
HD74AC175

Quad D-Type Flip-Flop

HITACHI

Description

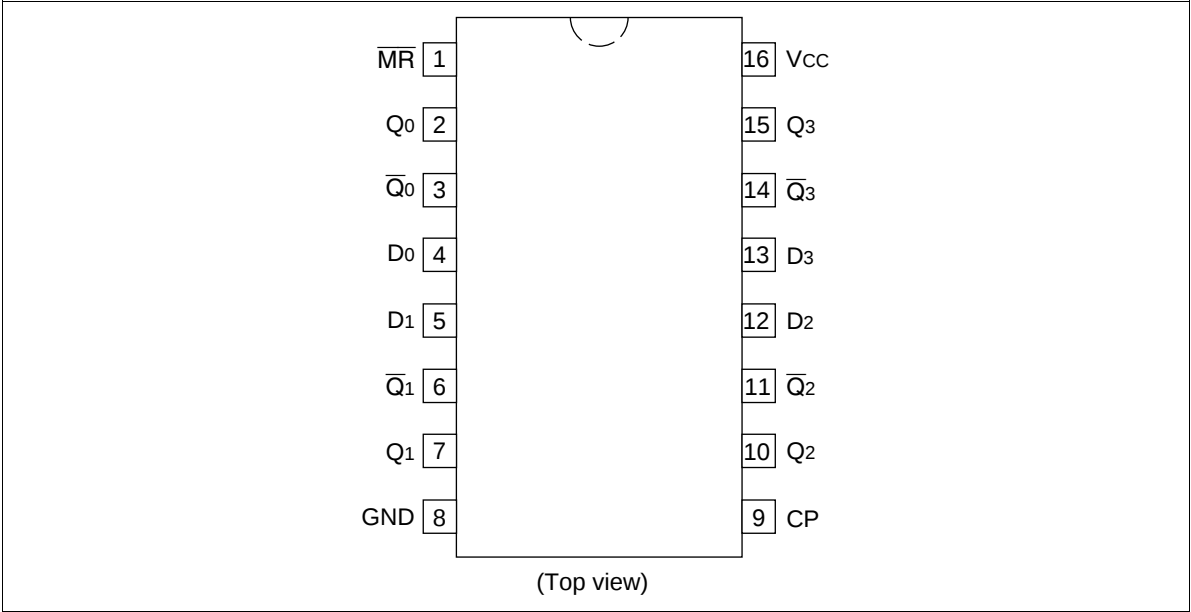
The HD74AC175 is a high-speed quad D flip-flop. The device is useful for general flip-flop requirements where clock and clear inputs are common. The information on the D inputs is stored during the Low-to-High clock transition. Both true and complemented outputs of each flip-flop are provided. A Master Reset input resets all flip-flops, independent of the Clock or D inputs, when Low.

Features

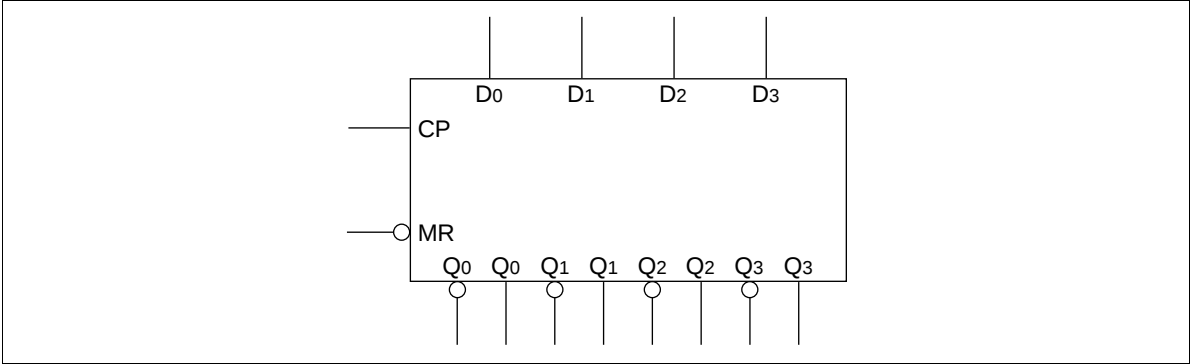
- Edge-Triggered D-Type Inputs
- Buffered Positive Edge-Triggered Clock
- Asynchronous Common Reset
- True and Complement Output
- Outputs Source/Sink 24 mA

HD74AC175

Pin Arrangement



Logic Symbol



Pin Names

- D₀ to D₃ Data Inputs
- CP Clock Pulse Input
- $\overline{\text{MR}}$ Master Reset Input
- Q₀ to Q₃ True Outputs
- $\overline{\text{Q}}_0$ to $\overline{\text{Q}}_3$ Complement Outputs

Functional Description

The HD74AC175 consists of four edge-triggered D flip-flops with individual D inputs and Q and $\bar{Q}$ outputs. The Clock and Master Reset are common. The four flip-flops will store the state of their individual D inputs on the Low-to-High clock (CP) transition, causing individual Q and $\bar{Q}$ outputs to follow. A Low input on the Master Reset ($\overline{MR}$) will force all Q outputs Low and $\bar{Q}$ outputs High independent of Clock or Data inputs. The HD74AC175 is useful for general logic applications where a common Master Reset and Clock are acceptable.

Truth Table

Inputs	Outputs	
@ t_n , $\overline{MR} = H$	@ t_{n+1}	
Dn	Qn	$\bar{Q}n$
L	L	H
H	H	L

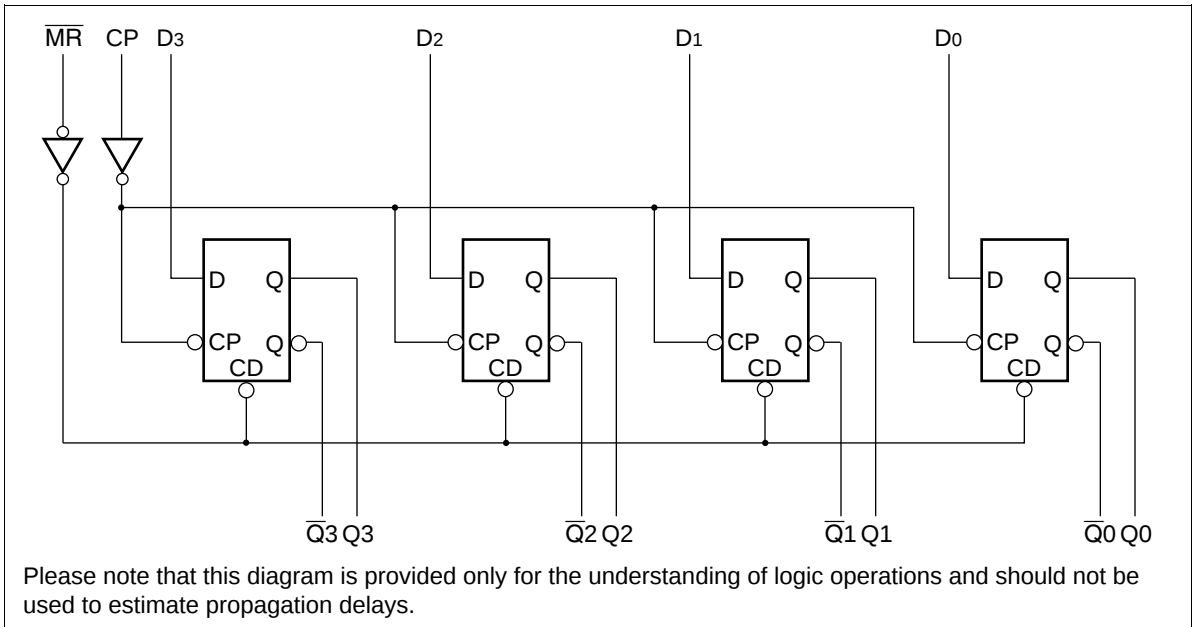
H : High Voltage Level

L : Low Voltage Level

t_n : Bit Time before Clock Pulse

t_{n+1} : Bit Time after Clock Pulse

Logic Diagram



DC Characteristics (unless otherwise specified)

Item	Symbol	Max	Unit	Condition
Maximum quiescent supply current	I_{CC}	80	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = \text{Worst case}$
Maximum quiescent supply current	I_{CC}	8.0	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = 25^{\circ}C$

AC Characteristics

Item	Symbol	$V_{CC} (V)^{*1}$	$T_a = +25^{\circ}C$ $C_L = 50 pF$			$T_a = -40^{\circ}C \text{ to } +85^{\circ}C$ $C_L = 50 pF$		Unit
			Min	Typ	Max	Min	Max	
Maximum clock frequency	f_{max}	3.3	149	—	—	139	—	MHz
		5.0	187	—	—	187	—	
Propagation delay CP to Q_n or $\overline{Q}_n$	t_{PLH}	3.3	1.0	9.5	12.0	1.0	13.5	ns
		5.0	1.0	7.0	9.0	1.0	9.5	
Propagation delay CP to Q_n or $\overline{Q}_n$	t_{PHL}	3.3	1.0	8.5	13.0	1.0	14.5	ns
		5.0	1.0	6.0	9.5	1.0	10.5	
Propagation delay $\overline{MR}$ to $\overline{Q}_n$	t_{PLH}	3.3	1.0	7.5	12.5	1.0	13.5	ns
		5.0	1.0	5.5	9.0	1.0	10.0	
Propagation delay $\overline{MR}$ to Q_n	t_{PHL}	3.3	1.0	8.5	11.0	1.0	12.5	ns
		5.0	1.0	6.0	8.5	1.0	9.5	

Note: 1. Voltage Range 3.3 is $3.3 V \pm 0.3 V$
Voltage Range 5.0 is $5.0 V \pm 0.5 V$

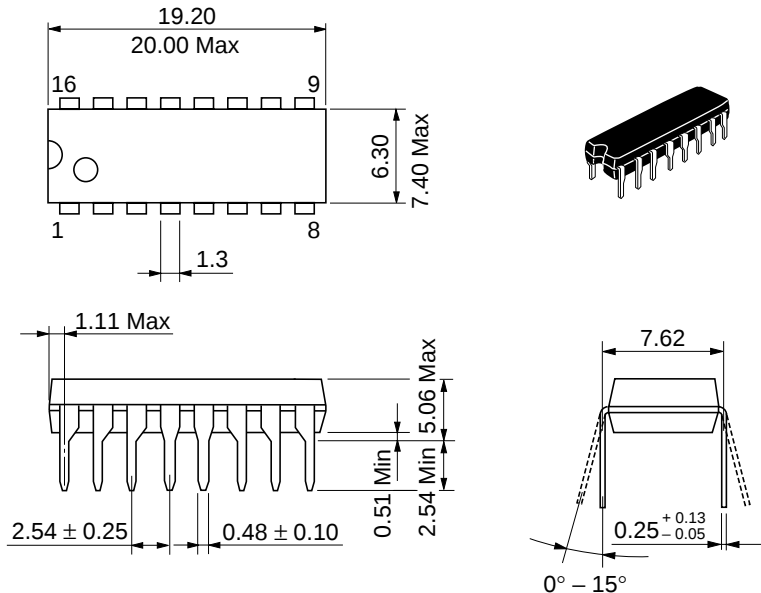
AC Operating Requirements

			Ta = +25°C CL = 50 pF	Ta = -40°C to +85°C CL = 50 pF		
Item	Symbol	Vcc (V)*1	Typ	Guaranteed Minimum		Unit
Set-up time, HIGH or LOW	t _{su}	3.3	2.0	4.5	4.5	ns
D _n to CP		5.0	1.0	3.0	3.0	
Hold time, HIGH or LOW	t _h	3.3	0	1.0	1.0	ns
D _n to CP		5.0	0	1.0	1.0	
CP pulse width HIGH or LOW	t _w	3.3	2.5	4.5	4.5	ns
		5.0	2.0	3.5	3.5	
MR pulse width, LOW	t _w	3.3	2.5	4.5	5.0	ns
		5.0	2.0	3.5	3.5	
Recovery time MR to CP	t _{rec}	3.3	-2.0	0.0	0.0	ns
		5.0	-1.0	0.0	0.0	

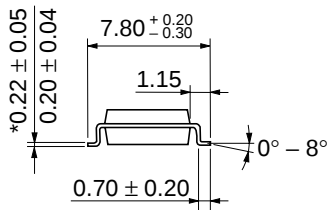
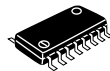
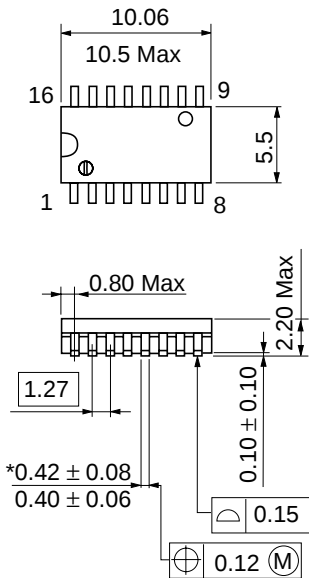
Note: 1. Voltage Range 3.3 is $3.3\text{ V} \pm 0.3\text{ V}$
Voltage Range 5.0 is $5.0\text{ V} \pm 0.5\text{ V}$

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C_{IN}	4.5	pF	$V_{CC} = 5.5\text{ V}$
Power dissipation capacitance	C_{PD}	45.0	pF	$V_{CC} = 5.0\text{ V}$

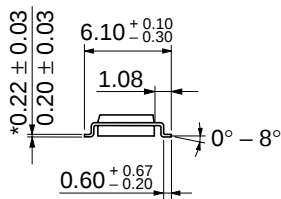
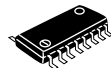
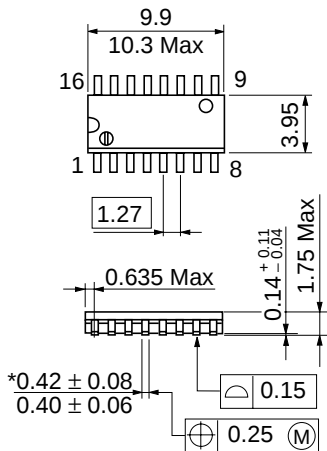


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



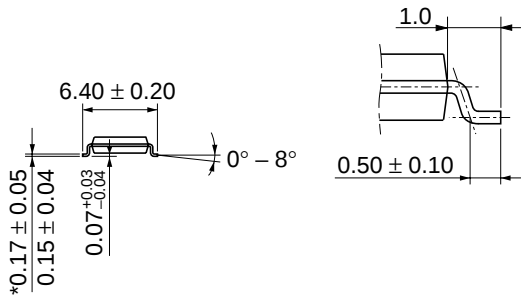
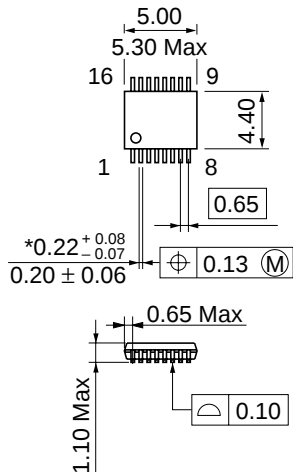
*Dimension including the plating thickness
Base material dimension

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



*Dimension including the plating thickness
Base material dimension

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



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
EIAJ	—
Weight (reference value)	0.05 g

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