

Highly Integrated Wireless Receiver Qi (WPC V1.1) Compliant Power Supply

Check for Samples: [bq51013B](#)

FEATURES

- **Integrated Wireless Power Supply Receiver Solution**
 - 93% Overall Peak AC-DC Efficiency
 - Full Synchronous Rectifier
 - WPC v1.1 Compliant Communication Control
 - Output Voltage Conditioning
 - Only IC Required Between RX coil and Output
- **WPC v1.1 Compliant (FOD Enabled) Highly Accurate Current Sense**
- **Dynamic Rectifier Control for Improved Load Transient Response**
- **Dynamic Efficiency Scaling for Optimized Performance Over wide Range of Output Power**
- **Adaptive Communication Limit for Robust Communication**
- **Supports 20-V Maximum Input**
- **Low-power Dissipative Rectifier Overvoltage Clamp ($V_{OVP} = 15V$)**
- **Thermal Shutdown**
- **Multifunction NTC and Control Pin for Temperature Monitoring, Charge Complete and Fault Host Control**
- **1.9 x 3mm DSBGA or 4.5 x 3.5mm QFN Package**

APPLICATIONS

- **WPC Compliant Receivers**
- **Cell Phones, Smart Phones**
- **Headsets**
- **Digital Cameras**
- **Portable Media Players**
- **Hand-held Devices**

DESCRIPTION

The bq5101xB is a family of advanced, flexible, secondary-side devices for wireless power transfer in portable applications. The bq5101xB devices provide the AC/DC power conversion and regulation while integrating the digital control required to comply with the Qi v1.1 communication protocol. Together with the bq50xxx primary-side controller, the bq5101xB enables a complete contact-less power transfer system for a wireless power supply solution. Global feedback is established from the secondary to the primary in order to control the power transfer process utilizing the Qi v1.1 protocol.

The bq5101xB devices integrate a low resistance synchronous rectifier, low-dropout regulator, digital control, and accurate voltage and current loops to ensure high efficiency and low power dissipation.

The bq5101xB also includes a digital controller that can calculate the amount of power received by the mobile device within the limits set by the WPC v1.1 standard. The controller will then communicate this information to the transmitter in order to allow the transmitter to determine if a foreign object is present within the magnetic interface and introduces a higher level of safety within magnetic field. This Foreign Object Detection (FOD) method is part of the new requirements under the WPC v1.1 specification.

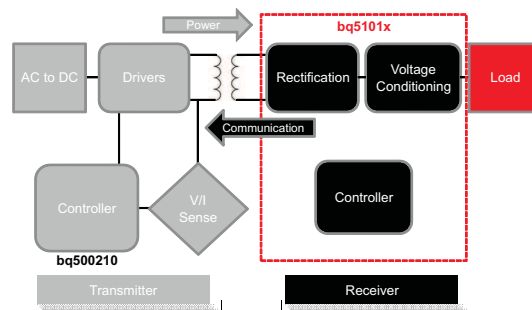


Figure 1. Wireless Power Consortium (WPC or Qi) Inductive Power System



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
BQ51013BRHLR	ACTIVE	QFN	RHL	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR		BQ51013B	Samples
BQ51013BRHLT	ACTIVE	QFN	RHL	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR		BQ51013B	Samples
BQ51013BYFPR	ACTIVE	DSBGA	YFP	28	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM		BQ51013B	Samples
BQ51013BYFPT	ACTIVE	DSBGA	YFP	28	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM		BQ51013B	Samples
HPA02221RHLR	ACTIVE	QFN	RHL	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR			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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Only one of markings shown within the brackets will appear on the physical device.

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TAPE AND REEL INFORMATION



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
BQ51013BRHLR	QFN	RHL	20	3000	330.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1
BQ51013BRHLT	QFN	RHL	20	250	180.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1
BQ51013BYFPR	DSBGA	YFP	28	3000	180.0	8.4	2.0	3.13	0.6	4.0	8.0	Q1
BQ51013BYFPT	DSBGA	YFP	28	250	180.0	8.4	2.0	3.13	0.6	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



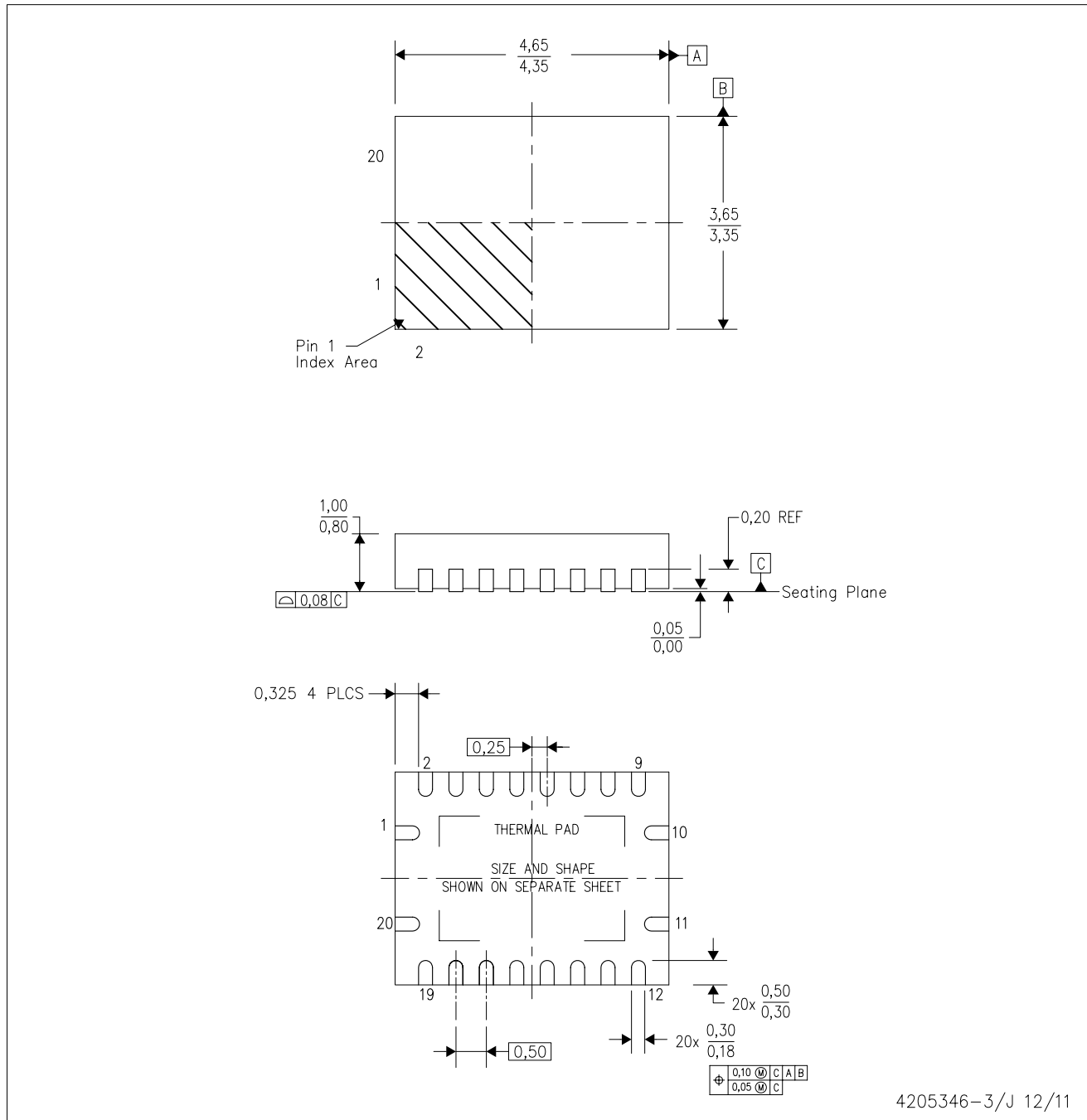
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
BQ51013BRHLR	QFN	RHL	20	3000	367.0	367.0	35.0
BQ51013BRHLT	QFN	RHL	20	250	210.0	185.0	35.0
BQ51013BYFPR	DSBGA	YFP	28	3000	210.0	185.0	35.0
BQ51013BYFPT	DSBGA	YFP	28	250	210.0	185.0	35.0

MECHANICAL DATA

RHL (R-PVQFN-N20)

PLASTIC QUAD FLATPACK NO-LEAD



4205346-3/J 12/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. QFN (Quad Flatpack No-Lead) Package configuration.
 - D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
 - E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

THERMAL PAD MECHANICAL DATA

RHL (S-PVQFN-N20)

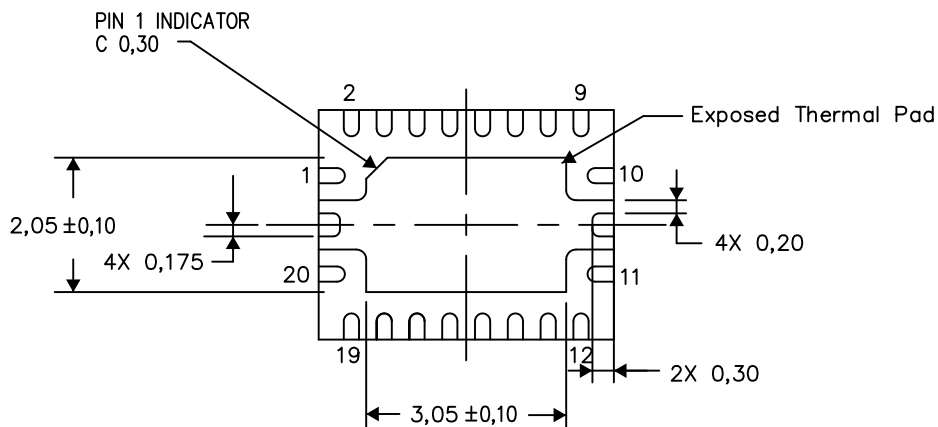
PLASTIC QUAD FLATPACK NO-LEAD

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

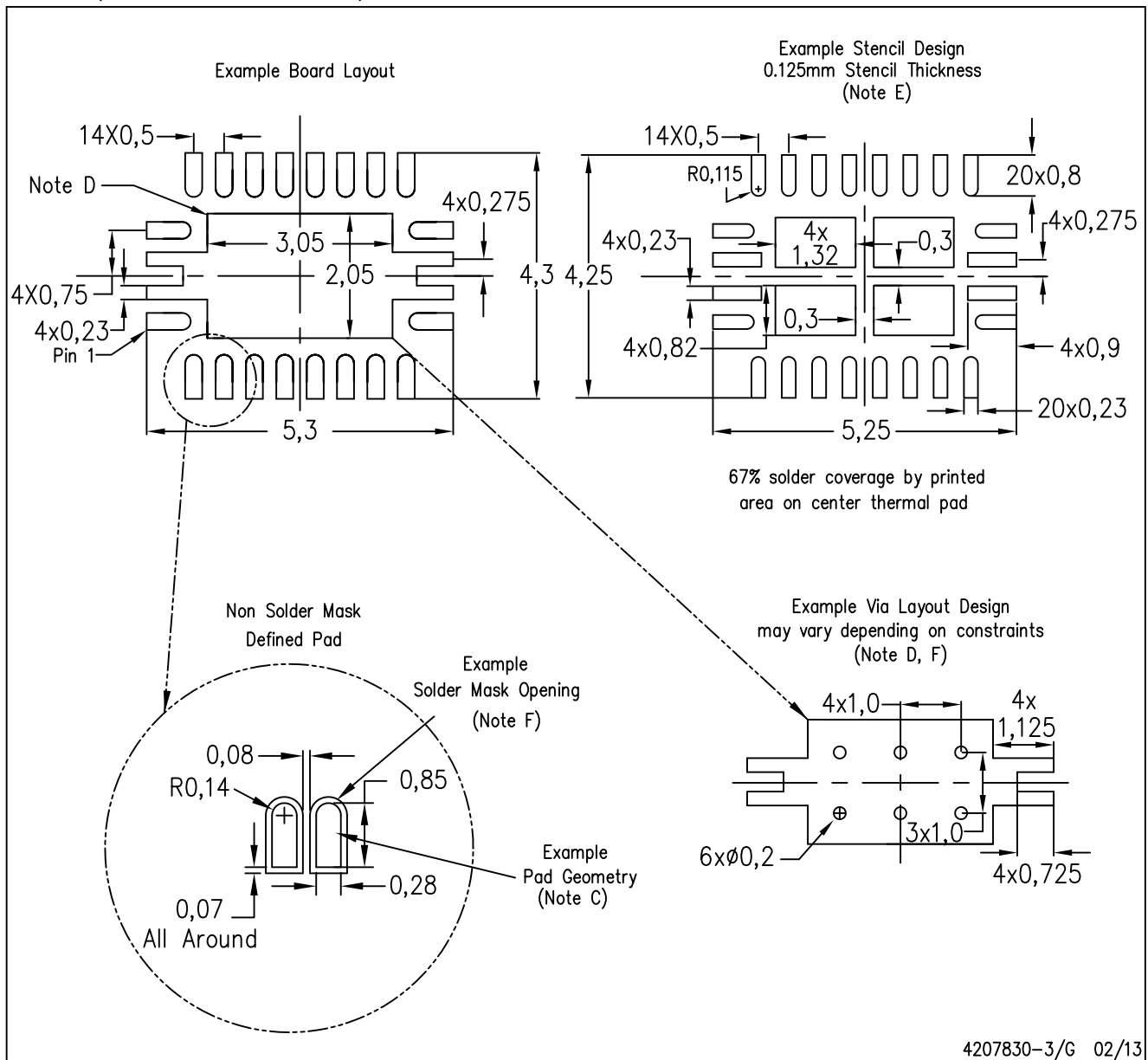
Exposed Thermal Pad Dimensions

4206363-3/M 08/12

NOTE: All linear dimensions are in millimeters

RHL (R-PVQFN-N20)

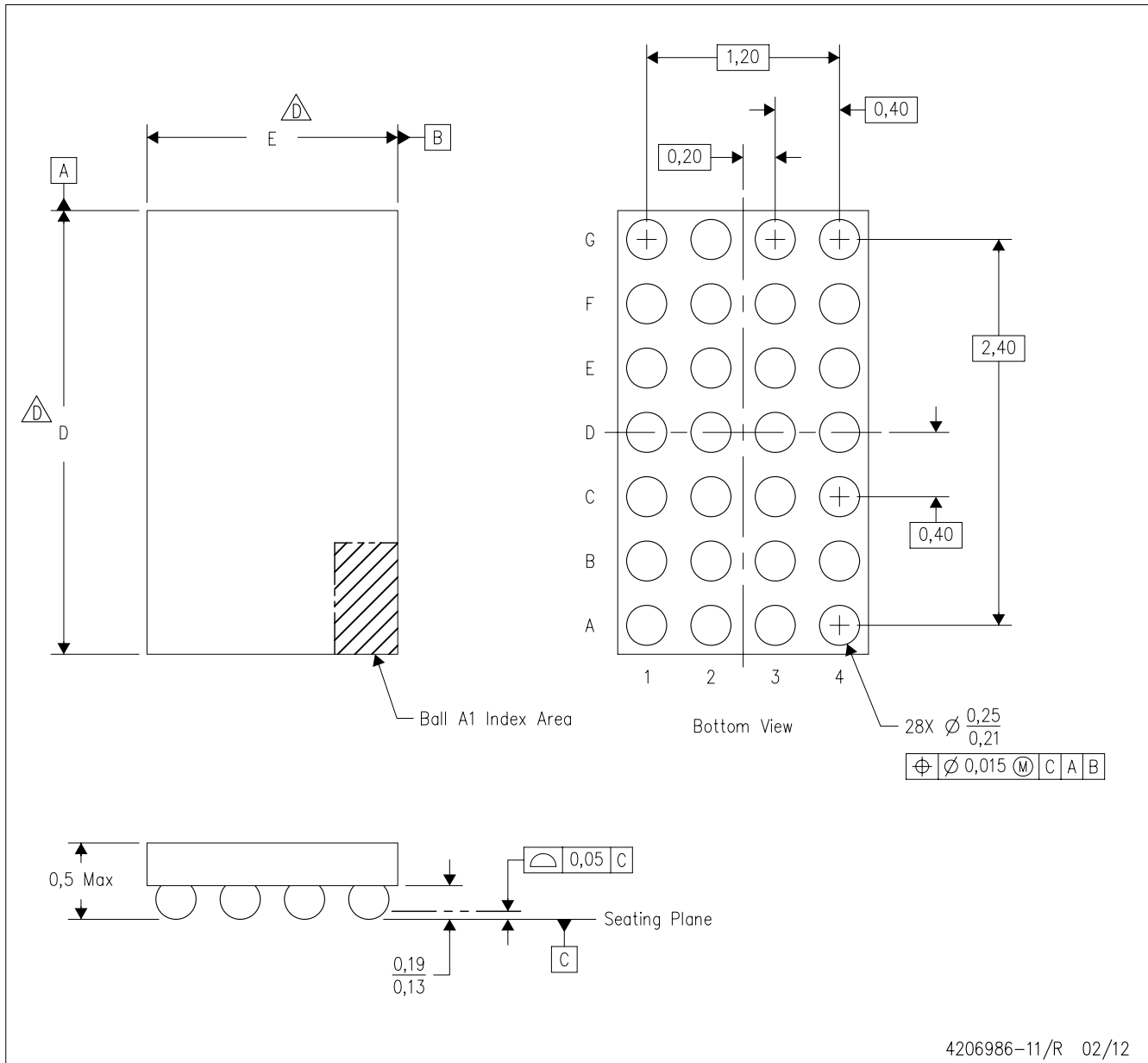
PLASTIC QUAD FLATPACK NO-LEAD



- 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. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack Packages, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <<http://www.ti.com>>.
 - E. 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.
 - F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

YFP (R-XBGA-N28)

DIE-SIZE BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. NanoFree™ package configuration.
 - D. To determine the exact package size of a particular device, refer to the device datasheet or contact a local TI representative.
 - E. This package contains Pb-free balls.

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