

## 74HC574D-HX/74HC574N-HX OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

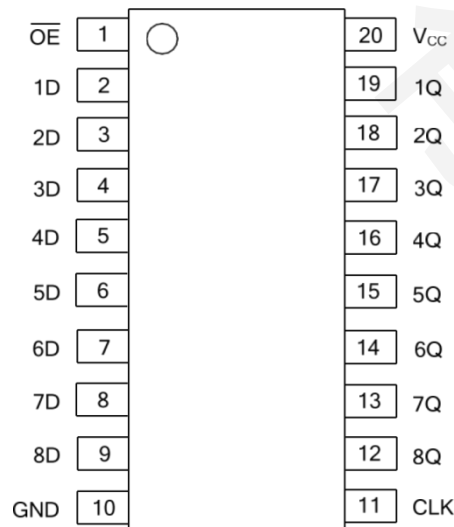
### Description

The 74HC574D-HX/74HC574N-HX is an octal, edge-triggered D-type flip-flop with three-state outputs, featuring eight independent channels.

### Features

- ★ Operate from 2V to 6V
- ★ Max tpd of 66ns at 4.5 V
- ★ Typical  $V_{OL} < 0.17V$  at  $V_{CC}=4.5V$ ,  $T_A=25^\circ C$
- ★ Typical  $V_{OH} > 4.3V$  at  $V_{CC}=4.5V$ ,  $T_A=25^\circ C$
- ★ Latch-up performance  $\leq 250$  mA
- ★ ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 2023 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 2022 exceeds 1000 V
- ★ Package Option: 74HC574D-HX SOIC-20  
74HC574N-HX DIP-20

### Pin Configuration

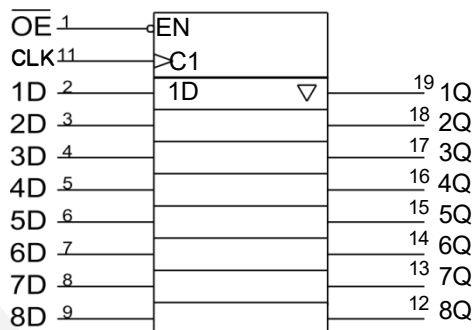


### Function Table

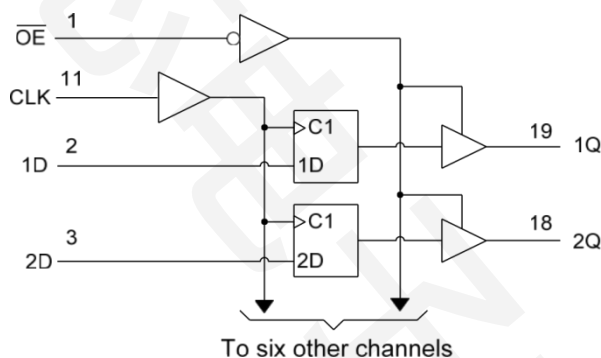
INPUTS(OE)	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	↑	H	H
L	↑	L	L
L	L/H	X	Q0
H	X	X	Z

Note: H: HIGH voltage level; L: LOW voltage level.

## Logic Symbol



## Logic Diagram



## Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ +7	V
VCC or GND Current	$I_{CC}$	$\pm 70$	mA
Output Current	$I_{OUT}$	$\pm 35$	mA
Input Clamp Current	$I_{IK}$	$\pm 20$	mA
Output Clamp Current	$I_{OK}$	$\pm 20$	mA
Storage Temperature	$T_{STG}$	-65 ~ + 150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	-	2	5	6	V
Input Voltage	$V_{IN}$	-	0	-	$V_{CC}$	V
Output Voltage	$V_{OUT}$	High or low state	0	-	$V_{CC}$	V
Input Rise or Fall Times	$t_r, t_f$	$V_{CC}=2.0\text{V}$	0	-	1	$\mu\text{s}$
		$V_{CC}=4.5\text{V}$	0	-	0.5	$\mu\text{s}$
		$V_{CC}=6.0\text{V}$	0	-	0.4	$\mu\text{s}$
Operating Temperature	$T_A$	-	-40	-	+125	$^{\circ}\text{C}$

## Thermal Data

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-20	52	°C/W
	SOIC-20	80	°C/W

## Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =2.0V	1.5	-		1.5	-	-	V
		V <sub>CC</sub> =4.5V	3.15	-		3.15	-	-	V
		V <sub>CC</sub> =6.0V	4.2	-		4.2	-	-	V
Low-level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =2.0V	-	-	0.5	-	-	0.5	V
		V <sub>CC</sub> =4.5V	-	-	1.35	-	-	1.35	V
		V <sub>CC</sub> =6.0V	-	-	1.8	-	-	1.8	V
Output High-Level Voltage	V <sub>OH</sub>	V <sub>CC</sub> =2.0V, I <sub>OH</sub> =-20μA	1.9	1.99	-	1.9	-	-	V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-20μA	4.4	4.49	-	4.4	-	-	V
		V <sub>CC</sub> =6.0V, I <sub>OH</sub> =-20μA	5.9	5.99	-	5.9	-	-	V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-6mA	3.98	4.32	-	3.7	-	-	V
		V <sub>CC</sub> =6.0V, I <sub>OH</sub> =-7.8mA	5.48	5.81	-	5.2	-	-	V
Output Voltage Low-Level	V <sub>OL</sub>	V <sub>CC</sub> =2.0V, I <sub>OL</sub> =20μA	-	0.002	0.1	-	-	0.1	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =20μA	-	0.001	0.1	-	-	0.1	V
		V <sub>CC</sub> =6.0V, I <sub>OL</sub> =20μA	-	0.001	0.1	-	-	0.1	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =6mA	-	0.15	0.26	-	-	0.4	V
		V <sub>CC</sub> =6.0V, I <sub>OL</sub> =7.8mA	-	0.16	0.26	-	-	0.4	V
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> =6.0V, V <sub>IN</sub> =V <sub>CC</sub> or GND	-	±0.1	±100	-	-	±1000	nA
Disable Output Leakage Current	I <sub>OZ</sub>	V <sub>CC</sub> =6.0V, V <sub>OUT</sub> =V <sub>CC</sub> or GND	-	±0.01	±1.0	-	-	±10	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =6.0V, V <sub>IN</sub> =V <sub>CC</sub> or GND, I <sub>OUT</sub> =0	-	-	8	-	-	160	μA

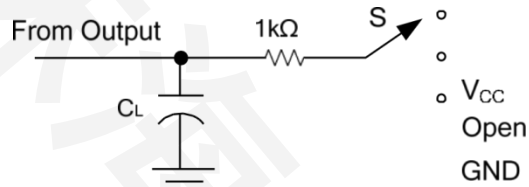
## Switching Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation delay from input (CLK) to output (Q)	t <sub>PLH</sub> /t <sub>PHL</sub>	V <sub>CC</sub> =2.0V, C <sub>L</sub> =50pF	-	47	180	-	-	225	ns
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =50pF	-	17	36	-	-	45	ns
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =50pF	-	14	31	-	-	38	ns
		V <sub>CC</sub> =2.0V, C <sub>L</sub> =150pF	-	105	265	-	-	330	ns
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =150pF	-	36	53	-	-	66	ns
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =150pF	-	31	46	-	-	57	ns
Output enable time from input (OE) to output (Q)	t <sub>PZL</sub> /t <sub>PZH</sub>	V <sub>CC</sub> =2.0V, C <sub>L</sub> =50pF	-	44	150	-	-	210	ns
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =50pF	-	16	30	-	-	42	ns
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =50pF	-	13	26	-	-	36	ns
		V <sub>CC</sub> =2.0V, C <sub>L</sub> =150pF	-	95	235	-	-	315	ns
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =150pF	-	32	47	-	-	63	ns
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =150pF	-	28	41	-	-	55	ns
Output disable time from input (OE) to output (Q)	t <sub>PLZ</sub> /t <sub>PHZ</sub>	V <sub>CC</sub> =2.0V, C <sub>L</sub> =50pF	-	39	150	-	-	190	ns
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =50pF	-	14	30	-	-	38	ns
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =50pF	-	11	26	-	-	32	ns
Maximum Clock Frequency	f <sub>MAX</sub>	V <sub>CC</sub> =2.0V, C <sub>L</sub> =50pF	6	11	-	4	-	-	MHz
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =50pF	30	36	-	20	-	-	MHz
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =50pF	36	40	-	24	-	-	MHz
		V <sub>CC</sub> =2.0V, C <sub>L</sub> =150pF	6	-	-	4	-	-	MHz
		V <sub>CC</sub> =4.5V, C <sub>L</sub> =150pF	30	-	-	20	-	-	MHz
		V <sub>CC</sub> =6.0V, C <sub>L</sub> =150pF	36	-	-	24	-	-	MHz
Clock Frequency	f <sub>CLOCK</sub>	V <sub>CC</sub> =2.0V	-	-	6	-	-	4	MHz
		V <sub>CC</sub> =4.5V	-	-	30	-	-	20	MHz
		V <sub>CC</sub> =6.0V	-	-	38	-	-	24	MHz
Pulse Width	t <sub>w</sub>	V <sub>CC</sub> =2.0V	80	-	-	120	-	-	ns
		V <sub>CC</sub> =4.5V	16	-	-	24	-	-	ns
		V <sub>CC</sub> =6.0V	14	-	-	20	-	-	ns
Setup Time	t <sub>SU</sub>	V <sub>CC</sub> =2.0V	100	-	-	125	-	-	ns
		V <sub>CC</sub> =4.5V	20	-	-	25	-	-	ns
		V <sub>CC</sub> =6.0V	17	-	-	21	-	-	ns
Hold Time	t <sub>H</sub>	V <sub>CC</sub> =2.0V	5	-	-	5	-	-	ns
		V <sub>CC</sub> =4.5V	5	-	-	5	-	-	ns
		V <sub>CC</sub> =6.0V	5	-	-	5	-	-	ns

## Operating Characteristics

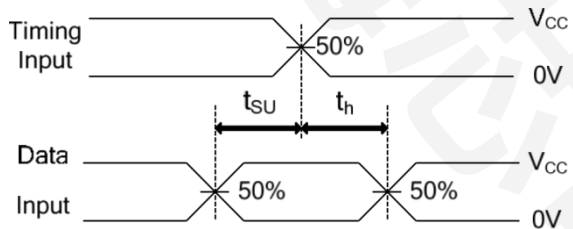
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> =2.0V~ 6.0V	-	3	10	pF
Power Dissipation Capacitance	C <sub>PD</sub>	No Load	-	100	-	pF

## Test Circuit and Waveforms

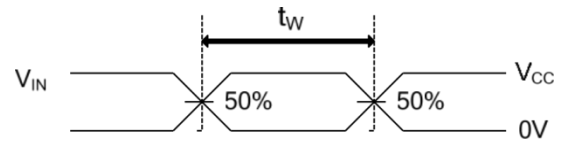


	S
PLH/t <sub>PHL</sub>	Open
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND
t <sub>PLZ</sub> /t <sub>pzL</sub>	VCC

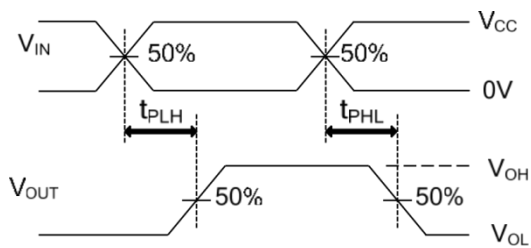
TEST CIRCUIT



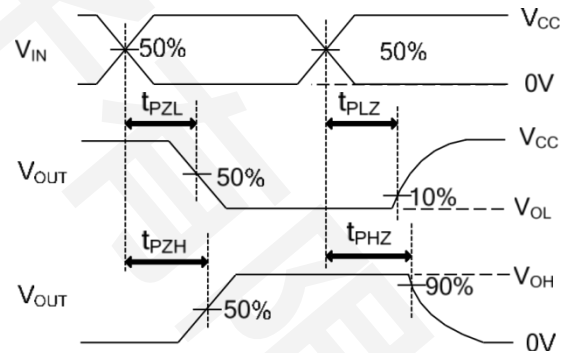
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES

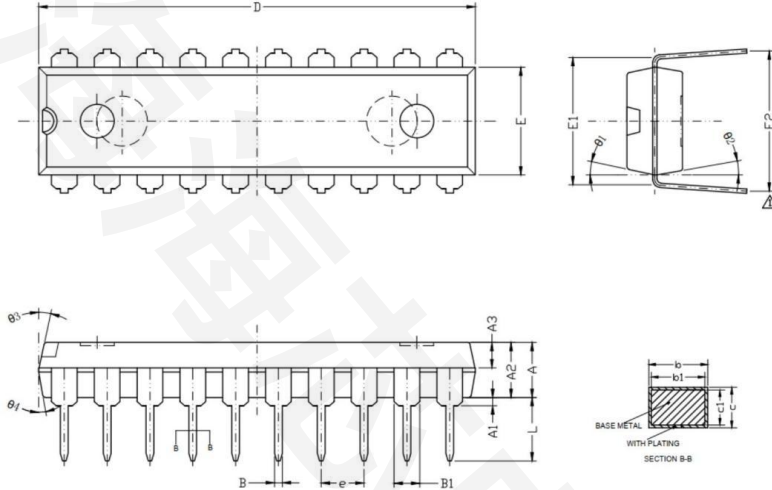


ENABLE AND DISABLE TIMES

Note: C<sub>L</sub> includes probe and jig capacitance. PRR ≤ 1MHz, Z<sub>o</sub> = 50Ω, t<sub>r</sub> ≤ 6ns, t<sub>f</sub> ≤ 6ns.

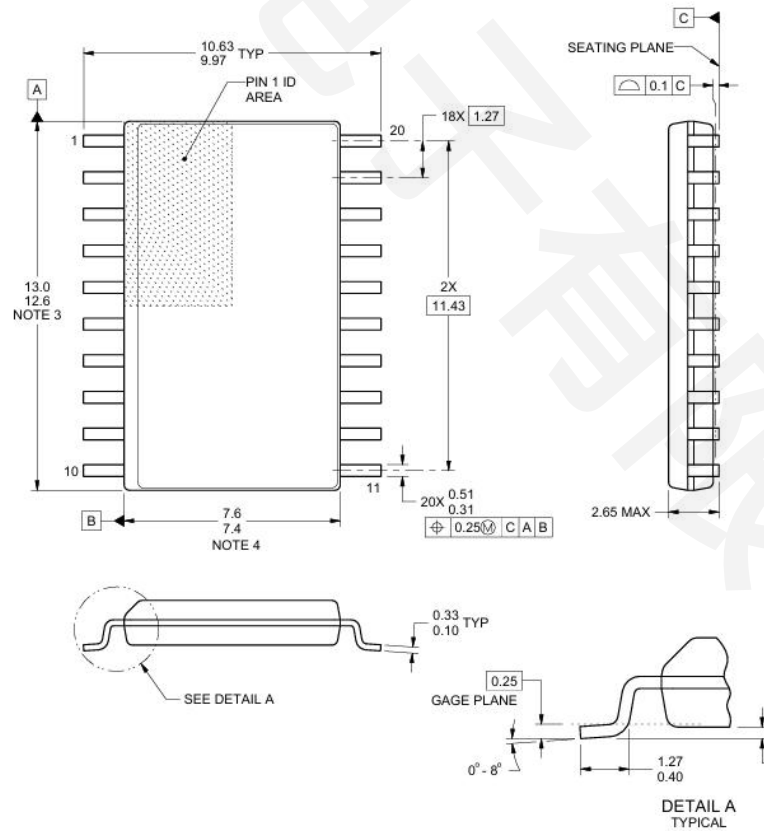
## Package Information

### 74HC574N-HX DIP 20 package information



SYMBOL	MILLIMETER		
	MIN	MIN	MAX
A	3.60	3.80	4.00
A1	0.51	--	--
A2	3.20	3.30	3.40
A3	1.47	1.52	1.57
B	0.44	--	0.53
B1	1.52(BSC)		
b	0.44	--	0.53
b1	0.43	0.46	0.48
c	0.25	--	0.31
c1	0.24	0.25	0.26
D	25.7	25.9	26.1
E	6.35	6.55	6.75
E1	7.62(BSC)		
E2	8.00	8.40	8.80
e	2.54(BSC)		
L	3.00	--	3.60
theta1	8°	~	14°
theta2	6°	~	12°
theta3	8°	~	14°
theta4	6°	~	12°

### 74HC574D-HX SOIC 20 package information



NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.