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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

| <b>Changes from Revision A (December 2022) to Revision B (June 2023)</b>    | <b>Page</b> |
|-----------------------------------------------------------------------------|-------------|
| • 在 <i>特性</i> 部分添加了 PAM4 串行器或解串器支持.....                                     | <b>1</b>    |
| • 更新了 <i>封装信息</i> 表格式以包含封装引线.....                                           | <b>1</b>    |
| <b>Changes from Revision * (October 2021) to Revision A (December 2022)</b> | <b>Page</b> |
| • 将数据表的状态从 <i>预告信息</i> 更改为 “ <i>量产数据</i> ” .....                            | <b>1</b>    |

## 5 说明 (续)

DS560DF810 配有位多路复用器和多路信号分离器齿轮箱，可在主机和模块间轻松实现 NRZ 至 PAM4 或 PAM4 至 NRZ 的转换。该齿轮箱可将一对速率高达 28.9GBd 的 NRZ 输入聚合为一个 28.9GBd PAM4 输出，也可将一个 28.9GBd PAM4 输入解聚为一对 28.9GBd NRZ 输出。

DS560DF810 在 CDR 后的每对相邻通道之间都具有一个完整的 2x2 交叉点开关，可支持快速、灵活的通道切换以实现灵活的 PCB 路由，支持 2 到 1 多路复用和 1 到 2 多路分解以实现故障转移冗余，还支持 1 对 2 扇出以实现诊断监控。此外，PCB 上集成了物理交流耦合电容器 (TX 和 RX)，无需使用外部电容器。这些特性可降低 PCB 布线的复杂程度并节省物料清单 (BOM) 成本。

诊断功能包括无损 PAM4/NRZ 垂直眼高监视器、2D PAM4/NRZ 眼图张开度监视器 (EOM)、具有错误注入模块的 PRBS 图形发生器、PRBS 错误校验器和片上温度传感器。这些特性可帮助测量链路裕量，并用于监测系统随时间推移的运行情况。

DS560DF810 可通过 I<sup>2</sup>C 或外部 EEPROM 进行配置。单个 EEPROM 最多可由 16 个器件共享。

## 6 Device and Documentation Support

### 6.1 Documentation Support

#### 6.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [DS560DFXX0 Programmer's Guide](#)
- Texas Instruments, [DS560DF810EVM User's Guide](#)
- Texas Instruments, [Implementation of TI 56Gbps PAM4 Retimers in Direct Attach Copper Cable Applications](#)

#### 6.2 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](https://www.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。

#### 6.3 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》](#)。

#### 6.4 Trademarks

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#### 6.5 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。

#### 6.6 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。

## 7 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="#">DS560DF810ALUR</a> | Active        | Production           | FCCSP (ALU)   135 | 1000   LARGE T&R      | Yes         | SNAGCU                               | Level-3-260C-168 HR               | -40 to 85    | DS560DF8E0          |
| <a href="#">DS560DF810ALUT</a> | Active        | Production           | FCCSP (ALU)   135 | 250   LARGE T&R       | Yes         | SNAGCU                               | Level-3-260C-168 HR               | -40 to 85    | DS560DF8E0          |

<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.

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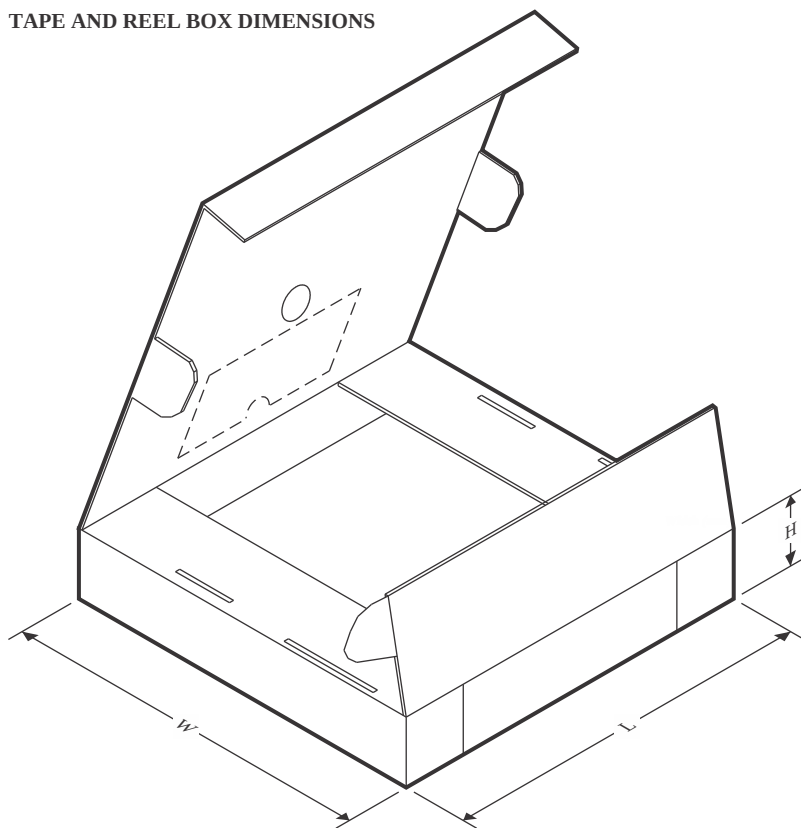
## TAPE AND REEL INFORMATION



\*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 |
|----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| DS560DF810ALUR | FCCSP        | ALU             | 135  | 1000 | 330.0              | 24.4               | 8.4     | 13.4    | 2.45    | 12.0    | 24.0   | Q2            |
| DS560DF810ALUT | FCCSP        | ALU             | 135  | 250  | 330.0              | 24.4               | 8.4     | 13.4    | 2.45    | 12.0    | 24.0   | Q2            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

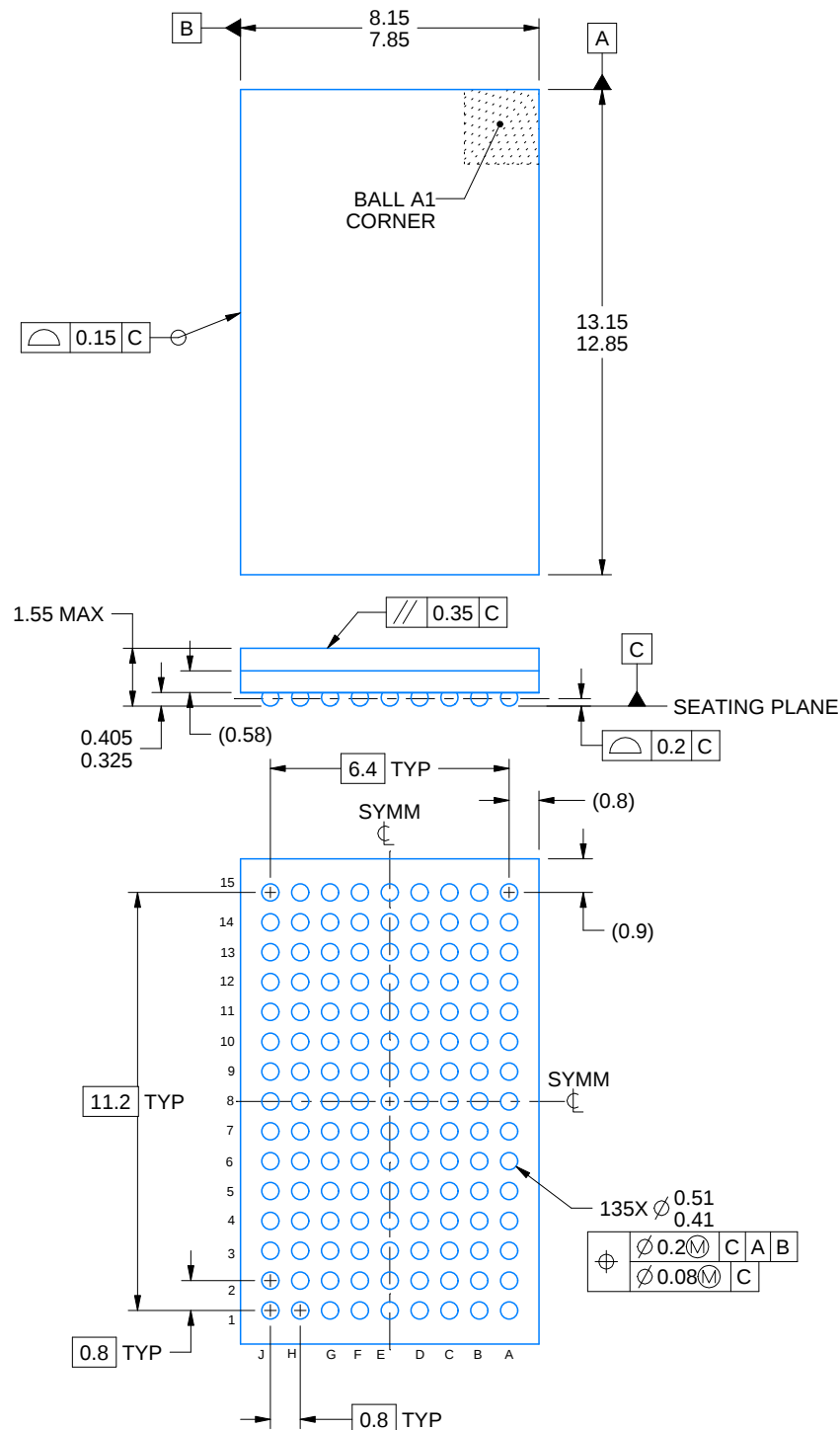
| Device         | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| DS560DF810ALUR | FCCSP        | ALU             | 135  | 1000 | 336.6       | 336.6      | 41.3        |
| DS560DF810ALUT | FCCSP        | ALU             | 135  | 250  | 336.6       | 336.6      | 41.3        |



# ALU0135A

### FCBGA - 1.55 mm max height

## PLASTIC BALL GRID ARRAY



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NOTES:

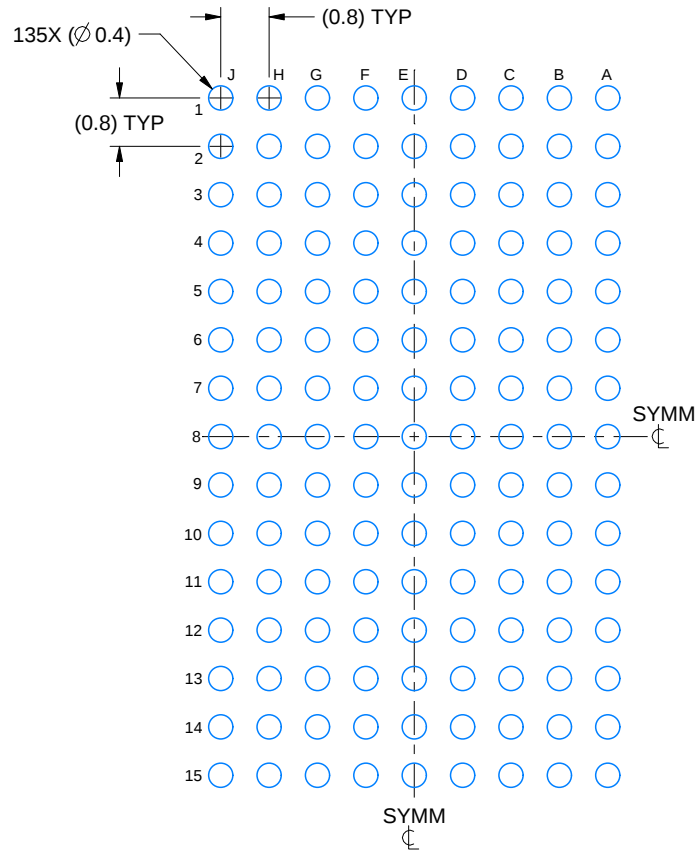
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

# EXAMPLE BOARD LAYOUT

ALU0135A

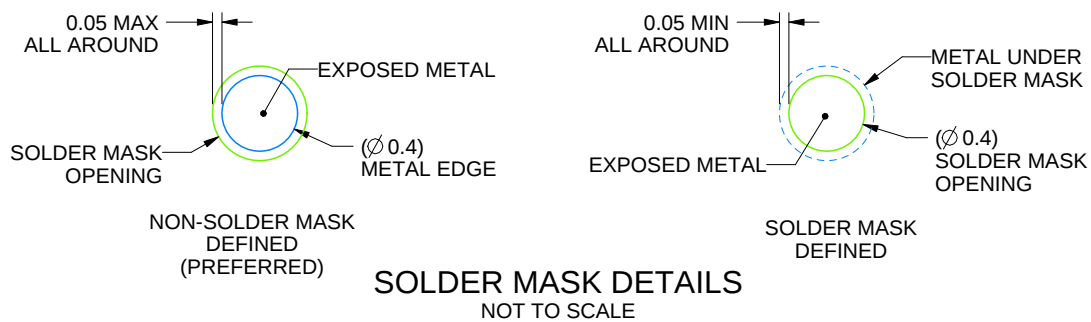
FCBGA - 1.55 mm max height

PLASTIC BALL GRID ARRAY



## LAND PATTERN EXAMPLE

EXPOSED METAL SHOWN  
SCALE: 8X



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NOTES: (continued)

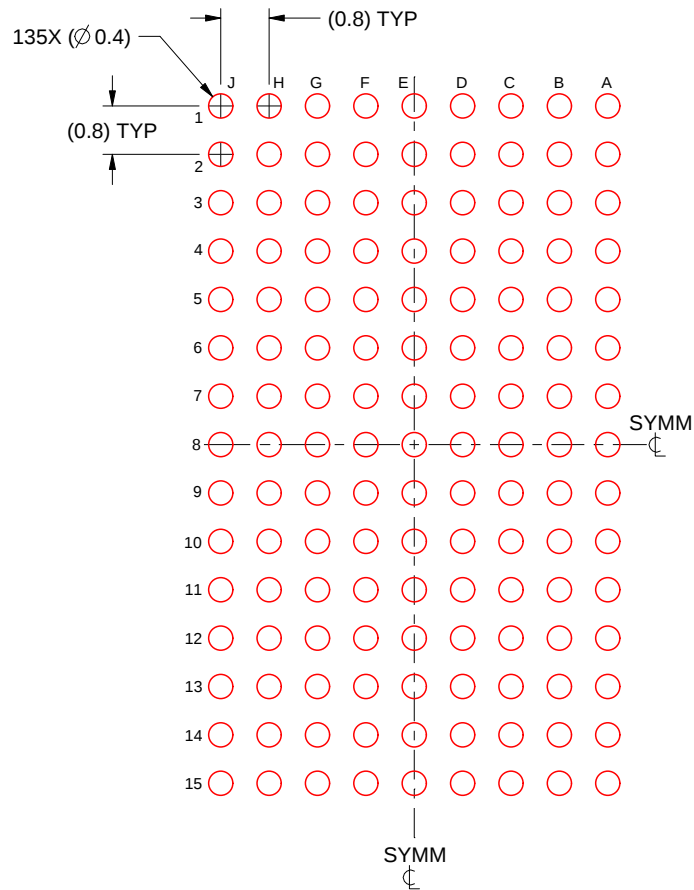
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For information, see Texas Instruments literature number SPRAA99 ([www.ti.com/lit/spraa99](http://www.ti.com/lit/spraa99)).

## EXAMPLE STENCIL DESIGN

ALU0135A

FCBGA - 1.55 mm max height

PLASTIC BALL GRID ARRAY



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

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NOTES: (continued)

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

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