



AiP293/AiP393

Dual Channel differential comparator

Product Specification

Specification Revision History:

Version	Date	Description
2021-07-A1	2021-07	New system
2021-11-A2	2021-11	Modify the working voltage range; Modify subscription information
2023-02-B1	2023-02	Replace the template
2023-08-B2	2023-08	Add partial parameter



Contents

1、General Description.....	1
2、Block Diagram And Pin Description	3
2.1、Block Diagram.....	3
2.2、Pin Configurations	3
2.3、Pin Description.....	3
3、Electrical Parameter	4
3.1、Absolute Maximum Ratings.....	4
3.2、Recommended operating conditions	4
3.3、DC Characteristics	4
3.4、AC Characteristics	5
4、Typical Application Circuit And Application Note.....	5
4.1. Single-ended and differential comparator configurations	5
5、Package Information	6
5.1. DIP8.....	6
5.2、SOP8.....	7
5.3、MSOP8	8
6、Statements And Notes	9
6.1、The name and content of Hazardous substances or Elements in the product	9
6.2、Notes.....	9



1、General Description

AiP293/AiP393 consists of two independent comparators. The circuit can work under a single power supply with a wide voltage range, and now it also supports dual power supply. When dual power supplies are used, the voltage difference between the two power supplies is between 2V and 18V, and V_{CC} is at least 1.5V higher than the input common-mode voltage. The quiescent current power consumption is independent of the supply voltage. The output can be connected to the open collector output terminals of other devices to achieve the wired-and relationship.

It can be mainly used in industry, automobile, power supply monitoring, oscillator peak detector, logic voltage conversion and other systems.

Features:

- Operating voltage range:
Single power supply 2V~36V
Dual power supply $\pm 1V \sim \pm 18V$
- Low supply current is independent of supply voltage: 0.8mA (typical)
- Low input offset current: 5nA (typical)
Low input bias current: 25nA (typical)
- Low input offset voltage: 2mV (typical)
- The common-mode input voltage range includes ground.
- Differential input voltage range is equal to the maximum rated power supply voltage: $\pm 36V$.
Low output saturation voltage
- The output is compatible with TTL, MOS and CMOS.
- Packaging form:
AiP293: SOP8/DIP8
AiP393: SOP8/DIP8/MSOP8

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP293SA8.TB	SOP8	AiP293	100 PCS/tube	100 Tube/box	10000 PCS/ box	Plastic package size: 4.9 mm×3.9mm Pin spacing: 1.27mm
AiP393SA8.TB	SOP8	AiP393	100 PCS/tube	100 Tube/box	10000 PCS/ box	Plastic package size: 4.9 mm×3.9mm Pin spacing: 1.27mm
AiP293DA8.TB	DIP8	AiP293	50 PCS/tube	40 Tube/box	2000 PCS/ box	Size of plastic package: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP393DA8.TB	DIP8	AiP393	50 PCS/tube	40 Tube/box	2000 PCS/ box	Size of plastic package: 9.2mm×6.4mm Pin spacing: 2.54mm



AiP393MA8.TB	MSOP8	AiP393	100 PCS/ tube	100 Tube/box	10000 PCS/ box	Plastic package size: 3.0mm×3.0mm Pin spacing: 0.65mm
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Reel packing specifications:

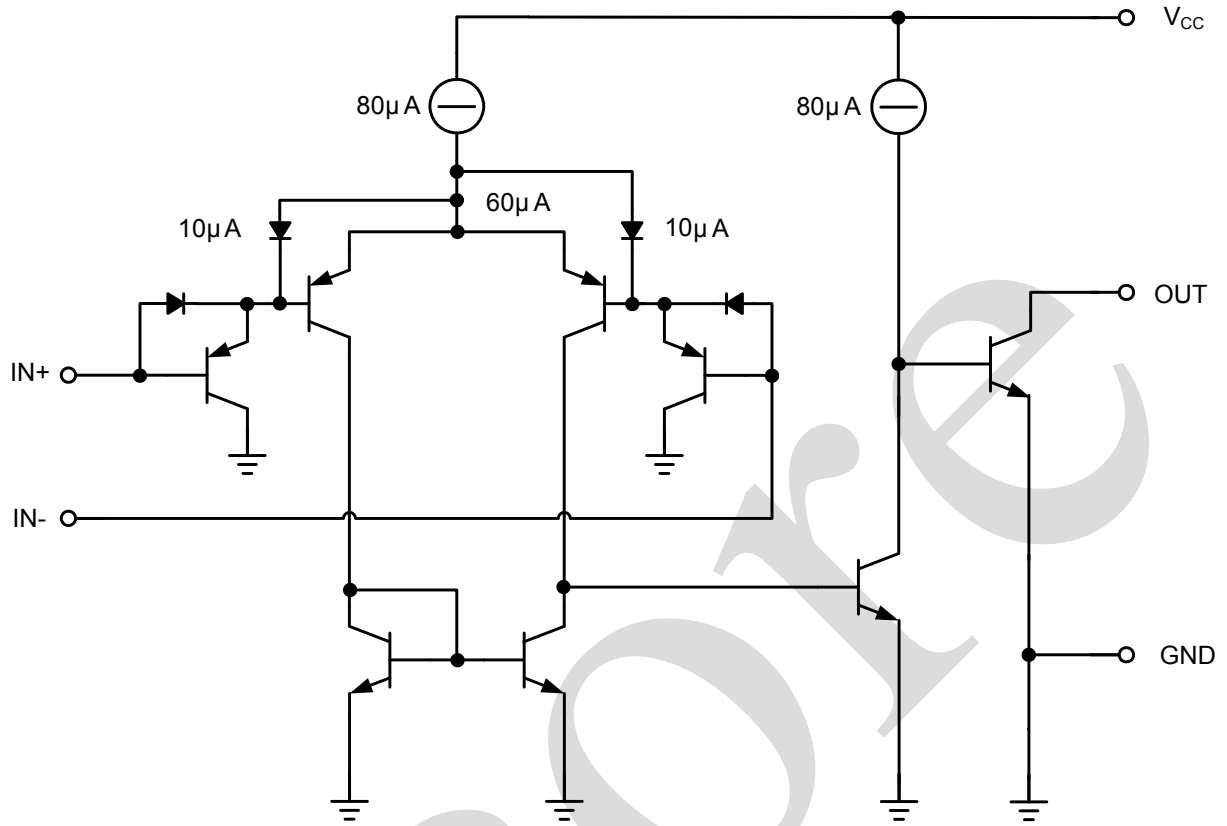
Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP293SA8.TR	SOP8	AiP293	4000PCS/ disc	8000PCS/ box	Size of plastic package: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP393SA8.TR	SOP8	AiP393	4000PCS/ disc	8000PCS/ box	Plastic package size: 4.9 mm×3.9mm Pin spacing: 1.27mm
AiP393MA8.TR	MSOP8	AiP393	5000PCS/ disc	10000PCS/ box	Size of plastic package: 3.0mm×3.0mm Pin spacing: 0.65mm

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

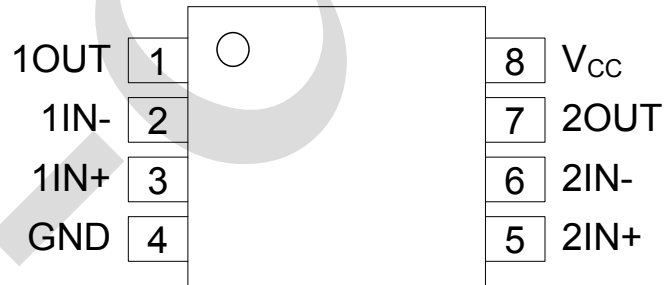


2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	1OUT	Output of comparator 1
2	1IN-	Negative input of comparator 1
3	1IN+	Positive input of comparator 1
4	GND	GND
5	2IN+	Positive input of comparator 2
6	2IN-	Negative input of comparator 2
7	2OUT	Output of comparator 2
8	VCC	Power Supply



3、Electrical Parameter

3.1、Absolute Maximum Ratings

(T_{amb}=25℃, unless otherwise specified)

Parameter		Symbol	Conditions	value	Unit	
Power supply voltage		V _{CC}	—	40	V	
Differential input voltage		V _{ID}	—	±40	V	
Input voltage range		V _I	—	-0.3~40	V	
incoming current		I _{IK}	—	-50	mA	
Output voltage		V _O	—	40	V	
thermal resistance	DIP8	R _{θJA}	—	110	℃/W	
	SOP8		—	160		
	MSOP8		—	210		
output current		I _O	—	20	mA	
operating junction temperature range		T _J	—	150	℃	
storage temperature		T _{stg}	—	-65~150	℃	
Lead temperature		T _L	10 s	DIP	250	℃
				SOP/MSOP	260	

Maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_{J(max)} - T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150℃ can affect reliability.

3.2、Recommended operating conditions

(T_{amb}=25℃, VDD=2.5V, fosc=3.579545MHz, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V _{CC}	—	2	—	36	V
junction temperature	T _J	—	—	—	125	℃
ambient temperature	T _{amb}	AiP293	-40	—	125	℃
		AiP393	-40	—	85	℃

3.3、DC Characteristics

(unless otherwise specified, V_{CC}=5V)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Parameter
Input offset voltage	V _{IO}	V _{CC} =5V~36V, V _{IC} =V _{ICRmin} , V _O =1.4V	25℃	—	2	5	mV
			Total temperature	—	—	9	
Input offset current	I _{IO}	V _O =1.4V	—	25℃	—	5	nA
			AiP293	Total temperature	—	150	
			AiP393	Total temperature	—	250	
Input bias current	I _{IB}	V _O =1.4V	25℃	—	-25	-250	nA
			Total temperature	—	—	-400	
common-mode	V _{ICR}	—	25℃	0~V _{CC} -1.5	—	—	V



input voltage			Total temperature	$0 \sim V_{CC}-2$	—	—	
Large signal differential amplification	A_{VD}	$V_{CC}=18V$, $R_L \geq 15K\Omega \sim V_{CC}$, $V_O=1.4 \sim 11.4V$	$25^\circ C$	50	200	—	V/mV
Common-mode rejection ratio	CMRR	$V_{CC}=\pm 15V$, $V_{CM}=\pm 13V$, $V_O=1.4V$	$25^\circ C$	—	84	—	dB
Supply-voltage rejection ratio	PSRR	$V_{DD}=5V$ to $10V$	$25^\circ C$	—	85	—	dB
High level output current	I_{OH}	$V_{ID}=1V$	$V_{OH}=5V$	$25^\circ C$	—	0.1	50 nA
			$V_{OH}=36V$	Total temperature	—	—	1 uA
Low level output voltage	V_{OL}	$V_{ID}=-1V$, $I_{OL}=4mA$	$25^\circ C$	—	130	400	mV
			Total temperature	—	—	700	
Low level output current	I_{OL}	$V_{ID}=-1V$, $V_{OL}=1.5V$	$25^\circ C$	6	—	—	mA
Operating current	I_{CC}	$V_O=2.5V$, no load.	$25^\circ C$	—	0.8	2	mA

3.4、AC Characteristics

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

Parameter name	Test strip		typical	Unit
Response time	R_L pulls up $5.1K\Omega$ to $5V$, $C_L=15pF$ ⁽¹⁾ ⁽²⁾	100mV input, 5mV overdrive.	1.3	us
		TTL signal	0.3	

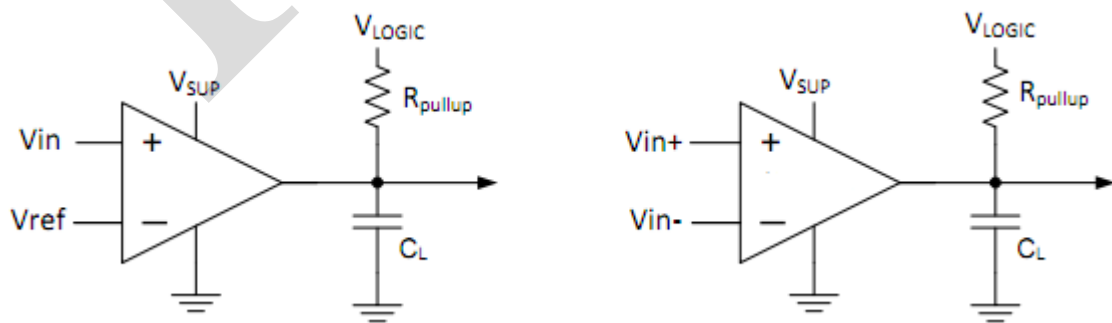
Note:

1: C_L includes probe and fixture capacitance.

2. Response time refers to the interval between the rising edge of the input and the transient response when the output reaches 1.4V.

4、Typical Application Circuit And Application Note

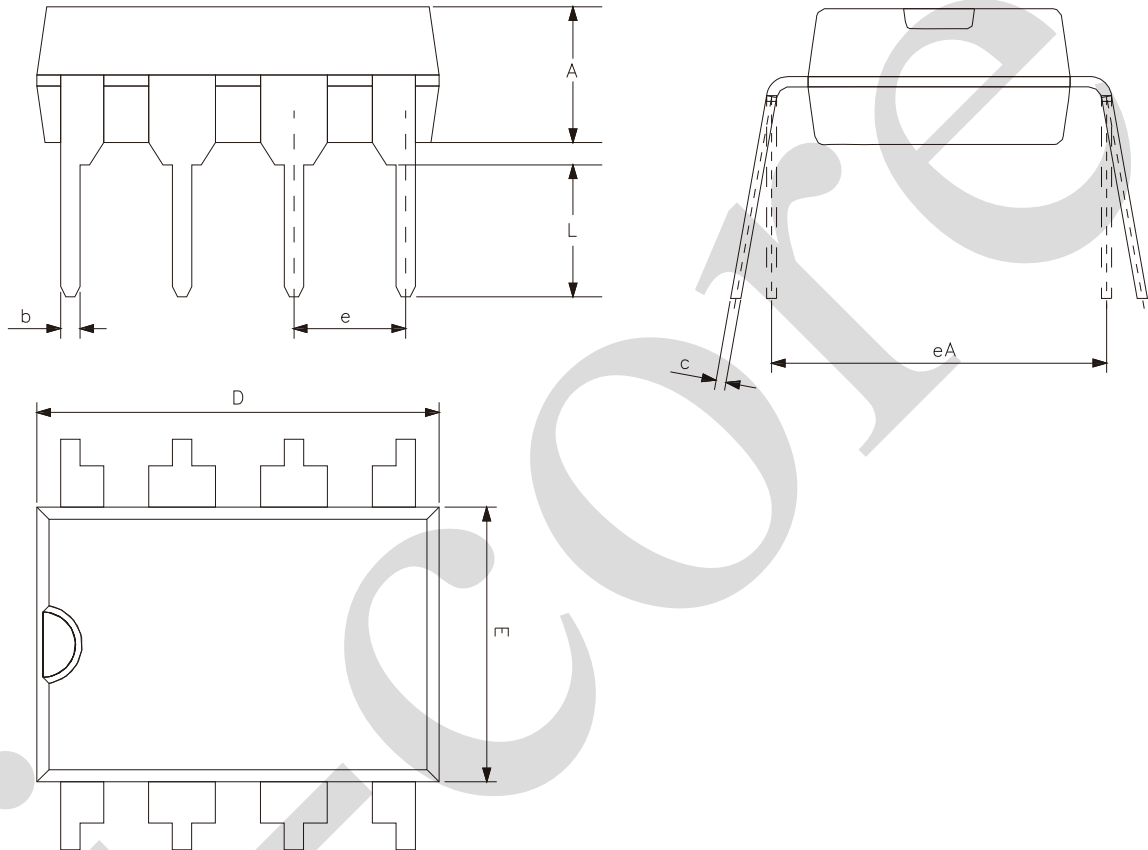
4.1. Single-ended and differential comparator configurations





5、Package Information

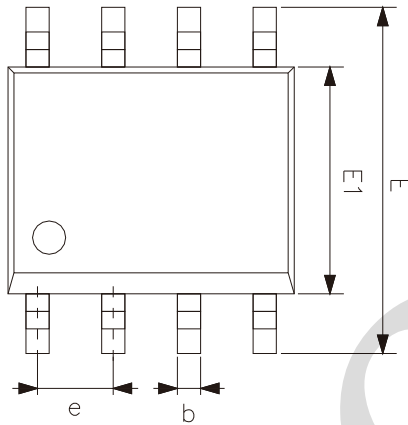
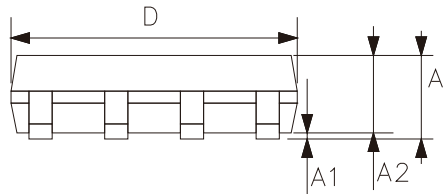
5.1. DIP8



Symbol	Size (mm)	
	minimum	maximum
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	—



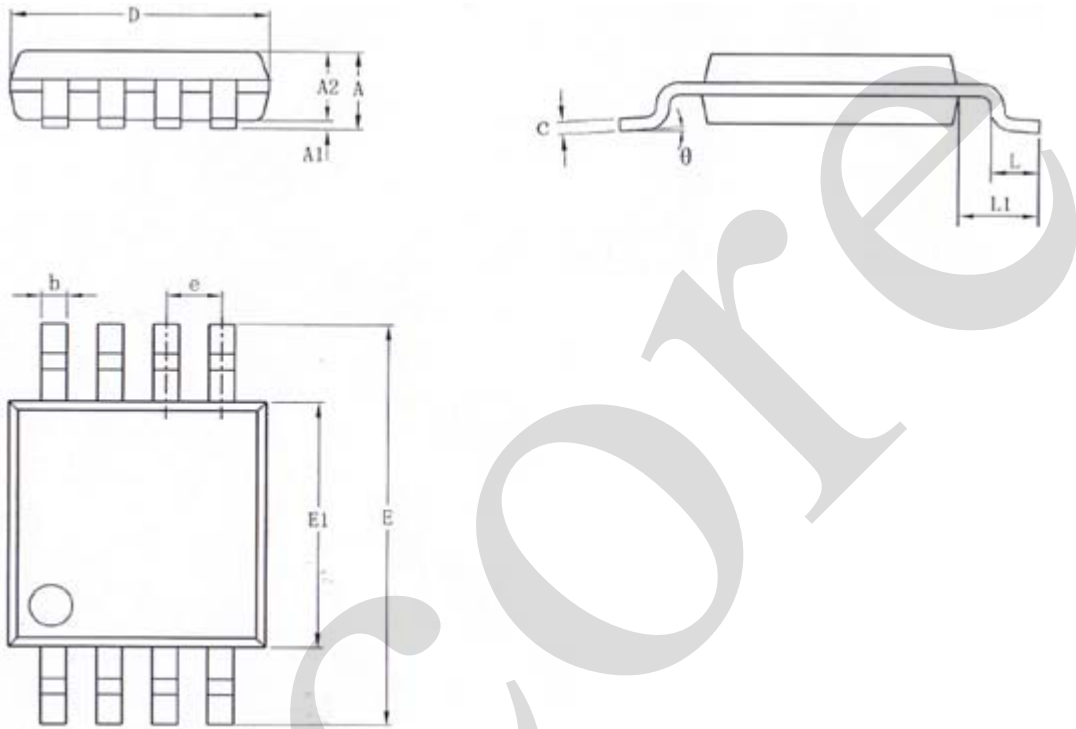
5.2、SOP8



Symbol	Size (mm)	
	minimum	maximum
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°



5.3、MSOP8



Symbol	Size (mm)	
	minimum	maximum
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、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

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