

## SNx4AHC14 六路施密特触发反相器

### 1 特性

- 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)
  - 1000V 带电器件模型 (C101)
- 工作范围：2V 至 5.5V
- 5V 时，输出驱动为  $\pm 8\text{mA}$
- 施密特触发器输入启用输入噪声电阻
- 低功耗：最大  $20\mu\text{A } I_{\text{CC}}$
- 闩锁性能超过 250mA，符合 JESD 17 规范

### 2 应用

- UPS
- 白色家电
- 计算机外设
- 打印机
- 交流伺服驱动器
- 台式机

### 3 说明

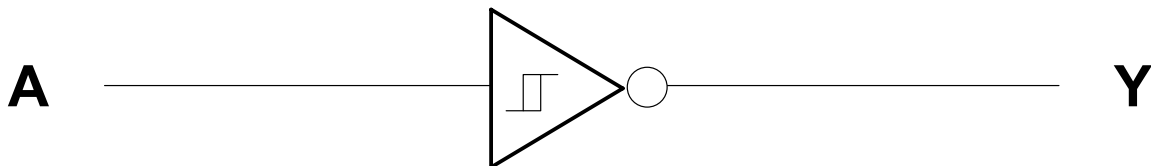
SNx4AHC14 器件包含六个独立的反相器。这些器件执行布尔函数  $Y = \bar{A}$ 。

每个电路均用作独立反相器，但出于施密特触发器操作方面的原因，对于正向 ( $V_{T+}$ ) 和负向 ( $V_{T-}$ ) 信号，这些反相器可能具有不同的输入阈值。

#### 器件信息

| 器件型号              | 额定值 | 封装 <sup>(1)</sup>  |
|-------------------|-----|--------------------|
| SN54AHC14         | 军用  | J ( CDIP , 14 )    |
|                   |     | W ( CFP , 14 )     |
|                   |     | FK ( LCCC , 20 )   |
|                   |     | BQA ( WQFN , 14 )  |
| SN74AHC14         | 商用级 | D ( SOIC , 14 )    |
|                   |     | DB ( SSOP , 14 )   |
|                   |     | N ( PDIP , 14 )    |
|                   |     | NS ( SO , 14 )     |
|                   |     | PW ( TSSOP , 14 )  |
|                   |     | DGV ( TVSOP , 14 ) |
|                   |     | RGY ( VQFN , 14 )  |
| BQA ( WQFN , 14 ) |     |                    |

(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。



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逻辑图 ( 正逻辑 )



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## 4 Pin Configuration and Functions

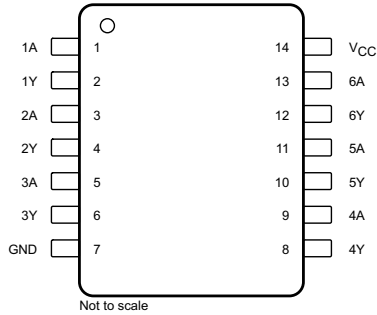


图 4-1. D, DB, DGV, J, N, NS, PW, or W Package, 14-Pin SOIC, SSOP, TVSOP, CDIP, PDIP, SO, TSSOP, or CFP (Top View)

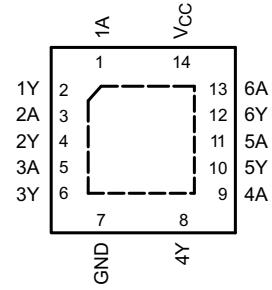


图 4-2. RGY or BQA Package, 14-Pin VQFN or WQFN (Top View)

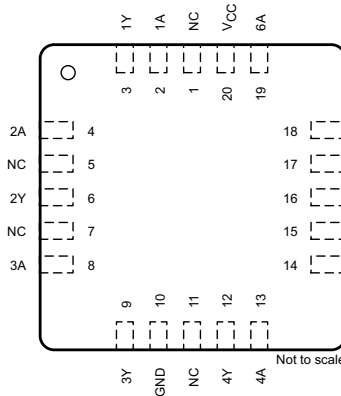


图 4-3. FK Package, 20-Pin LCCC (Top View)

表 4-1. Pin Functions

| NAME            | PIN   |                     | TYPE <sup>(1)</sup> | DESCRIPTION            |
|-----------------|---|---------------------|---------------------|------------------------|
|                 | SOIC, SSOP, TVSOP, CDIP, PDIP, SO, TSSOP, CFP, VQFN | LCCC                |                     |                        |
| 1A              | 1   | 2                   | I                   | Channel 1 Input        |
| 1Y              | 2   | 3                   | O                   | Channel 1 Output       |
| 2A              | 3   | 4                   | I                   | Channel 2 Input        |
| 2Y              | 4   | 6                   | O                   | Channel 2 Output       |
| 3A              | 5   | 8                   | I                   | Channel 3 Input        |
| 3Y              | 6   | 9                   | O                   | Channel 3 Output       |
| 4A              | 9   | 13                  | I                   | Channel 4 Input        |
| 4Y              | 8   | 12                  | O                   | Channel 4 Output       |
| 5A              | 11  | 16                  | I                   | Channel 5 Input        |
| 5Y              | 10  | 14                  | O                   | Channel 5 Output       |
| 6A              | 13  | 19                  | I                   | Channel 6 Input        |
| 6Y              | 12  | 18                  | O                   | Channel 6 Output       |
| GND             | 7   | 10                  | —                   | Ground                 |
| NC              | —   | 1, 5, 7, 11, 15, 17 | —                   | No internal connection |
| V <sub>CC</sub> | 14  | 20                  | —                   | Power supply           |

(1) I = input, O = output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

|   |  | MIN  | MAX                   | UNIT |
|---|--|--|-----------------------|------|
| V <sub>CC</sub>                                   | Supply voltage                         | - 0.5  | 7                     | V    |
| V <sub>I</sub> <sup>(2)</sup>                     | Input voltage                          | - 0.5  | 7                     | V    |
| V <sub>O</sub> <sup>(2)</sup>                     | Output voltage                         | - 0.5  | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>                                   | Input clamp current                    | V <sub>I</sub> < 0                                     | - 20                  | mA   |
| I <sub>OK</sub>                                   | Output clamp current                   | V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> | ±20                   | mA   |
| I <sub>O</sub>                                    | Continuous output current              | V <sub>O</sub> = 0 to V <sub>CC</sub>                  | ±25                   | mA   |
| Continuous current through V <sub>CC</sub> or GND |  |  | ±50                   | mA   |
| T <sub>J</sub>                                    | Virtual operating junction temperature |  | 150                   | °C   |
| T <sub>stg</sub>                                  | 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, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. 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.

### 5.2 ESD Ratings

|                    |                         | VALUE  | UNIT  |
|--------------------|-------------------------|--|-------|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)</sup>              | ±2000 |
|                    |                         | Charged-device model (CDM), per JEDEC specification JESD22-C101 <sup>(2)</sup> | ±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.

### 5.3 Recommended Operating Conditions

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

|                 |                                | MIN                             | MAX             | UNIT |
|-----------------|--------------------------------|---------------------------------|-----------------|------|
| V <sub>CC</sub> | Supply voltage                 | 2                               | 5.5             | V    |
| V <sub>I</sub>  | Input voltage                  | 0                               | 5.5             | V    |
| V <sub>O</sub>  | Output voltage                 | 0                               | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level output current      | V <sub>CC</sub> = 2 V           | - 50            | μA   |
|                 |                                | V <sub>CC</sub> = 3.3 V ± 0.3 V | - 4             | mA   |
|                 |                                | V <sub>CC</sub> = 5 V ± 0.5 V   | - 8             |      |
| I <sub>OL</sub> | Low-level output current       | V <sub>CC</sub> = 2 V           | 50              | μA   |
|                 |                                | V <sub>CC</sub> = 3.3 V ± 0.3 V | 4               | mA   |
|                 |                                | V <sub>CC</sub> = 5 V ± 0.5 V   | 8               |      |
| T <sub>A</sub>  | Operating free-air temperature | SN54AHC14                       | - 55            | °C   |
|                 |                                | SN74AHC14                       | - 40            |      |

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. See TI application report, [Implications of Slow or Floating CMOS Inputs](#) (SCBA004).

## 5.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74AHC14 |           |             |          |         |            |            |            | UNIT |
|-------------------------------|--|-----------|-----------|-------------|----------|---------|------------|------------|------------|------|
|                               |  | D (SOIC)  | DB (SSOP) | DGV (TVSOP) | N (PDIP) | NS (SO) | PW (TSSOP) | RGY (VQFN) | BQA (WQFN) |      |
|                               |  | 14 PINS   | 14 PINS   | 14 PINS     | 14 PINS  | 14 PINS | 14 PINS    | 14 PINS    | 14 PINS    |      |
| $R_{\theta JA}$               | Junction-to-ambient thermal resistance       | 124.5     | 137.8     | 141.9       | 61.9     | 94.7    | 147.7      | 87.1       | 88.3       | °C/W |
| $R_{\theta JC(top)}$          | Junction-to-case (top) thermal resistance    | 78.8      | 90        | 61.1        | 49.5     | 52.5    | 77.4       | 92.6       | 90.9       | °C/W |
| $R_{\theta JB}$               | Junction-to-board thermal resistance         | 81        | 98.3      | 71.3        | 41.7     | 53.4    | 90.9       | 62.5       | 56.8       | °C/W |
| $\psi_{JT}$                   | Junction-to-top characterization parameter   | 37        | 42.7      | 9.7         | 34.7     | 21.3    | 27.2       | 22.8       | 9.9        | °C/W |
| $\psi_{JB}$                   | Junction-to-board characterization parameter | 80.6      | 97        | 70.6        | 41.7     | 53.1    | 90.2       | 61.7       | 56.7       | °C/W |
| $R_{\theta JC(bot)}$          | Junction-to-case (bottom) thermal resistance | N/A       | N/A       | N/A         | N/A      | N/A     | N/A        | 45.1       | 33.4       | °C/W |

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

## 5.5 Electrical Characteristics

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

| PARAMETER                                      |  | TEST CONDITIONS |                          | MIN  | TYP | MAX  | UNIT |
|--|--|-----------------|--------------------------|------|-----|------|------|
| $V_{T+}$                                       | Positive-going input threshold voltage       |                 | $V_{CC} = 3\text{ V}$    | 1.2  |     | 2.2  | V    |
|  |  |                 | $V_{CC} = 4.5\text{ V}$  | 1.75 |     | 3.15 |      |
|  |  |                 | $V_{CC} = 5.5\text{ V}$  | 2.15 |     | 3.85 |      |
| $V_{T-}$                                       | Negative-going input threshold voltage       |                 | $V_{CC} = 3\text{ V}$    | 0.9  |     | 1.9  | V    |
|  |  |                 | $V_{CC} = 4.5\text{ V}$  | 1.35 |     | 2.75 |      |
|  |  |                 | $V_{CC} = 5.5\text{ V}$  | 1.65 |     | 3.35 |      |
| $\Delta V_T$                                   | Hysteresis ( $V_{T+} - V_{T-}$ )             |                 | $V_{CC} = 3\text{ V}$    | 0.3  |     | 1.2  | V    |
|  |  |                 | $V_{CC} = 4.5\text{ V}$  | 0.4  |     | 1.4  |      |
|  |  |                 | $V_{CC} = 5.5\text{ V}$  | 0.5  |     | 1.6  |      |
| $V_{OH}$                                       | $I_{OH} = -50\text{ }\mu\text{A}$            |                 | $V_{CC} = 2\text{ V}$    | 1.9  |     | 2    | V    |
|  |  |                 | $V_{CC} = 3\text{ V}$    | 2.9  |     | 3    |      |
|  |  |                 | $V_{CC} = 4.5\text{ V}$  | 4.4  |     | 4.5  |      |
|  | $I_{OH} = -4\text{ mA}, V_{CC} = 3\text{ V}$ |                 | $T_A = 25^\circ\text{C}$ | 2.58 |     |      |      |
|  |  |                 | SNx4AHC14                | 2.48 |     |      |      |
|  |  |                 | $T_A = 25^\circ\text{C}$ | 3.94 |     |      |      |
| $I_{OL} = -8\text{ mA}, V_{CC} = 4.5\text{ V}$ |  | SNx4AHC14       | 3.8                      |      |     |      |      |

## 5.5 Electrical Characteristics (续)

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

| PARAMETER                            |  | TEST CONDITIONS                                     | MIN                                  | TYP  | MAX           | UNIT    |      |
|--------------------------------------|--|---|--------------------------------------|------|---------------|---------|------|
| $V_{OL}$                             | $I_{OH} = 50 \mu A$                                    | $V_{CC} = 2 V$                                      |                                      |      | 0.1           | V       |      |
|                                      |  | $V_{CC} = 3 V$                                      |                                      |      | 0.1           |         |      |
|                                      |  | $V_{CC} = 4.5 V$                                    |                                      |      | 0.1           |         |      |
|                                      | $I_{OH} = 4 mA, V_{CC} = 3 V$                          | $T_A = 25^\circ C$                                  |                                      |      | 0.36          |         |      |
|                                      |  | SN54AHC14   |                                      |      | 0.5           |         |      |
|                                      |  | SN74AHC14   | $T_A = -40^\circ C$ to $85^\circ C$  |      |               |         | 0.44 |
|                                      |  |   | $T_A = -40^\circ C$ to $125^\circ C$ |      |               |         | 0.5  |
|                                      | $I_{OL} = 8 mA, V_{CC} = 4.5 V$                        | $T_A = 25^\circ C$                                  |                                      |      | 0.36          |         |      |
|                                      |  | SN54AHC14   |                                      |      | 0.5           |         |      |
|                                      |  | SN74AHC14   | $T_A = -40^\circ C$ to $85^\circ C$  |      |               |         | 0.44 |
| $T_A = -40^\circ C$ to $125^\circ C$ |  |   |                                      |      | 0.5           |         |      |
| $I_I$                                | $V_I = 5.5 V$ or GND,<br>$V_{CC} = 0 V$ to $5.5 V$     | $T_A = 25^\circ C$                                  |                                      |      | $\pm 0.1$     | $\mu A$ |      |
|                                      |  | SNx4AHC14   |                                      |      | $\pm 1^{(1)}$ |         |      |
| $I_{CC}$                             | $V_I = V_{CC}$ or GND, $I_O = 0$ ,<br>$V_{CC} = 5.5 V$ | $T_A = 25^\circ C$                                  |                                      |      | 1             | $\mu A$ |      |
|                                      |  | SNx4AHC14   |                                      |      | 20            |         |      |
| $C_I$                                | $V_I = V_{CC}$ or GND, $V_{CC} = 5 V$                  | $T_A = 25^\circ C$                                  |                                      | 2    | 10            | pF      |      |
|                                      |  | SN74AHC14   |                                      |      | 10            |         |      |
| $C_{pd}$                             | Power dissipation capacitance                          | No load, $f = 1 MHz$ , $V_{CC} = 5 V$               |                                      | 9    |               | pF      |      |
| <b>NOISE<sup>(2)</sup></b>           |  |   |                                      |      |               |         |      |
| $V_{OL(P)}$                          | Quiet output, maximum dynamic $V_{OL}$                 | $V_{CC} = 5 V$ , $C_L = 50 pF$ , $T_A = 25^\circ C$ |                                      | 0.8  |               | V       |      |
| $V_{OL(V)}$                          | Quiet output, minimum dynamic $V_{OL}$                 | $V_{CC} = 5 V$ , $C_L = 50 pF$ , $T_A = 25^\circ C$ |                                      | -0.4 |               | V       |      |
| $V_{OH(V)}$                          | Quiet output, minimum dynamic $V_{OH}$                 | $V_{CC} = 5 V$ , $C_L = 50 pF$ , $T_A = 25^\circ C$ |                                      | 4.6  |               | V       |      |
| $V_{IH(D)}$                          | High-level dynamic input voltage                       | $V_{CC} = 5 V$ , $C_L = 50 pF$ , $T_A = 25^\circ C$ |                                      | 3.5  |               | V       |      |
| $V_{IL(D)}$                          | Low-level dynamic input voltage                        | $V_{CC} = 5 V$ , $C_L = 50 pF$ , $T_A = 25^\circ C$ |                                      |      | 1.5           | V       |      |

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at  $V_{CC} = 0 V$ .

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

### 5.6 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$

$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  and over operating free-air temperature range (unless otherwise noted; see [Parameter Measurement Information](#))

| PARAMETER | TEST CONDITIONS                                    | MIN                      | TYP                | MAX                 | UNIT |
|-----------|--|--------------------------|--------------------|---------------------|------|
| $t_{PLH}$ | From A (input) to Y (output), $C_L = 15\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 8.3 <sup>(1)</sup> | 12.8 <sup>(1)</sup> | ns   |
|           |  | SN54AHC14                | 1 <sup>(1)</sup>   | 15 <sup>(1)</sup>   |      |
|           |  | SN74AHC14                | 1                  | 16                  |      |
| $t_{PHL}$ | From A (input) to Y (output), $C_L = 15\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 8.3 <sup>(1)</sup> | 12.8 <sup>(1)</sup> | ns   |
|           |  | SN54AHC14                | 1 <sup>(1)</sup>   | 15 <sup>(1)</sup>   |      |
|           |  | SN74AHC14                | 1                  | 16                  |      |
| $t_{PLH}$ | From A (input) to Y (output), $C_L = 50\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 10.8               | 16.3                | ns   |
|           |  | SN54AHC14                | 1                  | 18.5                |      |
|           |  | SN74AHC14                | 1                  | 19.5                |      |
| $t_{PHL}$ | From A (input) to Y (output), $C_L = 50\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 10.8               | 16.3                | ns   |
|           |  | SN54AHC14                | 1                  | 18.5                |      |
|           |  | SN74AHC14                | 1                  | 19.5                |      |

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

### 5.7 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  and over operating free-air temperature range (unless otherwise noted; see [Parameter Measurement Information](#))

| PARAMETER | TEST CONDITIONS                                    | MIN                      | TYP                | MAX                | UNIT |
|-----------|--|--------------------------|--------------------|--------------------|------|
| $t_{PLH}$ | From A (input) to Y (output), $C_L = 15\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 5.5 <sup>(1)</sup> | 8.6 <sup>(1)</sup> | ns   |
|           |  | SN54AHC14                | 1 <sup>(1)</sup>   | 10 <sup>(1)</sup>  |      |
|           |  | SN74AHC14                | 1                  | 10                 |      |
| $t_{PHL}$ | From A (input) to Y (output), $C_L = 15\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 5.5 <sup>(1)</sup> | 8.6 <sup>(1)</sup> | ns   |
|           |  | SN54AHC14                | 1 <sup>(1)</sup>   | 10 <sup>(1)</sup>  |      |
|           |  | SN74AHC14                | 1                  | 10                 |      |
| $t_{PLH}$ | From A (input) to Y (output), $C_L = 50\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 7                  | 10.6               | ns   |
|           |  | SNx4AHC14                | 1                  | 12                 |      |
| $t_{PHL}$ | From A (input) to Y (output), $C_L = 50\text{ pF}$ | $T_A = 25^\circ\text{C}$ | 7                  | 10.6               | ns   |
|           |  | SNx4AHC14                | 1                  | 12                 |      |

### 5.8 Typical Characteristics

$C_L = 50\text{ pF}$  (unless otherwise noted)

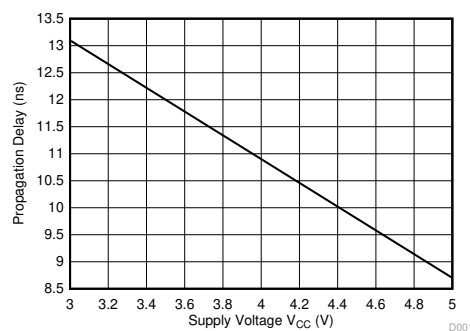


图 5-1. Propagation Delay vs Supply Voltage

## 6 Parameter Measurement Information

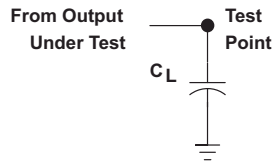


图 6-1. Load Circuit For Totem-Pole Outputs

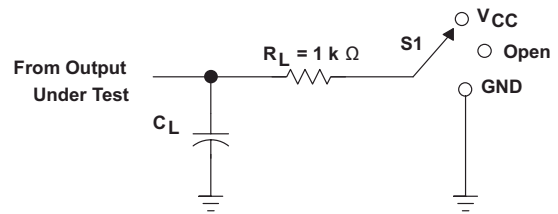


图 6-2. Load Circuit For 3-State and Open-Drain Outputs

表 6-1. Measurement Information

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

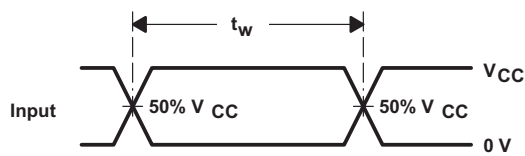


图 6-3. Voltage Waveforms Pulse Duration

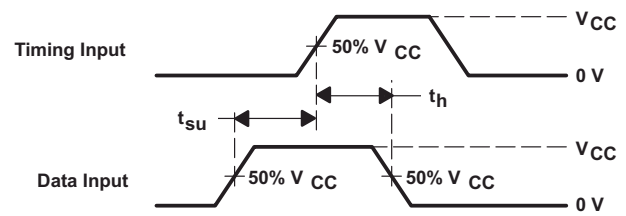


图 6-4. Voltage Waveforms Setup and Hold Times

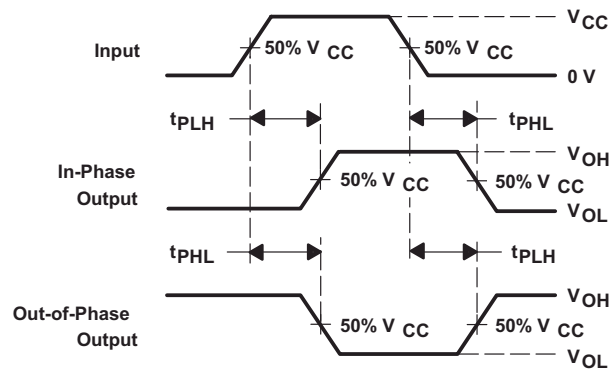
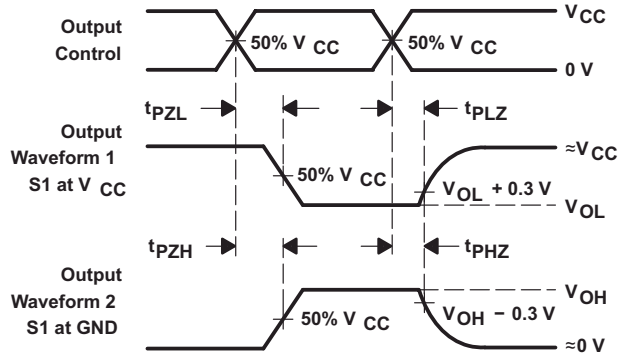


图 6-5. Voltage Waveforms Propagation Delay Times Inverting and Noninverting Outputs



- A. C<sub>L</sub> 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<sub>O</sub> = 50 Ω, t<sub>r</sub> ≤ 3 ns, t<sub>f</sub> ≤ 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 6-6. Voltage Waveforms Enable and Disable Times Low- and High-Level Enabling**

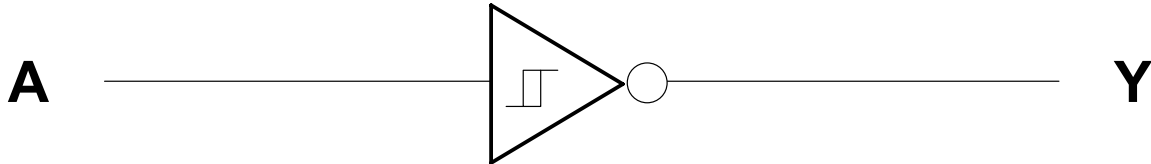
## 7 Detailed Description

### 7.1 Overview

The SNx4AHC14 Schmitt-Trigger devices contain six independent inverters. They perform the Boolean function  $Y = \bar{A}$  in positive logic.

Schmitt-Trigger inputs are designed to provide a minimum separation between positive and negative switching thresholds. This allows for noisy or slow inputs that would cause problems such as oscillation or excessive current draw with normal CMOS inputs.

### 7.2 Functional Block Diagram



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### 7.3 Feature Description

The wide operating range of the device allows it to be used in a variety of systems that use different logic levels. The output can drive up to 10 LSTTL loads each. The balanced drive outputs can source or sink 8 mA at 5-V  $V_{CC}$ .

### 7.4 Device Functional Modes

表 7-1 lists the functional modes of the SNx4AHC14.

表 7-1. Function Table

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

## 8 Application and Implementation

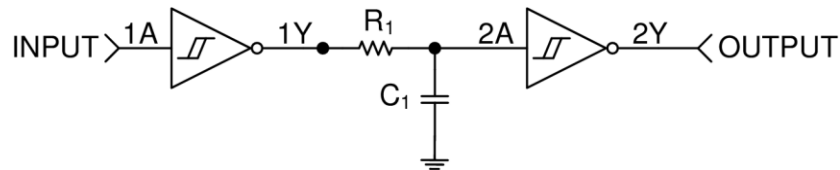
### 备注

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。

### 8.1 Application Information

The SN74AHC14 device is a Schmitt-Trigger input CMOS device that can be used for a multitude of inverting buffer type functions. The application shown here takes advantage of the Schmitt-Trigger inputs to produce a delay for a logic input.

### 8.2 Typical Application



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图 8-1. Simplified Application Schematic

#### 8.2.1 Design Requirements

This device uses CMOS technology. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. Parallel output drive can create fast edges into light loads so consider routing and load conditions to prevent ringing.

#### 8.2.2 Detailed Design Procedure

This circuit is designed around an RC network that produces a slow input to the second inverter. The RC time constant,  $\tau$ , is calculated from:  $\tau = RC$ .

The delay time for this circuit is from  $t_{\text{delay}(\text{min})} = -\ln |1 - V_{T+(\text{min})} / V_{CC}| \tau$  to  $t_{\text{delay}(\text{max})} = -\ln |1 - V_{T+(\text{max})} / V_{CC}| \tau$ . It must be noted that the delay is consistent for each device, but because the switching threshold is only ensured between the minimum and maximum value, the output pulse length varies between devices. These values must be calculated by using the minimum and maximum  $V_{T+}$  values in the [Electrical Characteristics](#).

The resistor value must be chosen such that the maximum current to and from the SN74AHC14 is 8 mA at  $5-V_{CC}$ .

### 8.2.3 Application Curve

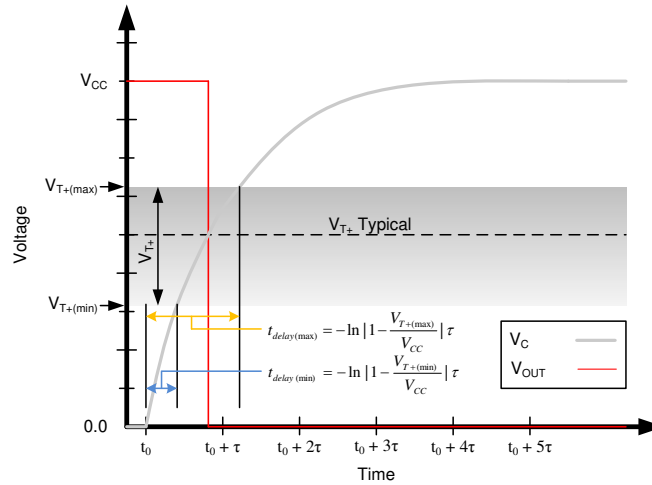


图 8-2. Ideal Capacitor Voltage and Output Voltage With Positive Switching Threshold

### 8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the [Recommended Operating Conditions](#). The  $V_{CC}$  terminal must have a good bypass capacitor to prevent power disturbance. TI recommends using a 0.1- $\mu\text{F}$  capacitor on the  $V_{CC}$  terminal, and must be placed as close as possible to the pin for best results.

### 8.4 Layout

#### 8.4.1 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 three of the four buffer gates are used. Such inputs must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. 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 are tied to GND or  $V_{CC}$ , whichever makes more sense or is more convenient. Floating outputs are generally acceptable, unless the part is a transceiver.

#### 8.4.2 Layout Example

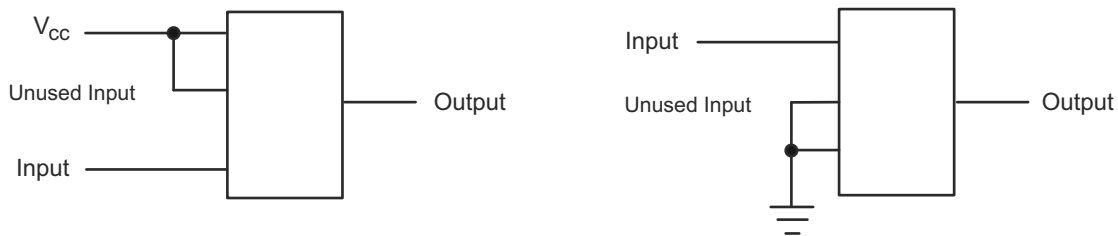


图 8-3. Layout Diagram

## 9 Device and Documentation Support

### 9.1 Documentation Support

#### 9.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [Implications of Slow or Floating CMOS Inputs application report](#)

### 9.2 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](http://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。

### 9.3 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](#)》。

### 9.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

### 9.5 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。

### 9.6 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。

## 10 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 (October 2023) to Revision P (February 2024) Page

- Updated R<sup>θ</sup> JA values: DB = 112.4 to 137.8, RGY = 63.8 to 87.1; Updated DB and RGY packages for R<sup>θ</sup> JC(top), R<sup>θ</sup> JB, ΨJT, ΨJB, and R<sup>θ</sup> JC(bot), all values in °C/W..... **5**

### Changes from Revision N (June 2023) to Revision O (October 2023) Page

- Deleted machine model..... **4**
- Updated R<sup>θ</sup> JA values: D = 99.3 to 124.5, PW = 128.8 to 147.7; Updated D and PW packages for R<sup>θ</sup> JC(top), R<sup>θ</sup> JB, ΨJT, ΨJB, and R<sup>θ</sup> JC(bot), all values in °C/W..... **5**

## 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<br>(1) | Material type<br>(2) | Package   Pins   | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)                 |
|---------------------------------|---------------|----------------------|------------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------------------|
| <a href="#">5962-9680201Q2A</a> | Active        | Production           | LCCC (FK)   20   | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201Q2A<br>SNJ54AHC<br>14FK |
| <a href="#">5962-9680201QCA</a> | Active        | Production           | CDIP (J)   14    | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QC<br>A<br>SNJ54AHC14J  |
| <a href="#">5962-9680201QDA</a> | NRND          | Production           | CFP (W)   14     | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QD<br>A<br>SNJ54AHC14W  |
| <a href="#">5962-9682001QCA</a> | Active        | Production           | CDIP (J)   14    | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9682001QC<br>A<br>SNJ54AHC08J  |
| <a href="#">5962-9682001QDA</a> | Active        | Production           | CFP (W)   14     | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9682001QD<br>A<br>SNJ54AHC08W  |
| <a href="#">SN74AHC14BQAR</a>   | Active        | Production           | WQFN (BQA)   14  | 3000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| SN74AHC14BQAR.A                 | Active        | Production           | WQFN (BQA)   14  | 3000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| <a href="#">SN74AHC14D</a>      | Obsolete      | Production           | SOIC (D)   14    | -                     | -           | Call TI                              | Call TI                           | -40 to 125   | AHC14                               |
| <a href="#">SN74AHC14DBR</a>    | Active        | Production           | SSOP (DB)   14   | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                |
| SN74AHC14DBR.A                  | Active        | Production           | SSOP (DB)   14   | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                |
| <a href="#">SN74AHC14DGVR</a>   | Active        | Production           | TVSOP (DGV)   14 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                |
| SN74AHC14DGVR.A                 | Active        | Production           | TVSOP (DGV)   14 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                |
| <a href="#">SN74AHC14DR</a>     | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| SN74AHC14DR.A                   | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| SN74AHC14DRE4                   | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| <a href="#">SN74AHC14DRG3</a>   | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| SN74AHC14DRG3.A                 | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| <a href="#">SN74AHC14DRG4</a>   | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| SN74AHC14DRG4.A                 | Active        | Production           | SOIC (D)   14    | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                               |
| <a href="#">SN74AHC14N</a>      | Active        | Production           | PDIP (N)   14    | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 125   | SN74AHC14N                          |
| SN74AHC14N.A                    | Active        | Production           | PDIP (N)   14    | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 125   | SN74AHC14N                          |

| Orderable part number          | Status<br>(1) | Material type<br>(2) | Package   Pins  | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)                     |
|--------------------------------|---------------|----------------------|-----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---|
| <a href="#">SN74AHC14NSR</a>   | Active        | Production           | SOP (NS)   14   | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                                   |
| SN74AHC14NSR.A                 | Active        | Production           | SOP (NS)   14   | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | AHC14                                   |
| <a href="#">SN74AHC14PW</a>    | Obsolete      | Production           | TSSOP (PW)   14 | -                     | -           | Call TI                              | Call TI                           | -40 to 125   | HA14                                    |
| <a href="#">SN74AHC14PWR</a>   | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14PWR.A                 | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| <a href="#">SN74AHC14PWRG3</a> | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14PWRG3.A               | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| <a href="#">SN74AHC14PWRG4</a> | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14PWRG4.A               | Active        | Production           | TSSOP (PW)   14 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| <a href="#">SN74AHC14RGYR</a>  | Active        | Production           | VQFN (RGY)   14 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14RGYR.A                | Active        | Production           | VQFN (RGY)   14 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14RGYRG4                | Active        | Production           | VQFN (RGY)   14 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| SN74AHC14RGYRG4.A              | Active        | Production           | VQFN (RGY)   14 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | HA14                                    |
| <a href="#">SNJ54AHC08J</a>    | Active        | Production           | CDIP (J)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9682001QC<br>A<br>SNJ54AHC08J      |
| <a href="#">SNJ54AHC08W</a>    | Active        | Production           | CFP (W)   14    | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9682001QD<br>A<br>SNJ54AHC08W      |
| <a href="#">SNJ54AHC14FK</a>   | Active        | Production           | LCCC (FK)   20  | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-<br>9680201Q2A<br>SNJ54AHC<br>14FK |
| SNJ54AHC14FK.A                 | Active        | Production           | LCCC (FK)   20  | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-<br>9680201Q2A<br>SNJ54AHC<br>14FK |
| <a href="#">SNJ54AHC14J</a>    | Active        | Production           | CDIP (J)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QC<br>A<br>SNJ54AHC14J      |
| SNJ54AHC14J.A                  | Active        | Production           | CDIP (J)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QC<br>A<br>SNJ54AHC14J      |

| Orderable part number       | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)                |
|-----------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|------------------------------------|
| <a href="#">SNJ54AHC14W</a> | NRND          | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QD<br>A<br>SNJ54AHC14W |
| SNJ54AHC14W.A               | NRND          | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9680201QD<br>A<br>SNJ54AHC14W |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **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.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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.

**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 SN54AHC14, SN74AHC14 :**

- Catalog : [SN74AHC14](#)
- Military : [SN54AHC14](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense 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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC14BQAR   | WQFN         | BQA             | 14   | 3000 | 180.0              | 12.4               | 2.8     | 3.3     | 1.1     | 4.0     | 12.0   | Q1            |
| SN74AHC14DBR    | SSOP         | DB              | 14   | 2000 | 330.0              | 16.4               | 8.35    | 6.6     | 2.4     | 12.0    | 16.0   | Q1            |
| SN74AHC14DGVR   | TVSOP        | DGV             | 14   | 2000 | 330.0              | 12.4               | 6.8     | 4.0     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14DR     | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74AHC14DRG3   | SOIC         | D               | 14   | 2500 | 330.0              | 16.8               | 6.5     | 9.5     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74AHC14DRG4   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74AHC14NSR    | SOP          | NS              | 14   | 2000 | 330.0              | 16.4               | 8.45    | 10.55   | 2.5     | 12.0    | 16.2   | Q1            |
| SN74AHC14PWR    | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14PWR    | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14PWRG3  | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14PWRG4  | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.3     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14PWRG4  | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC14RGYR   | VQFN         | RGY             | 14   | 3000 | 330.0              | 12.4               | 3.75    | 3.75    | 1.15    | 8.0     | 12.0   | Q1            |
| SN74AHC14RGYRG4 | 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) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC14BQAR   | WQFN         | BQA             | 14   | 3000 | 210.0       | 185.0      | 35.0        |
| SN74AHC14DBR    | SSOP         | DB              | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14DGVR   | TVSOP        | DGV             | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14DR     | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| SN74AHC14DRG3   | SOIC         | D               | 14   | 2500 | 364.0       | 364.0      | 27.0        |
| SN74AHC14DRG4   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| SN74AHC14NSR    | SOP          | NS              | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14PWR    | TSSOP        | PW              | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14PWR    | TSSOP        | PW              | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14PWRG3  | TSSOP        | PW              | 14   | 2000 | 364.0       | 364.0      | 27.0        |
| SN74AHC14PWRG4  | TSSOP        | PW              | 14   | 2000 | 367.0       | 367.0      | 35.0        |
| SN74AHC14PWRG4  | TSSOP        | PW              | 14   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74AHC14RGYR   | VQFN         | RGY             | 14   | 3000 | 360.0       | 360.0      | 36.0        |
| SN74AHC14RGYRG4 | VQFN         | RGY             | 14   | 3000 | 360.0       | 360.0      | 36.0        |

**TUBE**


\*All dimensions are nominal

| Device          | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9680201Q2A | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| 5962-9680201QDA | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| 5962-9682001QDA | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SN74AHC14N      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74AHC14N      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74AHC14N.A    | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74AHC14N.A    | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54AHC08W     | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SNJ54AHC14FK    | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54AHC14FK.A  | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54AHC14W     | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SNJ54AHC14W.A   | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |

## GENERIC PACKAGE VIEW

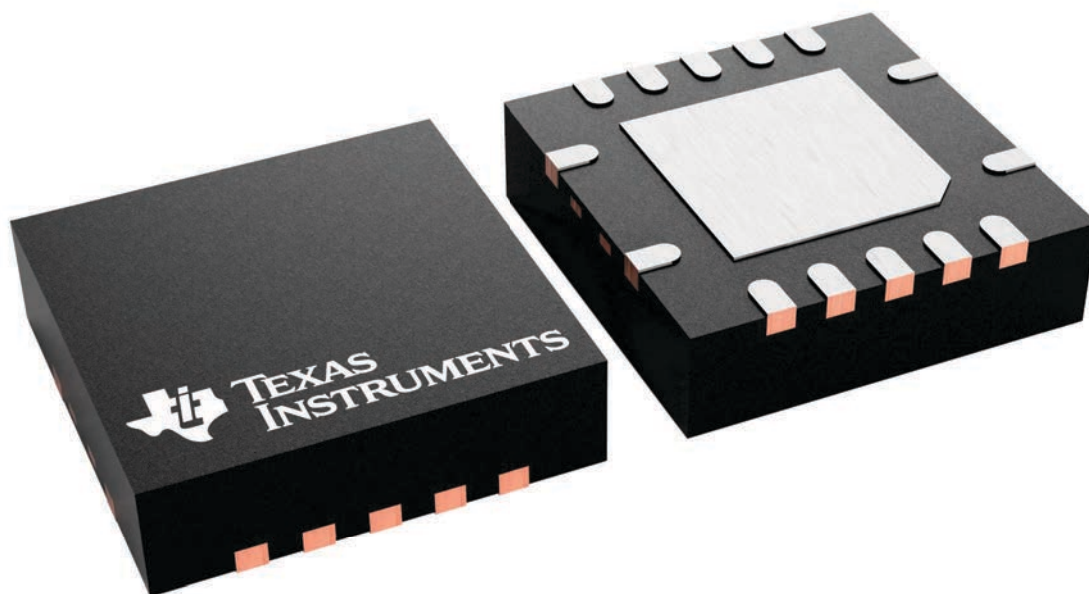
**RGY 14**

**VQFN - 1 mm max height**

3.5 x 3.5, 0.5 mm pitch

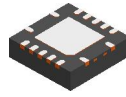
PLASTIC QUAD FLATPACK - NO LEAD

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



4231541/A

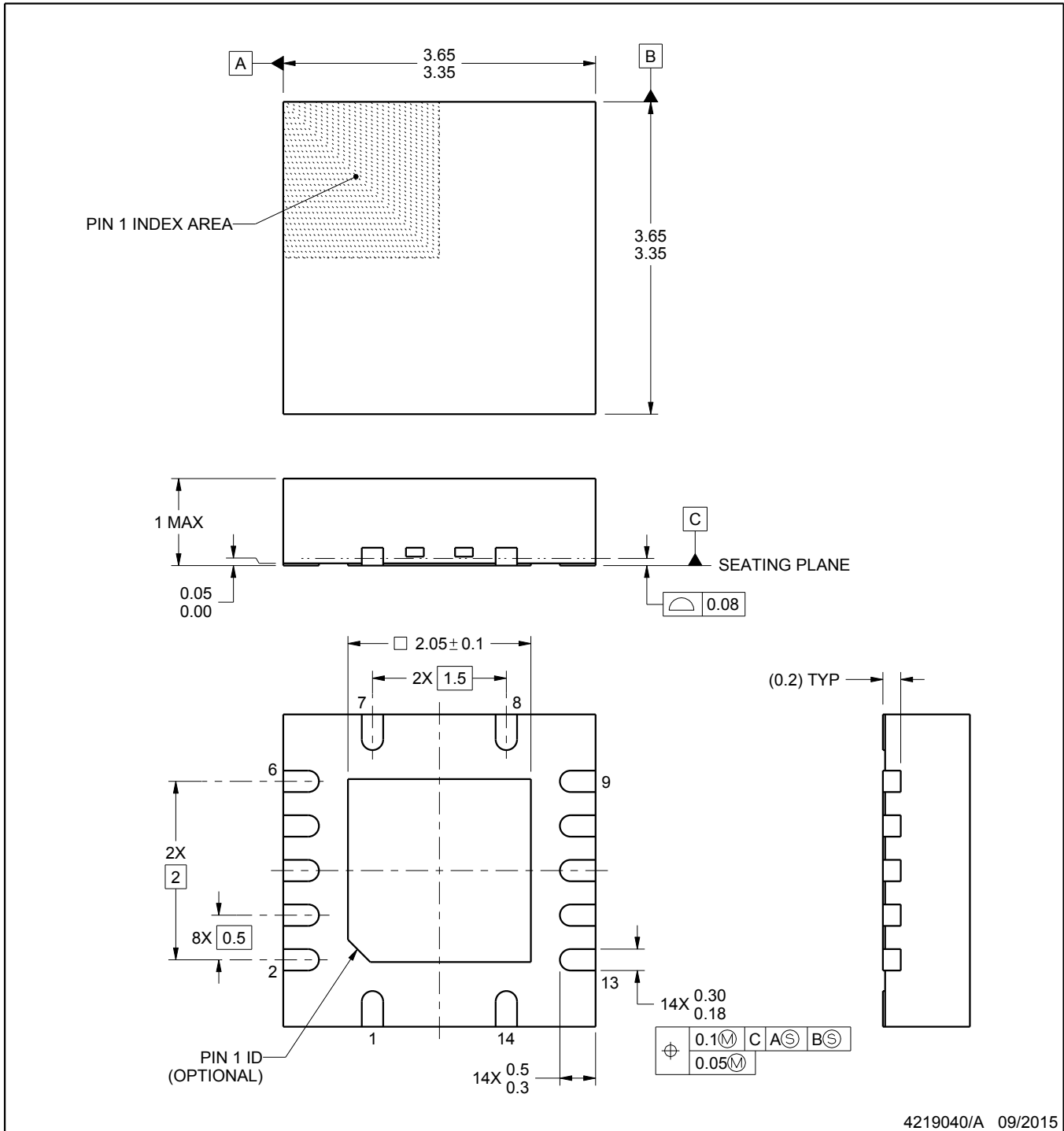
RGY0014A



PACKAGE OUTLINE

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



4219040/A 09/2015

NOTES:

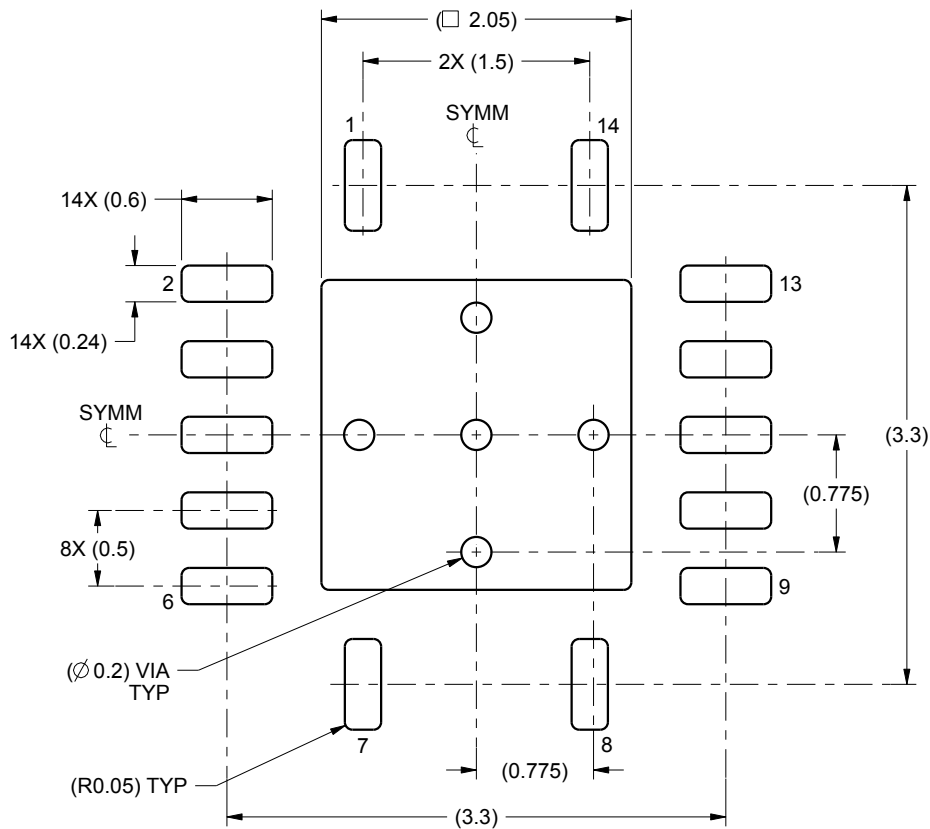
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

# EXAMPLE BOARD LAYOUT

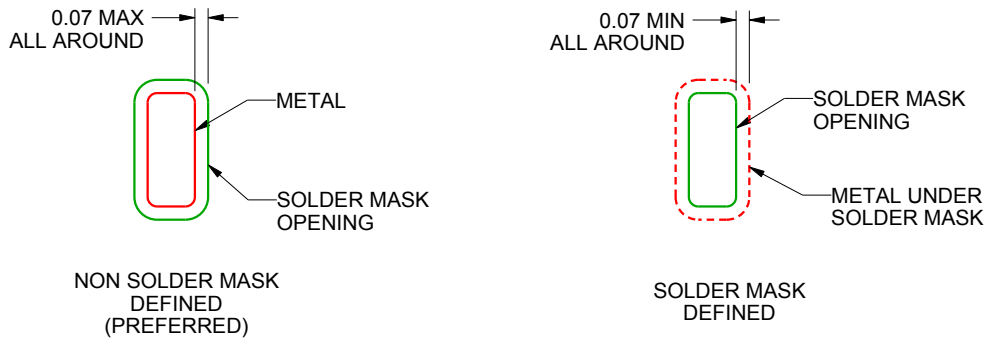
RGY0014A

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE  
SCALE:20X



SOLDER MASK DETAILS

4219040/A 09/2015

NOTES: (continued)

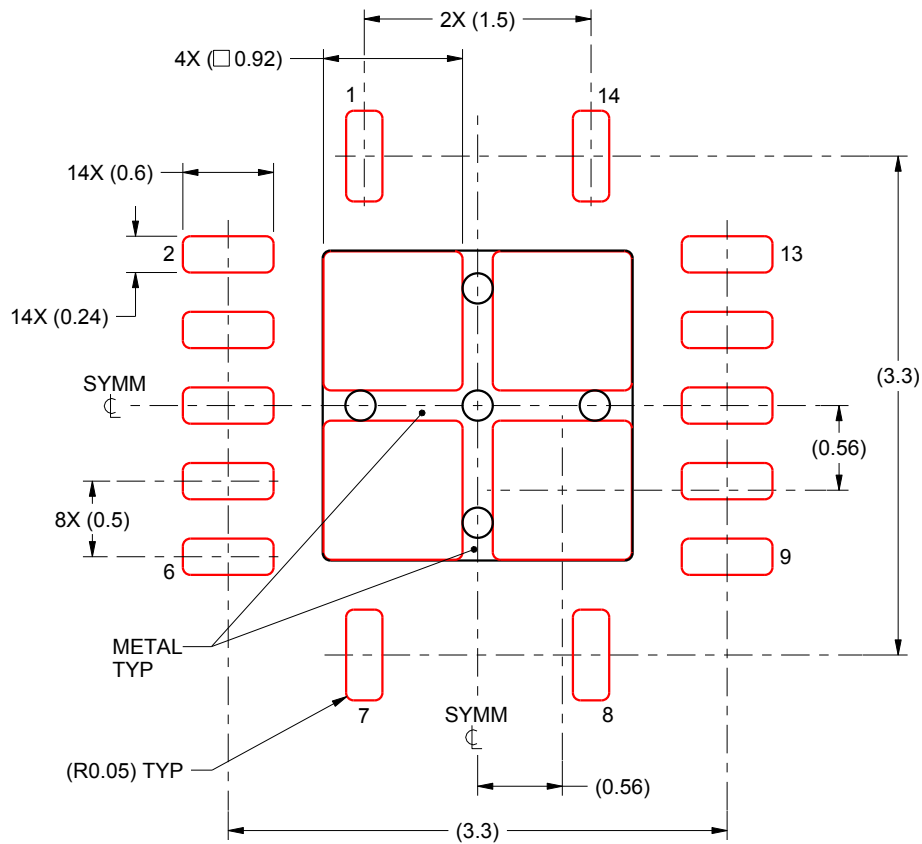
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slue271](http://www.ti.com/lit/slue271)).

# EXAMPLE STENCIL DESIGN

RGY0014A

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



**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.



# D0014A

# PACKAGE OUTLINE

## 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.

# EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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

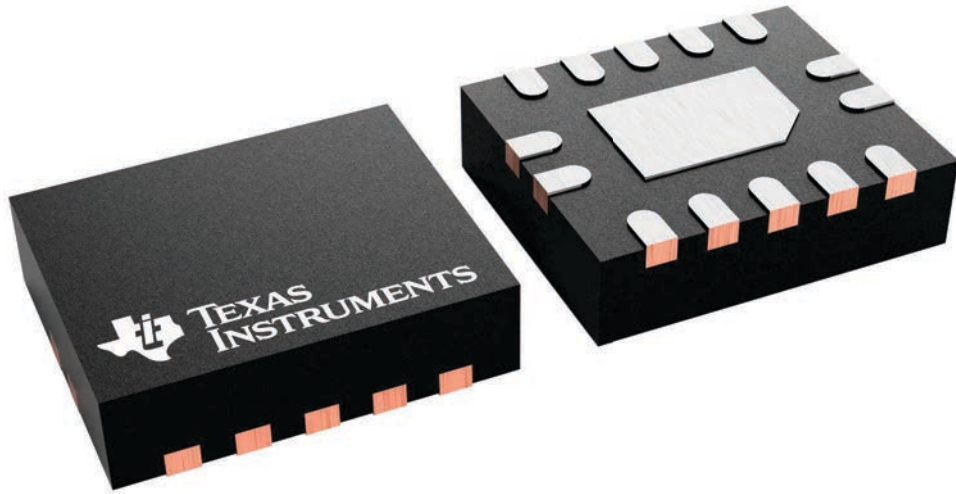
**BQA 14**

**WQFN - 0.8 mm max height**

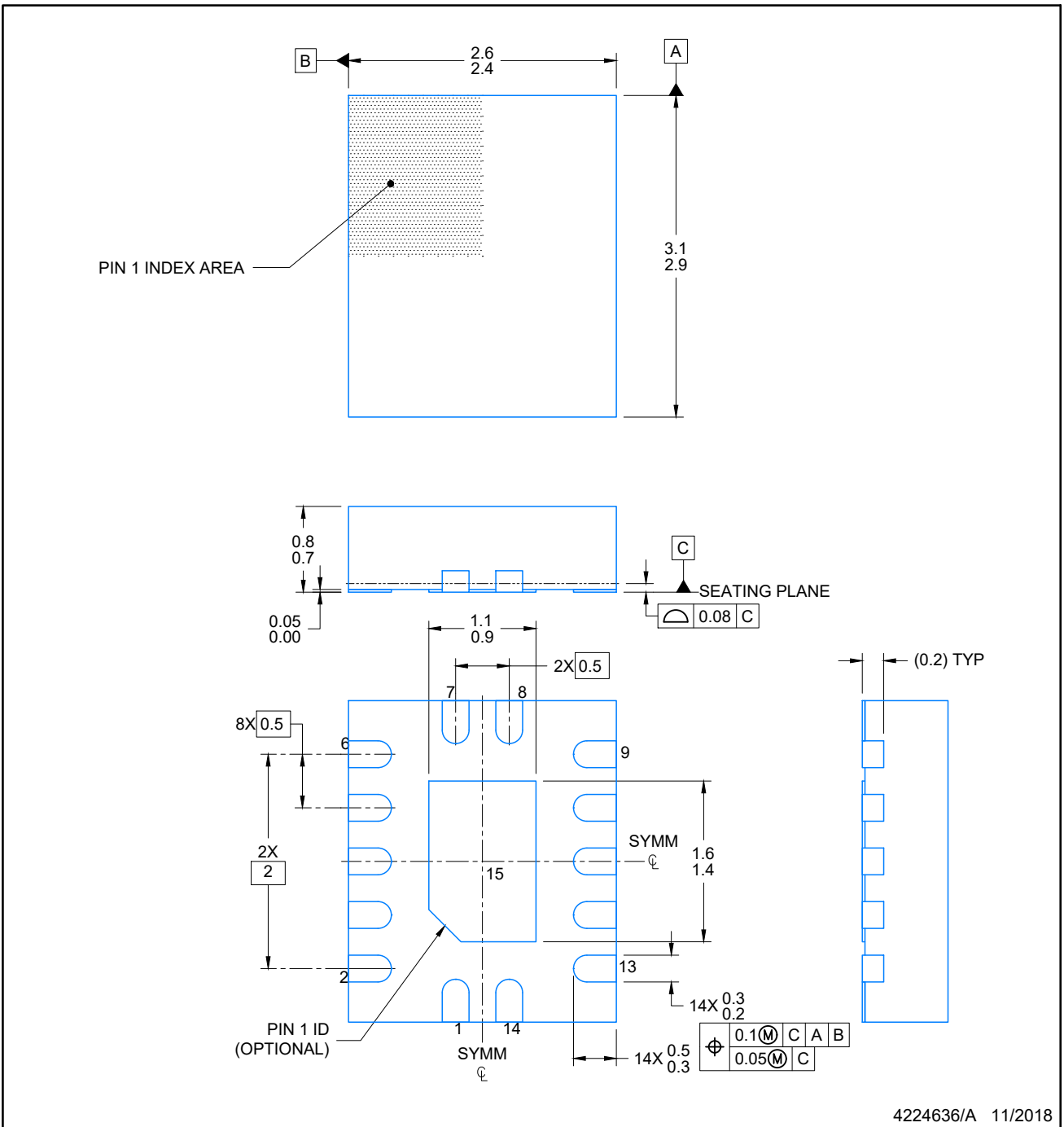
2.5 x 3, 0.5 mm pitch

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



4224636/A 11/2018

**NOTES:**

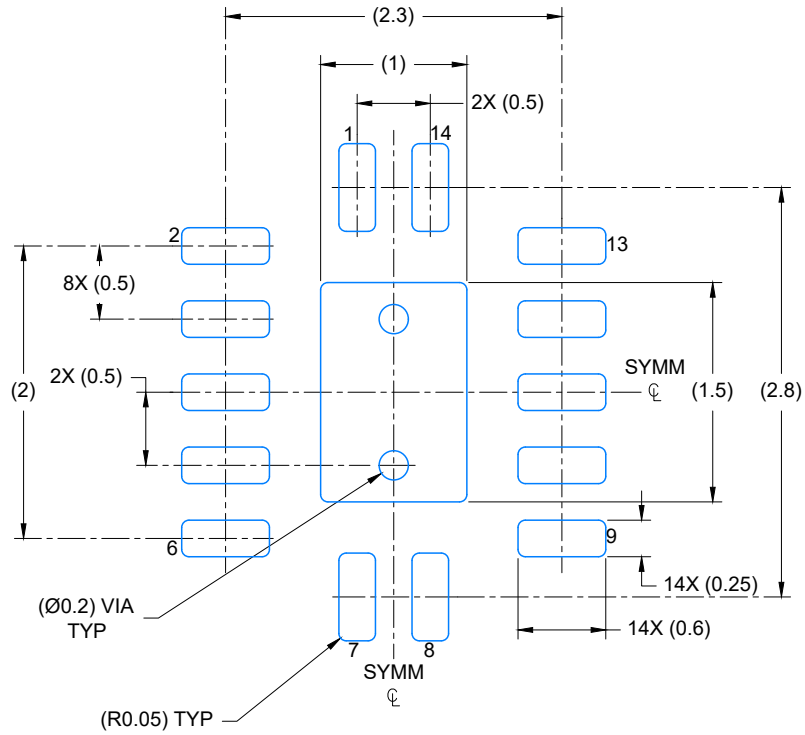
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.

# EXAMPLE BOARD LAYOUT

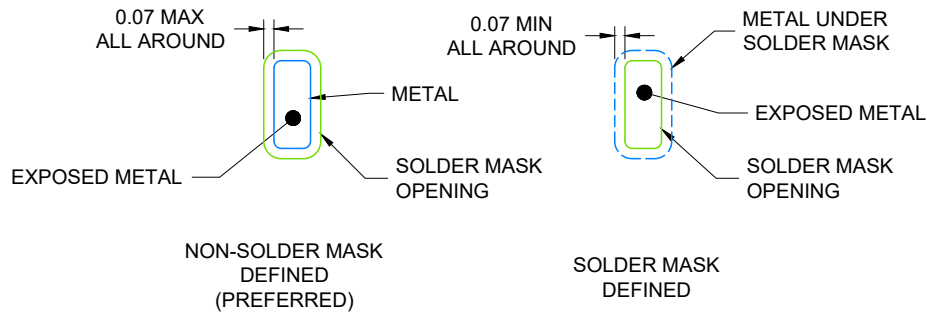
BQA0014A

WQFN - 0.8 mm max height

PLASTIC QUAD FLAT PACK-NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 20X



4224636/A 11/2018

NOTES: (continued)

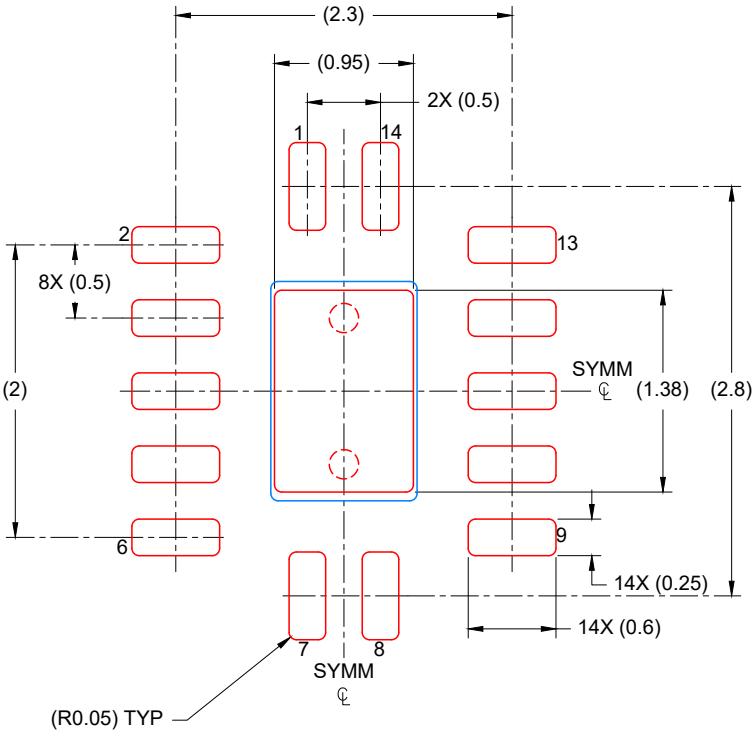
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented,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

# EXAMPLE STENCIL DESIGN

BQA0014A

WQFN - 0.8 mm max height

PLASTIC QUAD FLAT PACK-NO LEAD



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

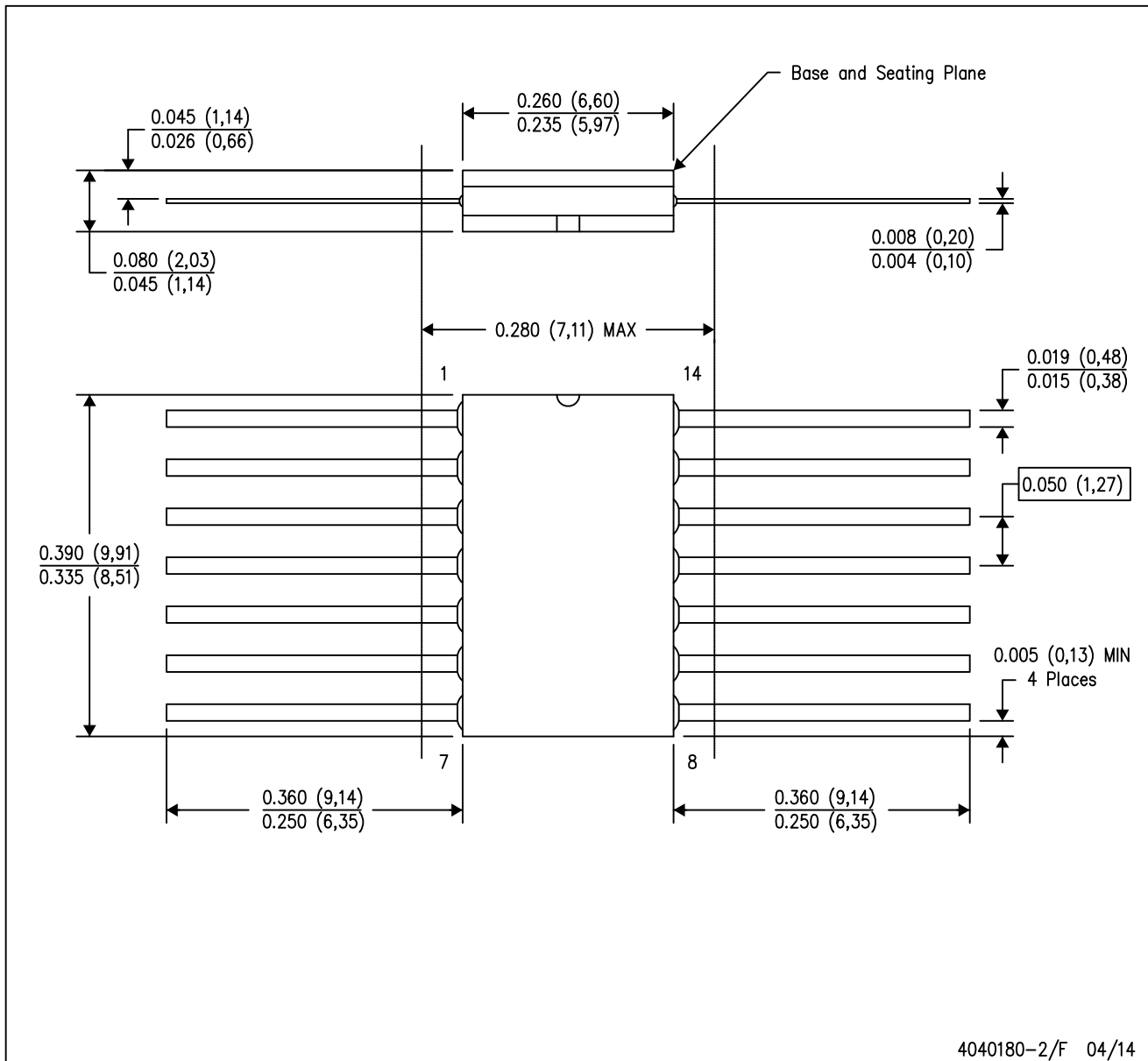
14-PINS SHOWN



- 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.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK

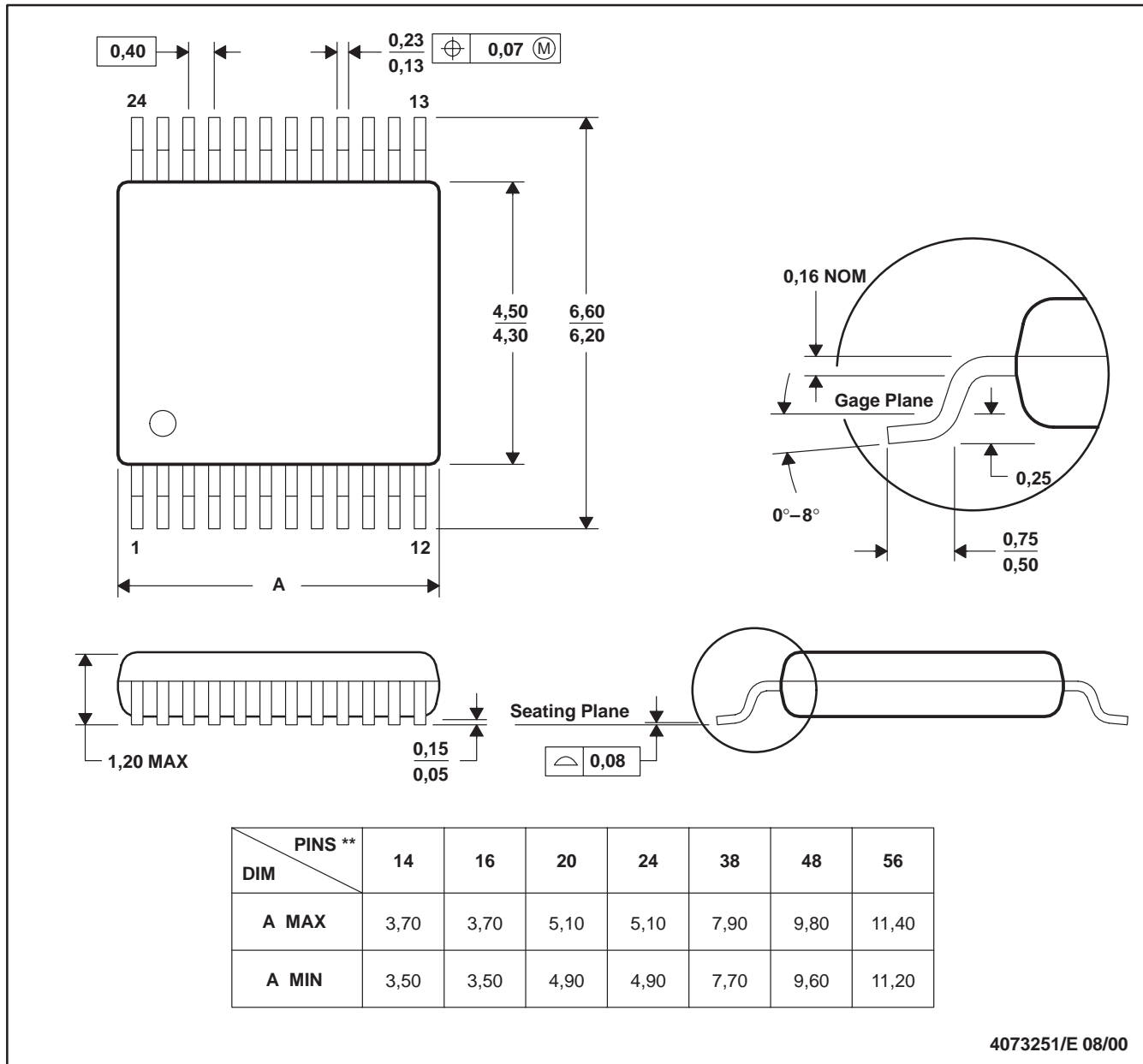


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP1-F14

DGV (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



4073251/E 08/00

- 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

# DB0014A



# PACKAGE OUTLINE

## 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.

# EXAMPLE BOARD LAYOUT

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



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.

# EXAMPLE STENCIL DESIGN

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

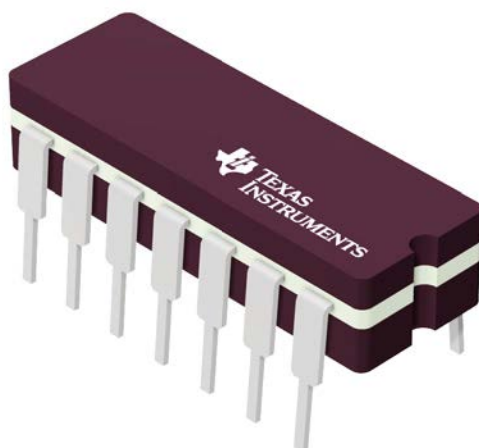
This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4229370VA\

J 14

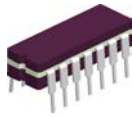
**GENERIC PACKAGE VIEW**  
**CDIP - 5.08 mm max height**  
CERAMIC DUAL IN LINE PACKAGE



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

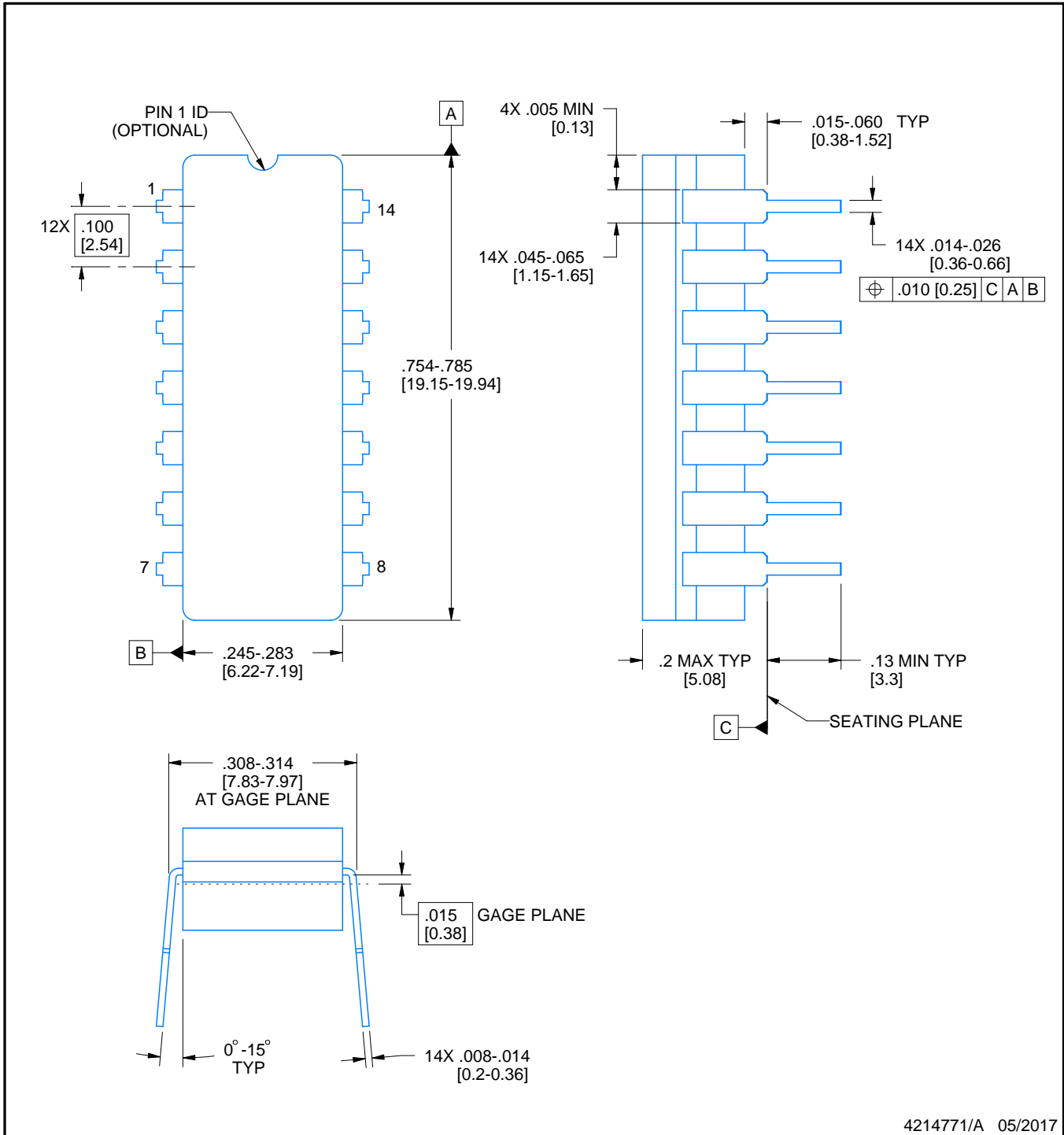
J0014A



# PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

**NOTES:**

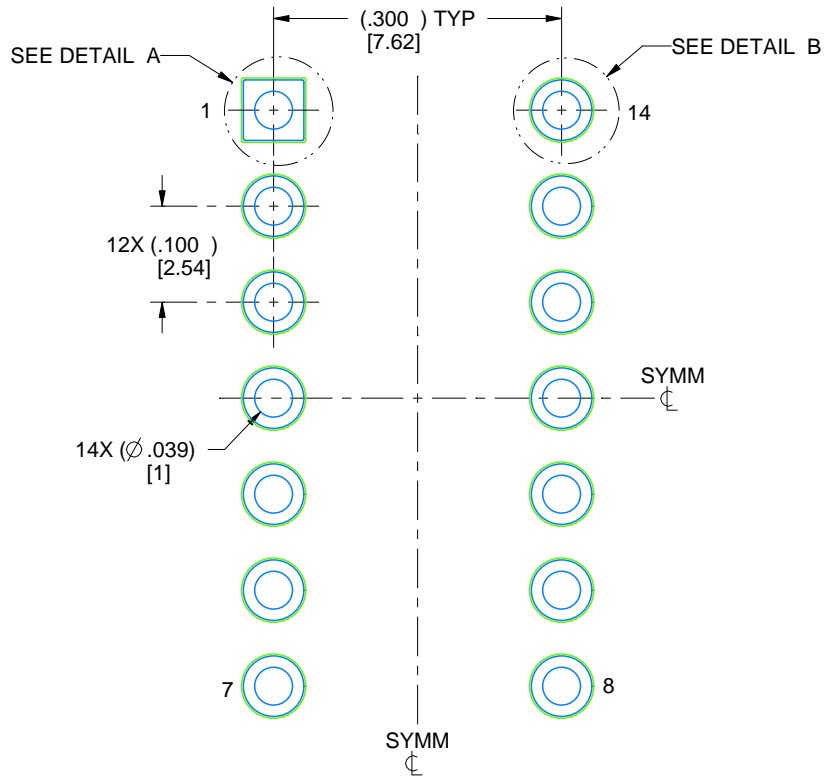
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with 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

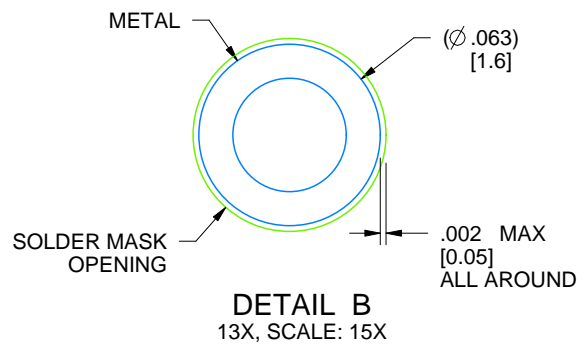
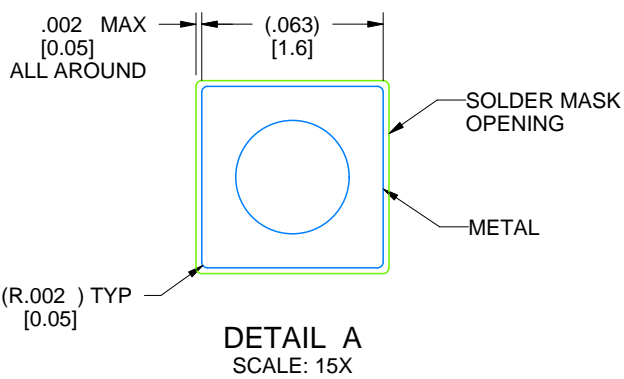
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



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



4214771/A 05/2017

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

4040049/E 12/2002

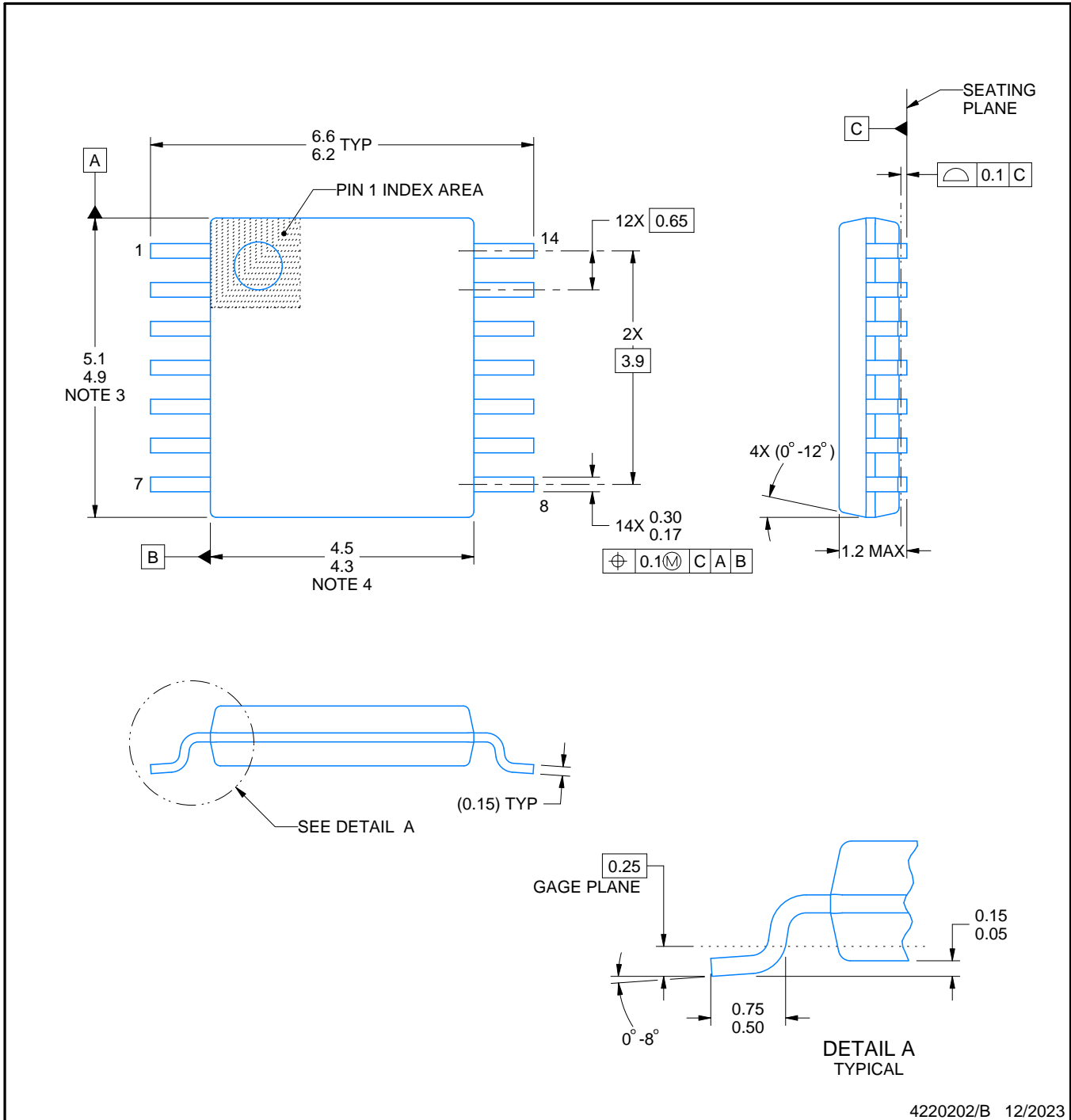
PW0014A



# PACKAGE OUTLINE

## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220202/B 12/2023

NOTES:

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

# EXAMPLE BOARD LAYOUT

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



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.

# EXAMPLE STENCIL DESIGN

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.

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最后更新日期：2025 年 10 月