

采用 EMI 降噪技术的 TPS92662A-Q1 高亮度 LED 矩阵管理器

1 特性

- 符合面向汽车 应用要求
 - 等级 1: -40°C 至 125°C 环境温度
 - 器件 HBM 分类等级 H1C
 - 器件 CDM 分类等级 C5
- 输入电压范围: 4.5V 至 60V
- 12 个集成旁路开关
- 多点 UART 通信接口
 - 与 TPS92662-Q1 和 TPS92663-Q1 器件兼容
 - 与 CAN 物理层兼容
- 具有 2 个多路复用输入的 8 位 ADC
- 具有可编程的晶体振荡器驱动器和时钟缓冲器
 - 提高了辐射和传导 EMI 性能
- 外部 EEPROM I²C 接口
- 可编程 10 位 PWM 调光
- LED 开路/短路检测和保护
- 通过时分多路复用, 支持 12 个以上 LED 灯串的多 LMM 同步

2 应用

- 汽车前照灯系统
- ADB 或无眩光远光灯
- 连续转向/动画日间行车灯

3 说明

TPS92662A-Q1 LED 矩阵管理器器件通过提供单个像素级 LED 控制来实现完全动态的自适应照明解决方案。该器件的 3 个串联集成开关各有 4 个子灯串, 可绕过单个 LED。各个子灯串允许器件接受单个或多个电流源。

TPS92662A-Q1 是一款可编程的皮尔斯晶体振荡器驱动器, 通过根据石英晶体或陶瓷谐振器制造商的建议选择驱动器强度, 实现了最佳性能。它还包括驱动强度可选的时钟缓冲器。通过改变时钟缓冲器的驱动强度, 可控制时钟信号的上升和下降时间以及 EMI。必要时可禁用时钟缓冲器, 以消除时钟信号产生的噪声并最大程度降低 EMI。

TPS92662A-Q1 支持多点通用异步接收器发送器 (UART) 串行接口, 并与 TPS92662-Q1 和 TPS92663-Q1 器件兼容。I²C 通信接口用于从存储系统校准数据的外部 EEPROM 读取数据或向其中写入数据。

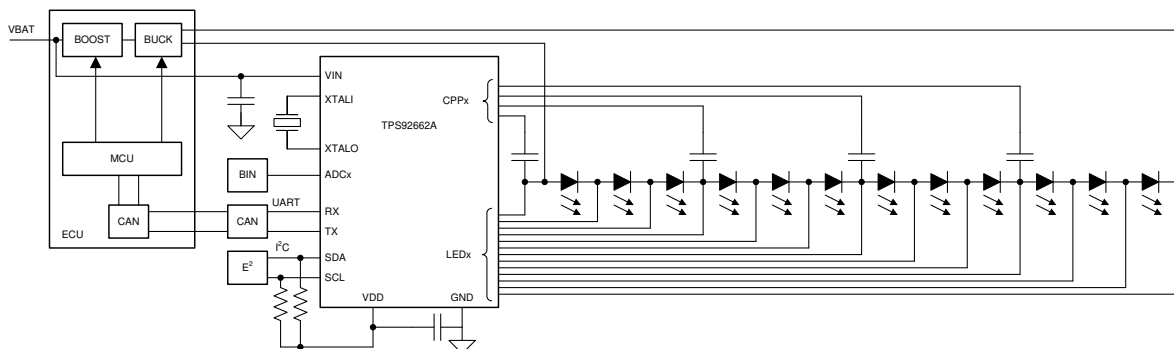
具有两个多路复用输入的板载 8 位 ADC 可用于系统温度补偿, 并用于测量分级值, 从而实现 LED 分级和编码。

器件信息(1)

器件型号	封装	封装尺寸 (标称值)
TPS92662A-Q1	PHP (48)	7.00mm × 7.00mm

(1) 要了解所有可用封装, 请参阅数据表末尾的可订购产品附录。

简化应用



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4 修订历史记录

注：之前版本的页码可能与当前版本有所不同。

Changes from Original (October 2019) to Revision A	Page
• 将器件状态从“预告信息”更改为“生产数据”	1

5 说明（续）

内部电荷泵轨为 LED 旁路开关提供栅极驱动电压。旁路开关的低电阻 ($R_{DS(on)}$) 可最大程度地减少传导损耗和功率耗散。

TPS92662A-Q1 和 TPS92662-Q1 二者具有相同的寄存器设置，可用于编程灯串中单个 LED 的相移和脉冲宽度以及报告 LED 开路和短路故障。

6 器件和文档支持

6.1 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。

6.2 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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6.3 商标

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6.4 静电放电警告



ESD 可能会损坏该集成电路。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措施和安装程序，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。

6.5 Glossary

[SLYZ022](#) — *TI Glossary*.

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

7 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。

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)
TPS92662AQPHPRQ1	Active	Production	HTQFP (PHP) 48	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	92662AQ
TPS92662AQPHPRQ1.A	Active	Production	HTQFP (PHP) 48	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	92662AQ

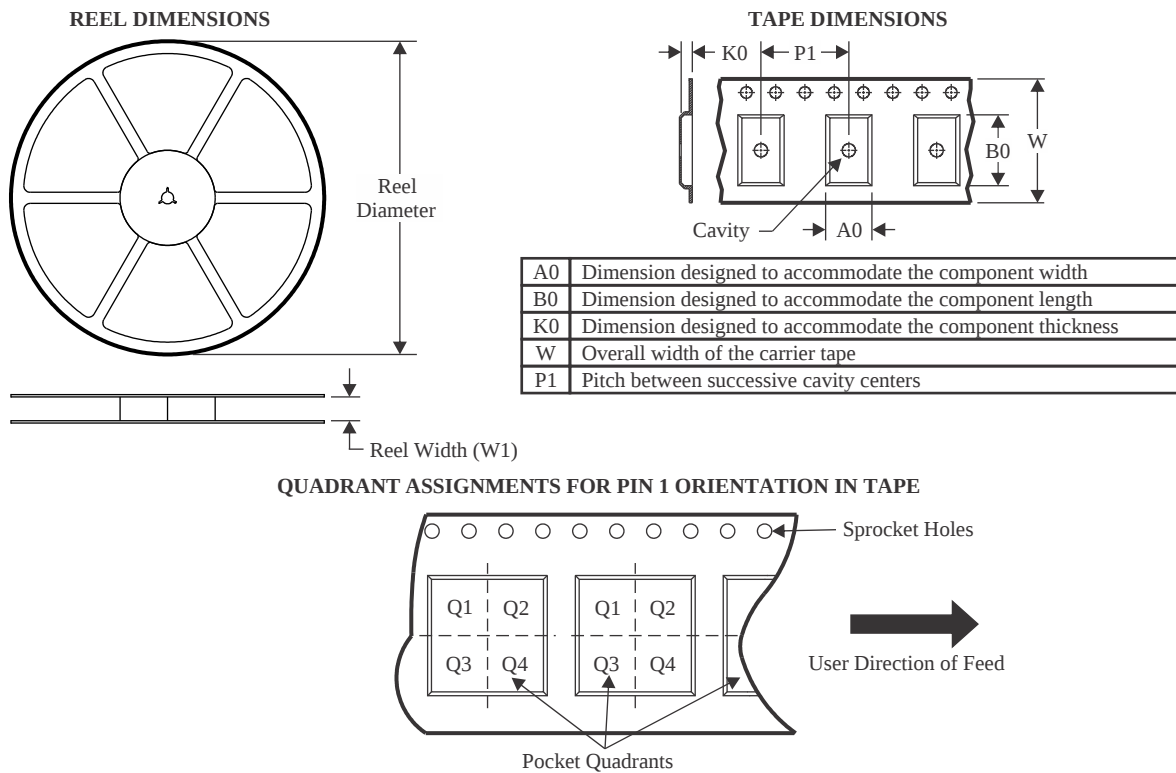
- ⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).
- ⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, 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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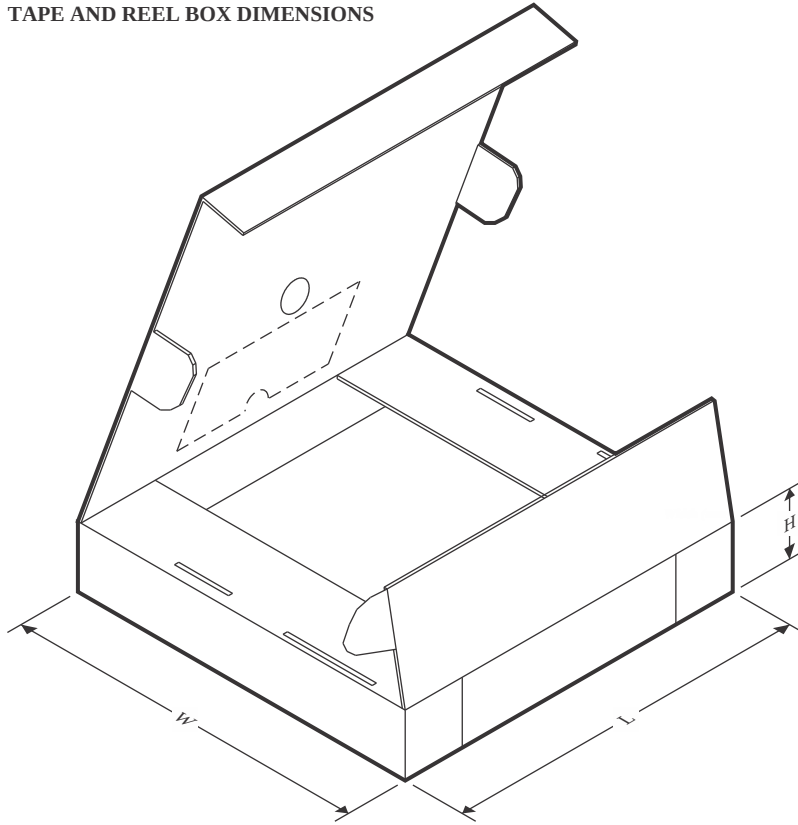
TAPE AND REEL INFORMATION



*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
TPS92662AQPHPRQ1	HTQFP	PHP	48	1000	330.0	16.4	9.8	9.8	2.0	12.0	16.0	Q2
TPS92662AQPHPRQ1	HTQFP	PHP	48	1000	330.0	16.4	9.6	9.6	1.5	12.0	16.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS92662AQPHPRQ1	HTQFP	PHP	48	1000	356.0	356.0	36.0
TPS92662AQPHPRQ1	HTQFP	PHP	48	1000	336.6	336.6	31.8

GENERIC PACKAGE VIEW

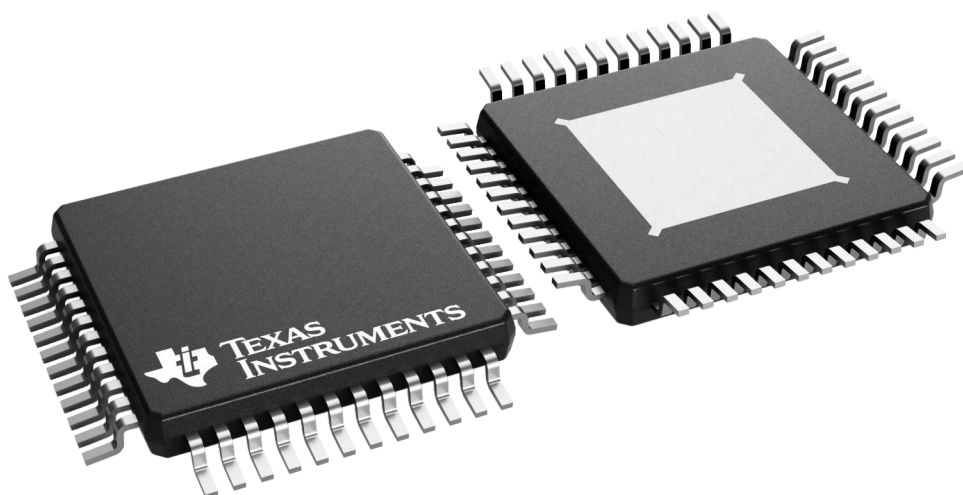
PHP 48

TQFP - 1.2 mm max height

7 x 7, 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.

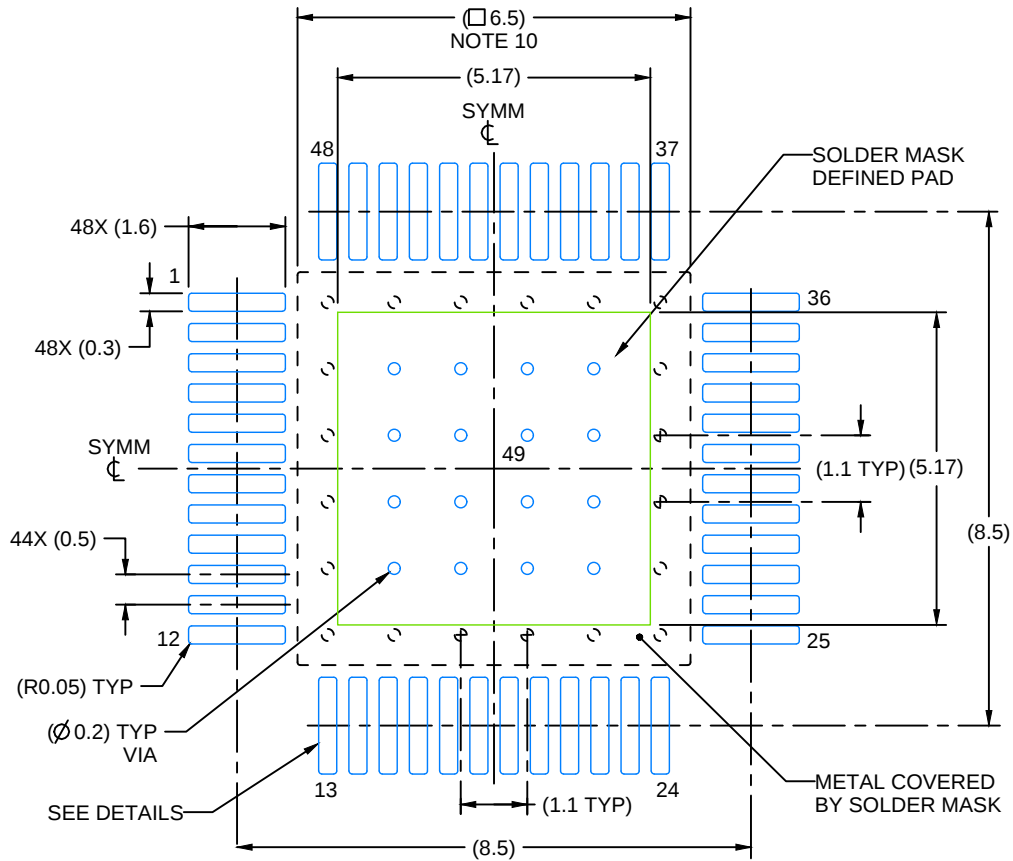


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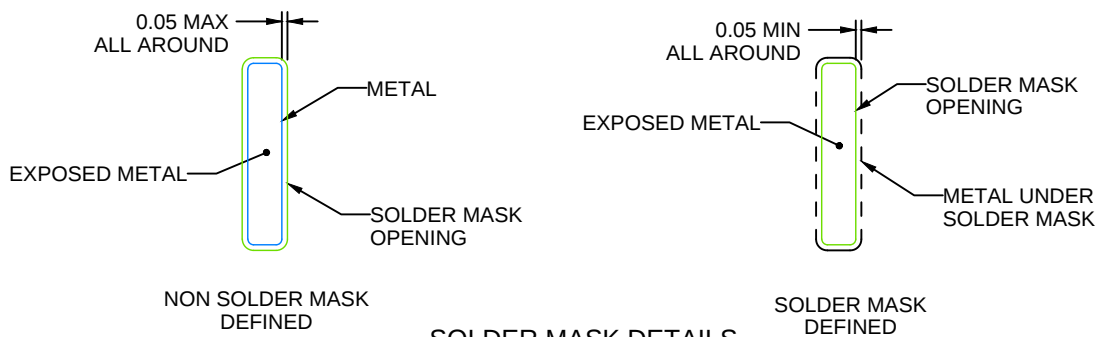
PHP0048G

PowerPAD™ HTQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4225861/A 4/2020

NOTES: (continued)

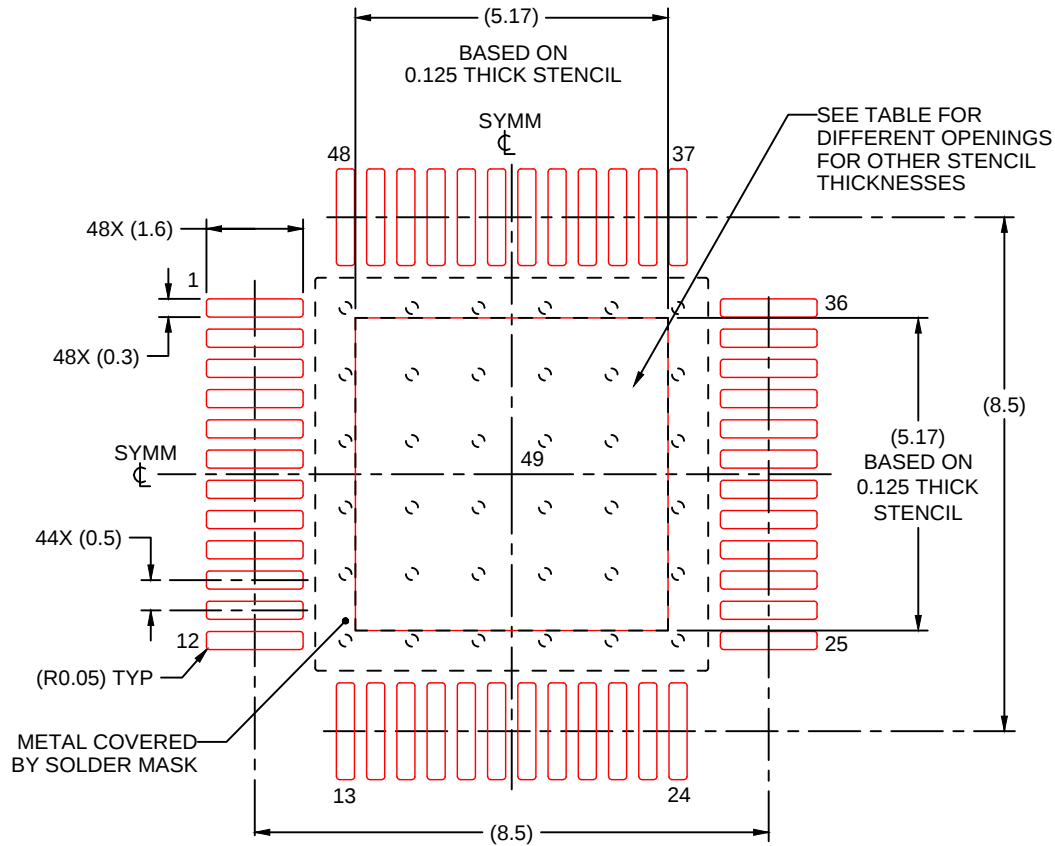
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
8. This package is designed to be soldered to a thermal pad on the board. See technical brief, Powerpad thermally enhanced package, Texas Instruments 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

PHP0048G

PowerPAD™ HTQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



SOLDER PASTE EXAMPLE
EXPOSED PAD
100% PRINTED SOLDER COVERAGE BY AREA
SCALE:8X

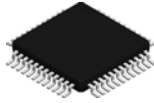
STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	5.78 X 5.78
0.125	5.17 X 5.17 (SHOWN)
0.150	4.72 X 4.72
0.175	4.37 X 4.37

4225861/A 4/2020

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.

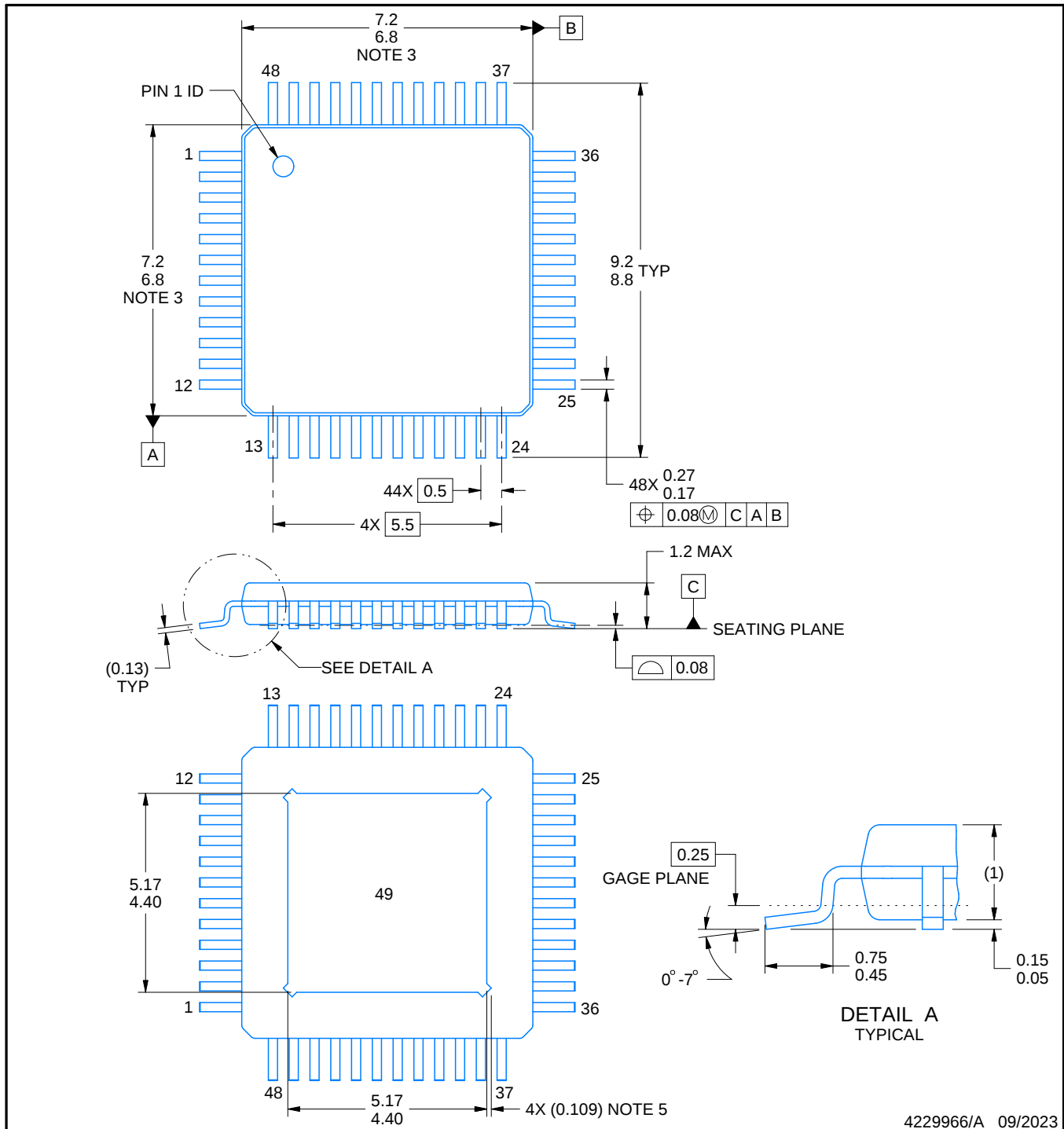
PHP0048N



PowerPAD™ HTQFP - 1.2 mm max height

PACKAGE OUTLINE

PLASTIC QUAD FLATPACK



4229966/A 09/2023

NOTES:

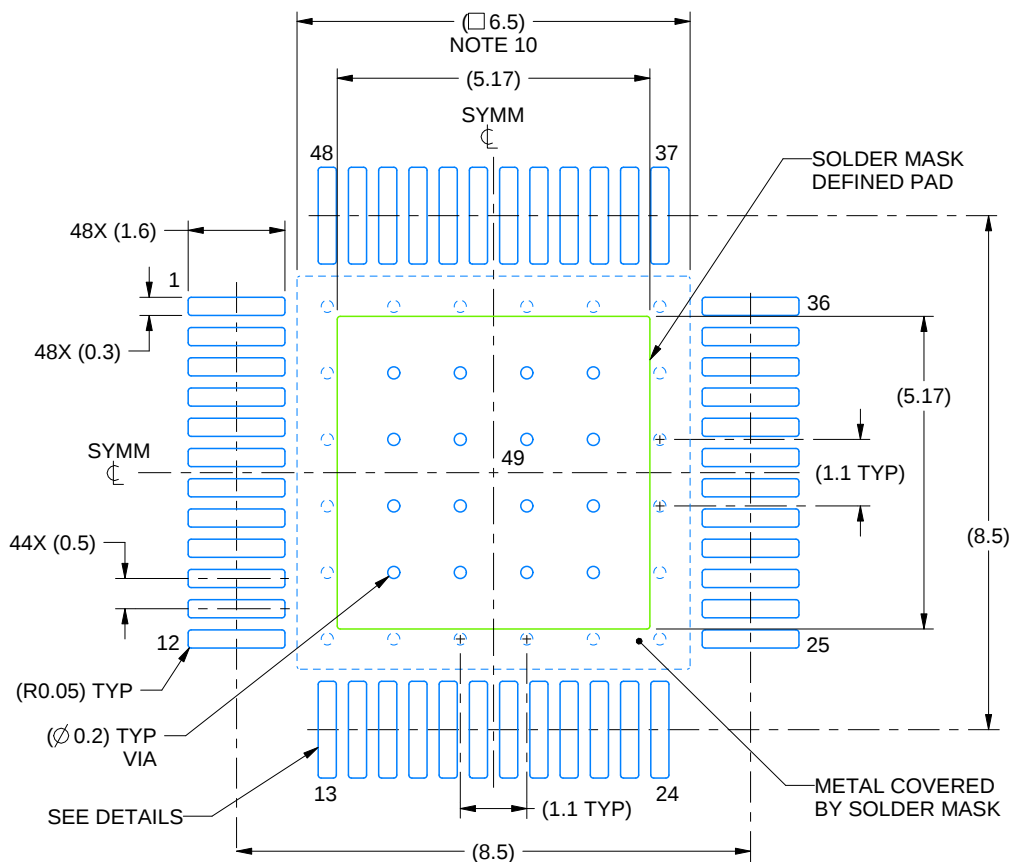
PowerPAD is a trademark of Texas Instruments.

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. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MS-026.
5. Feature may not be present.

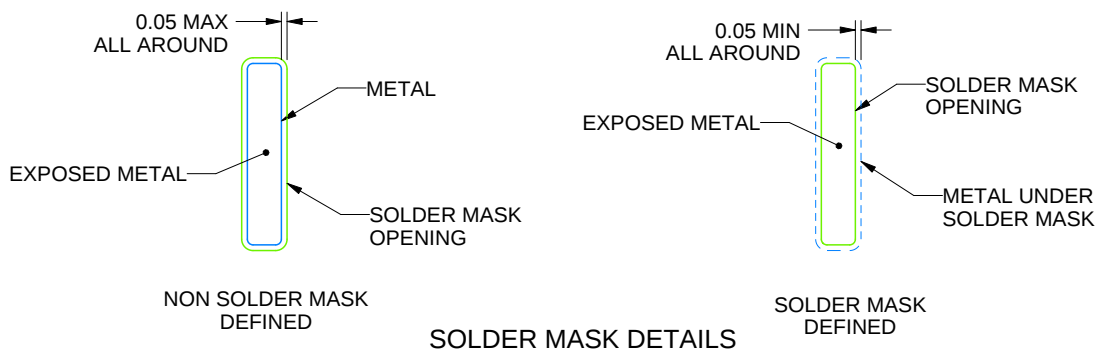
PHP0048N

PowerPAD™ HTQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



4229966/A 09/2023

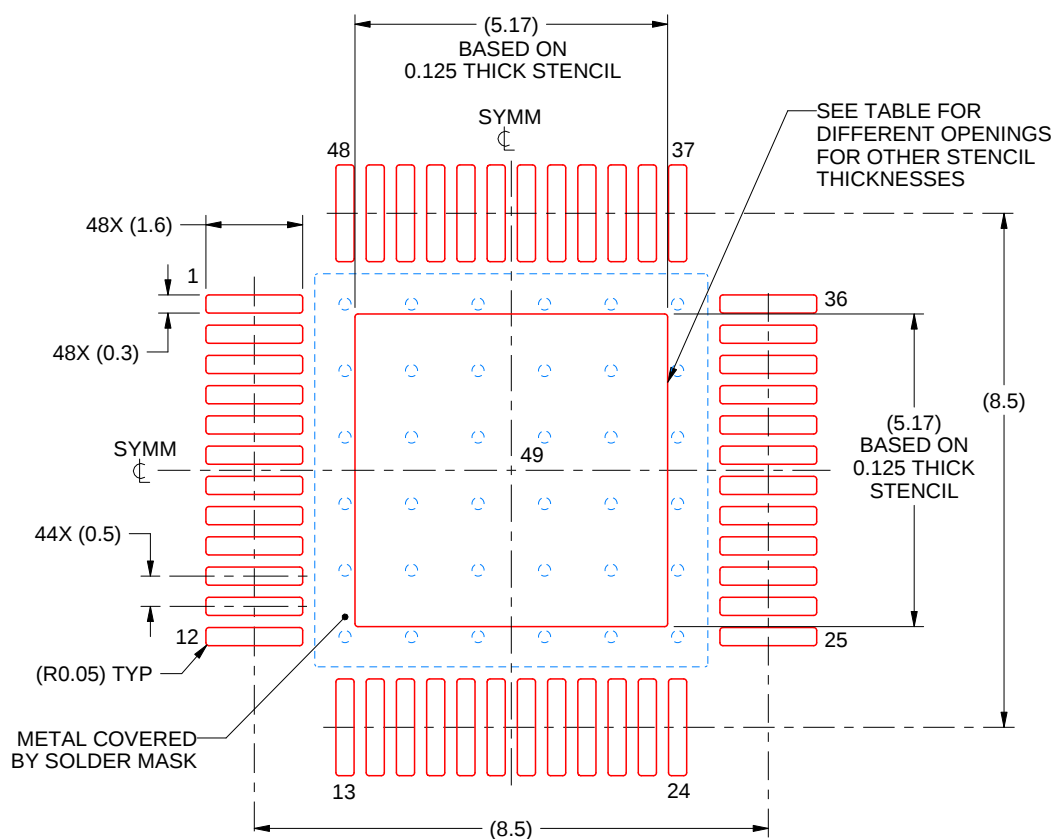
NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
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PHP0048N

PowerPAD™ HTQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



SOLDER PASTE EXAMPLE
EXPOSED PAD
100% PRINTED SOLDER COVERAGE BY AREA
SCALE:8X

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	5.78 X 5.78
0.125	5.17 X 5.17 (SHOWN)
0.150	4.72 X 4.72
0.175	4.37 X 4.37

4229966/A 09/2023

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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