

BQ79631-Q1 具有电压、电流和绝缘电阻监测功能、适用于 EV/BMS 高压汽车类应用的 UIR 传感器

1 特性

- 符合汽车应用要求
- 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 环境温度工作温度范围
 - 器件 HBM ESD 分类等级 2
 - 器件 CDM ESD 分类等级 C4B
- 符合功能安全标准
 - 专为功能安全应用开发
 - 可帮助进行 ISO 26262 系统设计的文档
 - 系统可满足 ASIL D 级要求
 - 硬件可满足 ASIL D 要求
- 带集成滤波的差分电压测量
 - Pack⁺、Fuse、Link[±]、Charge[±] 测量
 - 隔离电阻电压测量
- 集成式精密电流测量
 - 支持低侧分流电阻器
- 绝缘电阻监控功能
- 8 个 GPIO 输入可用作 IO、SPI、ADC 和温度检测
- 隔离式差分菊花链通信，采用可选的环形架构
 - 通过消除安全 MCU、CAN 收发器和多线接口简化 BJB/BDU 系统
- UART 主机接口
- 同步电流和电压测量
- 可与其他电芯和 UI 监视器堆叠和同步，如 16S (BQ79616-Q1、BQ79656-Q1)、14S (BQ79614-Q1、BQ79654-Q1)、12S (BQ79612-Q1、BQ79652-Q1) 和 BQ79631
- 内置 SPI 主器件

2 应用

- 纯电动、插电式混合动力和混合动力汽车

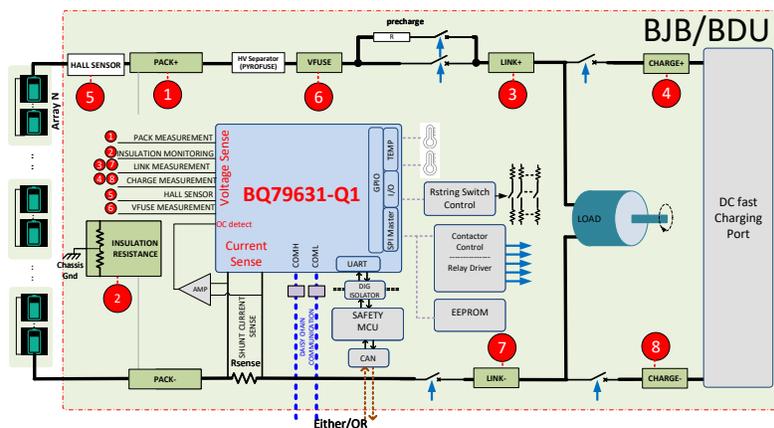
3 说明

BQ79631-Q1 提供高精度测量，能够测量来自高压节点的分压电压，例如电池接线盒 (BJB) 或电池切断单元 (BDU) 系统中的 Pack⁺ (HV 电池正极)、Fuse、Charge (端口)、Link (负载)。可以使用集成式数字低通滤波器测量关键电压。该器件具有高度精确的集成电流检测 ADC，能够测量低侧分流电阻器中的电流。该器件能使用内部 ADC 测量绝缘电阻，并能控制此测量所需的任何开关方案。有八个 GPIO/辅助输入可用于热敏电阻测量、驱动继电器、测量电压以及用作外围 SPI 器件的主 SPI 接口。隔离式双向菊花链端口支持基于电容器或变压器的隔离。该器件还支持通过 UART 进行通信。

器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 (标称值)
BQ79631-Q1	HTQFP (64 引脚)	10.00mm x 10.00mm

(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。



简化版系统图



4 说明 (续)

主机与 BQ79631-Q1 之间的通信可以通过器件的专用 UART 接口或者通信桥接器件 BQ79600-Q1 进行连接。此外，隔离式差分菊花链通信接口允许主机通过单个接口与其他 UIR 监视器甚至电芯监视器进行通信。可以将菊花链通信接口配置为环形架构，以使主机在通信线路中断时能够与堆叠任一端的器件进行通信。

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 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。

5.3 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》](#)。

5.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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5.5 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.

5.6 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 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.

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)
BQ79631PAPRQ1	Active	Production	HTQFP (PAP) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	BQ79631
BQ79631PAPRQ1.A	Active	Production	HTQFP (PAP) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	BQ79631

(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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GENERIC PACKAGE VIEW

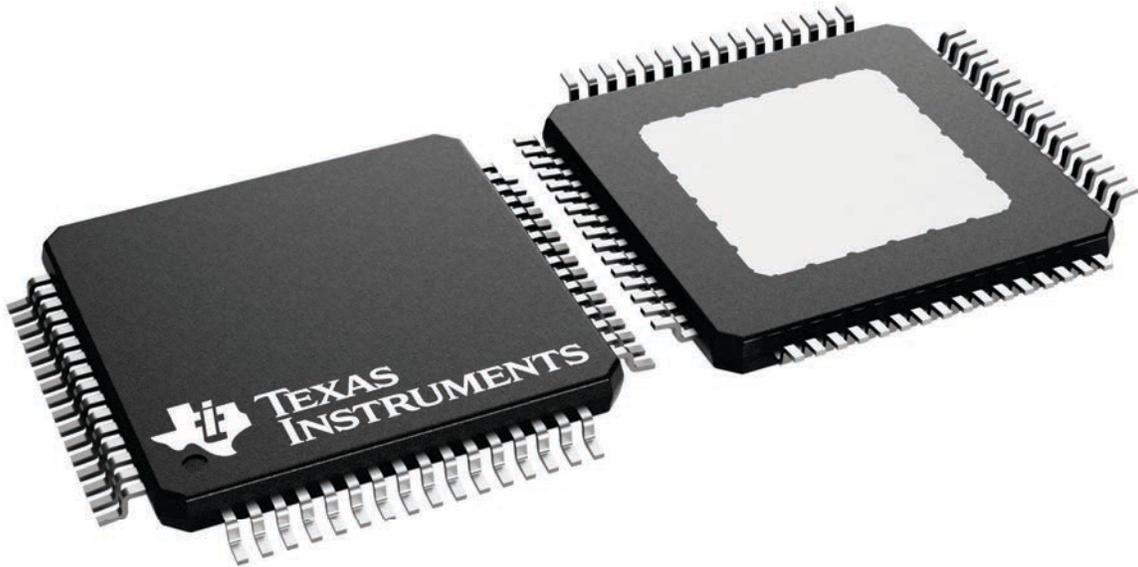
PAP 64

HTQFP - 1.2 mm max height

10 x 10, 0.5 mm pitch

QUAD FLATPACK

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



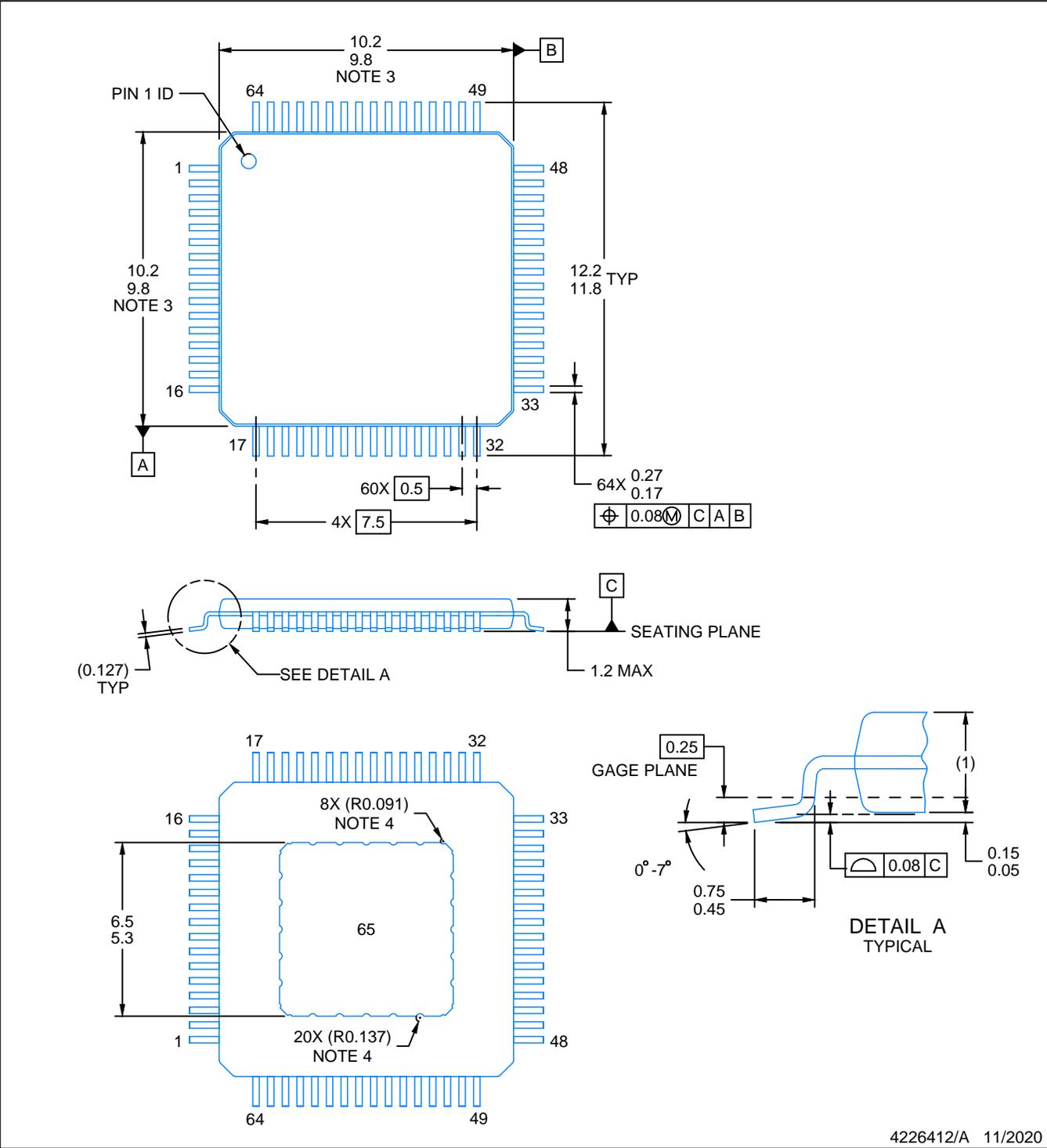
4226442/A

PACKAGE OUTLINE

PAP0064F

PowerPAD™ TQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



4226412/A 11/2020

NOTES:

PowerPAD is a trademark of Texas Instruments.

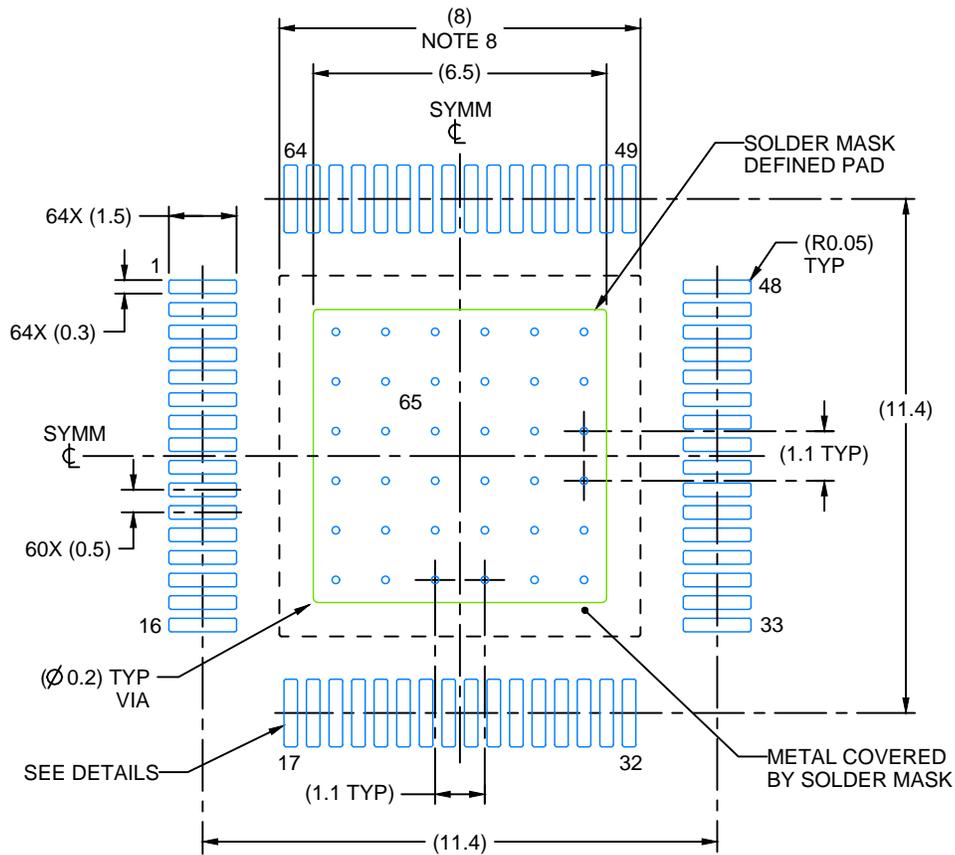
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs.
4. Strap features may not be present.
5. Reference JEDEC registration MS-026.

EXAMPLE BOARD LAYOUT

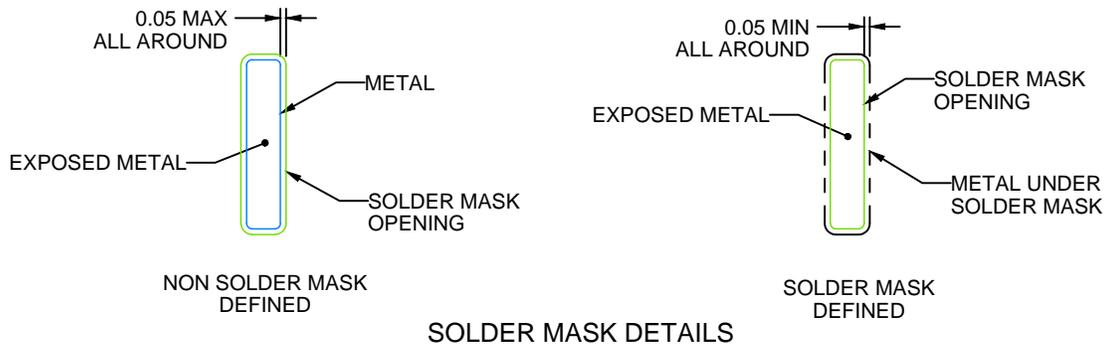
PAP0064F

PowerPAD™ TQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:6X



SOLDER MASK DETAILS

4226412/A 11/2020

NOTES: (continued)

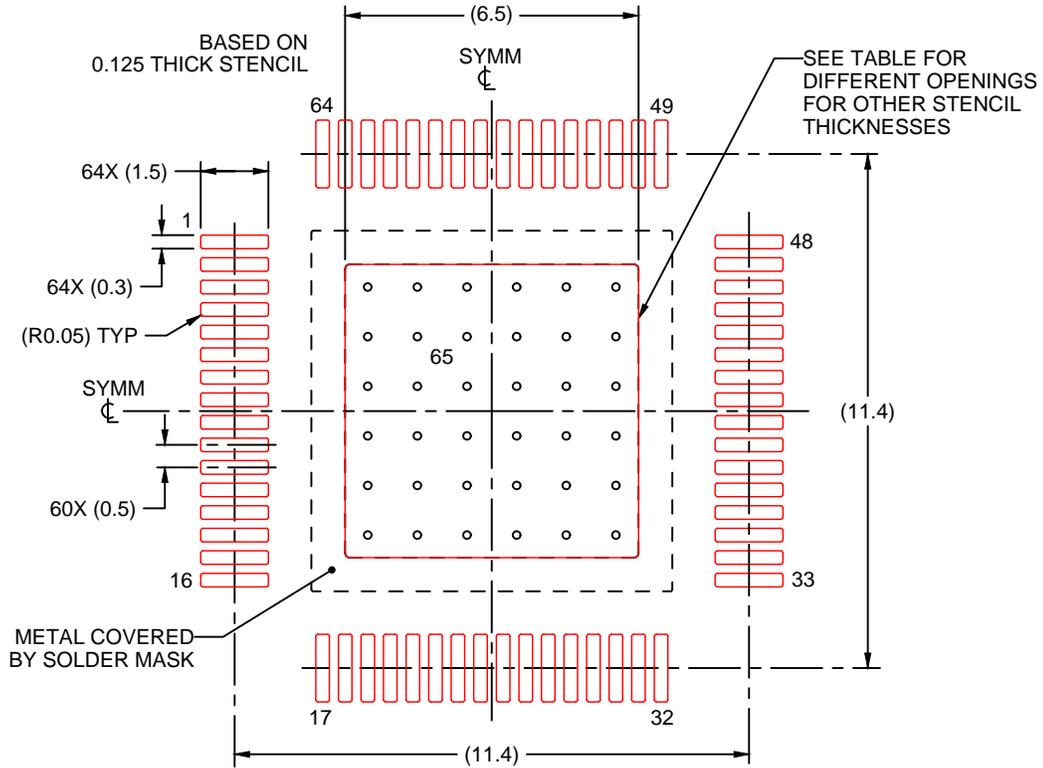
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
8. This package is designed to be soldered to a thermal pad on the board. See technical brief, Powerpad thermally enhanced package, Texas Instruments Literature No. SLMA002 (www.ti.com/lit/slma002) and SLMA004 (www.ti.com/lit/slma004).
9. Vias are optional depending on application, refer to device data sheet. It is recommended that vias under paste be filled, plugged or tented.
10. Size of metal pad may vary due to creepage requirement.

EXAMPLE STENCIL DESIGN

PAP0064F

PowerPAD™ TQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



SOLDER PASTE EXAMPLE
EXPOSED PAD
100% PRINTED SOLDER COVERAGE BY AREA
SCALE:6X

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	7.27 X 7.27
0.125	6.5 X 6.5 (SHOWN)
0.15	5.93 X 5.93
0.175	5.49 X 5.49

4226412/A 11/2020

NOTES: (continued)

11. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
12. Board assembly site may have different recommendations for stencil design.

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