

Product Specification

XBLW SN74HC574

Octal D-type flip-flop; positive edge-trigger;
3-state

WEB | www.xinboleic.com

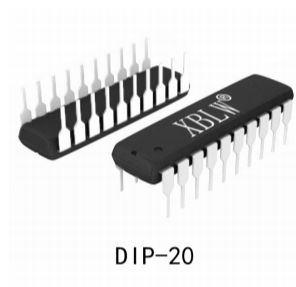


Description

The SN74HC574 is an octal positive-edge triggered D-type flip-flop with 3-state outputs. The device features a clock (CP) and output enable ($\overline{OE}$) inputs. A HIGH on $\overline{OE}$ causes the outputs to assume a high-impedance OFF-state. Operation of the $\overline{OE}$ input does not affect the state of the flip-flops.

Features

- 3-state non-inverting outputs for bus oriented applications
- 8-bit positive, edge-triggered register
- Specified from -40°C to +125°C
- Packaging information: DIP-20/SOP-20/TSSOP-20/SOIC-20-208mil



Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74HC574N	DIP-20	74HC574N	Tube	720Pcs/Box
XBLW SN74HC574DTR	SOP-20	74HC574	Tape	2000Pcs/Reel
XBLW SN74HC574TDTR	TSSOP-20	74HC574	Tape	2000Pcs/Reel
XBLW SN74HC574NSDTR	SOIC-20-208mil	74HC574	Tape	2000Pcs/Reel

Block Diagram

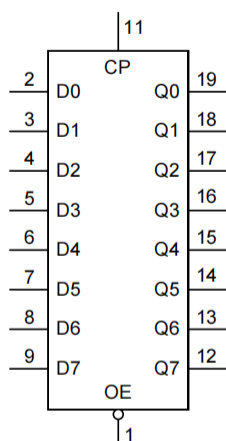


Figure 1. Logic symbol

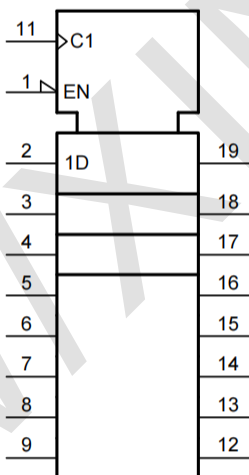


Figure 2. IEC logic symbol

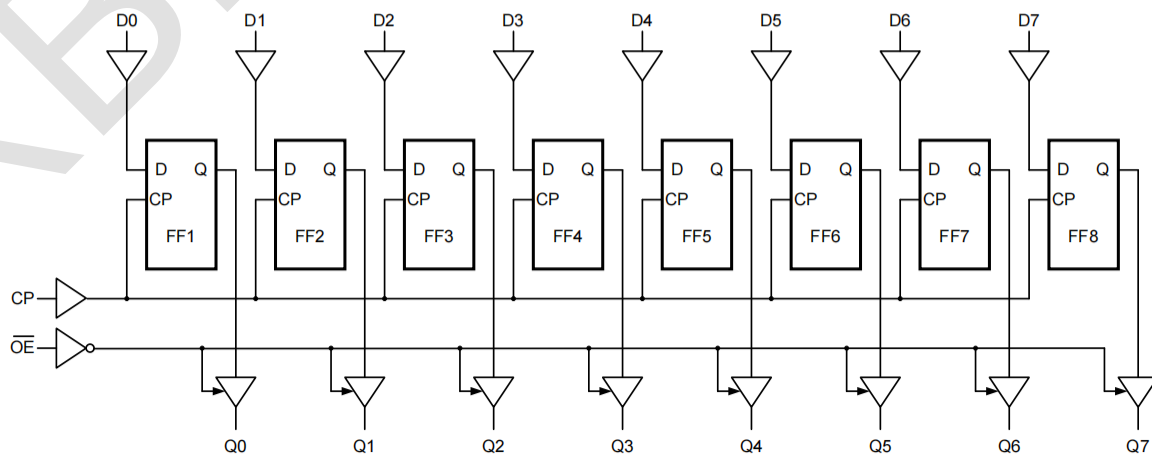


Figure 3. Logic diagram

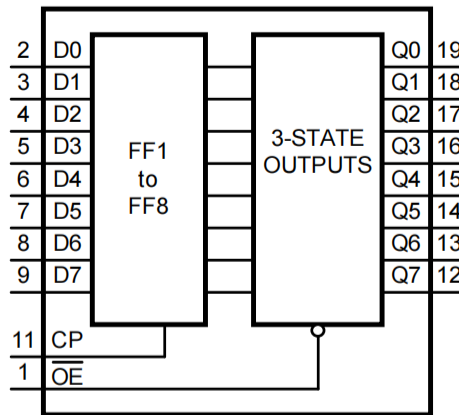
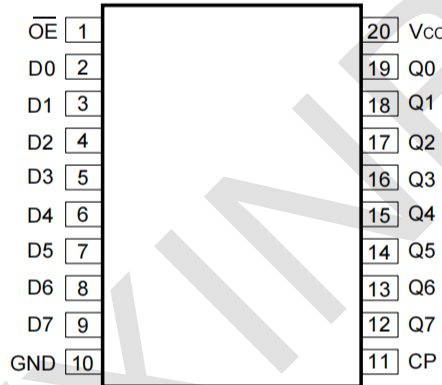


Figure 4. Functional diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	$\overline{\text{OE}}$	3-state output enable input (active LOW)
2	D0	data input
3	D1	data input
4	D2	data input
5	D3	data input
6	D4	data input
7	D5	data input
8	D6	data input
9	D7	data input
10	GND	ground (0V)
11	CP	clock input (LOW-to-HIGH, edge-triggered)
12	Q7	flip-flop output
13	Q6	flip-flop output
14	Q5	flip-flop output
15	Q4	flip-flop output
16	Q3	flip-flop output
17	Q2	flip-flop output
18	Q1	flip-flop output
19	Q0	flip-flop output
20	V _{CC}	supply voltage

Function Table

Operating modes	Input			Internal flip-flop	Output Qn
	$\overline{OE}$	CP	Dn		
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Load register and disable output	H	↑	l	L	Z
	H	↑	h	H	Z

Note:

H=HIGH voltage level; L=LOW voltage level; Z=high-impedance OFF-state;

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

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

transition; ↑=LOW-to-HIGH clock transition.

Electrical Parameter

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	+7.0	V
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	$-0.5V < V_O < V_{CC}+0.5V$		-	±35	mA
supply current	I_{CC}	-		-	70	mA
ground current	I_{GND}	-		-70	-	mA
storage temperature	T_{stg}	-		-65	+150	°C
total power dissipation	P_{tot}	-		-	500	mW
soldering temperature	T_L	10s	DIP	245		°C
			SOP/TSSOP	260		°C

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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

Electrical Characteristics

DC Characteristics 1

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0V$		1.5	1.2	-	V
		$V_{CC}=4.5V$		3.15	2.4	-	V
		$V_{CC}=6.0V$		4.2	3.2	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$		-	0.8	0.5	V
		$V_{CC}=4.5V$		-	2.1	1.35	V
		$V_{CC}=6.0V$		-	2.8	1.8	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	2.0	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	4.5	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	6.0	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.98	4.32	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	0	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	0.15	0.26	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	0.16	0.26	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$		-	-	± 1.0	μA
OFF-state output current	I_{OZ}	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V; V_O=V_{CC} \text{ or } GND$		-	-	± 1.0	μA
supply current	I_{CC}	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$		-	-	8.0	μA
input capacitance	C_I	-		-	3.5	-	pF

DC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ 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}	$V_{CC}=2.0V$		1.5	-	-	V
		$V_{CC}=4.5V$		3.15	-	-	V
		$V_{CC}=6.0V$		4.2	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$		-	-	0.5	V
		$V_{CC}=4.5V$		-	-	1.35	V
		$V_{CC}=6.0V$		-	-	1.8	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	-	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	-	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	-	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.84	-	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.34	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	-	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	-	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	-	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	-	0.33	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	-	0.33	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$		-	-	± 2.0	μA
OFF-state output current	I_{OZ}	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V; V_O=V_{CC} \text{ or } GND$		-	-	± 2.0	μA
supply current	I_{CC}	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$		-	-	80	μA

DC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ 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}	$V_{CC}=2.0V$		1.5	-	-	V
		$V_{CC}=4.5V$		3.15	-	-	V
		$V_{CC}=6.0V$		4.2	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$		-	-	0.5	V
		$V_{CC}=4.5V$		-	-	1.35	V
		$V_{CC}=6.0V$		-	-	1.8	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	-	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	-	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	-	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.7	-	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.2	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	-	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	-	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	-	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	-	0.4	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	-	0.4	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$		-	-	± 4.0	μA
OFF-state output current	I_{OZ}	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V; V_O=V_{CC} \text{ or } GND$		-	-	± 4.0	μA
supply current	I_{CC}	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$		-	-	160	μA

AC Characteristics 1

($T_{amb}=25^{\circ}C$, $GND=0V$, $C_L=50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
CP to Qn propagation delay	t_{PLH}, t_{PHL}	see Figure 6	$V_{CC}=2.0V$	-	47	150 ns
			$V_{CC}=4.5V$	-	17	30 ns
			$V_{CC}=5.0V; C_L=15pF$	-	14	- ns
			$V_{CC}=6.0V$	-	14	26 ns
$\bar{OE}$ to Qn enable time	t_{PZH}, t_{PZL}	see Figure 8	$V_{CC}=2.0V$	-	44	140 ns
			$V_{CC}=4.5V$	-	16	28 ns
			$V_{CC}=6.0V$	-	13	24 ns
$\bar{OE}$ to Qn disable time	t_{PLZ}, t_{PHZ}	see Figure 8	$V_{CC}=2.0V$	-	39	125 ns
			$V_{CC}=4.5V$	-	14	25 ns
			$V_{CC}=6.0V$	-	11	21 ns
transition time	t_{THL}, t_{TLH}	Qn output; see Figure 6	$V_{CC}=2.0V$	-	14	60 ns
			$V_{CC}=4.5V$	-	5	12 ns
			$V_{CC}=6.0V$	-	4	10 ns
pulse width	t_W	CP; HIGH or LOW; see Figure 7	$V_{CC}=2.0V$	80	14	- ns
			$V_{CC}=4.5V$	16	5	- ns
			$V_{CC}=6.0V$	14	4	- ns
Dn to CP set-up time	t_{su}	see Figure 7	$V_{CC}=2.0V$	60	6	- ns
			$V_{CC}=4.5V$	12	2	- ns
			$V_{CC}=6.0V$	10	2	- ns
Dn to CP hold time	t_h	see Figure 7	$V_{CC}=2.0V$	5	0	- ns
			$V_{CC}=4.5V$	5	0	- ns
			$V_{CC}=6.0V$	5	0	- ns
maximum frequency	f_{max}	CP input; see Figure 6	$V_{CC}=2.0V$	6.0	-	- MHz
			$V_{CC}=4.5V$	30	-	- MHz
			$V_{CC}=5.0V; C_L=15pF$	32	-	- MHz
			$V_{CC}=6.0V$	35	-	- MHz

AC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, GND = 0V, $C_L = 50\text{pF}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
CP to Qn propagation delay	t_{PLH}, t_{PHL}	see Figure 6	$V_{CC}=2.0\text{V}$	-	-	190 ns
			$V_{CC}=4.5\text{V}$	-	-	35 ns
			$V_{CC}=6.0\text{V}$	-	-	33 ns
$\bar{OE}$ to Qn enable time	t_{PZH}, t_{PZL}	see Figure 8	$V_{CC}=2.0\text{V}$	-	-	175 ns
			$V_{CC}=4.5\text{V}$	-	-	35 ns
			$V_{CC}=6.0\text{V}$	-	-	30 ns
$\bar{OE}$ to Qn disable time	t_{PLZ}, t_{PHZ}	see Figure 8	$V_{CC}=2.0\text{V}$	-	-	155 ns
			$V_{CC}=4.5\text{V}$	-	-	31 ns
			$V_{CC}=6.0\text{V}$	-	-	26 ns
transition time	t_{THL}, t_{TLH}	Qn output; see Figure 6	$V_{CC}=2.0\text{V}$	-	-	75 ns
			$V_{CC}=4.5\text{V}$	-	-	15 ns
			$V_{CC}=6.0\text{V}$	-	-	13 ns
pulse width	t_W	CP; HIGH or LOW; see Figure 7	$V_{CC}=2.0\text{V}$	100	-	- ns
			$V_{CC}=4.5\text{V}$	20	-	- ns
			$V_{CC}=6.0\text{V}$	17	-	- ns
Dn to CP set-up time	t_{su}	see Figure 7	$V_{CC}=2.0\text{V}$	75	-	- ns
			$V_{CC}=4.5\text{V}$	15	-	- ns
			$V_{CC}=6.0\text{V}$	13	-	- ns
Dn to CP hold time	t_h	see Figure 7	$V_{CC}=2.0\text{V}$	5	-	- ns
			$V_{CC}=4.5\text{V}$	5	-	- ns
			$V_{CC}=6.0\text{V}$	5	-	- ns
maximum frequency	f_{max}	CP input; see Figure 6	$V_{CC}=2.0\text{V}$	4.8	-	- MHz
			$V_{CC}=4.5\text{V}$	24	-	- MHz
			$V_{CC}=6.0\text{V}$	28	-	- MHz

AC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $GND = 0V$, $C_L = 50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
CP to Qn propagation delay	t_{PLH}, t_{PHL}	see Figure 6	$V_{CC}=2.0V$	-	-	225 ns
			$V_{CC}=4.5V$	-	-	45 ns
			$V_{CC}=6.0V$	-	-	38 ns
$\bar{OE}$ to Qn enable time	t_{PZH}, t_{PZL}	see Figure 8	$V_{CC}=2.0V$	-	-	210 ns
			$V_{CC}=4.5V$	-	-	42 ns
			$V_{CC}=6.0V$	-	-	36 ns
$\bar{OE}$ to Qn disable time	t_{PLZ}, t_{PHZ}	see Figure 8	$V_{CC}=2.0V$	-	-	190 ns
			$V_{CC}=4.5V$	-	-	38 ns
			$V_{CC}=6.0V$	-	-	32 ns
transition time	t_{THL}, t_{TLH}	Qn output; see Figure 6	$V_{CC}=2.0V$	-	-	90 ns
			$V_{CC}=4.5V$	-	-	18 ns
			$V_{CC}=6.0V$	-	-	15 ns
pulse width	t_W	CP; HIGH or LOW; see Figure 7	$V_{CC}=2.0V$	120	-	- ns
			$V_{CC}=4.5V$	24	-	- ns
			$V_{CC}=6.0V$	20	-	- ns
Dn to CP set-up time	t_{su}	see Figure 7	$V_{CC}=2.0V$	90	-	- ns
			$V_{CC}=4.5V$	18	-	- ns
			$V_{CC}=6.0V$	15	-	- ns
Dn to CP hold time	t_h	see Figure 7	$V_{CC}=2.0V$	5	-	- ns
			$V_{CC}=4.5V$	5	-	- ns
			$V_{CC}=6.0V$	5	-	- ns
maximum frequency	f_{max}	CP input; see Figure 6	$V_{CC}=2.0V$	4.0	-	- MHz
			$V_{CC}=4.5V$	20	-	- MHz
			$V_{CC}=6.0V$	24	-	- MHz

Testing Circuit

AC Testing Circuit

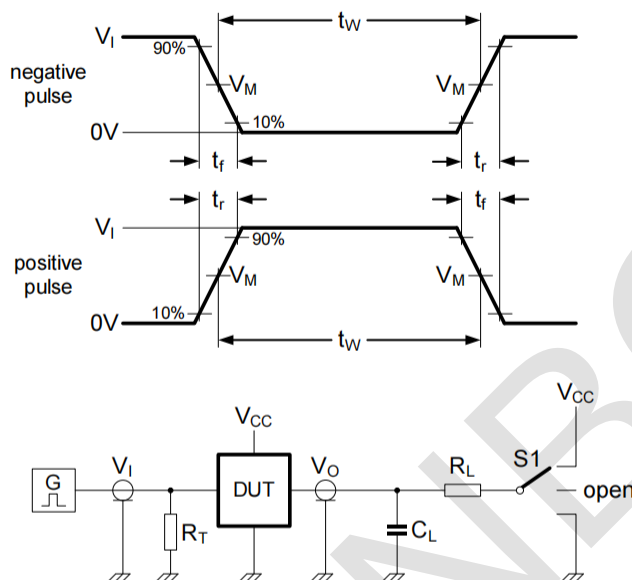


Figure 5. Test circuit for measuring switching times

Definitions for test circuit: R_L =Load resistance.

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to the output impedance Z_o of the pulse generator.

$S1$ =Test selection switch.

AC Testing Waveforms

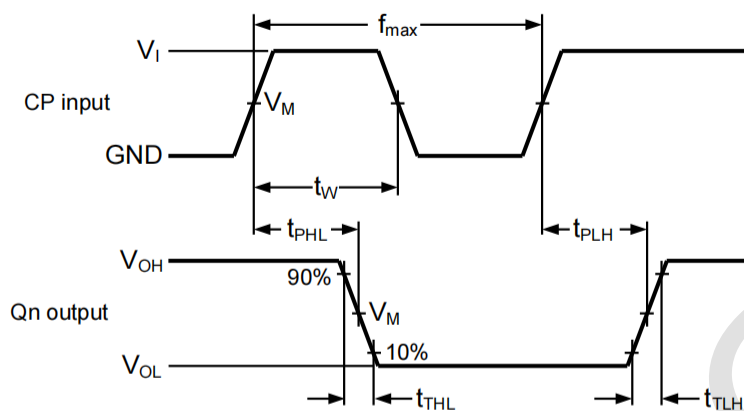


Figure 6. Propagation delay input (CP) to output (Qn), output transition time, clock input (CP) pulse width and the maximum frequency (CP)

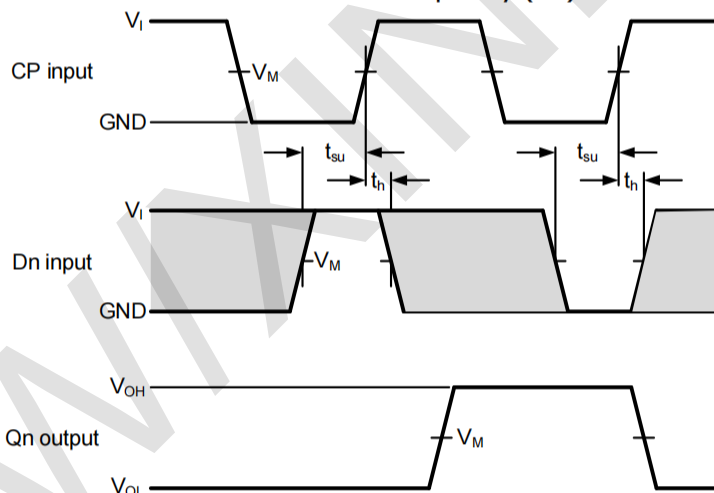


Figure 7. The data input (D) to clock input (CP) set-up times and clock input (CP) to data input (D) hold times

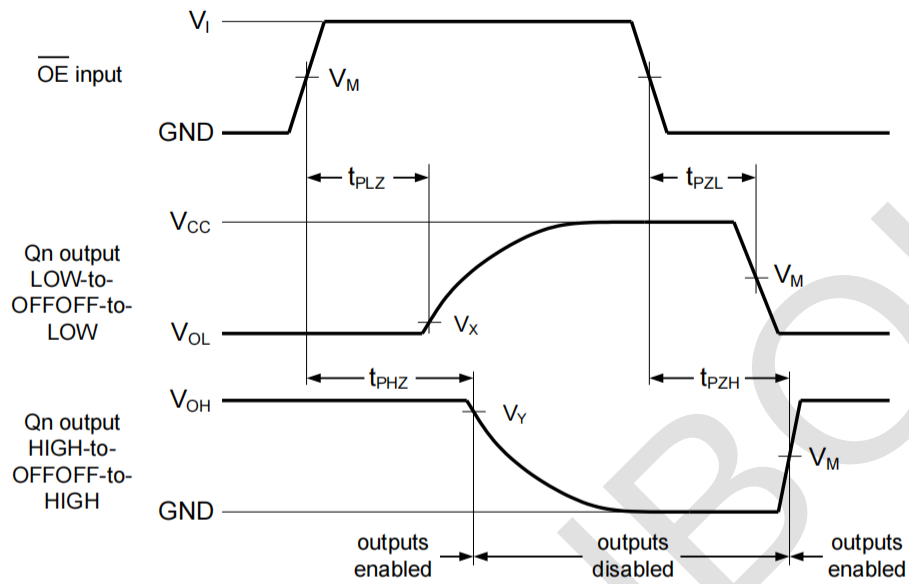


Figure 8. Enable and disable times

Measurement Points

Type	Input		Output	
	V_M	V_M	V_X	V_Y
SN74HC574	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

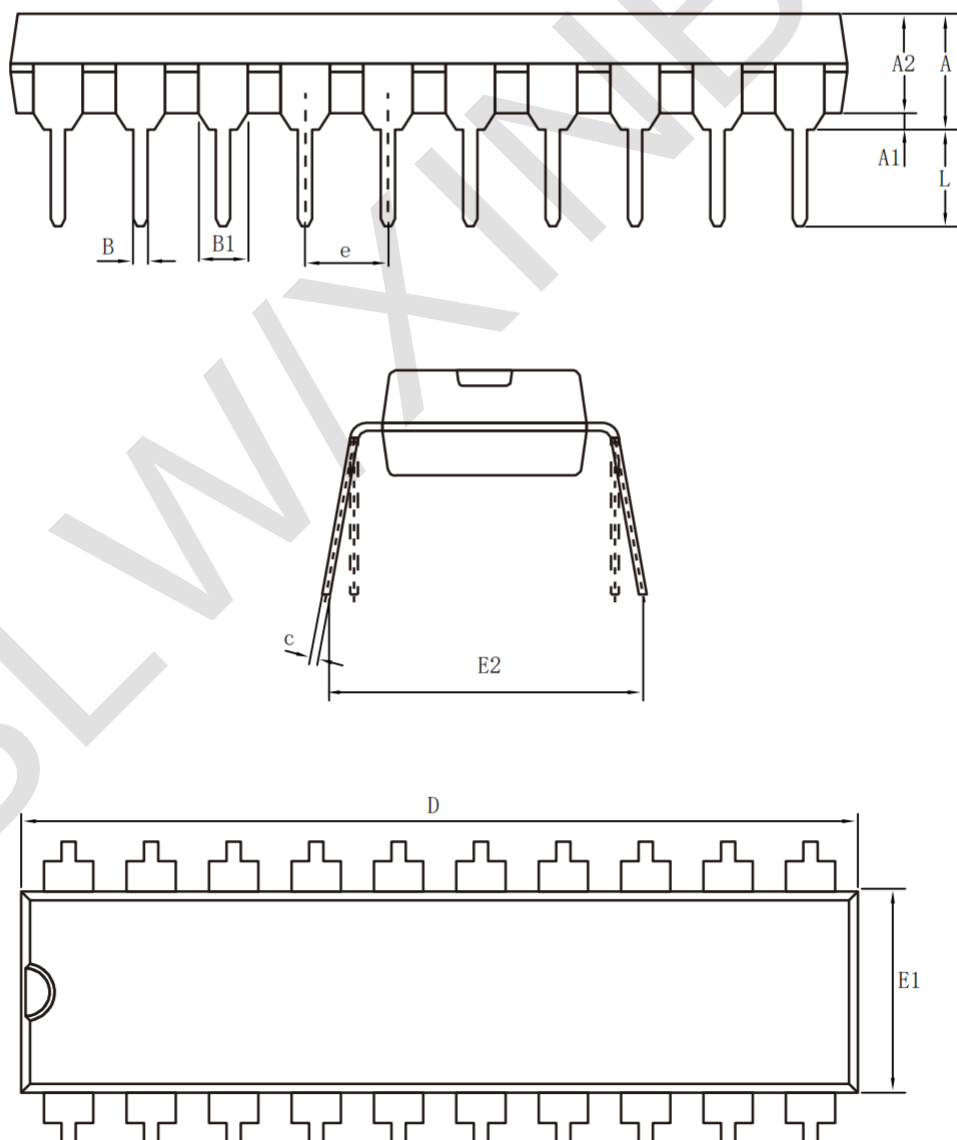
Test Data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
SN74HC574	V_{CC}	6ns	15pF, 50pF	1kΩ	open	GND	V_{CC}

Package Information

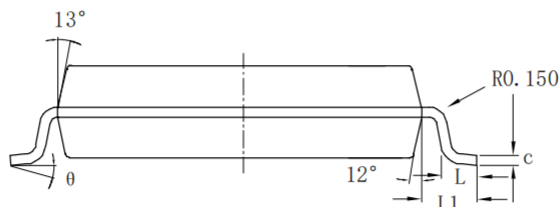
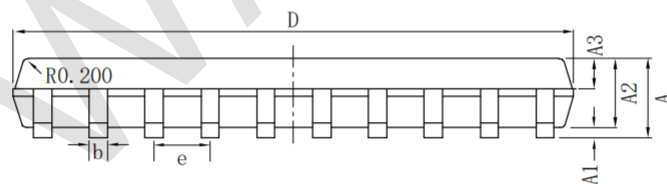
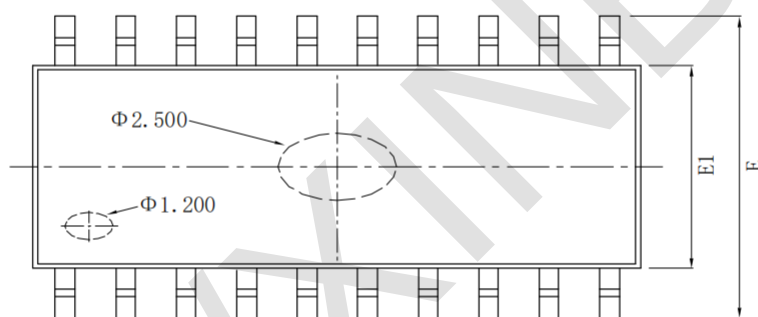
· DIP-20

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		3.600	5.330	A		0.142	0.210
A1		0.510		A1		0.020	
A2		3.200	3.600	A2		0.126	0.142
B		0.360	0.530	B		0.014	0.021
B1		1.52 (BSC)		B1		0.060 (BSC)	
c		0.204	0.360	c		0.008	0.014
D		25.70	26.54	D		1.010	1.040
E1		6.200	6.750	E1		0.244	0.260
E2		7.620	9.300	E2		0.300	0.366
e		2.54 (BSC)		e		0.100 (BSC)	
L		3.000	3.600	L		0.118	0.142



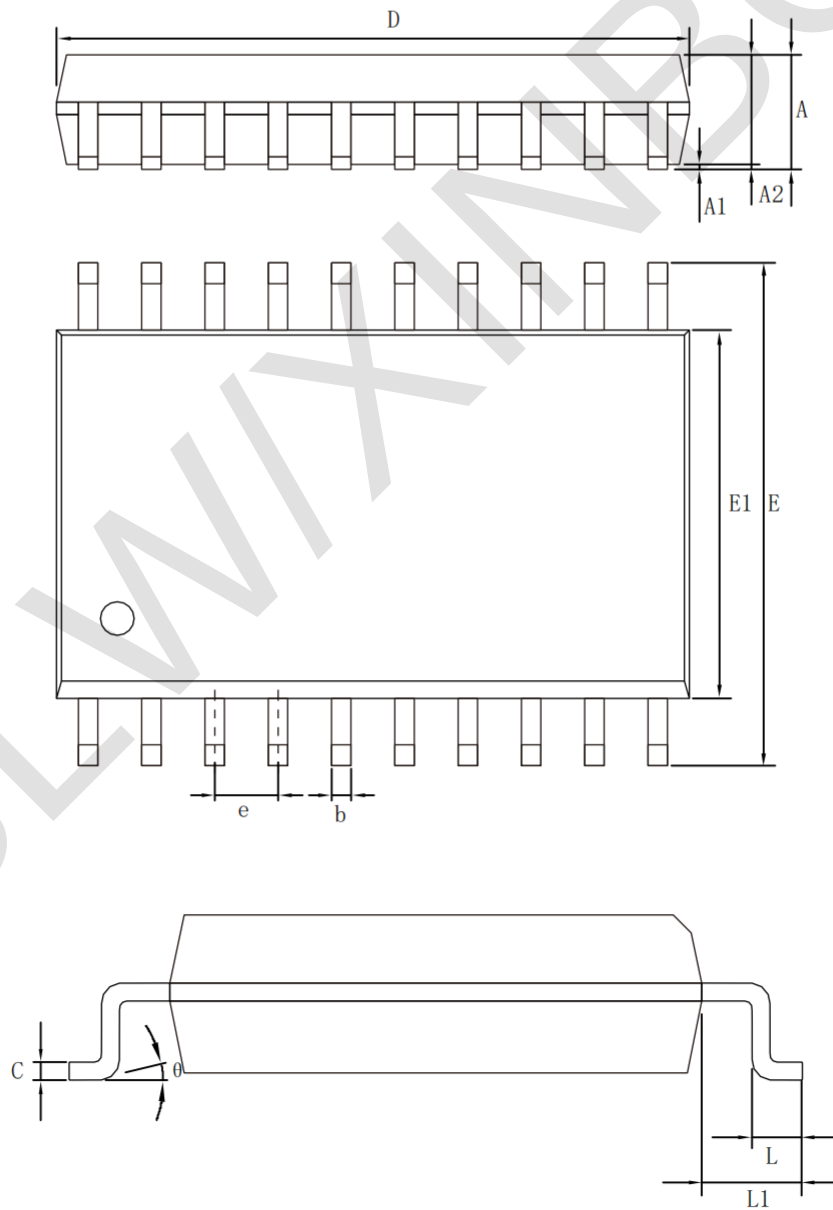
▪ S01C-20-208mil

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
	A		2.000		A		0.079
	A1	0.050	0.250		A1	0.002	0.010
	A2	1.650	1.850		A2	0.065	0.073
	b	0.350	0.550		b	0.014	0.022
	c	0.150	0.200		c	0.006	0.008
	D	12.25	12.65		D	0.482	0.498
	E	7.600	8.000		E	0.299	0.315
	E1	5.100	5.500		E1	0.201	0.217
	e	1.270			e	0.050	
	L	0.550	0.950		L	0.022	0.037
	L1	1.250			L1	0.049	
	θ	0°	8°		θ	0°	8°

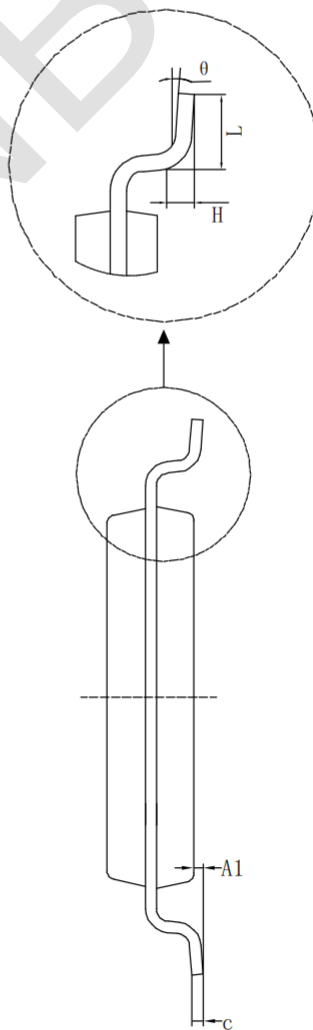
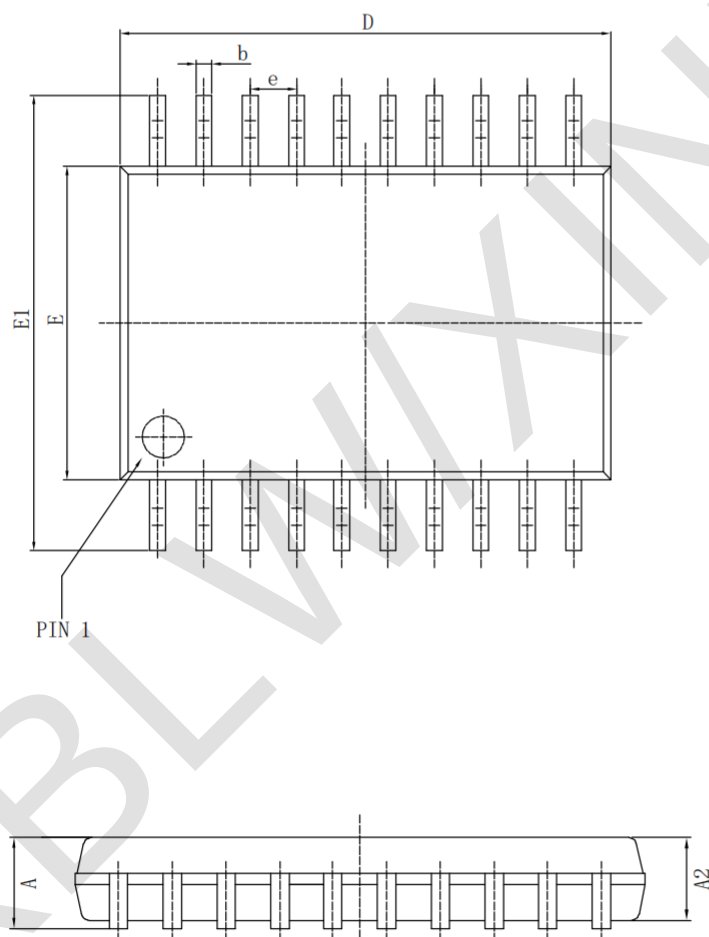


▪ SOP-20

Symbol \ Size	Dimensions In Millimeters		Symbol \ Size	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	2.470	2.650	A	0.097	0.104
A1	0.050	0.300	A1	0.002	0.012
A2	2.200	2.440	A2	0.087	0.096
b	0.350	0.500	b	0.014	0.020
c	0.150	0.300	c	0.006	0.012
D	12.54	12.94	D	0.494	0.509
E	10.00	10.60	E	0.394	0.417
E1	7.300	7.700	E1	0.287	0.303
e	1.270 (BSC)		e	0.050 (BSC)	
L	0.400	1.050	L	0.016	0.041
L1	1.300	1.500	L1	0.051	0.059
θ	0°	8°	θ	0°	8°



Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
D	6.400	6.600	D	0.252	0.259
E	4.300	4.500	E	0.169	0.177
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.008
E1	6.250	6.550	E1	0.246	0.258
A		1.200	A		0.047
A2	0.800	1.000	A2	0.031	0.039
A1	0.050	0.150	A1	0.002	0.006
e	0.65 (BSC)		e	0.026 (BSC)	
L	0.500	0.700	L	0.020	0.028
H	0.25 (TYP)		H	0.01 (TYP)	
θ	1°	7°	θ	1°	7°



Statement

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!
- XBLW product has not been licensed for life support, military and aerospace applications, and therefore XBLW is not responsible for any consequences arising from its use in these areas.
- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.
- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.