

UCC33420-Q1 超小型、1.5W、5.0V、3kV_{RMS} 隔离，汽车 直流/直流模块

1 特性

- 最大输出功率为 1.5W
- 4.5V 至 5.5V 输入电压工作范围
- 5.0V、5.5V 稳定可选输出电压
 - 5.0V : 300mA 可用负载电流
- 稳健可靠的隔离栅：
 - 隔离等级：3kV_{RMS}
 - 浪涌能力：6.5kV_{PK}
 - 工作电压：1188V_{PK}
 - 200V/nS 共模瞬态抗扰度
- 采用集成式变压器技术的高功率密度隔离式直流/直流模块
- 自适应展频调制 (SSM)
- 符合 CISPR32 B 级辐射标准
- 强磁场抗扰度
- 过载保护和短路保护
- 热关断
- 低浪涌电流软启动
- 具有故障报告机制的使能引脚
- 功能安全型
- 计划的安全相关认证：
 - 符合 DIN EN IEC 60747-17 (VDE 0884-17) 标准的基本隔离
 - 符合 UL 1577 标准且长达 1 分钟的 3kV_{RMS} 隔离
 - 符合 IEC 62368-1 和 IEC 60601-1 终端设备标准的 UL 认证
 - 根据 GB4943.1-2022 标准进行的 CQC 认证
- 具有符合 AEC-Q100 标准的下列特性：
 - 器件温度等级 1：- 40°C 至 125°C 环境温度范围
- VSON-12 (4.00mm x 5.00mm) 封装

2 应用

- 电池管理系统 (BMS)
- 适用于电压和电流传感器的隔离式电源
- 数字隔离器的隔离式辅助电源
- 适用于 RS-485、RS-422 和 CAN 的隔离式辅助电源
- 适用于 MCU 电源的隔离式辅助电源

3 说明

UCC33420-Q1 是一款采用集成变压器技术且汽车级的直流/直流电源模块，可提供 1.5W 的隔离式输出功率。它可支持 4.5V 至 5.5V 的输入电压工作范围，并可通过 5.5V 的可选余量调节 5.0V 输出电压。

UCC33420-Q1 具有专有变压器架构，可实现 3kV_{RMS} 隔离额定值，同时支持低 EMI 和出色的负载调节。

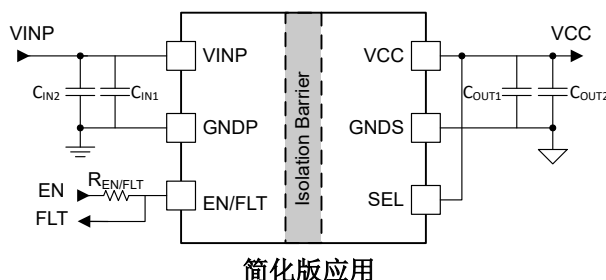
UCC33420-Q1 集成了保护特性以提高系统稳健性，例如具有故障报告机制的使能引脚、短路保护和热关断功能。

UCC33420-Q1 采用小型化、薄型解决方案 VSON (4.00mm x 5.00mm) 封装，高度为 1.00mm，爬电距离和间隙为 > 4.2mm

器件信息(1)

器件型号	封装	封装尺寸 (标称值)
UCC33420-Q1	VSON-FCRLF (12)	4.00mm x 5.00mm

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。



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ADVANCE INFORMATION

4 器件和文档支持

4.1 器件支持

4.2 文档支持

4.2.1 相关文档

请参阅如下相关文档：

- [隔离相关术语](#)

4.3 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 [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。

4.4 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](#)。

4.5 商标

TI E2E™ is a trademark of Texas Instruments.

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4.6 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。

4.7 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。


5 修订历史记录

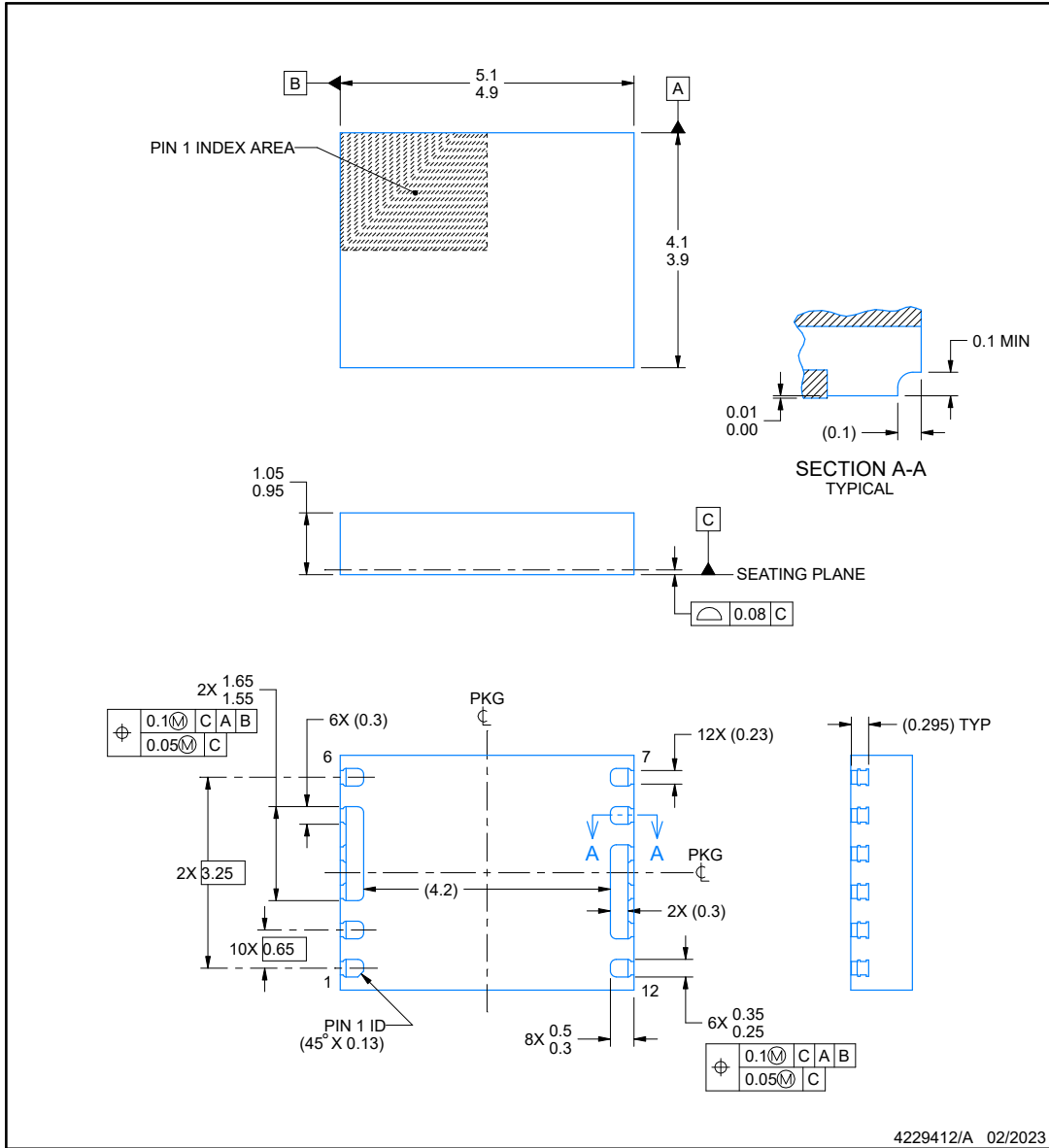
注：以前版本的页码可能与当前版本的页码不同

Changes from Revision * (January 2024) to Revision A (February 2024)	Page
• 更新了标题以包含“汽车类”。	1
• 向封装说明中添加了 4.2mm 爬电距离和间隙。	1

6 机械和封装信息

下述页面包含机械、封装和订购信息。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。

RAQ0012B  **PACKAGE OUTLINE**
VSON-FCRLF - 1.05 mm max height
 PLASTIC SMALL OUTLINE - NO LEAD



NOTES:

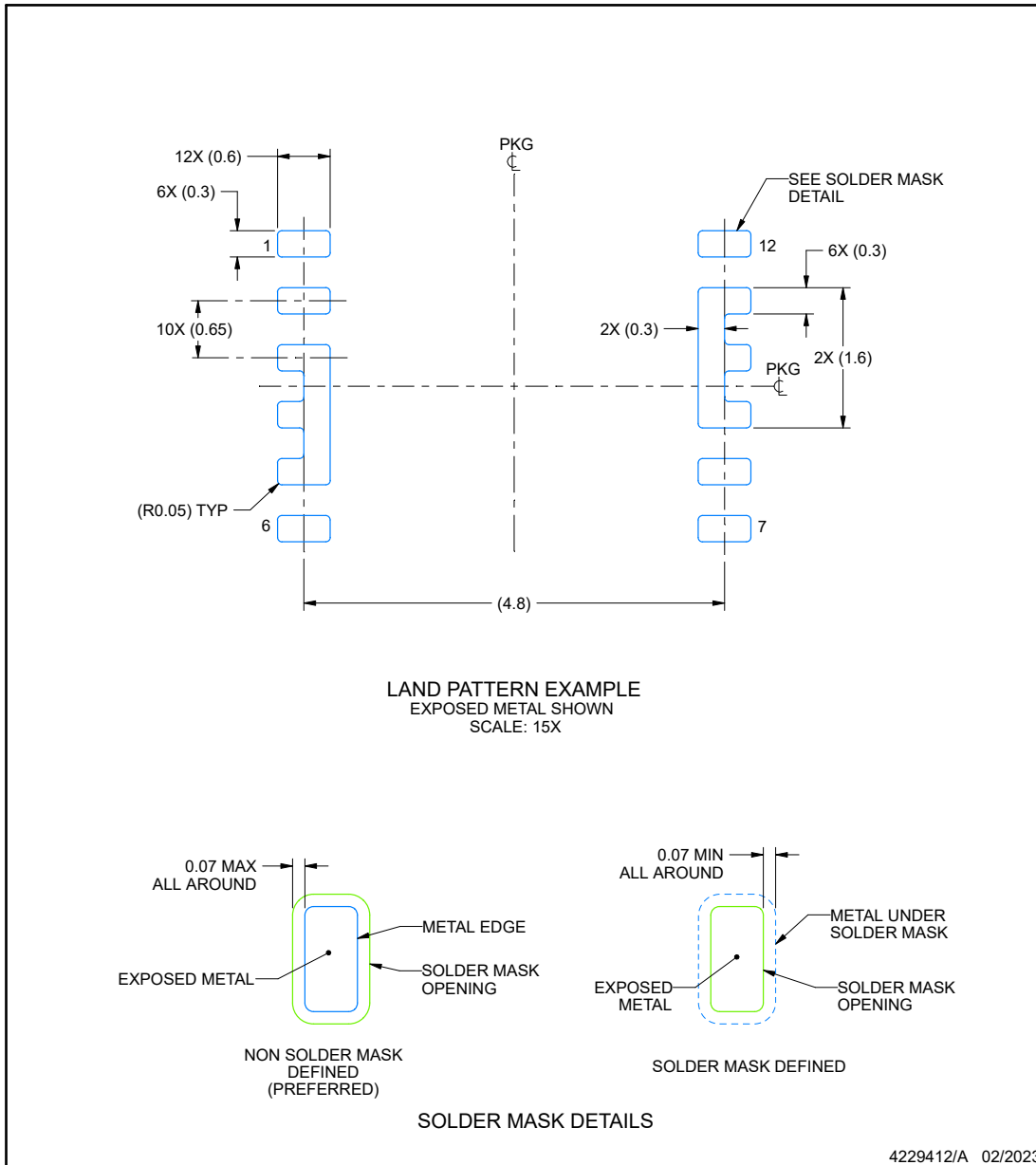
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

RAQ0012B

VSON-FCRLF - 1.05 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

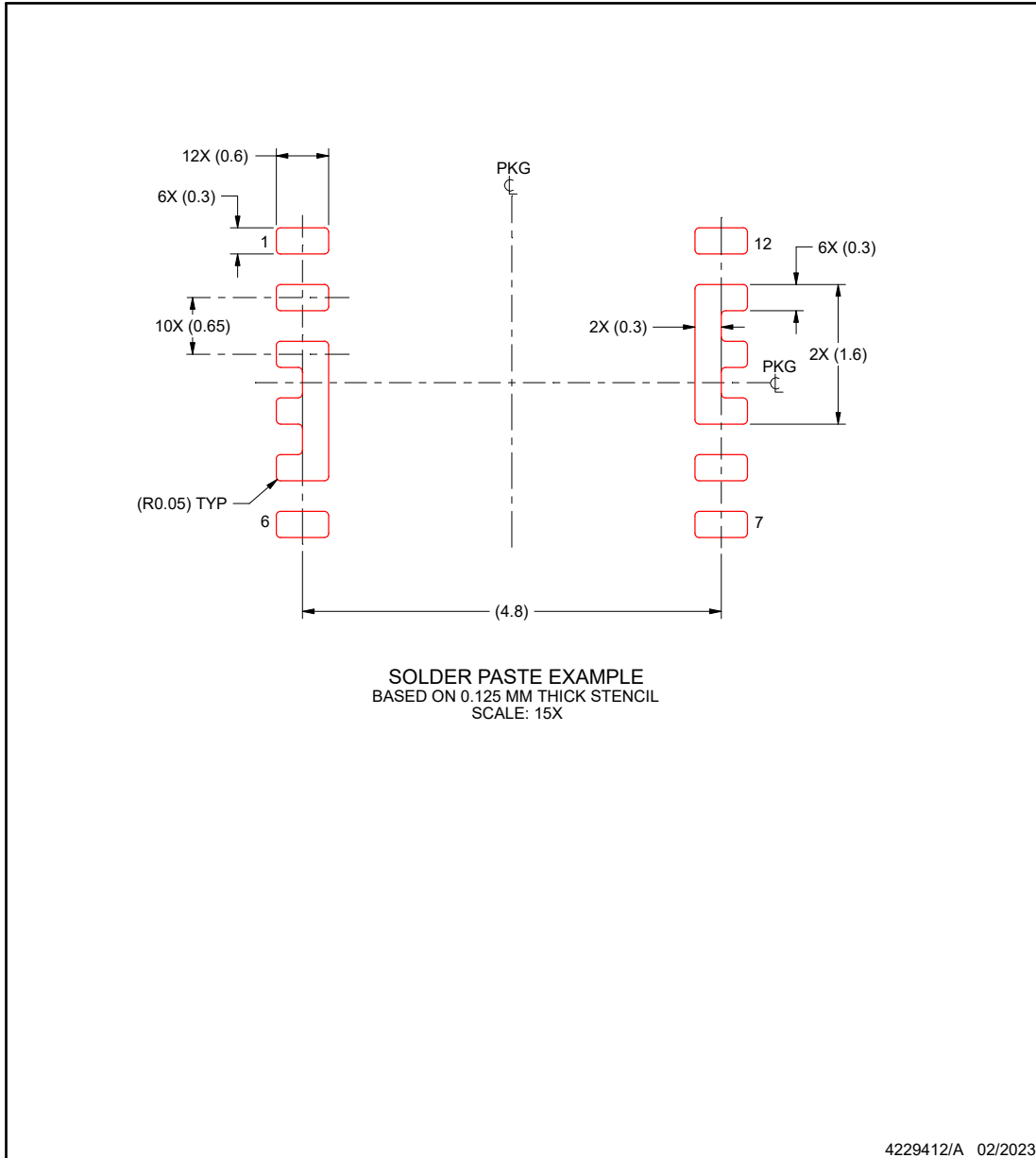
3. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/sluea271).
4. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

EXAMPLE STENCIL DESIGN

RAQ0012B

VSON-FCRLF - 1.05 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

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

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)
UCC33420QRAQRQ1	Active	Production	VSON-FCRLF (RAQ) 12	3000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	U33420Q
UCC33420QRAQRQ1.A	Active	Production	VSON-FCRLF (RAQ) 12	3000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	U33420Q

(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.

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OTHER QUALIFIED VERSIONS OF UCC33420-Q1 :

- Catalog : [UCC33420](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

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
UCC33420QRAQRQ1	VSON-FCRLF	RAQ	12	3000	330.0	12.4	4.3	5.3	1.3	8.0	12.0	Q2

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UCC33420QRAQRQ1	VSON-FCRLF	RAQ	12	3000	350.0	350.0	43.0

GENERIC PACKAGE VIEW

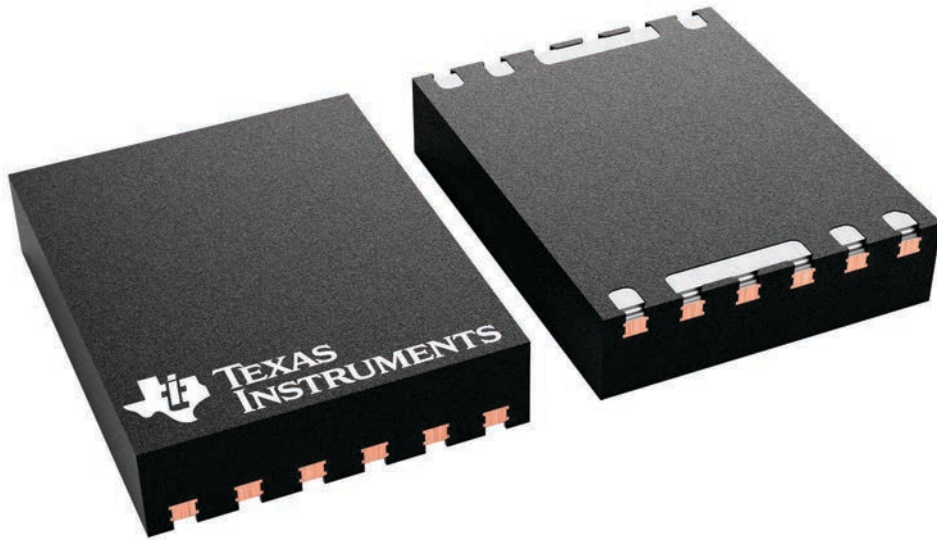
RAQ 12

VSON-FCRLF - 1.05 mm max height

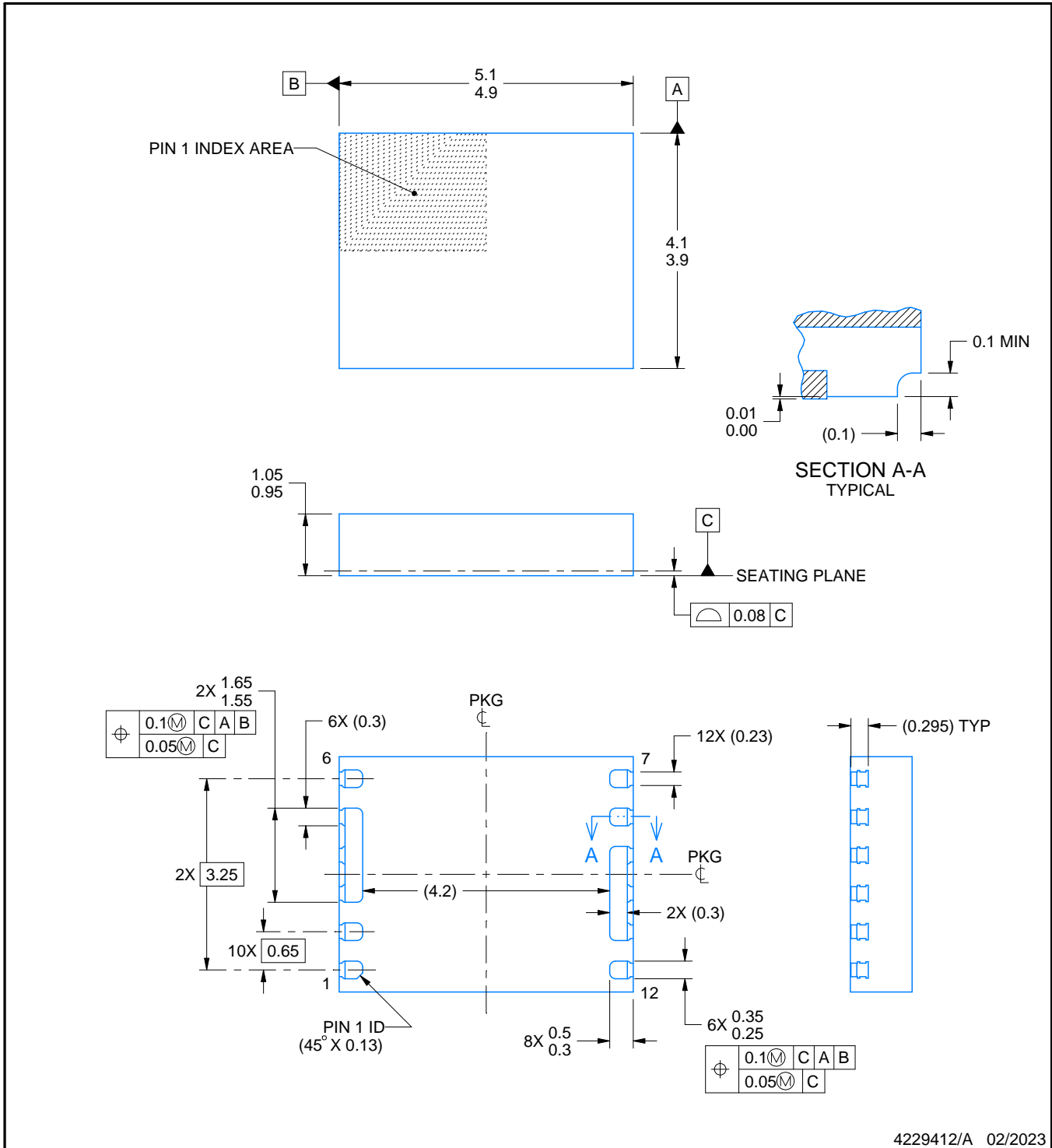
5 x 4, 0.65 mm pitch

PLASTIC SMALL OUTLINE - NO LEAD

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



4229417/A



4229412/A 02/2023

NOTES:

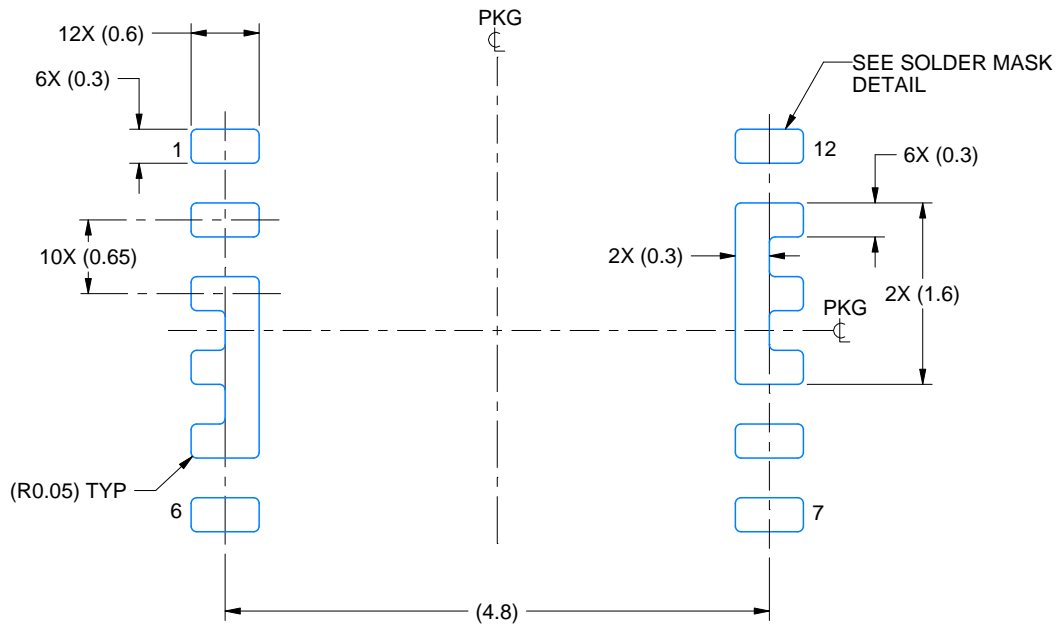
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
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EXAMPLE BOARD LAYOUT

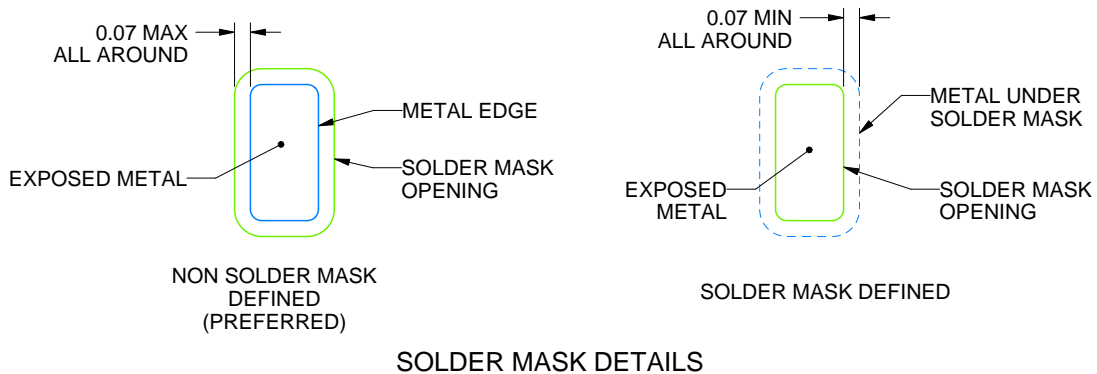
RAQ0012B

VSON-FCRLF - 1.05 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 15X



SOLDER MASK DETAILS

4229412/A 02/2023

NOTES: (continued)

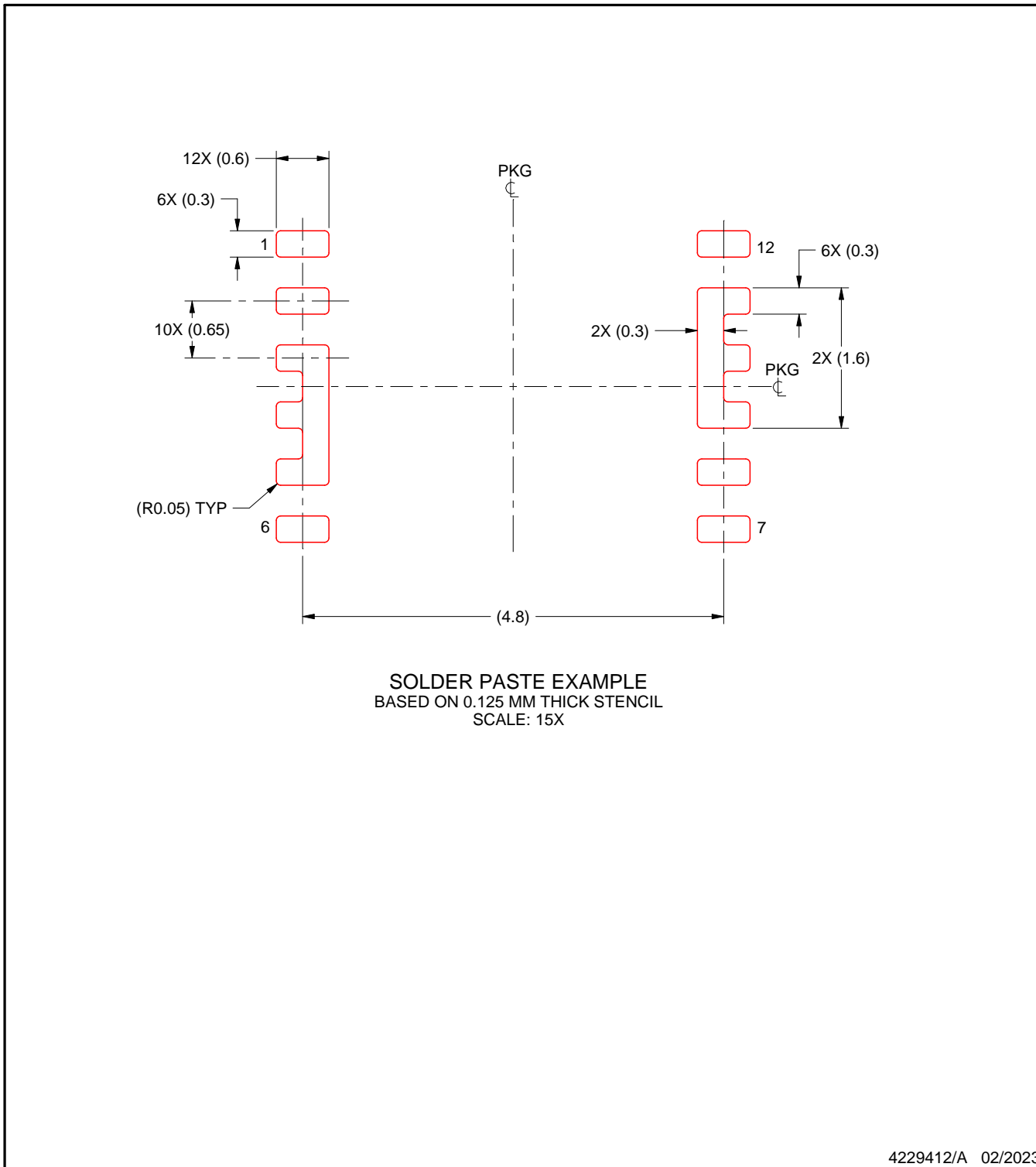
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EXAMPLE STENCIL DESIGN

RAQ0012B

VSON-FCRLF - 1.05 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

5. 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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最后更新日期：2025 年 10 月