



AiP8621/AiP8622/AiP8623/AiP8624

5kHz Nanoampere Power Rail-to-Rail

Operational Amplifier

Product Specification

Specification Revision History:

Version	Date	Description
2024-06-A0	2024-06	New
2024-09-A1	2024-09	Modify parameters
2025-08-A2	2025-08	Modify the product name; update the DFN8 marking code of AiP8622; update package information of DFN8



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1、General Description

The AiP8621/2/3/4 series consists of nanoampere power rail-to-rail input/output operational amplifiers. Among them, AiP8621, AiP8622 and AiP8624 are single-channel, dual-channel and quad-channel op amps without a shutdown pin respectively, while AiP8623 is a single-channel op amp with a shutdown control pin. The amplifiers feature a 5kHz gain bandwidth product and unity-gain stability, making them ideal for low-frequency applications such as battery current sensing and sensor signal conditioning.

Features:

- Open-loop voltage gain: 100dB
- Gain bandwidth product: 5kHz
- Slew rate: 1.6V/ms
- Offset voltage: $\leq 2.5\text{mV}$
- Noise: $342\text{nV}/\sqrt{\text{Hz}}$
- Output short-circuit current: $>21\text{mA}$
- Input bias current: 1pA
- Input common-mode voltage range: $V_{SS}-0.1\text{V}$ to $V_{CC}+0.1\text{V}$
- Supply voltage: 1.4V to 5.5V
- Operating temperature: -40°C to 125°C
- Package form:
 - AiP8621: SOT23-5/SOP8/MSOP8/DIP8
 - AiP8622: MSOP8/SOP8/DFN8/DIP8
 - AiP8623: SOT23-6/SOP8/MSOP8/DIP8
 - AiP8624: SOP14/TSSOP14/QFN16/DIP14



Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP8621DA8.TB	DIP8	AiP8621	50 PCS/tube	40 tube/box	2000 PCS/box	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP8622DA8.TB	DIP8	AiP8622	50 PCS/tube	40 tube/box	2000 PCS/box	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP8623DA8.TB	DIP8	AiP8623	50 PCS/tube	40 tube/box	2000 PCS/box	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP8624DA14.TB	DIP14	AiP8624	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP8621SA8.TB	SOP8	AiP8621	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8622SA8.TB	SOP8	AiP8622	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8623SA8.TB	SOP8	AiP8623	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8624SA14.TB	SOP14	AiP8624	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP8621MA8.TB	MSOP8	AiP8621	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8622MA8.TB	MSOP8	AiP8622	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm



						0.65mm
AiP8623MA8.TB	MSOP8	AiP8623	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8624TA14.TB	TSSOP14	AiP8624	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP8621SA8.TR	SOP8	AiP8621	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8622SA8.TR	SOP8	AiP8622	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8623SA8.TR	SOP8	AiP8623	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8624SA14.TR	SOP14	AiP8624	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP8621MA8.TR	MSOP8	AiP8621	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8622MA8.TR	MSOP8	AiP8622	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8623MA8.TR	MSOP8	AiP8623	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm
AiP8624TA14.TR	TSSOP14	AiP8624	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm



					Pin spacing: 0.65mm
AiP8621GB235.TR	SOT23-5	8621XX	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8622XB8.TR	DFN8	AiP8622	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.0mm×2.0mm Pin spacing: 0.50mm
AiP8623GB236.TR	SOT23-6	8623XX	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8624QA16.TR	QFN16	AiP8624	6000PCS/reel	12000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.50mm

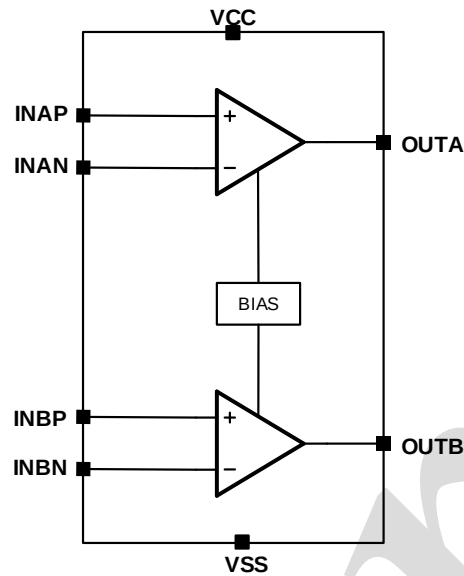
Note 1: “XX” refers to variable content, meaning package batch serial number.

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



2、Block Diagram And Pin Description

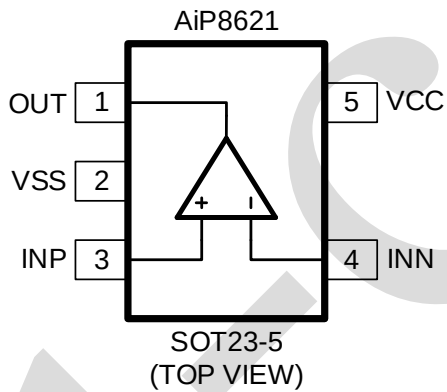
2.1、Block Diagram



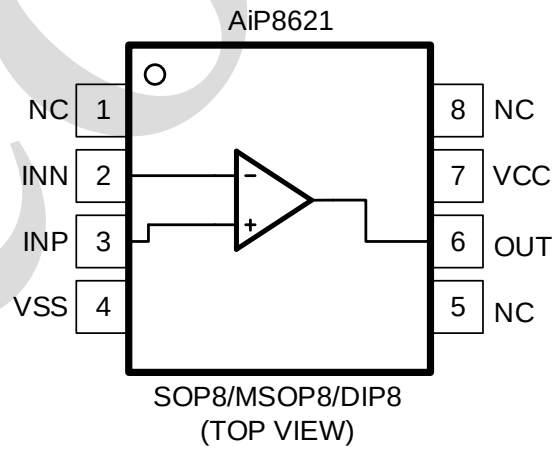
AiP8622 Block Diagram

2.2、Pin Configurations

AiP8621:



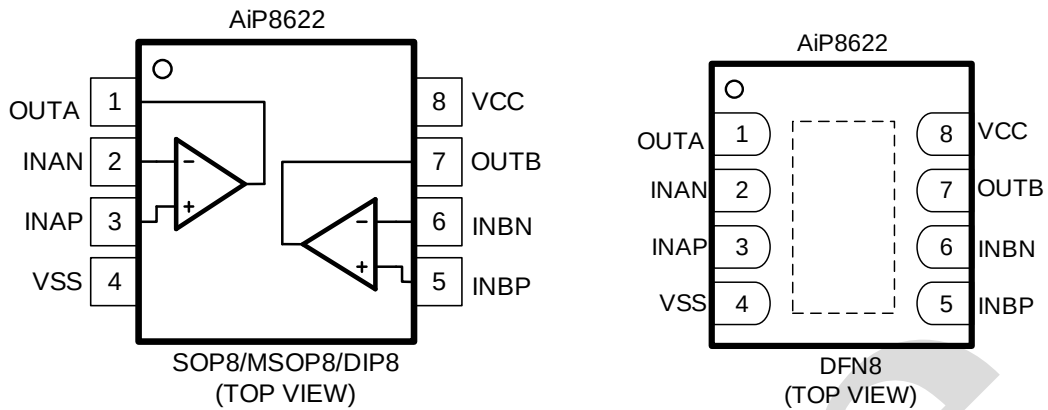
SOT23-5
(TOP VIEW)



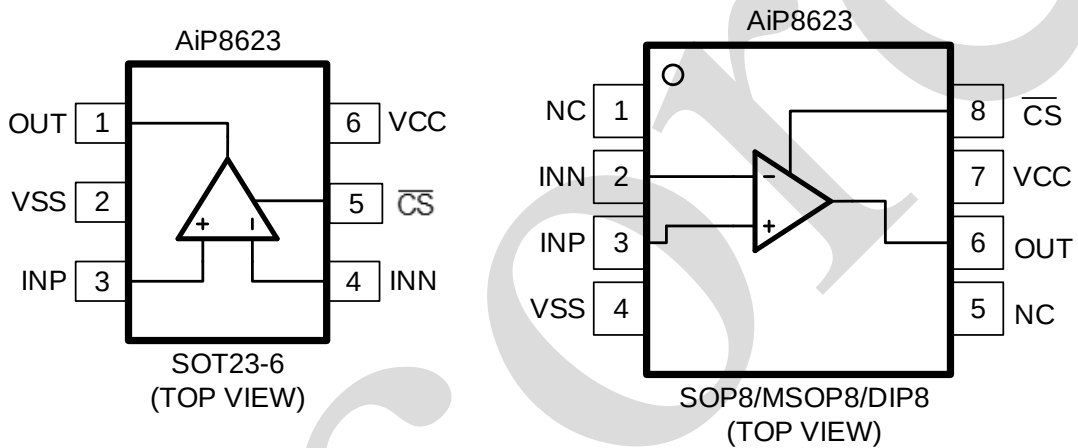
SOP8/MSOP8/DIP8
(TOP VIEW)



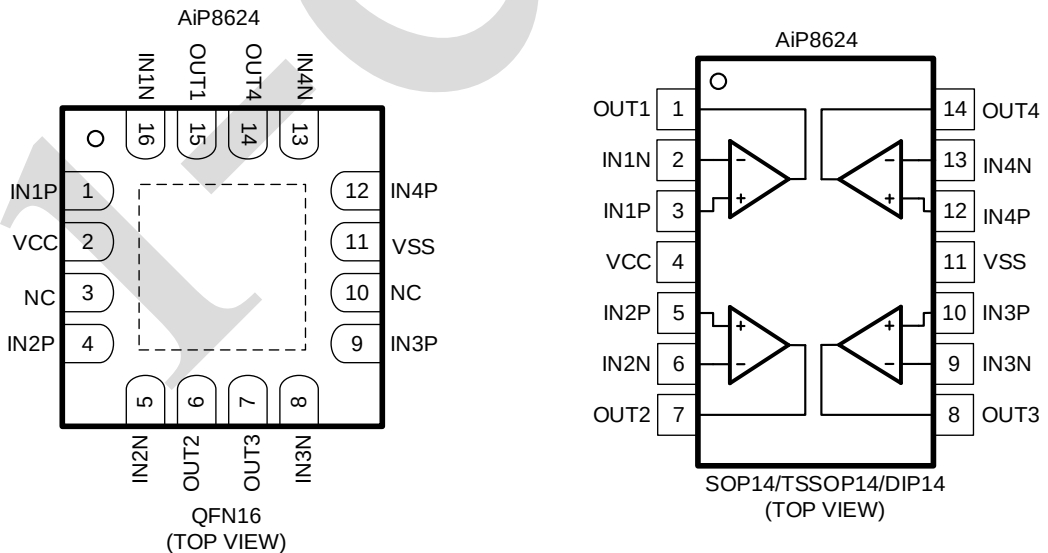
AiP8622:



AiP8623:



AiP8624:





2.3、Pin Description

AiP8621: SOT23-5

Pin No.	Pin Name	Description
1	OUT	Amplifier output
2	VSS	Ground (negative power supply)
3	INP	Amplifier positive input
4	INN	Amplifier negative input
5	VCC	Positive power supply

AiP8621: SOP8, MSOP8, DIP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	NC	Not connected	5	NC	Not connected
2	INN	Amplifier negative input	6	OUT	Amplifier output
3	INP	Amplifier positive input	7	VCC	Positive power supply
4	VSS	Ground (negative power supply)	8	NC	Not connected

AiP8622: SOP8, MSOP8, DFN8, DIP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUTA	Amplifier A output	5	INBP	Amplifier B positive input
2	INAN	Amplifier A negative input	6	INBN	Amplifier B negative input
3	INAP	Amplifier A positive input	7	OUTB	Amplifier B output
4	VSS	Ground (negative power supply)	8	VCC	Positive power supply

AiP8623: SOT23-6

Pin No.	Pin Name	Description
1	OUT	Amplifier output
2	VSS	Ground (negative power supply)
3	INP	Amplifier positive input
4	INN	Amplifier negative input
5	$\overline{\text{CS}}$	Amplifier enable pin, High level: amplifier shutdown; Low level: normal operation
6	VCC	Positive power supply



AiP8623: SOP8, MSOP8, DIP8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	NC	Not connected	5	$\overline{\text{CS}}$	Amplifier enable pin, High level: amplifier shutdown; Low level: normal operation
2	INN	Amplifier negative input	6	VCC	Positive power supply
3	INP	Amplifier positive input	7	OUT	Amplifier output
4	VSS	Ground (negative power supply)	8	NC	Not connected

AiP8624: SOP14, TSSOP14, DIP14

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	OUT1	Amplifier 1 output	8	OUT3	Amplifier 3 output
2	IN1N	Amplifier 1 negative input	9	IN3N	Amplifier 3 negative input
3	IN1P	Amplifier 1 positive input	10	IN3P	Amplifier 3 positive input
4	VCC	Positive power supply	11	VSS	Ground (negative power supply)
5	IN2P	Amplifier 2 positive input	12	IN4P	Amplifier 4 positive input
6	IN2N	Amplifier 2 negative input	13	IN4N	Amplifier 4 negative input
7	OUT2	Amplifier 2 output	14	OUT4	Amplifier 4 output

AiP8624: QFN16

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	IN1P	Amplifier 1 positive input	9	IN3P	Amplifier 3 positive input
2	VCC	Positive power supply	10	NC	Not connected
3	NC	Not connected	11	VSS	Ground (negative power supply)
4	IN2P	Amplifier 2 positive input	12	IN4P	Amplifier 4 positive input
5	IN2N	Amplifier 2 negative input	13	IN4N	Amplifier 4 negative input
6	OUT2	Amplifier 2 output	14	OUT4	Amplifier 4 output
7	OUT3	Amplifier 3 output	15	OUT1	Amplifier 1 output
8	IN3N	Amplifier 3 negative input	16	IN1N	Amplifier 1 negative input



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
Supply current	I_{CC}	-		55	mA
Power dissipation	P_D	-		-	mW
Ambient temperature	T_{amb}	-		-40 to +125	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-		-65 to +150	$^{\circ}\text{C}$
Soldering temperature	T_L	10s	DIP8	250	$^{\circ}\text{C}$
			DIP14	245	
			SOP8/MSOP8/SOP14/TSSOP14	260	
			SOT23-5/SOT23-6/QFN16/DFN8	260	

3.2、Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	VCC	1.4	-	5.5	V

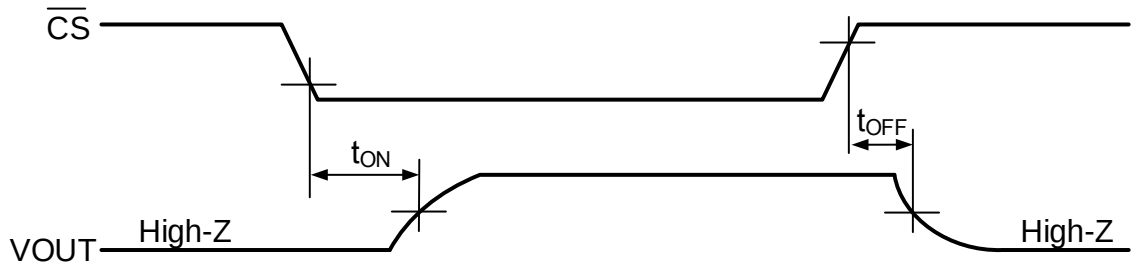
3.3、Electrical Characteristics

($T_{amb}=25^{\circ}\text{C}$, $V_{CC}=5\text{V}$, $V_{SS}=\text{GND}$, $V_{cm}=V_{CC}/2$, $R_L=1\text{M}\Omega$ and connected to $V_{CC}/2$, $C_L=60\text{pF}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V_{os}	$V_{CM}=V_{CC}/2$	-	0.4	2.5	mV
Input offset voltage drift	$\Delta V_{os}/\Delta T$	-	-	2.5	-	$\mu\text{V}/^{\circ}\text{C}$
Input bias current	I_B	$T_{amb}=25^{\circ}\text{C}$	-	1	-	pA
Input offset current	I_{os}	$T_{amb}=25^{\circ}\text{C}$	-	1	-	pA
Input voltage noise	e_n p-p	$V_{CC}=1.4\text{V}$, $f=0.1\text{Hz}$ to 10Hz	-	1.9	-	$\mu\text{Vp-p}$
		$V_{CC}=2.5\text{V}$, $f=0.1\text{Hz}$ to 10Hz	-	1.8	-	
		$V_{CC}=5\text{V}$, $f=0.1\text{Hz}$ to 10Hz	-	1.7	-	
Input voltage noise density	e_n	$V_{CC}=1.4\text{V}$, $f=1\text{kHz}$	-	392	-	$\text{nV}/\sqrt{\text{Hz}}$
		$V_{CC}=2.5$, $f=1\text{kHz}$	-	371	-	
		$V_{CC}=5\text{V}$, $f=1\text{kHz}$	-	342	-	
Common-mode rejection ratio	CMRR	$V_{CC}=5$, $V_{cm}=-0.1\text{V}$ to 5.1V	70	85	-	dB
		$V_{CC}=5$, $V_{cm}=2.5\text{V}$ to 5.1V	70	85	-	
		$V_{CC}=5$, $V_{cm}=-0.1\text{V}$ to 2.5V	70	82	-	
Common-mode input voltage	V_{CM}	-	$V_{SS}-0.1$	-	$V_{CC}+0.1$	V
Power supply rejection ratio	PSRR	$V_{CC}=1.4\text{V}$ to 5.5V	70	82	-	dB
Open-loop	A_{VO}	$V_{CC}=1.4\text{V}$, $R_L=50\text{k}\Omega$,	65	77	-	dB

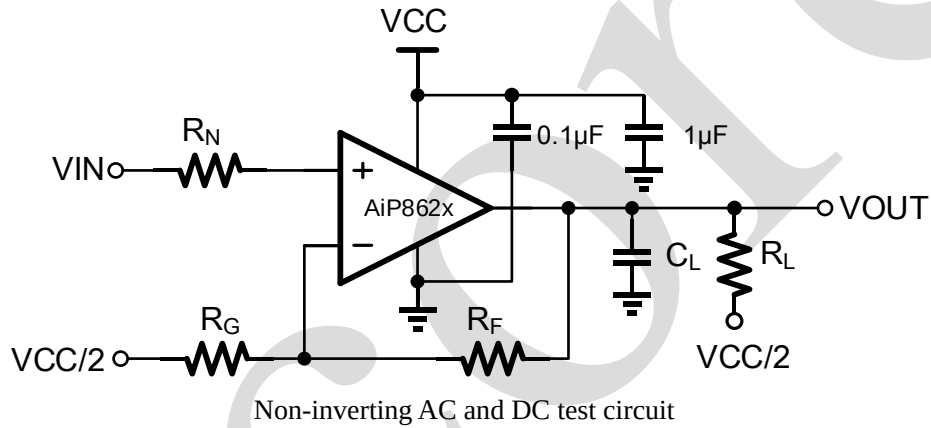


voltage gain		Vout=VCC-0.1V					
		VCC=2.5V, RL=50kΩ, Vout=VCC-0.1V		72	85	-	
		VCC=5V, RL=50kΩ, Vout=VCC-0.1V		84	100	-	
Phase margin	PM	VCC=1.4V to 5.5V		-	65	-	°
Gain bandwidth product	GBP	VCC=1.4V		-	4.2	-	kHz
		VCC=2.5V		-	4.5	-	
		VCC=5V		-	5	-	
Slew rate	SR	VCC=1.4V, Vout=1V Step		-	1.6	-	V/ms
		VCC=2.5V, Vout=1V Step		-	1.5	-	
		VCC=5V, Vout=2V Step		-	1.6	-	
Output voltage swing	VOH	VCC=1.4V, RL=50kΩ		1.39	1.396	-	V
		VCC=2.5V, RL=50kΩ		-	2.497	-	
		VCC=5V, RL=50kΩ		4.99	4.997	-	
	VOL	VCC=1.4V, RL=50kΩ		-	3.9	10	mV
		VCC=2.5V, RL=50kΩ		-	3.2	-	
		VCC=5V, RL=50kΩ		-	4.2	10	
Output short-circuit current	ISC	VCC=2.5V		3.8	5.2	-	mA
		VCC=5V		21	23	-	
Supply voltage	VCC	-		1.4	-	5.5	V
Quiescent current (per amplifier)	IQ	AiP8621/ AiP8623	VCC=1.4V	-	320	650	nA
			VCC=2.5V	-	340	700	
			VCC=5V	-	380	800	
		AiP8622/ AiP8624	VCC=1.4V	-	290	650	
			VCC=2.5V	-	310	700	
			VCC=5V	-	350	800	
Shutdown current	ISD	AiP8623		-	8	-	nA
input logic high of CS	VIH	AiP8623		3.3	-	-	V
input logic low of CS	VIL	AiP8623		-	-	1.5	V
input hysteresis voltage of CS	VHYST	AiP8623, VCC=5V		-	0.5	-	V
ON time	tON	AiP8623, G=1, CS=0.3V to VOUT=0.5VCC/2, CL=0		-	3.9	-	ms
OFF time	tOFF	AiP8623, G=1, CS=VCC-0.3V to VOUT=0.5VCC/2, CL=0		-	50	-	μs

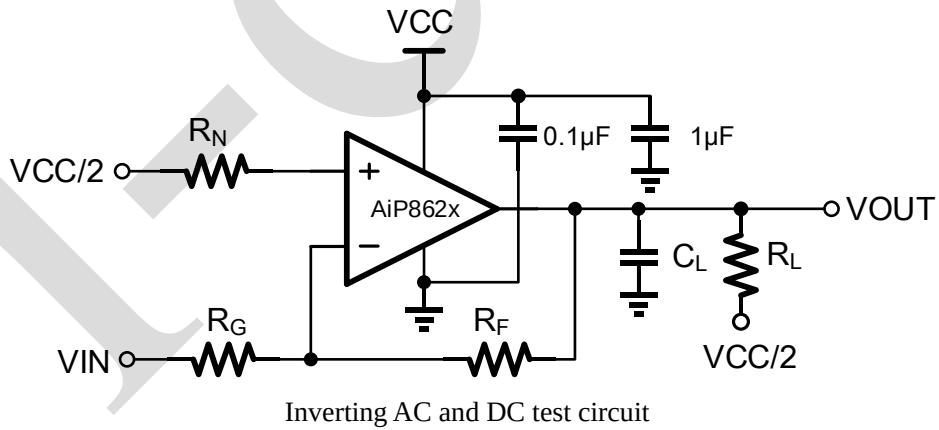


ON/OFF timing (AiP8623)

4、Testing Circuit



Non-inverting AC and DC test circuit



Inverting AC and DC test circuit



5、Function Description

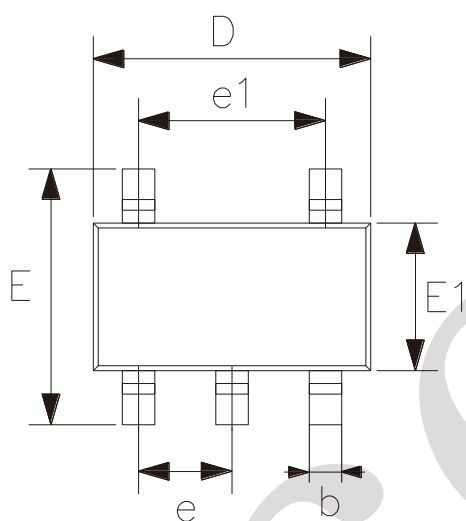
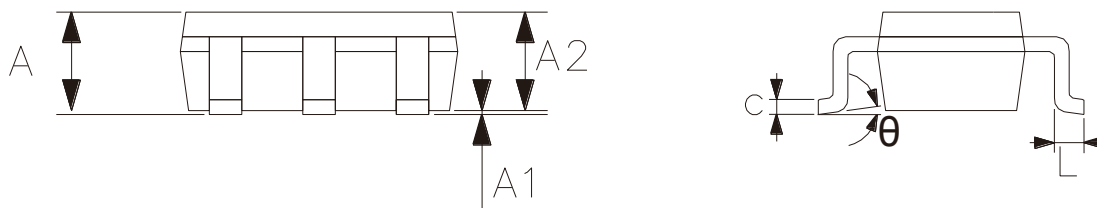
The AiP862x series are nanoampere-power rail-to-rail input/output operational amplifiers. AiP8621, AiP8622 and AiP8624 are single-channel, dual-channel and quad-channel op amps without enable control respectively, whereas AiP8623 is a single-channel op amp with an enable pin. These amplifiers offer a 5kHz gain bandwidth product and are unity-gain stable, suited for low-frequency applications including battery current sensing and sensor signal conditioning. The device operates over a supply voltage range of 1.4V to 5.5V, with an operating temperature range from -40°C to 125°C.

i-core



6、Package Information

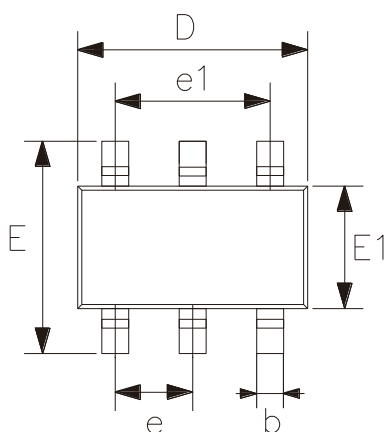
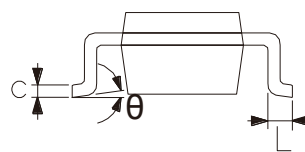
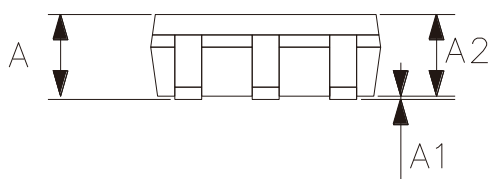
6.1、SOT23-5



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°



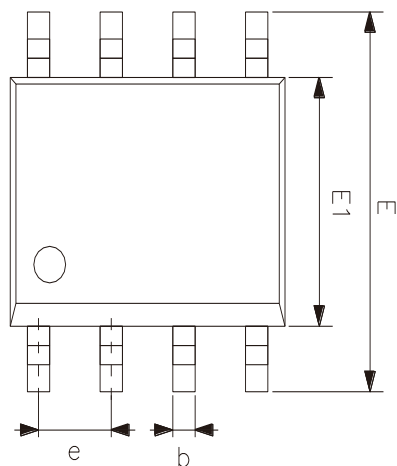
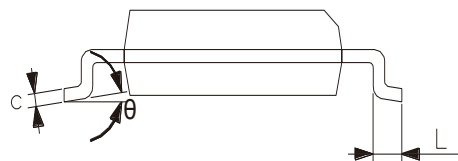
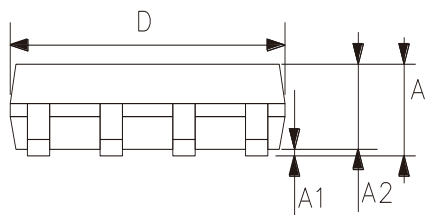
6.2、SOT23-6



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°



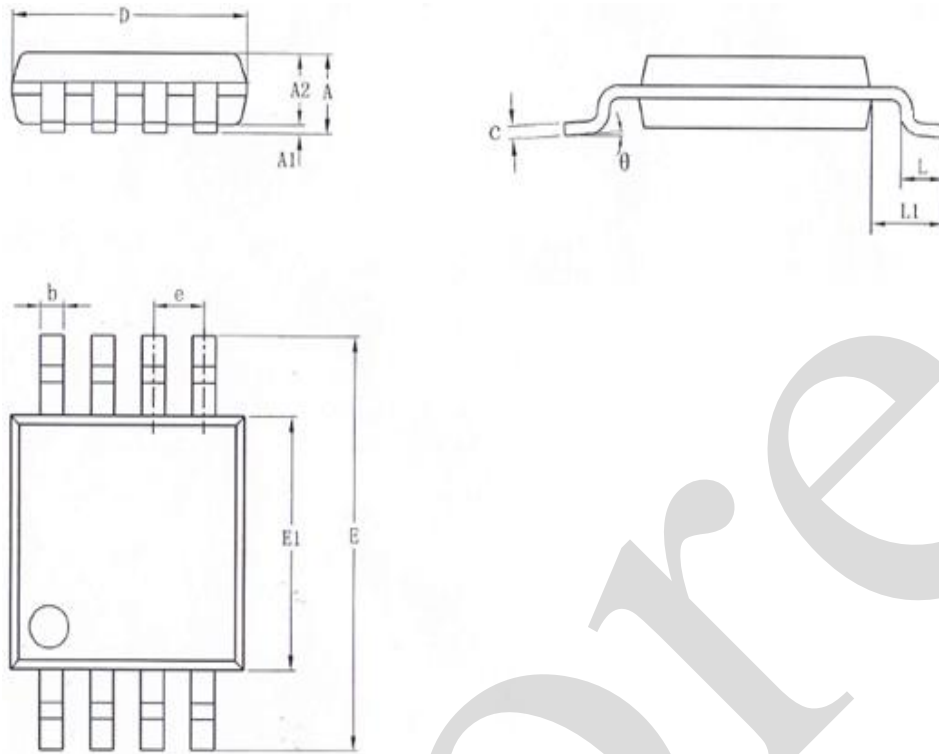
6.3、SOP8



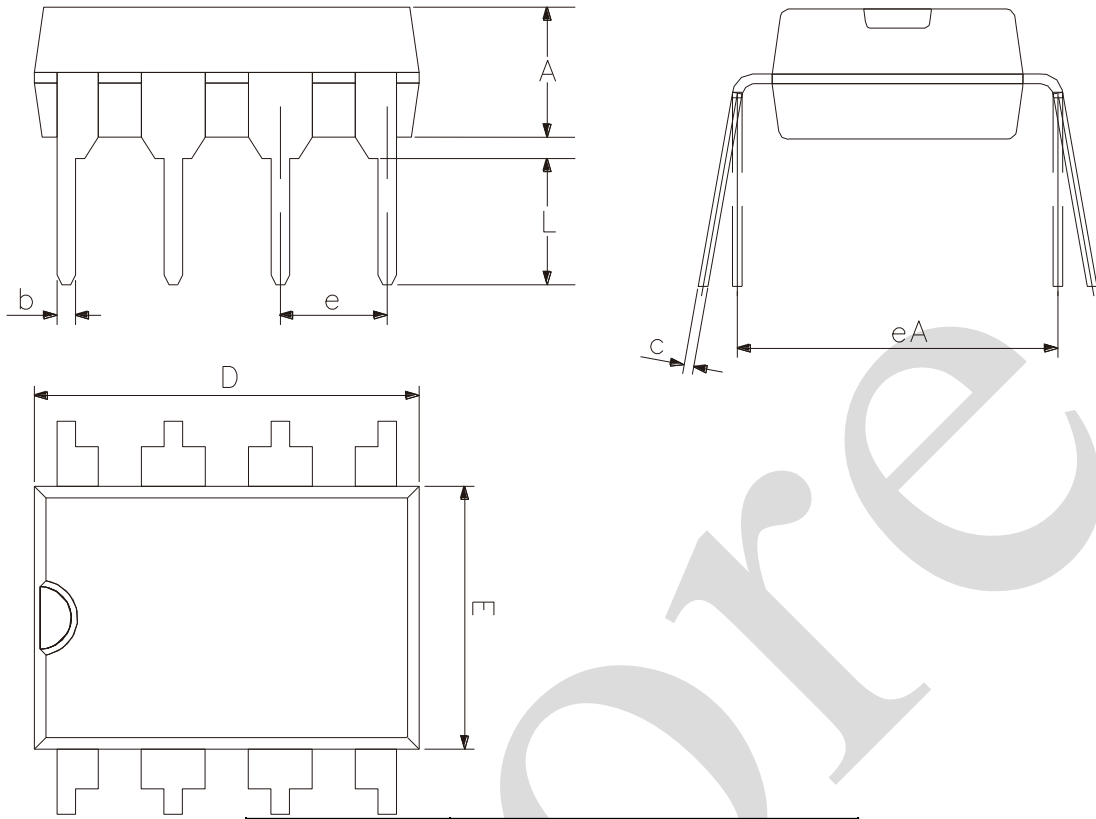
2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.35	1.80
A1	0.05	0.25
A2	1.25	1.55
D	4.70	5.10
E	5.80	6.30
E1	3.70	4.10
b	0.306	0.51
c	0.19	0.25
e	1.27	
L	0.40	0.89
θ	0°	8°



6.4、MSOP8



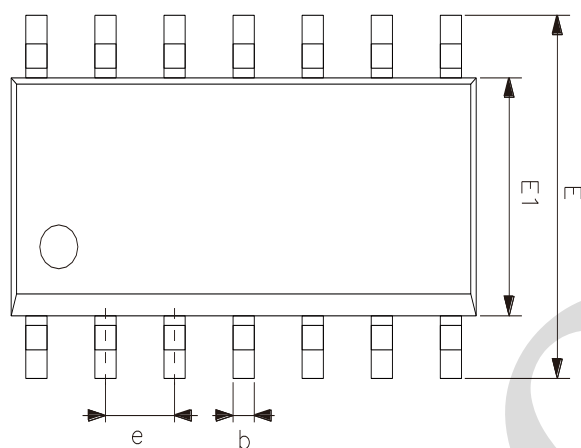
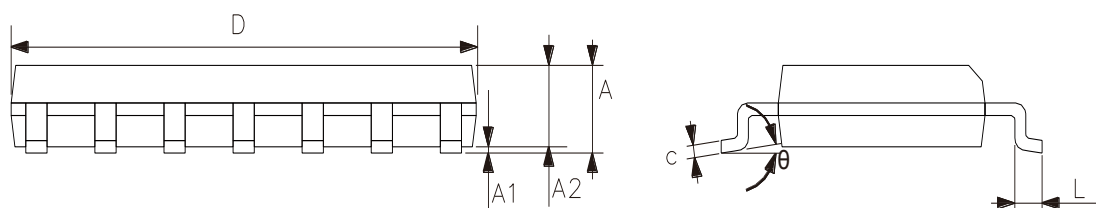
2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.10
A1	0.05	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	4.70	5.10
E1	2.90	3.10
e	0.65	
L	0.40	0.80
L1	0.95	
θ	0°	8°

**6.5、DIP8**

2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	3.00	3.60
b	0.36	0.56
c	0.20	0.36
D	9.00	9.45
E	6.15	6.60
e	2.54	
eA	7.62	9.30
L	3.00	—



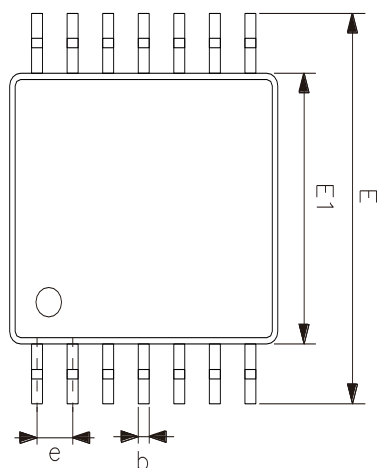
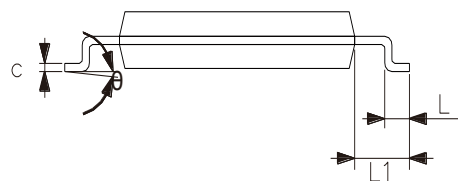
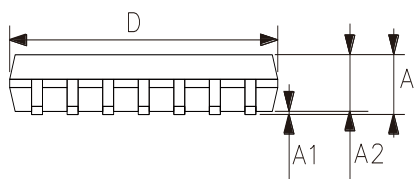
6.6、SOP14



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°



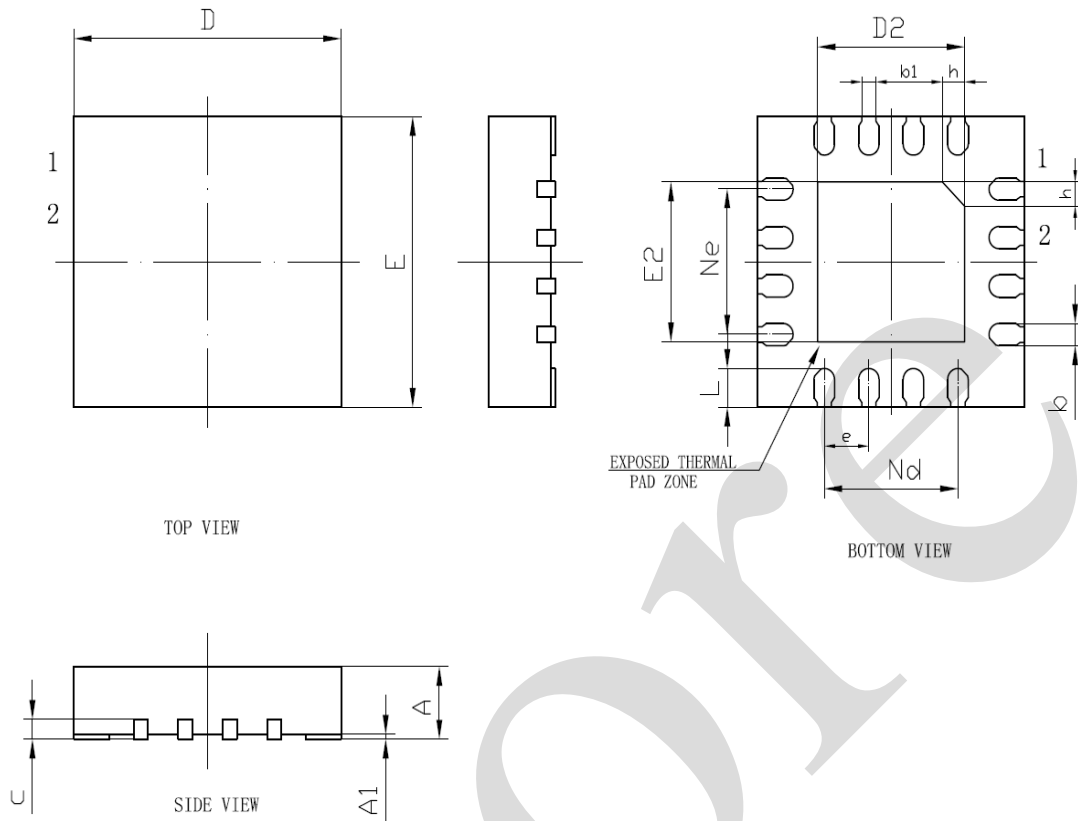
6.7、TSSOP14



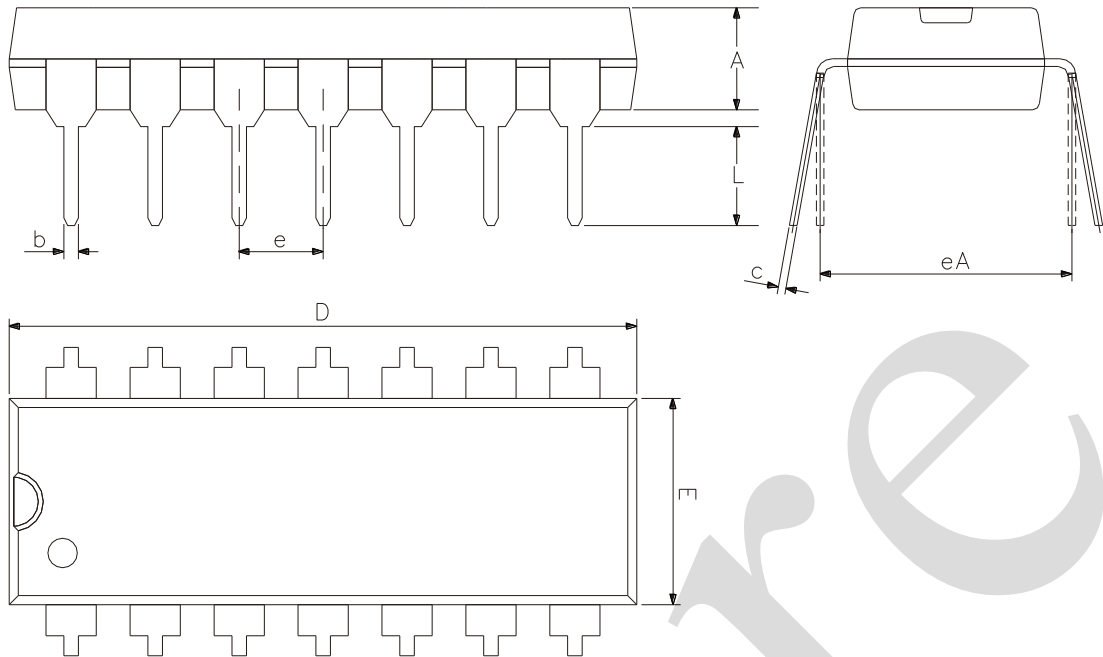
2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
θ	0°	8°



6.8、QFN16



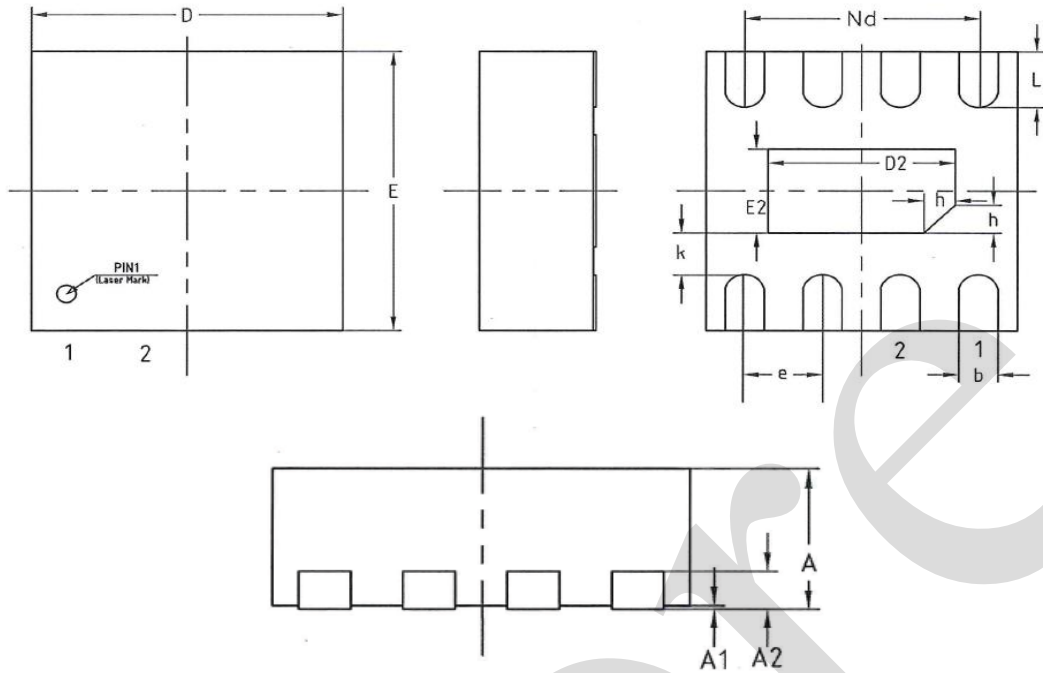
2024/01/B	Dimensions In Millimeters	
Symbol	Min	Max
A	0.70	0.80
A1	0	0.05
b	0.18	0.30
b1	0.16	
c	0.18	0.25
D	2.90	3.10
D2	1.55	1.80
e	0.50	
Ne	1.50	
Nd	1.50	
E	2.90	3.10
E2	1.55	1.80
L	0.30	0.50
h	0.20	0.45

**6.9、DIP14**

2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	3.05	3.60
b	0.33	0.56
c	0.20	0.36
D	18.80	19.40
E	6.20	6.60
e	2.54	
eA	7.62	10.90
L	2.92	—



6.10、DFN8



2025/03/B	Dimensions In Millimeters	
Symbol	Min	Max
A	0.70	0.80
A1	0.00	0.05
A3	0.20	
b	0.19	0.30
D	1.90	2.10
E	1.90	2.10
D2	0.60	0.85
E2	1.10	1.35
e	0.50	
L	0.30	0.40



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

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

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