

具有漏极开路输出的 SN74AUP2G07 低功耗双路缓冲器/驱动器

1 特性

- 低静态功耗
($I_{CC} = 0.9\mu\text{A}$, 最大值)
- 低动态功耗
($C_{pd} = 1\text{pF}$, 3.3V 时的典型值)
- 低输入电容 ($C_i = 1.5\text{pF}$, 典型值)
- 低噪声 - 过冲和下冲
低于 V_{CC} 的 10%
- I_{off} 支持带电插入、局部关断模式和后驱动保护
- 输入迟滞在 $V_{hys} = 250\text{mV}$ (3.3V 时的典型值) 输入下
可实现缓慢的输入转换和更好的开关抗噪性
- 宽工作 V_{CC} 范围为 0.8V 至 3.6V
- 针对 3.3V 运行进行了优化
- 3.6V 耐压 I/O 支持混合模式的信号操作
- 3.3V 时, $t_{pd} = 3.3\text{ns}$ (最大值)
- 适用于点到点应用
- 闩锁性能超过 100mA, 符合 JESD 78 II 类规范的要求
- ESD 性能测试符合 JESD 22 标准
 - 4500V 人体放电模型
 - 1500V 充电器件模型

2 应用

- 主动噪声消除 (ANC)
- 条形码扫描仪
- 血压监护仪
- CPAP 呼吸机
- 线缆解决方案
- DLP 3D 机器视觉、高光谱成像、光纤网络和光谱分析
- 电子书和智能手机
- 嵌入式计算机
- 现场变送器: 温度或湿度传感器
- 指纹生物识别
- HVAC: 暖通空调
- 网络附加存储 (NAS)
- 服务器主板和 PSU
- 软件定义无线电 (SDR)
- 电视: 高清电视 (HDTV)、LCD 电视和数字电视
- 视频通信系统
- 无线数据存储卡、耳机、键盘、鼠标和局域网 (LAN) 卡
- X 射线: 行李扫描仪、医疗和牙科

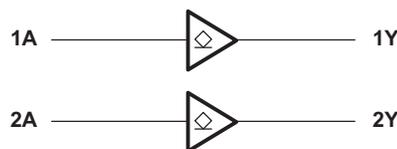
3 说明

SN74AUP2G07 器件是一个具有漏极开路输出的双路缓冲门, 可在 0.8V 至 3.6V 电压范围内运行。

器件信息

| 器件型号 | 封装 ⁽¹⁾ | 封装尺寸 (标称值) |
|-------------|-------------------|-------------------|
| SN74AUP2G07 | SC70 (6) | 3.00 mm x 1.25 mm |
| | SON (6) | 1.45mm x 1.00mm |
| | SON (6) | 1.00mm x 1.00mm |
| | DSBGA (6) | 1.16 mm x 0.76 mm |

(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。



简化版方框图



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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

| Changes from Revision D (February 2016) to Revision E (October 2021) | Page |
|--|------|
| • Changed pinout images style and formatting, removed overlapping letters in YZP package drawing, corrected BGA pin numbers in the <i>Pin Functions</i> table, changed V_{CC} and GND pin TYPE From: "—" To: "P" in the <i>Pin Functions</i> table and added footnote to the <i>Pin Functions</i> table to define pin types..... | 3 |
| • Changed maximum output voltage in the low state in the 节 6.1 table to 4.6 V..... | 4 |
| • Changed the V_O Output voltage in the 节 6.3 table from ' V_{CC} ' to '3.6'..... | 5 |
| • Updated $R_{\theta JA}$ values to more accurately reflect device characteristics: YFP 132 to 125.4, DCK 252 to 302.4, DRY 234 to 338, DSF 300 to 372.5, added standard thermal characteristics for all packages ($R_{\theta JC(top)}$, $R_{\theta JB}$, Ψ_{JT} , Ψ_{JB} , $R_{\theta JC(bot)}$)..... | 5 |
| Changes from Revision C (November 2014) to Revision D (February 2016) | Page |
| • Changed the V_{CC} pin TYPE From: "I" To: "—" in the <i>Pin Functions</i> table..... | 3 |
| • Added "Junction temperature" to the 节 6.1 table..... | 4 |
| • Deleted the I_{OH} High-level output current from the 节 6.3 table..... | 5 |
| • Deleted V_{OH} PARAMETER from the 节 6.5 table, these specifications do not pertain to open drain devices.... | 6 |
| Changes from Revision B (September 2009) to Revision C (November 2014) | Page |
| • 删除了订购信息表..... | 1 |
| • 添加了应用、器件信息表、引脚功能表、处理等级表、热性能信息表、典型特性、特性说明部分、器件功能模式、应用和实施部分、电源相关建议部分、布局部分、器件和文档支持部分以及机械、封装和可订购信息部分..... | 1 |
| • 更新了特性中的 I_{off} | 1 |

5 Pin Configuration and Functions

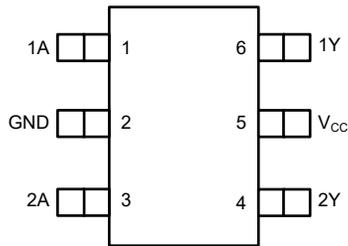


图 5-1. DCK Package
6-Pin SC70
Top View

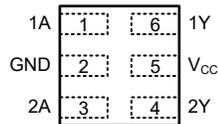


图 5-3. DSF Package
6-Pin SON
Transparent Top View

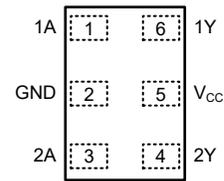


图 5-2. DRY Package
6-Pin SON
Transparent Top View

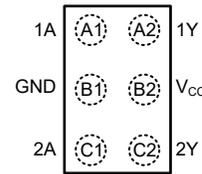


图 5-4. YFP Package
6-Pin DSBGA
Transparent Top View

See the mechanical drawings for dimensions.

表 5-1. Pin Functions

| NAME | PIN | | TYPE ⁽¹⁾ | DESCRIPTION |
|-----------------|-----------------------|-----------|---------------------|-------------|
| | DCK, DSF, DRY, YFP | (BGA) YFP | | |
| 1A | 1 | A1 | I | Input 1 |
| 1Y | 6 | A2 | O | Output 1 |
| 2A | 3 | C1 | I | Input 2 |
| 2Y | 4 | C2 | O | Output 2 |
| GND | 2 | B1 | P | Ground |
| V _{CC} | 5 | B2 | P | Power Pin |

(1) I = Input, O = Output, P = Power

6 Specifications

6.1 Absolute Maximum Ratings

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

| | | MIN | MAX | UNIT |
|-----------|---|-----------|------|------|
| V_{CC} | Supply voltage range | - 0.5 | 4.6 | V |
| V_I | Input voltage range ⁽¹⁾ | - 0.5 | 4.6 | V |
| V_O | Voltage range applied to any output in the high-impedance or power-off state ⁽¹⁾ | - 0.5 | 4.6 | V |
| V_O | Output voltage range in the low state ⁽¹⁾ | - 0.5 | 4.6 | V |
| I_{IK} | Input clamp current | $V_I < 0$ | - 50 | mA |
| I_{OK} | Output clamp current | $V_O < 0$ | - 50 | mA |
| I_O | Continuous output current | | ±20 | mA |
| | Continuous current through V_{CC} or GND | | ±50 | mA |
| T_J | Junction temperature | | 150 | °C |
| T_{stg} | Storage temperature range | - 65 | 150 | °C |

(1) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

| | | VALUE | UNIT |
|--|---|-------|------|
| $V_{(ESD)}$ | Electrostatic discharge | | |
| | Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾ | ±4500 | V |
| Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾ | ±1500 | | |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500-V HBM is possible with the necessary precautions.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250-V CDM is possible with the necessary precautions.

6.3 Recommended Operating Conditions

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

| | | MIN | MAX | UNIT |
|-----------------|------------------------------------|-----------------------------------|------------------------|------|
| V _{CC} | Supply voltage | 0.8 | 3.6 | V |
| V _{IH} | High-level input voltage | V _{CC} = 0.8 V | V _{CC} | V |
| | | V _{CC} = 1.1 V to 1.95 V | 0.65 × V _{CC} | |
| | | V _{CC} = 2.3 V to 2.7 V | 1.6 | |
| | | V _{CC} = 3 V to 3.6 V | 2 | |
| V _{IL} | Low-level input voltage | V _{CC} = 0.8 V | 0 | V |
| | | V _{CC} = 1.1 V to 1.95 V | 0.35 × V _{CC} | |
| | | V _{CC} = 2.3 V to 2.7 V | 0.7 | |
| | | V _{CC} = 3 V to 3.6 V | 0.9 | |
| V _I | Input voltage | 0 | 3.6 | V |
| V _O | Output voltage | 0 | 3.6 | V |
| I _{OL} | Low-level output current | V _{CC} = 0.8 V | 20 | μA |
| | | V _{CC} = 1.1 V | 1.1 | |
| | | V _{CC} = 1.4 V | 1.7 | |
| | | V _{CC} = 1.65 V | 1.9 | |
| | | V _{CC} = 2.3 V | 3.1 | |
| | | V _{CC} = 3 V | 4 | |
| Δt/Δv | Input transition rise or fall rate | V _{CC} = 0.8 V to 3.6 V | 200 | ns/V |
| T _A | Operating free-air temperature | - 40 | 85 | °C |

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number [SCBA004](#).

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | YFP | DCK | DRY | DSF | UNIT | |
|-------------------------------|--|--------|--------|--------|-------|------|
| | 6 PINS | 6 PINS | 6 PINS | 6 PINS | | |
| R _{θJA} | Junction-to-ambient thermal resistance | 125.4 | 302.4 | 338.0 | 372.5 | °C/W |
| R _{θJC(top)} | Junction-to-case (top) thermal resistance | 1.9 | 219.5 | 228.9 | 179.9 | °C/W |
| R _{θJB} | Junction-to-board thermal resistance | 37.2 | 106.7 | 203.5 | 231.2 | °C/W |
| Ψ _{JT} | Junction-to-top characterization parameter | 0.5 | 84.2 | 62.4 | 28.6 | °C/W |
| Ψ _{JB} | Junction-to-board characterization parameter | 37.5 | 106.0 | 203.6 | 230.9 | °C/W |
| R _{θJC(bot)} | Junction-to-case (bottom) thermal resistance | N/A | N/A | N/A | N/A | °C/W |

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

6.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | T _A = -40°C to 85°C | | UNIT |
|--------------------|--------------------------|--|-----------------------|-----|-----------------------|--------------------------------|-----------------------|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| V _{OL} | I _{OL} = 20 μA | 0.8 V to 3.6 V | | | 0.1 | | 0.1 | V |
| | I _{OL} = 1.1 mA | 1.1 V | | | 0.3 × V _{CC} | | 0.3 × V _{CC} | |
| | I _{OL} = 1.7 mA | 1.4 V | | | 0.31 | | 0.37 | |
| | I _{OL} = 1.9 mA | 1.65 V | | | 0.31 | | 0.35 | |
| | I _{OL} = 2.3 mA | 2.3 V | | | 0.31 | | 0.33 | |
| | I _{OL} = 3.1 mA | | | | 0.44 | | 0.45 | |
| | I _{OL} = 2.7 mA | 3 V | | | 0.31 | | 0.33 | |
| | I _{OL} = 4 mA | | | | 0.44 | | 0.45 | |
| I _I | A or B input | V _I = GND to 3.6 V | 0 V to 3.6 V | | 0.1 | | 0.5 | μA |
| I _{off} | | V _I or V _O = 0 V to 3.6 V | 0 V | | 0.2 | | 0.6 | μA |
| Δ I _{off} | | V _I or V _O = 0 V to 3.6 V | 0 V to 0.2 V | | 0.2 | | 0.6 | μA |
| I _{CC} | | V _I = GND or (V _{CC} to 3.6 V), I _O = 0 | 0.8 V to 3.6 V | | 0.5 | | 0.9 | μA |
| Δ I _{CC} | | V _I = V _{CC} - 0.6 V ⁽¹⁾ , I _O = 0 | 3.3 V | | 40 | | 50 | μA |
| C _i | | V _I = V _{CC} or GND | 0 V | | 1.5 | | | pF |
| | | | 3.6 V | | 1.5 | | | |
| C _o | | V _O = GND | 0 V | | 3 | | | pF |

(1) One input at V_{CC} - 0.6 V, other input at V_{CC} or GND.

6.6 Switching Characteristics, $C_L = 5 \text{ pF}$

over recommended operating free-air temperature range (unless otherwise noted) (see 图 7-1 and 图 7-2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|------------------------------------|--------------------------|-----|-----|--|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 0.8 V | 12.2 | | | | | ns |
| | | | $1.2 \text{ V} \pm 0.1 \text{ V}$ | 3.4 | 5.1 | 7.5 | 1.5 | 14.7 | |
| | | | $1.5 \text{ V} \pm 0.1 \text{ V}$ | 2.3 | 3.6 | 5.1 | 1.3 | 8.3 | |
| | | | $1.8 \text{ V} \pm 0.15 \text{ V}$ | 2.4 | 3.1 | 4 | 1 | 6.3 | |
| | | | $2.5 \text{ V} \pm 0.2 \text{ V}$ | 1.5 | 2.1 | 2.9 | 0.9 | 4.1 | |
| | | | $3.3 \text{ V} \pm 0.3 \text{ V}$ | 1.8 | 2.2 | 2.8 | 1.1 | 3.3 | |

6.7 Switching Characteristics, $C_L = 10 \text{ pF}$

over recommended operating free-air temperature range (unless otherwise noted) (see 图 7-1 and 图 7-2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|------------------------------------|--------------------------|-----|-----|--|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 0.8 V | 15 | | | | | ns |
| | | | $1.2 \text{ V} \pm 0.1 \text{ V}$ | 4 | 6.2 | 9 | 2.4 | 16.2 | |
| | | | $1.5 \text{ V} \pm 0.1 \text{ V}$ | 3.1 | 4.4 | 6.1 | 2 | 9.4 | |
| | | | $1.8 \text{ V} \pm 0.15 \text{ V}$ | 3.3 | 3.9 | 4.8 | 1.6 | 7.1 | |
| | | | $2.5 \text{ V} \pm 0.2 \text{ V}$ | 2.1 | 2.8 | 3.5 | 1.3 | 4.8 | |
| | | | $3.3 \text{ V} \pm 0.3 \text{ V}$ | 2.3 | 3 | 4 | 1.4 | 4.5 | |

6.8 Switching Characteristics, $C_L = 15 \text{ pF}$

over recommended operating free-air temperature range (unless otherwise noted) (see 图 7-1 and 图 7-2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|------------------------------------|--------------------------|-----|------|--|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 0.8 V | 18.2 | | | | | ns |
| | | | $1.2 \text{ V} \pm 0.1 \text{ V}$ | 4.9 | 7.3 | 10.4 | 3.2 | 17.6 | |
| | | | $1.5 \text{ V} \pm 0.1 \text{ V}$ | 3.8 | 5.2 | 6.8 | 2.6 | 10.2 | |
| | | | $1.8 \text{ V} \pm 0.15 \text{ V}$ | 3.4 | 4.8 | 6.7 | 2.2 | 7.9 | |
| | | | $2.5 \text{ V} \pm 0.2 \text{ V}$ | 2.4 | 3.4 | 4.5 | 1.9 | 5.3 | |
| | | | $3.3 \text{ V} \pm 0.3 \text{ V}$ | 2.2 | 3.7 | 5.4 | 1.8 | 6.1 | |

6.9 Switching Characteristics, $C_L = 30 \text{ pF}$

over recommended operating free-air temperature range (unless otherwise noted) (see 图 7-1 and 图 7-2)

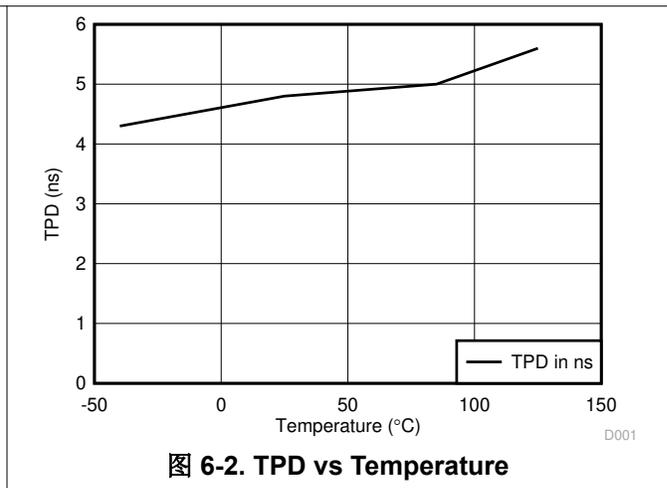
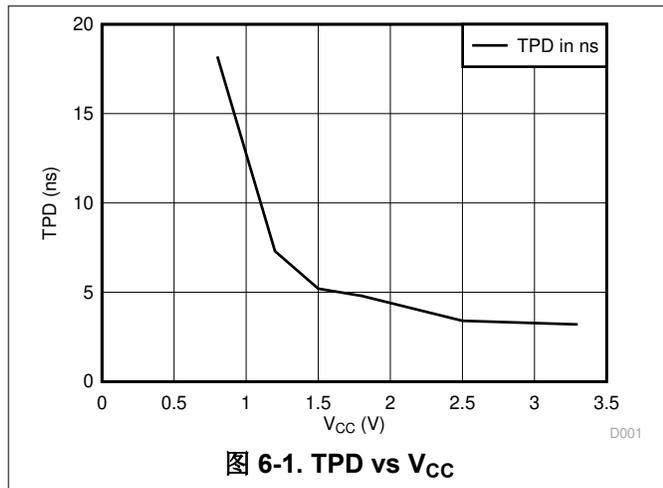
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|------------------------------------|--------------------------|------|------|--|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 0.8 V | 26.5 | | | | | ns |
| | | | $1.2 \text{ V} \pm 0.1 \text{ V}$ | 8.1 | 10.7 | 14.4 | 4.5 | 21.9 | |
| | | | $1.5 \text{ V} \pm 0.1 \text{ V}$ | 6.5 | 7.7 | 9.4 | 3.8 | 13 | |
| | | | $1.8 \text{ V} \pm 0.15 \text{ V}$ | 5.8 | 7.5 | 9.7 | 3.2 | 11 | |
| | | | $2.5 \text{ V} \pm 0.2 \text{ V}$ | 4.5 | 5.4 | 6.7 | 3 | 7.1 | |
| | | | $3.3 \text{ V} \pm 0.3 \text{ V}$ | 3.9 | 6.3 | 9.7 | 2.8 | 10.4 | |

6.10 Operating Characteristics

T_A = 25°C

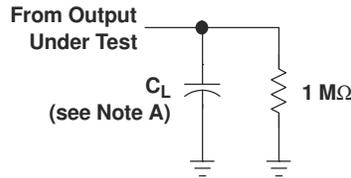
| PARAMETER | | TEST CONDITIONS | V _{CC} | TYP | UNIT |
|-----------------|-------------------------------|-----------------|-----------------|-----|------|
| C _{pd} | Power dissipation capacitance | f = 10 MHz | 0.8 V | 4 | pF |
| | | | 1.2 V ± 0.1 V | 4 | |
| | | | 1.5 V ± 0.1 V | 4 | |
| | | | 1.8 V ± 0.15 V | 4 | |
| | | | 2.5 V ± 0.2 V | 4.1 | |
| | | | 3.3 V ± 0.3 V | 4.3 | |

6.11 Typical Characteristics



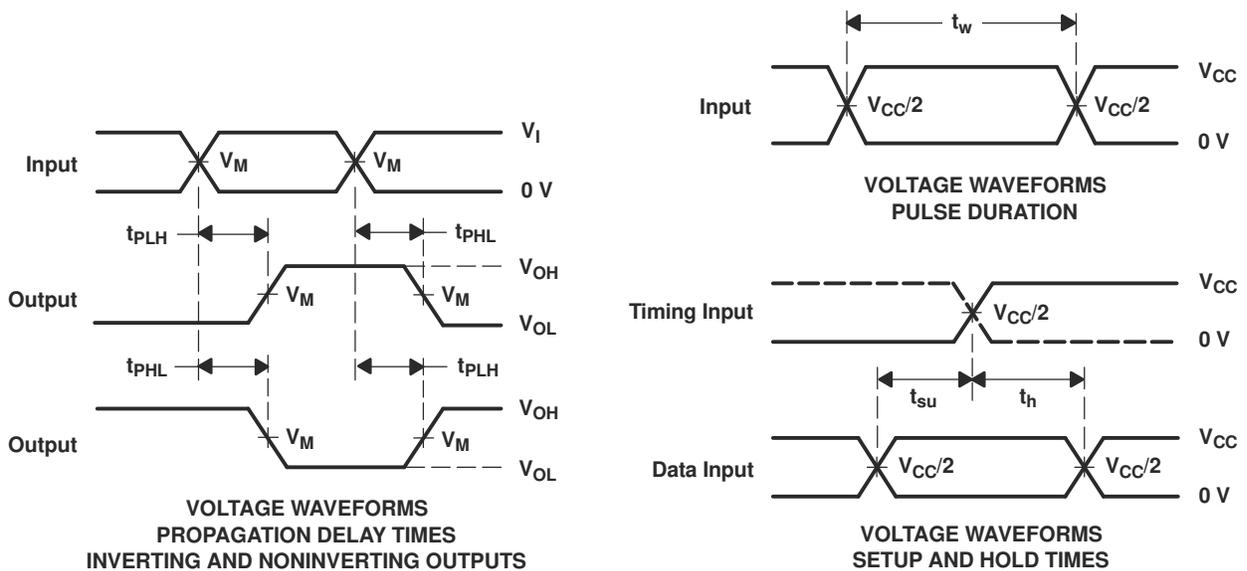
7 Parameter Measurement Information

7.1 Propagation Delays, Setup and Hold Times, and Pulse Duration



LOAD CIRCUIT

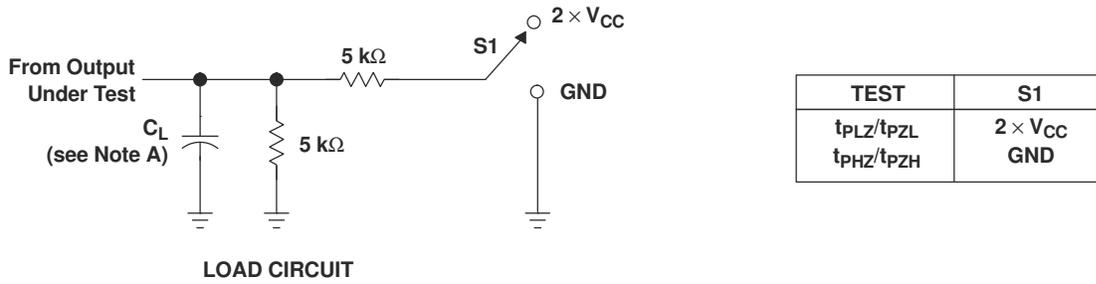
| | $V_{CC} = 0.8\text{ V}$ | $V_{CC} = 1.2\text{ V} \pm 0.1\text{ V}$ | $V_{CC} = 1.5\text{ V} \pm 0.1\text{ V}$ | $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |
|-------|-------------------------|--|--|---|--|--|
| C_L | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF |
| V_M | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ |
| V_I | V_{CC} | V_{CC} | V_{CC} | V_{CC} | V_{CC} | V_{CC} |



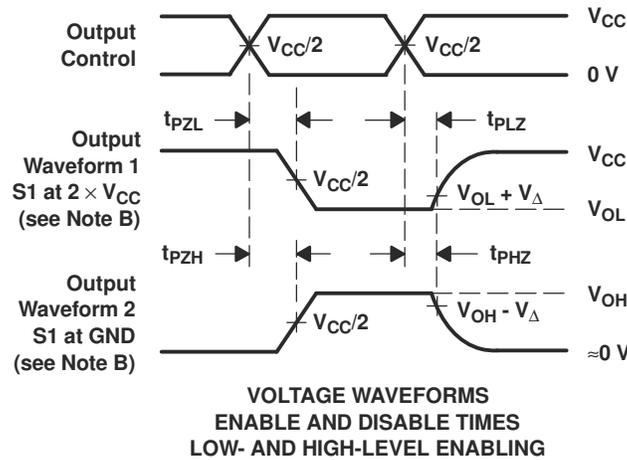
- NOTES: A. C_L includes probe and jig capacitance.
 B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r/t_f = 3\text{ ns}$.
 C. The outputs are measured one at a time, with one transition per measurement.
 D. t_{PLH} and t_{PHL} are the same as t_{pd} .
 E. All parameters and waveforms are not applicable to all devices.

图 7-1. Load Circuit and Voltage Waveforms

7.2 Enable and Disable Times



| | $V_{CC} = 0.8 \text{ V}$ | $V_{CC} = 1.2 \text{ V} \pm 0.1 \text{ V}$ | $V_{CC} = 1.5 \text{ V} \pm 0.1 \text{ V}$ | $V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}$ | $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ |
|--------------|--------------------------|--|--|---|--|--|
| C_L | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF |
| V_M | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ |
| V_I | V_{CC} | V_{CC} | V_{CC} | V_{CC} | V_{CC} | V_{CC} |
| V_{Δ} | 0.1 V | 0.1 V | 0.1 V | 0.15 V | 0.15 V | 0.3 V |



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r/t_f = 3 \text{ ns}$.
 - D. The outputs are measured one at a time, with one transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. All parameters and waveforms are not applicable to all devices.

图 7-2. Load Circuit and Voltage Waveforms

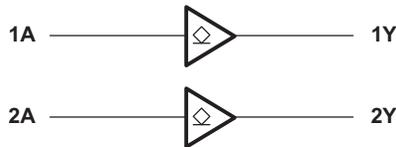
8 Detailed Description

8.1 Overview

The SN74AUP2G07 device is a dual buffer gate with open-drain outputs that operate from 0.8 V to 3.6 V. The output of this dual buffer/driver is open-drain, and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions.

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

8.2 Functional Block Diagram



8.3 Feature Description

- Wide operating V_{CC} range of 0.8 V to 3.6 V
- 3.6-V I/O tolerant to support down translation
- Input hysteresis allows slow input transition and better switching noise immunity at the input
- I_{off} feature allows voltages on the inputs and outputs when V_{CC} is 0 V
- Low noise due to slower edge rates

8.4 Device Functional Modes

表 8-1 is the function table for SN74AUP2G07.

表 8-1. Function Table

| INPUT ⁽¹⁾ A | OUTPUT ⁽²⁾ Y |
|---------------------------|----------------------------|
| H | Z |
| L | L |

(1) L = Input low, H = Input high

(2) L = Output low, Z = High impedance

9 Application and Implementation

Note

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

9.1 Application Information

The AUP family is TI's premier solution to the industry's low-power needs in battery-powered portable applications. This family ensures very low static and dynamic power consumption across the entire V_{CC} range of 0.8 V to 3.6 V, resulting in increased battery life. This product also maintains excellent signal integrity. It has a small amount of hysteresis built in, allowing for slower or noisy input signals. The lowered drive produces slower edges and prevents overshoot and undershoot on the outputs.

9.2 Typical Application

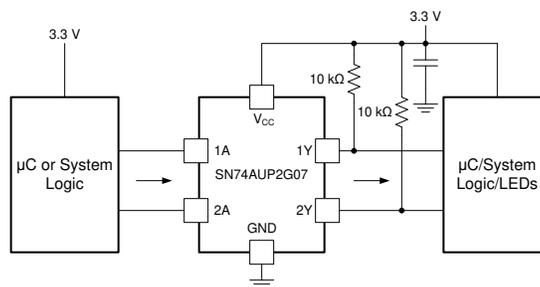


图 9-1. Typical Application Schematic

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits.

9.2.2 Detailed Design Procedure

- Recommended Input Conditions:
 - For rise time and fall time specifications, see $\Delta t / \Delta V$ in the 节 6.3 table.
 - For specified high and low levels. See V_{IH} and V_{IL} in the 节 6.3 table.
 - Inputs are overvoltage tolerant allowing them to go as high as 3.6 V at any valid V_{CC} .
- Recommend Output Conditions:
 - Load currents should not exceed 20 mA on the output and 50 mA total for the part.

9.2.3 Application Curves

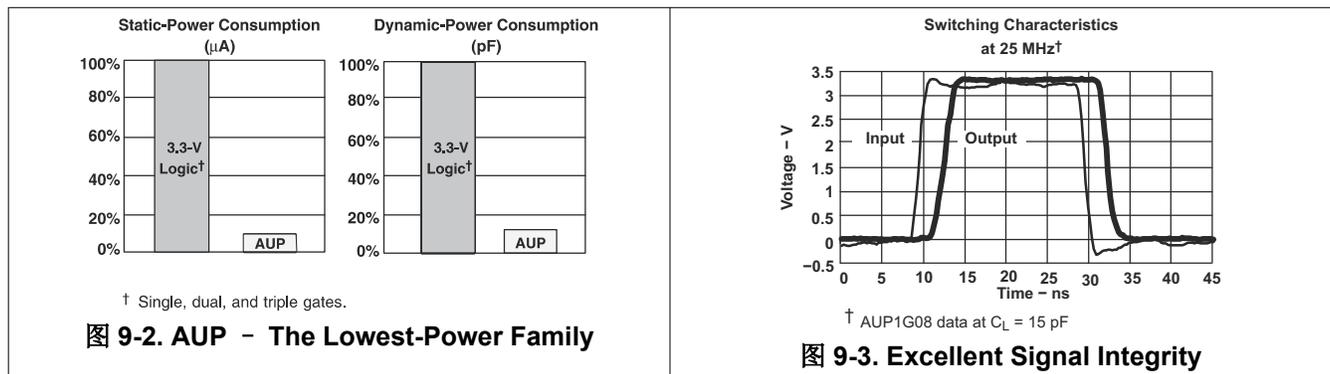


图 9-2. AUP - The Lowest-Power Family

图 9-3. Excellent Signal Integrity

The AUP family of single gate logic makes excellent translators for the new lower voltage microprocessors that typically are powered from 0.8 V to 1.2 V. They can drop the voltage of peripheral drivers and accessories that are still powered by 3.3 V to the new uC power levels.

10 Power Supply Recommendations

The power supply can be any voltage between the Min and Max supply voltage rating located in the [# 6.3](#) table.

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

11 Layout

11.1 Layout Guidelines

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 when only 3 of the 4 buffer gates are used.

Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [图 11-1](#) specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the output section of the part when asserted. This will not disable the input section of the I/Os, so they cannot float when disabled.

11.2 Layout Example

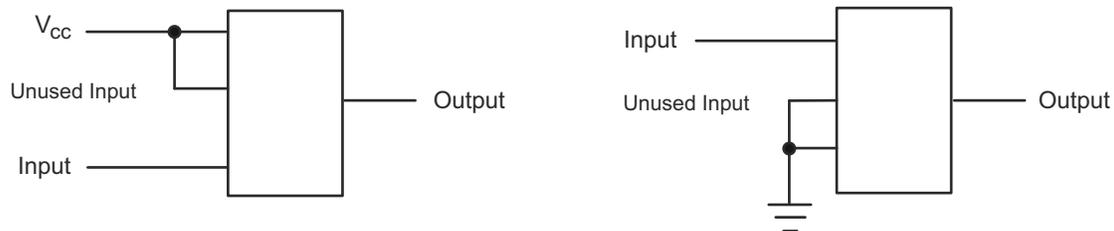


图 11-1. Layout Diagram

12 Device and Documentation Support

12.1 接收文档更新通知

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

12.2 支持资源

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

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

12.3 Trademarks

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12.4 Electrostatic Discharge Caution



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

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

12.5 术语表

TI 术语表 本术语表列出并解释了术语、首字母缩略词和定义。

13 Mechanical, Packaging, and Orderable Information

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

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74AUP2G07DCKR | ACTIVE | SC70 | DCK | 6 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (H55, H5F) | Samples |
| SN74AUP2G07DRYR | ACTIVE | SON | DRY | 6 | 5000 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 85 | H5 | Samples |
| SN74AUP2G07DSFR | ACTIVE | SON | DSF | 6 | 5000 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 85 | H5 | Samples |
| SN74AUP2G07YFPR | ACTIVE | DSBGA | YFP | 6 | 3000 | RoHS & Green | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | HVN | Samples |

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

ACTIVE: Product device recommended for new designs.

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

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

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

OBSELETE: TI has discontinued the production of the device.

(2) **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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm 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.

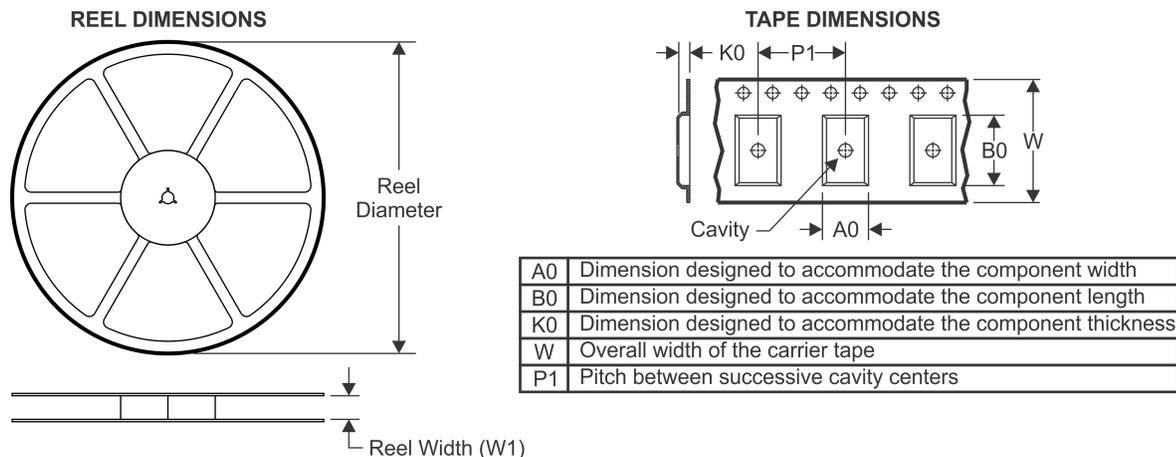
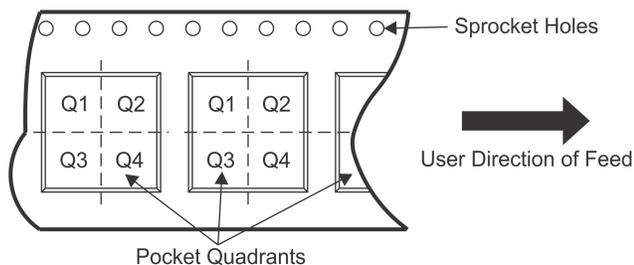
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(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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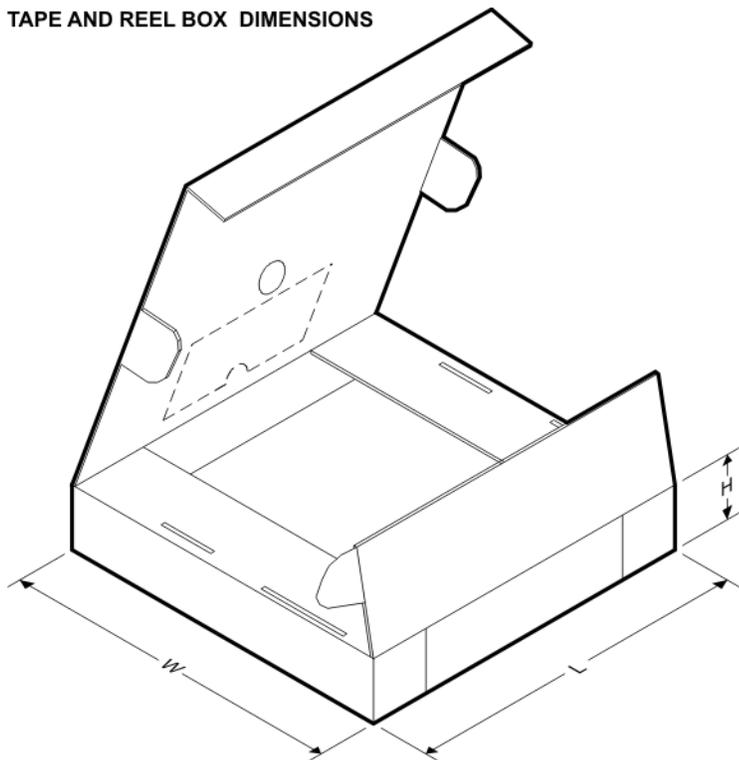
continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information 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.

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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AUP2G07DCKR | SC70 | DCK | 6 | 3000 | 178.0 | 9.2 | 2.4 | 2.4 | 1.22 | 4.0 | 8.0 | Q3 |
| SN74AUP2G07DCKR | SC70 | DCK | 6 | 3000 | 178.0 | 9.0 | 2.4 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |
| SN74AUP2G07DRYR | SON | DRY | 6 | 5000 | 180.0 | 9.5 | 1.15 | 1.6 | 0.75 | 4.0 | 8.0 | Q1 |
| SN74AUP2G07DSFR | SON | DSF | 6 | 5000 | 180.0 | 9.5 | 1.16 | 1.16 | 0.5 | 4.0 | 8.0 | Q2 |
| SN74AUP2G07YFPR | DSBGA | YFP | 6 | 3000 | 178.0 | 9.2 | 0.89 | 1.29 | 0.62 | 4.0 | 8.0 | Q1 |

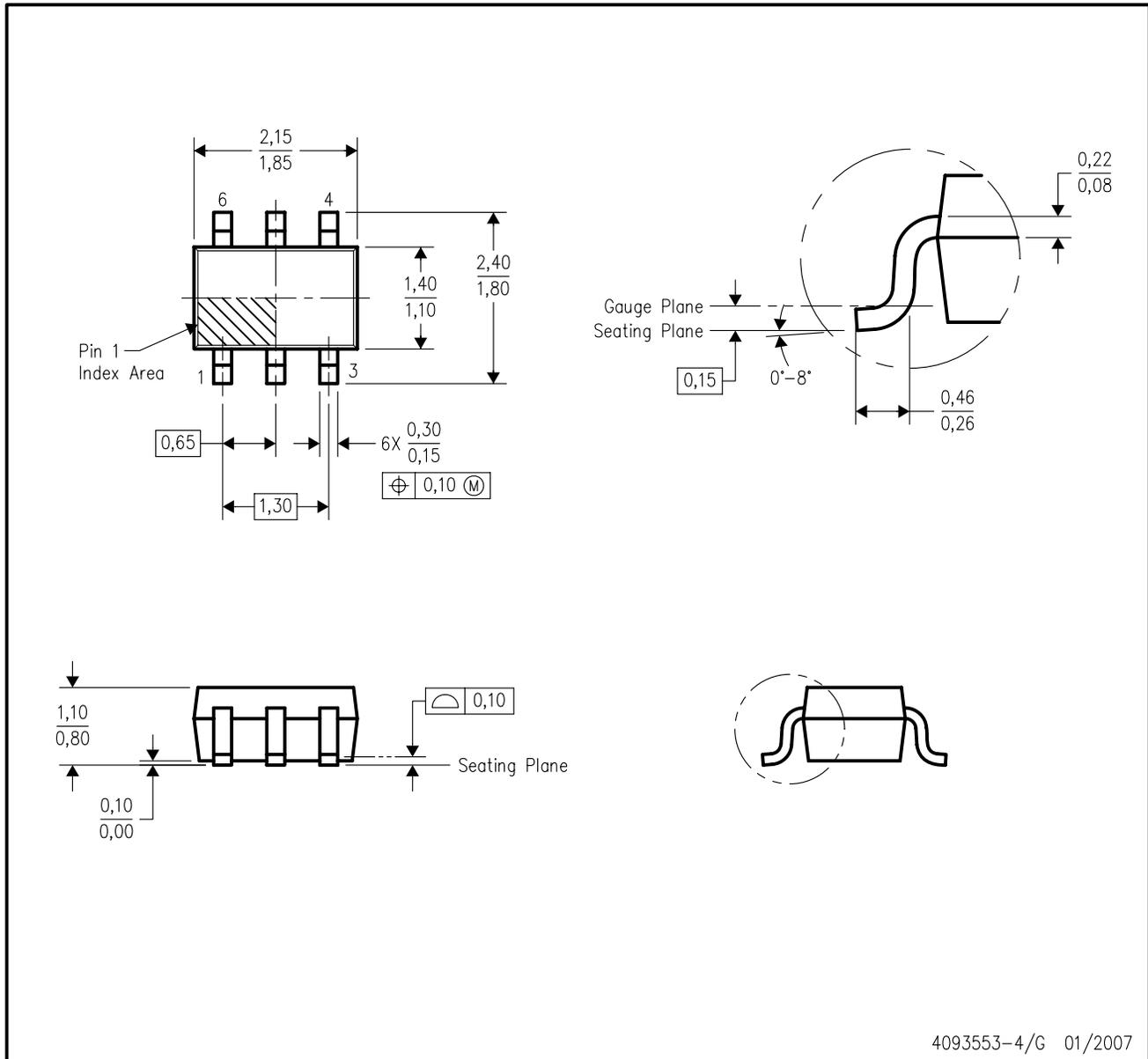
TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AUP2G07DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74AUP2G07DCKR | SC70 | DCK | 6 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74AUP2G07DRYR | SON | DRY | 6 | 5000 | 184.0 | 184.0 | 19.0 |
| SN74AUP2G07DSFR | SON | DSF | 6 | 5000 | 184.0 | 184.0 | 19.0 |
| SN74AUP2G07YFPR | DSBGA | YFP | 6 | 3000 | 220.0 | 220.0 | 35.0 |

DCK (R-PDSO-G6)

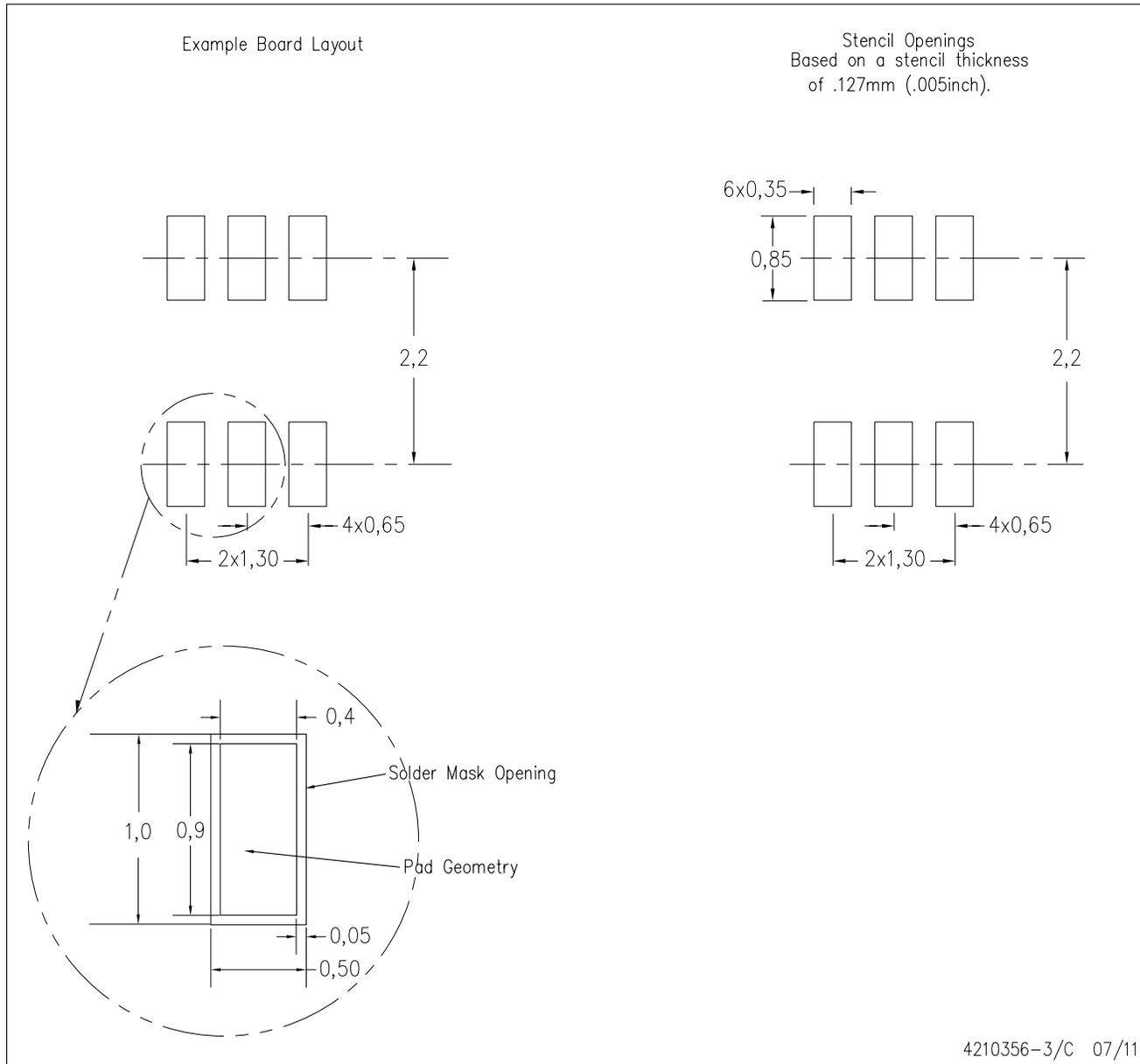
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
 - D. Falls within JEDEC MO-203 variation AB.

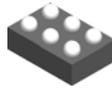
DCK (R-PDSO-G6)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

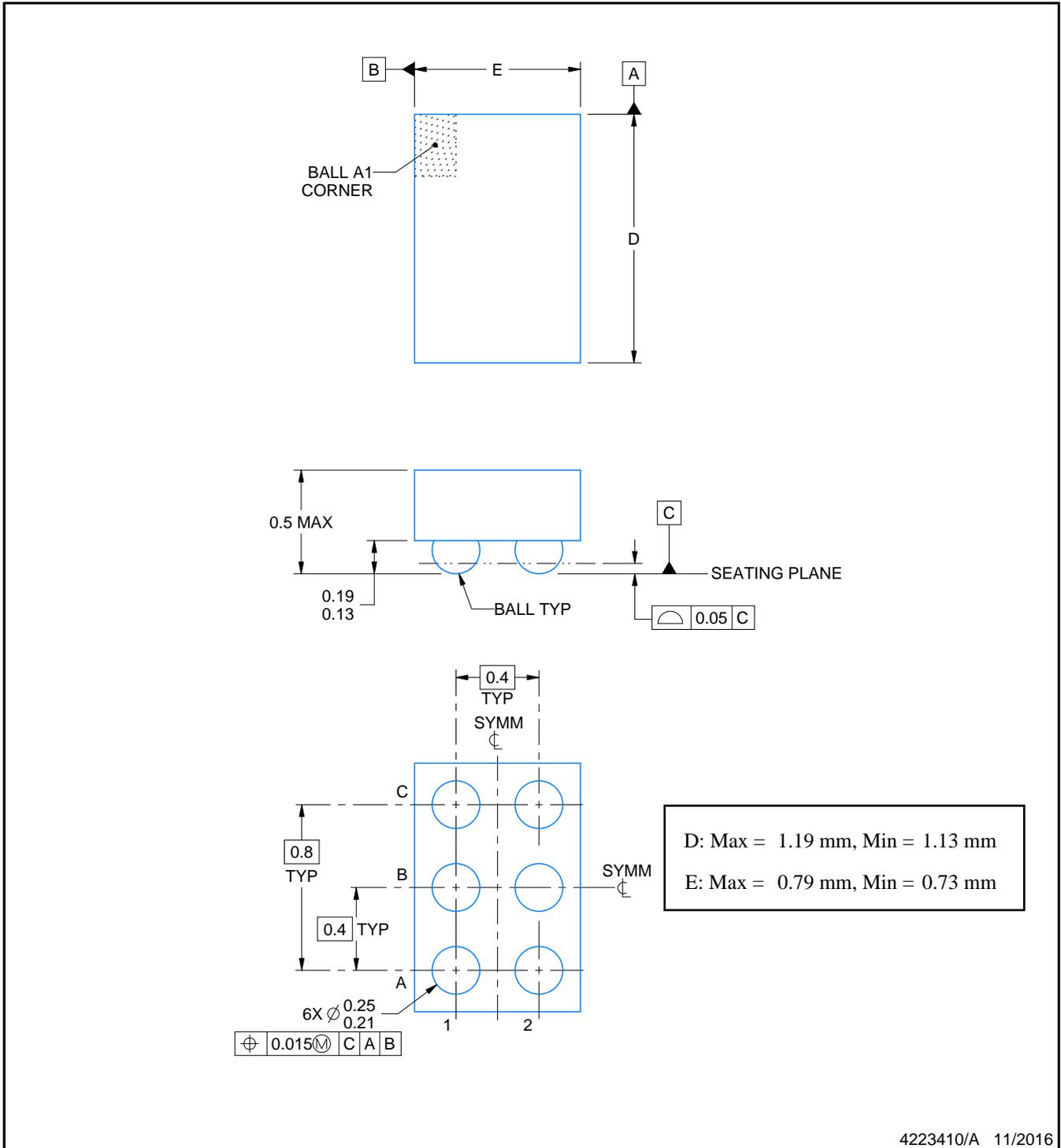
YFP0006



PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



4223410/A 11/2016

NOTES:

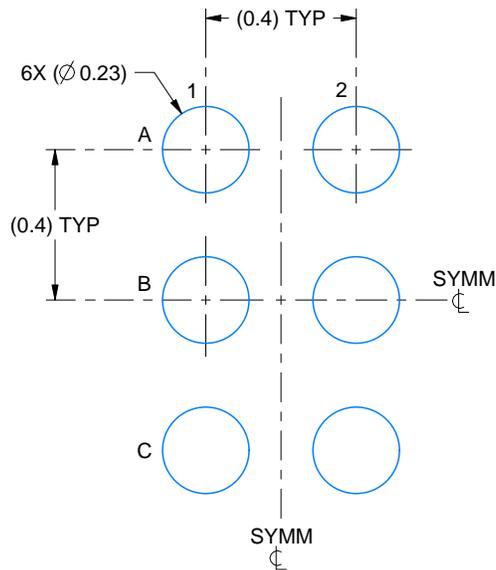
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

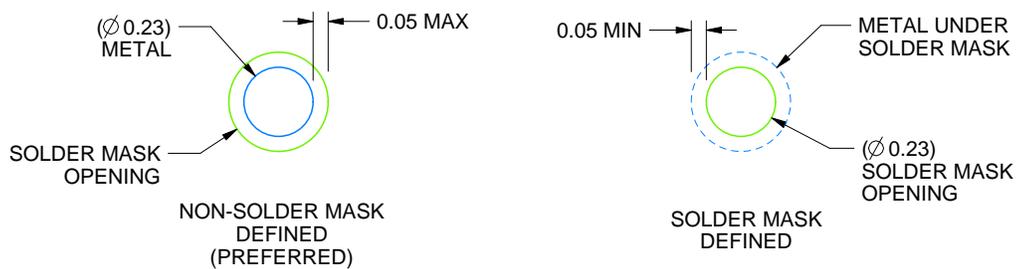
YFP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE
SCALE:50X



SOLDER MASK DETAILS
NOT TO SCALE

4223410/A 11/2016

NOTES: (continued)

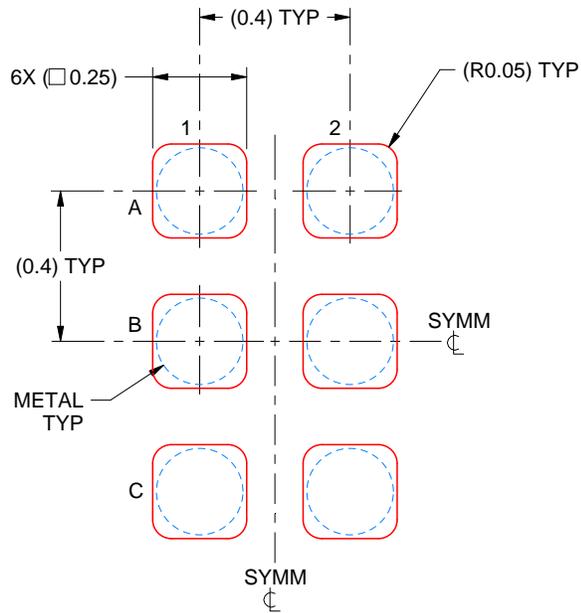
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).

EXAMPLE STENCIL DESIGN

YFP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:50X

4223410/A 11/2016

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

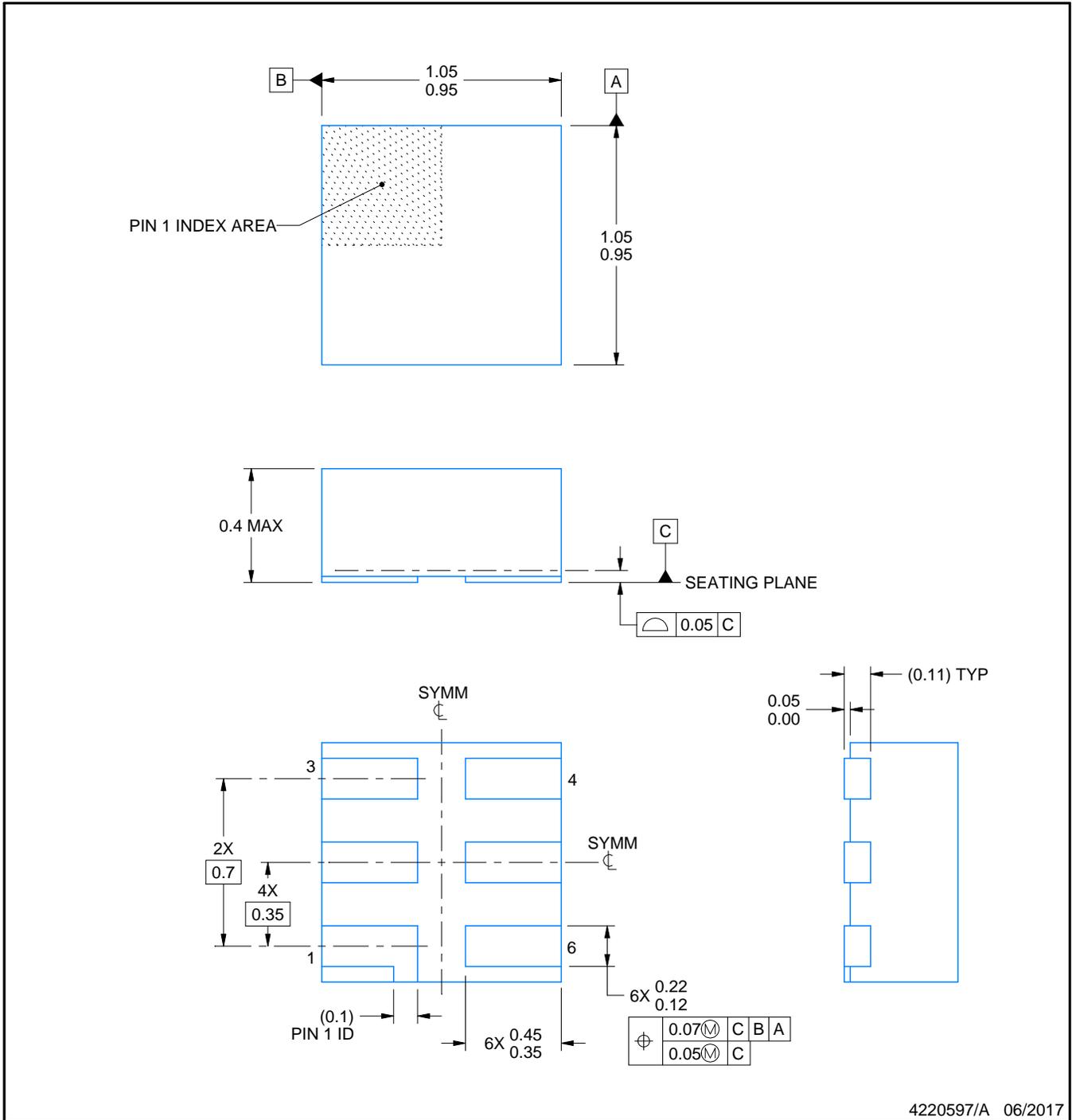


DSF0006A

PACKAGE OUTLINE

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4220597/A 06/2017

NOTES:

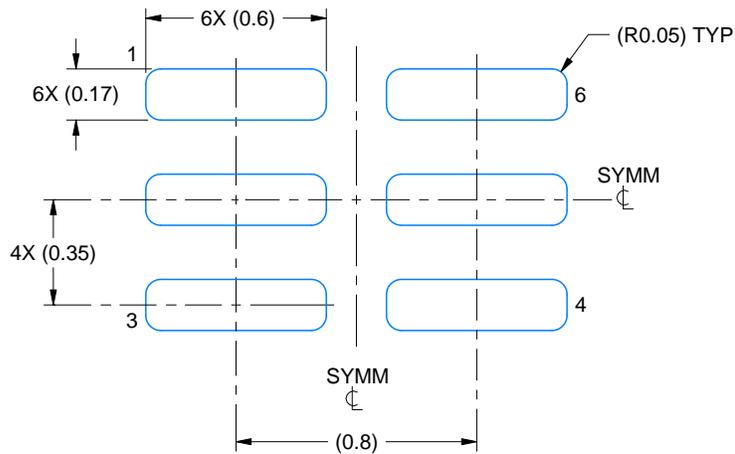
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration MO-287, variation X2AAF.

EXAMPLE BOARD LAYOUT

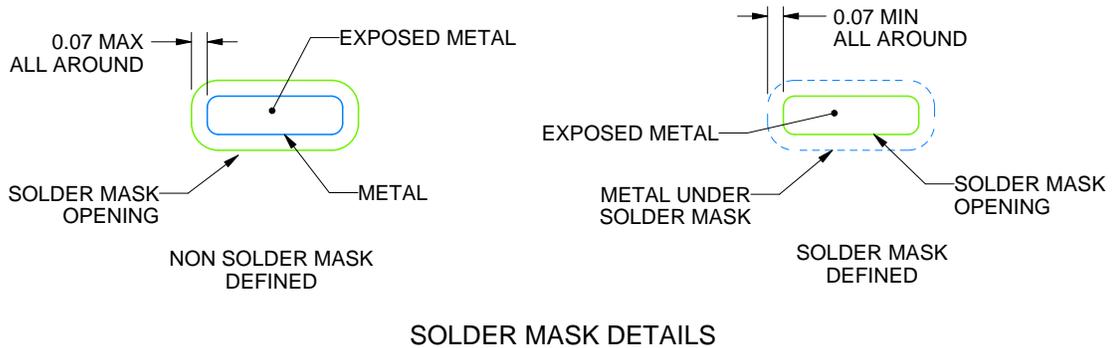
DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:40X



SOLDER MASK DETAILS

4220597/A 06/2017

NOTES: (continued)

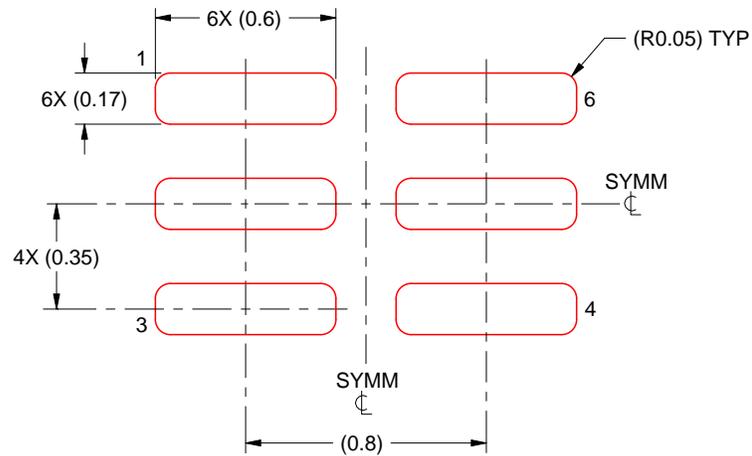
4. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
SCALE:40X

4220597/A 06/2017

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

GENERIC PACKAGE VIEW

DRY 6

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



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

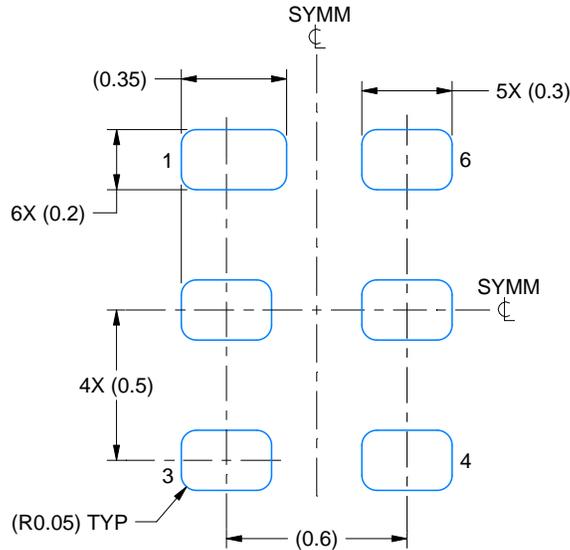
4207181/G

EXAMPLE BOARD LAYOUT

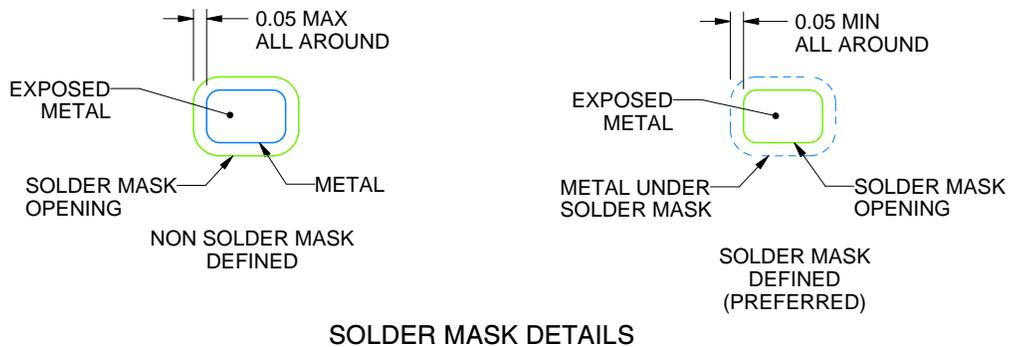
DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
1:1 RATIO WITH PKG SOLDER PADS
EXPOSED METAL SHOWN
SCALE:40X



SOLDER MASK DETAILS

4222894/A 01/2018

NOTES: (continued)

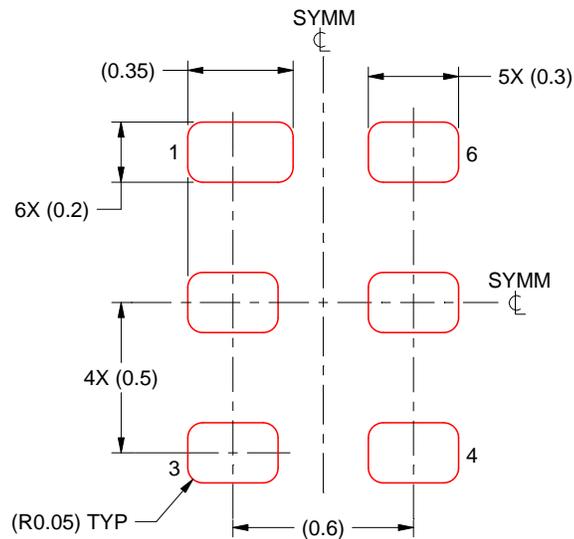
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.075 - 0.1 mm THICK STENCIL
SCALE:40X

4222894/A 01/2018

NOTES: (continued)

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

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