

# 具有数字和模拟输出的 PGA900 可编程电阻式传感调节器

## 1 特性

- 高精度、低噪声、低功耗、小尺寸电阻式传感信号调节器
- 用户可编程的温度和非线性补偿
- 片上 ARM® Cortex®M0 微处理器允许用户开发和实现校准软件
- 单线制接口，可通过电源引脚进行通信，无需使用额外线路
- 片上电源管理，支持 3.3V 至 30V 较宽的电源电压范围
- 工作温度范围：-40°C 至 +150°C
- 存储器：
  - 8kB 软件存储器
  - 128 字节 EEPROM
  - 1kB 数据 SRAM
- 传感器灵敏度可调节范围：1mV/V 至 135mV/V
- 两个单独的模拟前端 (AFE) 链，每个链包括：
  - 低噪声可编程增益放大器
  - 24 位  $\Sigma$ - $\Delta$  模数转换器
- 内置有温度传感器，也可选择使用外部温度传感器
- 带有可编程增益放大器的 14 位 DAC
- 输出选项：
  - 比例电压输出和绝对电压输出
  - 4mA 至 20mA 电流回路接口
  - 基于电源线的单线制接口 (OWI)
  - PWM 输出
  - 串行外设接口 (SPI)
  - 内部集成电路 (I<sup>2</sup>C)
- 耗尽型 MOSFET 栅极驱动器
- 诊断功能

## 2 应用

- 压力传感发送器和变送器
- 液位计和流量计
- 体重秤、载荷计和应变计
- 热电偶、热敏电阻和两线制电阻温度计 (RTD)
- 电阻式现场变送器

## 3 说明

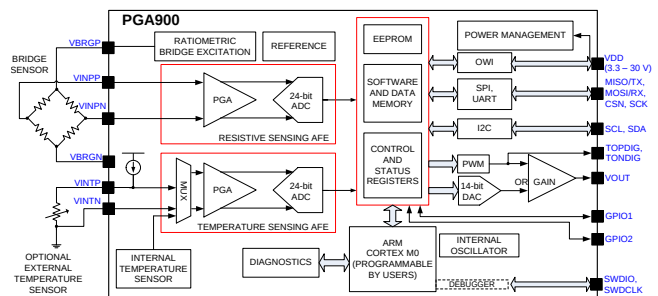
PGA900 是一款面向电阻式传感应用的信号调节器。该器件适用于多种检测元件类型。PGA900 通过两个模拟前端通道对其输入信号进行放大和数字化调节。通过片上 ARM Cortex M0 处理器中的用户可编程软件，PGA900 可以执行线性化、温度补偿及其他用户定义的补偿算法。经调节的信号可以三线制比例电压、绝对电压、二线制 4-20mA 电流回路或 PWM 的形式输出。该器件还可以通过 SPI、I<sup>2</sup>C、通用异步收发器 (UART) 和 2 个通用输入输出 (GPIO) 端口访问数据和配置寄存器。此外，凭借独特的 OWI，该器件可以通过电源引脚进行单线通信和配置，无需使用额外线路。PGA900 的工作电压范围为 3.3V 至 30V，工作温度范围为 -40°C 至 +150°C。

器件信息<sup>(1)</sup>

| 编号     | 封装         | 封装尺寸 (标称值)      |
|--------|------------|-----------------|
| PGA900 | VQFN (36)  | 6.00mm x 6.00mm |
|        | DSBGA (36) | 3.66mm x 3.66mm |

(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。

PGA900 简化方框图



## 4 器件和文档支持

### 4.1 文档支持

#### 4.1.1 相关文档

请参阅如下相关文档：

- 德州仪器 (TI), 《将 PGA900 用作容性负载驱动器》应用手册
- 德州仪器 (TI), 《将 PGA900 用作 4mA 至 20mA 电流回路变送器》应用手册
- 德州仪器 (TI), 《了解 PGA900 DAC 增益放大器的开环增益》应用手册
- 德州仪器 (TI), 《将 PGA900 仪表放大器连接到电阻式电桥传感器》应用手册
- 德州仪器 (TI), 《了解 PGA900 DAC 增益放大器的开环输出阻抗》应用手册
- 德州仪器 (TI), 《与 PGA900 相连的电阻式电桥压力传感器的系统噪声分析》应用手册
- 德州仪器 (TI), 《PGAxxxEVM-034 用户指南》
- 德州仪器 (TI), 《PGA900 软件用户指南》
- 德州仪器 (TI), 《PGA900 压力和温度传感器信号调节器用户指南》

### 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.cn](http://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。

### 4.3 社区资源

下列链接提供到 TI 社区资源的连接。链接的内容由各个分销商“按照原样”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》。

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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.

### 4.4 商标

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### 4.5 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

### 4.6 术语表

**SLYZ022** — TI 术语表。

这份术语表列出并解释术语、缩写和定义。

## 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<br>(1) | Material type<br>(2) | Package   Pins   | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|-----------------------------|---------------|----------------------|------------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">PGA900ARHHR</a> | Active        | Production           | VQFN (RHH)   36  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| PGA900ARHHR.A               | Active        | Production           | VQFN (RHH)   36  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| PGA900ARHHRG4               | Active        | Production           | VQFN (RHH)   36  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| PGA900ARHHRG4.A             | Active        | Production           | VQFN (RHH)   36  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| <a href="#">PGA900ARHHT</a> | Active        | Production           | VQFN (RHH)   36  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| PGA900ARHHT.A               | Active        | Production           | VQFN (RHH)   36  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>RHH      |
| <a href="#">PGA900AYZSR</a> | Active        | Production           | DSBGA (YZS)   36 | 1500   LARGE T&R      | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>YZS      |
| PGA900AYZSR.A               | Active        | Production           | DSBGA (YZS)   36 | 1500   LARGE T&R      | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>YZS      |
| <a href="#">PGA900AYZST</a> | Active        | Production           | DSBGA (YZS)   36 | 250   SMALL T&R       | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>YZS      |
| PGA900AYZST.A               | Active        | Production           | DSBGA (YZS)   36 | 250   SMALL T&R       | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 150   | PGA900A<br>YZS      |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **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.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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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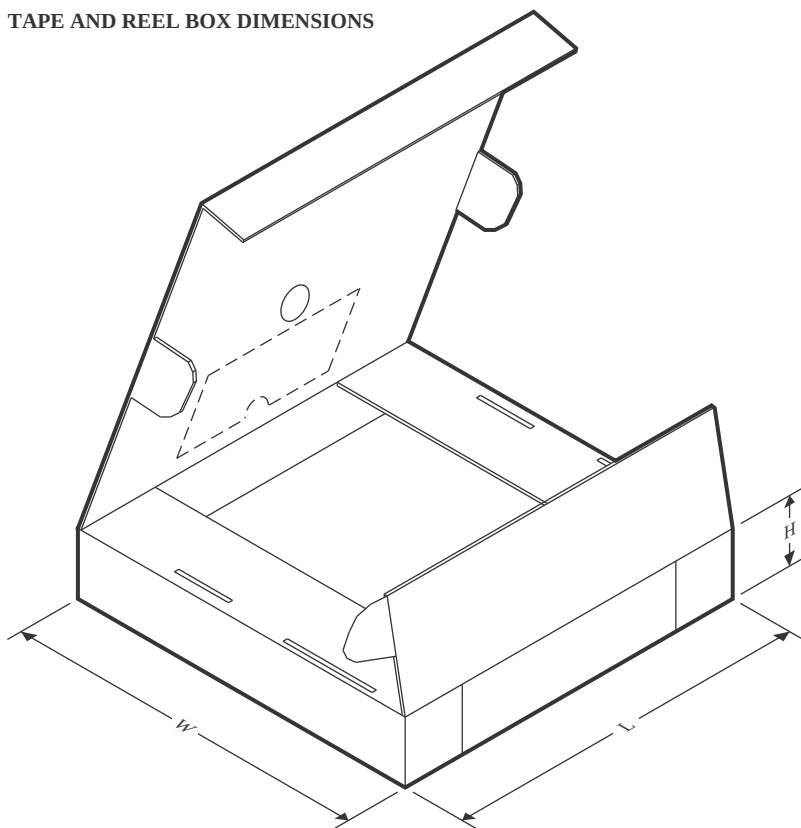
## TAPE AND REEL INFORMATION



\*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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| PGA900ARHHR   | VQFN         | RHH             | 36   | 2500 | 330.0              | 16.4               | 6.3     | 6.3     | 1.1     | 12.0    | 16.0   | Q2            |
| PGA900ARHHRG4 | VQFN         | RHH             | 36   | 2500 | 330.0              | 16.4               | 6.3     | 6.3     | 1.1     | 12.0    | 16.0   | Q2            |
| PGA900ARHHT   | VQFN         | RHH             | 36   | 250  | 180.0              | 16.4               | 6.3     | 6.3     | 1.1     | 12.0    | 16.0   | Q2            |
| PGA900AYZSR   | DSBGA        | YZS             | 36   | 1500 | 180.0              | 12.4               | 3.79    | 3.79    | 0.71    | 8.0     | 12.0   | Q1            |
| PGA900AYZST   | DSBGA        | YZS             | 36   | 250  | 180.0              | 12.4               | 3.79    | 3.79    | 0.71    | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device        | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| PGA900ARHHR   | VQFN         | RHH             | 36   | 2500 | 367.0       | 367.0      | 38.0        |
| PGA900ARHHRG4 | VQFN         | RHH             | 36   | 2500 | 367.0       | 367.0      | 38.0        |
| PGA900ARHHT   | VQFN         | RHH             | 36   | 250  | 182.0       | 182.0      | 20.0        |
| PGA900AYZSR   | DSBGA        | YZS             | 36   | 1500 | 182.0       | 182.0      | 20.0        |
| PGA900AYZST   | DSBGA        | YZS             | 36   | 250  | 182.0       | 182.0      | 20.0        |

## GENERIC PACKAGE VIEW

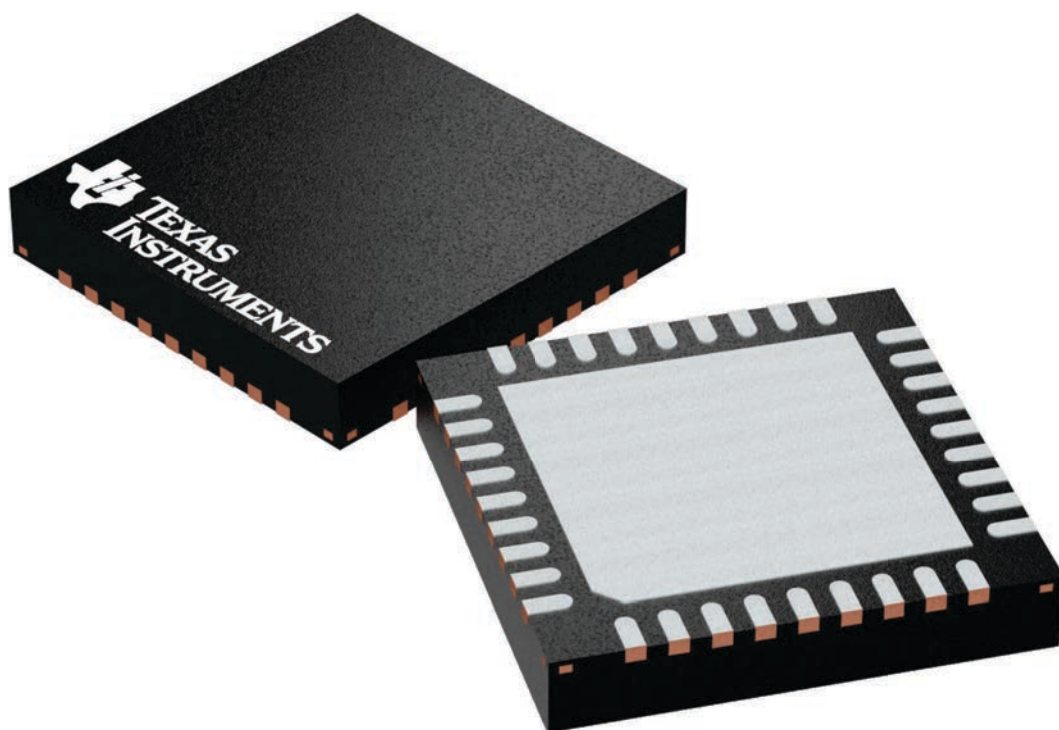
**RHH 36**

**VQFN - 1 mm max height**

6 x 6, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

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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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.

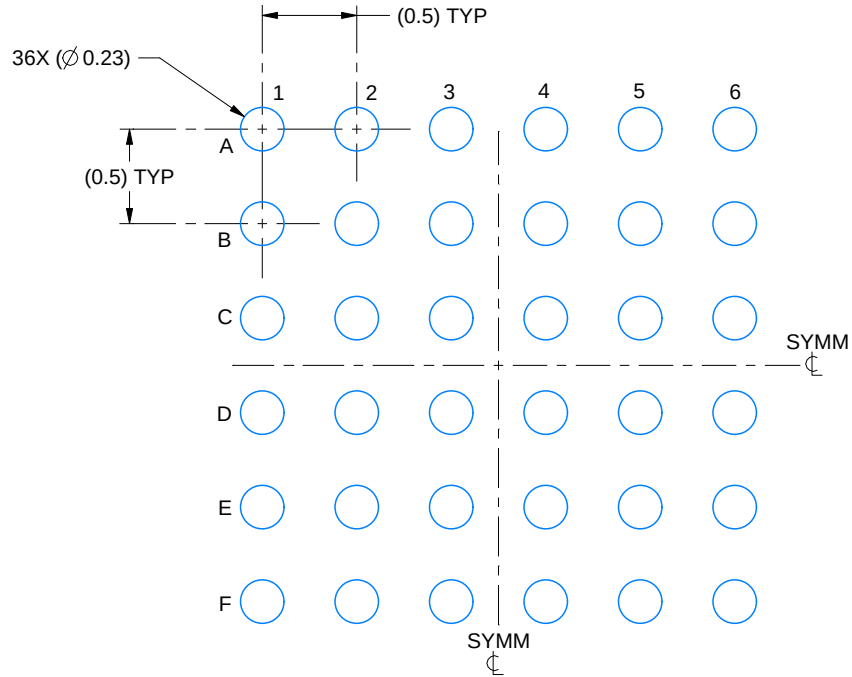


# EXAMPLE BOARD LAYOUT

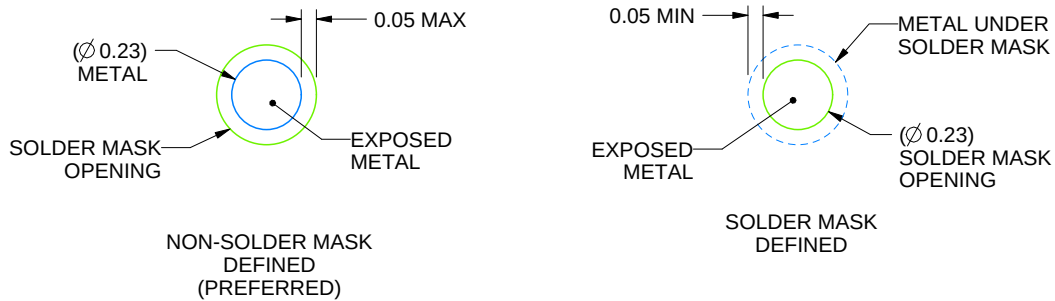
YZS0036

DSBGA - 0.625 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 25X

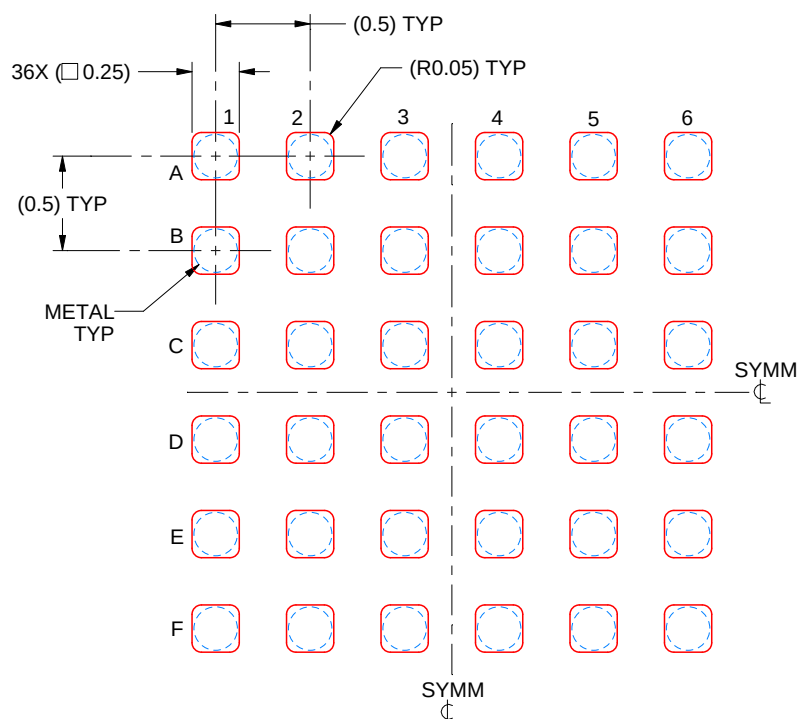


SOLDER MASK DETAILS  
NOT TO SCALE

4219444/A 02/2018

NOTES: (continued)

- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. See Texas Instruments Literature No. SNVA009 ([www.ti.com/lit/snva009](http://www.ti.com/lit/snva009)).



SOLDER PASTE EXAMPLE  
 BASED ON 0.1 mm THICK STENCIL  
 SCALE: 25X

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NOTES: (continued)

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

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