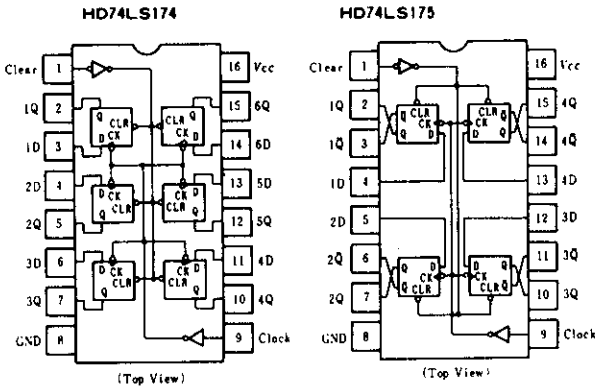


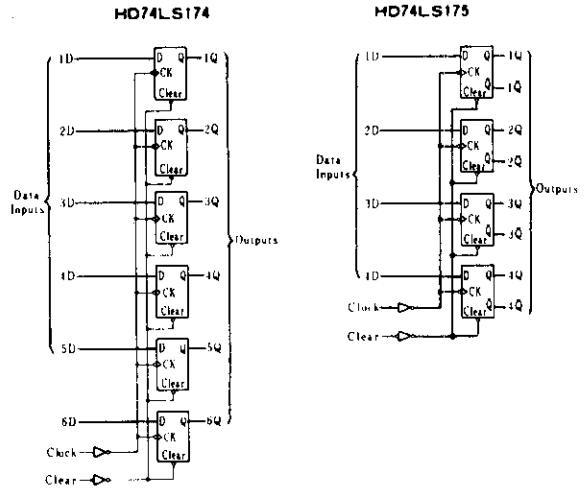
HD74LS174/HD74LS175 ●Hex/Quadruple D-type Flip-Flops (with clear)

These positive-edge-triggered flip-flops utilize TTL circuitry to implement D-type flip-flop logic. All have a direct clear input, and the HD74LS175 features complementary outputs from each flip-flops. Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the high or low level, the D input signal has no effect at the outputs.

■PIN ARRANGEMENT



■BLOCK DIAGRAM



■RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	max	Unit	
Clock frequency	f_{clock}	0	30	MHz	
Clock pulse width	$t_w(CK)$	20	—	ns	
Clear pulse width	$t_w(CLR)$	20	—	ns	
Setup time	Data input	$t_{st}(data)$	20	—	ns
	Clear inactive-state	$t_w(CLR)$	25	—	ns
Data hold time	$t_h(data)$	5	—	ns	

■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}	$V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}, I_{OH} = -400\mu\text{A}$	2.7	—	—	V	
	V_{OL}	$V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}$	$I_{OL} = 8\text{mA}$	—	—	0.5	V
			$I_{OL} = 4\text{mA}$	—	—	0.4	
Input current	I_I	$V_{CC} = 5.25\text{V}, V_i = 7\text{V}$	—	—	0.1	mA	
	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	
Short-circuit output current	I_{OS}	$V_{CC} = 5.25\text{V}$	-20	—	-100	mA	
Supply current**	I_{CC}	$V_{CC} = 5.25\text{V}$	HD74LS174	—	16	26	mA
			HD74LS175	—	11	18	
Input clamp voltage	V_{IK}	$V_{CC} = 4.75\text{V}, I_{IN} = -18\text{mA}$	—	—	-1.5	V	

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

** With all outputs open and 4.5V applied to all data and clear inputs, I_{CC} is measured after a momentary grounded, then 4.5V, is applied to clock.

■FUNCTION TABLE

Inputs			Outputs	
Clear	Clock	D	Q	\bar{Q}
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q_0	\bar{Q}_0

- Notes) 1. H; high level, L; low level, X; irrelevant
 2. ↑; transition from low to high level
 3. Q_0 ; the level of Q before the indicated steady-state input conditions were established.
 4. \bar{Q} is applied to HD74LS175 only.

HD74LS174/HD74LS175

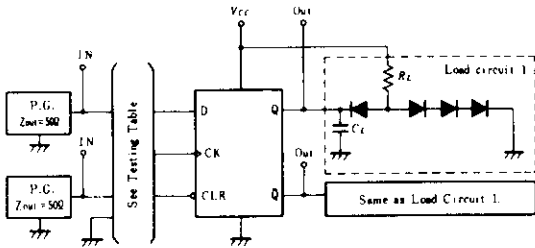
SWITCHING CHARACTERISTICS ($V_{CC}=5V, T_a=25^\circ C$)

Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f_{max}	Clock	Q, \bar{Q}^*	$C_L = 15pF, R_L = 2k\Omega$	30	40	—	MHz
Propagation delay time	t_{PLH}	Clear	\bar{Q}^*		—	16	25	ns
	t_{PHL}		Q		—	23	35	
	t_{PLH}	Clock	Q, \bar{Q}^*		—	20	30	
	t_{PHL}		Q, \bar{Q}^*	—	21	30		

* HD74LS175 only

TESTING METHOD

1) Test Circuit



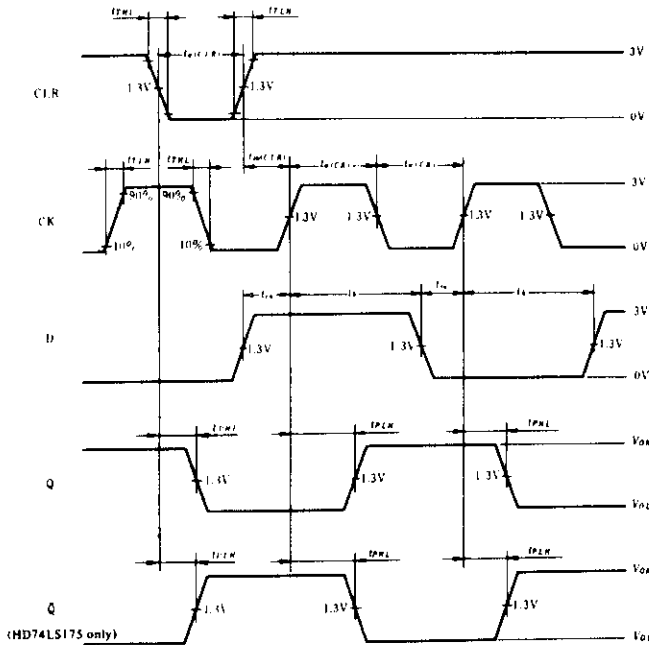
2) Testing Table

Item	From input to output	Inputs			Outputs	
		CLR	CK	D	Q	\bar{Q}^*
f_{max}	CK → Q, \bar{Q}^*	4.5V	IN	IN	OUT	OUT
t_{PLH}	CK → Q, \bar{Q}^*	4.5V	IN	IN		
t_{PHL}	CLR → Q, \bar{Q}^*	IN	IN	4.5V		

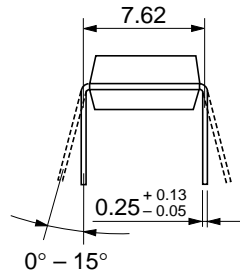
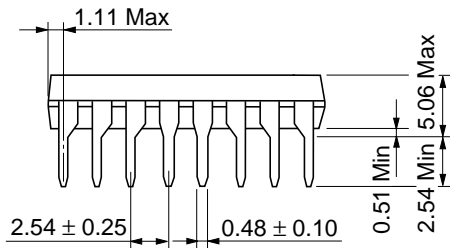
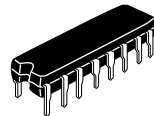
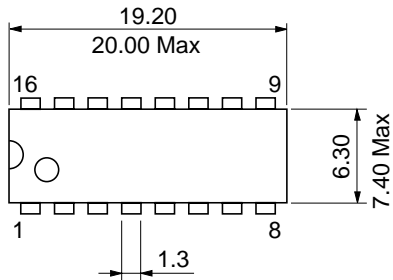
* HD74LS175 only

- Notes) 1. Test is put into the each flip-flop
 2. All diodes are 1S2074 (H).
 3. C_L includes probe and jig capacitance.

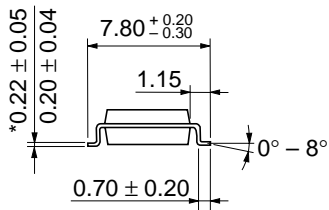
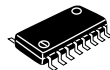
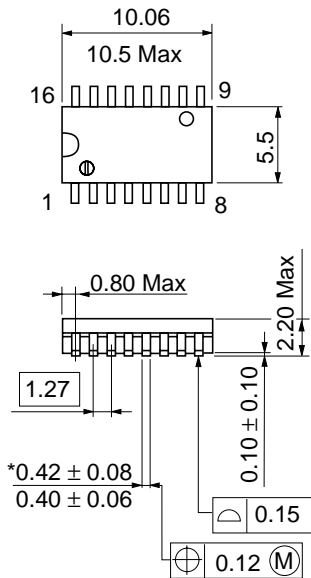
Waveform



- Notes) 1. Input pulse; $t_{TLH} \leq 15ns, t_{THL} \leq 6ns, PRR=1MHz$
 and: for $f_{max}, t_{TLH}=t_{THL} \leq 2.5ns$.

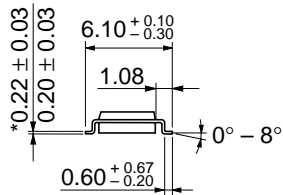
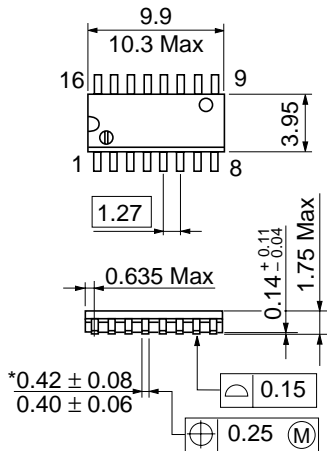


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

*Dimension including the plating thickness
 Base material dimension

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