

# CDx4HC4094, CD74HCT4094 High-Speed CMOS Logic 8-Stage Shift and Store Bus Register, Three-State

## 1 Features

- Buffered inputs
- Separate serial outputs synchronous to both positive and negative clock edges for cascading
- Fanout (over temperature range)
  - Standard outputs: 10 LSTTL loads
  - Bus driver outputs: 15 LSTTL loads
- Wide operating temp range:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- Balanced propagation delay and transition times
- Significant power reduction compared to LSTTL logic ICs
- HC types
  - 2- to 6-V operation
  - High noise immunity:  $N_{IL} = 30\%$ ,  $N_{IH} = 30\%$  of  $V_{CC}$  at  $V_{CC} = 5\text{ V}$
- HCT types
  - 4.5- to 5.5-V operation
  - Direct LSTTL input logic compatibility,  $V_{IL} = 0.8\text{ V}$  (Max),  $V_{IH} = 2\text{ V}$  (Min)
  - CMOS input compatibility,  $I_I \leq 1\mu\text{A}$  at  $V_{OL}$ ,  $V_{OH}$

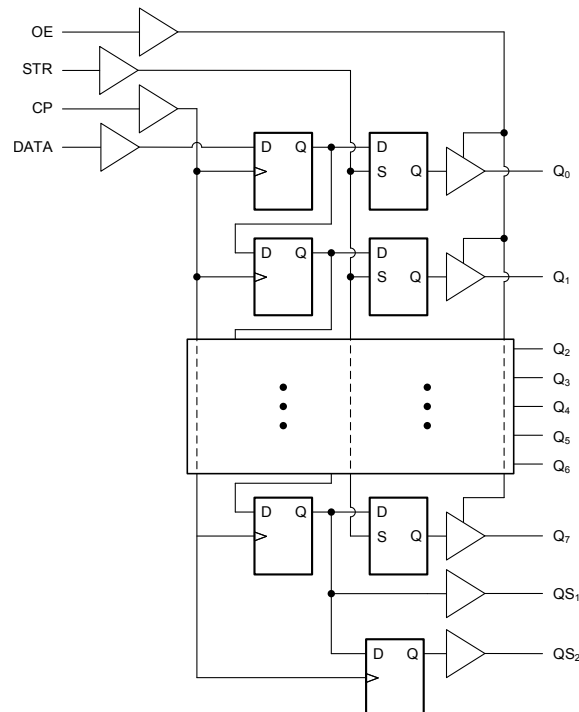
## 2 Description

The CDx4HC4094 and CD74HCT4094 are 8-stage serial shift registers having a storage latch associated with each stage for strobing data from the serial input to parallel buffered tri-state outputs. The parallel outputs may be connected directly to common bus lines. Data is shifted on positive clock transitions. The data in each shift register stage is transferred to the storage register when the Strobe input is high. Data in the storage register appears at the outputs whenever the Output-Enable signal is high.

### Device Information

| PART NUMBER   | PACKAGE <sup>(1)</sup> | BODY SIZE (NOM)    |
|---------------|------------------------|--------------------|
| CD54HC4094F3A | CDIP (16)              | 24.38 mm × 6.92 mm |
| CD74HC4094M   | SOIC (16)              | 9.90 mm × 3.90 mm  |
| CD74HC4094E   | PDIP (16)              | 19.31 mm × 6.35 mm |
| CD74HC4094NSR | SO (16)                | 6.20 mm × 5.30 mm  |
| CD74HC4094PW  | TSSOP (16)             | 5.00 mm × 4.40 mm  |
| CD74HCT4094M  | SOIC (16)              | 9.90 mm × 3.90 mm  |
| CD74HCT4094E  | PDIP (16)              | 19.31 mm × 6.35 mm |

(1) For all available packages, see the orderable addendum at the end of the data sheet.



**Functional Block Diagram**



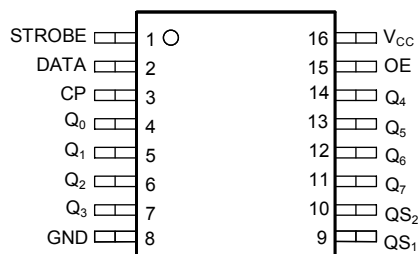
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## 3 Revision History

| Changes from Revision E (December 2010) to Revision F (March 2022)                                                                                                                             | Page     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <ul style="list-style-type: none"> <li>Updated the numbering, formatting, tables, figures, and cross-references throughout the document to reflect modern data sheet standards.....</li> </ul> | <b>1</b> |

## 4 Pin Configuration and Functions



**J, N, D, NS, or PW package**  
**16-Pin CDIP, PDIP, SOIC, SO, or TSSOP**  
**Top View**

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup>

|                  |                                                                  |                                                                         | MIN  | MAX | UNIT |
|------------------|------------------------------------------------------------------|-------------------------------------------------------------------------|------|-----|------|
| V <sub>CC</sub>  | Supply voltage                                                   |                                                                         | –0.5 | 7   | V    |
| I <sub>IK</sub>  | Input diode current                                              | For V <sub>I</sub> < –0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V |      | ±20 | mA   |
| I <sub>OK</sub>  | Output diode current                                             | For V <sub>O</sub> < –0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V |      | ±20 | mA   |
| I <sub>O</sub>   | Output source or sink current per output pin                     | For V <sub>O</sub> > –0.5 V or V <sub>O</sub> < V <sub>CC</sub> + 0.5 V |      | ±25 | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND                |                                                                         |      | ±50 | mA   |
| T <sub>J</sub>   | Junction temperature                                             |                                                                         |      | 150 | °C   |
| T <sub>stg</sub> | Storage temperature                                              |                                                                         | – 65 | 150 | °C   |
|                  | Maximum lead temperature (Soldering 10s) (SOIC - lead tips only) |                                                                         |      | 300 | °C   |

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

### 5.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

|                                    |                          |           | MIN | NOM | MAX             | UNIT |
|------------------------------------|--------------------------|-----------|-----|-----|-----------------|------|
| V <sub>CC</sub>                    | Supply voltage range     | HC types  | 2   |     | 6               | V    |
|                                    |                          | HCT types | 4.5 |     | 5.5             |      |
| V <sub>I</sub> ,<br>V <sub>O</sub> | Input or output voltage  |           | 0   |     | V <sub>CC</sub> | V    |
| t <sub>t</sub>                     | Input rise and fall time | 2 V       |     |     | 1000            | ns   |
|                                    |                          | 4.5 V     |     |     | 500             |      |
|                                    |                          | 6 V       |     |     | 400             |      |
| T <sub>A</sub>                     | Temperature range        |           | –55 |     | 125             | °C   |

### 5.3 Thermal Information

| THERMAL METRIC   |                                                       | N (PDIP) | D (SOIC) <sup>(2)</sup> | NS (SOP) | PW (TSSOP) | UNIT |
|------------------|-------------------------------------------------------|----------|-------------------------|----------|------------|------|
|                  |                                                       | PINS     | PINS                    | PINS     | PINS       |      |
| R <sub>θJA</sub> | Junction-to-ambient thermal resistance <sup>(1)</sup> | 67       | 73                      | 64       | 108        | °C/W |

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.  
(2) Lead tips only

## 5.4 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

| PARAMETER                           | TEST CONDITIONS <sup>(2)</sup>                                       | V <sub>CC</sub> (V)       | 25°C       |      |      | –40°C to 85°C |      | –55°C to 125°C |      | UNIT |    |
|-------------------------------------|----------------------------------------------------------------------|---------------------------|------------|------|------|---------------|------|----------------|------|------|----|
|                                     |                                                                      |                           | MIN        | TYP  | MAX  | MIN           | MAX  | MIN            | MAX  |      |    |
| HC TYPES                            |                                                                      |                           |            |      |      |               |      |                |      |      |    |
| V <sub>IH</sub>                     | High-level input voltage                                             |                           | 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    |    |
| V <sub>IL</sub>                     | Low-level input voltage                                              |                           | 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    |    |
| V <sub>OH</sub>                     | High-level output voltage<br>CMOS loads                              | I <sub>OH</sub> = – 20μA  | 2          | 1.9  |      | 1.9           |      | 1.9            |      | V    |    |
|                                     |                                                                      | I <sub>OH</sub> = – 20μA  | 4.5        | 4.4  |      | 4.4           |      | 4.4            |      | V    |    |
|                                     |                                                                      | I <sub>OH</sub> = – 20μA  | 6          | 5.9  |      | 5.9           |      | 5.9            |      | V    |    |
|                                     | High-level output voltage<br>TTL loads                               | I <sub>OH</sub> = – 6mA   | 4.5        | 3.98 |      | 3.84          |      | 3.7            |      | V    |    |
|                                     |                                                                      | I <sub>OH</sub> = – 7.8mA | 6          | 5.48 |      | 5.34          |      | 5.2            |      | V    |    |
| V <sub>OL</sub>                     | Low-level output voltage<br>CMOS loads                               | I <sub>OL</sub> = 20μA    | 2          |      | 0.1  |               | 0.1  |                | 0.1  | V    |    |
|                                     |                                                                      | I <sub>OL</sub> = 20μA    | 4.5        |      | 0.1  |               | 0.1  |                | 0.1  | V    |    |
|                                     |                                                                      | I <sub>OL</sub> = 20μA    | 6          |      | 0.1  |               | 0.1  |                | 0.1  | V    |    |
|                                     | Low-level output voltage<br>TTL loads                                | I <sub>OL</sub> = 6mA     | 4.5        |      | 0.26 |               | 0.33 |                | 0.4  | V    |    |
|                                     |                                                                      | I <sub>OL</sub> = 7.8mA   | 6          |      | 0.26 |               | 0.33 |                | 0.4  | V    |    |
| I <sub>I</sub>                      | Input leakage current                                                | V <sub>CC</sub> or GND    | 6          |      | ±0.1 |               | ±1   |                | ±1   | μA   |    |
| I <sub>CC</sub>                     | Supply current                                                       | V <sub>CC</sub> or GND    | 6          |      | 8    |               | 80   |                | 160  | μA   |    |
| HCT TYPES                           |                                                                      |                           |            |      |      |               |      |                |      |      |    |
| V <sub>IH</sub>                     | High-level input voltage                                             |                           | 4.5 to 5.5 | 2    |      | 2             |      | 2              |      | V    |    |
| V <sub>IL</sub>                     | Low-level input voltage                                              |                           | 4.5 to 5.5 |      | 0.8  |               | 0.8  |                | 0.8  | V    |    |
| V <sub>OH</sub>                     | High-level output voltage<br>CMOS loads                              | I <sub>OH</sub> = – 20μA  | 4.5        | 4.4  |      | 4.4           |      | 4.4            |      | V    |    |
|                                     | High-level output voltage<br>TTL loads                               | I <sub>OH</sub> = – 6mA   | 4.5        | 3.98 |      | 3.84          |      | 3.7            |      | V    |    |
| V <sub>OL</sub>                     | Low-level output voltage<br>CMOS loads                               | I <sub>OL</sub> = 20μA    | 4.5        |      | 0.1  |               | 0.1  |                | 0.1  | V    |    |
|                                     | Low-level output voltage<br>TTL loads                                | I <sub>OL</sub> = 6mA     | 4.5        |      | 0.26 |               | 0.33 |                | 0.4  | V    |    |
| I <sub>I</sub>                      | Input leakage current                                                | V <sub>CC</sub> and GND   | 5.5        |      | ±0.1 |               | ±1   |                | ±1   | μA   |    |
| I <sub>CC</sub>                     | Supply Current                                                       | V <sub>CC</sub> and GND   | 5.5        |      | 8    |               | 80   |                | 160  | μA   |    |
| ΔI <sub>CC</sub> <sup>(1) (3)</sup> | Additional quiescent<br>device current per input<br>pin: 1 unit load | D                         | 4.5 to 5.5 | 40   | 144  |               | 180  |                | 196  | μA   |    |
|                                     |                                                                      | CP, OE                    | 4.5 to 5.5 |      | 150  | 540           |      | 675            |      | 735  | μA |
|                                     |                                                                      | STR                       | 4.5 to 5.5 |      | 100  | 360           |      | 450            |      | 490  | μA |

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

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

(3) Inputs held at V<sub>CC</sub> – 2.1.

## 5.5 Prerequisite for Switching Characteristics

over operating free-air temperature range (unless otherwise noted)

over operating free air temperature range (unless otherwise noted)

| PARAMETER             |                      | V <sub>CC</sub> (V) | 25°C |     | –40 to 85°C |     | –55 to 125°C |     | UNIT |
|-----------------------|----------------------|---------------------|------|-----|-------------|-----|--------------|-----|------|
|                       |                      |                     | MIN  | MAX | MIN         | MAX | MIN          | MAX |      |
| HC TYPES              |                      |                     |      |     |             |     |              |     |      |
| t <sub>W</sub>        | CP pulse duration    | 2                   | 80   |     | 100         |     | 120          |     | ns   |
|                       |                      | 4.5                 | 16   |     | 20          |     | 24           |     |      |
|                       |                      | 6                   | 14   |     | 17          |     | 20           |     |      |
| t <sub>WH</sub>       | STR pulse duration   | 2                   | 80   |     | 100         |     | 120          |     | ns   |
|                       |                      | 4.5                 | 16   |     | 20          |     | 24           |     |      |
|                       |                      | 6                   | 14   |     | 17          |     | 20           |     |      |
| t <sub>SU</sub>       | Data set-up time     | 2                   | 50   |     | 65          |     | 75           |     | ns   |
|                       |                      | 4.5                 | 10   |     | 13          |     | 15           |     |      |
|                       |                      | 6                   | 9    |     | 11          |     | 13           |     |      |
| t <sub>H</sub>        | Data hold time       | 2                   | 3    |     | 3           |     | 3            |     | ns   |
|                       |                      | 4.5                 | 3    |     | 3           |     | 3            |     |      |
|                       |                      | 6                   | 3    |     | 3           |     | 3            |     |      |
| t <sub>SU</sub>       | STR set-up time      | 2                   | 100  |     | 125         |     | 150          |     | ns   |
|                       |                      | 4.5                 | 20   |     | 25          |     | 30           |     |      |
|                       |                      | 6                   | 17   |     | 21          |     | 26           |     |      |
| t <sub>H</sub>        | STR hold time        | 2                   | 0    |     | 0           |     | 0            |     | ns   |
|                       |                      | 4.5                 | 0    |     | 0           |     | 0            |     |      |
|                       |                      | 6                   | 0    |     | 0           |     | 0            |     |      |
| f <sub>CL (MAX)</sub> | Maximum CP frequency | 2                   | 6    |     | 5           |     | 4            |     | MHz  |
|                       |                      | 4.5                 | 30   |     | 24          |     | 20           |     |      |
|                       |                      | 6                   | 35   |     | 28          |     | 24           |     |      |
| HCT TYPES             |                      |                     |      |     |             |     |              |     |      |
| t <sub>W</sub>        | CP pulse duration    | 4.5                 | 16   |     | 20          |     | 24           |     | ns   |
| t <sub>WH</sub>       | STR pulse duration   | 4.5                 | 16   |     | 20          |     | 24           |     | ns   |
| t <sub>SU</sub>       | Data set-up time     | 4.5                 | 10   |     | 13          |     | 15           |     | ns   |
| t <sub>H</sub>        | Data hold time       | 4.5                 | 4    |     | 4           |     | 4            |     | ns   |
| t <sub>SU</sub>       | STR set-up time      | 4.5                 | 20   |     | 25          |     | 30           |     | ns   |
| t <sub>H</sub>        | STR hold time        | 4.5                 | 0    |     | 0           |     | 0            |     | ns   |
| f <sub>CL (MAX)</sub> | Maximum CP frequency | 4.5                 | 30   |     | 24          |     | 20           |     | MHz  |

## 5.6 Switching Characteristics

Input  $t_r$ ,  $t_f$  = 6 ns. Unless otherwise specified,  $C_L$  = 50pF [Parameter Measurement Information](#)

| PARAMETER                              |                                                       | V <sub>CC</sub> (V) | 25°C |                   |     | –40 to 85°C |     | –55 to 125°C |     | UNIT |
|----------------------------------------|-------------------------------------------------------|---------------------|------|-------------------|-----|-------------|-----|--------------|-----|------|
|                                        |                                                       |                     | MIN  | TYP               | MAX | MIN         | MAX | MIN          | MAX |      |
| HC TYPES                               |                                                       |                     |      |                   |     |             |     |              |     |      |
| t <sub>pd</sub>                        | Propagation delay time<br>CP to QS <sub>1</sub>       | 2                   |      | 150               |     | 190         |     | 225          | ns  |      |
|                                        |                                                       | 4.5                 |      | 12 <sup>(3)</sup> | 30  |             | 38  | 45           |     |      |
|                                        |                                                       | 6                   |      | 26                |     | 33          | 38  |              |     |      |
| t <sub>pd</sub>                        | CP to QS <sub>2</sub>                                 | 2                   |      | 135               |     | 170         |     | 205          | ns  |      |
|                                        |                                                       | 4.5                 |      | 11 <sup>(3)</sup> | 27  |             | 34  | 41           |     |      |
|                                        |                                                       | 6                   |      | 23                |     | 29          | 35  |              |     |      |
| t <sub>pd</sub>                        | CP to Q <sub>n</sub>                                  | 2                   |      | 195               |     | 245         |     | 295          | ns  |      |
|                                        |                                                       | 4.5                 |      | 16 <sup>(3)</sup> | 39  |             | 49  | 59           |     |      |
|                                        |                                                       | 6                   |      | 33                |     | 42          | 50  |              |     |      |
| t <sub>t</sub>                         | STR to Q <sub>n</sub>                                 | 2                   |      | 180               |     | 225         |     | 270          | ns  |      |
|                                        |                                                       | 4.5                 |      | 36                |     | 45          | 54  |              |     |      |
|                                        |                                                       | 6                   |      | 31                |     | 38          | 46  |              |     |      |
| t <sub>PZH</sub> ,<br>t <sub>PZL</sub> | Output enable to Q <sub>n</sub>                       | 2                   |      | 175               |     | 220         |     | 265          | ns  |      |
|                                        |                                                       | 4.5                 |      | 35                |     | 44          | 53  |              |     |      |
|                                        |                                                       | 6                   |      | 30                |     | 37          | 45  |              |     |      |
| t <sub>PHZ</sub> ,<br>t <sub>PLZ</sub> | Output disable to Q <sub>n</sub>                      | 2                   |      | 125               |     | 155         |     | 190          | ns  |      |
|                                        |                                                       | 4.5                 |      | 25                |     | 31          | 38  |              |     |      |
|                                        |                                                       | 6                   |      | 21                |     | 26          | 32  |              |     |      |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Output transition time                                | 2                   |      | 75                |     | 95          |     | 110          | ns  |      |
|                                        |                                                       | 4.5                 |      | 15                |     | 19          | 22  |              |     |      |
|                                        |                                                       | 6                   |      | 13                |     | 16          | 19  |              |     |      |
| t <sub>PHZ</sub> ,<br>t <sub>PLZ</sub> | Output disabling time                                 | 5                   |      | 10 <sup>(3)</sup> |     |             |     | ns           |     |      |
| f <sub>MAX</sub>                       | Maximum CP frequency                                  | 5                   |      | 60 <sup>(3)</sup> |     |             |     | MHz          |     |      |
| C <sub>IN</sub>                        | Input capacitance                                     |                     |      | 10                |     | 10          |     | 10           | pF  |      |
| C <sub>PD</sub>                        | Power dissipation capacitance <sup>(1),<br/>(2)</sup> | 5                   |      | 90 <sup>(3)</sup> |     |             |     |              | pF  |      |
| C <sub>O</sub>                         | Tri-state output capacitance                          |                     |      | 15                |     | 15          |     | 15           | pF  |      |
| HCT TYPES                              |                                                       |                     |      |                   |     |             |     |              |     |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Propagation delay time<br>CP to QS <sub>1</sub>       | 4.5                 |      | 16 <sup>(3)</sup> | 39  |             |     |              | ns  |      |
|                                        | CP to QS <sub>2</sub>                                 | 4.5                 |      | 15 <sup>(3)</sup> | 36  |             |     |              | ns  |      |
|                                        | CP to Q <sub>n</sub>                                  | 4.5                 |      | 18 <sup>(3)</sup> | 43  |             |     |              | ns  |      |
|                                        | STR to Q <sub>n</sub>                                 | 4.5                 |      | 39                |     |             |     |              | ns  |      |
| t <sub>PZH</sub> ,<br>t <sub>PZL</sub> | Output enable to Q <sub>n</sub>                       | 4.5                 |      | 35                |     |             |     |              | ns  |      |
| t <sub>PHZ</sub> ,<br>t <sub>PLZ</sub> | Output disable to Q <sub>n</sub>                      | 4.5                 |      | 35                |     |             |     |              | ns  |      |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Output transition time                                | 4.5                 |      | 15                |     |             |     |              | ns  |      |
| t <sub>PHZ</sub> ,<br>t <sub>PLZ</sub> | Output disabling time                                 | 5                   |      | 14 <sup>(3)</sup> |     |             |     |              | ns  |      |
| f <sub>MAX</sub>                       | Maximum CP frequency                                  | 5                   |      | 60 <sup>(3)</sup> |     |             |     |              | MHz |      |
| C <sub>IN</sub>                        | Input capacitance                                     |                     |      | 10                |     | 10          |     | 10           | pF  |      |

Input  $t_r$ ,  $t_f$  = 6 ns. Unless otherwise specified,  $C_L$  = 50pF [Parameter Measurement Information](#)

| PARAMETER |                                                       | $V_{CC}$ (V) | 25°C               |     |     | –40 to 85°C |     | –55 to 125°C |     | UNIT |
|-----------|-------------------------------------------------------|--------------|--------------------|-----|-----|-------------|-----|--------------|-----|------|
|           |                                                       |              | MIN                | TYP | MAX | MIN         | MAX | MIN          | MAX |      |
| $C_{PD}$  | Power dissipation capacitance <sup>(1)</sup> ,<br>(2) | 5            | 110 <sup>(3)</sup> |     |     |             |     |              |     | pF   |
| $C_O$     | Tri-state output capacitance                          |              |                    |     | 15  |             | 15  |              | 15  | pF   |

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

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

(3) Typical value tested at 5V,  $C_L$  = 15pF

## 6 Parameter Measurement Information

$t_{PD}$  is the maximum between  $t_{PLH}$  and  $t_{PHL}$

$t_t$  is the maximum between  $t_{TLH}$  and  $t_{THL}$

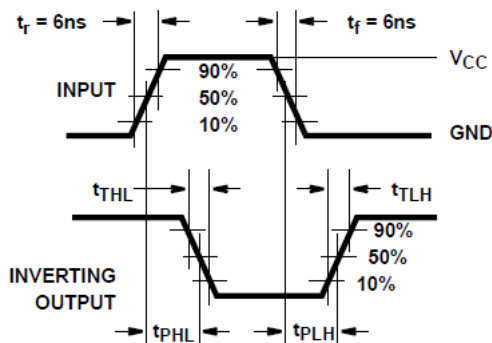


Figure 6-1. HC and HCT transition times and propagation delay times, combination logic

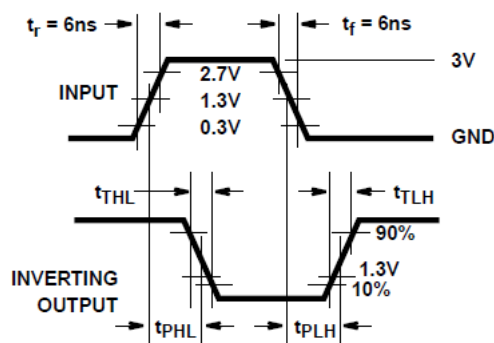


Figure 6-2. HCT transition times and propagation delay times, combination logic

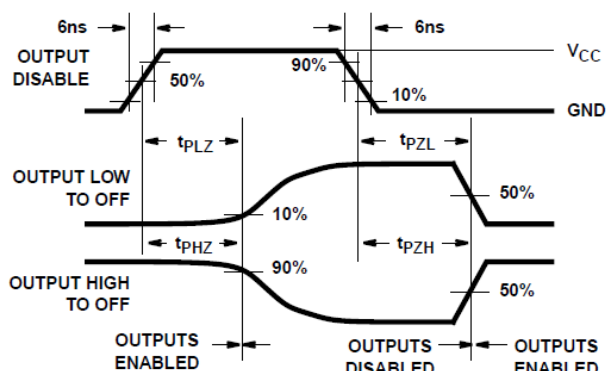


Figure 6-3. HC three-state propagation delay waveform

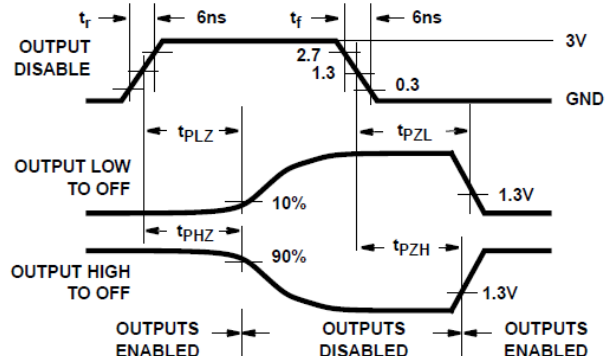
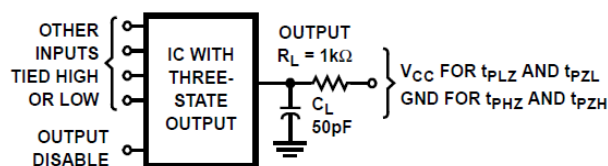


Figure 6-4. HCT three-state propagation delay waveform



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 6-5. HC and HCT three-state propagation delay test circuit

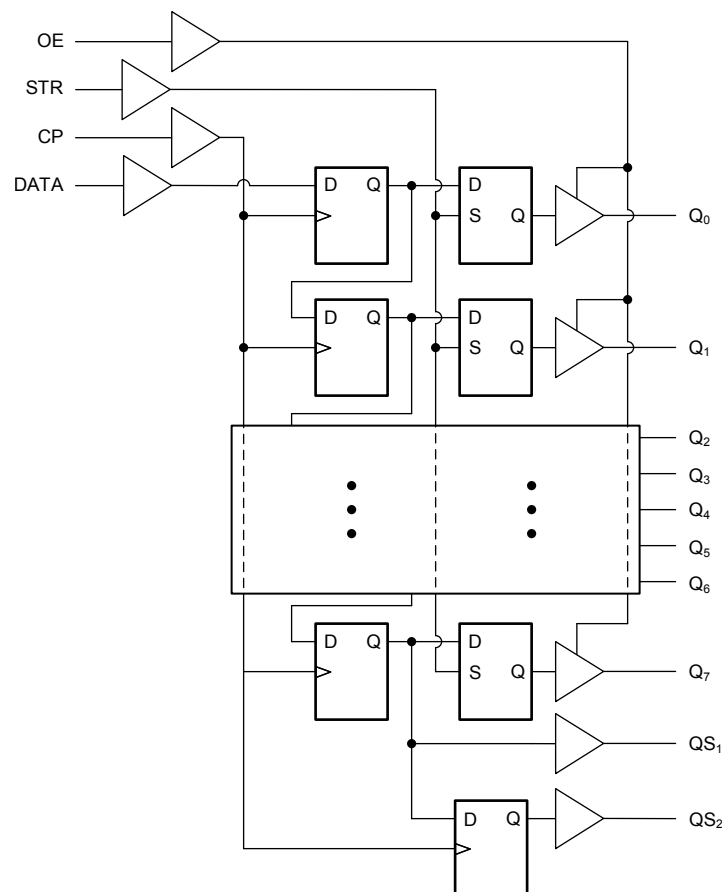
## 7 Detailed Description

### 7.1 Overview

The CDx4HC4094 and CD74HCT4094 are 8-stage serial shift registers having a storage latch associated with each stage for strobing data from the serial input to parallel buffered tri-state outputs. The parallel outputs may be connected directly to common bus lines. Data is shifted on positive clock transitions. The data in each shift register stage is transferred to the storage register when the Strobe input is high. Data in the storage register appears at the outputs whenever the Output-Enable signal is high.

Two serial outputs are available for cascading a number of these devices. Data is available at the QS<sub>1</sub> serial output terminal on positive clock edges to allow for high-speed operation in cascaded system in which the clock rise time is fast. The same serial information, available at the QS<sub>2</sub> terminal on the next negative clock edge, provides a means for cascading these devices when the clock rise time is slow.

### 7.2 Functional Block Diagram



## 7.3 Device Functional Modes

**Table 7-1. Truth Table**

| Inputs <sup>(2)</sup> |    |     |   | Parallel Outputs |                    | Serial Outputs                 |                 |
|-----------------------|----|-----|---|------------------|--------------------|--------------------------------|-----------------|
| CP                    | OE | STR | D | Q <sub>0</sub>   | Q <sub>n</sub>     | QS <sub>1</sub> <sup>(1)</sup> | QS <sub>2</sub> |
| ↑                     | L  | X   | X | Z                | Z                  | Q <sub>6</sub>                 | NC              |
| ↓                     | L  | X   | X | Z                | Z                  | NC                             | Q <sub>7</sub>  |
| ↑                     | H  | L   | X | NC               | NC                 | Q <sub>6</sub>                 | NC              |
| ↑                     | H  | H   | L | L                | Q <sub>n</sub> – 1 | Q <sub>6</sub>                 | NC              |
| ↑                     | H  | H   | H | H                | Q <sub>n</sub> – 1 | Q <sub>6</sub>                 | NC              |
| ↓                     | H  | H   | H | NC               | NC                 | NC                             | Q <sub>7</sub>  |

- (1) At the positive clock edge the information in the seventh register stage is transferred to the eighth register stage and QS<sub>1</sub> output.
- (2) H = High voltage level, L = Low voltage level, X = Don't care, NC = No charge, Z = High-impedance off-state, ↑ = Transition from low-to-high level, ↓ = Transition from high to low.

## 8 Power Supply Recommendations

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

## 9 Layout

### 9.1 Layout Guidelines

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

## 10 Device and Documentation Support

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

### 10.1 Documentation Support

#### 10.1.1 Related Documentation

### 10.2 Receiving Notification of Documentation Updates

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

### 10.3 Support Resources

TI E2E™ [support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 10.5 Electrostatic Discharge Caution



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

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

### 10.6 Glossary

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

## 11 Mechanical, Packaging, and Orderable Information

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

## PACKAGING INFORMATION

| Orderable part number           | Status<br>(1) | Material type<br>(2) | Package   Pins            | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|---------------------------------|---------------|----------------------|---------------------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">CD54HC4094F3A</a>   | Active        | Production           | CDIP (J)   16             | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC4094F3A       |
| CD54HC4094F3A.A                 | Active        | Production           | CDIP (J)   16             | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | CD54HC4094F3A       |
| <a href="#">CD74HC4094DYYR</a>  | Active        | Production           | SOT-23-THIN<br>(DYY)   16 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HJ4094              |
| CD74HC4094DYYR.A                | Active        | Production           | SOT-23-THIN<br>(DYY)   16 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HJ4094              |
| <a href="#">CD74HC4094E</a>     | Active        | Production           | PDIP (N)   16             | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC4094E         |
| CD74HC4094E.A                   | Active        | Production           | PDIP (N)   16             | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HC4094E         |
| <a href="#">CD74HC4094M</a>     | Obsolete      | Production           | SOIC (D)   16             | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094M96</a>   | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| CD74HC4094M96.A                 | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094M96G3</a> | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| CD74HC4094M96G3.A               | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094M96G4</a> | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| CD74HC4094M96G4.A               | Active        | Production           | SOIC (D)   16             | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094MT</a>    | Obsolete      | Production           | SOIC (D)   16             | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094NSR</a>   | Active        | Production           | SOP (NS)   16             | 2000   LARGE T&R      | Yes         | NIPDAU   NIPDAU                      | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| CD74HC4094NSR.A                 | Active        | Production           | SOP (NS)   16             | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| CD74HC4094NSRE4                 | Active        | Production           | SOP (NS)   16             | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HC4094M             |
| <a href="#">CD74HC4094PW</a>    | Obsolete      | Production           | TSSOP (PW)   16           | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HJ4094              |
| <a href="#">CD74HC4094PWR</a>   | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| CD74HC4094PWR.A                 | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| CD74HC4094PWR.B                 | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| CD74HC4094PWRE4                 | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| <a href="#">CD74HC4094PWRG4</a> | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| CD74HC4094PWRG4.A               | Active        | Production           | TSSOP (PW)   16           | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HJ4094              |
| <a href="#">CD74HCT4094E</a>    | Active        | Production           | PDIP (N)   16             | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT4094E        |
| CD74HCT4094E.A                  | Active        | Production           | PDIP (N)   16             | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT4094E        |
| CD74HCT4094EE4                  | Active        | Production           | PDIP (N)   16             | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -55 to 125   | CD74HCT4094E        |
| <a href="#">CD74HCT4094M</a>    | Obsolete      | Production           | SOIC (D)   16             | -                     | -           | Call TI                              | Call TI                           | -55 to 125   | HCT4094M            |

| 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) |
|-----------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| CD74HCT4094M96        | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -55 to 125   | HCT4094M            |
| CD74HCT4094M96.A      | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | HCT4094M            |

- (1) **Status:** For more details on status, see our [product life cycle](#).
- (2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.
- (3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.
- (4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.
- (5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.
- (6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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

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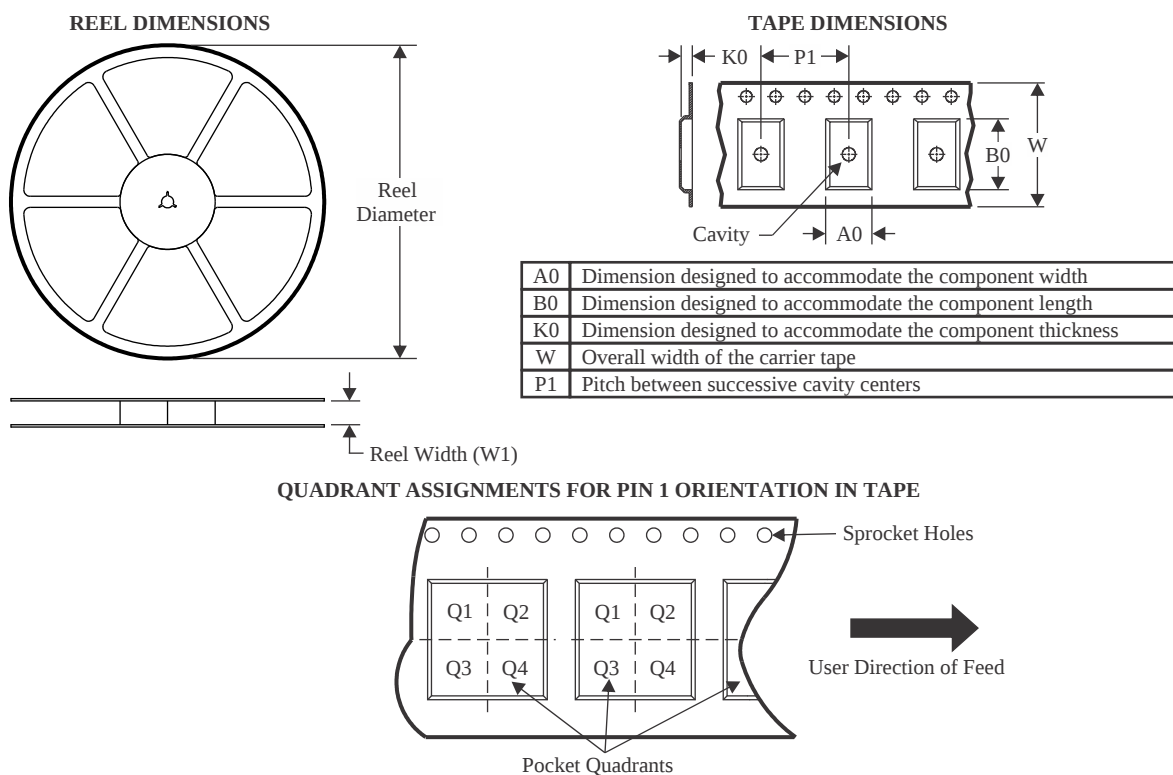
OTHER QUALIFIED VERSIONS OF CD54HC4094, CD74HC4094 :

- Catalog : [CD74HC4094](#)
- Military : [CD54HC4094](#)

NOTE: Qualified Version Definitions:

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

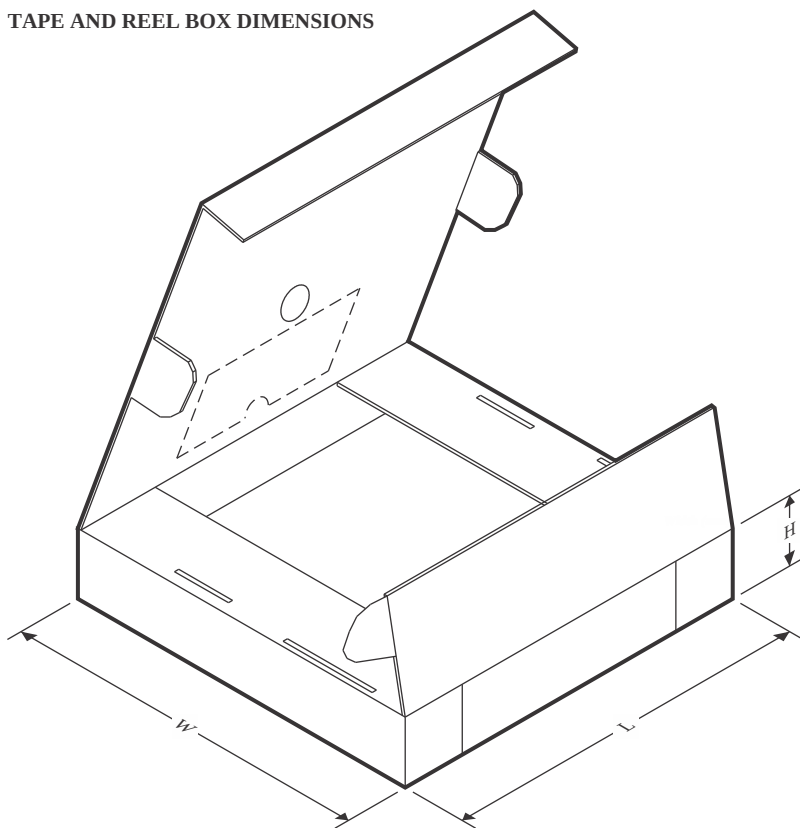
## TAPE AND REEL INFORMATION



\*All dimensions are nominal

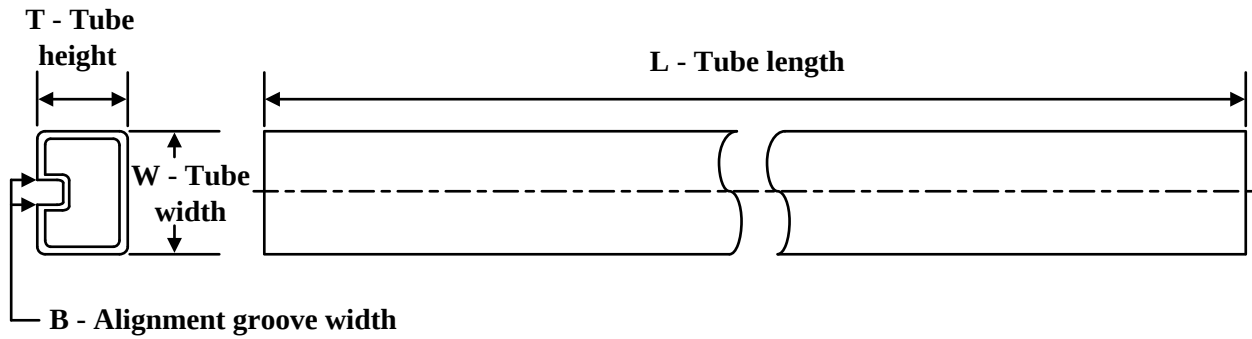
| Device          | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74HC4094DYYR  | SOT-23-THIN  | DYY             | 16   | 3000 | 330.0              | 12.4               | 4.8     | 3.6     | 1.6     | 8.0     | 12.0   | Q3            |
| CD74HC4094M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4094M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4094M96G3 | SOIC         | D               | 16   | 2500 | 330.0              | 16.8               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4094M96G4 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4094NSR   | SOP          | NS              | 16   | 2000 | 330.0              | 16.4               | 8.1     | 10.4    | 2.5     | 12.0    | 16.0   | Q1            |
| CD74HC4094NSR   | SOP          | NS              | 16   | 2000 | 330.0              | 16.4               | 8.45    | 10.55   | 2.5     | 12.0    | 16.2   | Q1            |
| CD74HC4094PWR   | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4094PWRG4 | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HCT4094M96  | 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) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74HC4094DYYR  | SOT-23-THIN  | DYY             | 16   | 3000 | 336.6       | 336.6      | 31.8        |
| CD74HC4094M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4094M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4094M96G3 | SOIC         | D               | 16   | 2500 | 364.0       | 364.0      | 27.0        |
| CD74HC4094M96G4 | SOIC         | D               | 16   | 2500 | 353.0       | 353.0      | 32.0        |
| CD74HC4094NSR   | SOP          | NS              | 16   | 2000 | 353.0       | 353.0      | 32.0        |
| CD74HC4094NSR   | SOP          | NS              | 16   | 2000 | 353.0       | 353.0      | 32.0        |
| CD74HC4094PWR   | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4094PWRG4 | TSSOP        | PW              | 16   | 2000 | 353.0       | 353.0      | 32.0        |
| CD74HCT4094M96  | 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) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74HC4094E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4094E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4094E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4094E.A  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094E.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094EE4 | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4094EE4 | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |



**SOP - 2.00 mm max height**

SOP

**NS0016A**



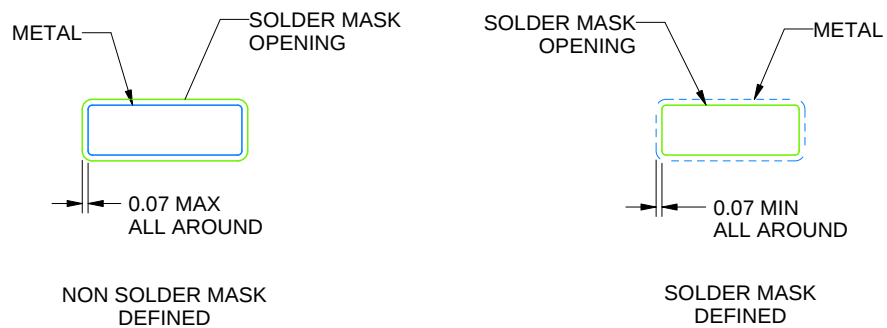
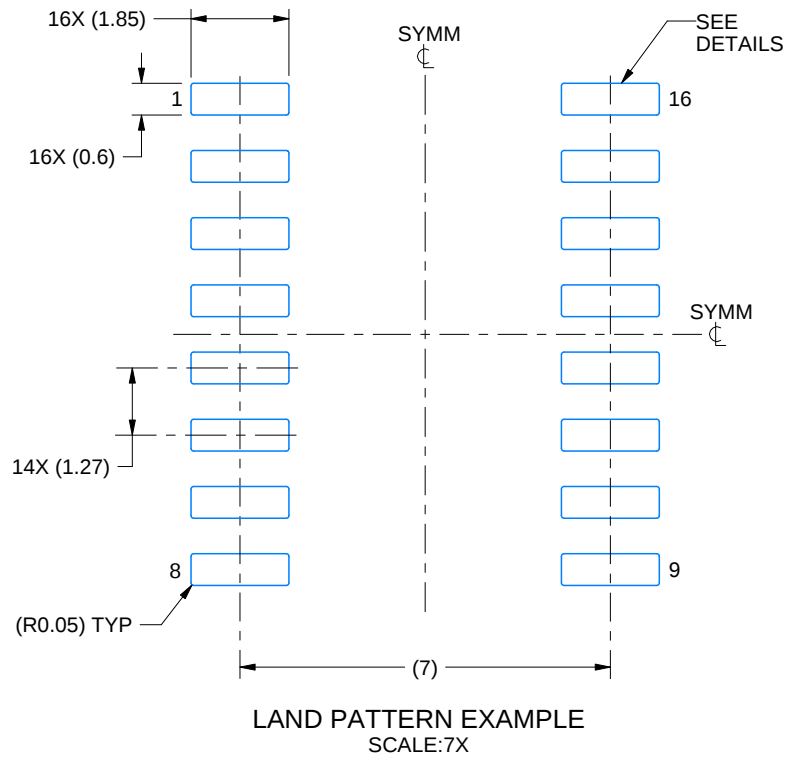
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.

# EXAMPLE BOARD LAYOUT

NS0016A

SOP - 2.00 mm max height

SOP



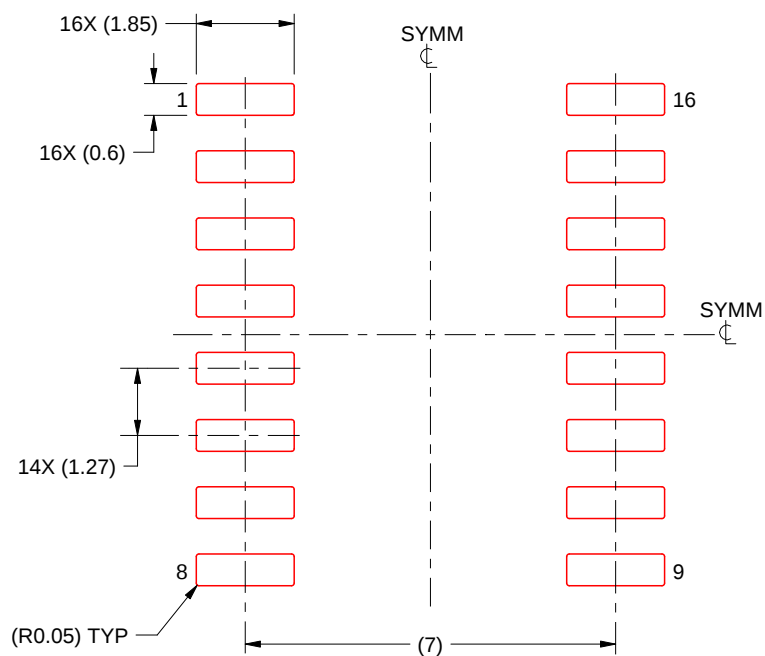
SOLDER MASK DETAILS

4220735/A 12/2021

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE  
 BASED ON 0.125 mm THICK STENCIL  
 SCALE:7X

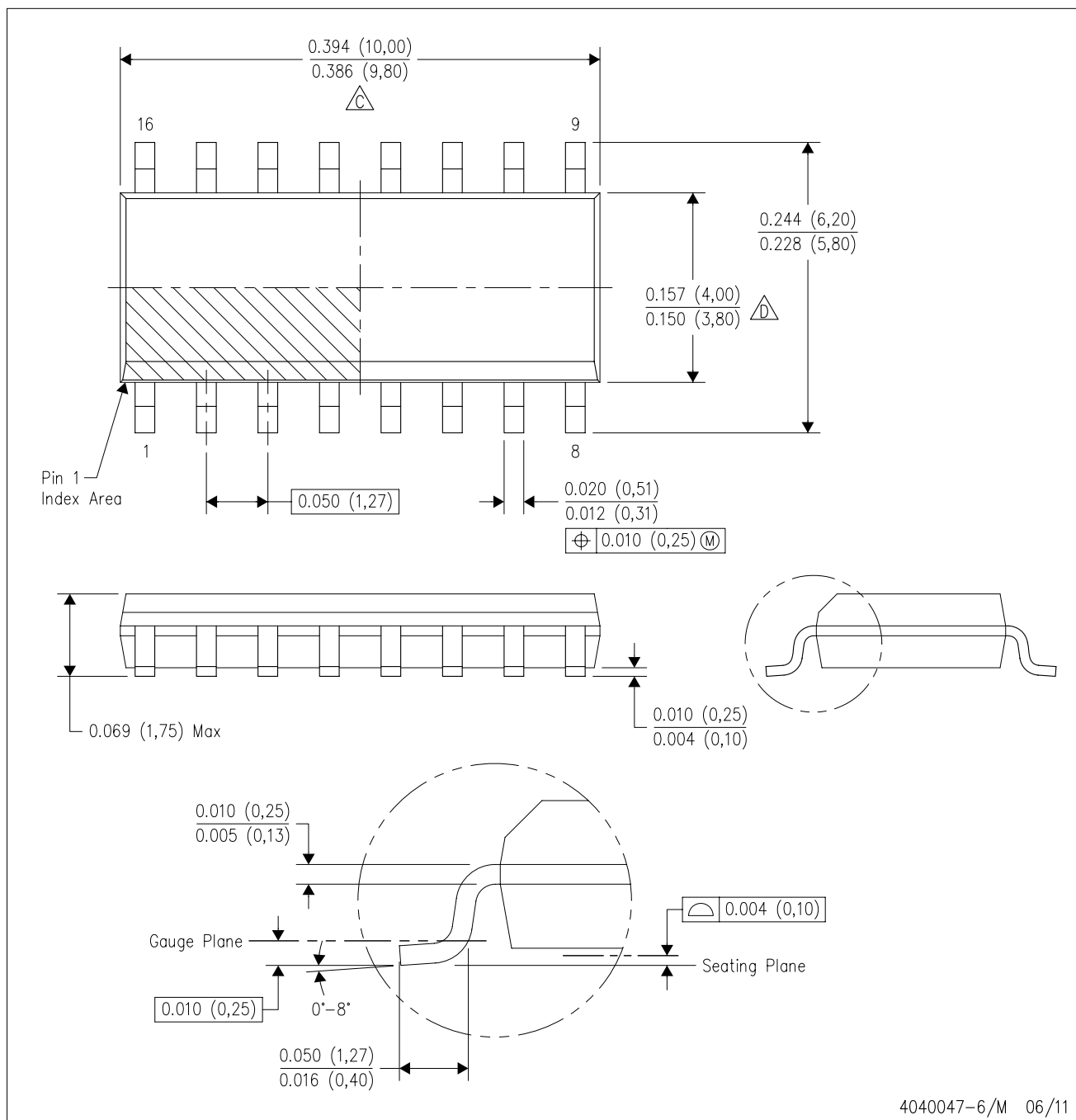
4220735/A 12/2021

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



NOTES:

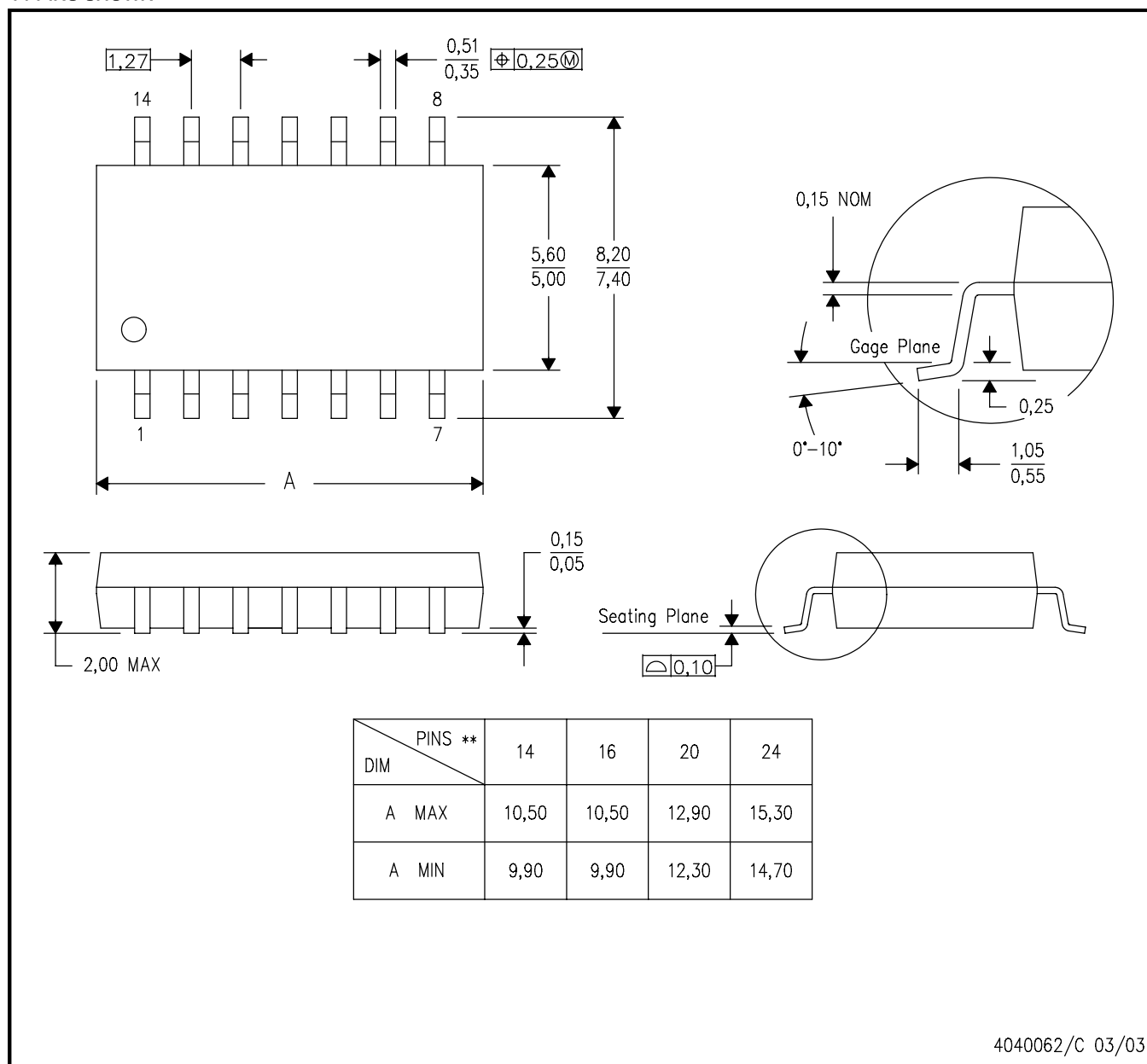
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- $\triangle D$  Body width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

# MECHANICAL DATA

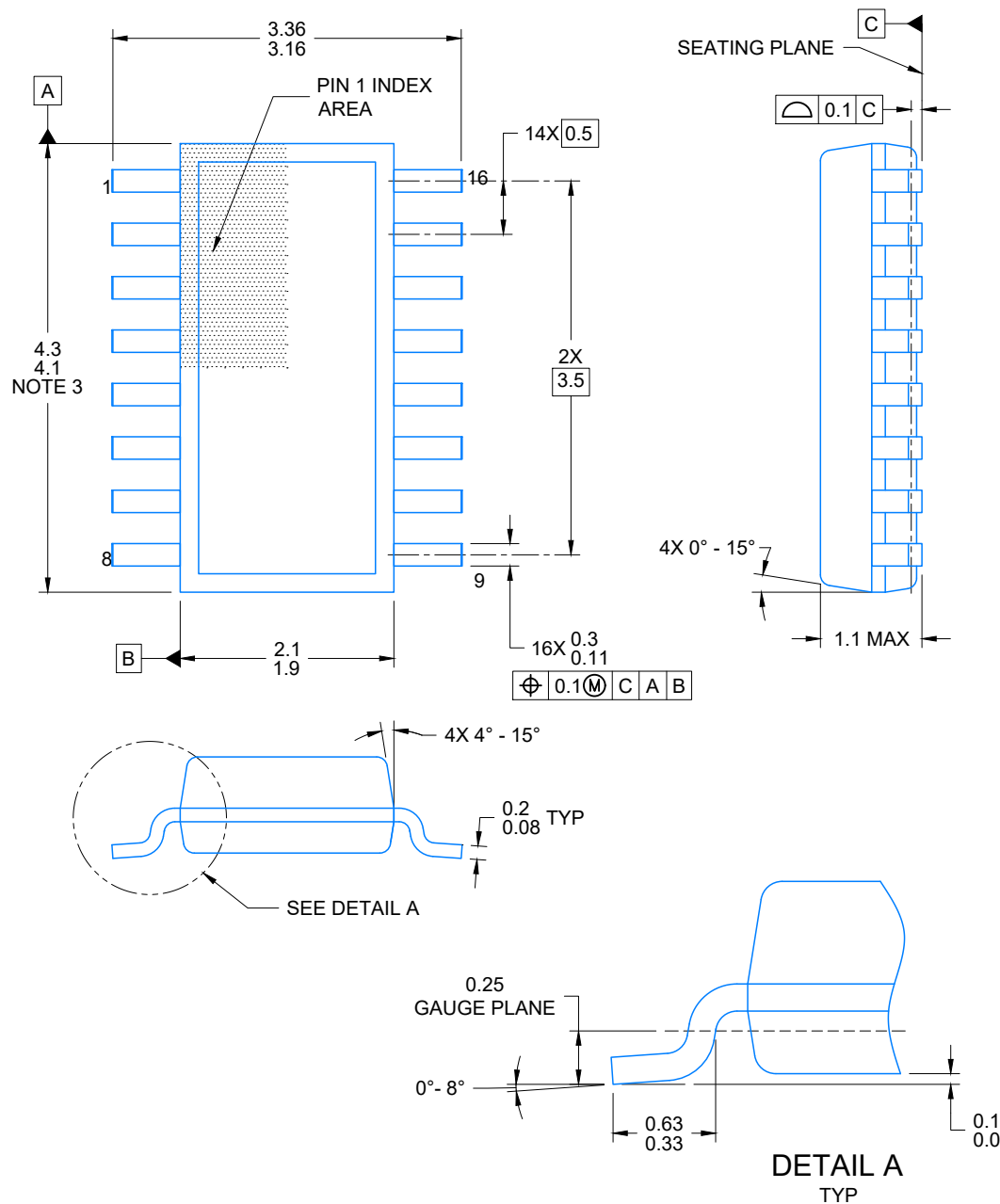
NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



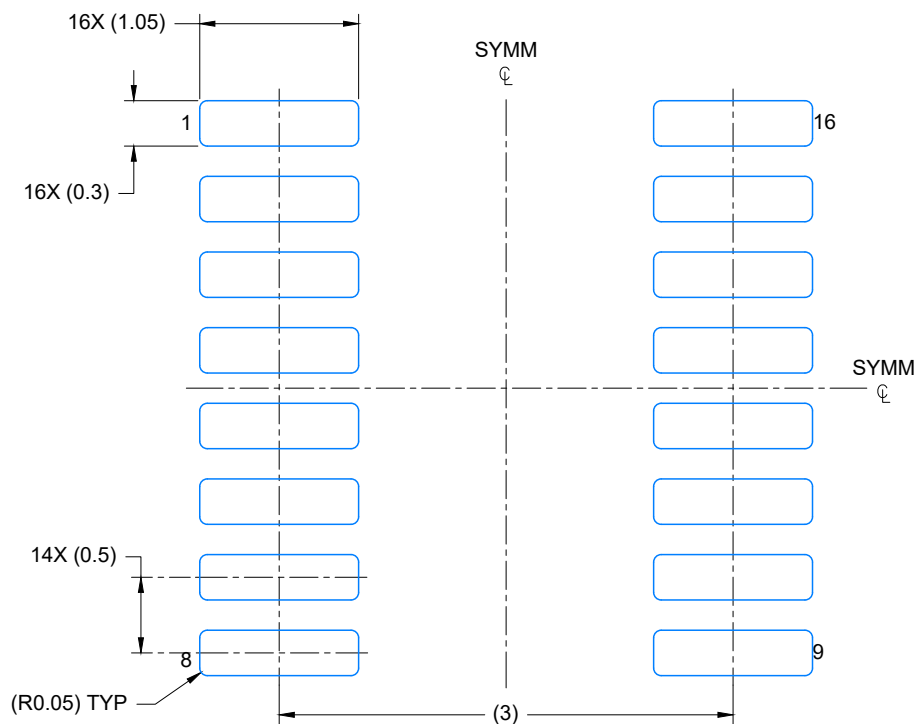
- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



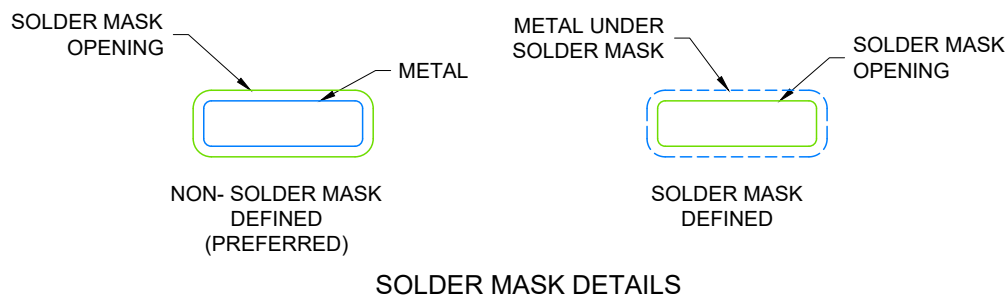
4224642/D 07/2024

## NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Reference JEDEC Registration MO-345, Variation AA



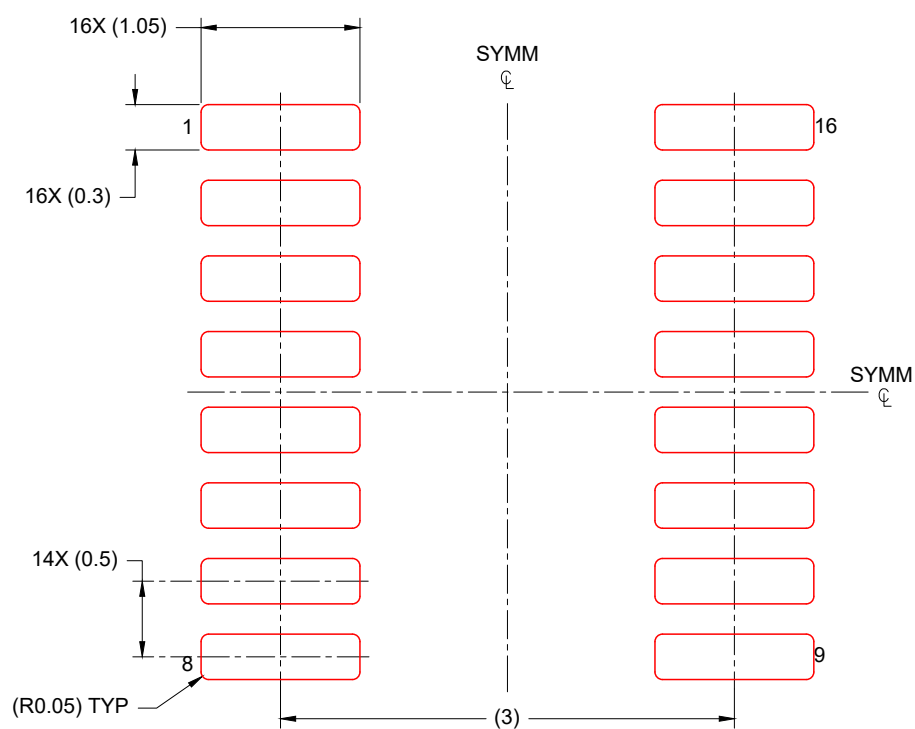
LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 20X



4224642/D 07/2024

## NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 20X

4224642/D 07/2024

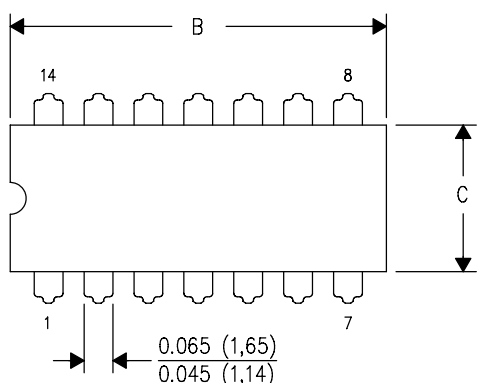
NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

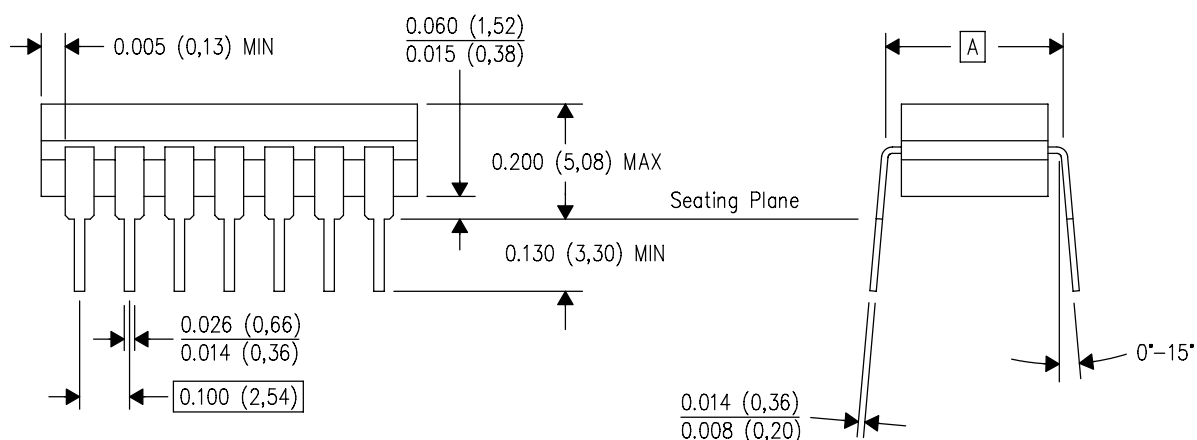
J (R-GDIP-T\*\*)

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.



**PW0016A**

## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



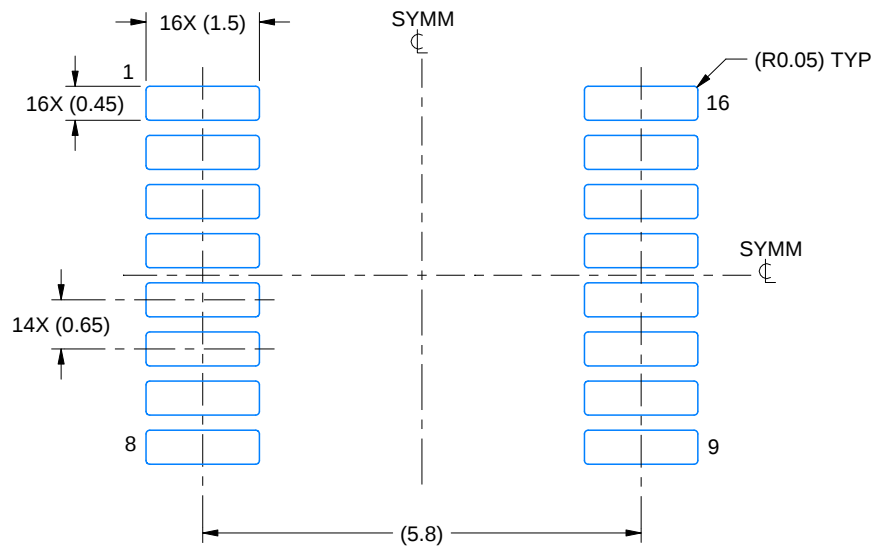
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

# EXAMPLE BOARD LAYOUT

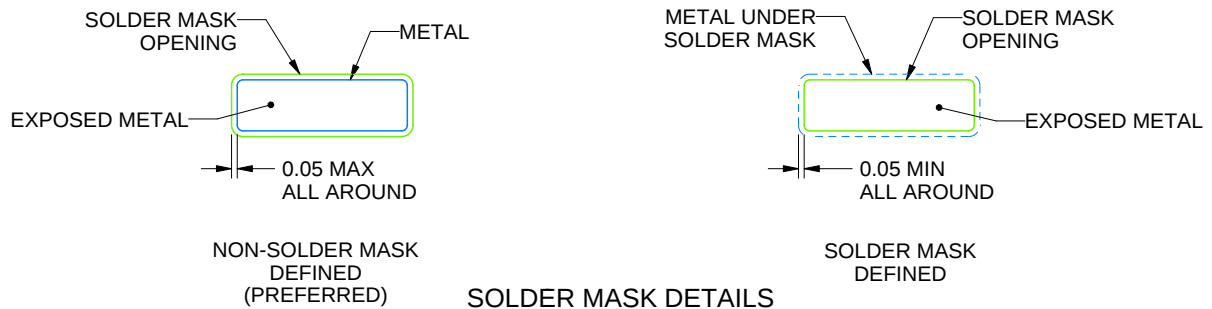
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220204/B 12/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

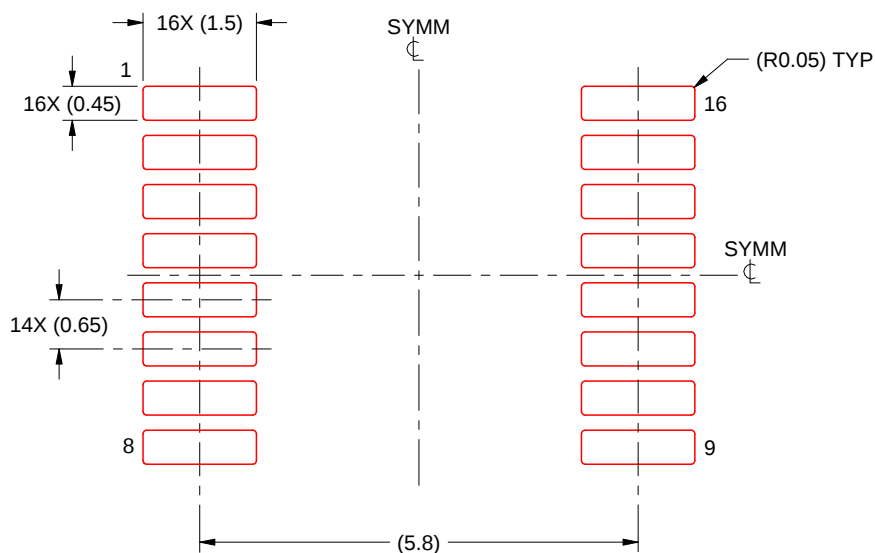
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220204/B 12/2023

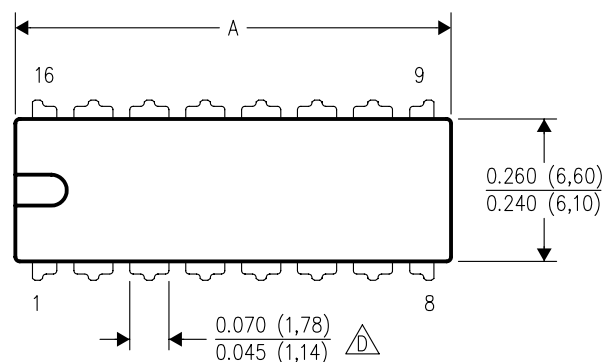
NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

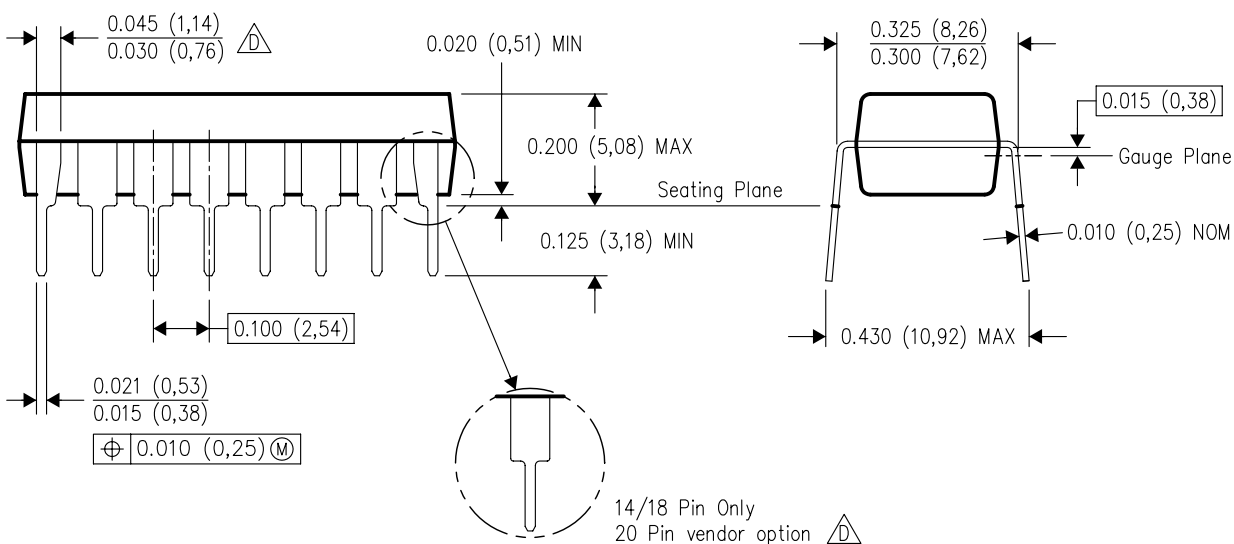
N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **<br>DIM      | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| 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               |



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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