LMG310xR0xx100V GaN 功率级，集成保护功能和智能开关特性

ADVANCE INFORMATION

1 特性

- 具有集成驱动器的 100V GaN 功率级：（GaN FET $R_{DS(ON)}$ 选项：1.1mΩ 和 1.7mΩ）
- 集成了高侧电平移位和自举
  - 两个 LMG310xR0xx 可构成一个半桥
  - 无需外部电平移位器
- 高效率、高密度的功率转换
  - 超低传播延迟 (20ns) 和匹配 (7ns)
  - GaN FET 独立导通和关断转换率控制
  - 用于优化死区时间的零电压检测 (ZVD) 报告
  - 理想二极管模式导通 (IDM) 和关断（零电流检测 ZCD），可降低软开关应用中的第三象限损耗
- 输入控制灵活多样
  - 独立输入模式 (IIM) 控制
  - 单路 PWM 输入，电阻可编程死区时间，适配 IO 受限的控制器
- 强大的保护
  - IIM 下的互锁保护 (LMG3104R0xx)
  - 内部自举电源电压调节，可防止 GaN FET 过驱动
  - 基于 V_{DS} 监测的逐周期短路保护
  - 过热、电源欠压和短路事件的故障指示
- 外置辅助供电电源：5V
  - 支持 3.3V 和 5V 输入逻辑电平
- 寄生优化 QFN 封装，顶部设有外露焊盘，支持顶面散热

2 应用

- 降压、升压和降压/升压转换器
- LLC 转换器
- 光伏逆变器
- 电信和服务器电源
- 电机驱动器
- 电动工具
- D 类音频放大器

3 说明

LMG310xR0xx 器件是一个具有集成高频驱动器的 100V 增强模式氮化镓 (GaN) HEMT 系列。LMG310xR0xx 包含一个高侧电平移位器和自举电路，因此两个 LMG310xR0xx 器件可用于构成一个半桥，而无需额外的电平移位器。LMG3104R0xx 在独立输入模式 (IIM) 下提供了逻辑输入互锁。

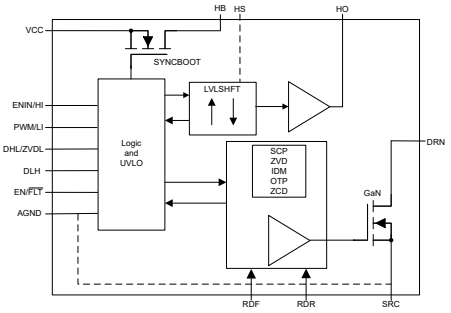
由于 GaN FET 的反向恢复为零，而且输入电容 (C_{ISS}) 和输出电容 (C_{OSS}) 都极小，所以 GaN FET 在功率转换方面优势极为显著。驱动器和 GaN FET 均安装在一个完全无键合线的封装平台上，尽可能减少了封装寄生元件数。LMG310xR0xx 器件采用 6.5mm × 4mm 无铅封装，可轻松安装在 PCB 上。

无论 VCC 电压如何，TTL 逻辑兼容输入均可支持 3.3V 和 5V 逻辑电平。专有自举电压调节技术可将增强模式 GaN FET 的栅极电压调控至安全工作范围内。该器件配有用户友好型接口且更为出色，进一步提升了分立式 GaN FET 的优势。对于需要小尺寸、高频率、高效率运行的应用，该器件是理想之选。

器件信息

器件型号(3)	封装(1)	封装尺寸(2)
LMG310xR011	VBE（VQFN-FCRLF，15）	6.5mm × 4mm
LMG310xR017		

(1) 有关更多信息，请参阅 节 7。
(2) 封装尺寸（长 × 宽）为标称值，并包括引脚（如适用）。
(3) 请参阅 *器件比较表*。



简化版方框图

本资源的原文使用英文撰写。为方便起见，TI 提供了译文；由于翻译过程中可能使用了自动化工具，TI 不保证译文的准确性。为确认准确性，请务必访问 ti.com 参考最新的英文版本（控制文档）。

内容

1 特性 1
2 应用 1
3 说明 1
4 器件比较 3
5 器件和文档支持 4
5.1 文档支持 4
5.2 接收文档更新通知 4
5.3 支持资源 4
5.4 商标 4
5.5 静电放电警告 4
5.6 术语表 4
6 修订历史记录 4
7 机械、封装和可订购信息 5
7.1 卷带包装信息 5
7.2 机械数据 6

ADVANCE INFORMATION

Copyright © 2026 Texas Instruments Incorporated

4 器件比较

表 4-1. 器件比较

器件		$RDS_{(ON)}$(mΩ)
LMG3105R011VBER	LMG3104R011VBER	1.1
LMG3105R017VBER(1)	LMG3104R017VBER	1.7

(1) 预发布信息 (非预告信息)

表 4-2. 特性比较

器件型号	IIM 模式下的互锁	IDM 处于关断切换状态
LMG3104Rxxx	启用	启用
LMG3105Rxxx	禁用	禁用

ADVANCE INFORMATION

Copyright © 2026 Texas Instruments Incorporated

5 器件和文档支持

5.1 文档支持

5.1.1 相关文档

如要查看相关文件，请参阅以下内容：

- 德州仪器 (TI)，*LMG5200 GaN 功率级布局设计要点* 应用手册
- 德州仪器 (TI)，*使用 LMG5200：GaN 半桥功率级 EVM* 用户指南
- 德州仪器 (TI)，AN-2029 操作和处理建议 应用手册

5.2 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*通知* 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。

5.3 支持资源

TI E2E™ 中文支持论坛是工程师的重要参考资料，可直接从专家处获得快速、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，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。

5.4 商标

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

5.5 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。

5.6 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。

6 修订历史记录

日期	修订版本	注释
May 2026	*	初始发行版

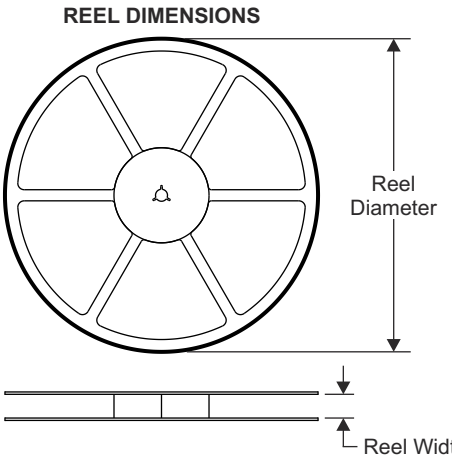
ADVANCE INFORMATION

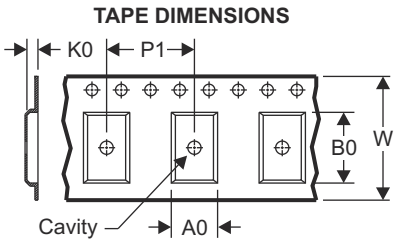
Copyright © 2026 Texas Instruments Incorporated

7 机械、封装和可订购信息

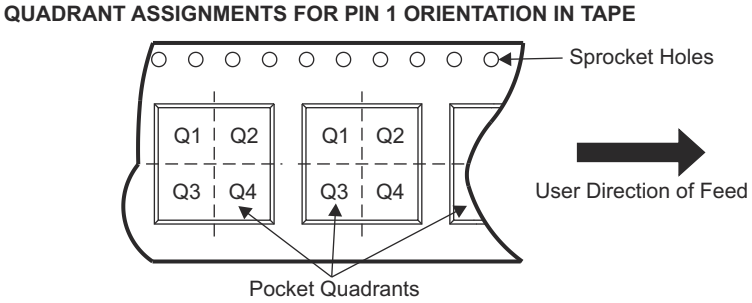
以下页面包含机械、封装和可订购信息。这些信息是指定器件可用的最新数据。数据如有变更，恕不另行通知，且不会对此文档进行修订。有关此数据表的浏览器版本，请查阅左侧的导航栏。

7.1 卷带包装信息





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



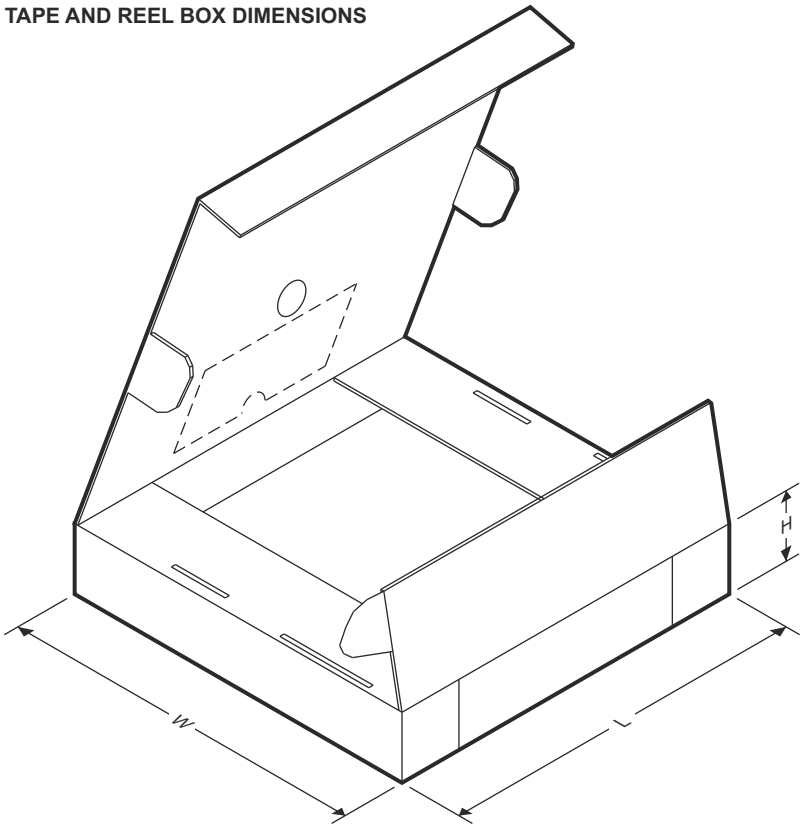
器件	封装类型	封装图	引脚	SPQ	卷带直径 (mm)	卷带宽度 W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1象限
LMG3104R011VBER	VQFN-FCRLF	VBE	15	2000	330	16.4	4.3	6.8	1.1	8.0	16.0	Q1
LMG3104R017VBER	VQFN-FCRLF	VBE	15	2000	330	16.4	4.3	6.8	1.1	8.0	16.0	Q1
LMG3105R011VBER	VQFN-FCRLF	VBE	15	2000	330	16.4	4.3	6.8	1.1	8.0	16.0	Q1
LMG3105R017VBER（预发布）	VQFN-FCRLF	VBE	15	2000	330	16.4	4.3	6.8	1.1	8.0	16.0	Q1

ADVANCE INFORMATION

Copyright © 2026 Texas Instruments Incorporated

ADVANCE INFORMATION

TAPE AND REEL BOX DIMENSIONS

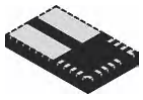


器件	封装类型	封装图	引脚	SPQ	长度 (mm)	宽度 (mm)	高度 (mm)
LMG3104R011VBER	VQFN-FCRLF	VBE	15	2000	336.6	336.6	28.6
LMG3104R017VBER	VQFN-FCRLF	VBE	15	2000	336.6	336.6	28.6
LMG3105R011VBER	VQFN-FCRLF	VBE	15	2000	336.6	336.6	28.6
LMG3105R017VBER（预发布）	VQFN-FCRLF	VBE	15	2000	336.6	336.6	28.6

7.2 机械数据

LMG310xR0xx 器件封装被评级为 MSL3 封装（湿敏等级 3）。有关 MSL3 封装的具体操作和处理建议，请参阅 *AN-2029 操作和处理建议*应用报告。

Copyright © 2026 Texas Instruments Incorporated

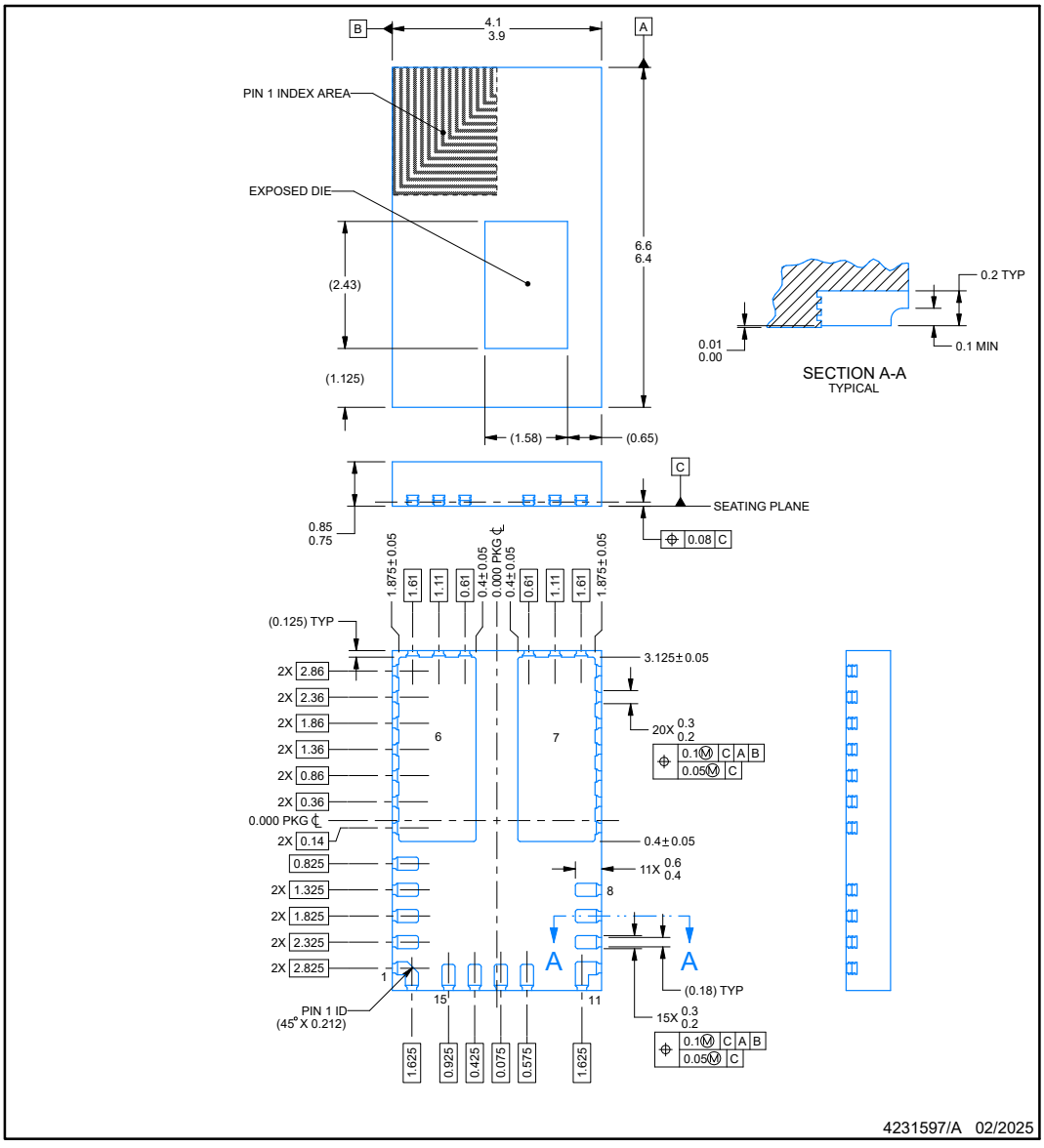


PACKAGE OUTLINE

VBE0015A-C01

VQFN-FCRLF - 0.85 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



NOTES:

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

www.ti.com

ADVANCE INFORMATION

Copyright © 2026 Texas Instruments Incorporated

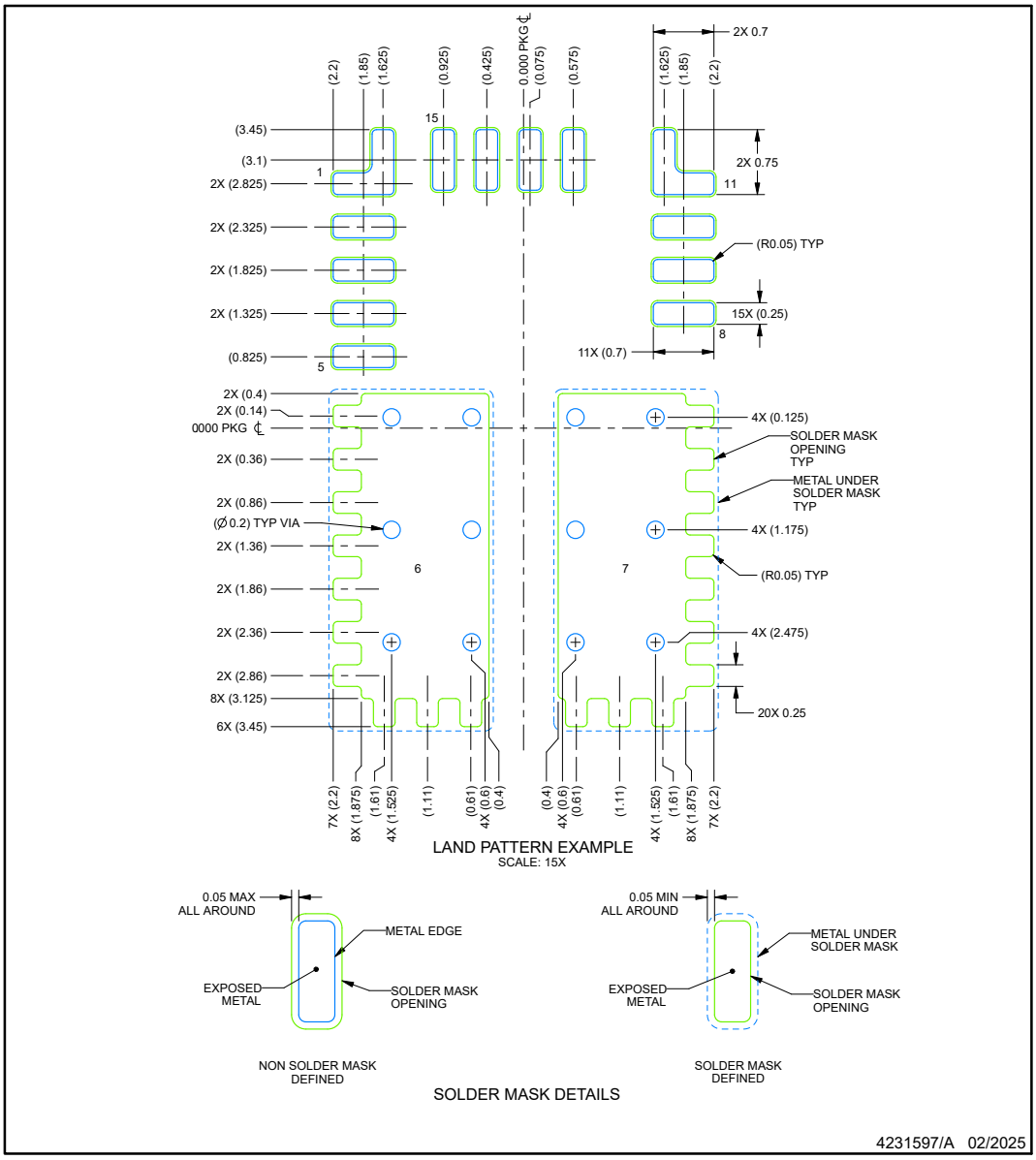
ADVANCE INFORMATION

EXAMPLE BOARD LAYOUT

VBE0015A-C01

VQFN-FCRLF - 0.85 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

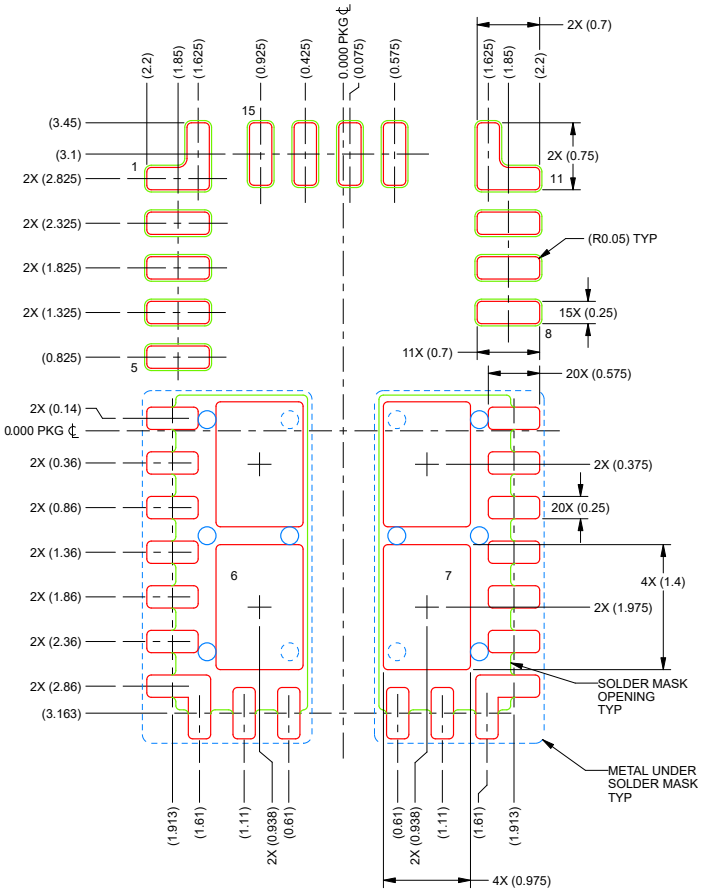
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown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

Copyright © 2026 Texas Instruments Incorporated

EXAMPLE STENCIL DESIGN

VBE0015A-C01 **VQFN-FCRLF - 0.85 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 15X

PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
PADS 6 & 7: 74%

4231597/A 02/2025

NOTES: (continued)

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

Copyright © 2026 Texas Instruments Incorporated

ADVANCE INFORMATION

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
XLMG3104R011VBER	Active	Preproduction	VQFN-FCRLF (VBE) | 15	2500 | LARGE T&R	-	Call TI	Call TI	-40 to 125	
XLMG3104R017VBER	Active	Preproduction	VQFN-FCRLF (VBE) | 15	2500 | LARGE T&R	-	Call TI	Call TI	-	

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

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

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

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

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

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

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

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

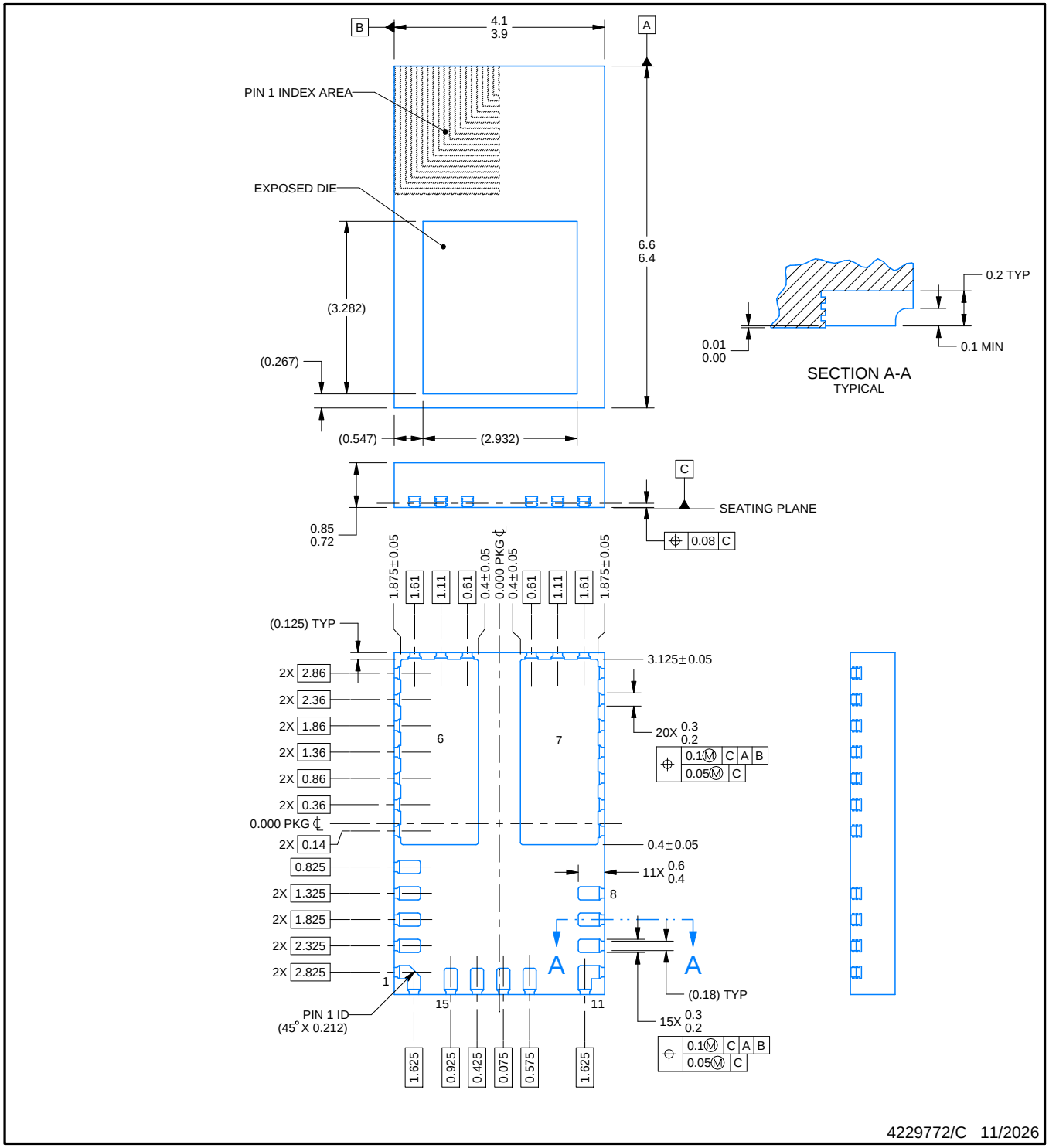


PACKAGE OUTLINE

VBE0015A

VQFN-FCRLF - 0.85 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



4229772/C 11/2026

NOTES:

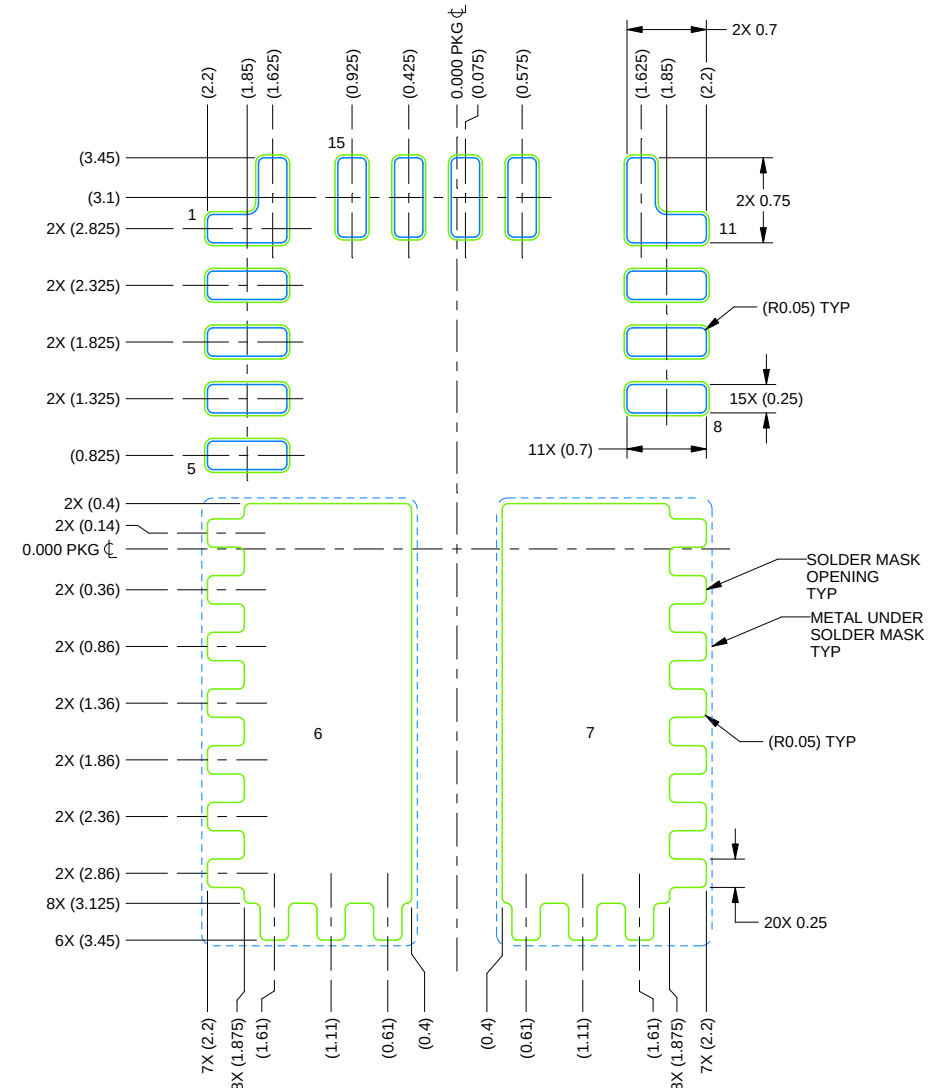
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

EXAMPLE BOARD LAYOUT

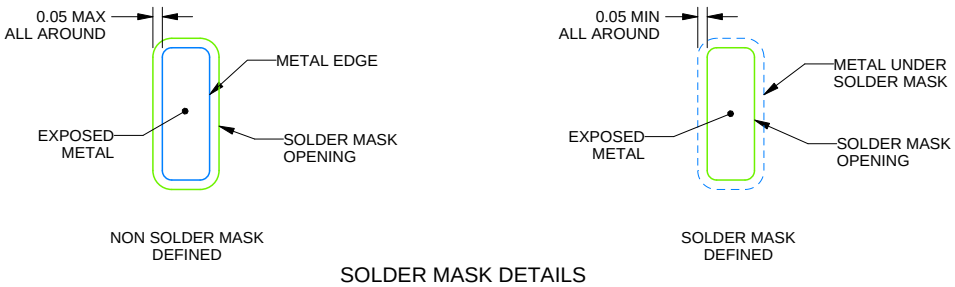
VBE0015A

VQFN-FCRLF - 0.85 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE
SCALE: 15X



SOLDER MASK DETAILS

4229772/C 11/2026

NOTES: (continued)

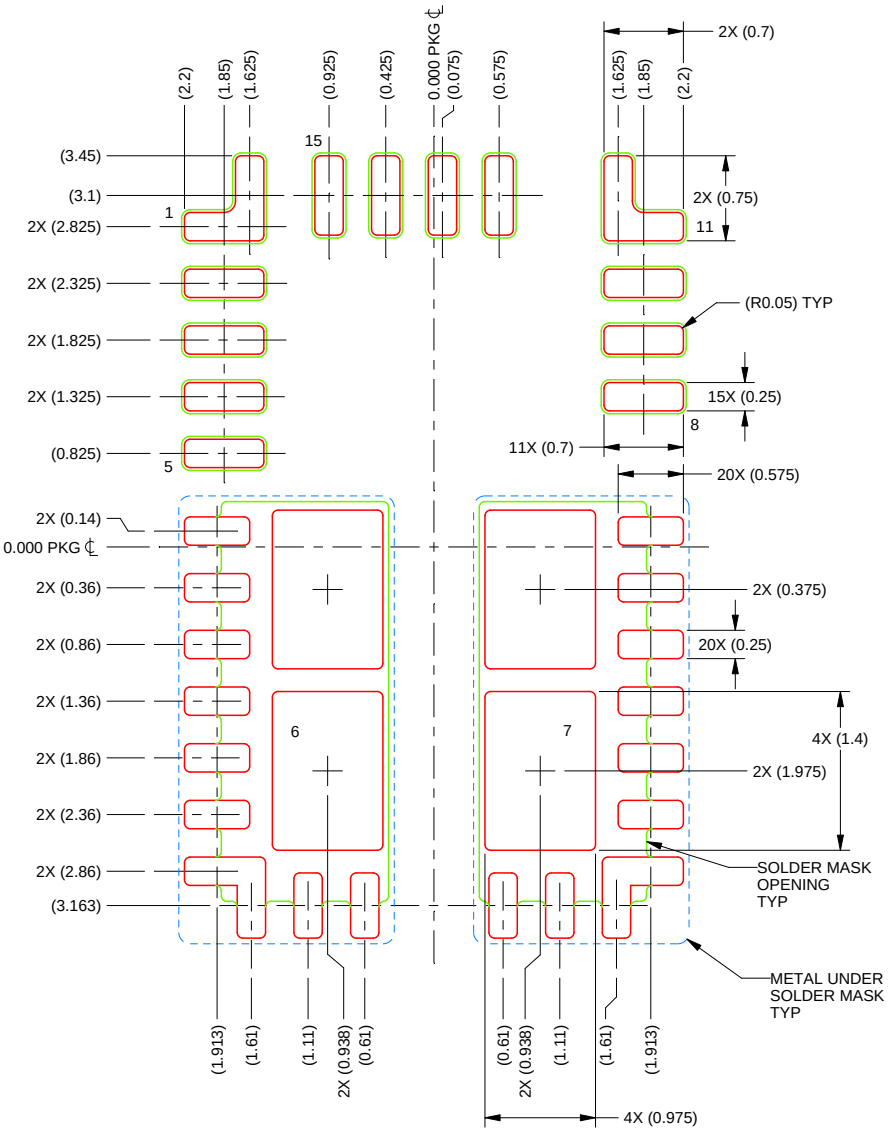
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown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

EXAMPLE STENCIL DESIGN

VBE0015A

VQFN-FCRLF - 0.85 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 15X

PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
PADS 6 & 7: 74%

4229772/C 11/2026

NOTES: (continued)

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

重要通知和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做出任何明示或暗示的担保，包括但不限于对适销性、与某特定用途的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他安全、安保法规或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的相关应用。严禁以其他方式对这些资源进行复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。对于因您对这些资源的使用而对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，您将全额赔偿，TI 对此概不负责。

TI 提供的产品受 TI 销售条款)、TI 通用质量指南 或 ti.com 上其他适用条款或 TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。 除非德州仪器 (TI) 明确将某产品指定为定制产品或客户特定产品，否则其产品均为按确定价格收入目录的标准通用器件。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

版权所有 © 2026，德州仪器 (TI) 公司

最后更新日期：2025 年 10 月