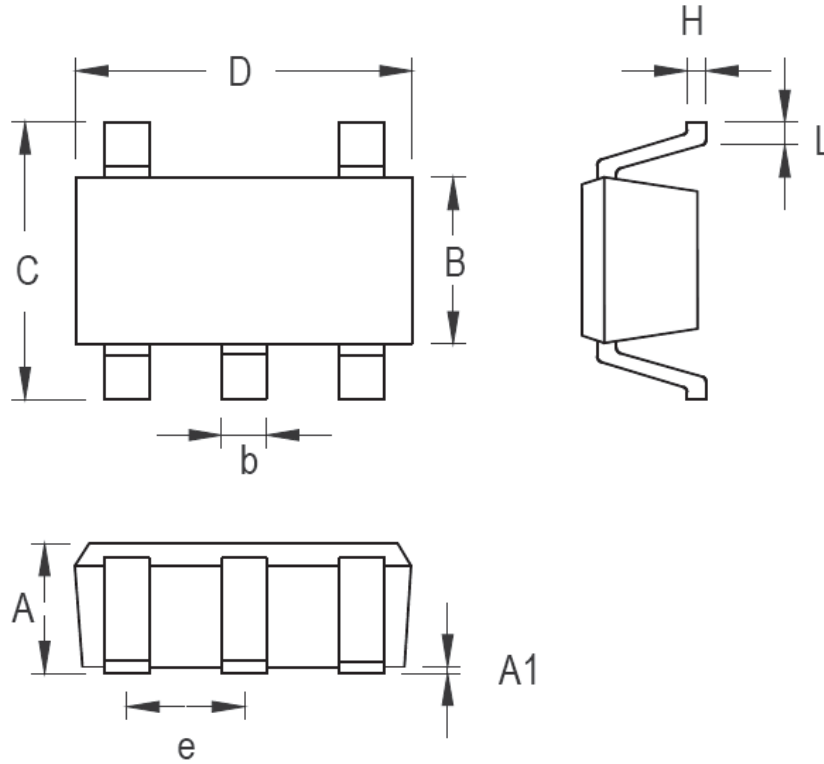


**■ PACKAGING INFORMATION**
**● SOT-23-3 PACKAGE OUTLINE DIMENSIONS**


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**


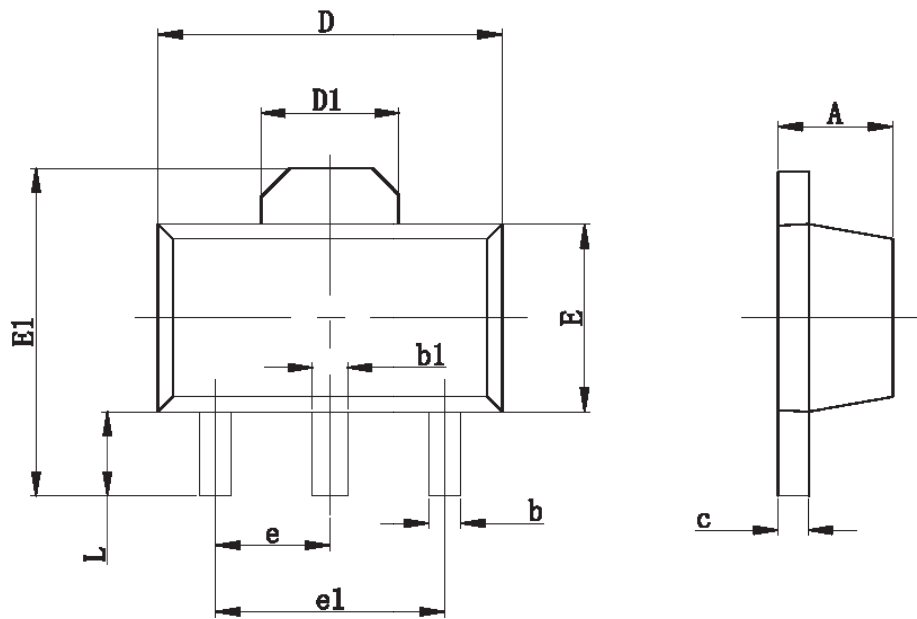
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

**• SC-70-5 PACKAGE OUTLINE DIMENSIONS**


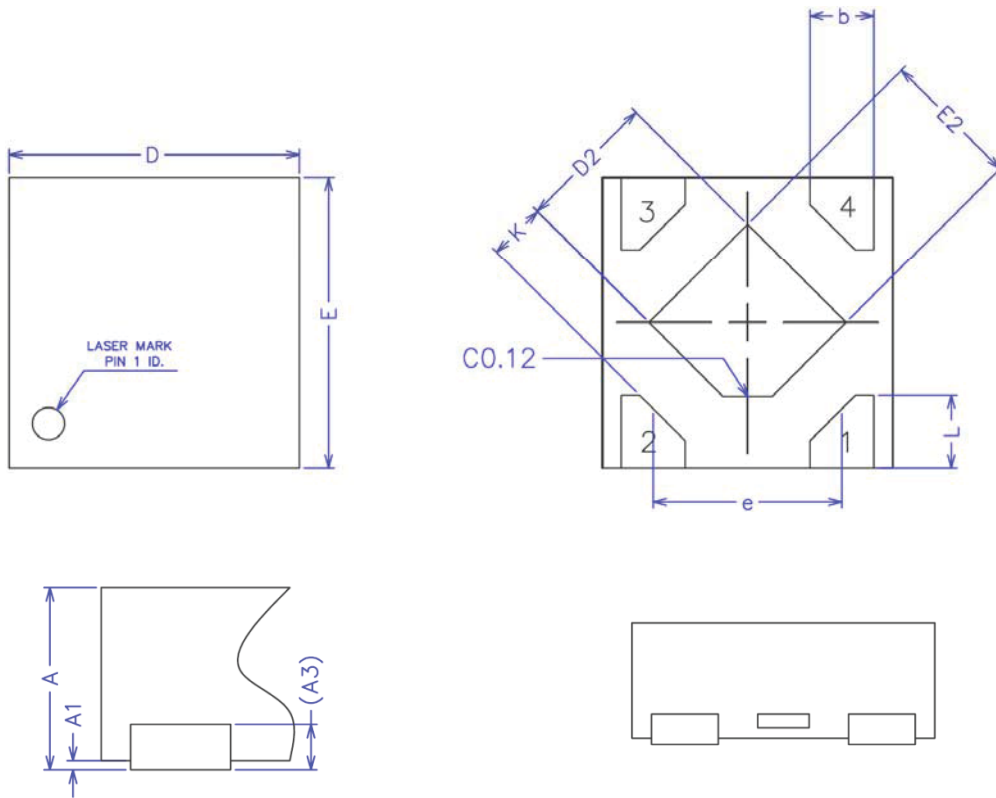
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.031	0.044
A1	0.000	0.100	0.000	0.004
B	1.150	1.350	0.045	0.054
b	0.150	0.400	0.006	0.016
C	1.800	2.450	0.071	0.096
D	1.800	2.250	0.071	0.089
e	0.650		0.026	
H	0.080	0.260	0.003	0.010
L	0.210	0.460	0.008	0.018



- SOT-89-3 PACKAGE OUTLINE DIMENSIONS



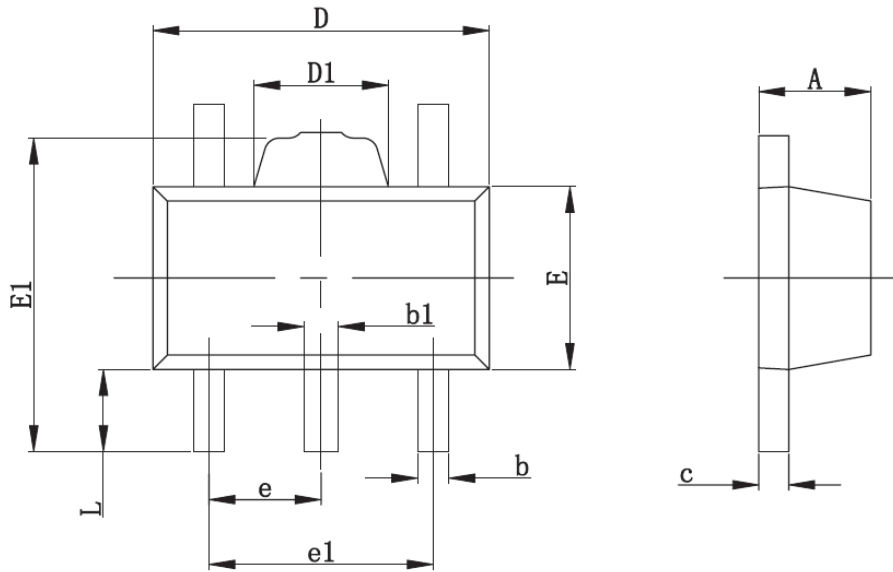
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

**● DFN1X1-4 PACKAGE OUTLINE DIMENSIONS**


COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A3	0.100REF		
b	0.17	0.22	0.27
D	0.95	1.00	1.05
E	0.95	1.00	1.05
D2	0.43	0.48	0.53
E2	0.43	0.48	0.53
L	0.20	0.25	0.30
e	—	0.65	—
K	0.15	—	—

- 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	1.500TYP		0.060TYP	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043