ULC1001-Q1 具有 I/V 检测放大器的可配置超声波 PWM 调制器

1 特性

- 集成可编程清洁模式
  - 水（排出）
  - 除冰（融化和排出）
  - 泥点（脱水和排出）
  - 自动清洁（检测质量和排出）
  - 自定义清洁模式
- 嵌入式算法
  - 镜头系统校准
  - 自动质量检测
  - 功率调节
  - 系统诊断
- 系统诊断
  - 驱动器故障报告
  - 镜头系统故障报告
  - 传感器温度调节
- 宽驱动频率范围
  - 高效直接驱动 (10kHz - 5MHz)
  - AD 调制 (<50kHz)
- I^2C 用户接口
- 所需的时钟源
  - 外部振荡器（10MHz，建议 5ppm）
- 电源
  - IOVDD：3.3V
- 32 引脚 QFN-HR 封装

2 应用

- 汽车热成像摄像头
- 视镜更换/摄像头视镜系统
- 后置摄像头
- 环视系统 ECU
- 前置摄像头

3 说明

ULC1001-Q1 是一款具有电流和电压检测功能的可配置 PWM 调制器，专用于基于压电效应的镜头清洁系统。

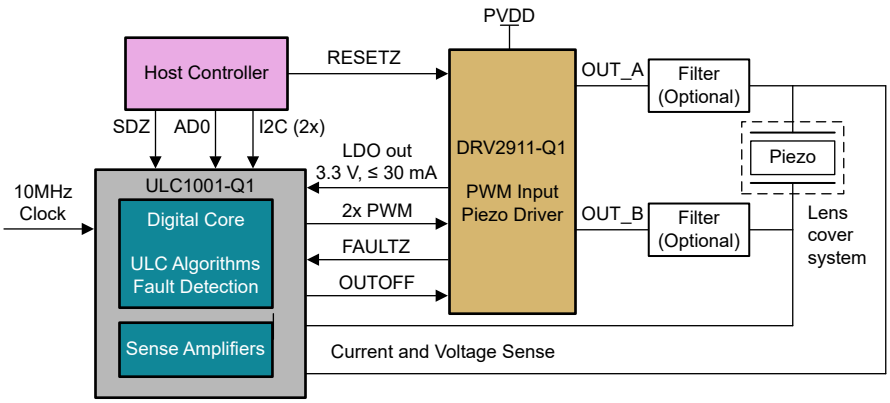
片上低延迟 DSP 支持德州仪器 (TI) 为镜头清洁设计的专有算法。ULC1001-Q1 和 DRV2911-Q1 配合使用，创建超声波镜头清洁系统。

ULC1001-Q1 器件采用 32 引脚 QFN-HR 封装，可实现紧凑的 PCB 尺寸。

器件信息

器件型号	封装(1)	封装尺寸(2)
ULC1001-Q1	HRQFN	4.5mm × 5.0mm

(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。
(2) 封装尺寸（长 × 宽）为标称值，并包括引脚（如适用）。



简化版应用

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内容

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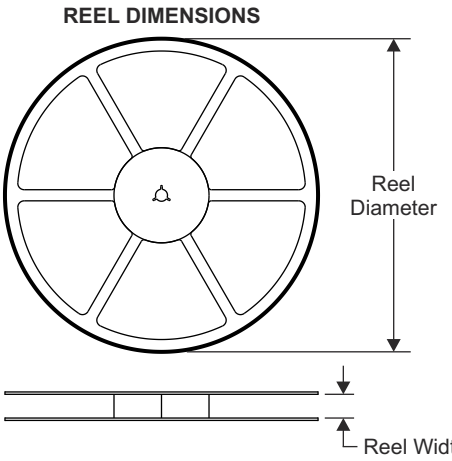
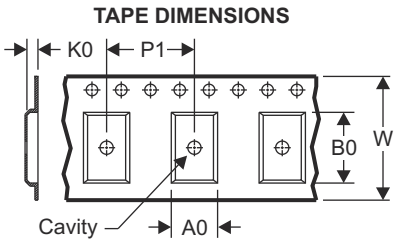
4 机械、封装和可订购信息

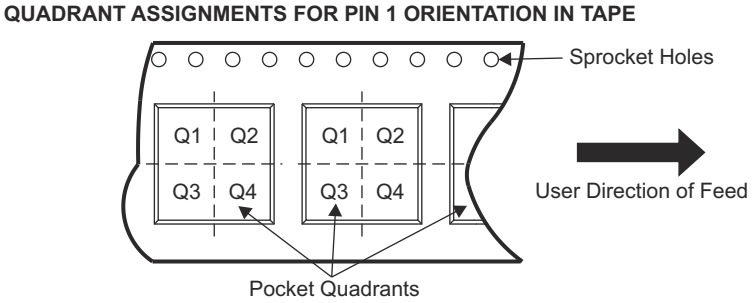
以下页面包含机械、封装和可订购信息。这些信息是指定器件可用的最新数据。数据如有变更，恕不另行通知，且不会对此文档进行修订。有关此数据表的浏览器版本，请查阅左侧的导航栏。

4.1 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
ULC1001QWRQTRQ1	VQFN-HR	RTQ	32	3000	330.0	12.4	4.8	5.3	1.15	8.0	12.0	Q2

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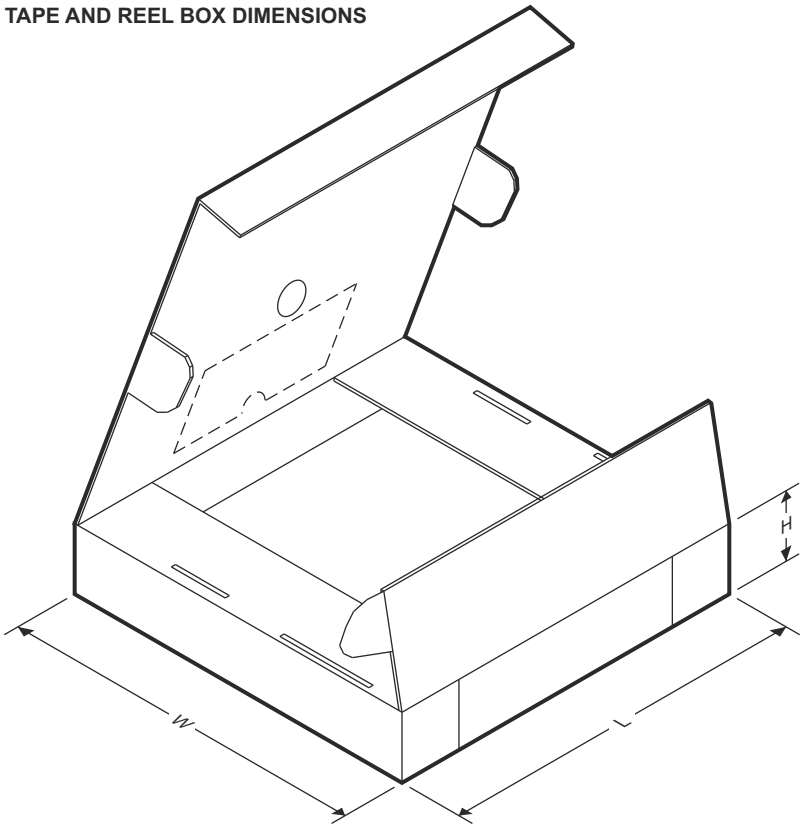
TAPE AND REEL BOX DIMENSIONS



器件	封装类型	封装图	引脚	SPQ	长度 (mm)	宽度 (mm)	高度 (mm)
ULC1001QWRQTRQ1	VQFN-HR	RTQ	32	3000	367.0	367.0	35.0

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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
ULC1001QWRQTRQ1	ACTIVE	VQFN-HR	RQT	32	3000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	ULC 1001WQ1	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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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.

OTHER QUALIFIED VERSIONS OF ULC1001-Q1 :

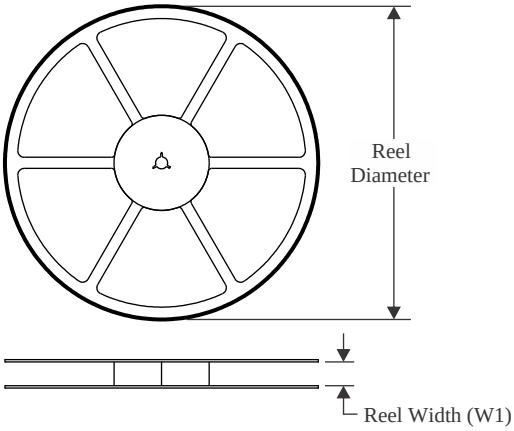
- Catalog : ULC1001

NOTE: Qualified Version Definitions:

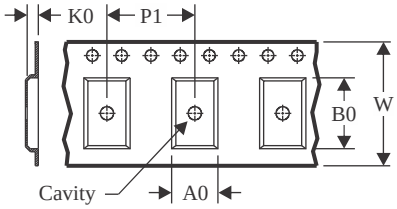
- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

REEL DIMENSIONS

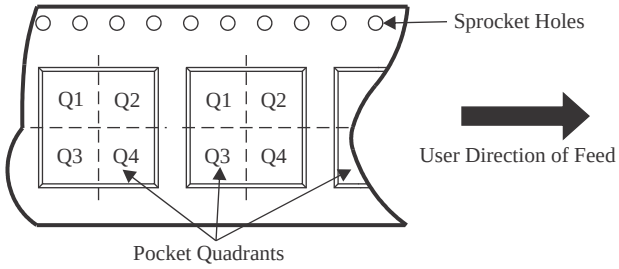


TAPE DIMENSIONS



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

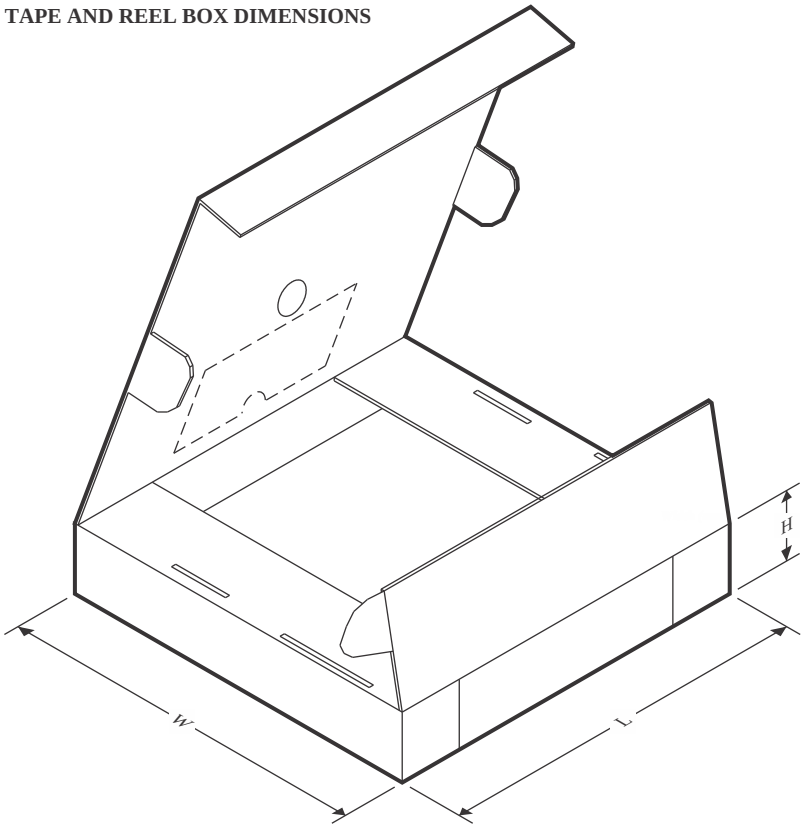
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
ULC1001QWRQTRQ1	VQFN-HR	RQT	32	3000	330.0	12.4	4.8	5.3	1.15	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)
ULC1001QWRQTRQ1	VQFN-HR	RQT	32	3000	367.0	367.0	35.0

GENERIC PACKAGE VIEW

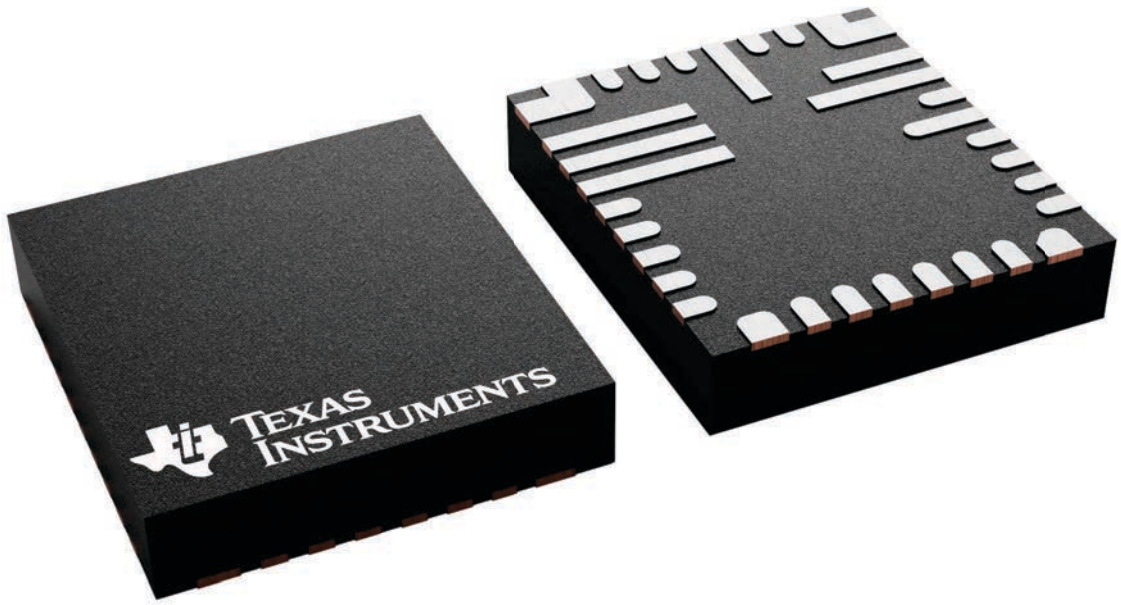
RQT 32

VQFN-HR - 1 mm max height

5 x 4.5, 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.

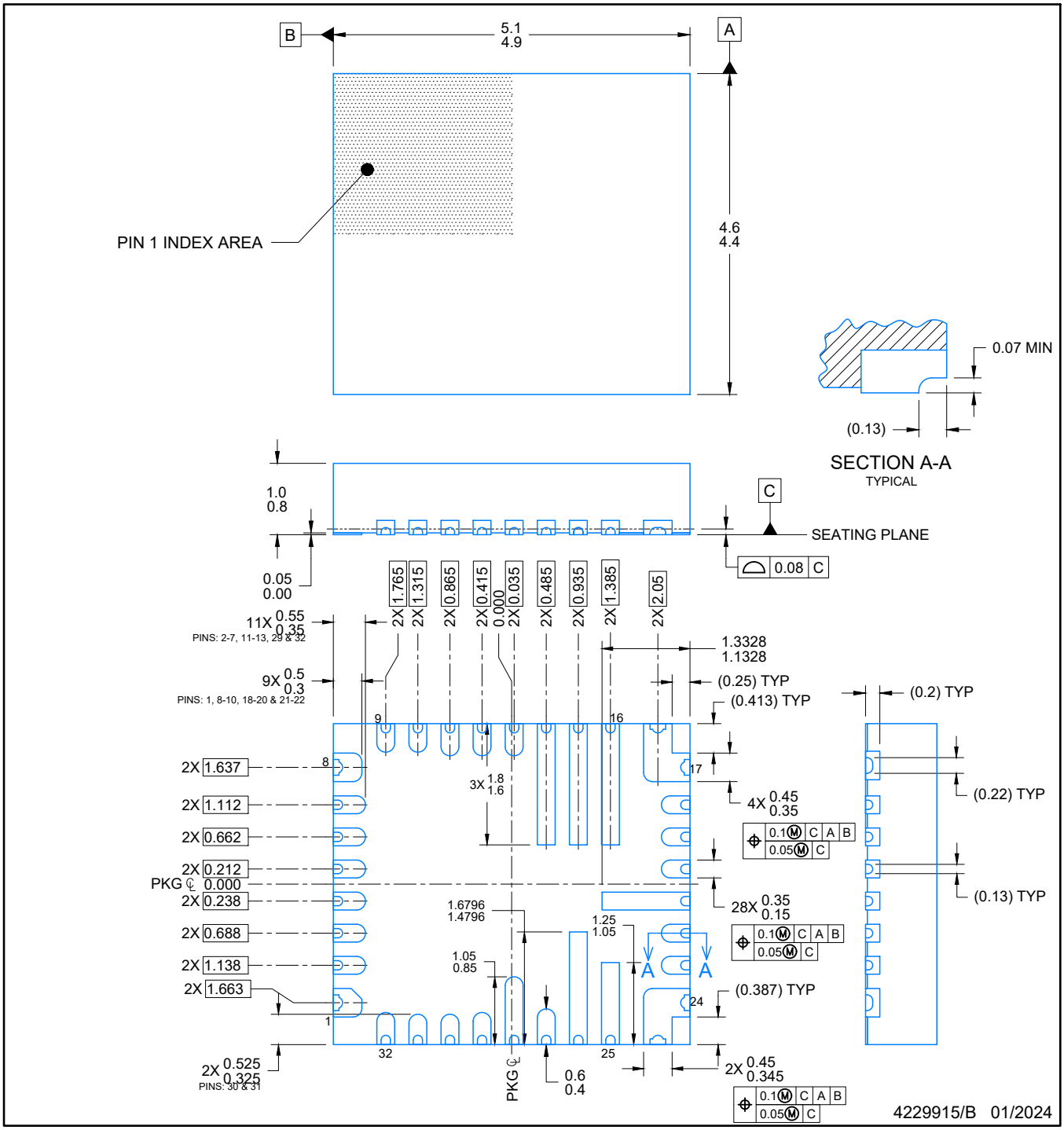


PACKAGE OUTLINE

RQT0032B

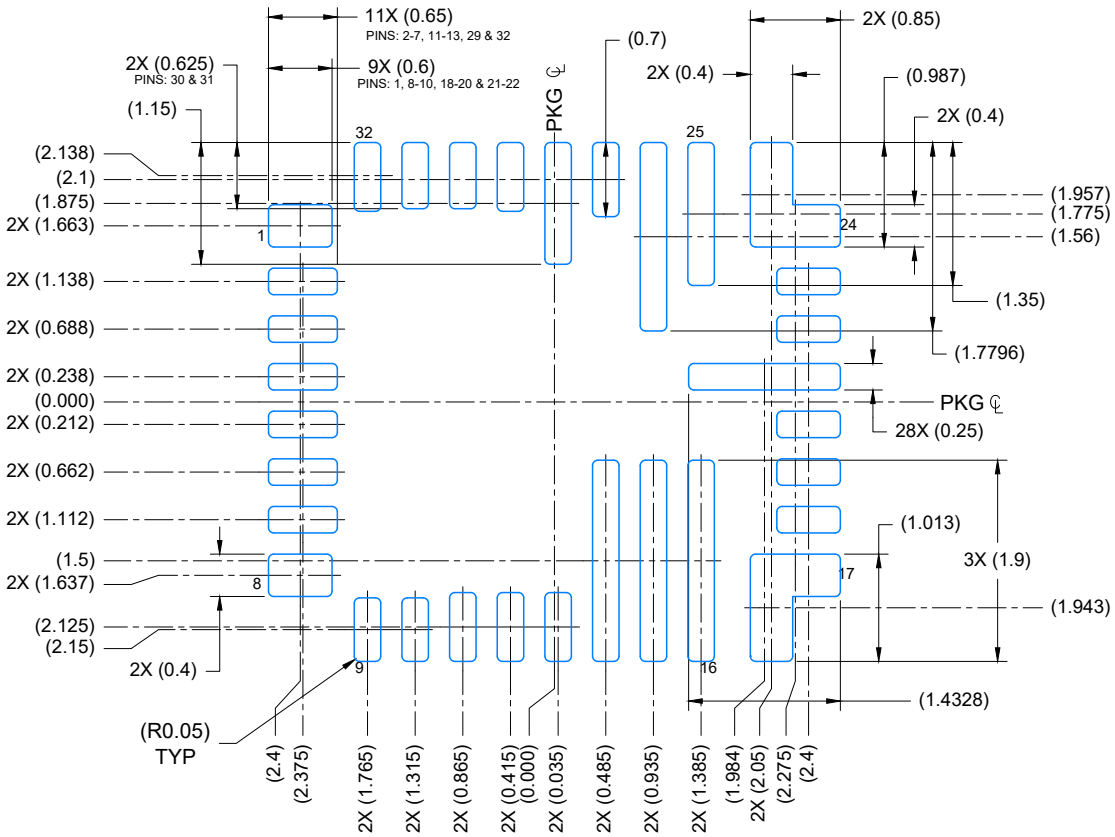
VQFN-HR - 1 mm max height

PLASTIC QUAD FLATPACK- NO LEAD

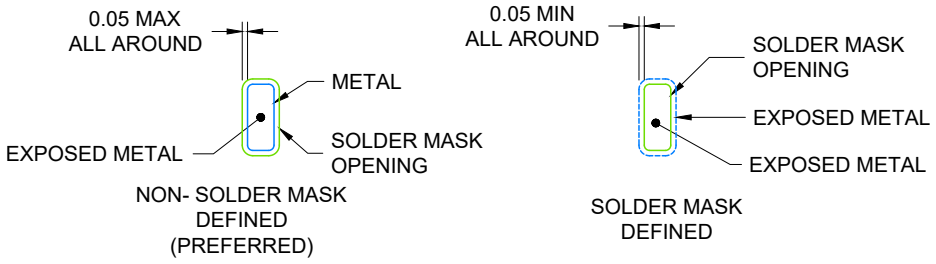


NOTES:

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: 14X

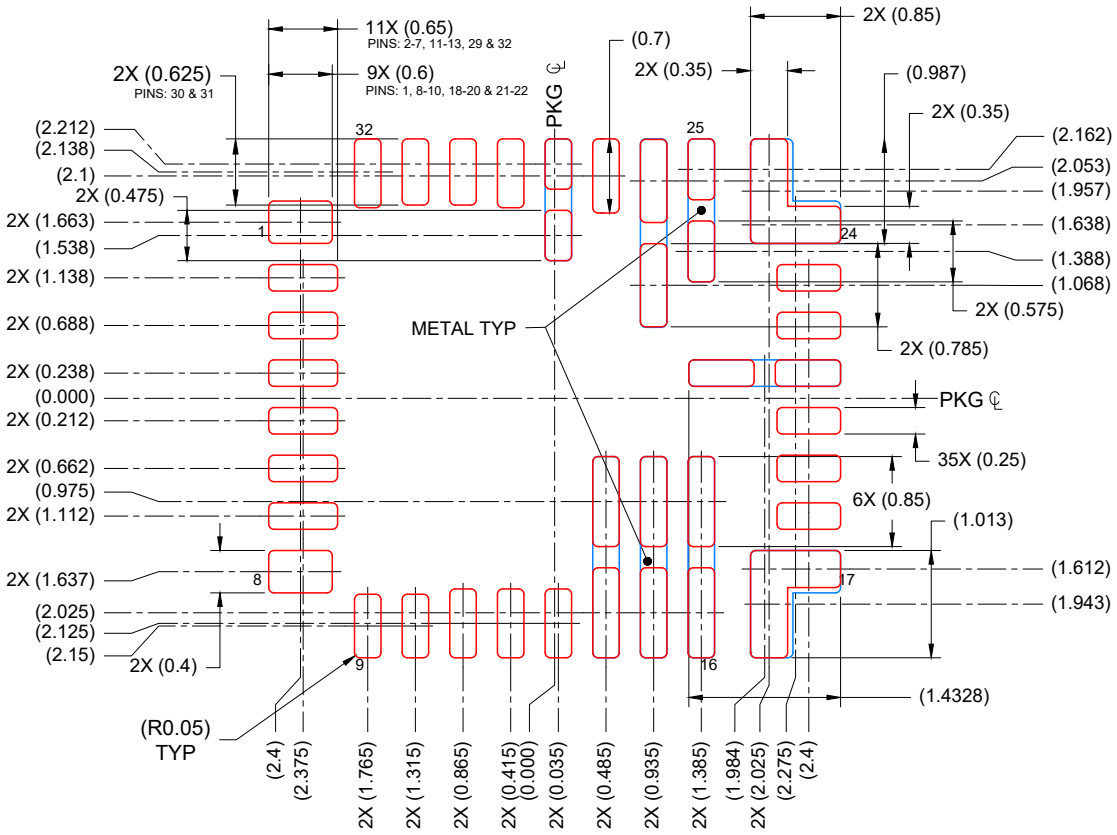


SOLDER MASK DETAILS

4229915/B 01/2024

NOTES: (continued)

3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271) .
4. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE: 14X

PRINTED COVERAGE BY AREA
PAD 14,15,16: 89%
PAD 21: 85%
PAD 17& 24: 90%
PAD 25: 84%
PAD 26: 88%
PAD 28: 82%

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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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