

SN74LVC1G19 1-of-2 Decoder and Demultiplexer

1 Features

- Available in the Texas Instruments NanoFree™ Package
- Supports 5-V V_{CC} Operation
- Inputs Accept Voltages to 5.5 V
- Supports Down Translation to V_{CC}
- Maximum t_{pd} of 4 ns at 3.3 V
- Low Power Consumption, 10- μ A Maximum I_{CC}
- ± 24 -mA Output Drive at 3.3 V
- V_{OLP} (Output Ground Bounce) <0.8 V Typical at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- V_{OHV} (Output V_{OH} Undershoot) >2 V Typical at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- I_{off} Supports Live Insertion, Partial-Power-Down Mode, and Back-Drive Protection
- 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)

2 Applications

- AV Receivers
- Audio Docks: Portable
- Blu-ray® Players and Home Theater
- MP3 Players/Recorders
- Personal Digital Assistants (PDAs)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drives (SSDs): Client and Enterprise
- TVs: LCD/Digital and High-Definition (HDTVs)
- Tablets: Enterprise
- Video Analytics: Server
- Wireless Headsets, Keyboards, and Mice

3 Description

This decoder/demultiplexer is designed for 1.65-V to 5.5-V V_{CC} operation.

The SN74LVC1G19 device is a 1-of-2 decoder / demultiplexer. When \bar{E} input is high, the decoder will be disabled and both outputs will be high. When \bar{E} input is low, the A input selects which output will be low.

This device is fully specified for partial-power-down applications using I_{off} .

Device Information⁽¹⁾

| PART NUMBER | PACKAGE | BODY SIZE (NOM) |
|----------------|------------|-------------------|
| SN74LVC1G19DBV | SOT-23 (6) | 2.9 mm × 1.6 mm |
| SN74LVC1G19DCK | SC70 (6) | 2.0 mm × 1.25 mm |
| SN74LVC1G19DRL | SOT (6) | 1.6 mm × 1.2 mm |
| SN74LVC1G19DRY | SON (6) | 1.45 mm × 1.0 mm |
| SN74LVC1G19YZP | DSBGA (6) | 1.41 mm × 0.91 mm |

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

Simplified Schematic

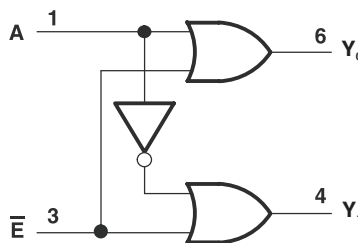


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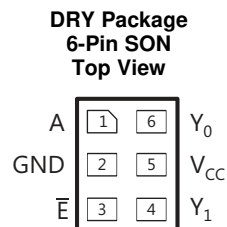
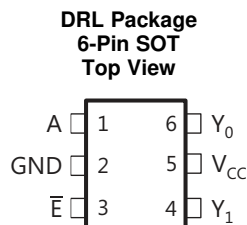
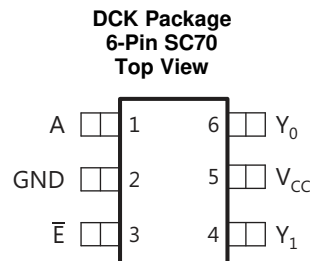
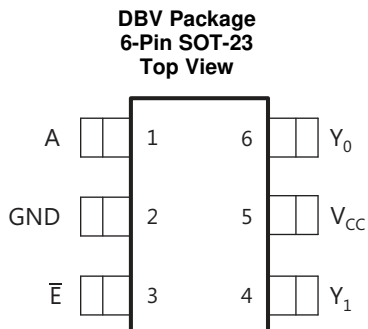
| | |
|---|---|
| 1 Features 1 2 Applications 1 3 Description 1 4 Revision History 2 5 Pin Configuration and Functions 3 6 Specifications 4 6.1 Absolute Maximum Ratings 4 6.2 ESD Ratings 4 6.3 Recommended Operating Conditions 5 6.4 Thermal Information 5 6.5 Electrical Characteristics 6 6.6 Switching Characteristics, $C_L = 15$ pF 6 6.7 Switching Characteristics, $C_L = 30$ pF or 50 pF 6 6.8 Operating Characteristics 6 6.9 Typical Characteristics 7 7 Parameter Measurement Information 8 8 Detailed Description 10 | 8.1 Overview 10 8.2 Functional Block Diagram 10 8.3 Feature Description 10 8.4 Device Functional Modes 10 9 Application and Implementation 11 9.1 Application Information 11 9.2 Typical Application 11 10 Power Supply Recommendations 12 11 Layout 12 11.1 Layout Guidelines 12 11.2 Layout Example 12 12 Device and Documentation Support 13 12.1 Community Resources 13 12.2 Trademarks 13 12.3 Electrostatic Discharge Caution 13 12.4 Glossary 13 13 Mechanical, Packaging, and Orderable Information 13 |
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4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from Revision F (July 2012) to Revision G | Page |
|---|------|
| <ul style="list-style-type: none"> • Added <i>Applications</i> section, <i>Device Information</i> table, <i>Pin Configuration and Functions</i> section, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Feature Description</i> section, <i>Device Functional Modes</i>, <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section 1 • Deleted <i>Ordering Information</i> table. 1 • Updated I_{off} in <i>Features</i>. 1 | |

5 Pin Configuration and Functions



**YZP Package
6-Pin DSBGA
Bottom View**



Pin Functions⁽¹⁾

| PIN | | I/O | DESCRIPTION |
|-----------|-----|-----|---|
| NAME | NO. | | |
| A | 1 | I | Adress input, selects which output goes low. |
| GND | 2 | — | Ground |
| \bar{E} | 3 | I | Enable input, active low |
| Y_1 | 4 | O | Output 1, low when selected by A high and \bar{E} low |
| V_{CC} | 5 | — | Power pin |
| Y_0 | 6 | O | Output 0, low when selected by A low and \bar{E} low |

(1) See mechanical drawings for dimensions

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | MIN | MAX | UNIT |
|------------------|---|--------------------|-----------------------|------|
| V _{CC} | Supply voltage | –0.5 | 6.5 | V |
| V _I | Input voltage ⁽²⁾ | –0.5 | 6.5 | V |
| V _O | Voltage applied to any output in the high-impedance or power-off state ⁽²⁾ | –0.5 | 6.5 | V |
| V _O | Voltage applied to any output in the high or low state ⁽²⁾⁽³⁾ | –0.5 | V _{CC} + 0.5 | V |
| I _{IK} | Input clamp current | V _I < 0 | –50 | mA |
| I _{OK} | Output clamp current | V _O < 0 | –50 | mA |
| I _O | Continuous output current | | ±50 | mA |
| | Continuous current through V _{CC} or GND | | ±100 | mA |
| T _{stg} | Storage temperature | –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) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V_{CC} is provided in the *Recommended Operating Conditions* table.

6.2 ESD Ratings

| | | VALUE | UNIT |
|------------------|-------------------------|--|-------|
| V _{ESD} | Electrostatic discharge | Human Body Model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾ | ±2000 |
| | | Charged-Device Model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾ | ±1000 |
| | | Machine model | ±200 |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

 over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | | MIN | MAX | UNIT |
|-----------------|------------------------------------|---|------------------------|------------------------|------|
| V _{CC} | Supply voltage | Operating | 1.65 | 5.5 | V |
| | | Data retention only | 1.5 | | |
| V _{IH} | High-level input voltage | V _{CC} = 1.65 V to 1.95 V | 0.65 × V _{CC} | | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | | |
| | | V _{CC} = 3 V to 3.6 V | 2 | | |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7 × V _{CC} | | |
| V _{IL} | Low-level input voltage | V _{CC} = 1.65 V to 1.95 V | | 0.35 × V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | | 0.7 | |
| | | V _{CC} = 3 V to 3.6 V | | 0.8 | |
| | | V _{CC} = 4.5 V to 5.5 V | | 0.3 × V _{CC} | |
| V _I | Input voltage | | 0 | 5.5 | V |
| V _O | Output voltage | | 0 | V _{CC} | V |
| I _{OH} | High-level output current | V _{CC} = 1.65 V | | –4 | mA |
| | | V _{CC} = 2.3 V | | –8 | |
| | | V _{CC} = 3 V | | –16 | |
| | | V _{CC} = 4.5 V | | –24 | |
| I _{OL} | Low-level output current | V _{CC} = 1.65 V | | 4 | mA |
| | | V _{CC} = 2.3 V | | 8 | |
| | | V _{CC} = 3 V | | 16 | |
| | | V _{CC} = 4.5 V | | 24 | |
| Δt/Δv | Input transition rise or fall rate | V _{CC} = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V | | 20 | ns/V |
| | | V _{CC} = 3.3 V ± 0.3 V | | 10 | |
| | | V _{CC} = 5 V ± 0.5 V | | 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*, [SCBA004](#).

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | SN74LVC1G19 | | | | | UNIT | |
|-------------------------------|--|------------|-----------|-----------|-------------|------|------|
| | DBV (SOT-23) | DCK (SC70) | DRL (SOT) | DRY (SON) | YZP (DSBGA) | | |
| | 6 PINS | 6 PINS | 6 PINS | 6 PINS | 6 PINS | | |
| R _{θJA} | Junction-to-ambient thermal resistance | 165 | 259 | 142 | 234 | 123 | °C/W |

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

6.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | V _{CC} | MIN | TYP ⁽¹⁾ | MAX | UNIT |
|------------------|--|-----------------|-----------------------|--------------------|------|------|
| V _{OH} | I _{OH} = -100 μA | 1.65 V to 5.5 V | V _{CC} - 0.1 | | | V |
| | I _{OH} = -4 mA | 1.65 V | 1.2 | | | |
| | I _{OH} = -8 mA | 2.3 V | 1.9 | | | |
| | I _{OH} = -16 mA | 3 V | 2.4 | | | |
| | I _{OH} = -24 mA | | 2.3 | | | |
| | I _{OH} = -32 mA | 4.5 V | 3.8 | | | |
| V _{OL} | I _{OL} = 100 μA | 1.65 V to 5.5 V | | | 0.1 | V |
| | I _{OL} = 4 mA | 1.65 V | | | 0.45 | |
| | I _{OL} = 8 mA | 2.3 V | | | 0.3 | |
| | I _{OL} = 16 mA | 3 V | | | 0.4 | |
| | I _{OL} = 24 mA | | | | 0.55 | |
| | I _{OL} = 32 mA | 4.5 V | | | 0.55 | |
| I _I | V _I = 5.5 V or GND | 0 to 5.5 V | | | ±1 | μA |
| I _{off} | V _I or V _O = 5.5 V | 0 | | | ±10 | μA |
| I _{CC} | V _I = 5.5 V or GND, I _O = 0 | 1.65 V to 5.5 V | | | 10 | μA |
| ΔI _{CC} | One input at V _{CC} - 0.6 V, Other inputs at V _{CC} or GND | 3 V to 5.5 V | | | 500 | μA |
| C _I | V _I = V _{CC} or GND | 3.3 V | 3.5 | | | pF |

 (1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

6.6 Switching Characteristics, C_L = 15 pF

 over recommended operating free-air temperature range, C_L = 15 pF (unless otherwise noted) (see [Figure 3](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 1.8 V ± 0.15 V | | V _{CC} = 2.5 V ± 0.2 V | | V _{CC} = 3.3 V ± 0.3 V | | V _{CC} = 5 V ± 0.5 V | | UNIT |
|-----------------|----------------|-------------|----------------------------------|------|---------------------------------|-----|---------------------------------|-----|-------------------------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{pd} | A or \bar{E} | Y | 2.5 | 16.1 | 1.5 | 5.9 | 1 | 4 | 0.5 | 2.8 | ns |

6.7 Switching Characteristics, C_L = 30 pF or 50 pF

 over recommended operating free-air temperature range, C_L = 30 pF or 50 pF (unless otherwise noted) (see [Figure 4](#))

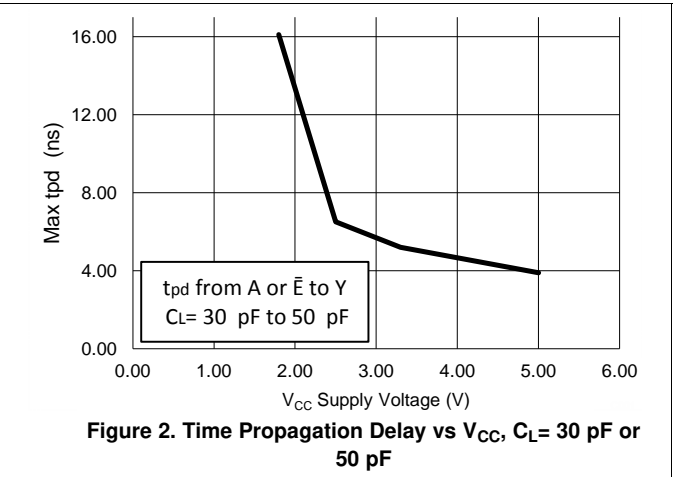
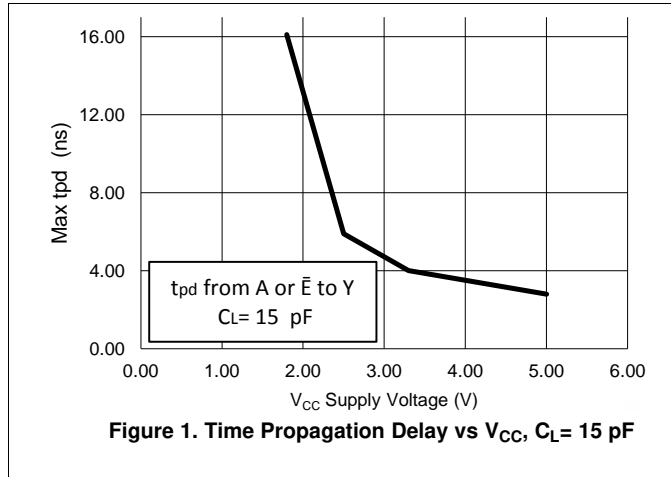
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 1.8 V ± 0.15 V | | V _{CC} = 2.5 V ± 0.2 V | | V _{CC} = 3.3 V ± 0.3 V | | V _{CC} = 5 V ± 0.5 V | | UNIT |
|-----------------|----------------|-------------|----------------------------------|------|---------------------------------|-----|---------------------------------|-----|-------------------------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{pd} | A or \bar{E} | Y | 3.2 | 16.1 | 1.5 | 6.5 | 1.1 | 5.2 | 0.5 | 3.9 | ns |

6.8 Operating Characteristics

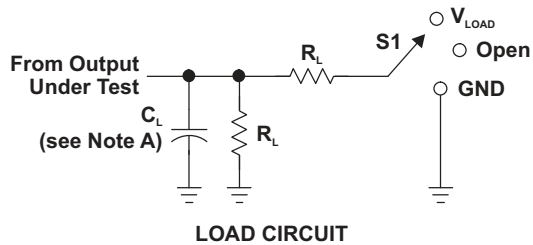
 T_A = 25°C

| PARAMETER | TEST CONDITIONS | V _{CC} = 1.8 V | V _{CC} = 2.5 V | V _{CC} = 3.3 V | V _{CC} = 5 V | UNIT | |
|-----------------|-------------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|----|
| | | TYP | TYP | TYP | TYP | | |
| C _{pd} | Power dissipation capacitance | f = 10 MHz | 15.5 | 16 | 16 | 18 | pF |

6.9 Typical Characteristics

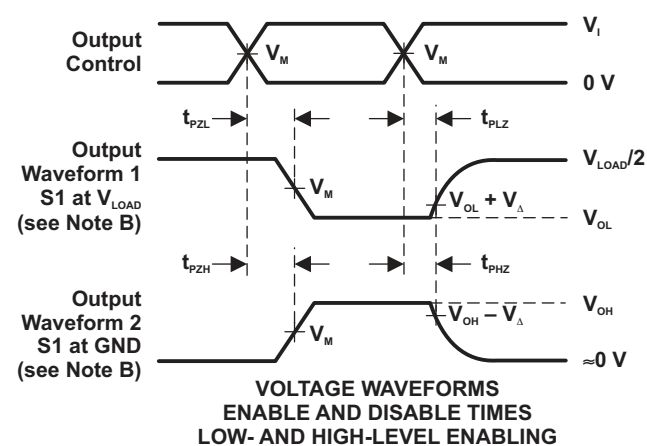
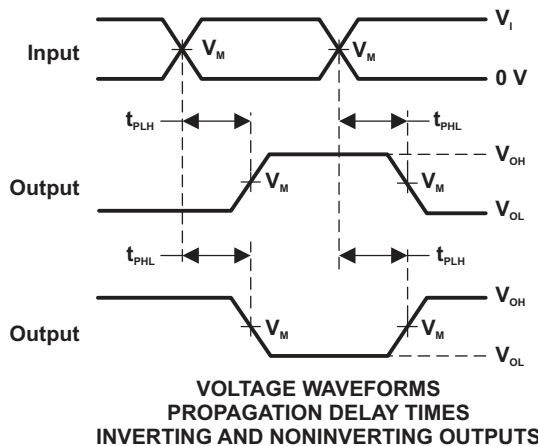
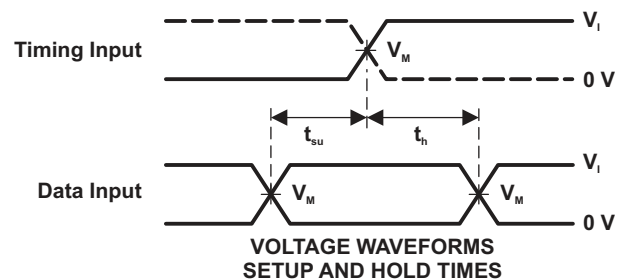
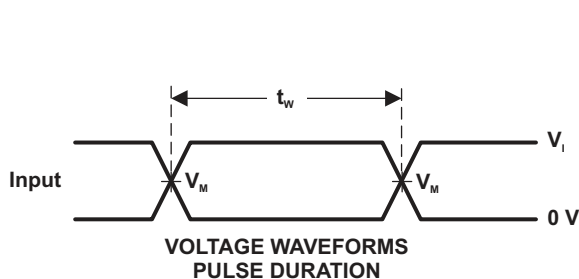


7 Parameter Measurement Information



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

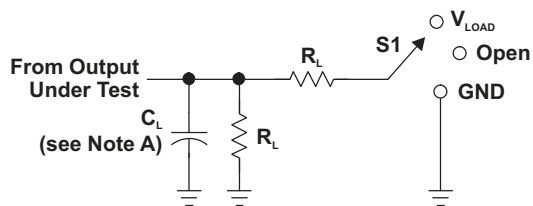
| V_{CC} | INPUTS | | V_M | V_{LOAD} | C_L | R_L | V_{Δ} |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
| | V_i | t_i/t_r | | | | | |
| $1.8\text{ V} \pm 0.15\text{ V}$ | V_{CC} | $\leq 2\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M Ω | 0.15 V |
| $2.5\text{ V} \pm 0.2\text{ V}$ | V_{CC} | $\leq 2\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M Ω | 0.15 V |
| $3.3\text{ V} \pm 0.3\text{ V}$ | 3 V | $\leq 2.5\text{ ns}$ | 1.5 V | 6 V | 15 pF | 1 M Ω | 0.3 V |
| $5\text{ V} \pm 0.5\text{ V}$ | V_{CC} | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M Ω | 0.3 V |



- 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 10 MHz, $Z_o = 50\ \Omega$.
 D. The outputs are measured one at a time, with one transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

Figure 3. Load Circuit and Voltage Waveforms

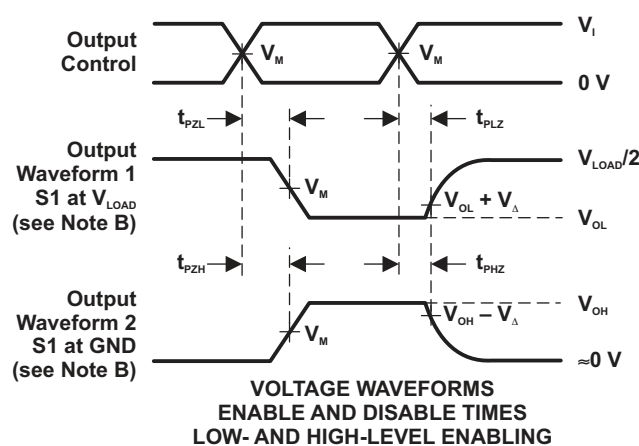
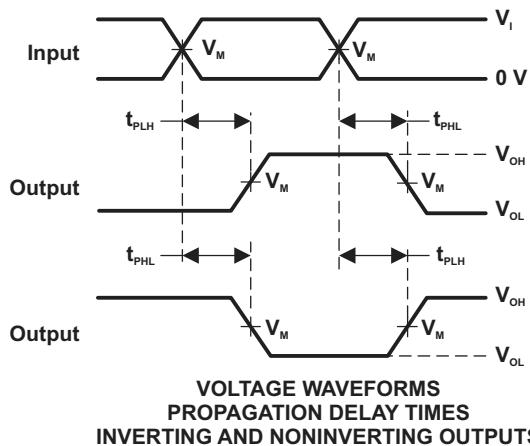
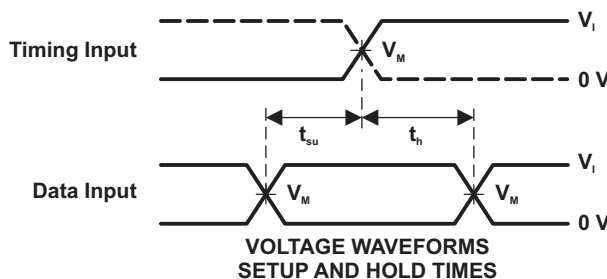
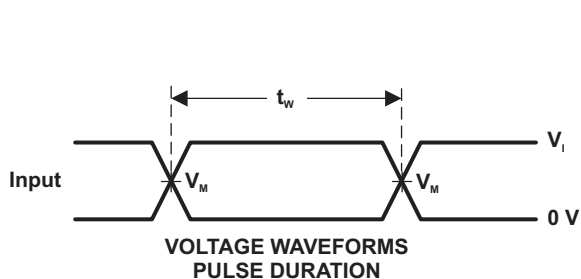
Parameter Measurement Information (continued)



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_{Δ} |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
| | V_I | t_r/t_f | | | | | |
| $1.8\text{ V} \pm 0.15\text{ V}$ | V_{CC} | $\leq 2\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 1 k Ω | 0.15 V |
| $2.5\text{ V} \pm 0.2\text{ V}$ | V_{CC} | $\leq 2\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 500 Ω | 0.15 V |
| $3.3\text{ V} \pm 0.3\text{ V}$ | 3 V | $\leq 2.5\text{ ns}$ | 1.5 V | 6 V | 50 pF | 500 Ω | 0.3 V |
| $5\text{ V} \pm 0.5\text{ V}$ | V_{CC} | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50 pF | 500 Ω | 0.3 V |



- 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 10 MHz, $Z_o = 50\ \Omega$.
 D. The outputs are measured one at a time, with one transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{on} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

Figure 4. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

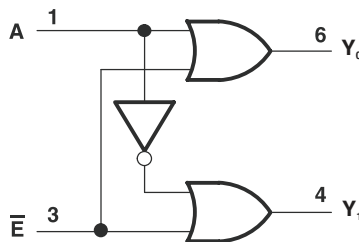
This decoder/demultiplexer is designed for 1.65-V to 5.5-V V_{CC} operation.

The SN74LVC1G19 device is a 1-of-2 decoder/demultiplexer. This device decodes the 1-bit address on input A and places a logic low on the matching address output, Y_0 or Y_1 , when the enable (\bar{E}) input signal is low.

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.

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

8.2 Functional Block Diagram



8.3 Feature Description

SN74LVC1G19 is available in NanoFree package. NanoFree is a major breakthrough in IC packaging concepts, it is a bare die package developed for applications that require the smallest possible package. The device supports 5-V V_{CC} Operation. All Inputs accept voltages up to 5.5 V. ± 24 -mA output drive at 3.3 V. The maximum time propagation delay (t_{pd}) is 5.4 ns at 3.3 V. Low Power Consumption, 10- μ A Max I_{CC} . Typical output ground bounce (V_{OLP}) and Output V_{OH} Undershoot (V_{OHV}). This device is fully specified for partial-power-down applications using I_{off} . The I_{off} feature ensures that damaging current will not backflow through the device when it is powered down. The SN74LVC1G19 device has isolation during power off. I_{off} supports live insertion, partial-power-down mode and back drive protection.

8.4 Device Functional Modes

Table 1 lists the functional modes of the SN74LVC1G19.

Table 1. Function Table

| INPUTS | | OUTPUTS | |
|-----------|---|---------|-------|
| \bar{E} | A | Y_0 | Y_1 |
| L | L | L | H |
| L | H | H | L |
| H | X | H | H |

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74LVC1G19 device is a 1-of-2 decoder/demultiplexer. This device decodes the 1 bit address on input A and places a logic low on the matching address output, Y_0 or Y_1 , when the enable (\bar{E}) input signal is low. It can produce 24 mA of drive current at 3.3 V making it ideal for driving multiple outputs.

9.2 Typical Application

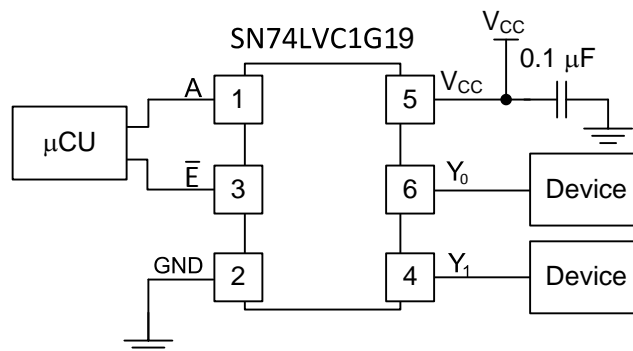


Figure 5. Typical Application Diagram

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads so routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

1. Recommended Input Conditions:

- For rise time and fall time specifications, see $(\Delta t/\Delta V)$ in [Recommended Operating Conditions](#) table.
- For specified high and low levels, see $(V_{IH}$ and $V_{IL})$ in [Recommended Operating Conditions](#) table.
- Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC} .

2. Recommend Output Conditions:

- Load currents must not exceed 50 mA per output and 100 mA total for the part.
- Series resistors on the output may be used if the user desires to slow the output edge signal or limit the output current.

Typical Application (continued)

9.2.3 Application Curve

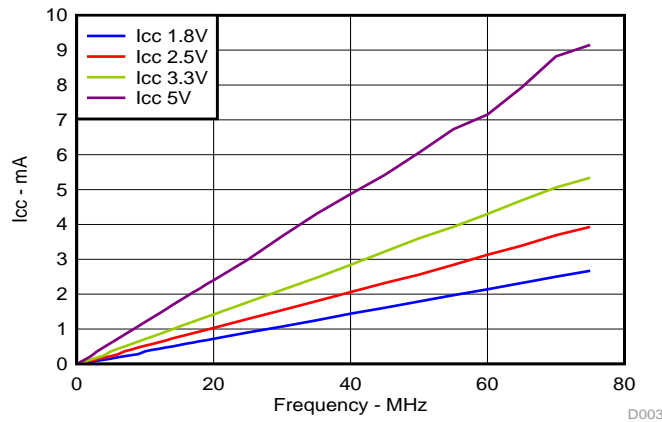


Figure 6. I_{CC} vs Frequency

10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in [Absolute Maximum Ratings](#) table.

Each V_{CC} terminal must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1-μF capacitor is recommended. If there are multiple V_{CC} terminals then 0.01-μF or 0.022-μF capacitors are recommended for each power terminal. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. Multiple bypass capacitors may be paralleled to reject different frequencies of noise. The bypass capacitor must be installed as close to the power terminal as possible for the best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices, inputs must not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when only 3 of the 4-buffer gates are used. Such input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in [Figure 7](#) are rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC}, whichever makes more sense or is more convenient.

11.2 Layout Example

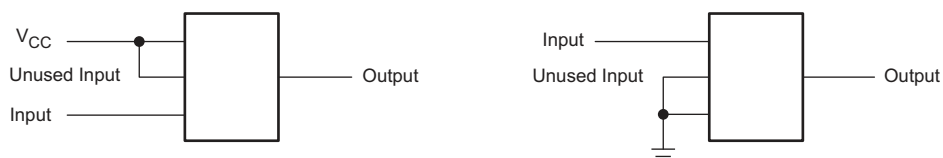


Figure 7. Layout Diagram

12 Device and Documentation Support

12.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.2 Trademarks

NanoFree, E2E are trademarks of Texas Instruments.
Blu-ray is a registered trademark of Blu-ray Disc Association.
All other trademarks are the property of their respective owners.

12.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

12.4 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 Mechanical, Packaging, and Orderable Information

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

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|-------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LVC1G19DBVR | ACTIVE | SOT-23 | DBV | 6 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (C195, C19R) | Samples |
| SN74LVC1G19DBVRE4 | ACTIVE | SOT-23 | DBV | 6 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (C195, C19R) | Samples |
| SN74LVC1G19DBVT | ACTIVE | SOT-23 | DBV | 6 | 250 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (C195, C19R) | Samples |
| SN74LVC1G19DCKR | ACTIVE | SC70 | DCK | 6 | 3000 | RoHS & Green | NIPDAU SN | Level-1-260C-UNLIM | -40 to 85 | (CY5, CYF, CYK, CYR) | Samples |
| SN74LVC1G19DCKRE4 | ACTIVE | SC70 | DCK | 6 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | CY5 | Samples |
| SN74LVC1G19DCKRG4 | ACTIVE | SC70 | DCK | 6 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | CY5 | Samples |
| SN74LVC1G19DRLR | ACTIVE | SOT-5X3 | DRL | 6 | 4000 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 85 | (1JZ, CY7, CYR) | Samples |
| SN74LVC1G19DRLRG4 | ACTIVE | SOT-5X3 | DRL | 6 | 4000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (1JZ, CY7, CYR) | Samples |
| SN74LVC1G19DRYR | ACTIVE | SON | DRY | 6 | 5000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | CY | Samples |
| SN74LVC1G19YZPR | ACTIVE | DSBGA | YZP | 6 | 3000 | RoHS & Green | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | (CY7, CYN) | 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 (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.

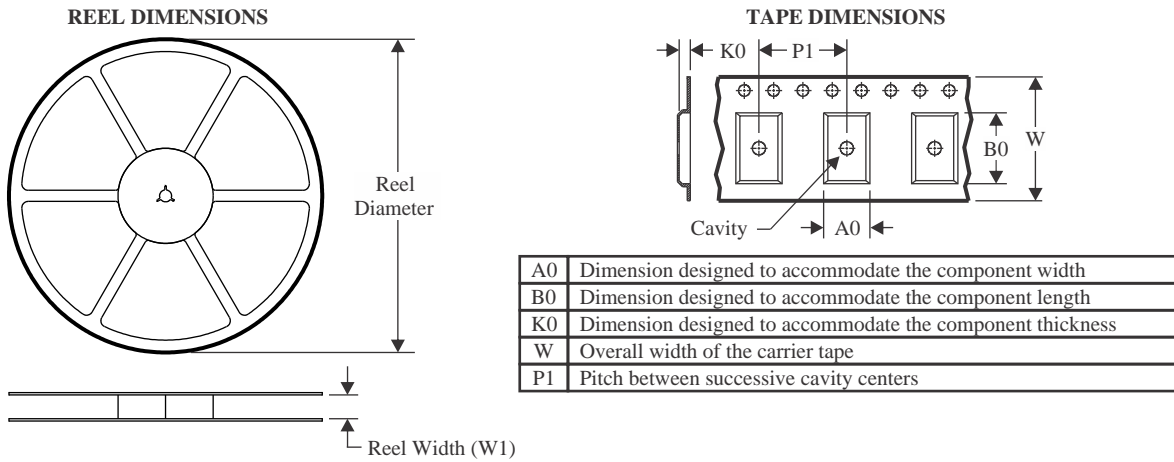
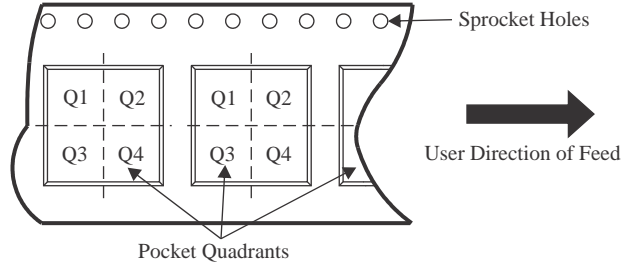
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

⁽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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TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC1G19DBVR | SOT-23 | DBV | 6 | 3000 | 180.0 | 8.4 | 3.23 | 3.17 | 1.37 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DBVR | SOT-23 | DBV | 6 | 3000 | 178.0 | 9.2 | 3.3 | 3.23 | 1.55 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DBVT | SOT-23 | DBV | 6 | 250 | 178.0 | 9.2 | 3.3 | 3.23 | 1.55 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 178.0 | 9.2 | 2.4 | 2.4 | 1.22 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 8.4 | 2.41 | 2.41 | 1.2 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 178.0 | 9.0 | 2.4 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 178.0 | 9.0 | 2.4 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DCKRG4 | SC70 | DCK | 6 | 3000 | 178.0 | 9.2 | 2.4 | 2.4 | 1.22 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DRLR | SOT-5X3 | DRL | 6 | 4000 | 180.0 | 8.4 | 2.0 | 1.8 | 0.75 | 4.0 | 8.0 | Q3 |
| SN74LVC1G19DRYR | SON | DRY | 6 | 5000 | 180.0 | 9.5 | 1.15 | 1.6 | 0.75 | 4.0 | 8.0 | Q1 |
| SN74LVC1G19YZPR | DSBGA | YZP | 6 | 3000 | 178.0 | 9.2 | 1.02 | 1.52 | 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) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC1G19DBVR | SOT-23 | DBV | 6 | 3000 | 202.0 | 201.0 | 28.0 |
| SN74LVC1G19DBVR | SOT-23 | DBV | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DBVT | SOT-23 | DBV | 6 | 250 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 202.0 | 201.0 | 28.0 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DCKRG4 | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74LVC1G19DRLR | SOT-5X3 | DRL | 6 | 4000 | 210.0 | 185.0 | 35.0 |
| SN74LVC1G19DRYR | SON | DRY | 6 | 5000 | 184.0 | 184.0 | 19.0 |
| SN74LVC1G19YZPR | DSBGA | YZP | 6 | 3000 | 220.0 | 220.0 | 35.0 |

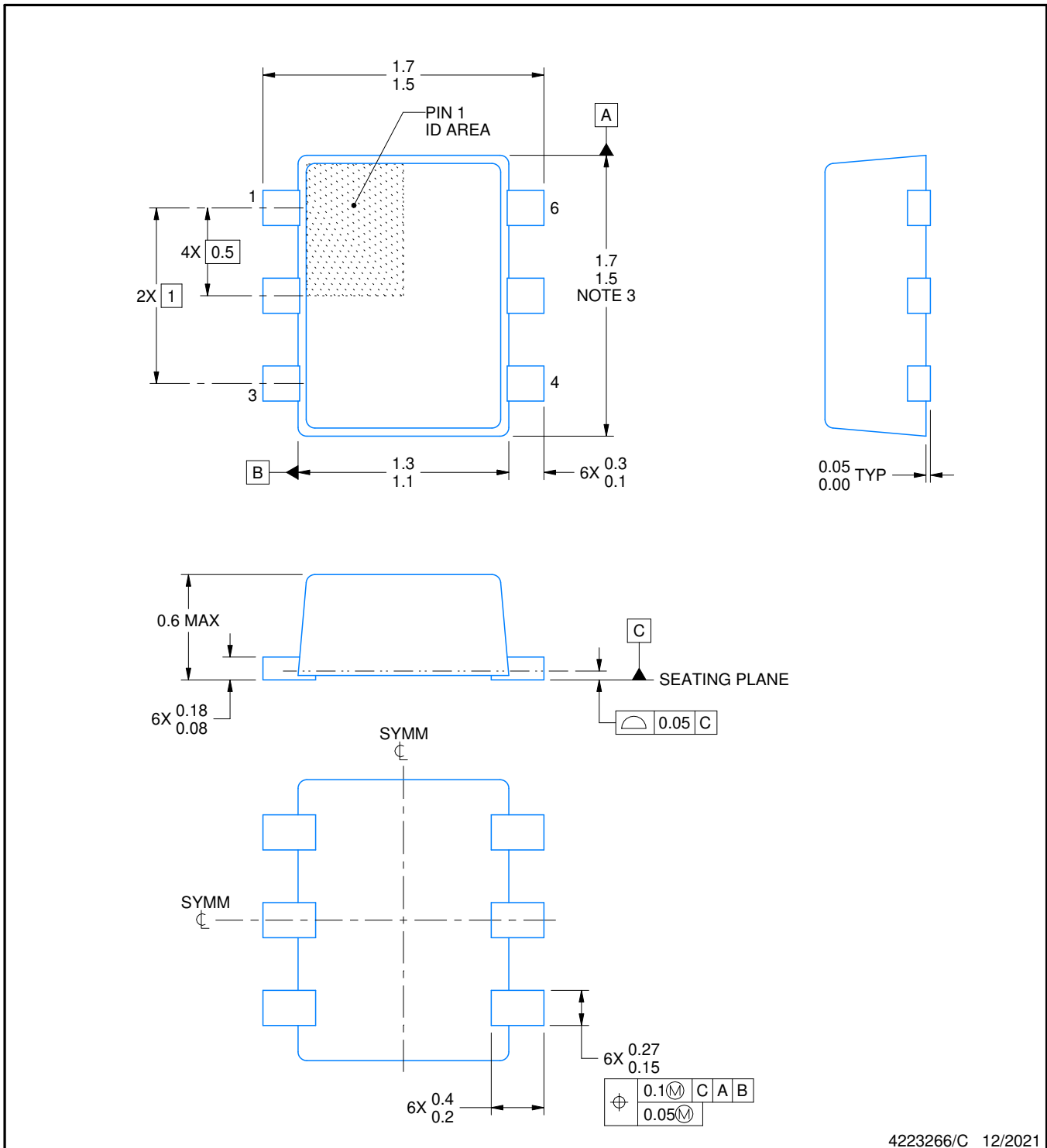
DRL0006A



PACKAGE OUTLINE

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



4223266/C 12/2021

NOTES:

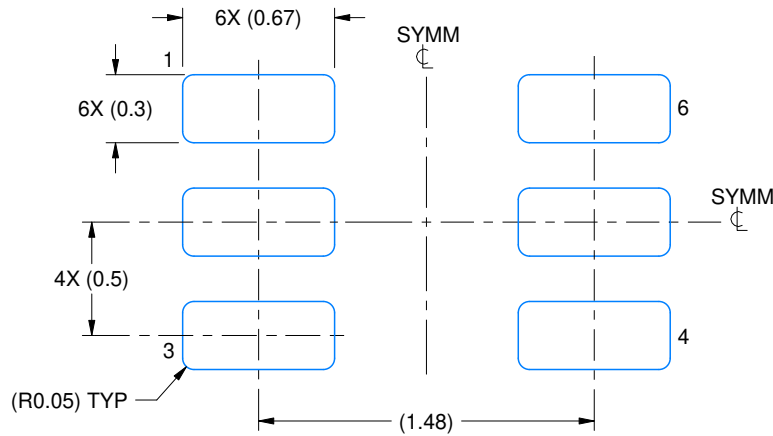
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-293 Variation UAAD

EXAMPLE BOARD LAYOUT

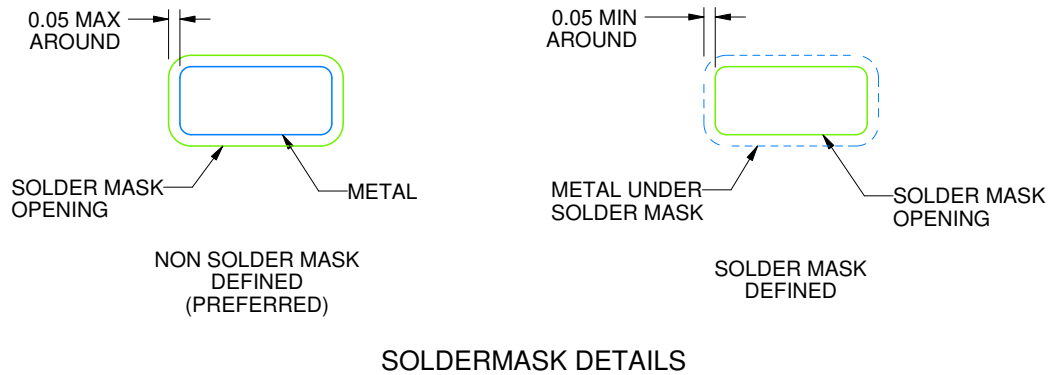
DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



LAND PATTERN EXAMPLE
SCALE:30X



SOLDERMASK DETAILS

4223266/C 12/2021

NOTES: (continued)

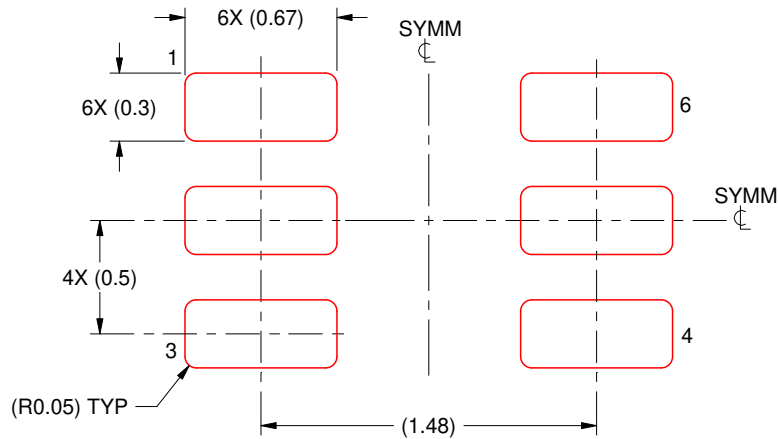
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Land pattern design aligns to IPC-610, Bottom Termination Component (BTC) solder joint inspection criteria.

EXAMPLE STENCIL DESIGN

DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

4223266/C 12/2021

NOTES: (continued)

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

GENERIC PACKAGE VIEW

DRY 6

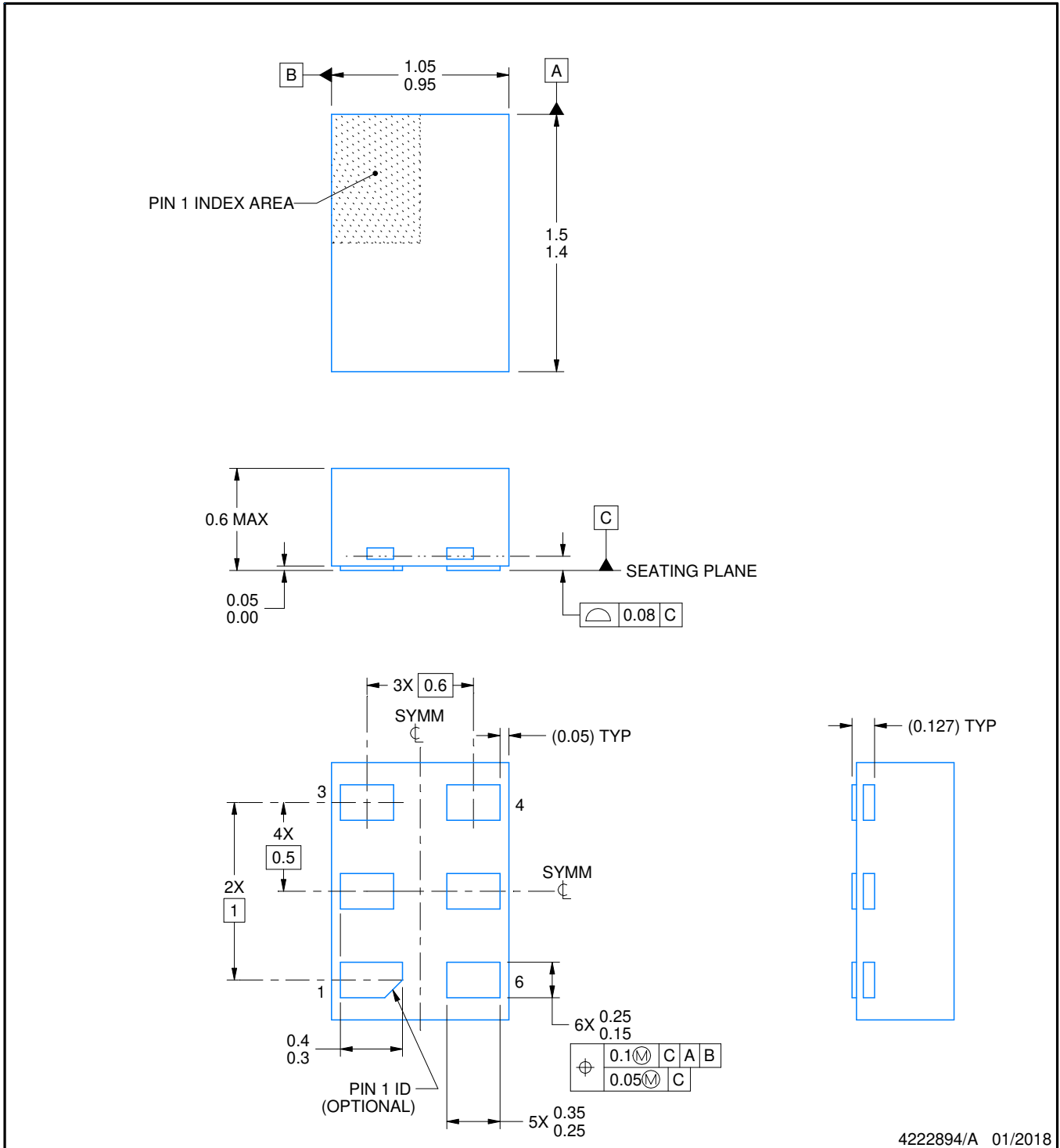
USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4207181/G



NOTES:

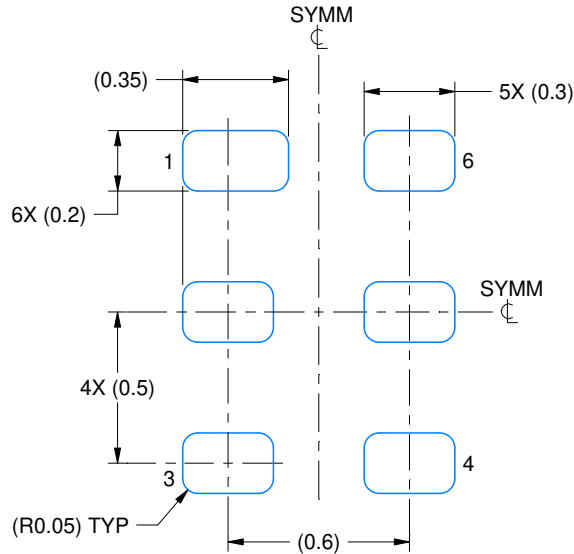
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

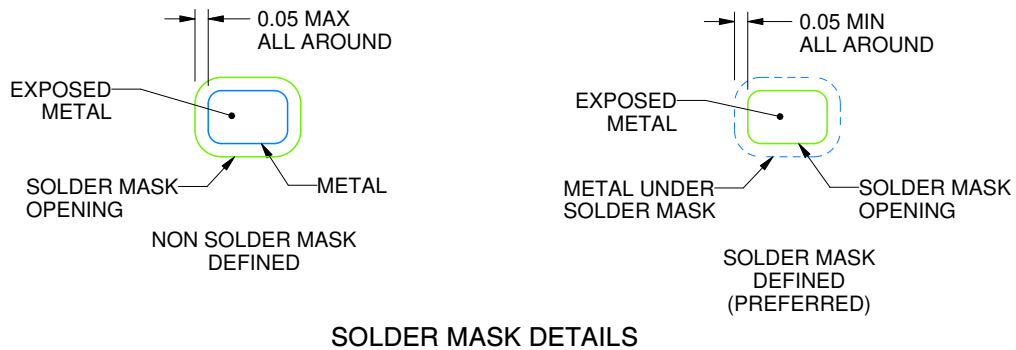
DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
 1:1 RATIO WITH PKG SOLDER PADS
 EXPOSED METAL SHOWN
 SCALE:40X



SOLDER MASK DETAILS

4222894/A 01/2018

NOTES: (continued)

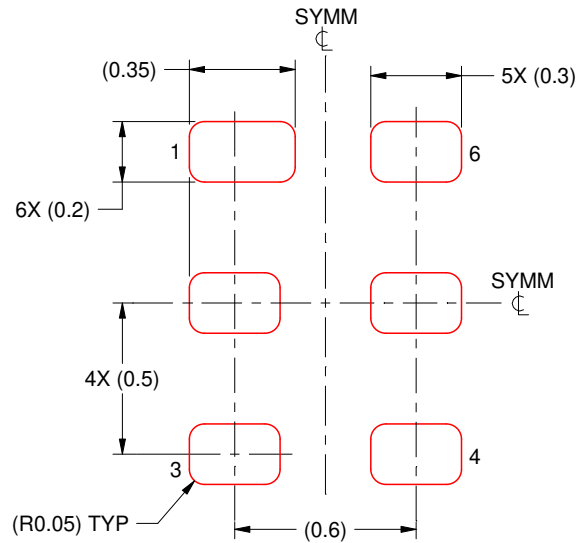
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 (www.ti.com/lit/sluea271).

EXAMPLE STENCIL DESIGN

DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.075 - 0.1 mm THICK STENCIL
SCALE:40X

4222894/A 01/2018

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

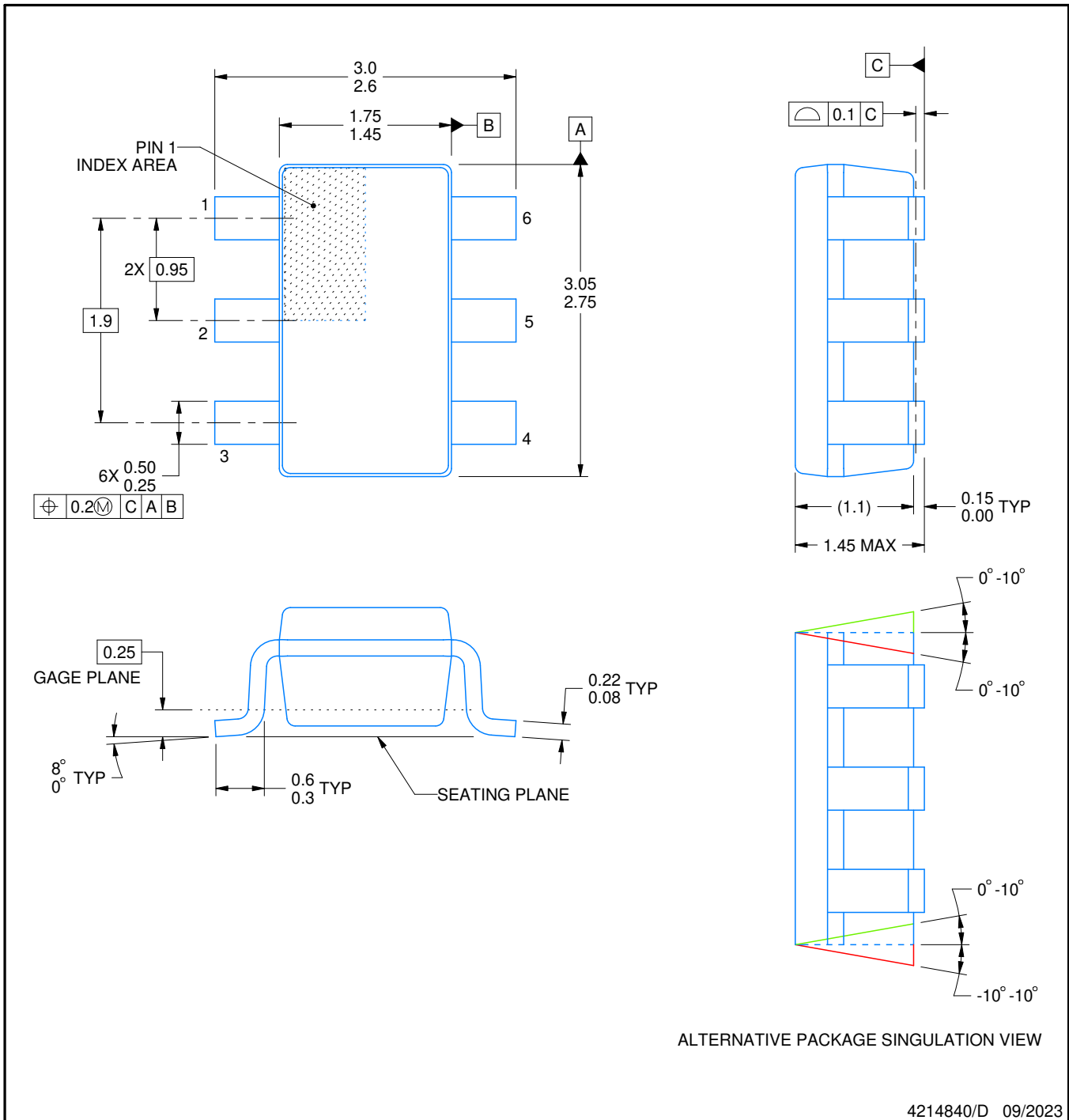
DBV0006A



PACKAGE OUTLINE

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



ALTERNATIVE PACKAGE SINGULATION VIEW

4214840/D 09/2023

NOTES:

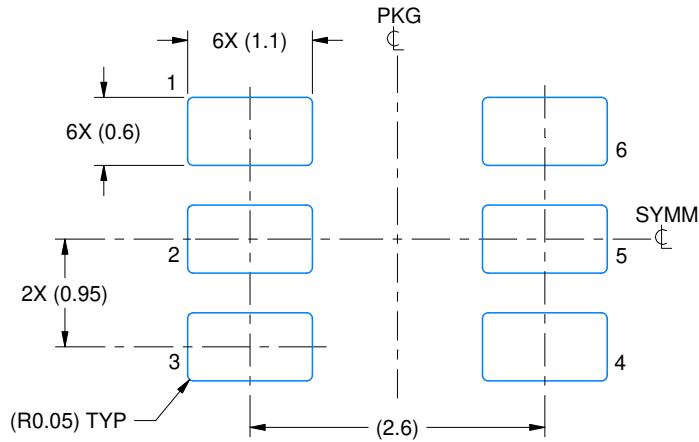
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.25 per side.
4. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
5. Reference JEDEC MO-178.

EXAMPLE BOARD LAYOUT

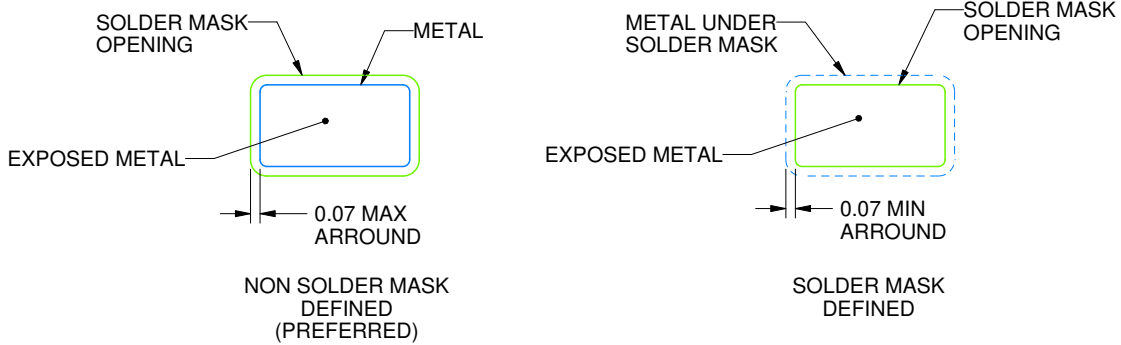
DBV0006A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X



SOLDER MASK DETAILS

4214840/D 09/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

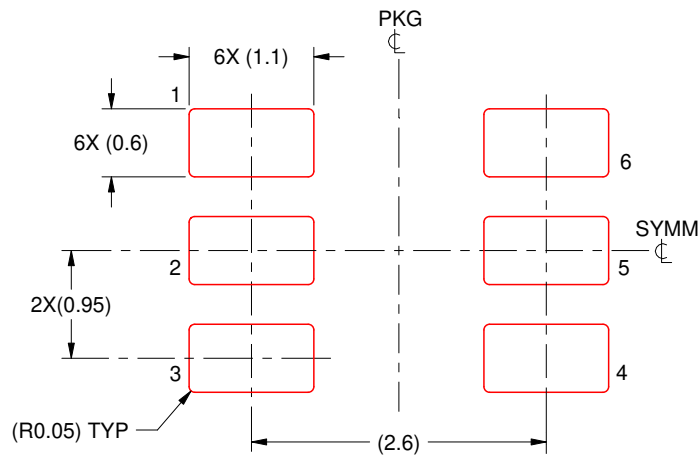
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DBV0006A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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

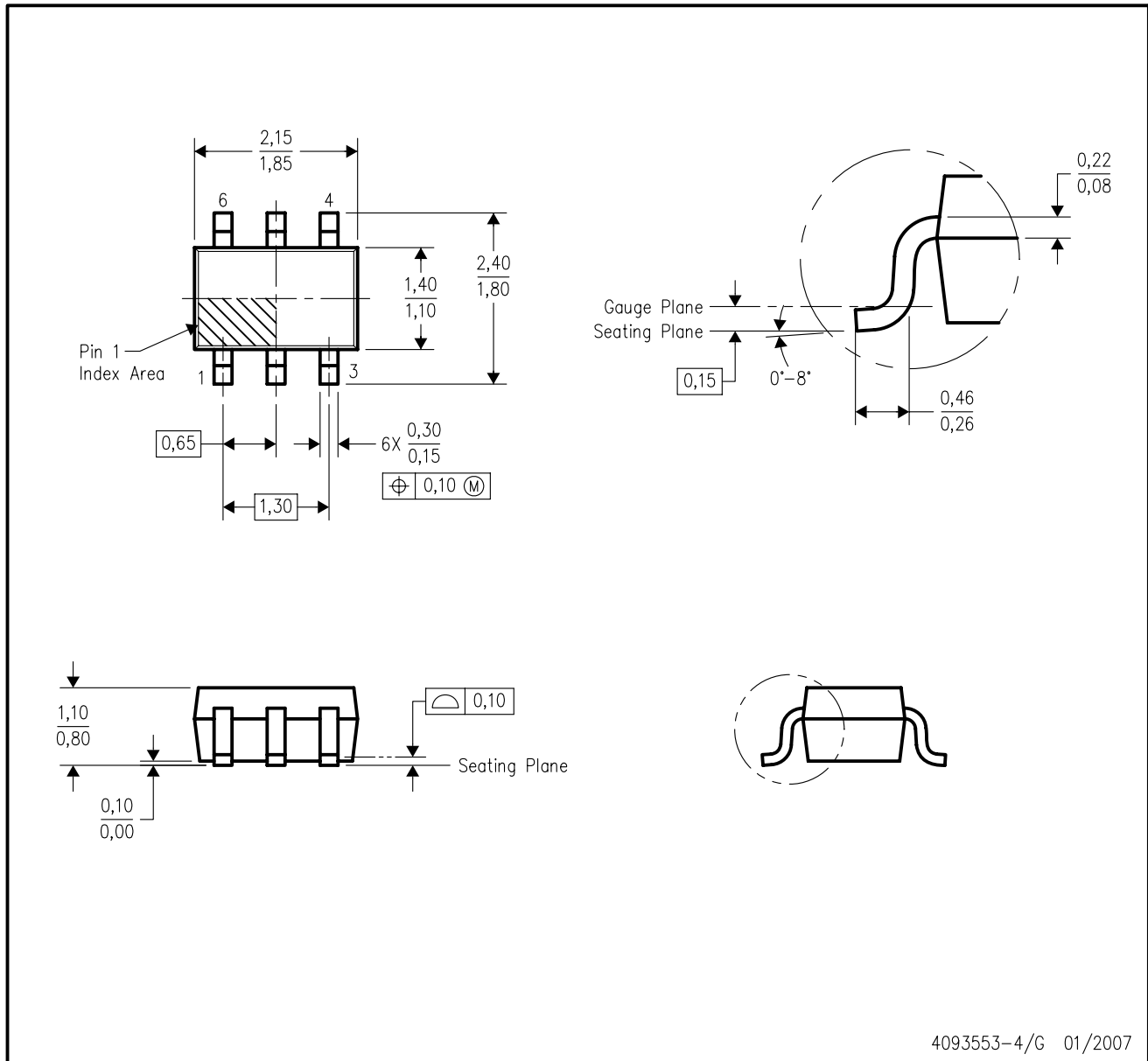
4214840/D 09/2023

NOTES: (continued)

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

DCK (R-PDSO-G6)

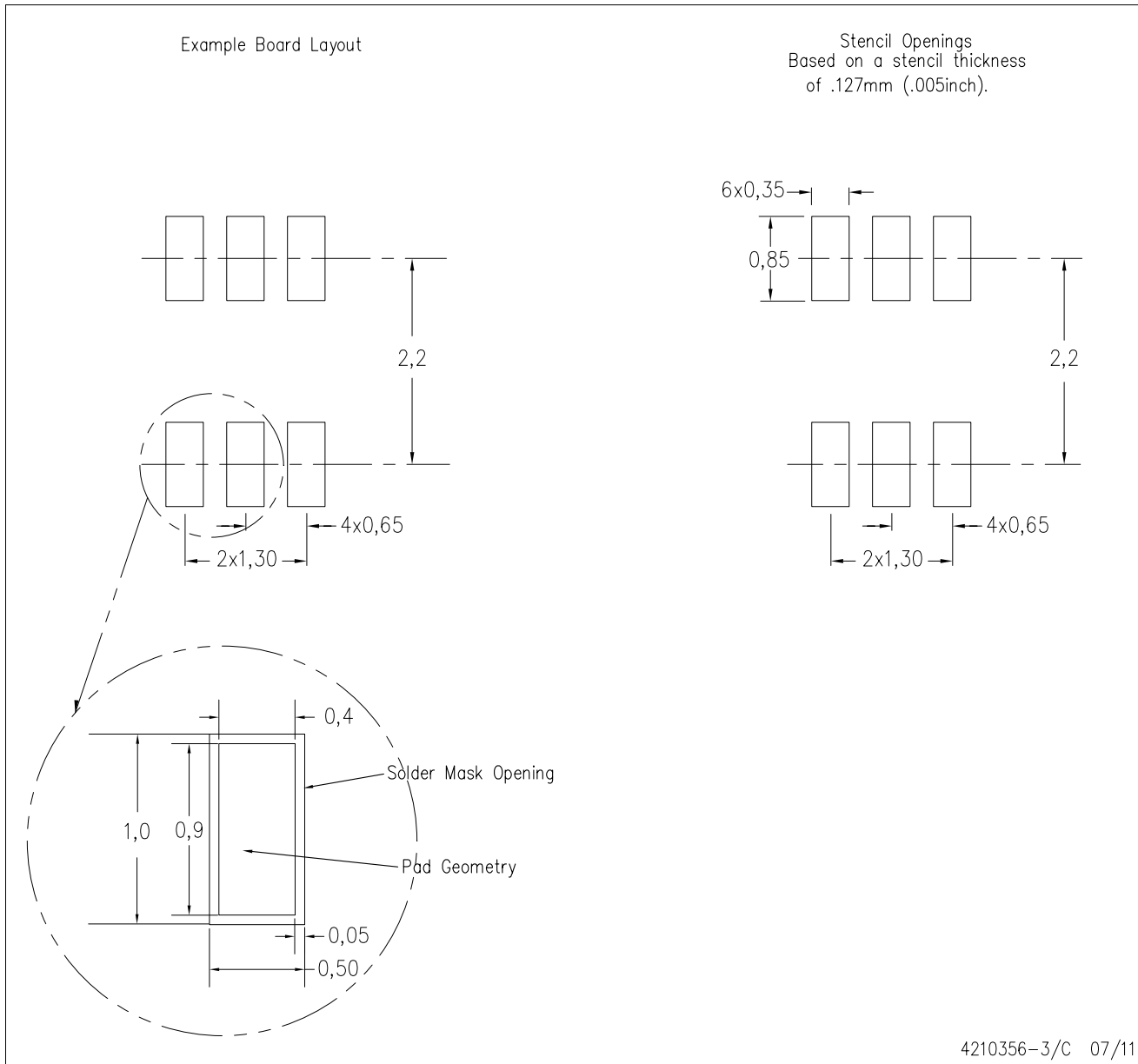
PLASTIC SMALL-OUTLINE PACKAGE



- 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-203 variation AB.

DCK (R-PDSO-G6)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - Publication IPC-7351 is recommended for alternate designs.
 - 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

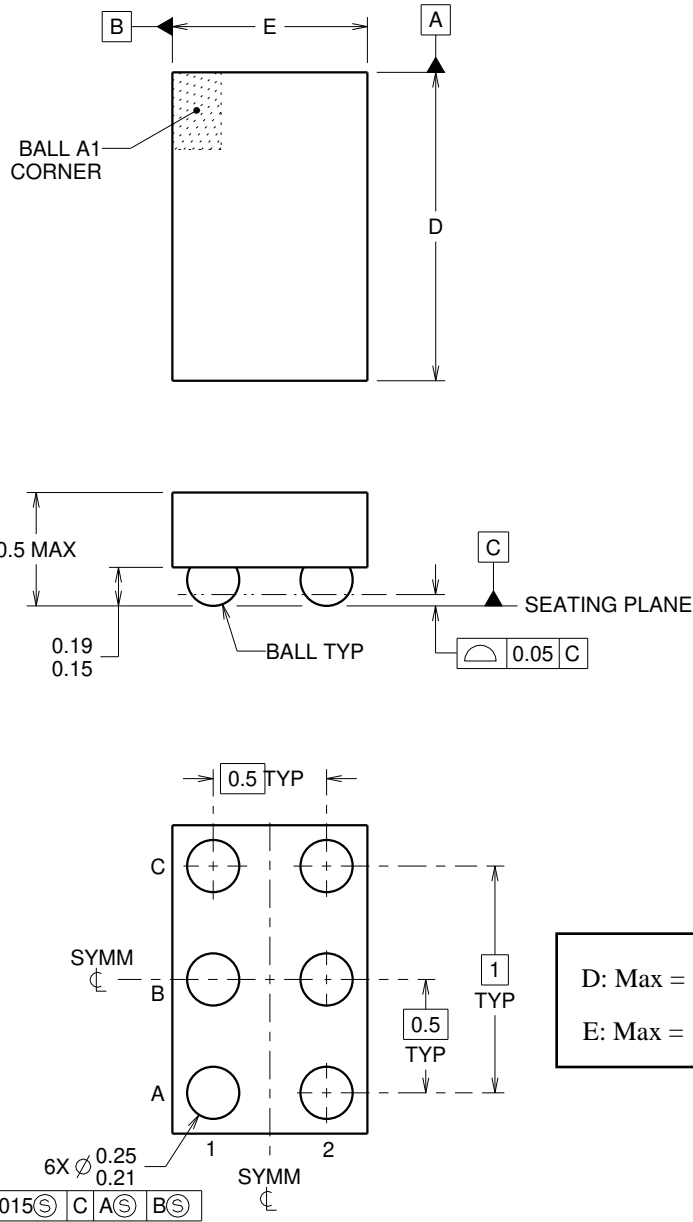
YZP0006



PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



4219524/A 06/2014

NOTES:

NanoFree Is a trademark of Texas Instruments.

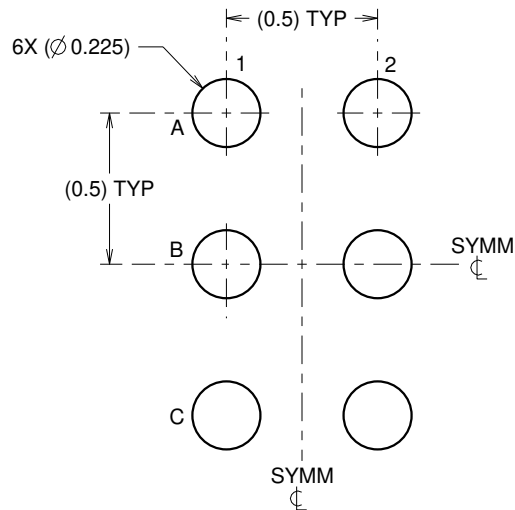
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. NanoFree™ package configuration.

EXAMPLE BOARD LAYOUT

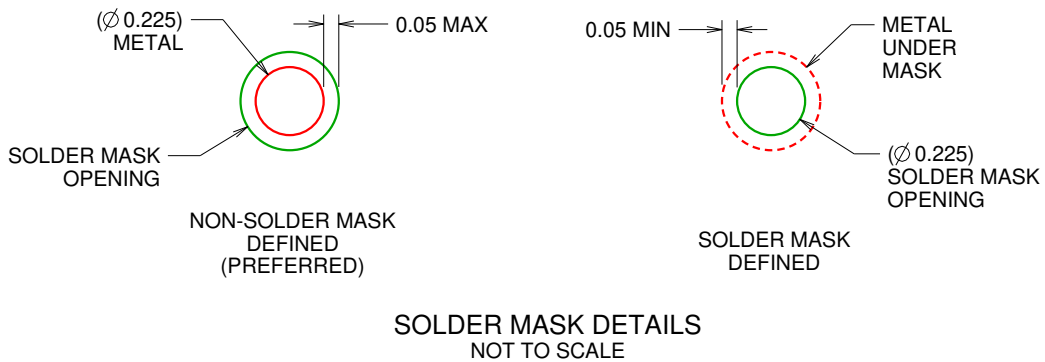
YZP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE
SCALE:40X



4219524/A 06/2014

NOTES: (continued)

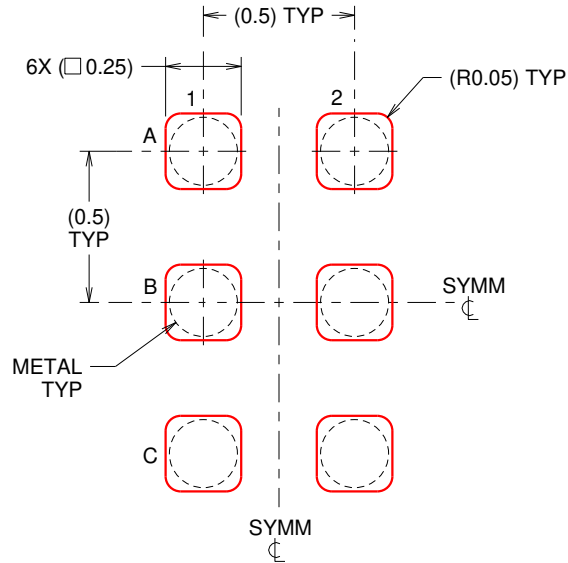
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SBVA017 (www.ti.com/lit/sbva017).

EXAMPLE STENCIL DESIGN

YZP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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

4219524/A 06/2014

NOTES: (continued)

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

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