AiP78L05/09/12/15
100mA Positive-Voltage Linear Regulators

Product Specification

Specification Revision History:

Version	Date	Description
2021-01-A1	2021-01	New
2021-11-A2	2021-11	Add Recommended Use Condition parameter table
2022-01-A3	2022-01	Modifying Ordering Information
2023-03-B1	2023-03	Replacement template
2023-06-B2	2023-06	Parameter correction
2023-12-B3	2023-12	Parameter correction; Add TO92 bagging specifications

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1、General Description

AiP78L05/09/12/15, the system is listed as a fixed voltage three-terminal regulated integrated circuit, the circuit built-in limited current protection and thermal shutdown function, can protect the circuit when overload.

In a variety of electronic instruments, equipment, as a voltage regulator power widely used.

Its main features are as follows:

- Less external elements, strong applicability;
- Built-in overheat, overcurrent protection circuit;
- Built-in output power tube safety work area protection function;
- The maximum output current is 100mA (normal application);
- Package form: TO92/SOT89-3/SOT23-3

Ordering Information:

Bag packing specifications:

Part number	Packaging form	Marking code	Bag quantity	Boxed bag quantity	Boxed quantity	Notes
AiP78L05JA92.TB	TO92	AiP78L05	1000 PCS/bag	10 bag/box	10000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L09JA92.TB	TO92	AiP78L09	1000 PCS/bag	10 bag/box	10000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L12JA92.TB	TO92	AiP78L12	1000 PCS/bag	10 bag/box	10000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L15JA92.TB	TO92	AiP78L15	1000 PCS/bag	10 bag/box	10000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP78L05JA92.TR	TO92	AiP78L05	2000 PCS/reel	2000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L09JA92.TR	TO92	AiP78L09	2000 PCS/reel	2000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L12JA92.TR	TO92	AiP78L12	2000 PCS/reel	2000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L15JA92.TR	TO92	AiP78L15	2000 PCS/reel	2000 PCS/box	Dimensions of plastic enclosure: 4.6mm×4.6mm Pin spacing: 1.27mm
AiP78L05GD893.TR	SOT89-3	78L05	1000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.5mm×2.5mm Pin spacing: 1.5mm

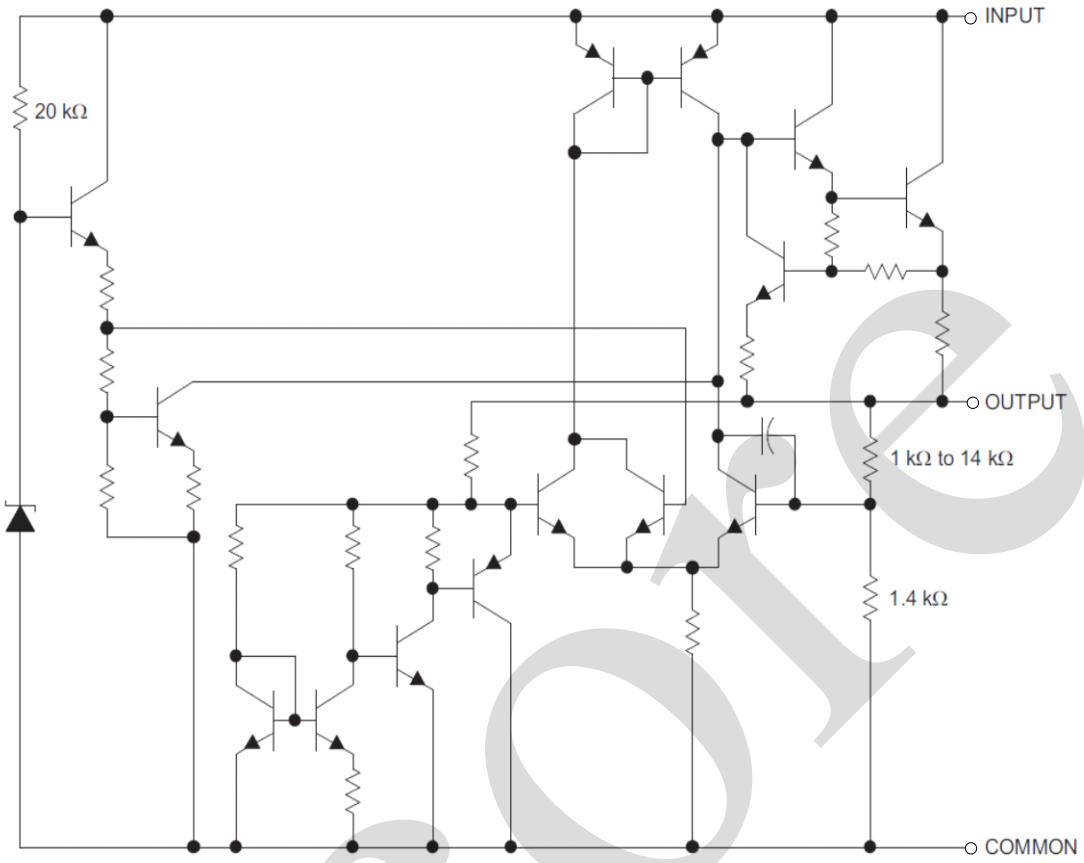
AiP78L09GD893.TR	SOT89-3	78L09	1000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.5mm×2.5mm Pin spacing: 1.5mm
AiP78L12GD893.TR	SOT89-3	78L12	1000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.5mm×2.5mm Pin spacing: 1.5mm
AiP78L15GD893.TR	SOT89-3	78L15	1000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.5mm×2.5mm Pin spacing: 1.5mm
AiP78L05GB233.TR	SOT23-3	78L05XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP78L09GB233.TR	SOT23-3	78L09XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP78L12GB233.TR	SOT23-3	78L12XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP78L15GB233.TR	SOT23-3	78L15XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm

Note 1: “XX” refers to variable content, meaning year and package batch serial number.

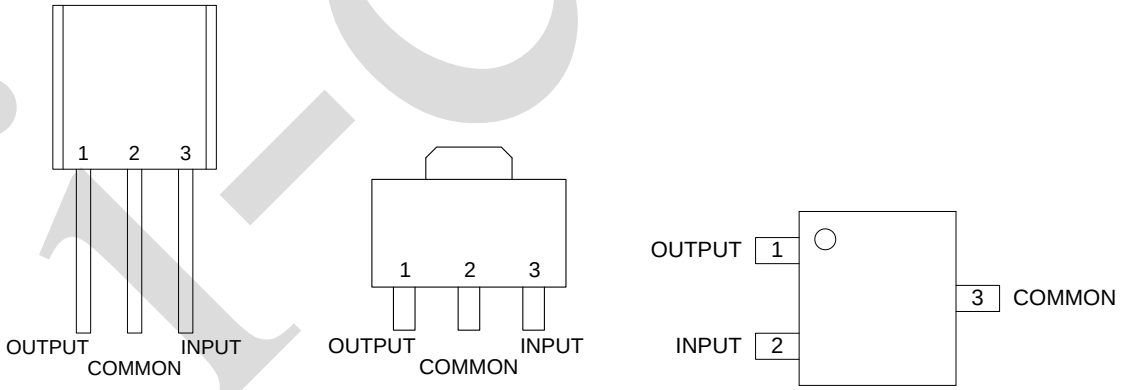
Note 2: If the physical information is inconsistent with the ordering information, please refer to the actual product.

2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pins			symbol	Description
TO92	SOT89-3	SOT23-3		
1	1	1	OUTPUT	Output pin
2	2	3	COMMON	Common
3	3	2	INPUT	Input

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(T_{amb}=25℃, All voltage referenced to Vss, unless otherwise specified)

Characteristic	Symbol	Conditions		Value	Unit
Supply Voltage	V_{in}	—		7.0～36	V
Output current	I_O	—		150	mA
Junction-to-ambient thermal resistance	$R_{\theta JA}$	TO92		143.6	℃/W
		SOT89-3		54.7	
		SOT23-3		206	
Junction-to-case thermal resistance	$R_{\theta JC}$	TO92		74.4	℃/W
		SOT89-3		88.1	
		SOT23-3		145.2	
Junction Temperature	T_J	—		150	℃
Storage Temperature	T_{stg}	—		-65～150	℃
Soldering Temperature	T_L	10s	TO92	250	℃
			SOT89-3/ SOT23-3	260	℃

3.2、Recommended Operating Conditions

Characteristic	Symbol	Conditions	Min.	Max	Unit
Supply Voltage	V_{in}	AiP78L05	7	25	V
		AiP78L09	11.5	29	V
		AiP78L12	14.5	32	V
		AiP78L15	17.5	35	V
Output current	I_O	—	—	100	mA
Junction Temperature	T_J	—	-40	125	℃
ambient temperature	T_{amb}	—	-40	85	℃

3.3、Electrical Characteristics

3.3.1、AiP78L05 electrical parameters

（Unless otherwise specified, TJ=25 ° C, Vin=10V, IO=40mA）

Characteristic	Symbol	Conditions	Min.	Typ	Max	Unit
Output voltage	V_O	V_{in}=7～20V，I_O=1～40mA	4.8	5.0	5.2	V
		V_{in}=7～20V，I_O=1～40mA T_J=full range	4.75	—	5.25	V
Input voltage regulation	REG_V	V_{in}=7～20V	—	32	170	mV
		V_{in}=8～20V	—	26	100	
Output voltage regulation	REG_L	I_O=1～100mA	—	15	80	mV
Bias current	I_B	—	—	3	6	mA
Bias current change	ΔI_{BV}	V_{in}=8.0～20V	—	—	1.5	mA
	ΔI_{BL}	I_O=1～40mA	—	—	0.1	
Output noise voltage	V_{NO}	f=10Hz～100kHz	—	42	—	uV
Ripple rejection	R.R	V_{in}=8～18V，f=120Hz	41	49	—	dB
Dropout voltage	V_{DIFmin}	—	—	1.7	—	V

3.3.2、AiP78L09 electrical parameters

（Unless otherwise specified, T_J=25℃，V_{in}=16V，I_O=40mA）

Characteristic	Symbol	Conditions	Min.	Typ	Max	Unit
Output voltage	V_O	V_{in}=12～24V，I_O=1~40mA	8.6	9	9.4	V
		V_{in}=12～24V，I_O=1~40mA T_J=full range	8.55	9	9.45	V
Input voltage regulation	REG_V	V_{in}=12～24V	—	45	175	mV
		V_{in}=13～24V	—	40	125	
Output voltage regulation	REG_L	I_O=1～100mA	—	19	90	mV
Bias current	I_B	—	—	4.1	6	mA
Bias current change	ΔI_{BV}	V_{in}=13～24V	—	—	1.5	mA
	ΔI_{BL}	I_O=1～40mA	—	—	0.1	
Output noise voltage	V_{NO}	f=10Hz～100kHz	—	58	—	uV
Ripple rejection	R.R	Vin=15～25V，f=120Hz	38	45	—	dB
Dropout voltage	V_{DIFmin}	—	—	1.7	—	V

3.3.3、AiP78L12 electrical parameters

（Unless otherwise specified, T_J=25℃，V_{in}=19V，I_O=40mA）

Characteristic	Symbol	Conditions	Min.	Typ	Max	Unit
Output voltage	V_O	V_{in}=14～27V，I_O=1~40mA	11.5	12	12.5	V
		V_{in}=14～27V，I_O=1~40mA T_J=full range	11.4	12	12.6	V
Input voltage regulation	REG_V	V_{in}=14.5～27V	—	55	250	mV
		V_{in}=16～27V	—	49	200	
Output voltage regulation	REG_L	I_O=1～100mA	—	22	100	mV
Bias current	I_B	—	—	4.3	6.5	mA

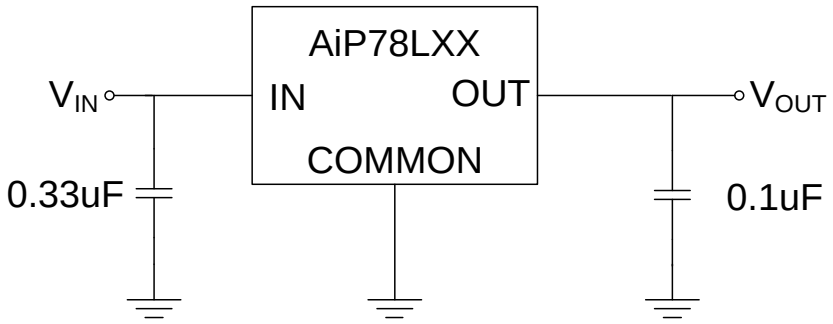
Bias current change	ΔI_{BV}	V_{in}=16～27V	—	—	1.5	mA
	ΔI_{BL}	I_O=1～40mA	—	—	0.1	
Output noise voltage	V_{NO}	f=10Hz～100kHz	—	70	—	uV
Ripple rejection	R.R	V=15～25V，f=120Hz	37	42	—	dB
Dropout voltage	V_{DIFmin}	—	—	1.7	—	V

3.3.4、AiP78L15 electrical parameters

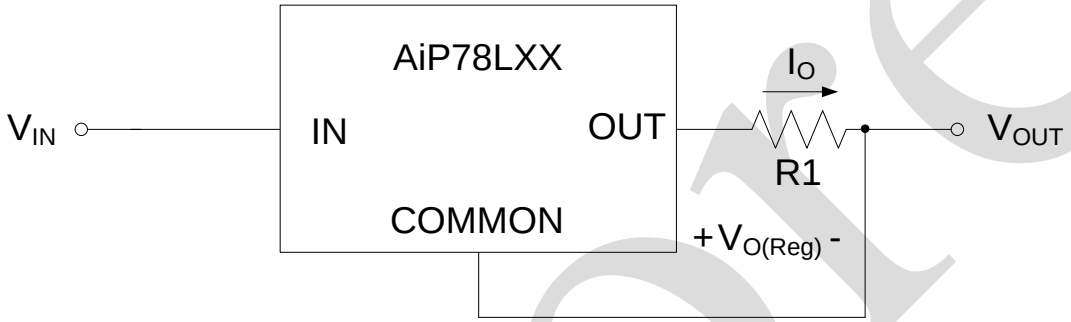
（Unless otherwise specified,T_J=25℃，V_{in}=23V，I_O=40mA）

Characteristic	Symbol	Conditions	Min.	Typ	Max	Unit
Output voltage	V_O	V_{in}=17.5～30V，I_O=1~40mA	14.4	15	15.6	V
		V_{in}=17.5～30V，I_O=1~40mA T_J=full range	14.25	15	15.75	V
Input voltage regulation	REG_V	V_{in}=17.5～30V	—	65	300	mV
		V_{in}=20～30V	—	58	250	
Output voltage regulation	REG_L	I_O=1～100mA	—	25	150	mV
Bias current	I_B	—	—	4.6	6.5	mA
Bias current change	ΔI_{BV}	V_{in}=10～30V	—	—	1.5	mA
	ΔI_{BL}	I_O=1～40mA	—	—	0.1	
Output noise voltage	V_{NO}	f=10Hz～100kHz	—	82	—	uV
Ripple rejection	R.R	V_{in}=18.5～28.5V，f=120Hz	34	39	—	dB
Dropout voltage	V_{DIFmin}	—	—	1.7	—	V

4、Test Circuit

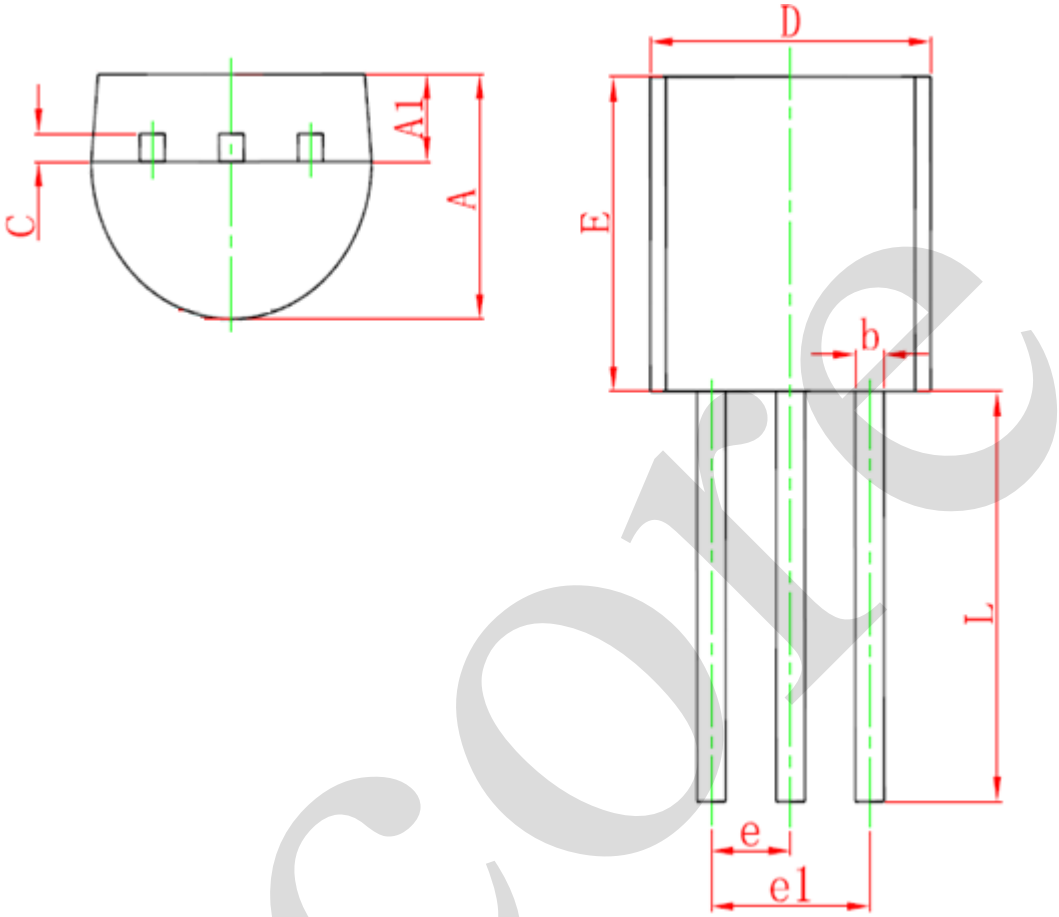


5、Typical Application Circuit And Application Note



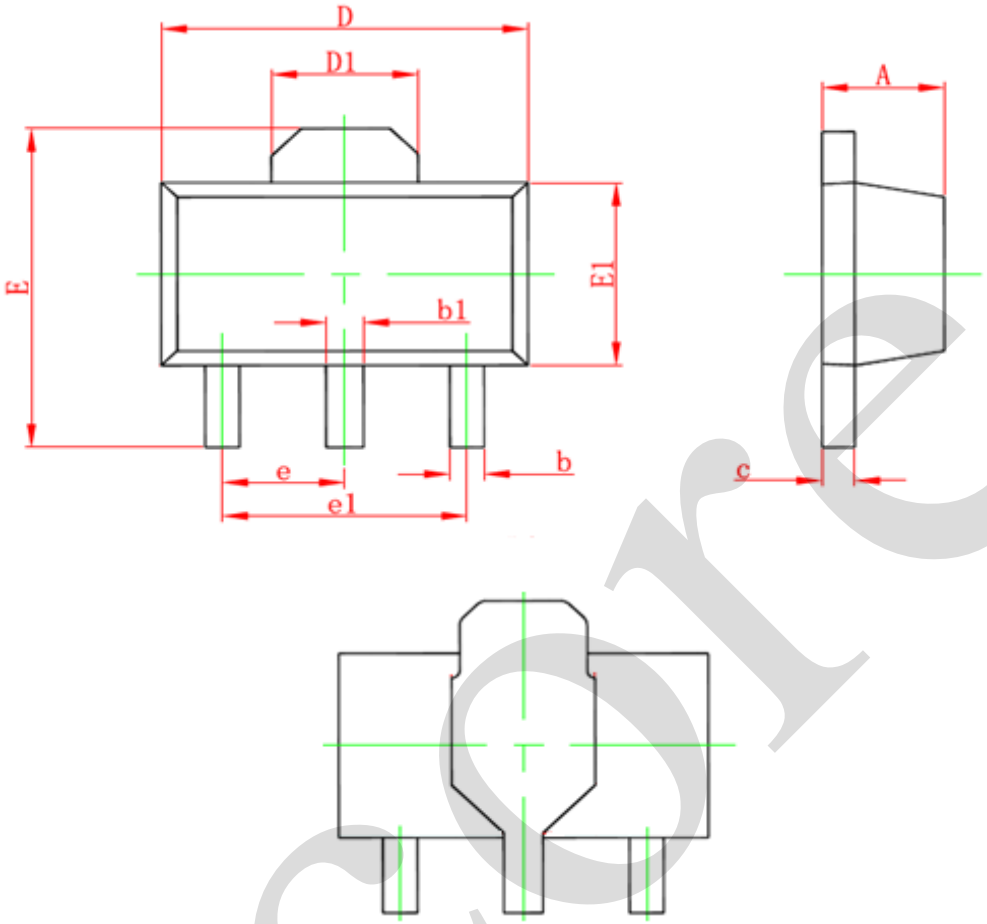
6、Package Information

6.1、TO92



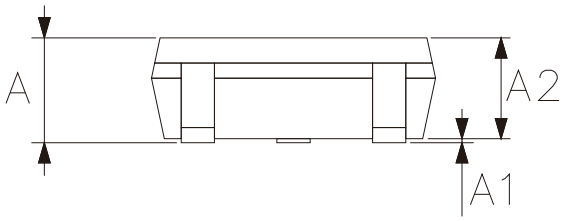
Symbol	Dimensions (mm)	
	Min.	Max.
A	3.30	3.75
A1	1.10	1.40
b	0.38	0.56
c	0.36	0.51
D	4.30	4.70
E	4.30	4.70
e	1.27	
e1	2.44	2.64
L	13.50	15.30

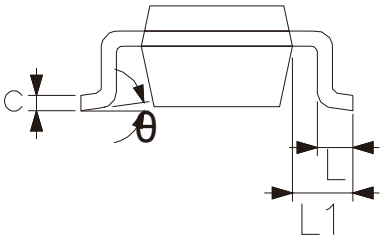
6.2、SOT89-3

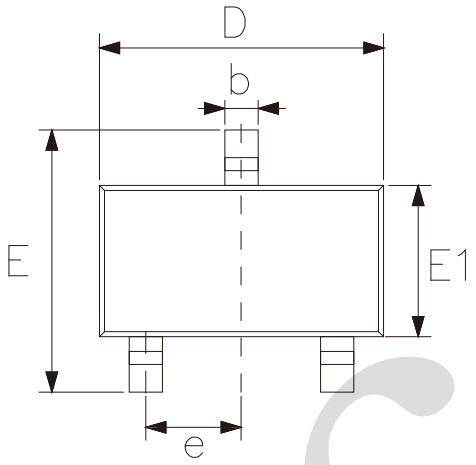


Symbol	Dimensions (mm)	
	Min.	Max.
A	1.40	1.60
b	0.32	0.52
b1	0.40	0.58
c	0.35	0.46
D	4.40	4.60
D1	1.55	1.83
E	3.94	4.30
E1	2.30	2.60
e	1.00	2.00
e1	2.95	3.05

6.3、SOT23-3







Symbol	Dimensions (mm)	
	Min.	Max.
A	—	1.25
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
L1	0.60	
θ	0°	8°

7、Statements And Notes

7.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

7.2、Notes

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