用于体重秤和人体成分测量的 AFE4300 低成本集成模拟前端

1 特性

- 体重秤前端：
  - 支持最多四路称重传感器输入
  - 片上称重传感器 1.7V 激励电压用于比例式测量
  - 68nVrms 输入参考噪声（0.1Hz 至 2Hz）
  - 优秀拟合线性：满标量程的 0.01%
  - 体重秤测量：540µA
- 身体成分分析仪前端：
  - 最多支持三个四极复合阻抗测量值
  - 6 位 1MSPS 正弦波生成数模转换器 (DAC)
  - 247.5µArms、±20% 激励源
  - 在 2Hz 带宽中具有 0.1Ω 测量 RMS 噪声
  - 人体成分测量：970µA
- 模数转换器 (ADC)：
  - 16 位，860 次每秒采样 (SPS)
  - 电源电流：110µA

2 应用

可进行人体成分测量的体重秤

3 说明

AFE4300 是一款低成本模拟前端，此模拟前端有两个独立的信号链：一个信号链用于体重计 (WS) 测量，而另外一个信号链用于体成分测量 (BCM) 分析。一个 16 位，860SPS 模数转换器 (ADC) 在两个信号链间复用。体重测量信号链包括一个可由外部电阻器设定增益的仪器放大器 (INA)，后接一个用于偏移校正的 6 位数模转换器 (DAC)，和一个驱动外部桥/负载单元（有一个用于比例式测量的 1.7V 固定电压）的电路。

AFE4300 还可通过产生一个进入人体的正弦电流来测量人体成分。此正弦电流由一个内部模式生成器和一个 6 位，1MSPS DAC 生成。一个电压电流转换器将这个正弦电流应用在两个端子之间的人体上。在这两个端子上生成的电压是由人体的阻抗生成的，此电压由一个差分放大器测量，再经过整流，且其振幅由 16 位 ADC 提取并测量。

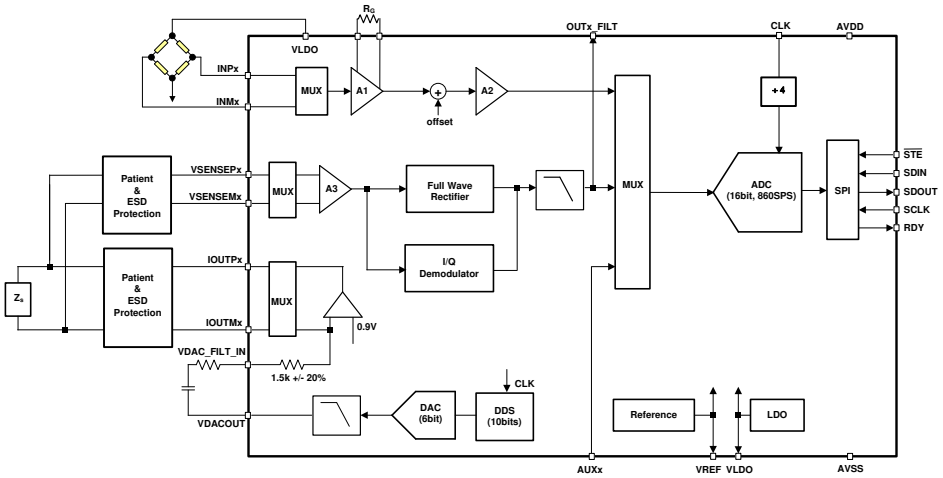
AFE4300 的工作电压范围为 2V 至 3.6V，额定温度为 0°C 至 +70°C，并采用 LQFP-80 封装。

器件信息(1)

器件型号	封装	封装尺寸（标称值）
AFE4300	LQFP (80)	12.00mm x 12.00mm

(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。

功能方框图



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4 器件和文档支持

4.1 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。

4.2 社区资源

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Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

4.3 商标

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4.4 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。

4.5 Glossary

SLYZ022 — *TI Glossary*.

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

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。

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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)
AFE4300PN	Active	Production	LQFP (PN) | 80	119 | JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	0 to 70	AFE4300
AFE4300PN.A	Active	Production	LQFP (PN) | 80	119 | JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	0 to 70	AFE4300
AFE4300PNR	Active	Production	LQFP (PN) | 80	1000 | LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	0 to 70	AFE4300
AFE4300PNR.A	Active	Production	LQFP (PN) | 80	1000 | LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	0 to 70	AFE4300

(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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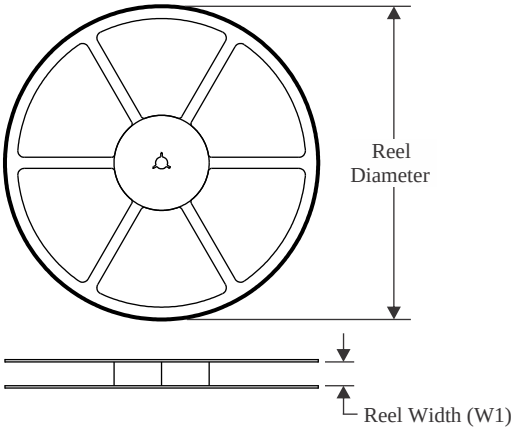
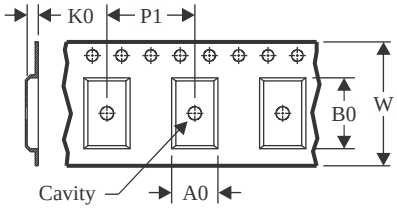
TAPE AND REEL INFORMATION

REEL DIMENSIONS

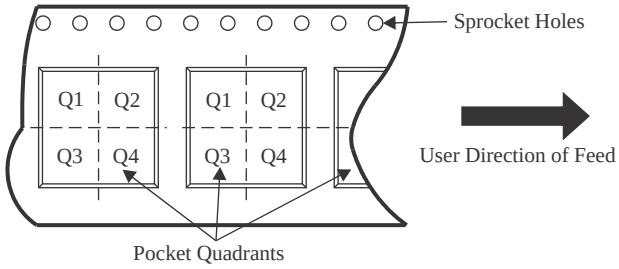


TAPE DIMENSIONS



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

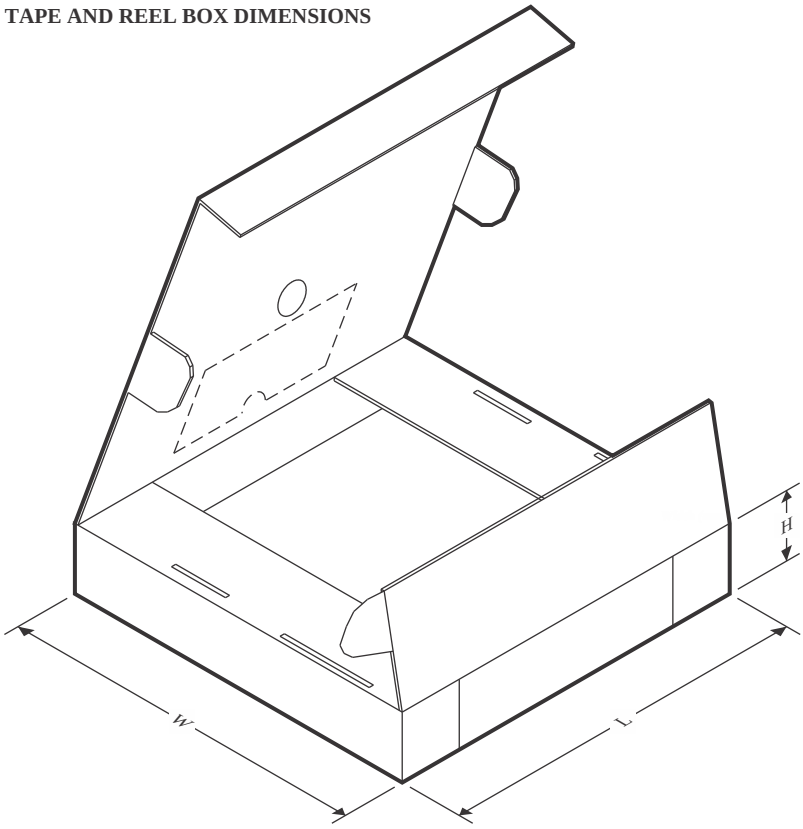
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
AFE4300PNR	LQFP	PN	80	1000	330.0	24.4	16.0	16.0	2.0	24.0	24.0	Q2

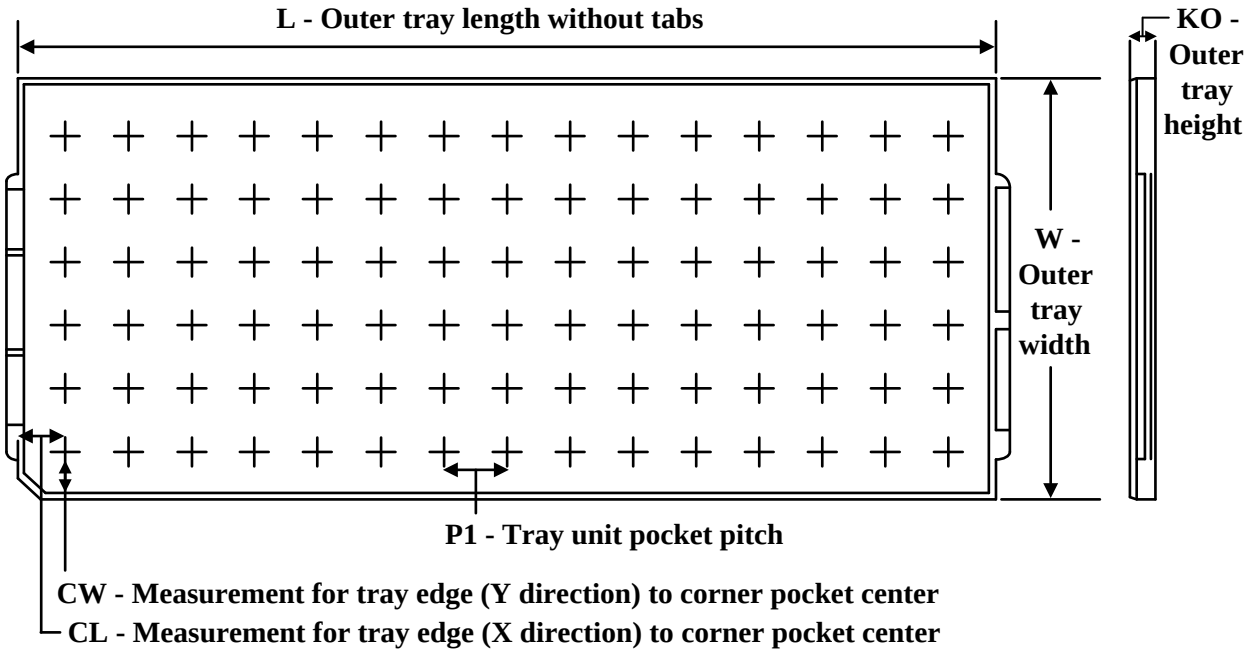
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
AFE4300PNR	LQFP	PN	80	1000	367.0	367.0	55.0

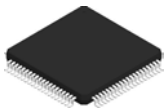
TRAY



Chamfer on Tray corner indicates Pin 1 orientation of packed units.

*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	Unit array matrix	Max temperature (°C)	L (mm)	W (mm)	K0 (µm)	P1 (mm)	CL (mm)	CW (mm)
AFE4300PN	PN	LQFP	80	119	7 X 17	150	315	135.9	7620	17.9	14.3	13.95
AFE4300PN.A	PN	LQFP	80	119	7 X 17	150	315	135.9	7620	17.9	14.3	13.95

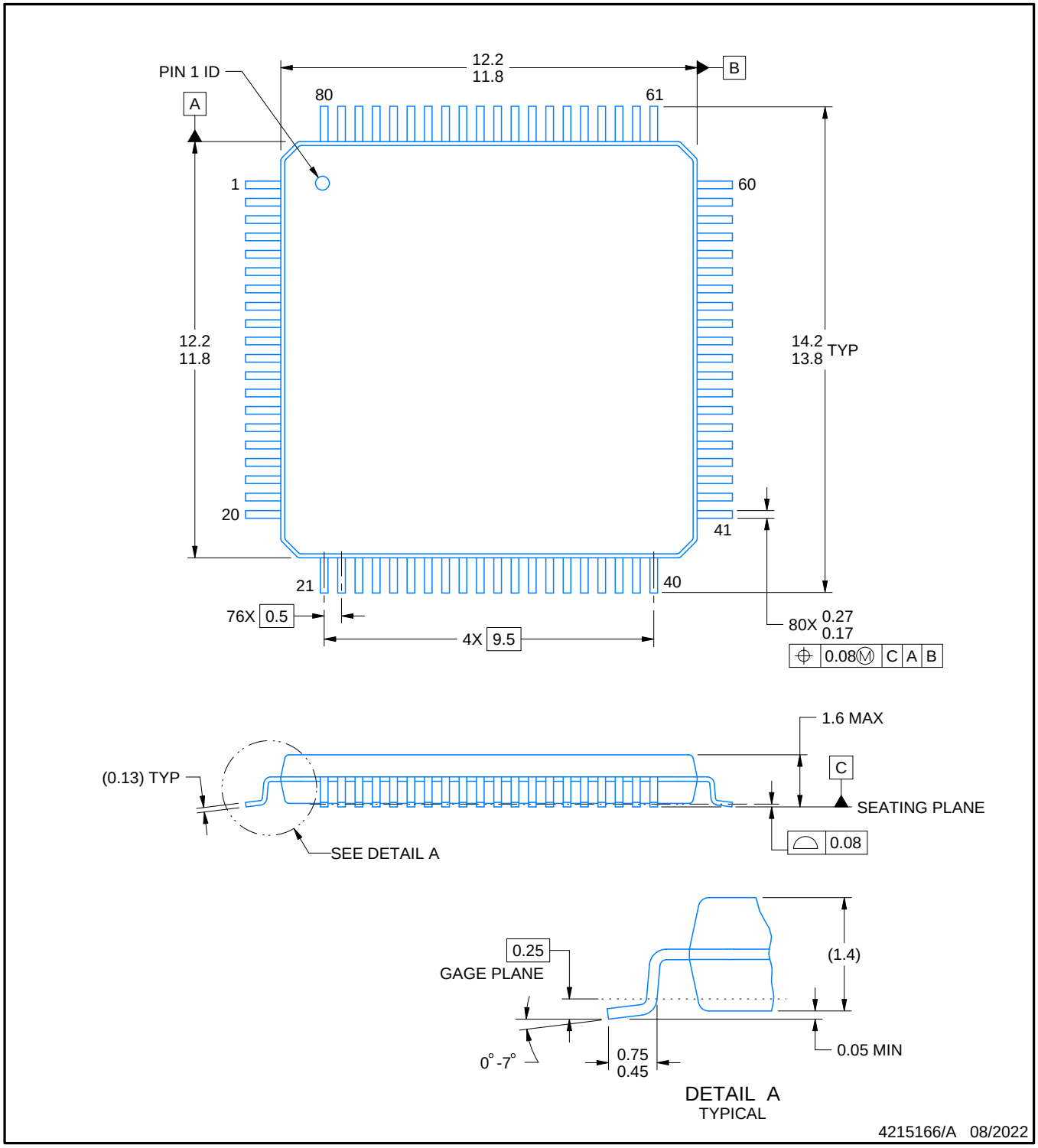


PACKAGE OUTLINE

PN0080A

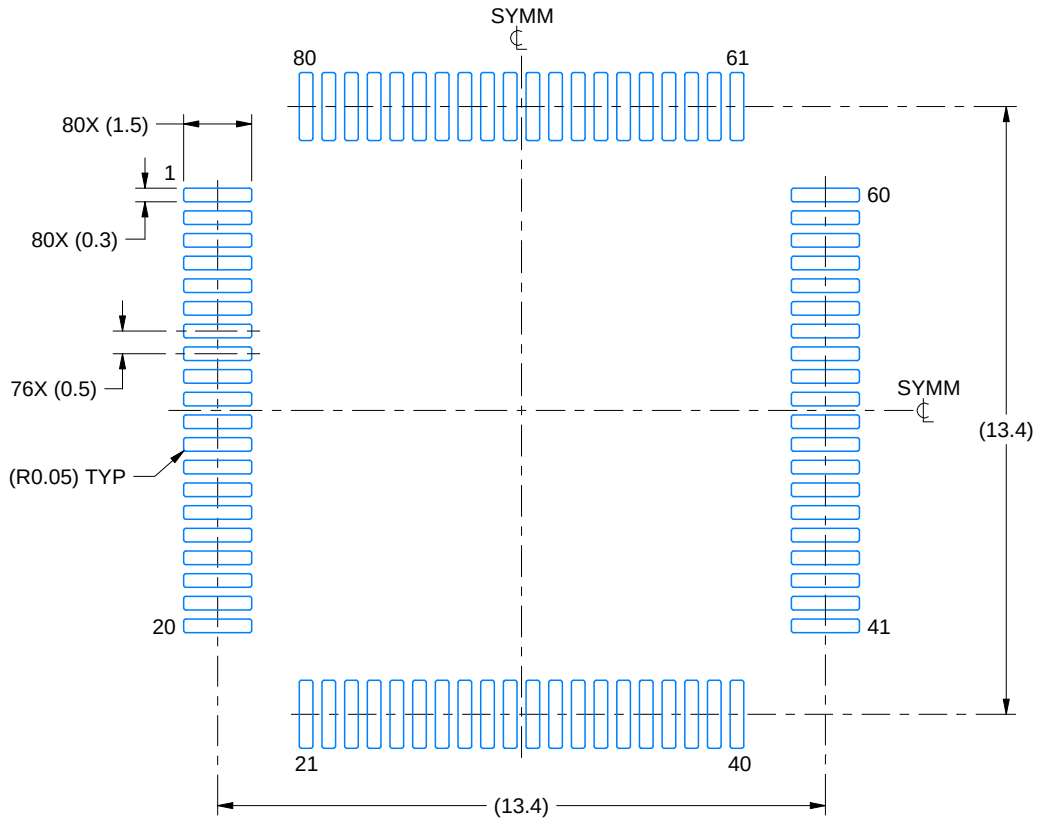
LQFP - 1.6 mm max height

PLASTIC QUAD FLATPACK

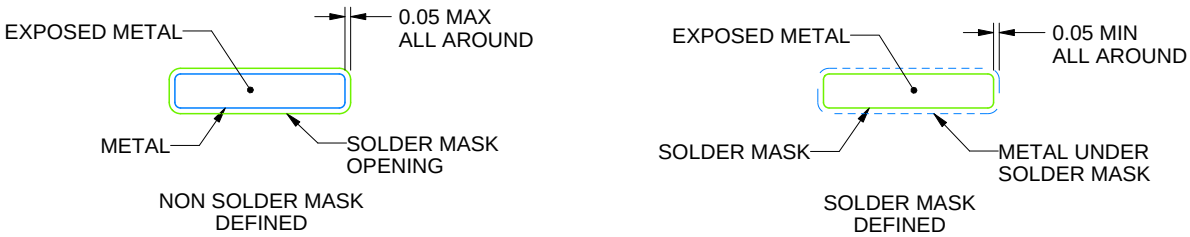


NOTES:

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.
3. Reference JEDEC registration MS-026.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:6X



SOLDER MASK DETAILS

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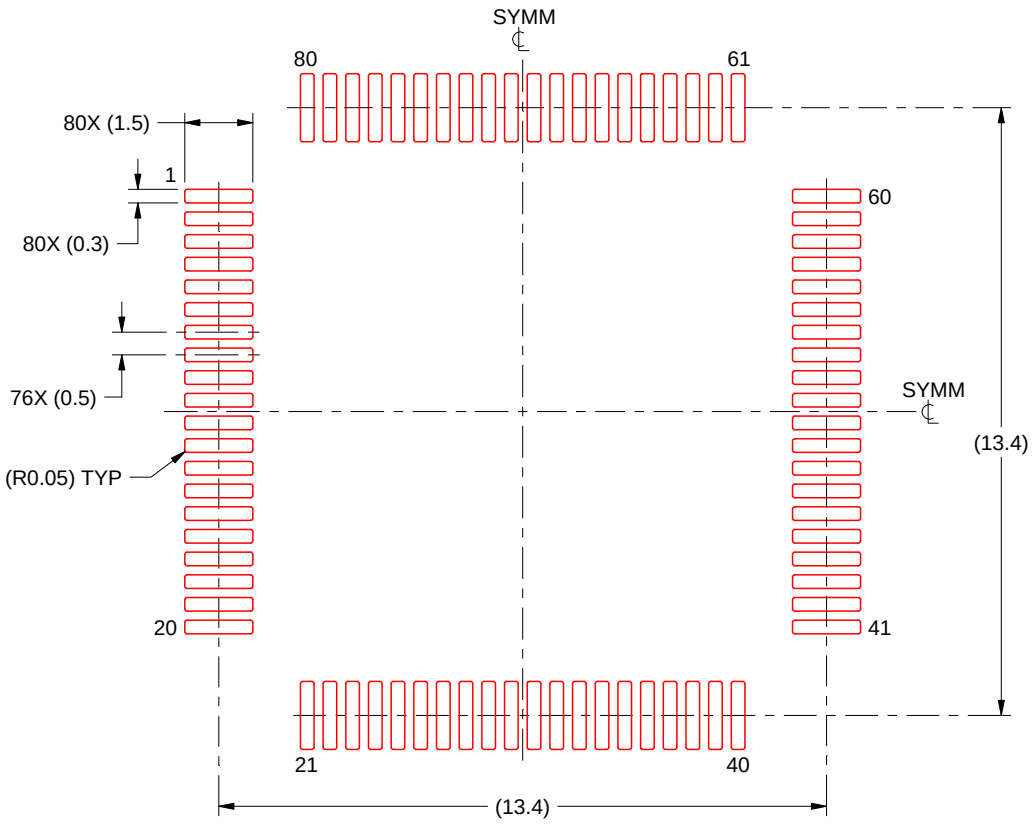
NOTES: (continued)

4. Publication IPC-7351 may have alternate designs.
5. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
6. For more information, see Texas Instruments literature number SLMA004 (www.ti.com/lit/slma004).



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:6X

4215166/A 08/2022

NOTES: (continued)

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

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