HE2218 Series
500mA Low Power LDO

Features

- Low voltage drop: 0.15V@100mA
- High input voltage: 24V
- Low temperature coefficient
- Large Output Current: >0.5A
- Low Quiescent Current: 2.0uA
- Output voltage accuracy: tolerance ±2%
- Built-in current limiter
- SOT89-3,SOT89-5,SOT23-3 and SOT23-5 packages

Applications

- Portable, Battery Powered Equipment
- Smoke detector and sensor
- Audio/Video Equipmen
- Weighting Scales

General Description

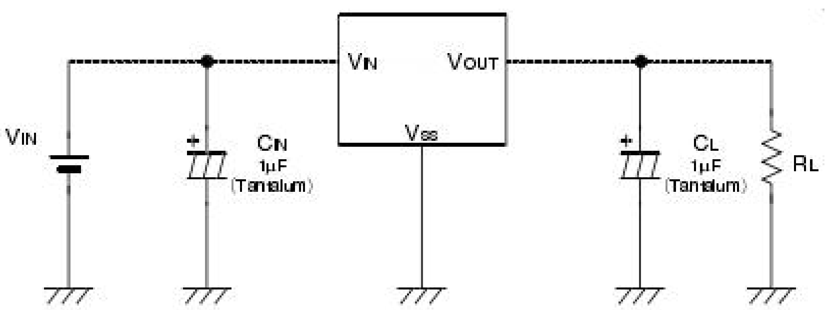
The HE2218 series is a group of positive voltage output, three-pin regulators, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.The HE2218 consists of a high-precision 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. SOT89-3, SOT89-5,SOT23-3 and SOT23-5 packages are available.

Order Information

HE2218①②③④⑤

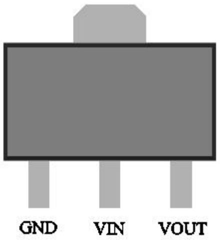
Designator	Symbol	Description
①	A	Standard
②③	Integer	Output Voltage(1.8~5.0V)
④	P	Package:SOT89-3
	PB	Package:SOT89B-3
	P5	Package:SOT89-5
	M	Package:SOT23-3
	M5	Package:SOT23-5
⑤	R	RoHS / Pb Free
	G	Halogen Free

Typical Application

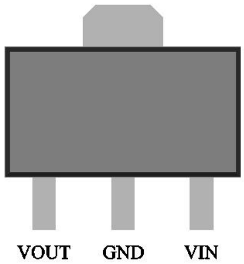


Pin Assignment

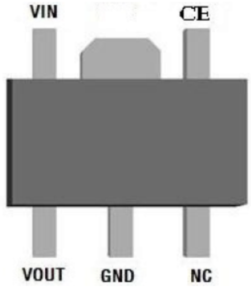
SOT89-3 (TOP view)



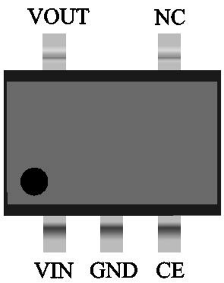
SOT89B-3 (TOP view)



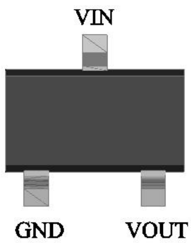
SOT89-5 (TOP view)



SOT23-5 (Top view)



SOT23-3 (Top view)



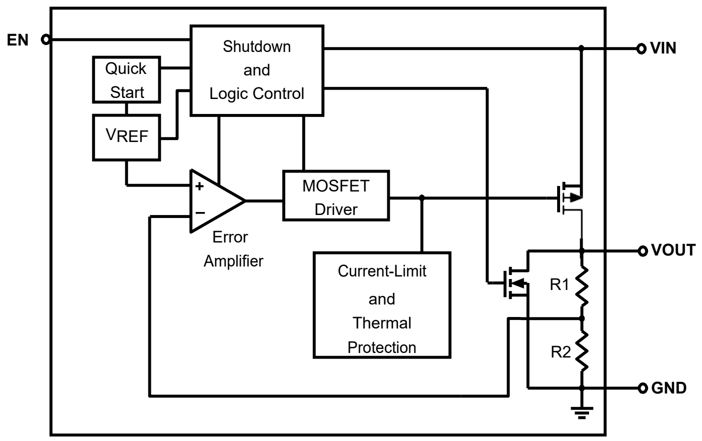
Selection Table

Part No.	Output Voltage	Package	Marking
HE2218A18MR	1.8V	SOT23-3	Refer to Marking rule
HE2218A28MR	2.8V	SOT23-3	
HE2218A30MR	3.0V	SOT23-3	
HE2218A33MR	3.3V	SOT23-3	
HE2218A36MR	3.6V	SOT23-3	
HE2218A40MR	4.0V	SOT23-3	
HE2218A44MR	4.4V	SOT23-3	
HE2218A50MR	5.0V	SOT23-3	
HE2218A30M5R	3.0V	SOT23-5	
HE2218A33M5R	3.3V	SOT23-5	
HE2218A36M5R	3.6V	SOT23-5	
HE2218A40M5R	4.0V	SOT23-5	
HE2218A44M5R	4.4V	SOT23-5	
HE2218A50M5R	5.0V	SOT23-5	

Selection Table

Part No.	Output Voltage	Package	Marking
HE2218A18PR	1.8V	SOT89-3	Refer to Marking rule
HE2218A28PR	2.8V	SOT89-3	
HE2218A30PR	3.0V	SOT89-3	
HE2218A33PR	3.3V	SOT89-3	
HE2218A36PR	3.6V	SOT89-3	
HE2218A40PR	4.0V	SOT89-3	
HE2218A44PR	4.4V	SOT89-3	
HE2218A50PR	5.0V	SOT89-3	
HE2218A30PBR	3.0V	SOT89B-3	
HE2218A33PBR	3.3V	SOT89B-3	
HE2218A50PBR	5.0V	SOT89B-3	

Block Diagram



Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Supply Input Voltage		V_{IN}	-0.3 ~ 24	V
EN to GND		V_{EN}	-0.3 ~ 24	V
Regulated Output Voltage		V_{OUT}	-0.3 ~ 6	V
Output Current		I_{OUT}	Internally limited	mA
Power Dissipation P_D @T_A=+25℃	SOT23-3	P_D	450	mW
	SOT23-5		500	
	SOT89-3		500	
	SOT89B-3，SOT89-5		700	
Thermal Resistance (Junction to air)	SOT23-3	θ_{JA}	275	°C /W
	SOT23-5		250	
	SOT89-3		130	
	SOT89B-3，SOT89-5		125	
Human Body Model (HBM)			4000	V
Charged Device Mode (CDM)			2000	V
Machine Mode (MM)			200	V
Storage Temperature Range		T_{STG}	-65 ~ +150	℃
Operating Junction Temperature		T_J	+150	℃
Lead Temperature (Soldering 10s)		T_{LEAD}	+260	℃

Note：

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 conditions is not implied. Exposure to absolute-maximum-rated conditions for extended period may affect device reliability.

2、Ratings apply to ambient temperature at +25°C

3、The package thermal impedance is calculated in accordance to JESD 51-7.

Recommended Operating Conditions

Item	Min	Max	Unit
Operating Ambient Temperature	-40	+85	°C
Input voltage V_{IN}	2.5	18	V
Output Voltage	1.8	5.0	V

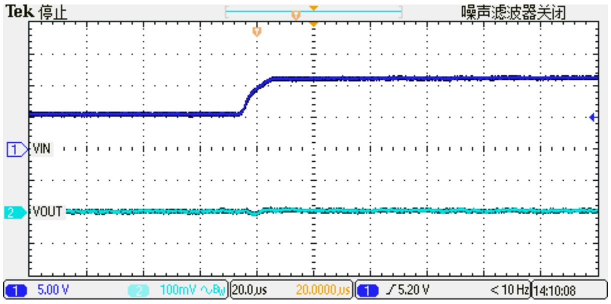
Electronic Characteristics

Test Conditions:VIN=VOUT+1V,CIN=COUT=1uF,,TA=25℃, unless otherwise specifi

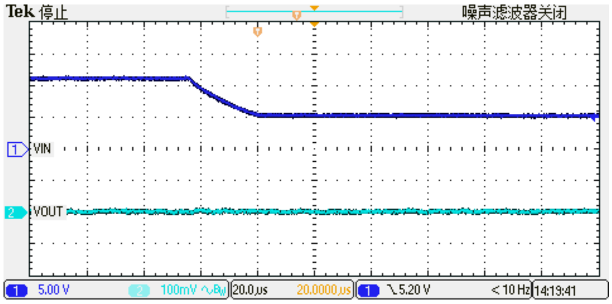
Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Input Voltage	VIN			2.5	——	18	V
Supply Current	IQ	VIN=12V; ILOAD=0mA		——	2	——	uA
Stand-by Current	ISD	EN=0 V; VOUT =0 V			0	0.2	uA
Output Voltage	VOUT	VIN=12V; ILOAD =10mA		VOUT*0.99	——	VOUT *1.01	V
Output Current	IOUT	VIN=VOUT +1V		500	——	——	mA
Dropout Voltage VOUT=3.3V	VDROP	ILOAD =100mA		——	150	——	mV
		ILOAD =300mA		——	400	——	
		ILOAD =500mA		——	700	——	
Line Regulation	Δ VOUT / Δ VIN * VOUT	ILOAD =10mA VOUT+1.0V ≦ VIN≦20V		——	0.05	——	% / V
Load Regulation	Δ VOUT	VIN= VOUT +1V 1mA≦ ILOAD ≦100mA		——	5	20	mV
EN Threshold Voltage	VCEH	CE"High"Voltage		1.5	——	——	V
	VCEL	CE"Low"Voltage		——	——	0.4	V
EN PIN Current	IEN			——	0	——	uA
Current Limit	ILIMIT			——	——	750	mA
Short Current	ISHORT	VOUT = GND		——	100	——	mA
Output Noise Voltage	VON	COUT =1uF ; ILOAD =10mA BW = 10Hz~100kHz		——	50	——	uVRMS
Power Supply Rejection Rate	PSRR	VIN = 4.3V, VOUT =3.3V, ILOAD =10mA	f=100Hz	——	85	——	dB
			f=1KHz	——	70	——	dB
			f=10KHz	——	50	——	dB
Thermal Shutdown Temperature	T_{SHDN}			——	160	——	℃
Thermal Shutdown Hysteresis	ΔT_{SHD}			——	20	——	℃

Note : All limits specified at room temperature (TA = 25°C) unless otherwise specified. All room temperature limits are 100% production tested. All limits at temperature extremes are ensured through correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).

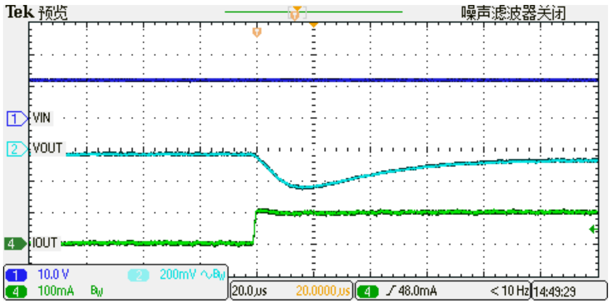
Typical Performance Characteristics



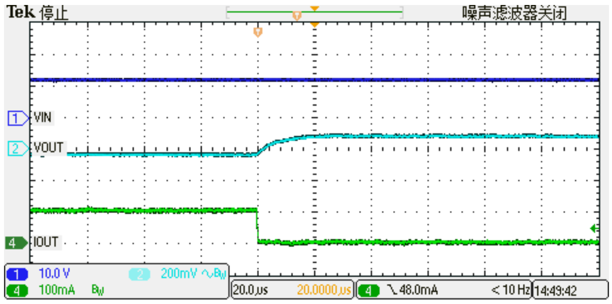
Line Transient V_{IN}=6V~12V
V_{OUT}=5V,I_{OUT}=10mA,20us



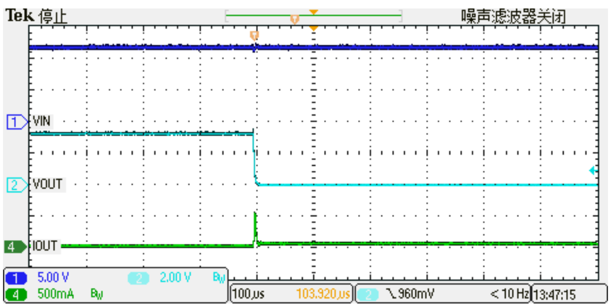
Line Transient V_{IN}=12V~6V
V_{OUT}=5V,I_{OUT}=10mA,20us



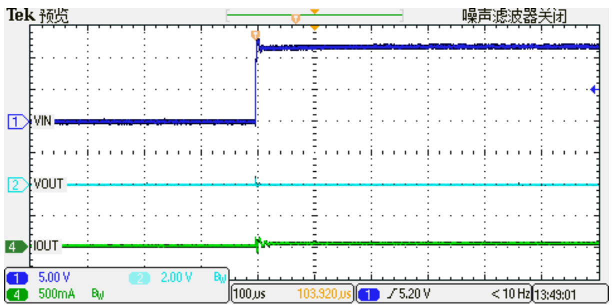
Load Transient V_{IN}=12V
V_{OUT}=5V,I_{OUT}=0~100mA,20us



Load Transient V_{IN}=12V
V_{OUT}=5V,I_{OUT}=100~0mA,20us



Power on Short circuit
V_{OUT}=12V ,100us



Short circuit on Power
V_{OUT}=12V ,100us

Application Guideline

■ Input Capacitor

A ⩾ 1μF ceramic capacitor is recommended to connect between VIN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

■ Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is ⩾1μF, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

■ Dropout Voltage

The dropout voltage refers to the voltage difference between the VIN and VOUT pins while operating at specific output current. The dropout voltage V_{DROP} also can be expressed as the voltage drop on the pass-FET at specific output current (I_{RATED}) while the pass-FET is fully operating at ohmic region and the pass-FET can be characterized asan resistance RDS(ON). Thus the dropout voltage can bedefined as ($V_{DROP} = V_{IN} - V_{OUT} = R_{DS(ON)} \times I_{RATED}$). Fornormal operation, the suggested LDO operating range is ($V_{IN} > V_{OUT} + V_{DROP}$) for good transient response and PSRR ability. Vice versa, while operating at the ohmic region will degrade the performance severely.

■ Thermal Application

For continuous operation, do not exceed the absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated as below:

T_A=25°C, AISIS DEMO PCB,

The max P_D= ($T_j - T_A$) / θ_{JA}.

Power dissipation (P_D) is equal to the product of the output current and the voltage drop across the output pass element, as shown in the equation below:

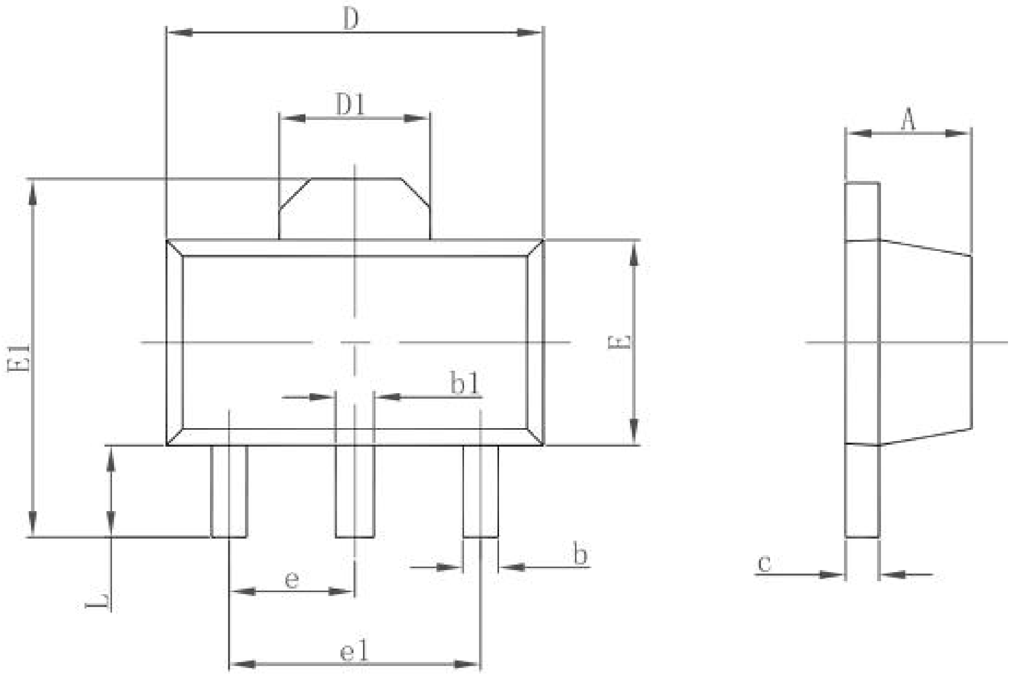
$P_D = (V_{IN} – V_{OUT}) \times I_{OUT}$

■ Layout Consideration

By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the HE2218 ground pin using as wide and as short of a copper trace as is practical.Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.

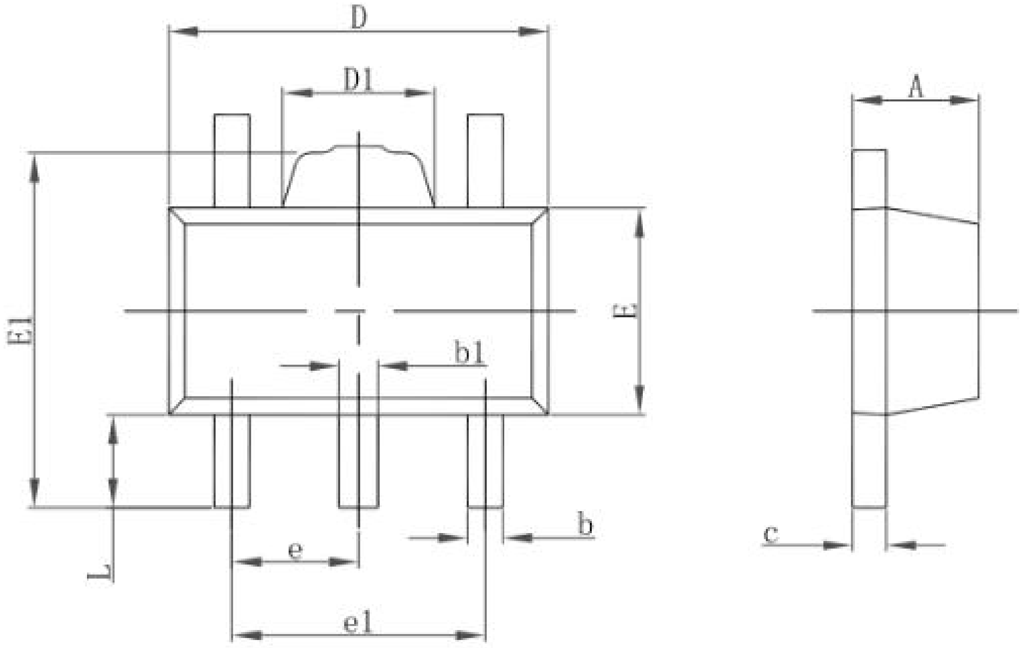
Package Information

3-pin SOT89 Outline Dimensions



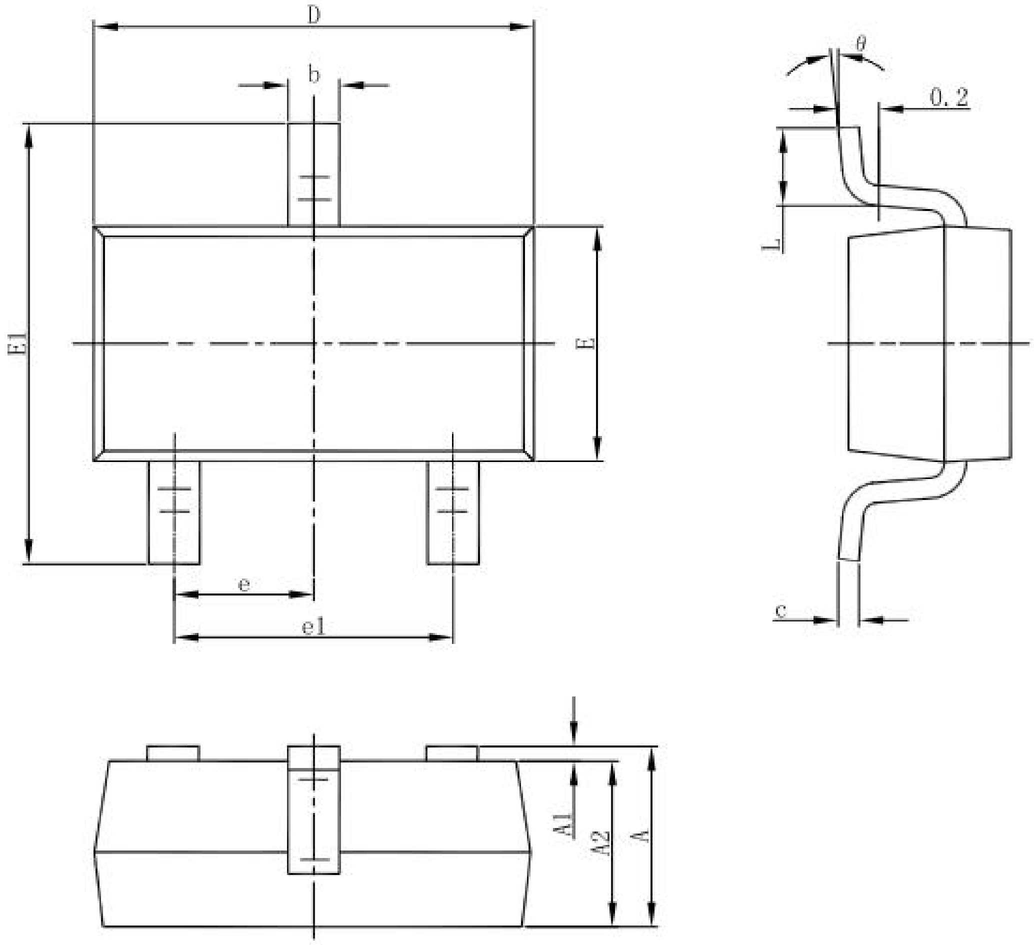
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.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

SOT89-5 Outline Dimensions



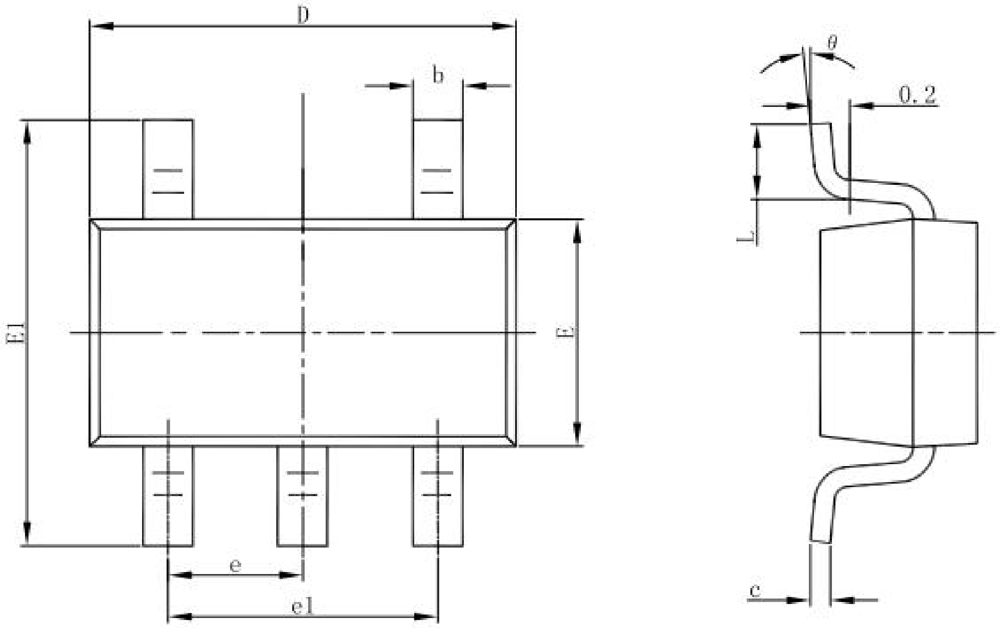
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500TYP.	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

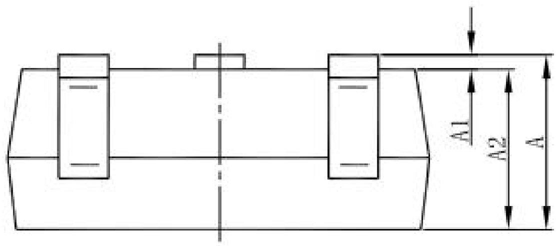
3-pin SOT23-3 Outline Dimensions



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°