

# CSD95411 同步降压 NexFET™ 智能功率级

## 1 特性

- 峰值连续电流：65A
- 峰值效率 (  $f_{SW} = 600\text{kHz}$  ,  $L_{OUT} = 150\text{nH}$  )：超过 94%
- 工作频率高：高达 1.75MHz
- 二极管仿真功能
- 温度补偿双向电流感应
- 模拟温度输出
- 故障监控
- 兼容 3.3V 和 5V PWM 信号
- 三态 PWM 输入
- 集成自举开关
- 用于击穿保护的经优化死区时间
- 高密度行业通用 5mm × 6mm QFN 封装
- 超低电感封装
- 系统已优化的 PCB 空间占用
- 耐热增强型顶部散热
- 符合 RoHS 标准、无铅端子镀层
- 无卤素

## 2 应用

- 多相位同步降压转换器
  - 高频应用
  - 大电流、低占空比应用
- 多负载点 (POL) 直流/直流转换器
- 内存和图形卡
- 台式机和服务器 VR12.x / VR13.x / VR14.x 电压内核同步降压转换器

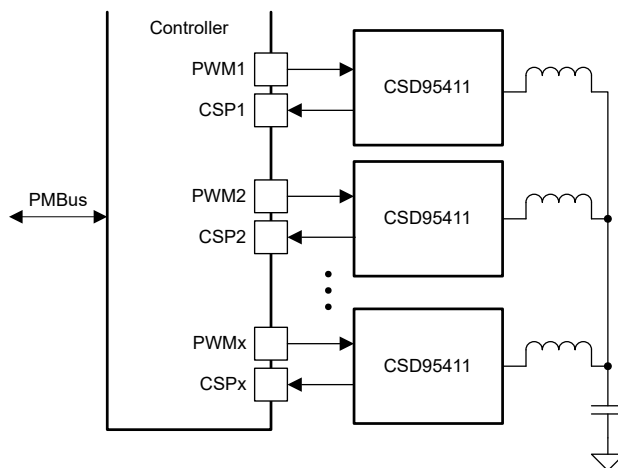
## 3 说明

CSD95411 NexFET™ 功率级是一款针对高功率、高密度同步降压转换器进行高度优化的设计。该器件集成了驱动器 IC 和功率 MOSFET 来完善功率级开关功能。该组合采用 5mm × 6mm 小型封装，可实现高电流、高效率以及高速切换功能。该功率级还集成了准确电流检测和温度感测功能，可简化系统设计并提高准确度。经过优化的 PCB 封装可帮助减少设计时间并轻松完成总体系统设计。

### 器件信息

器件	介质	数量	封装 <sup>(1)</sup>	配送
CSD95411RRB	13 英寸卷带	2500	QFN	卷带包装
CSD95411RRBT	7 英寸卷带	250	5.00mm × 6.00mm	

(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。



简化版应用



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## 4 Revision History

DATE	REVISION	NOTES
January 2023	*	Initial release.

## 5 Device and Documentation Support

### 5.1 Device Support

#### 5.1.1 第三方产品免责声明

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### 5.2 Documentation Support

#### 5.3 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 [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。

#### 5.4 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](#)》。

### 5.5 Trademarks

NexFET™ and TI E2E™ are trademarks of Texas Instruments.

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### 5.6 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 5.7 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。

## 6 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.

## 6.1 Package Option Addendum

Orderable Device	Status <sup>1</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>2</sup>	Lead/Ball Finish	MSL Peak Temp <sup>3</sup>	Op Temp (°C)	Device Marking <sup>4 5</sup>
CSD95411RRB	ACTIVE	QFN	RRB	41	2500	Green (RoHS-Exempt & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	- 55 to 150	95411RRB
CSD95411RRBT	ACTIVE	QFN	RRB	41	250	Green (RoHS-Exempt & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	- 55 to 150	95411RRB

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.

**PRE\_PROD** Unannounced device, not in production, not available for mass market, nor on the web, samples not available.

**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. Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

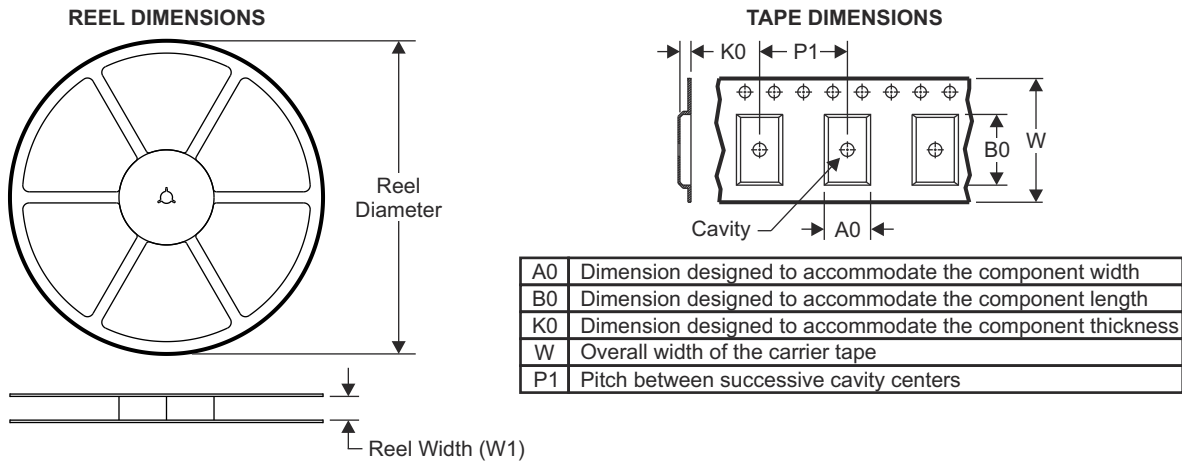
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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 on 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.

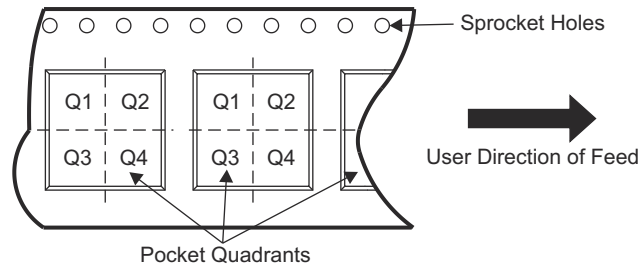
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## 6.2 Tape and Reel Information



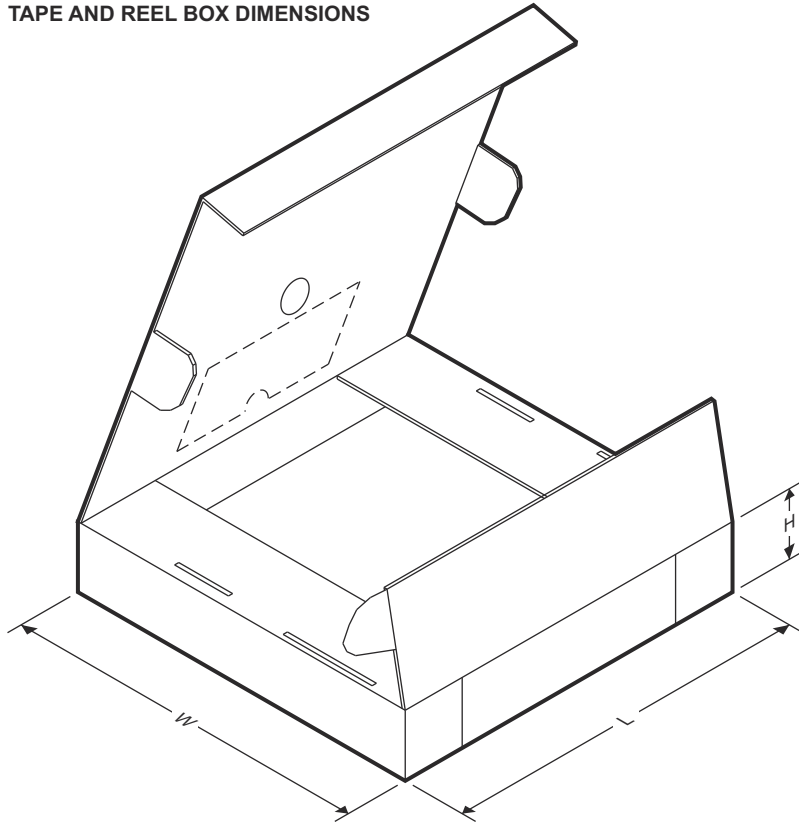
### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
CSD95411RRB	QFN	RRB	41	2500	330	12.4	5.30	6.30	1.20	8.00	12.00	Q1
CSD95411RRBT	QFN	RRB	41	250	180	12.4	5.30	6.30	1.20	8.00	12.00	Q1

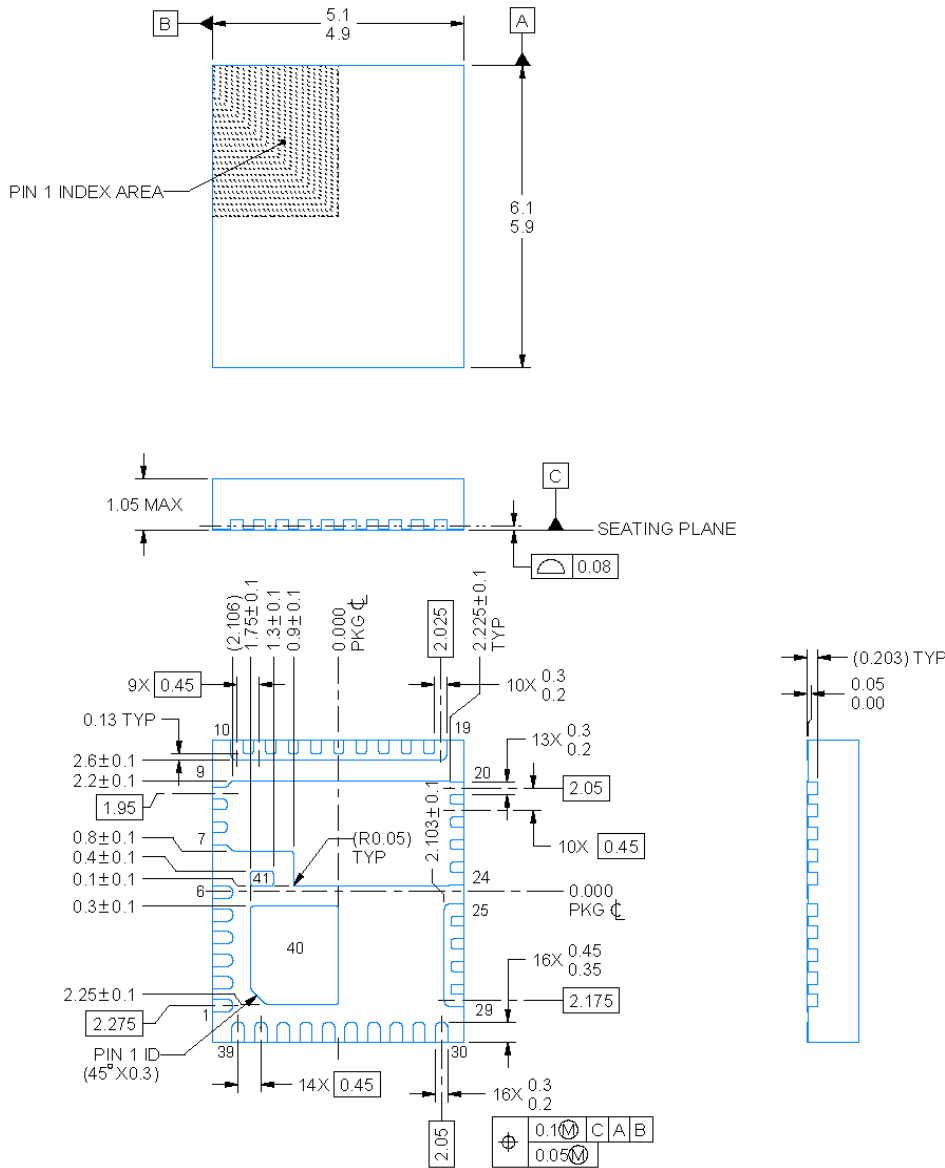


**TAPE AND REEL BOX DIMENSIONS**



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD95411RRB	QFN	RRB	41	2500	367	367	38
CSD95411RRBT	QFN	RRB	41	250	213	191	35

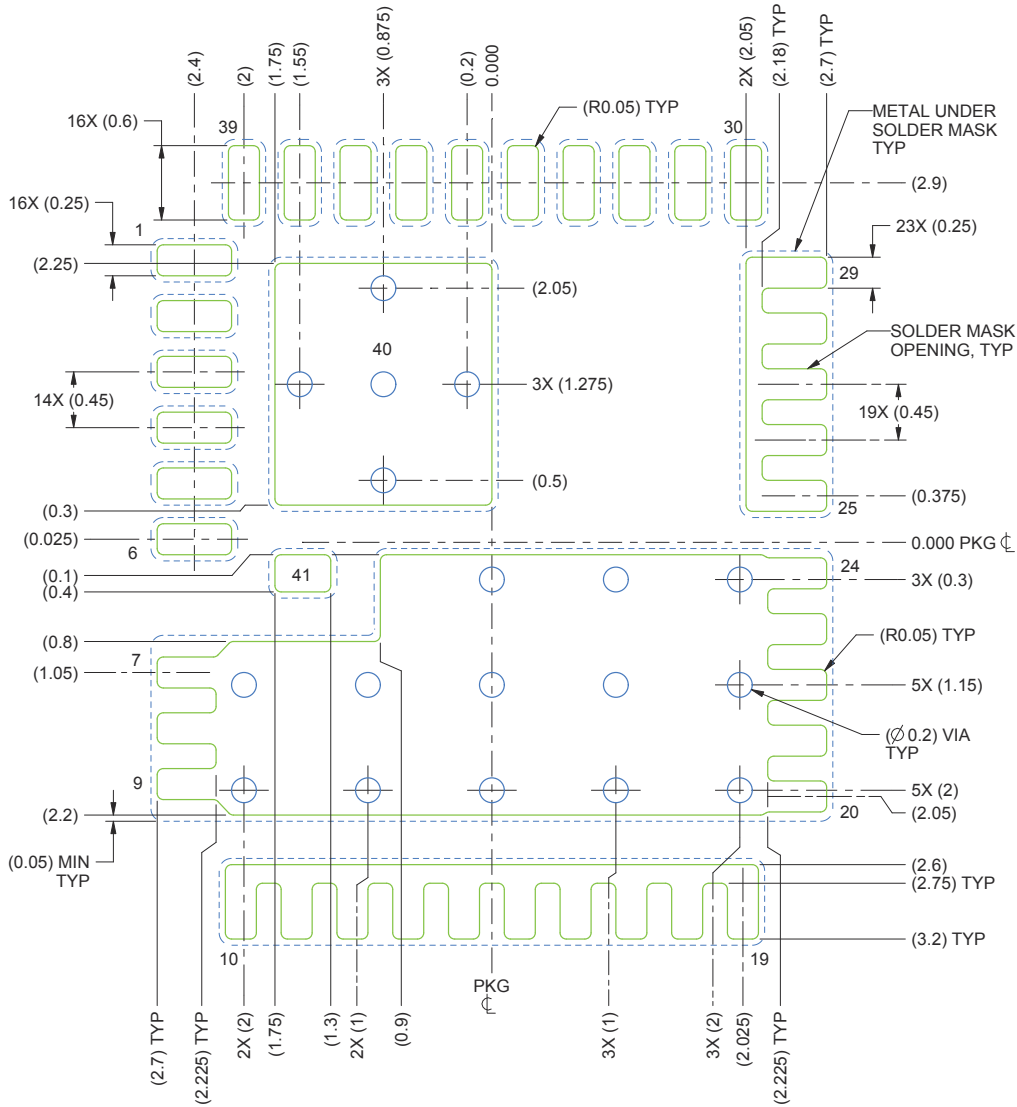
### 6.3 Mechanical Drawing



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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 pads must be soldered to the printed circuit board for optimal thermal and mechanical performance.

## 6.4 Recommended PCB Land Pattern

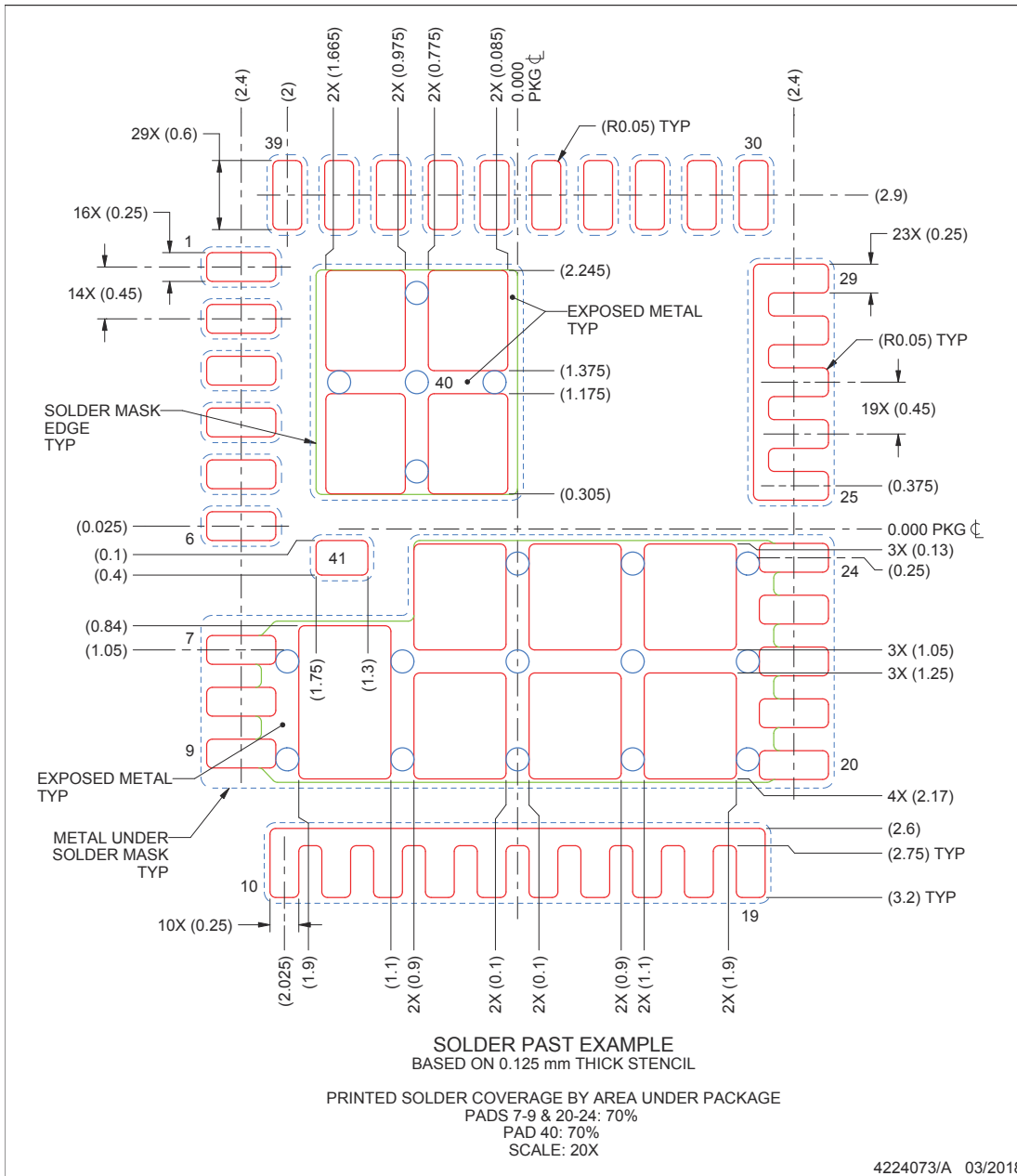


LAND PATTERN EXAMPLE  
 SOLDER MASK DEFINED  
 SCALE: 20X

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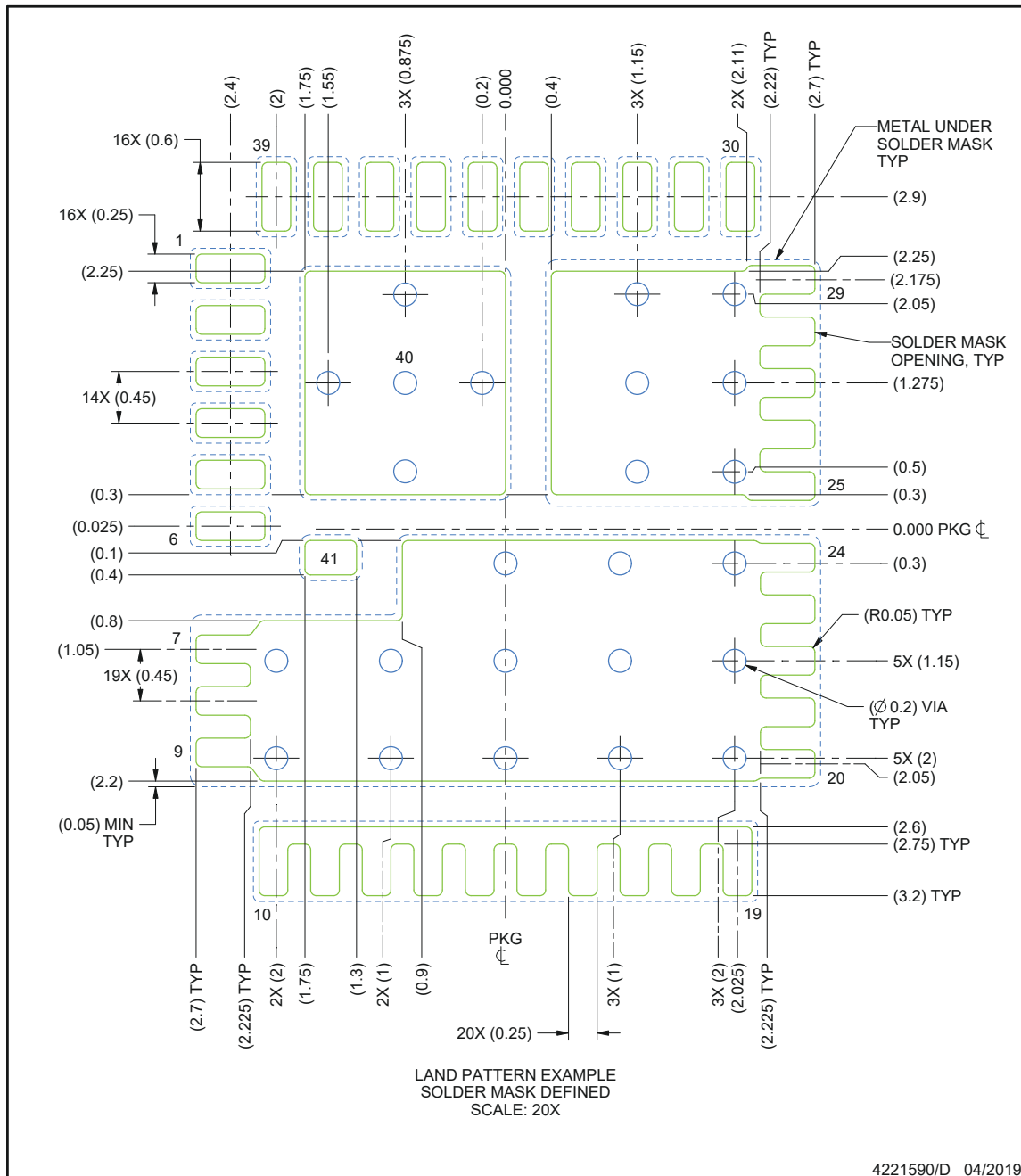
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is designed to be soldered to thermal pads on the board. For more information, see QFN/SON PCB Attachment (SLUA271).

## 6.5 Recommended Stencil Opening



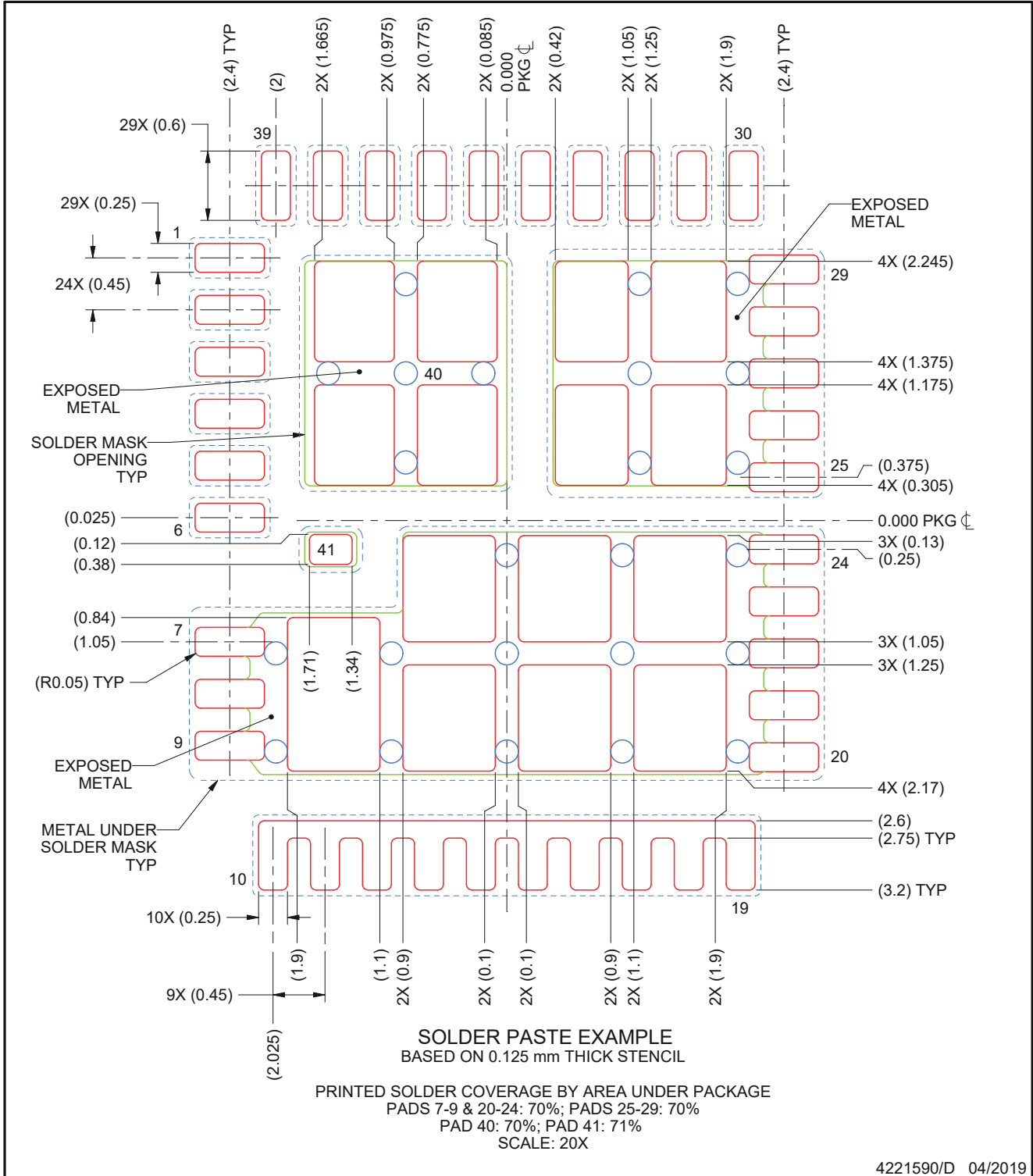
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

## 6.6 Alternate Industry Standard Compatible PCB Land Pattern



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

### 6.7 Alternate Industry Standard Compatible Stencil Opening



**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
CSD95411RRB	ACTIVE	VQFN-CLIP	RRB	41	2500	RoHS-Exempt & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	95411RRB	<a href="#">Samples</a>
CSD95411RRBT	ACTIVE	VQFN-CLIP	RRB	41	250	RoHS-Exempt & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	95411RRB	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

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**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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