

# SN54AHC16374, SN74AHC16374 16-BIT EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

SCLS330G – MARCH 1996 – REVISED JANUARY 2000

- **Members of the Texas Instruments Widebus™ Family**
- **EPIC™ (Enhanced-Performance Implanted CMOS) Process**
- **Operating Range 2-V to 5.5-V  $V_{CC}$**
- **3-State Outputs Drive Bus Lines Directly**
- **Distributed  $V_{CC}$  and GND Pins Minimize High-Speed Switching Noise**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model ( $C = 200$  pF,  $R = 0$ )**
- **Package Options Include Plastic Shrink Small-Outline (DL), Thin Shrink Small-Outline (DGG), and Thin Very Small-Outline (DGV) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings**

## description

The 'AHC16374 devices are 16-bit edge-triggered D-type flip-flops with 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

These devices can be used as two 8-bit flip-flops or one 16-bit flip-flop. On the positive transition of the clock (CLK) input, the Q outputs of the flip-flop take on the logic levels at the data (D) inputs.

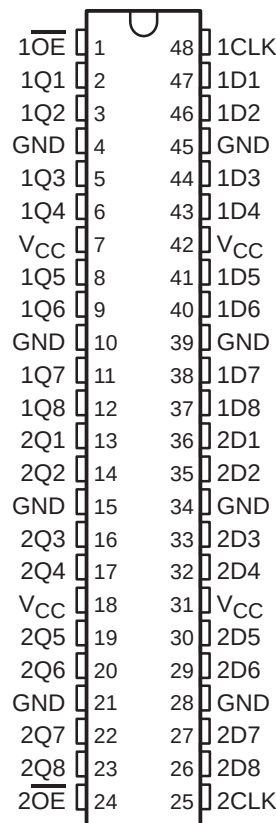
A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without need for interface or pullup components.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

$\overline{OE}$  does not affect internal operations of the flip-flop. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54AHC16374 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74AHC16374 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

SN54AHC16374 . . . WD PACKAGE  
SN74AHC16374 . . . DGG, DGV, OR DL PACKAGE  
(TOP VIEW)



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**TEXAS  
INSTRUMENTS**

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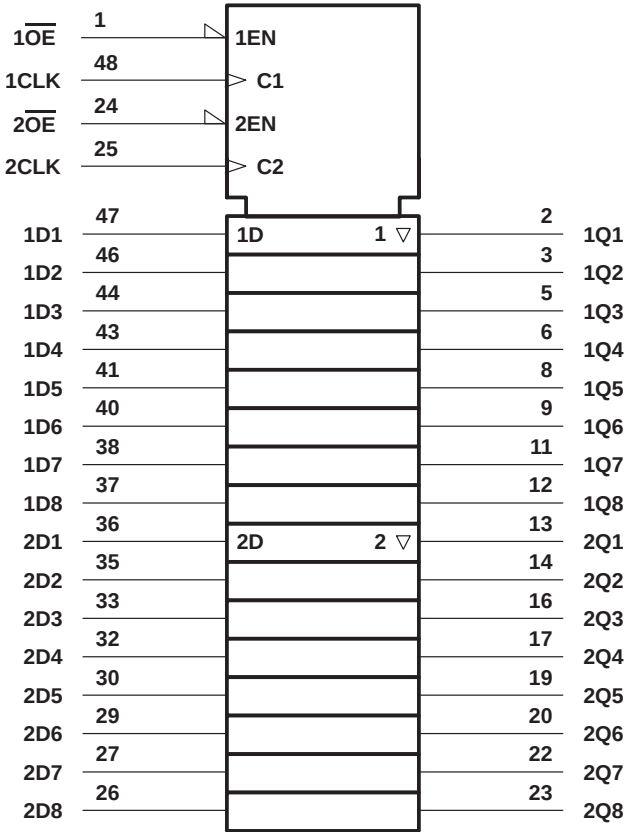
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FUNCTION TABLE  
(each 8-bit flip-flop)

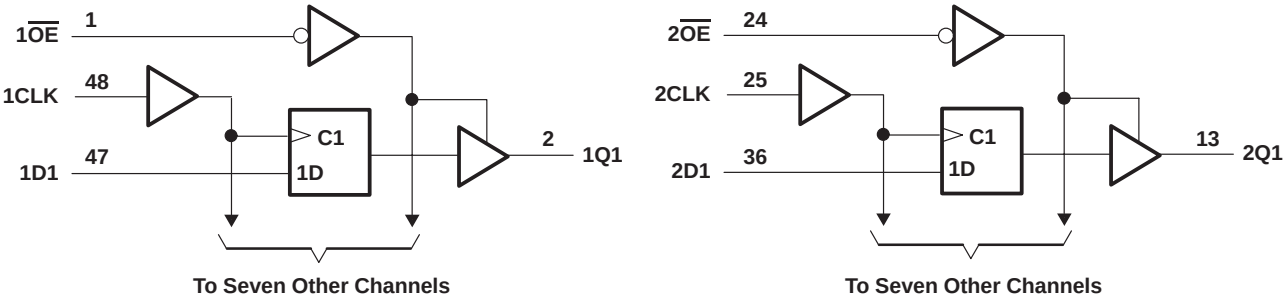
| INPUTS                 |        |   | OUTPUT<br>Q    |
|------------------------|--------|---|----------------|
| $\overline{\text{OE}}$ | CLK    | D |                |
| L                      | ↑      | H | H              |
| L                      | ↑      | L | L              |
| L                      | H or L | X | Q <sub>0</sub> |
| H                      | X      | X | Z              |

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



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|                                                                |       |                            |
|----------------------------------------------------------------|-------|----------------------------|
| Supply voltage range, $V_{CC}$                                 | ..... | -0.5 V to 7 V              |
| Input voltage range, $V_I$ (see Note 1)                        | ..... | -0.5 V to 7 V              |
| Output voltage range, $V_O$ (see Note 1)                       | ..... | -0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ )                    | ..... | -20 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) | ..... | $\pm 20$ mA                |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )     | ..... | $\pm 25$ mA                |
| Continuous current through each $V_{CC}$ or GND                | ..... | $\pm 75$ mA                |
| Package thermal impedance, $\theta_{JA}$ (see Note 2):         |       |                            |
| DGG package                                                    | ..... | 70°C/W                     |
| DGV package                                                    | ..... | 58°C/W                     |
| DL package                                                     | ..... | 63°C/W                     |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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

|                 |                                    |                                 | SN54AHC16374 |                 | SN74AHC16374 |                 | UNIT |
|-----------------|------------------------------------|---------------------------------|--------------|-----------------|--------------|-----------------|------|
|                 |                                    |                                 | MIN          | MAX             | MIN          | MAX             |      |
| V <sub>CC</sub> | Supply voltage                     |                                 | 2            | 5.5             | 2            | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 2 V           | 1.5          |                 | 1.5          |                 | V    |
|                 |                                    | V <sub>CC</sub> = 3 V           | 2.1          |                 | 2.1          |                 |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V         | 3.85         |                 | 3.85         |                 |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 2 V           |              | 0.5             |              | 0.5             | V    |
|                 |                                    | V <sub>CC</sub> = 3 V           |              | 0.9             |              | 0.9             |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V         |              | 1.65            |              | 1.65            |      |
| V <sub>I</sub>  | Input voltage                      |                                 | 0            | 5.5             | 0            | 5.5             | V    |
| V <sub>O</sub>  | Output voltage                     |                                 | 0            | V <sub>CC</sub> | 0            | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 2 V           |              | −50             |              | −50             | μA   |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V |              | −4              |              | −4              | mA   |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V   |              | −8              |              | −8              |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 2 V           |              | 50              |              | 50              | μA   |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V |              | 4               |              | 4               | mA   |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V   |              | 8               |              | 8               |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 3.3 V ± 0.3 V |              | 100             |              | 100             | ns/V |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V   |              | 20              |              | 20              |      |
| T <sub>A</sub>  | Operating free-air temperature     |                                 | −55          | 125             | −40          | 85              | °C   |

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# SN54AHC16374, SN74AHC16374

## 16-BIT EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

| PARAMETER       | TEST CONDITIONS                                             | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |       | SN54AHC16374 |      | SN74AHC16374 |      | UNIT |
|-----------------|-------------------------------------------------------------|-----------------|-----------------------|-----|-------|--------------|------|--------------|------|------|
|                 |                                                             |                 | MIN                   | TYP | MAX   | MIN          | MAX  | MIN          | MAX  |      |
| V <sub>OH</sub> | I <sub>OH</sub> = –50 µA                                    | 2 V             | 1.9                   | 2   |       | 1.9          |      | 1.9          |      | V    |
|                 |                                                             | 3 V             | 2.9                   | 3   |       | 2.9          |      | 2.9          |      |      |
|                 |                                                             | 4.5 V           | 4.4                   | 4.5 |       | 4.4          |      | 4.4          |      |      |
|                 | I <sub>OH</sub> = –4 mA                                     | 3 V             | 2.58                  |     |       | 2.48         |      | 2.48         |      |      |
|                 | I <sub>OH</sub> = –8 mA                                     | 4.5 V           | 3.94                  |     |       | 3.8          |      | 3.8          |      |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 50 µA                                     | 2 V             |                       |     | 0.1   |              | 0.1  |              | 0.1  | V    |
|                 |                                                             | 3 V             |                       |     | 0.1   |              | 0.1  |              | 0.1  |      |
|                 |                                                             | 4.5 V           |                       |     | 0.1   |              | 0.1  |              | 0.1  |      |
|                 | I <sub>OL</sub> = 4 mA                                      | 3 V             |                       |     | 0.36  |              | 0.5  |              | 0.44 |      |
|                 | I <sub>OL</sub> = 8 mA                                      | 4.5 V           |                       |     | 0.36  |              | 0.5  |              | 0.44 |      |
| I <sub>I</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 0 V to 5.5 V    |                       |     | ±0.1  |              | ±1*  |              | ±1   | µA   |
| I <sub>OZ</sub> | V <sub>O</sub> = V <sub>CC</sub> or GND                     | 5.5 V           |                       |     | ±0.25 |              | ±2.5 |              | ±2.5 | µA   |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           |                       |     | 4     |              | 40   |              | 40   | µA   |
| C <sub>i</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 2.5 | 10    |              |      |              | 10   | pF   |
| C <sub>0</sub>  | V <sub>O</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 3.5 |       |              |      |              |      | pF   |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested at V<sub>CC</sub> = 0 V.

**timing requirements over recommended operating free-air temperature range,  
V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)**

|                 |                                 | T <sub>A</sub> = 25°C |     | SN54AHC16374 |     | SN74AHC16374 |     | UNIT |
|-----------------|---------------------------------|-----------------------|-----|--------------|-----|--------------|-----|------|
|                 |                                 | MIN                   | MAX | MIN          | MAX | MIN          | MAX |      |
| t <sub>w</sub>  | Pulse duration, CLK high or low | 5                     |     | 5.5          |     | 5.5          |     | ns   |
| t <sub>su</sub> | Setup time, data before CLK↑    | 4.5                   |     | 4            |     | 4            |     | ns   |
| t <sub>h</sub>  | Hold time, data after CLK↑      | 2                     |     | 2            |     | 2            |     | ns   |

**timing requirements over recommended operating free-air temperature range,  
V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)**

|                 |                                 | T <sub>A</sub> = 25°C |     | SN54AHC16374 |     | SN74AHC16374 |     | UNIT |
|-----------------|---------------------------------|-----------------------|-----|--------------|-----|--------------|-----|------|
|                 |                                 | MIN                   | MAX | MIN          | MAX | MIN          | MAX |      |
| t <sub>w</sub>  | Pulse duration, CLK high or low | 5                     |     | 5            |     | 5            |     | ns   |
| t <sub>su</sub> | Setup time, data before CLK↑    | 3                     |     | 3            |     | 3            |     | ns   |
| t <sub>h</sub>  | Hold time, data after CLK↑      | 2                     |     | 2            |     | 2            |     | ns   |

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## 16-BIT EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER          | FROM<br>(INPUT)        | TO<br>(OUTPUT) | LOAD<br>CAPACITANCE  | $T_A = 25^\circ\text{C}$ |      |       | SN54AHC16374 |      | SN74AHC16374 |      | UNIT |
|--------------------|------------------------|----------------|----------------------|--------------------------|------|-------|--------------|------|--------------|------|------|
|                    |                        |                |                      | MIN                      | TYP  | MAX   | MIN          | MAX  | MIN          | MAX  |      |
| $f_{\text{max}}$   |                        |                | $C_L = 15\text{ pF}$ | 80*                      | 130* |       | 70*          |      | 70           |      | MHz  |
|                    |                        |                | $C_L = 50\text{ pF}$ | 55                       | 85   |       | 50           |      | 50           |      |      |
| $t_{\text{PLH}}$   | CLK                    | Q              | $C_L = 15\text{ pF}$ |                          | 9*   | 15*   | 1*           | 17*  | 1            | 17   | ns   |
| $t_{\text{PHL}}$   |                        |                |                      |                          | 9*   | 15*   | 1*           | 17*  | 1            | 17   |      |
| $t_{\text{PZH}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 15\text{ pF}$ |                          | 8*   | 13*   | 1*           | 15*  | 1            | 15   | ns   |
| $t_{\text{PZL}}$   |                        |                |                      |                          | 8*   | 13*   | 1*           | 15*  | 1            | 15   |      |
| $t_{\text{PHZ}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 15\text{ pF}$ |                          | 9*   | 14*   | 1*           | 16*  | 1            | 16   | ns   |
| $t_{\text{PLZ}}$   |                        |                |                      |                          | 10*  | 14*   | 1*           | 16*  | 1            | 16   |      |
| $t_{\text{PLH}}$   | CLK                    | Q              | $C_L = 50\text{ pF}$ |                          | 10.6 | 16.2  | 1            | 18.5 | 1            | 18.5 | ns   |
| $t_{\text{PHL}}$   |                        |                |                      |                          | 10.6 | 16.2  | 1            | 18.5 | 1            | 18.5 |      |
| $t_{\text{PZH}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 50\text{ pF}$ |                          | 9.6  | 14.9  | 1            | 16   | 1            | 16   | ns   |
| $t_{\text{PZL}}$   |                        |                |                      |                          | 9.6  | 14.9  | 1            | 16   | 1            | 16   |      |
| $t_{\text{PHZ}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 50\text{ pF}$ |                          | 10.2 | 15.5  | 1            | 17   | 1            | 17   | ns   |
| $t_{\text{PLZ}}$   |                        |                |                      |                          | 11.8 | 15.5  | 1            | 17   | 1            | 17   |      |
| $t_{\text{sk(o)}}$ |                        |                | $C_L = 50\text{ pF}$ |                          |      | 1.5** |              |      |              | 1.5  | ns   |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

\*\* On products compliant to MIL-PRF-38535, this parameter does not apply.

switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER          | FROM<br>(INPUT)        | TO<br>(OUTPUT) | LOAD<br>CAPACITANCE  | $T_A = 25^\circ\text{C}$ |      |      | SN54AHC16374 |       | SN74AHC16374 |      | UNIT |
|--------------------|------------------------|----------------|----------------------|--------------------------|------|------|--------------|-------|--------------|------|------|
|                    |                        |                |                      | MIN                      | TYP  | MAX  | MIN          | MAX   | MIN          | MAX  |      |
| $f_{\text{max}}$   |                        |                | $C_L = 15\text{ pF}$ | 130*                     | 185* |      | 110*         |       | 110          |      | MHz  |
|                    |                        |                | $C_L = 50\text{ pF}$ | 85                       | 120  |      | 75           |       | 75           |      |      |
| $t_{\text{PLH}}$   | CLK                    | Q              | $C_L = 15\text{ pF}$ |                          | 5.4* | 9.1* | 1*           | 10.1* | 1            | 10.1 | ns   |
| $t_{\text{PHL}}$   |                        |                |                      |                          | 5.4* | 9.1* | 1*           | 10.1* | 1            | 10.1 |      |
| $t_{\text{PZH}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 15\text{ pF}$ |                          | 5.1* | 9.1* | 1*           | 10.1* | 1            | 10.1 | ns   |
| $t_{\text{PZL}}$   |                        |                |                      |                          | 5.1* | 9.1* | 1*           | 10.1* | 1            | 10.1 |      |
| $t_{\text{PHZ}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 15\text{ pF}$ |                          | 5*   | 9.5* | 1*           | 10.5* | 1            | 10.5 | ns   |
| $t_{\text{PLZ}}$   |                        |                |                      |                          | 5*   | 9.5* | 1*           | 10.5* | 1            | 10.5 |      |
| $t_{\text{PLH}}$   | CLK                    | Q              | $C_L = 50\text{ pF}$ |                          | 6.9  | 10.1 | 1            | 11.5  | 1            | 11.5 | ns   |
| $t_{\text{PHL}}$   |                        |                |                      |                          | 6.9  | 10.1 | 1            | 11.5  | 1            | 11.5 |      |
| $t_{\text{PZH}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 50\text{ pF}$ |                          | 6.6  | 10.1 | 1            | 11.5  | 1            | 11.5 | ns   |
| $t_{\text{PZL}}$   |                        |                |                      |                          | 6.6  | 10.1 | 1            | 11.5  | 1            | 11.5 |      |
| $t_{\text{PHZ}}$   | $\overline{\text{OE}}$ | Q              | $C_L = 50\text{ pF}$ |                          | 6.1  | 10.5 | 1            | 11.5  | 1            | 11.5 | ns   |
| $t_{\text{PLZ}}$   |                        |                |                      |                          | 6.1  | 10.5 | 1            | 11.5  | 1            | 11.5 |      |
| $t_{\text{sk(o)}}$ |                        |                | $C_L = 50\text{ pF}$ |                          |      | 1**  |              |       |              | 1    | ns   |

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### WITH 3-STATE OUTPUTS

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noise characteristics,  $V_{CC} = 5\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (see Note 4)

| PARAMETER                                          | SN74AHC16374 |       |      | UNIT |
|----------------------------------------------------|--------------|-------|------|------|
|                                                    | MIN          | TYP   | MAX  |      |
| $V_{OL(P)}$ Quiet output, maximum dynamic $V_{OL}$ |              | 0.36  | 0.8  | V    |
| $V_{OL(V)}$ Quiet output, minimum dynamic $V_{OL}$ |              | –0.16 | –0.8 | V    |
| $V_{OH(V)}$ Quiet output, minimum dynamic $V_{OH}$ |              | 4.6   |      | V    |
| $V_{IH(D)}$ High-level dynamic input voltage       | 3.5          |       |      | V    |
| $V_{IL(D)}$ Low-level dynamic input voltage        |              |       | 1.5  | V    |

NOTE 4: Characteristics are for surface-mount packages only.

operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER                              | TEST CONDITIONS             | TYP | UNIT |
|----------------------------------------|-----------------------------|-----|------|
| $C_{pd}$ Power dissipation capacitance | No load, $f = 1\text{ MHz}$ | 32  | pF   |

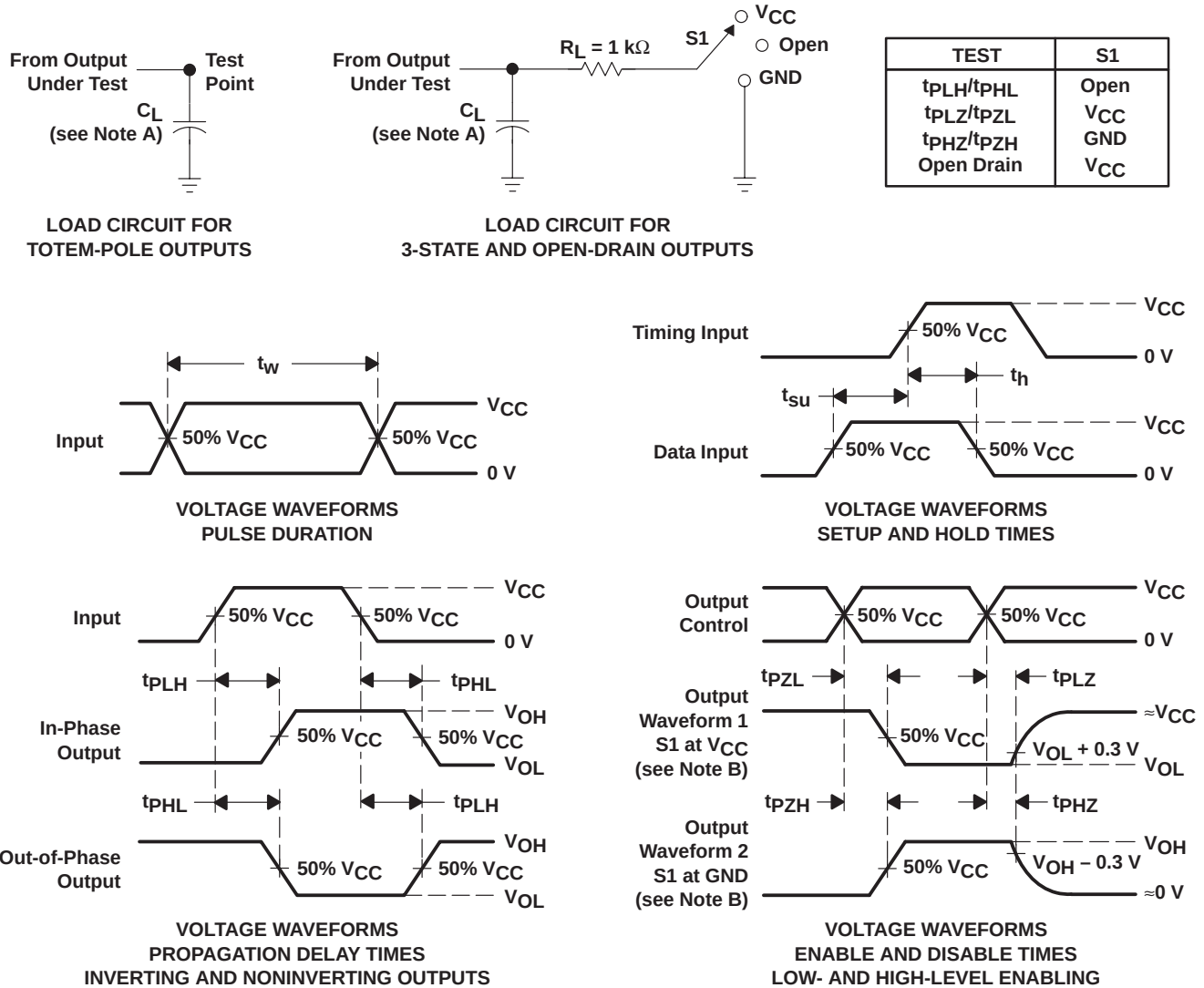


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## PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

## 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="#">SN74AHC16374DGGR</a> | Active        | Production           | TSSOP (DGG)   48 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AHC16374            |
| SN74AHC16374DGGR.A               | Active        | Production           | TSSOP (DGG)   48 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AHC16374            |
| <a href="#">SN74AHC16374DGVR</a> | Active        | Production           | TVSOP (DGV)   48 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | HE374               |
| SN74AHC16374DGVR.A               | Active        | Production           | TVSOP (DGV)   48 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | HE374               |
| <a href="#">SN74AHC16374DL</a>   | Obsolete      | Production           | SSOP (DL)   48   | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | AHC16374            |
| <a href="#">SN74AHC16374DLR</a>  | Active        | Production           | SSOP (DL)   48   | 1000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AHC16374            |
| SN74AHC16374DLR.A                | Active        | Production           | SSOP (DL)   48   | 1000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AHC16374            |

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

<sup>(2)</sup> **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.

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

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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.

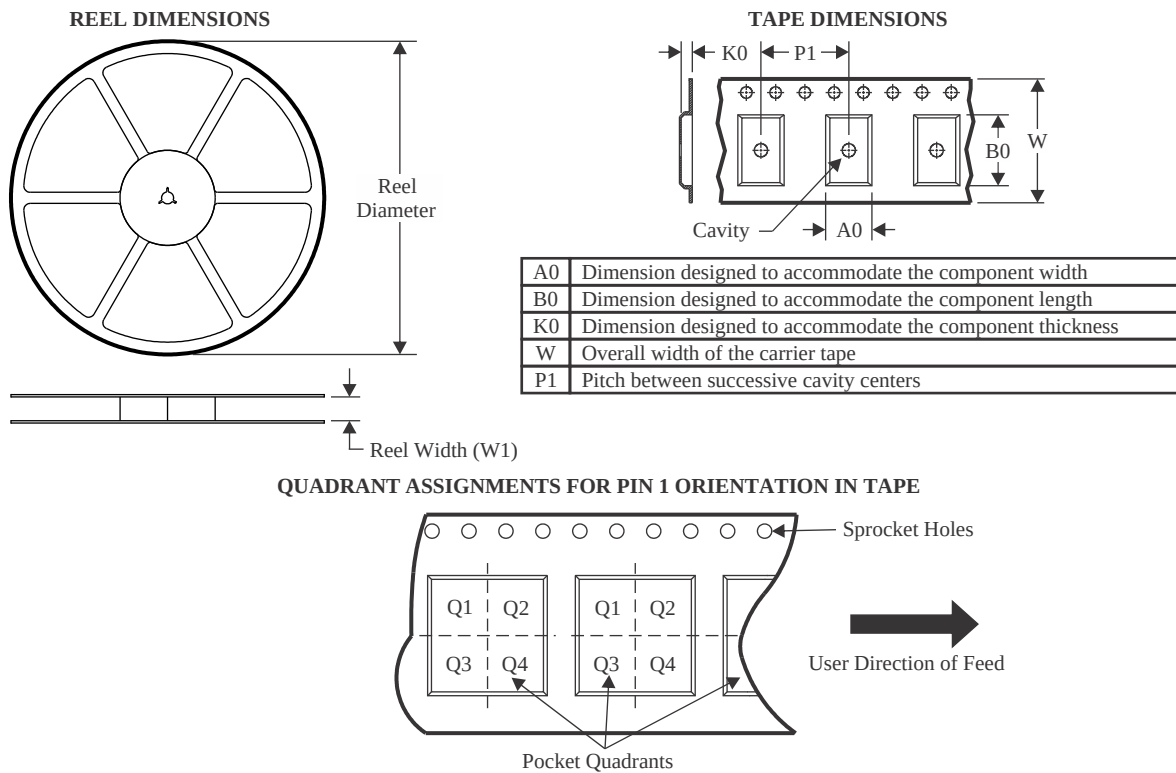
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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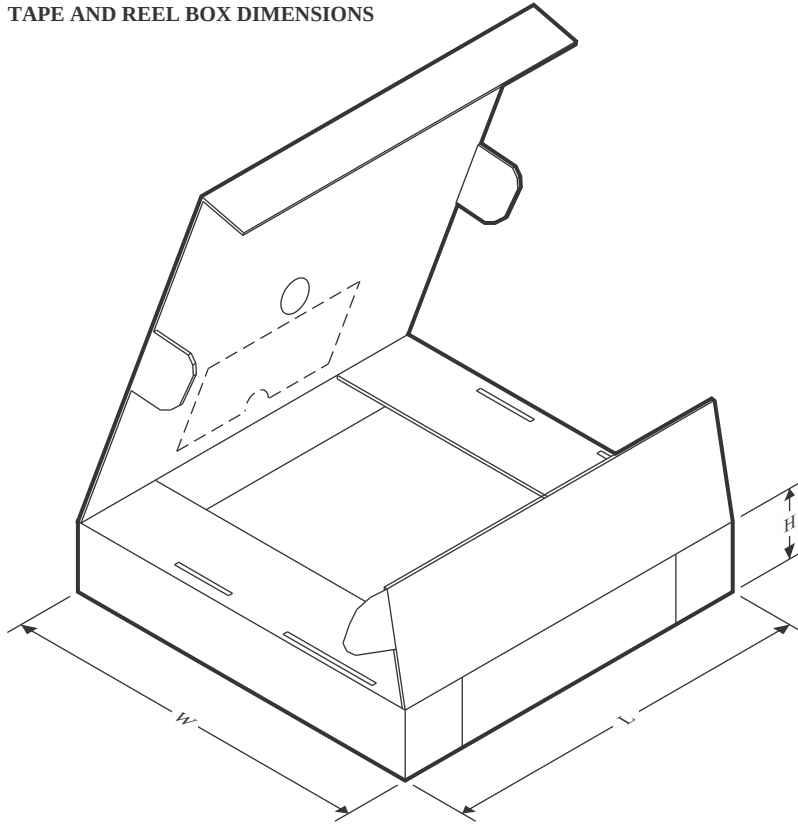
## TAPE AND REEL INFORMATION



\*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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC16374DGGR | TSSOP        | DGG             | 48   | 2000 | 330.0              | 24.4               | 8.6     | 13.0    | 1.8     | 12.0    | 24.0   | Q1            |
| SN74AHC16374DGVR | TVSOP        | DGV             | 48   | 2000 | 330.0              | 16.4               | 7.1     | 10.2    | 1.6     | 12.0    | 16.0   | Q1            |
| SN74AHC16374DLR  | SSOP         | DL              | 48   | 1000 | 330.0              | 32.4               | 11.35   | 16.2    | 3.1     | 16.0    | 32.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

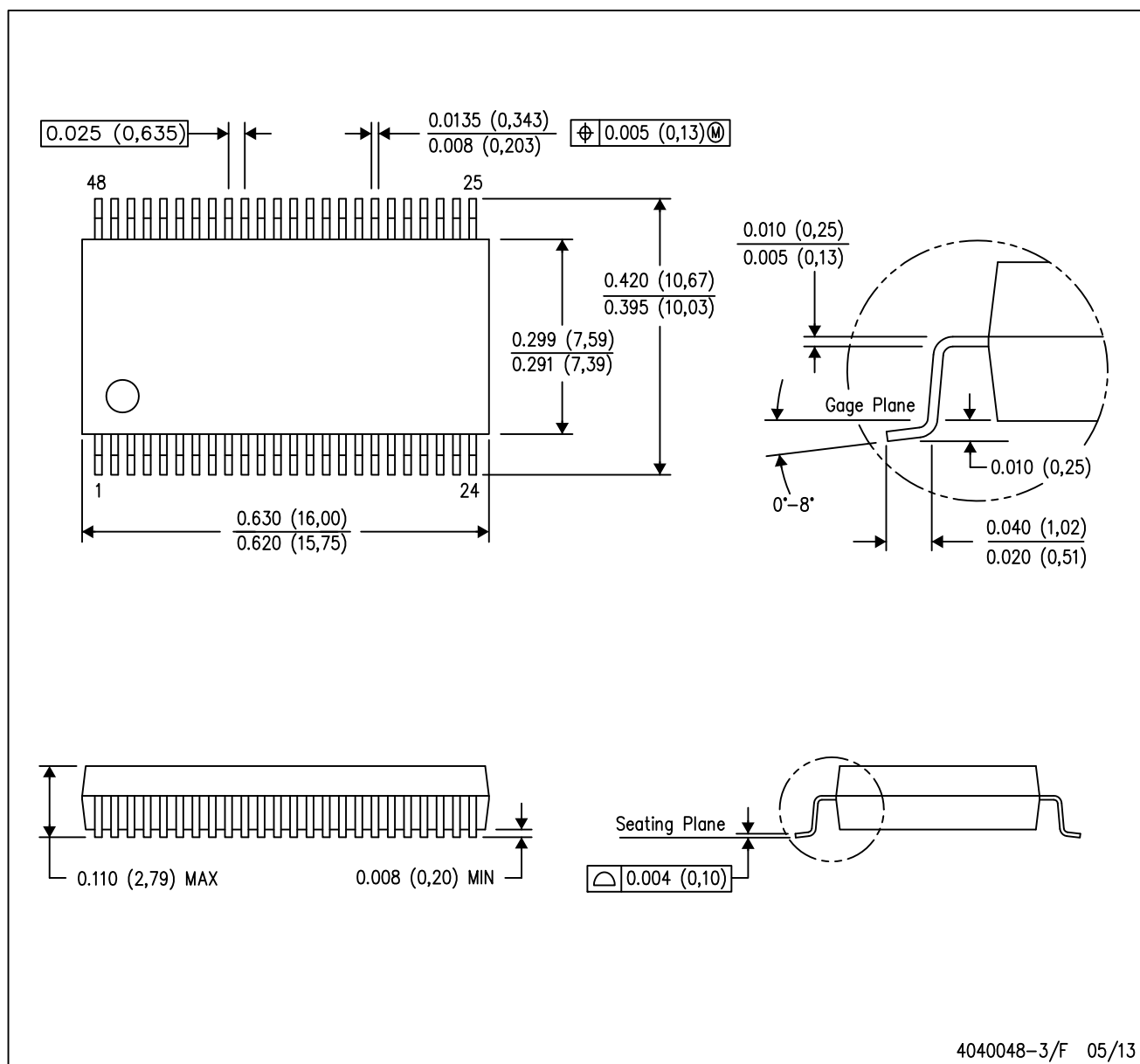


\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC16374DGGR | TSSOP        | DGG             | 48   | 2000 | 356.0       | 356.0      | 45.0        |
| SN74AHC16374DGVR | TVSOP        | DGV             | 48   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC16374DLR  | SSOP         | DL              | 48   | 1000 | 356.0       | 356.0      | 53.0        |

DL (R-PDSO-G48)

PLASTIC SMALL-OUTLINE PACKAGE

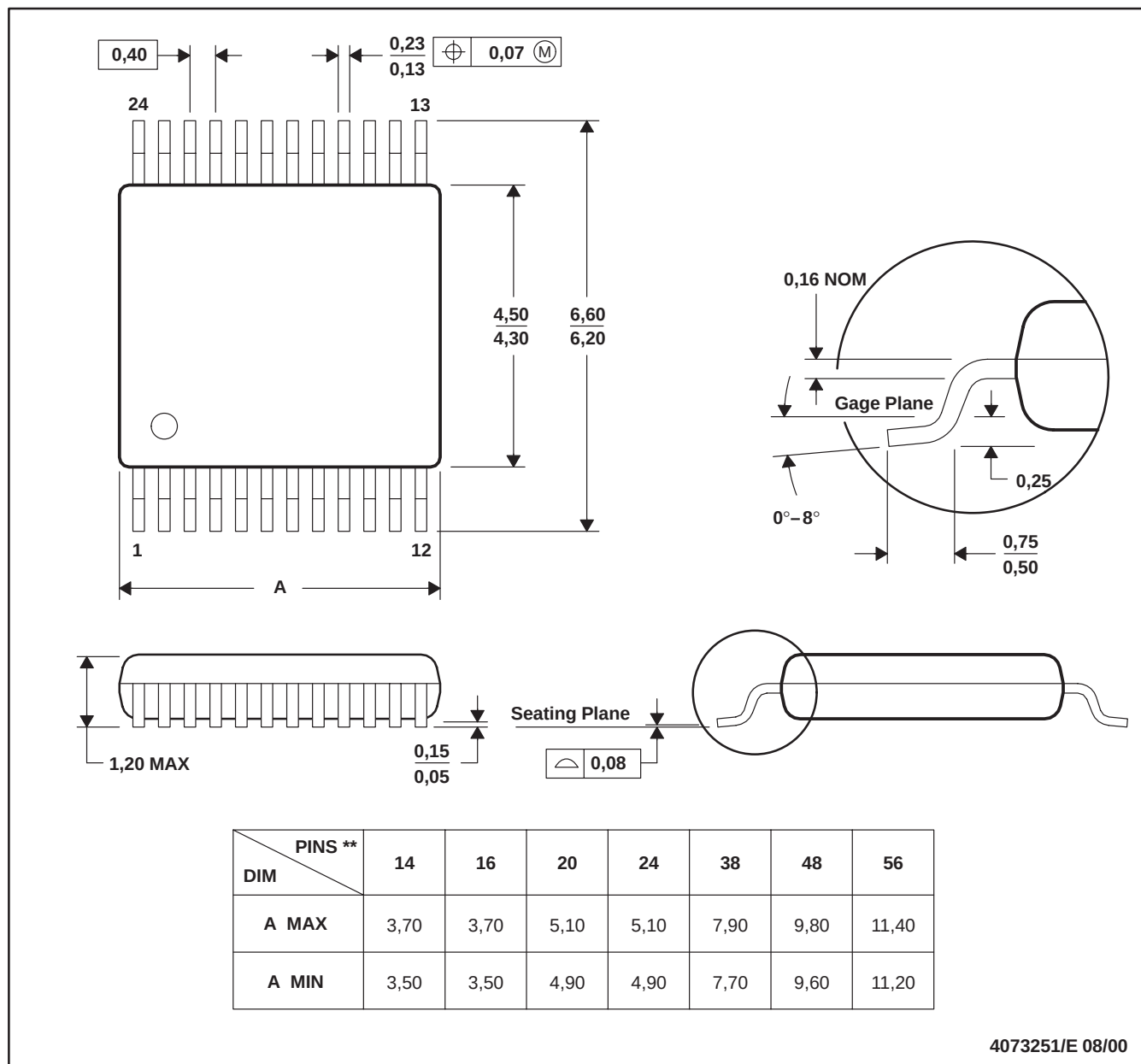


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MO-118

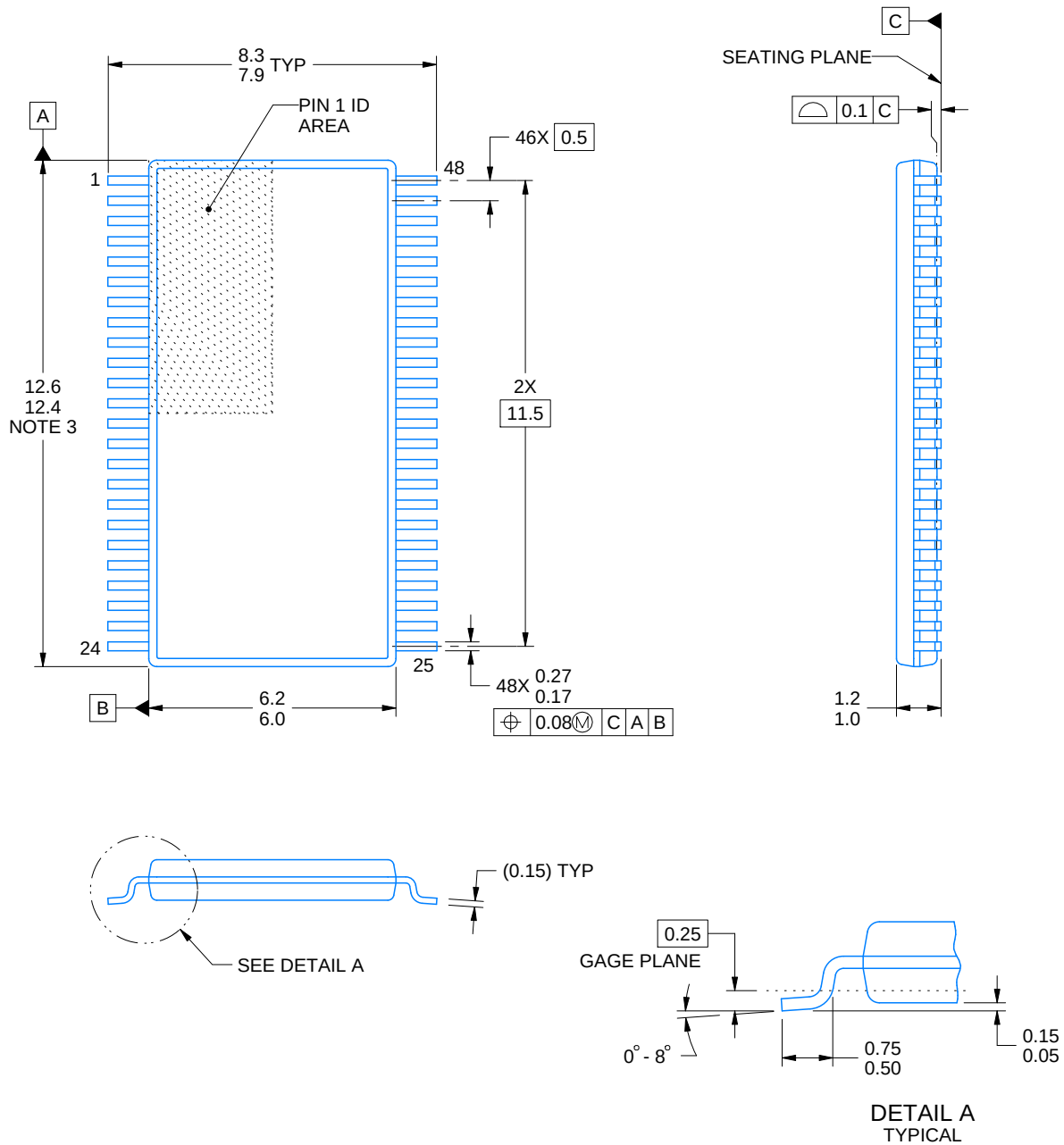
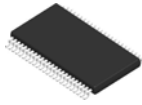
## DGV (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

24 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 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194



4214859/B 11/2020

## NOTES:

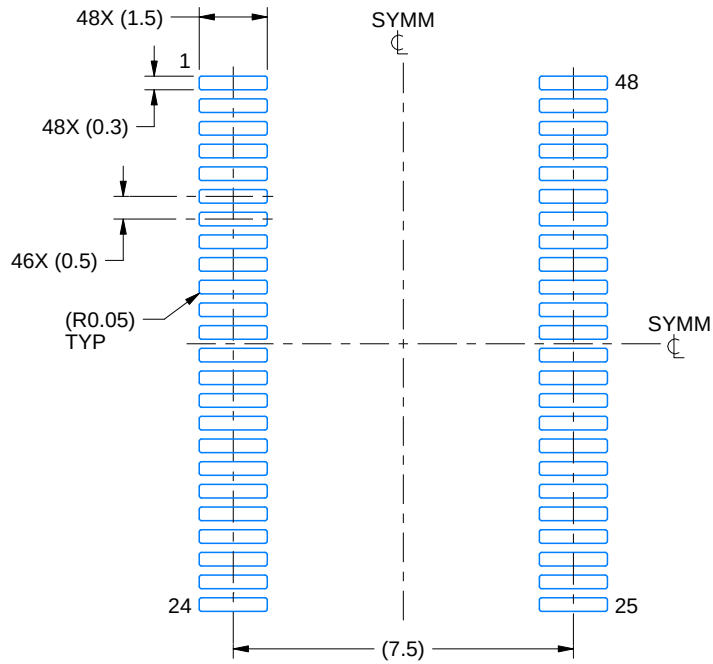
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

# EXAMPLE BOARD LAYOUT

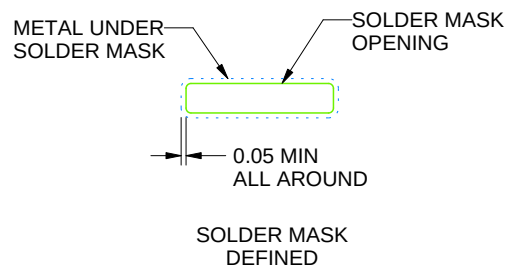
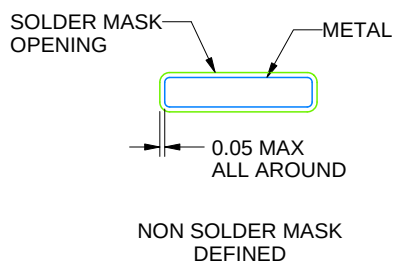
DGG0048A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

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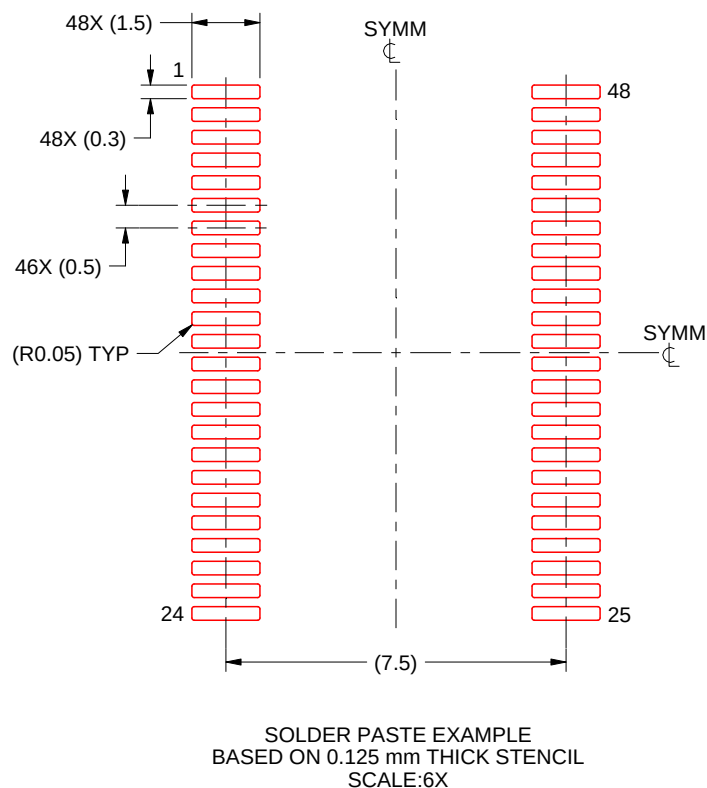
NOTES: (continued)

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

**DGG0048A**

## TSSOP - 1.2 mm max height

## SMALL OUTLINE PACKAGE



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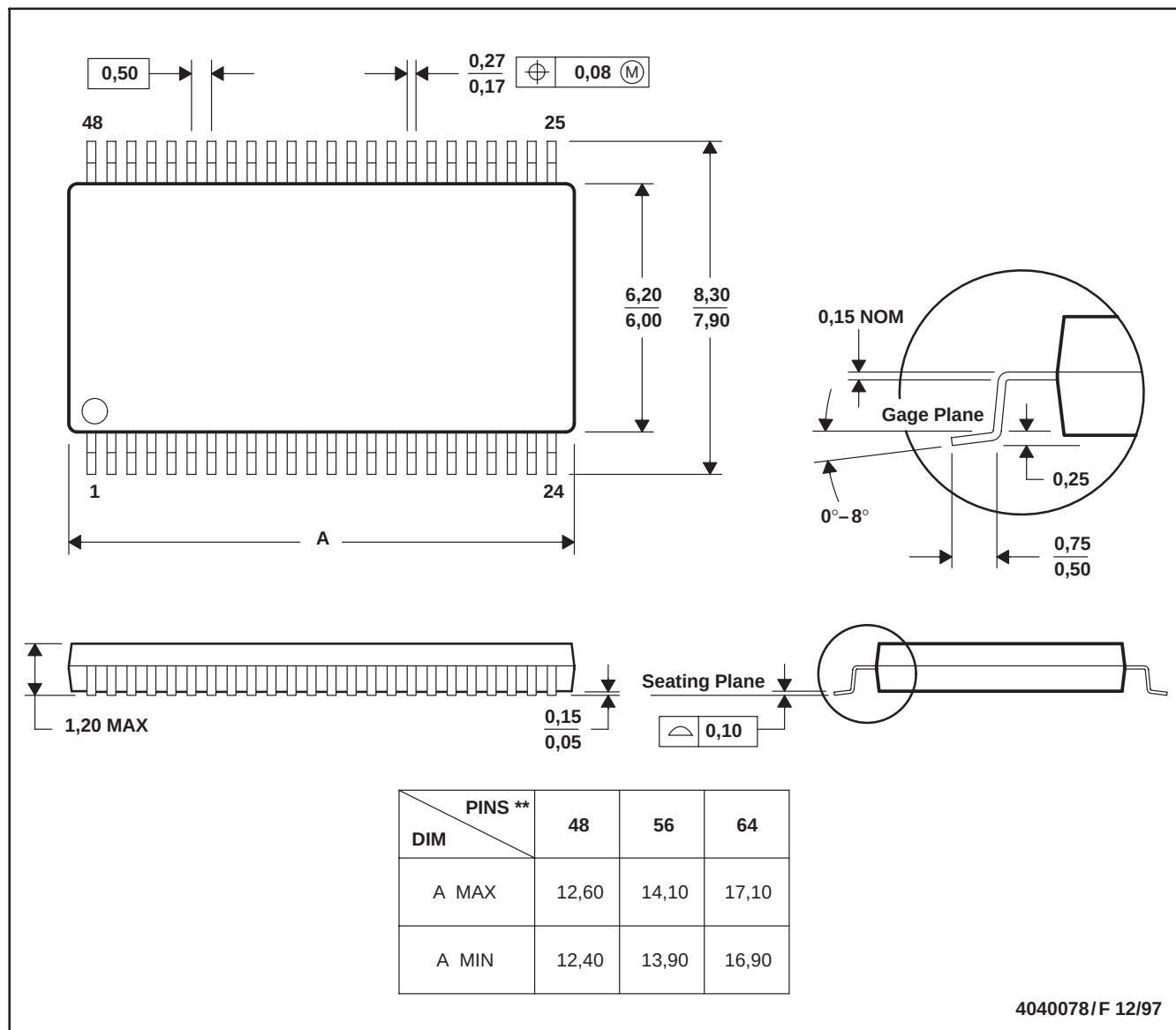
NOTES: (continued)

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.

## DGG (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

48 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 protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153

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