



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 μ A (TYP.)
- Maximum Output Current : 500mA ($V_{in} \geq V_{out} + 1V$)
- Internal protector: current limiter and short protector
- Maximum Operating voltage: 10V
- Small packages: SOT-89-3, SOT-26, SOT-223

■ 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

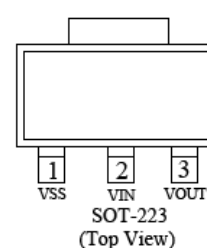
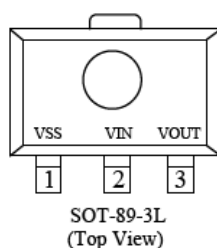
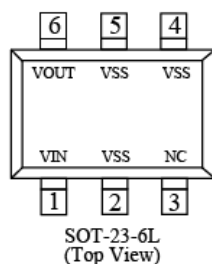
- SOT-89-3L
- SOT-23-6L
- SOT-223

■ Ordering Information

LN6214P ①②③④⑤

Designator	Symbol	Description	Designator	Symbol	Description
①②	31	Output Voltage e.g. 30: 3.0V 50: 5.0V	④	M	SOT-26
				P	SOT-89
				F	SOT-223
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

■ Pin Configuration

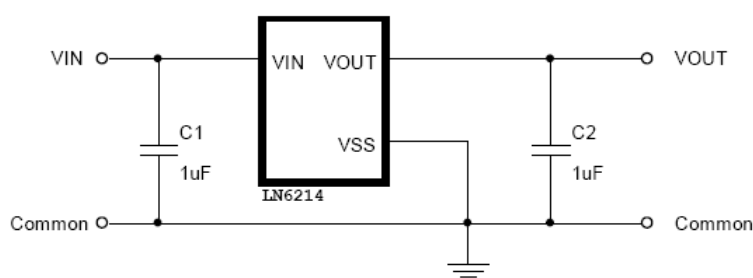




■ Pin Assignment

Pin Number			Pin Name	Function
SOT26	SOT89-3	SOT-223		
6	3	3	Vout	OUTPUT
2, 4, 5	1	1	Vss	GROUND
1	2	2	Vin	POWER INPUT
3	-	-	NC	No Connection

■ Typical Application Circuit



Caution: The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

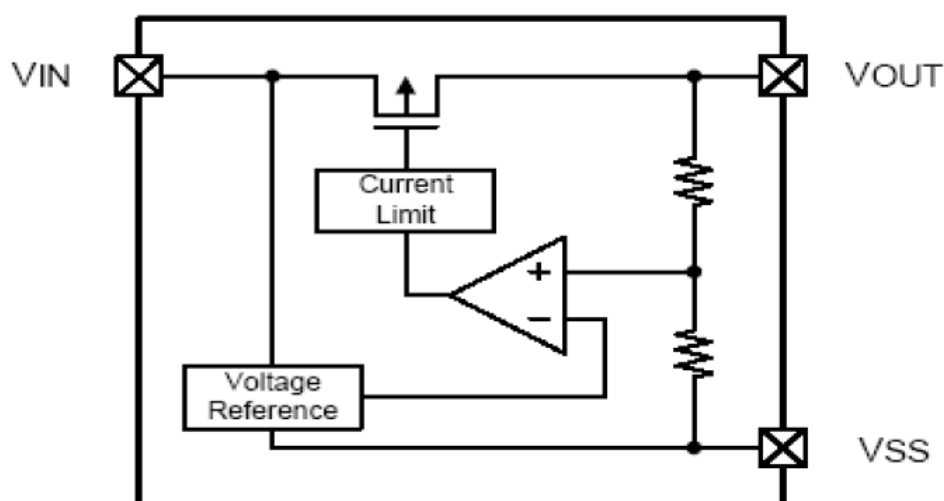
■ Application Conditions

Input capacitor (CIN): 1.0 μ F or more

Output capacitor (CL): 1.0 μ F or more (tantalum capacitor)

Caution A general series regulator may oscillate, depending on the external components selected. Check that no oscillation occurs with the application using the above capacitor.

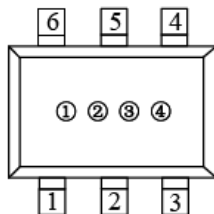
■ Function Block Diagram



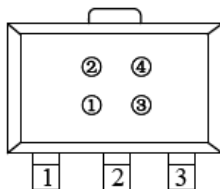


■ Marking Rule

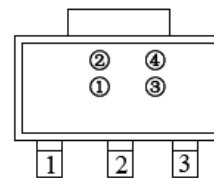
- SOT-89-3L , SOT-23-6L,SOT-223



SOT-23-6L
(Top View)



SOT-89-3L
(Top View)



SOT-223
(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)	
0	-	3.1
1	-	3.2
2	-	3.3
3	-	3.4
4	-	3.5
5	-	3.6
6	-	3.7
7	-	3.8
8	-	3.9
9	-	4.0
A	-	4.1
B	-	4.2
C	-	4.3
D	-	4.4
E	1.5	4.5

Symbol	Output Voltage (V)	
F	1.6	4.6
H	1.7	4.7
K	1.8	4.8
L	1.9	4.9
M	2.0	5.0
N	2.1	5.1
P	2.2	5.2
R	2.3	5.3
S	2.4	5.4
T	2.5	5.5
U	2.6	5.6
V	2.7	5.7
X	2.8	5.8
Y	2.9	5.9
Z	3.0	6.0

④ Represents the assembly lot no.

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



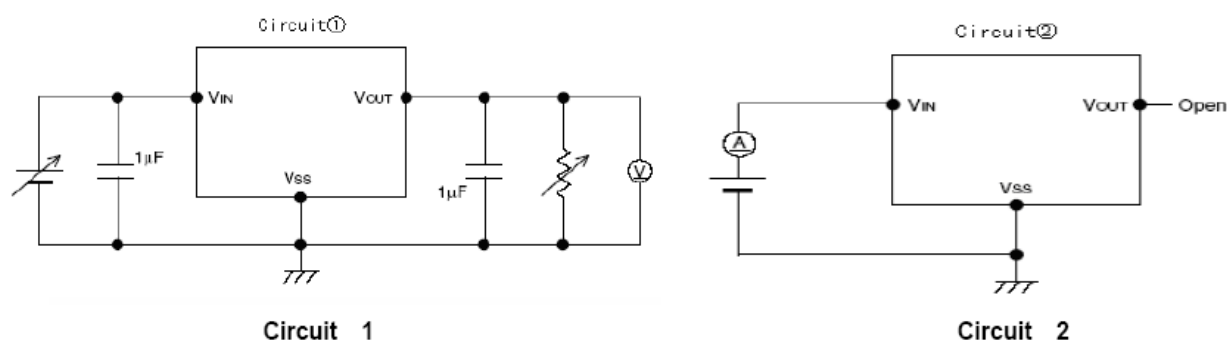
■ Absolute Maximum Ratings

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
		SOT-89-3	500
		SOT-223	1500
Operating Ambient Temperature	T_{opr}	$-40 \sim +85$	°C
Storage Temperature	T_{stg}	$-55 \sim +125$	

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

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





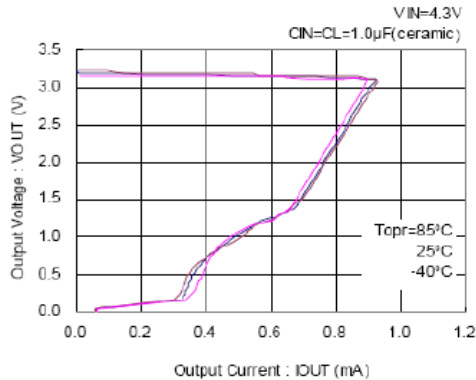
■ Electrical Characteristics

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
			$2.6\text{ V} \leq V_{OUT(S)} \leq 3.3\text{ V}$	—	0.55	0.82	
			$3.4\text{ V} \leq V_{OUT(S)} \leq 5.5\text{ V}$	—	0.48	0.76	
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{OUT(S)}+0.5\text{ V} \leq V_{IN} \leq 9\text{ V}$ $I_{OUT}=80\text{ mA}$	—	0.05	0.3	%/V	
Input Voltage	ΔV_{OUT2}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$ $1.0\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	20	50	mV	1
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_a \cdot V_{OUT}}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, $I_{OUT}=10\text{ mA}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	—	± 100	—	ppm/ $^\circ\text{C}$	
Supply Current	I_{SS1}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$	—	8	15	μA	2
Input Voltage	V_{IN}	—	1.8	—	9	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

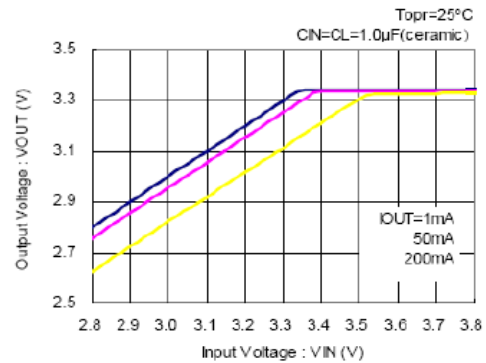


Typical Performance Characteristics (3.3V output)

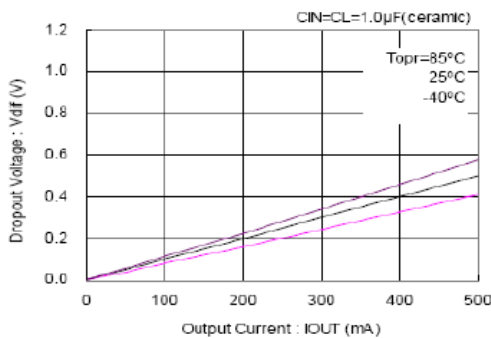
1、Output Voltage vs. Output Current



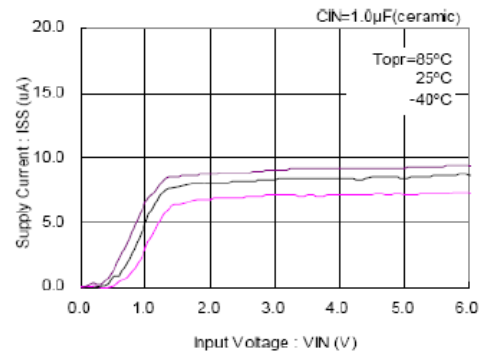
2、Output Voltage vs. Input Voltage (Contd.)



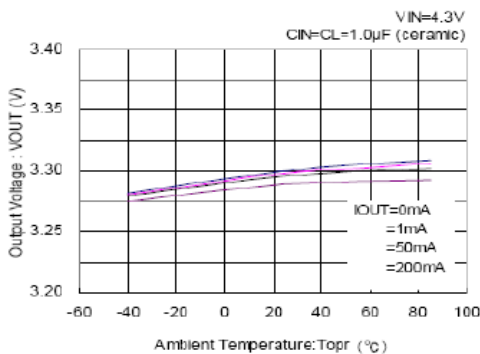
3、Dropout Voltage vs. Output Current



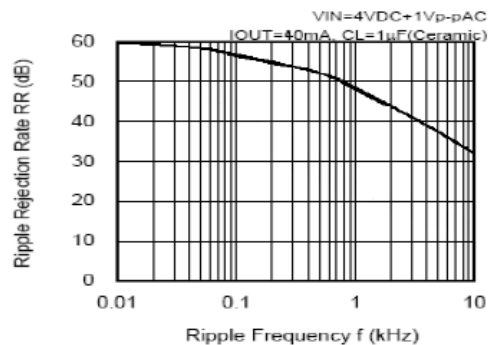
4、Supply Current vs. Supply Voltage



5、Output Voltage vs. Ambient Temperature

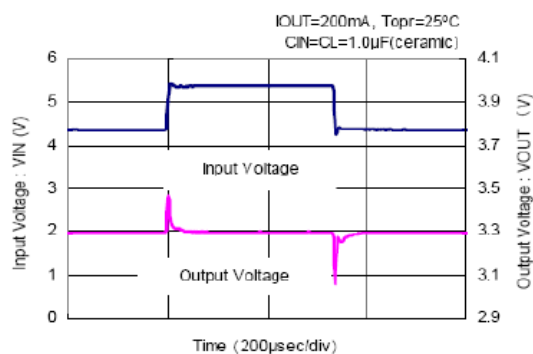


6、Ripple Rejection Rate

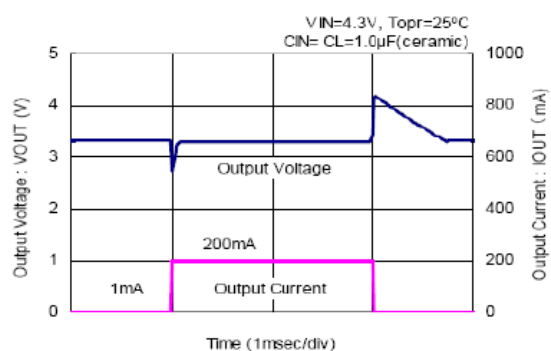


7、Transient Response

Input Transient Response



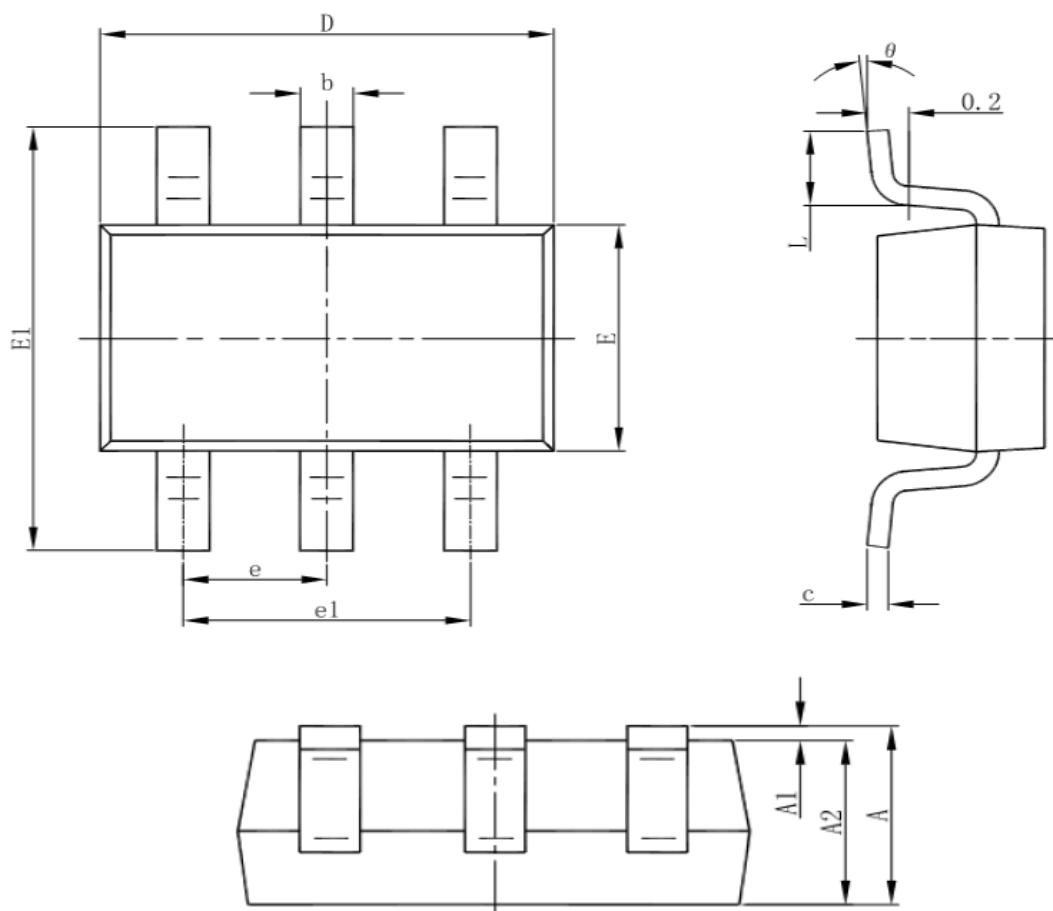
Load Transient Response





■ Package Information

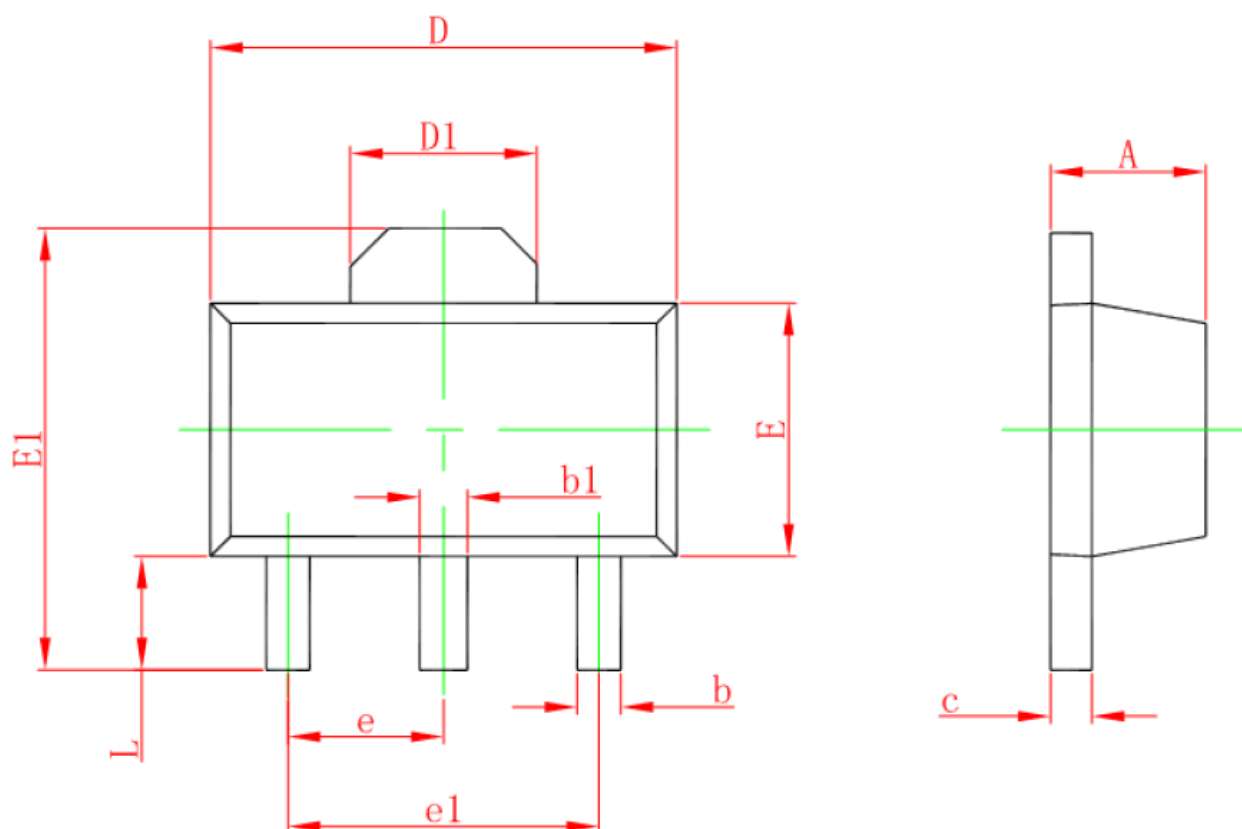
- SOT-23-6L



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
θ	0°	8°	0°	8°



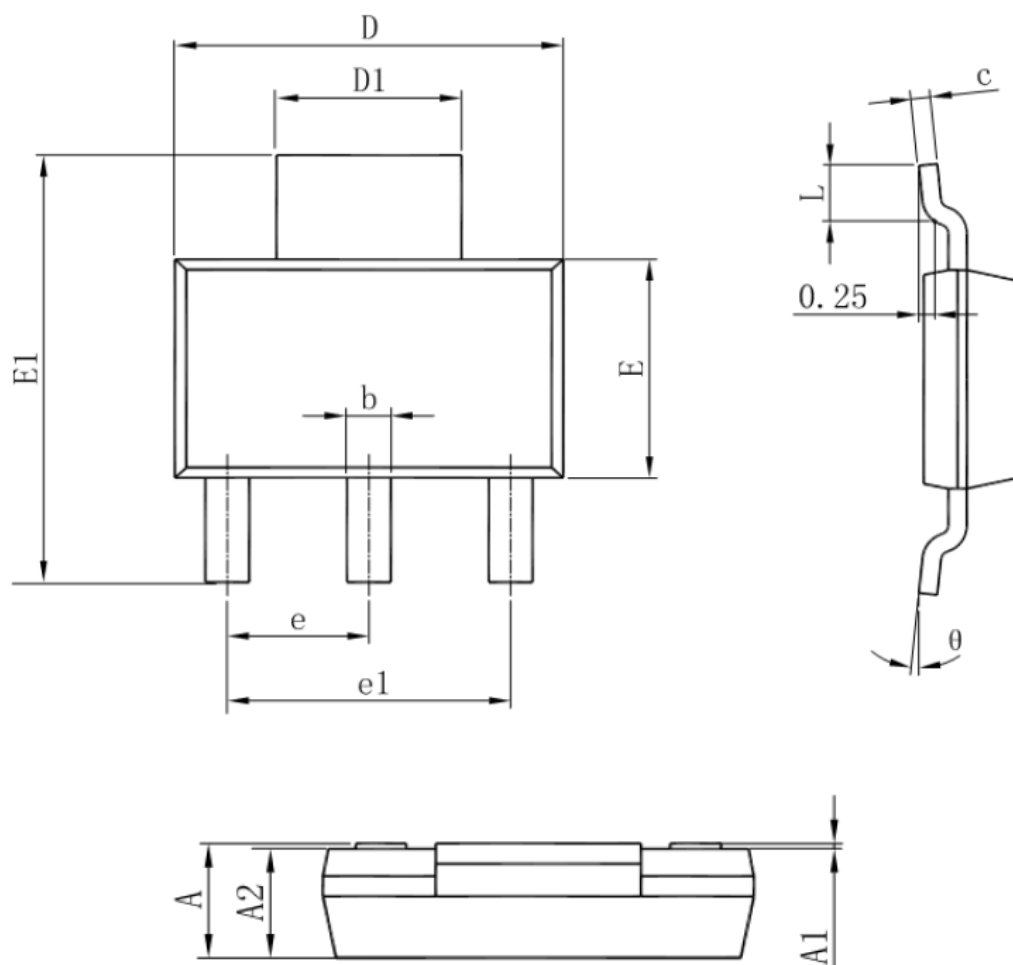
• SOT-89-3L



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



• SOT-223



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°