

74HC374D-HX OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

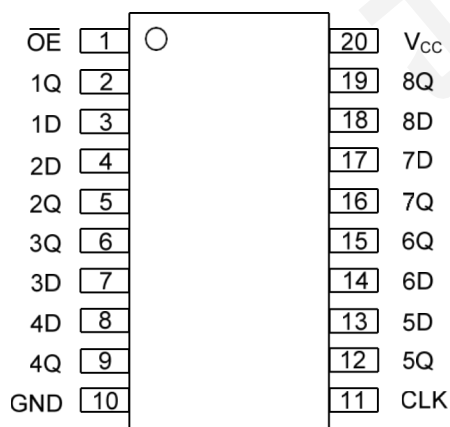
DESCRIPTION

The 74HC374D-HX is an octal edge-triggered D-type flip-flop with 3-state outputs and 8 channels.

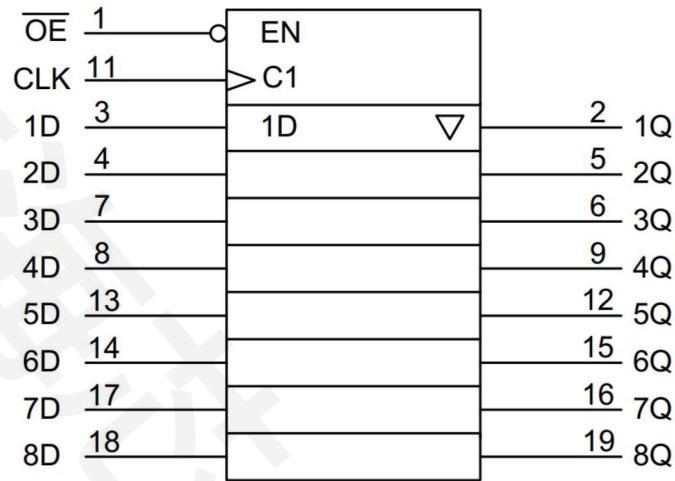
FEATURES

- ★ Operate from 2V to 6V
- ★ Max tPD of 46ns at 4.5 V, TA =25°C
- ★ Max ICC of 8μA, TA =25°C
- ★ Typical VOL<0.17V at VCC=4.5V, IOU_T=-6mA, TA=25°C
- ★ Typical VOH > 4.3V at VCC=4.5V, IOU_T=6mA, TA=25°C
- ★ Latch-up performance ≤ 250 mA
- ★ ESD protection:
 - CDM: ANSI/ESDA/JEDEC JS-002 2022 exceeds 2000 V
- ★ Package Option: SOP-20

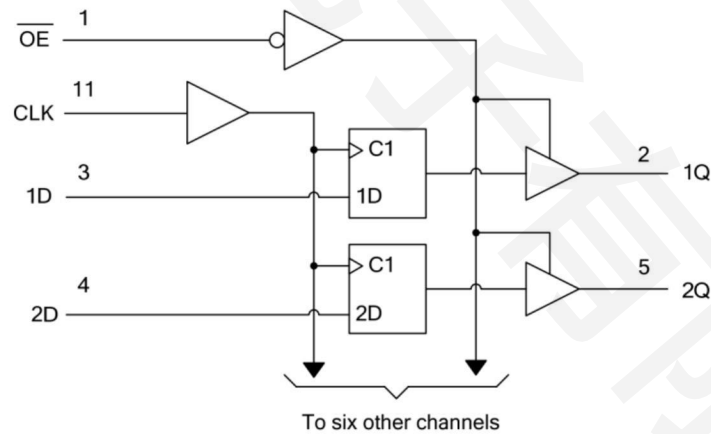
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V _{CC}	-0.5 ~ +7	V
VCC or GND Current	I _{CC}	±70	mA
Output Current	I _{OUT}	±35	mA
Input Clamp Current	I _{IK}	±20	mA
Output Clamp Current	I _{OK}	±20	mA
Storage Temperature	T _{STG}	-65 ~ + 150	°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
High-Level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5	-	-	V
		$V_{CC}=4.5V$	3.15	-	-	V
		$V_{CC}=6V$	4.2	-	-	V
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$	-	-	0.5	V
		$V_{CC}=4.5V$	-	-	1.35	V
		$V_{CC}=6V$	-	-	1.8	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	$V_{CC}=2V$	0	-	1000	ns
		$V_{CC}=4.5V$	0	-	500	ns
		$V_{CC}=6V$	0	-	400	ns
Operating Temperature	T_A	-	-40	-	+125	°C

THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20 θ_{JA}	115	°C/W

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage High-Level	V_{OH}	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	1.999	-	V
		$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.499	-	V
		$V_{CC}=6V, I_{OH}=-20\mu A$	5.9	5.999	-	V
		$V_{CC}=4.5V, I_{OH}=-6mA$	3.98	4.32	-	V
		$V_{CC}=6V, I_{OH}=-7.8mA$	5.48	5.81	-	V
Output Voltage Low-Level	V_{OL}	$V_{CC}=2V, I_{OL}=20\mu A$	-	0.002	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$	-	0.002	0.1	V
		$V_{CC}=6V, I_{OL}=20\mu A$	-	0.003	0.1	V
		$V_{CC}=4.5V, I_{OL}=6mA$	-	0.15	0.26	V
		$V_{CC}=6V, I_{OL}=7.8mA$	-	0.16	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND	-	± 0.1	± 100	nA
3-State Leakage Current	I_{OZ}	$V_{CC}=6V, V_{OUT}=V_{CC}$ or GND	-	± 0.01	± 0.5	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$	-	-	8	μA
Input Capacitance	C_I	$V_{CC}=2V \sim 6V$	-	3	10	pF

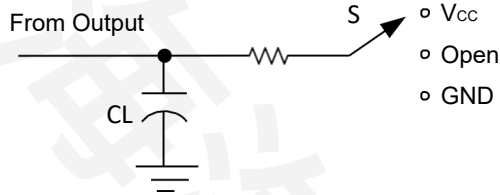
SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
From CLK to Q	t_{PLH}/t_{PHL}	$C_L=50pF$	$V_{CC}=2V$	-	50	165 ns
			$V_{CC}=4.5V$	-	18	33 ns
			$V_{CC}=6V$	-	14	28 ns
		$C_L=150pF$	$V_{CC}=2V$	-	80	230 ns
			$V_{CC}=4.5V$	-	22	46 ns
			$V_{CC}=6V$	-	19	39 ns
From $\overline{OE}$ to Q	t_{PZL}/t_{PZH}	$C_L=50pF$	$V_{CC}=2V$	-	41	150 ns
			$V_{CC}=4.5V$	-	15	30 ns
			$V_{CC}=6V$	-	12	26 ns
		$C_L=150pF$	$V_{CC}=2V$	-	70	200 ns
			$V_{CC}=4.5V$	-	25	40 ns
			$V_{CC}=6V$	-	22	34 ns
From $\overline{OE}$ to Q	t_{PLZ}/t_{PHZ}	$C_L=50pF$	$V_{CC}=2V$	-	50	150 ns
			$V_{CC}=4.5V$	-	18	30 ns
			$V_{CC}=6V$	-	14	26 ns
Any Q	t_T	$C_L=50pF$	$V_{CC}=2V$	-	14	60 ns
			$V_{CC}=4.5V$	-	5	12 ns
			$V_{CC}=6V$	-	4	10 ns
		$C_L=150pF$	$V_{CC}=2V$	-	45	210 ns
			$V_{CC}=4.5V$	-	17	42 ns
			$V_{CC}=6V$	-	13	36 ns
Maximum Clock Frequency	f_{MAX}	$C_L=50pF$	$V_{CC}=2V$	6	12	- MHz
			$V_{CC}=4.5V$	30	60	- MHz
			$V_{CC}=6V$	35	70	- MHz
		$C_L=150pF$	$V_{CC}=2V$	6	12	- MHz
			$V_{CC}=4.5V$	30	60	- MHz
			$V_{CC}=6V$	35	70	- MHz
Clock Frequency	f_{CLOCK}	$V_{CC}=2V$	-	-	6	MHz
		$V_{CC}=4.5V$	-	-	30	MHz
		$V_{CC}=6V$	-	-	35	MHz
Pulse Width	t_W	$V_{CC}=2V$	80	-	-	ns
		$V_{CC}=4.5V$	16	-	-	ns
		$V_{CC}=6V$	14	-	-	ns
Setup Time	t_{SU}	$V_{CC}=2V$	100	-	-	ns
		$V_{CC}=4.5V$	20	-	-	ns
		$V_{CC}=6V$	17	-	-	ns
Hold Time	t_H	$V_{CC}=2V$	10	-	-	ns
		$V_{CC}=4.5V$	5	-	-	ns
		$V_{CC}=6V$	5	-	-	ns

OPERATING CHARACTERISTICS

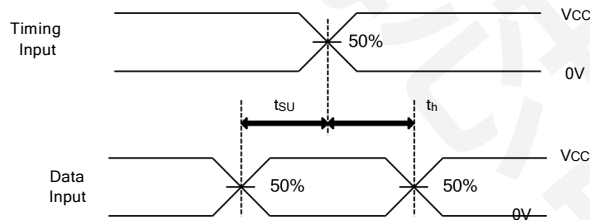
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	CPD	No load	-	100	-	pF

TEST CIRCUIT AND WAVEFORMS

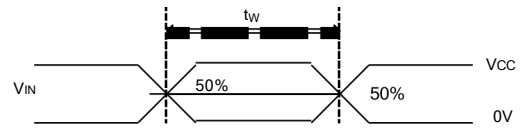


TEST CIRCUIT

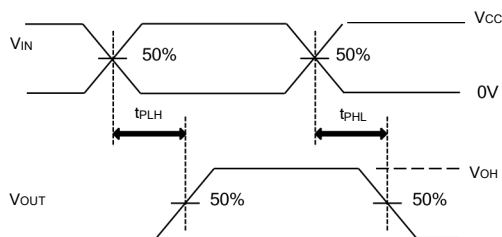
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V _{CC}



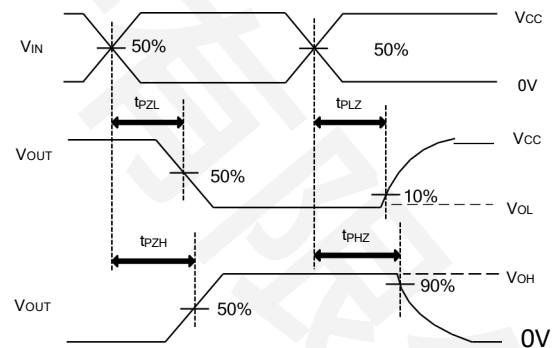
SET UP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



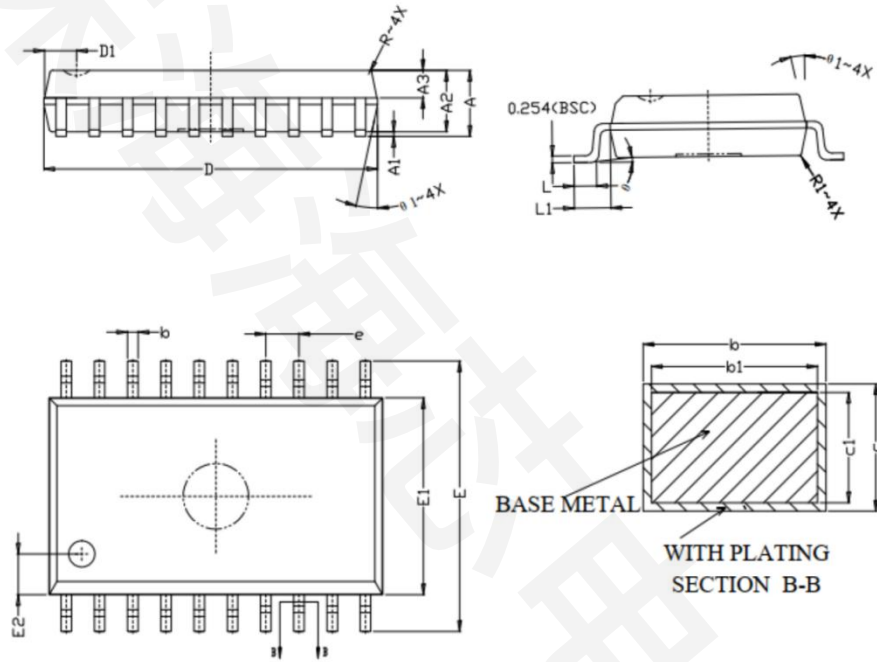
ENABLE AND DISABLE TIMES

Notes: 1. CL includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1MHz, Z_o = 50Ω, t_r = 6ns, t_f = 6ns.

PACKAGE INFORMATION

SOP 20 package information



SYMBOL	MILLIMETER		
	MIN	MIN	MAX
A	--	--	2.615
A1	0.10	--	0.30
A2	2.29	2.34	2.39
A3	0.99	1.043	1.07
b	0.39	--	0.47
b1	0.38	0.41	0.44
c	0.25	--	0.29
c1	0.24	0.25	0.26
D	12.65	12.75	12.85
D1	1.225(BSC)		
E	10.10	10.30	10.50
E1	7.40	7.50	7.60
E2	1.55(BSC)		
e	1.27(BSC)		
L	0.854	0.864	0.874
L1	1.403(REF)		
θ	0°	~	8°
θ_1	6°	~	15°
R/R1	R1.27(BSC)		