

# CDx4HC4020、CDx4HCT4020 高速 CMOS ロジック、14 段バイナリ・カウンタ

## 1 特長

- 完全静的動作
- バッファ付き入力
- コモン・リセット
- ネガティブ・エッジ・クロッキング
- ファンアウト (全温度範囲にわたって)
  - 標準出力: 10 個の LSTTL 負荷
  - バス・ドライバ出力: 15 個の LSTTL 負荷
- 広い動作温度範囲:  $-55^{\circ}\text{C}$  ~  $125^{\circ}\text{C}$
- 平衡な伝搬遅延と遷移時間
- LSTTL ロジック IC に比べて消費電力を大幅削減
- HC タイプ
  - 2V ~ 6V で動作
  - 優れたノイズ耐性:  $V_{\text{CC}}$  に対して  $N_{\text{IL}} = 30\%$ 、 $N_{\text{IH}} = 30\%$  ( $V_{\text{CC}} = 5\text{V}$  時)
- HCT タイプ
  - 4.5V ~ 5.5V で動作
  - LSTTL 入力ロジックと直接互換、 $V_{\text{IL}} = 0.8\text{V}$  (最大値)、 $V_{\text{IH}} = 2\text{V}$  (最小値)
  - CMOS 入力互換、 $V_{\text{OL}}$ 、 $V_{\text{OH}}$  で  $I_{\text{L}} \leq 1\mu\text{A}$

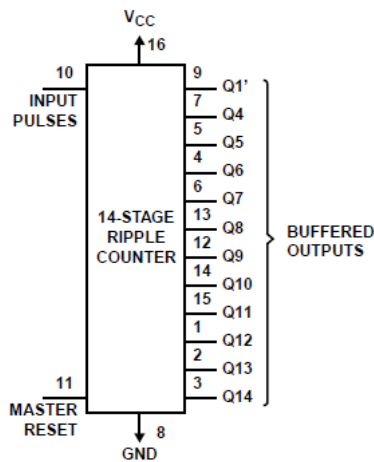
## 2 概要

'HC4020 および 'HCT4020 は、14 段リップルキャリー・バイナリ・カウンタです。すべてのカウンタ段は、コントローラ / ペリフェラルのフリップ・フロップです。段の状態は、各入力パルスの負のクロック遷移時に 1 カウント進み、MR ラインが High 電圧レベルになると、すべてのカウンタがゼロ状態にリセットされます。すべての入出力はバッファ付きです。

### 製品情報

| 部品番号                   | パッケージ <sup>(1)</sup> | 本体サイズ (公称)       |
|------------------------|----------------------|------------------|
| CD54HC4020             | J (CDIP, 16)         | 24.38mm × 6.92mm |
| CD74HC4020CD74HC4020   | D (SOIC, 16)         | 9.90mm × 3.90mm  |
|                        | N (PDIP, 16)         | 19.31mm × 6.35mm |
| CD54HCT4020            | J (CDIP, 16)         | 24.38mm × 6.92mm |
| CD74HCT4020CD74HCT4020 | D (SOIC, 16)         | 9.90mm × 3.90mm  |
|                        | N (PDIP, 16)         | 19.31mm × 6.35mm |

- (1) 利用可能なすべてのパッケージについては、このデータシートの末尾にある注文情報を参照してください。



機能ブロック図



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### 3 Revision History

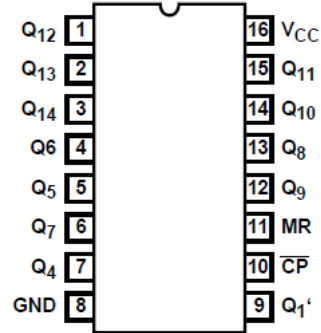
資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

#### Changes from Revision C (October 2003) to Revision D (August 2022)

Page

- 最新のデータシート規格を反映するように、文書全体の採番、書式設定、表、図、相互参照を更新..... 1

## 4 Pin Configuration and Functions



J, N, or D package  
16-PIN CDIP, PDIP, or SOIC  
Top View

## 5 Specifications

### 5.1 Absolute Maximum Ratings

|           |  |  | MIN  | MAX      | UNIT               |
|-----------|--|--|------|----------|--------------------|
| $V_{CC}$  | Supply voltage   |  | -0.5 | 7        | V                  |
| $I_{IK}$  | Input diode current                                      | For $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ |      | $\pm 20$ | mA                 |
| $I_{OK}$  | Output diode current                                     | For $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ |      | $\pm 20$ | mA                 |
| $I_O$     | Output source or sink current per output pin             | For $V_O > -0.5\text{ V}$ or $V_O < V_{CC} + 0.5\text{ V}$ |      | $\pm 25$ | mA                 |
|           | Continuous current through $V_{CC}$ or GND               |  |      | $\pm 50$ | mA                 |
| $T_J$     | Junction temperature                                     |  |      | 150      | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage temperature range                                |  | -65  | 150      | $^{\circ}\text{C}$ |
|           | Lead temperature (Soldering 10s) (SOIC - lead tips only) |  |      | 300      | $^{\circ}\text{C}$ |

### 5.2 Recommended Operating Conditions

|            |                            |           | MIN | MAX      | UNIT               |
|------------|----------------------------|-----------|-----|----------|--------------------|
| $V_{CC}$   | Supply voltage range       | HC types  | 2   | 6        | V                  |
|            |                            | HCT types | 4.5 | 5.5      |                    |
| $V_I, V_O$ | DC input or output voltage |           | 0   | $V_{CC}$ | V                  |
|            | Input rise and fall time   | 2 V       |     | 1000     | ns                 |
|            |                            | 4.5 V     |     | 500      |                    |
|            |                            | 6 V       |     | 400      |                    |
| $T_A$      | Temperature range          |           | -55 | 125      | $^{\circ}\text{C}$ |

### 5.3 Thermal Information

| THERMAL METRIC  |   | D (SOIC) | N (PDIP) | UNIT                        |
|-----------------|---|----------|----------|-----------------------------|
|                 |   | 16 PINS  | 16 PINS  |                             |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance <sup>(1)</sup> | 73       | 67       | $^{\circ}\text{C}/\text{W}$ |

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

## 5.4 Electrical Characteristics

| PARAMETER                       |   | TEST CONDITIONS <sup>(2)</sup>         | V <sub>CC</sub> (V) | 25°C |      |      | -40°C to 85°C |      | -55°C to 125°C |     | UNIT |
|---------------------------------|---|--|---------------------|------|------|------|---------------|------|----------------|-----|------|
|                                 |   |  |                     | MIN  | TYP  | MAX  | MIN           | MAX  | MIN            | MAX |      |
| <b>HC TYPES</b>                 |   |  |                     |      |      |      |               |      |                |     |      |
| V <sub>IH</sub>                 | High level input voltage                |  | 2                   | 1.5  |      | 1.5  |               | 1.5  |                | V   |      |
|                                 |   |  | 4.5                 | 3.15 |      | 3.15 |               | 3.15 |                |     |      |
|                                 |   |  | 6                   | 4.2  |      | 4.2  |               | 4.2  |                |     |      |
| V <sub>IL</sub>                 | Low level input voltage                 |  | 2                   |      | 0.5  |      | 0.5           |      | 0.5            | V   |      |
|                                 |   |  | 4.5                 |      | 1.35 |      | 1.35          |      | 1.35           |     |      |
|                                 |   |  | 6                   |      | 1.8  |      | 1.8           |      | 1.8            |     |      |
| V <sub>OH</sub>                 | High level output voltage<br>CMOS loads | I <sub>OH</sub> = -20 μA               | 2                   | 1.9  |      | 1.9  |               | 1.9  |                | V   |      |
|                                 |   | I <sub>OH</sub> = -20 μA               | 4.5                 | 4.4  |      | 4.4  |               | 4.4  |                |     |      |
|                                 |   | I <sub>OH</sub> = -20 μA               | 6                   | 5.9  |      | 5.9  |               | 5.9  |                |     |      |
|                                 | High level output voltage<br>TTL loads  | I <sub>OH</sub> = 4 mA                 | 4.5                 | 3.98 |      | 3.84 |               | 3.7  |                | V   |      |
|                                 |   | I <sub>OH</sub> = 5.2 mA               | 6                   | 5.48 |      | 5.34 |               | 5.2  |                |     |      |
| V <sub>OL</sub>                 | Low level output voltage<br>CMOS loads  | I <sub>OL</sub> = 20 μA                | 2                   |      | 0.1  |      | 0.1           |      | 0.1            | V   |      |
|                                 |   | I <sub>OL</sub> = 20 μA                | 4.5                 |      | 0.1  |      | 0.1           |      | 0.1            |     |      |
|                                 |   | I <sub>OL</sub> = 20 μA                | 6                   |      | 0.1  |      | 0.1           |      | 0.1            |     |      |
|                                 | Low level output voltage<br>TTL loads   | I <sub>OL</sub> = 4 mA                 | 4.5                 |      | 0.26 |      | 0.33          |      | 0.4            | V   |      |
|                                 |   | I <sub>OL</sub> = 5.2 mA               | 6                   |      | 0.26 |      | 0.33          |      | 0.4            |     |      |
| I <sub>I</sub>                  | Input leakage current                   | V <sub>CC</sub> or GND                 | 6                   |      | ±0.1 |      | ±1            |      | ±1             | μA  |      |
| I <sub>CC</sub>                 | Supply current                          | V <sub>CC</sub> or GND                 | 6                   |      | 8    |      | 80            |      | 160            | μA  |      |
| <b>HCT TYPES</b>                |   |  |                     |      |      |      |               |      |                |     |      |
| V <sub>IH</sub>                 | High level input voltage                |  | 4.5 to 5.5          | 2    |      |      | 2             |      | 2              | V   |      |
| V <sub>IL</sub>                 | Low level input voltage                 |  | 4.5 to 5.5          |      | 0.8  |      | 0.8           |      | 0.8            | V   |      |
| V <sub>OH</sub>                 | High level output voltage<br>CMOS loads | I <sub>OH</sub> = -20 μA               | 4.5                 | 4.4  |      | 4.4  |               | 4.4  |                | V   |      |
|                                 | High level output voltage<br>TTL loads  | I <sub>OH</sub> = -4 mA                | 4.5                 | 3.98 |      | 3.84 |               | 3.7  |                | V   |      |
| V <sub>OL</sub>                 | Low level output voltage<br>CMOS loads  | I <sub>OL</sub> = 20 μA                | 4.5                 |      | 0.1  |      | 0.1           |      | 0.1            | V   |      |
|                                 | Low level output voltage<br>TTL loads   | I <sub>OL</sub> = 4 mA                 | 4.5                 |      | 0.26 |      | 0.33          |      | 0.4            | V   |      |
| I <sub>I</sub>                  | Input leakage current                   | V <sub>CC</sub> and GND                | 5.5                 |      | ±0.1 |      | ±1            |      | ±1             | μA  |      |
| I <sub>CC</sub>                 | Supply current                          | V <sub>CC</sub> or GND                 | 5.5                 |      | 8    |      | 80            |      | 160            | μA  |      |
| ΔI <sub>CC</sub> <sup>(1)</sup> | Additional supply current per input pin | MR input held at V <sub>CC</sub> - 2.1 | 4.5 to 5.5          | 100  | 234  |      | 292.5         |      | 318.5          | μA  |      |
|                                 |   | CP input held at V <sub>CC</sub> - 2.1 | 4.5 to 5.5          | 100  | 180  |      | 225           |      | 245            | μA  |      |

(1) For dual-supply systems theoretical worst case (V<sub>I</sub> = 2.4 V, V<sub>CC</sub> = 5.5 V) specification is 1.8 mA.

(2) V<sub>I</sub> = V<sub>IH</sub> or V<sub>IL</sub>, unless otherwise noted.

## 5.5 Prerequisite for Switching Characteristics

| PARAMETER        |                               | V <sub>CC</sub> (V) | 25°C |     |     | -40°C to 85°C |     | -55°C to 125°C |     | UNIT |
|------------------|-------------------------------|---------------------|------|-----|-----|---------------|-----|----------------|-----|------|
|                  |                               |                     | MIN  | TYP | MAX | MIN           | MAX | MIN            | MAX |      |
| <b>HC TYPES</b>  |                               |                     |      |     |     |               |     |                |     |      |
| f <sub>MAX</sub> | Maximum input pulse frequency | 2                   | 6    |     |     | 5             |     | 4              |     | MHz  |
|                  |                               | 4.5                 | 30   |     |     | 25            |     | 20             |     |      |
|                  |                               | 6                   | 35   |     |     | 29            |     | 24             |     |      |
| t <sub>W</sub>   | Input pulse width             | 2                   | 80   |     |     | 100           |     | 120            |     | ns   |
|                  |                               | 4.5                 | 16   |     |     | 20            |     | 24             |     |      |
|                  |                               | 6                   | 14   |     |     | 17            |     | 20             |     |      |
| t <sub>REM</sub> | Reset removal time            | 2                   | 50   |     |     | 65            |     | 75             |     | ns   |
|                  |                               | 4.5                 | 10   |     |     | 13            |     | 15             |     |      |
|                  |                               | 6                   | 9    |     |     | 11            |     | 13             |     |      |
| t <sub>W</sub>   | Reset pulse width             | 2                   | 80   |     |     | 100           |     | 120            |     | ns   |
|                  |                               | 4.5                 | 16   |     |     | 20            |     | 24             |     |      |
|                  |                               | 6                   | 14   |     |     | 17            |     | 20             |     |      |
| <b>HCT TYPES</b> |                               |                     |      |     |     |               |     |                |     |      |
| f <sub>MAX</sub> | Maximum input pulse frequency | 4.5                 | 25   |     |     | 20            |     | 16             |     | MHz  |
| t <sub>W</sub>   | Input pulse width             | 4.5                 | 20   |     |     | 25            |     | 30             |     | ns   |
| t <sub>REC</sub> | Reset recovery time           | 4.5                 | 10   |     |     | 13            |     | 15             |     | ns   |
| t <sub>W</sub>   | Reset pulse width             | 4.5                 | 20   |     |     | 25            |     | 30             |     | ns   |

## 5.6 Switching Characteristics

Input t<sub>r</sub>, t<sub>f</sub> = 6 ns. See [Parameter Measurement Information](#)

| PARAMETER                              |  | TEST CONDITIONS        | V <sub>CC</sub> (V) | 25°C |     |     | -40°C to 85°C |     | -55°C to 125°C |     | UNIT |
|--|--|------------------------|---------------------|------|-----|-----|---------------|-----|----------------|-----|------|
|  |  |                        |                     | MIN  | TYP | MAX | MIN           | MAX | MIN            | MAX |      |
| <b>HC TYPES</b>                        |  |                        |                     |      |     |     |               |     |                |     |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Propagation delay time<br>CP to Q1' Output       | C <sub>L</sub> = 50 pF | 2                   | 140  |     |     | 175           |     | 210            |     | ns   |
|  |  |                        | 4.5                 | 28   |     |     | 35            |     | 42             |     |      |
|  |  | C <sub>L</sub> = 15 pF | 5                   | 11   |     |     |               |     |                |     |      |
|  |  | C <sub>L</sub> = 50 pF | 6                   | 24   |     |     | 30            |     | 36             |     |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Q <sub>n</sub> to Q <sub>n</sub> + 1             | C <sub>L</sub> = 50 pF | 2                   | 75   |     |     | 95            |     | 110            |     | ns   |
|  |  |                        | 4.5                 | 15   |     |     | 19            |     | 22             |     |      |
|  |  | C <sub>L</sub> = 15 pF | 5                   | 6    |     |     |               |     |                |     |      |
|  |  | C <sub>L</sub> = 50 pF | 6                   | 13   |     |     | 16            |     | 19             |     |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | MR to Q <sub>n</sub>                             | C <sub>L</sub> = 50 pF | 2                   | 170  |     |     | 215           |     | 255            |     | ns   |
|  |  |                        | 4.5                 | 34   |     |     | 43            |     | 51             |     |      |
|  |  |                        | 5                   | 14   |     |     |               |     |                |     |      |
|  |  |                        | 6                   | 29   |     |     | 37            |     | 43             |     |      |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Output transition time                           | C <sub>L</sub> = 50 pF | 2                   | 75   |     |     | 95            |     | 110            |     | ns   |
|  |  |                        | 4.5                 | 15   |     |     | 19            |     | 22             |     |      |
|  |  |                        | 6                   | 13   |     |     | 16            |     | 19             |     |      |
| C <sub>IN</sub>                        | Input capacitance                                | C <sub>L</sub> = 50 pF |                     | 10   |     |     | 10            |     | 10             |     | pF   |
| C <sub>PD</sub>                        | Power dissipation capacitance <sup>(1) (2)</sup> | C <sub>L</sub> = 15 pF | 5                   | 30   |     |     |               |     |                |     | pF   |
| <b>HCT TYPES</b>                       |  |                        |                     |      |     |     |               |     |                |     |      |

## 5.6 Switching Characteristics (continued)

Input  $t_r$ ,  $t_f$  = 6 ns. See [Parameter Measurement Information](#)

| PARAMETER                |  | TEST CONDITIONS | $V_{CC}$ (V) | 25°C |     |     | -40°C to 85°C |     | -55°C to 125°C |     | UNIT |
|--------------------------|--|-----------------|--------------|------|-----|-----|---------------|-----|----------------|-----|------|
|                          |  |                 |              | MIN  | TYP | MAX | MIN           | MAX | MIN            | MAX |      |
| $t_{PLH}$ ,<br>$t_{PHL}$ | Propagation delay time                           | $C_L = 50$ pF   | 4.5          |      | 40  |     | 50            |     | 60             | ns  |      |
|                          | CP to Q1' Output                                 | $C_L = 15$ pF   | 5            | 17   |     |     |               |     |                |     |      |
| $t_{PLH}$ ,<br>$t_{PHL}$ | Q <sub>n</sub> to Q <sub>n</sub> + 1             | $C_L = 50$ pF   | 4.5          |      | 15  |     | 19            |     | 22             | ns  |      |
|                          |  | $C_L = 15$ pF   | 5            | 6    |     |     |               |     |                |     |      |
| $t_{PLH}$ ,<br>$t_{PHL}$ | MR to Q <sub>n</sub>                             | $C_L = 50$ pF   | 4.5          |      | 40  |     | 50            |     | 60             | ns  |      |
|                          |  | $C_L = 15$ pF   | 5            | 17   |     |     |               |     |                |     |      |
| $t_{TLH}$ ,<br>$t_{THL}$ | Output transition                                | $C_L = 50$ pF   | 4.5          |      | 15  |     | 19            |     | 22             | ns  |      |
| $C_{IN}$                 | Input capacitance                                | $C_L = 50$ pF   |              |      | 10  |     | 10            |     | 10             | pF  |      |
| $C_{PD}$                 | Power dissipation capacitance <sup>(1) (2)</sup> | $C_L = 15$ pF   | 5            | 30   |     |     |               |     |                | pF  |      |

(1)  $C_{PD}$  is used to determine the dynamic power consumption, per package.

(2)  $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$  where  $f_i$  = Input frequency,  $C_L$  = Output load capacitance,  $V_{CC}$  = Supply Voltage.

## 6 Parameter Measurement Information

Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_t < 6 \text{ ns}$ .

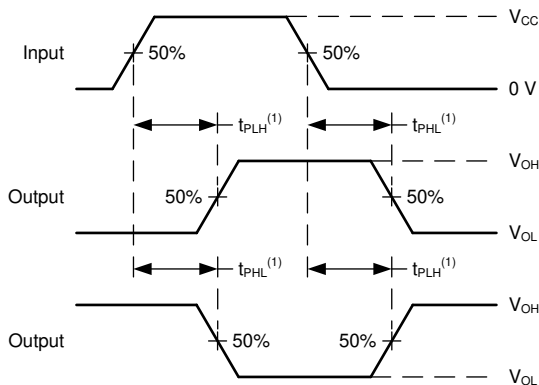
For clock inputs,  $f_{\text{max}}$  is measured when the input duty cycle is 50%.

The outputs are measured one at a time with one input transition per measurement.



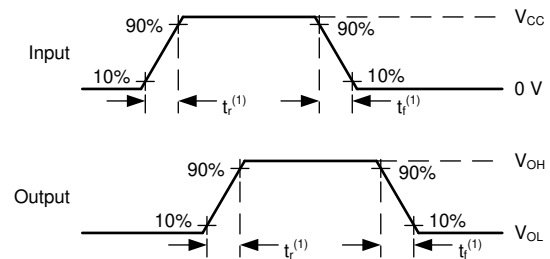
(1)  $C_L$  includes probe and test-fixture capacitance.

**6-1. Load Circuit for Push-Pull Outputs**



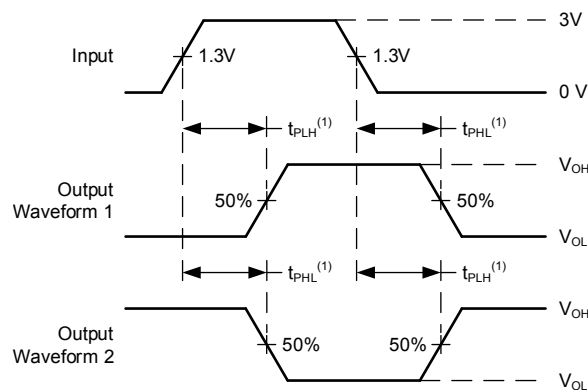
(1) The greater between  $t_{\text{pLH}}$  and  $t_{\text{pHL}}$  is the same as  $t_{\text{pd}}$ .

**6-2. Voltage Waveforms, Propagation Delays for Standard CMOS Inputs**



(1) The greater between  $t_r$  and  $t_f$  is the same as  $t_t$ .

**6-3. Voltage Waveforms, Input and Output Transition Times for Standard CMOS Inputs**



(1) The greater between  $t_{\text{pLH}}$  and  $t_{\text{pHL}}$  is the same as  $t_{\text{pd}}$ .

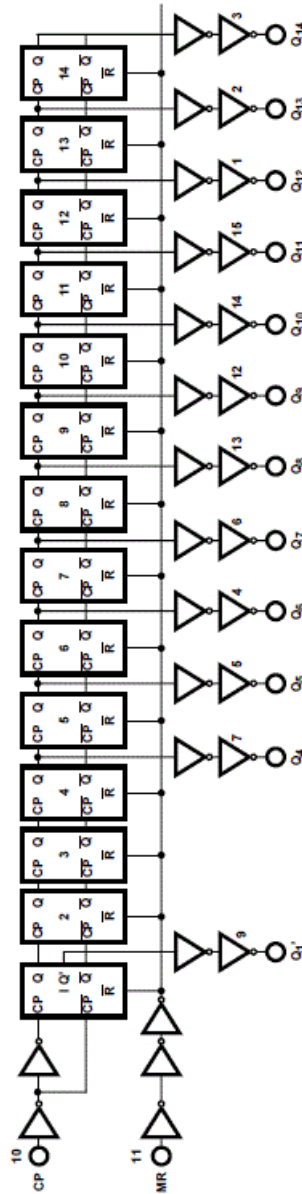
**6-4. Voltage Waveforms, Propagation Delays for TTL-Compatible Inputs**

## 7 Detailed Description

### 7.1 Overview

The 'HC4020 and 'HCT4020 are 14-stage ripple-carry binary counters. All counter stages are controller flipflops. The state of the stage advances one count on the negative clock transition of each input pulse; a high voltage level on the CLR line resets all counters to their zero state. All inputs and outputs are buffered.

### 7.2 Functional Block Diagram



**7-1. Functional Diagram**

### 7.3 Device Functional Modes

表 7-1. Truth Table

| CP COUNT <sup>(1)</sup> | MR | OUTPUT STATE          |
|-------------------------|----|-----------------------|
| ↑                       | L  | No change             |
| ↓                       | L  | Advance to next state |
| X                       | H  | All outputs are low   |

(1) H = High Voltage Level, L = Low Voltage Level, X = Don't Care  
↑ = Transition from Low to High Level, ↓ = Transition from High to Low.

## 8 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. A 0.1- $\mu\text{F}$  capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- $\mu\text{F}$  and 1- $\mu\text{F}$  capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 9 Layout

### 9.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or  $V_{CC}$ , whichever makes more sense for the logic function or is more convenient.

## 10 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

### 10.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 10.2 サポート・リソース

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### 10.3 Trademarks

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### 10.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 10.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

**PACKAGING INFORMATION**

| Orderable part number          | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)              |
|--------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------------------|
| <a href="#">5962-8945801EA</a> | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8945801EA<br>CD54HCT4020F3A |
| <a href="#">CD54HC4020F</a>    | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC4020F                      |
| CD54HC4020F.A                  | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC4020F                      |
| <a href="#">CD54HC4020F3A</a>  | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8500301EA<br>CD54HC4020F3A       |
| CD54HC4020F3A.A                | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8500301EA<br>CD54HC4020F3A       |
| <a href="#">CD54HCT4020F3A</a> | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8945801EA<br>CD54HCT4020F3A |
| CD54HCT4020F3A.A               | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8945801EA<br>CD54HCT4020F3A |
| <a href="#">CD74HC4020E</a>    | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC4020E                      |
| CD74HC4020E.A                  | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC4020E                      |
| CD74HC4020EE4                  | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC4020E                      |
| <a href="#">CD74HC4020M</a>    | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HC4020M                          |
| <a href="#">CD74HC4020M96</a>  | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -55 to 125   | HC4020M                          |
| CD74HC4020M96.A                | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4020M                          |
| CD74HC4020M961G4               | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4020M                          |
| CD74HC4020M961G4.A             | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4020M                          |
| <a href="#">CD74HCT4020E</a>   | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT4020E                     |
| CD74HCT4020E.A                 | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT4020E                     |
| <a href="#">CD74HCT4020M</a>   | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HCT4020M                         |
| <a href="#">CD74HCT4020M96</a> | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HCT4020M                         |
| CD74HCT4020M96.A               | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HCT4020M                         |
| <a href="#">CD74HCT4020MT</a>  | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HCT4020M                         |

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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**OTHER QUALIFIED VERSIONS OF CD54HC4020, CD54HCT4020, CD74HC4020, CD74HCT4020 :**

- Catalog : [CD74HC4020](#), [CD74HCT4020](#)
- Military : [CD54HC4020](#), [CD54HCT4020](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74HC4020M96    | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4020M961G4 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HCT4020M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74HC4020M96    | SOIC         | D               | 16   | 2500 | 353.0       | 353.0      | 32.0        |
| CD74HC4020M961G4 | SOIC         | D               | 16   | 2500 | 353.0       | 353.0      | 32.0        |
| CD74HCT4020M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |

**TUBE**


\*All dimensions are nominal

| Device         | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74HC4020E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4020E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4020E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4020E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4020EE4  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4020EE4  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4020E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4020E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4020E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4020E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |

# J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14                     | 16                     | 18                     | 20                     |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A             | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC |
| B MAX         | 0.785<br>(19,94)       | .840<br>(21,34)        | 0.960<br>(24,38)       | 1.060<br>(26,92)       |
| B MIN         | —                      | —                      | —                      | —                      |
| C MAX         | 0.300<br>(7,62)        | 0.300<br>(7,62)        | 0.310<br>(7,87)        | 0.300<br>(7,62)        |
| C MIN         | 0.245<br>(6,22)        | 0.245<br>(6,22)        | 0.220<br>(5,59)        | 0.245<br>(6,22)        |



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.

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