
HD74HC108

Dual J-K Flip-Flops (with Preset, Common Clear and Common Clock)

HITACHI

Description






This flip-flop is edge sensitive to the clock input and change state on the negative transition of the clock pulse. Each flip-flop has independent J, K, and preset inputs and Q and \bar{Q} outputs. Two flip-flops are controlled by a common clear and a common clock. Preset and clear are independent of the clock and accomplished by a low logic level on the corresponding input.

Features

- High Speed Operation: t_{pd} (Clock to Q) = 20 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 ($T_a = 25^\circ\text{C}$)

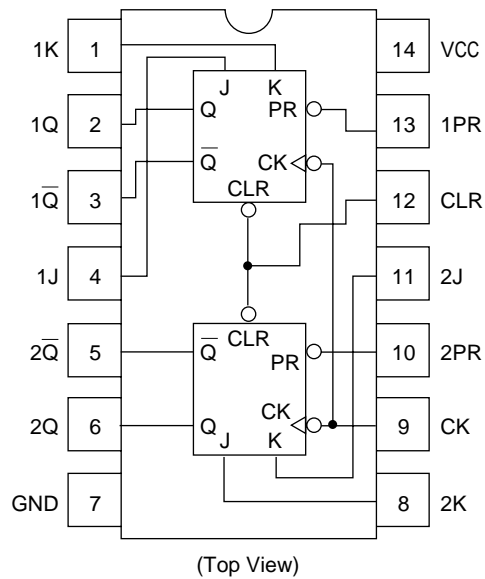
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Function Table

| Inputs | | | | | Output | |
|--------|-------|---|---|---|-----------------|-----------------|
| Preset | Clear | Clock | J | K | Q | \bar{Q} |
| L | H | X | X | X | H | L |
| H | L | X | X | X | L | H |
| L | L | X | X | X | H* ¹ | H* ¹ |
| H | H |  | L | L | No change | |
| H | H |  | L | H | L | H |
| H | H |  | H | L | H | L |
| H | H |  | H | H | Toggle | |
| H | H | L | X | X | No change | |
| H | H | H | X | X | No change | |
| H | H |  | X | X | No change | |

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

Pin Arrangement



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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 | Vin = V _{IH} or V _{IL} I _{OH} = -20 μA | |
| | | 4.5 | 4.4 | 4.5 | — | 4.4 | — | | | |
| | | 6.0 | 5.9 | 6.0 | — | 5.9 | — | | | |
| | | 4.5 | 4.18 | — | — | 4.13 | — | | | I _{OH} = -4 mA |
| | | 6.0 | 5.68 | — | — | 5.63 | — | | | I _{OH} = -5.2 mA |
| | | V _{OL} | 2.0 | — | 0.0 | 0.1 | — | | | 0.1 |
| | 4.5 | | — | 0.0 | 0.1 | — | 0.1 | | | |
| | 6.0 | | — | 0.0 | 0.1 | — | 0.1 | | | |
| | 4.5 | | — | — | 0.26 | — | 0.33 | I _{OL} = 4 mA | | |
| | 6.0 | — | — | 0.26 | — | 0.33 | I _{OL} = 5.2 mA | | | |
| Input current | I _{in} | 6.0 | — | — | ±0.1 | — | ±1.0 | μA | Vin = V _{CC} or GND | |
| Quiescent supply current | I _{CC} | 6.0 | — | — | 2.0 | — | 20 | μA | Vin = V _{CC} or GND, I _{out} = 0 μA | |

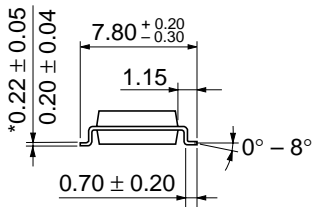
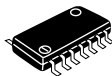
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AC Characteristics ($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

| Item | Symbol | V_{CC} (V) | $T_a = 25^\circ\text{C}$ | | | $T_a = -40$ to $+85^\circ\text{C}$ | | Unit | Test Conditions | |
|-------------------------|------------|--------------|--------------------------|-----|-----|------------------------------------|-----|------|-------------------------|--|
| | | | Min | Typ | Max | Min | Max | | | |
| Maximum clock frequency | f_{max} | 2.0 | — | — | 6 | — | 5 | MHz | | |
| | | 4.5 | — | — | 30 | — | 24 | | | |
| | | 6.0 | — | — | 35 | — | 28 | | | |
| Propagation delay time | t_{PLH} | 2.0 | — | — | 150 | — | 190 | ns | Clock to Q or \bar{Q} | |
| | | 4.5 | — | 20 | 30 | — | 38 | | | |
| | | 6.0 | — | — | 26 | — | 33 | | | |
| | t_{PHL} | 2.0 | — | — | 140 | — | 175 | ns | Clear to Q or \bar{Q} | |
| | | 4.5 | — | 18 | 28 | — | 35 | | | |
| | | 6.0 | — | — | 24 | — | 30 | | | |
| Pulse width | t_w | 2.0 | 80 | — | — | 100 | — | ns | | |
| | | 4.5 | 16 | 7 | — | 20 | — | | | |
| | | 6.0 | 14 | — | — | 17 | — | | | |
| | Setup time | t_{su} | 2.0 | 100 | — | — | 125 | — | ns | |
| | | | 4.5 | 20 | 2 | — | 25 | — | | |
| | | | 6.0 | 17 | — | — | 21 | — | | |
| Hold time | t_h | 2.0 | 5 | — | — | 5 | — | ns | | |
| | | 4.5 | 5 | -1 | — | 5 | — | | | |
| | | 6.0 | 5 | — | — | 5 | — | | | |
| Removal time | t_{rem} | 2.0 | 100 | — | — | 125 | — | ns | | |
| | | 4.5 | 20 | -2 | — | 25 | — | | | |
| | | 6.0 | 17 | — | — | 21 | — | | | |
| Output rise/fall time | t_{TLH} | 2.0 | — | — | 75 | — | 95 | ns | | |
| | | 4.5 | — | 5 | 15 | — | 19 | | | |
| | t_{THL} | 6.0 | — | — | 13 | — | 16 | | | |
| Input capacitance | C_{in} | — | — | 5 | 10 | — | 10 | pF | | |



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

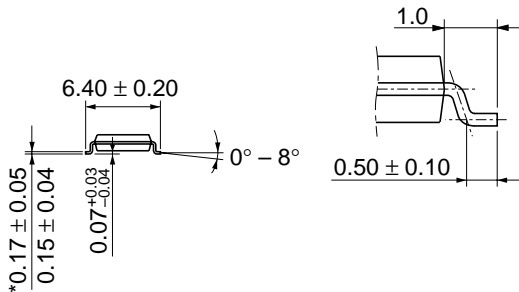
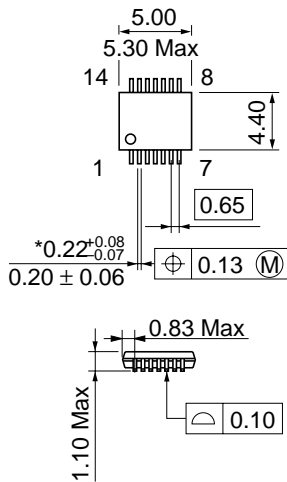


| | |
|--------------------------|----------|
| Hitachi Code | FP-14DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.23 g |

*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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