PGA300 Signal Conditioner and Transmitter for Pressure Sensors

1 Features

- Analog features:
  - Analog front-end for resistive bridge sensors
  - Accommodates sensor sensitivities from 1mV/V to 135mV/V
  - On-chip temperature sensor
  - Programmable gain
  - 16-bit sigma-delta analog-to-digital converter for signal channel
  - 16-bit sigma-delta analog-to-digital converter for temperature channel
  - 14-bit output DAC
- Digital features:
  - <0.1% FSO accuracy across temperature
  - System response time: <220µs
  - Third-order temperature and nonlinearity compensation
  - Diagnostic functions
  - Integrated EEPROM for device operation, calibration data, and user data
- Peripheral features:
  - One-wire interface enables communication through the power-supply pin
  - Current-loop output: 4mA to 20mA
  - Ratiometric and absolute voltage output
- Power supply:
  - On-chip power management accepts wide power-supply voltage from 3.3V to 30V
  - Integrated reverse voltage protection circuit
- Industrial temperature range: –40°C to +150°C

2 Applications

- Pressure transmitters
- Temperature transmitters
- Flow transmitters
- Level transmitters

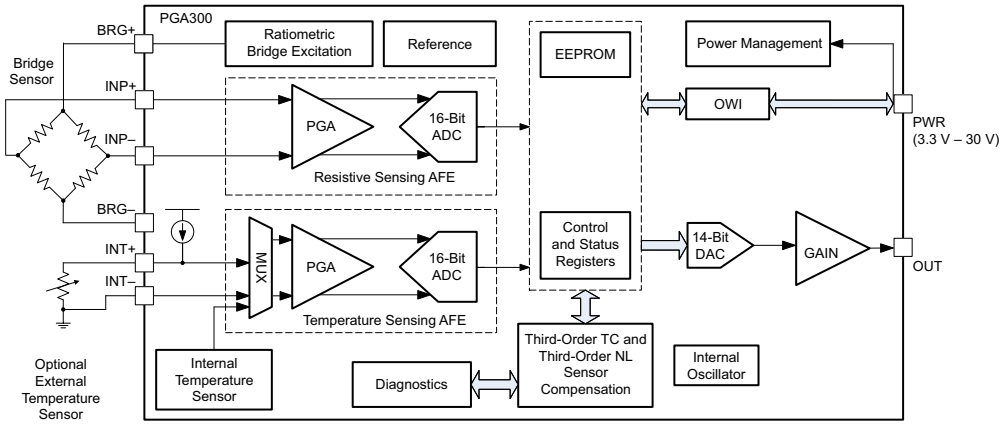
3 Description

The PGA300 provides an interface for piezoresistive and strain-gauge pressure-sense elements. The device is a full system-on-chip (SoC) solution that incorporates a programmable analog front-end (AFE), ADC, and digital signal processing that enable direct connection to the sense element. Further, the PGA300 includes integrated voltage regulators and an oscillator, thus minimizing the number of external components. The device achieves high accuracy by employing third-order temperature and nonlinearity compensation. External communication is achieved by using a one-wire serial interface (OWI) through the power-supply pin to simplify the system calibration process. An Integrated DAC supports absolute-voltage, ratiometric-voltage, and 4mA to 20mA current-loop outputs.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)
PGA300	RHH (VQFN, 36)	6mm × 6mm

(1) For more information, see the *Mechanical, Packaging, and Orderable Information* .
(2) The package size (length × width) is a nominal value and includes pins, where applicable.



PGA300 Simplified Block Diagram

4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, *PGA900 DAC Output Stability* application note
- Texas Instruments, *PGA900 as a 4- to 20-mA Current Loop Transmitter* application note
- Texas Instruments, *Understanding Open Loop Gain of the PGA900 DAC Gain Amplifier* application note
- Texas Instruments, *Understanding Open Loop Output Impedance of the PGA900 DAC Gain Amplifier* application note

4.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.3 Support Resources

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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4.4 Trademarks

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4.5 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

4.6 Glossary

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

5 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 device. This data is subject to change without notice and without revision of this document. For browser-based versions of this data sheet, see the left-hand navigation pane.

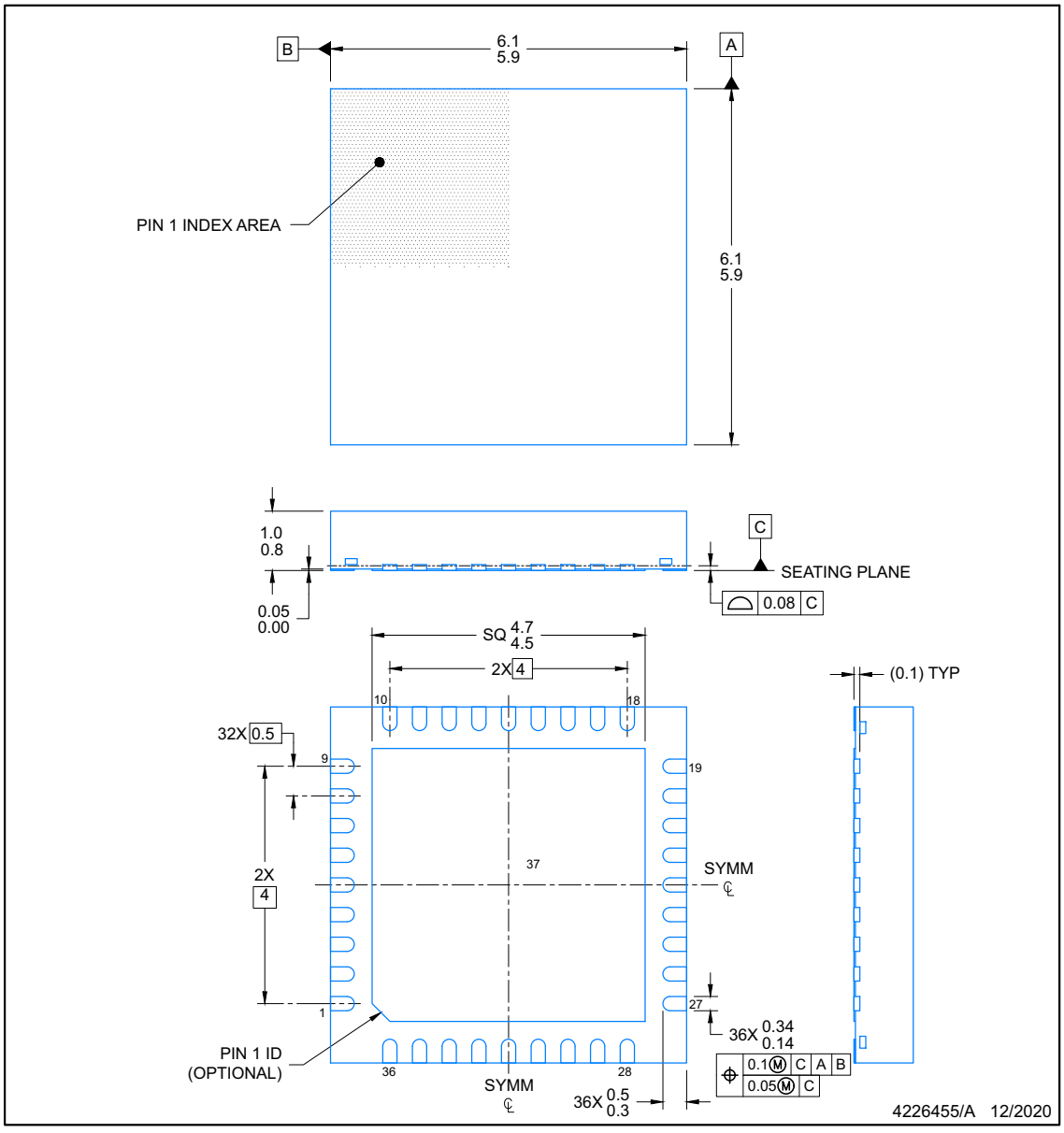
5.1 Mechanical Data

RHH0036G

PACKAGE OUTLINE

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK-NO LEAD



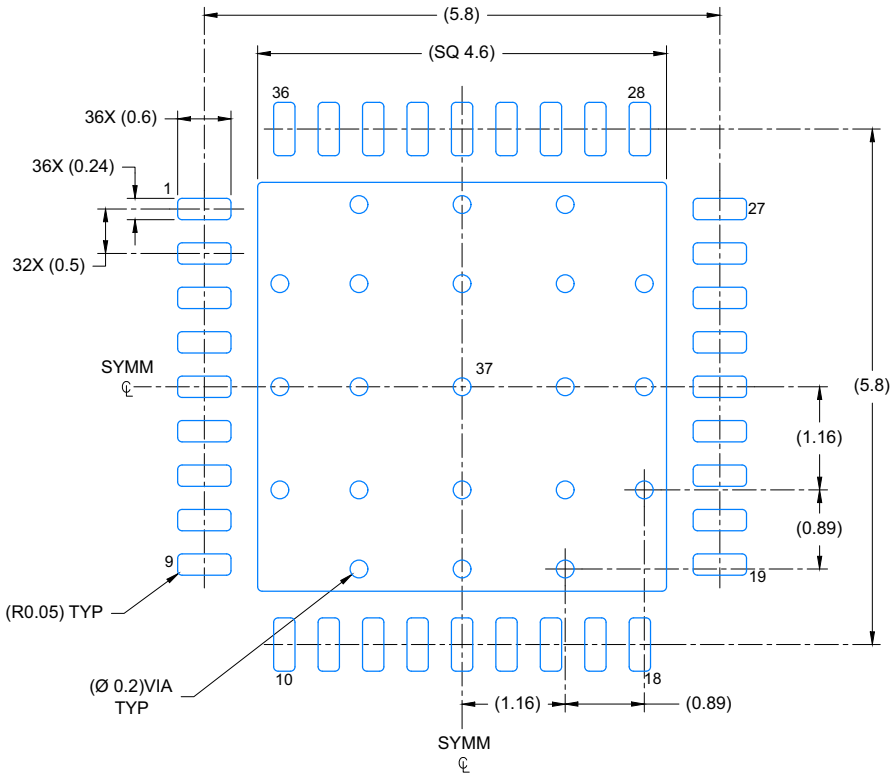
NOTES:

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. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.

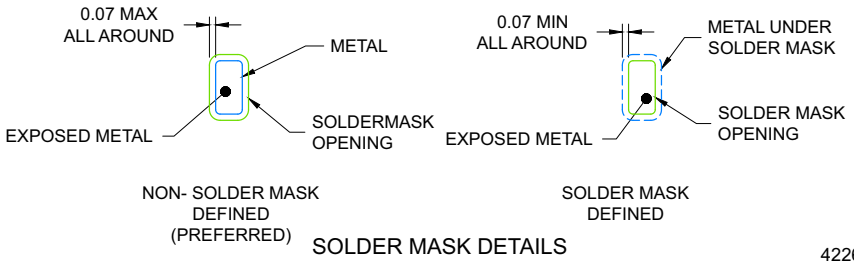
EXAMPLE BOARD LAYOUT

RHH0036G — **VQFN - 1 mm max height**

PLASTIC QUAD FLATPACK-NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 14X



SOLDER MASK DETAILS

4226455/A 12/2020

NOTES: (continued)

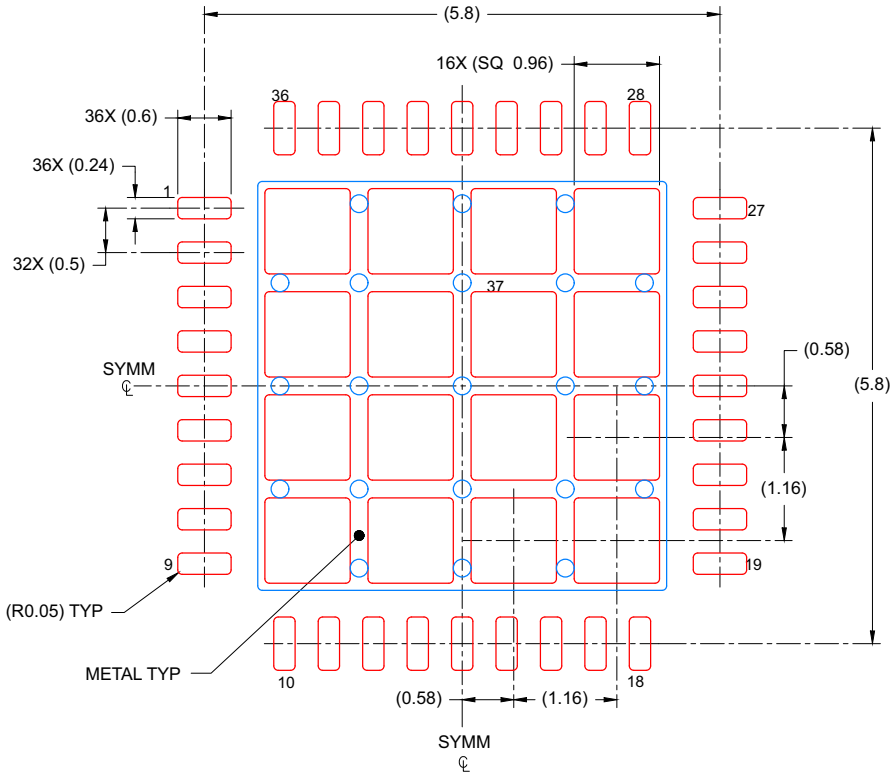
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271) .
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

EXAMPLE STENCIL DESIGN

RHH0036G

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK-NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
70% PRINTED COVERAGE BY AREA
SCALE: 14X

4226455/A 12/2020

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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
PGA300ARHHR	ACTIVE	VQFN	RHH	36	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 150	PGA300A RHH	Samples
PGA300ARHHT	ACTIVE	VQFN	RHH	36	250	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 150	PGA300A RHH	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.
OBSOLETE: 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.

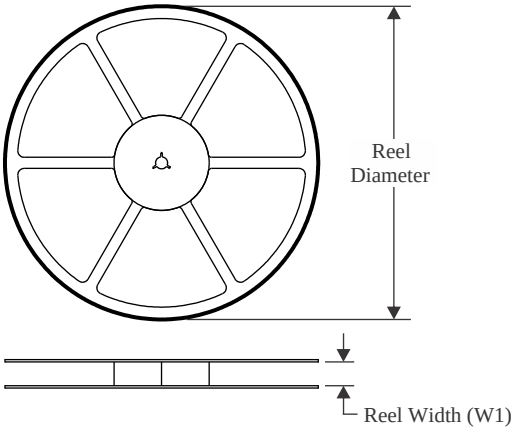
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(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.

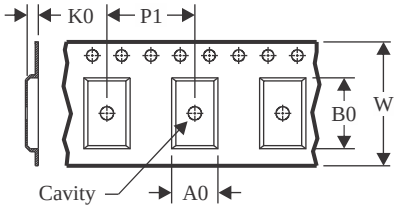
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

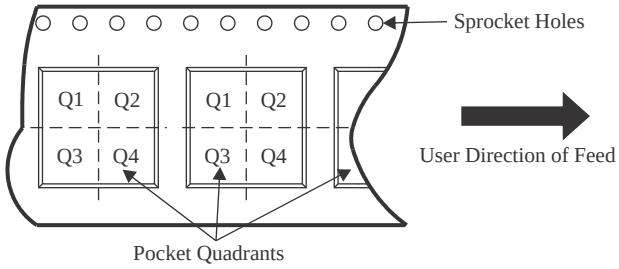


TAPE DIMENSIONS



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

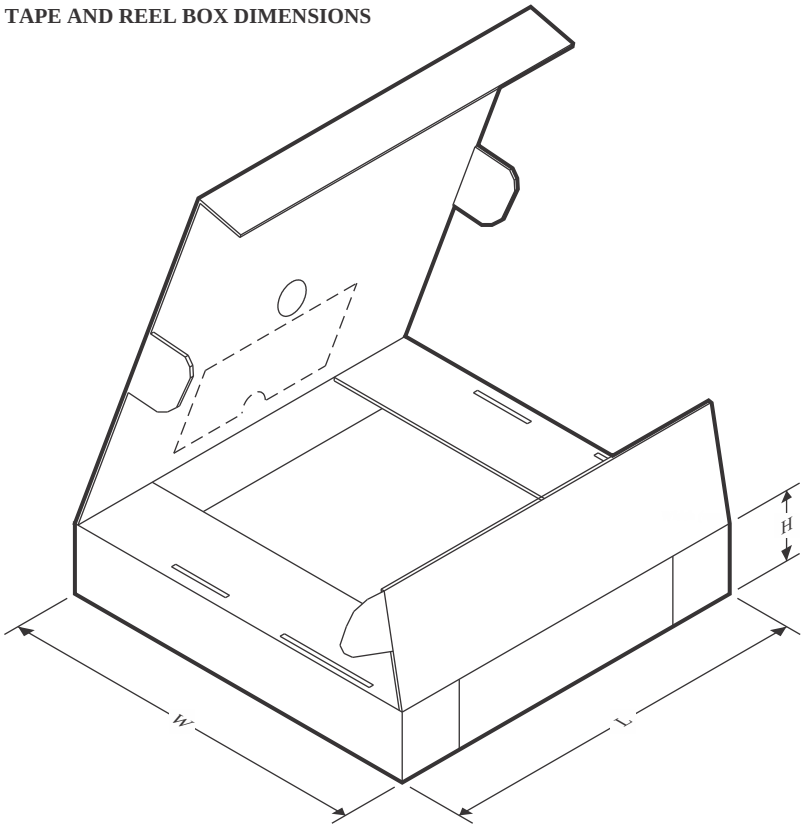
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
PGA300ARHHR	VQFN	RHH	36	2500	330.0	16.4	6.3	6.3	1.1	12.0	16.0	Q2
PGA300ARHHT	VQFN	RHH	36	250	180.0	16.4	6.3	6.3	1.1	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)
PGA300ARHHR	VQFN	RHH	36	2500	367.0	367.0	38.0
PGA300ARHHT	VQFN	RHH	36	250	210.0	185.0	35.0

GENERIC PACKAGE VIEW

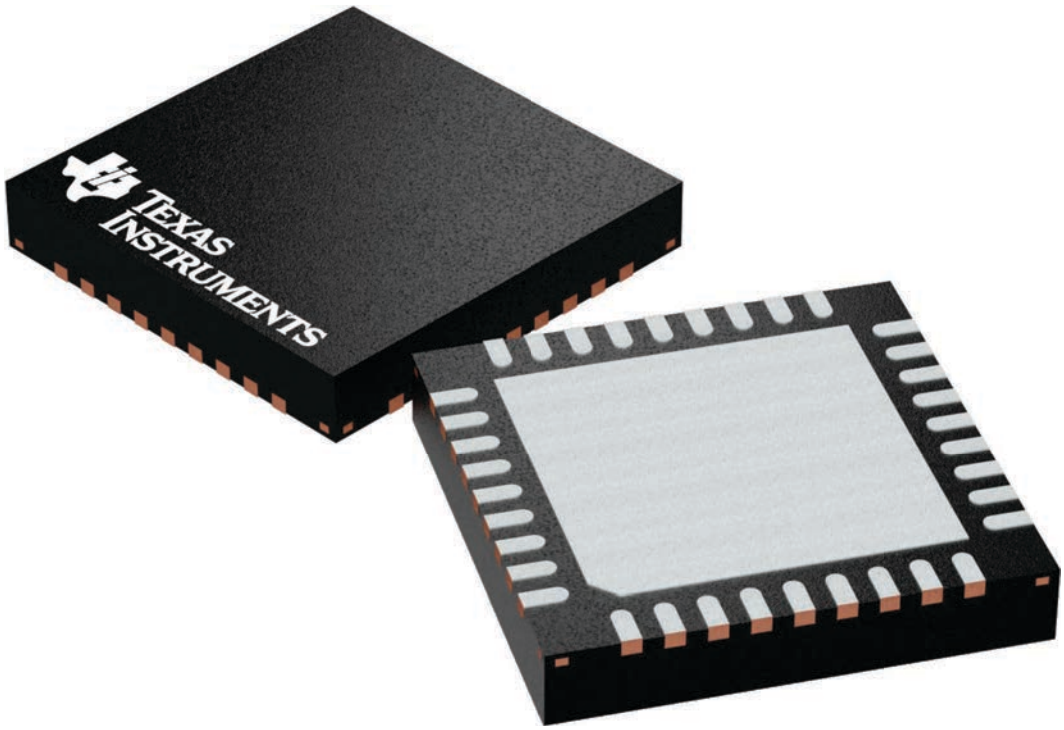
RHH 36

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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