

SN74LVC07A Hex Buffer/Driver With Open-Drain Outputs

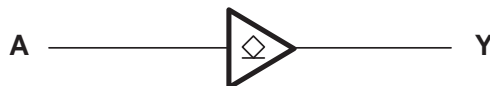
1 Features

- Operates From 1.65 V to 5 V
- Inputs and Open-Drain Outputs Accept Voltages Up to 5.5 V
- Max t_{pd} of 2.6 ns at 5 V
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- I_{off} Supports Live Insertion, Partial-Power-Down Mode, and Back-Drive Protection

2 Applications

- AV Receiver
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- MP3 Player or Recorder
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD, Digital, and High-Definition (HDTV)
- Tablet: Enterprise
- Video Analytics: Server
- Wireless Headset, Keyboard, and Mouse

4 Simplified Schematic



3 Description

This hex buffer/driver is designed for 1.65-V to 5.5-V V_{CC} operation.

Device Information⁽¹⁾

| PART NUMBER | PACKAGE | BODY SIZE (NOM) |
|-------------|------------|-------------------|
| SN74LVC07A | SOIC (14) | 8.65 mm × 3.91 mm |
| | SSOP (14) | 6.20 mm × 5.30 mm |
| | TVSOP (14) | 3.60 mm × 4.40 mm |
| | TSSOP (14) | 5.00 mm × 4.40 mm |
| | VQFN (14) | 3.50 mm × 3.50 mm |

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



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| 8.3 $V_{CC} = 2.7\text{ and }3.3\text{ V} \pm 0.3\text{ V}$ | 9 | | |

5 Revision History

Changes from Revision U (June 2014) to Revision V

Page

| | |
|--|-----------|
| • Changed <i>Handling Ratings</i> table to <i>ESD Ratings</i> table | 4 |
| • Added industry standard terms to package designators in the <i>Thermal Information</i> table | 5 |
| • Changed from "High" to "High-Z" in the <i>Function Table</i> | 11 |

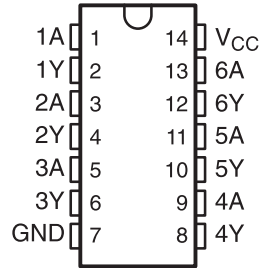
Changes from Revision T (February 2011) to Revision U

Page

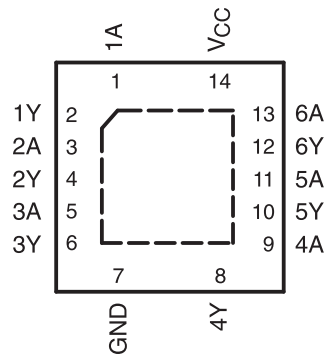
| | |
|---|----------|
| • Updated document to new TI data sheet format | 1 |
| • Removed <i>Ordering Information</i> table | 1 |
| • Added I_{off} <i>Features</i> bullet | 1 |
| • Added <i>Applications</i> | 1 |
| • Added <i>Device Information</i> table | 1 |
| • Added <i>Handling Ratings</i> table | 4 |
| • Changed MAX operating free-air temperature from 85°C to 125°C | 4 |
| • Updated <i>Thermal Information</i> table | 5 |
| • Added –40°C TO 125°C temperature range to <i>Electrical Characteristics</i> table | 5 |
| • Added <i>Switching Characteristics</i> table for –40°C TO 125°C temperature range | 6 |
| • Added <i>Typical Characteristics</i> | 6 |

6 Pin Configuration and Functions

**D, DB, DGV, NS, or PW Package
14-Pin SOIC, SSOP, TVSOP, SO, or TSSOP
Top View**



**RGY Package
14-Pin VQFN
Top View**



Pin Functions

| PIN | | I/O | DESCRIPTION |
|-----|------|-----|-------------|
| NO. | NAME | | |
| 1 | 1A | I | Input 1 |
| 2 | 1Y | O | Output 1 |
| 3 | A2 | I | Input 1 |
| 4 | Y2 | O | Output 2 |
| 5 | A3 | I | Input 3 |
| 6 | Y3 | O | Output 3 |
| 7 | GND | — | Ground pin |
| 8 | Y4 | O | Output 4 |
| 9 | A4 | I | Input 4 |
| 10 | Y5 | O | Output 5 |
| 11 | A5 | I | Input 5 |
| 12 | Y6 | O | Output 6 |
| 13 | A7 | I | Input 6 |
| 14 | VCC | — | Power pin |

7 Specifications

7.1 Absolute Maximum Ratings

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

| | | MIN | MAX | UNIT |
|---|------------------------------------|--------------------|-----|---------|
| V _{CC} | Supply voltage range | -0.5 | 6.5 | V |
| V _I | Input voltage range ⁽²⁾ | -0.5 | 6.5 | V |
| V _O | Output voltage range | -0.5 | 6.5 | 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 and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

7.2 ESD Ratings

| | | VALUE | UNIT |
|--------------------|-------------------------|--|-------|
| V _(ESD) | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾ | ±4000 |
| | | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾ | ±1500 |

- (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.

7.3 Recommended Operating Conditions

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

| | | MIN | MAX | UNIT |
|-----------------|--------------------------------|------------------------------------|------------------------|------|
| V _{CC} | Supply voltage | 1.65 | 5.5 | V |
| 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} = 2.7 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} = 2.7 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 | 5.5 | V |
| I _{OL} | Low-level output current | V _{CC} = 1.65 V | 4 | mA |
| | | V _{CC} = 2.3 V | 12 | |
| | | V _{CC} = 2.7 V | 12 | |
| | | V _{CC} = 3 V | 24 | |
| | | V _{CC} = 4.5 V | 24 | |
| T _A | Operating free-air temperature | -40 | 125 | °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](#).

7.4 Thermal Information

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

| THERMAL METRIC ⁽¹⁾ | | SN74LVC07A | | | | | | UNIT |
|-------------------------------|--|-------------|--------------|----------------|------------|---------------|---------------|------|
| | | D (SOIC) | DB (SSOP) | DGV (TVSOP) | NS (SO) | PW (TSSOP) | RGY (VQFN) | |
| | | 14 PINS | | | | | | |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 177.4 | 135.1 | 157.7 | 120.3 | 160.3 | 80.6 | °C/W |
| $R_{\theta JC(top)}$ | Junction-to-case (top) thermal resistance | 75.4 | 86.7 | 78.3 | 76.3 | 84.4 | 97.0 | °C/W |
| $R_{\theta JB}$ | Junction-to-board thermal resistance | 70.6 | 82.4 | 90.8 | 79.0 | 102.1 | 56.7 | °C/W |
| Ψ_{JT} | Junction-to-top characterization parameter | 34.7 | 43.7 | 21.0 | 36.2 | 24.3 | 16.7 | °C/W |
| Ψ_{JB} | Junction-to-board characterization parameter | 70.4 | 81.9 | 90.1 | 78.7 | 101.4 | 56.8 | °C/W |
| $R_{\theta JC(bot)}$ | Junction-to-case (bottom) thermal resistance | n/a | n/a | n/a | n/a | n/a | 35.8 | °C/W |

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

7.5 Electrical Characteristics—DC Limit Changes

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

| PARAMETER | TEST CONDITIONS | V_{CC} | –40°C TO 85°C | | –40°C TO 125°C | | UNIT |
|-----------------|--|-----------------|---------------|------------------------|----------------|------------------------|------|
| | | | MIN | TYP ⁽¹⁾ MAX | MIN | TYP ⁽¹⁾ MAX | |
| V_{OL} | $I_{OL} = 100 \mu A$ | 1.65 V to 5.5 V | | 0.2 | | 0.2 | V |
| | $I_{OL} = 4 \text{ mA}$ | 1.65 V | | 0.45 | | 0.45 | |
| | $I_{OL} = 12 \text{ mA}$ | 2.3 V | | 0.7 | | 0.7 | |
| | | 2.7 V | | 0.4 | | 0.4 | |
| | $I_{OL} = 24 \text{ mA}$ | 3 V | | 0.55 | | 0.55 | |
| I_I | $V_I = 5.5 \text{ V or GND}$ | 3.6 V | | ±5 | | ±5 | μA |
| I_{off} | $V_I \text{ or } V_O = 5.5 \text{ V}$ | 0 V | | ±10 | | ±10 | μA |
| I_{CC} | $V_I = V_{CC} \text{ or GND, } I_O = 0$ | 3.6 V | | 10 | | 10 | μA |
| ΔI_{CC} | One input at $V_{CC} - 0.6 \text{ V}$, Other inputs at $V_{CC} \text{ or GND}$ | 2.7 V to 3.6 V | | 500 | | 500 | μA |
| C_i | $V_I = V_{CC} \text{ or GND}$ | 3.3 V | | 5.0 | | 5.0 | pF |

(1) All typical values are at $V_{CC} = 3.3 \text{ V}$, $T_A = 25^\circ\text{C}$.

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7.6 Switching Characteristics –40°C to 85°C

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 3](#) through [Figure 6](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | –40°C TO 85°C | | | | | | | | UNIT | | |
|-----------------|--------------|-------------|----------------------------------|-----|---------------------------------|-----|-------------------------|-----|---------------------------------|-----|------|-------------------------------|-----|
| | | | V _{CC} = 1.8 V ± 0.15 V | | V _{CC} = 2.5 V ± 0.2 V | | V _{CC} = 2.7 V | | V _{CC} = 3.3 V ± 0.3 V | | | V _{CC} = 5 V ± 0.5 V | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | | MIN | MAX |
| t _{pd} | A | Y | 1 | 5.6 | 1 | 3.4 | 1 | 3.3 | 1 | 3.6 | 1 | 2.6 | ns |

7.7 Switching Characteristics –40°C to 125°C

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 3](#) through [Figure 6](#))

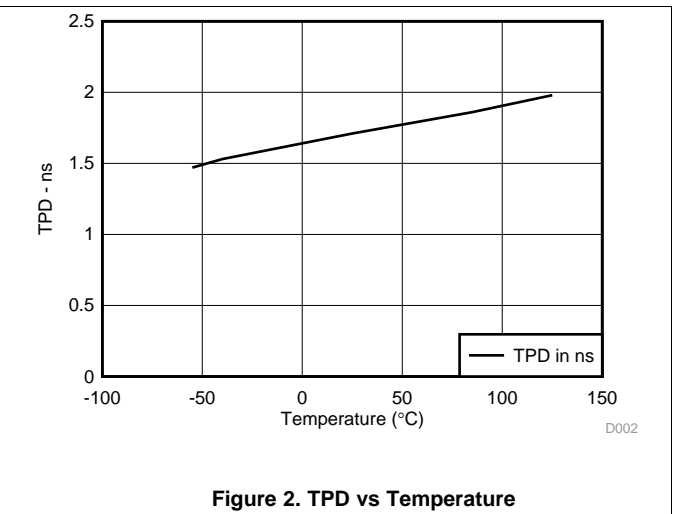
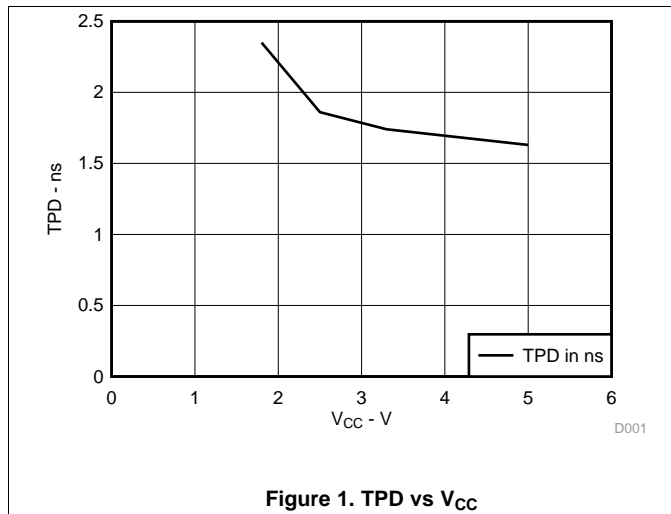
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | –40°C TO 125°C | | | | | | | | UNIT | | |
|-----------------|--------------|-------------|----------------------------------|-----|---------------------------------|-----|-------------------------|-----|---------------------------------|-----|------|-------------------------------|-----|
| | | | V _{CC} = 1.8 V ± 0.15 V | | V _{CC} = 2.5 V ± 0.2 V | | V _{CC} = 2.7 V | | V _{CC} = 3.3 V ± 0.3 V | | | V _{CC} = 5 V ± 0.5 V | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | | MIN | MAX |
| t _{pd} | A | Y | 1 | 6.1 | 1 | 3.9 | 1 | 3.8 | 1 | 4.1 | 1 | 3.1 | ns |

7.8 Operating Characteristics

T_A = 25°C

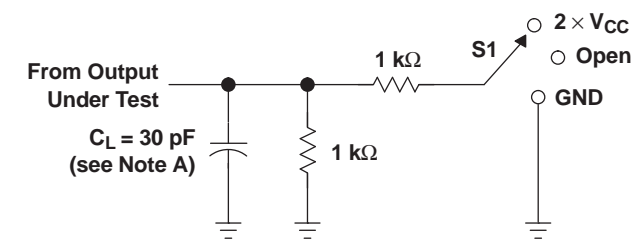
| PARAMETER | TEST CONDITIONS | V _{CC} = 1.8 V | V _{CC} = 2.5 V | V _{CC} = 3.3 V | V _{CC} = 5 V | UNIT |
|---|-----------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
| | | TYP | TYP | TYP | TYP | |
| C _{pd} Power dissipation capacitance per buffer/driver | f = 10 MHz | 1.8 | 2 | 2.5 | 3.78 | pF |

7.9 Typical Characteristics

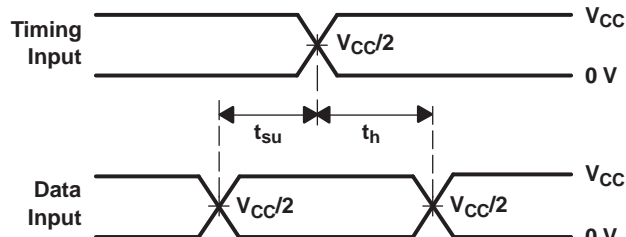


8 Parameter Measurement Information

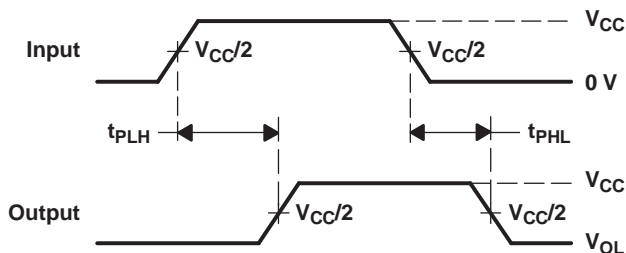
8.1 $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$



LOAD CIRCUIT

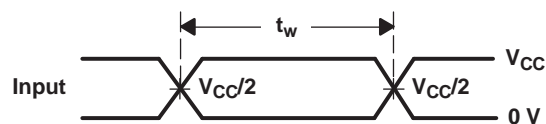


VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES

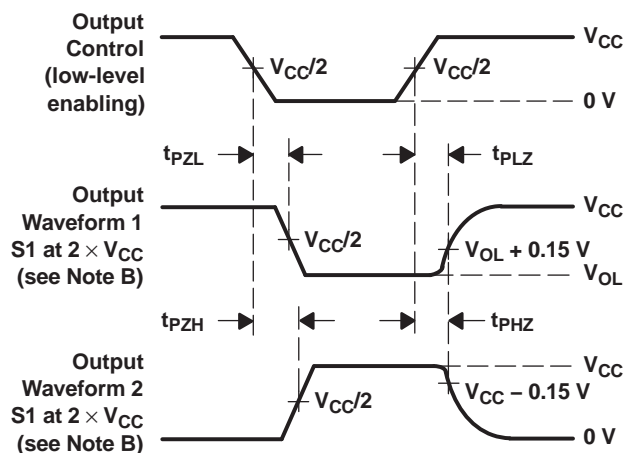


VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

| TEST | S1 |
|------------------------|-------------------|
| t_{PZL} (see Note F) | 2 $\times V_{CC}$ |
| t_{PLZ} (see Note G) | 2 $\times V_{CC}$ |
| t_{PHZ}/t_{PZH} | 2 $\times V_{CC}$ |



VOLTAGE WAVEFORMS
PULSE DURATION



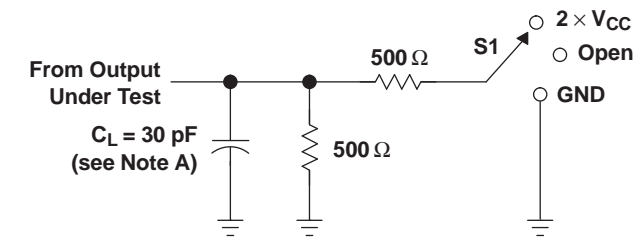
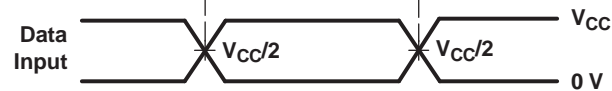
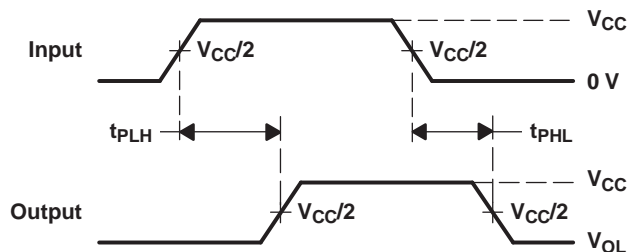
VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

- 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 $\leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2\text{ ns}$, $t_f \leq 2\text{ ns}$.
 - D. The outputs are measured one at a time, with one transition per measurement.
 - E. Since this device has open-drain outputs, t_{PLZ} and t_{PZL} are the same as t_{pd} .
 - F. t_{PZL} is measured at $V_{CC}/2$.
 - G. t_{PLZ} is measured at $V_{OL} + 0.15\text{ V}$.
 - H. All parameters and waveforms are not applicable to all devices.

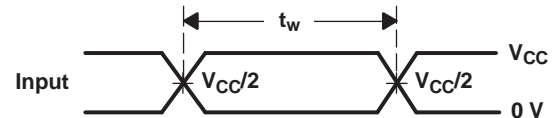
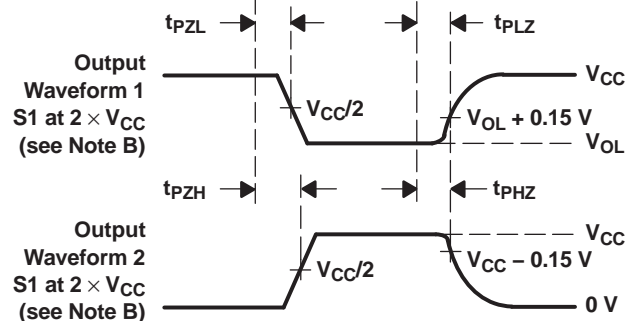
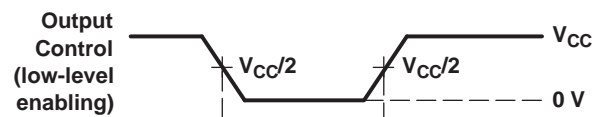
Figure 3. Load Circuit and Voltage Waveforms

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8.2 $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$

LOAD CIRCUIT

**VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES**

**VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES**

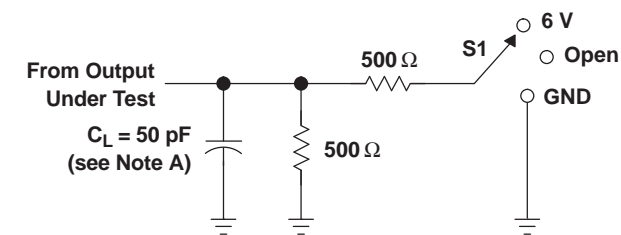
| TEST | S1 |
|------------------------|-------------------|
| t_{PZL} (see Note F) | $2 \times V_{CC}$ |
| t_{PLZ} (see Note G) | $2 \times V_{CC}$ |
| t_{PHZ}/t_{PZH} | $2 \times V_{CC}$ |


**VOLTAGE WAVEFORMS
PULSE DURATION**

**VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES**

- 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: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2\text{ ns}$, $t_f \leq 2\text{ ns}$.
 - The outputs are measured one at a time, with one transition per measurement.
 - Since this device has open-drain outputs, t_{PLZ} and t_{PZL} are the same as t_{pd} .
 - t_{PZL} is measured at $V_{CC}/2$.
 - t_{PLZ} is measured at $V_{OL} + 0.15\text{ V}$.
 - All parameters and waveforms are not applicable to all devices.

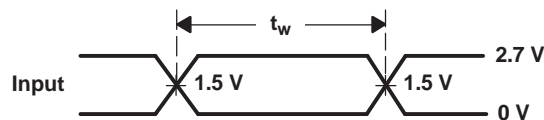
Figure 4. Load Circuit and Voltage Waveforms

8.3 $V_{CC} = 2.7$ and $3.3\text{ V} \pm 0.3\text{ V}$

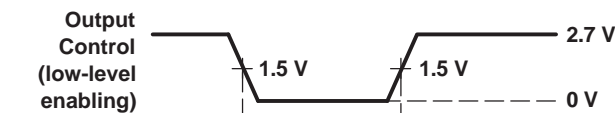


LOAD CIRCUIT

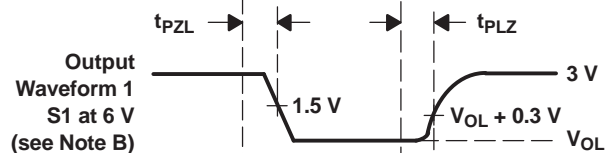
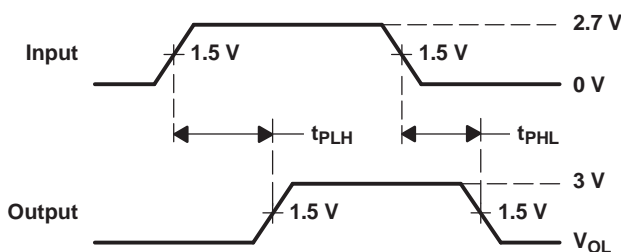
| TEST | S1 |
|------------------------|-----|
| t_{pZL} (see Note F) | 6 V |
| t_{pLZ} (see Note G) | 6 V |
| t_{PHZ}/t_{PZH} | 6 V |



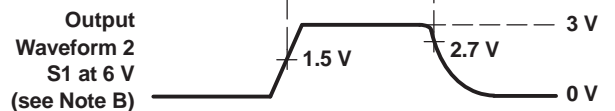
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

- 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 $\leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$.
 D. The outputs are measured one at a time, with one transition per measurement.
 E. Since this device has open-drain outputs, t_{pLZ} and t_{pZL} are the same as t_{pd} .
 F. t_{pZL} is measured at 1.5 V.
 G. t_{pLZ} is measured at $V_{OL} + 0.3\text{ V}$.
 H. All parameters and waveforms are not applicable to all devices.

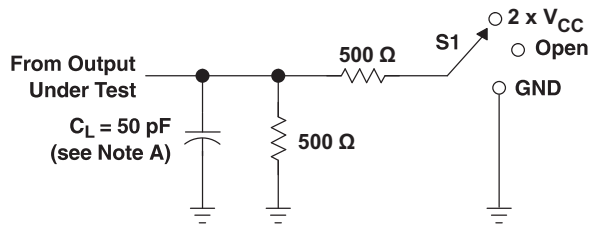
Figure 5. Load Circuit and Voltage Waveforms

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8.4 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

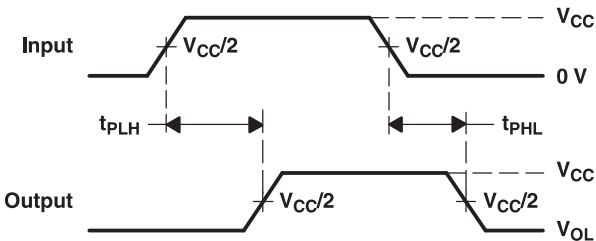


LOAD CIRCUIT

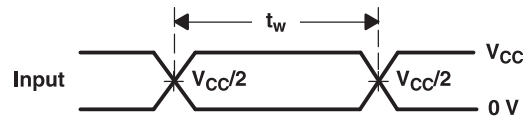
| TEST | S1 |
|------------------------|-------------------|
| t_{pZL} (see Note F) | $2 \times V_{CC}$ |
| t_{pLZ} (see Note G) | $2 \times V_{CC}$ |
| t_{PHZ}/t_{PZH} | $2 \times V_{CC}$ |



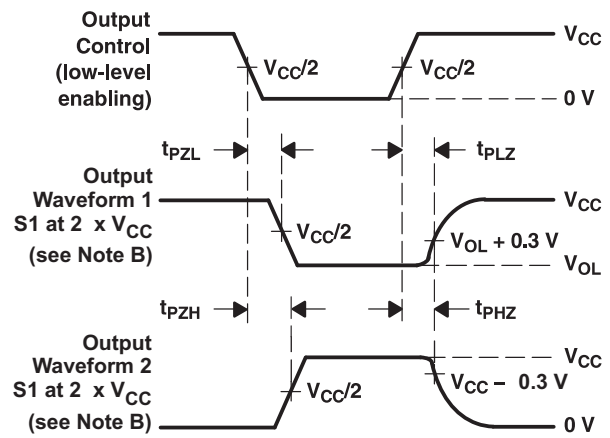
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal connections such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal connections 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: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$.
 - D. The outputs are measured one at a time, with one transition per measurement.
 - E. Since this device has open-drain outputs, t_{pLZ} and t_{pZL} are the same as t_{pd} .
 - F. t_{pZL} is measured at $V_{CC}/2$.
 - G. t_{pLZ} is measured at $V_{OL} + 0.3\text{ V}$.
 - H. All parameters and waveforms are not applicable to all devices.

Figure 6. Load Circuit and Voltage Waveforms

9 Detailed Description

9.1 Overview

The outputs of the SN74LVC07A device are open drain and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 24 mA.

Inputs can be driven from 1.8-V, 2.5-V, 3.3-V (LVTTTL), or 5-V (CMOS) devices. This feature allows the use of this device as translators in a mixed-system environment.

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.

9.2 Functional Block Diagram



9.3 Feature Description

- Wide operating voltage range
 - Operates from 1.65 V to 5.5 V
- Allows up or down voltage translation
 - Inputs and outputs accept voltages to 5.5 V
- I_{off} feature
 - Allows voltages on the inputs and outputs when V_{CC} is 0 V

9.4 Device Functional Modes

Table 1. Function Table

| INPUT A | OUTPUT Y |
|------------|-------------|
| H | Hi-Z |
| L | L |

10 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.

10.1 Application Information

The SN74LVC07A device is a high-drive, open-drain CMOS device that can be used for a multitude of buffer-type functions. It can produce 24 mA of drive current at 3.3 V. Therefore, this device is ideal for driving multiple inputs and for high-speed applications up to 100 Mhz. The inputs and outputs are 5.5-V tolerant allowing the device to translate up to 5.5 V or down to V_{CC} .

10.2 Typical Application

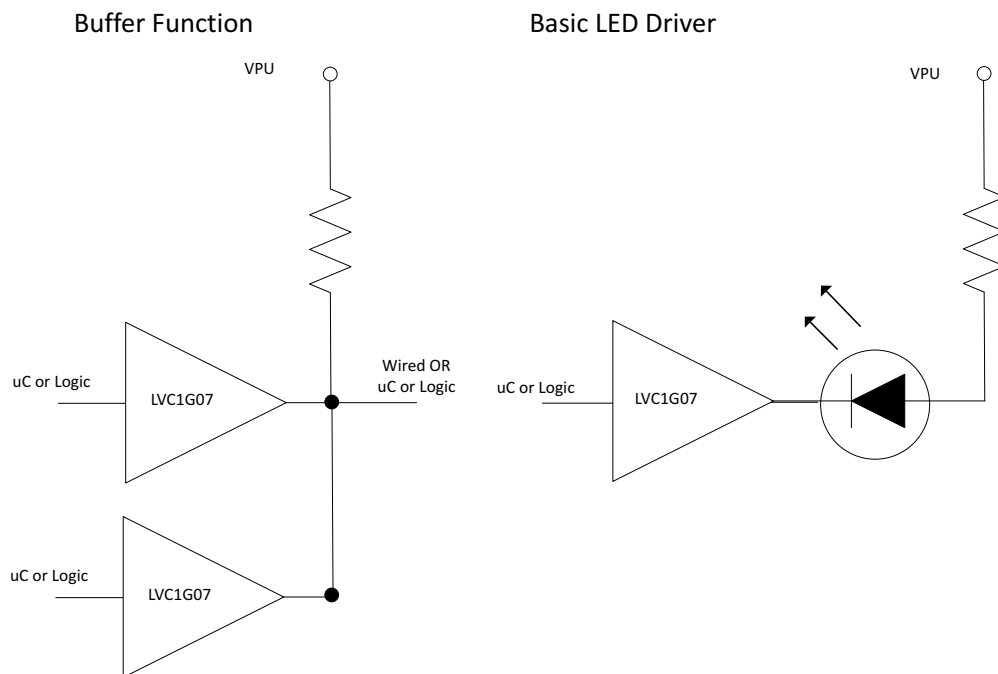


Figure 7. Typical Application Diagram

10.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care must be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads; therefore, routing and load conditions must be considered to prevent ringing.

10.2.2 Detailed Design Procedure

1. Recommended Input Conditions
 - Rise time and fall time specs: See $(\Delta t/\Delta V)$ in the [Recommended Operating Conditions](#) table.
 - Specified high and low levels: See $(V_{IH}$ and $V_{IL})$ in the [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 25 mA per output and 50 mA total for the part.
 - Outputs must not be pulled above 5.5 V.

Typical Application (continued)

10.2.3 Application Curves

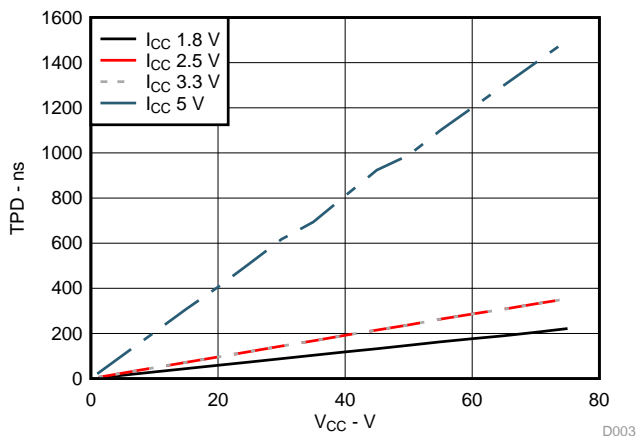


Figure 8. I_{CC} vs Frequency

11 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the *Recommended Operating Conditions* table.

Each V_{CC} pin must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μf is recommended; if there are multiple V_{CC} pins, then 0.01 μf or 0.022 μf is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μf and a 1 μf are commonly used in parallel. The bypass capacitor must be installed as close to the power pin as possible for best results.

12 Layout

12.1 Layout Guidelines

When using multiple bit logic devices inputs must never float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or 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. Figure 9 specifies the 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. It is generally acceptable to float outputs, unless the part is a transceiver.

12.2 Layout Example

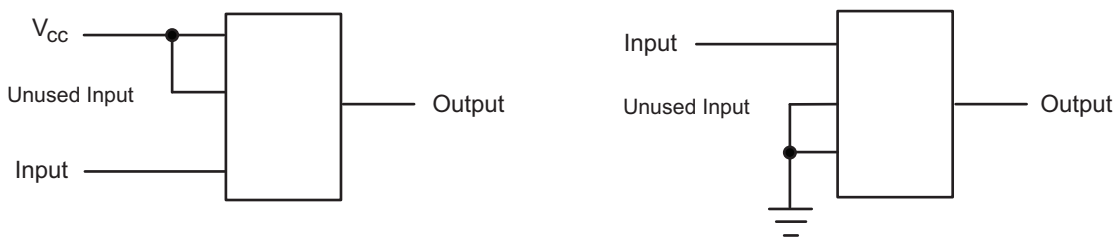


Figure 9. Layout Diagram

13 Device and Documentation Support

13.1 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.

13.2 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

13.3 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.

13.4 Glossary

[SLYZ022](#) — *TI Glossary*.

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

14 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/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LVC07AD | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADBR | ACTIVE | SSOP | DB | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07ADBRG4 | ACTIVE | SSOP | DB | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07ADE4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADGVR | ACTIVE | TVSOP | DGV | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07ADR | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU CU SN | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADRE4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADRG3 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADRG4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADT | ACTIVE | SOIC | D | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ADTG4 | ACTIVE | SOIC | D | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07ANSR | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC07A | Samples |
| SN74LVC07APW | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWE4 | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWG4 | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWLE | OBSOLETE | TSSOP | PW | 14 | | TBD | Call TI | Call TI | -40 to 85 | | |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LVC07APWR | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU CU SN | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWRE4 | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWRG3 | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWRG4 | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWT | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWTE4 | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07APWTG4 | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC07A | Samples |
| SN74LVC07ARGYR | ACTIVE | VQFN | RGY | 14 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 125 | LC07A | Samples |
| SN74LVC07ARGYRG4 | ACTIVE | VQFN | RGY | 14 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 125 | LC07A | 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.

OBSELETE: 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.

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)

(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/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.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

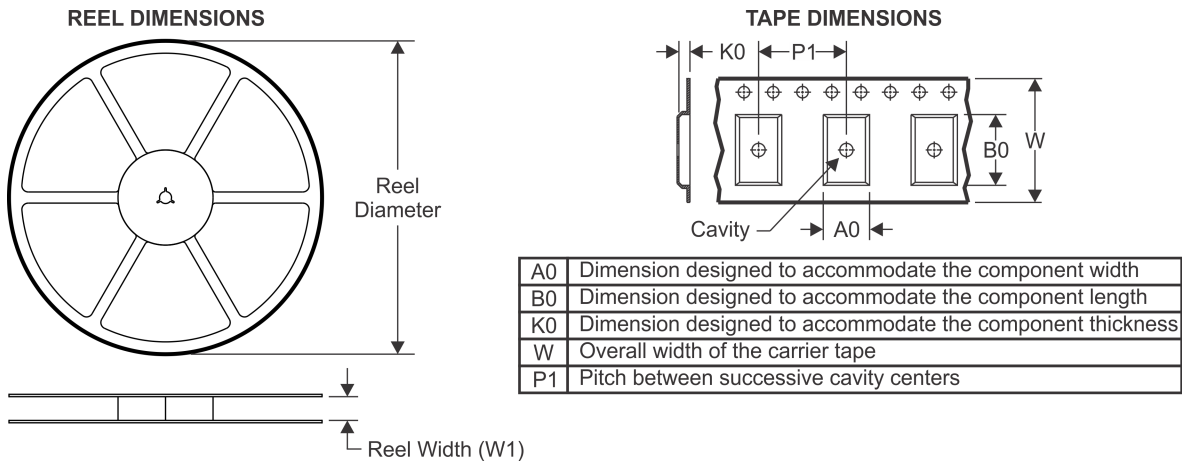
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN74LVC07A :

- Automotive: [SN74LVC07A-Q1](#)
- Enhanced Product: [SN74LVC07A-EP](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC07ADBR | SSOP | DB | 14 | 2000 | 330.0 | 16.4 | 8.2 | 6.6 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74LVC07ADGVR | TVSOP | DGV | 14 | 2000 | 330.0 | 12.4 | 6.8 | 4.0 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 330.0 | 16.8 | 6.5 | 9.5 | 2.3 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADRG3 | SOIC | D | 14 | 2500 | 330.0 | 16.8 | 6.5 | 9.5 | 2.3 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADRG4 | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADRG4 | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LVC07ADT | SOIC | D | 14 | 250 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LVC07ANSR | SO | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74LVC07APWR | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07APWR | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07APWRG3 | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07APWRG4 | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07APWT | TSSOP | PW | 14 | 250 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74LVC07ARGYR | VQFN | RGY | 14 | 3000 | 330.0 | 12.4 | 3.75 | 3.75 | 1.15 | 8.0 | 12.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC07ADBR | SSOP | DB | 14 | 2000 | 367.0 | 367.0 | 38.0 |
| SN74LVC07ADGVR | TVSOP | DGV | 14 | 2000 | 367.0 | 367.0 | 35.0 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 364.0 | 364.0 | 27.0 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 367.0 | 367.0 | 38.0 |
| SN74LVC07ADR | SOIC | D | 14 | 2500 | 333.2 | 345.9 | 28.6 |
| SN74LVC07ADRG3 | SOIC | D | 14 | 2500 | 364.0 | 364.0 | 27.0 |
| SN74LVC07ADRG4 | SOIC | D | 14 | 2500 | 367.0 | 367.0 | 38.0 |
| SN74LVC07ADRG4 | SOIC | D | 14 | 2500 | 333.2 | 345.9 | 28.6 |
| SN74LVC07ADT | SOIC | D | 14 | 250 | 367.0 | 367.0 | 38.0 |
| SN74LVC07ANSR | SO | NS | 14 | 2000 | 367.0 | 367.0 | 38.0 |
| SN74LVC07APWR | TSSOP | PW | 14 | 2000 | 367.0 | 367.0 | 35.0 |
| SN74LVC07APWR | TSSOP | PW | 14 | 2000 | 364.0 | 364.0 | 27.0 |
| SN74LVC07APWRG3 | TSSOP | PW | 14 | 2000 | 364.0 | 364.0 | 27.0 |
| SN74LVC07APWRG4 | TSSOP | PW | 14 | 2000 | 367.0 | 367.0 | 35.0 |
| SN74LVC07APWT | TSSOP | PW | 14 | 250 | 367.0 | 367.0 | 35.0 |
| SN74LVC07ARGYR | VQFN | RGY | 14 | 3000 | 367.0 | 367.0 | 35.0 |

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

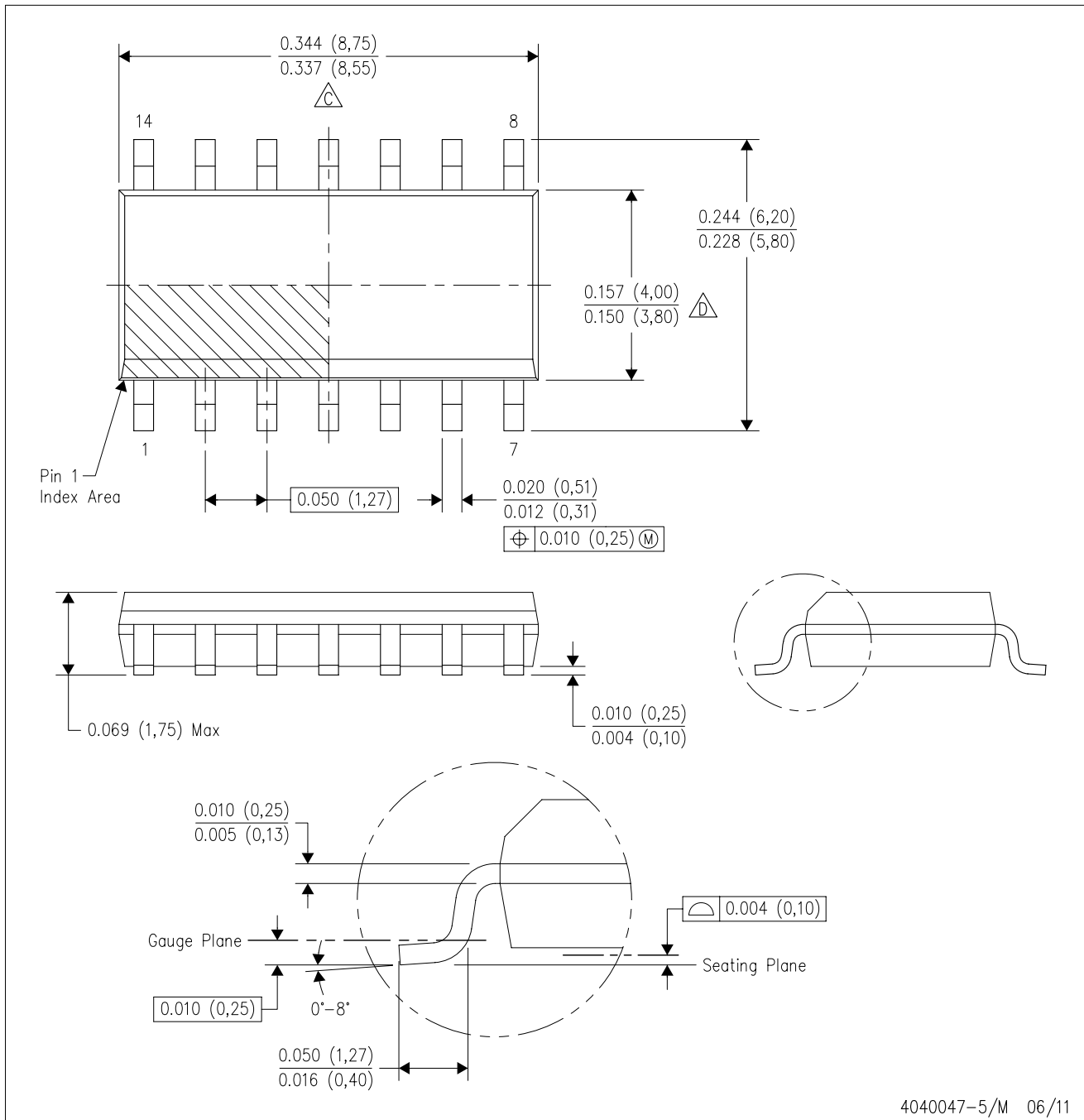
24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 - Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

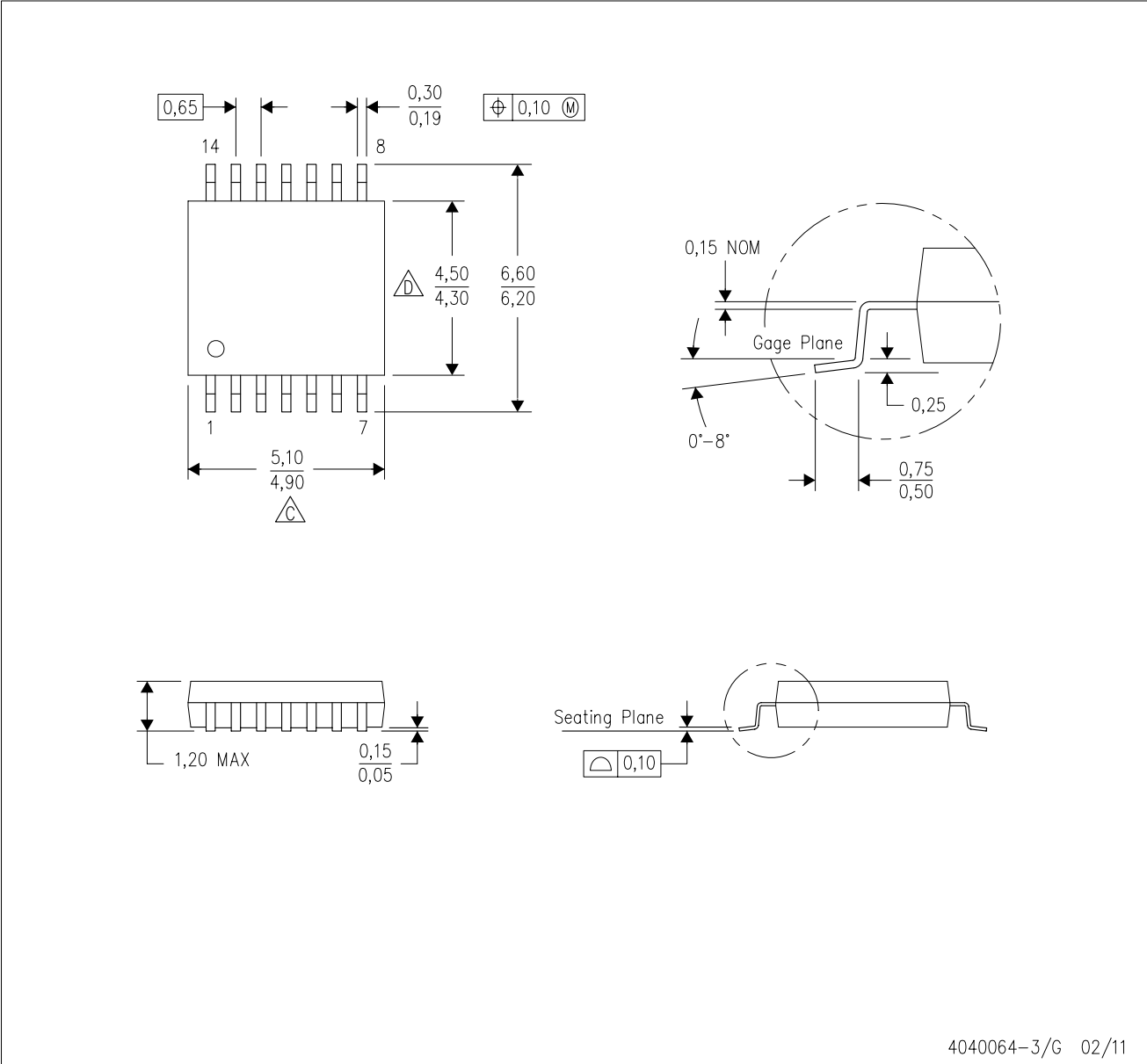
PLASTIC SMALL OUTLINE



- 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 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040064-3/G 02/11

- 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. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

PW (R-PDSO-G14)

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 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - QFN (Quad Flatpack No-Lead) package configuration.
 - The package thermal pad must be soldered to the board for thermal and mechanical performance.
 - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - △ Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
 - Package complies to JEDEC MO-241 variation BA.

RGY (S-PVQFN-N14)

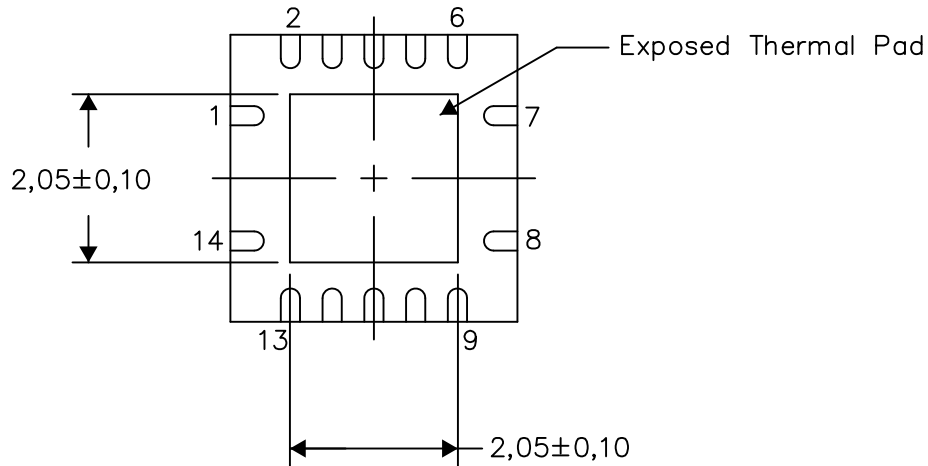
PLASTIC QUAD FLATPACK NO-LEAD

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

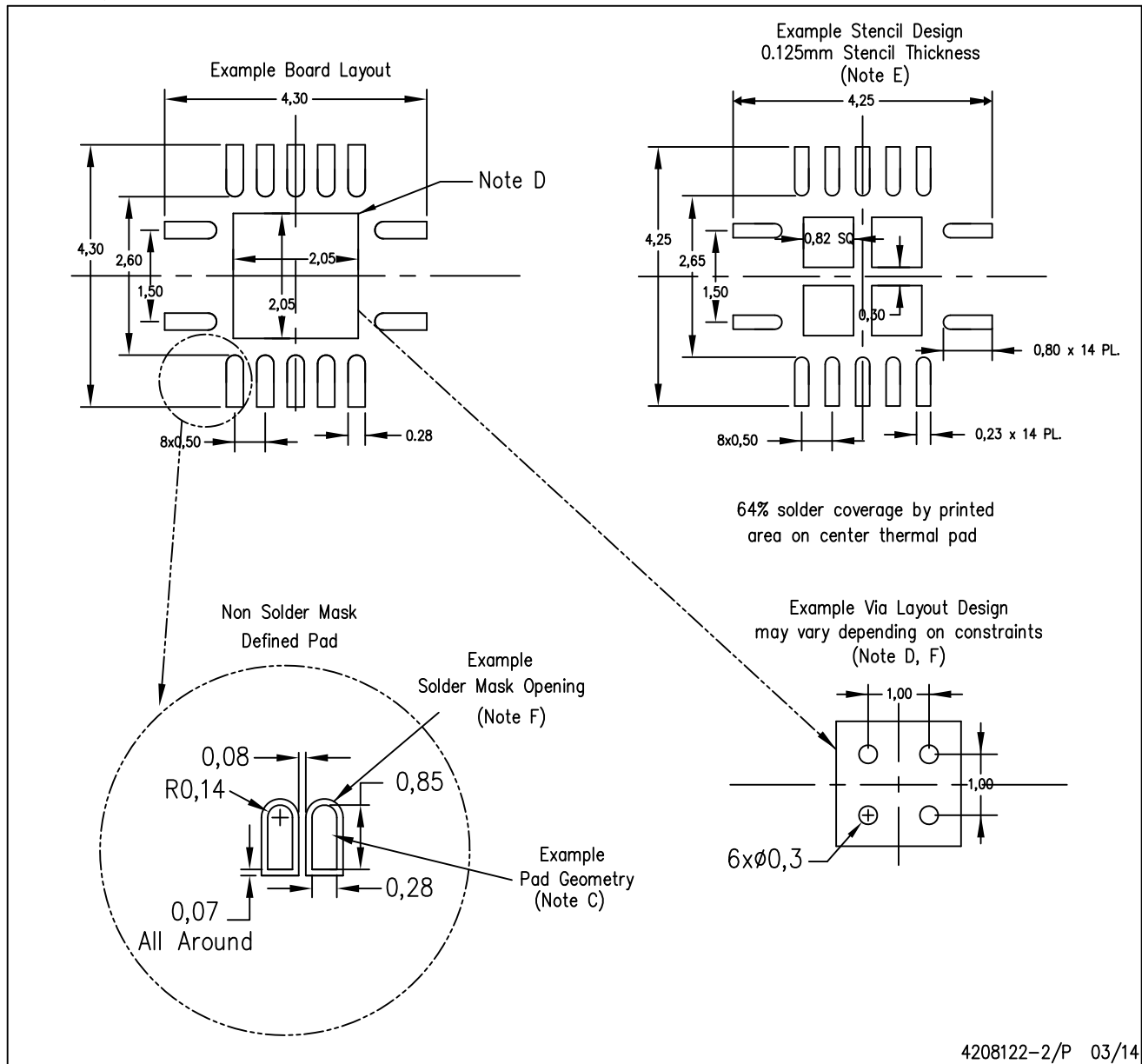
Exposed Thermal Pad Dimensions

4206353-2/P 03/14

NOTE: All linear dimensions are in millimeters

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



4208122-2/P 03/14

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <<http://www.ti.com>>.
 - 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 stencil design considerations.
 - Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

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