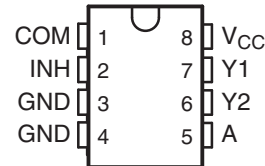


## SINGLE-POLE DOUBLE-THROW (SPDT) ANALOG SWITCH OR 2:1 ANALOG MULTIPLEXER/DEMULTIPLEXER

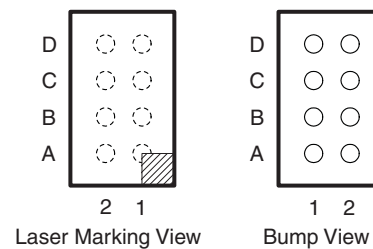
### FEATURES

- Available in the Texas Instruments NanoFree™ Package
- Operates at 0.8 V to 2.7 V
- Sub-1-V Operable
- Low Power Consumption, 10  $\mu$ A at 2.7 V
- High On-Off Output Voltage Ratio
- High Degree of Linearity
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

**DCT OR DCU PACKAGE  
(TOP VIEW)**



**YZP PACKAGE**



**YZP TERMINAL ASSIGNMENTS**

|          |          |                 |
|----------|----------|-----------------|
| <b>D</b> | GND      | A               |
| <b>C</b> | GND      | Y2              |
| <b>B</b> | INH      | Y1              |
| <b>A</b> | COM      | V <sub>CC</sub> |
|          | <b>1</b> | <b>2</b>        |

### DESCRIPTION/ORDERING INFORMATION

This analog switch is operational at 0.8-V to 2.7-V  $V_{CC}$ , but is designed specifically for 1.1-V to 2.7-V  $V_{CC}$  operation.

The SN74AUC2G53 can handle both analog and digital signals. The device permits signals with amplitudes of up to  $V_{CC}$  (peak) to be transmitted in either direction.

NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.



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.

NanoFree is a trademark of Texas Instruments.

ORDERING INFORMATION

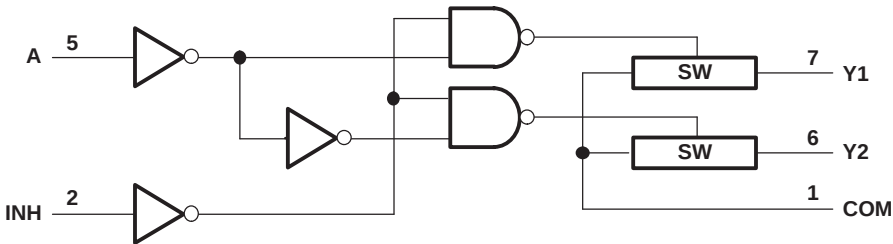
| T <sub>A</sub> | PACKAGE <sup>(1)(2)</sup>                                      |              | ORDERABLE PART NUMBER | TOP-SIDE MARKING <sup>(3)</sup> |
|----------------|----------------------------------------------------------------|--------------|-----------------------|---------------------------------|
| –40C to 85C    | NanoFree™ – WCSP (DSBGA)<br>0.23-mm Large Bump – YZP (Pb-free) | Reel of 3000 | SN74AUC2G53YZPR       | __ _U4_                         |
|                | SSOP – DCT                                                     | Reel of 3000 | SN74AUC2G53DCTR       | U53__ _                         |
|                | VSSOP – DCU                                                    | Reel of 3000 | SN74AUC2G53DCUR       | U53_                            |

- (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](http://www.ti.com).
- (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).
- (3) DCT: The actual top-side marking has three additional characters that designate the year, month, and assembly/test site.  
DCU: The actual top-side marking has one additional character that designates the assembly/test site.  
YZP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the assembly/test site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).

FUNCTION TABLE

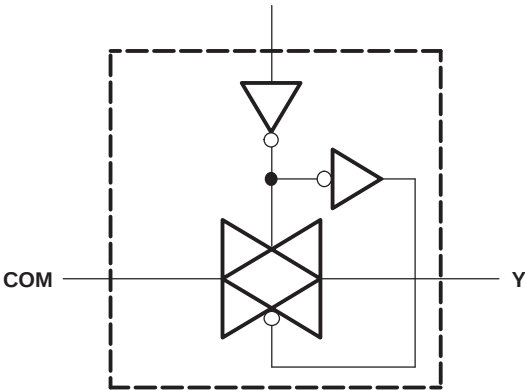
| CONTROL INPUTS |   | ON CHANNEL |
|----------------|---|------------|
| INH            | A |            |
| L              | L | Y1         |
| L              | H | Y2         |
| H              | X | None       |

LOGIC DIAGRAM (POSITIVE LOGIC)



NOTE A: For simplicity, the test conditions shown in Figures 1 through 4 and 6 through 10 are for the demultiplexer configuration. Signals may be passed from COM to Y1 (Y2) or from Y1 (Y2) to COM.

SIMPLIFIED SCHEMATIC, EACH SWITCH (SW)



## Absolute Maximum Ratings<sup>(1)</sup>

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

|               |                                            | MIN                                 | MAX            | UNIT |
|---------------|--------------------------------------------|-------------------------------------|----------------|------|
| $V_{CC}$      | Supply voltage range <sup>(2)</sup>        | –0.5                                | 3.6            | V    |
| $V_I$         | Input voltage range <sup>(2)(3)</sup>      | –0.5                                | 3.6            | V    |
| $V_{I/O}$     | Switch I/O voltage range <sup>(2)(3)</sup> | –0.5                                | $V_{CC} + 0.5$ | V    |
| $I_{IK}$      | Control input clamp current                | $V_I < 0$                           | –50            | mA   |
| $I_{I/OK}$    | I/O port diode current                     | $V_{I/O} < 0$ or $V_{I/O} > V_{CC}$ | 50             | mA   |
| $I_T$         | On-state switch current                    | $V_{I/O} = 0$ to $V_{CC}$           | 50             | mA   |
|               | Continuous current through $V_{CC}$ or GND |                                     | 100            | mA   |
| $\theta_{JA}$ | Package thermal impedance <sup>(4)</sup>   | DCT package                         | 220            | C/W  |
|               |                                            | DCU package                         | 227            |      |
|               |                                            | YZP package                         | 102            |      |
| $T_{stg}$     | Storage temperature range                  | –65                                 | 150            | C    |

- (1) 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) All voltages are with respect to ground unless otherwise specified.
- (3) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

## Recommended Operating Conditions<sup>(1)</sup>

|                     |                                    | MIN                         | MAX           | UNIT |
|---------------------|------------------------------------|-----------------------------|---------------|------|
| $V_{CC}$            | Supply voltage                     | 0.8                         | 2.7           | V    |
| $V_{IH}$            | High-level input voltage           | $V_{CC} = 0.8$ V            | $V_{CC}$      | V    |
|                     |                                    | $V_{CC} = 1.1$ V to 1.95 V  | $0.65 V_{CC}$ |      |
|                     |                                    | $V_{CC} = 2.3$ V to 2.7 V   | 1.7           |      |
| $V_{IL}$            | Low-level input voltage            | $V_{CC} = 0.8$ V            | 0             | V    |
|                     |                                    | $V_{CC} = 1.1$ V to 1.95 V  | $0.35 V_{CC}$ |      |
|                     |                                    | $V_{CC} = 2.3$ V to 2.7 V   | 0.7           |      |
| $V_{I/O}$           | I/O port voltage                   | 0                           | $V_{CC}$      | V    |
| $V_I$               | Control input voltage              | 0                           | 3.6           | V    |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | $V_{CC} = 0.8$ V to 1.6 V   | 20            | ns/V |
|                     |                                    | $V_{CC} = 1.65$ V to 1.95 V | 10            |      |
|                     |                                    | $V_{CC} = 2.3$ V to 2.7 V   | 3.5           |      |
| $T_A$               | Operating free-air temperature     | –40                         | 85            | C    |

- (1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to 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)

| PARAMETER   | TEST CONDITIONS                                                                                           | $V_{CC}$     | MIN    | TYP <sup>(1)</sup> | MAX | UNIT     |
|-------------|-----------------------------------------------------------------------------------------------------------|--------------|--------|--------------------|-----|----------|
| $r_{on}$    | On-state switch resistance<br>$V_I = V_{CC}$ or GND,<br>$V_{INH} = V_{IL}$<br>(see Figure 1 and Figure 2) | $I_S = 4$ mA | 1.1 V  |                    | 40  | $\Omega$ |
|             |                                                                                                           |              | 1.65 V | 12.5               | 20  |          |
|             |                                                                                                           | $I_S = 8$ mA | 2.3 V  | 6                  | 15  |          |
| $r_{on(p)}$ | Peak on resistance<br>$V_I = V_{CC}$ to GND,<br>$V_{INH} = V_{IL}$<br>(see Figure 1 and Figure 2)         | $I_S = 4$ mA | 1.1 V  | 131                | 180 | $\Omega$ |
|             |                                                                                                           |              | 1.65 V | 32                 | 80  |          |
|             |                                                                                                           | $I_S = 8$ mA | 2.3 V  | 15                 | 20  |          |

- (1)  $T_A = 25^\circ\text{C}$

## Electrical Characteristics (continued)

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

| PARAMETER       |                                                    | TEST CONDITIONS                                                                                                                             |              | V <sub>CC</sub> | MIN | TYP <sup>(1)</sup> | MAX                     | UNIT          |
|-----------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|-----|--------------------|-------------------------|---------------|
| $\Delta r_{on}$ | Difference of on-state resistance between switches | $V_I = V_{CC}$ to GND,<br>$V_C = V_{IH}$<br>(see <a href="#">Figure 1</a> and <a href="#">Figure 2</a> )                                    | $I_S = 4$ mA | 1.1 V           |     |                    | 4                       | $\Omega$      |
|                 |                                                    |                                                                                                                                             |              | 1.65 V          |     |                    | 1                       |               |
|                 |                                                    |                                                                                                                                             | $I_S = 8$ mA | 2.3 V           |     |                    | 1                       |               |
| $I_{S(off)}$    | Off-state switch leakage current                   | $V_I = V_{CC}$ and $V_O = \text{GND}$ , or<br>$V_I = \text{GND}$ and $V_O = V_{CC}$ ,<br>$V_{INH} = V_{IH}$ (see <a href="#">Figure 3</a> ) |              | 2.7 V           |     |                    | 1<br>0.1 <sup>(1)</sup> | $\mu\text{A}$ |
| $I_{S(on)}$     | On-state switch leakage current                    | $V_I = V_{CC}$ or GND, $V_{INH} = V_{IL}$ ,<br>$V_O = \text{Open}$ (see <a href="#">Figure 4</a> )                                          |              | 2.7 V           |     |                    | 1<br>0.1 <sup>(1)</sup> | $\mu\text{A}$ |
| $I_I$           | Control input current                              | $V_C = V_{CC}$ or GND                                                                                                                       |              | 2.7 V           |     |                    | 5                       | $\mu\text{A}$ |
| $I_{CC}$        | Supply current                                     | $V_C = V_{CC}$ or GND                                                                                                                       |              | 2.7 V           |     |                    | 10                      | $\mu\text{A}$ |
| $C_{ic}$        | Control input capacitance                          |                                                                                                                                             |              | 2.5 V           |     | 2                  |                         | pF            |
| $C_{io(off)}$   | Switch input/output capacitance                    | Y                                                                                                                                           |              | 2.5 V           |     | 3                  |                         | pF            |
|                 |                                                    | COM                                                                                                                                         |              |                 |     | 4.5                |                         |               |
| $C_{io(on)}$    | Switch input/output capacitance                    |                                                                                                                                             |              | 2.5 V           |     | 9                  |                         | pF            |

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 15$  pF (unless otherwise noted) (see [Figure 5](#))

| PARAMETER      | FROM<br>(INPUT) | TO<br>(OUTPUT) | 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 <sub>CC</sub> = 1.8 V<br>0.15 V |     |     | V <sub>CC</sub> = 2.5 V<br>0.2 V |     | UNIT |
|----------------|-----------------|----------------|-------------------------|----------------------------------|-----|----------------------------------|-----|-----------------------------------|-----|-----|----------------------------------|-----|------|
|                |                 |                | TYP                     | MIN                              | MAX | MIN                              | MAX | MIN                               | TYP | MAX | MIN                              | MAX |      |
| $t_{pd}^{(1)}$ | COM or Y        | Y or COM       | 0.3                     |                                  | 0.3 |                                  | 0.3 |                                   |     | 0.2 |                                  | 0.1 | ns   |
| $t_{en}$       | INH             | COM or Y       | 9.2                     | 0.5                              | 3.5 | 0.5                              | 2.2 | 0.5                               | 1   | 1.9 | 0.5                              | 1.8 | ns   |
| $t_{dis}$      |                 |                | 8.1                     | 0.5                              | 4.2 | 0.5                              | 3.2 | 0.5                               | 1.9 | 3.4 | 0.5                              | 2.6 |      |
| $t_{en}$       | A               | COM or Y       | 9.2                     | 0.5                              | 3.6 | 0.5                              | 2.3 | 0.5                               | 1.1 | 1.9 | 0.5                              | 1.6 | ns   |
| $t_{dis}$      |                 |                | 10                      | 0.5                              | 3.6 | 0.5                              | 2.3 | 0.5                               | 1.1 | 2   | 0.5                              | 1.6 |      |

- (1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 30$  pF (unless otherwise noted) (see [Figure 5](#))

| PARAMETER      | FROM<br>(INPUT) | TO<br>(OUTPUT) | V <sub>CC</sub> = 1.8 V<br>0.15 V |     |     | V <sub>CC</sub> = 2.5 V<br>0.2 V |     | UNIT |
|----------------|-----------------|----------------|-----------------------------------|-----|-----|----------------------------------|-----|------|
|                |                 |                | MIN                               | TYP | MAX | MIN                              | MAX |      |
| $t_{pd}^{(1)}$ | COM or Y        | Y or COM       |                                   |     | 0.4 |                                  | 0.2 | ns   |
| $t_{en}$       | INH             | COM or Y       | 0.5                               | 1.6 | 3.1 | 0.5                              | 2.2 | ns   |
| $t_{dis}$      |                 |                | 0.5                               | 2.2 | 3.4 | 0.5                              | 2.2 |      |
| $t_{en}$       | A               | COM or Y       | 0.5                               | 1.6 | 3   | 0.5                              | 2.2 | ns   |
| $t_{dis}$      |                 |                | 0.5                               | 1.6 | 3   | 0.5                              | 2.3 |      |

- (1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

## Analog Switch Characteristics

 $T_A = 25^\circ\text{C}$ 

| PARAMETER                                               | FROM<br>(INPUT) | TO<br>(OUTPUT) | TEST CONDITIONS                                                                                         | V <sub>CC</sub> | TYP  | UNIT |
|---------------------------------------------------------|-----------------|----------------|---------------------------------------------------------------------------------------------------------|-----------------|------|------|
| Frequency response <sup>(1)</sup><br>(switch ON)        | COM or Y        | Y or COM       | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = \text{sine wave}$<br>(see Figure 6)           | 0.8 V           | 90   | MHz  |
|                                                         |                 |                |                                                                                                         | 1.1 V           | 101  |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | 110  |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | 122  |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | 198  |      |
|                                                         |                 |                | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$ ,<br>$f_{in} = \text{sine wave}$<br>(see Figure 6)             | 0.8 V           | >500 |      |
|                                                         |                 |                |                                                                                                         | 1.1 V           | >500 |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | >500 |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | >500 |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | >500 |      |
| Crosstalk <sup>(2)</sup><br>(between switches)          | COM or Y        | Y or COM       | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 7)   | 0.8 V           | –59  | dB   |
|                                                         |                 |                |                                                                                                         | 1.1 V           | –59  |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | –59  |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | –59  |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | –60  |      |
|                                                         |                 |                | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 7)     | 0.8 V           | –55  |      |
|                                                         |                 |                |                                                                                                         | 1.1 V           | –55  |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | –55  |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | –55  |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | –55  |      |
| Crosstalk<br>(control input to signal output)           | INH             | COM or Y       | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (square wave)<br>(see Figure 8) | 0.8 V           | 0.56 | mV   |
|                                                         |                 |                |                                                                                                         | 1.1 V           | 0.68 |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | 0.81 |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | 0.93 |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | 1.5  |      |
| Feed-through attenuation <sup>(3)</sup><br>(switch OFF) | COM or Y        | Y or COM       | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 9)   | 0.8 V           | –60  | dB   |
|                                                         |                 |                |                                                                                                         | 1.1 V           | –60  |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | –60  |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | –60  |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | –60  |      |
|                                                         |                 |                | $C_L = 5\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 9)    | 0.8 V           | –59  |      |
|                                                         |                 |                |                                                                                                         | 1.1 V           | –59  |      |
|                                                         |                 |                |                                                                                                         | 1.4 V           | –59  |      |
|                                                         |                 |                |                                                                                                         | 1.65 V          | –59  |      |
|                                                         |                 |                |                                                                                                         | 2.3 V           | –59  |      |

(1) Adjust  $f_{in}$  voltage to obtain 0 dBm at output. Increase  $f_{in}$  frequency until dB meter reads –3 dB.

(2) Adjust  $f_{in}$  voltage to obtain 0 dBm at input.

(3) Adjust  $f_{in}$  voltage to obtain 0 dBm at input.

## Analog Switch Characteristics (continued)

 $T_A = 25^\circ\text{C}$ 

| PARAMETER            | FROM<br>(INPUT) | TO<br>(OUTPUT) | TEST CONDITIONS                                                                                                                | $V_{CC}$ | TYP  | UNIT |
|----------------------|-----------------|----------------|--------------------------------------------------------------------------------------------------------------------------------|----------|------|------|
| Sine-wave distortion | COM or Y        | Y or COM       | $C_L = 50\text{ pF}$ , $R_L = 10\text{ k}\Omega$ ,<br>$f_{in} = 1\text{ kHz}$ (sine wave)<br>(see <a href="#">Figure 10</a> )  | 0.8 V    | 6.19 | %    |
|                      |                 |                |                                                                                                                                | 1.1 V    | 0.39 |      |
|                      |                 |                |                                                                                                                                | 1.4 V    | 0.06 |      |
|                      |                 |                |                                                                                                                                | 1.65 V   | 0.02 |      |
|                      |                 |                |                                                                                                                                | 2.3 V    | 0.01 |      |
|                      |                 |                | $C_L = 50\text{ pF}$ , $R_L = 10\text{ k}\Omega$ ,<br>$f_{in} = 10\text{ kHz}$ (sine wave)<br>(see <a href="#">Figure 10</a> ) | 0.8 V    | 3.55 |      |
|                      |                 |                |                                                                                                                                | 1.1 V    | 0.38 |      |
|                      |                 |                |                                                                                                                                | 1.4 V    | 0.04 |      |
|                      |                 |                |                                                                                                                                | 1.65 V   | 0.02 |      |
|                      |                 |                |                                                                                                                                | 2.3 V    | 0.02 |      |

## Operating Characteristics

 for INH input,  $T_A = 25^\circ\text{C}$ 

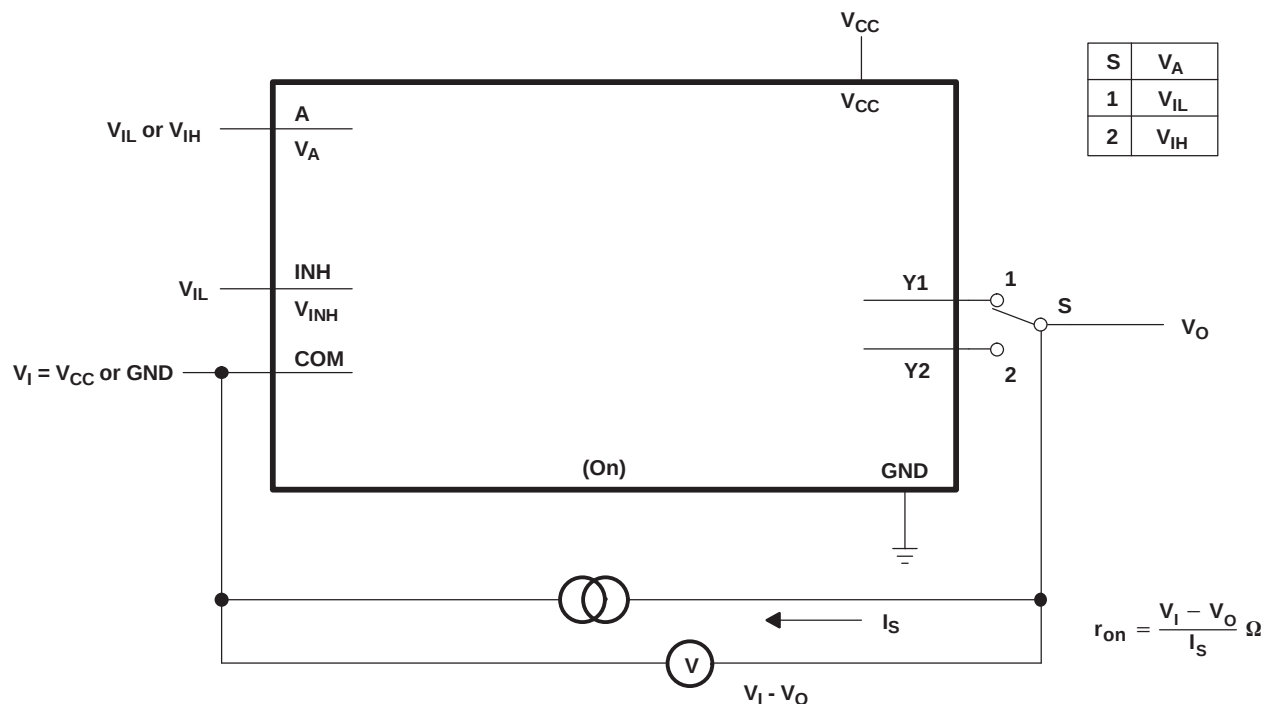
| PARAMETER                              | TEST<br>CONDITIONS  | $V_{CC} = 0.8\text{ V}$ | $V_{CC} = 1.2\text{ V}$ | $V_{CC} = 1.5\text{ V}$ | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | UNIT |
|----------------------------------------|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------|
|                                        |                     | TYP                     | TYP                     | TYP                     | TYP                     | TYP                     |      |
| $C_{pd}$ Power dissipation capacitance | $f = 10\text{ MHz}$ | 3                       | 3                       | 3                       | 3                       | 3                       | pF   |

## Operating Characteristics

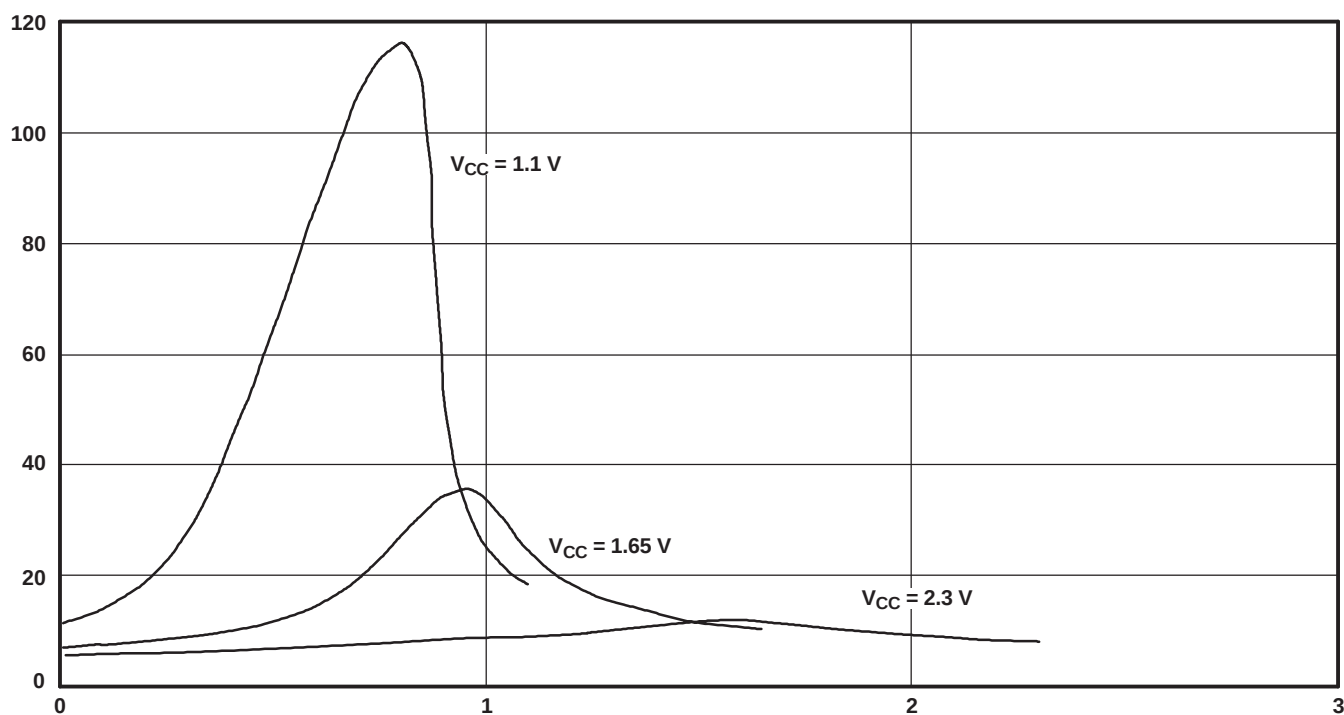
 for A input,  $T_A = 25^\circ\text{C}$ 

| PARAMETER                              |                  | TEST<br>CONDITIONS  | $V_{CC} = 0.8\text{ V}$ | $V_{CC} = 1.2\text{ V}$ | $V_{CC} = 1.5\text{ V}$ | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | UNIT |
|----------------------------------------|------------------|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------|
|                                        |                  |                     | TYP                     | TYP                     | TYP                     | TYP                     | TYP                     |      |
| $C_{pd}$ Power dissipation capacitance | Outputs enabled  | $f = 10\text{ MHz}$ | 5.5                     | 5.5                     | 5.5                     | 5.5                     | 5.5                     | pF   |
|                                        | Outputs disabled |                     | 0.5                     | 0.5                     | 0.5                     | 0.5                     | 0.5                     |      |

## PARAMETER MEASUREMENT INFORMATION



**Figure 1. On-State Resistance Test Circuit**



**Figure 2. Typical  $r_{on}$  as a Function of Voltage ( $V_I$ ) for  $V_I = 0$  to  $V_{CC}$**

PARAMETER MEASUREMENT INFORMATION

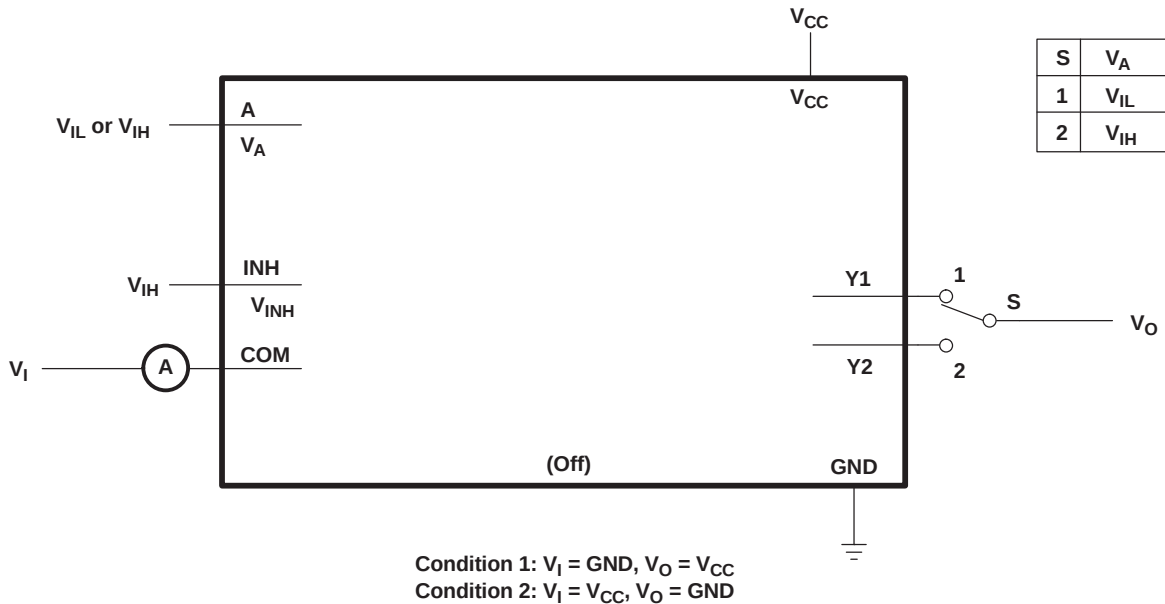


Figure 3. Off-State Switch Leakage-Current Test Circuit

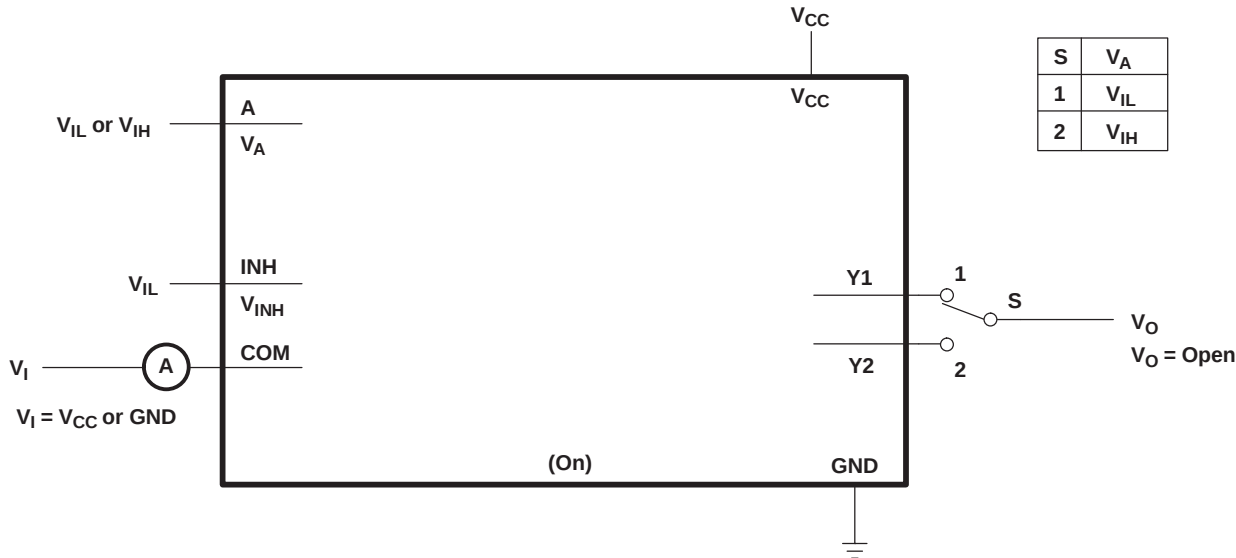
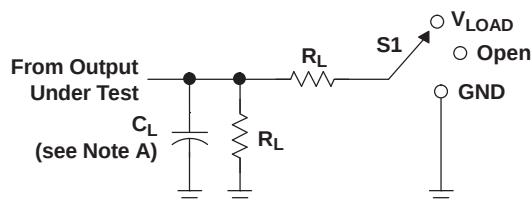


Figure 4. On-State Switch Leakage-Current Test Circuit

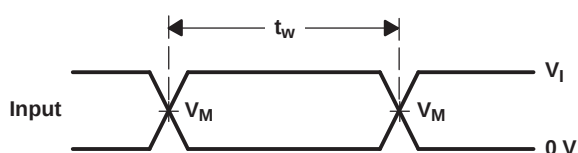
## PARAMETER MEASUREMENT INFORMATION



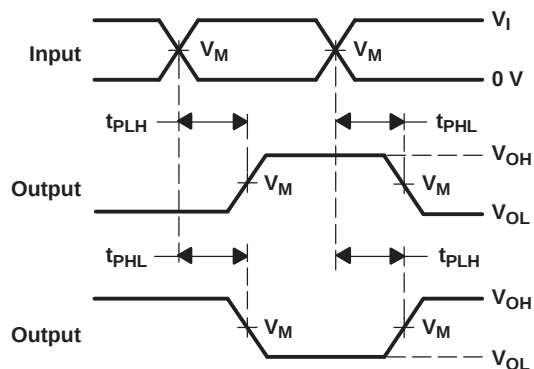
LOAD CIRCUIT

| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

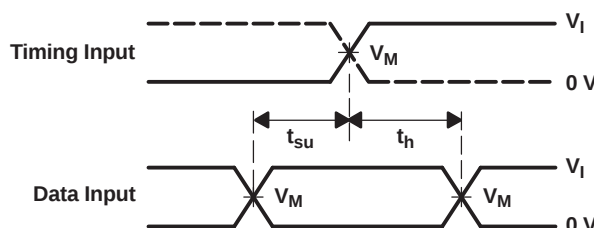
| $V_{CC}$                           | INPUTS   |             | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|------------------------------------|----------|-------------|------------|-------------------|-------|--------------|--------------|
|                                    | $V_I$    | $t_r/t_f$   |            |                   |       |              |              |
| 0.8 V                              | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 2 k $\Omega$ | 0.1 V        |
| $1.2 \text{ V} \pm 0.1 \text{ V}$  | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 2 k $\Omega$ | 0.1 V        |
| $1.5 \text{ V} \pm 0.1 \text{ V}$  | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 2 k $\Omega$ | 0.1 V        |
| $1.8 \text{ V} \pm 0.15 \text{ V}$ | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 2 k $\Omega$ | 0.15 V       |
| $2.5 \text{ V} \pm 0.2 \text{ V}$  | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 2 k $\Omega$ | 0.15 V       |
| $1.8 \text{ V} \pm 0.15 \text{ V}$ | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 1 k $\Omega$ | 0.15 V       |
| $2.5 \text{ V} \pm 0.2 \text{ V}$  | $V_{CC}$ | $\leq 2$ ns | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 500 $\Omega$ | 0.15 V       |



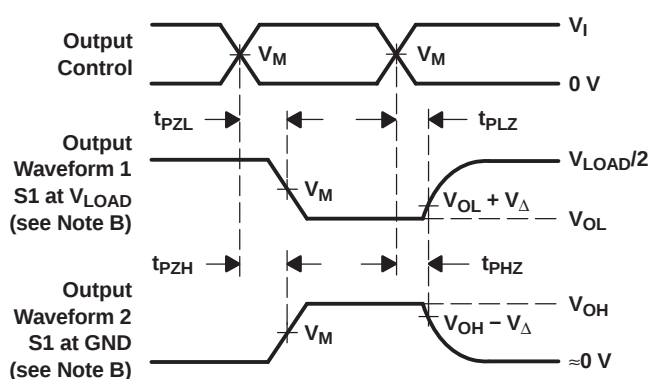
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES

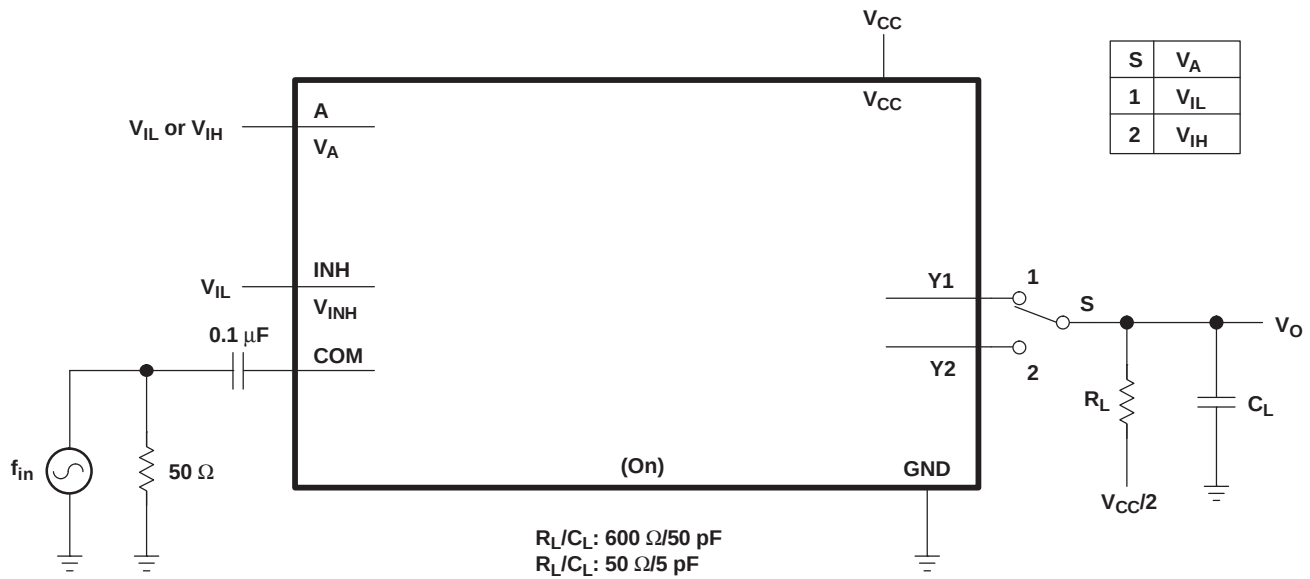


VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

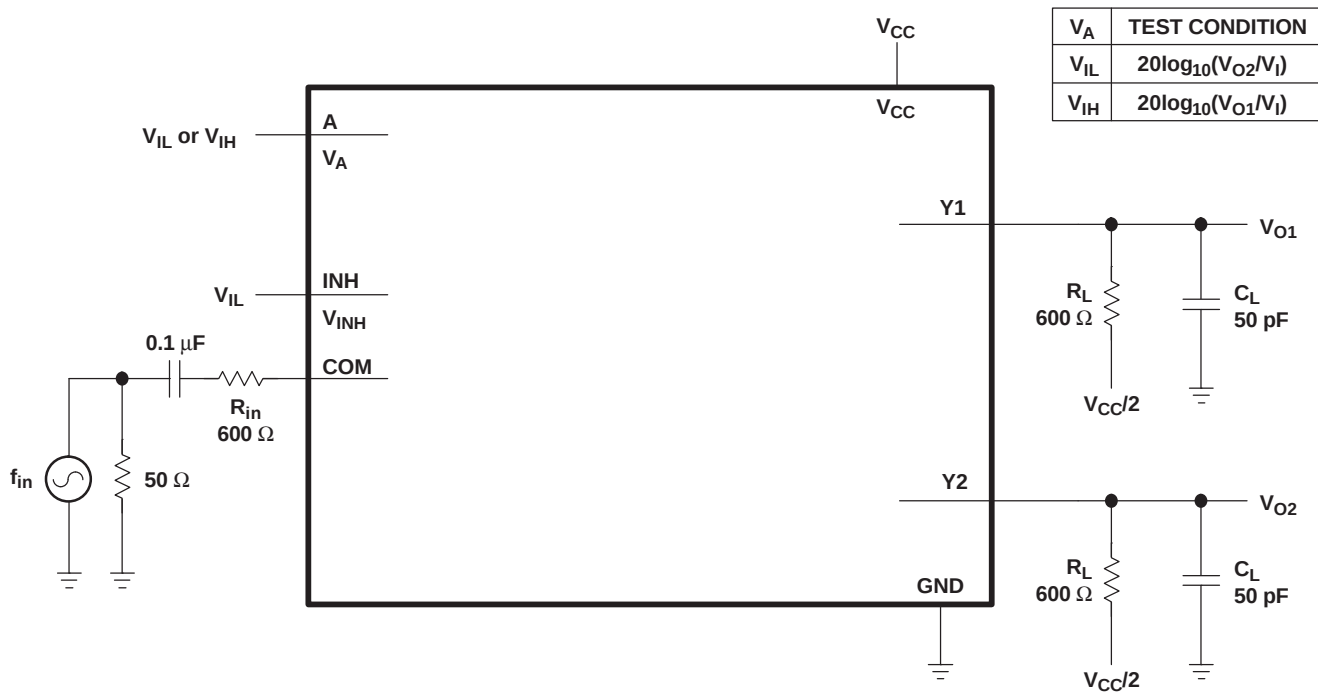
- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ , slew rate  $\geq 1 \text{ V/ns}$ .
  - The outputs are measured one at a time, with one transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - All parameters and waveforms are not applicable to all devices.

Figure 5. Load Circuit and Voltage Waveforms

## PARAMETER MEASUREMENT INFORMATION

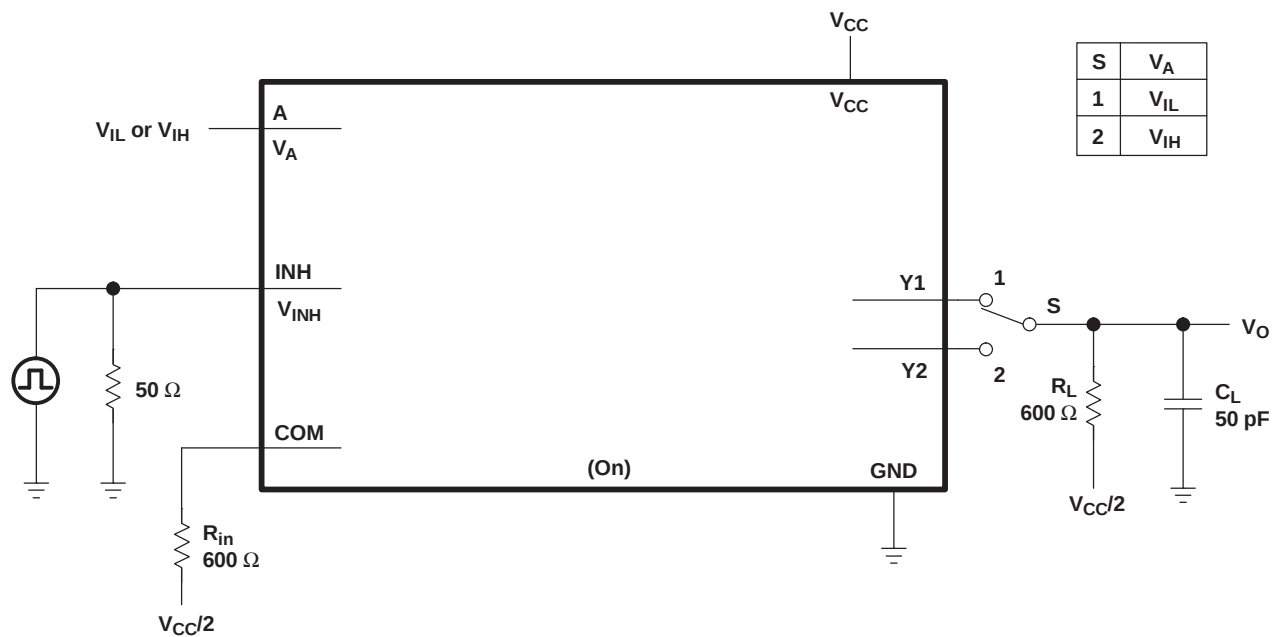


### Figure 6. Frequency Response (Switch On)

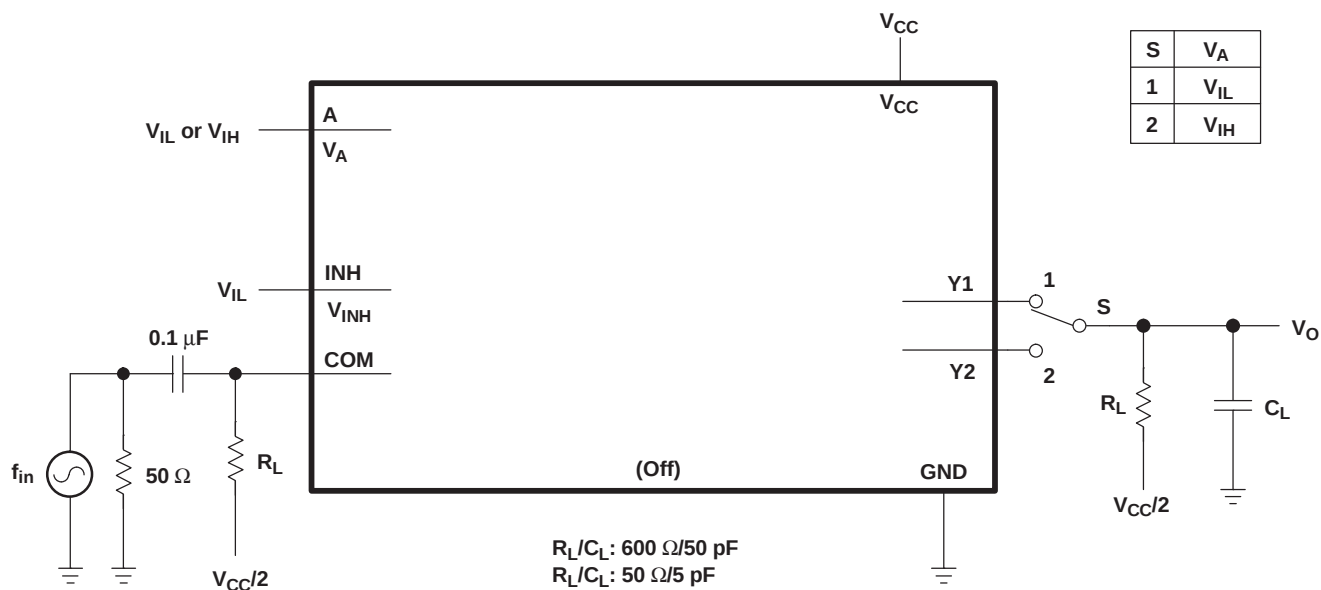


### Figure 7. Crosstalk (Between Switches)

## PARAMETER MEASUREMENT INFORMATION



**Figure 8. Crosstalk (Control Input, Switch Output)**



**Figure 9. Feedthrough (Switch Off)**

## PARAMETER MEASUREMENT INFORMATION

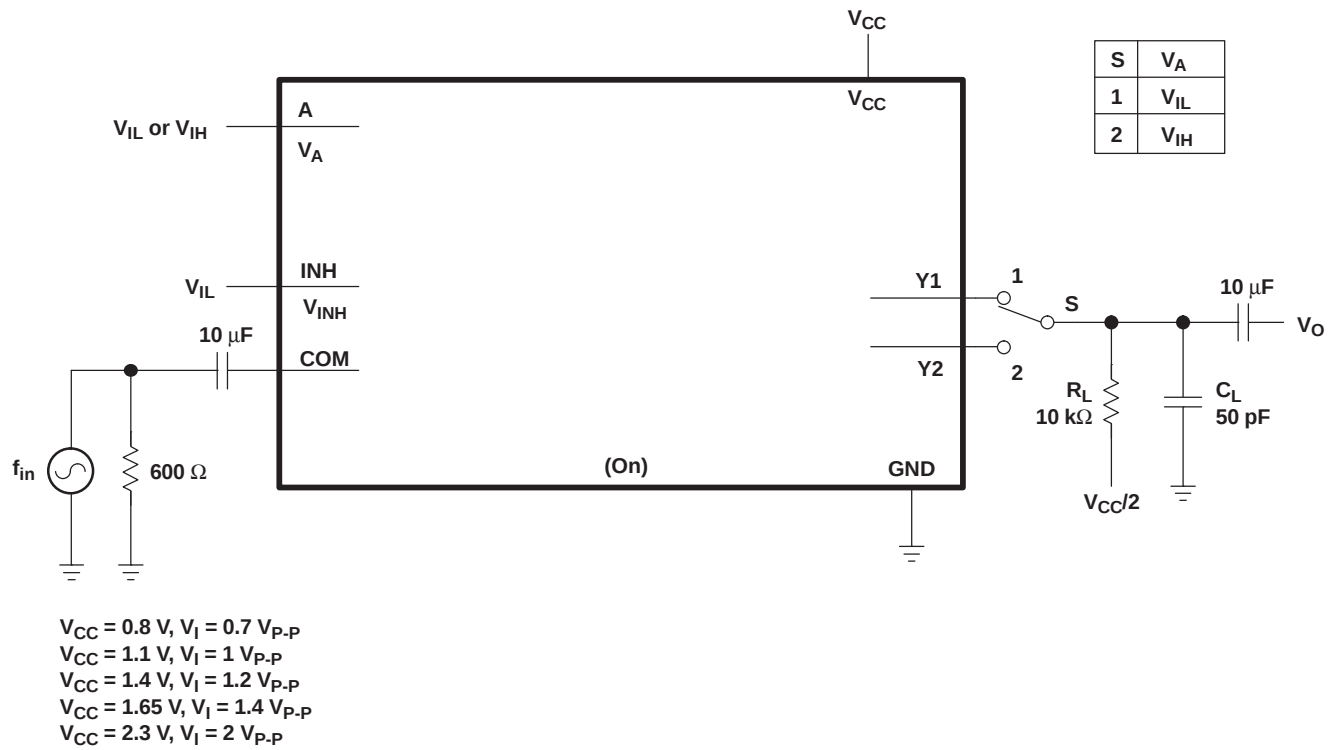


Figure 10. Sine-Wave Distortion

## PACKAGING INFORMATION

| Orderable Device  | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|-------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74AUC2G53DCTR   | ACTIVE        | SM8          | DCT                | 8    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | U53<br>Z                | <a href="#">Samples</a> |
| SN74AUC2G53DCTRE4 | ACTIVE        | SM8          | DCT                | 8    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | U53<br>Z                | <a href="#">Samples</a> |
| SN74AUC2G53DCUR   | ACTIVE        | VSSOP        | DCU                | 8    | 3000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 85    | (U53Q, U53R)            | <a href="#">Samples</a> |
| SN74AUC2G53DCURG4 | ACTIVE        | VSSOP        | DCU                | 8    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | U53R                    | <a href="#">Samples</a> |
| SN74AUC2G53YZPR   | ACTIVE        | DSBGA        | YZP                | 8    | 3000           | RoHS & Green    | SNAGCU                               | Level-1-260C-UNLIM   | -40 to 85    | U4N                     | <a href="#">Samples</a> |

(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 (Cl) 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.

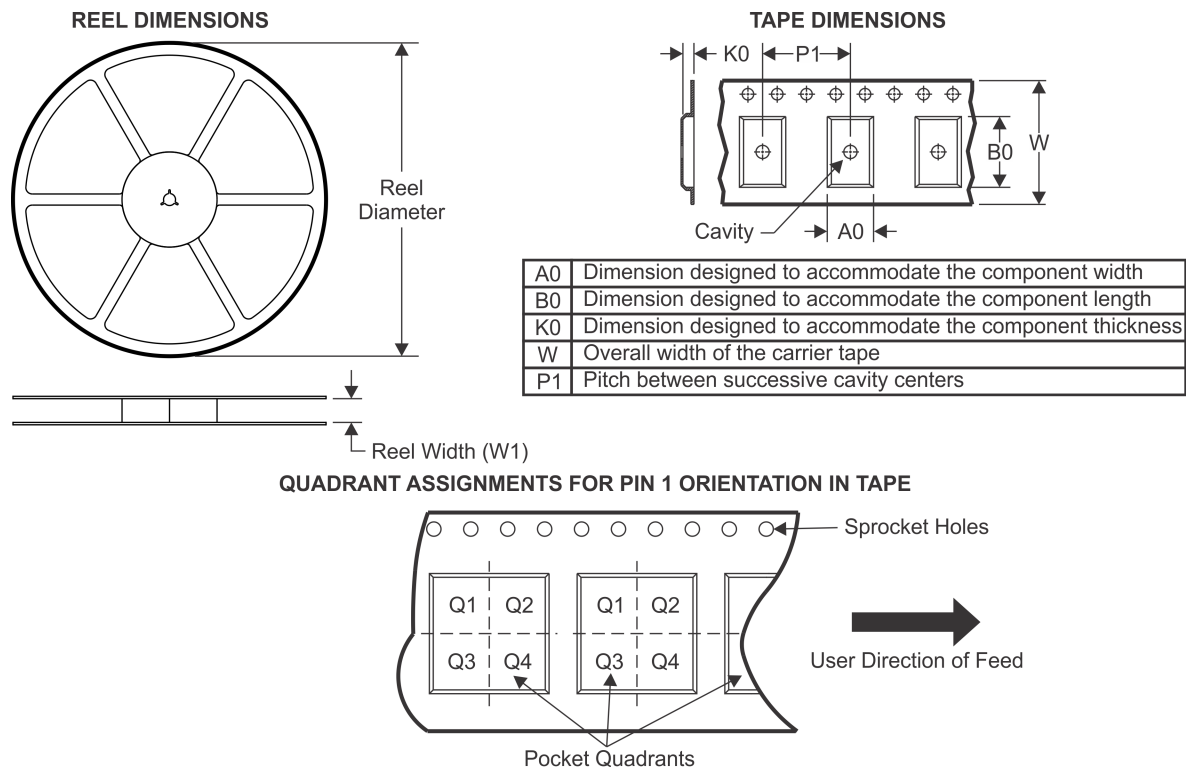
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(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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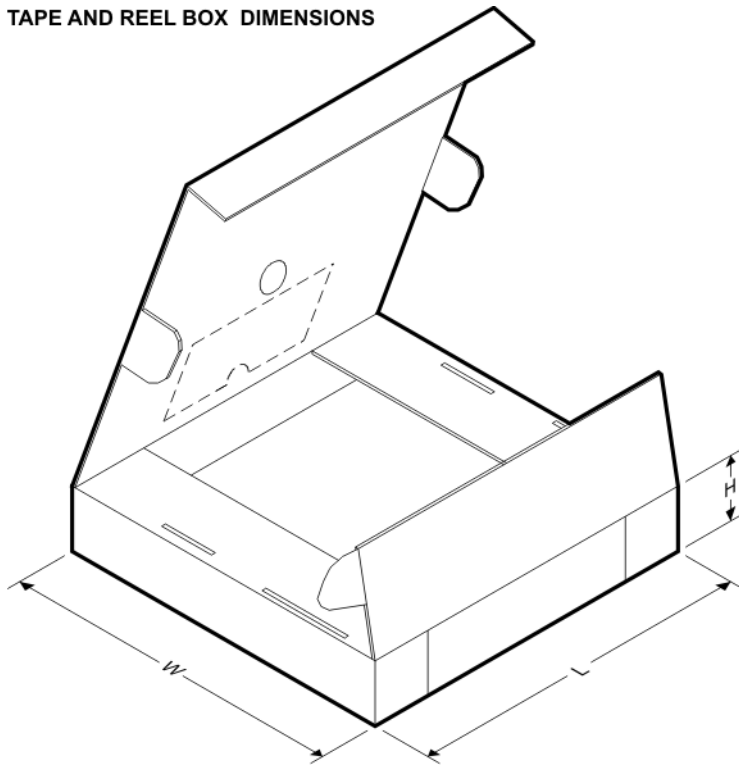
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**TAPE AND REEL INFORMATION**


\*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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AUC2G53DCTR   | SM8          | DCT             | 8    | 3000 | 180.0              | 13.0               | 3.35    | 4.5     | 1.55    | 4.0     | 12.0   | Q3            |
| SN74AUC2G53DCUR   | VSSOP        | DCU             | 8    | 3000 | 180.0              | 8.4                | 2.25    | 3.35    | 1.05    | 4.0     | 8.0    | Q3            |
| SN74AUC2G53DCURG4 | VSSOP        | DCU             | 8    | 3000 | 180.0              | 8.4                | 2.25    | 3.35    | 1.05    | 4.0     | 8.0    | Q3            |
| SN74AUC2G53YZPR   | DSBGA        | YZP             | 8    | 3000 | 178.0              | 9.2                | 1.02    | 2.02    | 0.63    | 4.0     | 8.0    | Q1            |

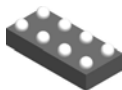
## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device            | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AUC2G53DCTR   | SM8          | DCT             | 8    | 3000 | 182.0       | 182.0      | 20.0        |
| SN74AUC2G53DCUR   | VSSOP        | DCU             | 8    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AUC2G53DCURG4 | VSSOP        | DCU             | 8    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AUC2G53YZPR   | DSBGA        | YZP             | 8    | 3000 | 220.0       | 220.0      | 35.0        |

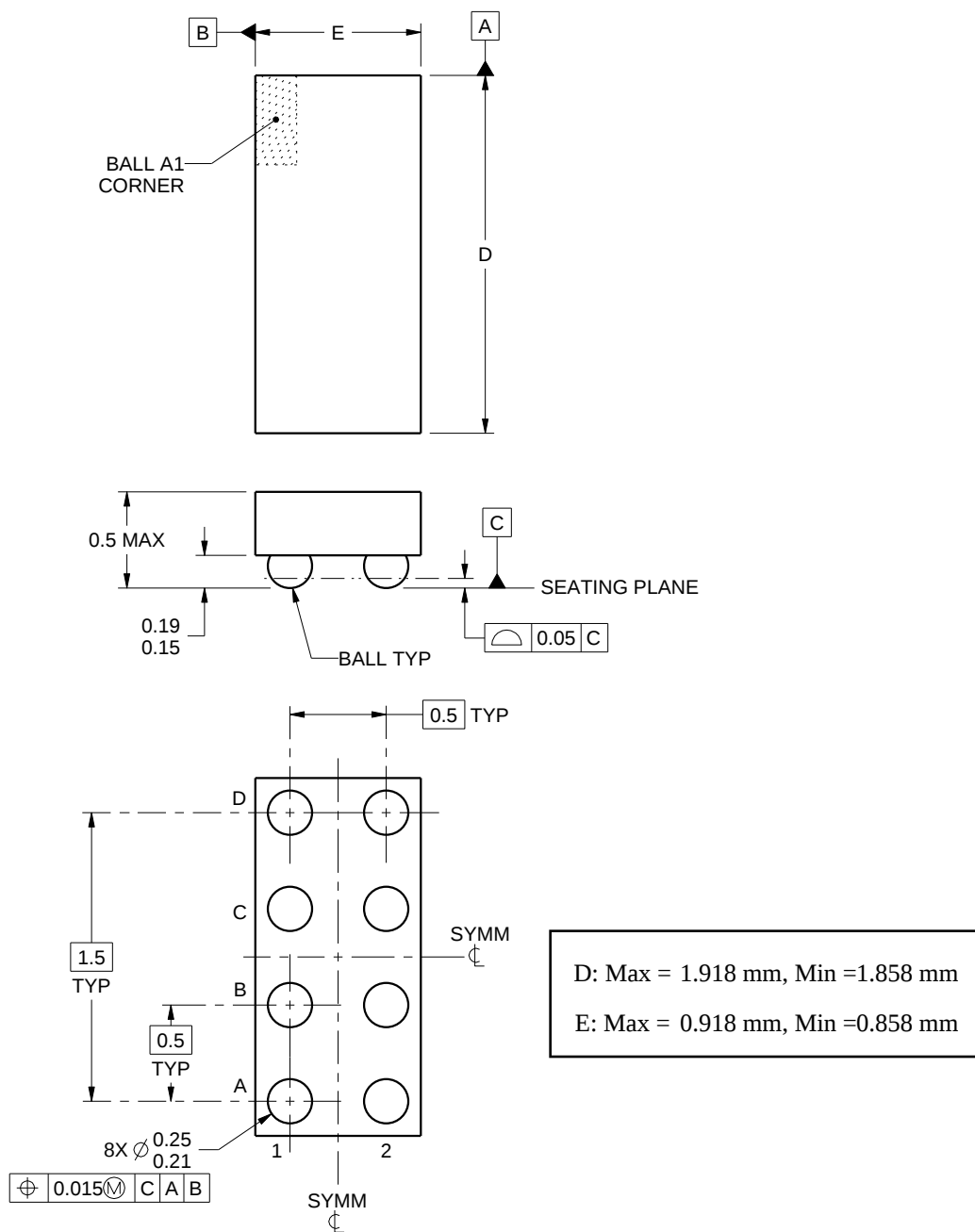
YZP0008



# PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



4223082/A 07/2016

## NOTES:

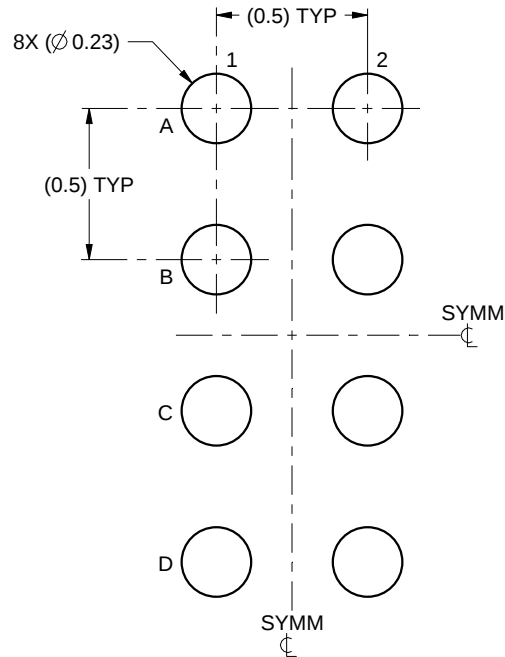
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

# EXAMPLE BOARD LAYOUT

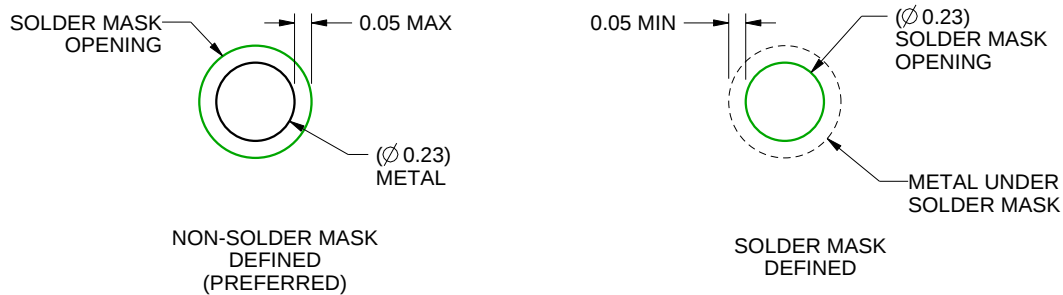
YZP0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE  
SCALE:40X



SOLDER MASK DETAILS  
NOT TO SCALE

4223082/A 07/2016

NOTES: (continued)

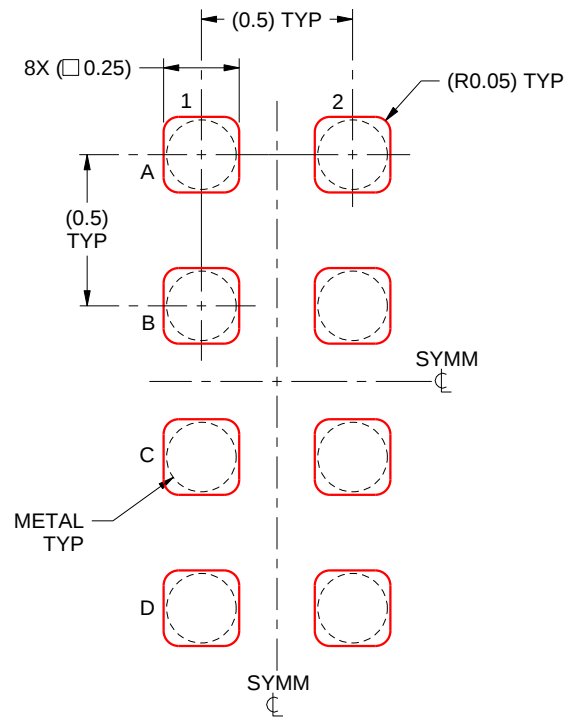
3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 ([www.ti.com/lit/snva009](http://www.ti.com/lit/snva009)).

# EXAMPLE STENCIL DESIGN

YZP0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:40X

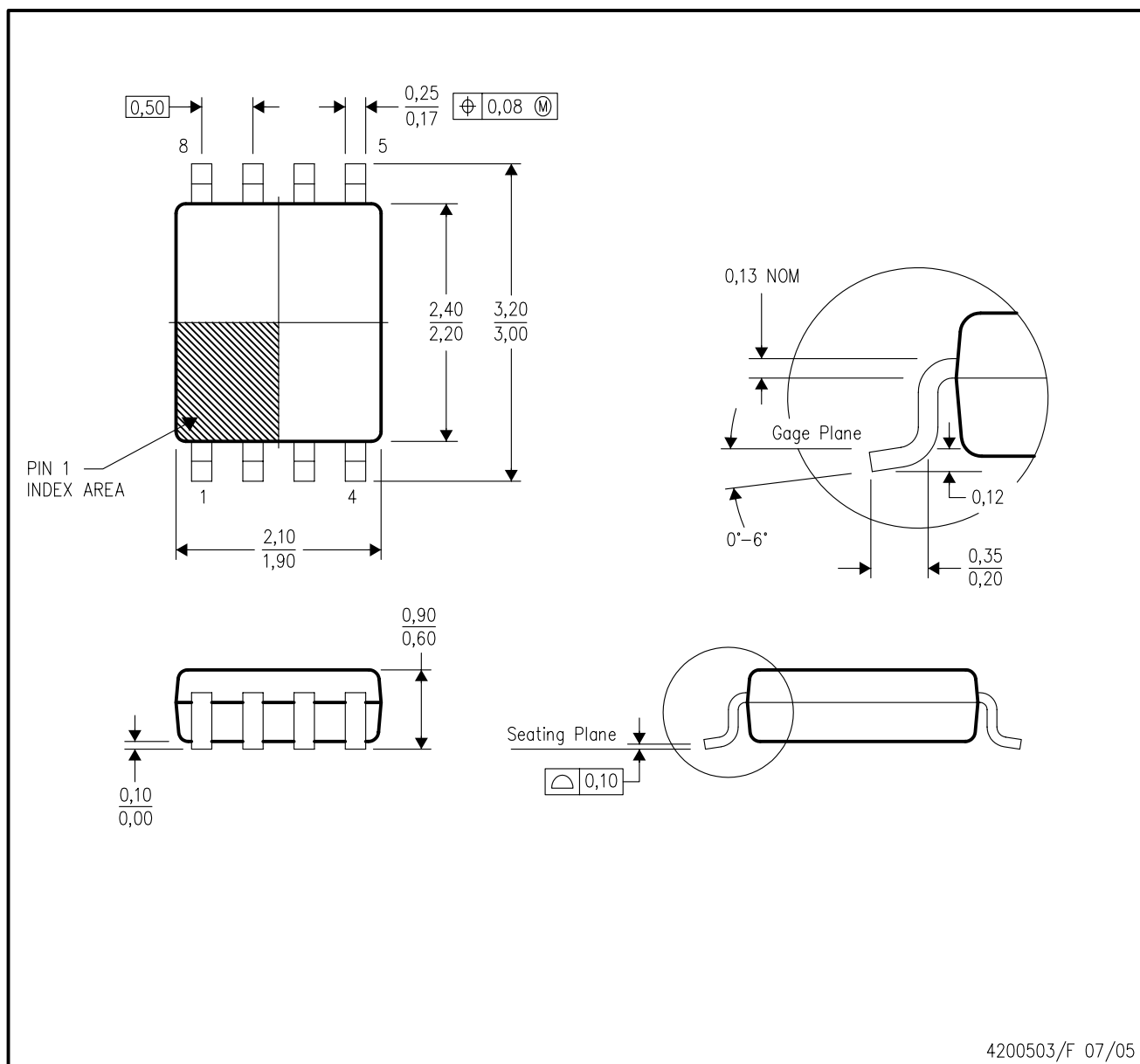
4223082/A 07/2016

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

DCU (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)

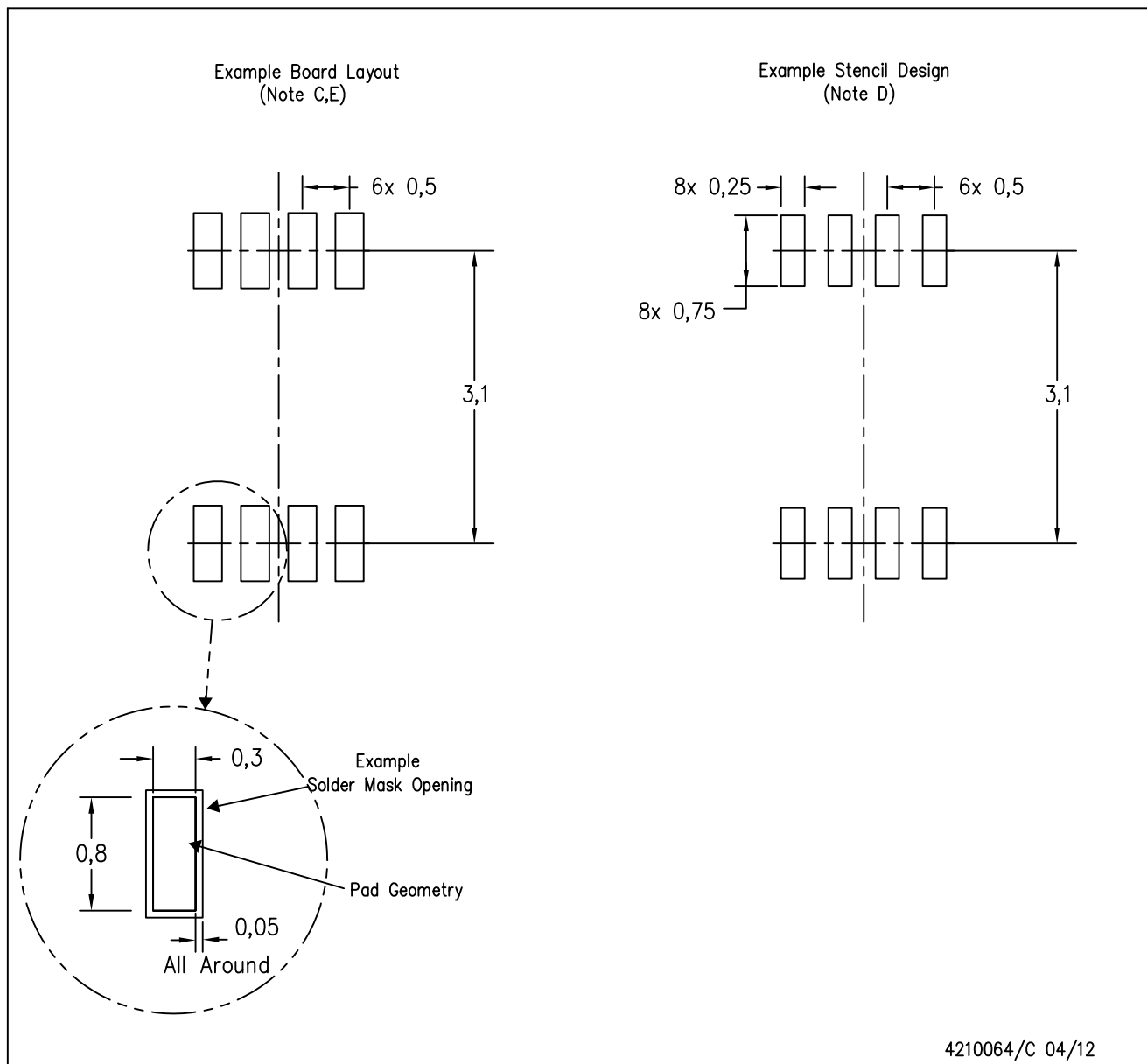


4200503/F 07/05

- 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. Mold flash and protrusion shall not exceed 0.15 per side.
  - D. Falls within JEDEC MO-187 variation CA.

DCU (S-PDSO-G8)

PLASTIC SMALL OUTLINE PACKAGE (DIE DOWN)



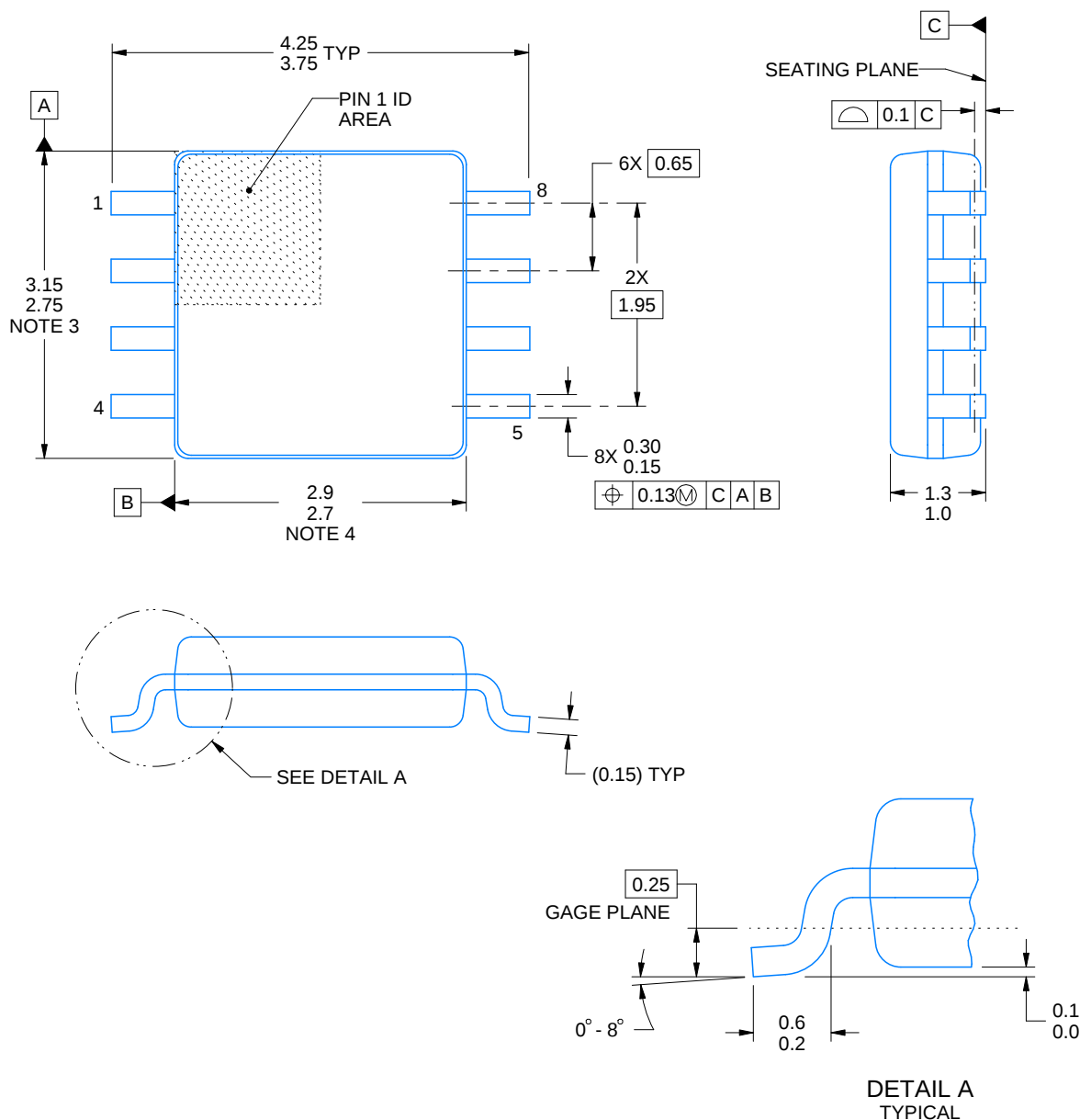
- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



## PACKAGE OUTLINE

## SSOP - 1.3 mm max height

## SMALL OUTLINE PACKAGE



4220784/C 06/2021

NOTES:

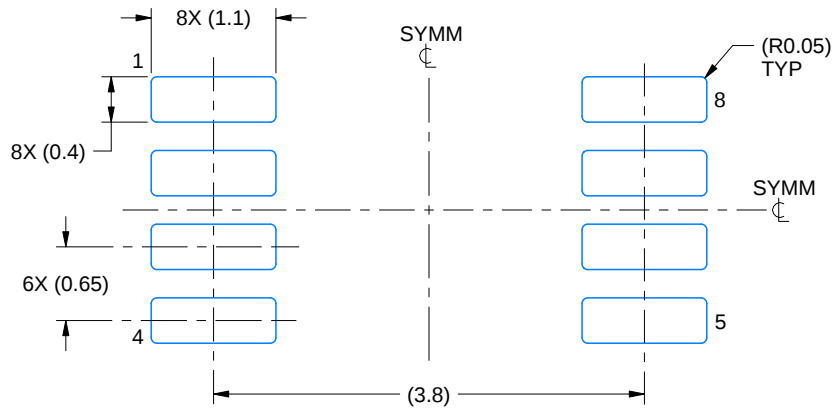
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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

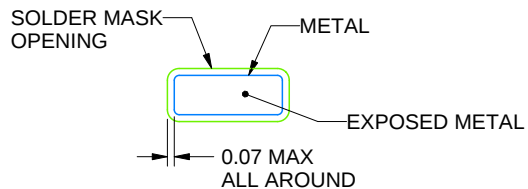
DCT0008A

SSOP - 1.3 mm max height

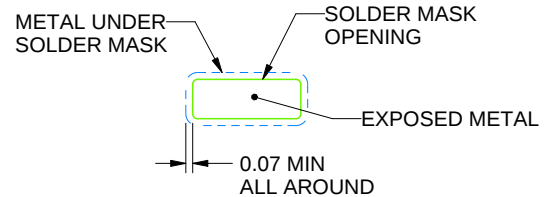
SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



NON SOLDER MASK  
DEFINED



SOLDER MASK  
DEFINED

SOLDER MASK DETAILS

4220784/C 06/2021

NOTES: (continued)

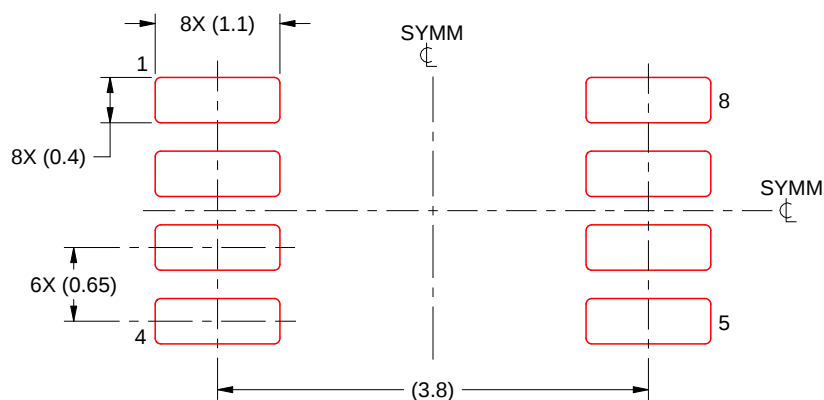
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DCT0008A

SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

4220784/C 06/2021

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.

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