

BQ79735-Q1 用于 HV 汽车 BMS 应用的电池包电压和隔离电阻监测器

1 特性

- 符合 AEC-Q100 标准, -40°C 至 $+125^{\circ}\text{C}$
- 功能安全合规型
 - 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
- 17 个单端电压通道
 - 高压电池包、链路、电荷测量精度更新至 0.2%
 - 电池包和电池同步至 64 μs
- 15 个具有 IO、I2C、SPI、ADC 和温度检测功能的 GPIO 输入
- 专用 MOSFET 开关驱动引脚
- 智能 SPI 控制器 HUB
 - 支持多个 SPI 外围器件
 - 用于触发接触器驱动器和热熔丝驱动器的 HW 引脚
- 与 BQ7971x-Q1 电池监测器兼容的可堆叠和寄存器映射

2 应用

- 全电动、插电式混合动力和混合动力汽车

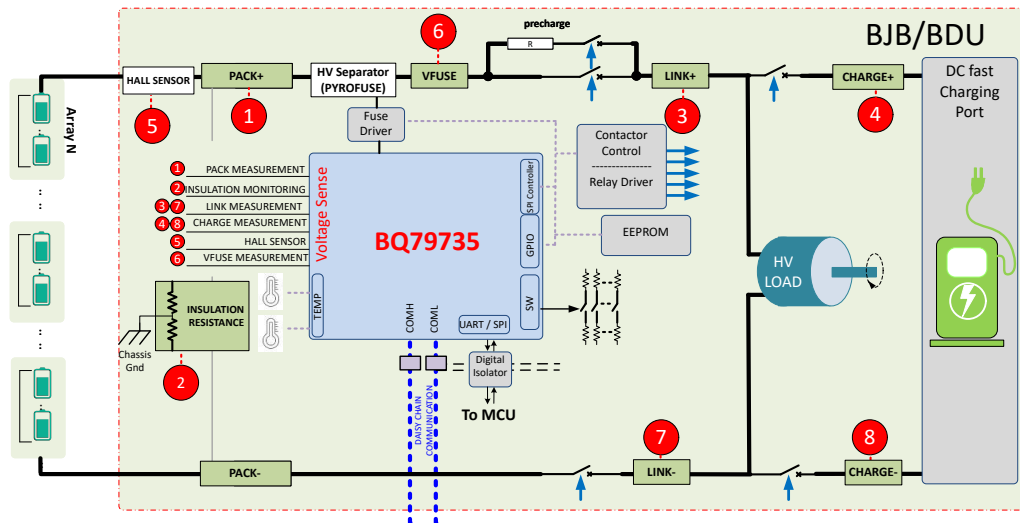
3 说明

该器件可用于测量电池系统中的高电压分压节点。它可以测量保险丝和接触器两端的电压,并检查电池接线盒(BJB)系统中的隔离电压。有 15 个 GPIO/辅助输入可用于高压测量、热敏电阻测量和驱动继电器。有 4 个 SW 输出可用于驱动测量路径中的 MOSFET 开关管。该器件可用作 SPI 集线器并与多达 8 个独立的 SPI 器件/组进行连接。隔离式双向菊花链端口支持基于电容器和变压器的隔离。该器件还可以通过 SPI 和 UART 与 MCU 通信。

器件信息

器件型号	封装 ⁽¹⁾	封装尺寸(标称值)
BQ79735-Q1	HTQFP (48 引脚)	7mm × 7mm

(1) 有关所有可用封装,请参阅节 5。



简化版系统图



4 器件和文档支持

TI 提供广泛的开发工具。下面列出了用于评估器件性能、生成代码和开发解决方案的工具和软件。

4.1 器件支持

4.1.1 第三方产品免责声明

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4.2 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 [通知](#) 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。

4.3 支持资源

[TI E2E™ 中文支持论坛](#) 是工程师的重要参考资料，可直接从专家处获得快速、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，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](#)。

4.4 商标

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

4.5 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。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。

4.6 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。

5 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。

5.1 封装选项附录

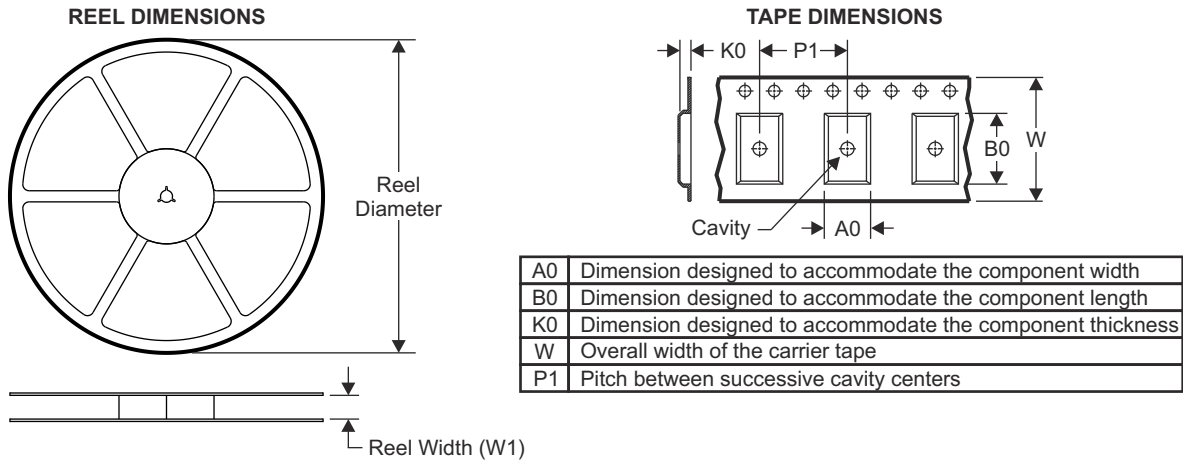
封装信息

可订购器件	状态 ⁽¹⁾	封装类型	封装图	引脚	包装数量	环保计划 ⁽²⁾	铅/焊球镀层 ⁽⁶⁾	MSL 峰值温度 ⁽³⁾	工作温度 (°C)	器件标识 ^{(4) (5)}
BQ79735PHPRQ1	正在供货	HTQFP	PHP	48	1000	RoHS 和绿色环保	NiPdAu	MSL-3-260 C-168 HR	-40C 至 125C	BQ79735Q

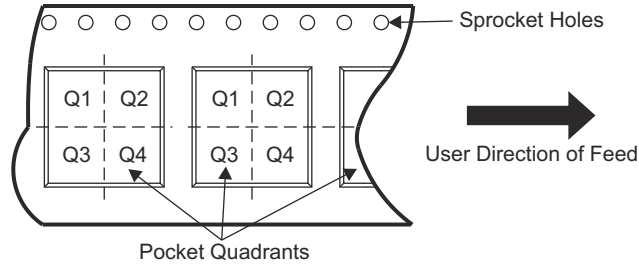
- (1) 销售状态值定义如下：
正在供货：建议用于新设计的产品器件。
限期购买：TI 已宣布器件即将停产，但仍在购买期限内。
NRND：不推荐用于新设计。为支持现有客户，器件仍在生产，但 TI 不建议在新设计中使用此器件。
PRE_PROD：器件未发布，尚未量产，未向大众市场供货，也未在网络上供应，未提供样片。
预发布：器件已发布，但未量产。可能提供样片，也可能无法提供样片。
已停产：TI 已停止生产该器件。
- (2) 环保计划 - 规划的环保分级包括：无铅 (RoHS)，无铅 (RoHS 豁免) 或绿色 (RoHS，无镉/溴) - 如需了解最新供货信息及更多产品内容详情，请访问 www.ti.com.cn/productcontent。
待定：无铅/绿色环保转换计划尚未确定。
无铅 (RoHS)：TI 所说的“无铅”或“无 Pb”是指半导体产品符合针对所有 6 种物质的现行 RoHS 要求，包括要求铅的重量不超过同质材料总重量的 0.1%。因在设计时就考虑到了高温焊接要求，因此 TI 的无铅产品适用于指定的无铅作业。
无铅 (RoHS 豁免)：该元件在以下两种情况下可享受 RoHS 豁免：1) 芯片和封装之间使用铅基倒装芯片焊接凸点；2) 芯片和引线框之间使用铅基芯片粘合剂。否则，元件将根据上述规定视为无铅 (符合 RoHS)。
绿色环保 (RoHS，无镉/溴)：TI 定义的“绿色环保”表示无铅 (符合 RoHS 标准)、无溴 (Br) 和无镉 (Sb) 系阻燃剂 (均质材料中 Br 或 Sb 的质量不超过总质量的 0.1%)。
- (3) MSL，峰值温度-- 湿敏等级额定值 (符合 JEDEC 工业标准分级) 和峰值焊接温度。
- (4) 器件上可能还有与标识、批次跟踪代码信息或环境分类相关的其他标志。
- (5) 如有多个器件标识，将用括号括起来。不过，器件上仅显示括号中以“~”隔开的其中一个器件标识。如果某一行缩进，说明该行续接上一行，这两行合在一起表示该器件的完整器件标识。
- (6) 铅/焊球镀层 - 可订购器件可能有多种镀层材料选项。各镀层选项用垂直线隔开。如果铅/焊球镀层值超出最大列宽，则会折为两行。
- 重要信息和免责声明**：本页面上提供的信息代表 TI 在提供该信息之日的认知和观点。TI 的认知和观点基于第三方提供的信息，TI 不对此类信息的正确性做任何声明或保证。TI 正在致力于更好地整合第三方信息。TI 已经并将继续采取合理的措施来提供有代表性且准确的信息，但是可能尚未对引入的原料和化学制品进行破坏性测试或化学分析。TI 和 TI 供应商认为某些信息属于专有信息，因此可能不会公布其 CAS 编号及其他受限制的信息。

在任何情况下，TI 因此类信息产生的责任决不超过 TI 每年向客户销售的本文档所述 TI 器件的总购买价。

5.2 卷带包装信息

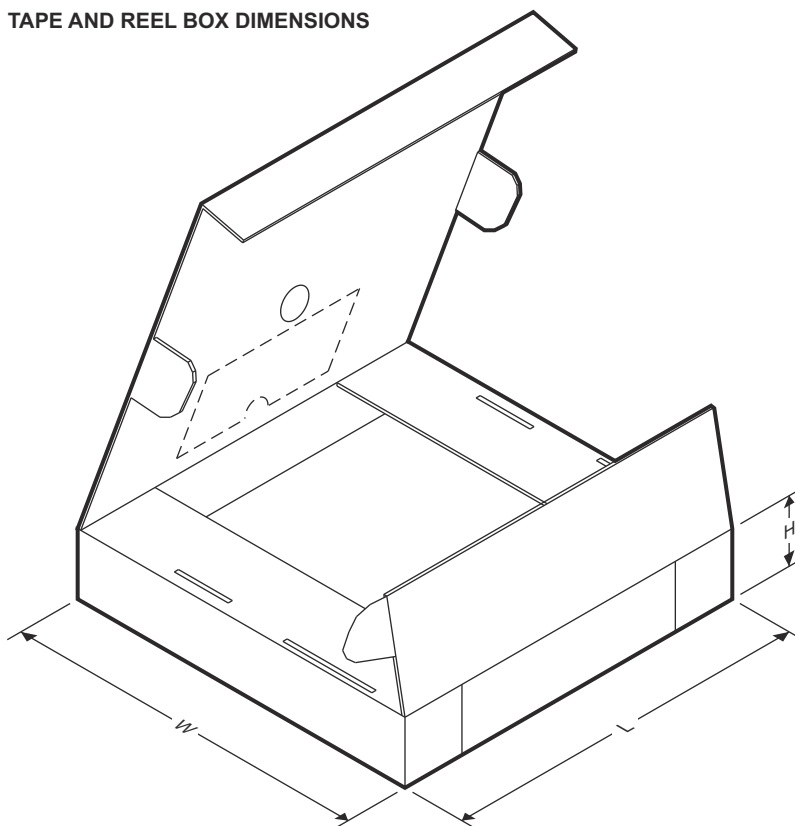


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
BQ79735PHPRQ1	HTQFP	PHP	48	1000	330.0	16.4	9.6	9.6	1.5	12.0	16.0	Q2

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)
BQ79735PHPRQ1	HTQFP	PHP	48	1000	336.6	336.6	31.8

5.3 机械数据

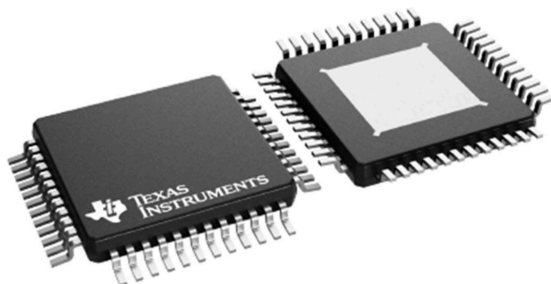
PHP 48

7 x 7, 0.5 mm pitch

TQFP - 1.2 mm max height

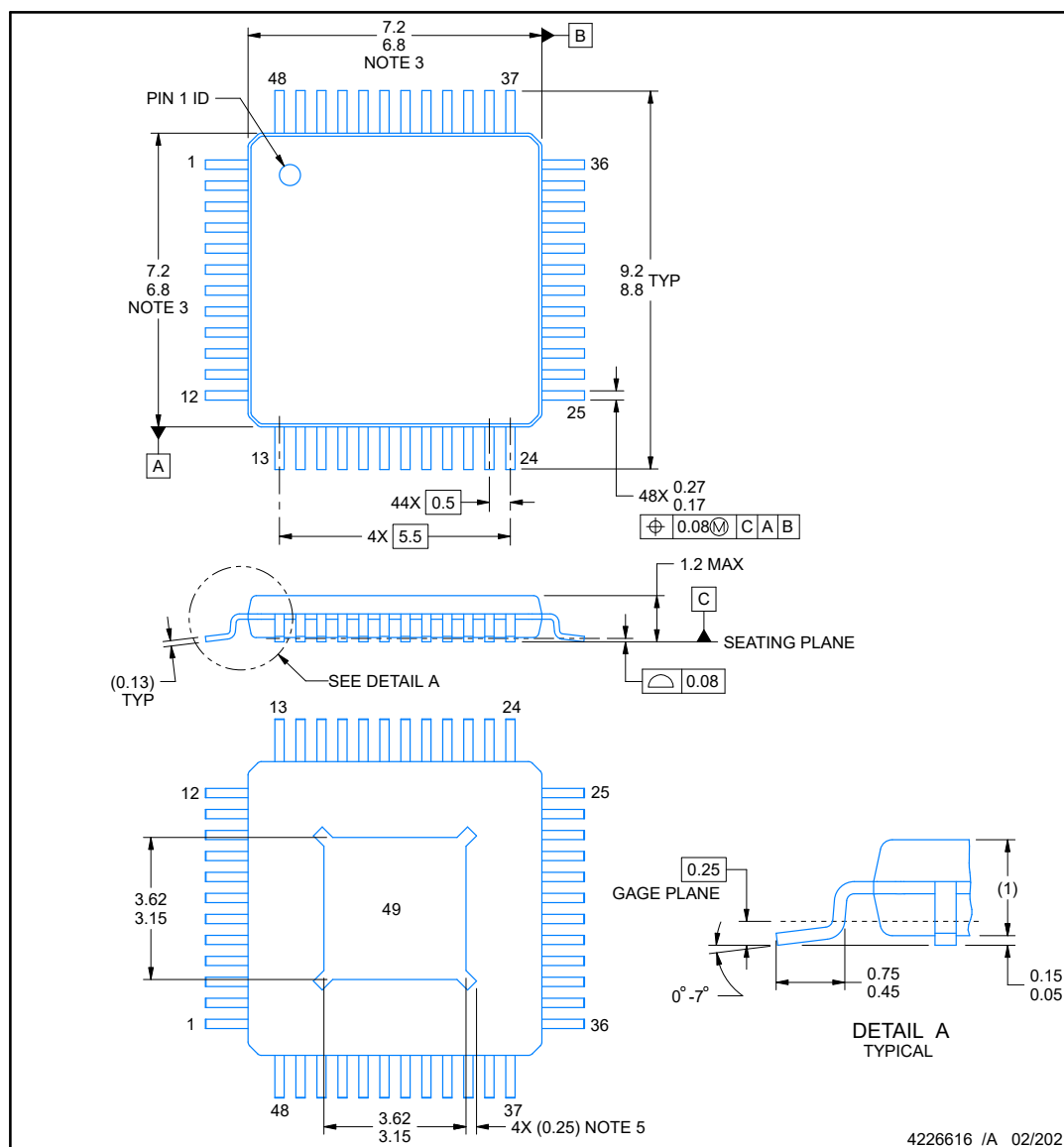
QUAD FLATPACK

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





PACKAGE OUTLINE

PHP0048E**PowerPAD™ HTQFP - 1.2 mm max height**

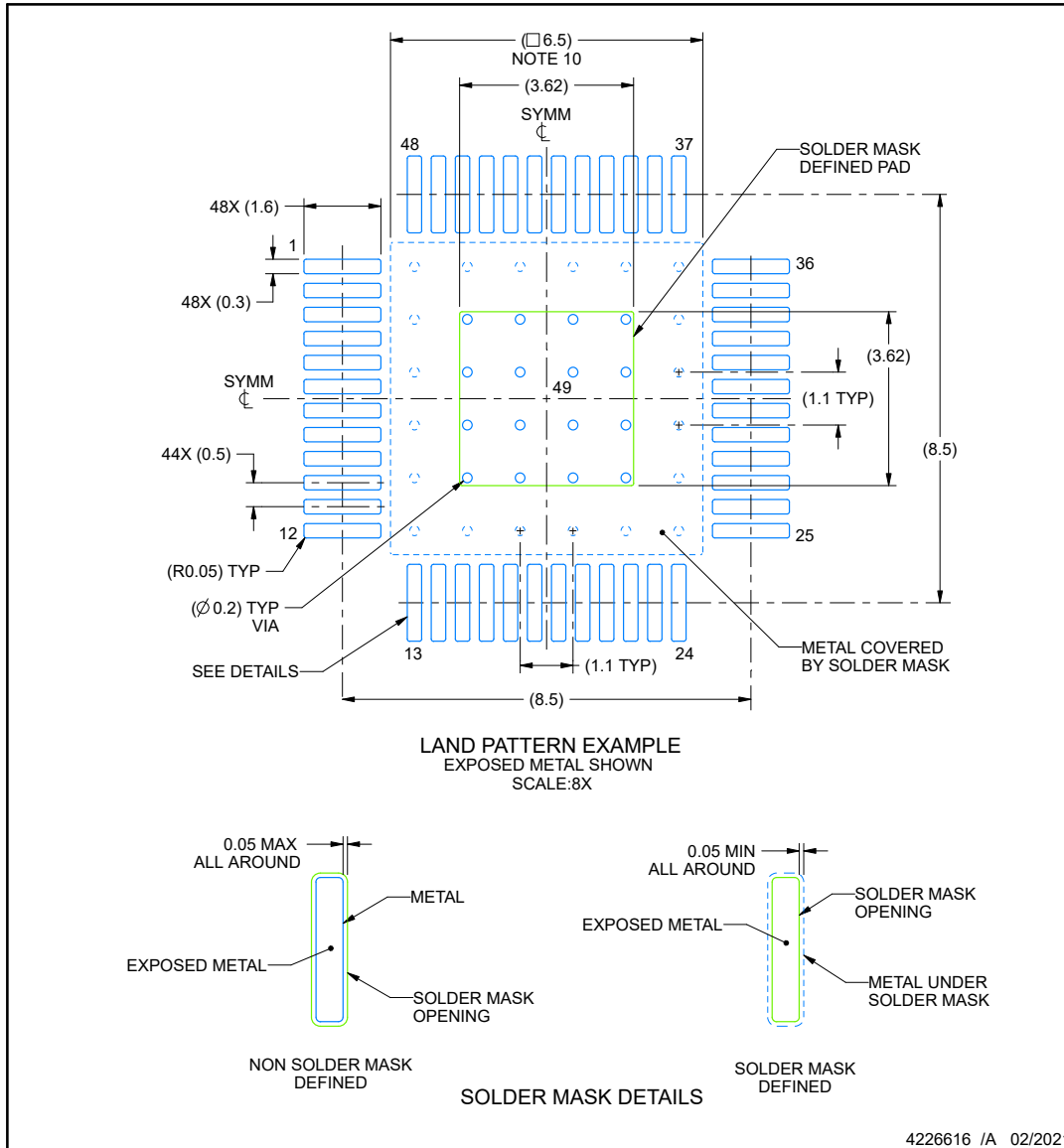
NOTES:

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.

EXAMPLE BOARD LAYOUT

PHP0048E

PowerPAD™ HTQFP - 1.2 mm max height

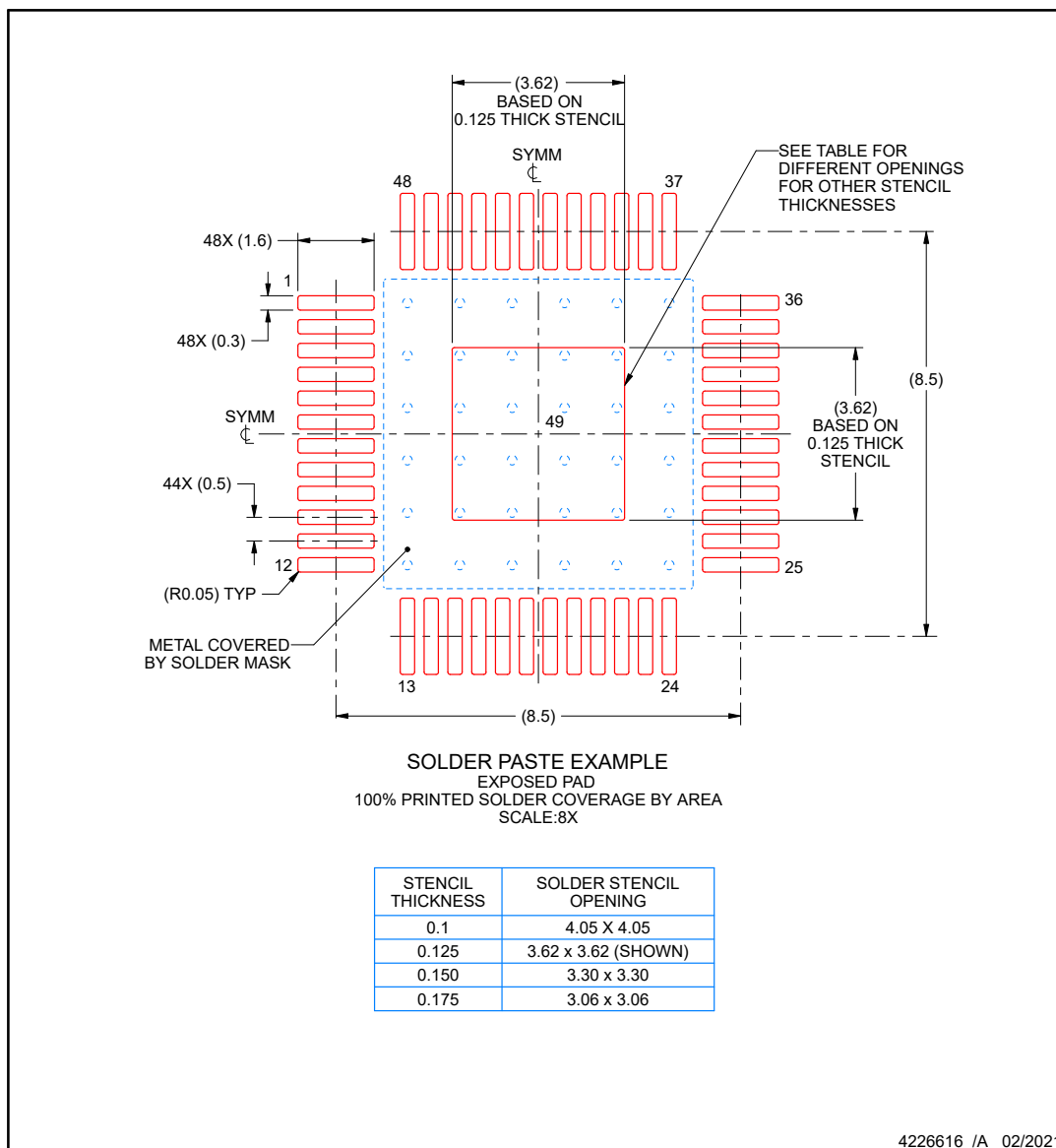
NOTES: (continued)

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

PHP0048E

PowerPAD™ HTQFP - 1.2 mm max height



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.

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
BQ79735PHPRQ1	ACTIVE	HTQFP	PHP	48	1000	RoHS & Green	NIPDAU	Level-3-260C-168 HR	-40 to 125	BQ79735Q	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.

OBSELETE: 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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GENERIC PACKAGE VIEW

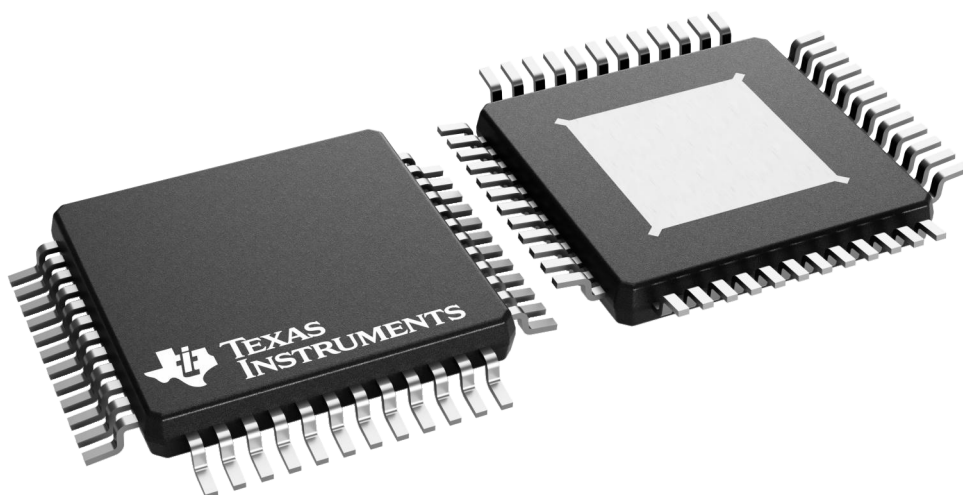
PHP 48

TQFP - 1.2 mm max height

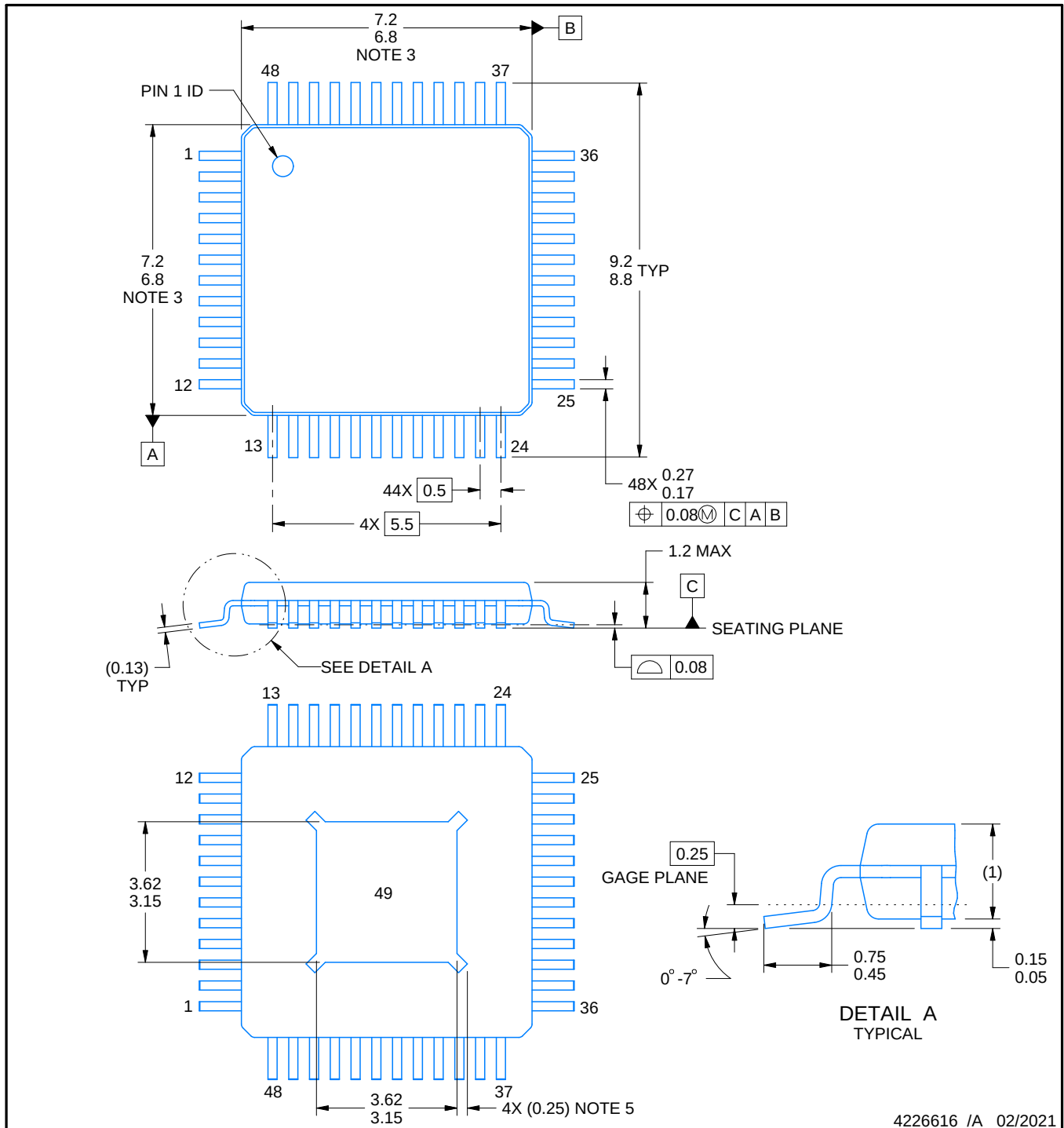
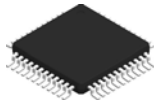
7 x 7, 0.5 mm pitch

QUAD FLATPACK

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



4226443/A



4226616 /A 02/2021

NOTES:

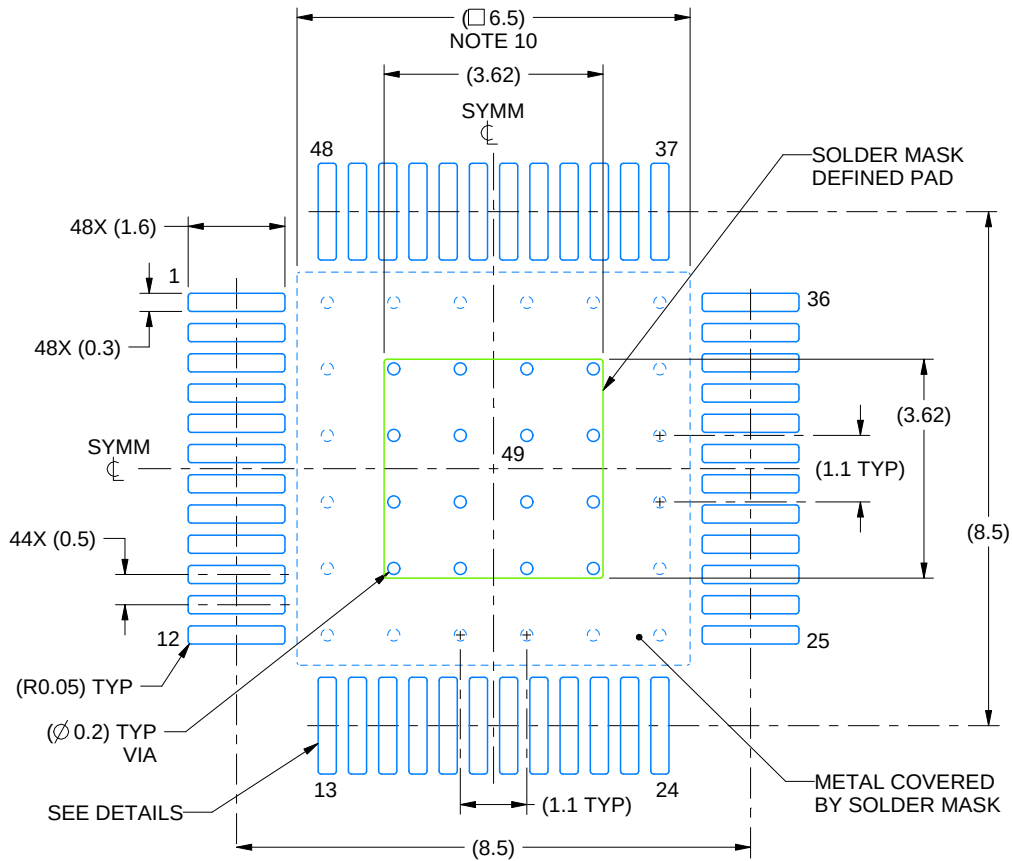
PowerPAD is a trademark of Texas Instruments.

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.

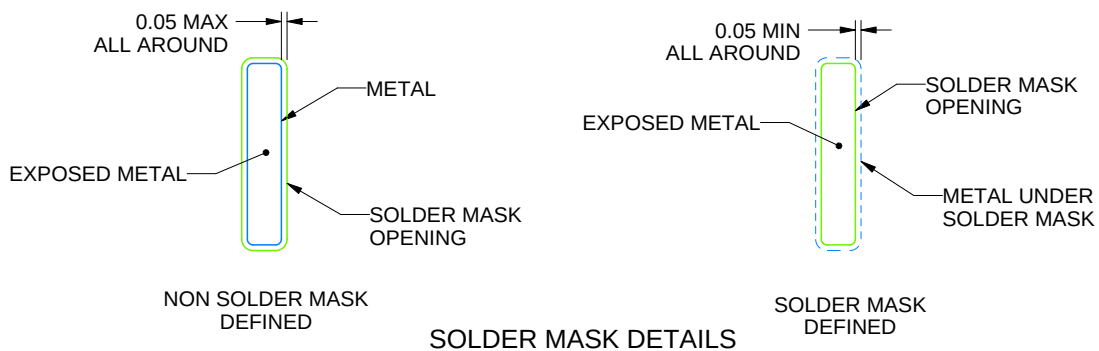
EXAMPLE BOARD LAYOUT

PHP0048E

PowerPAD™ HTQFP - 1.2 mm max height



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4226616 /A 02/2021

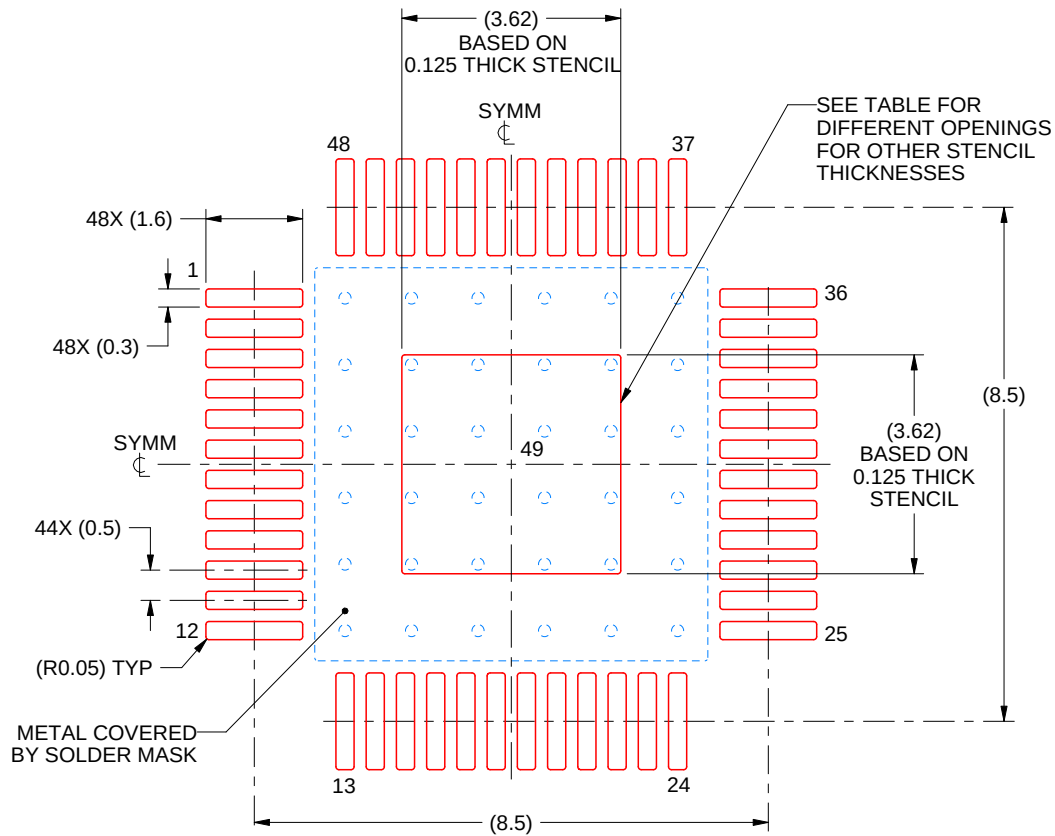
NOTES: (continued)

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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

PHP0048E

PowerPAD™ HTQFP - 1.2 mm max height



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

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	4.05 X 4.05
0.125	3.62 x 3.62 (SHOWN)
0.150	3.30 x 3.30
0.175	3.06 x 3.06

4226616 /A 02/2021

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.

重要声明和免责声明

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