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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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

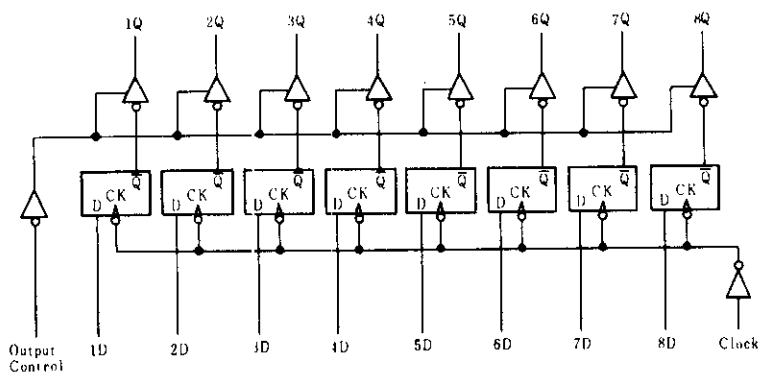
The HD74LS374, 8-bit registers features totem-pole three-state outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance third state and increased high-logic-level drive provide this register with the capability of being connected directly to and 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.

■FUNCTION TABLE

Inputs			Output
Output control	Clock	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	Q_0
H	X	X	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

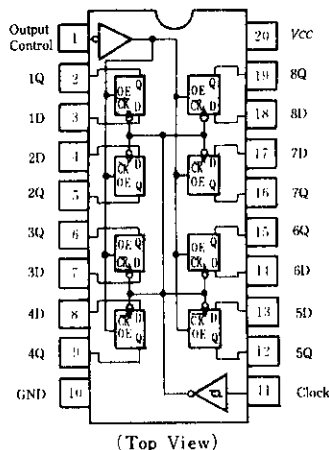


■RECOMMENDED OPERATING CONDITION

Item	Symbol	min	typ	max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.26	V
Output voltage	V_{OH}	—	—	5.5	V
Output current	I_{OH}	—	—	-2.6	mA
	I_{OL}	—	—	24	mA
Clock pulse width	t_w	15	—	—	ns
		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.

■PIN ARRANGEMENT



■ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

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

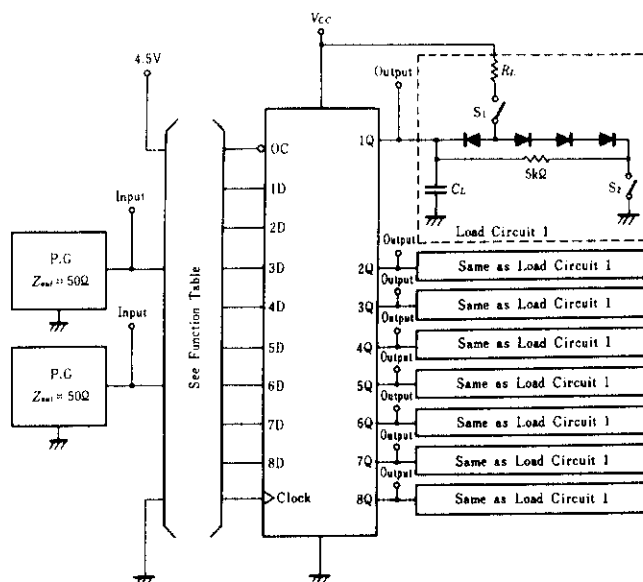
* $V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$

■SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$)

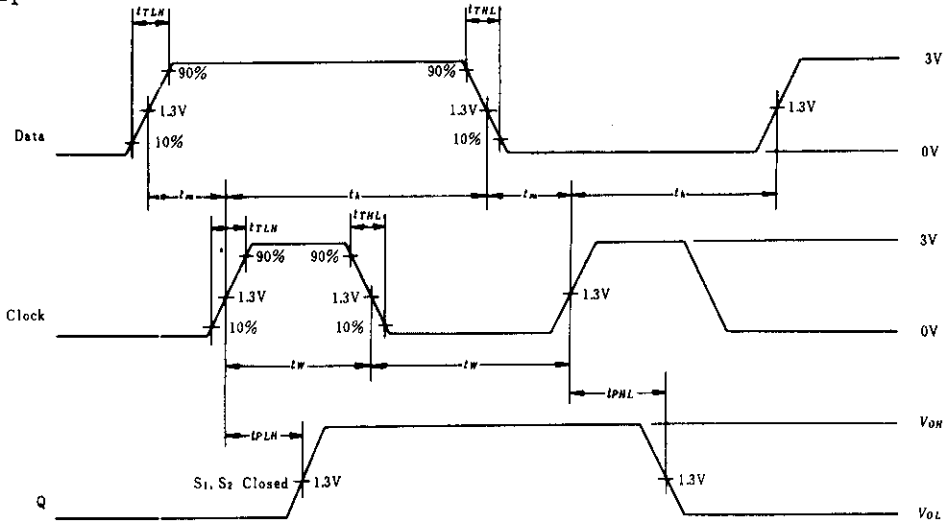
Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f_{max}	Clock	Q	$C_L=45\text{pF}$ $R_L=667\Omega$	35	50	—	MHz
Propagation delay time	t_{PLH}	Clock	Q		—	15	28	ns
	t_{PHL}				—	19	28	
Output enable time	t_{ZH}	OC	Q		—	20	28	
	t_{ZL}				—	21	28	
Output disable time	t_{HZ}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

■TESTING METHOD

Test Circuit

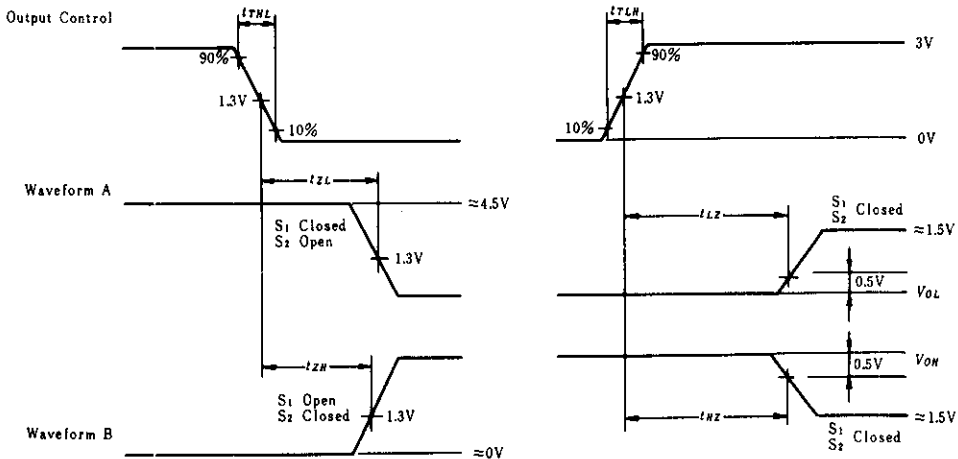


Waveform-1

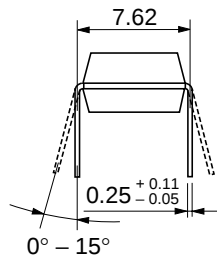
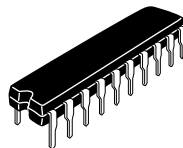
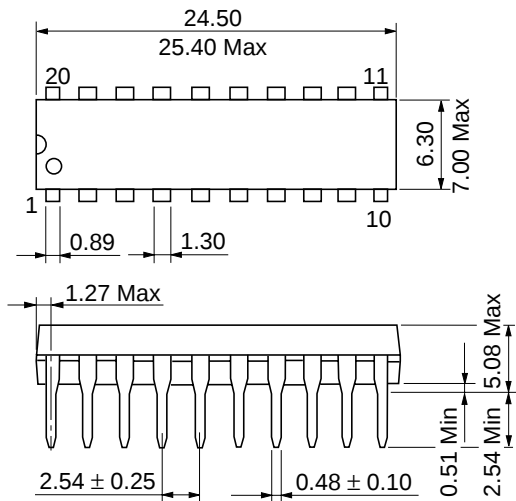


- Notes:
1. Input pulse; $t_{TLH} = 15\text{ns}$, $t_{THL} = 6\text{ns}$
 Clock input; $PRR = 1\text{MHz}$, duty cycle 50%
 Data input; $PRR = 500\text{kHz}$, duty cycle 50%
 2. f_{max} ; $t_{TLH} = 2.5\text{ns}$, $t_{THL} = 2.5\text{ns}$

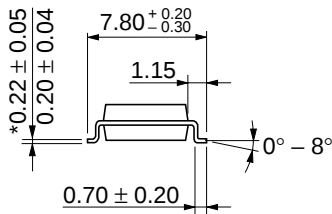
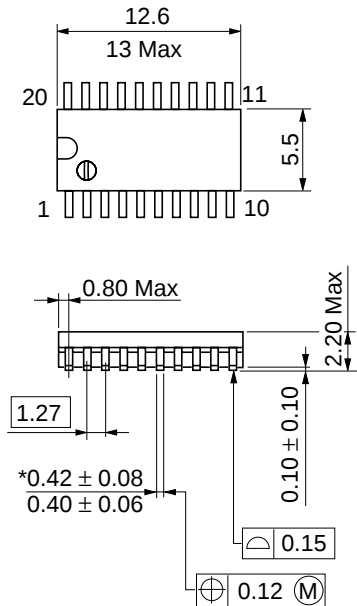
Waveform-2



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

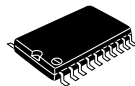
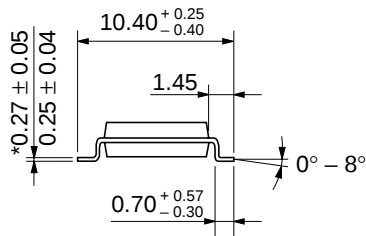
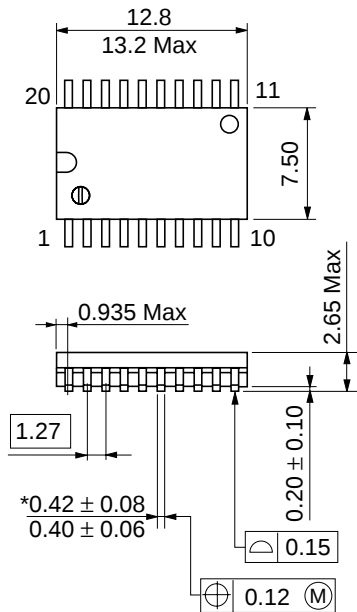


Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Weight (reference value)	1.26 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.31 g



Hitachi Code	FP-20DB
JEDEC	Conforms
EIAJ	—
Weight (reference value)	0.52 g

*Dimension including the plating thickness
Base material dimension

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