



AiP8772/AiP8774

Dual/Quad Low-Noise Rail-to-Rail Operational Amplifier

Product Specification

Specification Revision History:

Version	Date	Description
2023-03-A0	2023-03	New
2024-06-A1	2024-06	Modify parameters
2025-08-A2	2025-08	Add AiP8774



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1、General Description

AiP8772 and AiP8774 are dual-channel and quad-channel rail-to-rail output operational amplifiers respectively, which expand the dynamic response range for single-supply or dual-supply applications. These CMOS operational amplifiers feature low noise and low input offset voltage, and are mainly used in audio, industrial and instrumentation applications.

Features:

- Low noise: $9\text{nV}/\sqrt{\text{Hz}}@f=1\text{KHz}$
- Low input bias current: 1pA (Typ.)
- Rail to rail output
- High gain bandwidth product: 2.2MHz (Typ.)
- High slew rate: $4.5\text{V}/\mu\text{s}$ (Typ.)
- Low input offset voltage: $300\mu\text{V}$ (Typ.)
- Support single or dual power supply
- Package form:
 - AiP8772: DIP8/SOP8/TSSOP8
 - AiP8774: DIP14/SOP14/TSSOP14

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP8772DA8.TB	DIP8	AiP8772	50 PCS/tube	40 tube/box	2000 PCS/box	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP8772SA8.TB	SOP8	AiP8772	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8772TB8.TB	TSSOP8	8772	100 PCS/tube	200 tube/box	20000 PCS/box	Dimensions of plastic enclosure: 3.0mm×4.4mm Pin spacing: 0.65mm
AiP8774DA14.TB	DIP14	AiP8774	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP8774SA14.TB	SOP14	AiP8774	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP8774TA14.TB	TSSOP14	AiP8774	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

**Reel packing specifications:**

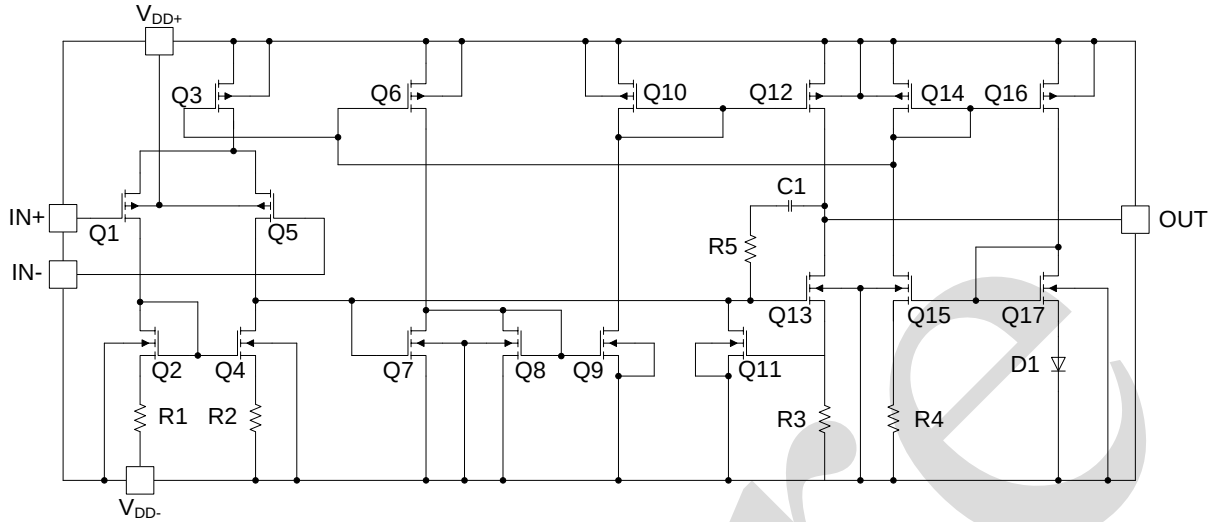
Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP8772SA8.TR	SOP8	AiP8772	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP8772TB8.TR	TSSOP8	8772	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×4.4mm Pin spacing: 0.65mm
AiP8774SA14.TR	SOP14	AiP8774	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP8774TA14.TR	TSSOP14	AiP8774	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

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

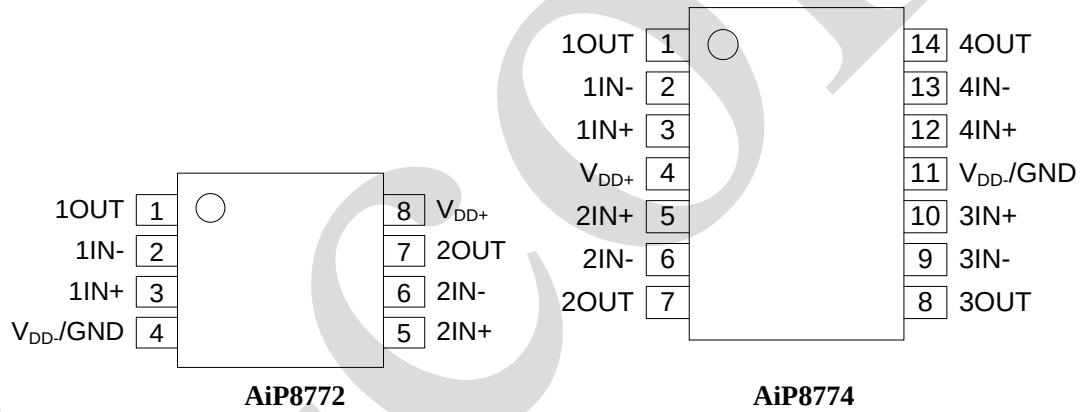


2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin Name	AiP8772	AiP8774	I/O	Description
1OUT	1	1	O	通道 1, 输出
1IN-	2	2	I	通道 1, 反相输入
1IN+	3	3	I	通道 1, 同相输入
V _{DD-} /GND	4	11	P/GND	负 (最低) 电源
2IN+	5	5	I	通道 2, 同相输入
2IN-	6	6	I	通道 2, 反相输入
2OUT	7	7	O	通道 2, 输出
V _{DD+}	8	4	P	正 (最高) 电源
3OUT	-	8	O	通道 3, 输出
3IN-	-	9	I	通道 3, 反相输入
3IN+	-	10	I	通道 3, 同相输入
4IN+	-	12	I	通道 4, 同相输入



4IN-	-	13	I	通道 4, 反相输入
4OUT	-	14	O	通道 4, 输出

3、Electrical Parameter

3.1、Absolute Maximum Ratings

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

Characteristic	Symbol	Conditions	Min.	Max.	Unit
Supply voltage	V_{DD+}	-	-	8	V
Supply voltage	V_{DD-}	-	-8	-	V
Differential input voltage	V_{ID}	-	-	± 16	V
Input voltage	V_I	-	$V_{DD-}-0.3$	V_{DD+}	V
Input current	I_I	-	-	± 5	mA
Output current	I_O	-	-	± 50	mA
V_{DD+} input current	I_{VDD+}	-	-	± 50	mA
V_{DD-} output current	I_{VDD-}	-	-	± 50	mA
Storage temperature	T_{stg}	-	-65	150	$^{\circ}\text{C}$
Soldering temperature	T_L	10s	DIP8	250	$^{\circ}\text{C}$
			DIP14	245	$^{\circ}\text{C}$
			SOP/TSSOP	260	$^{\circ}\text{C}$

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.
Supply voltage	$V_{DD\pm}$	-	± 2.2	± 8	V
Common-mode input voltage	V_{IC}	-	V_{DD-}	$V_{DD+}-2$	V
Input voltage	V_I	-	V_{DD-}	$V_{DD+}-2$	V
Ambient temperature	T_{amb}	-	-40	125	$^{\circ}\text{C}$



3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

($T_{amb}=25^{\circ}\text{C}$, $V_{DD}=5\text{V}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V_{IO}	$V_{IC}=0\text{V}$, $V_{DD\pm}=\pm 2.5\text{V}$, $V_O=0\text{V}$, $R_S=50\Omega$	-	300	2500	μV
Input offset voltage temperature drift	α_{VIO}	$V_{IC}=0\text{V}$, $V_{DD\pm}=\pm 2.5\text{V}$, $V_O=0\text{V}$, $R_S=50\Omega$	-	2	-	$\mu\text{V}/^{\circ}\text{C}$
Input offset current	I_{IO}	$V_{IC}=0\text{V}$, $V_{DD\pm}=\pm 2.5\text{V}$, $V_O=0\text{V}$, $R_S=50\Omega$	-	0.5	60	pA
Input bias current	I_{IB}	$V_{IC}=0\text{V}$, $V_{DD\pm}=\pm 2.5\text{V}$, $V_O=0\text{V}$, $R_S=50\Omega$	-	1	60	pA
Common-mode input voltage	V_{IC}	$R_S=50\Omega$; $V_{IO}\leq 5\text{mV}$	-0.3	-	3	V
High level output voltage	V_{OH}	$I_{OH}=-20\mu\text{A}$	-	4.99	-	V
		$I_{OH}=-200\mu\text{A}$	4.85	4.93	-	
		$I_{OH}=-1\text{mA}$	4.25	4.70	-	
Low level output voltage	V_{OL}	$V_{IC}=2.5\text{V}$	$I_{OL}=50\mu\text{A}$	-	0.01	V
			$I_{OL}=500\mu\text{A}$	-	0.09	
			$I_{OL}=5\text{mA}$	-	0.90	
Large signal differential voltage amplification	A_{VD}	$V_{IC}=2.5\text{V}$, $V_O=1\text{V}$ to 4V , $R_S=10\text{K}\Omega$	15	35	-	V/mV
		$V_{IC}=2.5\text{V}$, $V_O=1\text{V}$ to 4V , $R_S=1\text{M}\Omega$	-	175	-	
Differential input resistor	r_{id}	-	-	10^{12}	-	Ω
Common-mode input resistor	r_i	-	-	10^{12}	-	Ω
Common-mode input capacitor	C_i	$f=10\text{KHz}$	-	8	-	pF
Closed-loop output impedance	Z_O	$f=1\text{MHz}$, $A_V=10$	-	140	-	Ω
Common-mode rejection ratio	CMRR	$V_{IC}=0\text{V}$ to 2.7V , $V_O=2.5\text{V}$, $R_S=50\Omega$	70	75	-	dB
Power supply rejection ratio	K_{SVR}	$V_{DD}=4.4\text{V}$ to 16V , $V_{IC}=V_{DD}/2$, no load	80	95	-	dB
Supply current	I_{DD}	AiP8772: $V_O=2.5\text{V}$, no load	-	2.2	3	mA
		AiP8774: $V_O=2.5\text{V}$, no load	-	4.4	6	mA
Unit gain slew rate	SR	$V_O=0.5\text{V}$ to 2.5V , $R_L=10\text{K}\Omega$, $C_L=100\text{pF}$	2.3	4.5	-	$\text{V}/\mu\text{s}$
Equivalent input noise voltage	V_n	$f=10\text{Hz}$	-	50	-	$\text{nV}/\sqrt{\text{Hz}}$
		$f=1\text{KHz}$	-	9	-	
Peak-to-peak equivalent input noise voltage	V_{NPP}	$f=0.1\text{Hz}$ to 1Hz	-	1	-	μV
		$f=0.1\text{Hz}$ to 10Hz	-	1.4	-	
Equivalent input noise current	I_n	-	-	0.6	-	$\text{fA}/\sqrt{\text{Hz}}$
Total harmonic distortion plus	THD+N	$V_O=0.5\text{V}$ to 2.5V , $R_L=10\text{K}\Omega$, $f=20\text{KHz}$	$AV=1$	-	0.0013%	—
			$AV=10$	-	0.004%	



noise			AV=100	-	0.03 %	-	
Gain bandwidth product	—	f=10KHz, RL=10KΩ, CL=100pF		-	2.18	-	MHz
Maximum bandwidth output swing	B _{OM}	V _{O (PP)} =2V, A _V =1, RL=10KΩ, CL=100pF		-	1	-	MHz
Setup time	t _s	A _V =-1, RL=10KΩ, step=0.5V to 2.5V, CL=100pF	To 0.1%	-	1.5	-	us
			To 0.01%	-	2.6	-	
Unit gain phase margin	ψ _m	RL=10KΩ, CL=100pF		-	50 °	-	—
Gain margin	-	RL=10KΩ, CL=100pF		-	10	-	dB

3.3.2、DC Characteristics 2

(T_{amb}=25℃, V_{DD}±=±5V, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V _{IO}	V _{IC} =0V, V _O =0V, R _S =50Ω	-	300	2500	uV
Input offset voltage temperature drift	α _{VIO}	V _{IC} =0V, V _O =0V, R _S =50Ω	-	2	-	uV /℃
Input offset current	I _{IO}	V _{IC} =0V, V _O =0V, R _S =50Ω	-	0.5	60	pA
Input bias current	I _{IB}	V _{IC} =0V, V _O =0V, R _S =50Ω	-	1	60	pA
Common-mode input voltage	V _{IC}	R _S =50Ω; V _{IO} ≤5mV	-5.3	-	3	V
High level output voltage	V _{OH}	I _{OH} =-20uA	-	4.99	-	V
		I _{OH} =-200uA	4.85	4.93	-	
		I _{OH} =-1mA	4.25	4.70	-	
Low level output voltage	V _{OL}	V _{IC} =2.5V	I _{OL} =50uA	-	-4.99	V
			I _{OL} =500uA	-	-4.91	
			I _{OL} =5mA	-	-4.1	
Large signal differential voltage amplification	A _{VD}	V _O =±4V, R _S =10KΩ	25	50	-	V/mV
		V _O =±4V, R _S =1MΩ	-	300	-	
Differential input resistor	r _{id}	-	-	10 ¹²	-	Ω
Common-mode input resistor	r _i	-	-	10 ¹²	-	Ω
Common-mode input capacitor	C _i	f=10KHz, DIP package	-	8	-	pF
Closed-loop output impedance	Z _O	f=1MHz, A _V =10	-	130	-	Ω
Common-mode rejection ratio	CMRR	V _{IC} =-5V to 2.7V, V _O =0V, R _S =50Ω	75	80	-	dB
Power supply rejection ratio	K _{SVR}	V _{DD} =2.2V to ±8V, V _{IC} =0V, no load	80	95	-	dB



Supply current	I_{DD}	AiP8772: $V_O=0V$, no load	-	2.4	3	mA
		AiP8774: $V_O=0V$, no load	-	4.8	6	mA
Unit gain slew rate	SR	$V_O=\pm 2.5V$, $R_L=10K\Omega$, $C_L=100pF$	2.3	4.6	-	V/us
Equivalent input noise voltage	V_n	$f=10Hz$	-	50	-	nV/ $\sqrt{Hz}$
		$f=1KHz$	-	9	-	
Peak-to-peak equivalent input noise voltage	V_{NPP}	$f=0.1Hz$ to $1Hz$	-	1	-	μV
		$f=0.1Hz$ to $10Hz$	-	1.4	-	
Equivalent input noise current	I_n	-	-	0.6	-	fA/ $\sqrt{Hz}$
Total harmonic distortion plus noise	THD+N	$V_O=\pm 2.3V$, $R_L=10K\Omega$, $f=20KHz$	$AV=1$	-	0.0011%	-
			$AV=10$	-	0.004%	-
			$AV=100$	-	0.03%	-
Gain bandwidth product	—	$f=10KHz$, $R_L=10K\Omega$, $C_L=100pF$	-	2.25	-	MHz
Maximum bandwidth output swing	B_{OM}	$V_{O(PP)}=4.6V$, $AV=1$, $R_L=10K\Omega$, $C_L=100pF$	-	0.54	-	MHz
Setup time	t_s	$AV=-1$, $R_L=10K\Omega$, step=-2.3V to 2.3V, $C_L=100pF$	To 0.1%	-	1.5	-
			To 0.01%	-	3.2	-
Unit gain phase margin	ψ_m	$R_L=10K\Omega$, $C_L=100pF$	-	52°	-	—
Gain margin	-	$R_L=10K\Omega$, $C_L=100pF$	-	10	-	dB

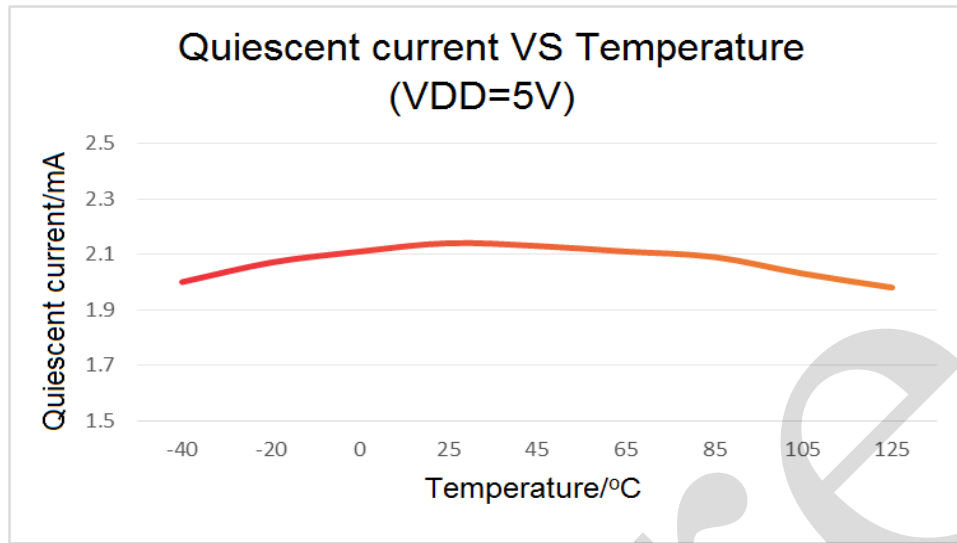
4、Function Description

AiP8772 and AiP8774 are rail-to-rail output operational amplifiers configurable for single or dual power supply at power-up. The single-supply operating voltage ranges from 4.4V to 16V, while the dual-supply mode supports $\pm 2.2V$ to $\pm 8V$.

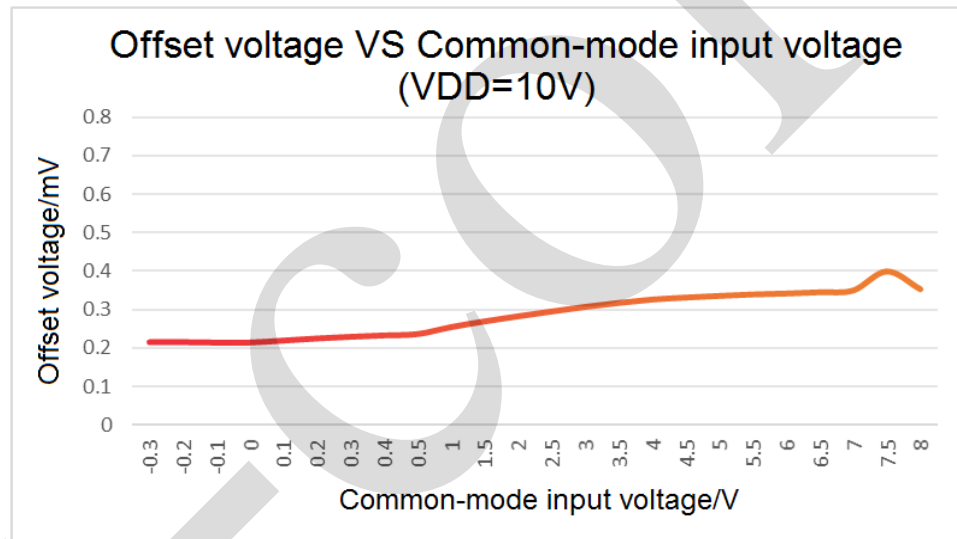
AiP8772 and AiP8774 feature high input impedance and low noise, suitable for small-signal processing of high-impedance sources such as piezoelectric transducers. Thanks to ultra-low power consumption, these devices are widely adopted in handheld monitoring and remote sensing equipment. Their rail-to-rail output performance under single or dual supply makes them an ideal interface for analog-to-digital converters (ADCs). The circuits deliver an extended output dynamic range, along with low noise voltage and low input offset voltage. These superior characteristics enable optimal performance in audio, industrial and instrumentation applications.



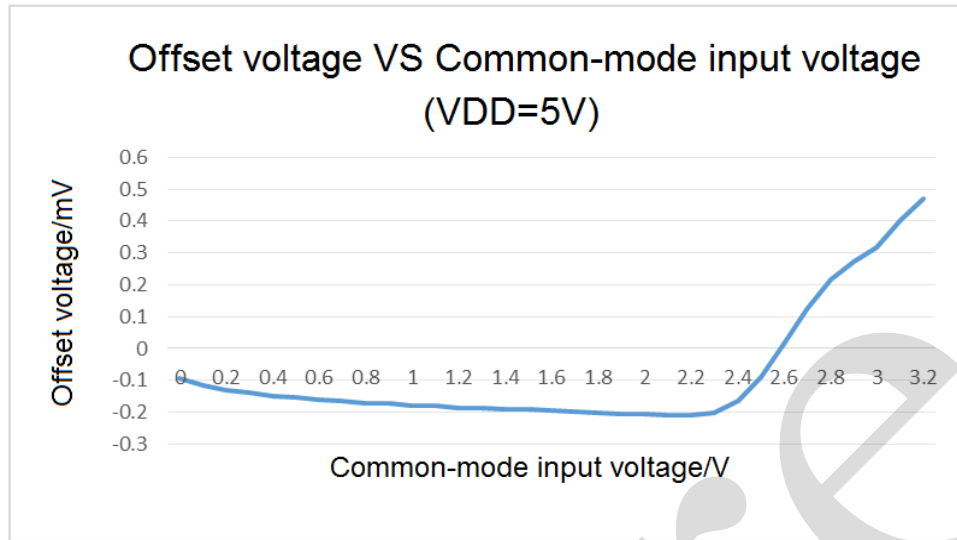
5、Characteristic Curve



AiP8772 Quiescent current vs Temperature



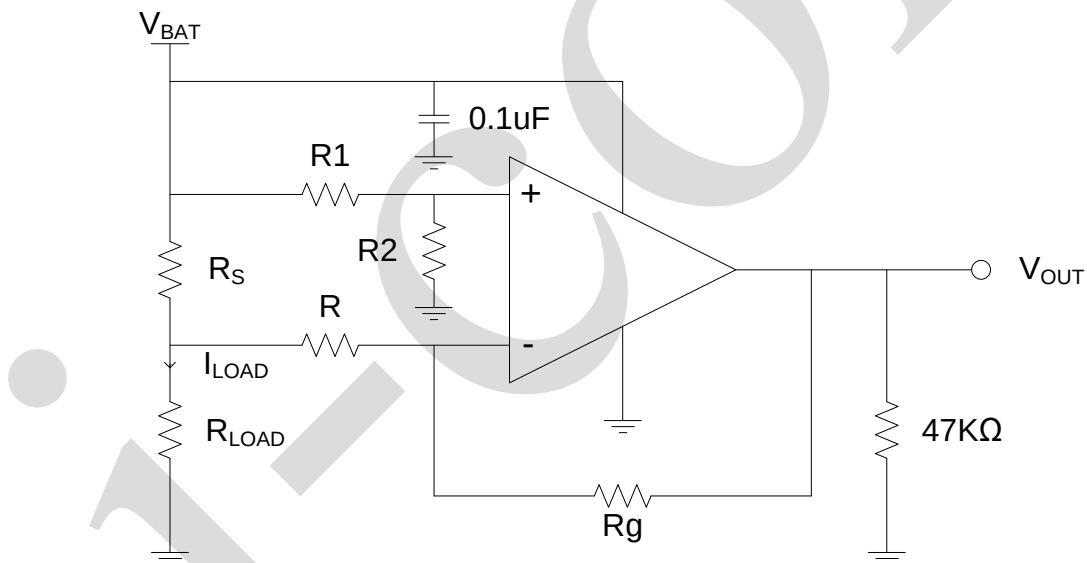
AiP8772 Offset voltage vs Common-mode input voltage (VDD=10V)



AiP8772 Offset voltage vs Common-mode input voltage (VDD=5V)

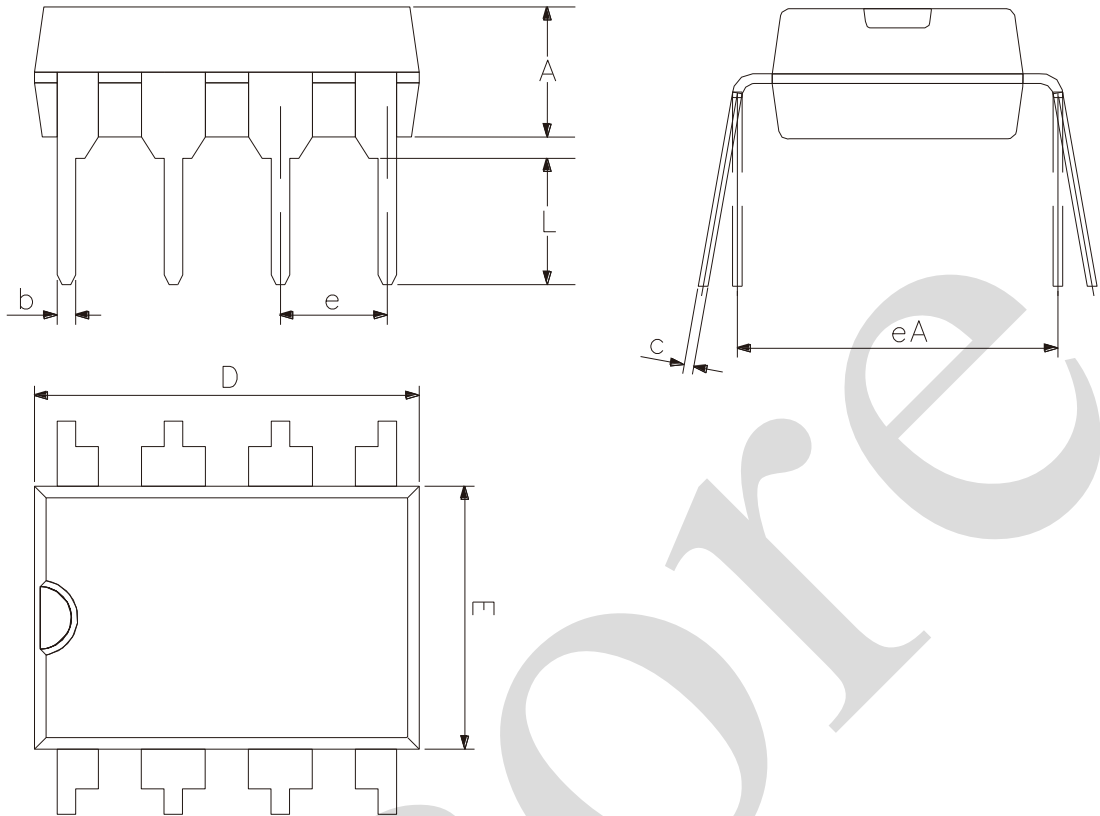
6、Typical Application Circuit And Application Note

6.1、Application Circuit



Note: R_S is the sampling resistor, select the appropriate precision according to application requirements.

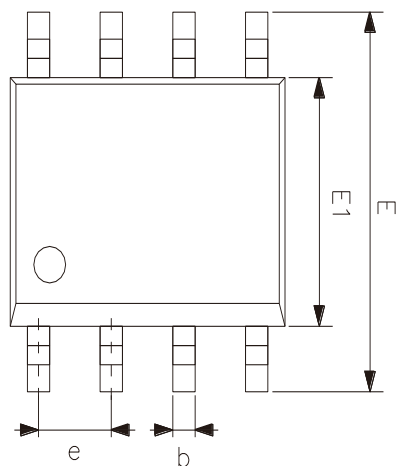
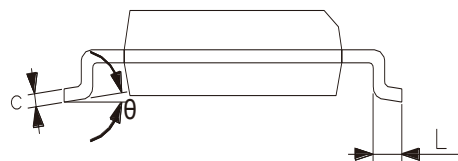
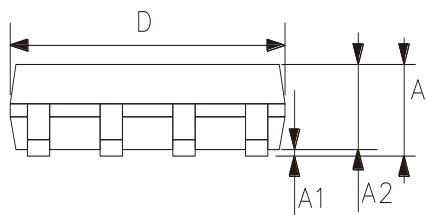
High-side current monitor

**7、Package Information****7.1、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	—



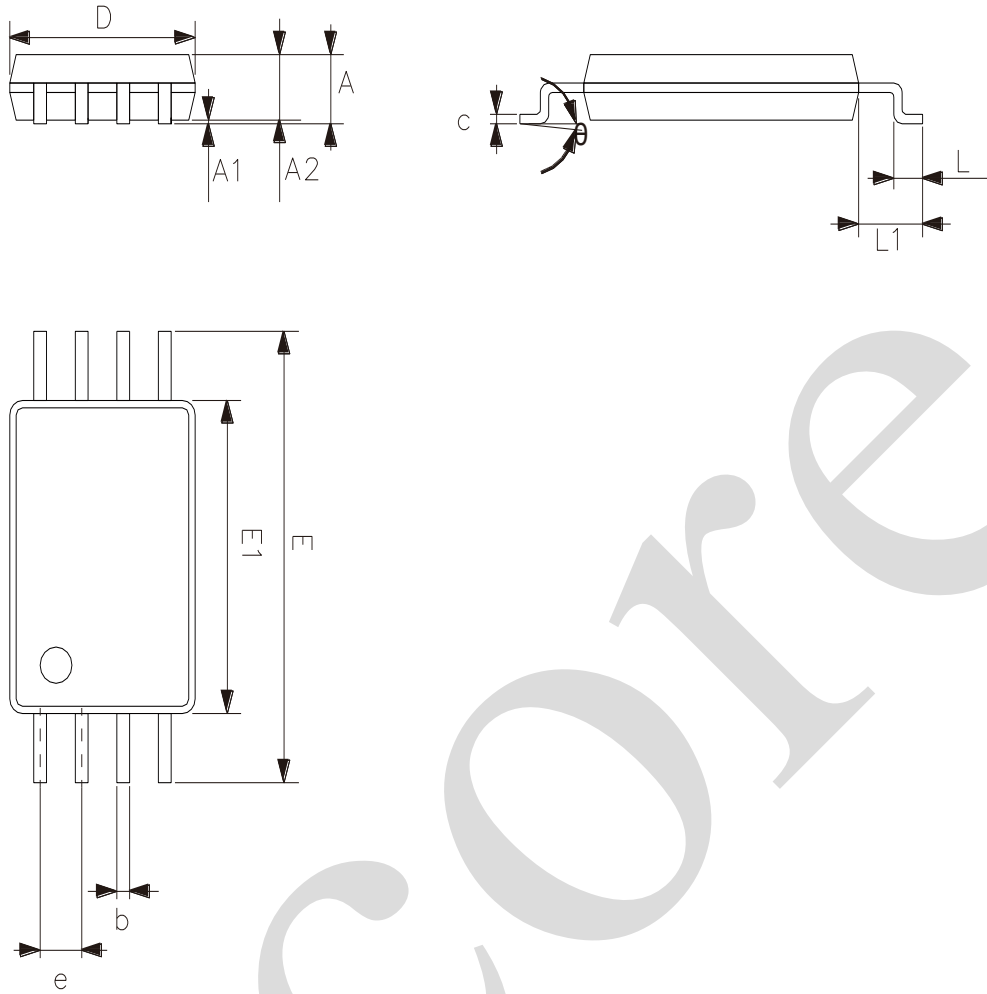
7.2、SOP8



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°



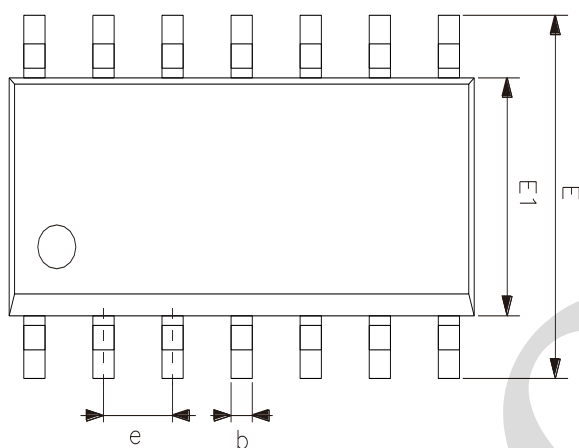
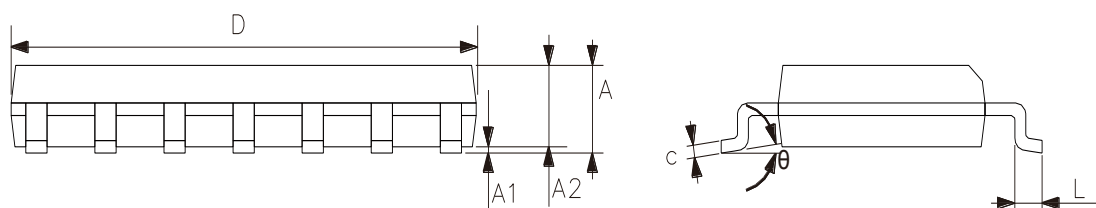
7.3、TSSOP8



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°



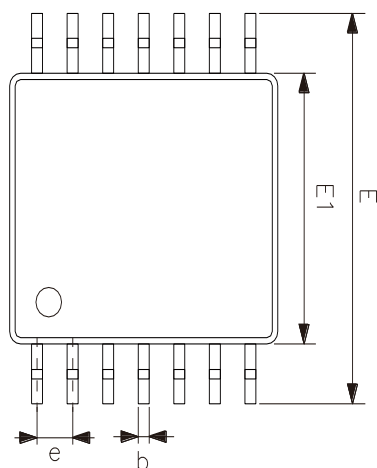
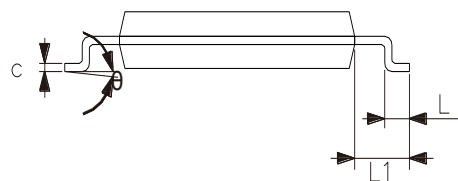
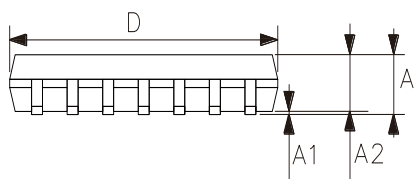
7.4、SOP14



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°



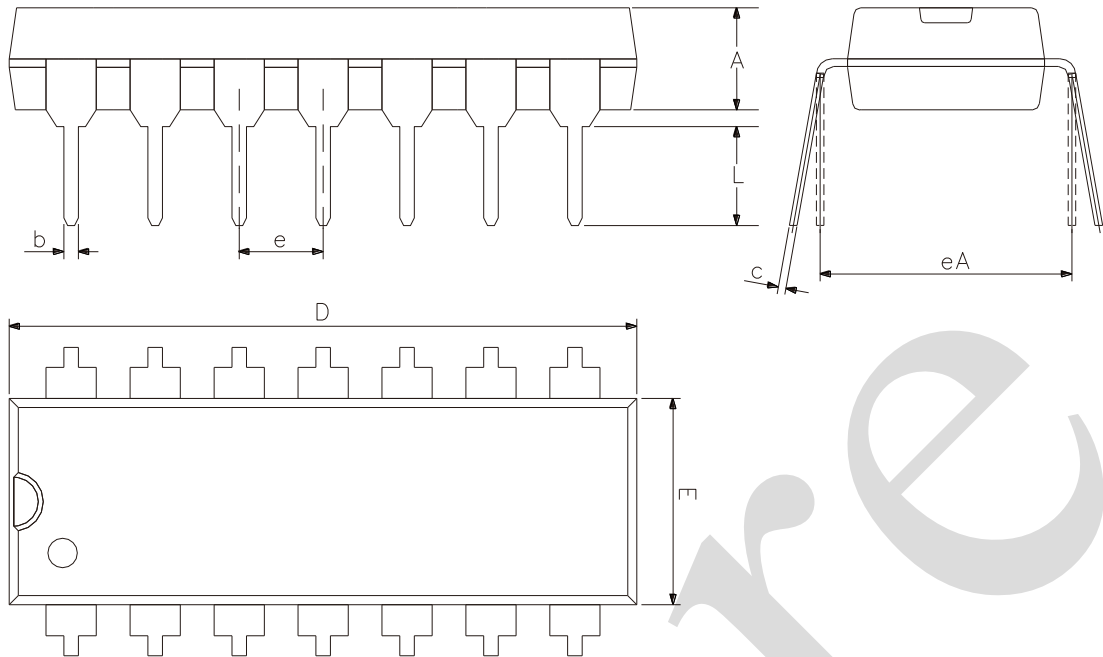
7.5、TSSOP14



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°



7.6、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	—



8、Statements And Notes

8.1、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.									

8.2、Notes

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

The information in this chapter is provided for reference only and i-Core disclaims any express or implied warranties, including but not limited to applicability, special application or non-infringement of third party rights.

This product is not suitable for critical equipment such as life-saving, life-sustaining or safety equipment. It is also not suitable for applications that may result in personal injury, death, or serious property or environmental damage due to product malfunction or failure. I-Core will not be liable for any damages incurred by the customers at their own risk for such applications.

The customer is responsible for conducting all necessary tests i-Core's application to avoid failure in the application or the application of the customer's third party users. I-Core does not accept any liability.

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