



AiP74HC107/HCT107 Dual JK Flip-Flop with Reset; Negative-Edge Trigger

Product Specification

Specification Revision History:

Version	Date	Description
2023-12-A0	2023-12	New
2024-03-A1	2024-03	Modify the parameters



1、General Description

The AiP74HC/HCT107 is dual negative-edge triggered JK-type flip-flops featuring individual J, K, clock ($\bar{n}CP$) and reset ($\bar{n}R$) inputs; also complementary Q and \bar{Q} outputs.

Features:

- Supply voltage range:
AiP74HC107: 2V to 6V
AiP74HCT107: 4.5V to 5.5V
- Input levels:
AiP74HC107: CMOS level
AiP74HCT107: TTL level
- Temperature range: -40°C to +125°C
- Packaging information: DIP14/SOP14/TSSOP14

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74HC107DA14.TB	DIP14	74HC107	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT107DA14.TB	DIP14	74HCT107	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC107SA14.TB	SOP14	74HC107	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74HCT107SA14.TB	SOP14	74HCT107	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74HC107TA14.TB	TSSOP14	74HC107	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT107TA14.TB	TSSOP14	74HCT107	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
AiP74HC107SA14.TR	SOP14	74HC107	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74HCT107SA14.TR	SOP14	74HCT107	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
AiP74HC107TA14.TR	TSSOP14	74HC107	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT107TA14.TR	TSSOP14	74HCT107	5000 PCS/reel	10000 PCS/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

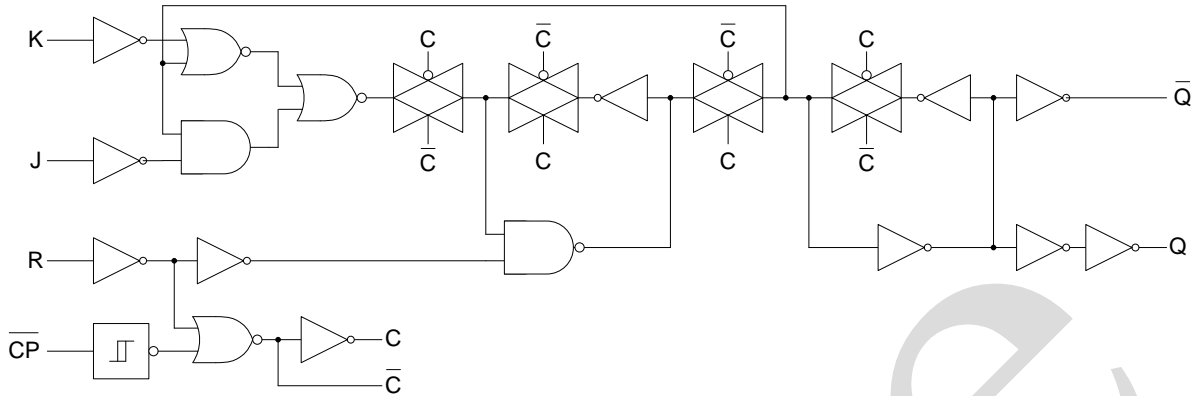


Figure 1. Logic diagram

2.2、Pin Configurations

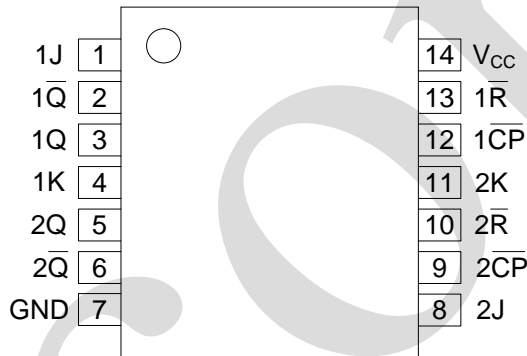


Figure 2. Pin Configurations

2.3、Pin Description

Pin No.	Pin Name	Description
1	1J	synchronous J input
2	1Q \bar{Q}	complement output
3	1Q	true output
4	1K	synchronous K input
5	2Q	true output
6	2Q \bar{Q}	complement output
7	GND	ground (0V)
8	2J	synchronous J input
9	2CP	clock input (HIGH-to-LOW edge-triggered)
10	2R \bar{R}	asynchronous reset input (active LOW)
11	2K	synchronous K input
12	1CP	clock input (HIGH-to-LOW edge-triggered)
13	1R \bar{R}	asynchronous reset input (active LOW)
14	V _{CC}	supply voltage



2.4、Function Table

Input				Output		Operating mode
\overline{nR}	\overline{nCP}	nJ	nK	nQ	\overline{nQ}	
L	X	X	X	L	H	asynchronous reset
H	↓	h	h	\overline{q}	q	toggle
H	↓	l	h	L	H	load 0 (reset)
H	↓	h	l	H	L	load 1 (set)
H	↓	l	l	q	\overline{q}	hold (no change)

Notes:

H = HIGH voltage level;

h = HIGH voltage level one set-up time prior to the HIGH-to-LOW clock transition;

L = LOW voltage level;

l = LOW voltage level one set-up time prior to the HIGH-to-LOW clock transition;

q = state of referenced output one set-up time prior to the HIGH-to-LOW clock transition;

X = don't care;

↓ = HIGH-to-LOW clock transition.

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7	V
supply current	I_{CC}	-	-	50	mA
ground current	I_{GND}	-	-50	-	mA
input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$	-	±20	mA
output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$	-	±20	mA
output current	I_O	$-0.5V < V_O < V_{CC}+0.5V$	-	±25	mA
storage temperature	T_{stg}	-	-65	+150	°C
soldering temperature	T_L	10s	DIP		°C
			SOP/TSSOP		

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74HC107						
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	°C
AiP74HCT107						
supply voltage	V_{CC}	-	4.5	5.0	5.5	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	°C



3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V _{CC}	Conditions	Min.	Typ.	Max.	Unit
AiP74HC107							
HIGH-level input voltage	V _{IH}	2.0V	-	1.5	1.2	-	V
		4.5V	-	3.15	2.4	-	V
		6.0V	-	4.2	3.2	-	V
LOW-level input voltage	V _{IL}	2.0V	-	-	0.8	0.5	V
		4.5V	-	-	2.1	1.35	V
		6.0V	-	-	2.8	1.8	V
HIGH-level output voltage	V _{OH}	2.0V	I _O =-20uA	1.9	2.0	-	V
		4.5V	I _O =-20uA	4.4	4.5	-	V
		6.0V	I _O =-20uA	5.9	6.0	-	V
		4.5V	I _O =-4.0mA	3.84	4.32	-	V
		6.0V	I _O =-5.2mA	5.34	5.81	-	V
LOW-level output voltage	V _{OL}	2.0V	I _O =20uA	-	0	0.1	V
		4.5V	I _O =20uA	-	0	0.1	V
		6.0V	I _O =20uA	-	0	0.1	V
		4.5V	I _O =4.0mA	-	0.15	0.33	V
		6.0V	I _O =5.2mA	-	0.16	0.33	V
input leakage current	I _I	6.0V	V _I =V _{CC} or GND	-	-	±1	uA
supply current	I _{CC}	6.0V	V _I =V _{CC} or GND; I _O =0A	-	-	80	uA
AiP74HCT107							
HIGH-level input voltage	V _{IH}	4.5~5.5V	-	2.0	1.6	-	V
LOW-level input voltage	V _{IL}	4.5~5.5V	-	-	1.2	0.8	V
HIGH-level output voltage	V _{OH}	4.5V	I _O =-20uA	4.4	4.5	-	V
			I _O =-4.0mA	3.84	4.32	-	V
LOW-level output voltage	V _{OL}	4.5V	I _O =20uA	-	0	0.1	V
			I _O =4.0mA	-	0.15	0.33	V
input leakage current	I _I	5.5V	V _I =V _{CC} or GND	-	-	±1	uA
supply current	I _{CC}	5.5V	V _I =V _{CC} or GND; I _O =0A	-	-	80	uA
additional supply current	ΔI _{CC}	4.5~5.5V	One input at V _I =V _{CC} -2.1V; Other inputs at V _{CC} or GND; I _O =0A	-	-	135	uA



3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V _{CC}	Conditions	Min.	Typ.	Max.	Unit
AiP74HC107							
HIGH-level input voltage	V _{IH}	2.0V	-	1.5	-	-	V
		4.5V	-	3.15	-	-	V
		6.0V	-	4.2	-	-	V
LOW-level input voltage	V _{IL}	2.0V	-	-	-	0.5	V
		4.5V	-	-	-	1.35	V
		6.0V	-	-	-	1.8	V
HIGH-level output voltage	V _{OH}	2.0V	I _O =-20uA	1.9	-	-	V
		4.5V	I _O =-20uA	4.4	-	-	V
		6.0V	I _O =-20uA	5.9	-	-	V
		4.5V	I _O =-4.0mA	3.7	-	-	V
		6.0V	I _O =-5.2mA	5.2	-	-	V
LOW-level output voltage	V _{OL}	2.0V	I _O =20uA	-	-	0.1	V
		4.5V	I _O =20uA	-	-	0.1	V
		6.0V	I _O =20uA	-	-	0.1	V
		4.5V	I _O =4.0mA	-	-	0.4	V
		6.0V	I _O =5.2mA	-	-	0.4	V
input leakage current	I _I	6.0V	V _I =V _{CC} or GND	-	-	±1	uA
supply current	I _{CC}	6.0V	V _I =V _{CC} or GND; I _O =0A	-	-	160	uA
AiP74HCT107							
HIGH-level input voltage	V _{IH}	4.5~5.5V	-	2.0	-	-	V
LOW-level input voltage	V _{IL}	4.5~5.5V	-	-	-	0.8	V
HIGH-level output voltage	V _{OH}	4.5V	I _O =-20uA	4.4	-	-	V
			I _O =-4.0mA	3.7	-	-	V
LOW-level output voltage	V _{OL}	4.5V	I _O =20uA	-	-	0.1	V
			I _O =4.0mA	-	-	0.4	V
input leakage current	I _I	5.5V	V _I =V _{CC} or GND	-	-	±1	uA
supply current	I _{CC}	5.5V	V _I =V _{CC} or GND; I _O =0A	-	-	160	uA
additional supply current	ΔI _{CC}	4.5~5.5V	One input at V _I =V _{CC} -2.1V; Other inputs at V _{CC} or GND; I _O =0A	-	-	147	uA



3.3.3、AC Characteristics 1

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V _{CC}	Conditions	Min.	Typ.	Max.	Unit			
AiP74HC107										
nCP to nQ propagation delay	t _{PLH} , t _{PHL}	2.0V	C _L =50pF	see Figure 4	-	52	160	ns		
		4.5V	C _L =50pF		-	19	32	ns		
		5.0V	C _L =15pF		-	16	-	ns		
		6.0V	C _L =50pF		-	15	27	ns		
nCP to nQ propagation delay		2.0V	C _L =50pF		see Figure 4	-	52	200	ns	
		4.5V	C _L =50pF			-	19	40	ns	
		5.0V	C _L =15pF			-	16	-	ns	
		6.0V	C _L =50pF			-	15	34	ns	
nR to nQ/nQ propagation delay	t _{THL} , t _{TLH}	2.0V	C _L =50pF	see Figure 5	-	52	195	ns		
		4.5V	C _L =50pF		-	19	39	ns		
		5.0V	C _L =15pF		-	16	-	ns		
		6.0V	C _L =50pF		-	15	26	ns		
nQ/nQ transition time		tw	2.0V		C _L =50pF	see Figure 4	-	19	95	ns
			4.5V		C _L =50pF		-	7	19	ns
			6.0V		C _L =50pF		-	6	16	ns
nCP input HIGH or LOW pulse width		trec	2.0V		C _L =50pF	see Figure 4	100	22	-	ns
	4.5V		C _L =50pF	20	8		-	ns		
	6.0V		C _L =50pF	17	6		-	ns		
nR input, HIGH pulse width	tsu		2.0V	C _L =50pF	see Figure 5	100	22	-	ns	
			4.5V	C _L =50pF		20	8	-	ns	
			6.0V	C _L =50pF		17	6	-	ns	
nR to nCP recovery time	th	2.0V	C _L =50pF	see Figure 5	75	19	-	ns		
		4.5V	C _L =50pF		15	7	-	ns		
		6.0V	C _L =50pF		13	6	-	ns		
nJ,nK to nCP set-up time	fmax	2.0V	C _L =50pF	see Figure 4	125	22	-	ns		
		4.5V	C _L =50pF		25	8	-	ns		
		6.0V	C _L =50pF		21	6	-	ns		
nJ,nK to nCP hold time	fmax	2.0V	C _L =50pF	see Figure 4	3	-6	-	ns		
		4.5V	C _L =50pF		3	-2	-	ns		
		6.0V	C _L =50pF		3	-2	-	ns		
maximum clock frequency	fmax	2.0V	C _L =50pF	see Figure 4	4.8	30	-	MHz		
		4.5V	C _L =50pF		24	91	-	MHz		
		6.0V	C _L =50pF		28	108	-	MHz		
AiP74HCT107										
nCP to nQ propagation delay	t _{PLH} , t _{PHL}	4.5V	C _L =50pF	see Figure 4	-	19	45	ns		
		5.0V	C _L =15pF		-	16	-	ns		
4.5V		C _L =50pF	-		21	45	ns			
5.0V		C _L =15pF	-		18	-	ns			
nR to nQ/nQ		4.5V	C _L =50pF	see Figure 5	-	20	48	ns		



propagation delay		5.0V	$C_L=15\text{pF}$			17	-	ns
transition time	$t_{\text{THL}}, t_{\text{TLH}}$	4.5V	$C_L=50\text{pF}$	see Figure 4	-	7	15	ns
nCP HIGH or LOW pulse width	tw	4.5V	$C_L=50\text{pF}$	see Figure 4	20	9	-	ns
nR HIGH pulse width		4.5V	$C_L=50\text{pF}$	see Figure 5	25	11	-	ns
nR to nCP recovery time	trec	4.5V	$C_L=50\text{pF}$	see Figure 5	18	8	-	ns
nJ/nQ to nCP set-up time	tsu	4.5V	$C_L=50\text{pF}$	see Figure 4	25	7	-	ns
nJ/nQ to nCP hold time	th	4.5V	$C_L=50\text{pF}$	see Figure 4	5	-2	-	ns
maximum clock frequency	fmax	4.5V	$C_L=50\text{pF}$	see Figure 4	24	66	-	MHz

3.3.4、AC Characteristics 2

($T_{\text{amb}}=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.	Max.	Unit		
AiP74HC107									
nCP to nQ propagation delay	$t_{\text{PLH}}, t_{\text{PHL}}$	2.0V	$C_L=50\text{pF}$	see Figure 4	-	-	240	ns	
		4.5V	$C_L=50\text{pF}$		-	-	48	ns	
		6.0V	$C_L=50\text{pF}$		-	-	41	ns	
nCP to nQ propagation delay		2.0V	$C_L=50\text{pF}$	see Figure 4	-	-	240	ns	
		4.5V	$C_L=50\text{pF}$		-	-	48	ns	
		6.0V	$C_L=50\text{pF}$		-	-	41	ns	
nR to nQ/nQ propagation delay		2.0V	$C_L=50\text{pF}$	see Figure 5	-	-	235	ns	
		4.5V	$C_L=50\text{pF}$		-	-	47	ns	
		6.0V	$C_L=50\text{pF}$		-	-	40	ns	
nQ/nQ transition time	$t_{\text{THL}}, t_{\text{TLH}}$	2.0V	$C_L=50\text{pF}$	see Figure 4	-	-	110	ns	
		4.5V	$C_L=50\text{pF}$		-	-	22	ns	
		6.0V	$C_L=50\text{pF}$		-	-	19	ns	
nCP input HIGH or LOW pulse width	tw	2.0V	$C_L=50\text{pF}$	see Figure 4	120	-	-	ns	
		4.5V	$C_L=50\text{pF}$		24	-	-	ns	
		6.0V	$C_L=50\text{pF}$		20	-	-	ns	
nR input, HIGH pulse width		2.0V	$C_L=50\text{pF}$	see Figure 5	120	-	-	ns	
		4.5V	$C_L=50\text{pF}$		24	-	-	ns	
		6.0V	$C_L=50\text{pF}$		20	-	-	ns	
nR to nCP recovery time		trec	2.0V	$C_L=50\text{pF}$	see Figure 5	90	-	-	ns
			4.5V	$C_L=50\text{pF}$		18	-	-	ns
			6.0V	$C_L=50\text{pF}$		15	-	-	ns
nJ,nK to nCP set-up time	tsu	2.0V	$C_L=50\text{pF}$	see Figure 4	150	-	-	ns	
		4.5V	$C_L=50\text{pF}$		30	-	-	ns	



		6.0V	$C_L=50\text{pF}$		26	-	-	ns
nJ,nK to nCP hold time	th	2.0V	$C_L=50\text{pF}$	see Figure 4	3	-	-	ns
		4.5V	$C_L=50\text{pF}$		3	-	-	ns
		6.0V	$C_L=50\text{pF}$		3	-	-	ns
maximum clock frequency	fmax	2.0V	$C_L=50\text{pF}$	see Figure 4	4.0	-	-	MHz
		4.5V	$C_L=50\text{pF}$		20	-	-	MHz
		6.0V	$C_L=50\text{pF}$		24	-	-	MHz
AiP74HCT107								
nCP to nQ propagation delay	t_{PLH}, t_{PHL}	4.5V	$C_L=50\text{pF}$	see Figure 4	-	-	54	ns
nCP to nQ propagation delay		4.5V	$C_L=50\text{pF}$		-	-	54	ns
nR to nQ/nQ propagation delay		4.5V	$C_L=50\text{pF}$	see Figure 5	-	-	57	ns
transition time	t_{THL}, t_{TLH}	4.5V	$C_L=50\text{pF}$	see Figure 4	-	-	22	ns
nCP HIGH or LOW pulse width	tw	4.5V	$C_L=50\text{pF}$	see Figure 4	24	-	-	ns
nR HIGH pulse width		4.5V	$C_L=50\text{pF}$	see Figure 5	30	-	-	ns
nR to nCP recovery time	trec	4.5V	$C_L=50\text{pF}$	see Figure 5	21	-	-	ns
nJ/nQ to nCP set-up time	tsu	4.5V	$C_L=50\text{pF}$	see Figure 4	30	-	-	ns
nJ/nQ to nCP hold time	th	4.5V	$C_L=50\text{pF}$	see Figure 4	5	-	-	ns
maximum clock frequency	fmax	4.5V	$C_L=50\text{pF}$	see Figure 4	20	-	-	MHz



4、Testing Circuit

4.1、AC Testing Circuit

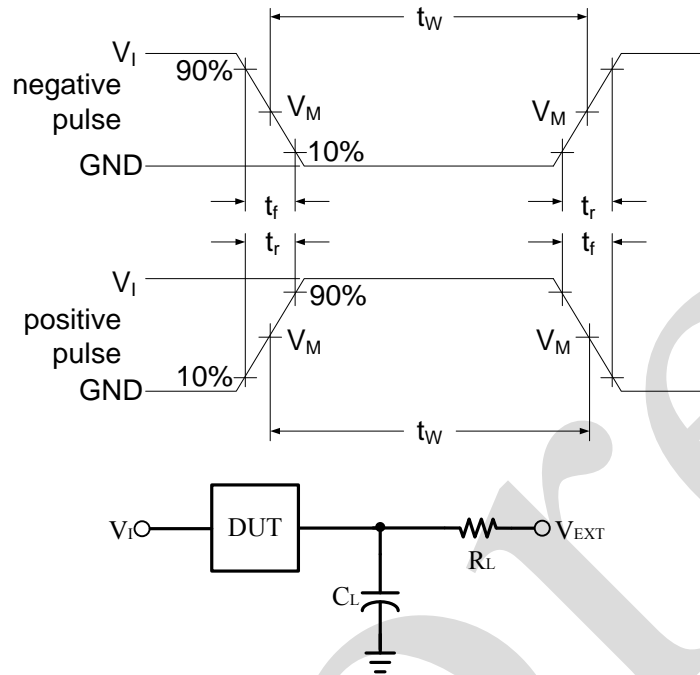


Figure 3. Test circuit for measuring switching times

C_L includes probe and jig capacitance.

4.2、Test Data

Type	Input		Load		V_{EXT}		
	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}/t_{PHL}	t_{PLZ}/t_{PZL}	t_{PHZ}/t_{PZH}
AiP74HC107	V_{CC}	3.0ns	15pF, 50pF	1K Ω	Open	V_{CC}	GND
AiP74HCT107	3.0V	3.0ns	15pF, 50pF	1K Ω	Open	V_{CC}	GND



4.3、 AC Testing Waveforms

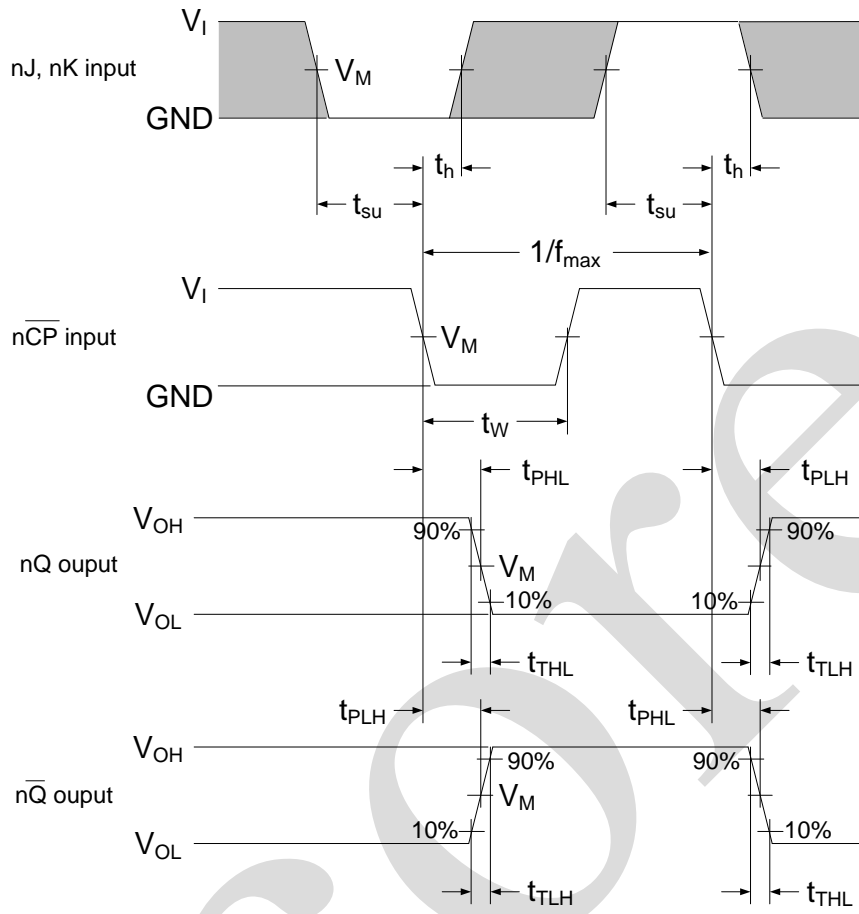


Figure 4. Clock propagation delays, pulse width, set-up and hold times, output transition times and the maximum frequency

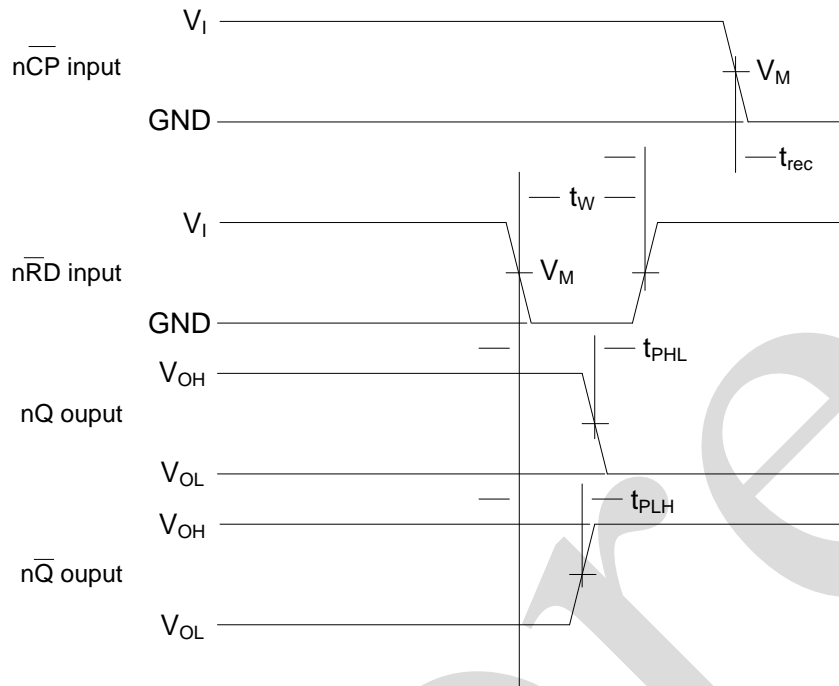


Figure 5. Reset propagation delays, pulse width and recovery time

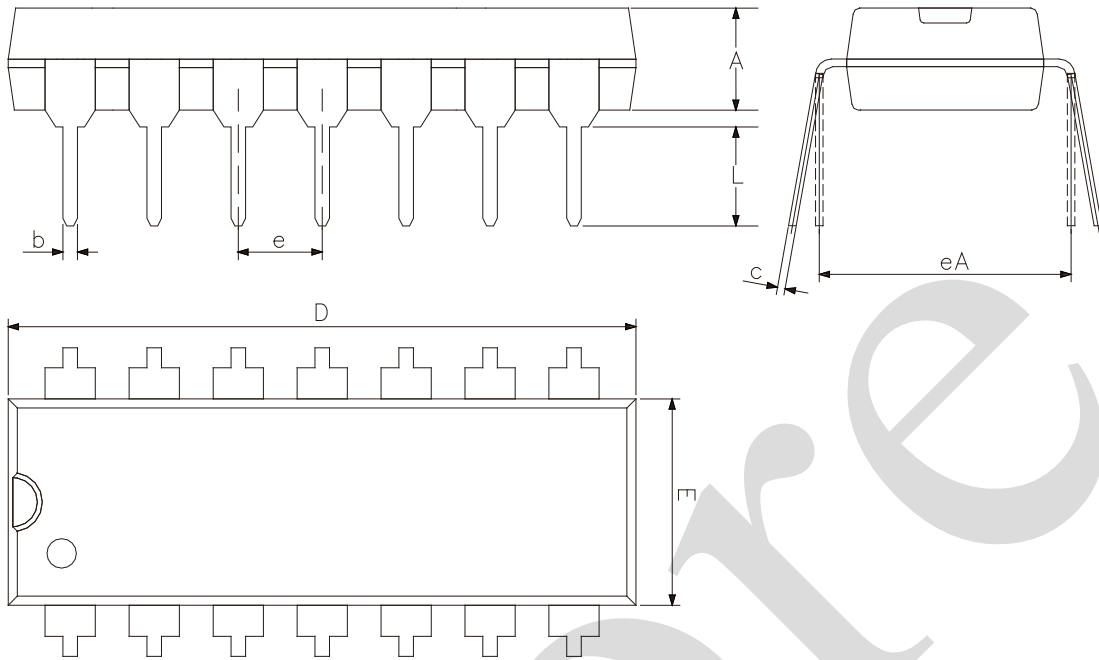
4.4. Measurement Points

Type	Input	Output
	V_M	V_M
AiP74HC107	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
AiP74HCT107	1.3V	1.3V



5、Package Information

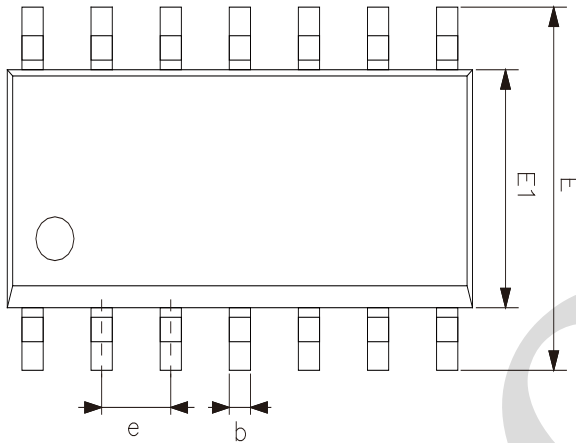
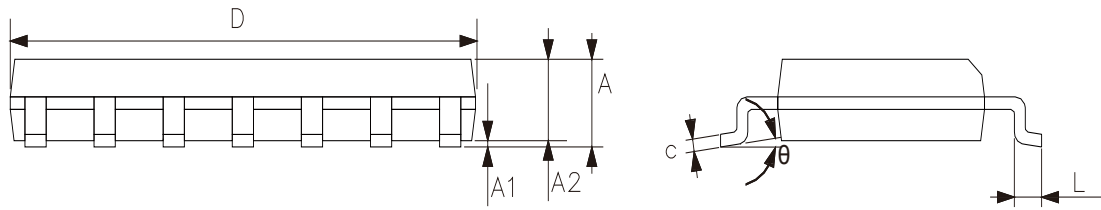
5.1、DIP14



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	—



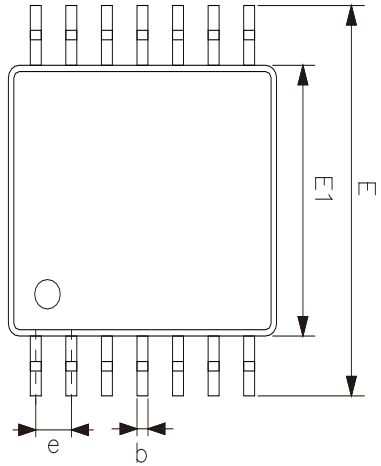
5.2、SOP14



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°



5.3、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、 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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