



AiP74LVC1G175

Single D-type Flip-flop with Reset; Positive-edge Trigger

Product Specification

Specification Revision History:

Version	Date	Description
2023-06-A1	2023-06	New



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1、General Description

The AiP74LVC1G175 is a low-power, low-voltage single positive edge triggered D-type flip-flop with individual data (D) input, clock (CP) input, master reset ($\overline{\text{MR}}$) input, and Q output.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

Features:

- Wide supply voltage range from 1.65V to 5.5V
- Inputs accept voltages to 5.5 V
- $\pm 24\text{mA}$ output drive at 3.0V
- High-impedance when $V_{\text{CC}}=0\text{V}$
- Temperature range: -40°C to $+125^{\circ}\text{C}$
- Packaging information: SOT23-6/SOT363

Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LVC1G175GB236.TR	SOT23-6	ENXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP74LVC1G175GC363.TR	SOT363	ENXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm

Note 1: “XX” refers to variable content, meaning year and 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

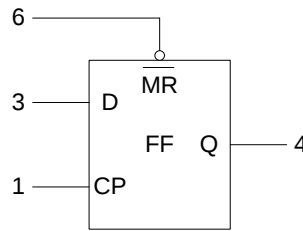


Figure 1. Logic symbol

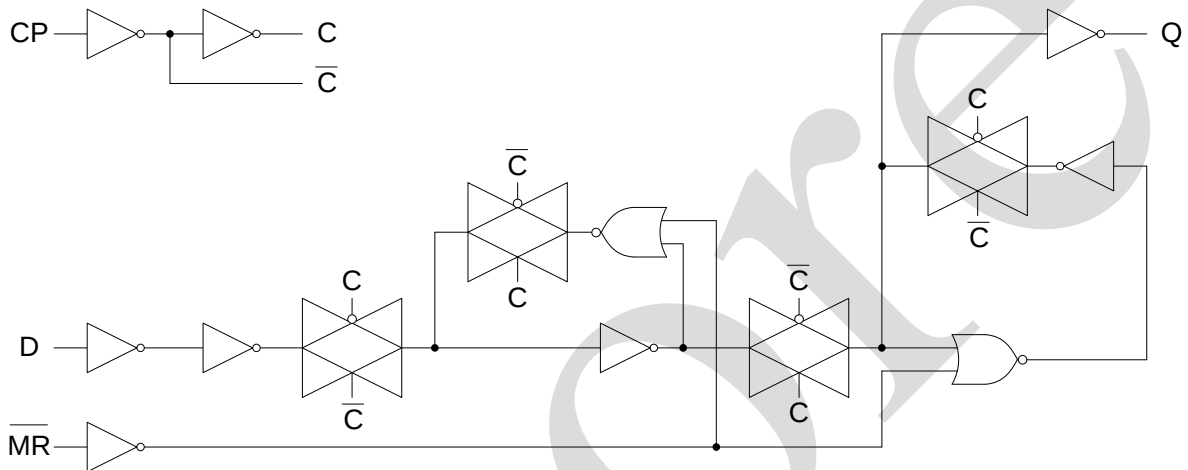
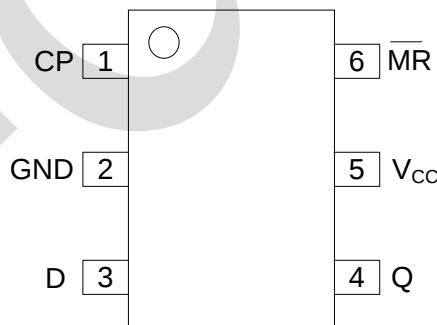


Figure 2. Logic diagram

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	CP	clock input (LOW-to-HIGH, edge-triggered)
2	GND	ground (0V)
3	D	data input
4	Q	data output
5	V _{CC}	supply voltage
6	MR	master reset input (active LOW)



2.4、Function Table

Operating mode	Input			Output
	$\overline{\text{MR}}$	CP	D	Q
Reset(clear)	L	X	X	L
Load '1'	H	↑	h	H
Load '0'	H	↑	l	L

Note:

H=HIGH voltage level; L=LOW voltage level.

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

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

↑ = LOW-to-HIGH CP transition

X = don't care

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	+6.5	V
input voltage	V_I	-	-0.5	+6.5	V
output voltage	V_O	Active mode	-0.5	$V_{CC}+0.5$	V
		Power-down mode; $V_{CC}=0V$	-0.5	+6.5	V
supply current	I_{CC}	-	-	100	mA
ground current	I_{GND}	-	-100	-	mA
input clamping current	I_{IK}	$V_I < 0V$	-50	-	mA
output current	I_O	$V_O=0V$ to V_{CC}	-	±50	mA
output clamping current	I_{OK}	$V_O > V_{CC}$ or $V_O < 0V$	-	±50	mA
storage temperature	T_{stg}	-	-65	+150	°C
soldering temperature	T_L	10s	260		°C

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.65	-	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	Active mode	0	-	V_{CC}	V
		Power-down mode; $V_{CC}=0V$	0	-	5.5	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	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=1.65\text{V to }1.95\text{V}$		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		1.7	-	-	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		2.0	-	-	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		$0.7 \times V_{CC}$	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=1.65\text{V to }1.95\text{V}$		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		-	-	0.7	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		-	-	0.8	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		-	-	$0.3 \times V_{CC}$	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	$V_{CC} - 0.1$	-	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	1.2	1.54	-	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.9	2.15	-	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	2.2	2.50	-	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.3	2.62	-	V
			$I_O = -32\text{mA}; V_{CC}=4.5\text{V}$	3.8	4.11	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	-	-	0.10	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	0.07	0.45	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	0.12	0.30	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	0.17	0.40	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	0.33	0.55	V
			$I_O = 32\text{mA}; V_{CC}=4.5\text{V}$	-	0.39	0.55	V
input leakage current	I_I	$V_I = 5.5\text{V or GND}; V_{CC}=0\text{V to }5.5\text{V}$		-	-	± 1	μA
power-off leakage current	I_{OFF}	$V_I \text{ or } V_O = 5.5\text{V}; V_{CC}=0\text{V}$		-	-	± 2	μA
supply current	I_{CC}	$V_I = 5.5\text{V or GND}; I_O = 0\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$		-	-	4	μA
additional supply current	ΔI_{CC}	$V_I = V_{CC} - 0.6\text{V}; I_O = 0\text{A}; V_{CC}=2.3\text{V to }5.5\text{V}$		-	-	500	μA

Note: Typical values are measured at $T_{amb} = 25^{\circ}\text{C}$.



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	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=1.65\text{V to }1.95\text{V}$		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		1.7	-	-	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		2.0	-	-	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		$0.7 \times V_{CC}$	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=1.65\text{V to }1.95\text{V}$		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		-	-	0.7	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		-	-	0.8	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		-	-	$0.3 \times V_{CC}$	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	$V_{CC} - 0.1$	-	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	0.95	-	-	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.7	-	-	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	1.9	-	-	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.0	-	-	V
			$I_O = -32\text{mA}; V_{CC}=4.5\text{V}$	3.4	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	-	-	0.10	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.70	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.45	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.60	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.80	V
			$I_O = 32\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.80	V
input leakage current	I_I	$V_I = 5.5\text{V or GND}; V_{CC}=0\text{V to }5.5\text{V}$		-	-	± 1	μA
power-off leakage current	I_{OFF}	$V_I \text{ or } V_O = 5.5\text{V}; V_{CC}=0\text{V}$		-	-	± 2	μA
supply current	I_{CC}	$V_I = 5.5\text{V or GND}; I_O = 0\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$		-	-	4	μA
additional supply current	ΔI_{CC}	$V_I = V_{CC} - 0.6\text{V}; I_O = 0\text{A}; V_{CC}=2.3\text{V to }5.5\text{V}$		-	-	500	μA



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	Conditions		Min.	Typ. ^[1]	Max.	Unit
A to Y propagation delay	t _{PLH} , t _{PHL}	see Figure 4	V _{CC} =1.65V to 1.95V	-	4.9	13.4	ns
			V _{CC} =2.3V to 2.7V	-	3.1	7.1	ns
			V _{CC} =2.7V	-	3.2	7.1	ns
			V _{CC} =3.0V to 3.6V	-	3.1	5.7	ns
			V _{CC} =4.5V to 5.5V	-	2.2	4.0	ns
$\overline{\text{MR}}$ to Q High to Low propagation delay	t _{PHL}	see Figure 5	V _{CC} =1.65V to 1.95V	-	4.3	12.9	ns
			V _{CC} =2.3V to 2.7V	-	2.8	7.0	ns
			V _{CC} =2.7V	-	3.0	7.0	ns
			V _{CC} =3.0V to 3.6V	-	2.5	5.8	ns
			V _{CC} =4.5V to 5.5V	-	2.0	4.1	ns
CP HIGH or LOW pulse width	t _w	see Figure 4	V _{CC} =1.65V to 1.95V	6.2	-	-	ns
			V _{CC} =2.3V to 2.7V	2.7	-	-	ns
			V _{CC} =2.7V	2.7	-	-	ns
			V _{CC} =3.0V to 3.6V	2.7	1.3	-	ns
			V _{CC} =4.5V to 5.5V	2.0	-	-	ns
$\overline{\text{MR}}$ LOW pulse width		see Figure 5	V _{CC} =1.65V to 1.95V	6.2	-	-	ns
			V _{CC} =2.3V to 2.7V	2.7	-	-	ns
			V _{CC} =2.7V	2.7	-	-	ns
			V _{CC} =3.0V to 3.6V	2.7	1.6	-	ns
			V _{CC} =4.5V to 5.5V	2.0	-	-	ns
$\overline{\text{MR}}$ to CP recovery time	t _{rec}	see Figure 5	V _{CC} =1.65V to 1.95V	1.9	-	-	ns
			V _{CC} =2.3V to 2.7V	1.4	-	-	ns
			V _{CC} =2.7V	1.3	-	-	ns
			V _{CC} =3.0V to 3.6V	1.2	0.4	-	ns
			V _{CC} =4.5V to 5.5V	1.0	-	-	ns
D to CP Set-up time	t _{su}	see Figure 4	V _{CC} =1.65V to 1.95V	2.9	-	-	ns
			V _{CC} =2.3V to 2.7V	1.7	-	-	ns
			V _{CC} =2.7V	1.7	-	-	ns
			V _{CC} =3.0V to 3.6V	1.3	0.5	-	ns
			V _{CC} =4.5V to 5.5V	1.1	-	-	ns
D to CP hold time	t _h	see Figure 4	V _{CC} =1.65V to 1.95V	0.0	-	-	ns
			V _{CC} =2.3V to 2.7V	0.3	-	-	ns
			V _{CC} =2.7V	0.5	-	-	ns
			V _{CC} =3.0V to 3.6V	1.2	0.2	-	ns
			V _{CC} =4.5V to 5.5V	0.5	-	-	ns
maximum frequency	f _{max}	see Figure 4	V _{CC} =1.65V to 1.95V	80	-	-	MHZ
			V _{CC} =2.3V to 2.7V	175	-	-	MHZ
			V _{CC} =2.7V	175	-	-	MHZ
			V _{CC} =3.0V to 3.6V	175	-	-	MHZ
			V _{CC} =4.5V to 5.5V	200	-	-	MHZ

Note: Typical values are measured at $T_{amb} = 25^{\circ}\text{C}$ and $V_{CC} = 1.8\text{V}, 2.5\text{V}, 2.7\text{V}, 3.3\text{V}$ and 5.0V respectively.



3.3.4、AC 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	Conditions		Min.	Typ. ^[1]	Max.	Unit
A to Y propagation delay	t _{PLH} , t _{PHL}	see Figure 4	V _{CC} =1.65V to 1.95V	-	-	17	ns
			V _{CC} =2.3V to 2.7V	-	-	9.0	ns
			V _{CC} =2.7V	-	-	9.0	ns
			V _{CC} =3.0V to 3.6V	-	-	7.5	ns
			V _{CC} =4.5V to 5.5V	-	-	5.5	ns
$\overline{\text{MR}}$ to Q propagation delay	t _{PHL}	see Figure 5	V _{CC} =1.65V to 1.95V	-	-	17	ns
			V _{CC} =2.3V to 2.7V	-	-	9.0	ns
			V _{CC} =2.7V	-	-	9.0	ns
			V _{CC} =3.0V to 3.6V	-	-	7.5	ns
			V _{CC} =4.5V to 5.5V	-	-	5.5	ns
CP HIGH or LOW pulse width	t _W	see Figure 4	V _{CC} =1.65V to 1.95V	6.8	-	-	ns
			V _{CC} =2.3V to 2.7V	2.9	-	-	ns
			V _{CC} =2.7V	2.9	-	-	ns
			V _{CC} =3.0V to 3.6V	2.9	-	-	ns
			V _{CC} =4.5V to 5.5V	2.2	-	-	ns
$\overline{\text{MR}}$ LOW pulse width		see Figure 5	V _{CC} =1.65V to 1.95V	6.8	-	-	ns
			V _{CC} =2.3V to 2.7V	2.9	-	-	ns
			V _{CC} =2.7V	2.9	-	-	ns
			V _{CC} =3.0V to 3.6V	2.9	-	-	ns
			V _{CC} =4.5V to 5.5V	2.2	-	-	ns
$\overline{\text{MR}}$ to CP recovery time	t _{rec}	see Figure 5	V _{CC} =1.65V to 1.95V	2.1	-	-	ns
			V _{CC} =2.3V to 2.7V	1.5	-	-	ns
			V _{CC} =2.7V	1.4	-	-	ns
			V _{CC} =3.0V to 3.6V	1.3	-	-	ns
			V _{CC} =4.5V to 5.5V	1.1	-	-	ns
D to CP Set-up time	t _{su}	see Figure 4	V _{CC} =1.65V to 1.95V	3.2	-	-	ns
			V _{CC} =2.3V to 2.7V	1.8	-	-	ns
			V _{CC} =2.7V	1.8	-	-	ns
			V _{CC} =3.0V to 3.6V	1.4	-	-	ns
			V _{CC} =4.5V to 5.5V	1.2	-	-	ns
D to CP hold time	t _h	see Figure 4	V _{CC} =1.65V to 1.95V	0.0	-	-	ns
			V _{CC} =2.3V to 2.7V	0.3	-	-	ns
			V _{CC} =2.7V	0.6	-	-	ns
			V _{CC} =3.0V to 3.6V	1.3	-	-	ns
			V _{CC} =4.5V to 5.5V	0.6	-	-	ns
maximum frequency	f _{max}	see Figure 4	V _{CC} =1.65V to 1.95V	72	-	-	MHZ
			V _{CC} =2.3V to 2.7V	159	-	-	MHZ
			V _{CC} =2.7V	159	-	-	MHZ
			V _{CC} =3.0V to 3.6V	159	-	-	MHZ
			V _{CC} =4.5V to 5.5V	182	-	-	MHZ



4、Testing Circuit

4.1、AC Testing Circuit

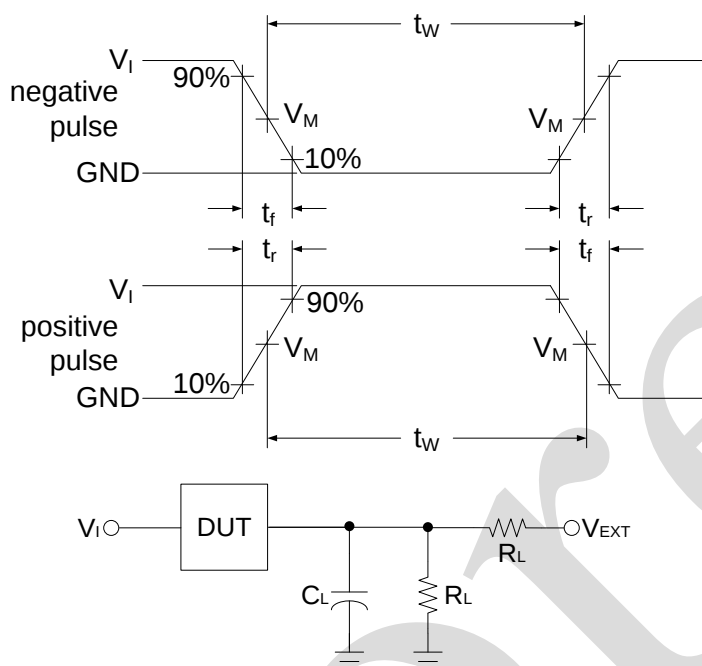


Figure 3. Load circuit

C_L includes probe and jig capacitance.

R_L =Load resistance.

4.2、Test Data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}/t_{PHL}	t_{PLZ}/t_{PZL}	t_{PHZ}/t_{PZH}
1.65V to 1.95V	V_{CC}	$\leq 3ns$	30pF	1k Ω	Open	$2 \times V_{CC}$	GND
2.3V to 2.7V	V_{CC}	$\leq 3ns$	30pF	500 Ω	Open	$2 \times V_{CC}$	GND
2.7V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND
3.0V to 3.6V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND
4.5V to 5.5V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	$2 \times V_{CC}$	GND



4.3、AC Testing Waveforms

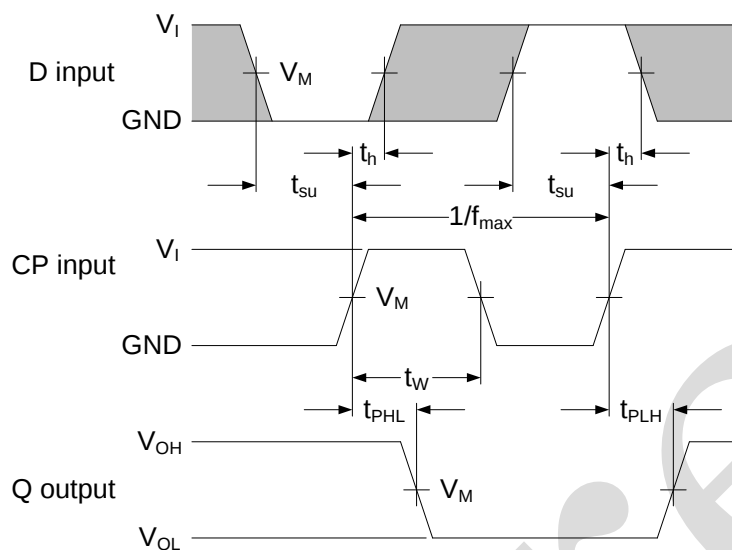


Figure 4. The clock input (CP) to output (Q) propagation delays, the clock pulse width, the D to CP set-up, the CP to D hold times, and the maximum clock pulse frequency

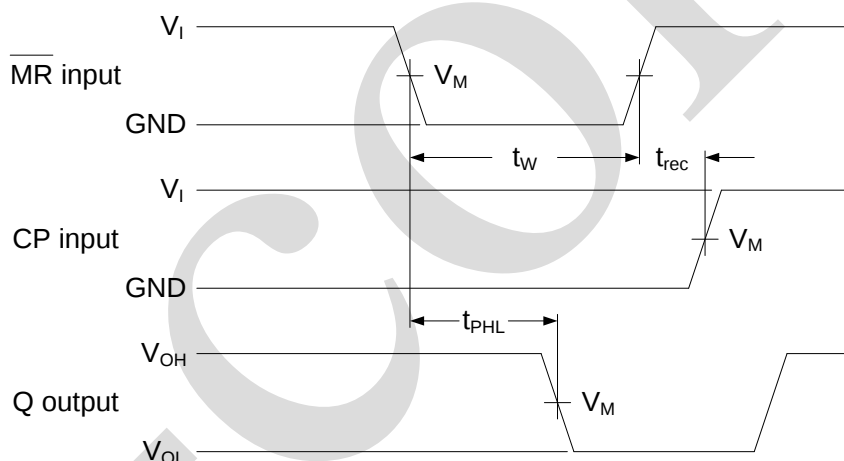


Figure 5. The master reset ($\overline{\text{MR}}$) input to output (Q) propagation delays, the master reset pulse width, and the $\overline{\text{MR}}$ to CP recovery time

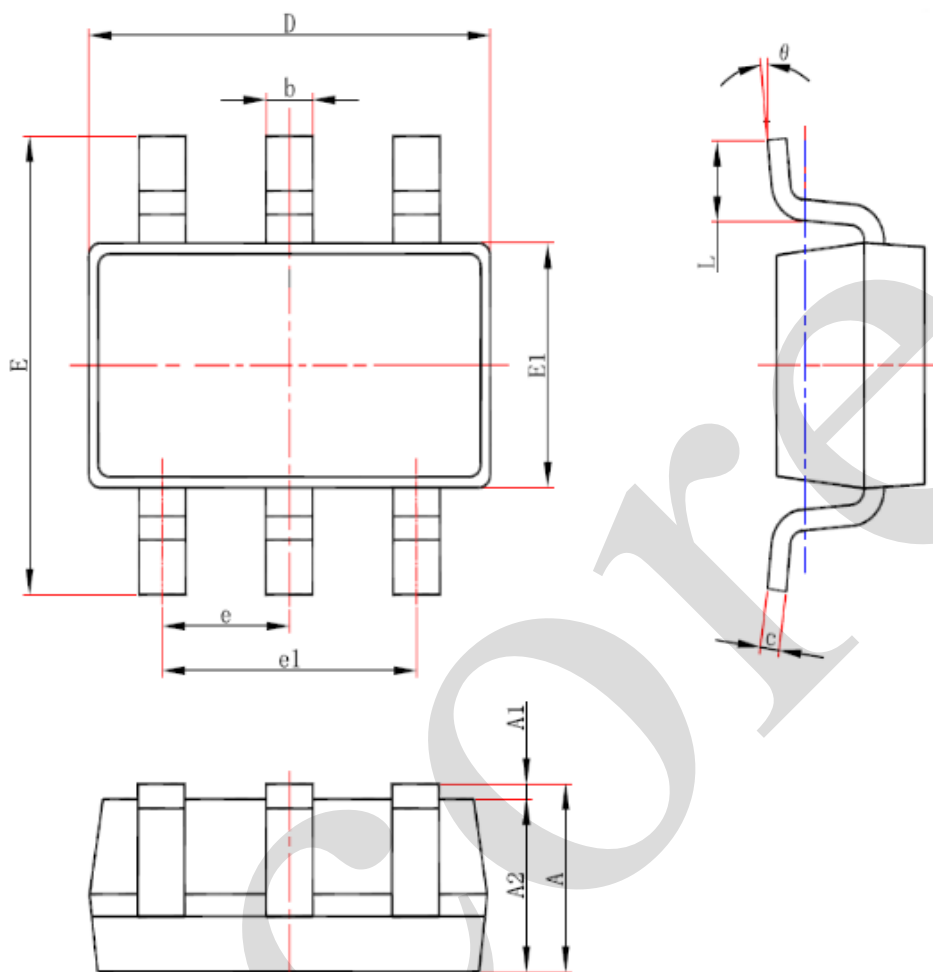
4.4、Measurement Points

Supply voltage	Input	Output
V_{CC}	V_M	V_M
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
3.0V to 3.6V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$



5、Package Information

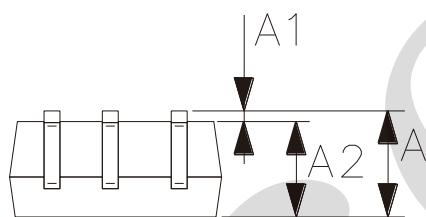
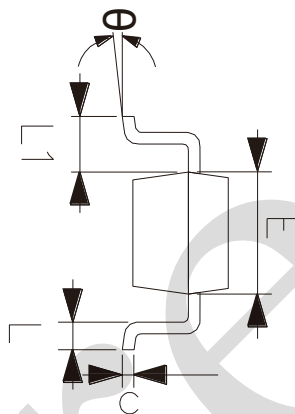
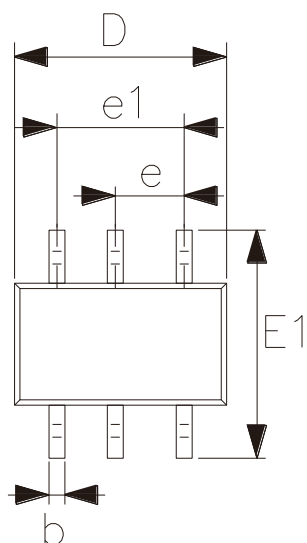
5.1、SOT23-6



Symbol	Dimensions (mm)	
	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°



5.2、SOT363



Symbol	Dimensions (mm)	
	Min.	Max.
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.15	0.35
c	0.11	0.175
D	2.00	2.20
E1	2.15	2.45
E	1.15	1.35
e	0.65	
e1	1.20	1.40
L	0.26	0.46
L1	0.525	
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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