

## SNx4AHC04 六路反相器

### 1 特性

- 工作电压范围为 2 V 至 5.5V
- 闩锁性能超过 250mA，符合 JESD 17 规范

### 2 说明

'AHC04 器件包含六个独立的反相器。这些器件执行布尔函数  $Y = \bar{A}$ 。

器件信息

| 器件型号      | 封装 <sup>1</sup>    | 封装尺寸 <sup>2</sup> |
|-----------|--------------------|-------------------|
| SN54AHC04 | J ( CDIP , 14 )    | 19.56mm x 6.67mm  |
|           | W ( CFP , 14 )     | 13.1 mm x 6.92 mm |
|           | FK ( LCCC , 20 )   | 8.9 mm x 8.9 mm   |
| SN74AHC04 | N ( PDIP , 14 )    | 19.3mm x 6.35mm   |
|           | D ( SOIC , 14 )    | 8.65mm x 3.91mm   |
|           | DB ( SSOP , 14 )   | 6.20mm x 5.30mm   |
|           | NS ( SOP , 14 )    | 12.60mm x 5.30mm  |
|           | PW ( TSSOP , 14 )  | 5.00mm x 4.40mm   |
|           | DGV ( TVSOP , 14 ) | 3.6mm x 4.4mm     |
|           | RGY ( VQFN , 14 )  | 3.50mm x 3.50mm   |
|           | BQA ( WQFN , 14 )  | 3mm x 2.5mm       |

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。
2. 封装尺寸（长 × 宽）为标称值，并包括引脚（如适用）。



图 2-1. 逻辑图，每个逻辑门（正逻辑）

## Table of Contents

|   |   |  |   |
|---|---|--|---|
| <b>1 特性</b> .....   | 1 | 5.9 Operating Characteristics.....                             | 6 |
| <b>2 说明</b> .....   | 1 | <b>6 Parameter Measurement Information</b> .....               | 7 |
| <b>3 Revision History</b> .....   | 2 | <b>7 Detailed Description</b> .....                            | 8 |
| <b>4 Pin Configuration and Functions</b> .....                              | 3 | 7.1 Functional Block Diagram.....                              | 8 |
| <b>5 Specifications</b> .....   | 4 | 7.2 Device Functional Modes.....                               | 8 |
| 5.1 Absolute Maximum Ratings.....   | 4 | <b>8 Device and Documentation Support</b> .....                | 9 |
| 5.2 ESD Ratings.....  | 4 | 8.1 Documentation Support (Analog).....                        | 9 |
| 5.3 Recommended Operating Conditions .....                                  | 4 | 8.2 接收文档更新通知.....  | 9 |
| 5.4 Thermal Information.....  | 5 | 8.3 支持资源.....  | 9 |
| 5.5 Electrical Characteristics.....   | 5 | 8.4 Trademarks.....  | 9 |
| 5.6 Switching Characteristics.....  | 5 | 8.5 静电放电警告.....  | 9 |
| 5.7 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ ..... | 6 | 8.6 术语表.....   | 9 |
| 5.8 Noise Characteristics.....  | 6 | <b>9 Mechanical, Packaging, and Orderable Information</b> .... | 9 |

### 3 Revision History

注：以前版本的页码可能与当前版本的页码不同

| <b>Changes from Revision O (May 2023) to Revision P (June 2023)</b>  | <b>Page</b> |
|--|-------------|
| • 向 <i>器件信息</i> 表中添加了 BQA 封装.....  | 1           |
| • 添加了 <i>器件和文档支持</i> 部分以及 <i>机械、封装和可订购信息</i> 部分.....   | 1           |
| • Updated thermal values for R <sup>θ</sup> JA: D = 86 to 124.5, PW = 113 to 147.7, all values in °C/W ..... | 5           |
| • Added thermal value for R <sup>θ</sup> JA: BQA = 88.3, all values in °C/W.....                             | 5           |

| <b>Changes from Revision N (May 2013) to Revision O (May 2023)</b> | <b>Page</b> |
|--|-------------|
| • 添加了 <i>封装信息表</i> 、 <i>引脚功能表</i> 和 <i>热性能信息表</i> .....            | 1           |

## 4 Pin Configuration and Functions

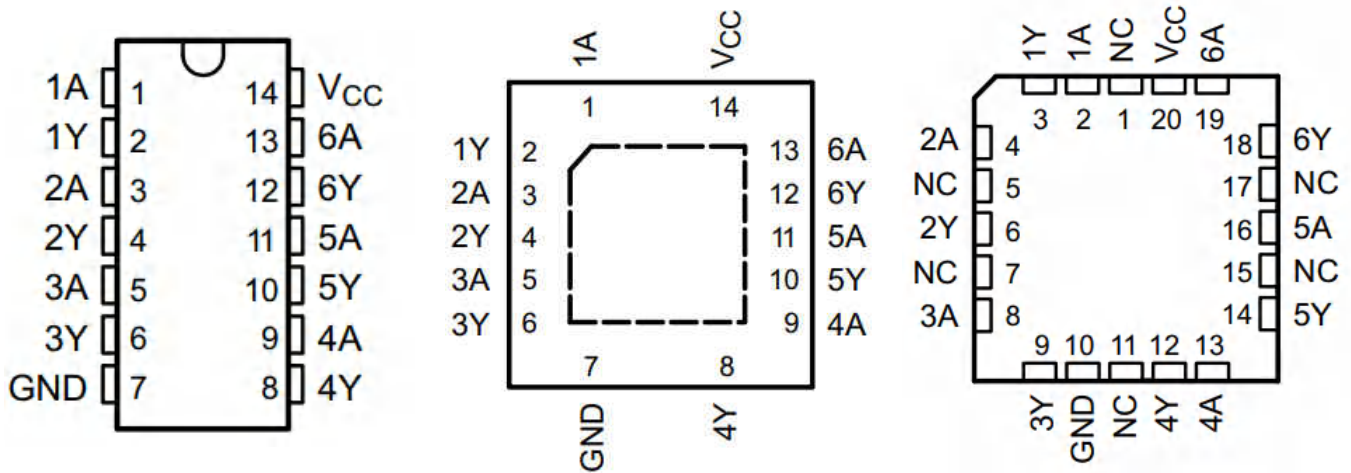


图 4-1. SN54AHC04 J or W Package SN74AHC04 D, DB, DGV, N, NS, or PW Package (Top View)

图 4-2. SN74AHC04 RGY or BQA Package (Top View)

图 4-3. SN54AHC04 FK Package (Top View)

表 4-1. Pin Functions

| NAME            | PIN                   |          |           |    | I/O | DESCRIPTION   |
|-----------------|-----------------------|----------|-----------|----|-----|---------------|
|                 | SN74AHC04             |          | SN54AHC04 |    |     |               |
|                 | D, DB, DGV, N, NS, PW | RGY, BQA | J, W      | FK |     |               |
| 1A              | 1                     | 1        | 1         | 2  | I   | 1A Input      |
| 1Y              | 2                     | 2        | 2         | 3  | O   | 1Y Output     |
| 2A              | 3                     | 3        | 3         | 4  | I   | 2A Input      |
| 2Y              | 4                     | 4        | 4         | 6  | O   | 2Y Output     |
| 3A              | 5                     | 5        | 5         | 8  | I   | 3A Input      |
| 3Y              | 6                     | 6        | 6         | 9  | O   | 3Y Output     |
| 4A              | 9                     | 9        | 9         | 13 | I   | 4A Input      |
| 4Y              | 8                     | 8        | 8         | 12 | O   | 4Y Output     |
| 5A              | 11                    | 11       | 11        | 16 | I   | 5A Input      |
| 5Y              | 10                    | 10       | 10        | 14 | I   | 5Y Output     |
| 6A              | 13                    | 13       | 13        | 19 | I   | 6A Input      |
| 6Y              | 12                    | 12       | 12        | 18 | O   | 6Y Output     |
| GND             | 7                     | 7        | 7         | 10 | —   | Ground Pin    |
| NC              | —                     | —        | —         | 1  | —   | No Connection |
|                 |                       |          |           | 5  |     |               |
|                 |                       |          |           | 7  |     |               |
|                 |                       |          |           | 11 |     |               |
|                 |                       |          |           | 15 |     |               |
| V <sub>CC</sub> | 14                    | 14       | 14        | 20 | —   | Power Pin     |
|                 |                       |          |           | 20 |     |               |

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

|                      |  | MIN                                  | MAX            | UNIT               |
|----------------------|--|--------------------------------------|----------------|--------------------|
| $V_{CC}$             | Supply voltage range                       | - 0.5                                | 7              | V                  |
| $V_I$ <sup>(2)</sup> | Input voltage range                        | - 0.5                                | 7              | V                  |
| $V_O$ <sup>(2)</sup> | Output voltage range                       | - 0.5                                | $V_{CC} + 0.5$ | V                  |
| $I_{IK}$             | Input clamp current                        | $(V_I < 0)$                          |                | - 20 mA            |
| $I_{OK}$             | Output clamp current                       | $(V_O < 0 \text{ or } V_O > V_{CC})$ |                | $\pm 20$ mA        |
| $I_{OK}$             | Continuous output current                  | $(V_O = 0 \text{ to } V_{CC})$       |                | $\pm 25$ mA        |
|                      | Continuous current through $V_{CC}$ or GND |                                      | $\pm 50$       | mA                 |
| $T_{stg}$            | Storage temperature range                  | - 65                                 | 150            | $^{\circ}\text{C}$ |

- (1) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### 5.2 ESD Ratings

|             |                         | VALUE      | UNIT |
|-------------|-------------------------|------------|------|
| $V_{(ESD)}$ | Electrostatic discharge | $\pm 2000$ | V    |
|             |                         | $\pm 1000$ |      |

- (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

|                       |                                    | SN54AHC04                                  |          | SN74AHC04 |          | UNIT               |
|-----------------------|------------------------------------|--|----------|-----------|----------|--------------------|
|                       |                                    | MIN  | MAX      | MIN       | MAX      |                    |
| $V_{CC}$              | Supply voltage                     | 2  | 5.5      | 2         | 5.5      | V                  |
| $V_{IH}$              | High-level input voltage           | $V_{CC} = 2 \text{ V}$                     |          | 1.5       |          | V                  |
|                       |                                    | $V_{CC} = 3 \text{ V}$                     |          | 2.1       |          |                    |
|                       |                                    | $V_{CC} = 5.5 \text{ V}$                   |          | 3.85      |          |                    |
| $V_{IL}$              | Low-level Input voltage            | $V_{CC} = 2 \text{ V}$                     |          | 0.5       |          | V                  |
|                       |                                    | $V_{CC} = 3 \text{ V}$                     |          | 0.9       |          |                    |
|                       |                                    | $V_{CC} = 5.5 \text{ V}$                   |          | 1.65      |          |                    |
| $V_I$                 | 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          | $V_{CC} = 2 \text{ V}$                     |          | - 50      |          | mA                 |
|                       |                                    | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ |          | - 4       |          |                    |
|                       |                                    | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$   |          | - 8       |          |                    |
| $I_{OL}$              | Low-level output current           | $V_{CC} = 2 \text{ V}$                     |          | 50        |          | mA                 |
|                       |                                    | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ |          | 4         |          |                    |
|                       |                                    | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$   |          | 8         |          |                    |
| $\Delta t / \Delta v$ | Input Transition rise or fall rate | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ |          | 100       |          | ns/V               |
|                       |                                    | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$   |          | 20        |          |                    |
| $T_A$                 | Operating free-air temperature     | - 55                                       | 125      | - 40      | 125      | $^{\circ}\text{C}$ |

## 5.4 Thermal Information

| THERMAL METRIC <sup>1</sup> |  | SNx4AHC04 |    |     |    |    |       |     |      | UNIT |
|-----------------------------|--|-----------|----|-----|----|----|-------|-----|------|------|
|                             |  | D         | DB | DGV | N  | NS | PW    | RGY | BQA  |      |
|                             |  | 14 PINS   |    |     |    |    |       |     |      |      |
| R <sub>θJA</sub>            | Junction-to-ambient thermal resistance | 124.5     | 96 | 127 | 80 | 76 | 147.7 | 47  | 88.3 | °C/W |

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

## 5.5 Electrical Characteristics

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

| PARAMETER       | TEST CONDITIONS   | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |      | T <sub>A</sub> = -55°C TO 125°C |                   | T <sub>A</sub> = -40°C TO 85°C |      | T <sub>A</sub> = -40°C TO 125°C |     | UNIT |
|-----------------|---|-----------------|-----------------------|-----|------|---------------------------------|-------------------|--------------------------------|------|---------------------------------|-----|------|
|                 |   |                 |                       |     |      | SN54AHC04                       |                   | SN74AHC04                      |      | Recommended<br>SN74AHC04        |     |      |
|                 |   |                 | MIN                   | TYP | MAX  | MIN                             | MAX               | MIN                            | MAX  | MIN                             | MAX |      |
| V <sub>OH</sub> | I <sub>OH</sub> = -50 μA                                    | 2 V             | 1.9                   | 2   | 1.9  |                                 | 1.9               |                                | 1.9  |                                 | V   |      |
|                 |   | 3 V             | 2.9                   | 3   | 2.9  |                                 | 2.9               |                                | 2.9  |                                 |     |      |
|                 |   | 4.5 V           | 4.4                   | 4.5 | 4.4  |                                 | 4.4               |                                | 4.4  |                                 |     |      |
|                 | I <sub>OH</sub> = -4 mA                                     | 3 V             | 2.58                  |     | 2.48 |                                 | 2.48              |                                | 2.48 |                                 |     |      |
|                 |   | 4.5 V           | 3.94                  |     | 3.8  |                                 | 3.8               |                                | 3.8  |                                 |     |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 50 μA                                     | 2 V             |                       |     | 0.1  |                                 | 0.1               |                                | 0.1  |                                 | V   |      |
|                 |   | 3 V             |                       |     | 0.1  |                                 | 0.1               |                                | 0.1  |                                 |     |      |
|                 |   | 4.5 V           |                       |     | 0.1  |                                 | 0.1               |                                | 0.1  |                                 |     |      |
|                 | I <sub>OH</sub> = 4 mA                                      | 3 V             |                       |     | 0.36 |                                 | 0.5               |                                | 0.44 |                                 |     |      |
|                 |   | 4.5 V           |                       |     | 0.36 |                                 | 0.5               |                                | 0.44 |                                 |     |      |
| I <sub>I</sub>  | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V    |                       |     | ±0.1 |                                 | ±1 <sup>(1)</sup> |                                | ±1   |                                 | μA  |      |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           |                       |     | 2    |                                 | 20                |                                | 20   |                                 | μA  |      |
| C <sub>i</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 2   | 10   |                                 |                   |                                | 10   |                                 | pF  |      |

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V<sub>CC</sub> = 0 V.

## 5.6 Switching Characteristics

over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |                    | T <sub>A</sub> = -55°C TO 125°C |                     | T <sub>A</sub> = -40°C TO 85°C |      | T <sub>A</sub> = -40°C TO 125°C |      | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|--------------------|---------------------------------|---------------------|--------------------------------|------|---------------------------------|------|------|
|                  |              |             |                        |                       |                    | SN54AHC04                       |                     | SN74AHC04                      |      | Recommended<br>SN74AHC04        |      |      |
|                  |              |             |                        | TYP                   | MAX                | MIN                             | MAX                 | MIN                            | MAX  | MIN                             | MAX  |      |
| t <sub>PLH</sub> | A            | Y           | C <sub>L</sub> = 15 pF | 5 <sup>(1)</sup>      | 8.9 <sup>(1)</sup> | 1 <sup>(1)</sup>                | 10.5 <sup>(1)</sup> | 1                              | 10.5 | 1                               | 10.5 | ns   |
| t <sub>PHL</sub> |              |             |                        | 5 <sup>(1)</sup>      | 8.9 <sup>(1)</sup> | 1 <sup>(1)</sup>                | 10.5 <sup>(1)</sup> | 1                              | 10.5 | 1                               | 10.5 |      |
| t <sub>PLH</sub> | A            | Y           | C <sub>L</sub> = 50 pF | 7.5                   | 11.4               | 1                               | 13                  | 1                              | 13   | 1                               | 13   | ns   |
| t <sub>PHL</sub> |              |             |                        | 7.5                   | 11.4               | 1                               | 13                  | 1                              | 13   | 1                               | 13   |      |

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

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

over recommended operating free-air temperature range,  $V_{CC} = 5 V \pm 0.5 V$  (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | $T_A = 25^\circ C$ |                  | $T_A = -55^\circ C$ TO $125^\circ C$ |                  | $T_A = -40^\circ C$ TO $85^\circ C$ |     | $T_A = -40^\circ C$ TO $125^\circ C$ |     | UNIT |
|-----------|--------------|-------------|-----------------|--------------------|------------------|--------------------------------------|------------------|-------------------------------------|-----|--------------------------------------|-----|------|
|           |              |             |                 | TYP                | MAX              | SN54AHC04                            |                  | SN74AHC04                           |     | Recommended                          |     |      |
|           |              |             |                 |                    |                  | MIN                                  | MAX              | MIN                                 | MAX | MIN                                  | MAX |      |
| $t_{PLH}$ | A            | Y           | $C_L = 15$ pF   | 3.8 <sup>1</sup>   | 5.5 <sup>1</sup> | 1 <sup>1</sup>                       | 6.5 <sup>1</sup> | 1                                   | 6.5 | 1                                    | 6.5 | ns   |
| $t_{PHL}$ |              |             |                 | 3.8 <sup>1</sup>   | 5.5 <sup>1</sup> | 1 <sup>1</sup>                       | 6.5 <sup>1</sup> | 1                                   | 6.5 | 1                                    | 6.5 |      |
| $t_{PLH}$ | A            | Y           | $C_L = 50$ pF   | 5.3                | 7.5              | 1                                    | 8.5              | 1                                   | 8.5 | 1                                    | 8.5 | ns   |
| $t_{PHL}$ |              |             |                 | 5.3                | 7.5              | 1                                    | 8.5              | 1                                   | 8.5 | 1                                    | 8.5 |      |

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

### 5.8 Noise Characteristics

$V_{CC} = 5 V$ ,  $C_L = 50$  pF,  $T_A = 25^\circ C$ <sup>(1)</sup>

| PARAMETER   |  | SN74AHC04 |      |     | UNIT |
|-------------|--|-----------|------|-----|------|
|             |  | MIN       | TYP  | MAX |      |
| $V_{OL(P)}$ | Quiet output, maximum dynamic $V_{OL}$ |           | 0.4  |     | V    |
| $V_{OL(V)}$ | Quiet output, minimum dynamic $V_{OL}$ |           | -0.4 |     | V    |
| $V_{OH(V)}$ | Quiet output, minimum dynamic $V_{OH}$ |           | 4.8  |     | V    |
| $V_{IH(D)}$ | High-level dynamic input voltage       |           | 3.5  |     | V    |
| $V_{IL(D)}$ | Low-level dynamic input voltage        |           |      | 1.5 | V    |

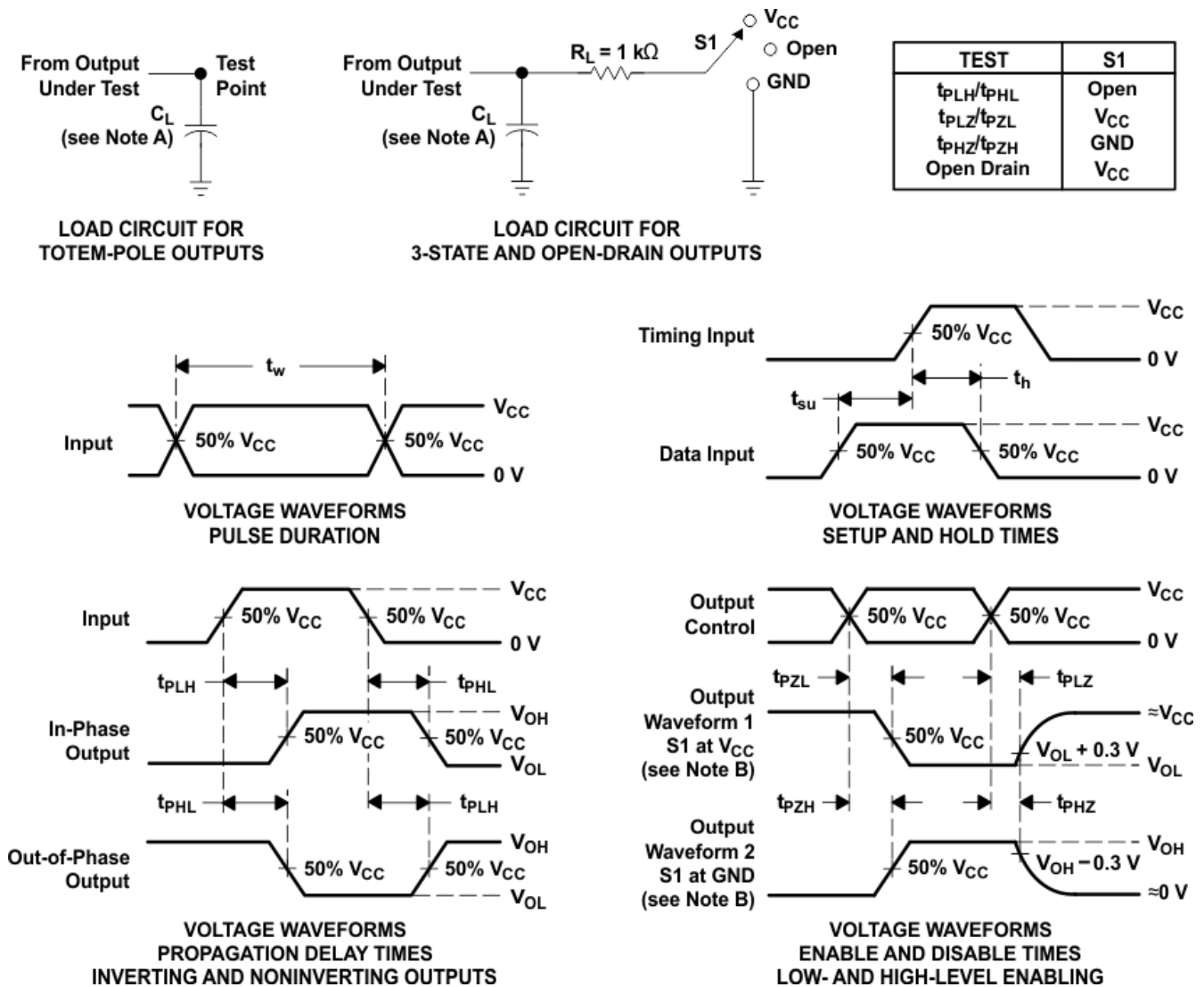
(1) Characteristics are for surface-mount packages only.

### 5.9 Operating Characteristics

$V_{CC} = 5 V$ ,  $T_A = 25^\circ C$

| PARAMETER |                               | TEST CONDITIONS      | TYP | UNIT |
|-----------|-------------------------------|----------------------|-----|------|
| $C_{pd}$  | Power dissipation capacitance | No load, $f = 1$ MHz | 12  | pF   |

## 6 Parameter Measurement Information

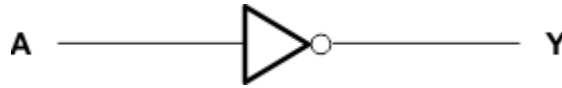


- $C_L$  includes probe and jig capacitance.
- Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 3$  ns,  $t_f \leq 3$  ns.
- The outputs are measured one at a time with one input transition per measurement.
- All parameters and waveforms are not applicable to all devices.

图 6-1. Load Circuit and Voltage Waveforms

## 7 Detailed Description

### 7.1 Functional Block Diagram



### 7.2 Device Functional Modes

表 7-1. Function Table  
(Each Inverter)

| INPUT<br>A | OUTPUT<br>Y |
|------------|-------------|
| H          | L           |
| L          | H           |



## 8 Device and Documentation Support

### 8.1 Documentation Support (Analog)

#### 8.1.1 Related Documentation

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

表 8-1. Related Links

| PARTS     | PRODUCT FOLDER             | SAMPLE & BUY               | TECHNICAL DOCUMENTS        | TOOLS & SOFTWARE           | SUPPORT & COMMUNITY        |
|-----------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| SN54AHC04 | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> |
| SN74AHC04 | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> |

### 8.2 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。

### 8.3 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》](#)。

### 8.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

### 8.5 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。

### 8.6 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。

## 9 Mechanical, Packaging, and Orderable Information

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

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)     | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)                 | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|---------------------|--------------------------------------|----------------------|--------------|---|-------------------------|
| 5962-9680501Q2A  | ACTIVE        | LCCC         | FK              | 20   | 55          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-<br>9680501Q2A<br>SNJ54AHC<br>04FK | <a href="#">Samples</a> |
| 5962-9680501QCA  | ACTIVE        | CDIP         | J               | 14   | 25          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9680501QC<br>A<br>SNJ54AHC04J      | <a href="#">Samples</a> |
| 5962-9680501QDA  | ACTIVE        | CFP          | W               | 14   | 25          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9680501QD<br>A<br>SNJ54AHC04W      | <a href="#">Samples</a> |
| SN74AHC04BQAR    | ACTIVE        | WQFN         | BQA             | 14   | 3000        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AHC04                                   | <a href="#">Samples</a> |
| SN74AHC04DBR     | ACTIVE        | SSOP         | DB              | 14   | 2000        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | HA04                                    | <a href="#">Samples</a> |
| SN74AHC04DGVR    | ACTIVE        | TVSOP        | DGV             | 14   | 2000        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | HA04                                    | <a href="#">Samples</a> |
| SN74AHC04DR      | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AHC04                                   | <a href="#">Samples</a> |
| SN74AHC04N       | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green        | NIPDAU                               | N / A for Pkg Type   | -40 to 125   | SN74AHC04N                              | <a href="#">Samples</a> |
| SN74AHC04NSR     | ACTIVE        | SO           | NS              | 14   | 2000        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AHC04                                   | <a href="#">Samples</a> |
| SN74AHC04PWR     | ACTIVE        | TSSOP        | PW              | 14   | 2000        | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | HA04                                    | <a href="#">Samples</a> |
| SN74AHC04RGYR    | ACTIVE        | VQFN         | RGY             | 14   | 3000        | RoHS & Green        | NIPDAU                               | Level-2-260C-1 YEAR  | -40 to 125   | HA04                                    | <a href="#">Samples</a> |
| SNJ54AHC04FK     | ACTIVE        | LCCC         | FK              | 20   | 55          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-<br>9680501Q2A<br>SNJ54AHC<br>04FK | <a href="#">Samples</a> |
| SNJ54AHC04J      | ACTIVE        | CDIP         | J               | 14   | 25          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9680501QC<br>A<br>SNJ54AHC04J      | <a href="#">Samples</a> |
| SNJ54AHC04W      | ACTIVE        | CFP          | W               | 14   | 25          | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9680501QD<br>A<br>SNJ54AHC04W      | <a href="#">Samples</a> |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of  $\leq 1000$ ppm threshold. Antimony trioxide based flame retardants must also meet the  $\leq 1000$ ppm threshold requirement.

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

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

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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**OTHER QUALIFIED VERSIONS OF SN54AHC04, SN74AHC04 :**

● Catalog : [SN74AHC04](#)

● Automotive : [SN74AHC04-Q1](#), [SN74AHC04-Q1](#)

● Enhanced Product : [SN74AHC04-EP](#), [SN74AHC04-EP](#)

- Military : [SN54AHC04](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- 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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC04BQAR | WQFN         | BQA             | 14   | 3000 | 180.0              | 12.4               | 2.8     | 3.3     | 1.1     | 4.0     | 12.0   | Q1            |
| SN74AHC04DBR  | SSOP         | DB              | 14   | 2000 | 330.0              | 16.4               | 8.35    | 6.6     | 2.4     | 12.0    | 16.0   | Q1            |
| SN74AHC04DGVR | TVSOP        | DGV             | 14   | 2000 | 330.0              | 12.4               | 6.8     | 4.0     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC04DR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74AHC04NSR  | SO           | NS              | 14   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| SN74AHC04PWR  | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AHC04RGYR | 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) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC04BQAR | WQFN         | BQA             | 14   | 3000 | 210.0       | 185.0      | 35.0        |
| SN74AHC04DBR  | SSOP         | DB              | 14   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74AHC04DGVR | TVSOP        | DGV             | 14   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74AHC04DR   | SOIC         | D               | 14   | 2500 | 356.0       | 356.0      | 35.0        |
| SN74AHC04NSR  | SO           | NS              | 14   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74AHC04PWR  | TSSOP        | PW              | 14   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74AHC04RGYR | 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) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9680501Q2A | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| 5962-9680501QDA | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SN74AHC04N      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74AHC04N      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54AHC04FK    | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54AHC04W     | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



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



RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD

**THERMAL INFORMATION**

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

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

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



Bottom View

Exposed Thermal Pad Dimensions

4206353-2/P 03/14

NOTE: All linear dimensions are in millimeters

RGY (S-PVQFN-N14)

PLASTIC QUAD FLATPACK NO-LEAD



4208122-2/P 03/14

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at [www.ti.com](http://www.ti.com) <<http://www.ti.com>>.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

## GENERIC PACKAGE VIEW

**BQA 14**

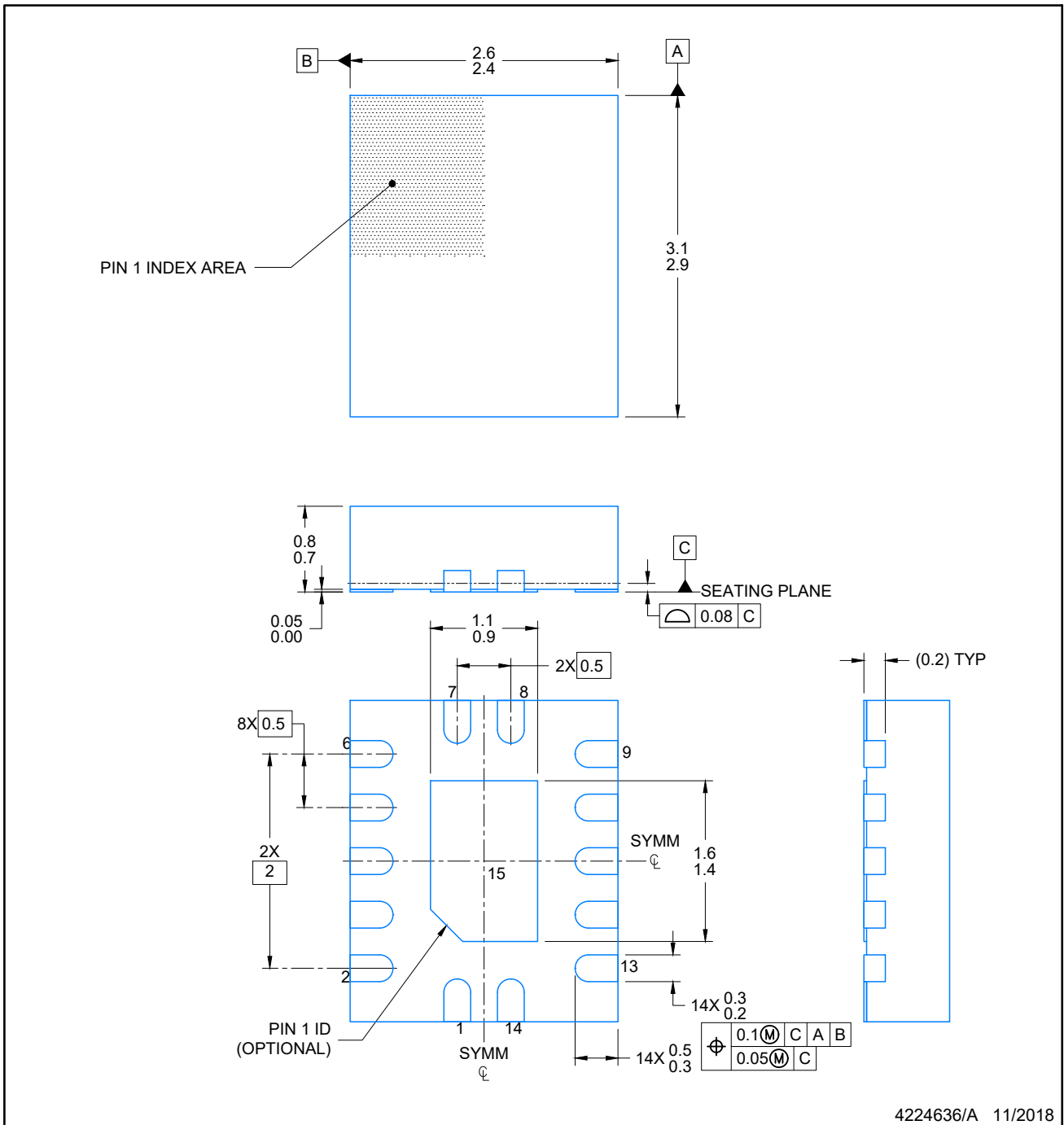
**WQFN - 0.8 mm max height**

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.





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

WQFN - 0.8 mm max height

BQA0014A

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



- 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

## 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

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040047-5/M 06/11

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

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE

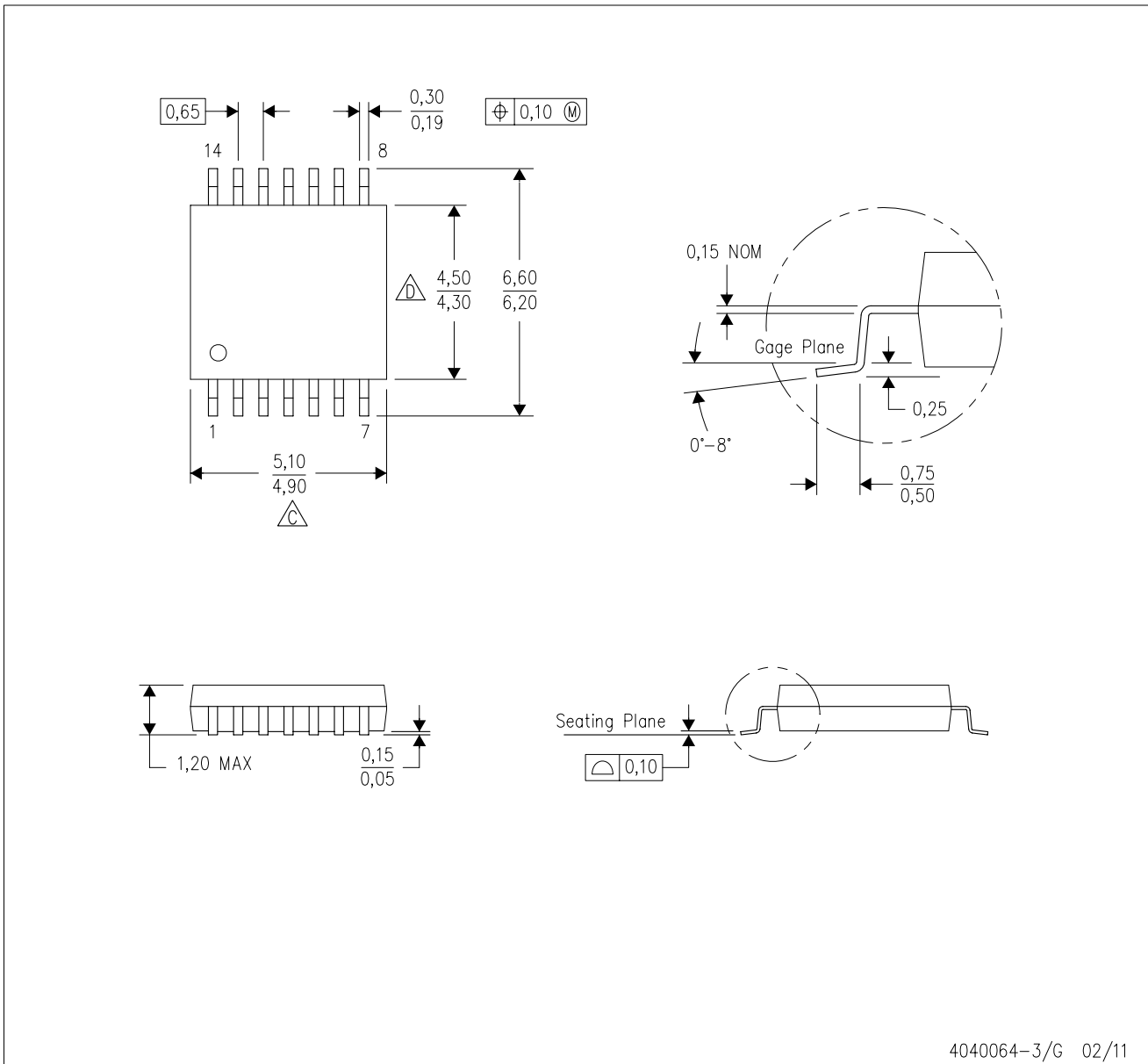


4211283-3/E 08/12



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040064-3/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153



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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN

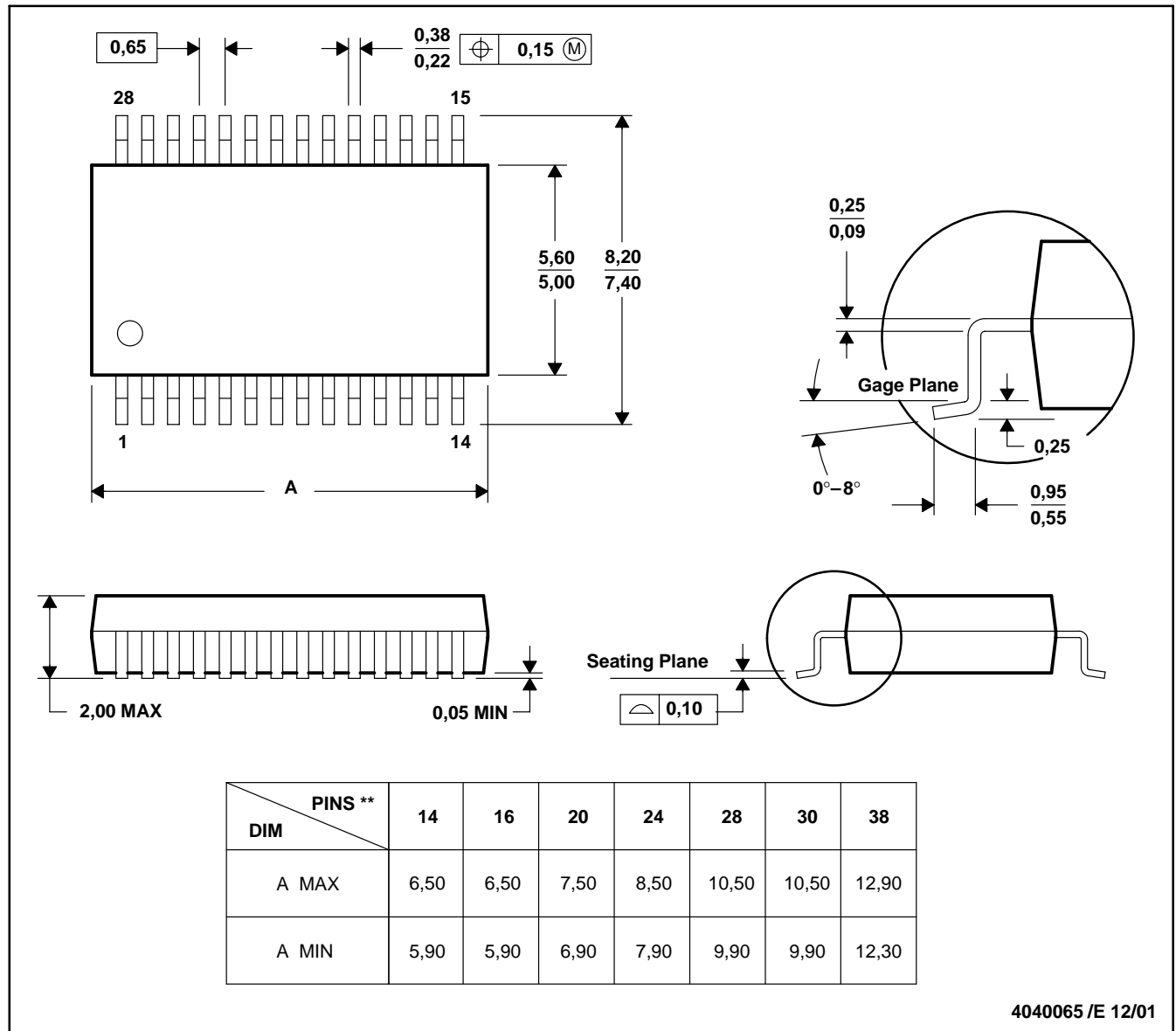


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



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

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