LMR36506-Q1 3V 至 65V、0.6A 降压转换器（针对尺寸和轻负载效率进行了优化）

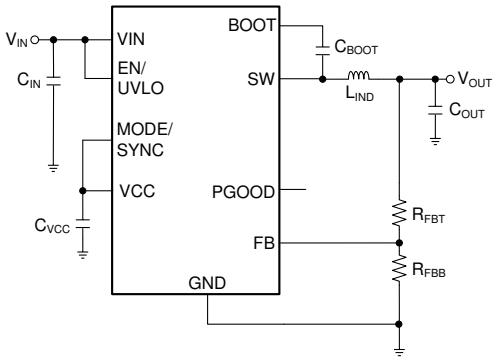
1 特性

- 符合面向汽车 应用的 AEC-Q100 标准：
  - 器件温度等级 1：–40°C 至 +125°C，T_A
- 电流为 1mA 时的效率大于 80%
  - 在输入电压为 24V 和输出电压为 3.3V（固定输出选项）时具有 4µA 的 I_q（开关）
- 微型解决方案尺寸和低组件成本：
  - 超小型 2mm × 2mm HotRod™封装，具有可湿性侧面
  - 功率密度超高，具有内部补偿并减少了外部组件数量
- 专为汽车 应用而设计：
  - 结温范围为 –40°C 至 +150°C
  - 针对 CISPR 25 EMI 标准进行了优化，具有扩频频率调制功能
  - 宽输入电压范围：3.0V（下降阈值）至 65V
  - 提供可调的 3.3V 和 5V 固定输出电压选项
  - 可与 MODE/SYNC 引脚型号同步
  - MODE/SYNC 引脚型号可选择 PFM 和强制 PWM
  - 可调节的开关频率范围：200kHz 至 2.2MHz（采用 RT 引脚型号时）
  - 与 LMR36503-Q1 引脚兼容（65V、300mA）

2 “应用”

- 高级驾驶辅助系统 (ADAS)
- 车身电子装置和照明
- 信息娱乐系统和仪表组

简化原理图



3 “说明”

LMR36506-Q1 是业界超小型 65V、0.6A 同步降压直流/直流转换器，采用 2mm x 2mm HotRod™封装。借助极少的外部组件和简单的 PCB 布局，这款稳健且高度可靠的转换器可处理高达 70V 的输入电压瞬变，提供出色的 EMI 性能，并支持固定电压 3.3V、5V 以及其他可调输出电压。

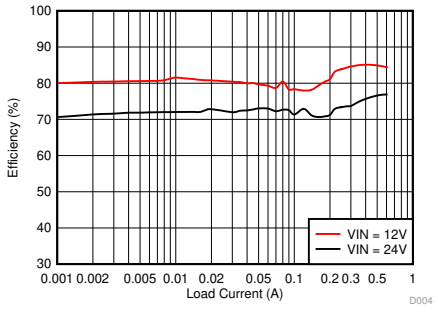
LMR36506-Q1 采用具有内部补偿的峰值电流模式控制架构，用于在 200kHz 至 2.2MHz 的宽开关频率范围内维持稳定运行和极小的输入电容。LMR36506-Q1 在输入电压突降至 3V 时可继续工作，因而是用于承受严苛冷启动脉冲的汽车类宽输入电源的理想选择。LMR36506-Q1 的开漏电源正常输出功能以及干扰滤波器和延迟释放特性，可提供输出电压状态的真实指示，免去了使用外部监控器的麻烦。从 FPWM 到 PFM 的无缝转换以及极低的待机静态电流，在超低的输出负载条件下实现了高效率。MODE/SYNC 引脚型号有助于将 LMR36506-Q1 与外部时钟同步，或选择脉冲频率调制 (PFM) 模式，从而在超低的输出负载条件下实现更高的效率。LMR36506-Q1 紧凑的解决方案尺寸和丰富的功能集旨在简化各种汽车类终端设备的实施。

器件信息(1)

器件型号	封装	封装尺寸（标称值）
LMR36506-Q1	VQFN-HR (9)	2.00mm × 2.00mm

(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。

效率与输出电流间的关系
V_{OUT} = 3.3V（固定值），2.2MHz



ADVANCE INFORMATION

目录

4 修订历史记录

Changes from Original (July 2019) to Revision A **Page**

- 更新了“应用” ... 1
- 编辑了“说明” ... 1

ADVANCE INFORMATION

5 器件和文档支持

5.1 文档支持

5.1.1 相关文档

请参阅如下相关文档：

- 德州仪器 (TI)，*《热设计：学会洞察先机，不做事后诸葛》* 应用报告
- 德州仪器 (TI)，*《外露焊盘封装实现最佳热阻性的电路板布局指南》* 应用报告
- 德州仪器 (TI)，*《半导体和 IC 封装热指标》* 应用报告
- 德州仪器 (TI)，*《通过 LM43603 和 LM43602 简化热设计》* 应用报告
- 德州仪器 (TI)，*《PowerPAD™ 热增强型封装》* 应用报告
- 德州仪器 (TI)，*《PowerPAD 速成》* 应用报告
- 德州仪器 (TI)，*《SBVA025 使用新的热指标》* 应用报告
- 德州仪器 (TI)，*《开关电源布局指南》* 应用报告
- 德州仪器 (TI)，*《Simple Switcher PCB 布局指南》* 应用报告
- 德州仪器 (TI)，*《构建电源 - 布局注意事项》* 应用报告
- 德州仪器 (TI)，*《使用 LM4360x 与 LM4600x 简化低辐射 EMI 布局》* 应用报告

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.cn 上的器件产品文件夹。单击右上角的*通知我* 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™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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5.4 商标

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5.5 静电放电警告

这些装置包含有限的内置 ESD 保护。 存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

5.6 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

6 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的最新可用数据。数据如有变更，恕不另行通知，且不会对此文档进行修订。如需获取此数据表的浏览器版本，请查阅左侧的导航栏。

ADVANCE INFORMATION

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
LMR36506MSC3RPERQ1	ACTIVE	VQFN-HR	RPE	9	3000	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 150	MCCQ	Samples
LMR36506MSC5RPERQ1	ACTIVE	VQFN-HR	RPE	9	3000	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 150	MCBQ	Samples
LMR36506MSCQRPERQ1	ACTIVE	VQFN-HR	RPE	9	3000	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 150	MCAQ YMJ	Samples
LMR36506RS3QRPERQ1	ACTIVE	VQFN-HR	RPE	9	3000	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 150	MCDQ	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.
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 <=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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OTHER QUALIFIED VERSIONS OF LMR36506-Q1 :

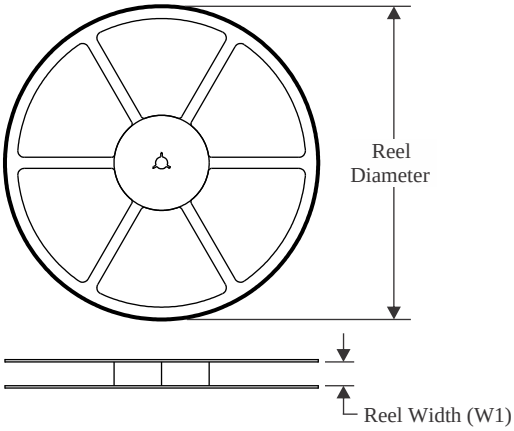
- Catalog : LMR36506

NOTE: Qualified Version Definitions:

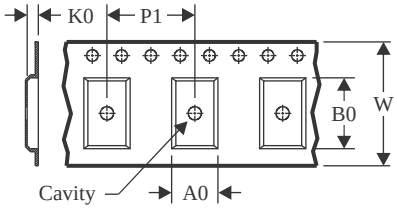
- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

REEL DIMENSIONS

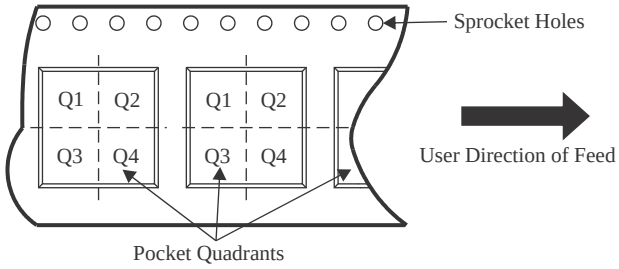


TAPE DIMENSIONS



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

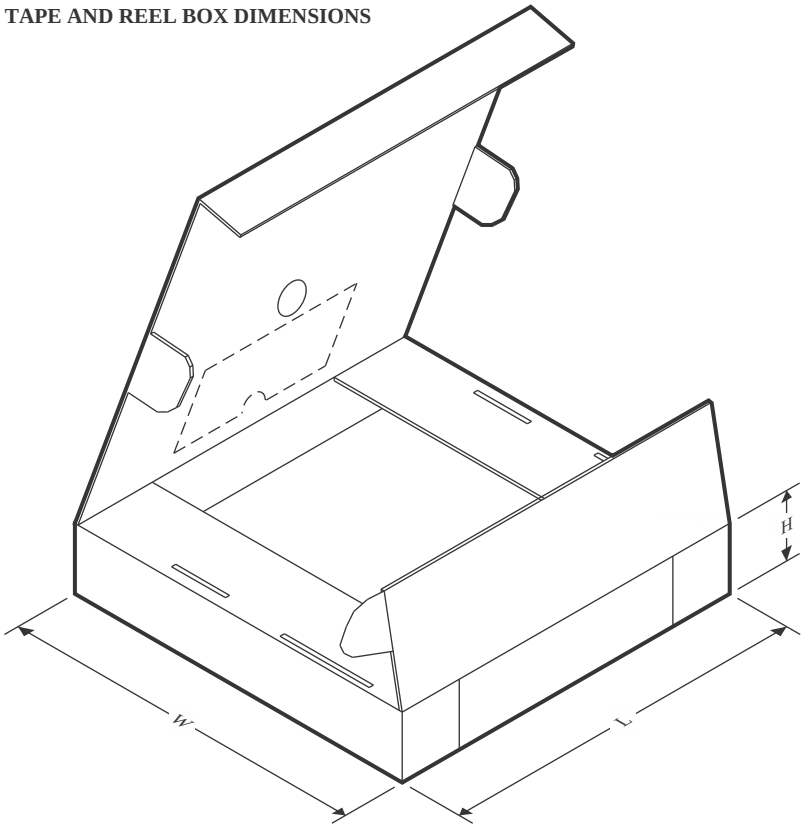
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
LMR36506MSC3RPERQ1	VQFN-HR	RPE	9	3000	180.0	8.4	2.2	2.2	1.2	4.0	8.0	Q2
LMR36506MSC5RPERQ1	VQFN-HR	RPE	9	3000	180.0	8.4	2.2	2.2	1.2	4.0	8.0	Q2
LMR36506MSCQRPERQ1	VQFN-HR	RPE	9	3000	180.0	8.4	2.2	2.2	1.2	4.0	8.0	Q2
LMR36506RS3QRPERQ1	VQFN-HR	RPE	9	3000	180.0	8.4	2.2	2.2	1.2	4.0	8.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LMR36506MSC3RPERQ1	VQFN-HR	RPE	9	3000	213.0	191.0	35.0
LMR36506MSC5RPERQ1	VQFN-HR	RPE	9	3000	213.0	191.0	35.0
LMR36506MSCQRPERQ1	VQFN-HR	RPE	9	3000	213.0	191.0	35.0
LMR36506RS3QRPERQ1	VQFN-HR	RPE	9	3000	213.0	191.0	35.0

GENERIC PACKAGE VIEW

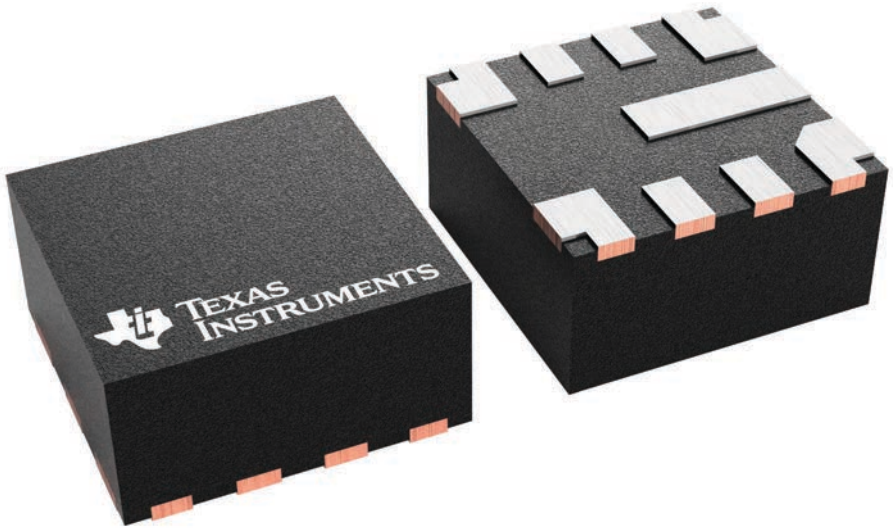
RPE 9

VQFN-HR - 1.0 mm max height

2 x 2, 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.



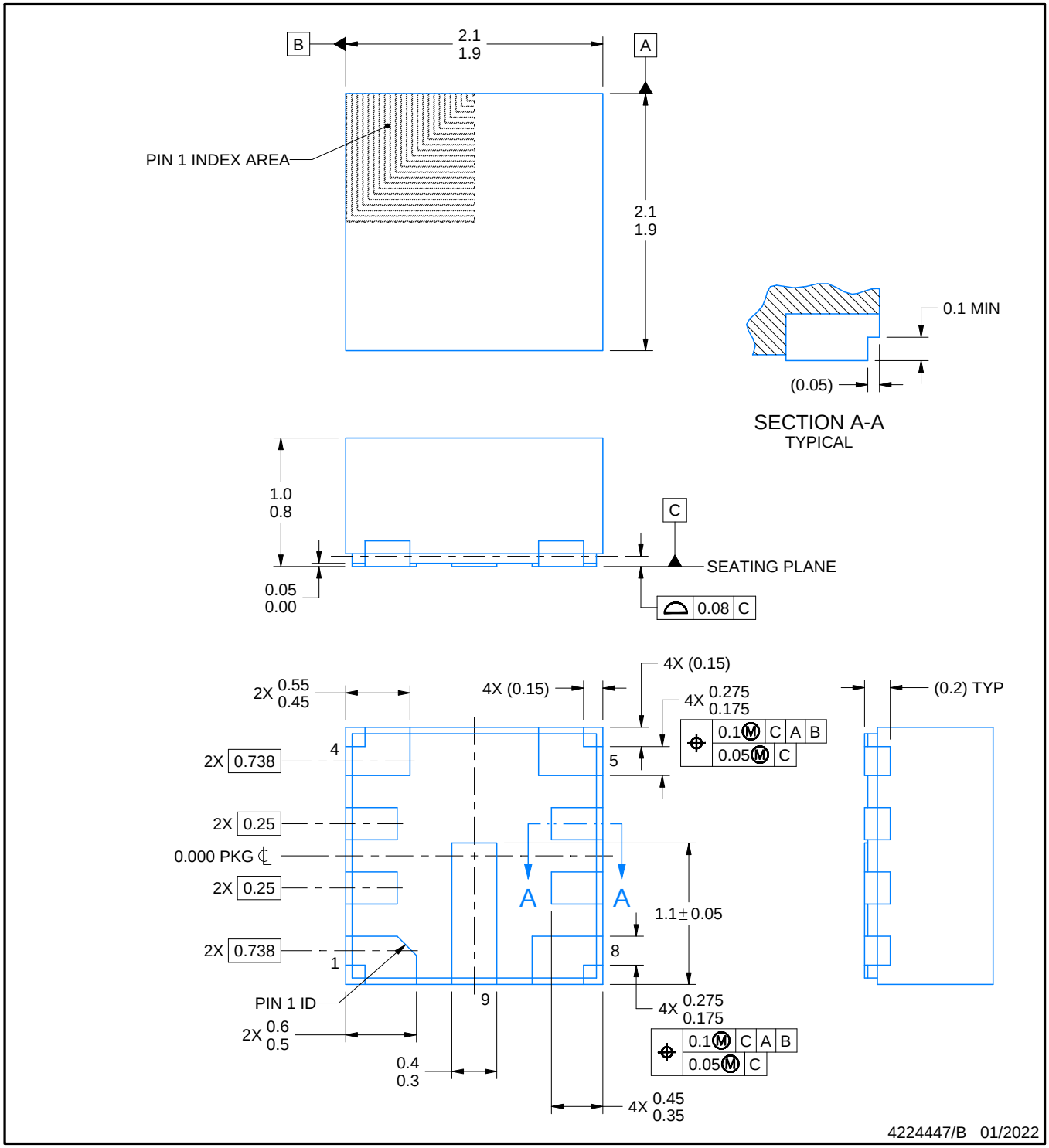
4227057/A

PACKAGE OUTLINE

RPE0009A

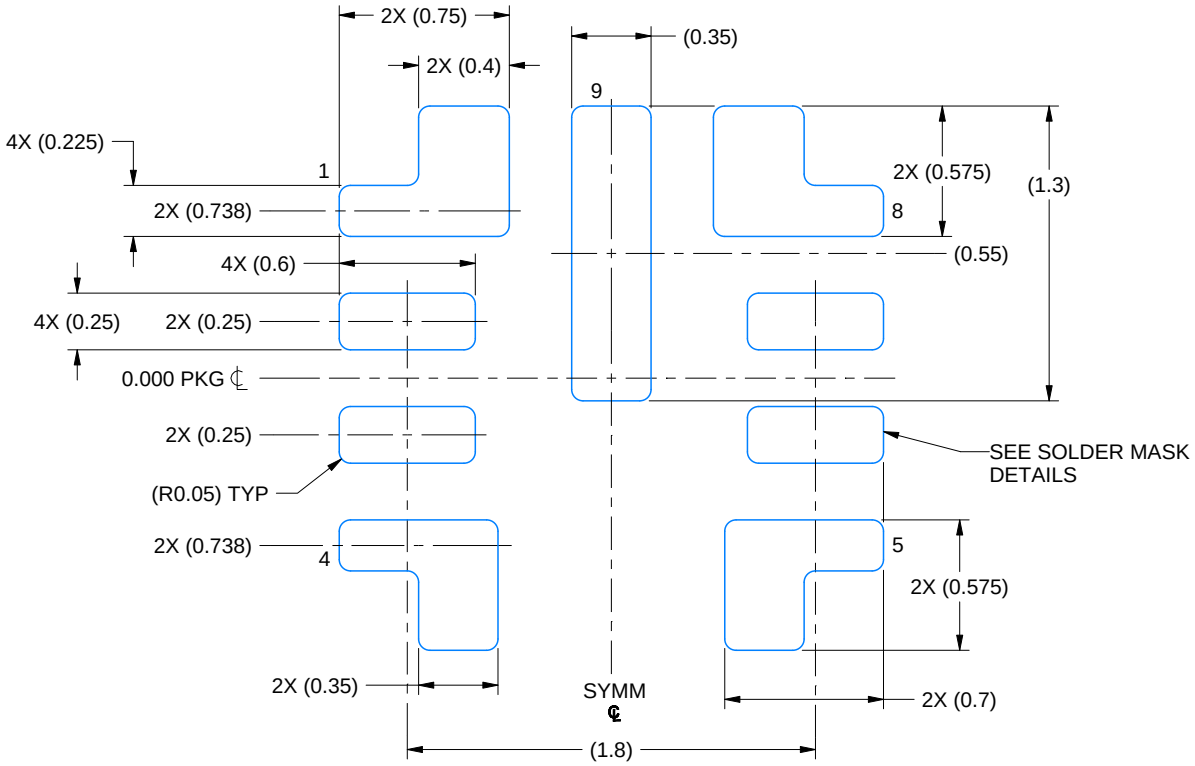
VQFN-HR - 1.0 mm max height

PLASTIC QUAD FLATPACK - NO LEAD

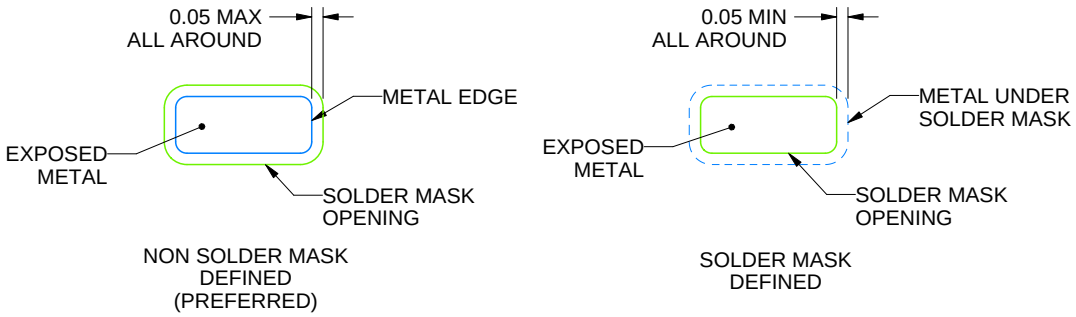


NOTES:

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.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 30X



SOLDER MASK DETAILS

4224447/B 01/2022

NOTES: (continued)

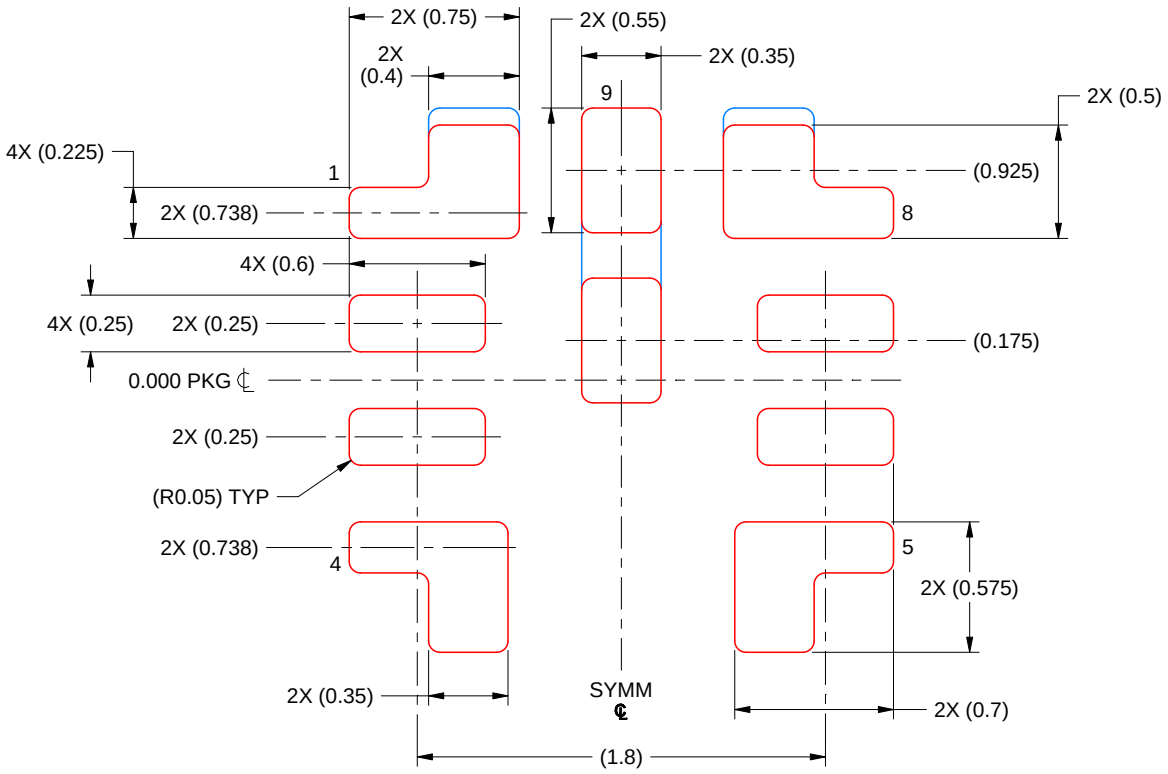
3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
4. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged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

EXAMPLE STENCIL DESIGN

RPE0009A

VQFN-HR - 1.0 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 MM THICK STENCIL
SCALE: 30X

PADS 1 & 8:
90% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
PAD 9:
85% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE

DWG_NO:5/REV:5 MM_YYYY:5

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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