

Current 300mA High Voltage 40V Low Power LDO

MC4300

General Description

The MC4300 series is a group of positive voltage output, three-pin regulators, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.

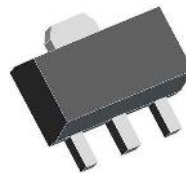
The MC4300 consists of a high-precision voltage reference, an error amplification circuit, and a current limited output driver. Transient response to load variations have improved in comparison to the existing series.



SOT23-3L



SOR23-5L



SOT89-3L



SOT223

Features

- Low Quiescent Current: 1.6 μ A(type);
- Temperature Stability: ± 50 ppm/ $^{\circ}$ C ;
- Max input voltage: 40V;
- Output voltage accuracy: tolerance $\pm 2\%$;
- Dropout Voltage: 20mV@Iout=10mA 350mV@Iout=100mA;
- Max Output Current: 300mA;
- Protections Circuits: Current Limiter, Short Circuit, Thermal shutdown
- Packages:SOT23-3L、SOR23-5L、SOT89-3L、SOT223;

Applications

- Industrial control
- Consumer electronics
- Battery power equipment
- Wireless communication equipment



Order information

Product model	Package	Manner of packing	Minimum packing quantity
MC4300PxxMx	SOT23-3L	Reel	3000
MC4300PxxM5x	SOT23-5L		3000
MC4300PxxPx	SOT89-3L		1000
MC4300PxxPBx	SOT89-3L(B)		1000
MC4300PxxFx	SOT223		2500
MC4300PxxFBx	SOT223(B)		2500

Selection Guide Table

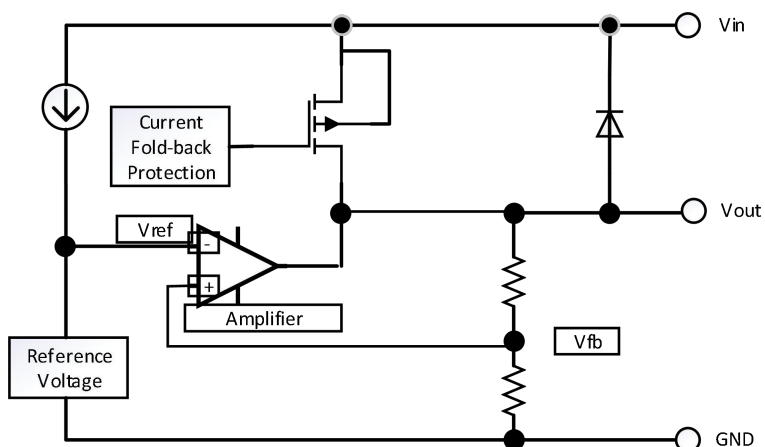
MC4300P①②③④

Designator	Symbol	Description
①②	Integer	Output Voltage(3.0V~12.0V)
③	M	Package:SOT23-3L
	M5	Package:SOT23-5L
	P	Package:SOT89-3L
	PB	Package:SOT89-3L(B)
	F	Package:SOT223
	FB	Package:SOT-223(B)
④	R	RoHS / Pb Free
	G	Halogen Free

Note: ①②stands for output voltages. Other voltages can be specially customized.



Functional Block Diagram



PIN CONFIGURATION (Top View)

MC4300PxxMx		
NO.	Description	<p>SOT23-3L (Top View)</p>
1	GND	
2	Vout	
3	Vin	
MARK	01Mxx YWH	
MC4300PxxM5x		
NO.	Description	<p>SOT23-5L (Top View)</p>
1	Vin	
2	GND	
3	NC	
4	NC	
5	Vout	
MARK	01M5xx YWH	



MC4300PxxPx		
NO.	Description	<p style="text-align: center;">SOT89-3L (Top View)</p>
1	GND	
2	Vin	
3	Vout	
MARK	01Pxx YWH	
MC4300PxxPBx		
NO.	Description	<p style="text-align: center;">SOT89-3L(B) (Top View)</p>
1	Vout	
2	GND	
3	Vin	
MARK	01PBxx YWH	
MC4300PxxFx		
NO.	Description	<p style="text-align: center;">SOT-223 (Top View)</p>
1	GND	
2	Vin	
3	Vout	
MARK	01Pxx YWH	
MC4300PxxFBx		
NO.	Description	<p style="text-align: center;">SOT-223 (B) (Top View)</p>
1	Vout	
2	GND	
3	Vin	
MARK	01FBxx YWH	

Note: xx:Output

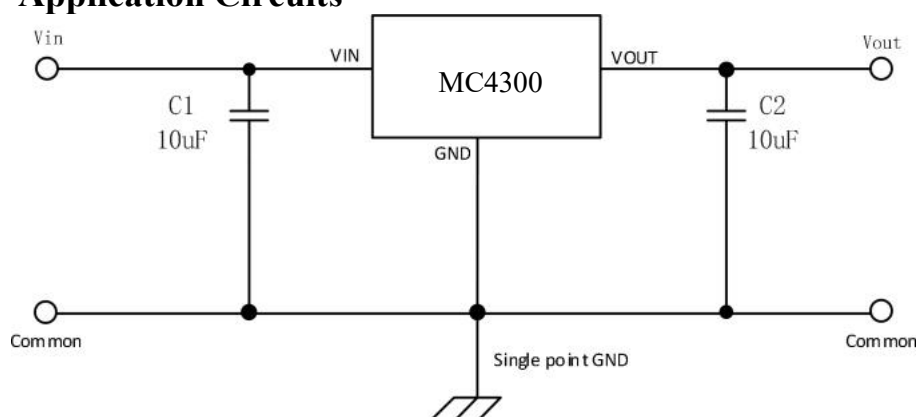
Voltage, "33" stands for 3.3V

Y: The Year of manufacturing, "2" stands for year 2022;

W: The week of manufacturing. "20" stands for week 20;

H: Factory Code;

Application Circuits



Absolute Maximum Ratings

(Unless otherwise indicated: $T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Voltage	V_{IN}	-0.3	40	V
Output Voltage	V_{OUT}	$V_{SS}-0.3$	$V_{IN}+0.3V$	
Output Current	I_{out}	-	300	mA
Power Dissipation	$P_D^{(1)}$		SOT23-3 220 SOT23-5 220 SOT-89 650 SOT 223 1000	mW
Operating Ambient Temperature	T_{opr}	-40	85	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40	125	
ESD Protection	ESD HBM		2000	V

Note: These are just the limit parameters. Beyond the range specified in the Absolute Maximum Ratings may cause serious damage to the equipment. Long exposure to extreme conditions may affect the reliability of the device.

(1) Increasing the welding area of package is beneficial to increase power consumption

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Voltage	V_{IN}	-0.3	36	V
Operating Ambient Temperature	T_{opr}	-40	85	$^{\circ}\text{C}$

Note: Always use semiconductor devices within their recommended operating condition ranges.

Operation outside these ranges may adversely affect reliability



Electrical Characteristics

 MC4300 Series (Unless otherwise indicated: $T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage ¹	$V_{OUT(S)}$	$V_{IN}=V_{OUT(S)}+2V, I_{OUT}=10\text{mA}$	$V_{OUT(S)} \times 0.98$	$V_{OUT(S)}$	$V_{OUT(S)} \times 1.02$	V	
Dropout Voltage ²	V_{DROP}	$I_{OUT}=10\text{mA}$	-	20	-	mV	
		$I_{OUT}=100\text{mA}$		350	-		
		$I_{OUT}=200\text{mA}$		770	-		
		$I_{OUT}=300\text{mA}$	-	1280	-		
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$V_{OUT(S)}+2V \leq V_{IN} \leq 36V$ $I_{OUT}=10\text{mA}$	-	0.01	0.02	%/V	
Load Regulation	ΔV_{OUT2}	$V_{IN}=V_{out(S)}+2V$ $1\text{mA} \leq I_{OUT} \leq 300\text{mA}$	$V_{out(S)} \leq 10V$	40	90	mV	
			$V_{out(S)} > 10V$	85	150		
Temperature Stability	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=V_{OUT(S)}+2V, I_{OUT}=10\text{mA}$ $-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$		± 50		ppm/ $^{\circ}\text{C}$	
Quiescent Current	I_q	no load	$V_{OUT(S)} < 3.0V$	0.8	1.2	2	μA
			$3.0 \leq V_{OUT(S)} \leq 40V$	1	1.6	3	
Input Voltage	V_{IN}	---	2.2		40	V	
Maximum Output Current	I_{OUTMAX}			300		mA	
Current Limit ³	I_{LIM}	$V_{IN}=V_{OUT(S)}+1V,$ $V_{OUT}=0.98 \times V_{OUT(S)}$		340		mA	
Short Circuit Current	I_{SHORT}	$V_{IN}=V_{out(S)}+2V, V_{out}$ Short to GND with 0Ω		140		mA	
Power Supply Rejection Ratio	PSRR	$f=10\text{Hz}, V_{OUT(S)}=3.3V$		70		dB	
		$f=100\text{Hz}, V_{OUT(S)}=3.3V$		70			
		$f=1\text{kHz}, V_{OUT(S)}=3.3V$		55			
Over Temperature Protection	OTP	$I_{OUT}=10\text{mA}$		140		$^{\circ}\text{C}$	

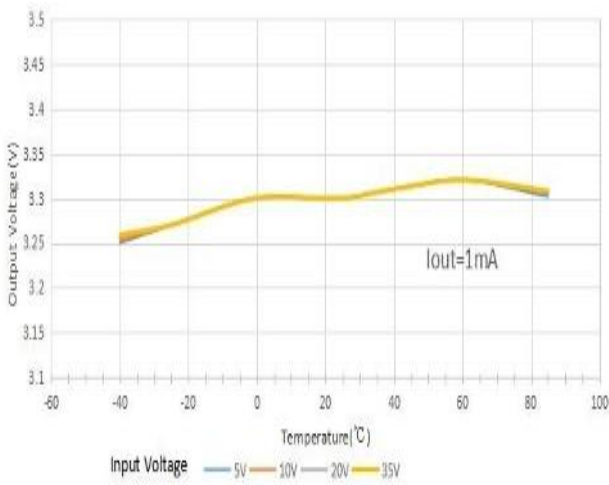
Notes:

1. $V_{OUT(S)}$: Output voltage when $V_{IN}=V_{out}+2V, I_{out}=1\text{mA}$.
2. $V_{DROP}=V_{in1} - (V_{out(S)} \times 0.98)$ where V_{in1} is the input voltage when $V_{out} = V_{out(S)} \times 0.98$.
3. I_{LIM} : Output current when $V_{in}=V_{out(S)}+1V$ and $V_{out} = 0.98 \times V_{out(S)}$.

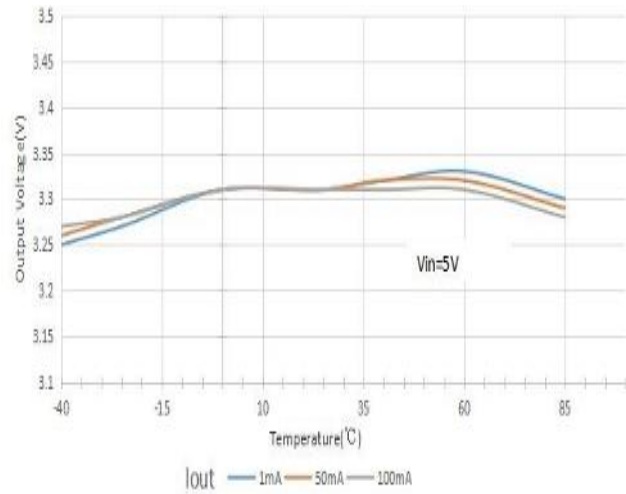


Typical Performance Characteristics

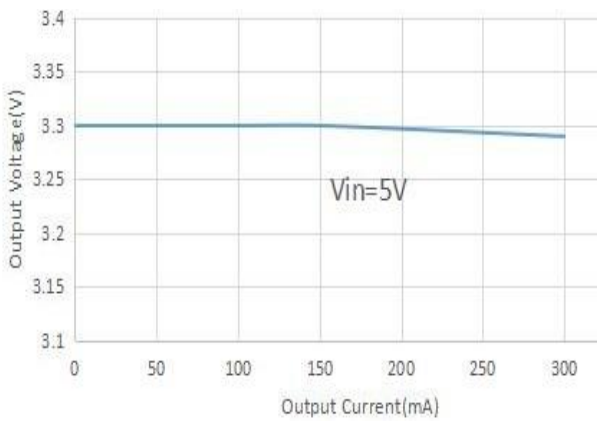
Test Conditions:MC4300P33P SOT-89 CIN=10μF, COUT=10μF,Ta=25°C,unless otherwise indicated.



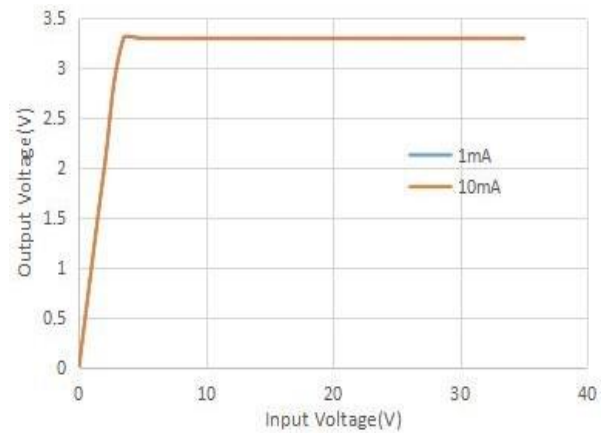
V_{OUT} vs Temperature
MC4300P33PR



V_{OUT} vs Temperature
MC4300P33PR



V_{OUT} Vs Output Current
MC4300P33PR

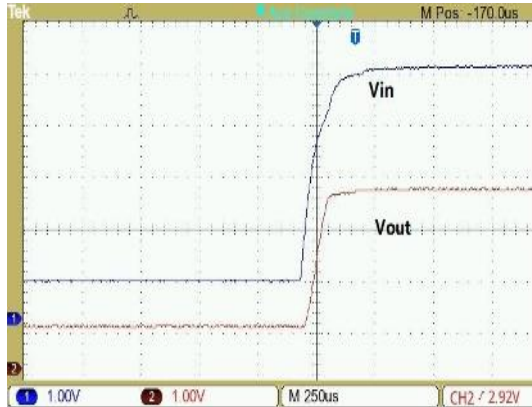


V_{OUT} Vs Input Voltage
MC4300P33PR

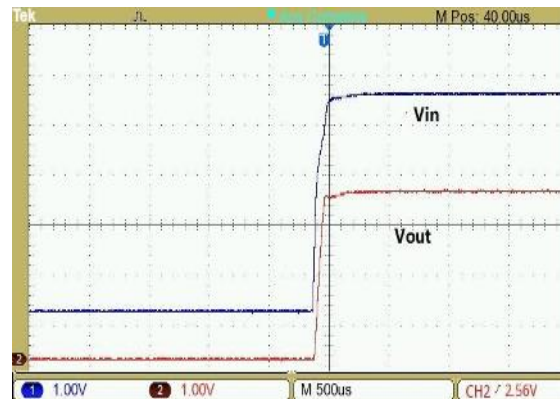


Typical Performance Characteristics

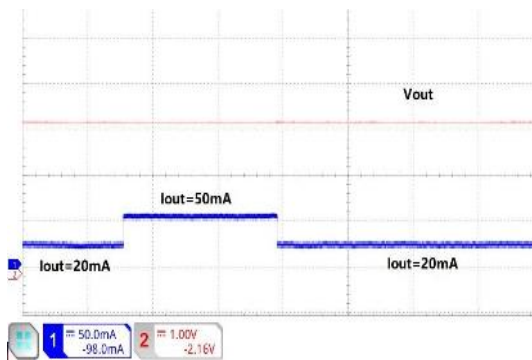
Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=10\mu F$, $C_{OUT}=10\mu F$, unless otherwise indicated.



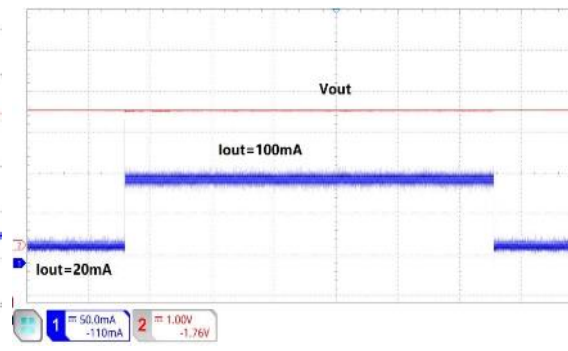
Power-Up at $V_{OUT}=3.3V$ MC4300P33PR
($I_{OUT}=0mA$)



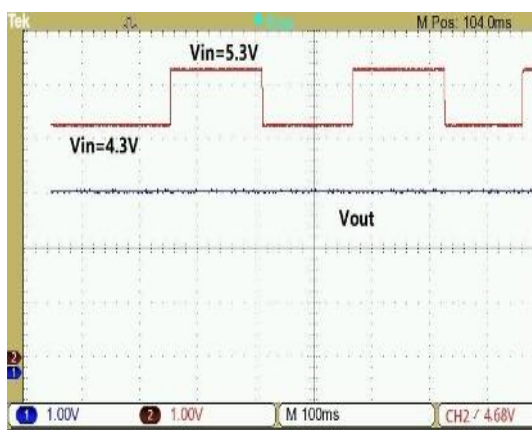
Power-Up at $V_{OUT}=3.3V$ MC4300P33PR
($I_{OUT}=100mA$)



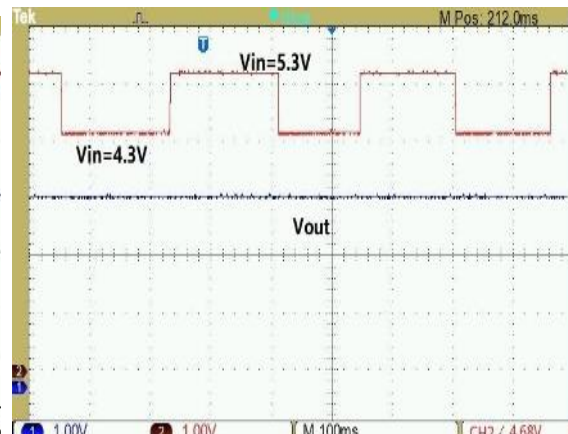
Load transient response
 $V_{out}=3.3V$,MC4300P33PR



Load transient response
 $V_{out}=3.3V$,MC4300P33PR



Input Voltage transient response
 $V_{out}=3.3V$, $I_{out}=10mA$,MC4300P33PR

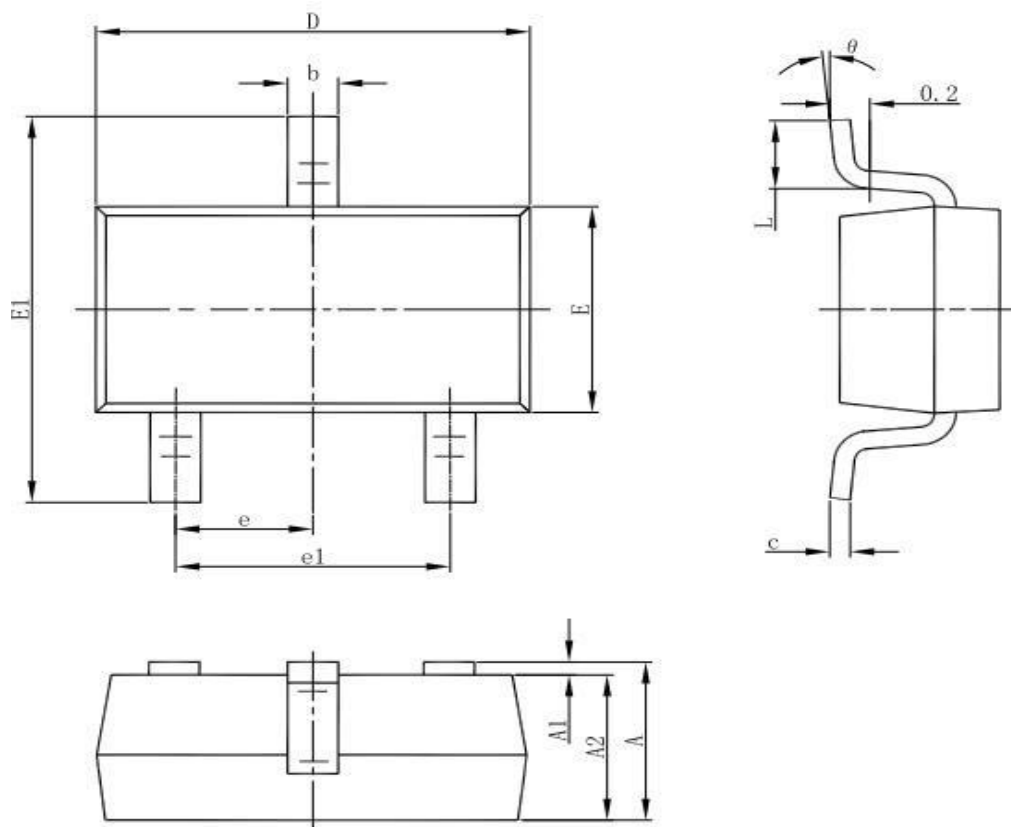


Input Voltage transient response
 $V_{out}=3.3V$, $I_{out}=100mA$,MC4300P33PR



Package Information

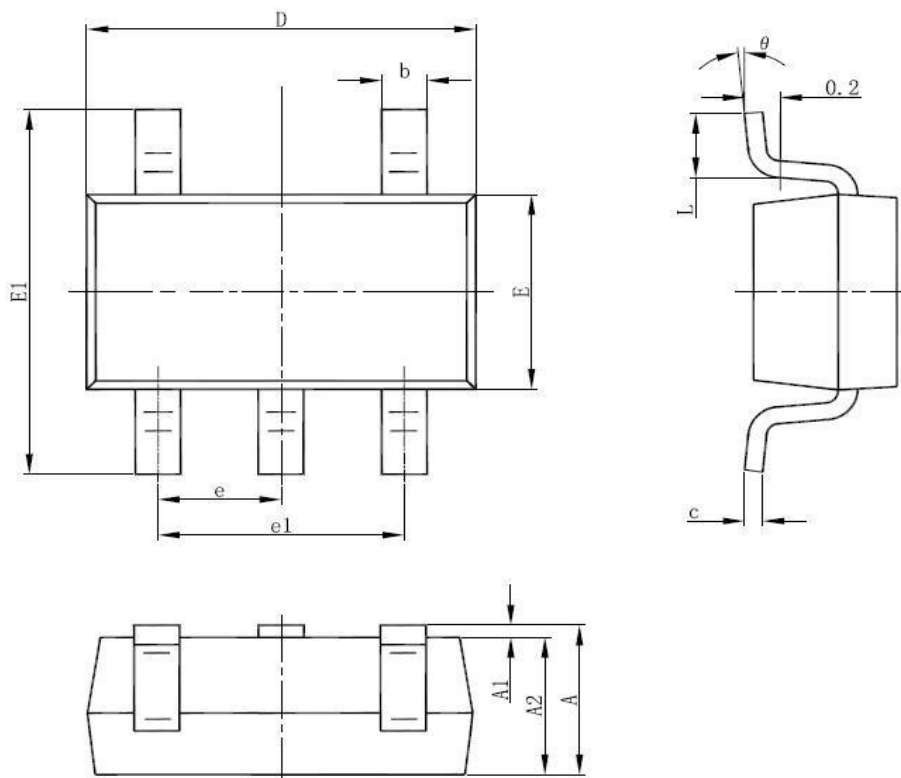
SOT23-3 Outline Dimensions



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°



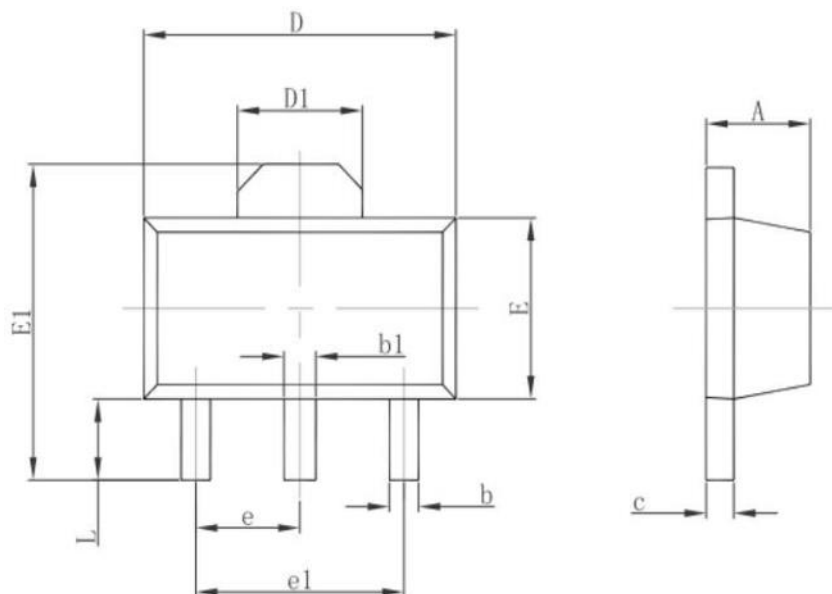
SOT23-5 Outline Dimensions



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°



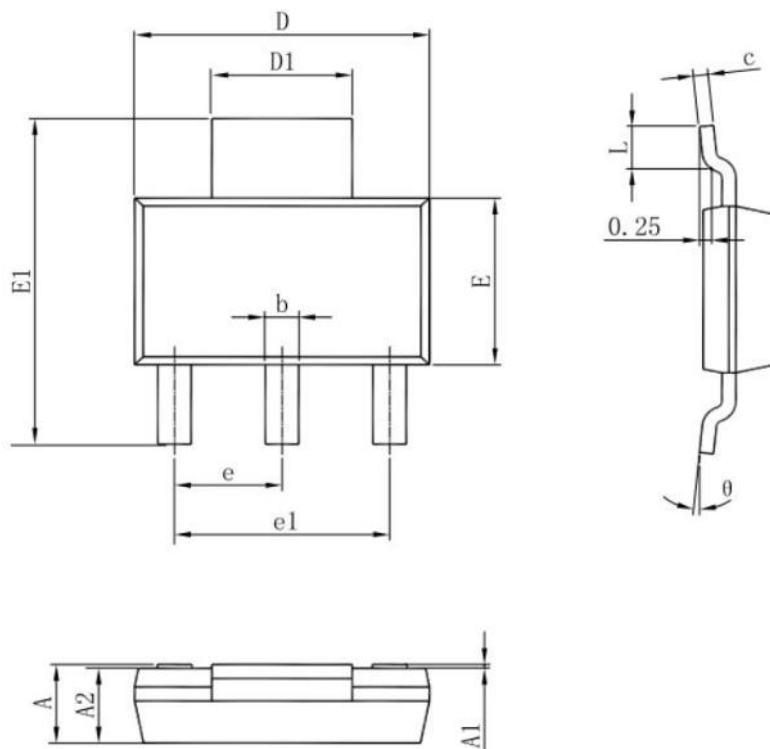
SOT89-3L Package Outline Dimensions



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	0.012	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



SOT223 Package Outline Dimensions



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	0.120	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°

