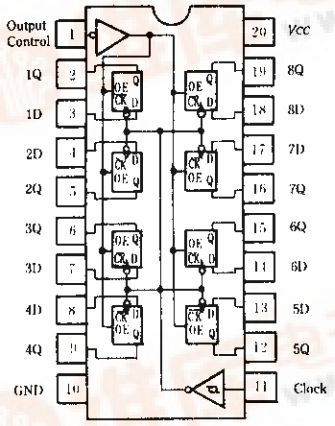
HD74LS374 ●Octal D-type Edge-triggered Flip-flops, (with three-state outputs)

The HD74LS374, 8-bit registers features totem-pole three-state outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance third state and increased high-logic-level drive provide this register with the capability of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. They are particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers. The eight flip-flops are edge-triggered D-type flip-flops. On the positive transition the clock, the Q outputs will be set to the logic states that were setup at the D inputs.

■PIN ARRANGEMENT



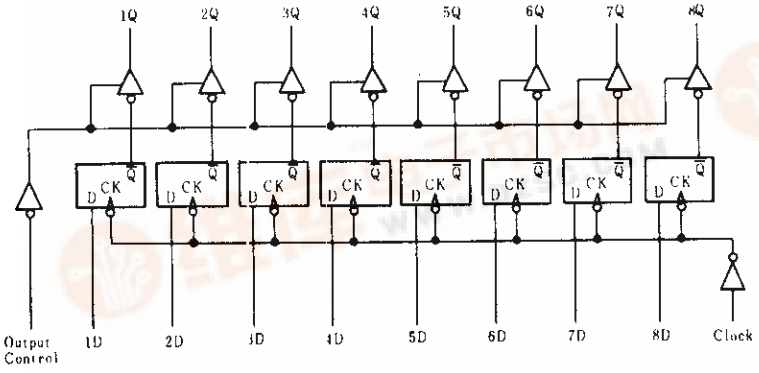
(Top View)

■FUNCTION TABLE

Inputs			Output
Output control	Clock	D	Q
L	↑	H	H
L	↑	L	L
L	L	×	Q_0
H	×	×	Z

Notes: H = high level, L = low level,
X = irrelevant
↑ = transition from low to high level
Q_0 = level of Q before the indicated steady-state input conditions were established
Z = off (high-impedance) state of a three-state output

■BLOCK DIAGRAM



■RECOMMENDED OPERATING CONDITION

Item		Symbol	min	typ	max	Unit
Supply voltage		V_{CC}	4.75	5.00	5.25	V
Output voltage		V_{OH}	—	—	5.5	V
Output current		I_{OH}	—	—	−2.6	mA
		I_{OL}	—	—	24	mA
Clock pulse width	"H" level	t_w	15	—	—	ns
	"L" level		15	—	—	
Data setup time		t_{su}	20↑	—	—	ns
Data hold time		t_h	3↑	—	—	ns

Note) ↑ : The arrow indicates the rising edge of clock pulse.

HD74LS374

■ELECTRICAL CHARACTERISTICS (Ta= − 20～+75°C)

Item	Symbol	Test Conditions		min	typ*	max	Unit
Input voltage	V_{IH}			2.0	—	—	V
	V_{IL}			—	—	0.8	V
Output voltage	V_{OH}	V_{CC}=4.75V, V_{IH}=2V, V_{IL}=0.8V, I_{OH}=−2.6mA		2.4	—	—	V
	V_{OL}	V_{CC}=4.75V, V_{IH}=2V, V_{IL}=0.8V	I_{OL}=12mA	—	—	0.4	V
			I_{OL}=24mA	—	—	0.5	
Off-state output current	I_{OZH}	V_{CC}=5.25V, V_{IH}=2V	V_O=2.7V	—	—	20	μA
	I_{OZL}		V_O=0.4V	—	—	−20	
Input current	I_{IH}	V_{CC}=5.25V, V_I=2.7V		—	—	20	μA
	I_{IL}	V_{CC}=5.25V, V_I=0.4V		—	—	−0.4	mA
	I_I	V_{CC}=5.25V, V_I=7V		—	—	0.1	mA
Short-circuit output current	I_{OS}	V_{CC}=5.25V		−30	—	−130	mA
Supply current	I_{CC}	V_{CC}=5.25V, V_I=4.5V (Output control)		—	27	40	mA
Input clamp voltage	V_{IK}	V_{CC}=4.75V, I_{IN}=−18mA		—	—	−1.5	V

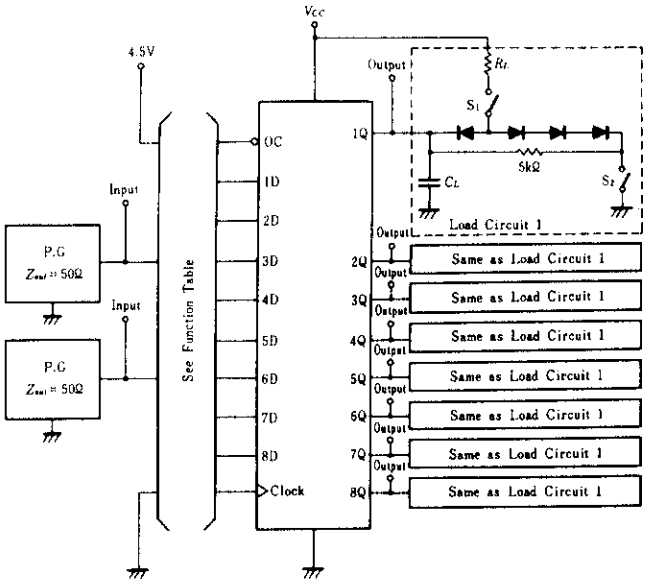
* V_{CC}=5V, Ta=25°C

■SWITCHING CHARACTERISTICS (V_{CC}=5V, Ta=25°C)

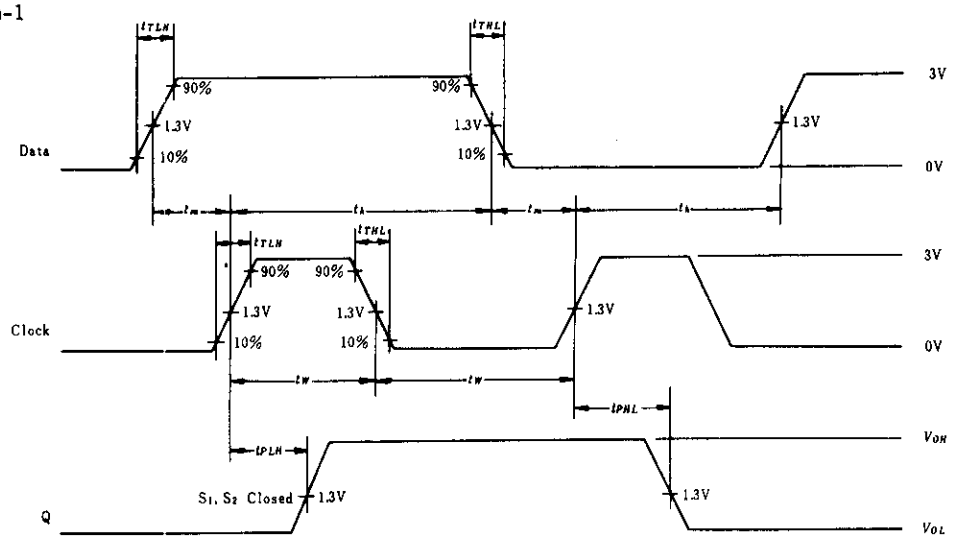
Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f_{max}	Clock	Q	C_L=45pF, R_L=667Ω	35	50	—	MHz
Propagation delay time	t_{PLH}	Clock	Q		—	15	28	ns
	t_{PHL}				—	19	28	
Output enable time	t_{ZH}	OC	Q		—	20	28	
	t_{ZL}				—	21	28	
Output disable time	t_{HZ}	OC	Q	C_L=5pF, R_L=667Ω	—	12	20	
	t_{LZ}				—	14	25	

■TESTING METHOD

Test Circuit

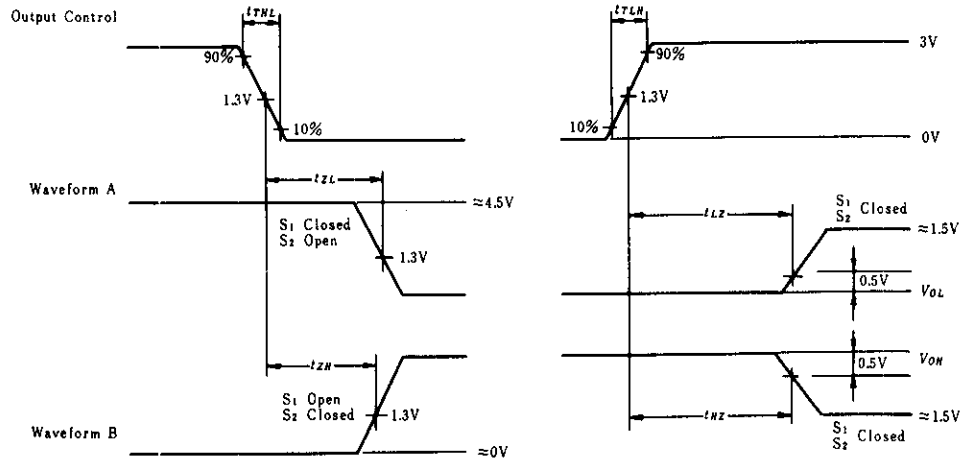


Waveform-1



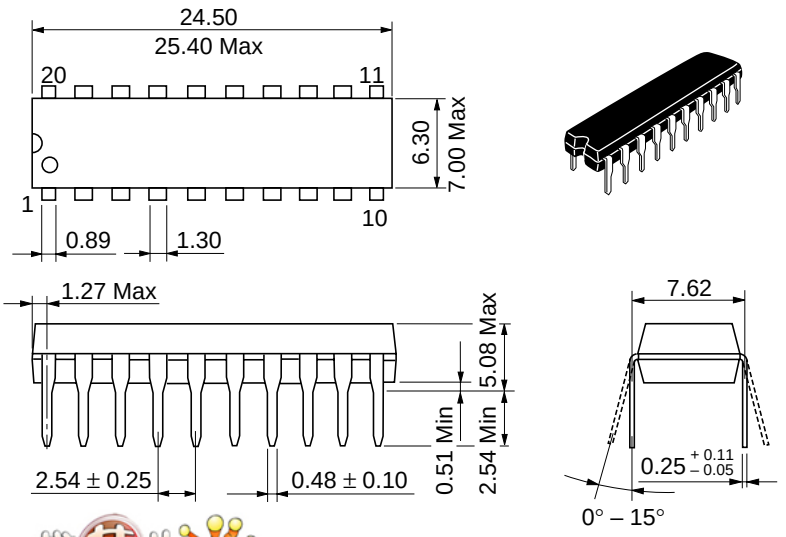
Notes: 1. Input pulse; t_{TLH} = 15ns, t_{THL} = 6ns
Clock input; PRR = 1MHz, duty cycle 50%
Data input; PRR = 500kHz, duty cycle 50%
2. f_{max}; t_{TLH} = 2.5ns, t_{THL} = 2.5ns

Waveform-2

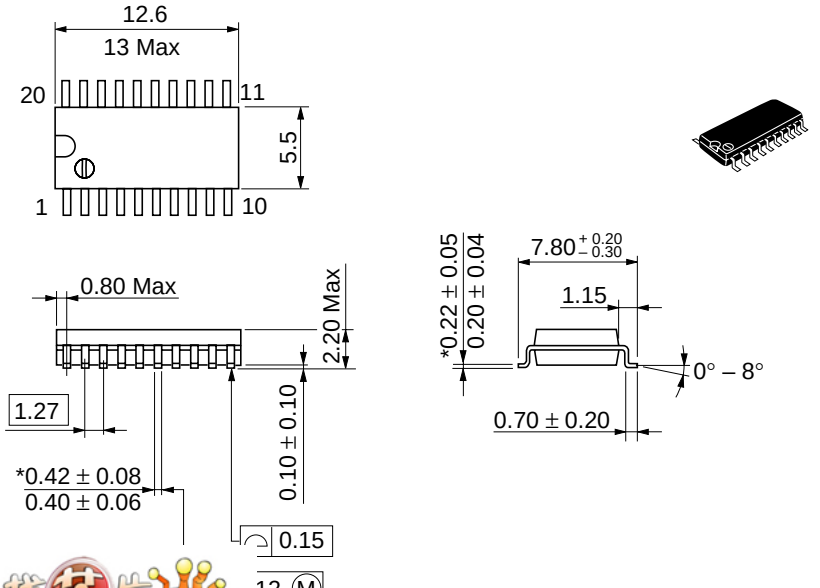


Notes: 1. Input pulse; t_{TLH} = 15ns, t_{THL} = 6ns, PRR = 1MHz, duty cycle 50%
2. Waveform A is for an output with internal conditions such that the output is low except when disable by the output control. Waveform B is for an output with internal conditions such that the output is high except when disabled by the output control.

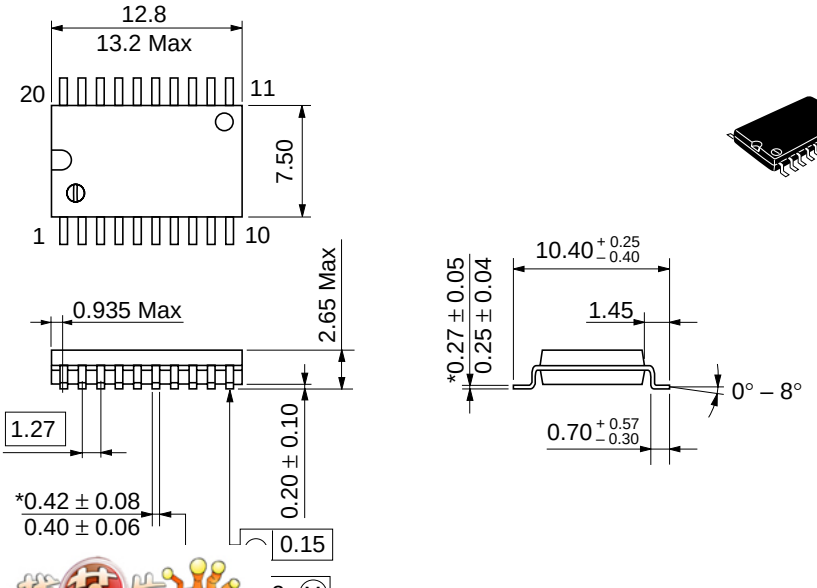
Unit: mm


24.50
25.40 Max
20
11
6.30
7.00 Max
1
10
0.89
1.30
1.27 Max
5.08 Max
0.51 Min
2.54 Min
2.54 ± 0.25
0.48 ± 0.10
7.62
0.25 + 0.11 − 0.05
0° – 15°

Unit: mm


12.6
13 Max
20
11
1
10
5.5
0.80 Max
2.20 Max
1.27
*0.42 ± 0.08
0.40 ± 0.06
0.10 ± 0.10
0.15
*0.22 ± 0.05
0.20 ± 0.04
7.80 +0.20 −0.30
1.15
0° – 8°
0.70 ± 0.20

Unit: mm


12.8
13.2 Max
20
11
7.50
1
10
0.935 Max
2.65 Max
1.27
*0.42 ± 0.08
0.40 ± 0.06
0.20 ± 0.10
0.15
10.40 +0.25 −0.40
*0.27 ± 0.05
0.25 ± 0.04
1.45
0° – 8°
0.70 +0.57 −0.30

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