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# HD74HC4024

## 7-stage Binary Counter

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



### Description

The HD74HC4024 is a 7-stage counter. This device is incremented on the falling edge (negative transition) of the input clock, and all its output is reset to a low level by applying a logical high on its reset input.

### Features

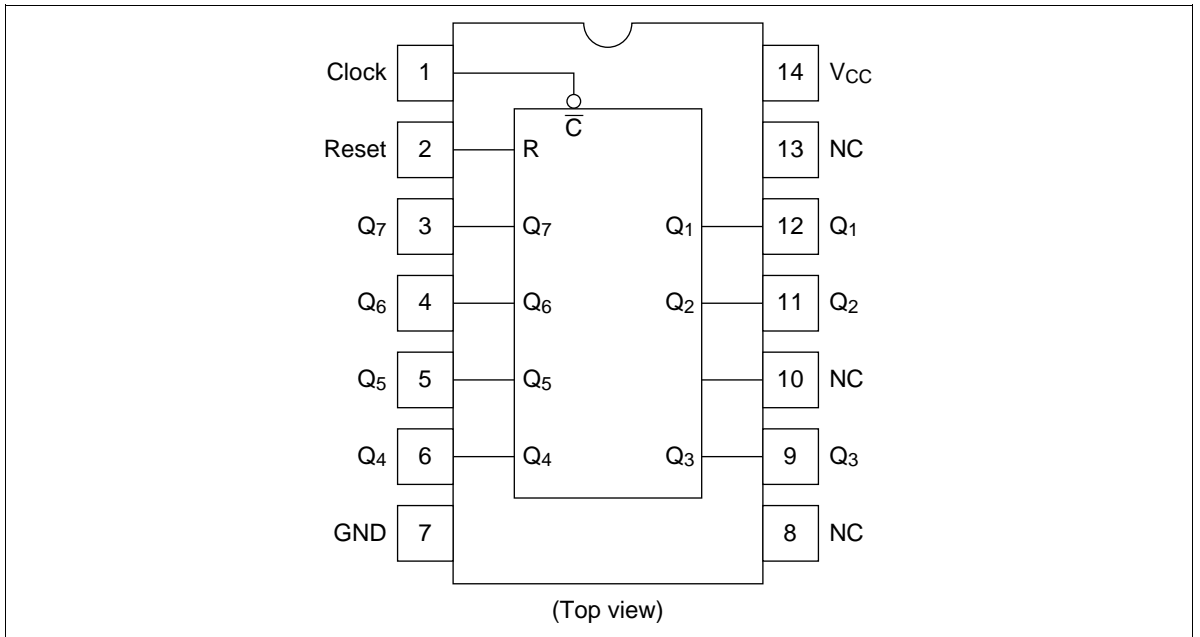
- High Speed Operation:  $t_{pd}$  (Clock to  $Q_1$ ) = 14 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )

### Function Table

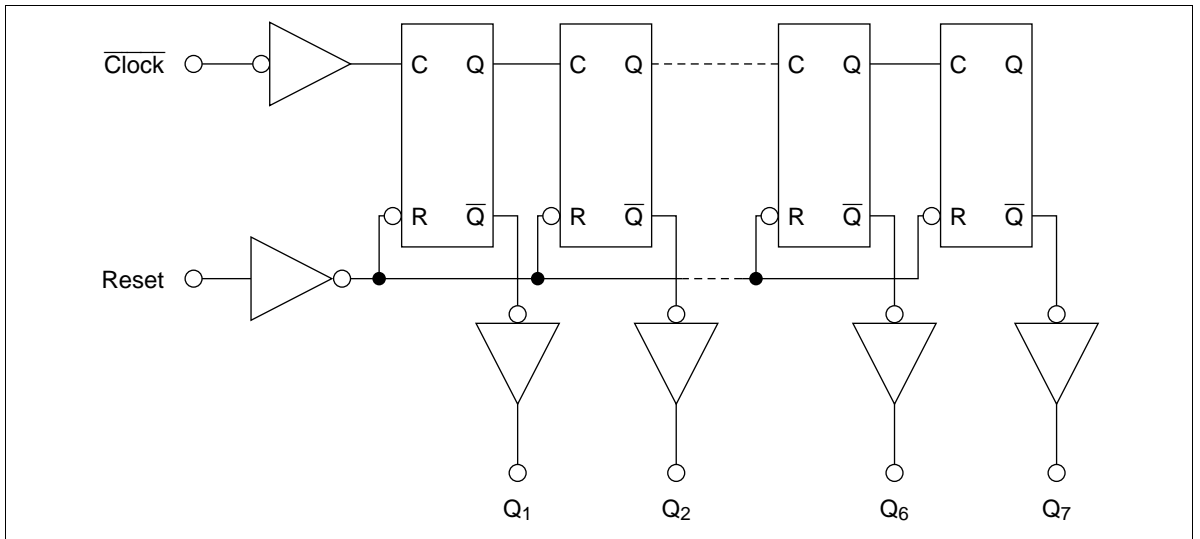
| $\overline{\text{Clock}}$  | Reset | Outputs State         |
|--|-------|-----------------------|
| L  | L     | No change             |
| L  | H     | All outputs are low   |
| H  | L     | No change             |
| H  | H     | All outputs are low   |
|  | L     | No change             |
|  | H     | All outputs are low   |
|  | L     | Advance to next state |
|  | H     | All outputs are low   |

# HD74HC4024

## Pin Arrangement



## Block Diagram



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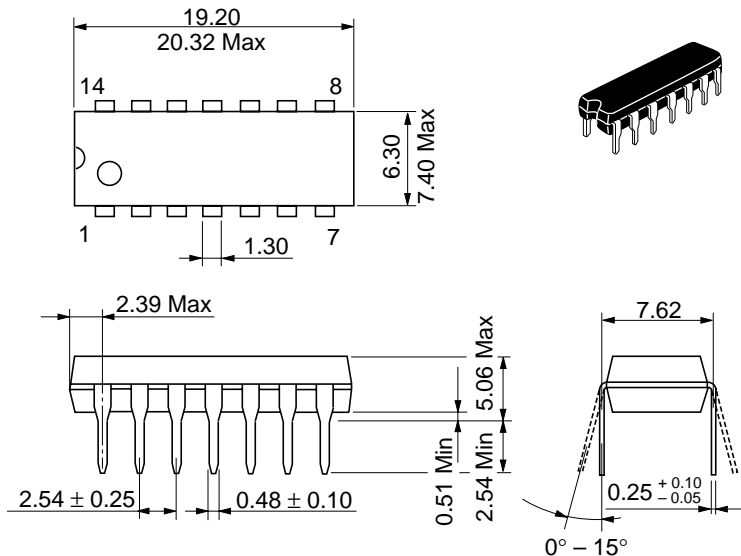
DC Characteristics

| Item                     | Symbol          | V <sub>CC</sub> (V) | Ta = 25°C |      |      | Ta = -40 to +85°C |                          | Unit | Test Conditions   |                           |
|--------------------------|-----------------|---------------------|-----------|------|------|-------------------|--------------------------|------|---|---------------------------|
|                          |                 |                     | Min       | Typ  | Max  | Min               | Max                      |      |   |                           |
| Input voltage            | V <sub>IH</sub> | 2.0                 | 1.5       | —    | —    | 1.5               | —                        | V    |   |                           |
|                          |                 | 4.5                 | 3.15      | —    | —    | 3.15              | —                        |      |   |                           |
|                          |                 | 6.0                 | 4.2       | —    | —    | 4.2               | —                        |      |   |                           |
|                          | V <sub>IL</sub> | 2.0                 | —         | —    | 0.5  | —                 | 0.5                      |      |   | V                         |
|                          |                 | 4.5                 | —         | —    | 1.35 | —                 | 1.35                     |      |   |                           |
|                          |                 | 6.0                 | —         | —    | 1.8  | —                 | 1.8                      |      |   |                           |
| Output voltage           | V <sub>OH</sub> | 2.0                 | 1.9       | 2.0  | —    | 1.9               | —                        | V    | Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -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 <sub>OH</sub> = -4 mA   |
|                          |                 | 6.0                 | 5.68      | —    | —    | 5.63              | —                        |      |   | I <sub>OH</sub> = -5.2 mA |
|                          |                 | 6.0                 | —         | 0.0  | 0.1  | —                 | 0.1                      |      |   | V                         |
|                          | 4.5             | —                   | 0.0       | 0.1  | —    | 0.1               |                          |      |   |                           |
|                          | 6.0             | —                   | 0.0       | 0.1  | —    | 0.1               |                          |      |   |                           |
|                          | 4.5             | —                   | —         | 0.26 | —    | 0.33              | I <sub>OL</sub> = 4 mA   |      |   |                           |
|                          | 6.0             | —                   | —         | 0.26 | —    | 0.33              | I <sub>OL</sub> = 5.2 mA |      |   |                           |
| Input current            | I <sub>in</sub> | 6.0                 | —         | —    | ±0.1 | —                 | ±1.0                     | μA   | Vin = V <sub>CC</sub> or GND                                      |                           |
| Quiescent supply current | I <sub>CC</sub> | 6.0                 | —         | —    | 4.0  | —                 | 40                       | μA   | Vin = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA             |                           |

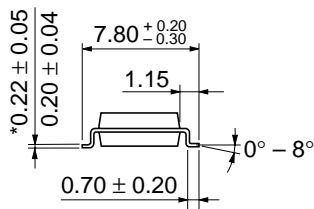
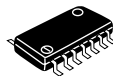
# HD74HC4024

## 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          | —                        | —   | 5   | —                                  | 4   | MHz  |                 |
|                         |           | 4.5          | —                        | —   | 25  | —                                  | 20  |      |                 |
|                         |           | 6.0          | —                        | —   | 29  | —                                  | 24  |      |                 |
| Propagation delay time  | $t_{PLH}$ | 2.0          | —                        | —   | 185 | —                                  | 230 | ns   | Clock to $Q_1$  |
|                         |           | 4.5          | —                        | 14  | 37  | —                                  | 46  |      |                 |
|                         |           | 6.0          | —                        | —   | 31  | —                                  | 39  |      |                 |
|                         | $t_{PHL}$ | 2.0          | —                        | —   | 185 | —                                  | 230 | ns   | Clock to $Q_1$  |
|                         |           | 4.5          | —                        | 14  | 37  | —                                  | 46  |      |                 |
|                         |           | 6.0          | —                        | —   | 31  | —                                  | 39  |      |                 |
|                         | $t_{PHL}$ | 2.0          | —                        | —   | 185 | —                                  | 230 | ns   | Reset to output |
|                         |           | 4.5          | —                        | 13  | 37  | —                                  | 46  |      |                 |
|                         |           | 6.0          | —                        | —   | 31  | —                                  | 39  |      |                 |
| Removal time            | $t_{rem}$ | 2.0          | 100                      | —   | —   | 125                                | —   | ns   |                 |
|                         |           | 4.5          | 20                       | 0   | —   | 25                                 | —   |      |                 |
|                         |           | 6.0          | 17                       | —   | —   | 21                                 | —   |      |                 |
| Pulse width             | $t_w$     | 2.0          | 80                       | —   | —   | 100                                | —   | ns   |                 |
|                         |           | 4.5          | 16                       | 4   | —   | 20                                 | —   |      |                 |
|                         |           | 6.0          | 14                       | —   | —   | 17                                 | —   |      |                 |
| Output rise/fall time   | $t_{TLH}$ | 2.0          | —                        | —   | 75  | —                                  | 95  | ns   |                 |
|                         | $t_{THL}$ | 4.5          | —                        | 5   | 15  | —                                  | 19  |      |                 |
|                         |           | 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   |

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