

## 500mA Low Dropout CMOS Voltage Regulators

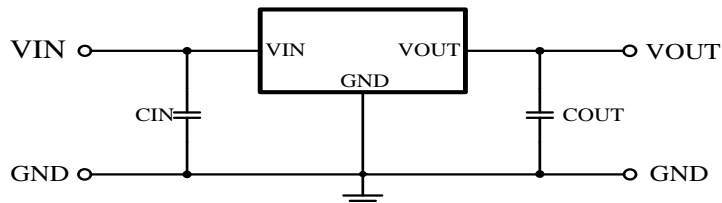
### ■ General Description

The LN6214 series are highly precise, low power consumption, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage. The LN6214 consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error amplifier. Output voltage is selectable in 0.1V steps between 1.5V~6.0V.

### ■ Features

- Output Voltage Range: 1.5V to 6.0V (selectable in 100mV steps)
- Highly Accurate:  $\pm 2\%$
- Dropout Voltage : 500mV @ 500mA (3.3V type)
- Low Power Consumption: 8.0 $\mu$ A (TYP.)
- Maximum Output Current : 500mA ( $V_{in} \geq V_{out} + 1V$ )
- Internal protector: current limiter and short protector
- Maximum Operating voltage: 7.0V

### ■ Typical Application Circuit



- Caution:** 1. The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.
2. Input capacitor (CIN): 1.0 $\mu$ F or more; Output capacitor (CL): 1.0 $\mu$ F or more

### ■ Ordering Information

#### LN6214P ①②③④⑤

Designator	Symbol	Description	Designator	Symbol	Description
①②	31	Output Voltage e.g. 30: 3.0V 50: 5.0V	④	M	SOT23-3L
				P	SOT-89
				N	SOT23-6L
③	1/2	Output Voltage Accuracy e.g. 1: $\pm 1\%$ 2: $\pm 2\%$	⑤	R	Embossed tape, standard feed
				L	Embossed tape, reverse feed

- Small packages: SOT-89-3, SOT-26

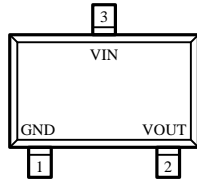
### ■ Applications

- DVD, CD-ROM, HDD drive equipment
- Wireless Communication equipment (Mobile & Cordless phone, etc.)
- Network equipment (Wireless LAN etc.)
- Desktop computers, Note book computer, PDAs
- Portable AV equipment
- Reference voltage
- Battery powered equipment

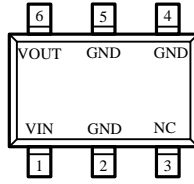
### ■ Package

- SOT89-3L
- SOT23-6L
- SOT23-3L

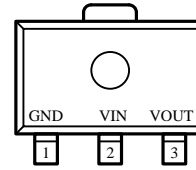
## ■ Pin Configuration



SOT23-3L  
(TOP VIEW)



SOT23-6L  
(TOP VIEW)

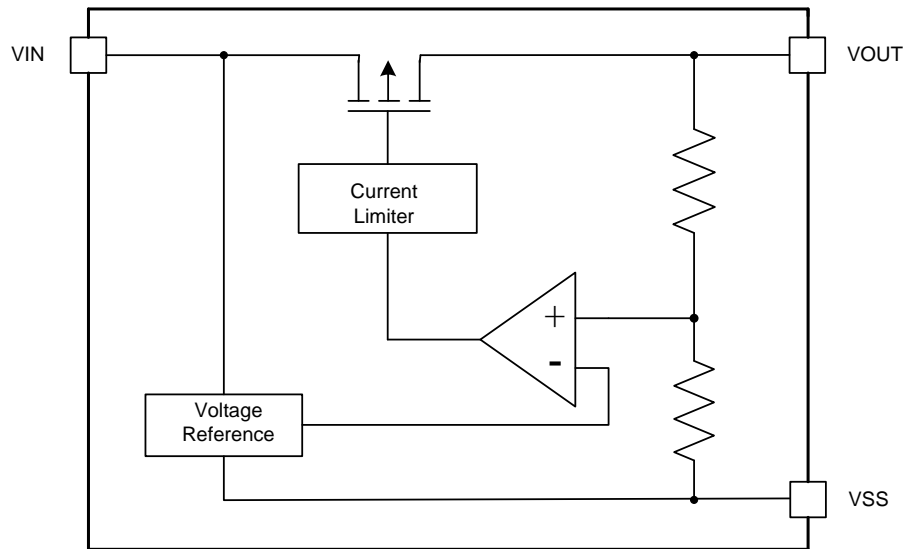


SOT89-3L  
(TOP VIEW)

## ■ Pin Assignment

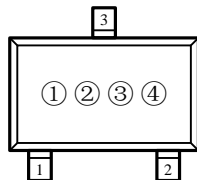
Pin Number			Pin Name	Function
SOT23-6L	SOT23-3L	SOT89-3L		
6	2	3	VOUT	OUTPUT
2/4/5	1	1	GND	GROUND
1	3	2	VIN	POWER INPUT
3	-	-	NC	No Connection

## ■ Function Block Diagram

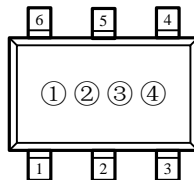


## ■ Marking Rule

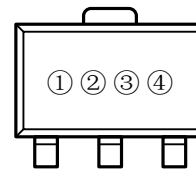
- SOT89-3L , SOT23-6L, SOT23-3L



SOT23-3L  
(TOP VIEW)



SOT23-5L  
(TOP VIEW)



SOT89-3L  
(TOP VIEW)

① Represents the product name

Symbol	Product Name
N	LN6214P◆◆2◆◆

② Represents the range of output voltage

Voltage(V)	0.1~3.0	3.1~6.0
Symbol	5	6

③ Represents the Output Voltage

Symbol	Output Voltage (V)		Symbol	Output Voltage (V)	
0	-	3.1	F	1.6	4.6
1	-	3.2	H	1.7	4.7
2	-	3.3	K	1.8	4.8
3	-	3.4	L	1.9	4.9
4	-	3.5	M	2.0	5.0
5	-	3.6	N	2.1	5.1
6	-	3.7	P	2.2	5.2
7	-	3.8	R	2.3	5.3
8	-	3.9	S	2.4	5.4
9	-	4.0	T	2.5	5.5
A	-	4.1	U	2.6	5.6
B	-	4.2	V	2.7	5.7
C	-	4.3	X	2.8	5.8
D	-	4.4	Y	2.9	5.9
E	1.5	4.5	Z	3.0	6.0

④ Represents the assembly lot no.

0~9, A~Z repeated (G, I, J, O, Q, W excepted)

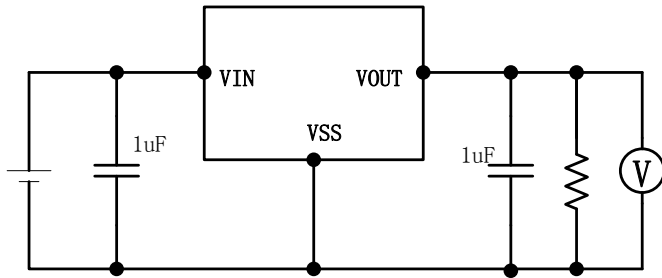
## ■ Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating	Unit	
Input Voltage	$V_{IN}$	$V_{SS}-0.3 \sim V_{SS}+10$	V	
Output Voltage	$V_{OUT}$	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Output Current	$I_{OUT}$	800*	mA	
Power Dissipation	$P_D$	SOT-26	500	mW
		SOT-89-3	500	
Operating Ambient Temperature	$T_{opr}$	-40~+85	°C	
Storage Temperature	$T_{stg}$	-55~+125		

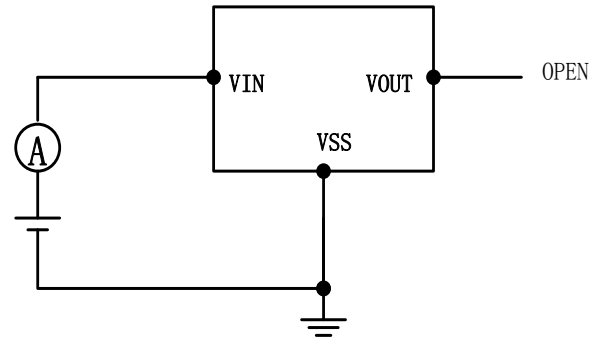
\*  $I_{OUT} \cong P_D / (V_{IN} - V_{OUT})$

**Caution:** The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

## Test Circuits



Circuit 1



Circuit 2

## Electrical Characteristics

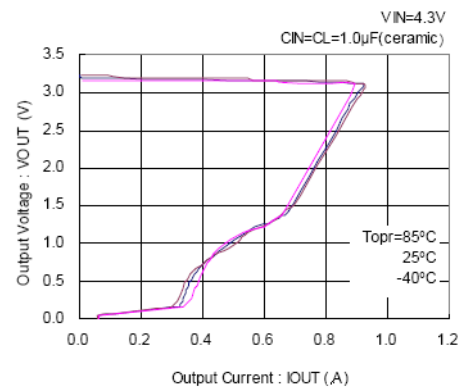
(TA=25°C unless otherwise noted)

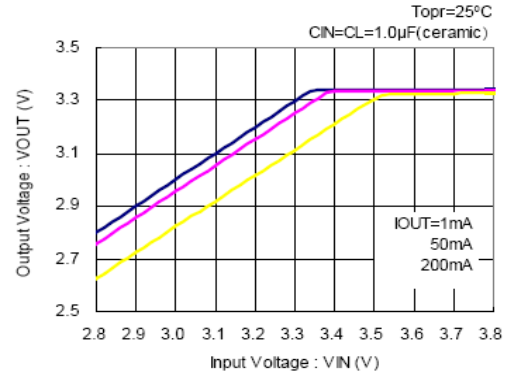
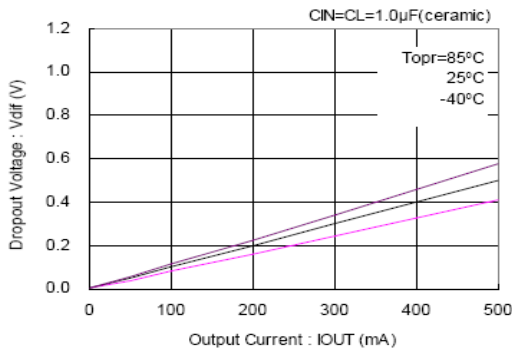
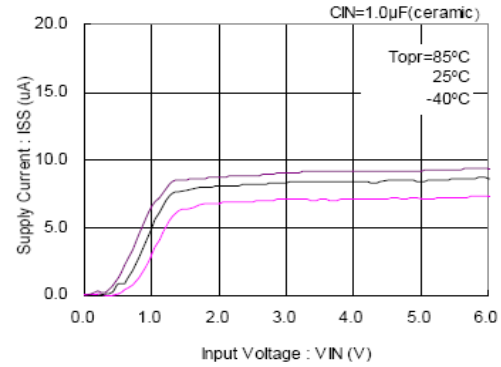
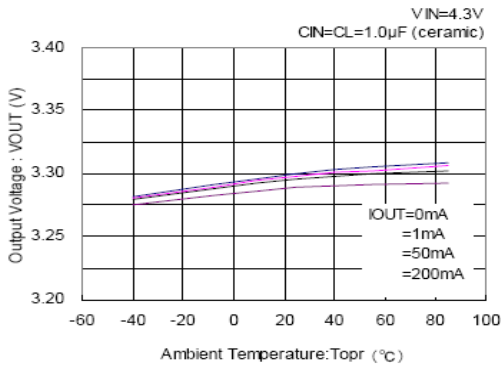
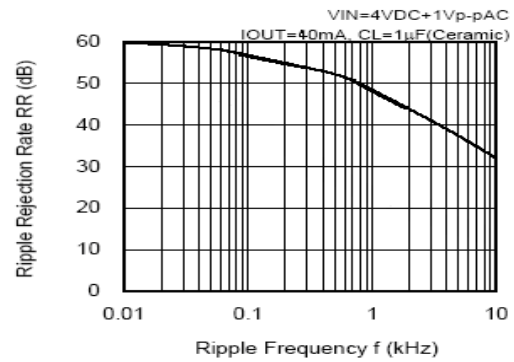
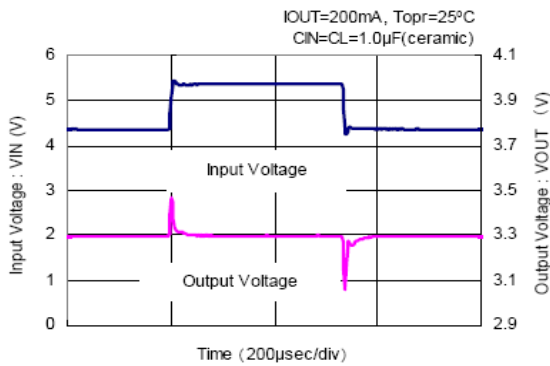
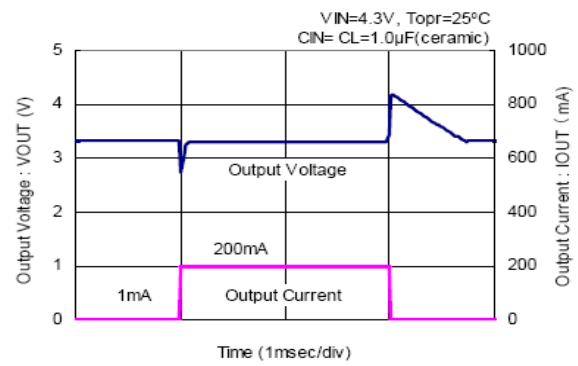
Item	Symbol	Condition	Min	Typ	Max	Unit	Circuit	
Output Voltage	$V_{OUT(E)}$	$V_{IN} = V_{OUT(S)} + 1.0 \text{ V}$ , $I_{OUT} = 50 \text{ mA}$	$V_{OUT(S)} \times 0.98$	$V_{OUT(S)}$	$V_{OUT(S)} \times 1.02$	V	1	
Output Current	$I_{OUT}$	$V_{IN} \geq V_{OUT(S)} + 1.0 \text{ V}$	500	—	—	mA	1	
Dropout Voltage	$V_{drop}$	$I_{OUT} = 500 \text{ mA}$	$2.2 \text{ V} \leq V_{OUT(S)} \leq 2.5 \text{ V}$	—	0.65	1.05	V	1
			$2.6 \text{ V} \leq V_{OUT(S)} \leq 3.3 \text{ V}$	—	0.55	0.82		
			$3.4 \text{ V} \leq V_{OUT(S)} \leq 5.5 \text{ V}$	—	0.48	0.76		
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{OUT(S)} + 0.5 \text{ V} \leq V_{IN} \leq 7 \text{ V}$ $I_{OUT} = 80 \text{ mA}$	—	0.05	0.3	%/V		

Input Voltage	$\Delta V_{OUT2}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$ $1.0\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	20	50	mV	
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_a \cdot V_{OUT}}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$ , $I_{OUT}=10\text{ mA}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	—	$\pm 100$	—	ppm/ $^\circ\text{C}$	
Supply Current	$I_{SS1}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$	—	8	15	$\mu\text{A}$	2
Input Voltage	$V_{IN}$	—	1.8	—	7	V	—
Ripple-Rejection	RR	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$ , $f=1.0\text{ kHz}$ $V_{rip}=0.5\text{ V}_{rms}$ , $I_{OUT}=80\text{ mA}$	—	50	—	dB	1
Short current	$I_{short}$	$V_{IN}=V_{OUT(S)}+1.5\text{ V}$ ,	—	50	—	mA	1
Current Limiter	$I_{lim}$	$V_{IN}=V_{OUT(S)}+1.5\text{ V}$ ,	—	800	—	mA	1

## ■ Typical Performance Characteristics (3.3V output)

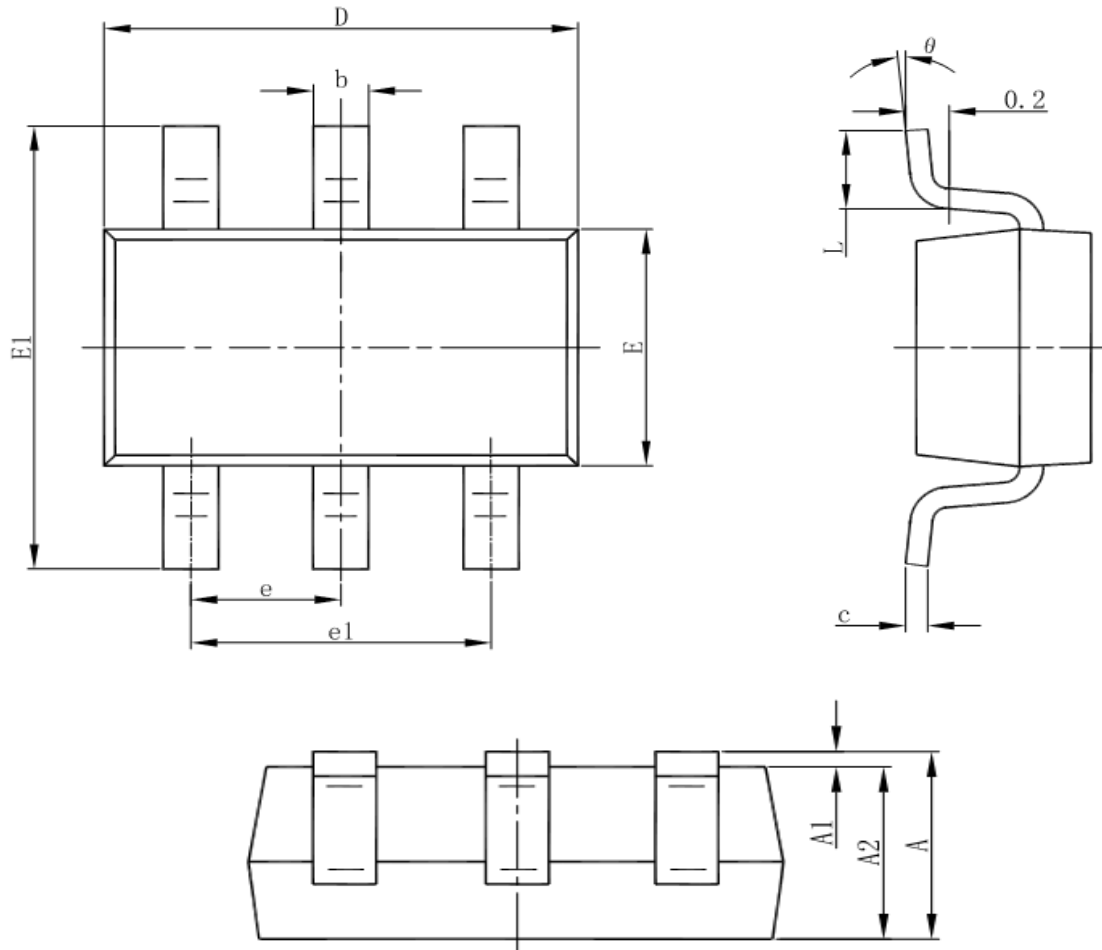
### 1、Output Voltage vs. Output Current



**2、 Output Voltage vs. Input Voltage (Contd.)**

**3、 Dropout Voltage vs. Output Current**

**4. Supply Current vs. Supply Voltage**

**5、 Output Voltage vs. Ambient Temperature**

**6、 Ripple Rejection Rate**

**7、 Transient Response**
**Input Transient Response**

**Load Transient Response**


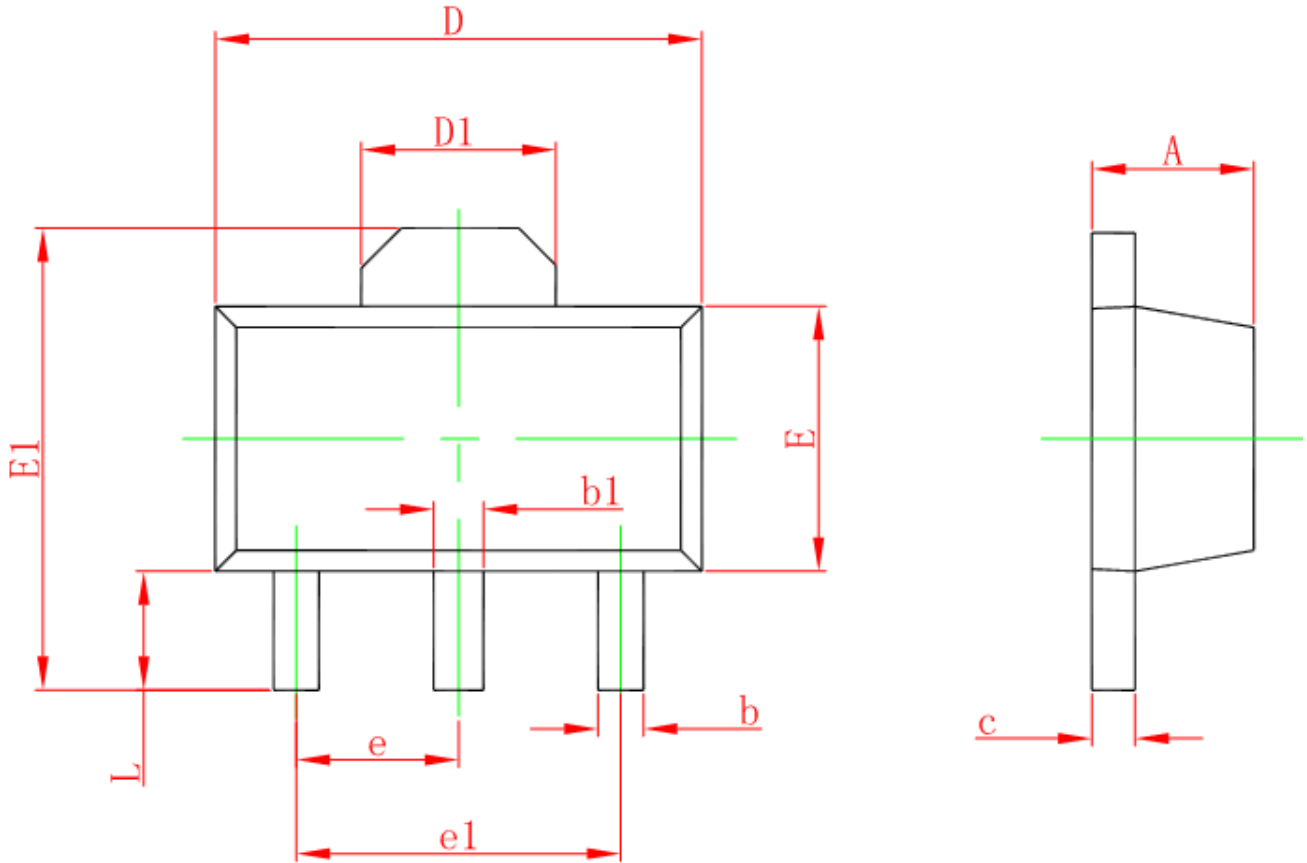
**Package Information**

- SOT-23-6L



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°

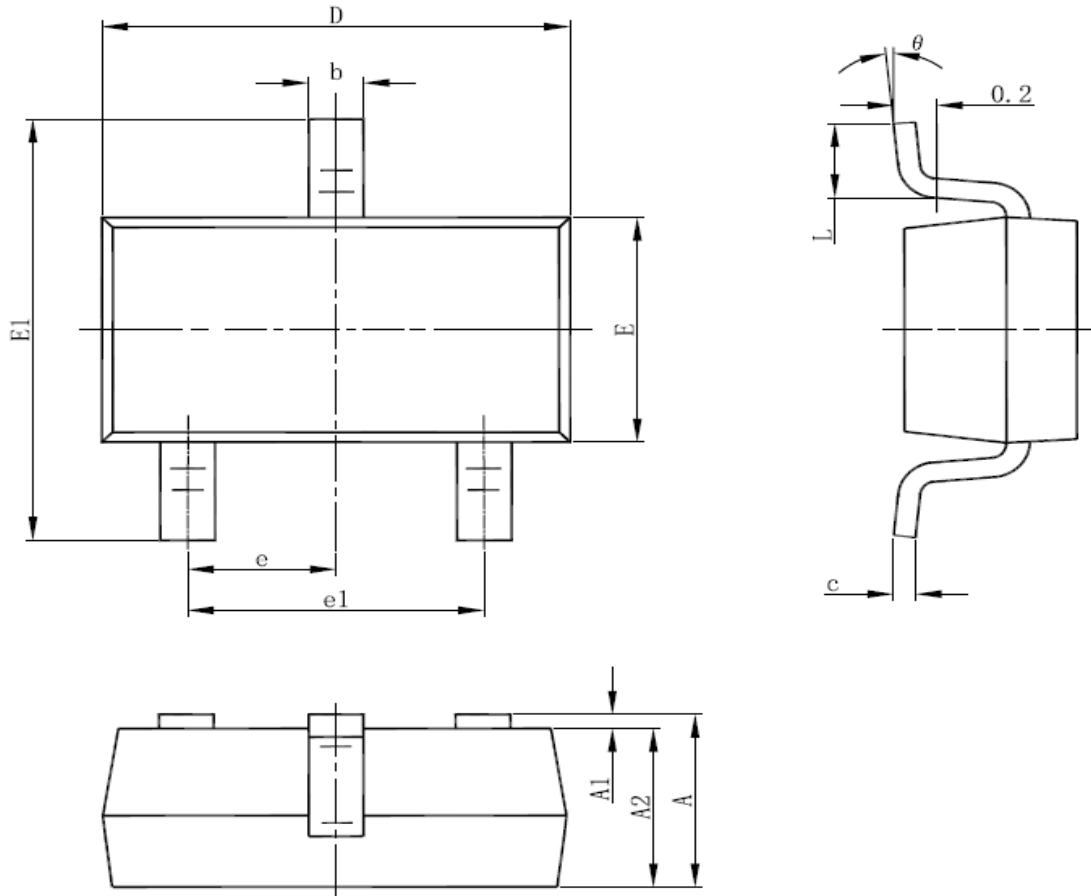
## ● SOT-89-3L



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



## ● SOT23-3L



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A1	0.000	0.100	0.000	0.004
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L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°