

78LXX

3-Terminal 100mA Positive Voltage Regulators

General Description

The 78LXX family is a monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 100mA.

The 78LXX family is available in SOT89-3、SOT23-3 and SOP8 package.

Features

- Maximum Output Current of 100mA
- Fixed Output Voltage of 3.3V, 5V, 6V, 8V, 9V, 10V, 12V and 15V
- Thermal Overload Shutdown Protection
- Short Circuit Current Limiting



Applications

- Network Products
- Sound Card and Computer Motherboard
- Linear Regulator Source
- CD-ROM and DVD-ROM
- Controller

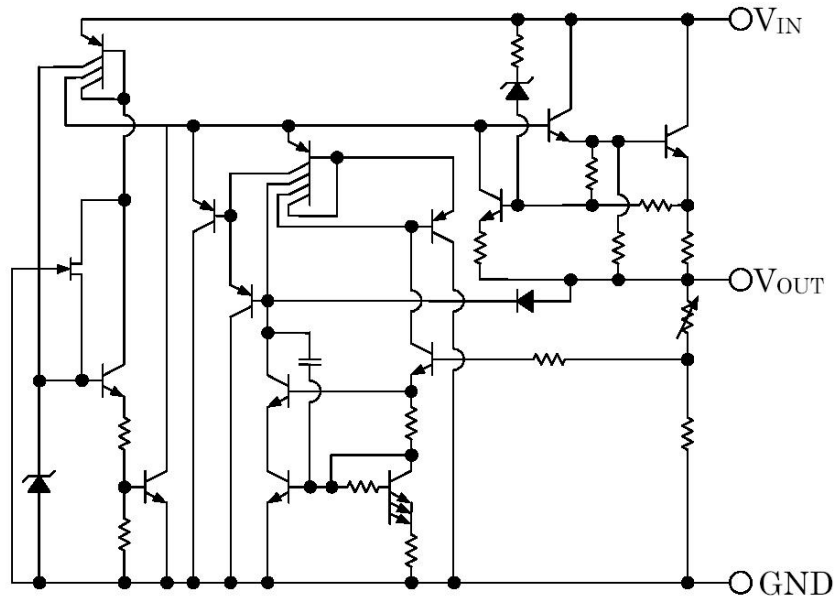
Package Information

Part NO.	Package Description	Package Marking	Package Option
78LXXL	SOT89-3	78LXXL SXXXX	1000/Reel
78LXX	SOT23-3	78LXX SXXXX	3000/Reel
78LXX	SOP8	CHMC 78LXX SXXXX	100/Tube 4000/Reel

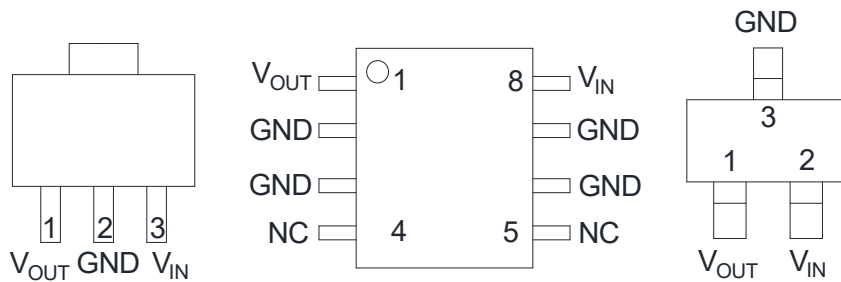
CHMC: Trademark SXXXX: Lot NO. 78LXXL/78LXX: Part NO. (XX: Output Voltage)

XX(Output Voltage): 33(3.3V)/05(5.0V)/06(6.0V)/08(8.0V)/09(9.0V)/10(10V)/12(12V)/15(15V)

Functional Block Diagram



Pin Configuration



78LXXL(SOT89-3)

78LXX(SOP8)

78LXX(SOT23-3)

Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$)

Parameter Name		Symbol	Value	Unit
Input Voltage	$V_o=3.3\text{V}\sim 10\text{V}$	V_{IN}	30	V
	$V_o=12\text{V}\sim 15\text{V}$		35	
Output Current		I_o	100	mA
Power Dissipation	SOT23-3	P_d	125	mW
	SOT89-3		500	
	SOP8		300	
Operating Temperature Range		T_{opr}	$-40\sim 125$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim 150$	$^{\circ}\text{C}$
Operating Junction Temperature		T_j	150	$^{\circ}\text{C}$

78L33/78L33L Electrical Characteristics

Operating Conditions: $V_{in}=9V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	3.168	3.300	3.432	V
		$6.5V \leq V_i \leq 18V$ $I_o=1mA \sim 40mA$	3.135		3.465	V
		$I_o=1mA \sim 70mA$	3.135		3.465	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$, $I_o=1mA \sim 100mA$		10	60	mV
		$T_j=25^{\circ}C$, $I_o=1mA \sim 40mA$		5	30	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$, $6.5V \leq V_i \leq 18V$		10	150	mV
		$T_j=25^{\circ}C$, $7.5V \leq V_i \leq 18V$		5	100	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$, $I_o=0mA$		2.0	5.5	mA
Quiescent Current Change	ΔI_q	$7.5V \leq V_i \leq 18V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		40		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.6		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$7.5V \leq V_i \leq 18V$ $f=120Hz$, $T_j=25^{\circ}C$	41	50		dB
Dropout Voltage	V_d	$f=120Hz$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L05/78L05L Electrical Characteristics

Operating Conditions: $V_{in}=10V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	4.80	5.00	5.20	V
		$7V \leq V_i \leq 20V$, $I_o=1mA \sim 40mA$	4.75		5.25	V
		$I_o=1mA \sim 70mA$	4.75		5.25	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		10	60	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	30	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $7V \leq V_i \leq 20V$		15	150	mV
		$T_j=25^{\circ}C$; $8V \leq V_i \leq 20V$		10	100	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		2.0	5.5	mA
Quiescent Current Change	ΔI_q	$8V \leq V_i \leq 20V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	e_N	$10Hz \leq f \leq 100kHz$		40		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.65		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$8V \leq V_i \leq 20V$; $f=120Hz$; $T_j=25^{\circ}C$	41	50		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L06/78L06L Electrical Characteristics

Operating Conditions: $V_{in}=12V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	5.76	6.00	6.24	V
		$8.5V \leq V_i \leq 20V$, $I_o=1mA \sim 40mA$	5.70		6.30	V
		$I_o=1mA \sim 70mA$	5.70		6.30	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		15	80	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	40	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $8.5V \leq V_i \leq 20V$		10	175	mV
		$T_j=25^{\circ}C$; $9V \leq V_i \leq 20V$		5	125	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		3.9	6.0	mA
Quiescent Current Change	ΔI_q	$9V \leq V_i \leq 20V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		49		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.7		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$10V \leq V_i \leq 20V$; $f=120Hz$; $T_j=25^{\circ}C$	40	46		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L08/78L08L Electrical Characteristics

Operating Conditions: $V_{in}=14V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	7.68	8.00	8.32	V
		$10.5V \leq V_i \leq 23V$, $I_o=1mA \sim 40mA$	7.60		8.40	V
		$I_o=1mA \sim 70mA$	7.60		8.40	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		15	80	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	40	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $10.5V \leq V_i \leq 23V$		15	175	mV
		$T_j=25^{\circ}C$; $11V \leq V_i \leq 23V$		10	125	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		2.0	5.5	mA
Quiescent Current Change	ΔI_q	$11V \leq V_i \leq 23V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	e_N	$10Hz \leq f \leq 100kHz$		49		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.8		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$11V \leq V_i \leq 23V$; $f=120Hz$; $T_j=25^{\circ}C$	39	45		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L09/78L09L Electrical Characteristics

Operating Conditions: $V_{in}=15V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	8.64	9.00	9.36	V
		$11.5V \leq V_i \leq 24V$; $I_o=1mA \sim 40mA$	8.55		9.45	V
		$I_o=1mA \sim 70mA$	8.55		9.45	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		15	90	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	45	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $11.5V \leq V_i \leq 24V$		15	200	mV
		$T_j=25^{\circ}C$; $13V \leq V_i \leq 24V$		10	150	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		2.0	6.0	mA
Quiescent Current Change	ΔI_q	$13V \leq V_i \leq 24V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	e_N	$10Hz \leq f \leq 100kHz$		49		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.9		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$12V \leq V_i \leq 23V$; $f=120Hz$; $T_j=25^{\circ}C$	38	44		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L10/78L10L Electrical Characteristics

Operating Conditions: $V_{in}=16V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	9.6	10.0	10.4	V
		$12.5V \leq V_i \leq 23V$; $I_o=1mA \sim 40mA$	9.5		10.5	V
		$I_o=1mA \sim 70mA$	9.5		10.5	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		15	95	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	50	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $12.5V \leq V_i \leq 25V$		15	220	mV
		$T_j=25^{\circ}C$; $14V \leq V_i \leq 25V$		10	200	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		4.2	6.5	mA
Quiescent Current Change	ΔI_q	$14V \leq V_i \leq 25V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		74		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-0.95		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$14V \leq V_i \leq 25V$; $f=120Hz$; $T_j=25^{\circ}C$	38	43		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L12/78L12L Electrical Characteristics

Operating Conditions: $V_{in}=19V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

(Note 1)

Parameter Name	Symbol	Test conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	11.52	12.00	12.48	V
		$14.5V \leq V_i \leq 27V$; $I_o=1mA \sim 40mA$	11.40		12.60	V
		$I_o=1mA \sim 70mA$	11.40		12.60	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$		20	150	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$		5	75	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $14.5V \leq V_i \leq 27V$		20	300	mV
		$T_j=25^{\circ}C$; $16V \leq V_i \leq 27V$		15	250	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$		2.0	6.0	mA
Quiescent Current Change	ΔI_q	$16V \leq V_i \leq 27V$			1.5	mA
		$1mA \leq I_o \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		80		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$		-1.0		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$15V \leq V_i \leq 25V$; $f=120Hz$; $T_j=25^{\circ}C$	37	42		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

78L15/78L15L Electrical Characteristics

Operating Conditions: $V_{in}=23V$, $I_o=40mA$, $C_i=0.33\mu F$, $C_o=0.1\mu F$ Unless otherwise specified.

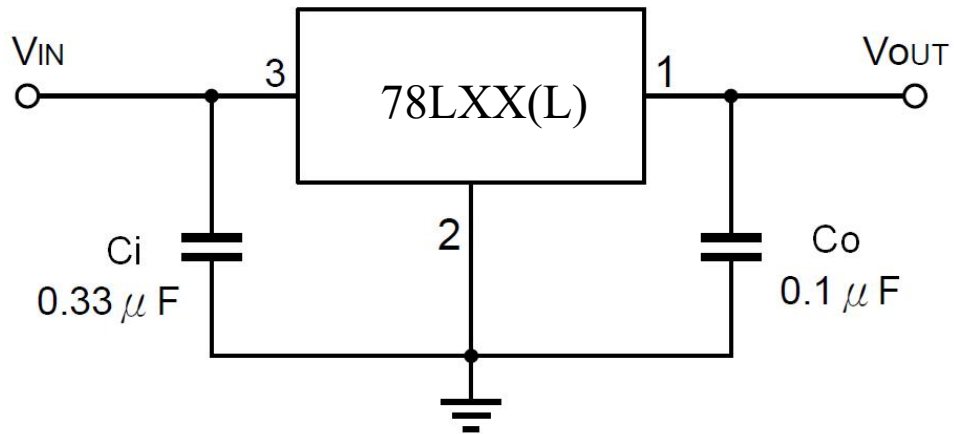
(Note 1)

Characteristics	Symbol	Test conditions		Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=25^{\circ}C$	$\pm 2.0\%$ (A)	14.70	15.00	15.30	V
			- 4.0% (B1)	14.10		14.70	
			+4.0% (B2)	15.30		15.90	
		$17.5V \leq V_i \leq 30V$; $I_o=1mA \sim 40mA$		14.25		15.75	V
		$I_o=1mA \sim 70mA$		14.25		15.75	V (Note 2)
Load Regulation	ΔV_o	$T_j=25^{\circ}C$; $I_o=1mA \sim 100mA$			30	160	mV
		$T_j=25^{\circ}C$; $I_o=1mA \sim 40mA$			10	80	mV
Line Regulation	ΔV_o	$T_j=25^{\circ}C$; $17.5V \leq V_i \leq 30V$			30	300	mV
		$T_j=25^{\circ}C$; $20V \leq V_i \leq 30V$			20	250	mV
Quiescent Current	I_q	$T_j=25^{\circ}C$; $I_o=0mA$			2.2	6.5	mA
Quiescent Current Change	ΔI_q	$20V \leq V_i \leq 30V$				1.5	mA
		$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$			90		μV
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$I_o=5mA$			-1.3		mV/ $^{\circ}C$
Ripple Rejection Ratio	RR	$18.5V \leq V_i \leq 28.5V$; $f=120Hz$; $T_j=25^{\circ}C$		34	42		dB
Dropout Voltage	V_d	$T_j=25^{\circ}C$			1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

Note 2: Power dissipation is less than 0.75W.

Typical Application



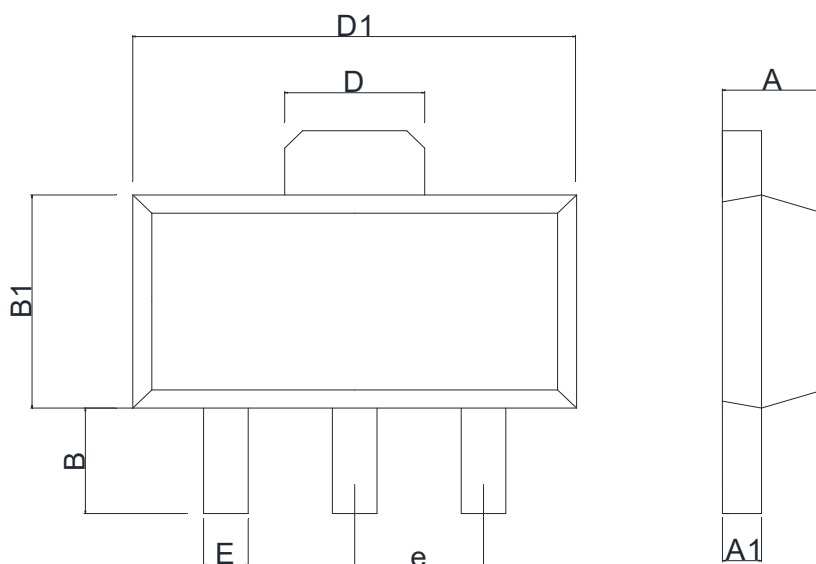
Note 1: "XX" stands for different output voltage value.

Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

Outline Dimensions

SOT89-3

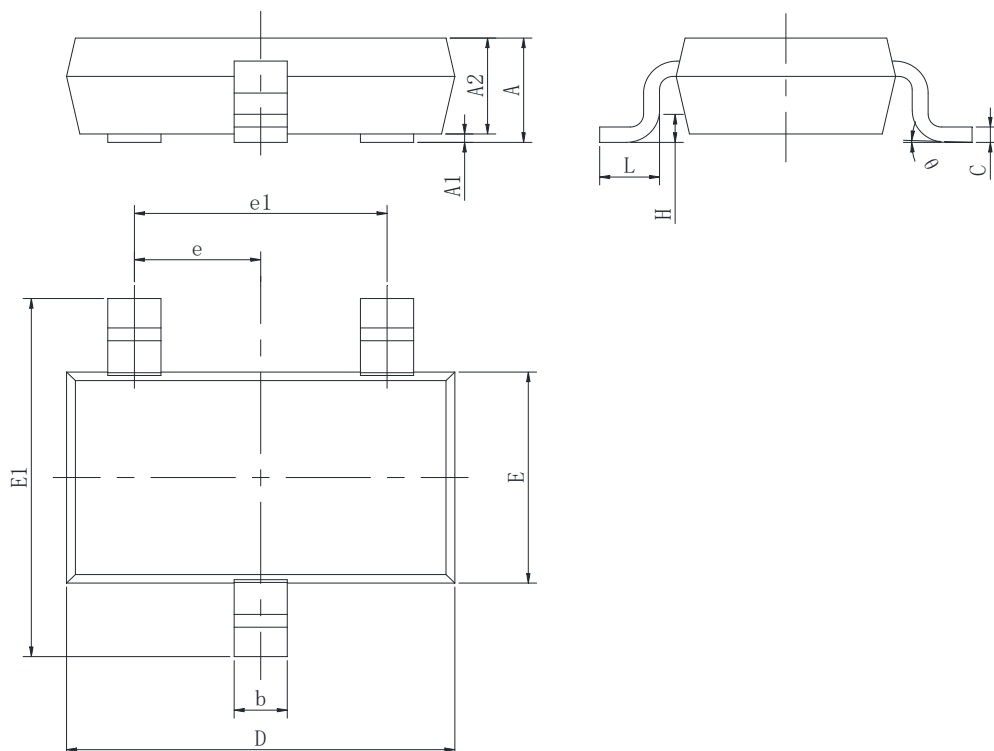
Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.550	0.057	0.061
A1	0.390	0.410	0.015	0.016
B	0.950	1.050	0.037	0.041
B1	2.350	2.550	0.092	0.100
E	0.350	0.450	0.013	0.017
D1	4.400	4.600	0.173	0.181
D	1.550 REF		0.061 REF	
e	1.500 (BSC)		0.059 (BSC)	

SOT23-3

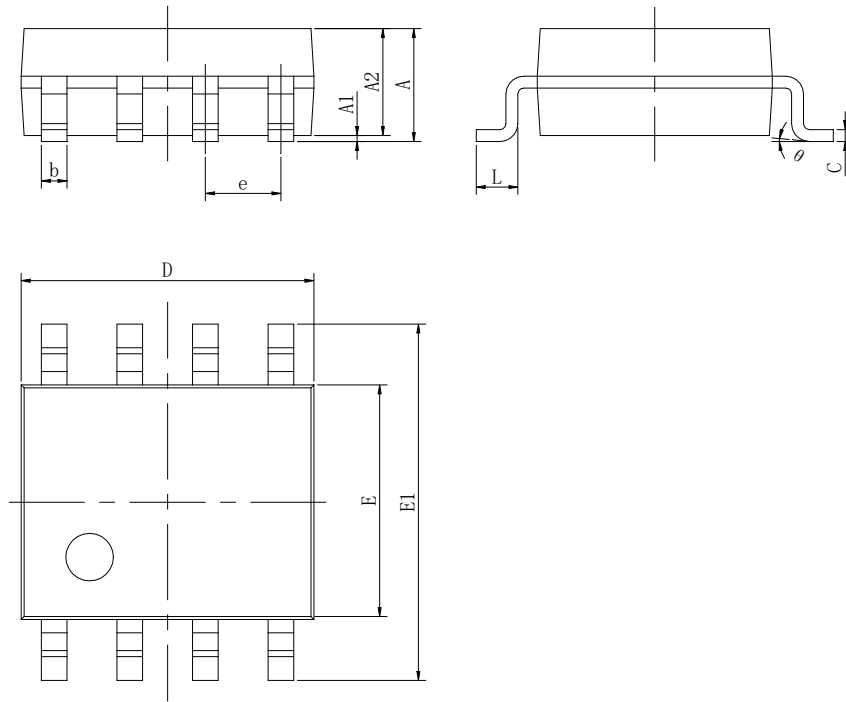
Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.130	0.000	0.005
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.080	0.200	0.003	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	0.95 (BSC)		0.037(BSC)	
e1	1.90 (BSC)		0.075(BSC)	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOP8

Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.000	0.250	0.000	0.010
A2	1.250	1.550	0.053	0.061
b	0.300	0.510	0.011	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Statements

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