



AiP3241/AiP3241B/AiP3242/AiP3244

24ns, Low-Power, Push-Pull 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 AiP3241B
2025-12-A3	2025-12	Add SOT353/SOT553 package form for AiP3241B



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1、General Description

AiP3241, AiP3241B, AiP3242 and AiP3244 are single, dual and quad-channel push-pull 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.

Features:

- Low propagation delay: 24ns
- Input common-mode voltage range: $-0.2V$ to $V_{CC} + 0.2V$
- Input offset voltage: 1mV
- Push-pull output
- Supply voltage: +2.7V to 5.5V
- Operating temperature: $-40^{\circ}C$ to $125^{\circ}C$
- Package form:
 - AiP3241: SOT23-5/SOT353
 - AiP3241B: SOT23-5/SOT353/SOT553
 - AiP3242: SOP8/MSOP8
 - AiP3244: SOP14/TSSOP14



Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP3241GB235.TR	SOT23-5	3241XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP3241GC353.TR	SOT353	3241XX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP3241BGB235.TR	SOT23-5	3241BXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing:0.95mm
AiP3241BGC353.TR	SOT353	KHXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing:0.65mm
AiP3241BGG553.TR	SOT553	KHXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 1.6mm×1.2mm Pin spacing:0.5mm
AiP3242SA8.TR	SOP8	AiP3242	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing:1.27mm
AiP3242MA8.TR	MSOP8	AiP3242	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing:0.65mm
AiP3244SA14.TR	SOP14	AiP3244	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing:1.27mm
AiP3244TA14.TR	TSSOP14	AiP3244	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm

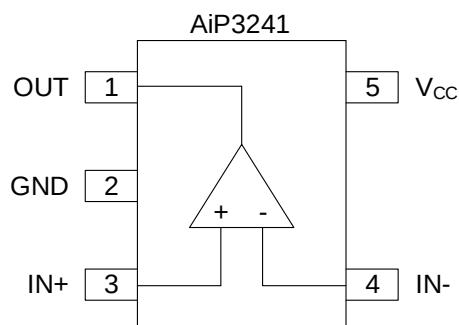
Note 1: “XX” refers to variable content, meaning package batch serial number.

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

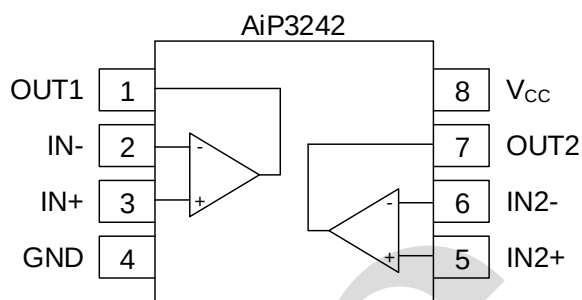


2、Pin Configurations And Pin Description

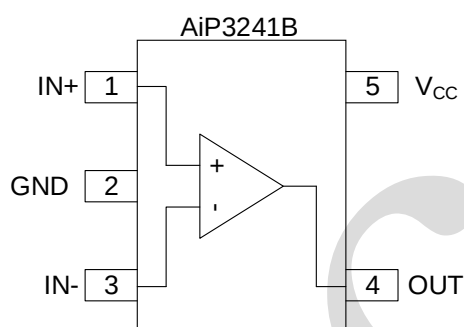
2.1、Pin Configurations



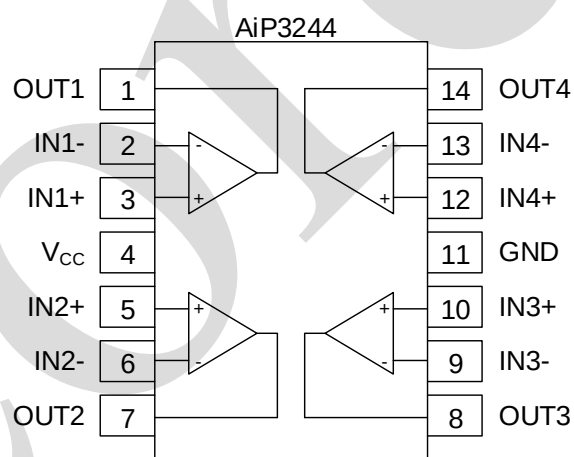
SOT23-5/SOT353



SOP8/MSOP8



SOT23-5/SOT353/SOT553



SOP14/TSSOP14



2.2、Pin Description

AiP3241 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

AiP3241B 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

AiP3242 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

AiP3244 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 to $V_{CC}+0.5$	V
	current	-	-	± 10	mA
output short-circuit current to ground		I_O	-	100	mA
Maximum junction temperature		T_J	-	150	$^{\circ}\text{C}$
storage temperature		T_{stg}	-	-65 to +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									
Specified voltage	V _{CC}	-	2.7	-	5.5	2.7	-	5.5	V
quiescent current (AiP3241)	I _Q	-	-	320	420	-	335	450	μA
		T _{amb} =−40°C to +125°C	-	-	560	-	-	600	μA
quiescent current (AiP3242)		-	-	320	420	-	335	450	μA
		T _{amb} =−40°C to +125°C	-	-	560	-	-	600	μA
quiescent current (AiP3244)		-	-	640	840	-	670	900	μA
		T _{amb} =−40°C to +125°C	-	-	1120	-	-	1200	μA
Offset voltage									
input offset voltage	V _{IO}	V _{CM} = V _{CC} / 2	-	1	5	-	1	5	mV
		T _{amb} =−40°C to +125°C	-	-	6	-	-	6	mV
input offset voltage drift	dV _{OS} /dT	T _{amb} =−40°C to +125°C	-	2.3	15	-	2.3	15	μV/°C
power supply rejection ratio	PSRR	-	65	85	-	65	85	-	dB
input hysteresis voltage	V _{HYST}	-	-	0.4	-	-	0.7	-	mV
Input bias current									
input bias current	I _{IB}	V _{CM} = V _{CC} / 2	-	1	50	-	1	50	pA
		T _{amb} =−40°C to +125°C	-	-	5	-	-	5	nA
input offset current	I _{IO}	V _{CM} = V _{CC} / 2	-	1	50	-	1	50	pA
		T _{amb} =−40°C to +125°C	-	-	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	t _{PD}	Low to High	input drive=20mV, C _L =15pF	-	33	42	-	32	42	ns
			input drive=100mV, C _L =15pF	-	24	32	-	24	32	ns
			T _{amb} =−40℃ to +125℃	-	-	45	-	-	45	ns
		High to Low	input drive=20mV, C _L =15pF	-	32	42	-	31	42	ns
			input drive=100mV, C _L =15pF	-	23	32	-	23	32	ns
			T _{amb} =−40℃ to +125℃	-	-	45	-	-	45	ns
propagation delay skew	-	input drive=20mV, C _L =15pF		-	1	-	-	1	-	ns
channel-to-channel propagation delay skew	-	Low to High, High to Low	input drive=20mV, C _L =15pF	-	-	10	-	-	10	ns
rise time	t _r	10% to 90%		-	3.5	-	-	2.6	-	ns
fall time	t _f	10% to 90%		-	3.6	-	-	2.8	-	ns
Output										
Output swing from supply rail	ΔV _{OL}	I _{SINK} =4mA		-	196	260	-	160	190	mV
		T _{amb} =−40℃ to +125℃		-	-	320	-	-	225	mV
	ΔV _{OH}	I _{SOURCE} =4mA		-	184	250	-	120	150	mV
		T _{amb} =−40℃ to +125℃		-	-	350	-	-	170	mV
short-circuit current (per comparator)	I _{SC}	I _{SC} sink current		18	23	-	40	55	-	mA
		T _{amb} =−40℃ to +125℃		15	-	-	35	-	-	mA
		I _{SC} source current		16	20	-	50	65	-	mA
		T _{amb} =−40℃ to +125℃		14	-	-	45	-	-	mA

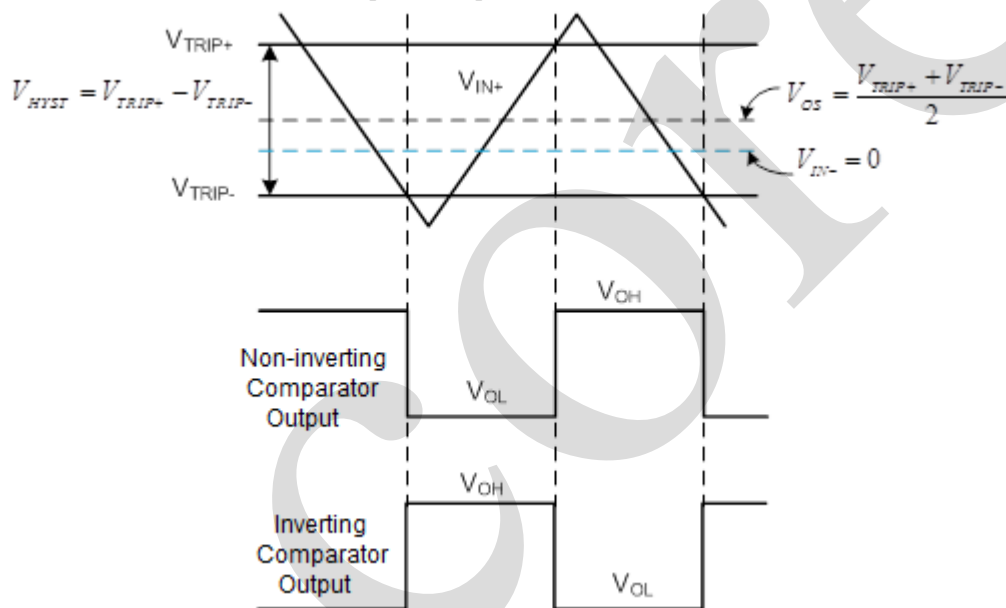


4、Function Description

The AiP324x series are push-pull comparators featuring 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 0.7mV 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.

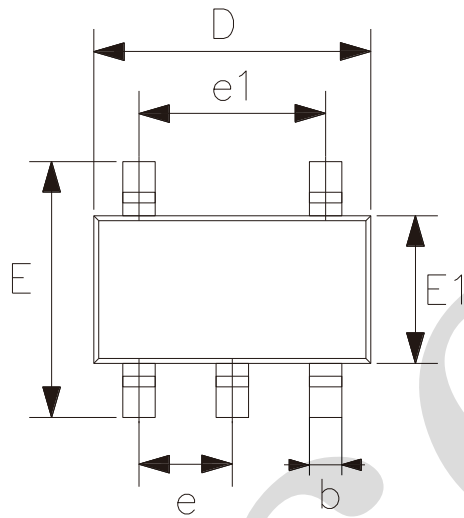
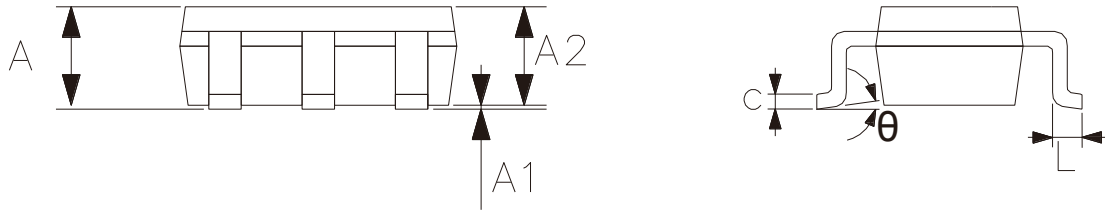


Comparator hysteresis and offset



5、Package Information

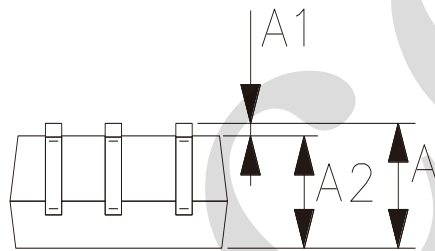
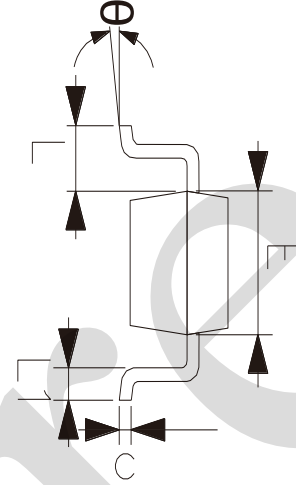
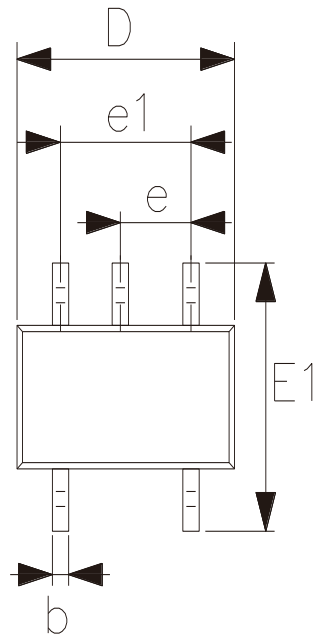
5.1、SOT23-5



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°



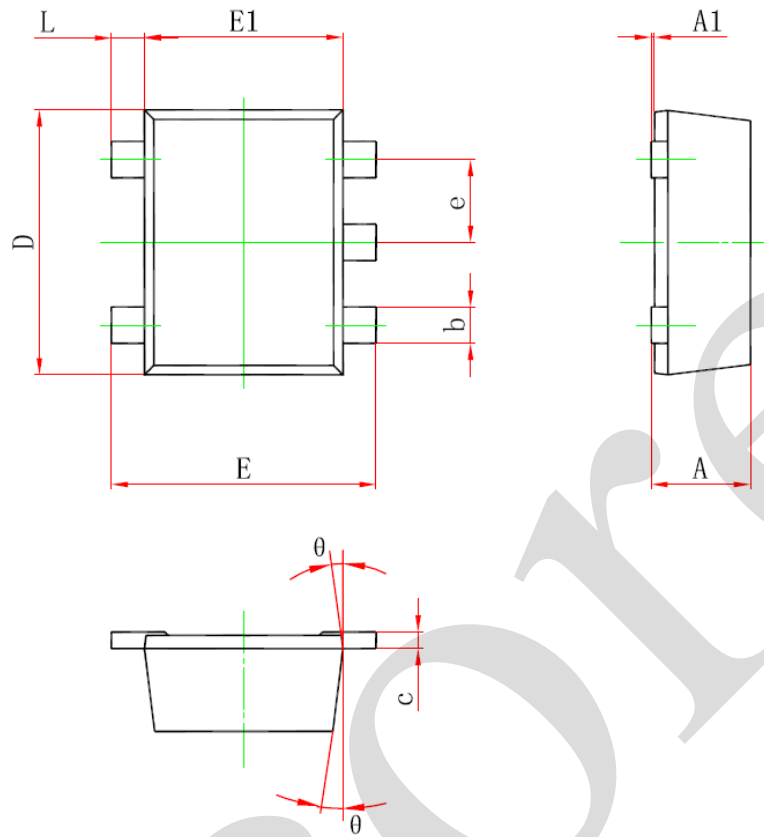
5.2、SOT353



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°



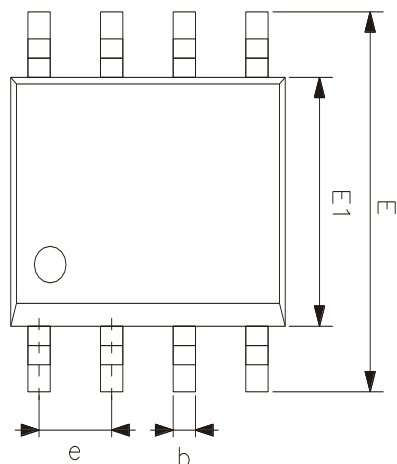
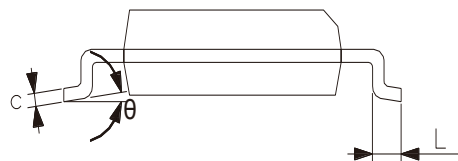
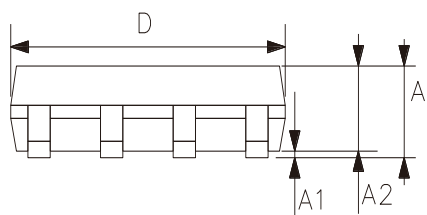
5.3、SOT553



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°	



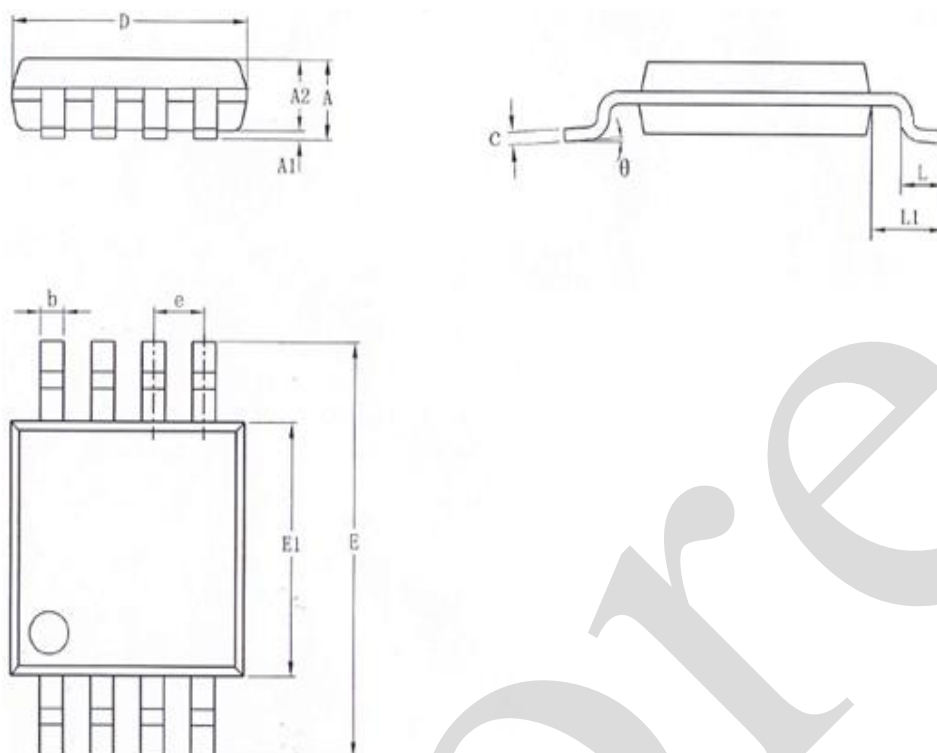
5.4、SOP8



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°



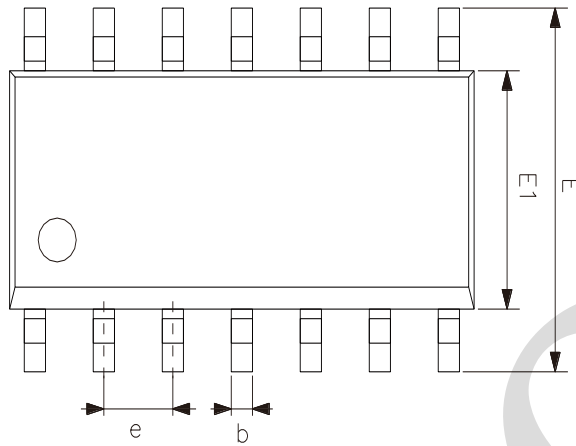
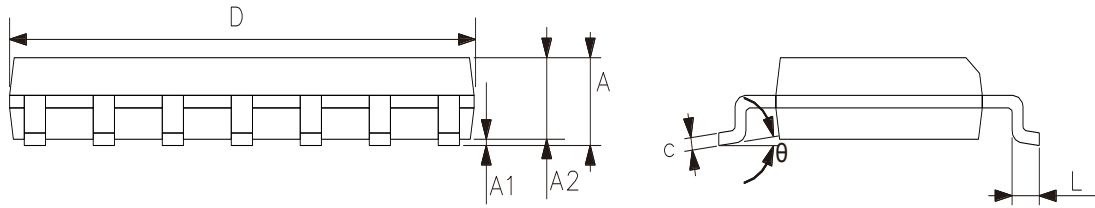
5.5、MSOP8



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°



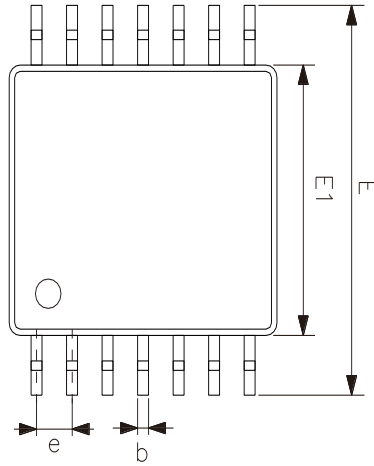
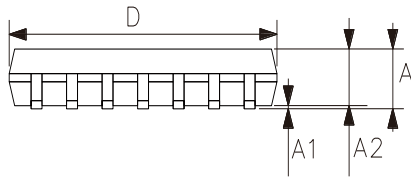
5.6、SOP14



2023/12/A	Dimensions In Millimeters	
Symbol	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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