

High-Speed CMOS Logic 14-Stage Binary Counter

February 1998 - Revised October 2003

Features

- Fully Static Operation
- Buffered Inputs
- Common Reset
- Negative Edge Clocking
- Fanout (Over Temperature Range)
 - Standard Outputs 10 LSTTL Loads
 - Bus Driver Outputs 15 LSTTL Loads
- Wide Operating Temperature Range . . . -55°C to 125°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- HC Types
 - 2V to 6V Operation
 - High Noise Immunity: $N_{IL} = 30\%$, $N_{IH} = 30\%$ of V_{CC} at $V_{CC} = 5V$
- HCT Types
 - 4.5V to 5.5V Operation
 - Direct LSTTL Input Logic Compatibility, $V_{IL} = 0.8V$ (Max), $V_{IH} = 2V$ (Min)
 - CMOS Input Compatibility, $I_I \leq 1\mu A$ at V_{OL} , V_{OH}

Description

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

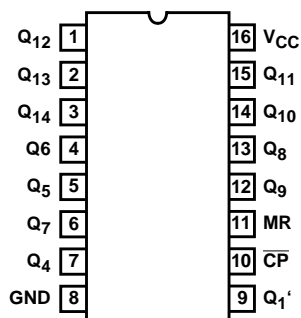
Ordering Information

| PART NUMBER | TEMP. RANGE (°C) | PACKAGE |
|----------------|------------------|--------------|
| CD54HC4020F3A | -55 to 125 | 16 Ld CERDIP |
| CD54HCT4020F3A | -55 to 125 | 16 Ld CERDIP |
| CD74HC4020E | -55 to 125 | 16 Ld PDIP |
| CD74HC4020M | -55 to 125 | 16 Ld SOIC |
| CD74HC4020MT | -55 to 125 | 16 Ld SOIC |
| CD74HC4020M96 | -55 to 125 | 16 Ld SOIC |
| CD74HCT4020E | -55 to 125 | 16 Ld PDIP |
| CD74HCT4020M | -55 to 125 | 16 Ld SOIC |
| CD74HCT4020MT | -55 to 125 | 16 Ld SOIC |
| CD74HCT4020M96 | -55 to 125 | 16 Ld SOIC |

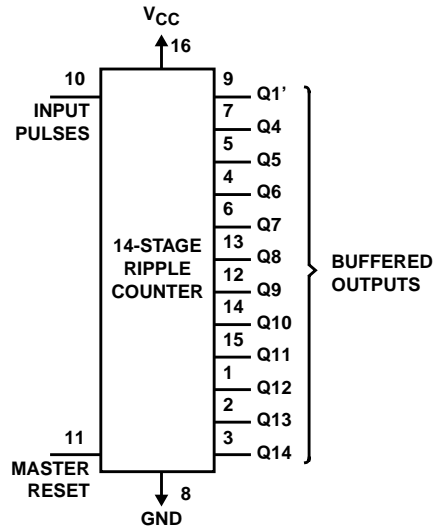
NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel. The suffix T denotes a small-quantity reel of 250.

Pinout

CD54HC4020, CD54HCT4020
(CERDIP)
CD74HC4020, CD74HCT4020
(PDIP, SOIC)
TOP VIEW



Functional Diagram

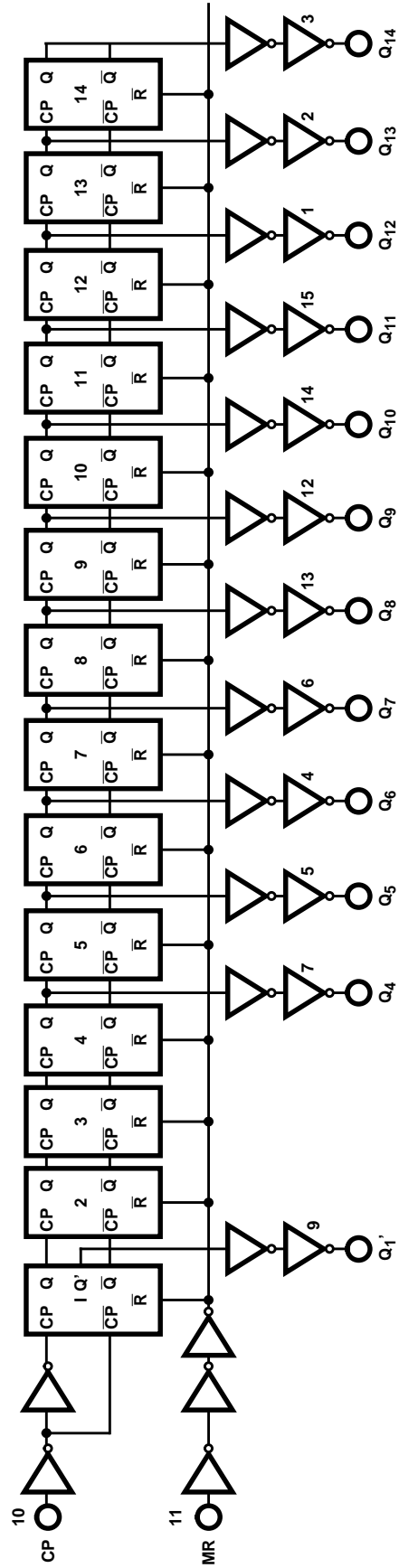


TRUTH TABLE

| CP COUNT | MR | OUTPUT STATE |
|----------|----|-----------------------|
| ↑ | L | No Change |
| ↓ | L | Advance to Next State |
| X | H | All Outputs Are Low |

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

Logic Diagram



CD54HC4020, CD74HC4020, CD54HC4020, CD74HCT4020

Absolute Maximum Ratings

| | |
|--|-------------|
| DC Supply Voltage, V_{CC} | -0.5V to 7V |
| DC Input Diode Current, I_{IK} | |
| For $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$ | $\pm 20mA$ |
| DC Output Diode Current, I_{OK} | |
| For $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$ | $\pm 20mA$ |
| DC Output Source or Sink Current per Output Pin, I_O | |
| For $V_O > -0.5V$ or $V_O < V_{CC} + 0.5V$ | $\pm 25mA$ |
| DC V_{CC} or Ground Current, I_{CC} or I_{GND} | $\pm 50mA$ |

Thermal Information

| | |
|--|----------------------------------|
| Thermal Resistance (Typical, Note 1) | θ_{JA} (°C/W) |
| E (PDIP) Package | 67 |
| M (SOIC) Package | 73 |
| Maximum Junction Temperature | 150°C |
| Maximum Storage Temperature Range | -65°C to 150°C |
| Maximum Lead Temperature (Soldering 10s) | 300°C (SOIC - Lead Tips Only) |

Operating Conditions

| | |
|---|----------------|
| Temperature Range (T_A) | -55°C to 125°C |
| Supply Voltage Range, V_{CC} | |
| HC Types | .2V to 6V |
| HCT Types | .4.5V to 5.5V |
| DC Input or Output Voltage, V_I , V_O | 0V to V_{CC} |
| Input Rise and Fall Time | |
| 2V | 1000ns (Max) |
| 4.5V | 500ns (Max) |
| 6V | 400ns (Max) |

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

- The package thermal impedance is calculated in accordance with JESD 51-7.

DC Electrical Specifications

| PARAMETER | SYMBOL | TEST CONDITIONS | | V_{CC} (V) | 25°C | | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|---|----------|----------------------|------------|-----------------|------|-----|-----------|---------------|---------|----------------|---------|---------|
| | | V_I (V) | I_O (mA) | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| HC TYPES | | | | | | | | | | | | |
| High Level Input Voltage | V_{IH} | - | - | 2 | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
| | | | | 4.5 | 3.15 | - | - | 3.15 | - | 3.15 | - | V |
| | | | | 6 | 4.2 | - | - | 4.2 | - | 4.2 | - | V |
| Low Level Input Voltage | V_{IL} | - | - | 2 | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| | | | | 4.5 | - | - | 1.35 | - | 1.35 | - | 1.35 | V |
| | | | | 6 | - | - | 1.8 | - | 1.8 | - | 1.8 | V |
| High Level Output Voltage CMOS Loads | V_{OH} | V_{IH} or V_{IL} | -0.02 | 2 | 1.9 | - | - | 1.9 | - | 1.9 | - | V |
| | | | -0.02 | 4.5 | 4.4 | - | - | 4.4 | - | 4.4 | - | V |
| | | | -0.02 | 6 | 5.9 | - | - | 5.9 | - | 5.9 | - | V |
| High Level Output Voltage TTL Loads | V_{OH} | V_{IH} or V_{IL} | - | - | - | - | - | - | - | - | - | V |
| | | | -4 | 4.5 | 3.98 | - | - | 3.84 | - | 3.7 | - | V |
| | | | -5.2 | 6 | 5.48 | - | - | 5.34 | - | 5.2 | - | V |
| Low Level Output Voltage CMOS Loads | V_{OL} | V_{IH} or V_{IL} | 0.02 | 2 | - | - | 0.1 | - | 0.1 | - | 0.1 | V |
| | | | 0.02 | 4.5 | - | - | 0.1 | - | 0.1 | - | 0.1 | V |
| | | | 0.02 | 6 | - | - | 0.1 | - | 0.1 | - | 0.1 | V |
| Low Level Output Voltage TTL Loads | V_{OL} | V_{IH} or V_{IL} | - | - | - | - | - | - | - | - | - | V |
| | | | 4 | 4.5 | - | - | 0.26 | - | 0.33 | - | 0.4 | V |
| | | | 5.2 | 6 | - | - | 0.26 | - | 0.33 | - | 0.4 | V |
| Input Leakage Current | I_I | V_{CC} or GND | - | 6 | - | - | ± 0.1 | - | ± 1 | - | ± 1 | μA |
| Quiescent Device Current | I_{CC} | V_{CC} or GND | 0 | 6 | - | - | 8 | - | 80 | - | 160 | μA |

CD54HC4020, CD74HC4020, CD54HCT4020, CD74HCT4020

DC Electrical Specifications (Continued)

| PARAMETER | SYMBOL | TEST CONDITIONS | | V _{CC} (V) | 25°C | | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|--|---------------------------|------------------------------------|---------------------|---------------------|------|-----|------|---------------|------|----------------|-----|-------|
| | | V _I (V) | I _O (mA) | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| HCT TYPES | | | | | | | | | | | | |
| High Level Input Voltage | V _{IH} | - | - | 4.5 to 5.5 | 2 | - | - | 2 | - | 2 | - | V |
| Low Level Input Voltage | V _{IL} | - | - | 4.5 to 5.5 | - | - | 0.8 | - | 0.8 | - | 0.8 | V |
| High Level Output Voltage CMOS Loads | V _{OH} | V _{IH} or V _{IL} | -0.02 | 4.5 | 4.4 | - | - | 4.4 | - | 4.4 | - | V |
| High Level Output Voltage TTL Loads | | | -4 | 4.5 | 3.98 | - | - | 3.84 | - | 3.7 | - | V |
| Low Level Output Voltage CMOS Loads | V _{OL} | V _{IH} or V _{IL} | 0.02 | 4.5 | - | - | 0.1 | - | 0.1 | - | 0.1 | V |
| Low Level Output Voltage TTL Loads | | | 4 | 4.5 | - | - | 0.26 | - | 0.33 | - | 0.4 | V |
| Input Leakage Current | I _I | V _{CC} and GND | 0 | 5.5 | - | - | ±0.1 | - | ±1 | - | ±1 | μA |
| Quiescent Device Current | I _{CC} | V _{CC} or GND | 0 | 5.5 | - | - | 8 | - | 80 | - | 160 | μA |
| Additional Quiescent Device Current Per Input Pin: 1 Unit Load | ΔI _{CC} (Note 2) | V _{CC} -2.1 | - | 4.5 to 5.5 | - | 100 | 360 | - | 450 | - | 490 | μA |

NOTE:

- For dual-supply systems theoretical worst case (V_I = 2.4V, V_{CC} = 5.5V) specification is 1.8mA.

HCT Input Loading Table

| INPUT | UNIT LOADS |
|-------|------------|
| MR | 0.65 |
| CP | 0.5 |

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Table, e.g., 360μA max at 25°C.

Prerequisite for Switching Specifications

| PARAMETER | SYMBOL | V _{CC} (V) | 25°C | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|-------------------------------|------------------|---------------------|------|-----|---------------|-----|----------------|-----|-------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| HC TYPES | | | | | | | | | |
| Maximum Input Pulse Frequency | f _{MAX} | 2 | 6 | - | 5 | - | 4 | - | MHz |
| | | 4.5 | 30 | - | 25 | - | 20 | - | MHz |
| | | 6 | 35 | - | 29 | - | 24 | - | MHz |
| Input Pulse Width | t _w | 2 | 80 | - | 100 | - | 120 | - | ns |
| | | 4.5 | 16 | - | 20 | - | 24 | - | ns |
| | | 6 | 14 | - | 17 | - | 20 | - | ns |

CD54HC4020, CD74HC4020, CD54HCT4020, CD74HCT4020

Prerequisite for Switching Specifications (Continued)

| PARAMETER | SYMBOL | V _{CC} (V) | 25°C | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|--------------------|------------------|---------------------|------|-----|---------------|-----|----------------|-----|-------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| Reset Removal Time | t _{REM} | 2 | 50 | - | 65 | - | 75 | - | ns |
| | | 4.5 | 10 | - | 13 | - | 15 | - | ns |
| | | 6 | 9 | - | 11 | - | 13 | - | ns |
| Reset Pulse Width | t _W | 2 | 80 | - | 100 | - | 120 | - | ns |
| | | 4.5 | 16 | - | 20 | - | 24 | - | ns |
| | | 6 | 14 | - | 17 | - | 20 | - | ns |

HCT TYPES

| | | | | | | | | | |
|-------------------------------|------------------|-----|----|---|----|---|----|---|-----|
| Maximum Input Pulse Frequency | f _{MAX} | 4.5 | 25 | - | 20 | - | 16 | - | MHz |
| Input Pulse Width | t _W | 4.5 | 20 | - | 25 | - | 30 | - | ns |
| Reset Recovery Time | t _{REC} | 4.5 | 10 | - | 13 | - | 15 | - | ns |
| Reset Pulse Width | t _W | 4.5 | 20 | - | 25 | - | 30 | - | ns |

Switching Specifications Input t_r, t_f = 6ns

| PARAMETER | SYMBOL | TEST CONDITIONS | V _{CC} (V) | 25°C | | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|---|--|-----------------------|---------------------|------|-----|-----|---------------|-----|----------------|-----|-------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| HC TYPES | | | | | | | | | | | |
| Propagation Delay Time (Figure 1) CP to Q1' Output | t _{PLH} , t _{PHL} | C _L = 50pF | 2 | - | - | 140 | - | 175 | - | 210 | ns |
| | | | 4.5 | - | - | 28 | - | 35 | - | 42 | ns |
| | | C _L = 15pF | 5 | - | 11 | - | - | - | - | - | ns |
| | | C _L = 50pF | 6 | - | - | 24 | - | 30 | - | 36 | ns |
| Q _n to Q _n + 1 | t _{PLH} , t _{PHL} | C _L = 50pF | 2 | - | - | 75 | - | 95 | - | 110 | ns |
| | | | 4.5 | - | - | 15 | - | 19 | - | 22 | ns |
| | | C _L = 15pF | 5 | - | 6 | - | - | - | - | - | ns |
| | | C _L = 50pF | 6 | - | - | 13 | - | 16 | - | 19 | ns |
| MR to Q _n | t _{PLH} , t _{PHL} | C _L = 50pF | 2 | - | - | 170 | - | 215 | - | 255 | ns |
| | | | 4.5 | - | - | 34 | - | 43 | - | 51 | ns |
| | | | 5 | - | 14 | - | - | - | - | - | ns |
| | | | 6 | - | - | 29 | - | 37 | - | 43 | ns |
| Output Transition Time (Figure 1) | t _{TLH} , t _{THL} | C _L = 50pF | 2 | - | - | 75 | - | 95 | - | 110 | ns |
| | | | 4.5 | - | - | 15 | - | 19 | - | 22 | ns |
| | | | 6 | - | - | 13 | - | 16 | - | 19 | ns |
| Input Capacitance | C _{IN} | C _L = 50pF | - | - | - | 10 | - | 10 | - | 10 | pF |
| Power Dissipation Capacitance (Notes 3, 4) | C _{PD} | C _L = 15pF | 5 | - | 30 | - | - | - | - | - | pF |

CD54HC4020, CD74HC4020, CD54HCT4020, CD74HCT4020

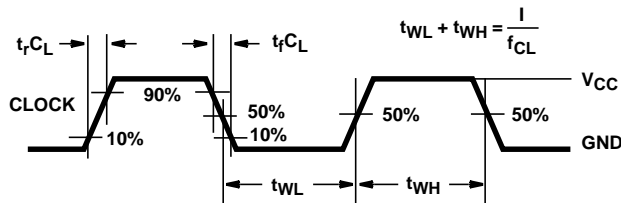
Switching Specifications Input $t_r, t_f = 6\text{ns}$ (Continued)

| PARAMETER | SYMBOL | TEST CONDITIONS | V _{CC} (V) | 25°C | | | -40°C TO 85°C | | -55°C TO 125°C | | UNITS |
|---|--------------------|---------------------|---------------------|------|-----|-----|---------------|-----|----------------|-----|-------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| HCT TYPES | | | | | | | | | | | |
| Propagation Delay Time (Figure 2) CP to Q1' Output | t_{PLH}, t_{PHL} | $C_L = 50\text{pF}$ | 4.5 | - | - | 40 | - | 50 | - | 60 | ns |
| | | $C_L = 15\text{pF}$ | 5 | - | 17 | - | - | - | - | - | ns |
| Q_n to Q_{n+1} | t_{PLH}, t_{PHL} | $C_L = 50\text{pF}$ | 4.5 | - | - | 15 | - | 19 | - | 22 | ns |
| | | $C_L = 15\text{pF}$ | 5 | - | 6 | - | - | - | - | - | ns |
| MR to Q_n | t_{PLH}, t_{PHL} | $C_L = 50\text{pF}$ | 4.5 | - | - | 40 | - | 50 | - | 60 | ns |
| | | $C_L = 15\text{pF}$ | 5 | - | 17 | - | - | - | - | - | ns |
| Output Transition | t_{TLH}, t_{THL} | $C_L = 50\text{pF}$ | 4.5 | - | - | 15 | - | 19 | - | 22 | ns |
| Input Capacitance | C_{IN} | $C_L = 15\text{pF}$ | - | - | - | 10 | - | 10 | - | 10 | pF |
| Power Dissipation Capacitance (Notes 3, 4) | C_{PD} | $C_L = 15\text{pF}$ | 5 | - | 30 | - | - | - | - | - | pF |

NOTES:

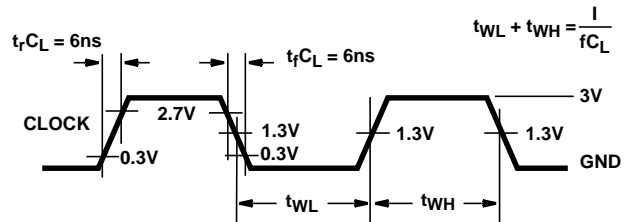
- C_{PD} is used to determine the dynamic power consumption, per package.
- $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where f_i = Input Frequency, C_L = Output Load Capacitance, V_{CC} = Supply Voltage.

Test Circuits and Waveforms



NOTE: Outputs should be switching from 10% V_{CC} to 90% V_{CC} in accordance with device truth table. For f_{MAX} , input duty cycle = 50%.

FIGURE 1. HC CLOCK PULSE RISE AND FALL TIMES AND PULSE WIDTH



NOTE: Outputs should be switching from 10% V_{CC} to 90% V_{CC} in accordance with device truth table. For f_{MAX} , input duty cycle = 50%.

FIGURE 2. HCT CLOCK PULSE RISE AND FALL TIMES AND PULSE WIDTH

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|----------------------------|-------------------------|----------------------|--------------|----------------------------------|-------------------------|
| 5962-8945801EA | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-8945801EA CD54HCT4020F3A | Samples |
| CD54HC4020F | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | CD54HC4020F | Samples |
| CD54HC4020F3A | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 8500301EA CD54HC4020F3A | Samples |
| CD54HCT4020F3A | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-8945801EA CD54HCT4020F3A | Samples |
| CD74HC4020E | ACTIVE | PDIP | N | 16 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type | -55 to 125 | CD74HC4020E | Samples |
| CD74HC4020EE4 | ACTIVE | PDIP | N | 16 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type | -55 to 125 | CD74HC4020E | Samples |
| CD74HC4020M | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HC4020M | Samples |
| CD74HC4020M96 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HC4020M | Samples |
| CD74HC4020M96E4 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HC4020M | Samples |
| CD74HCT4020E | ACTIVE | PDIP | N | 16 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type | -55 to 125 | CD74HCT4020E | Samples |
| CD74HCT4020M | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HCT4020M | Samples |
| CD74HCT4020M96 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HCT4020M | Samples |
| CD74HCT4020MT | ACTIVE | SOIC | D | 16 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -55 to 125 | HCT4020M | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm threshold requirement.

(3) **MSL, Peak Temp.** - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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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 |
| 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 | 333.2 | 345.9 | 28.6 |
| CD74HCT4020M96 | SOIC | D | 16 | 2500 | 333.2 | 345.9 | 28.6 |

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



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

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.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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.

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