

# CD54/74HC240, CD54/74HCT240, CD74HC241, CD54/74HCT241, CD54/74HC244, CD54/74HCT244

## High-Speed CMOS Logic Octal Buffer/Line Drivers, Three-State

### Features

- HC/HCT240 Inverting
- HC/HCT241 Non-Inverting
- HC/HCT244 Non-Inverting
- Typical Propagation Delay = 8ns at  $V_{CC} = 5V$ ,  $C_L = 15pF$ ,  $T_A = 25^\circ C$  for HC240
- Three-State Outputs
- Buffered Inputs
- High-Current Bus Driver Outputs
- Fanout (Over Temperature Range)
  - Standard Outputs . . . . . 10 LSTTL Loads
  - Bus Driver Outputs . . . . . 15 LSTTL Loads
- Wide Operating Temperature Range . . .  $-55^\circ C$  to  $125^\circ C$
- 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 'HC240 and 'HCT240 are inverting three-state buffers having two active-low output enables. The CD74HC241, 'HCT241, 'HC244 and 'HCT244 are non-inverting three-state buffers that differ only in that the 241 has one active-high and one active-low output enable, and the 244 has two active-low output enables. All three types have identical pinouts.

### Ordering Information

| PART NUMBER   | TEMP. RANGE (°C) | PACKAGE      |
|---------------|------------------|--------------|
| CD54HC240F3A  | -55 to 125       | 20 Ld CERDIP |
| CD54HC244F3A  | -55 to 125       | 20 Ld CERDIP |
| CD54HCT240F3A | -55 to 125       | 20 Ld CERDIP |
| CD54HCT241F3A | -55 to 125       | 20 Ld CERDIP |
| CD54HCT244F3A | -55 to 125       | 20 Ld CERDIP |
| CD74HC240E    | -55 to 125       | 20 Ld PDIP   |
| CD74HC240M    | -55 to 125       | 20 Ld SOIC   |
| CD74HC240M96  | -55 to 125       | 20 Ld SOIC   |
| CD74HC241E    | -55 to 125       | 20 Ld PDIP   |
| CD74HC241M    | -55 to 125       | 20 Ld SOIC   |
| CD74HC241M96  | -55 to 125       | 20 Ld SOIC   |
| CD74HC244E    | -55 to 125       | 20 Ld PDIP   |
| CD74HC244M    | -55 to 125       | 20 Ld SOIC   |
| CD74HC244M96  | -55 to 125       | 20 Ld SOIC   |
| CD74HCT240E   | -55 to 125       | 20 Ld PDIP   |
| CD74HCT240M   | -55 to 125       | 20 Ld SOIC   |
| CD74HCT240M96 | -55 to 125       | 20 Ld SOIC   |
| CD74HCT240PW  | -55 to 125       | 20 Ld TSSOP  |
| CD74HCT240PWR | -55 to 125       | 20 Ld TSSOP  |
| CD74HCT240PWT | -55 to 125       | 20 Ld TSSOP  |
| CD74HCT241E   | -55 to 125       | 20 Ld PDIP   |
| CD74HCT241M   | -55 to 125       | 20 Ld SOIC   |
| CD74HCT241M96 | -55 to 125       | 20 Ld SOIC   |
| CD74HCT244E   | -55 to 125       | 20 Ld PDIP   |
| CD74HCT244M   | -55 to 125       | 20 Ld SOIC   |
| CD74HCT244M96 | -55 to 125       | 20 Ld SOIC   |

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

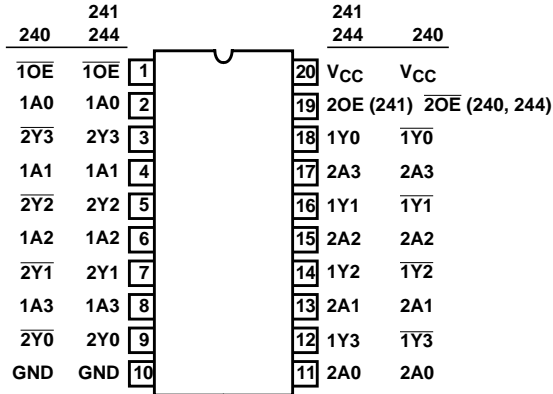
**Pinout**

CD54HC240, CD54HCT240, CD54HCT241,  
CD54HC244, CD54HCT244  
(CERDIP)

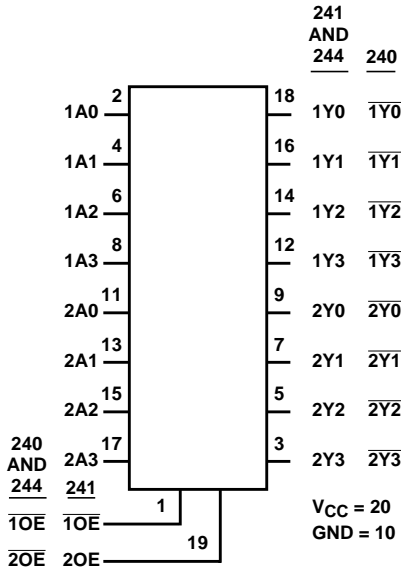
CD74HC240, CD74HC241, CD74HCT241,  
CD74HC244, CD74HCT244  
(PDIP, SOIC)

CD74HCT240,  
(PDIP, SOIC, TSSOP)

TOP VIEW



**Functional Diagram**



**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 Drain Current, per Output,  $I_O$   
 For  $-0.5V < V_O < V_{CC} + 0.5V$  .....  $\pm 35mA$   
 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,  $I_{CC}$  .....  $\pm 70mA$

**Thermal Information**

Thermal Resistance (Typical, Note 1)  $\theta_{JA}$   
 E (PDIP) Package .....  $69^{\circ}C/W$   
 M (SOIC) Package .....  $58^{\circ}C/W$   
 PW (TSSOP) Package .....  $83^{\circ}C/W$   
 Maximum Junction Temperature .....  $150^{\circ}C$   
 Maximum Storage Temperature Range .....  $-65^{\circ}C$  to  $150^{\circ}C$   
 Maximum Lead Temperature (Soldering 10s) .....  $300^{\circ}C$   
 (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         |            | $V_{CC}$ (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     |         |
| <b>HC TYPES</b>                         |          |                         |            |              |      |     |           |               |         |                |         |         |
| 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<br>CMOS Loads | $V_{OH}$ | $V_{IH}$ or<br>$V_{IL}$ | -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<br>TTL Loads  | $V_{OH}$ | $V_{IH}$ or<br>$V_{IL}$ | -6         | 4.5          | 3.98 | -   | -         | 3.84          | -       | 3.7            | -       | V       |
|   |          |                         | -7.8       | 6            | 5.48 | -   | -         | 5.34          | -       | 5.2            | -       | V       |
| Low Level Output Voltage<br>CMOS Loads  | $V_{OL}$ | $V_{IH}$ or<br>$V_{IL}$ | 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<br>TTL Loads   | $V_{OL}$ | $V_{IH}$ or<br>$V_{IL}$ | 6          | 4.5          | -    | -   | 0.26      | -             | 0.33    | -              | 0.4     | V       |
|   |          |                         | 7.8        | 6            | -    | -   | 0.26      | -             | 0.33    | -              | 0.4     | V       |
| Input Leakage Current                   | $I_I$    | $V_{CC}$ or<br>GND      | -          | 6            | -    | -   | $\pm 0.1$ | -             | $\pm 1$ | -              | $\pm 1$ | $\mu A$ |
| Quiescent Device Current                | $I_{CC}$ | $V_{CC}$ or<br>GND      | 0          | 6            | -    | -   | 8         | -             | 80      | -              | 160     | $\mu A$ |

**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 |       |
| Three-State Leakage Current                                    | I <sub>OZ</sub>           | V <sub>IL</sub> or V <sub>IH</sub> | -                   | 6                   | -    | -   | ±0.5 | -             | ±0.5 | -              | ±10 | µA    |
| <b>HCT TYPES</b>   |                           |                                    |                     |                     |      |     |      |               |      |                |     |       |
| 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                         |                           |                                    | -6                  | 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                          |                           |                                    | 6                   | 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    |
| Three-State Leakage Current                                    | I <sub>OZ</sub>           | V <sub>IL</sub> or V <sub>IH</sub> | -                   | 5.5                 | -    | -   | ±0.5 | -             | ±5   | -              | ±10 | µA    |

NOTE:

2. 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 |
|------------------|------------|
| <b>HCT240</b>    |            |
| nA0-A3           | 1.5        |
| $\overline{1}OE$ | 0.7        |
| $\overline{2}OE$ | 0.7        |
| <b>HCT241</b>    |            |
| nA0-A3           | 0.7        |
| $\overline{1}OE$ | 0.7        |
| $\overline{2}OE$ | 1.5        |
| <b>HCT244</b>    |            |
| nA0-A3           | 0.7        |
| $\overline{1}OE$ | 0.7        |
| $\overline{2}OE$ | 0.7        |

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

**CD54/74HC240, CD54/74HCT240, CD74HC241, CD54/74HCT241, CD54/74HC244, CD54/74HCT244**

**Switching Specifications**  $C_L = 50\text{pF}$ , Input  $t_r, t_f = 6\text{ns}$

| PARAMETER                                      | SYMBOL             | TEST CONDITIONS     | V <sub>CC</sub> (V) | 25°C |     |     | -40°C TO 85°C |     |     | -55°C TO 125°C |     |     | UNITS |
|--|--------------------|---------------------|---------------------|------|-----|-----|---------------|-----|-----|----------------|-----|-----|-------|
|  |                    |                     |                     | MIN  | TYP | MAX | MIN           | TYP | MAX | MIN            | TYP | MAX |       |
| <b>HC TYPES</b>                                |                    |                     |                     |      |     |     |               |     |     |                |     |     |       |
| Propagation Delay<br>Data to Outputs<br>HC240  | $t_{PLH}, t_{PHL}$ | $C_L = 50\text{pF}$ | 2                   | -    | -   | 100 | -             | -   | 125 | -              | -   | 150 | ns    |
|  |                    |                     | 4.5                 | -    | -   | 20  | -             | -   | 25  | -              | -   | 30  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 8   | -   | -             | -   | -   | -              | -   | -   | ns    |
|  |                    | $C_L = 50\text{pF}$ | 6                   | -    | -   | 17  | -             | -   | 21  | -              | -   | 26  | ns    |
| Data to Outputs<br>HC241                       | $t_{PLH}, t_{PHL}$ | $C_L = 50\text{pF}$ | 2                   | -    | -   | 110 | -             | -   | 140 | -              | -   | 165 | ns    |
|  |                    |                     | 4.5                 | -    | -   | 22  | -             | -   | 28  | -              | -   | 33  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 9   | -   | -             | -   | -   | -              | -   | -   | ns    |
|  |                    | $C_L = 50\text{pF}$ | 6                   | -    | -   | 19  | -             | -   | 24  | -              | -   | 28  | ns    |
| Data to Outputs<br>HC244                       | $t_{PLH}, t_{PHL}$ | $C_L = 50\text{pF}$ | 2                   | -    | -   | 110 | -             | -   | 140 | -              | -   | 165 | ns    |
|  |                    |                     | 4.5                 | -    | -   | 22  | -             | -   | 28  | -              | -   | 33  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 9   | -   | -             | -   | -   | -              | -   | -   | ns    |
|  |                    | $C_L = 50\text{pF}$ | 6                   | -    | -   | 19  | -             | -   | 24  | -              | -   | 28  | ns    |
| Output Enable and Disable<br>Time              | $t_{THL}, t_{TLH}$ | $C_L = 50\text{pF}$ | 2                   | -    | -   | 150 | -             | -   | 190 | -              | -   | 225 | ns    |
|  |                    |                     | 4.5                 | -    | -   | 30  | -             | -   | 38  | -              | -   | 45  | ns    |
|  |                    | 5                   | -                   | 12   | -   | -   | -             | -   | -   | -              | -   | -   | ns    |
|  |                    | 6                   | -                   | -    | 26  | -   | -             | 33  | -   | -              | 38  | ns  |       |
| Output Transition Time                         | $t_{TLH}, t_{THL}$ | $C_L = 50\text{pF}$ | 2                   | -    | -   | 60  | -             | -   | 75  | -              | -   | 90  | ns    |
|  |                    |                     | 4.5                 | -    | -   | 12  | -             | -   | 15  | -              | -   | 18  | ns    |
|  |                    |                     | 6                   | -    | -   | 10  | -             | -   | 13  | -              | -   | 15  | ns    |
| Input Capacitance                              | $C_I$              | $C_L = 50\text{pF}$ | -                   | 10   | -   | 10  | -             | -   | 10  | -              | -   | 10  | pF    |
| Three-State Output<br>Capacitance              | $C_O$              | $C_L = 50\text{pF}$ | -                   | -    | -   | 20  | -             | -   | 20  | -              | -   | 20  | pF    |
| Power Dissipation Capacitance<br>(Notes 3, 4)  | $C_{PD}$           | $C_L = 15\text{pF}$ | 5                   | -    | 38  | -   | -             | -   | -   | -              | -   | -   | pF    |
|  |                    |                     | 5                   | -    | 34  | -   | -             | -   | -   | -              | -   | -   | pF    |
|  |                    |                     | 5                   | -    | 46  | -   | -             | -   | -   | -              | -   | -   | pF    |
| <b>HCT TYPES</b>                               |                    |                     |                     |      |     |     |               |     |     |                |     |     |       |
| Propagation Delay<br>Data to Outputs<br>HCT240 | $t_{PHL}, t_{PLH}$ | $C_L = 50\text{pF}$ | 4.5                 | -    | -   | 22  | -             | -   | 28  | -              | -   | 33  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 9   | -   | -             | -   | -   | -              | -   | -   | ns    |
| Data to Outputs<br>HCT241                      | $t_{PHL}, t_{PLH}$ | $C_L = 50\text{pF}$ | 4.5                 | -    | -   | 25  | -             | -   | 31  | -              | -   | 38  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 10  | -   | -             | -   | -   | -              | -   | -   | ns    |
| Data to Outputs<br>HCT244                      | $t_{PHL}, t_{PLH}$ | $C_L = 50\text{pF}$ | 4.5                 | -    | -   | 25  | -             | -   | 31  | -              | -   | 38  | ns    |
|  |                    | $C_L = 15\text{pF}$ | 5                   | -    | 10  | -   | -             | -   | -   | -              | -   | -   | ns    |

**Switching Specifications**  $C_L = 50\text{pF}$ , 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           | TYP | MAX | MIN            | TYP | MAX |       |
| Output Enable and Disable Times            | $t_{TLH}, t_{TLH}$ | $C_L = 50\text{pF}$ | 4.5          | -    | -   | 30  | -             | -   | 38  | -              | -   | 45  | ns    |
| Output Transition Time                     | $t_{THL}, t_{TLH}$ | $C_L = 50\text{pF}$ | 4.5          | -    | -   | 12  | -             | -   | 15  | -              | -   | 18  | ns    |
| Input Capacitance                          | $C_I$              | $C_L = 50\text{pF}$ | -            | 10   | -   | 10  | -             | -   | 10  | -              | -   | 10  | pF    |
| Power Dissipation Capacitance (Notes 3, 4) | $C_{PD}$           |                     |              |      |     |     |               |     |     |                |     |     |       |
| HCT240                                     |                    | -                   | 5            | -    | 40  | -   | -             | -   | -   | -              | -   | -   | pF    |
| HCT241                                     |                    | -                   | 5            | -    | 38  | -   | -             | -   | -   | -              | -   | -   | pF    |
| HCT244                                     |                    | -                   | 5            | -    | 40  | -   | -             | -   | -   | -              | -   | -   | pF    |

NOTES:

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

**Test Circuits and Waveforms**

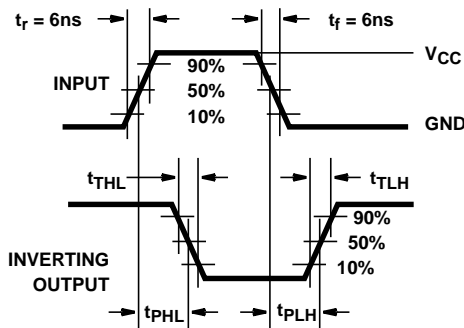


FIGURE 1. HC TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

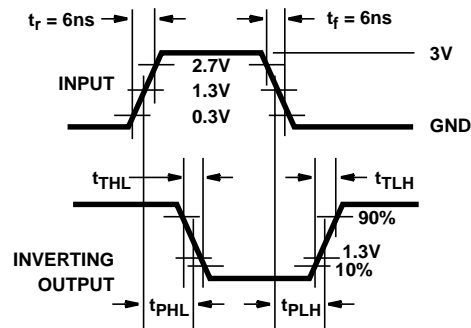


FIGURE 2. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

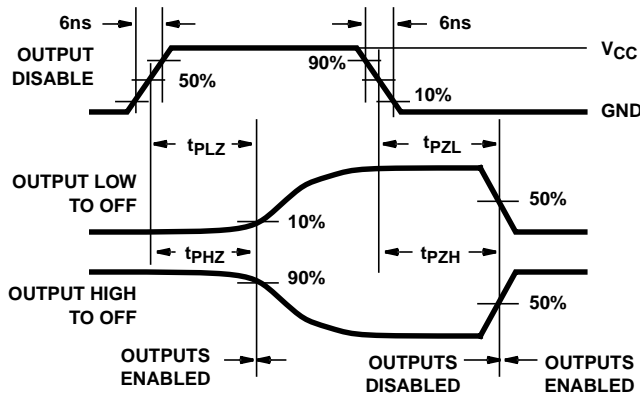


FIGURE 3. HC THREE-STATE PROPAGATION DELAY WAVEFORM

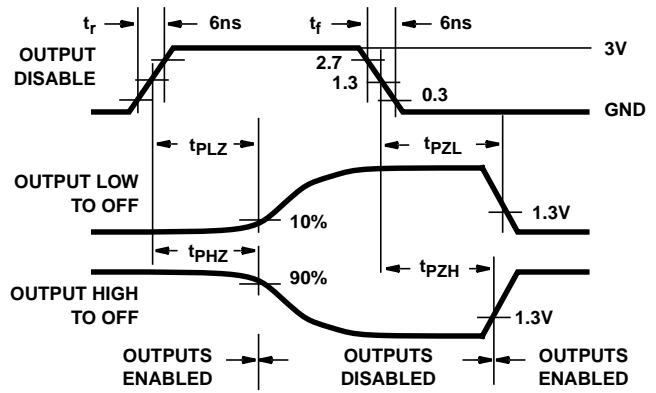
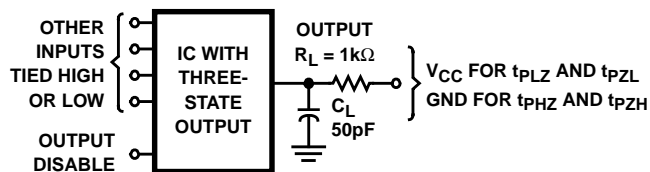


FIGURE 4. HCT THREE-STATE PROPAGATION DELAY WAVEFORM

**Test Circuits and Waveforms** (Continued)



NOTE: Open drain waveforms  $t_{pLZ}$  and  $t_{pZL}$  are the same as those for three-state shown on the left. The test circuit is Output  $R_L = 1k\Omega$  to  $V_{CC}$ ,  $C_L = 50pF$ .

**FIGURE 5. HC AND HCT THREE-STATE PROPAGATION DELAY TEST CIRCUIT**

**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| CD54HC240F3A     | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HC244F       | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HC244F3A     | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HCT240F3A    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HCT241F3A    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HCT244F      | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD54HCT244F3A    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| CD74HC240E       | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC240EE4     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC240M       | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC240M96     | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC240M96E4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC240M96G4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC240ME4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC240MG4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241E       | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC241EE4     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC241M       | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241M96     | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241M96E4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241M96G4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241ME4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC241MG4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC244E       | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC244EE4     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HC244M       | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC244M96     | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC244M96E4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |



| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
|                  |                       |              |                 |      |             | no Sb/Br)               |                  |                              |
| CD74HC244M96G4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC244ME4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HC244MG4     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240E      | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT240EE4    | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT240M      | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240M96    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240M96E4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240M96G4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240ME4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240MG4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PW     | ACTIVE                | TSSOP        | PW              | 20   | 70          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWE4   | ACTIVE                | TSSOP        | PW              | 20   | 70          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWG4   | ACTIVE                | TSSOP        | PW              | 20   | 70          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWR    | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWRE4  | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWG4   | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWT    | ACTIVE                | TSSOP        | PW              | 20   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWTE4  | ACTIVE                | TSSOP        | PW              | 20   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT240PWTG4  | ACTIVE                | TSSOP        | PW              | 20   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT241E      | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT241EE4    | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT241M      | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT241M96    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT241M96E4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| CD74HCT241M96G4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT241ME4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT241MG4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244E      | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT244EE4    | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD74HCT244M      | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244M96    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244M96E4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244M96G4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244ME4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD74HCT244MG4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

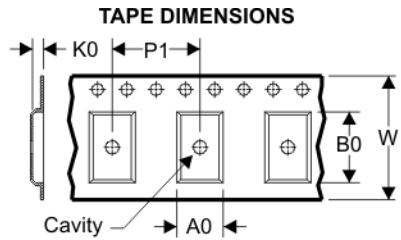
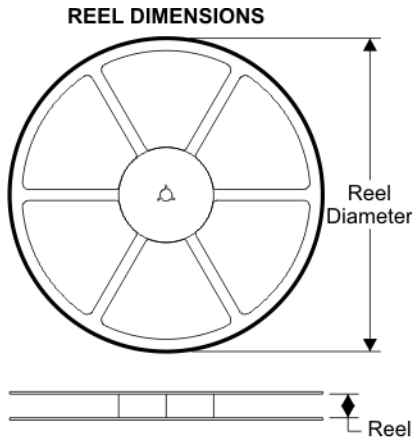
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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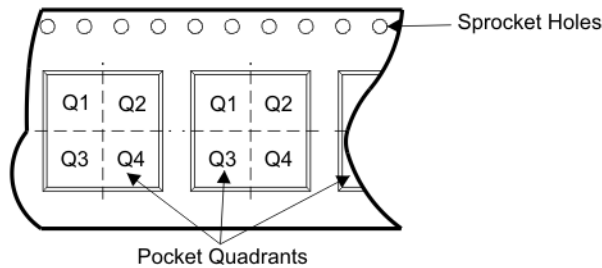
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**TAPE AND REEL BOX INFORMATION**



|    |   |
|----|---|
| A0 | Dimension designed to accommodate the component width     |
| B0 | Dimension designed to accommodate the component length    |
| K0 | Dimension designed to accommodate the component thickness |
| W  | Overall width of the carrier tape                         |
| P1 | Pitch between successive cavity centers                   |

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



| Device        | Package | Pins | Site    | Reel Diameter (mm) | Reel Width (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---------------|---------|------|---------|--------------------|-----------------|---------|---------|---------|---------|--------|---------------|
| CD74HC240M96  | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |
| CD74HC241M96  | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |
| CD74HC244M96  | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |
| CD74HCT240M96 | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |
| CD74HCT240PWR | PW      | 20   | SITE 41 | 330                | 16              | 6.95    | 7.1     | 1.6     | 8       | 16     | Q1            |
| CD74HCT241M96 | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |
| CD74HCT244M96 | DW      | 20   | SITE 41 | 330                | 24              | 10.8    | 13.0    | 2.7     | 12      | 24     | Q1            |

**TAPE AND REEL BOX DIMENSIONS**



| Device        | Package | Pins | Site    | Length (mm) | Width (mm) | Height (mm) |
|---------------|---------|------|---------|-------------|------------|-------------|
| CD74HC240M96  | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |
| CD74HC241M96  | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |
| CD74HC244M96  | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |
| CD74HCT240M96 | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |
| CD74HCT240PWR | PW      | 20   | SITE 41 | 346.0       | 346.0      | 33.0        |
| CD74HCT241M96 | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |
| CD74HCT244M96 | DW      | 20   | SITE 41 | 346.0       | 346.0      | 41.0        |

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

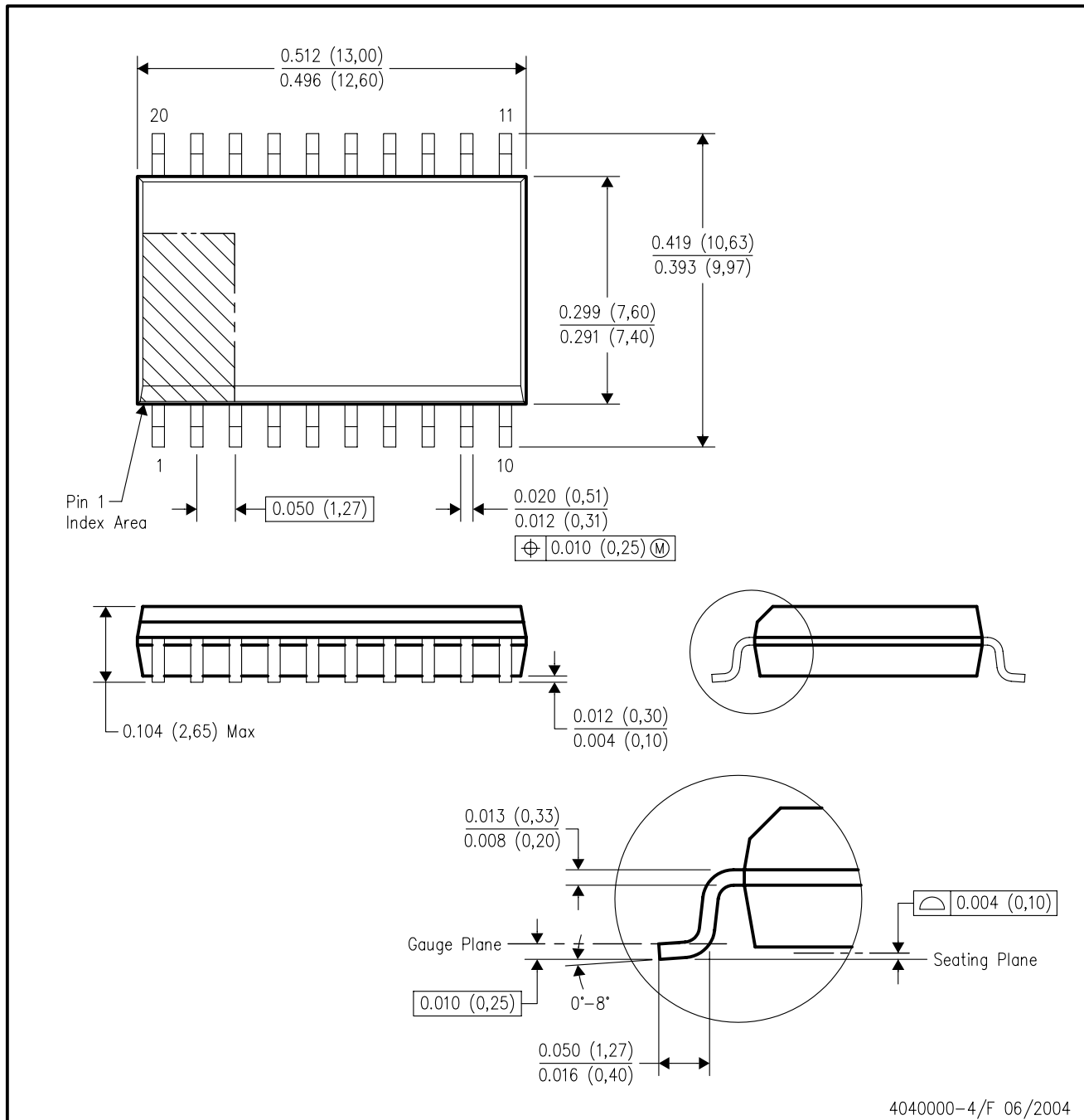
16 PINS SHOWN



- 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.

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

PW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153



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| RFID                  | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>               | Telephony           | <a href="http://www.ti.com/telephony">www.ti.com/telephony</a>           |
| Low Power<br>Wireless | <a href="http://www.ti.com/lpw">www.ti.com/lpw</a>                 | Video & Imaging     | <a href="http://www.ti.com/video">www.ti.com/video</a>                   |
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