



AiP3205/AiP3205B/AiP3206/AiP3208 50ns, Low-Power, Open-Drain Output Comparators

Product Specification

Specification Revision History:

Version	Date	Description
2024-09-A0	2024-09	New
2025-02-A1	2025-02	Modify parameters
2025-08-A2	2025-08	Add product model AiP3205B
2025-12-A3	2025-12	Add SOT353/SOT553 package form for AiP3205B



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1、General Description

The AiP3205, AiP3205B, AiP3206, and AiP3208 are single, dual, and quad-channel open-drain output comparators, featuring fast response, low power consumption, rail-to-rail input voltage range, low offset voltage and large output drive current. The devices are ideal for a wide variety of applications, such as detection systems, test and measurement equipment, and high-speed sampling systems. AiP3205, AiP3205B, AiP3206 and AiP3208 are single, dual and quad-channel open-drain output comparators respectively. They feature fast response, low power consumption, rail-to-rail input, low input offset voltage and high output drive current, and can be used in detection equipment, test and measurement instruments, high-speed sampling systems and other applications.

Features:

- Low propagation delay: 50ns (TYP.)
- Input common-mode voltage range: $-0.2V$ to $V_{CC} + 0.2V$
- Input offset voltage: 1mV
- Open-drain output
- Supply voltage: +2.7V to 5.5V
- Operating temperature: $-40^{\circ}C$ to $125^{\circ}C$
- Package form:
 - AiP3205: SOT23-5/SOT353
 - AiP3205B: SOT23-5/SOT353/SOT553
 - AiP3206: SOP8/MSOP8
 - AiP3208: SOP14/TSSOP14



Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP3205GB235.TR	SOT23-5	3205XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP3205GC353.TR	SOT353	3205XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP3205BGB235.TR	SOT23-5	3205BXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP3205BGC353.TR	SOT353	KIXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP3205BGG553.TR	SOT553	KIXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 1.6mm×1.2mm Pin spacing:0.5mm
AiP3206SA8.TR	SOP8	AiP3206	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing:1.27mm
AiP3206MA8.TR	MSOP8	AiP3206	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing:0.65mm
AiP3208SA14.TR	SOP14	AiP3208	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing:1.27mm
AiP3208TA14.TR	TSSOP14	AiP3208	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm

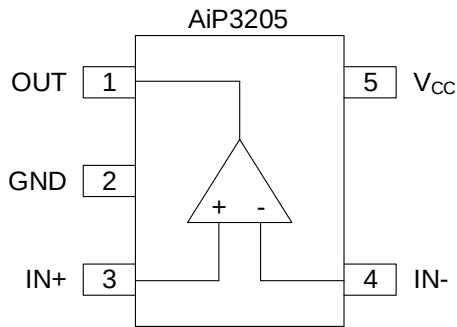
Note 1: “XX” refers to variable content, meaning package batch serial number.

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

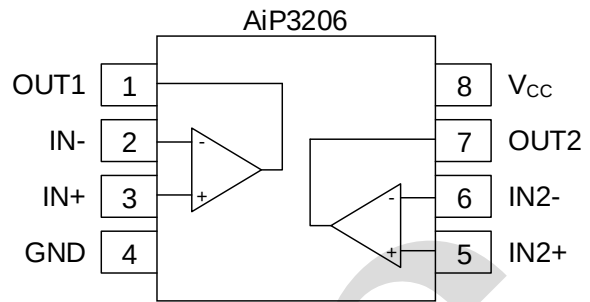


2、Pin Configurations And Pin Description

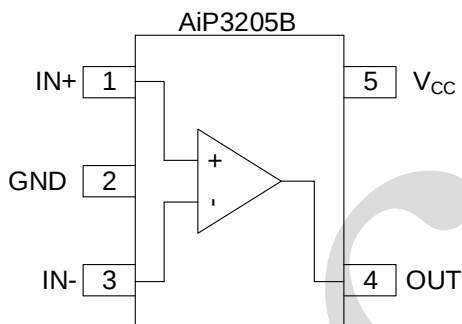
2.1、Pin Configurations



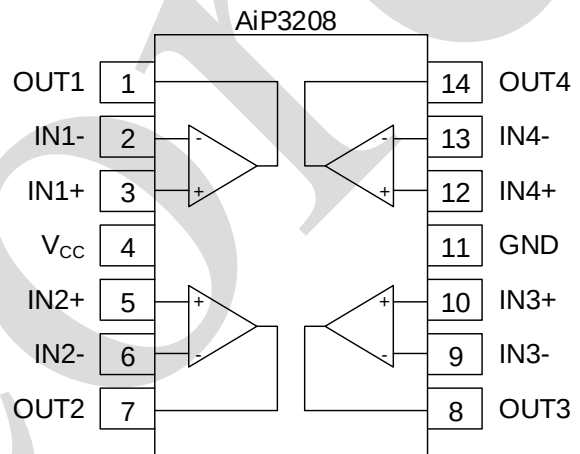
SOT23-5/SOT353



SOP8/MSOP8



SOT23-5/SOT353/SOT553



SOP14/TSSOP14



2.2、Pin Description

AiP3205 Pin Description: SOT353, SOT23-5

Pin No.	Pin Name	Description
1	OUT	output
2	GND	negative power supply, ground
3	IN+	comparator positive input
4	IN-	comparator negative input
5	V _{CC}	positive power supply

AiP3205B Pin Description: SOT23-5, SOT353, SOT553

Pin No.	Pin Name	Description
1	IN+	comparator positive input
2	GND	negative power supply, ground
3	IN-	comparator negative input
4	OUT	output
5	V _{CC}	positive power supply

AiP3206 Pin Description: SOP8, MSOP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUT1	comparator 1 output	5	IN2+	comparator 2 positive input
2	IN1-	comparator 1 negative input	6	IN2-	comparator 2 negative input
3	IN1+	comparator 1 positive input	7	OUT2	comparator 2 output
4	GND	negative power supply, ground	8	V _{CC}	positive power supply

AiP3208 Pin Description: SOP14, TSSOP14

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUT1	comparator 1 output	8	OUT3	comparator 3 output
2	IN1-	comparator 1 negative input	9	IN3-	comparator 3 negative input
3	IN1+	comparator 1 positive input	10	IN3+	comparator 3 positive input
4	V _{CC}	positive power supply	11	GND	negative power supply, ground
5	IN2+	comparator 2 positive input	12	IN4+	comparator 4 positive input
6	IN2-	Comparator 2 negative input	13	IN4-	comparator 4 negative input
7	OUT2	comparator 2 output	14	OUT4	comparator 4 output



3、Electrical Parameter

3.1、Absolute Maximum Ratings

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

Characteristic		Symbol	Conditions	Value	Unit
supply voltage		V_{CC}	-	6	V
signal input terminals	voltage	-	-	$-0.5 \sim V_{CC}+0.5$	V
	current	-	-	± 10	mA
output to ground short-circuit current to ground		I_O	-	100	mA
Maximum junction temperature		T_J	-	150	$^{\circ}\text{C}$
storage temperature		T_{stg}	-	$-65 \sim +150$	$^{\circ}\text{C}$
soldering temperature		T_L	10s	260	$^{\circ}\text{C}$
ESD		-	HBM	2000	V

3.2、Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	2.7	-	5.5	V
ambient temperature	T_{amb}	-40	-	125	$^{\circ}\text{C}$

3.3、Electrical Characteristics

($T_{amb}=25^{\circ}\text{C}$, $R_{PU}=10\text{k}\Omega$, unless otherwise specified)

Parameter	Symbol	Conditions	V _{CC} =2.7V			V _{CC} =5V			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Power supply									
rated Specified voltage	V _{CC}	-	2.7	-	5.5	2.7	-	5.5	V
quiescent current (AiP3205)	I _Q	-	-	85	140	-	95	160	μA
		T _{amb} =−40℃ to +125℃	-	-	160	-	-	180	μA
quiescent current (AiP3206)		-	-	85	140	-	95	160	μA
		T _{amb} =−40℃ to +125℃	-	-	160	-	-	180	μA
quiescent current (AiP3208)		-	-	170	280	-	190	320	μA
		T _{amb} =−40℃ to +125℃	-	-	320	-	-	360	μA
Offset voltage									
input offset voltage	V _{IO}	V _{CM} = V _{CC} / 2	-	1	5	-	1	5	mV
		T _{amb} =−40℃ to +125℃	-	-	6	-	-	6	mV
input offset voltage temperature drift	dV _{OS} /dT	T _{amb} =−40℃ to +125℃	-	1	10	-	1	10	μV/℃
power supply rejection ratio	PSRR	-	65	85	-	65	85	-	dB
input hysteresis voltage	V _{HYST}	-	-	1	-	-	1	-	mV
Input bias current									
input bias current	I _{IB}	V _{CM} = V _{CC} / 2	-	1	50	-	1	50	pA



		T _{amb} =−40℃ to +125℃		-	-	5	-	-	5	nA
input offset current	I _{IO}	V _{CM} = V _{CC} / 2		-	1	50	-	1	50	pA
		T _{amb} =−40℃ to +125℃		-	-	2.5	-	-	2.5	nA
Input voltage										
common-mode voltage range	V _{CM}	T _{amb} =−40℃ to +125℃		-0.2	-	V _{CC} +0.2	-0.2	-	V _{CC} +0.2	V
common-mode rejection ratio	CMRR	−0.2V<V _{CM} <V _{CC} +0.2 V		65	85	-	60	70	-	dB
Input impedance										
input resistance	R _{IN}	-		-	12.5	-	-	12.5	-	GΩ
input capacitance	C _{IN}	differential mode		-	3.3	-	-	2.9	-	pF
		common mode		-	2.9	-	-	2.5	-	pF
Switch characteristics										
propagation delay (High to Low)	t _{PD}	input drive=20mV, C _L =15pF		-	72	80	-	66	75	ns
		input drive=100mV, C _L =15pF		-	52	65	-	49	60	ns
		T _{amb} =−40℃ to +125℃		-	-	90	-	-	85	ns
channel-to-channel propagation delay skew	-	High to Low	input drive=20mV, C _L =15pF	-	-	10	-	-	10	ns
fall time	t _F	10% to 90%		-	3.6	-	-	2.8	-	ns
Output										
Low level output voltage	V _{OL}	I _{SINK} =4mA		-	196	260	-	160	190	mV
		T _{amb} =−40℃ to +125℃		-	-	320	-	-	225	mV
short-circuit current (persingle comparator)	I _{SC}	I _{SC} sink current		18	23	-	40	55	-	mA
		T _{amb} =−40℃ to +125℃		15	-	-	35	-	-	mA



4、Function Description

AiP3205/6/8 are open-drain comparators which require an external pull-up resistor at the output. This comparator family features internal hysteresis, low propagation delay and low power consumption. The combination of rail-to-rail input voltage range and low-voltage single-supply operation make it ideal for portable, battery-powered devices.

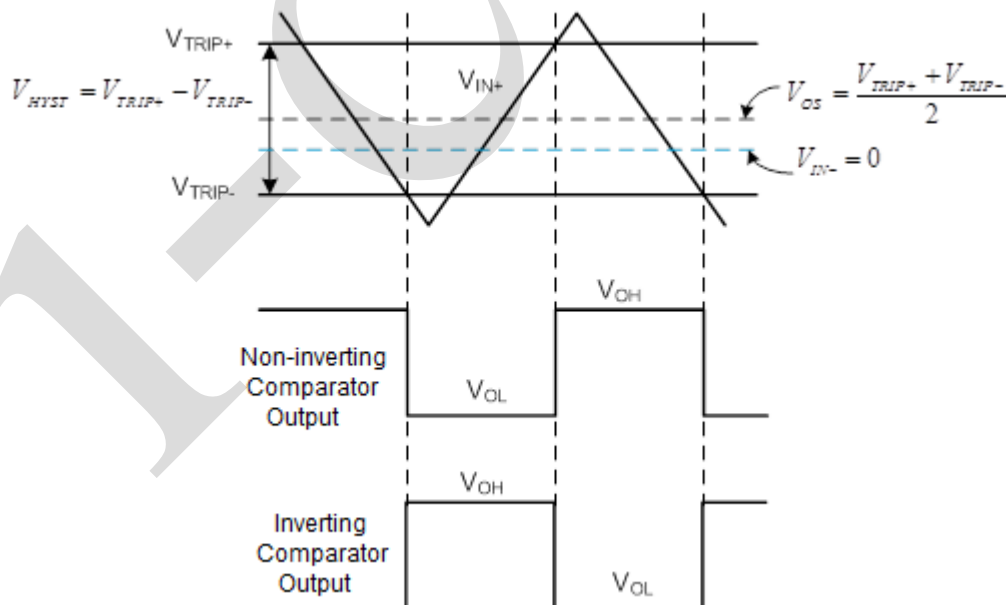
The devices have an internal hysteresis of 1mV to prevent oscillations caused by noise or undesired parasitic feedback. The hysteresis in a comparator creates two trip points: one for the rising input voltage and one for the falling input voltage. The difference between the trip points is the hysteresis. The average of the trip points is the offset voltage. When the comparator's input voltages are equal, the hysteresis effectively causes one comparator input voltage to move quickly past the other, thus taking the input out of the region where oscillation occurs. To increase hysteresis and noise margin even more, external resistors can be used.

The waveform below illustrates the case where IN^- is fixed and IN^+ is varied. If the inputs were reversed, the waveform would look the same, except the output would be inverted.

Its rail-to-rail input voltage range and low-voltage single-supply operation make it an ideal option for portable equipment.

The comparators are designed with 1mV internal hysteresis to avoid oscillation caused by noise or unwanted parasitic feedback. The built-in hysteresis generates two threshold trip voltages: one for rising input voltage and the other for falling input voltage. The voltage difference between the two trip points is defined as hysteresis voltage, while the average value of the two trip voltages equals the input offset voltage. When the two input pins of the comparator are at equal potentials, hysteresis accelerates one input to exceed the other rapidly, pulling the input operating point out of the oscillation region. Further increase of hysteresis and noise margin can be realized via external resistors.

The waveform below illustrates the condition with IN^- fixed and IN^+ varying. If the two input ports are swapped, the waveform shape remains identical but the output phase is inverted.

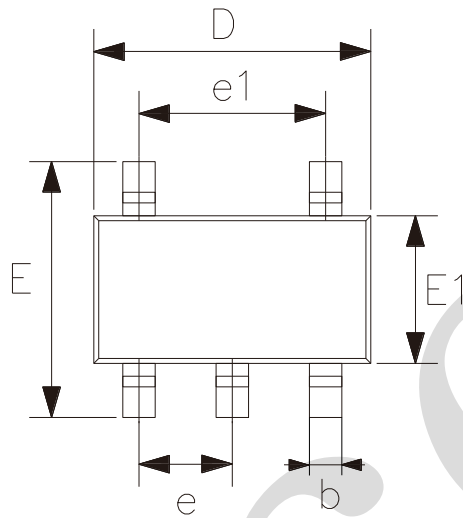
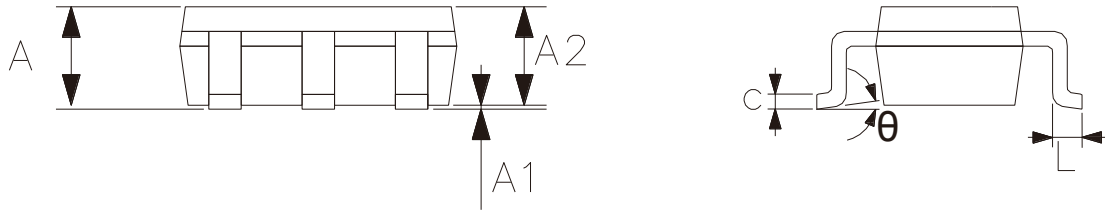


Comparator hysteresis and offset



5、Package Information

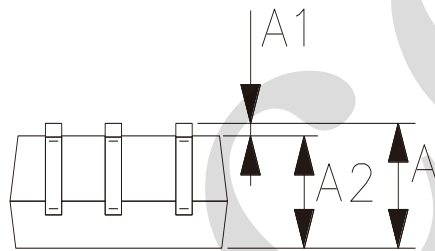
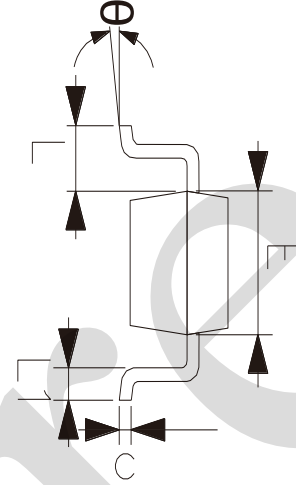
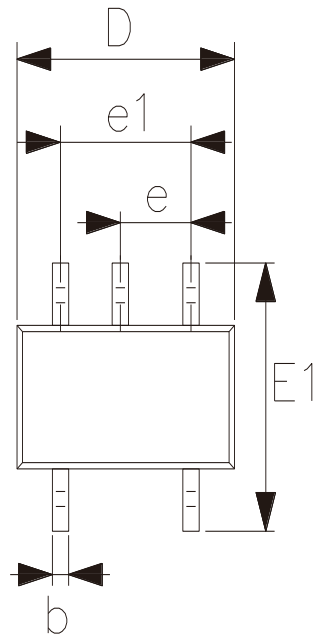
5.1、SOT23-5



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	—	1.26
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
θ	0°	8°



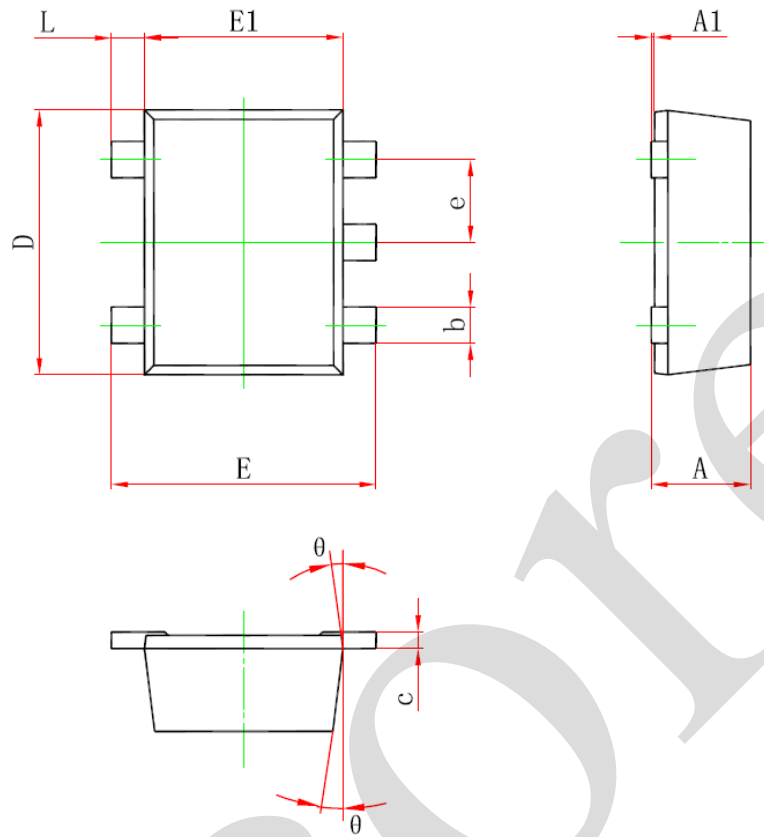
5.2、SOT353



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.15	0.35
c	0.11	0.175
D	2.00	2.20
E	1.15	1.35
E1	2.15	2.45
e	0.65	
e1	1.20	1.40
L	0.525	
L1	0.26	0.46
θ	0°	8°



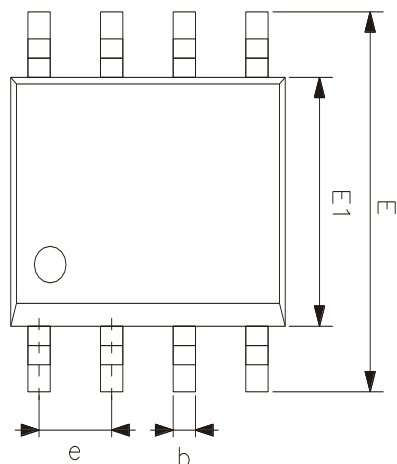
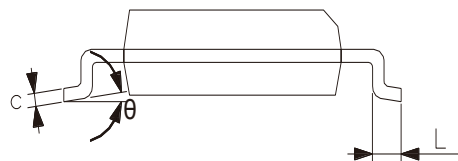
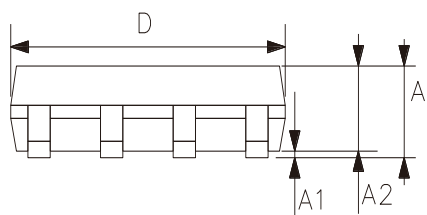
5.3、SOT553



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	0.525	0.60
A1	0	0.05
e	0.45	0.55
c	0.09	0.16
D	1.50	1.70
b	0.17	0.27
E1	1.10	1.30
E	1.50	1.70
L	0.10	0.30
θ	7°	



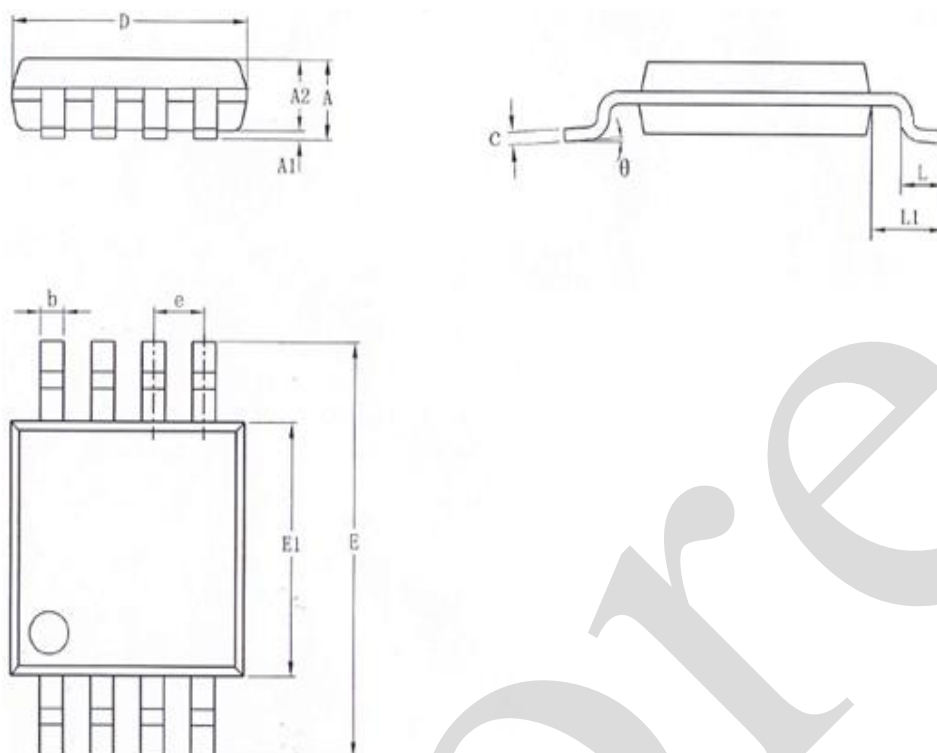
5.4、SOP8



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.35	1.80
A1	0.05	0.25
A2	1.25	1.55
D	4.70	5.10
E	5.80	6.30
E1	3.70	4.10
b	0.306	0.51
c	0.19	0.25
e	1.27	
L	0.40	0.89
θ	0°	8°



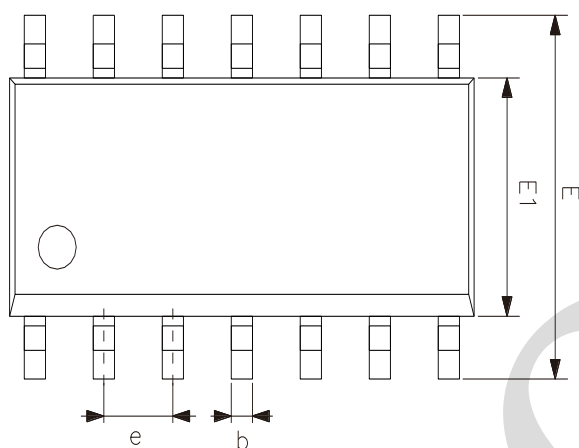
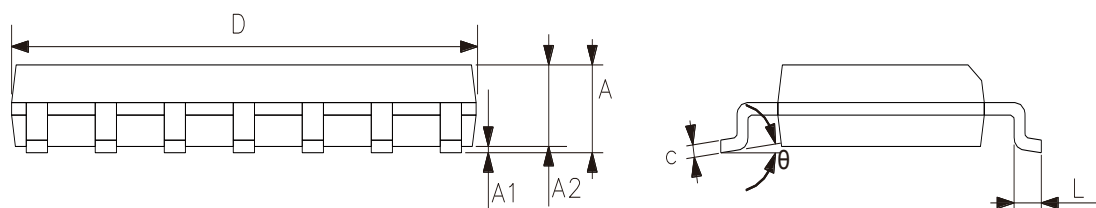
5.5、MSOP8



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.10
A1	0.05	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	4.70	5.10
E1	2.90	3.10
e	0.65	
L	0.40	0.80
L1	0.95	
θ	0°	8°



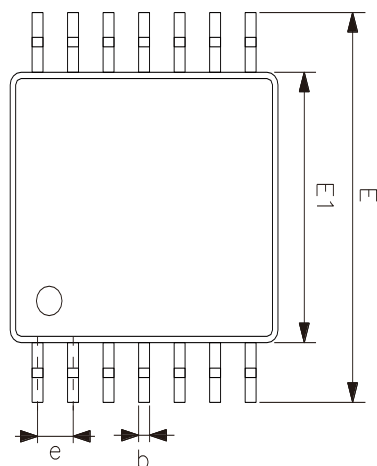
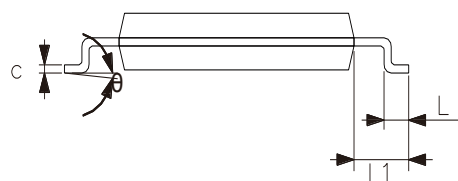
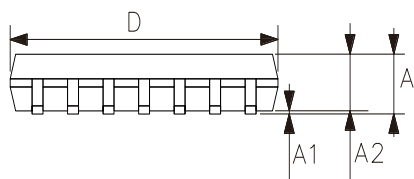
5.6、SOP14



2023/12/A Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.50	1.75
A1	0.05	0.25
A2	1.30	—
b	0.33	0.50
c	0.19	0.25
D	8.43	8.76
E	5.80	6.25
E1	3.75	4.00
e	1.27	
L	0.40	0.89
θ	0°	8°



5.7、TSSOP14



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
θ	0°	8°



6、Statements And Notes

6.1、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.									

6.2、Notes

We recommend you to read this chapter carefully before using this product.

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