# SNx4AHCT86 四路双输入异或门

## 1 特性

- 输入兼容 TTL 电压
- 闩锁性能超过 250mA，符合 JESD 17 规范
- 对于符合 MIL-PRF-38535 标准的产品，所有参数均经过测试，除非另外注明。对于所有其他产品，生产流程不一定包含对所有参数的测试。
- ESD 保护性能超过 JESD 22 规范要求
  - 2000V 人体放电模型 (A114-A)
  - 200V 机器放电模型 (A115-A)

## 2 应用

- 服务器
- PC 和笔记本电脑
- 网络交换机
- 可穿戴保健和健身设备
- 电信基础设施
- 电子销售终端

## 3 说明

SNx4AHCT86 器件是四路双输入异或门。这些器件以正逻辑执行布尔函数 $Y = A \times B$ 或 $Y = \overline{A}B + A\overline{B}$。

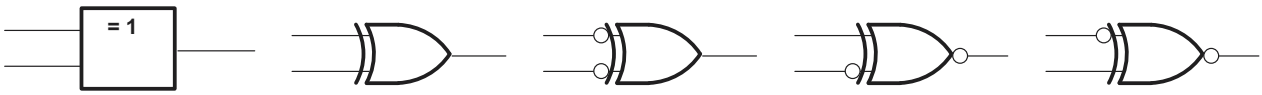
**封装信息**(1)

| 器件型号 | 封装 | 封装尺寸（标称值） |
|---|---|---|
| SN54AHCT86 | J（CDIP，14） | 19.56mm x 6.67mm |
| | W（CFP，14） | 13.09mm x 6.92mm |
| | FK（LCCC，20） | 8.89mm x 8.89mm |
| SN74AHCT86 | N（PDIP，14） | 19.3mm x 6.35mm |
| | D（SOIC，14） | 8.65mm x 3.91mm |
| | NS（SOP，14） | 10.30mm x 5.30mm |
| | DB（SSOP，14） | 6.20mm x 5.30mm |
| | PW（TSSOP，14） | 5.00mm x 4.40mm |
| | DGV（TVSOP，14） | 3.60mm x 4.40mm |
| | RGY（VQFN，14） | 3.50mm x 3.50mm |
| | BQA（WQFN，14） | 3.00mm x 2.50mm |

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。

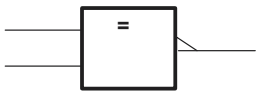
An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.

**EXCLUSIVE OR**



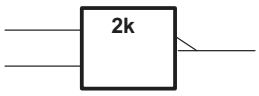

These are five equivalent exclusive-OR symbols valid for an SN74AHCT86 gate in positive logic; negation may be shown at any two ports.

**LOGIC-IDENTITY ELEMENT**



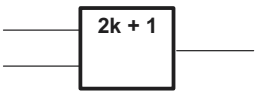

The output is active (low) if all inputs stand at the same logic level (that is, A = B).

**EVEN-PARITY ELEMENT**




The output is active (low) if an even number of inputs (that is, 0 or 2) are active.

**ODD-PARITY ELEMENT**




The output is active (high) if an odd number of inputs (that is, only 1 of the 2) are active.

**简化原理图**

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## 4 Revision History

注：以前版本的页码可能与当前版本的页码不同

| Changes from Revision O (May 2023) to Revision P (October 2023) | Page |
|---|---|
| • Updated RθJA values: D = 97.5 to 124.5, PW = 125.1 to 147.7; Updated D and PW packages for RθJC(top), RθJB, ΨJT, ΨJB, and RθJC(bot), all values in °C/W | 6 |

| Changes from Revision N (August 2014) to Revision O (May 2023) | Page |
|---|---|
| • 更新了整个文档中的表格、图和交叉参考的编号格式 | 1 |
| • 更新了*封装信息* 表 | 1 |
| • 向数据表添加了 *BQA* 封装 | 1 |

## 5 Pin Configuration and Functions

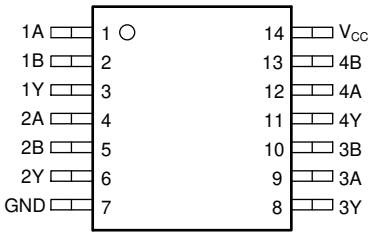



**图 5-1. SN54AHCT86 J or W Package, 14-Pin (Top View)**
**SN74AHCT86 D, DB, DGV, N, NS, or PW Package, 14-Pin (Top View)**

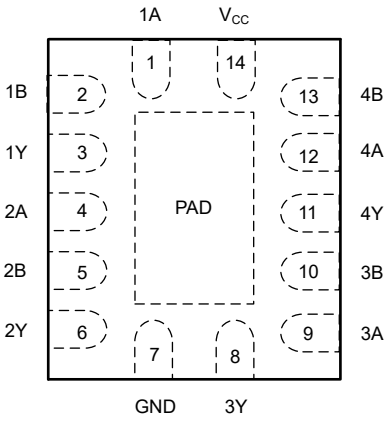



**图 5-2. SN74AHCT86 RGY or BQA Package, 14-Pin (Top View)**

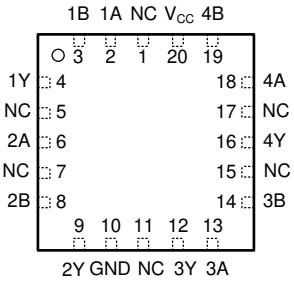



**图 5-3. SN54AHCT86 FK Package, 20-Pin (Top View)**

**表 5-1. Pin Functions**

| PIN | | | | | TYPE[1] | DESCRIPTION |
|---|---|---|---|---|---|---|
| NAME | SN74AHCT86 | | SN54AHCT86 | | | |
| | D, DB, DGV, N, NS, PW | RGY, BQA | J, W | FK | | |
| 1A | 1 | 1 | 1 | 2 | I | 1A Input |
| 1B | 2 | 2 | 2 | 3 | I | 1B Input |
| 1Y | 3 | 3 | 3 | 4 | O | 1Y Output |
| 2A | 4 | 4 | 4 | 6 | I | 2A Input |
| 2B | 5 | 5 | 5 | 8 | I | 2B Input |
| 2Y | 6 | 6 | 6 | 9 | O | 2Y Output |
| 3Y | 8 | 8 | 8 | 12 | O | 3Y Output |
| 3A | 9 | 9 | 9 | 13 | I | 3A Input |
| 3B | 10 | 10 | 10 | 14 | I | 3B Input |
| 4Y | 11 | 11 | 11 | 16 | O | 4Y Output |
| 4A | 12 | 12 | 12 | 18 | I | 4A Input |
| 4B | 13 | 13 | 13 | 19 | I | 4B Input |
| GND | 7 | 7 | 7 | 10 | — | Ground Pin |
| NC | — | — | — | 1, 5, 7, 11, 15, 17 | — | No Connection |
| $V_{CC}$ | 14 | 14 | 14 | 20 | — | Power Pin |

**表 5-1. Pin Functions（续）**

| PIN | | | | | TYPE(1) | DESCRIPTION |
|---|---|---|---|---|---|---|
| NAME | SN74AHCT86 | | SN54AHCT86 | | | |
| | D, DB, DGV, N, NS, PW | RGY, BQA | J, W | FK | | |
| Thermal Pad | — | PAD | — | — | — | Thermal Pad |

(1) I = input, O = output

# 6 Specifications

## 6.1 Absolute Maximum Ratings

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

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage range | | –0.5 | 7 | V |
| $V_I$ | Input voltage range(2) | | –0.5 | 7 | V |
| $V_O$ | Output voltage range(2) | | –0.5 | $V_{CC}$ + 0.5 | V |
| $I_{IK}$ | Input clamp current | $V_I$ < 0 | | –20 | mA |
| $I_{OK}$ | Output clamp current | $V_O$ < 0 or $V_O$ > $V_{CC}$ | | ±20 | mA |
| $I_O$ | Continuous output current | $V_O$ = 0 to $V_{CC}$ | | ±25 | mA |
| | Continuous current through $V_{CC}$ or GND | | | ±50 | mA |

(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 voltage ratings may be exceeded if the input and output current ratings are observed.

## 6.2 ESD Ratings

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $T_{stg}$ | Storage temperature range | | –65 | 150 | °C |
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1) | 0 | 2000 | V |
| | | Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002, all pins(2) | 0 | 1000 | |

(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)

| | | SN54AHCT86 | | SN74AHCT86 | | UNIT |
|---|---|---|---|---|---|---|
| | | MIN | MAX | MIN | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5.5 | 4.5 | 5.5 | V |
| $V_{IH}$ | High-level input voltage | 2 | | 2 | | V |
| $V_{IL}$ | Low-level input voltage | | 0.8 | | 0.8 | V |
| $V_I$ | Input voltage | 0 | 5.5 | 0 | 5.5 | V |
| $V_O$ | Output voltage | 0 | $V_{CC}$ | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | | –8 | | –8 | mA |
| $I_{OL}$ | Low-level output current | | 8 | | 8 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | | 20 | | 20 | ns/V |
| $T_A$ | Operating free-air temperature | –55 | 125 | –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).

## 6.4 Thermal Information

| THERMAL METRIC(1) | | SNx4AHCT86 | | | | | | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | D | DB | DGV | N | NS | PW | RGY | BQA | |
| | | 14 PINS | | | | | | | | |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 124.5 | 109.5 | 133.3 | 59.7 | 92.2 | 147.7 | 59.0 | 88.3 | °C/W |
| $R_{\theta JC(top)}$ | Junction-to-case (top) thermal resistance | 78.8 | 62.1 | 55.6 | 47.3 | 49.8 | 77.4 | 72.5 | 90.9 | |
| $R_{\theta JB}$ | Junction-to-board thermal resistance | 81 | 56.9 | 66.3 | 39.5 | 51.0 | 90.9 | 35.0 | 56.8 | |
| $\psi_{JT}$ | Junction-to-top characterization parameter | 37 | 22.6 | 7.8 | 32.4 | 15.7 | 27.2 | 3.9 | 9.9 | |
| $\psi_{JB}$ | Junction-to-board characterization parameter | 80.6 | 56.3 | 56.6 | 39.4 | 50.6 | 90.2 | 35.1 | 56.7 | |
| $R_{\theta JC(bot)}$ | Junction-to-case (bottom) thermal resistance | N/A | N/A | N/A | N/A | N/A | N/A | 15.4 | 33.4 | |

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

## 6.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | $V_{CC}$ | $T_A$ = 25°C | | | SN54AHCT86 | | –40°C to 85°C SN74AHCT86 | | –40°C to 125°C SN74AHCT86 | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| $V_{OH}$ | $I_{OH}$ = −50 µA | 4.5 V | 4.4 | 4.5 | | 4.4 | | 4.4 | | 4.4 | | V |
| | $I_{OH}$ = −8 mA | | 3.94 | | | 3.8 | | 3.8 | | 3.8 | | |
| $V_{OL}$ | $I_{OL}$ = 50 µA | 4.5 V | | | 0.1 | | 0.1 | | 0.1 | | 0.1 | V |
| | $I_{OL}$ = 8 mA | | | | 0.36 | | 0.44 | | 0.44 | | 0.44 | |
| $I_I$ | $V_I$ = 5.5 V or GND | 0 V to 5.5 V | | | ±0.1 | | ±1(1) | | ±1 | | ±1 | µA |
| $I_{CC}$ | $V_I$ = $V_{CC}$ or GND, $I_O$ = 0 | 5.5 V | | | 2 | | 20 | | 20 | | 20 | µA |
| $\Delta I_{CC}$ (2) | One input at 3.4 V, Other inputs at $V_{CC}$ or GND | 5.5 V | | | 1.35 | | 1.5 | | 1.5 | | 1.5 | mA |
| $C_i$ | $V_I$ = $V_{CC}$ or GND | 5 V | | 4 | 10 | | | | 10 | | | pF |

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at $V_{CC}$ = 0 V.
(2) This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or $V_{CC}$.

## 6.6 Switching Characteristics

over recommended operating free-air temperature range, $V_{CC}$ = 5 V ± 0.5 V (unless otherwise noted) (see 图 7-1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A$ = 25°C | | | –55°C to 125°C SN54AHCT86 | | –40°C to 85°C SN74AHCT86 | | –40°C to 125°C SN74AHCT86 | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| $t_{PLH}$ | A or B | Y | $C_L$ = 15 pF | | 5(1) | 6.9(1) | 1(1) | 8(1) | 1 | 8 | 1 | 9 | ns |
| $t_{PHL}$ | | | | | 5(1) | 6.9(1) | 1(1) | 8(1) | 1 | 8 | 1 | 9 | |
| $t_{PLH}$ | A or B | Y | $C_L$ = 50 pF | | 5.5 | 8.8 | 1 | 10 | 1 | 9 | 1 | 11 | ns |
| $t_{PHL}$ | | | | | 5.5 | 8.8 | 1 | 10 | 1 | 9 | 1 | 11 | |

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## 6.7 Noise Characteristics

$V_{CC}$ = 5 V, $C_L$ = 50 pF, $T_A$ = 25°C(1)

| PARAMETER | | SN74AHCT86 | | | UNIT |
|---|---|---|---|---|---|
| | | MIN | TYP | MAX | |
| $V_{OL(P)}$ | Quiet output, maximum dynamic $V_{OL}$ | | 0.4 | 0.8 | V |
| $V_{OL(V)}$ | Quiet output, minimum dynamic $V_{OL}$ | | –0.4 | –0.8 | V |
| $V_{OH(V)}$ | Quiet output, minimum dynamic $V_{OH}$ | 4.4 | | | V |
| $V_{IH(D)}$ | High-level dynamic input voltage | 2 | | | V |
| $V_{IL(D)}$ | Low-level dynamic input voltage | | | 0.8 | V |

(1) Characteristics are for surface-mount packages only.

## 6.8 Operating Characteristics

$V_{CC}$ = 5 V, $T_A$ = 25°C

| PARAMETER | | TEST CONDITIONS | | TYP | UNIT |
|---|---|---|---|---|---|
| $C_{pd}$ | Power dissipation capacitance | No load, | f = 1 MHz | 18 | pF |

## 6.9 Typical Characteristics

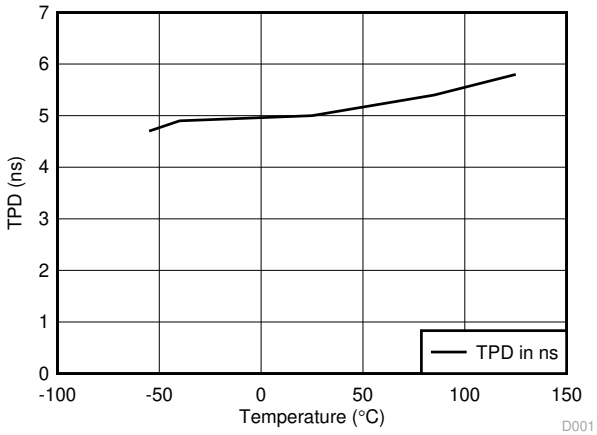
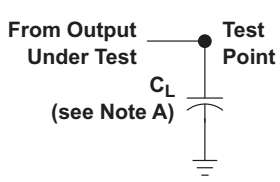
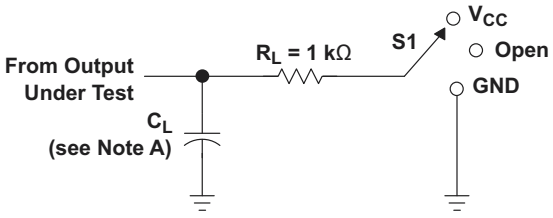



**图 6-1. TPD vs Temperature**

## 7 Parameter Measurement Information

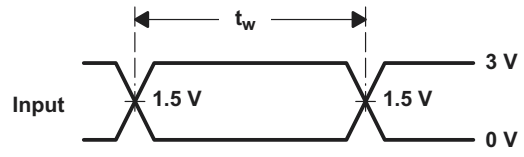



LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

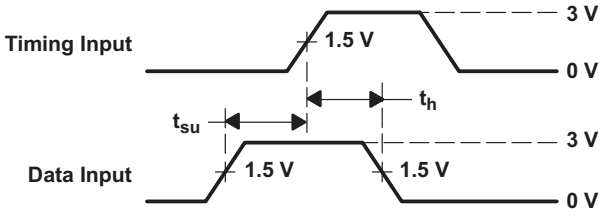



LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS

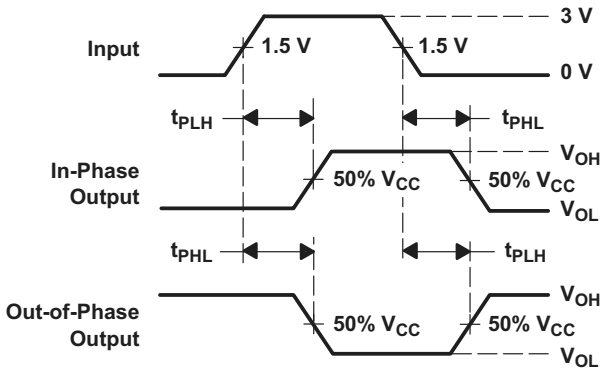
| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | $V_{CC}$ |
| $t_{PHZ}/t_{PZH}$ | GND |
| Open Drain | $V_{CC}$ |



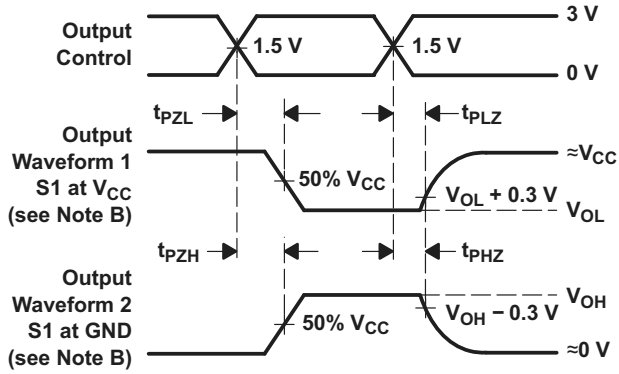

VOLTAGE WAVEFORMS
PULSE DURATION




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: 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 ≤ 1 MHz, $Z_O$ = 50 Ω, $t_r$ ≤ 3 ns, $t_f$ ≤ 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.
E. All parameters and waveforms are not applicable to all devices.

**图 7-1. Load Circuit and Voltage Waveforms**

# 8 Detailed Description

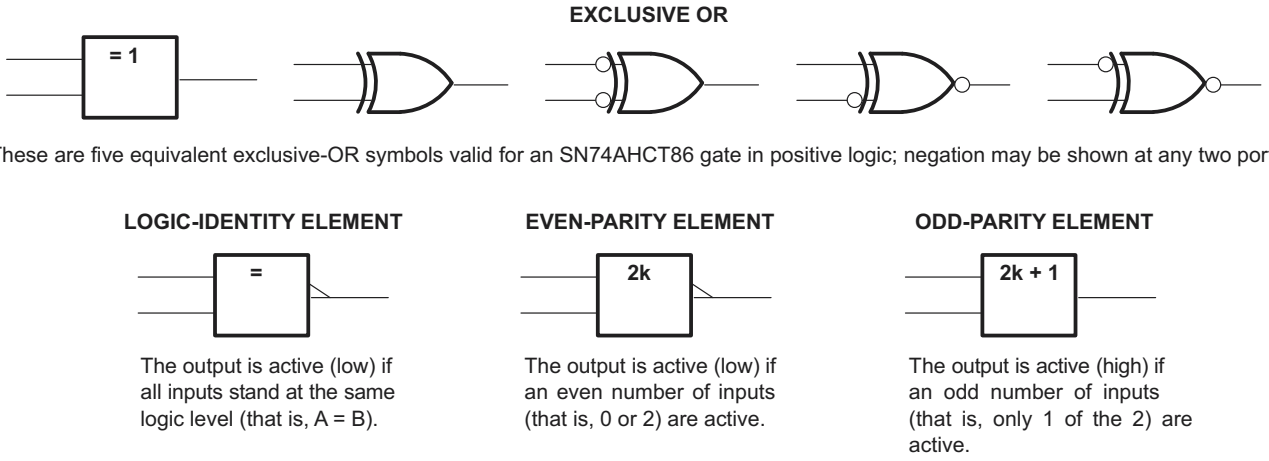
## 8.1 Overview

The SNx4AHCT86 devices are quadruple 2-input exclusive-OR gates. These devices perform the Boolean function $Y = A \times B$ or $Y = \overline{A}B + A\overline{B}$ in positive logic.

The inputs are TTL compatible allowing 3.3 V to 5 V translation.

## 8.2 Functional Block Diagram

An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.




These are five equivalent exclusive-OR symbols valid for an SN74AHCT86 gate in positive logic; negation may be shown at any two ports.

**图 8-1. Exclusive-OR Logic**

## 8.3 Feature Description

- TTL inputs
  - Lowered switching threshold allows up translation 3.3 V to 5 V
- Slow edges reduce output ringing

## 8.4 Device Functional Modes

**表 8-1. Function Table (Each Gate)**

| INPUTS | | OUTPUT |
|---|---|---|
| A | B | Y |
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

# 9 Application and Implementation

**备注**

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客 户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

## 9.1 Application Information

The SNx4AHCT86 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The input switching levels have been lowered to accommodate TTL inputs of 0.8-V $V_{IL}$ and 2-V $V_{IH}$. This feature makes the device ideal for translating up from 3.3 V to 5 V. 图 9-2 shows this type of translation.

## 9.2 Typical Application

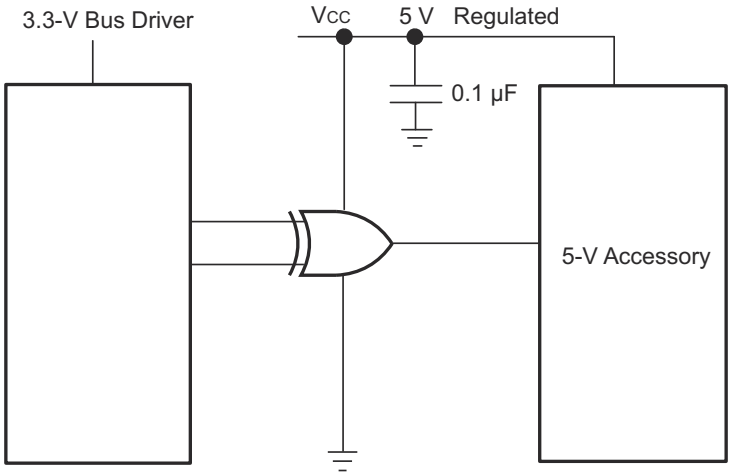



**图 9-1. Typical Application Schematic**

### 9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should 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 should be considered to prevent ringing.

### 9.2.2 Detailed Design Procedure

1. Recommended input conditions:
   - Rise time and fall time specs: see (Δt/ΔV) 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 should not exceed 25 mA per output and 75 mA total for the part
   - Outputs should not be pulled above $V_{CC}$

### 9.2.3 Application Curves

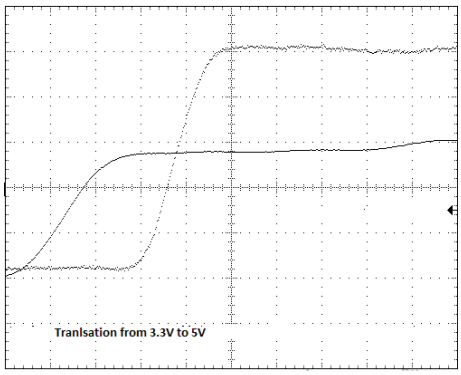



**图 9-2. Up Translation**

## 9.3 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 should 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, 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 1 µF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

## 9.4 Layout

### 9.4.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever 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 should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Specified in 图 9-3 are 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 should 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. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the IOs so they cannot float when disabled.

### 9.4.2 Layout Example

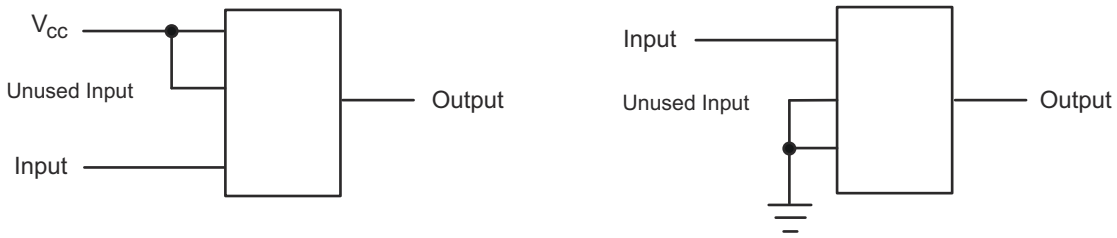



**图 9-3. Layout Diagram**

# 10 Device and Documentation Support

## 10.1 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 *订阅更新* 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

## 10.2 支持资源

TI E2E™ 支持论坛是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

## 10.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

## 10.4 静电放电警告

静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

## 10.5 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

# 11 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 part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| 5962-9681701Q2A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 5962-9681701Q2A SNJ54AHCT86FK |
| 5962-9681701QCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 5962-9681701QCA SNJ54AHCT86J |
| SN74AHCT86BQAR | Active | Production | WQFN (BQA) \| 14 | 3000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT86 |
| SN74AHCT86D | Obsolete | Production | SOIC (D) \| 14 | - | - | Call TI | Call TI | -40 to 85 | AHCT86 |
| SN74AHCT86DBR | Active | Production | SSOP (DB) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB86 |
| SN74AHCT86DGVR | Active | Production | TVSOP (DGV) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB86 |
| SN74AHCT86DR | Active | Production | SOIC (D) \| 14 | 2500 \| LARGE T&R | Yes | NIPDAU \| NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT86 |
| SN74AHCT86N | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 125 | SN74AHCT86N |
| SN74AHCT86NSR | Active | Production | SOP (NS) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT86 |
| SN74AHCT86PW | Obsolete | Production | TSSOP (PW) \| 14 | - | - | Call TI | Call TI | -40 to 125 | HB86 |
| SN74AHCT86PWR | Active | Production | TSSOP (PW) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU \| SN | Level-1-260C-UNLIM | -40 to 125 | HB86 |
| SN74AHCT86RGYR | Active | Production | VQFN (RGY) \| 14 | 3000 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 125 | HB86 |
| SNJ54AHCT86FK | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 5962-9681701Q2A SNJ54AHCT86FK |
| SNJ54AHCT86J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | 5962-9681701QCA SNJ54AHCT86J |

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

**(4) Lead finish/Ball material:** Parts 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.

**(5) MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

**(6) Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.



**OTHER QUALIFIED VERSIONS OF SN54AHCT86, SN74AHCT86 :**

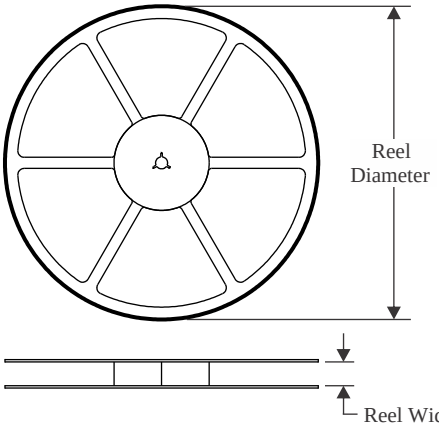
- Catalog : SN74AHCT86
- Military : SN54AHCT86

NOTE: Qualified Version Definitions:

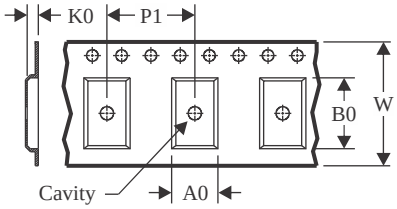
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

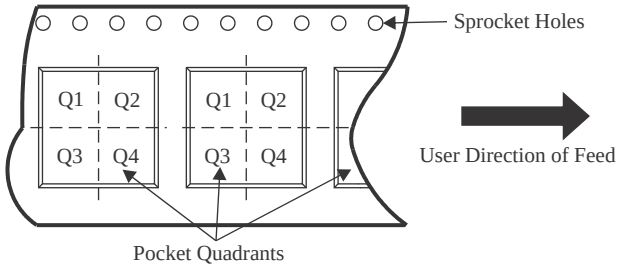



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

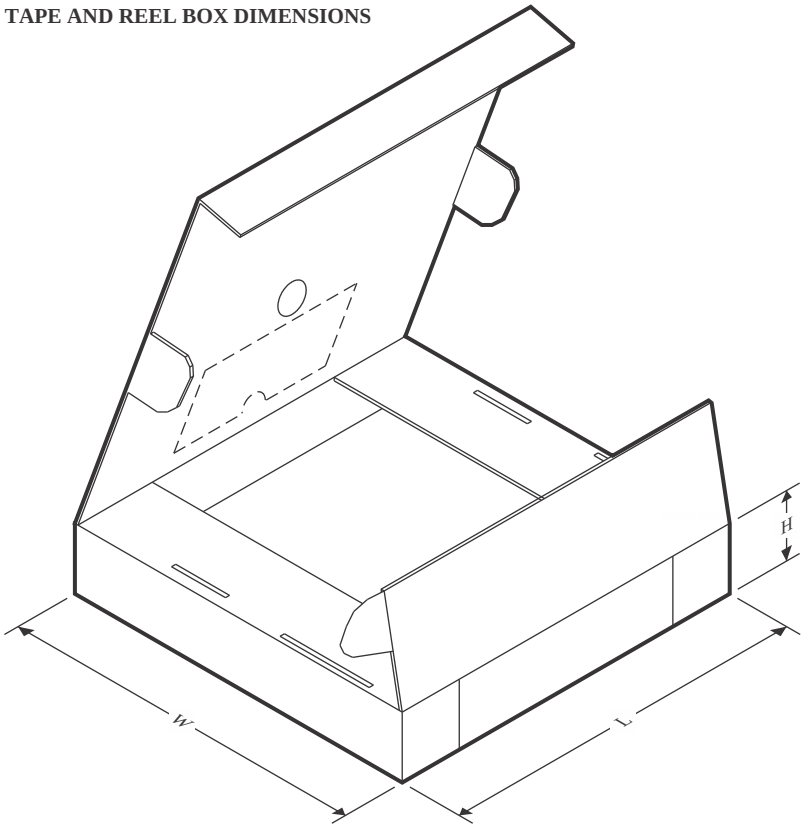
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74AHCT86BQAR | WQFN | BQA | 14 | 3000 | 180.0 | 12.4 | 2.8 | 3.3 | 1.1 | 4.0 | 12.0 | Q1 |
| SN74AHCT86DBR | SSOP | DB | 14 | 2000 | 330.0 | 16.4 | 8.35 | 6.6 | 2.4 | 12.0 | 16.0 | Q1 |
| SN74AHCT86DGVR | TVSOP | DGV | 14 | 2000 | 330.0 | 12.4 | 6.8 | 4.0 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74AHCT86DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74AHCT86DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74AHCT86NSR | SOP | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74AHCT86PWR | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74AHCT86PWR | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74AHCT86RGYR | VQFN | RGY | 14 | 3000 | 330.0 | 12.4 | 3.75 | 3.75 | 1.15 | 8.0 | 12.0 | Q1 |

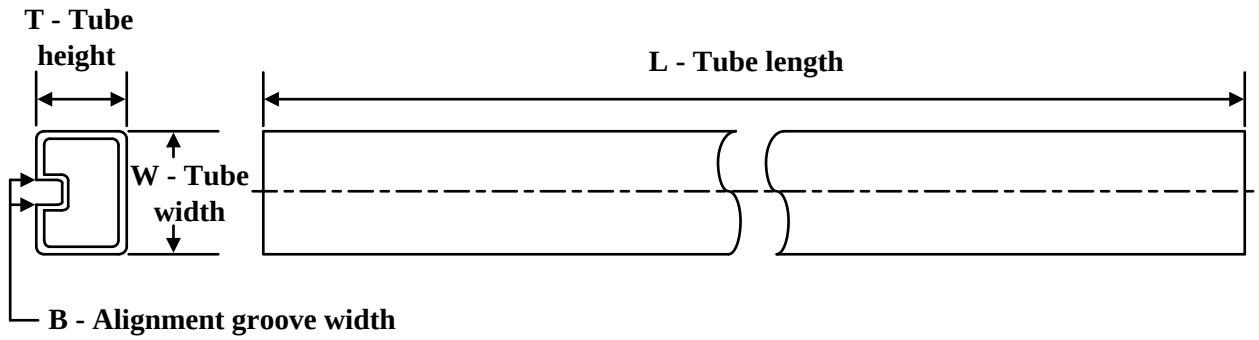
TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| SN74AHCT86BQAR | WQFN | BQA | 14 | 3000 | 210.0 | 185.0 | 35.0 |
| SN74AHCT86DBR | SSOP | DB | 14 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHCT86DGVR | TVSOP | DGV | 14 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHCT86DR | SOIC | D | 14 | 2500 | 353.0 | 353.0 | 32.0 |
| SN74AHCT86DR | SOIC | D | 14 | 2500 | 356.0 | 356.0 | 35.0 |
| SN74AHCT86NSR | SOP | NS | 14 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHCT86PWR | TSSOP | PW | 14 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHCT86PWR | TSSOP | PW | 14 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74AHCT86RGYR | VQFN | RGY | 14 | 3000 | 356.0 | 356.0 | 35.0 |

## TUBE




*All dimensions are nominal

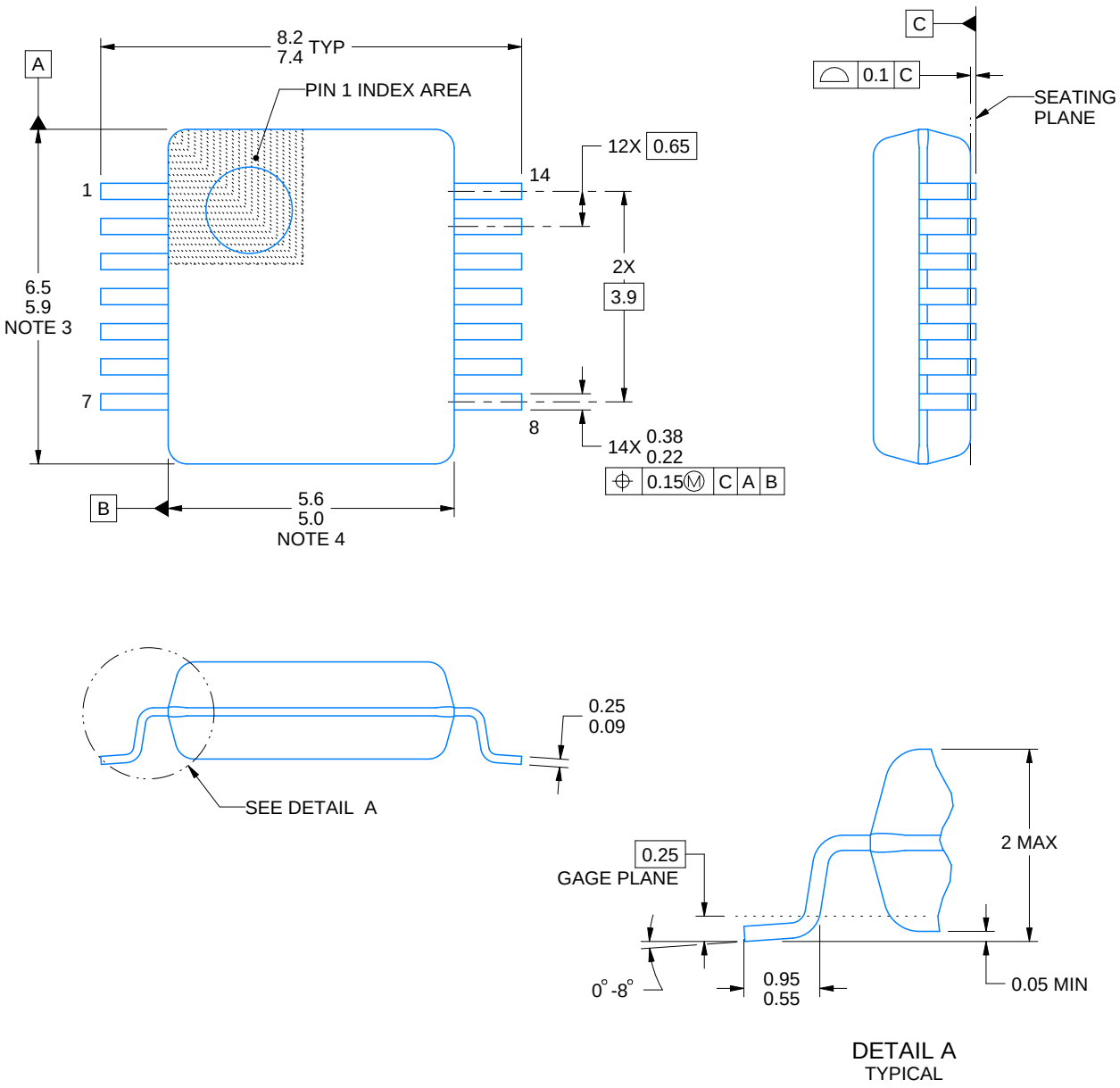
| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| 5962-9681701Q2A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SN74AHCT86N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74AHCT86N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SNJ54AHCT86FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |

# PACKAGE OUTLINE

## DB0014A

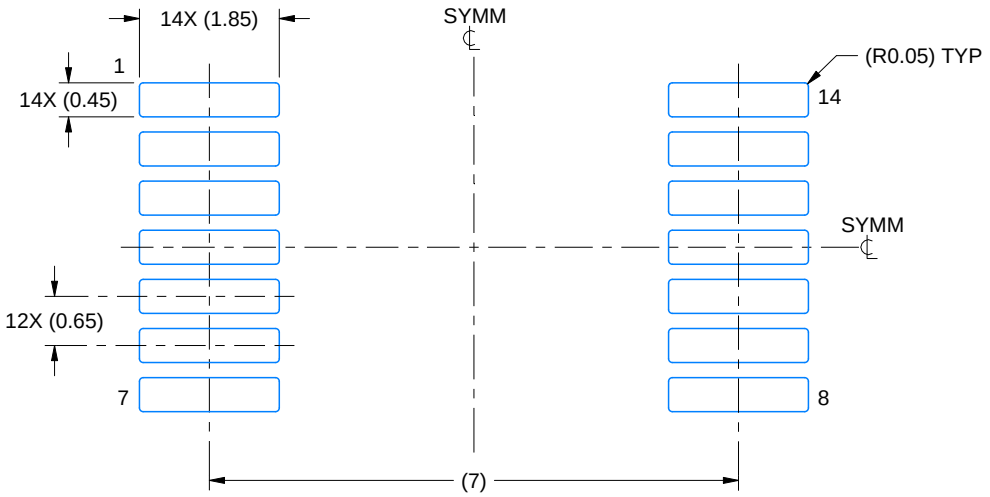
## SSOP - 2 mm max height

SMALL OUTLINE PACKAGE

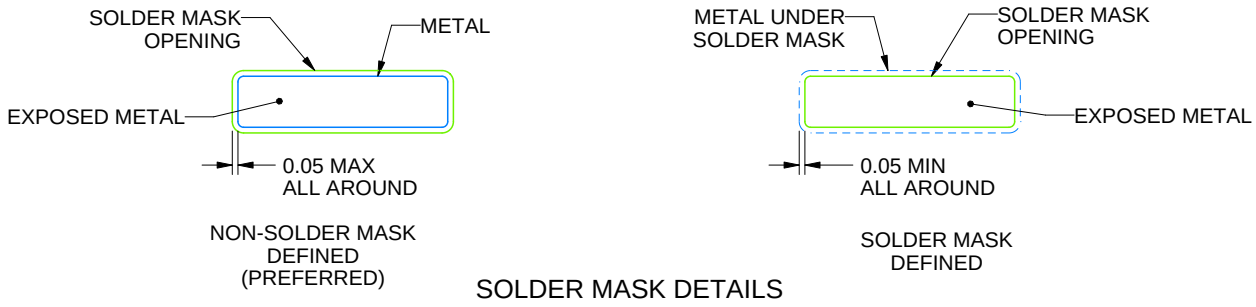



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-150.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

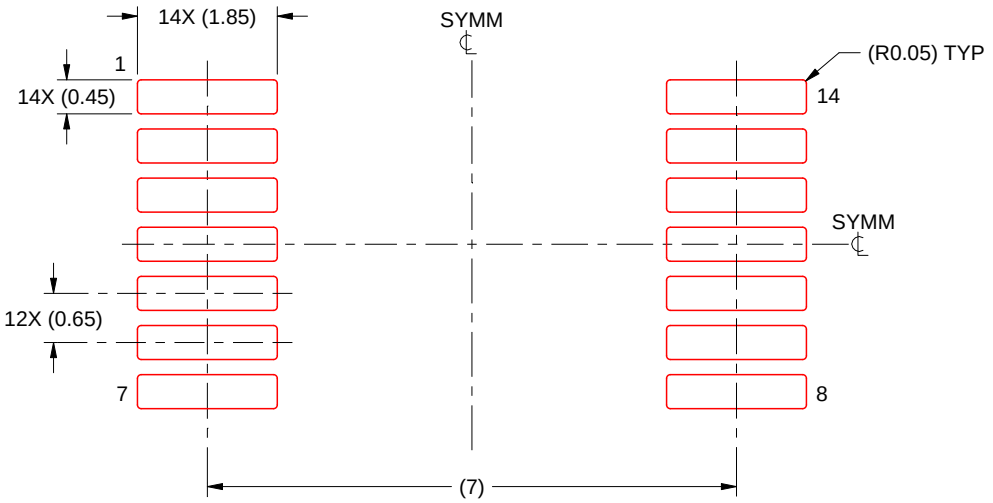



SOLDER MASK DETAILS

4220762/A 05/2024

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.




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220762/A 05/2024

NOTES: (continued)

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

# GENERIC PACKAGE VIEW

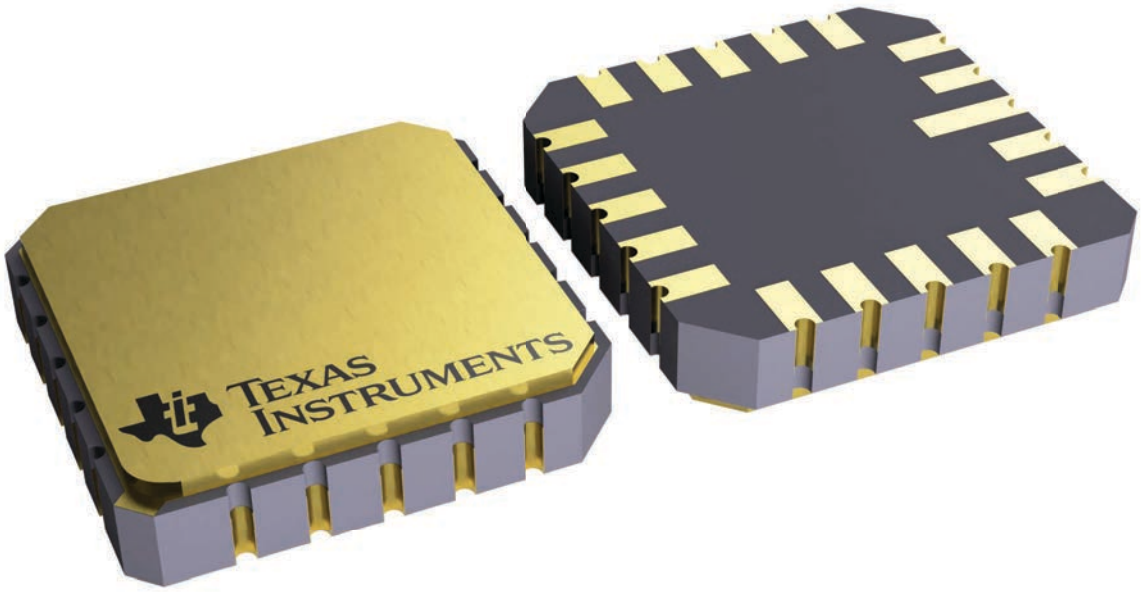
## FK 20

## LCCC - 2.03 mm max height

**8.89 x 8.89, 1.27 mm pitch**

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

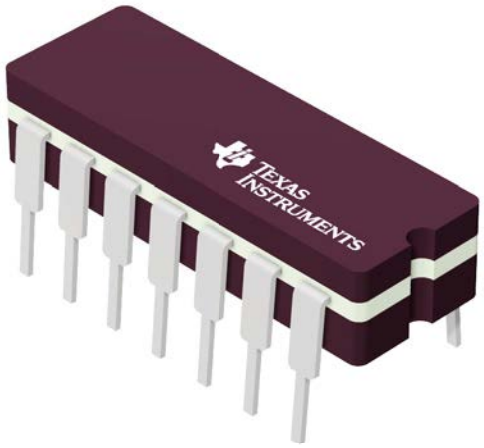



4229370VA\

# GENERIC PACKAGE VIEW

## J 14 CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE




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

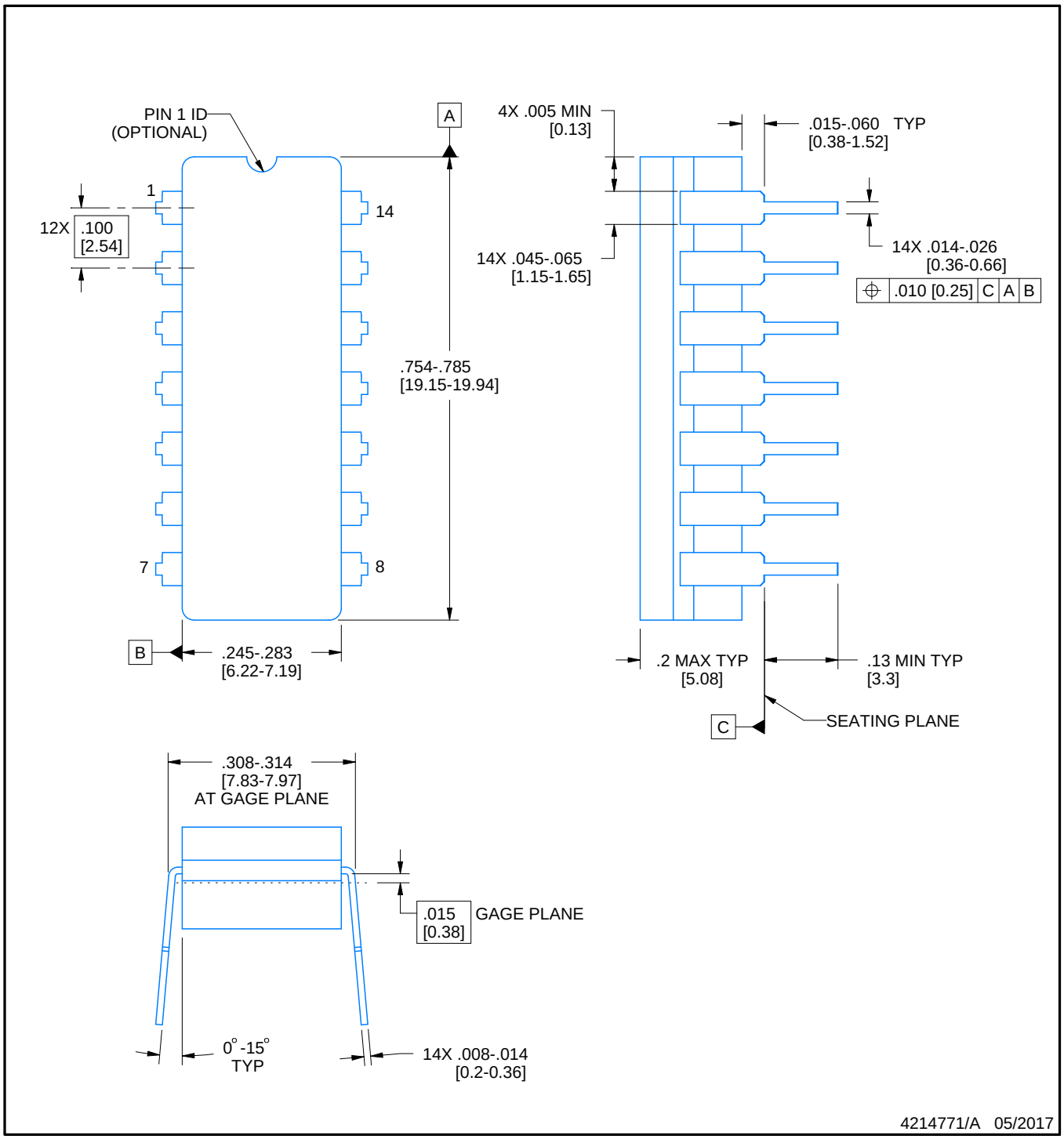
4040083-5/G

# PACKAGE OUTLINE

## J0014A

## CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE




NOTES:

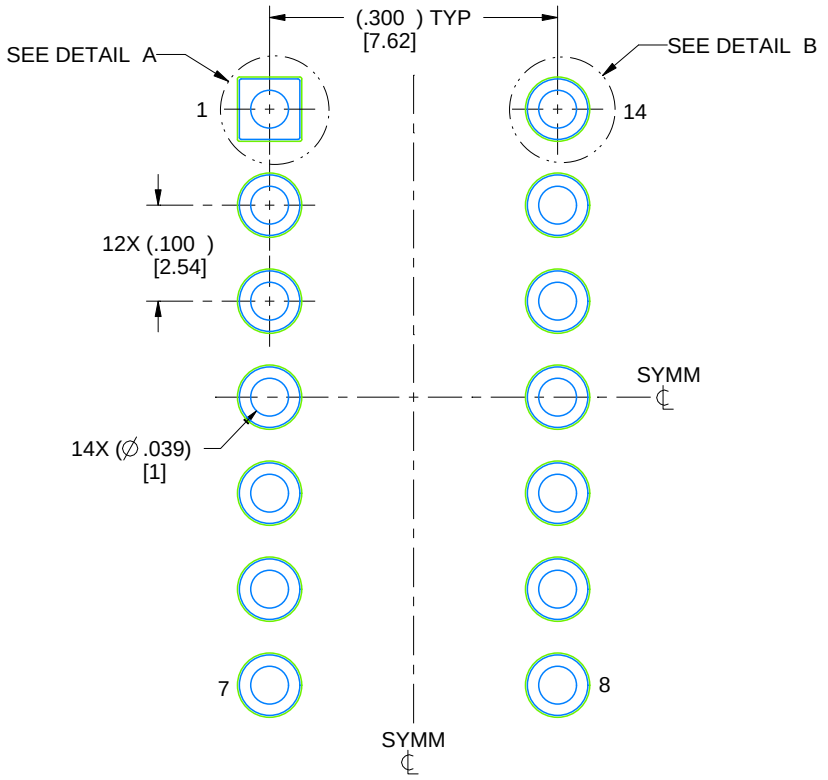
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

# EXAMPLE BOARD LAYOUT

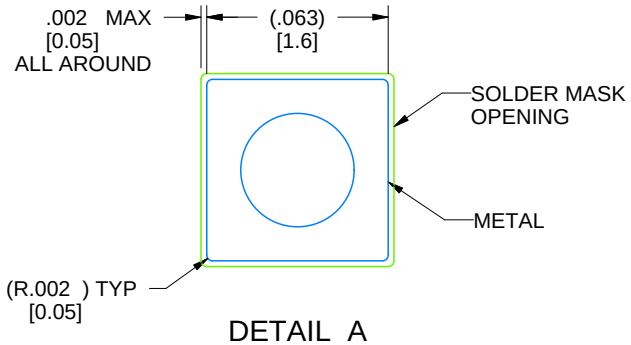
## J0014A

## CDIP - 5.08 mm max height

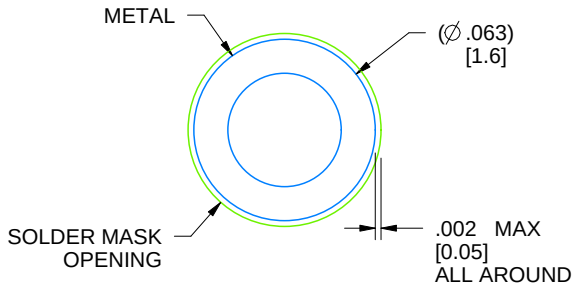
CERAMIC DUAL IN LINE PACKAGE




LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X




DETAIL A
SCALE: 15X



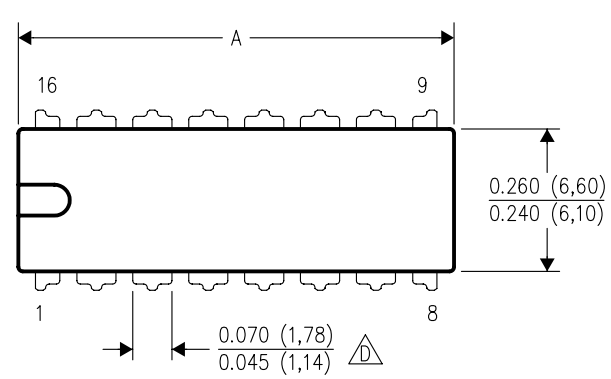

DETAIL B
13X, SCALE: 15X

4214771/A 05/2017

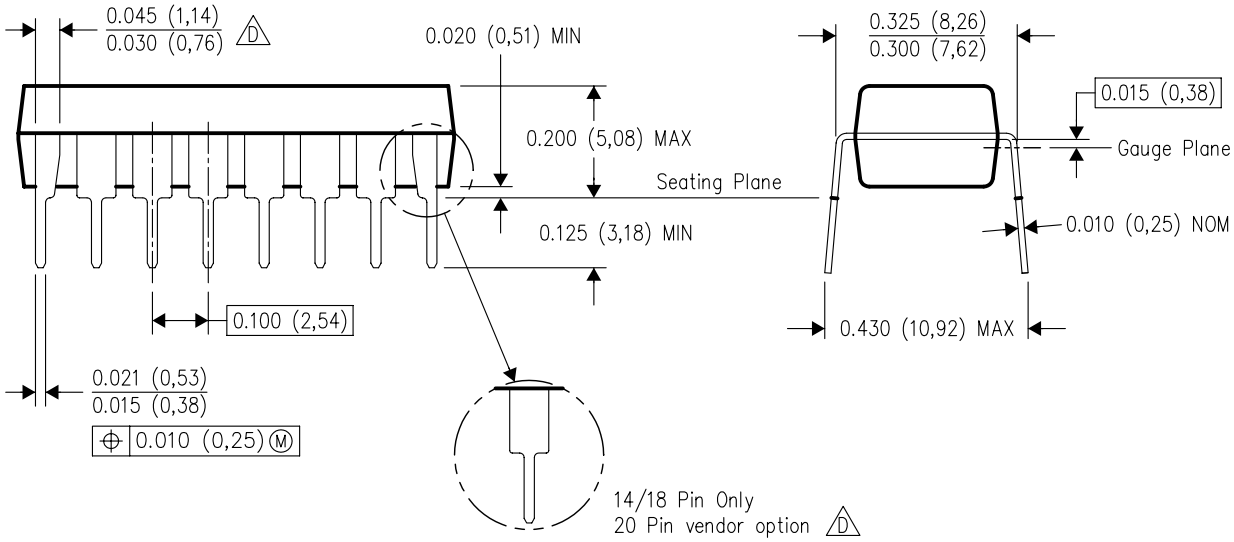
## N (R–PDIP–T**)

## PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN




| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS–001 VARIATION (C) | AA | BB | AC | AD |




4040049/E 12/2002

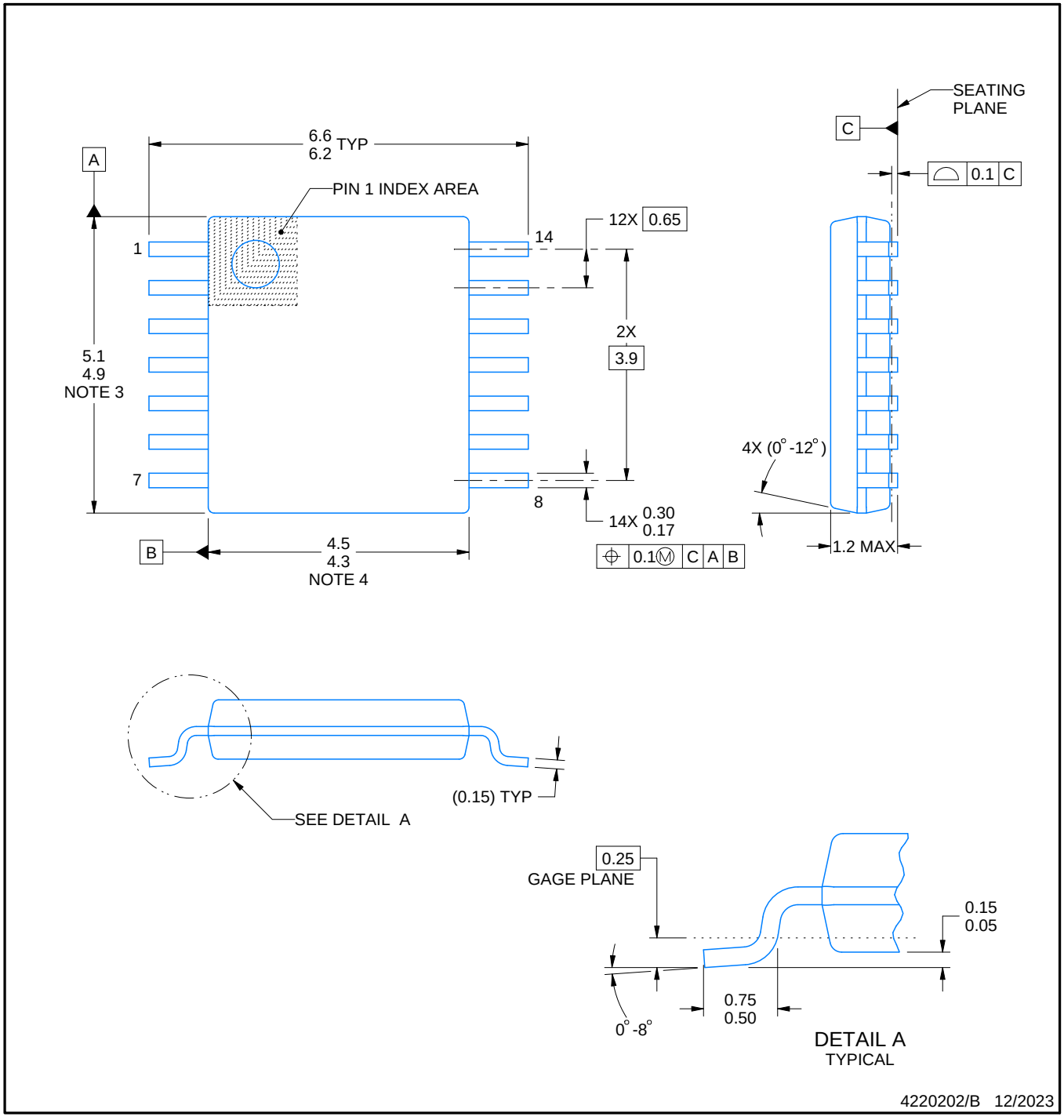
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

# PACKAGE OUTLINE

## PW0014A

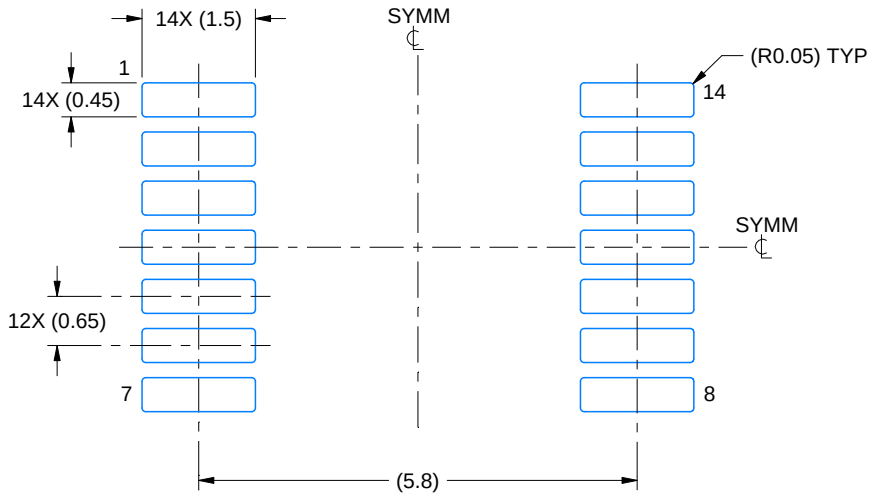
## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

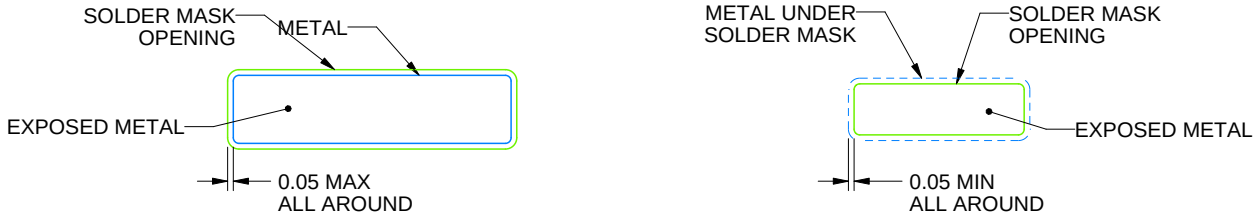



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

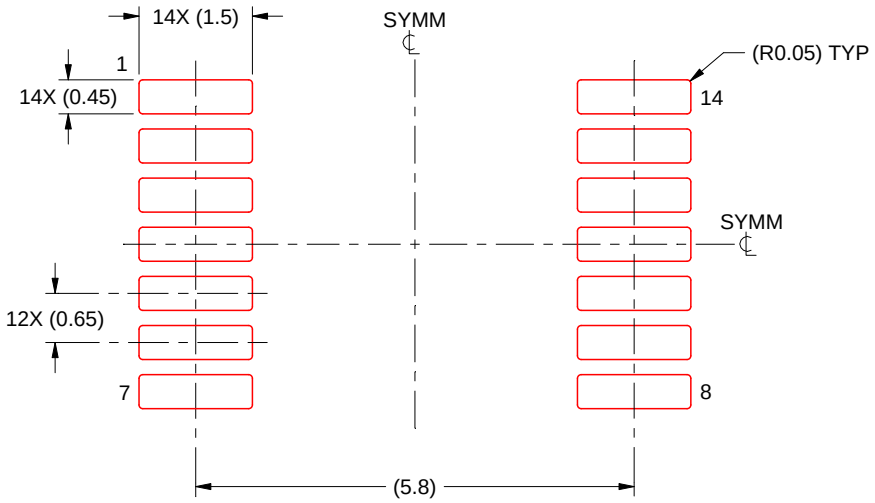



SOLDER MASK DETAILS

4220202/B 12/2023

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.




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220202/B 12/2023

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.

# GENERIC PACKAGE VIEW

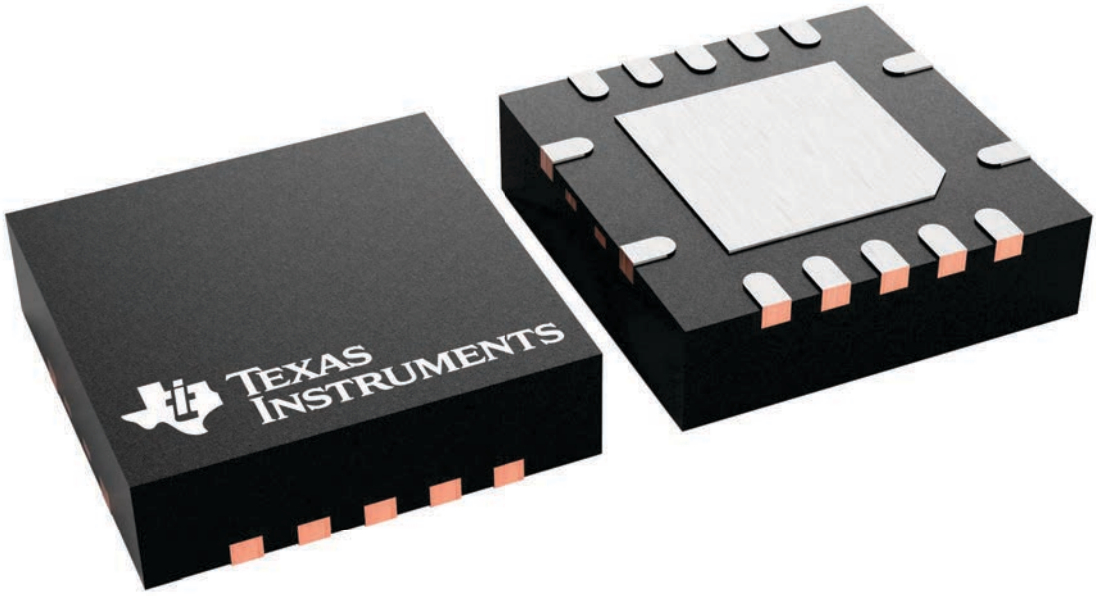
## RGY 14

## VQFN - 1 mm max height

**3.5 x 3.5, 0.5 mm pitch**

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



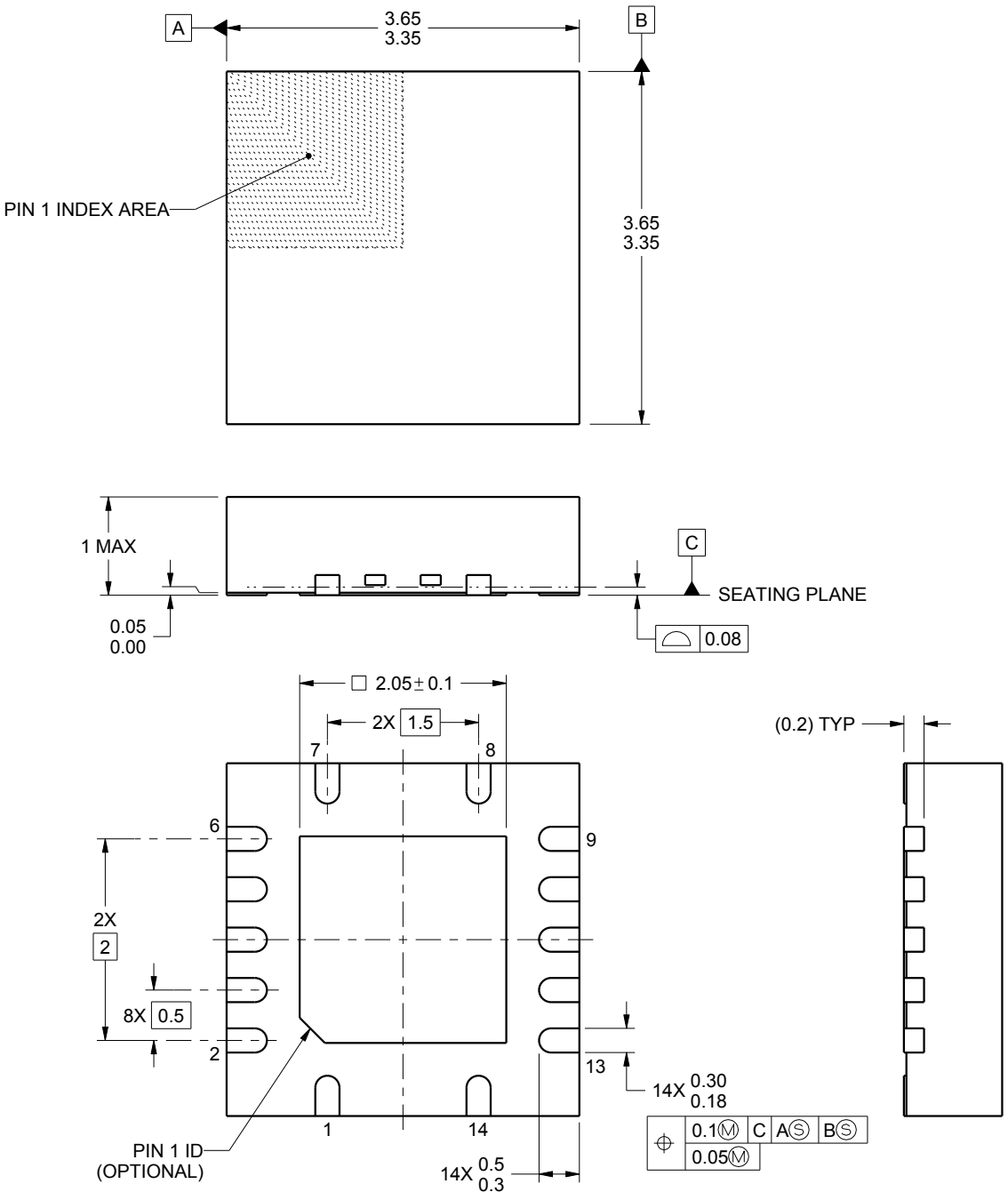

4231541/A

# PACKAGE OUTLINE

## RGY0014A

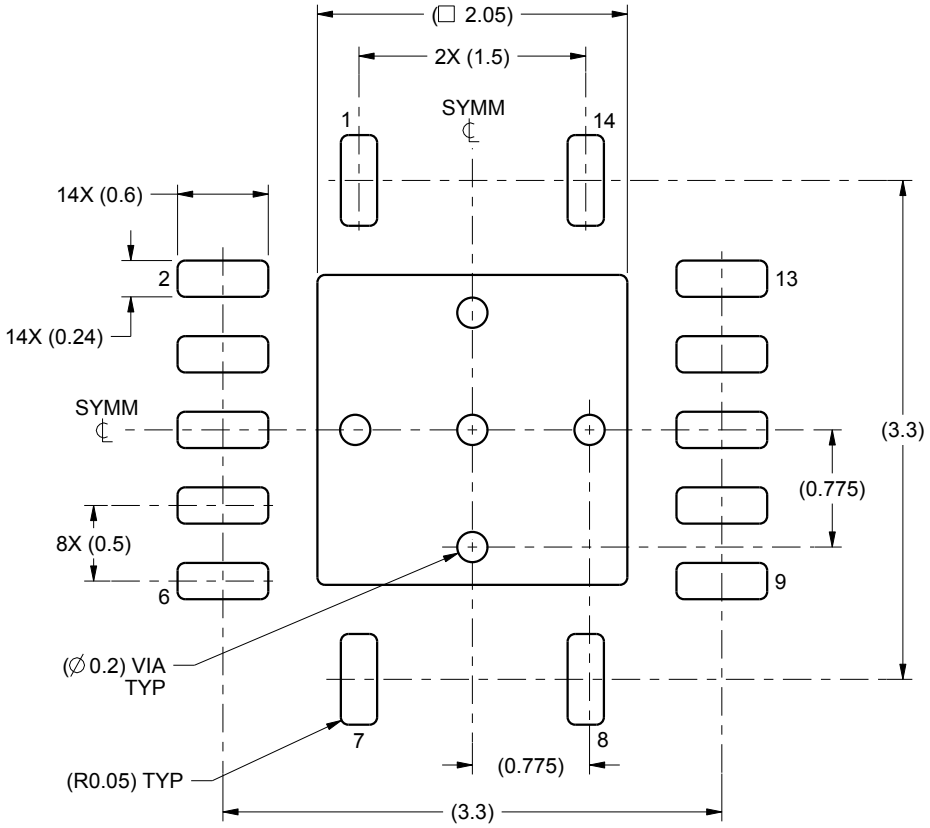
## VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD

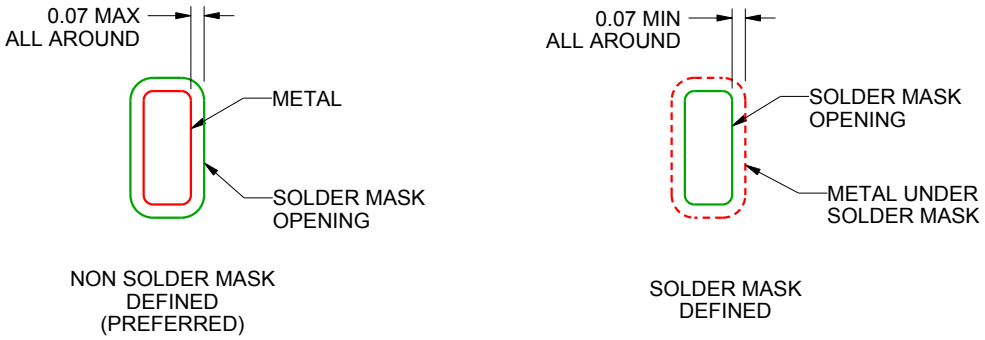



NOTES:

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. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.




LAND PATTERN EXAMPLE
SCALE:20X

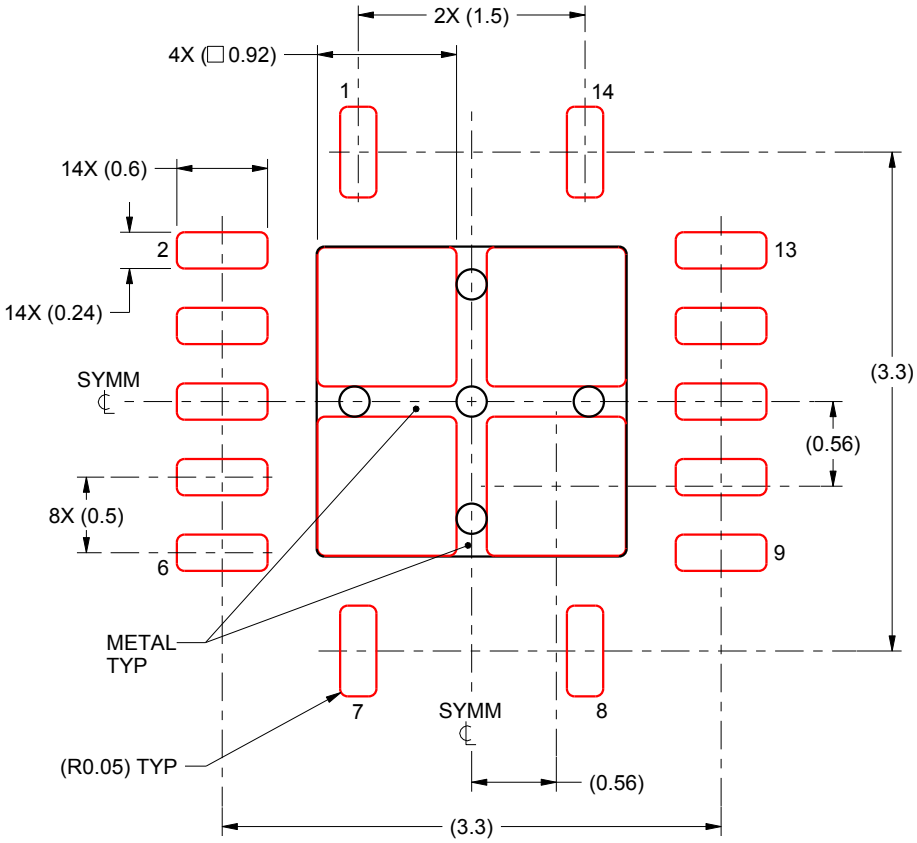



SOLDER MASK DETAILS

4219040/A 09/2015

NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).



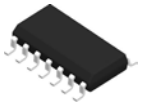

SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
80% PRINTED SOLDER COVERAGE BY AREA
SCALE:20X

4219040/A 09/2015

NOTES: (continued)

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

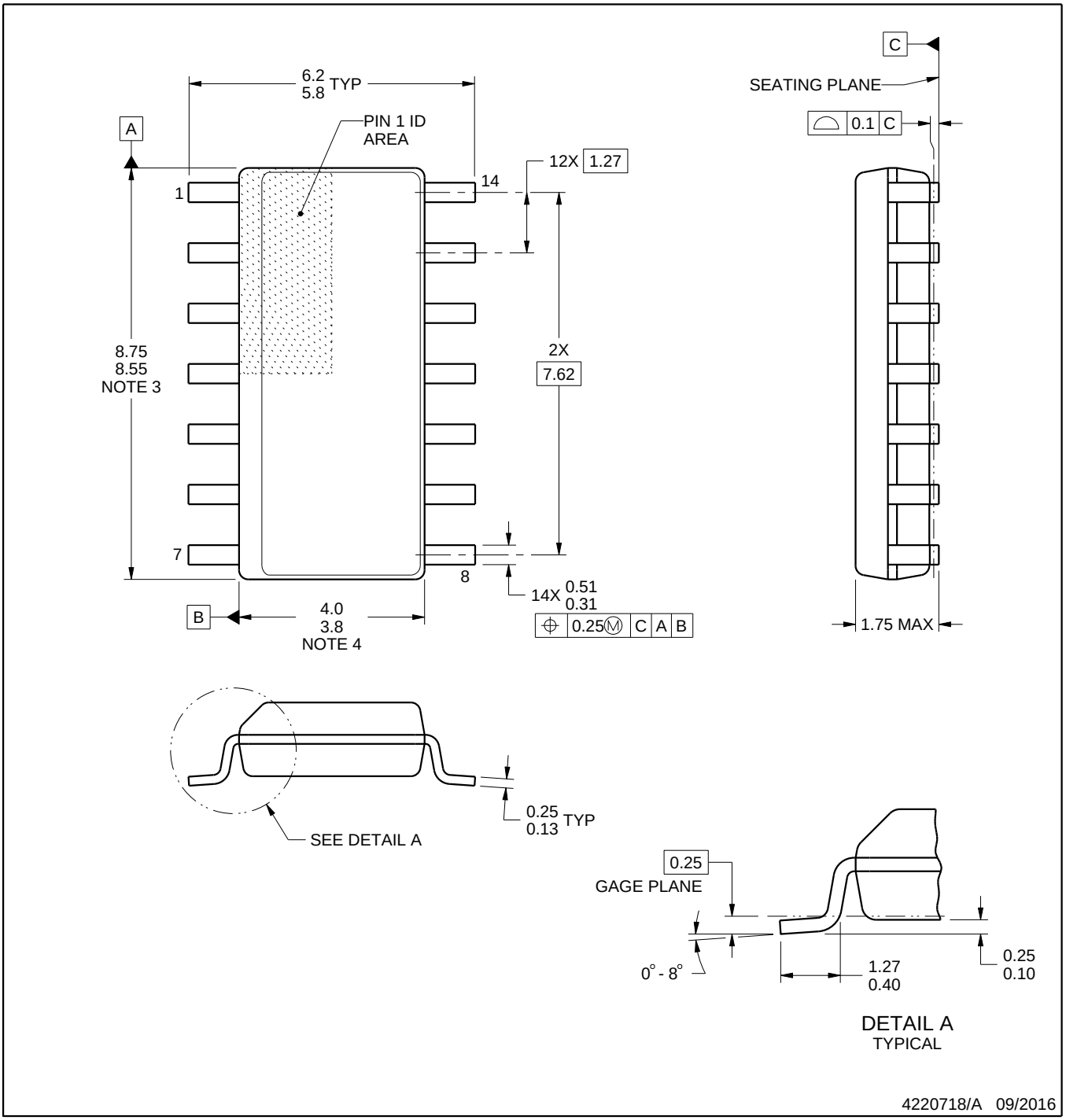


# PACKAGE OUTLINE

## D0014A

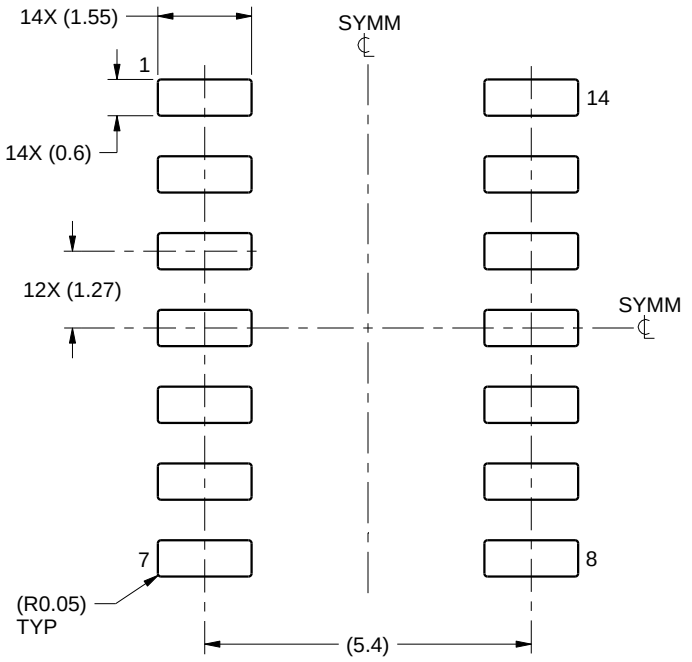
## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

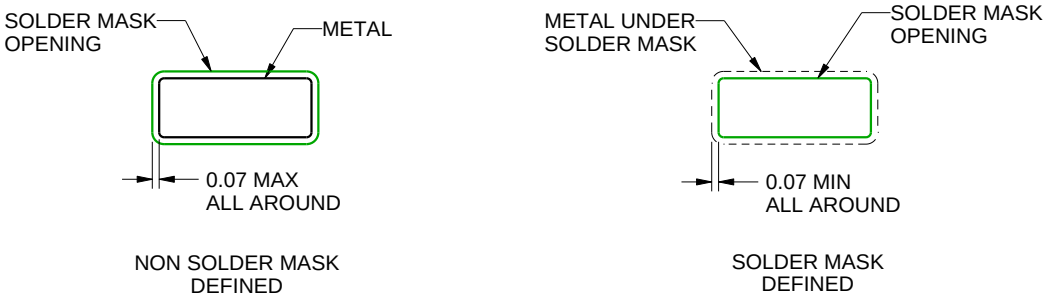



NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.




LAND PATTERN EXAMPLE
SCALE:8X




SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

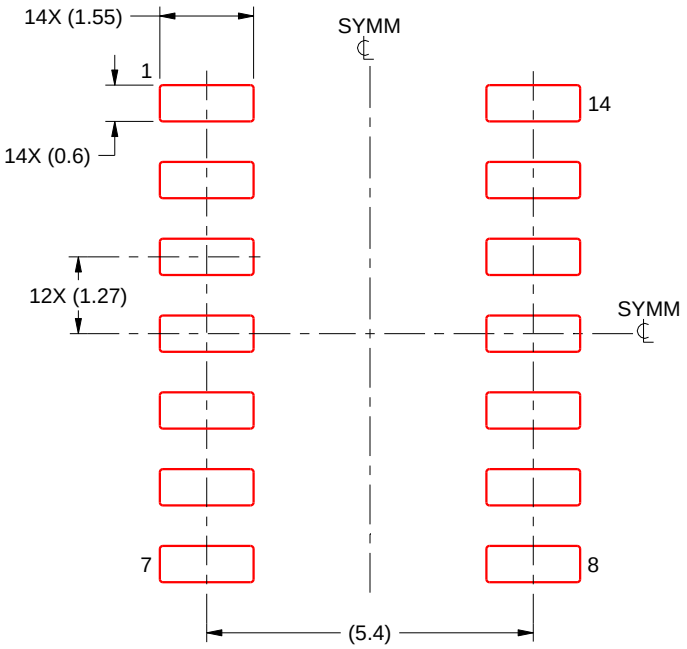
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

## D0014A

## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

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

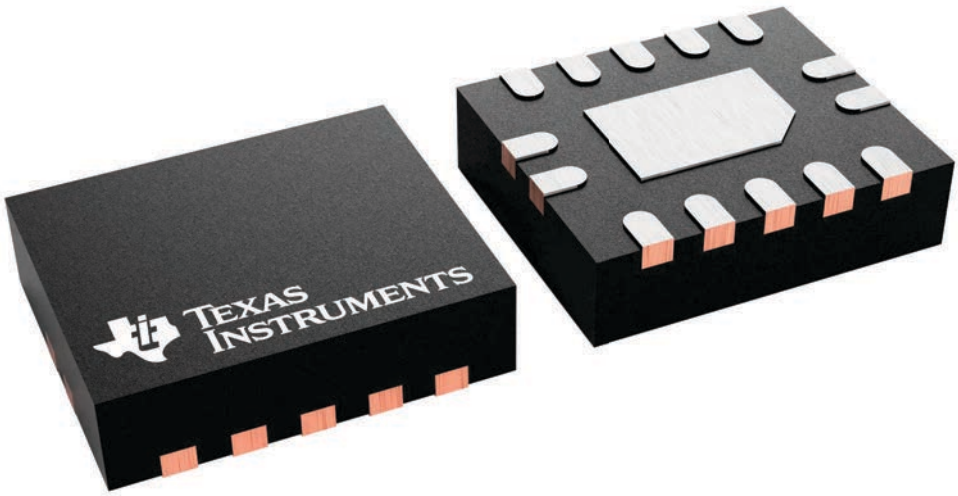
## BQA 14

## WQFN - 0.8 mm max height

**2.5 x 3, 0.5 mm pitch**

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



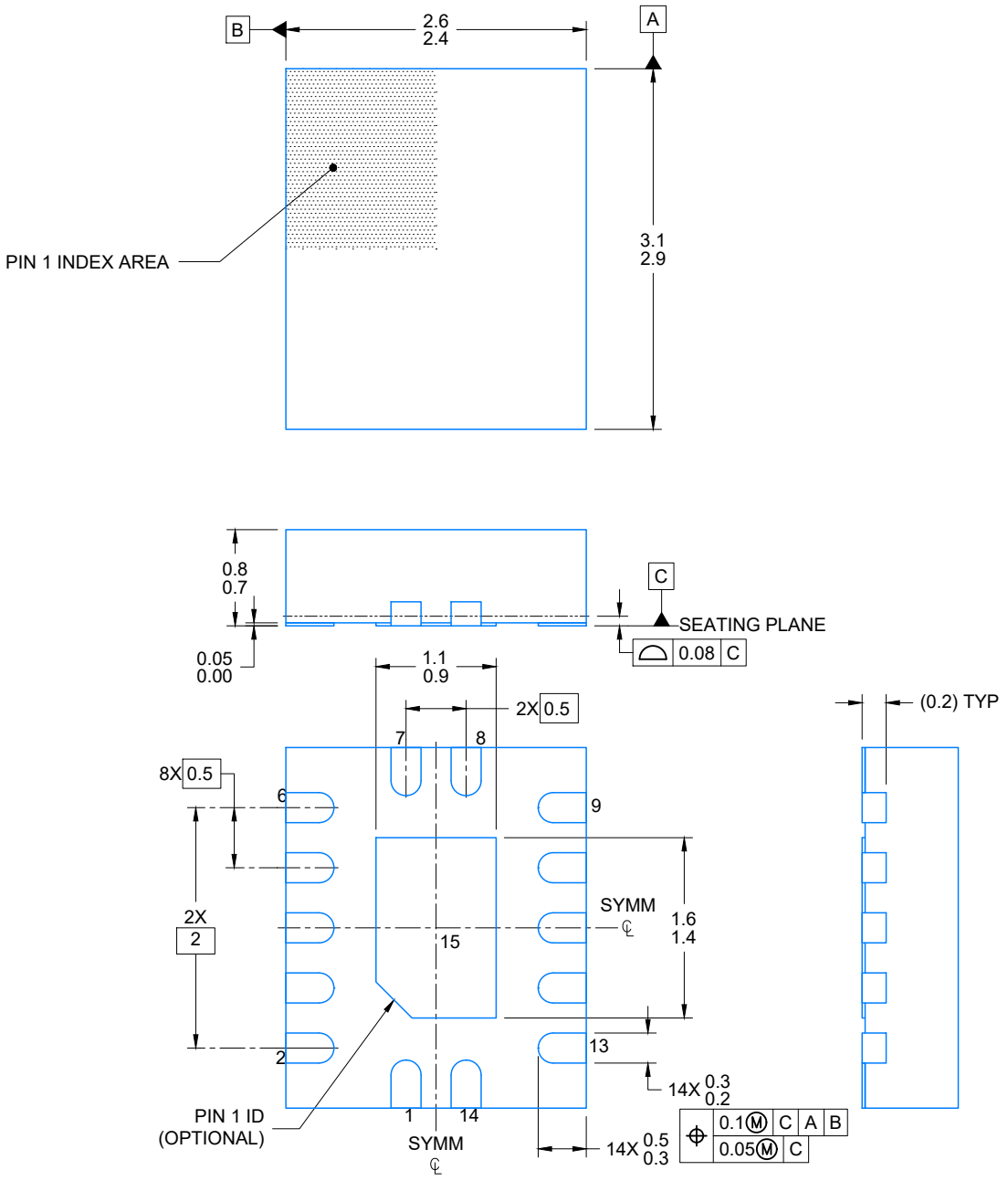

4227145/A

# PACKAGE OUTLINE

## BQA0014A

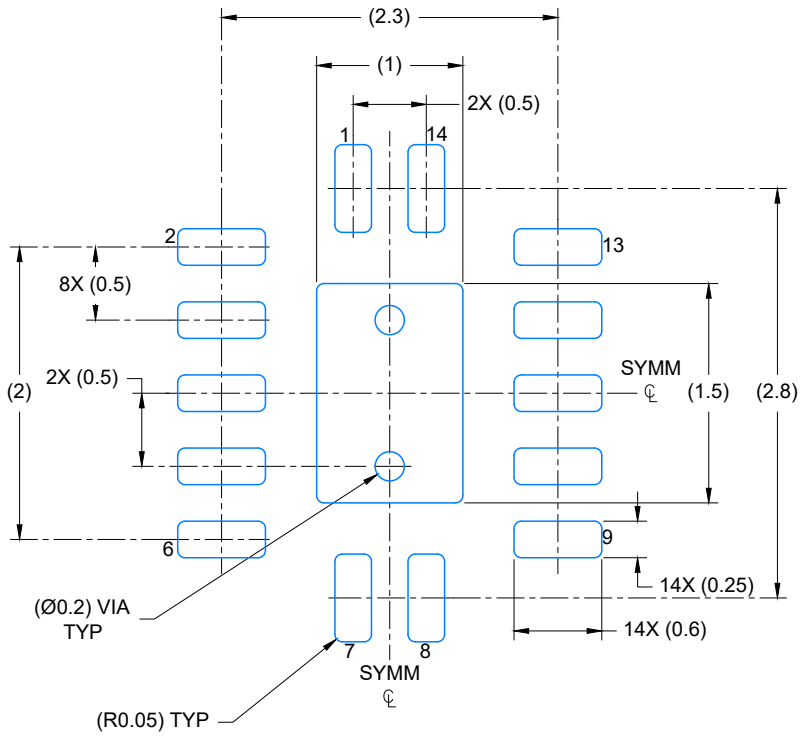
### WQFN - 0.8 mm max height

PLASTIC QUAD FLAT PACK-NO LEAD

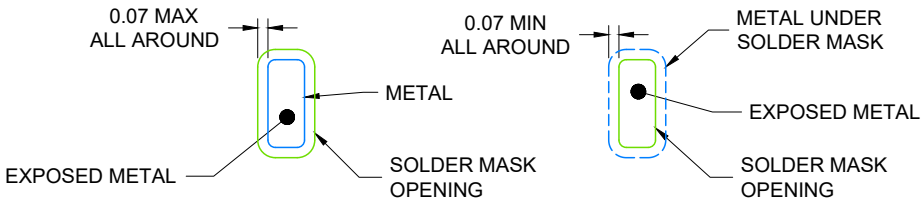



NOTES:

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. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X



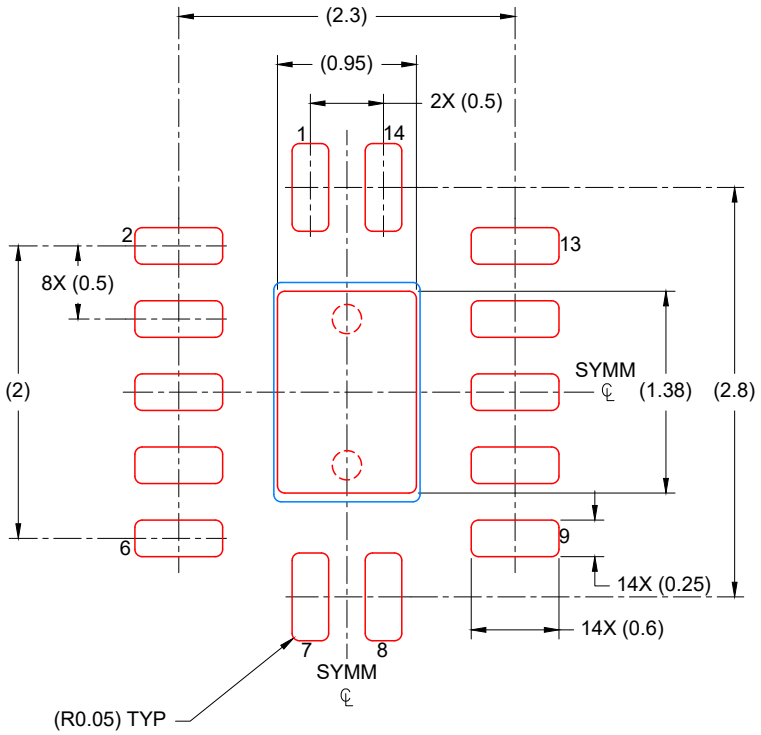

NON-SOLDER MASK
DEFINED
(PREFERRED)

SOLDER MASK
DEFINED

4224636/A 11/2018

NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
88% PRINTED COVERAGE BY AREA
SCALE: 20X

4224636/A 11/2018

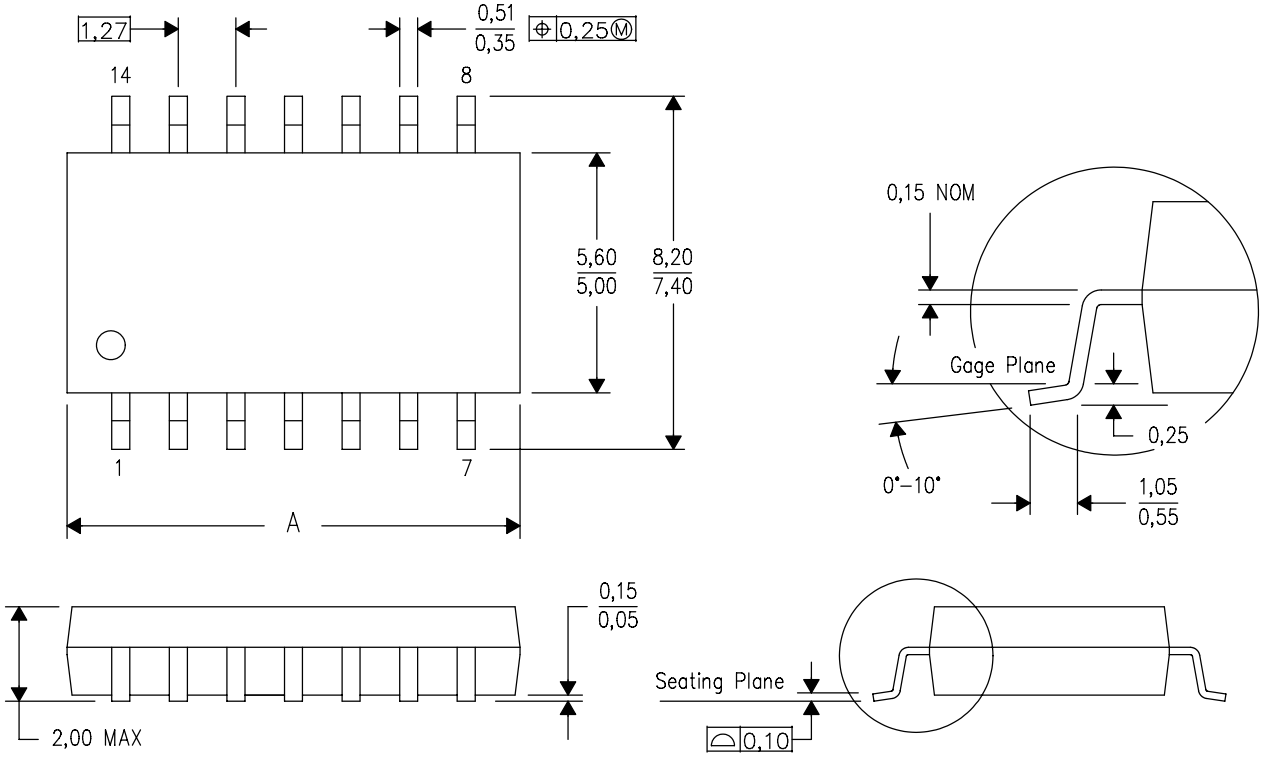
NOTES: (continued)

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

## MECHANICAL DATA

**NS (R-PDSO-G**)** **PLASTIC SMALL-OUTLINE PACKAGE**

**14-PINS SHOWN**




| DIM \ PINS ** | 14 | 16 | 20 | 24 |
|---|---|---|---|---|
| A MAX | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN | 9,90 | 9,90 | 12,30 | 14,70 |

4040062/C 03/03

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.

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