



AiP8711/AiP8712/AiP8713/ AiP8714/AiP8719 6MHz, Low Noise Rail-to-Rail Operational Amplifier

Product Specification

Specification Revision History:

Version	Date	Description
2025-04-A0	2025-04	New
2025-08-A1	2025-08	Modify parameters



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1、General Description

AiP8711, AiP8712, AiP8713, AiP8714 and AiP8719 are a family of operational amplifiers with a supply voltage of 5V and rail-to-rail input and output. They feature low offset voltage, low input voltage noise, low current noise and wide signal bandwidth.

Among them, the AiP8711 is a single-channel op amp, the AiP8712 is a dual-channel op amp, and the AiP8714 is a quad-channel op amp. The AiP8713 and AiP8719 are single-channel and dual-channel devices with enable function, supporting low-power standby mode.

Applications include audio output, thermocouple amplifiers, precision current sensing, photodiode amplifiers, etc.

Features:

- Supply voltage: 2.2V to 5.5V
- Gain bandwidth product: 6MHz
- Supply current: 0.7mA/ch
- Slew rate: 3.7V/us
- Noise: 8.2nV/ $\sqrt{\text{Hz}}$ @f=1kHz
- Input bias current: 0.3pA (typ)
- Offset voltage: 1mV (max)
- Package form:
 - AiP8711: SOT23-5, SOT353, SOP8, MSOP8
 - AiP8712: SOP8, MSOP8, TSSOP8
 - AiP8713: SOT23-6, SOP8
 - AiP8714: SOP14, TSSOP14
 - AiP8719: MSOP10

**Ordering Information:****Reel packing specifications:**

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP8711GB235.TR	SOT23-5	8711XX	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8711GC353.TR	SOT353	8711XX	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8711SA8.TR	SOP8	AiP8711	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8711MA8.TR	MSOP8	AiP8711	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8712SA8.TR	SOP8	AiP8712	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8712MA8.TR	MSOP8	AiP8712	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8712TB8.TR	TSSOP8	8712	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×4.4mm Pin spacing: 0.65mm
AiP8713GB236.TR	SOT23-6	8713XX	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8713SA8.TR	SOP8	AiP8713	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8714SA14.TR	SOP14	AiP8714	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm



AiP8714TA14.TR	TSSOP14	AiP8714	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP8719MA10.TR	MSOP10	AiP8719	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.50mm

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

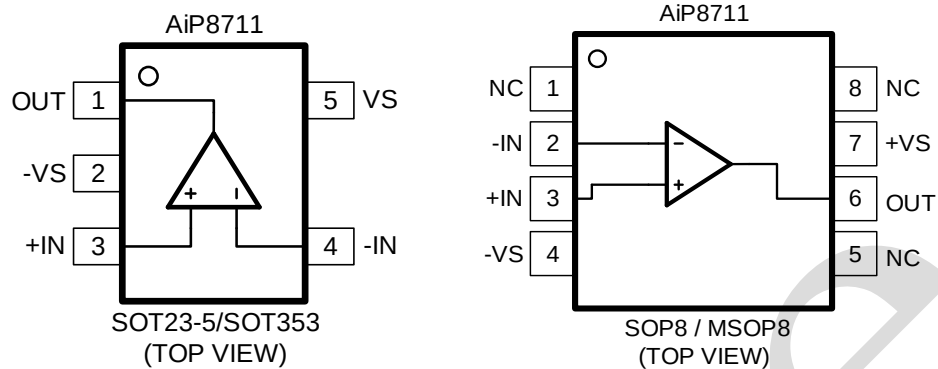
Note 2: If the physical information is inconsistent with the ordering information, please refer to the actual product.



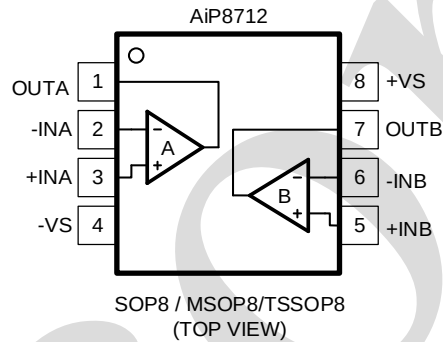
2、Pin Configurations And Pin Description

2.1、Pin Configurations

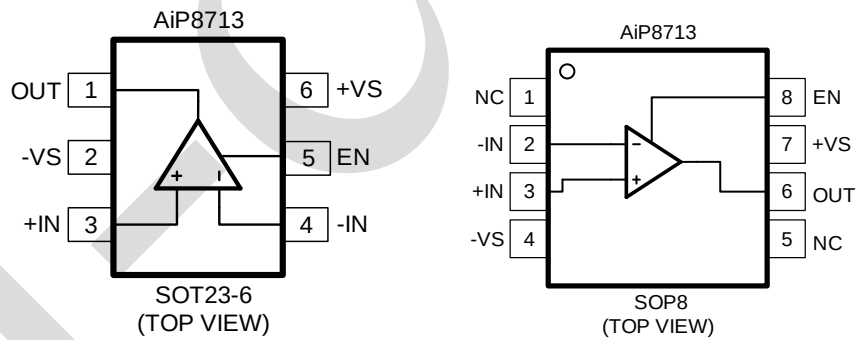
AiP8711:



AiP8712:

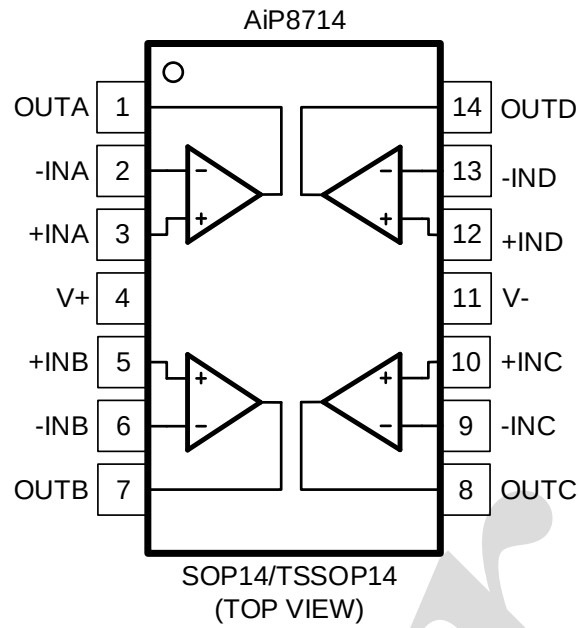


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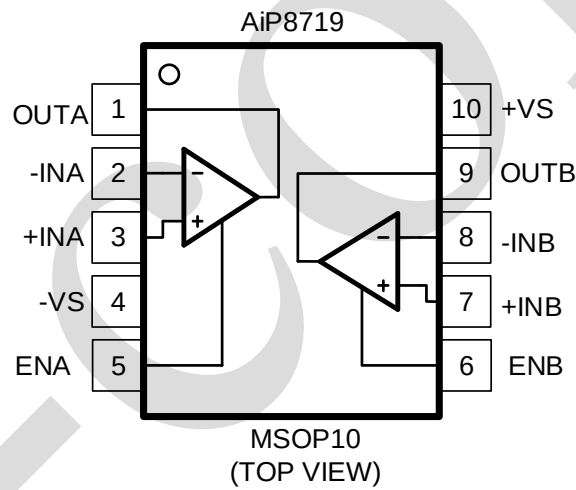




AiP8714:



AiP8719:



**2.3、Pin Description****AiP8711: SOT23-5, SOT353**

Pin No.	Pin Name	Description
1	OUT	Amplifier output
2	-VS	Negative power supply
3	+IN	Amplifier positive input
4	-IN	Amplifier negative input
5	+VS	Positive power supply

AiP8711: SOP8, MSOP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	NC	Not connected	5	NC	Not connected
2	-IN	Amplifier negative input	6	OUT	Amplifier output
3	+IN	Amplifier positive input	7	+VS	Positive power supply
4	-VS	Negative power supply	8	NC	Not connected

AiP8712: SOP8, MSOP8, TSSOP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUTA	Amplifier A output	5	+INB	Amplifier B positive input
2	-INA	Amplifier A negative input	6	-INB	Amplifier B negative input
3	+INA	Amplifier A positive input	7	OUTB	Amplifier B output
4	-VS	Negative power supply	8	+VS	Positive power supply

AiP8713: SOT23-6

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUT	Amplifier output	4	-IN	Amplifier negative input
2	-VS	Negative power supply	5	EN	Amplifier enable pin, Low level: amplifier shutdown; High level: normal operation
3	+IN	Amplifier positive input	6	+VS	Positive power supply

AiP8713: SOP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	NC	Not connected	5	NC	Not connected
2	-IN	Amplifier negative input	6	OUT	Amplifier output
3	+IN	Amplifier positive input	7	+VS	Positive power supply
4	-VS	Negative power supply	8	EN	Amplifier enable pin, Low level: amplifier shutdown; High level: normal operation



AiP8714: SOP14, TSSOP14

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUTA	Amplifier A output	8	OUTC	Amplifier C output
2	-INA	Amplifier A negative input	9	-INC	Amplifier C negative input
3	+INA	Amplifier A positive input	10	+INC	Amplifier C positive input
4	+VS	Positive power supply	11	-VS	Negative power supply)
5	+INB	Amplifier B positive input	12	+IND	Amplifier D positive input
6	-INB	Amplifier B negative input	13	-IND	Amplifier D negative input
7	OUTB	Amplifier B output	14	OUTD	Amplifier D output

AiP8719: MSOP10

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUTA	Amplifier A output	6	ENB	Amplifier B enable pin, Low level: amplifier shutdown; High level: normal operation
2	-INA	Amplifier A negative input	7	+INB	Amplifier B positive input
3	+INA	Amplifier A positive input	8	-INB	Amplifier B negative input
4	-VS	Negative power supply	9	OUTB	Amplifier B output
5	ENA	Amplifier A enable pin, Low level: amplifier shutdown; High level: normal operation	10	+VS	Positive power supply

**3、Electrical Parameter****3.1、Absolute Maximum Ratings**(T_{amb}=25℃, All voltage referenced to V_{ss}, unless otherwise specified)

Characteristic	Symbol	Conditions	Value	Unit
Supply voltage	V _S	-	7	V
Input voltage	V _{IN}	-	-V _S -0.3 to +V _S +0.3	V
Input current (+I _{IN} , -I _{IN})	I _{IN}	-	±20	mA
Power supply pin current	-	-	±60	mA
Junction temperature	T _J	-	150	℃
Soldering temperature	T _{stg}	-	-65 to 150	℃
Soldering temperature	T _L	10s	260	℃

3.2、Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _S	2.2	-	5.5	V
Operating temperature	T _{amb}	-40	-	125	℃

3.3、ESD

Characteristic	Symbol	Conditions	Value	Unit
Human body model	HBM	MIL-STD-883-3	4000	V
Charged device model	CDM	JS-002	1000	V



3.4、Electrical Characteristics

($T_{amb}=25^{\circ}\text{C}$, $V_S=5\text{V}$, $R_L=2\text{k}\Omega$, $C_L=100\text{pF}$, unless otherwise specified)

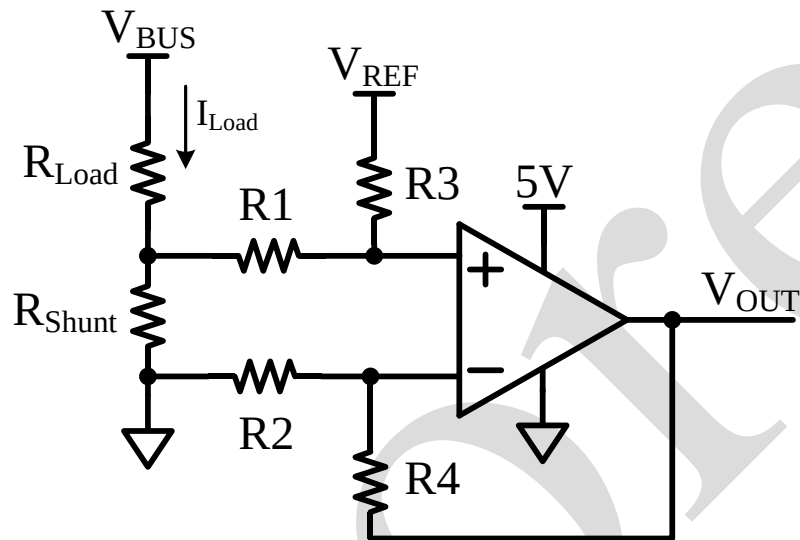
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V_{OS}	$V_{CM}=V_S/2$	-1	± 0.25	1	mV
		$V_{CM}=0\text{V}$	-1	± 0.25	1	
Input offset voltage drift	$V_{OS\ TC}$	-40 to 125°C	-	1	-	$\mu\text{V}/^{\circ}\text{C}$
Input bias current	I_B	$T_{amb}=25^{\circ}\text{C}$	-	0.3	-	pA
Input offset current	I_{OS}	-	-	0.3	-	pA
Input voltage noise	V_n	$f=0.1\text{Hz}$ to 10Hz	-	3.2	-	μV_{PP}
Input voltage noise density	e_n	$f=1\text{kHz}$	-	8.2	-	$\text{nV}/\sqrt{\text{Hz}}$
Input capacitance	C_{IN}	Differential mode	-	8	-	pF
		Common mode	-	7	-	
Input current noise	I_n	$f=1\text{kHz}$	-	2	-	$\text{fA}/\sqrt{\text{Hz}}$
Common-mode rejection ratio	CMRR	$V_{CM}=0\text{V}$ to 3V	80	100	-	dB
		$V_{CM}=0\text{V}$ to 5V	55	75	-	
Common-mod input voltage	V_{CM}	-	$-V_S-0.1$	-	$+V_S-0.1$	V
Power supply rejection ratio	PSRR	$V_S=2.2\text{V}$ to 5.5V , $V_{CM}=0\text{V}$	74	100	-	dB
Open-loop large-signal gain	A_{VOL}	$R_{LOAD}=2\text{k}\Omega$, $V_{OUT}=0.5\text{V}$ to 4.5V	-	110	-	dB
Output rail-to-rail voltage	V_{OH}	$R_{LOAD}=2\text{k}\Omega$	-	20	50	mV
	V_{OL}		-	10	50	mV
Closed-loop output impedance	R_{OUT}	$G=1$, $f=1\text{MHz}$, $I_{OUT}=0$	-	0.15	-	Ω
Open-loop output impedance	R_O	$f=1\text{KHz}$, $I_{OUT}=0$	-	125	-	Ω
Output short-circuit current	$I_{SC,SINK}$	-	100	130	200	mA
	$I_{SC,SOURCE}$	-	80	110	200	mA
Supply voltage	V_S	-	2.2	-	5.5	V
Quiescent current (each op amp)	I_Q	$V_S=5\text{V}$	-	0.7	1.1	mA
Phase margin	PM	$R_{LOAD}=1\text{k}\Omega$, $C_{LOAD}=60\text{pF}$	-	60	-	$^{\circ}$
Gain margin	GM	$R_{LOAD}=1\text{k}\Omega$, $C_{LOAD}=60\text{pF}$	-	8	-	dB
Gain bandwidth product	GBWP	$f=1\text{kHz}$	-	6	-	MHz
Slew rate	SR	$A_V=1$, $C_{LOAD}=100\text{pF}$, $R_{LOAD}=2\text{k}\Omega$	-	3.7	-	V/us
Full power bandwidth	FPBW	-	-	336	-	kHz
Setup time	t_s	$A_V=-1$, 1V Step, 0.1%	-	1.2	-	μs
		$A_V=-1$, 1V Step, 0.01%	-	1.5	-	μs
Total harmonic distortion plus noise	THD+N	$f=1\text{kHz}$, $A_V=1$, $R_L=2\text{k}\Omega$, $V_{OUT}=1V_{P-P}$	-	0.0005	-	%
Channel isolation	Xtalk	$f=1\text{kHz}$, $R_L=2\text{k}\Omega$	-	110	-	dB
Shutdown time	t_{OFF}	AiP8713/ AiP8719	-	0.25	-	μs
Turn-on time	t_{ON}		-	1.5	-	μs



Shutdown current	I_{QSD}		-	0.1	-	μA
Enable input high-level voltage	V_{IH}		1.3	-	-	V
Enable input low-level voltage	V_{IL}		-	-	0.7	V

4、Typical Application Circuit And Application Note

4.1、Application Circuit



Low-side current sensing application diagram

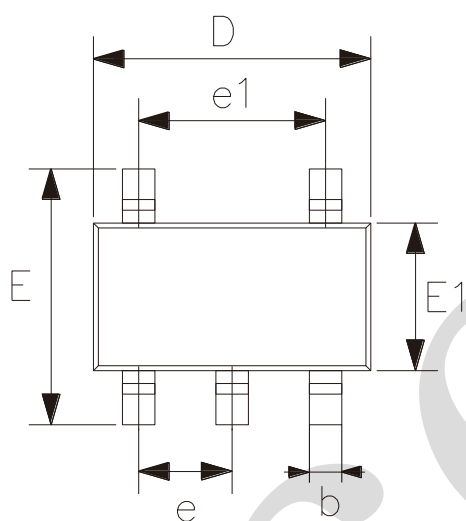
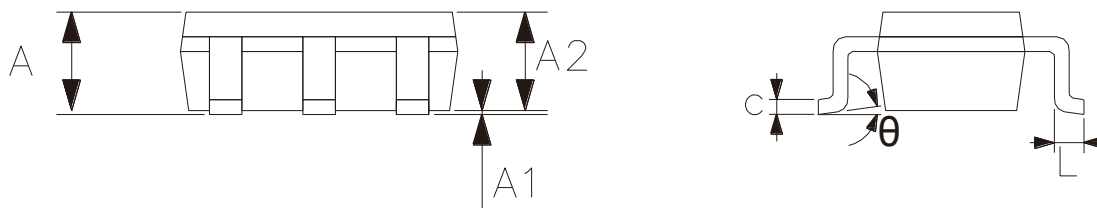
$$V_{OUT} = (I_{Load} * R_{Shunt}) * (R3/R1) + V_{REF}$$

Note: $R1=R2$, $R3=R4$, $R_{Shunt} \ll R1$.



5、Package Information

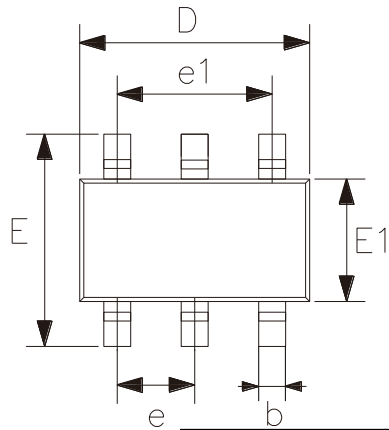
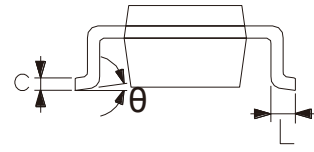
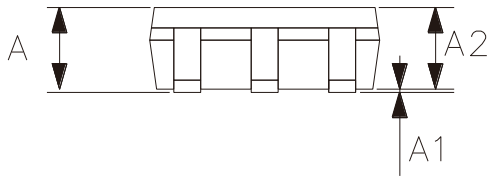
5.1、SOT23-5



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°



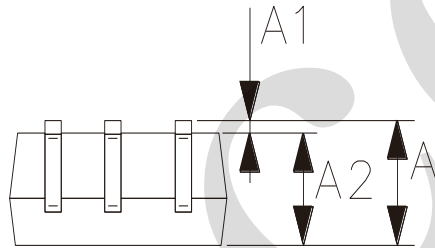
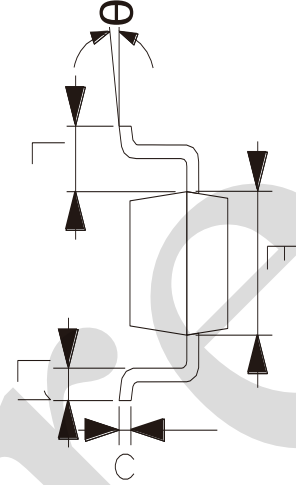
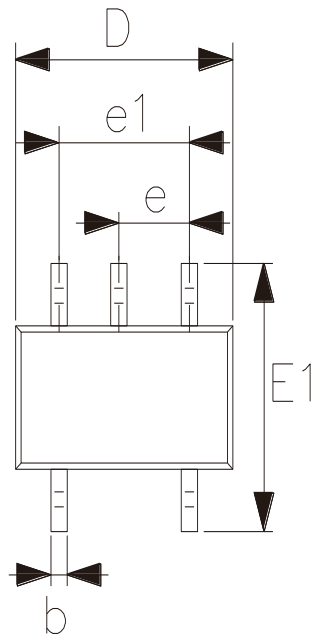
5.2、SOT23-6



2023/12/A	Dimensions In Millimeters	
Symbol	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
θ	0°	8°



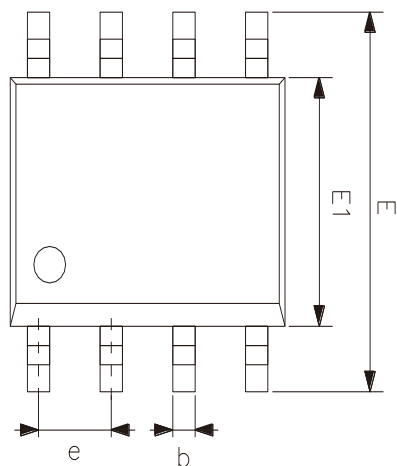
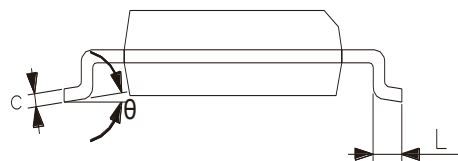
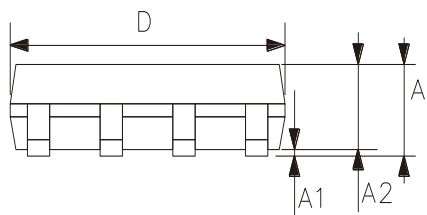
5.3、SOT353



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°



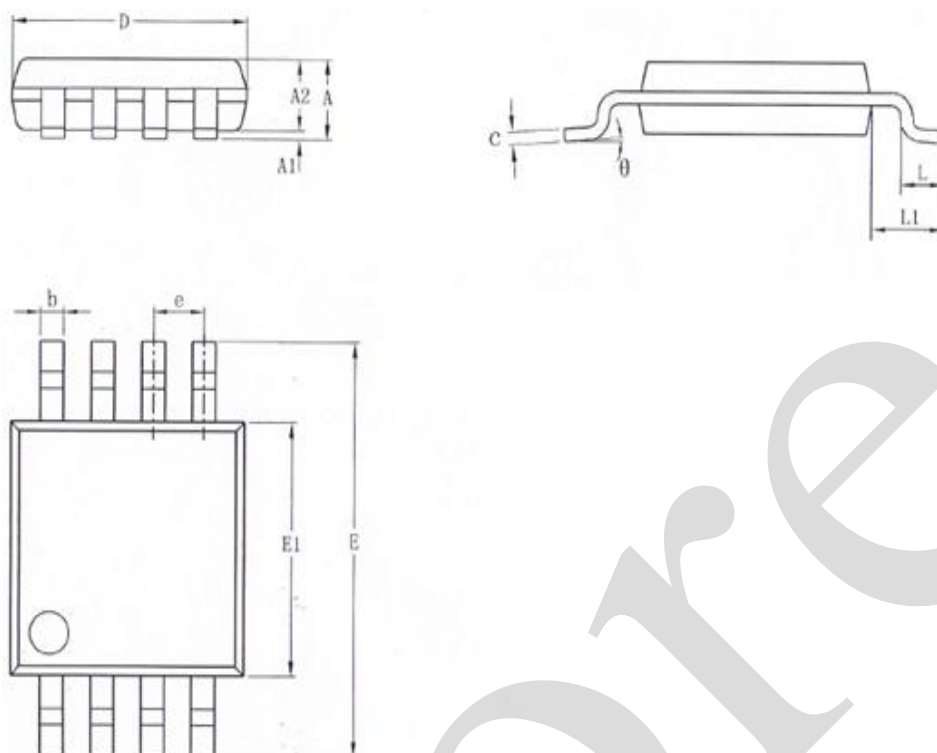
5.4、SOP8



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°



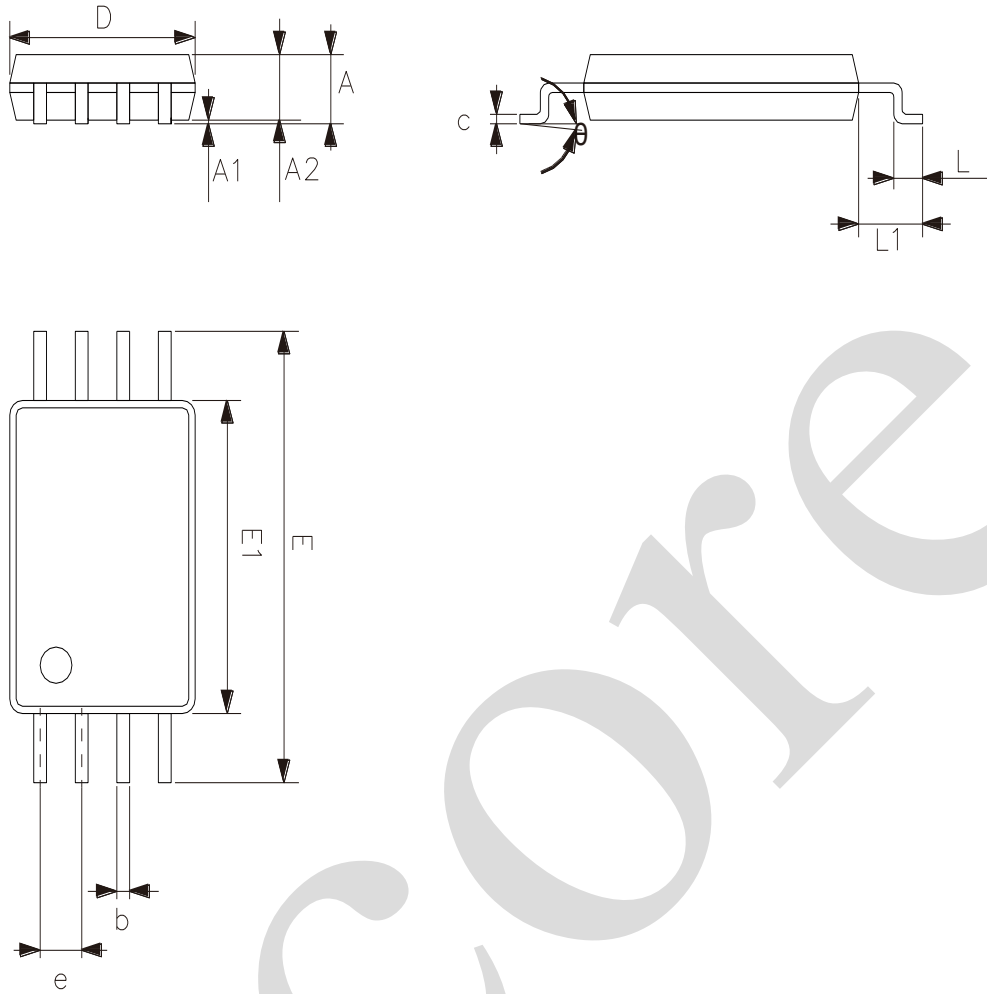
5.5、MSOP8



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°



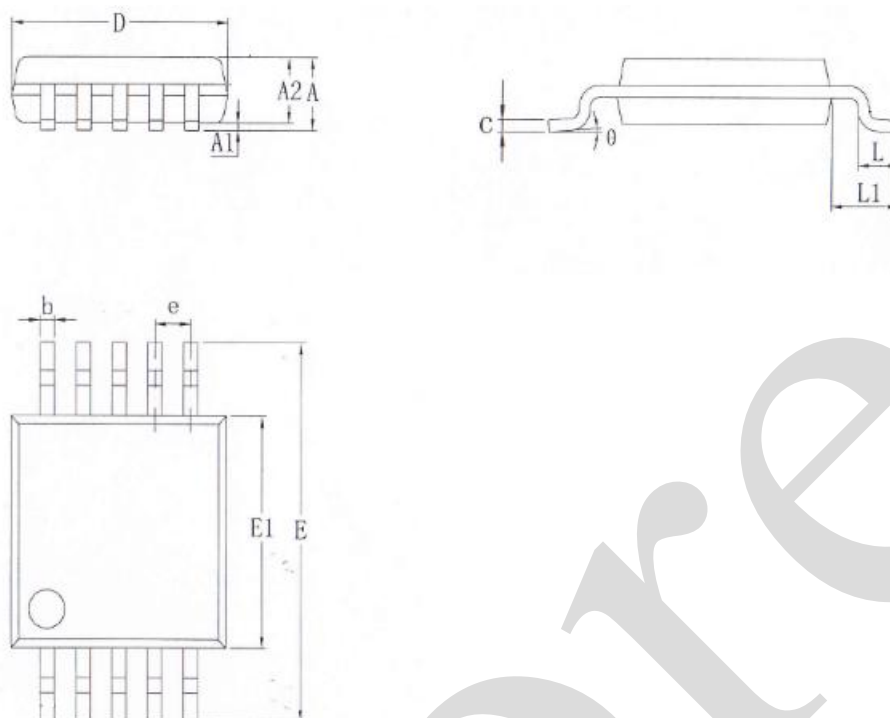
5.6、TSSOP8



2023/12/A Symbol	Dimensions In Millimeters	
	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	2.90	3.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
θ	0°	8°



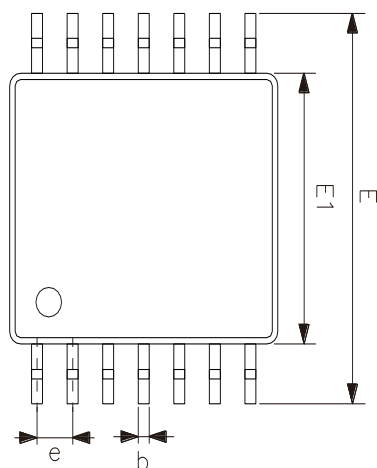
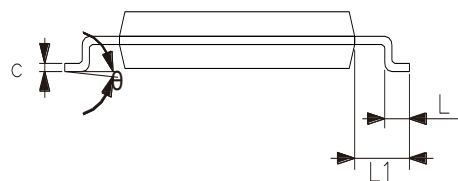
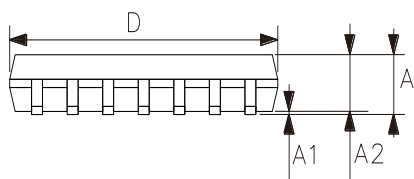
5.7、MSOP10



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.10
A1	0.05	0.15
A2	0.75	0.95
b	0.17	0.27
c	0.08	0.23
D	2.90	3.10
E	4.70	5.10
E1	2.90	3.10
e	0.50	
L	0.40	0.80
L1	0.95	
θ	0°	8°



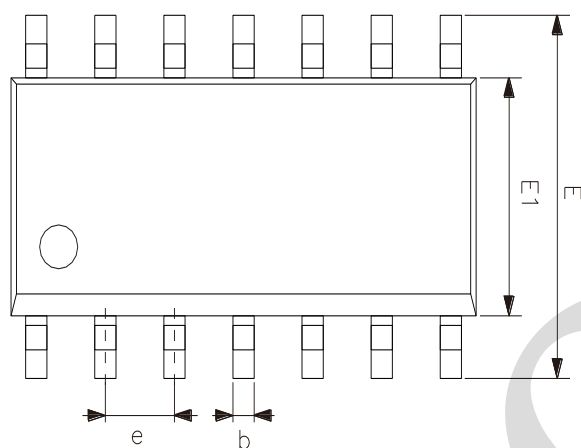
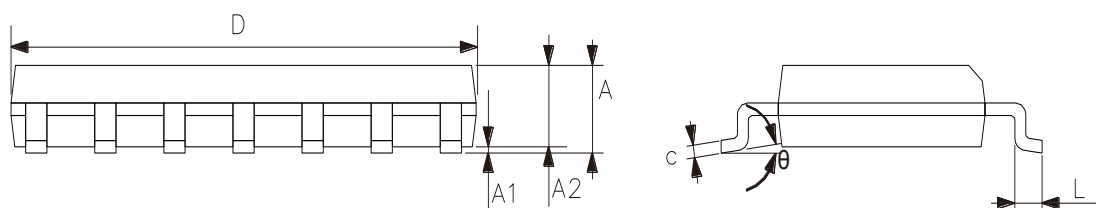
5.8、TSSOP14



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°



5.9、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°



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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