

DDC3256 256 通道、电流输入模数转换器

1 特性

- 单芯片解决方案，可同时直接测量 256 个低电平电流
- 高达 320pC 的可调满量程电荷范围
- 输入电流：1 μ A (最大值)
- 速度可调，积分时间低至 50 μ s (每通道 20KSPS)
- 分辨率：24 位
- 低功率损耗：1.2mW/通道
- 积分非线性： $\pm 0.025\%$ (满量程范围的 ± 1 ppm，所有通道均处于活动状态)
- 低噪声：0.26fCrms (320pC FSR 且传感器电容为 20pF)
- 无电荷损耗
- 片上温度传感器
- 串行 LVDS 输出接口
- 1.85-V 单电源
- 封装内旁路电容器和基准缓冲器可减小 PCB 面积并降低设计复杂性

2 应用

- CT 扫描仪数据采集系统
- 光电二极管传感器
- X 射线检测系统
- 光纤功率监控
- 多通道电流/电压仪表

3 说明

DDC3256 是一款 24 位、256 通道电流输入模数 (A/D) 转换器。它结合了通过电流积分进行的电流电压转换和模数转换。

光电二极管等多达 256 个独立的低电平电流输出器件可直接连接到其输入并并行 (同时) 进行数字化。

对于全部 256 路输入中的每一路，该器件都有一个低噪声、低功耗积分器，专用于捕捉传感器中的全部电荷。积分时间可在 50 μ s 至 1.6ms 范围内调整，从而能够以出色的精度连续测量 fA 至 μ A 级别的电流。积分器的输出通过片上低功耗 ADC 进行数字化，而转换得到的数字代码通过单个 LVDS 对进行传输，该 LVDS 对经过设计，可尽可能地减少高通道数环境中的噪声耦合。

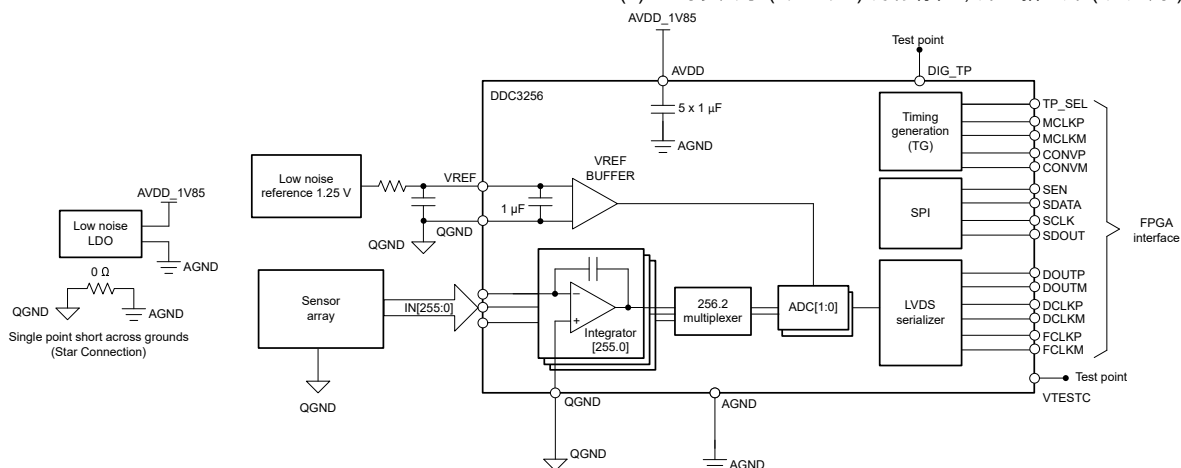
DDC3256 采用 1.85V 单电源供电。该器件采用 13.2mm \times 17.2mm² 336 焊球 0.8mm 间距 BGA 封装，额定工作温度范围为 0 $^{\circ}$ C 至 70 $^{\circ}$ C。片上基准缓冲器和旁路电容器 (位于 BGA 上) 有助于尽可能地降低外部元件要求并进一步减小布板空间。

封装信息

器件型号	封装 ⁽¹⁾	封装尺寸 (标称值) ⁽²⁾
DDC3256ZWX	ZWX (NFBGA, 336)	17.2mm \times 13.2mm

(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。

(2) 封装尺寸 (长 \times 宽) 为标称值，并包括引脚 (如适用)。



简化原理图



Table of Contents

1 特性.....	1	5.2 支持资源.....	3
2 应用.....	1	5.3 Trademarks.....	3
3 说明.....	1	5.4 静电放电警告.....	3
4 Revision History.....	2	5.5 术语表.....	3
5 Device and Documentation Support.....	3	6 Mechanical, Packaging, and Orderable Information....	3
5.1 Documentation Support.....	3	6.1 Mechanical Data.....	4

4 Revision History

注：以前版本的页码可能与当前版本的页码不同

DATE	REVISION	NOTES
June 2023	*	Initial Release

5 Device and Documentation Support

5.1 Documentation Support

5.1.1 Related Documentation

For related documentation, see the following:

1. Texas Instruments, [TPS7A84 High-Current \(3 A\), High-Accuracy \(1%\), Low-Noise \(4.4 \$\mu\$ V_{RMS}\), LDO Voltage Regulator data sheet](#)
2. Texas Instruments, [REF70 2 ppm/°C Maximum Drift, 0.23 ppm-p 1/f Noise, Precision Voltage Reference data sheet](#)

5.2 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》。

5.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

5.4 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。

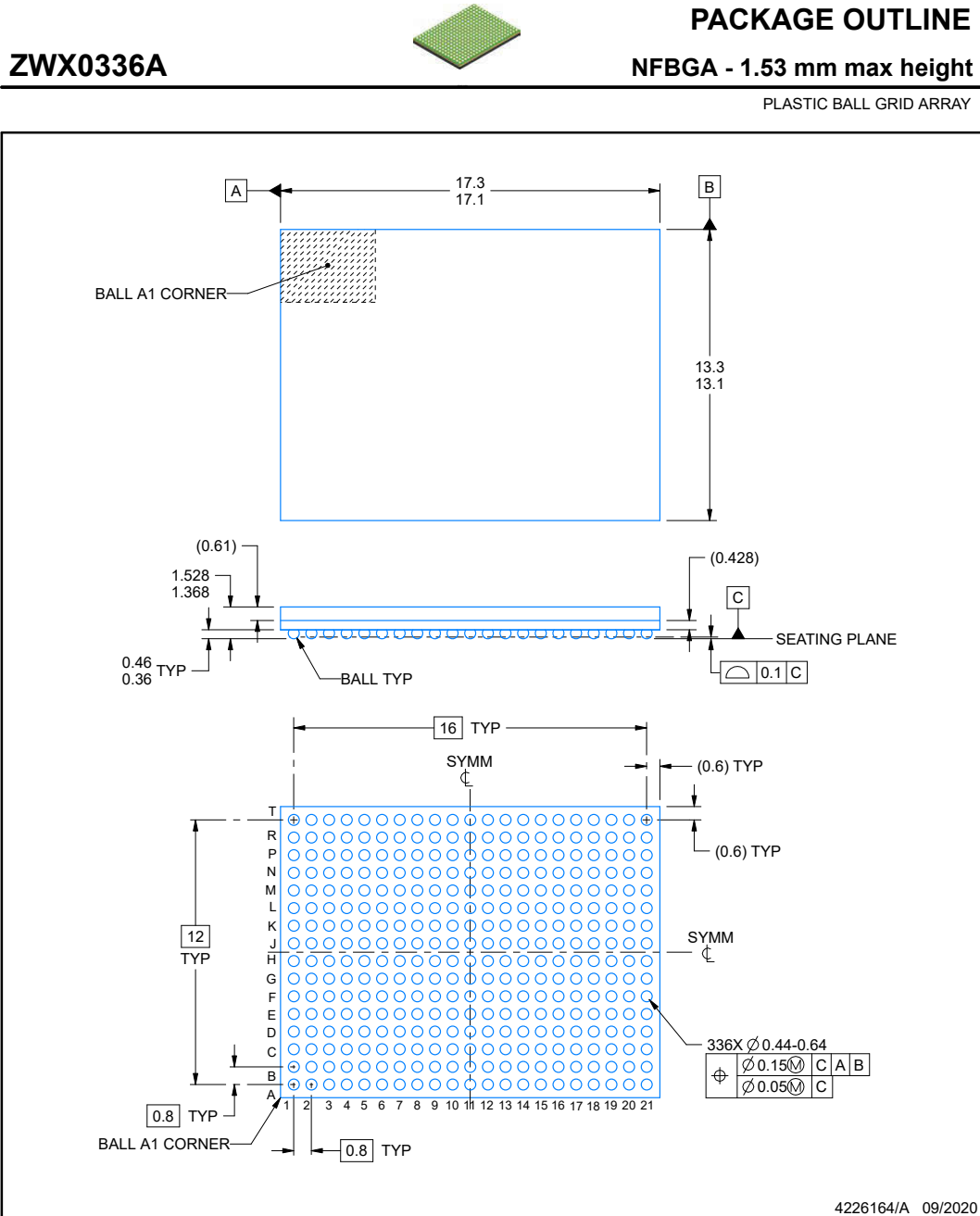
5.5 术语表

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 Mechanical Data



NOTES:

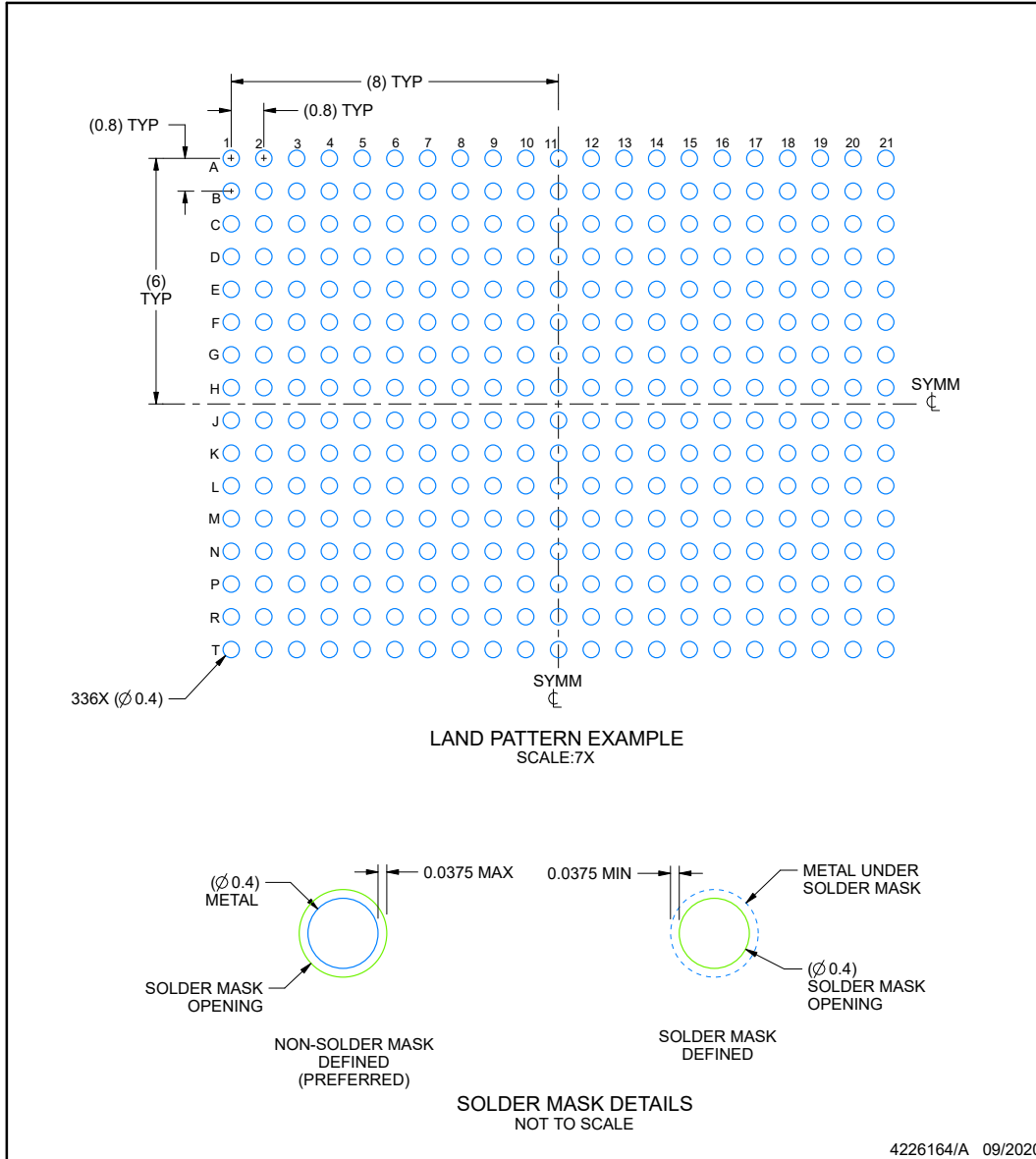
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

ZWX0336A

NFBGA - 1.53 mm max height

PLASTIC BALL GRID ARRAY



NOTES: (continued)

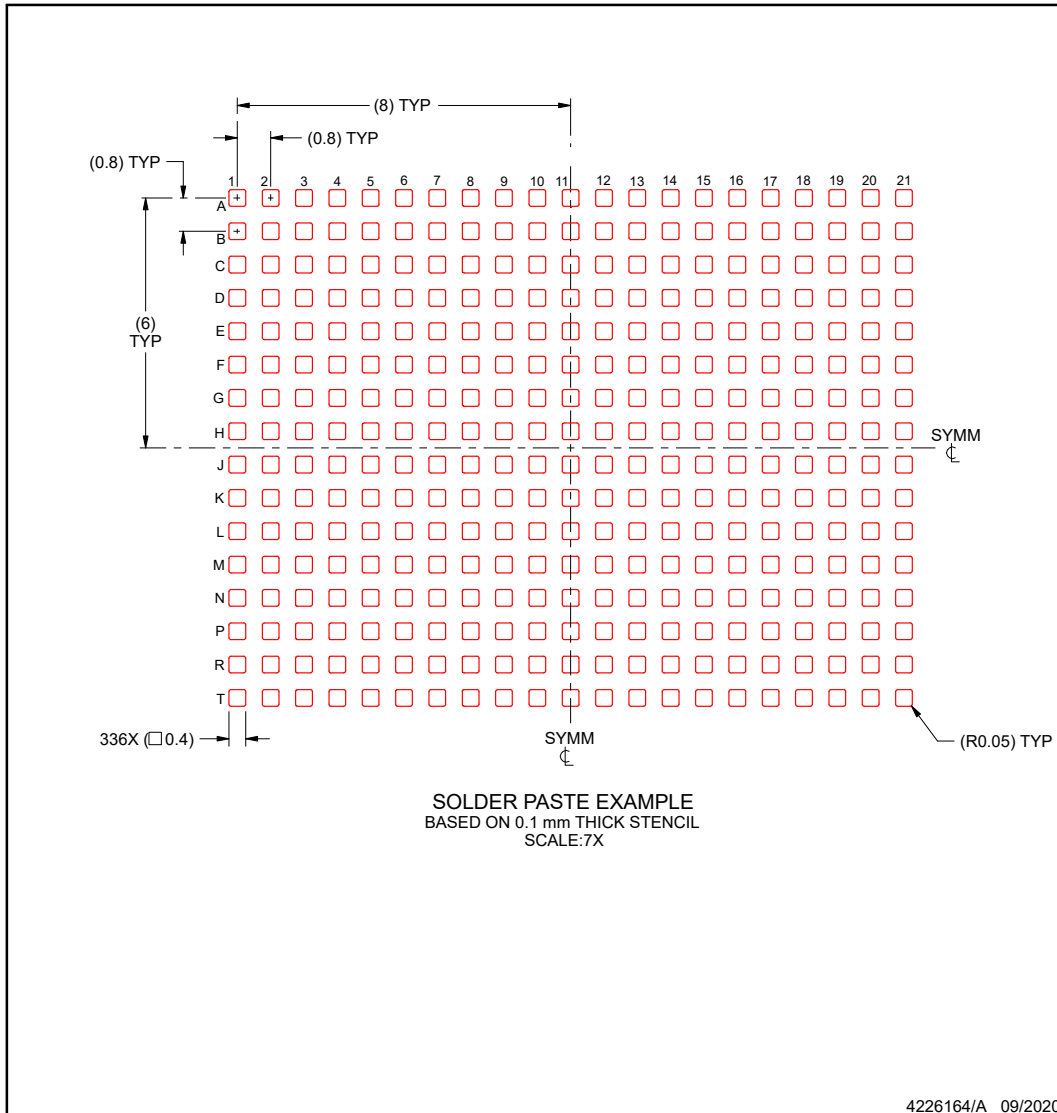
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For information, see Texas Instruments literature number SPRAA99 (www.ti.com/lit/spraa99).

EXAMPLE STENCIL DESIGN

ZWX0336A

NFBGA - 1.53 mm max height

PLASTIC BALL GRID ARRAY



NOTES: (continued)

- 4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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
DDC3256ZWX	ACTIVE	NFBGA	ZWX	336	108	RoHS & Green	SNAGCU	Level-3-260C-168 HR	0 to 70	DDC3256	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.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

重要声明和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做任何明示或暗示的担保，包括但不限于对适销性、某特定用途方面的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他功能安全、信息安全、监管或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的应用。严禁对这些资源进行其他复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。您应全额赔偿因在这些资源的使用中对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，TI 对此概不负责。

TI 提供的产品受 [TI 的销售条款](#) 或 [ti.com](#) 上其他适用条款/TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

邮寄地址：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

Copyright © 2023，德州仪器 (TI) 公司