DAC874xH, HART and FOUNDATION Fieldbus / PROFIBUS PA Modems

1 Features

- HART-Compliant Physical Layer Modem
  - 1200/2200 Hz HART FSK Sinusoids
  - Register Programmable Amplitude of TX Signals (DAC8741H / DAC8742H only)
  - Integrated RX Demodulator and Band-Pass Filter with Minimal External Components
- Foundation Fieldbus Compliant H1 Controller and Medium Attachment Unit (MAU)
  - 31.25 kbit/s Communication Based on Manchester Coded Bus Powered (MBP)
  - Integrated Manchester Encoder and Decoder
  - Compliant with PROFIBUS PA
- Low Quiescent Current: 200 uA Max
- Integrated 1.5 V Reference
- Flexible Clocking Options
  - External Crystal Oscillator
  - External CMOS Clock
- Digital Interface
  - DAC8740H: UART
  - DAC8741H: SPI
  - DAC8742H: UART and SPI
- Reliability: CRC Bit Error Checking, Watchdog Timer (DAC8741H and DAC8742H only)
- Wide Operating Temperature: –55°C to 125°C
- 4 mm x 4 mm QFN and 5 mm x 5 mm TQFP Packages

2 Applications

- Industrial Process Control and Automation
- PLC or DCS I/O Modules
- Field and Sensor Transmitters

3 Description

The DAC8740H, DAC8741H, and DAC8742H are HART®, FOUNDATION Fieldbus™, and PROFIBUS PA compliant low power modems designed for industrial process control and industrial automation applications.

In HART mode, the DAC874xH integrates all of the required circuitry to operate as half-duplex HART physical layer modems, in either slave or master configurations with minimal external components for filtering. In FOUNDATION Fieldbus mode, the DAC874xH integrates all of the required circuitry to operate as half-duplex FOUNDATION Fieldbus compliant H1 Controllers and MAUs.

The HART, FOUNDATION Fieldbus, or PROFIBUS PA, data stream can be transferred from the microcontroller through either a UART interface or an integrated FIFO accessed by a SPI interface. The SPI interface includes an SDO pin for daisy-chain support, various interrupts, and other extended features.

The devices operate from a supply of 2.7V to 5.5V while consuming only 200 uA, making them an excellent choice for loop-powered or 2-wire applications. They operate from –55°C to 125°C and are available in 24-lead VQFN and 32-lead TQFP packages.

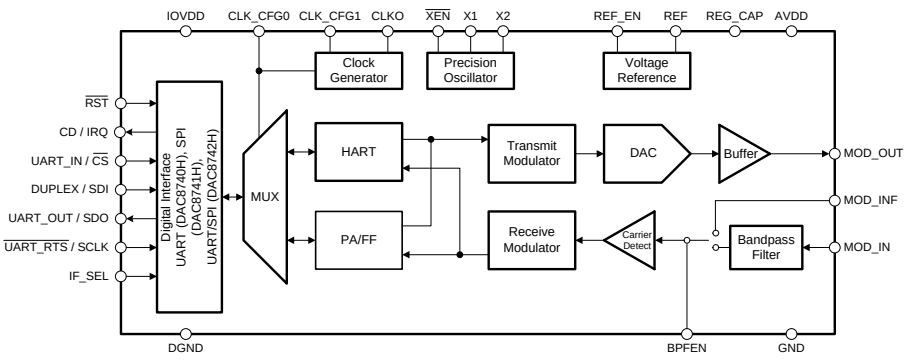
Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
DAC8740H	VQFN (24)	4 mm × 4 mm
DAC8741H	VQFN (24)	4 mm × 4 mm
DAC8742H	TQFP (32)	5 mm × 5 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

ADVANCE INFORMATION

Simplified Schematic



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An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. ADVANCE INFORMATION for pre-production products; subject to change without notice.

4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following: DAC8742H Evaluation Module User's Guide (SLAU700)

4.2 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 1. Related Links

PARTS	PRODUCT FOLDER	ORDER NOW	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
DAC8740H	Click here	Click here	Click here	Click here	Click here
DAC8741H	Click here	Click here	Click here	Click here	Click here
DAC8742H	Click here	Click here	Click here	Click here	Click here

4.3 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* 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.

4.4 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

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

4.5 Trademarks

E2E is a trademark of Texas Instruments.
FOUNDATION Fieldbus is a trademark of FieldComm Group.
HART is a registered trademark of FieldComm Group.
All other trademarks are the property of their respective owners.

4.6 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.

4.7 Glossary

SLYZ022 — *TI Glossary*.

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

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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 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.

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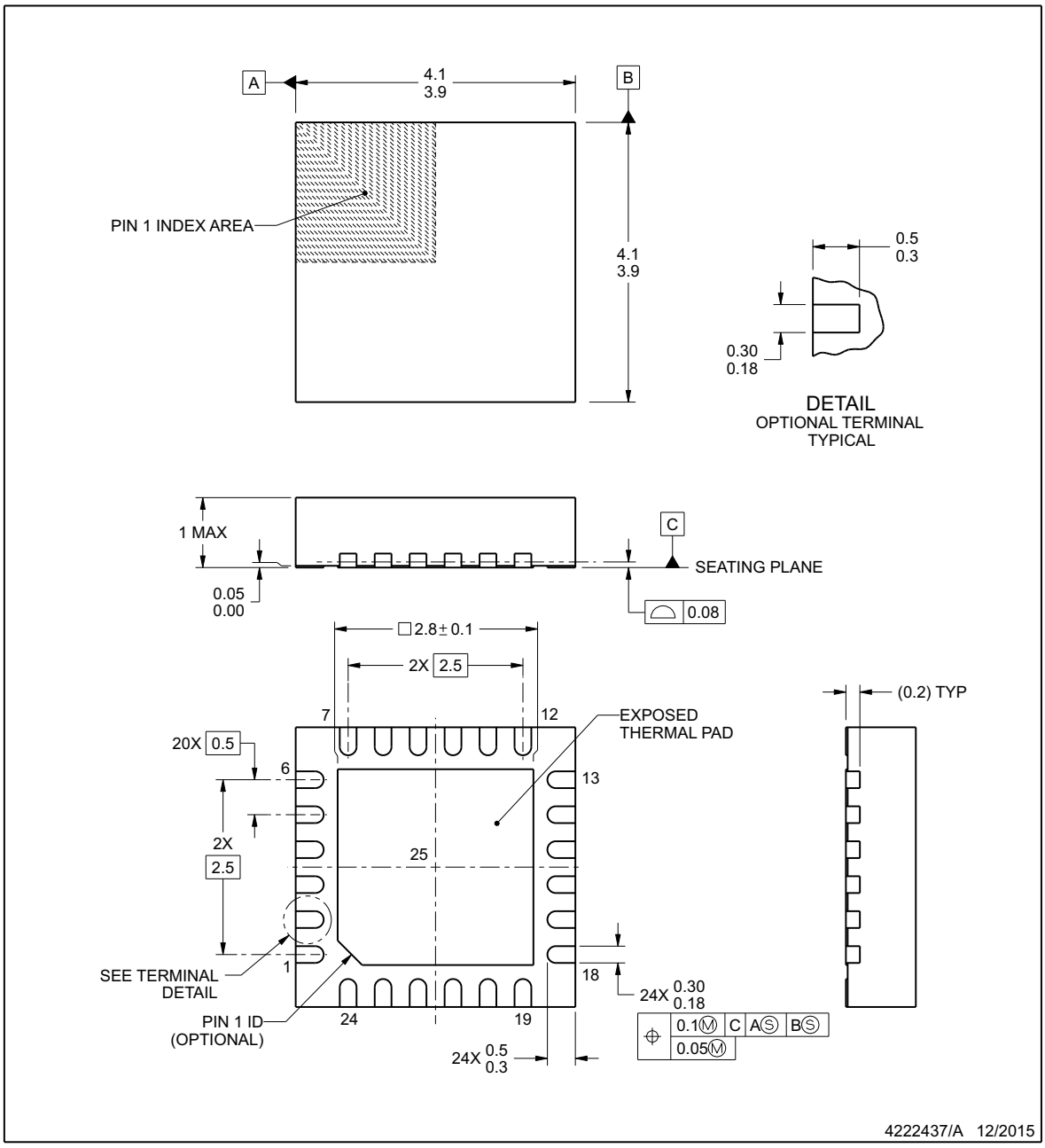
ADVANCE INFORMATION

RGE0024F

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 thermal and mechanical performance.
4. Reference JEDEC registration MO-220.

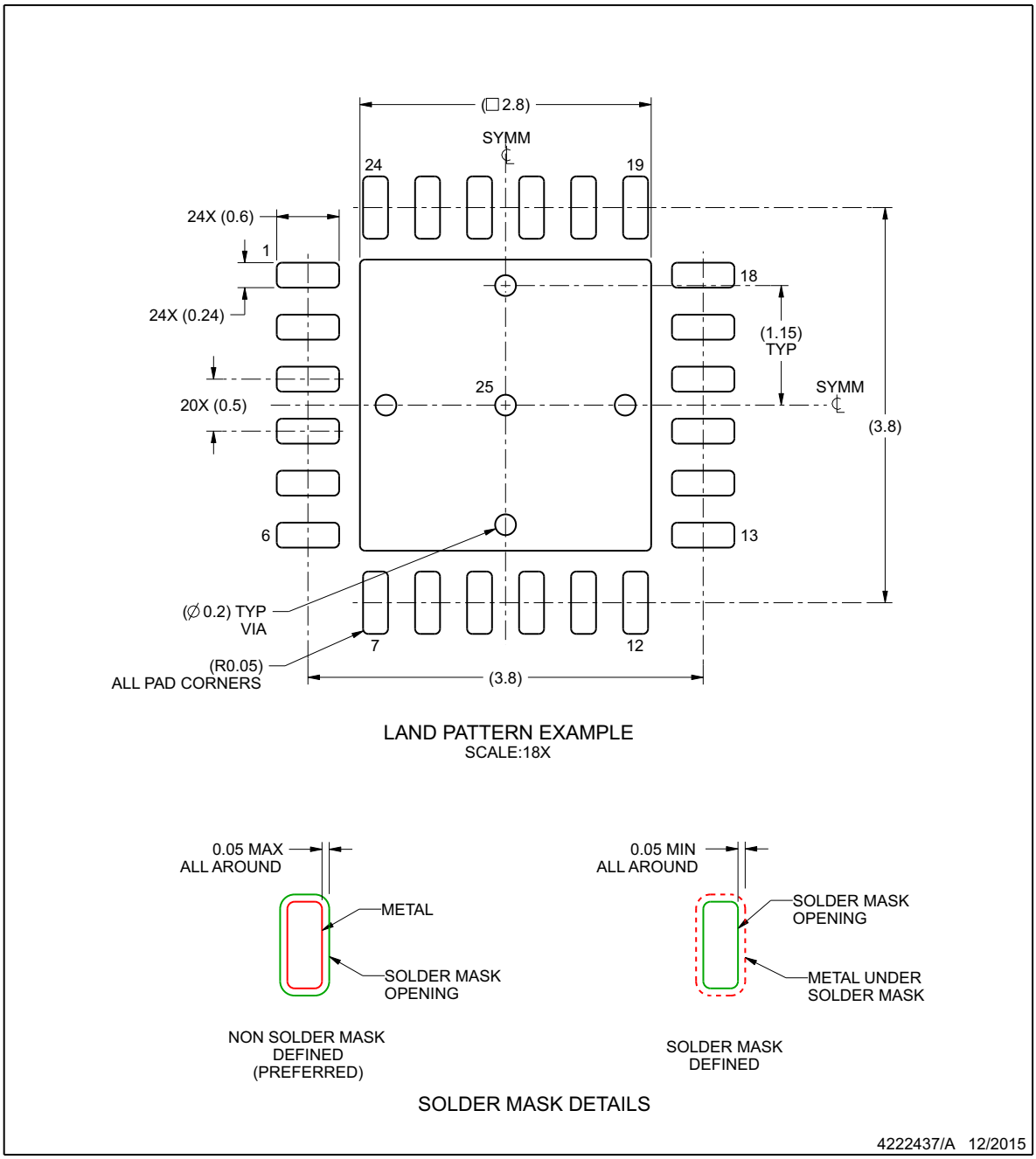
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EXAMPLE BOARD LAYOUT

RGE0024F

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



NOTES: (continued)

5. 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).
6. Vias are optional depending on application, refer to device data sheet. If some or all are implemented, recommended via locations are shown.

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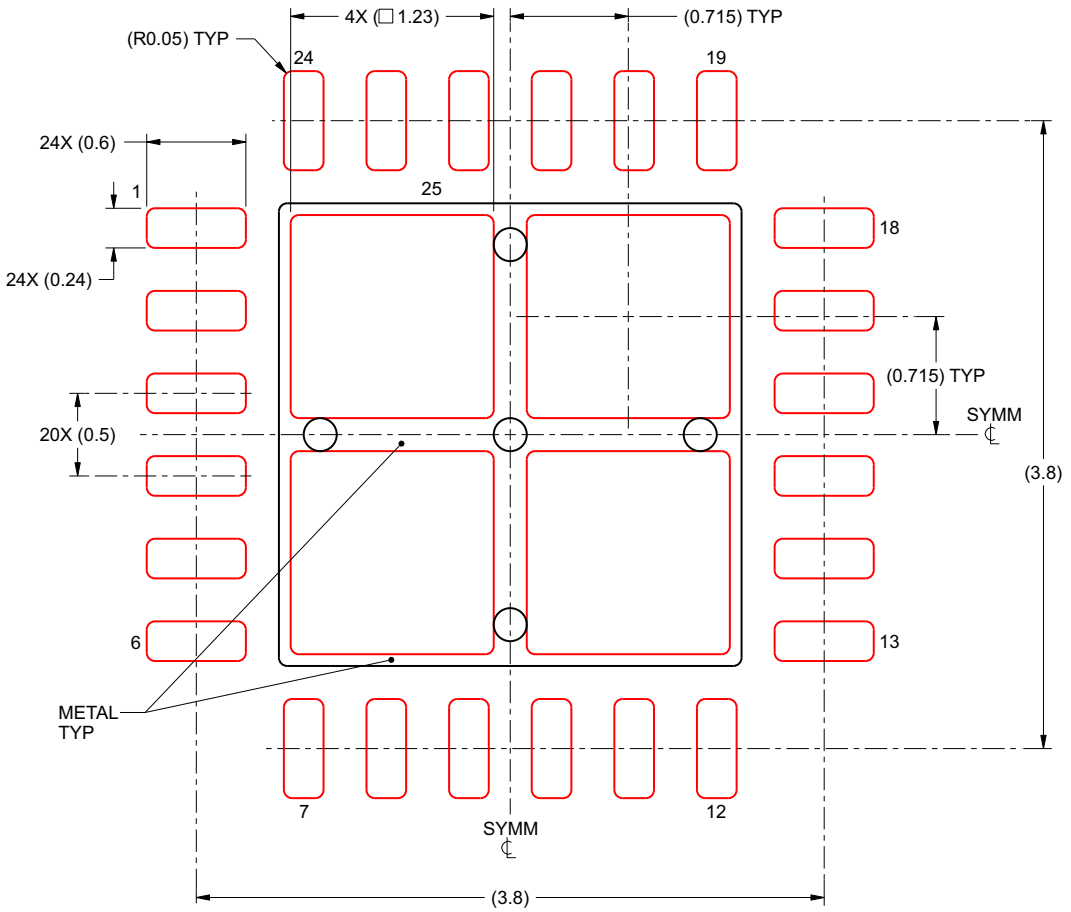
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ADVANCE INFORMATION

EXAMPLE STENCIL DESIGN

RGE0024F — **VQFN - 1 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 25:
77% PRINTED SOLDER COVERAGE BY AREA
SCALE:25X

4222437/A 12/2015

NOTES: (continued)

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

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DAC8740HRGER	PREVIEW	VQFN	RGE	24	3000	TBD	Call TI	Call TI	-55 to 125		
DAC8740HRGET	PREVIEW	VQFN	RGE	24	250	TBD	Call TI	Call TI	-55 to 125	DAC 8740H	
DAC8742HPBS	PREVIEW	TQFP	PBS	32	250	TBD	Call TI	Call TI	-55 to 125	8742H	
DAC8742HPBSR	PREVIEW	TQFP	PBS	32	1000	TBD	Call TI	Call TI	-55 to 125		
XDAC8740HRGET	ACTIVE	VQFN	RGE	24	250	TBD	Call TI	Call TI	-55 to 125		Samples
XDAC8742HPBST	ACTIVE	TQFP	PBS	32	250	TBD	Call TI	Call TI	-55 to 125		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.

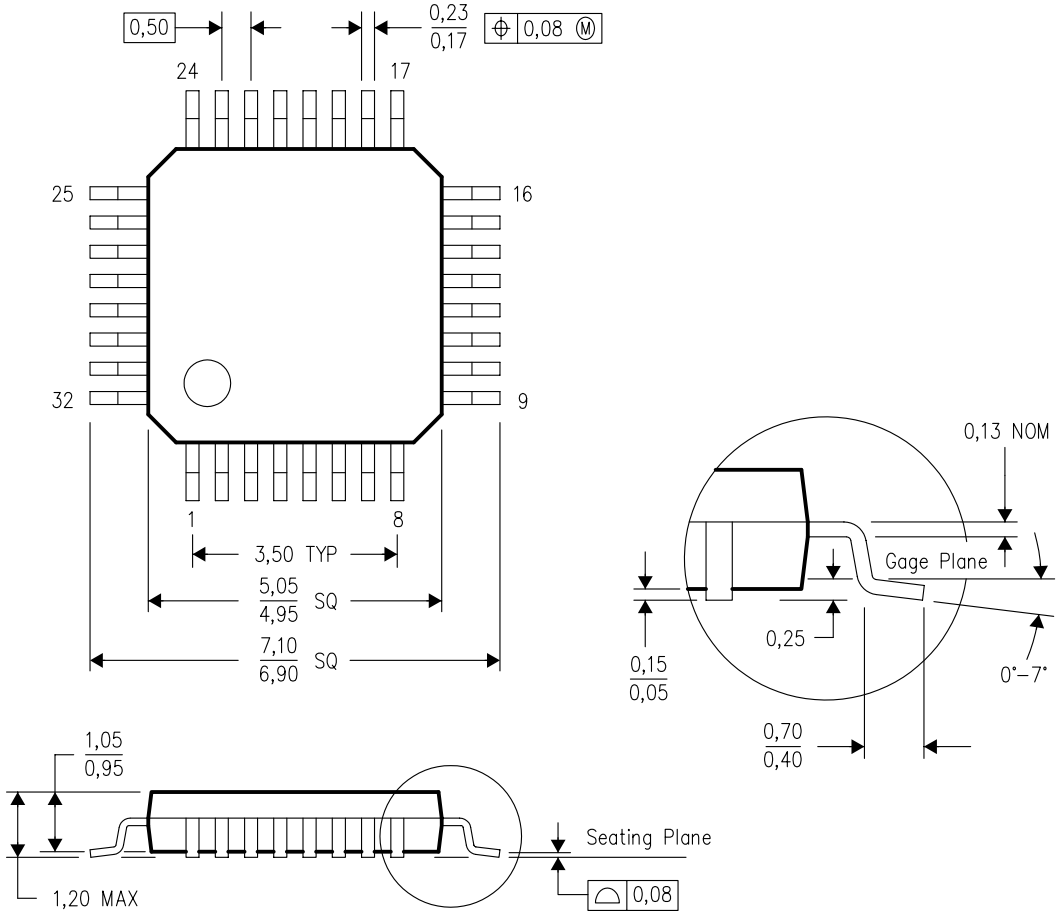
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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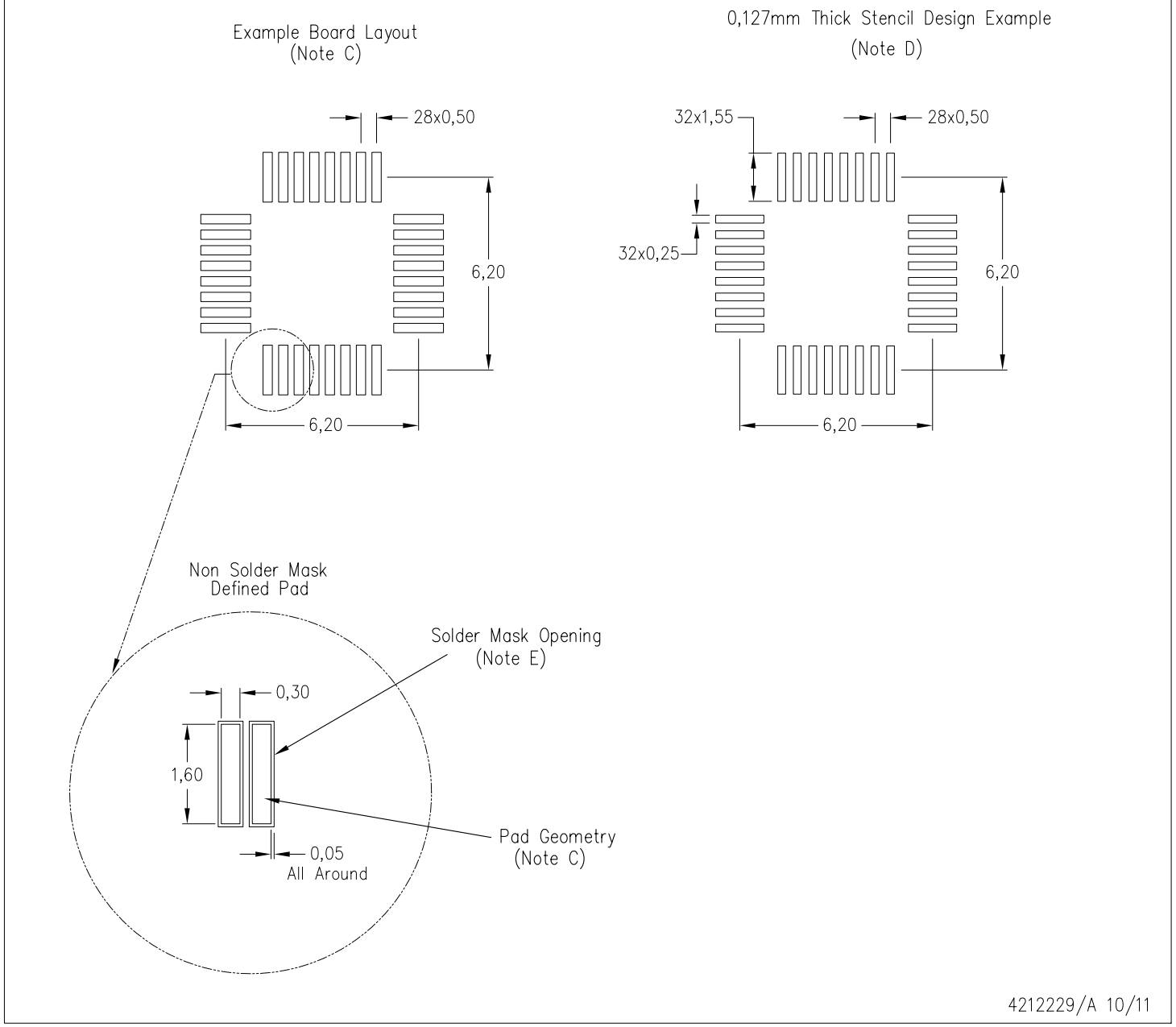
PBS (S–PQFP–G32) PLASTIC QUAD FLATPACK



4087735/B 07/05

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.

PBS (S–PQFP–G32) PLASTIC QUAD FLATPACK



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
E. Customers should contact their board fabrication site for recommended solder mask tolerances between and around signal pads.

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