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

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HD74HC74

Dual D-type Flip-Flops (with Preset and Clear)



ADE-205-421 (Z)

1st. Edition

Sep. 2000

Description

The flip-flop has independent data, preset, clear, and clock inputs and Q and $\overline{Q}$ outputs. The logic level present at the data input is transferred to the output during the positive going transition to the clock pulse. Preset and clear are independent of the clock and accomplished by a low level at the appropriate input.

Features

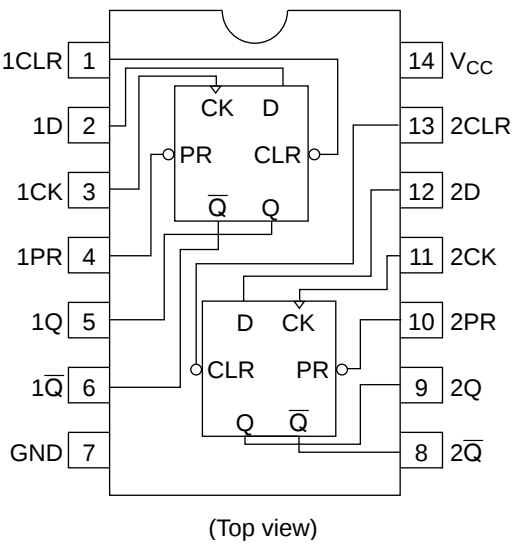
- High Speed Operation: t_{pd} (Clock to Q or $\overline{Q}$) = 14 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 2 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

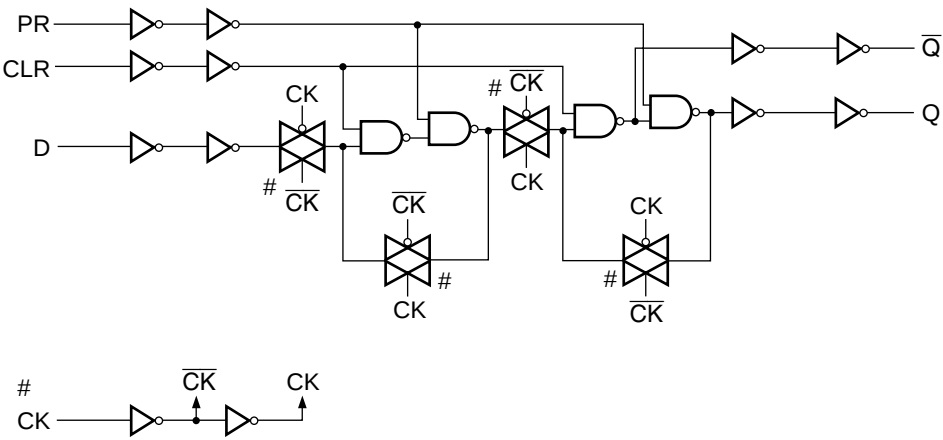
Inputs				Outputs	
Preset	Clear	Clock	Data	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H* ¹	H* ¹
H	H		H	H	L
H	H		L	L	H
H	H	L	X	no change	no change
H	H	H	X	no change	no change
H	H		X	no change	no change

Note: 1. Q and $\overline{Q}$ will remain HIGH as long as Preset and Clear are Low, but Q and $\overline{Q}$ are unpredictable, if Preset and Clear go HIGH simultaneously.

Pin Arrangement



Logic Diagram (1/2)



DC Characteristics

Item	Symbol	V_{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V	
		4.5	3.15	—	—	3.15	—		
		6.0	4.2	—	—	4.2	—		
	V_{IL}	2.0	—	—	0.5	—	0.5	V	
		4.5	—	—	1.35	—	1.35		
		6.0	—	—	1.8	—	1.8		
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH}$ or V_{IL} $I_{OH} = -20\ \mu A$
		4.5	4.4	4.5	—	4.4	—		
		6.0	5.9	6.0	—	5.9	—		
		4.5	4.18	—	—	4.13	—		
		6.0	5.68	—	—	5.63	—		
	V_{OL}	2.0	—	0.0	0.1	—	0.1	V	$V_{in} = V_{IH}$ or V_{IL} $I_{OL} = 20\ \mu A$
		4.5	—	0.0	0.1	—	0.1		
		6.0	—	0.0	0.1	—	0.1		
		4.5	—	—	0.26	—	0.33		
		6.0	—	—	0.26	—	0.33		
Input current	I_{in}	6.0	—	—	± 0.1	—	± 1.0	μA	$V_{in} = V_{CC}$ or GND
Quiescent supply current	I_{CC}	6.0	—	—	2.0	—	20	μA	$V_{in} = V_{CC}$ or GND, $I_{out} = 0\ \mu A$

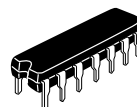
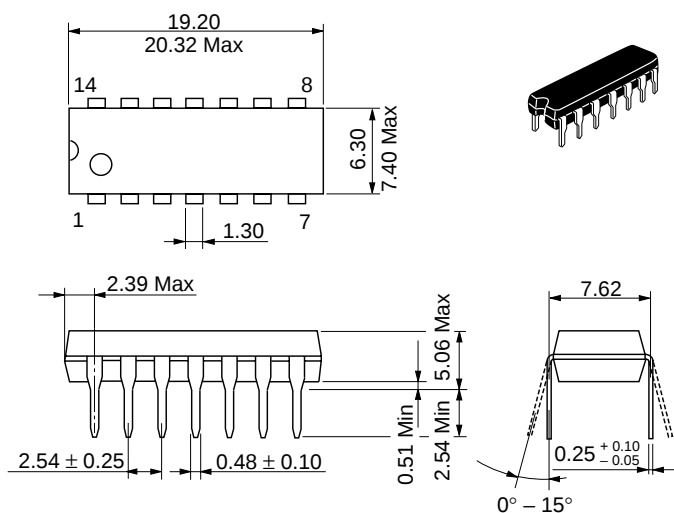
HD74HC74

AC Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Item	Symbol	V _{CC} (V)	Ta = −40 to +85°C					Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	f _{max}	2.0	—	—	5	—	4	MHz	
		4.5	—	35	25	—	20		
		6.0	—	—	29	—	24		
Propagation delay time	t _{PLH}	2.0	—	—	160	—	200	ns	Clock to Q or $\overline{Q}$
		4.5	—	14	32	—	40		
		6.0	—	—	27	—	34		
	t _{PHL}	2.0	—	—	160	—	200		Preset or Clear to Q or $\overline{Q}$
		4.5	—	13	32	—	40		
		6.0	—	—	27	—	34		
Setup time	t _{su}	2.0	100	—	—	125	—	ns	Data to Clock
		4.5	20	1	—	25	—		
		6.0	17	—	—	21	—		
Hold time	t _h	2.0	5	—	—	5	—	ns	Clock to Data
		4.5	5	0	—	5	—		
		6.0	5	—	—	5	—		
Removal time	t _{rem}	2.0	25	—	—	31	—	ns	Preset, Clear to Clock
		4.5	5	−5	—	6	—		
		6.0	4	—	—	5	—		
Pulse width	t _w	2.0	80	—	—	100	—	ns	Clock, Preset, Clear
		4.5	16	8	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	t _{TLH}	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input Capacitance	C _{in}	—	—	5	10	—	10	pF	

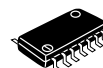
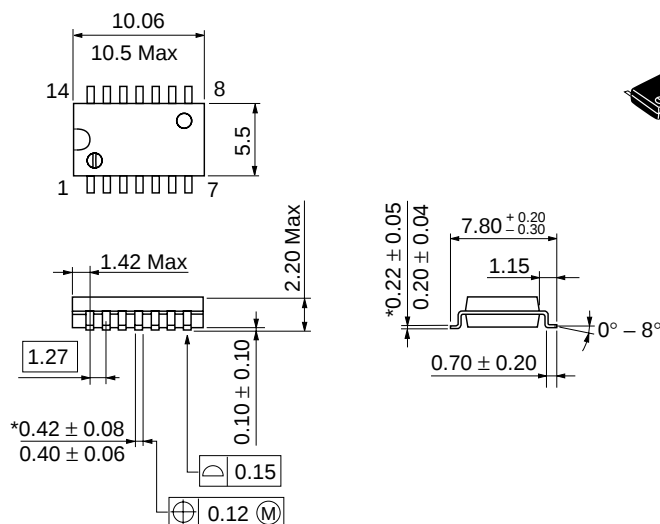
Package Dimensions

Unit: mm



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.97 g

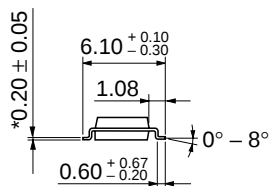
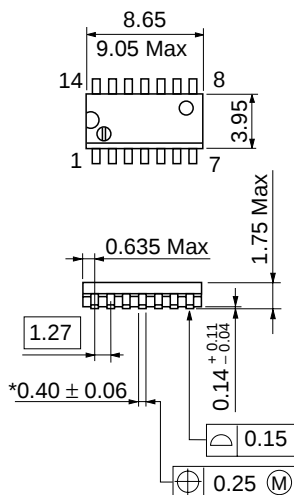
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.23 g

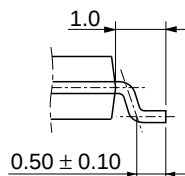
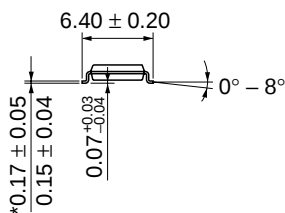
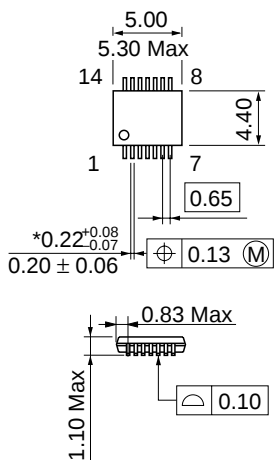
Unit: mm



*Pd plating

Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.13 g

Unit: mm


$$\frac{\text{*Dimension including the plating thickness}}{\text{Base material dimension}}$$

Hitachi Code	TTP-14D
JEDEC	—
EIAJ	—
Mass (reference value)	0.05 g

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