

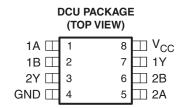
# LOW-POWER DUAL 2-INPUT POSITIVE-NAND GATE

Check for Samples: SN74AUP2G00-Q1

#### **FEATURES**

- Qualified for Automotive Applications
- Low Static-Power Consumption (I<sub>CC</sub> = 1.7 μA Maximum)
- Low Dynamic-Power Consumption (C<sub>pd</sub> = 4.3 pF Typ at 3.3 V)
- Low Input Capacitance (C<sub>i</sub> = 1.5 pF Typical)
- Low Noise Overshoot and Undershoot <10% of V<sub>CC</sub>
- I<sub>off</sub> Supports Partial-Power-Down Mode Operation
- Wide Operating V<sub>CC</sub> Range of 0.8 V to 3.6 V
- Optimized for 3.3-V Operation

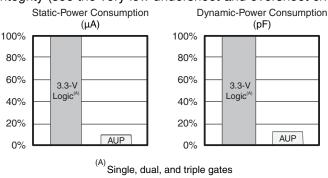
- 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation
- t<sub>pd</sub> = 5.9 ns Maximum at 3.3 V
- Suitable for Point-to-Point Applications
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

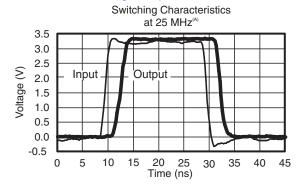


See mechanical drawings for dimensions.

# **DESCRIPTION/ORDERING INFORMATION**

The AUP family is TI's premier solution to the industry's low-power needs in battery-powered portable applications. This family ensures a very low static- and dynamic-power consumption across the entire  $V_{CC}$  range of 0.8 V to 3.6 V, resulting in increased battery life (see Figure 1). This product also maintains excellent signal integrity (see the very low undershoot and overshoot characteristics shown in Figure 2).





<sup>(A)</sup> SN74AUP2Gxx data at  $C_1 = 15 pF$ .

Figure 1. AUP - The Lowest-Power Family

Figure 2. Excellent Signal Integrity

The SN74AUP2G00 performs the Boolean function  $Y = \overline{A \cdot B}$  or  $Y = \overline{A} + \overline{B}$  in positive logic.

NanoStar $^{\text{TM}}$  package technology is a major breakthrough in IC packaging concepts, using the die as the package.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



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# ORDERING INFORMATION(1)

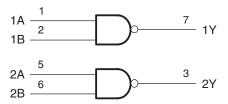
| T <sub>A</sub> | PACKAGE <sup>(2)</sup> |              | ORDERABLE PART NUMBER | TOP-SIDE MARKING |  |
|----------------|------------------------|--------------|-----------------------|------------------|--|
| -40°C to 125°C | VSSOP - DCU            | Reel of 3000 | SN74AUP2G00QDCURQ1    | SBTQ             |  |

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
- (2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

### **FUNCTION TABLE**

| INP | UTS | OUTPUT |  |  |  |  |
|-----|-----|--------|--|--|--|--|
| Α   | В   | Υ      |  |  |  |  |
| L   | L   | Н      |  |  |  |  |
| L   | Χ   | Н      |  |  |  |  |
| X   | L   | Н      |  |  |  |  |
| Н   | Н   | L      |  |  |  |  |

## **LOGIC DIAGRAM (POSITIVE LOGIC)**



Pin number shown are for DCU and DQE packages.



# ABSOLUTE MAXIMUM RATINGS(1)

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

|                  |                                                              |                    | MIN  | MAX            | UNIT |
|------------------|--------------------------------------------------------------|--------------------|------|----------------|------|
| $V_{CC}$         | Supply voltage range                                         |                    | -0.5 | 4.6            | V    |
| VI               | Input voltage range <sup>(2)</sup>                           |                    | -0.5 | 4.6            | V    |
| Vo               | Voltage range applied to any output in the high-important    | -0.5               | 4.6  | V              |      |
| Vo               | Output voltage range in the high or low state <sup>(2)</sup> |                    |      | $V_{CC} + 0.5$ | V    |
| I <sub>IK</sub>  | Input clamp current                                          | V <sub>1</sub> < 0 |      | -50            | mA   |
| I <sub>OK</sub>  | Output clamp current                                         | V <sub>O</sub> < 0 |      | -50            | mA   |
| Io               | Continuous output current                                    |                    |      | ±20            | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND            |                    |      | ±50            | mA   |
| $\theta_{JA}$    | Package thermal impedance, junction to free air              | DCU package (3)    |      | 220            | °C/W |
| T <sub>stg</sub> | Storage temperature range                                    |                    |      | 150            | °C   |

<sup>(1)</sup> 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.

### **ESD PROTECTION**

|     |                                |                        | MAX  | UNIT |
|-----|--------------------------------|------------------------|------|------|
| ESD | Electrostatic discharge rating | Human-Body Model (HBM) | 1000 | V    |

<sup>(2)</sup> The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

<sup>(3)</sup> The package thermal impedance is calculated in accordance with JESD 51-7.



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# **RECOMMENDED OPERATING CONDITIONS**(1)

|                 |                                    |                                            | MIN                    | MAX                    | UNIT |  |
|-----------------|------------------------------------|--------------------------------------------|------------------------|------------------------|------|--|
| V <sub>CC</sub> | Supply voltage                     |                                            | 0.8                    | 3.6                    | V    |  |
|                 |                                    | V <sub>CC</sub> = 0.8 V                    | V <sub>CC</sub>        |                        |      |  |
| V               | High level input valtage           | V <sub>CC</sub> = 1.1 V to 1.95 V          | 0.65 × V <sub>CC</sub> |                        | ٧    |  |
| $V_{IH}$        | High-level input voltage           | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ | 1.6                    |                        | V    |  |
|                 |                                    | $V_{CC} = 3 \text{ V to } 3.6 \text{ V}$   | 2                      |                        |      |  |
|                 |                                    | V <sub>CC</sub> = 0.8 V                    |                        | 0                      |      |  |
| .,              | Landard Sandard Rana               | V <sub>CC</sub> = 1.1 V to 1.95 V          |                        | 0.35 × V <sub>CC</sub> |      |  |
| $V_{IL}$        | Low-level input voltage            | V <sub>CC</sub> = 2.3 V to 2.7 V           |                        | 0.7                    | V    |  |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V             |                        | 0.9                    |      |  |
| VI              | Input voltage                      |                                            | 0                      | 3.6                    | V    |  |
| Vo              | Output voltage                     |                                            | 0                      | $V_{CC}$               | V    |  |
|                 |                                    | V <sub>CC</sub> = 0.8 V                    |                        | -20                    | μА   |  |
|                 |                                    | V <sub>CC</sub> = 1.1 V                    |                        | -1.1                   |      |  |
|                 |                                    | V <sub>CC</sub> = 1.4 V                    |                        | -1.7                   |      |  |
| l <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 1.65                     |                        | -1.9                   | mA   |  |
|                 |                                    | V <sub>CC</sub> = 2.3 V                    |                        | -3.1                   |      |  |
|                 |                                    | V <sub>CC</sub> = 3 V                      |                        | -4                     |      |  |
|                 |                                    | V <sub>CC</sub> = 0.8 V                    |                        | 20                     | μА   |  |
|                 |                                    | V <sub>CC</sub> = 1.1 V                    |                        | 1.1                    |      |  |
|                 |                                    | V <sub>CC</sub> = 1.4 V                    |                        | 1.7                    |      |  |
| $I_{OL}$        | Low-level output current           | V <sub>CC</sub> = 1.65 V                   |                        | 1.9                    | mA   |  |
|                 |                                    | V <sub>CC</sub> = 2.3 V                    |                        | 3.1                    |      |  |
|                 |                                    | V <sub>CC</sub> = 3 V                      |                        | 4                      |      |  |
| Δt/Δν           | Input transition rise or fall rate | V <sub>CC</sub> = 0.8 V to 3.6 V           |                        | 200                    | ns/V |  |
| T <sub>A</sub>  | Operating free-air temperature     |                                            | -40                    | 125                    | °C   |  |

<sup>(1)</sup> All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. See the TI application report *Implications* of Slow or Floating CMOS Inputs, literature number SCBA004.



## **ELECTRICAL CHARACTERISTICS**

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

| DADAMETED                   | TECT CONDITIONS                                                          | V               | T,                     | <sub>A</sub> = 25°C   | $T_A = -40$ °C t      | $T_A = -40$ °C to 125°C |      |  |
|-----------------------------|--------------------------------------------------------------------------|-----------------|------------------------|-----------------------|-----------------------|-------------------------|------|--|
| PARAMETER                   | TEST CONDITIONS                                                          | V <sub>cc</sub> | MIN                    | TYP MAX               | MIN                   | MAX                     | UNIT |  |
|                             | $I_{OH} = -20 \mu A$                                                     | 0.8 V to 3.6 V  | V <sub>CC</sub> - 0.1  |                       | V <sub>CC</sub> - 0.1 |                         |      |  |
|                             | I <sub>OH</sub> = -1.1 mA                                                | 1.1 V           | 0.75 × V <sub>CC</sub> |                       | 0.7 × V <sub>CC</sub> |                         |      |  |
|                             | $I_{OH} = -1.7 \text{ mA}$                                               | 1.4 V           | 1.11                   |                       | 1.03                  |                         |      |  |
| M                           | $I_{OH} = -1.9 \text{ mA}$                                               | 1.65 V          | 1.32                   |                       | 1.3                   |                         | V    |  |
| $V_{OH}$                    | $I_{OH} = -2.3 \text{ mA}$                                               | 2.3 V           | 2.05                   |                       | 1.97                  |                         | V    |  |
|                             | $I_{OH} = -3.1 \text{ mA}$                                               | 2.3 V           | 1.9                    |                       | 1.85                  |                         |      |  |
|                             | $I_{OH} = -2.7 \text{ mA}$                                               | 3 V             | 2.72                   |                       | 2.67                  |                         |      |  |
|                             | $I_{OH} = -4 \text{ mA}$                                                 | 3 V             | 2.6                    |                       | 2.55                  |                         |      |  |
|                             | I <sub>OL</sub> = 20 μA                                                  | 0.8 V to 3.6 V  |                        | 0.1                   |                       | 0.1                     |      |  |
|                             | I <sub>OL</sub> = 1.1 mA                                                 | 1.1 V           |                        | 0.3 × V <sub>CC</sub> |                       | 0.3 × V <sub>CC</sub>   |      |  |
|                             | I <sub>OL</sub> = 1.7 mA                                                 | 1.4 V           |                        | 0.31                  |                       | 0.37                    |      |  |
| V                           | I <sub>OL</sub> = 1.9 mA                                                 | 1.65 V          |                        | 0.31                  |                       | 0.35                    | V    |  |
| $V_{OL}$                    | I <sub>OL</sub> = 2.3 mA                                                 | 0.0.1/          |                        | 0.31                  |                       | 0.33                    |      |  |
|                             | I <sub>OL</sub> = 3.1 mA                                                 | 2.3 V           |                        | 0.44                  |                       | 0.45                    |      |  |
|                             | I <sub>OL</sub> = 2.7 mA                                                 | 0.1/            |                        | 0.31                  |                       | 0.33                    |      |  |
|                             | I <sub>OL</sub> = 4 mA                                                   | 3 V             |                        | 0.44                  |                       | 0.45                    |      |  |
| I <sub>I</sub> A or B input | $V_I = GND \text{ to } 3.6 \text{ V}$                                    | 0 V to 3.6 V    |                        | 0.1                   |                       | 0.5                     | μΑ   |  |
| l <sub>off</sub>            | $V_{I}$ or $V_{O} = 0 \text{ V to } 3.6 \text{ V}$                       | 0 V             |                        | 0.2                   |                       | 1.3                     | μΑ   |  |
| $\Delta I_{ m off}$         | $V_{I}$ or $V_{O} = 0 \text{ V to } 3.6 \text{ V}$                       | 0 V to 0.2 V    |                        | 0.2                   |                       | 2                       | μΑ   |  |
| I <sub>CC</sub>             | $V_I = GND \text{ or } (V_{CC} \text{ to } 3.6 \text{ V}),$<br>$I_O = 0$ | 0.8 V to 3.6 V  |                        | 0.5                   |                       | 1.7                     | μА   |  |
| ΔI <sub>CC</sub>            | $V_I = V_{CC} - 0.6 V^{(1)},$ $I_O = 0$                                  | 3.3 V           |                        | 40                    |                       | 50                      | μА   |  |
| C <sub>i</sub>              | V <sub>I</sub> = V <sub>CC</sub> or GND                                  | 0 V             |                        | 1.5                   |                       |                         | pF   |  |
| C <sub>o</sub>              | V <sub>O</sub> = GND                                                     | 3.6 V<br>0 V    |                        | 1.5<br>3              |                       |                         | pF   |  |

<sup>(1)</sup> One input at  $V_{CC} - 0.6 \text{ V}$ , other input at  $V_{CC}$  or GND

# **SWITCHING CHARACTERISTICS**(1)

over recommended operating free-air temperature range,  $C_L = 5 pF$  (unless otherwise noted) (see Figure 3 and Figure 4)

| PARAMETER       | PARAMETER FROM TO      |          | V <sub>CC</sub> | T <sub>A</sub> = 25°C |      |      | T <sub>A</sub> = -40°C to<br>125°C |      | UNIT |
|-----------------|------------------------|----------|-----------------|-----------------------|------|------|------------------------------------|------|------|
|                 | (INPUT)                | (OUTPUT) |                 | MIN                   | TYP  | MAX  | MIN                                | MAX  |      |
|                 | t <sub>pd</sub> A or B |          | 0.8 V           |                       | 19.8 |      |                                    |      |      |
|                 |                        |          | 1.2 V ± 0.1 V   | 2.6                   | 7.8  | 18.8 | 2.1                                | 20.9 |      |
|                 |                        | V        | 1.5 V ± 0.1 V   | 1.4                   | 5.4  | 11.8 | 0.9                                | 12.7 |      |
| <sup>I</sup> pd |                        | Y        | 1.8 V ± 0.15 V  | 1                     | 4.3  | 9    | 0.5                                | 9.5  | ns   |
|                 |                        |          | 2.5 V ± 0.2 V   | 1                     | 3    | 5.9  | 0.5                                | 6.4  |      |
|                 |                        |          | 3.3 V ± 0.3 V   | 1                     | 2.4  | 5.2  | 0.5                                | 5.7  |      |

<sup>(1)</sup> Specified by design. Not production tested.

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## SWITCHING CHARACTERISTICS(1)

over recommended operating free-air temperature range,  $C_L = 10 \text{ pF}$  (unless otherwise noted) (see Figure 3 and Figure 4)

| PARAMETER       | FROM TO V <sub>CC</sub> |          | T <sub>A</sub> = 25°C |     |      | $T_A = -40$ | UNIT |      |    |
|-----------------|-------------------------|----------|-----------------------|-----|------|-------------|------|------|----|
|                 | (INPUT)                 | (OUTPUT) |                       | MIN | TYP  | MAX         | MIN  | MAX  |    |
|                 |                         |          | 0.8 V                 |     | 23.1 |             |      |      |    |
|                 |                         |          | 1.2 V ± 0.1 V         | 1.5 | 8.9  | 21.1        | 1    | 22.1 |    |
|                 |                         | .,       | 1.5 V ± 0.1 V         | 1   | 6.3  | 13.2        | 0.5  | 13.7 |    |
| t <sub>pd</sub> | A or B                  | Y        | 1.8 V ± 0.15 V        | 1   | 5    | 10.1        | 0.5  | 10.6 | ns |
|                 |                         |          | 2.5 V ± 0.2 V         | 1   | 3.6  | 7.4         | 0.5  | 7.9  |    |
|                 |                         |          | 3.3 V ± 0.3 V         | 1   | 2.9  | 5.5         | 0.5  | 6    |    |

<sup>(1)</sup> Specified by design. Not production tested.

# **SWITCHING CHARACTERISTICS**(1)

over recommended operating free-air temperature range, C<sub>L</sub> = 15 pF (unless otherwise noted) (see Figure 3 and Figure 4)

| PARAMETER       | FROM<br>(INPUT) | TO (OUTPUT) | V <sub>cc</sub> | T,  | λ = 25°C | ,    | T <sub>A</sub> = -40 |      | UNIT |
|-----------------|-----------------|-------------|-----------------|-----|----------|------|----------------------|------|------|
|                 | (INPUT)         | (OUTPUT)    |                 | MIN | TYP      | MAX  | MIN                  | MAX  |      |
|                 |                 |             | 0.8 V           |     | 24.7     |      |                      |      |      |
|                 |                 |             | 1.2 V ± 0.1 V   | 3.6 | 9.8      | 21.7 | 3.1                  | 24.8 |      |
|                 |                 | Y           | 1.5 V ± 0.1 V   | 2.3 | 4.6      | 14   | 1.8                  | 15.8 |      |
| t <sub>pd</sub> | A or B          | Ť           | 1.8 V ± 0.15 V  | 1.6 | 5.5      | 10.6 | 1.1                  | 11.7 | ns   |
|                 |                 |             | 2.5 V ± 0.2 V   | 1   | 4        | 7    | 0.5                  | 7.5  |      |
|                 |                 |             | 3.3 V ± 0.3 V   | 1   | 3.3      | 5.9  | 0.5                  | 6.4  |      |

<sup>(1)</sup> Specified by design. Not production tested.

## **SWITCHING CHARACTERISTICS**

over recommended operating free-air temperature range, C<sub>L</sub> = 30 pF (unless otherwise noted) (see Figure 3 and Figure 4)

| PARAMETER       | FROM                   | TO       | V <sub>cc</sub> | T <sub>A</sub> = 25°C |      |      | T <sub>A</sub> = -40°C to<br>125°C |      | UNIT |
|-----------------|------------------------|----------|-----------------|-----------------------|------|------|------------------------------------|------|------|
|                 | (INPUT)                | (OUTPUT) |                 | MIN                   | TYP  | MAX  | MIN                                | MAX  |      |
|                 |                        |          | 0.8 V           |                       | 31.8 |      |                                    |      |      |
|                 | t <sub>pd</sub> A or B |          | 1.2 V ± 0.1 V   | 4.9                   | 12.6 | 26.3 | 4.4                                | 29   | 1    |
|                 |                        | V        | 1.5 V ± 0.1 V   | 3.4                   | 9    | 16.6 | 2.9                                | 20   |      |
| <sup>L</sup> pd |                        | Y        | 1.8 V ± 0.15 V  | 2.5                   | 7.3  | 12.9 | 2                                  | 15.7 |      |
|                 |                        |          | 2.5 V ± 0.2 V   | 1.8                   | 5.4  | 8.8  | 1.3                                | 11.4 |      |
|                 |                        |          | 3.3 V ± 0.3 V   | 1.5                   | 4.5  | 7    | 1                                  | 9.5  |      |

### **OPERATING CHARACTERISTICS**

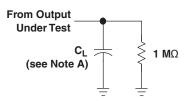
 $T_A = 25^{\circ}C$ 

|                 | PARAMETER                     | TEST<br>CONDITIONS | V <sub>cc</sub> | TYP | UNIT |
|-----------------|-------------------------------|--------------------|-----------------|-----|------|
|                 |                               |                    | 0.8 V           | 4   |      |
|                 |                               |                    | 1.2 V ± 0.1 V   | 4   |      |
| 0               | Davis dissination associtance | f 40 MH-           | 1.5 V ± 0.1 V   | 4   | pF   |
| C <sub>pd</sub> | Power dissipation capacitance | f = 10 MHz         | 1.8 V ± 0.15 V  | 4   |      |
|                 |                               | 2.5 V ± 0          | 2.5 V ± 0.2 V   | 4.1 |      |
|                 |                               |                    | 3.3 V ± 0.3 V   | 4.3 |      |

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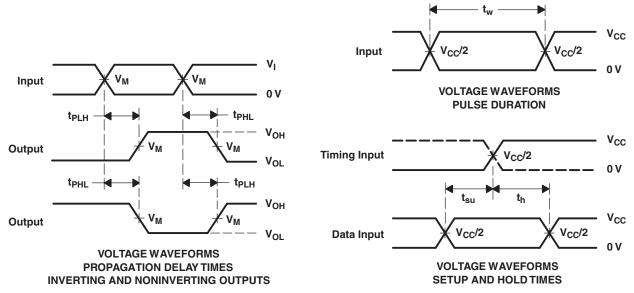


# PARAMETER MEASUREMENT INFORMATION (Propagation Delays, Setup and Hold Times, and Pulse Width)



**LOAD CIRCUIT** 

|                | V <sub>CC</sub> = 0.8 V | V <sub>CC</sub> = 1.2 V<br>± 0.1 V | V <sub>CC</sub> = 1.5 V<br>± 0.1 V | $V_{CC}$ = 1.8 V $\pm$ 0.15 V | $V_{CC}$ = 2.5 V $\pm$ 0.2 V | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |
|----------------|-------------------------|------------------------------------|------------------------------------|-------------------------------|------------------------------|------------------------------------|
| C <sub>L</sub> | 5, 10, 15, 30 pF        | 5, 10, 15, 30 pF                   | 5, 10, 15, 30 pF                   | 5, 10, 15, 30 pF              | 5, 10, 15, 30 pF             | 5, 10, 15, 30 pF                   |
| V <sub>M</sub> | V <sub>CC</sub> /2      | V <sub>CC</sub> /2                 | V <sub>CC</sub> /2                 | V <sub>CC</sub> /2            | V <sub>CC</sub> /2           | V <sub>CC</sub> /2                 |
| V <sub>I</sub> | V <sub>CC</sub>         | V <sub>CC</sub>                    | V <sub>CC</sub>                    | V <sub>CC</sub>               | V <sub>CC</sub>              | V <sub>CC</sub>                    |



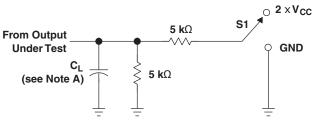
- A. C<sub>L</sub> includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz,  $Z_O = 50 \Omega$ , for propagation delays  $t_r/t_f = 3$  ns, for setup and hold times and pulse width  $t_r/t_f = 1.2$  ns.
- D. The outputs are measured one at a time, with one transition per measurement.
- E.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- F. All parameters and waveforms are not applicable to all devices.

Figure 3. Load Circuit and Voltage Waveforms

TEXAS INSTRUMENTS

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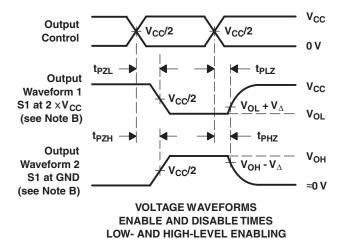
# PARAMETER MEASUREMENT INFORMATION (Enable and Disable Times)



| TEST                               | S1                |
|------------------------------------|-------------------|
| t <sub>PLZ</sub> /t <sub>PZL</sub> | 2×V <sub>CC</sub> |
| t <sub>PHZ</sub> /t <sub>PZH</sub> | GND               |

LOAD CIRCUIT

|                | V <sub>CC</sub> = 0.8 V | V <sub>CC</sub> = 1.2 V<br>± 0.1 V | V <sub>CC</sub> = 1.5 V<br>± 0.1 V | $V_{CC}$ = 1.8 V<br>$\pm$ 0.15 V | $V_{CC}$ = 2.5 V $\pm$ 0.2 V | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |
|----------------|-------------------------|------------------------------------|------------------------------------|----------------------------------|------------------------------|------------------------------------|
| C <sub>L</sub> | 5, 10, 15, 30 pF        | 5, 10, 15, 30 pF                   | 5, 10, 15, 30 pF                   | 5, 10, 15, 30 pF                 | 5, 10, 15, 30 pF             | 5, 10, 15, 30 pF                   |
| V <sub>M</sub> | V <sub>CC</sub> /2      | V <sub>CC</sub> /2                 | V <sub>CC</sub> /2                 | V <sub>CC</sub> /2               | V <sub>CC</sub> /2           | V <sub>CC</sub> /2                 |
| V <sub>I</sub> | V <sub>CC</sub>         | V <sub>CC</sub>                    | V <sub>CC</sub>                    | V <sub>CC</sub>                  | V <sub>CC</sub>              | V <sub>CC</sub>                    |
| V <sub>∆</sub> | 0.1 V                   | 0.1 V                              | 0.1 V                              | 0.15 V                           | 0.15 V                       | 0.3 V                              |



- A. C<sub>L</sub> 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  $\leq$  10 MHz,  $Z_O = 50 \Omega$ ,  $t_r/t_f = 3$  ns.
- D. The outputs are measured one at a time, with one transition per measurement.
- E. t<sub>PLZ</sub> and t<sub>PHZ</sub> are the same as t<sub>dis</sub>.
- F. t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>pd</sub>.
- G. All parameters and waveforms are not applicable to all devices.

Figure 4. Load Circuit and Voltage Waveforms



# PACKAGE OPTION ADDENDUM

10-Dec-2020

### **PACKAGING INFORMATION**

| Orderable Device   | Status | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan     | Lead finish/<br>Ball material | MSL Peak Temp      | Op Temp (°C) | Device Marking<br>(4/5) | Samples |
|--------------------|--------|--------------|--------------------|------|----------------|--------------|-------------------------------|--------------------|--------------|-------------------------|---------|
|                    |        |              |                    |      |                |              | (6)                           |                    |              |                         |         |
| SN74AUP2G00QDCURQ1 | ACTIVE | VSSOP        | DCU                | 8    | 3000           | RoHS & Green | NIPDAU                        | Level-1-260C-UNLIM | -40 to 125   | SBTQ                    | Samples |

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

**ACTIVE:** Product device recommended for new designs.

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

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

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

**OBSOLETE:** TI has discontinued the production of the device.

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

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

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

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead finish/Ball material Orderable Devices 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.

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#### OTHER QUALIFIED VERSIONS OF SN74AUP2G00-Q1:



# **PACKAGE OPTION ADDENDUM**

10-Dec-2020

• Catalog: SN74AUP2G00

NOTE: Qualified Version Definitions:

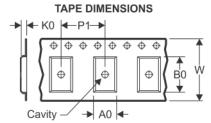
• Catalog - TI's standard catalog product

# **PACKAGE MATERIALS INFORMATION**

www.ti.com 3-Aug-2017

# TAPE AND REEL INFORMATION





|   |    | Dimension designed to accommodate the component width     |
|---|----|-----------------------------------------------------------|
|   |    | Dimension designed to accommodate the component length    |
| K | (0 | Dimension designed to accommodate the component thickness |
|   | Ν  | Overall width of the carrier tape                         |
| Г | 21 | Pitch between successive cavity centers                   |

# QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



### \*All dimensions are nominal

| Device                 | Package<br>Type | Package<br>Drawing |   | SPQ  | Reel<br>Diameter<br>(mm) | Reel<br>Width<br>W1 (mm) | A0<br>(mm) | B0<br>(mm) | K0<br>(mm) | P1<br>(mm) | W<br>(mm) | Pin1<br>Quadrant |
|------------------------|-----------------|--------------------|---|------|--------------------------|--------------------------|------------|------------|------------|------------|-----------|------------------|
| SN74AUP2G00QDCURQ<br>1 | VSSOP           | DCU                | 8 | 3000 | 180.0                    | 8.4                      | 2.25       | 3.35       | 1.05       | 4.0        | 8.0       | Q3               |

**PACKAGE MATERIALS INFORMATION** 

www.ti.com 3-Aug-2017

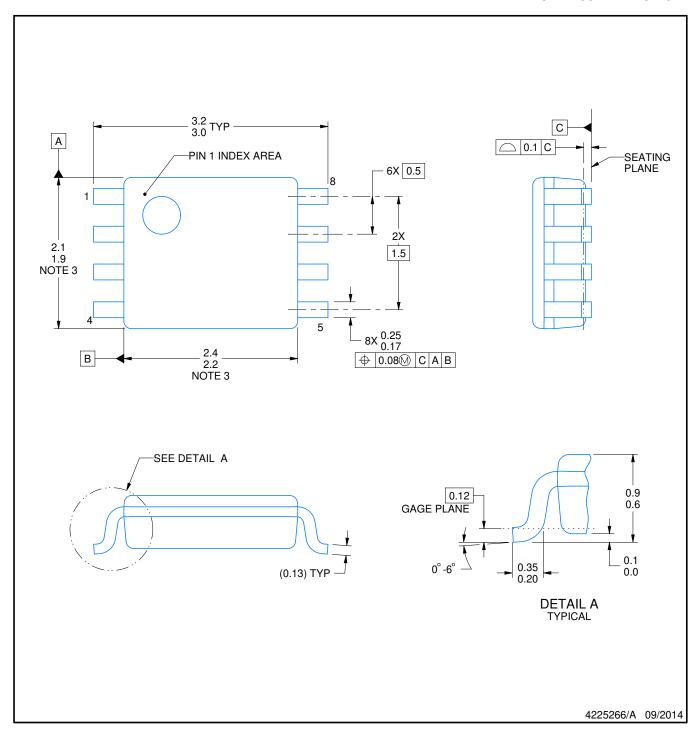


### \*All dimensions are nominal

| Device             | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AUP2G00QDCURQ1 | VSSOP        | DCU             | 8    | 3000 | 202.0       | 201.0      | 28.0        |



SMALL OUTLINE PACKAGE



### NOTES:

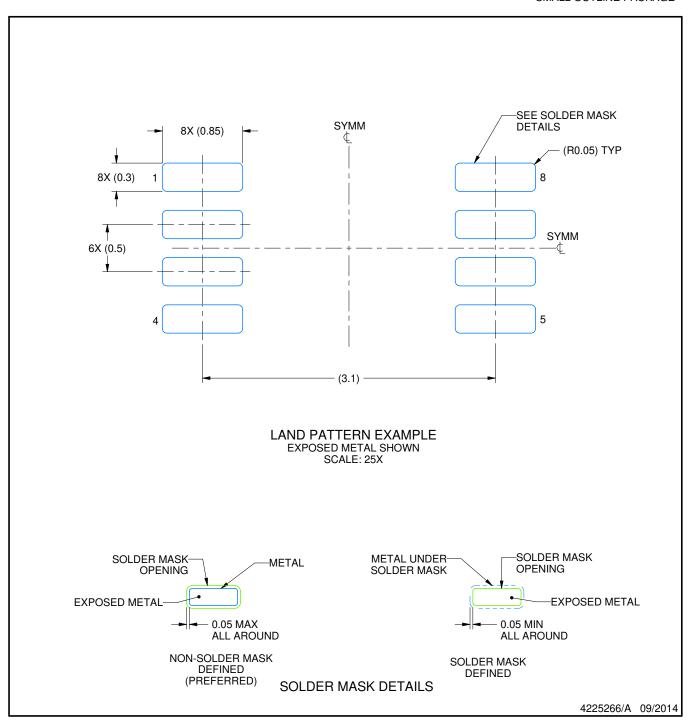
- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  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-187 variation CA.



SMALL OUTLINE PACKAGE



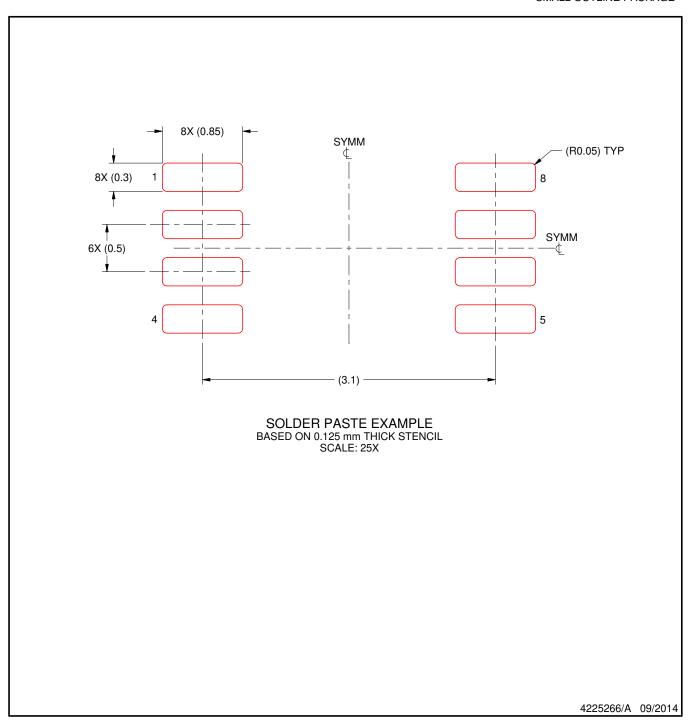
NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

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



SMALL OUTLINE PACKAGE



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.



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