
HD74AC107/HD74ACT107

Dual JK Flip-Flop (with Separate Clear and Clock)

HITACHI

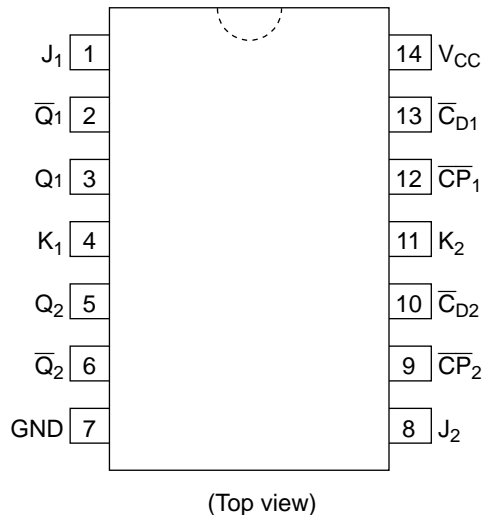
Description

The HD74AC107/HD74ACT107 dual JK master/slave flip-flops have a separate clock for each flip-flop. Inputs to the master section are controlled by the clock pulse. The clock pulse also regulates the state of the coupling transistors which connect the master and slave sections. The sequence of operation is as follows: 1) isolate slave from master; 2) enter information from J and K inputs to master; 3) disable J and K inputs; 4) transfer information from master to slave.

Features

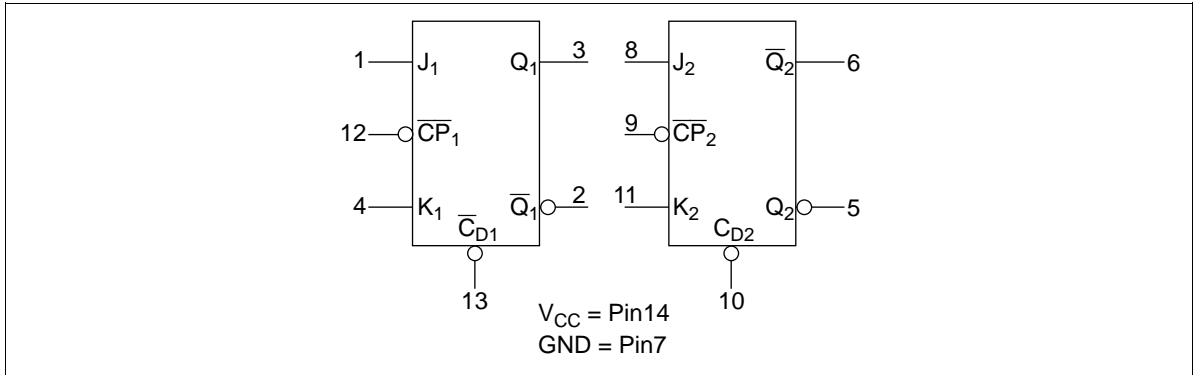
- Outputs Source/Sink 24 mA
- HD74ACT107 has TTL-Compatible Inputs

Pin Arrangement



HD74AC107/HD74ACT107

Logic Symbol



Pin Names

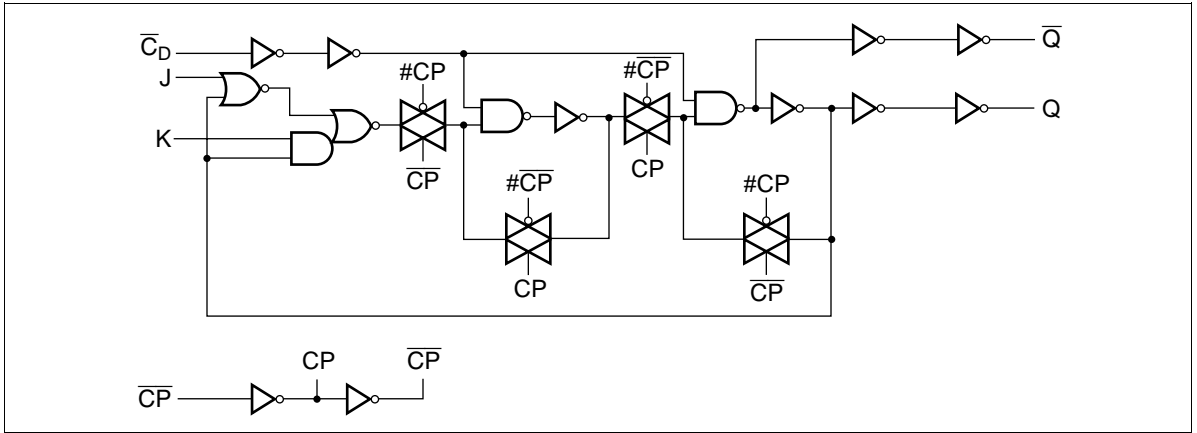
- J_1, J_2, K_1, K_2 Data Inputs
- $\overline{CP}_1, \overline{CP}_2$ Clock Pulse Inputs (Active Falling Edge)
- $\overline{C}_{D1}, \overline{C}_{D2}$ Direct Clear Inputs (Active Low)
- $Q_1, Q_2, \overline{Q}_1, \overline{Q}_2$ Outputs

Truth Table

Inputs		Outputs
@ t_n		@ t_{n+1}
J	K	Q
L	L	Q_n
L	H	L
H	L	H
H	H	\overline{Q}_n

- 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, $V_{CC} = 5.5 V$, $T_a = 25^\circ C$
Maximum additional I_{CC} /input (HD74ACT107)	I_{CCT}	1.5	mA	$V_{IN} = V_{CC} - 2.1 V$, $V_{CC} = 5.5 V$ $T_a = \text{Worst case}$

HD74AC107/HD74ACT107

AC Characteristics: HD74AC107

Item	Symbol	$V_{CC} (V)^{*1}$	$T_a = +25^{\circ}C$ $C_L = 50 pF$			$T_a = -40^{\circ}C$ to $+85^{\circ}C$ $C_L = 50 pF$		Unit
			Min	Typ	Max	Min	Max	
Maximum clock frequency	f_{max}	3.3	125	—	—	100	—	MHz
		5.0	150	—	—	125	—	
Propagation delay \overline{C}_P to Q or \overline{Q}	t_{PLH}	3.3	1.0	9.5	13.0	1.0	14.0	ns
		5.0	1.0	7.5	10.0	1.0	11.0	
Propagation delay \overline{C}_P to Q or \overline{Q}	t_{PHL}	3.3	1.0	10.0	13.5	1.0	14.5	ns
		5.0	1.0	8.0	10.5	1.0	11.5	
Propagation delay \overline{C}_D to \overline{Q}	t_{PLH}	3.3	1.0	9.5	13.0	1.0	14.0	ns
		5.0	1.0	7.5	10.0	1.0	11.0	
Propagation delay \overline{C}_D to \overline{Q}	t_{PHL}	3.3	1.0	9.5	13.0	1.0	14.0	ns
		5.0	1.0	7.5	10.0	1.0	11.0	

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

Operating Requirements: HD74AC107

Item	Symbol	$V_{CC} (V)^{*1}$	$T_a = +25^{\circ}C$	$T_a = -40^{\circ}C$ to $+85^{\circ}C$		Unit
			Typ	Guaranteed Minimum		
Setup time J or k to \overline{C}_P	t_{su}	3.3	3.0	5.5	6.0	ns
		5.0	2.0	4.0	4.5	
Hold time \overline{C}_P to J or k	t_h	3.3	-1.5	0.0	0.0	
		5.0	-0.5	0.0	0.0	
Pulse width \overline{C}_P or \overline{C}_D	t_w	3.3	2.0	5.5	7.5	
		5.0	2.0	4.5	5.0	
Recovery time \overline{C}_D to \overline{C}_P	t_{rec}	3.3	-2.5	0.0	0.0	
		5.0	-1.5	0.0	0.0	

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 Characteristics: HD74ACT107

Item	Symbol	$V_{CC} (V)^{*1}$	$T_a = +25^{\circ}C$ $C_L = 50 \text{ pF}$			$T_a = -40^{\circ}C \text{ to } +85^{\circ}C$ $C_L = 50 \text{ pF}$		Unit
			Min	Typ	Max	Min	Max	
Maximum clock frequency	f_{max}	5.0	100	—	—	80	—	MHz
Propagation delay \overline{C}_P to Q or \overline{Q}	t_{PLH}	5.0	1.0	9.5	12.5	1.0	13.5	ns
Propagation delay \overline{C}_P to Q or \overline{Q}	t_{PHL}	5.0	1.0	10.5	13.0	1.0	14.0	
Propagation delay \overline{C}_D to \overline{Q}	t_{PLH}	5.0	1.0	8.5	11.0	1.0	12.0	
Propagation delay \overline{C}_D to Q	t_{PHL}	5.0	1.0	8.5	11.0	1.0	12.0	

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

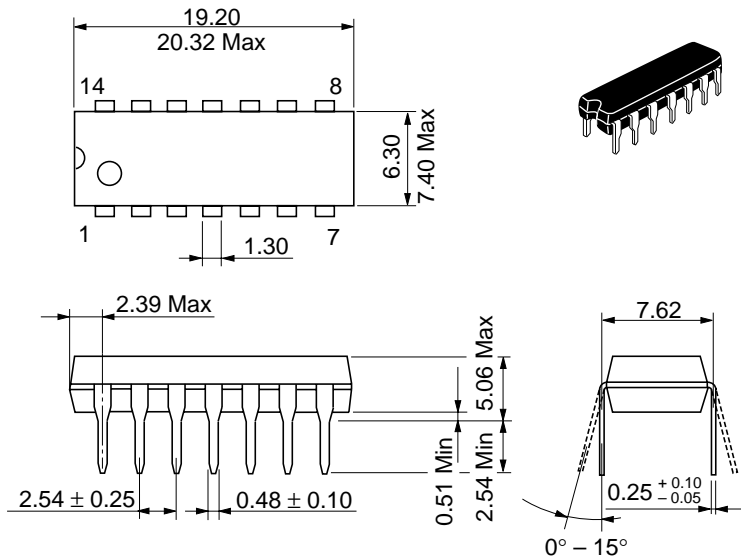
Operating Requirements: HD74ACT107

Item	Symbol	$V_{CC} (V)^{*1}$	$T_a = +25^{\circ}C$	$T_a = -40^{\circ}C$ to $+85^{\circ}C$		Unit
			Typ	$C_L = 50 \text{ pF}$		
Setup time J or k to \overline{C}_P	t_{su}	5.0	2.5	7.0	8.0	ns
Hold time \overline{C}_P to J or k	t_h	5.0	0.0	1.5	1.5	
Pulse width \overline{C}_P or \overline{C}_D	t_w	5.0	4.5	7.0	8.0	
Recovery time \overline{C}_D to \overline{C}_P	t_{rec}	5.0	—	3.0	3.0	

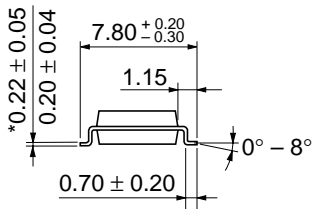
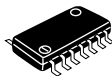
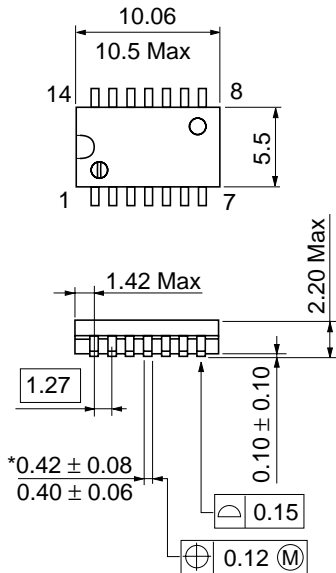
Note: 1. Voltage Range 5.0 is $5.0 \text{ V} \pm 0.5 \text{ V}$

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C_{IN}	4.5	pF	$V_{CC} = 5.5 \text{ V}$
Power dissipation capacitance	C_{PD}	35.0	pF	$V_{CC} = 5.0 \text{ V}$

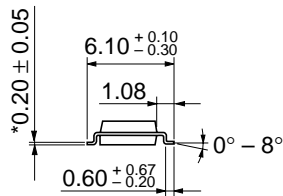
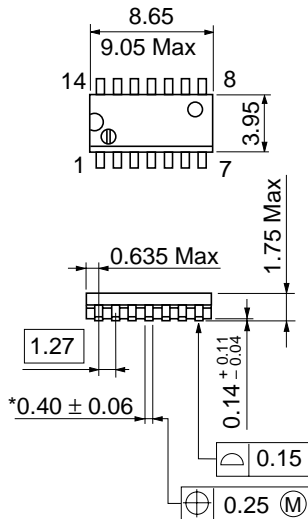


Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g

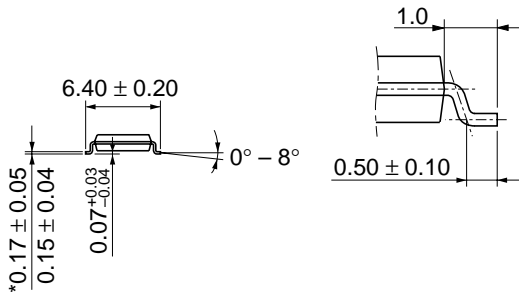
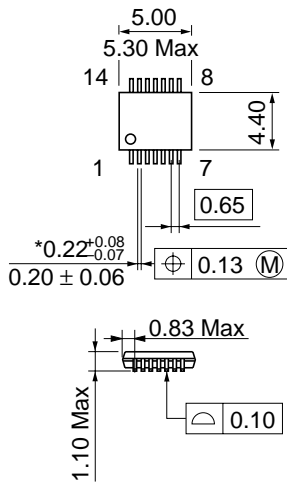


Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

*Dimension including the plating thickness
Base material dimension



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



*Dimension including the plating thickness
 Base material dimension

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

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