



AiP485A

Low-Power 10Mbps Full Fail-Safe RS-485 Transceiver

Product Specification

Specification Revision History:

Version	Date	Description
2021-05-A1	2021-05	New
2022-11-B1	2022-11	Update the template
2024-03-B2	2024-03	Update the template
2026-01-B3	2026-01	Modify operating temperature to -40 to 125°C; add soldering temperature
2026-05-B4	2026-05	Add DFN8 package form; update package information



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1、General Description

The AiP485A is a 5V powered, half-duplex RS-485 transceiver integrating one driver and one receiver.

Features:

- Supply voltage range: 3V to 5.5V
- Data rate: 10Mbps
- Up to 256 nodes on a bus (1/8 unit load)
- Bus-Pin Protection: $\pm 15\text{kV}$ HBM protection
- Hot plug circuitry-Tx and Rx outputs remain three-state during power-up/power-down
- Full fail-safe (open, short, terminated) receivers
- Overvoltage and overcurrent protection driver
- Specified from -40°C to $+125^{\circ}\text{C}$
- Packaging information: DIP8/SOP8/MSOP8/DFN8



Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP485ADA8.TB	DIP8	AiP485A	50 PCS/tube	40 tube/box	2000 PCS/box	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm
AiP485ASA8.TB	SOP8	AiP485A	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP485AMA8.TB	MSOP8	AiP485A	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing: 0.65mm

Reel packing specifications:

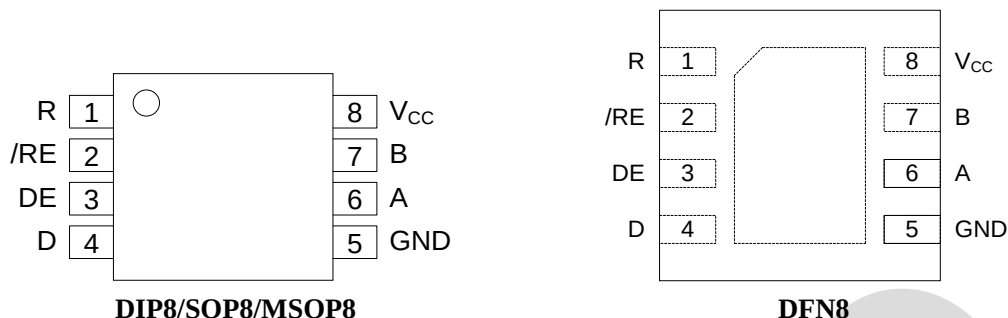
Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP485ASA8.TR	SOP8	AiP485A	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing:1.27mm
AiP485AMA8.TR	MSOP8	AiP485A	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 3.0mm×3.0mm Pin spacing:0.65mm
AiP485AXA8.TR	DFN8	AiP485A	3000PCS/reel	30000PCS/box	Dimensions of plastic enclosure: 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、Pin Configurations



2.2、Pin Description

Pin No.	Pin Name	I/O	Description
1	R	O	Receiver output
2	/RE	I	Receiver output enable
3	DE	I	Driver output enable
4	D	I	Driver input
5	GND	GND	Ground
6	A	I/O	Non-inverting receiver input and non-inverting driver output
7	B	I/O	Inverting receiver input and inverting driver output
8	V _{CC}	POWER	Power supply

2.3、Function Table

2.3.1、Driver Function Table

Input	Enable	Outputs	
D	DE	A	B
H	H	H	L
L	H	L	H
X	L	Z	Z
X	open	Z	Z
open	H	H	L

2.3.2、Receiver Function Table

Differential Input	Enable	Outputs
V _{ID} =V _A -V _B	/RE	R
V _{IT+} <V _{ID}	L	H
V _{IT-} <V _{ID} <V _{IT+}	L	-
V _{ID} <V _{IT-}	L	L
X	H	Z
X	open	Z
open, short, idle bus	L	H



3、Electrical Parameter

3.1、Absolute Maximum Ratings

($T_{amb}=25^{\circ}\text{C}$, all voltage referenced to GND, unless otherwise specified)

Characteristic	Symbol	Conditions		Value	Unit
Supply voltage	V _{CC}	-		-0.3 to +7	V
Input voltage	V _I	D, DE, /RE		-0.3 to V _{CC} +0.3	V
Input/output voltage	V _{I/O}	A, B		-15 to +15	V
		R		-0.3 to V _{CC} +0.3	V
Operating temperature	T _{amb}	-		-40 to 125	°C
Storage temperature	T _{stg}	-		-65 to 150	°C
Soldering temperature	T _L	10s	DIP8	250	°C
			SOP8/MSOP8/DFN8	260	°C

3.2、Recommended Operating Conditions

Characteristic	Symbol	Conditions	Value	Unit
Supply voltage	V_{CC}	-	3 to 5.5	V
Common mode voltage	V_{CM}	-	-7 to 12	V
High-level input voltage	V_{IH}	Driver input, driver enable, and receiver enable	2 to V_{CC}	V
Low-level input voltage	V_{IL}		0 to 0.8	V
Differential input voltage	V_{ID}	-	-7 to 12	V
Differential load resistance	R_L	-	>54	Ω

3.3、ESD Rating

HBM Model	Value	Unit
bus pins(A,B)	± 15	kV
all other pins	± 15	kV



3.4、Electrical Characteristics

3.4.1、DC Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Power supply							
Operating voltage	V _{CC}	-	3	-	5.5	V	
Quiescent current	I _{CC}	DE=V _{CC} , /RE=GND, no load	-	1.9	2.35	mA	
		DE=V _{CC} , /RE=V _{CC} , no load	-	0.47	0.6		
		DE=GND, /RE=GND, no load	-	1.7	2.05		
		DE=GND, /RE=V _{CC} , no load	-	-	0.001		
Driver							
Differential output voltage magnitude	V _{OD}	R _L =60Ω@VA&VB(-7 to 12V) V _{CC} =4.5 to 5.5V	Figure 1A	2.1	3.5	-	V
		R _L =60Ω@VA&VB(-7 to 12V) V _{CC} =3.0 to 3.6V		1.5	2.2	-	V
		R _L =54Ω, V _{CC} =5V	Figure 1B	2	3.6	-	V
		R _L =54Ω, V _{CC} =3V		1.5	1.9	-	V
		R _L =100Ω, V _{CC} =5V		2.7	4.0	-	V
		R _L =100Ω, V _{CC} =3V		2	2.3	-	V
Change in magnitude of driver differential-output voltage	Δ V _{OD}	R _L =54Ω, V _{CC} =5V, C _L =50pF	Figure 1B	-50	2	50	mV
Steady-stage common-mode output voltage	V _{OC(SS)}	center of two 27Ω load resistors		1	V _{CC} /2	3	V
Change in differential driver common-mode output voltage	ΔV _{OC}			-	50	-	mV
Peak-to-peak driver common-mode output voltage	V _{OC(PP)}			-	500	-	mV
Short-circuit output current	I _{OS}	I _{OS} VA/VB: -7 to 12V	-250	110	250	mA	
		Bus pin A,B short current	-	-	150	mA	
Receiver							
Positive-going receiver differential-input voltage threshold	V _{IT+}	VA/VB: -7 to 12V	-	-120	-40	mV	
Negative-going receiver differential-input voltage threshold	V _{IT-}	VA/VB: -7 to 12V	-220	-170	-	mV	
Receiver differential-input voltage threshold hysteresis (V _{IT+} -V _{IT-})	V _{HYS}	-	-	50	-	mV	
High-level output voltage	V _{OH}	I _{OH} =-8mA	3	4.6	-	V	
Low-level output voltage	V _{OL}	I _{OL} =8mA	-	-	0.4	V	
High-Z output current	I _{OZ}	V _O =0/V _{CC} , /RE=V _{CC}	-1	-	1	uA	
Bus input current (driver disabled)	I _{IN}	V _{CC} =4.5 to 5.5 or V _{CC} =0, DE=0V	V _I =12V	-	-	120	uA
			V _I =-7V	-110	-	-	uA
Bus input impedance	R _A /R _B	VA=-7V, VB=12V and VA=12V, VB=-7V	96	-	-	KΩ	
Logic input							



Logic Input High Voltage	V_{IH}	DI, DE, /RE	2	-	-	V
Logic Input Low Voltage	V_{IL}		-	-	0.8	V
Input leakage current	I_i		-5	-	5	uA

3.4.2、AC Characteristics

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Driver							
Maximum data rate	f _{MAX}	V _{OD} ≥±1.5V, R _L =54Ω, C _L =100pF (Figure 2)		-	-	10	Mbps
Differential-output rise and fall times	t _r , t _f	R _L =54Ω, C _L =50pF	Figure 3	-	5	-	ns
Propagation delay	t _{PHL} , t _{PLH}			-	15	30	ns
t _{PHL} - t _{PLH}	t _{SK(P)}			-	-	20	ns
Disable time	t _{PHZ}	C _L =15pF, SW2 closed	Figure 4	-	17	50	ns
	t _{PLZ}	C _L =15pF, SW1 closed		-	20	50	ns
Enable time	t _{PZH}	C _L =100pF, RX enable, SW2 closed		-	36	45	ns
		C _L =100pF, RX disable, SW2 closed		-	2400	3200	ns
	t _{PZL}	C _L =100pF, RX enable, SW1 closed		-	21	45	ns
		C _L =100pF, RX disable, SW1 closed		-	2400	3200	ns
Receiver							
Output rise and fall times	t _r , t _f	C _L =15pF	Figure 5	-	9	-	ns
Propagation delay	t _{PHL} , t _{PLH}			-	28	50	ns
t _{PHL} -t _{PLH}	t _{SK(P)}			-	-	15	ns
Disable time	t _{PHZ}	SW2 closed	Figure 6	-	30	60	ns
	t _{PLZ}	SW1 closed		-	27	60	
Enable time	t _{PZH}	TX enable, SW2 closed		-	67	-	ns
		TX disable, SW2 closed		-	2500	3200	ns
	t _{PZL}	TX enable, SW1 closed		-	24	35	ns
		TX disable, SW1 closed		-	2400	3200	ns



4、Testing Circuit

4.1、DC Testing Circuit

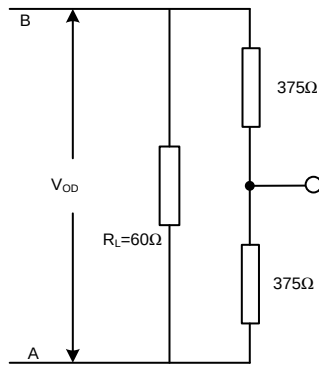


Figure 1A. V_{OD} with common mode load

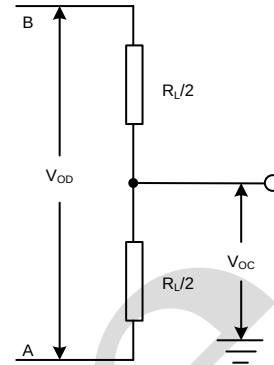


Figure 1B. V_{OD} and V_{OC}

Figure 1. Driver common-mode and differential-mode test circuits

4.2、AC Testing Circuit

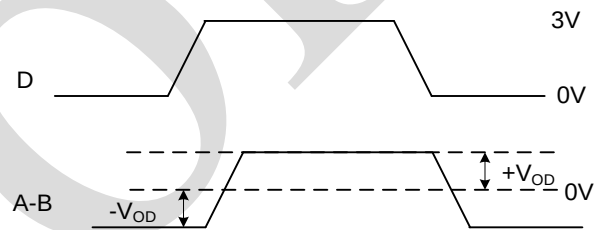
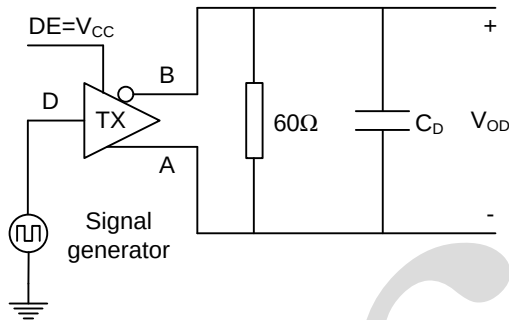


Figure 2. Driver data rate

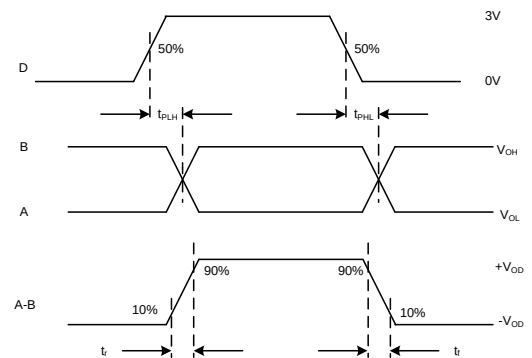
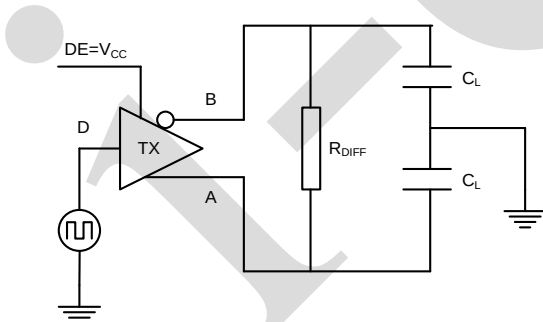


Figure 3. Driver propagation delay and output rise and fall times

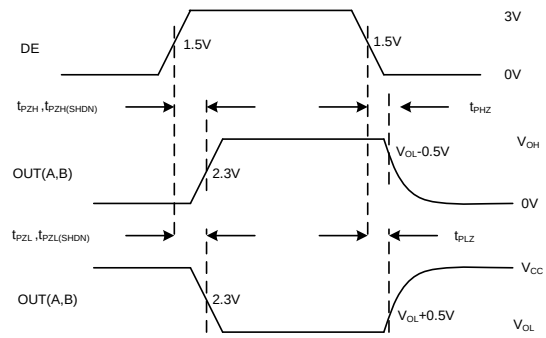
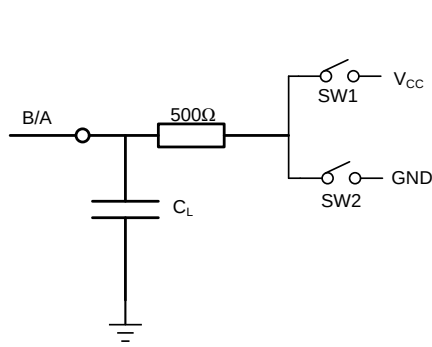


Figure 4. Driver enable and disable times

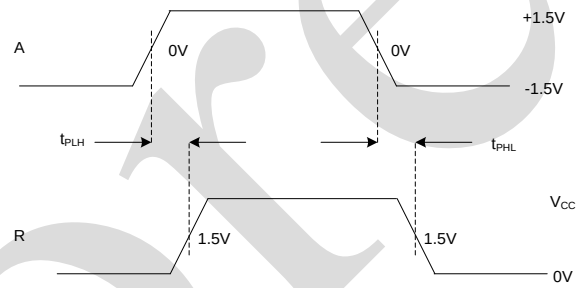
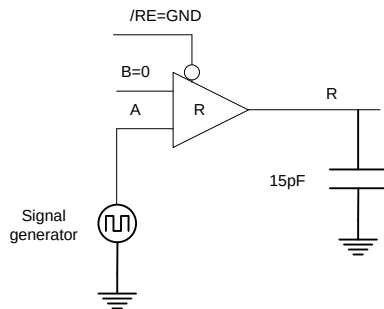


Figure 5. Receiver propagation delay and data rate

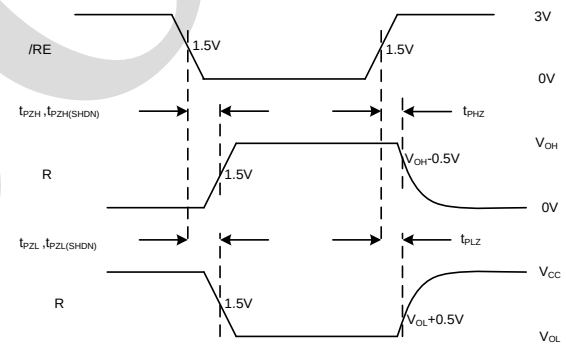
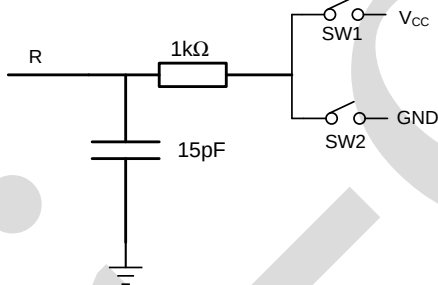
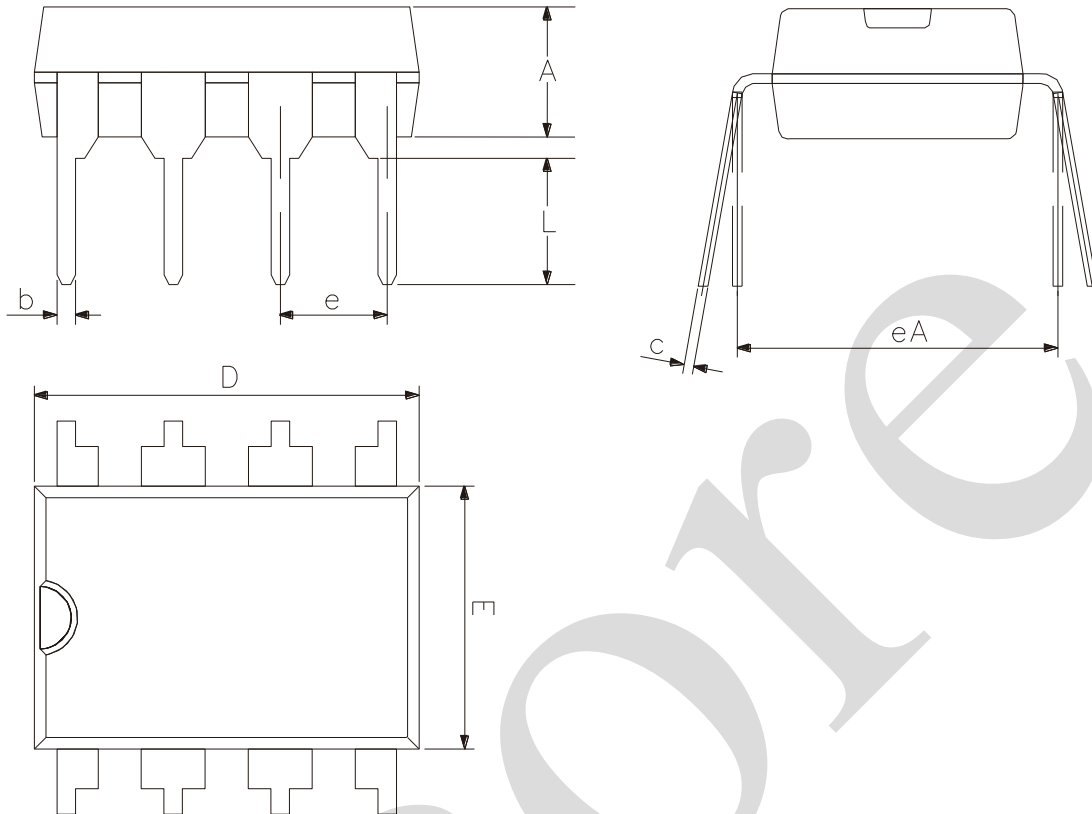


Figure 6. Receiver enable and disable times



5、Package Information

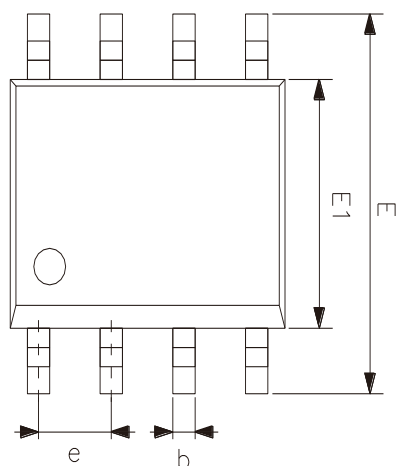
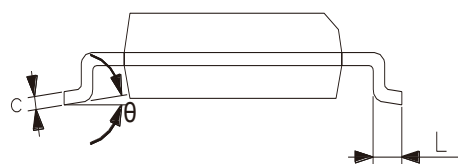
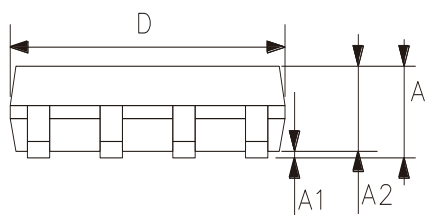
5.1、DIP8



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	—



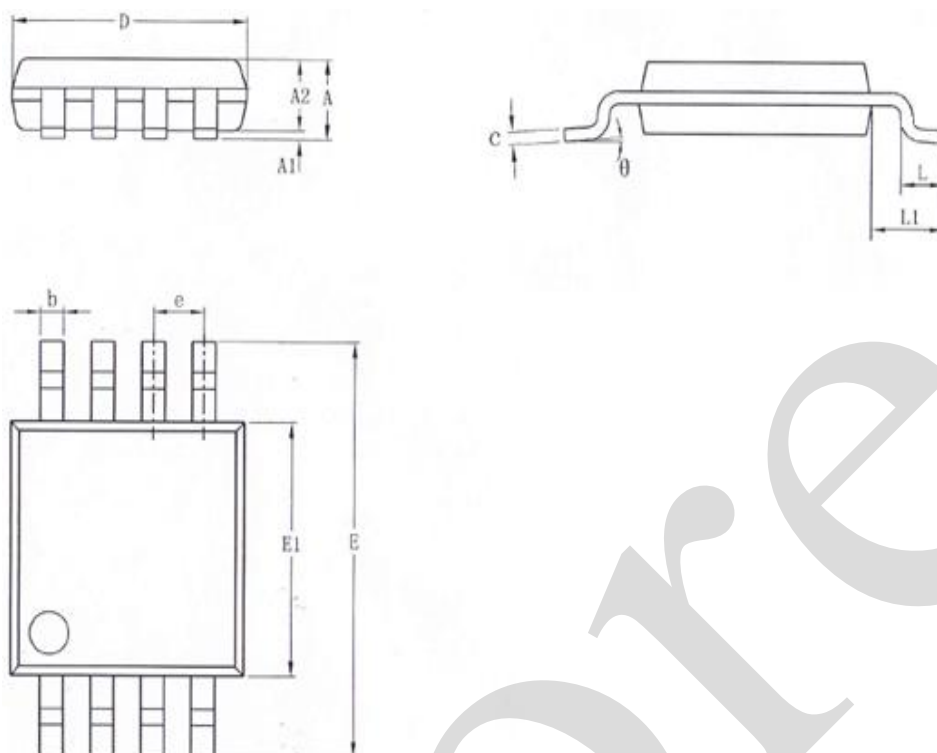
5.2、SOP8



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°



5.3、MSOP8



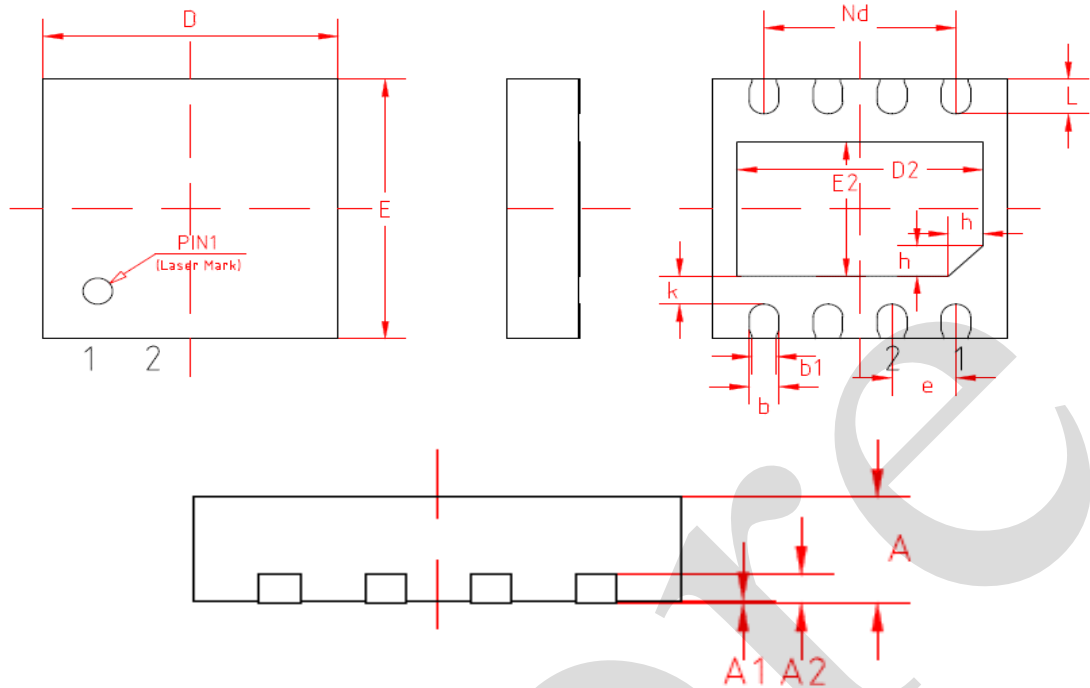
2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.10
A1	0.05	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	4.70	5.10
E1	2.90	3.10
e	0.65	
L	0.40	0.80
L1	0.95	
θ	0°	8°



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5.4、DFN8



2025/03/B	Dimensions In Millimeters	
Symbol	Min	Max
A	0.70	0.80
A1	—	0.05
b	0.25	0.35
c	0.18	0.25
D	2.90	3.10
D2	2.40	2.60
E	2.90	3.10
E2	1.45	1.65
e	0.65	
L	0.30	0.50
h	0.20	0.40



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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