

August 1997 - Revised October 2003

## High-Speed CMOS Logic Hex D-Type Flip-Flop with Reset

### Features

- Buffered Positive Edge Triggered Clock
- Asynchronous Common Reset
- 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 'HC174 and 'HCT174 are edge triggered flip-flops which utilize silicon gate CMOS circuitry to implement D-type flip-flops. They possess low power and speeds comparable to low power Schottky TTL circuits. The devices contain six master-slave flip-flops with a common clock and common reset. Data on the D input having the specified setup and hold

times is transferred to the Q output on the low to high transition of the CLOCK input. The MR input, when low, sets all outputs to a low state.

Each output can drive ten low power Schottky TTL equivalent loads. The 'HCT174 is functional as well as, pin compatible to the 'LS174.

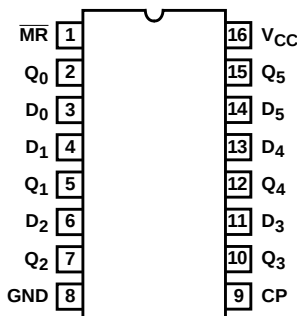
### Ordering Information

| PART NUMBER   | TEMP. RANGE (°C) | PACKAGE      |
|---------------|------------------|--------------|
| CD54HC174F3A  | -55 to 125       | 16 Ld CERDIP |
| CD54HCT174F3A | -55 to 125       | 16 Ld CERDIP |
| CD74HC174E    | -55 to 125       | 16 Ld PDIP   |
| CD74HC174M    | -55 to 125       | 16 Ld SOIC   |
| CD74HC174MT   | -55 to 125       | 16 Ld SOIC   |
| CD74HC174M96  | -55 to 125       | 16 Ld SOIC   |
| CD74HCT174E   | -55 to 125       | 16 Ld PDIP   |
| CD74HCT174M   | -55 to 125       | 16 Ld SOIC   |
| CD74HCT174MT  | -55 to 125       | 16 Ld SOIC   |
| CD74HCT174M96 | -55 to 125       | 16 Ld SOIC   |

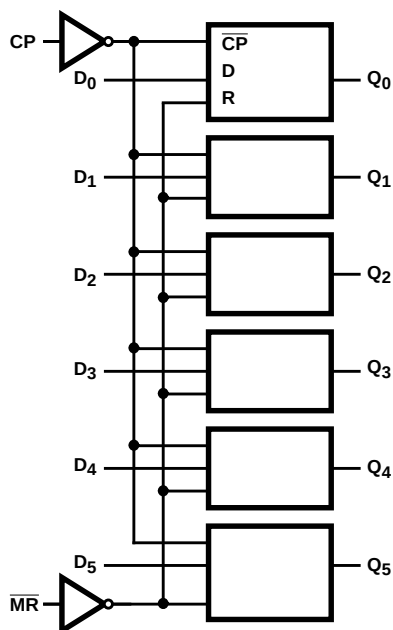
NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel. The suffix T denotes a small-quantity reel of 250.

### Pinout

CD54HC174, CD54HCT174  
(CERDIP)  
CD74HC174, CD74HCT174  
(PDIP, SOIC)  
TOP VIEW



## Functional Diagram

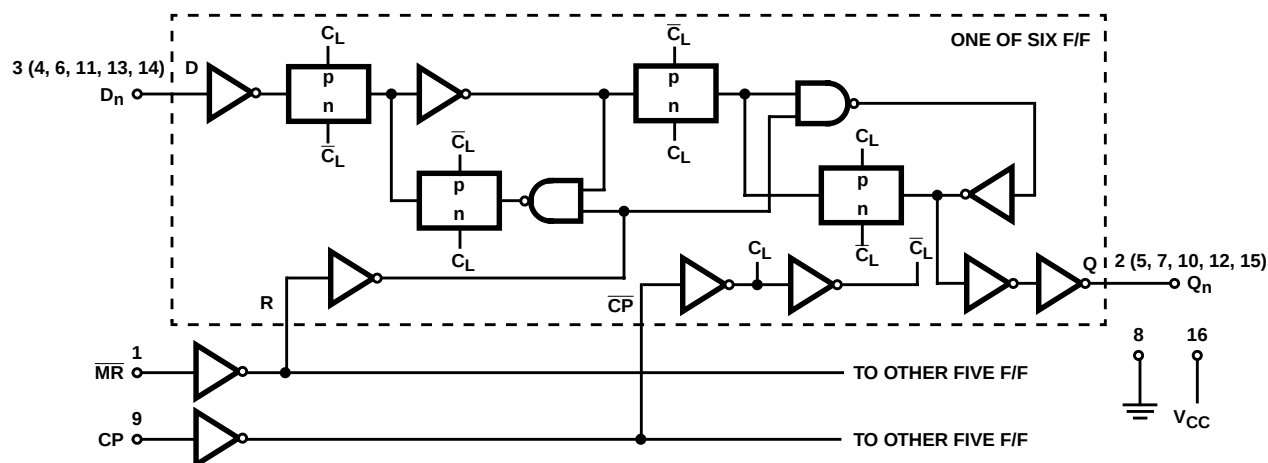


TRUTH TABLE

| INPUTS                    |            |            | OUTPUT |
|---------------------------|------------|------------|--------|
| RESET ( $\overline{MR}$ ) | CLOCK CP   | DATA $D_n$ | $Q_n$  |
| L                         | X          | X          | L      |
| H                         | $\uparrow$ | H          | H      |
| H                         | $\uparrow$ | L          | L      |
| H                         | L          | X          | $Q_0$  |

H = High Voltage Level, L = Low Voltage Level, X = Irrelevant,  $\uparrow$  = Transition from Low to High Level,  $Q_0$  = Level Before the Indicated Steady-State Input Conditions Were Established

## Logic Diagram



# CD54HC174, CD74HC174, CD54HCT174, CD74HCT174

## 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)     | $\theta_{JA}$ ( $^{\circ}C/W$ )            |
| E (PDIP) Package                         | 67                                         |
| M (SOIC) Package                         | 73                                         |
| Maximum Junction Temperature             | 150 $^{\circ}C$                            |
| Maximum Storage Temperature Range        | -65 $^{\circ}C$ to 150 $^{\circ}C$         |
| Maximum Lead Temperature (Soldering 10s) | 300 $^{\circ}C$<br>(SOIC - Lead Tips Only) |

## Operating Conditions

|                                           |                                    |
|-------------------------------------------|------------------------------------|
| Temperature Range ( $T_A$ )               | -55 $^{\circ}C$ to 125 $^{\circ}C$ |
| 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:

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

## DC Electrical Specifications

| PARAMETER                               | SYMBOL          | TEST CONDITIONS                       |                     | V <sub>CC</sub> (V) | 25°C |     |      | -40°C TO +85°C |      | -55°C TO 125°C |      | UNITS |
|-----------------------------------------|-----------------|---------------------------------------|---------------------|---------------------|------|-----|------|----------------|------|----------------|------|-------|
|                                         |                 | V <sub>I</sub> (V)                    | I <sub>O</sub> (mA) |                     | MIN  | TYP | MAX  | MIN            | MAX  | MIN            | MAX  |       |
| HC TYPES                                |                 |                                       |                     |                     |      |     |      |                |      |                |      |       |
| High Level Input Voltage                | V <sub>IH</sub> | -                                     | -                   | 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 <sub>IL</sub> | -                                     | -                   | 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<br>CMOS Loads | V <sub>OH</sub> | V <sub>IH</sub> or<br>V <sub>IL</sub> | -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     |
| -4                                      |                 |                                       | 4.5                 | 3.98                | -    | -   | 3.84 | -              | 3.7  | -              | V    |       |
| -5.2                                    |                 |                                       | 6                   | 5.48                | -    | -   | 5.34 | -              | 5.2  | -              | V    |       |
| High Level Output Voltage<br>TTL Loads  |                 |                                       |                     |                     |      |     |      |                |      |                |      |       |
| Low Level Output Voltage<br>CMOS Loads  | V <sub>OL</sub> | V <sub>IH</sub> or<br>V <sub>IL</sub> | 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     |
|                                         |                 |                                       | 4                   | 4.5                 | -    | -   | 0.26 | -              | 0.33 | -              | 0.4  | V     |
|                                         |                 |                                       | 5.2                 | 6                   | -    | -   | 0.26 | -              | 0.33 | -              | 0.4  | V     |
| Low Level Output Voltage<br>TTL Loads   |                 |                                       |                     |                     |      |     |      |                |      |                |      |       |
| Input Leakage Current                   | I <sub>I</sub>  | V <sub>CC</sub> or<br>GND             | -                   | 6                   | -    | -   | ±0.1 | -              | ±1   | -              | ±1   | μA    |
| Quiescent Device Current                | I <sub>CC</sub> | V <sub>CC</sub> or<br>GND             | 0                   | 6                   | -    | -   | 8    | -              | 80   | -              | 160  | μA    |

# **CD54HC174, CD74HC174, CD54HCT174, CD74HCT174**

## **DC Electrical Specifications (Continued)**

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

NOTE:

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

## **HCT Input Loading Table**

| INPUT | UNIT LOADS |
|-------|------------|
| CP    | 0.80       |
| MR    | 0.55       |
| D     | 0.15       |

NOTE: Unit Load is ΔI<sub>CC</sub> limit specified in DC Electrical Specifications table, e.g. 360μA max at 25°C.

## **Prerequisite For Switching Function**

| PARAMETER         | SYMBOL         | TEST CONDITIONS | V <sub>CC</sub> (V) | 25°C |     | -40°C TO 85°C |     | -55°C TO 125°C |     | UNITS |
|-------------------|----------------|-----------------|---------------------|------|-----|---------------|-----|----------------|-----|-------|
|                   |                |                 |                     | MIN  | MAX | MIN           | MAX | MIN            | MAX |       |
| HC TYPES          |                |                 |                     |      |     |               |     |                |     |       |
| Clock Pulse Width | t <sub>w</sub> | -               | 2                   | 80   | -   | 100           | -   | 120            | -   | ns    |
|                   |                |                 | 4.5                 | 16   | -   | 20            | -   | 24             | -   | ns    |
|                   |                |                 | 6                   | 14   | -   | 17            | -   | 20             | -   | ns    |
| MR Pulse Width    | t <sub>w</sub> | -               | 2                   | 80   | -   | 100           | -   | 120            | -   | ns    |
|                   |                |                 | 4.5                 | 16   | -   | 20            | -   | 24             | -   | ns    |
|                   |                |                 | 6                   | 14   | -   | 17            | -   | 20             | -   | ns    |

# CD54HC174, CD74HC174, CD54HCT174, CD74HCT174

## Prerequisite For Switching Function (Continued)

| PARAMETER                                     | SYMBOL           | TEST CONDITIONS | V <sub>CC</sub> (V) | 25°C |     | -40°C TO 85°C |     | -55°C TO 125°C |     | UNITS |
|-----------------------------------------------|------------------|-----------------|---------------------|------|-----|---------------|-----|----------------|-----|-------|
|                                               |                  |                 |                     | MIN  | MAX | MIN           | MAX | MIN            | MAX |       |
| Setup Time, Data to Clock                     | t <sub>SU</sub>  | -               | 2                   | 60   | -   | 75            | -   | 90             | -   | ns    |
|                                               |                  |                 | 4.5                 | 12   | -   | 15            | -   | 18             | -   | ns    |
|                                               |                  |                 | 6                   | 10   | -   | 13            | -   | 15             | -   | ns    |
| Hold Time, Data to Clock                      | t <sub>H</sub>   | -               | 2                   | 5    | -   | 5             | -   | 5              | -   | ns    |
|                                               |                  |                 | 4.5                 | 5    | -   | 5             | -   | 5              | -   | ns    |
|                                               |                  |                 | 6                   | 5    | -   | 5             | -   | 5              | -   | ns    |
| Removal Time, $\overline{\text{MR}}$ to Clock | t <sub>REM</sub> | -               | 2                   | 5    | -   | 5             | -   | 5              | -   | ns    |
|                                               |                  |                 | 4.5                 | 5    | -   | 5             | -   | 5              | -   | ns    |
|                                               |                  |                 | 6                   | 5    | -   | 5             | -   | 5              | -   | ns    |
| Clock Frequency                               | f <sub>MAX</sub> | -               | 2                   | 6    | -   | 5             | -   | 4              | -   | MHz   |
|                                               |                  |                 | 4.5                 | 30   | -   | 24            | -   | 20             | -   | MHz   |
|                                               |                  |                 | 6                   | 35   | -   | 28            | -   | 24             | -   | MHz   |

### HCT TYPES

|                                               |                  |   |     |    |   |    |   |    |   |     |
|-----------------------------------------------|------------------|---|-----|----|---|----|---|----|---|-----|
| Clock Pulse Width                             | t <sub>w</sub>   | - | 4.5 | 20 | - | 25 | - | 30 | - | ns  |
| $\overline{\text{MR}}$ Pulse Width            | t <sub>w</sub>   | - | 6   | 25 | - | 31 | - | 38 | - | ns  |
| Setup Time, Data to Clock                     | t <sub>SU</sub>  | - | 4.5 | 16 | - | 20 | - | 24 | - | ns  |
| Hold Time, Data to Clock                      | t <sub>H</sub>   | - | 6   | 5  | - | 5  | - | 5  | - | ns  |
| Removal Time, $\overline{\text{MR}}$ to Clock | t <sub>REM</sub> | - | 4.5 | 12 | - | 15 | - | 18 | - | ns  |
| Clock Frequency                               | f <sub>MAX</sub> | - | 6   | 25 | - | 20 | - | 17 | - | MHz |

## Switching Specifications Input t<sub>r</sub>, t<sub>f</sub> = 6ns

| PARAMETER                                        | SYMBOL                              | TEST<br>CONDITIONS    | V <sub>CC</sub> (V) | 25°C |     | -40°C TO 85°C | -55°C TO 125°C | UNITS |
|--------------------------------------------------|-------------------------------------|-----------------------|---------------------|------|-----|---------------|----------------|-------|
|                                                  |                                     |                       |                     | TYP  | MAX | MAX           | MAX            |       |
| HC TYPES                                         |                                     |                       |                     |      |     |               |                |       |
| Propagation Delay, Clock to Q                    | t <sub>PLH</sub> , t <sub>PHL</sub> | C <sub>L</sub> = 50pF | 2                   | -    | 165 | 205           | 250            | ns    |
|                                                  |                                     |                       | 4.5                 | -    | 33  | 41            | 50             | ns    |
|                                                  |                                     |                       | 6                   | -    | 28  | 35            | 43             | ns    |
|                                                  |                                     | C <sub>L</sub> = 15pF | 5                   | 13   | -   | -             | -              | ns    |
| Propagation Delay, $\overline{\text{MR}}$ to Q   | t <sub>PLH</sub> , t <sub>PHL</sub> | C <sub>L</sub> = 50pF | 2                   | -    | 150 | 190           | 225            | ns    |
|                                                  |                                     |                       | 4.5                 | -    | 30  | 38            | 45             | ns    |
|                                                  |                                     |                       | 6                   | -    | 26  | 33            | 38             | ns    |
|                                                  |                                     | C <sub>L</sub> = 15pF | 5                   | 12   | -   | -             | -              | ns    |
| Output Transition Times                          | t <sub>TLH</sub> , t <sub>THL</sub> | C <sub>L</sub> = 50pF | 2                   | -    | 75  | 95            | 110            | ns    |
|                                                  |                                     |                       | 4.5                 | -    | 15  | 19            | 22             | ns    |
|                                                  |                                     |                       | 6                   | -    | 13  | 16            | 19             | ns    |
| Input Capacitance                                | C <sub>IN</sub>                     | -                     | -                   | -    | 10  | 10            | 10             | pF    |
| Power Dissipation<br>Capacitance<br>(Notes 3, 4) | C <sub>PD</sub>                     | -                     | 5                   | 38   | -   | -             | -              | pF    |

# CD54HC174, CD74HC174, CD54HCT174, CD74HCT174

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

| PARAMETER                                     | SYMBOL                              | TEST CONDITIONS       | V <sub>CC</sub> (V) | 25°C |     | -40°C TO 85°C | -55°C TO 125°C | UNITS |
|-----------------------------------------------|-------------------------------------|-----------------------|---------------------|------|-----|---------------|----------------|-------|
|                                               |                                     |                       |                     | TYP  | MAX | MAX           | MAX            |       |
| HCT TYPES                                     |                                     |                       |                     |      |     |               |                |       |
| Propagation Delay, Clock to Q                 | t <sub>PLH</sub> , t <sub>PHL</sub> | C <sub>L</sub> = 50pF | 4.5                 | -    | 40  | 50            | 60             | ns    |
|                                               |                                     | C <sub>L</sub> = 15pF | 5                   | 17   | -   | -             | -              | ns    |
| Propagation Delay, $\overline{MR}$ to Q       | t <sub>PLH</sub> , t <sub>PHL</sub> | C <sub>L</sub> = 50pF | 4.5                 | -    | 44  | 55            | 66             | ns    |
|                                               |                                     | C <sub>L</sub> = 15pF | 5                   | 18   | -   | -             | -              | ns    |
| Output Transition Times                       | t <sub>TLH</sub> , t <sub>THL</sub> | C <sub>L</sub> = 50pF | 4.5                 | -    | 15  | 19            | 22             | ns    |
| Input Capacitance                             | C <sub>IN</sub>                     | -                     | -                   | -    | 10  | 10            | 10             | pF    |
| Power Dissipation Capacitance<br>(Notes 3, 4) | C <sub>PD</sub>                     | -                     | 5                   | 44   | -   | -             | -              | pF    |

### NOTES:

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

## Test Circuits and Waveforms

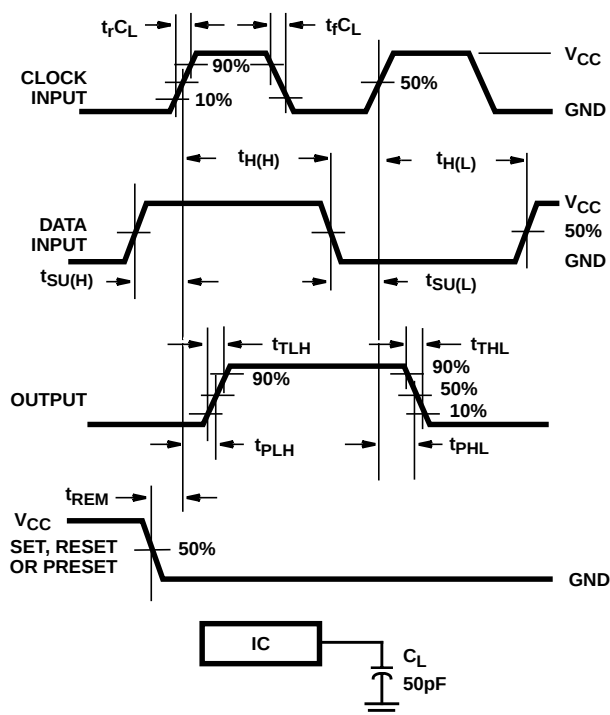


FIGURE 1. HC SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS

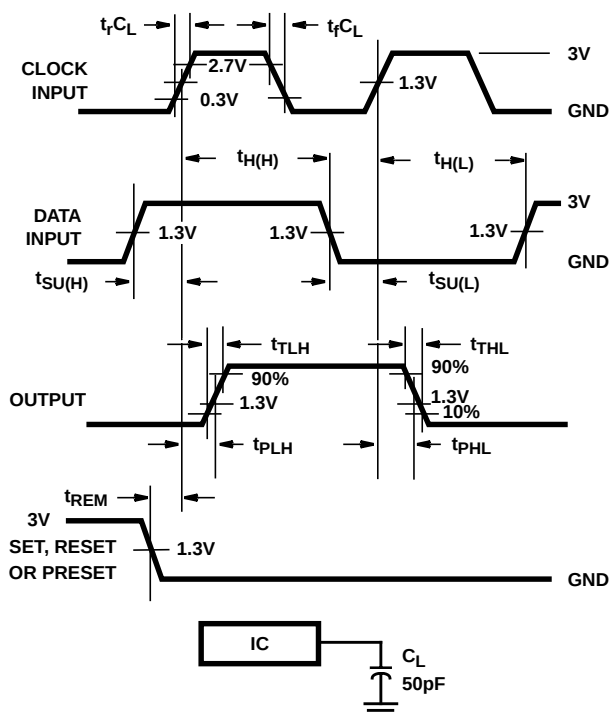


FIGURE 2. HCT SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS

## 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="#">5962-8974301EA</a> | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8974301EA<br>CD54HCT174F3A |
| <a href="#">CD54HC174F</a>     | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC174F                      |
| CD54HC174F.A                   | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC174F                      |
| <a href="#">CD54HC174F3A</a>   | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8407301EA<br>CD54HC174F3A       |
| CD54HC174F3A.A                 | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8407301EA<br>CD54HC174F3A       |
| <a href="#">CD54HCT174F</a>    | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HCT174F                     |
| CD54HCT174F.A                  | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HCT174F                     |
| <a href="#">CD54HCT174F3A</a>  | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8974301EA<br>CD54HCT174F3A |
| CD54HCT174F3A.A                | Active        | Production           | CDIP (J)   16  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-8974301EA<br>CD54HCT174F3A |
| <a href="#">CD74HC174E</a>     | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC174E                      |
| CD74HC174E.A                   | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC174E                      |
| <a href="#">CD74HC174M</a>     | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HC174M                          |
| <a href="#">CD74HC174M96</a>   | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC174M                          |
| CD74HC174M96.A                 | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC174M                          |
| CD74HC174M96E4                 | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC174M                          |
| <a href="#">CD74HCT174E</a>    | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT174E                     |
| CD74HCT174E.A                  | Active        | Production           | PDIP (N)   16  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT174E                     |
| <a href="#">CD74HCT174M</a>    | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HCT174M                         |
| <a href="#">CD74HCT174M96</a>  | NRND          | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HCT174M                         |
| CD74HCT174M96.A                | NRND          | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HCT174M                         |
| <a href="#">CD74HCT174MT</a>   | Obsolete      | Production           | SOIC (D)   16  | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HCT174M                         |

<sup>(1)</sup> **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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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

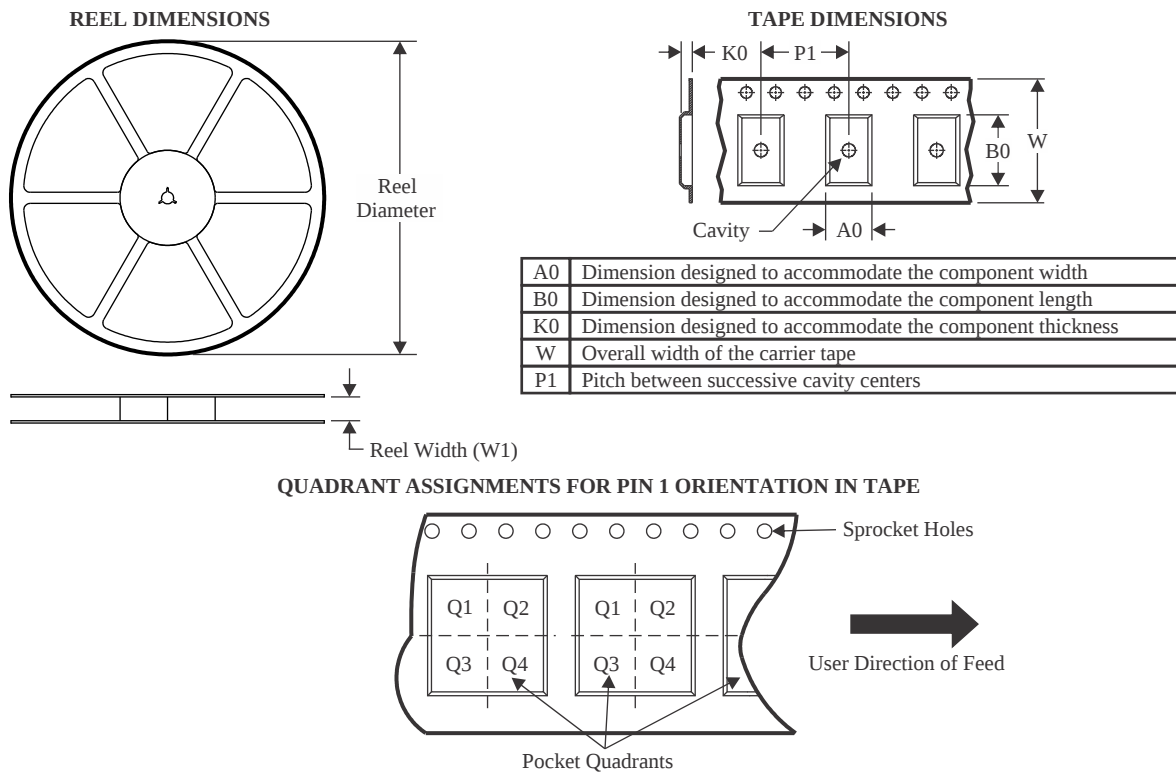
**OTHER QUALIFIED VERSIONS OF CD54HC174, CD54HCT174, CD74HC174, CD74HCT174 :**

- Catalog : [CD74HC174](#), [CD74HCT174](#)
- Military : [CD54HC174](#), [CD54HCT174](#)

NOTE: Qualified Version Definitions:

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

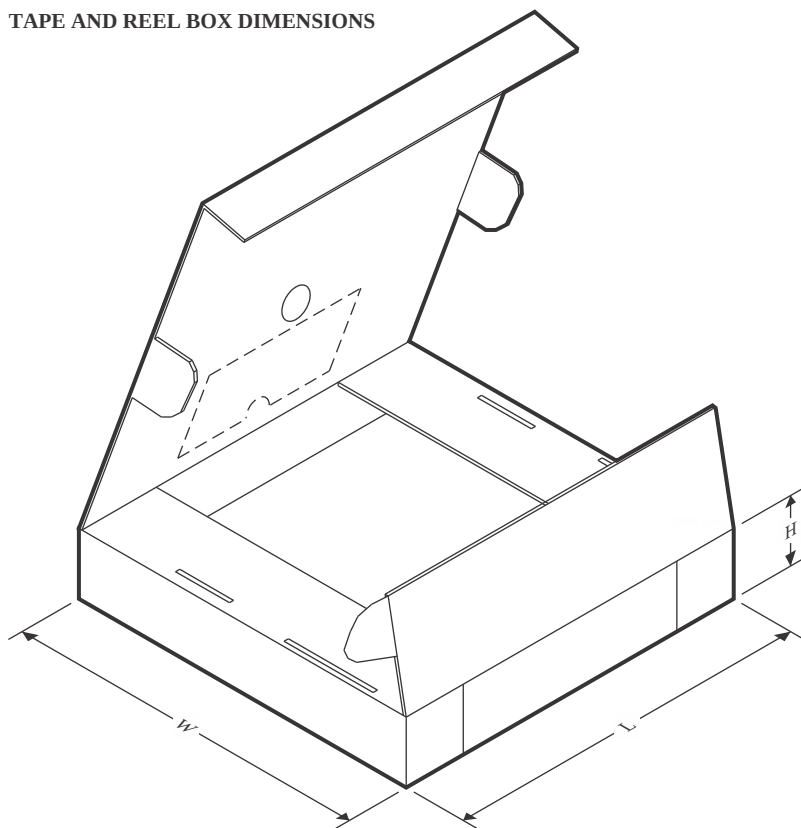
## TAPE AND REEL INFORMATION



\*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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74HC174M96  | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HCT174M96 | 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

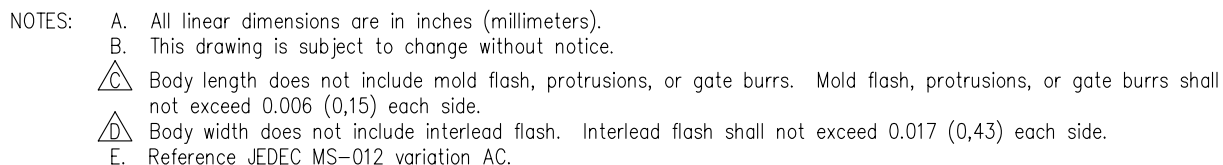
| Device        | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74HC174M96  | SOIC         | D               | 16   | 2500 | 353.0       | 353.0      | 32.0        |
| CD74HCT174M96 | SOIC         | D               | 16   | 2500 | 353.0       | 353.0      | 32.0        |

## TUBE



\*All dimensions are nominal

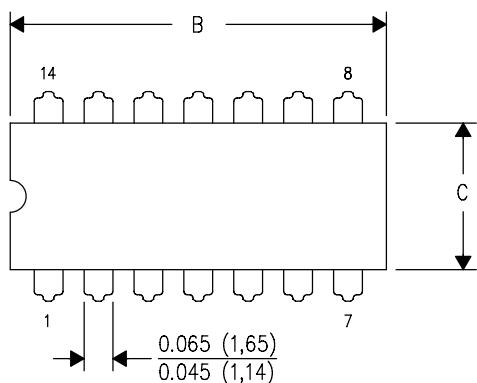
| Device        | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|---------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74HC174E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC174E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC174E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC174E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT174E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT174E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT174E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT174E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |



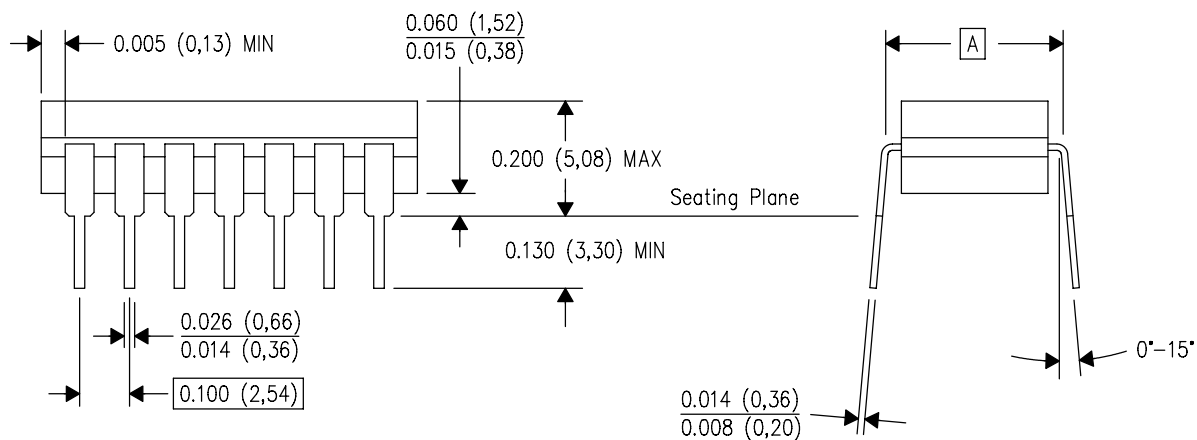
J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



| PINS **<br>DIM | 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)        |



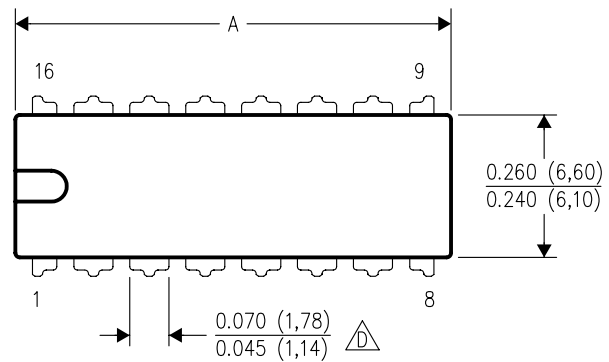
4040083/F 03/03

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

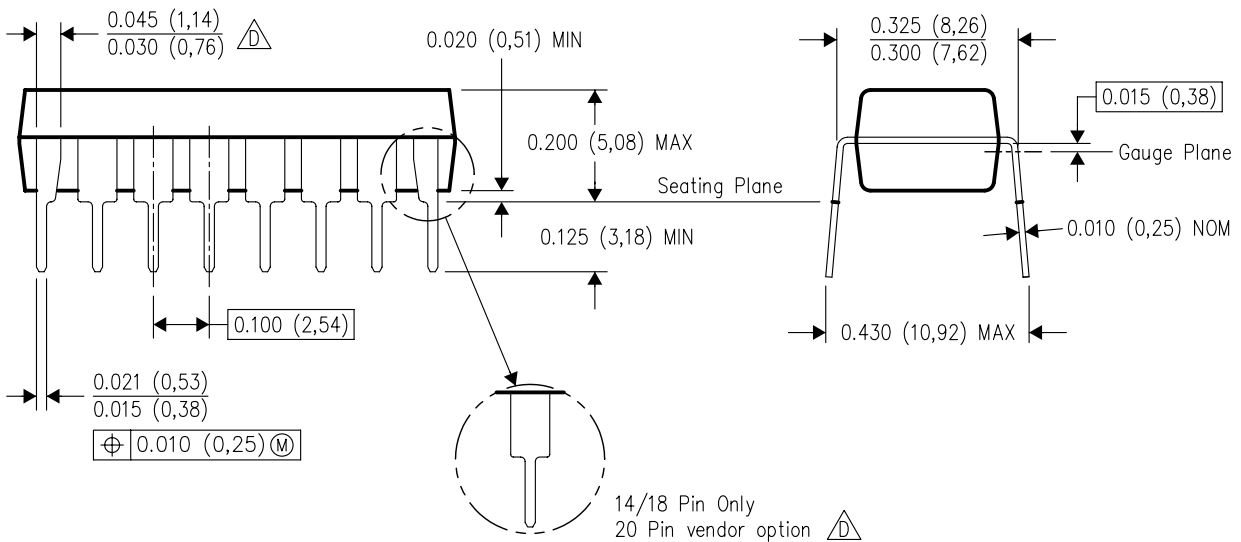
## N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **             | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| DIM                 |                  |                  |                  |                  |
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
| A MIN               | 0.745<br>(18,92) | 0.745<br>(18,92) | 0.850<br>(21,59) | 0.940<br>(23,88) |
| MS-001<br>VARIATION | AA               | BB               | AC               | AD               |



14/18 Pin Only  
20 Pin vendor option

4040049/E 12/2002

- 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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