

## SN74LVC1G139

### SN74LVC1G139 2-to-4 Line Decoder

Check for Samples: [SN74LVC1G139](#)

#### FEATURES

- Available in the Texas Instruments NanoStar™ and NanoFree™ Packages
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Supports Down Translation to  $V_{CC}$
- Max  $t_{pd}$  of 4.9 ns at 3.3 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 24$ -mA Output Drive at 3.3 V
- $I_{off}$  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)

#### DESCRIPTION

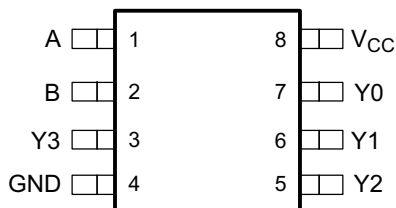
This 2-to-4 line decoder is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

The SN74LVC1G139 2-line to 4-line decoder is designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, this decoder can be used to minimize the effects of system decoding. When used with high-speed memories utilizing a fast enable circuit, the delay times of these decoders and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoder is negligible.

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

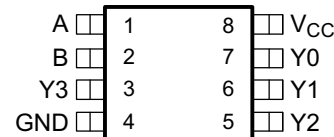
This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

**DCT PACKAGE  
(TOP VIEW)**

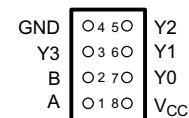


See mechanical drawings for dimensions.

**DCU PACKAGE  
(TOP VIEW)**



**YEP OR YZP PACKAGE  
(BOTTOM VIEW)**



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

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# SN74LVC1G139

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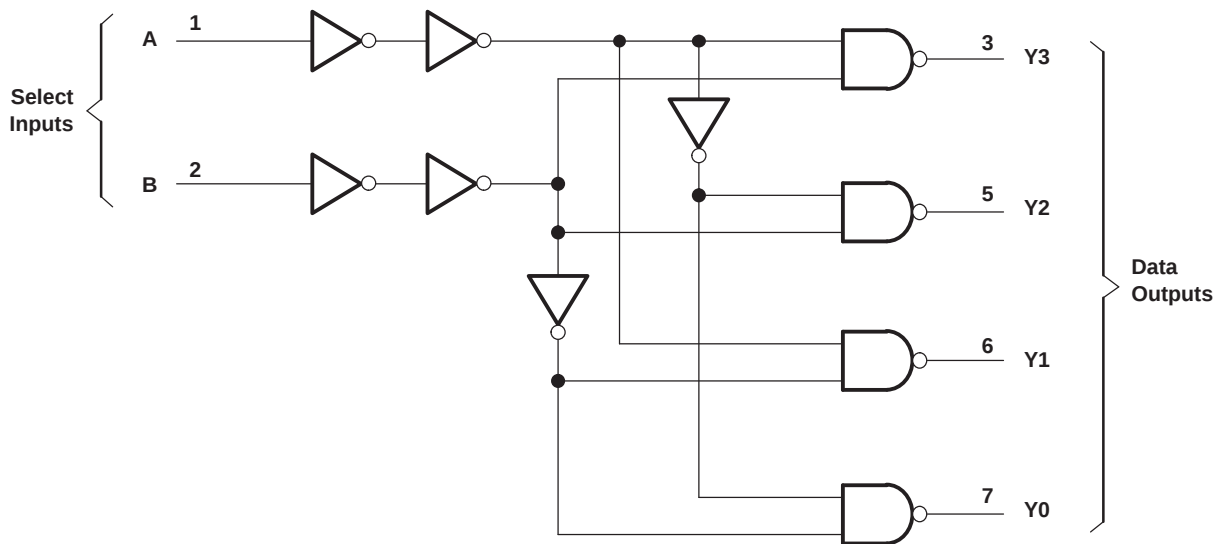
This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

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

**Function Table**

| SELECT INPUTS |   | OUTPUTS |    |    |    |
|---------------|---|---------|----|----|----|
| B             | A | Y0      | Y1 | Y2 | Y3 |
| L             | L | L       | H  | H  | H  |
| L             | H | H       | L  | H  | H  |
| H             | L | H       | H  | L  | H  |
| H             | H | H       | H  | H  | L  |

**Logic Diagram (Positive Logic)**



## Absolute Maximum Ratings

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

|                  |                                                                                             |                    | MIN  | MAX                   | UNIT |
|------------------|---------------------------------------------------------------------------------------------|--------------------|------|-----------------------|------|
| V <sub>CC</sub>  | Supply voltage range                                                                        |                    | –0.5 | 6.5                   | V    |
| V <sub>I</sub>   | Input voltage range                                                                         |                    | –0.5 | 6.5                   | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> |                    | –0.5 | 6.5                   | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>              |                    | –0.5 | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>  | Input clamp current                                                                         | V <sub>I</sub> < 0 |      | –50                   | mA   |
| I <sub>OK</sub>  | Output clamp current                                                                        | V <sub>O</sub> < 0 |      | –50                   | mA   |
| I <sub>O</sub>   | Continuous output current                                                                   |                    |      | ±50                   | mA   |
| I <sub>CC</sub>  | Continuous current through V <sub>CC</sub> or GND                                           |                    |      | ±100                  | mA   |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(4)</sup>                                                    | DCT package        |      | 220                   | °C/W |
|                  |                                                                                             | DCU package        |      | 227                   |      |
|                  |                                                                                             | YEP or YZP package |      | 102                   |      |
| T <sub>stg</sub> | 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) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V<sub>CC</sub> is provided in the *Recommended Operating Conditions* table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

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## Recommended Operating Conditions

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

|                 |                                    |                                                 | MIN                    | MAX                    | UNIT |
|-----------------|------------------------------------|-------------------------------------------------|------------------------|------------------------|------|
| V <sub>CC</sub> | Supply voltage                     | Operating                                       | 1.65                   | 5.5                    | V    |
|                 |                                    | Data retention only                             | 1.5                    |                        |      |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 1.65 V to 1.95 V              | 0.65 × V <sub>CC</sub> |                        | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                | 1.7                    |                        |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  | 2                      |                        |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                | 0.7 × V <sub>CC</sub>  |                        |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 1.65 V to 1.95 V              |                        | 0.35 × V <sub>CC</sub> | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                |                        | 0.7                    |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  |                        | 0.8                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                |                        | 0.3 × V <sub>CC</sub>  |      |
| V <sub>I</sub>  | Input voltage                      |                                                 | 0                      | 5.5                    | V    |
| V <sub>O</sub>  | Output voltage                     |                                                 | 0                      | V <sub>CC</sub>        | V    |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 1.65 V                        |                        | –4                     | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         |                        | –8                     |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           |                        | –16                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         |                        | –24                    |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 1.65 V                        |                        | 4                      | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         |                        | 8                      |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           |                        | 16                     |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         |                        | 24                     |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V |                        | 20                     | ns/V |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V                 |                        | 15                     |      |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V                   |                        | 10                     |      |
| T <sub>A</sub>  | Operating free-air temperature     |                                                 | –40                    | 85                     | °C   |

(1) All unused inputs of the device must be held at V<sub>CC</sub> 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 <sub>CC</sub> | MIN                   | TYP <sup>(1)</sup> | MAX | UNIT |
|------------------|---------------|------------------------------------------------------------------------------|-----------------|-----------------------|--------------------|-----|------|
| V <sub>OH</sub>  |               | I <sub>OH</sub> = –100 µA                                                    | 1.65 V to 5.5 V | V <sub>CC</sub> – 0.1 |                    |     | V    |
|                  |               | I <sub>OH</sub> = –4 mA                                                      | 1.65 V          | 1.2                   |                    |     |      |
|                  |               | I <sub>OH</sub> = –8 mA                                                      | 2.3 V           | 1.9                   |                    |     |      |
|                  |               | I <sub>OH</sub> = –16 mA                                                     | 3 V             | 2.4                   |                    |     |      |
|                  |               | I <sub>OH</sub> = –24 mA                                                     |                 | 2.3                   |                    |     |      |
|                  |               | I <sub>OH</sub> = –32 mA                                                     | 4.5 V           | 3.8                   |                    |     |      |
| V <sub>OL</sub>  |               | I <sub>OL</sub> = 100 µA                                                     | 1.65 V to 5.5 V | 0.1                   |                    |     | V    |
|                  |               | I <sub>OL</sub> = 4 mA                                                       | 1.65 V          | 0.45                  |                    |     |      |
|                  |               | I <sub>OL</sub> = 8 mA                                                       | 2.3 V           | 0.3                   |                    |     |      |
|                  |               | I <sub>OL</sub> = 16 mA                                                      | 3 V             | 0.4                   |                    |     |      |
|                  |               | I <sub>OL</sub> = 24 mA                                                      |                 | 0.55                  |                    |     |      |
|                  |               | I <sub>OL</sub> = 32 mA                                                      | 4.5 V           | 0.55                  |                    |     |      |
| I <sub>I</sub>   | A or B inputs | V <sub>I</sub> = 5.5 V or GND                                                | 0 to 5.5 V      | ±1                    |                    |     | µA   |
| I <sub>off</sub> |               | V <sub>I</sub> or V <sub>O</sub> = 5.5 V                                     | 0               | ±5                    |                    |     | µA   |
| I <sub>CC</sub>  |               | V <sub>I</sub> = 5.5 V or GND, I <sub>O</sub> = 0                            | 1.65 V to 5.5 V | 10                    |                    |     | µA   |
| ΔI <sub>CC</sub> |               | One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND | 3 V to 5.5 V    | 500                   |                    |     | µA   |
| C <sub>i</sub>   |               | V <sub>I</sub> = V <sub>CC</sub> or GND                                      | 3.3 V           | 4                     |                    |     | pF   |

(1) All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

## Switching Characteristics

over recommended operating free-air temperature range, C<sub>L</sub> = 15 pF (unless otherwise noted) (see [Figure 1](#))

| 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 |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 5 V<br>± 0.5 V |     | UNIT |
|-----------------|-----------------|----------------|-------------------------------------|------|------------------------------------|-----|------------------------------------|-----|----------------------------------|-----|------|
|                 |                 |                | MIN                                 | MAX  | MIN                                | MAX | MIN                                | MAX | MIN                              | MAX |      |
| t <sub>pd</sub> | A or B          | Y              | 2.7                                 | 15.3 | 1.5                                | 7.5 | 0.9                                | 4.9 | 0.8                              | 3.6 | ns   |

## Switching Characteristics

over recommended operating free-air temperature range, C<sub>L</sub> = 30 pF or 50 pF (unless otherwise noted) (see [Figure 2](#))

| 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 |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 5 V<br>± 0.5 V |     | UNIT |
|-----------------|-----------------|----------------|-------------------------------------|------|------------------------------------|-----|------------------------------------|-----|----------------------------------|-----|------|
|                 |                 |                | MIN                                 | MAX  | MIN                                | MAX | MIN                                | MAX | MIN                              | MAX |      |
| t <sub>pd</sub> | A or B          | Y              | 3                                   | 16.7 | 1.6                                | 8.2 | 1.2                                | 5.9 | 1.1                              | 4.2 | ns   |

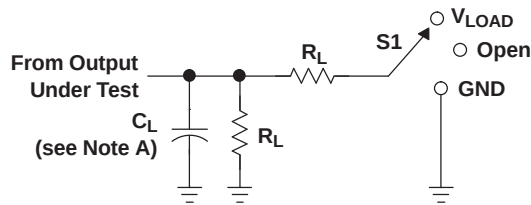
## Operating Characteristics

T<sub>A</sub> = 25°C

| PARAMETER                                                    | TEST CONDITIONS | V <sub>CC</sub> = 1.8 V | V <sub>CC</sub> = 2.5 V | V <sub>CC</sub> = 3.3 V | V <sub>CC</sub> = 5 V | UNIT |
|--------------------------------------------------------------|-----------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
|                                                              |                 | TYP                     | TYP                     | TYP                     | TYP                   |      |
| C <sub>pd</sub> <sup>(1)</sup> Power dissipation capacitance | f = 10 MHz      | 31                      | 34                      | 36                      | 39                    | pF   |

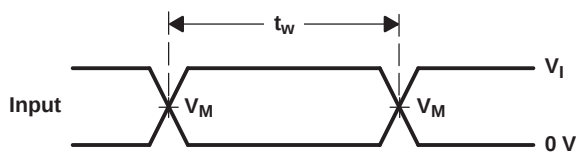
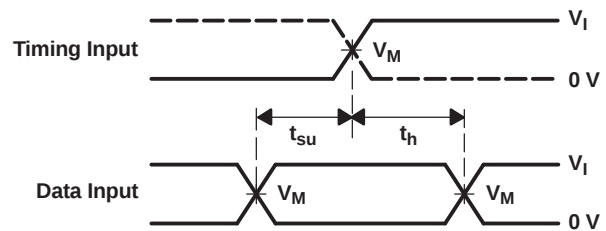
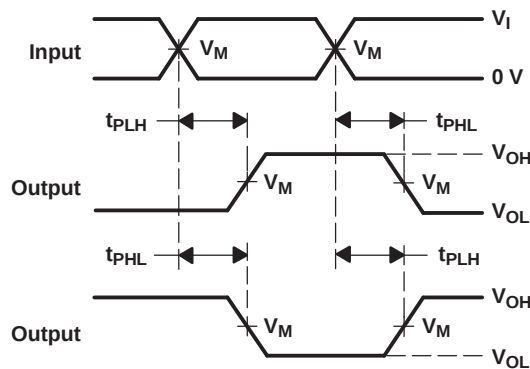
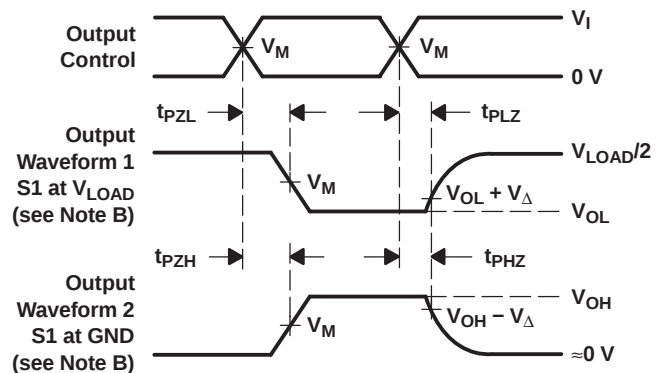
(1) Two outputs switching

## Parameter Measurement Information


**LOAD CIRCUIT**

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

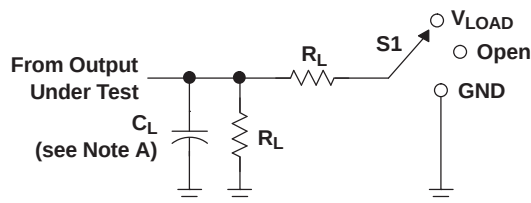
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 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 $\Omega$ | 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 $\Omega$ | 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 $\Omega$ | 0.3 V        |


**VOLTAGE WAVEFORMS  
PULSE DURATION**

**VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES**

**VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS**

**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:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ .
  - 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 1. Load Circuit and Voltage Waveforms**

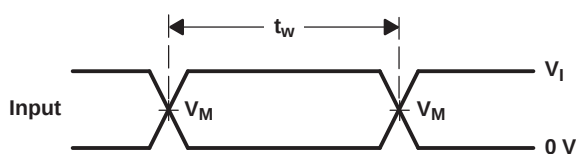
## Parameter Measurement Information



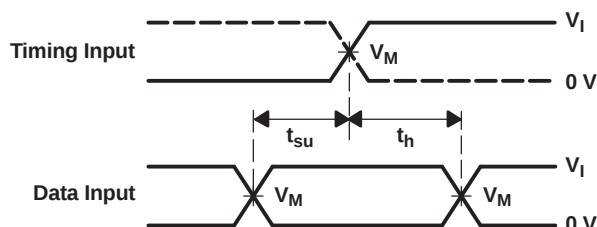
LOAD CIRCUIT

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

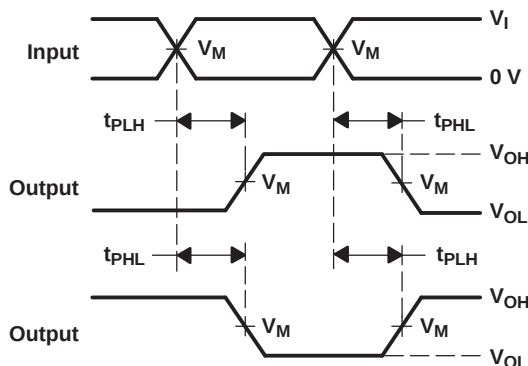
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 1 k $\Omega$ | 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 $\Omega$ | 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 $\Omega$ | 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 $\Omega$ | 0.3 V        |



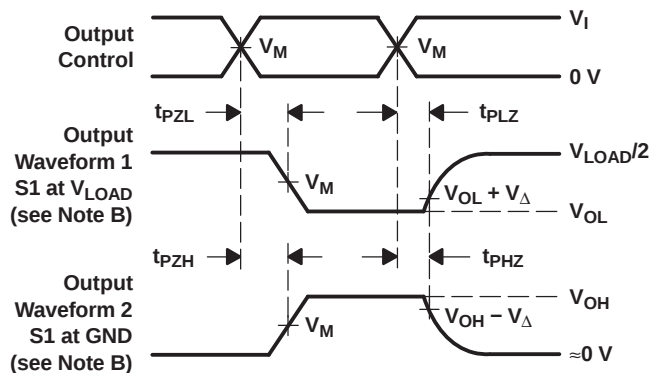
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
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  - $t_{PLZ}$  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 2. Load Circuit and Voltage Waveforms**

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## REVISION HISTORY

| Changes from Revision B (December 2005) to Revision C |  | Page              |
|-------------------------------------------------------|--|-------------------|
| • Updated document to new TI data sheet format. ....  |  | <a href="#">1</a> |
| • Updated Features. ....                              |  | <a href="#">1</a> |
| • Removed Ordering Information table. ....            |  | <a href="#">1</a> |
| • Added ESD warning. ....                             |  | <a href="#">2</a> |

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| 74LVC1G139DCTRE4 | ACTIVE        | SM8          | DCT                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39<br>Z                | <a href="#">Samples</a> |
| 74LVC1G139DCTRG4 | ACTIVE        | SM8          | DCT                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39<br>Z                | <a href="#">Samples</a> |
| 74LVC1G139DCTTE4 | ACTIVE        | SM8          | DCT                | 8    | 250            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39<br>Z                | <a href="#">Samples</a> |
| 74LVC1G139DCURE4 | ACTIVE        | US8          | DCU                | 8    |                | TBD                        | Call TI                 | Call TI              | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| 74LVC1G139DCURG4 | ACTIVE        | US8          | DCU                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| 74LVC1G139DCUTE4 | ACTIVE        | US8          | DCU                | 8    |                | TBD                        | Call TI                 | Call TI              | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| 74LVC1G139DCUTG4 | ACTIVE        | US8          | DCU                | 8    | 250            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| SN74LVC1G139DCTR | ACTIVE        | SM8          | DCT                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39<br>Z                | <a href="#">Samples</a> |
| SN74LVC1G139DCTT | ACTIVE        | SM8          | DCT                | 8    | 250            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39<br>Z                | <a href="#">Samples</a> |
| SN74LVC1G139DCUR | ACTIVE        | US8          | DCU                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| SN74LVC1G139DCUT | ACTIVE        | US8          | DCU                | 8    | 250            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | C39R                    | <a href="#">Samples</a> |
| SN74LVC1G139YZPR | ACTIVE        | DSBGA        | YZP                | 8    | 3000           | Green (RoHS<br>& no Sb/Br) | SNAGCU                  | Level-1-260C-UNLIM   | -40 to 85    | (DF7 ~ DFN)             | <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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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

<sup>(5)</sup> 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.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC1G139DCUR | US8          | DCU             | 8    | 3000 | 180.0              | 8.4                | 2.25    | 3.35    | 1.05    | 4.0     | 8.0    | Q3            |
| SN74LVC1G139YZPR | 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) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC1G139DCUR | US8          | DCU             | 8    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G139YZPR | DSBGA        | YZP             | 8    | 3000 | 220.0       | 220.0      | 35.0        |

## DCT (R-PDSO-G8)

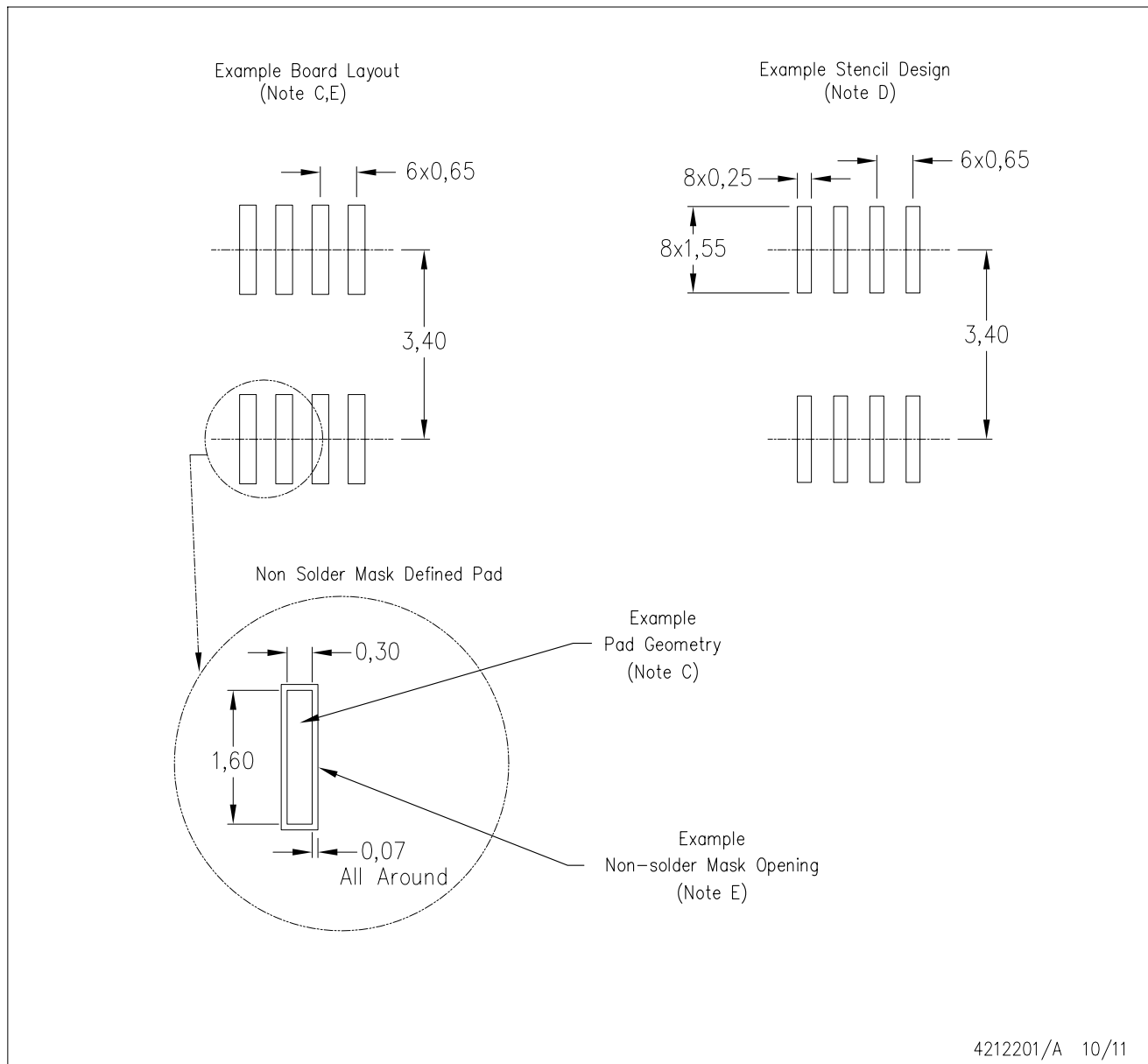
## PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion.
  - Falls within JEDEC MO-187 variation DA.

## DCT (R-PDSO-G8)

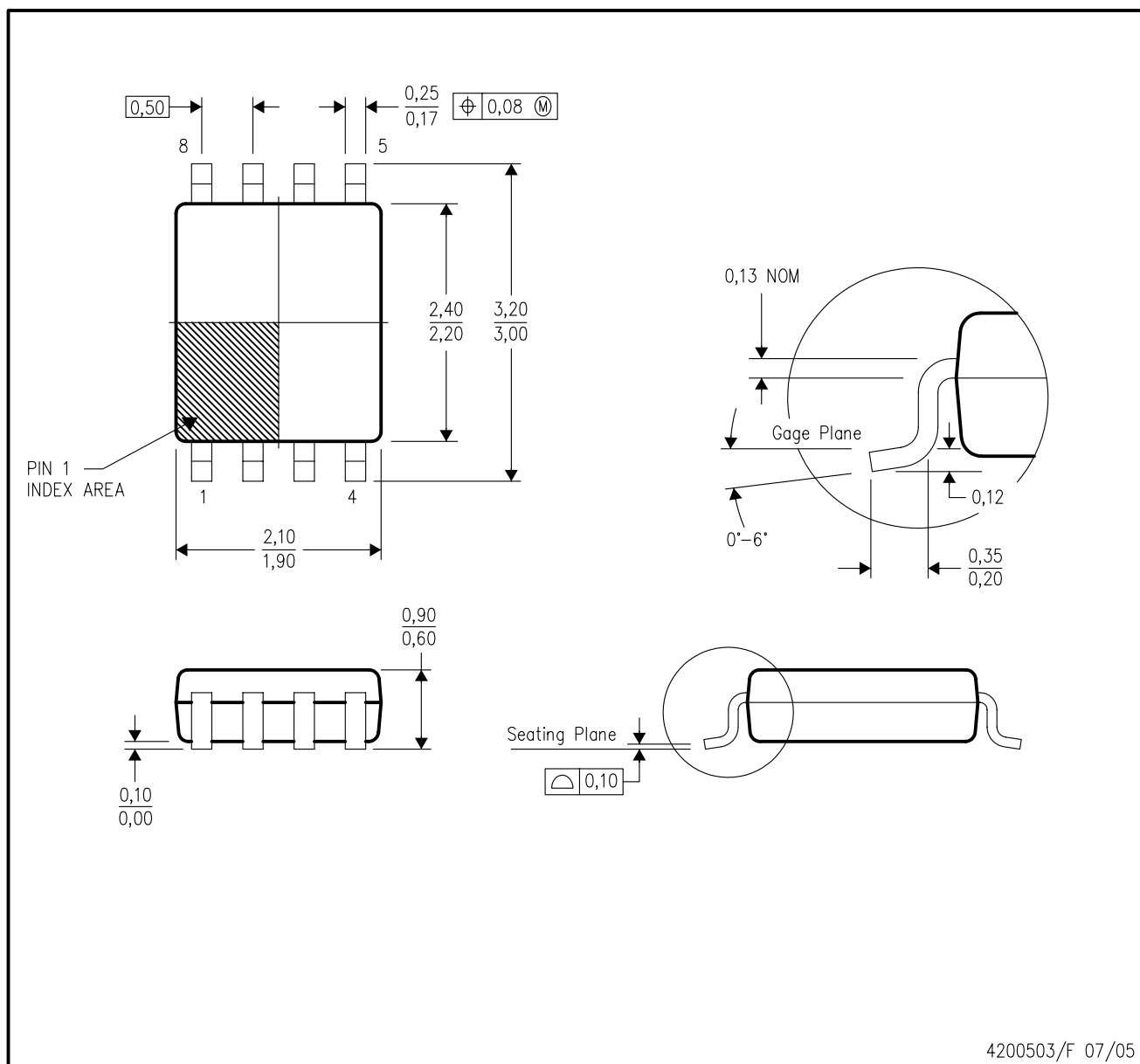
## PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - 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. Refer to IPC-7525.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

DCU (R-PDSO-G8)

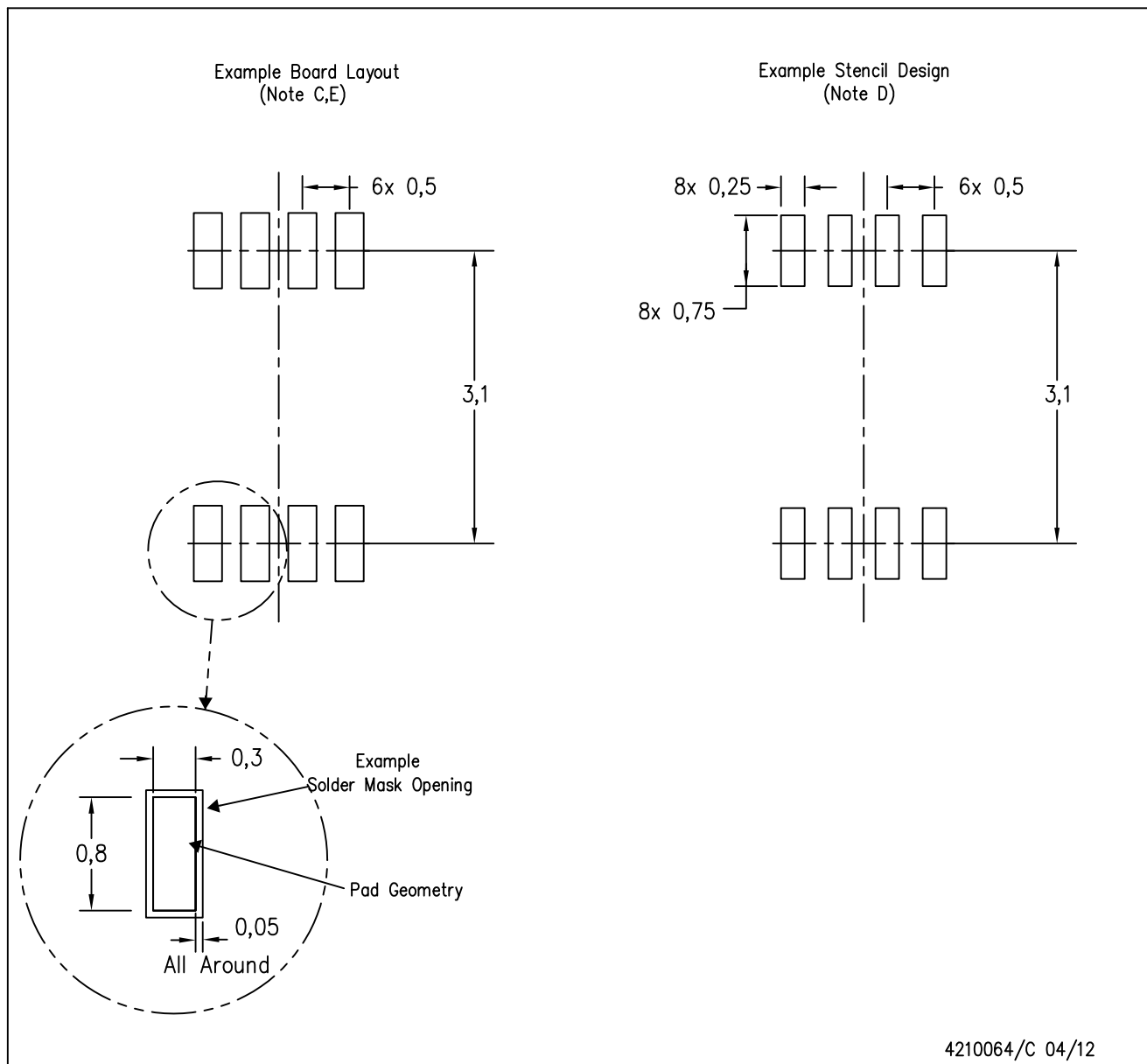
PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. 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)

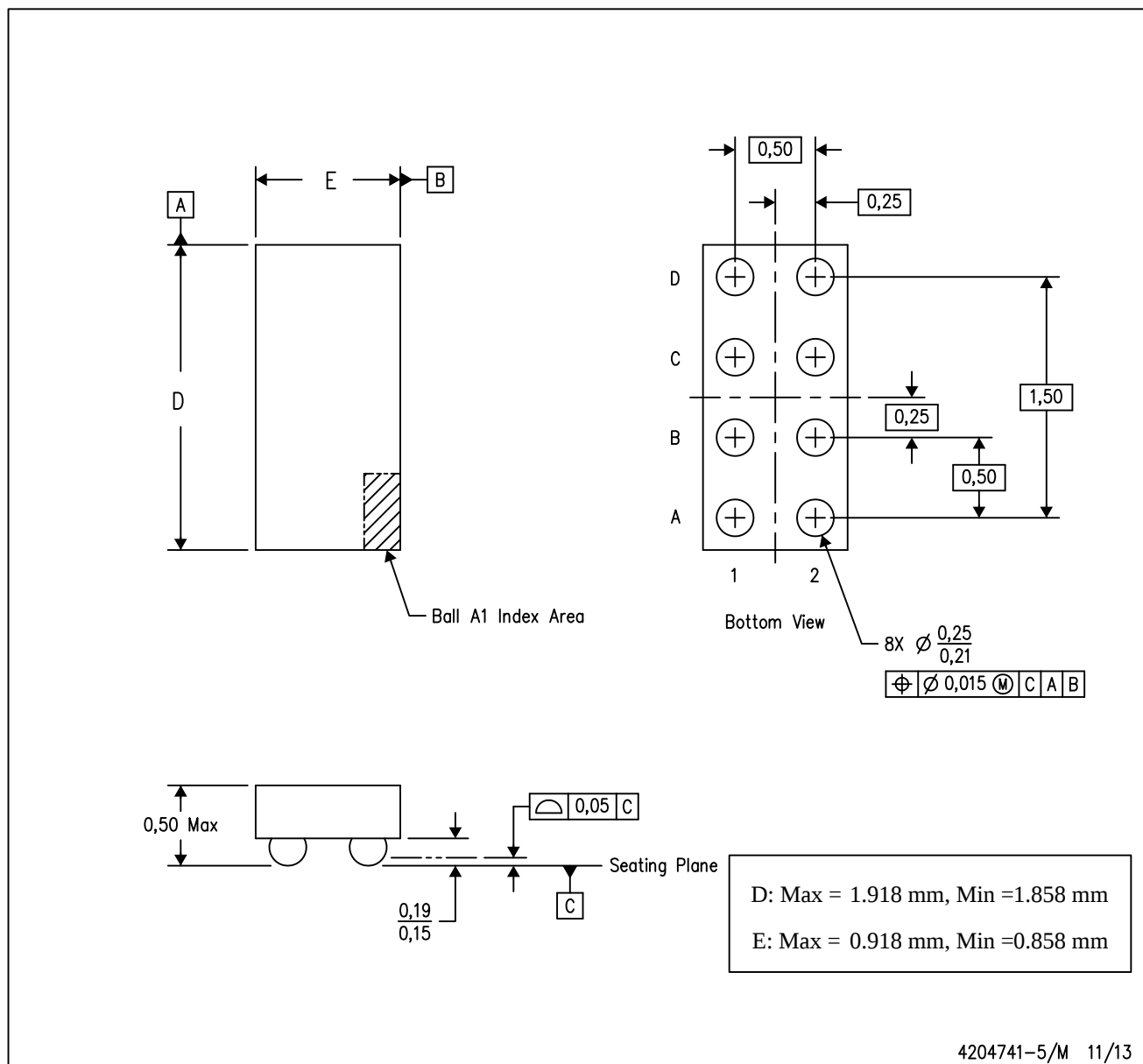
PLASTIC SMALL OUTLINE PACKAGE (DIE DOWN)



- 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.

YZP (R-XBGA-N8)

DIE-SIZE BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. NanoFree™ package configuration.

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