



**THE DATASHEET OF
TSB43CB43APGF**



iceLynx-Micro IEEE 1394a-2000 Consumer Electronics Solution

FEATURES

- **1394 Features**
 - Integrated 400 Mbps 3-port PHY
 - Compliant with IEEE 1394-1995 and IEEE 1394a-2000 standards
 - Supports bus manager functions and automatic 1394 self-ID verification.
 - Separate Async Ack FIFO decreases the ack-tracking burden on in-CPU and ex-CPU
- **DTLA Encryption Support for MPEG2-DVB, DSS, DV, and Audio (TSB43CA43A and TSB43CA42 Only)**
 - Two M6 baseline ciphers (one per HSDI port)
 - Content key generation from exchange key
 - AKE acceleration features in hardware
 - Random Number Generator
 - Secure Hash Algorithm, Revision 1 (SHA-1)
 - Other AKE acceleration features
 - Elliptical curve digital signature algorithm (EC-DCA) both signature and verification
 - Elliptical curve Diffie-Hellman (EC-DH), first phase value and shared secret calculation
 - 160-bit math functions
- **High Speed Data Interface (HSDI)**
 - Two configurable high speed data interfaces support the following audio and video modes:
 - MPEG2-DVB interface
 - MPEG2-DSS interface
 - DV codec interface
 - IEC60958 interface
 - Audio DAC interface
 - SACD interface
- **External CPU Interface**
 - 16-bit parallel asynchronous I/O-type
 - 16-bit parallel synchronous I/O-type
 - 16-bit parallel synchronous memory type
- **Internal ARM7**
 - 50-MHz operating frequency
 - 32-bit and thumb (16-bit) mode support
 - UART included for communication
 - 256K bytes of program memory included on chip
 - ARM JTAG included for software debug
- **Data Buffers**
 - Large 16.5K byte total FIFO
 - Programmable data/space available indicators for buffer flow control
- **Hardware Packet Formatting for the Following Standards**
 - DVB MPEG2 transport stream (IEC61883-4)
 - DSS MPEG2 transport stream per standard
 - DV Stream (IEC 61883-2) SD-DV
 - Audio over 1394 (IEC 61883-6)
 - Audio Music Protocol (version 1.0 and enhancements)
 - Asynchronous and asynchronous stream (as defined by IEEE 1394)
- **Additional Features**
 - PID filtering for transmit function (up to 16 separate PIDs per HSDI)
 - Packet insertion – two insertion buffers per HSDI
 - 11 general-purpose inputs/outputs (GPIOs)
 - Interrupt driven to minimize CPU polling.
 - Single 3.3-V supply
 - JTAG interface to support post-assembly scan of device I/O – boundary scan



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.

DESCRIPTION

The iceLynx-Micro (consumer electronics link with integrated microcontroller and physical layer (PHY)) is a high performance 1394 link-layer device designed as a total solution for digitally interfacing advanced audio/video consumer electronics applications. The device is offered in both a DTCP encryption/decryption version (TSB43CA43A and TSB43CA42) and a non-DTCP encryption/decryption version (TSB43CB43).

In addition to supporting transmit and receive of MPEG2 and DSS formatted transport streams with encryption and decryption, the iceLynx-Micro supports the IEC 61883-6 and audio music protocol standards for audio format and packetizing and asynchronous and asynchronous stream (as defined by 1394).

The device also features an embedded ARM7TDMI microprocessor core with access to 256K bytes of internal program memory. The ARM7 is embedded to process 1394 specific transactions, thus significantly reducing the processing power required by the host CPU and the development time required by the user. The ARM7 is accessed from the 16/1-bit host CPU interface, from a UART communication port, or from a JTAG debug port.

The iceLynx-Micro integrated 3-port PHY allows the user enhanced flexibility as two additional devices can be utilized in a system application. The PHY's speeds are capable of running at 100 Mbps, 200 Mbps, or 400 Mbps. The PHY follows all requirements as stated in the IEEE 1394-1995 and IEEE 1394a-2000 standards.

The TSB43CA43A and TSB43CA42 version of iceLynx-Micro incorporates two M6 baseline ciphers (one per HSDI port) per the 5C specification to support transmit and receive of MPEG2 formatted transport streams with encryption and decryption. The TSB43CB43 version of iceLynx-Micro is identical to the TSB43CA43A without implementation of the encryption/decryption features. The TSB43CB43 device allows customers that do not require the encryption/decryption features to incorporate iceLynx-Micro without becoming DTLA licensees. Both devices support the IEC 61883-6 and audio music protocol standards for audio format and packetizing.

NOTE:

This product is for high-volume CE applications only. For a complete datasheet or more information contact support@ti.com.

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 |
|------------------|---------------|------------------|-----------------|------|-------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| TSB43CA42ZGW | ACTIVE | BGA MICROSTAR | ZGW | 176 | 126 | Green (RoHS & no Sb/Br) | SNAGCU | Level-3-260C-168 HR | -20 to 70 | TSB43CA42Z | Samples |
| TSB43CB43APGF | ACTIVE | LQFP | PGF | 176 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-3-260C-168 HR | -20 to 70 | TSB43CB43A | 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.

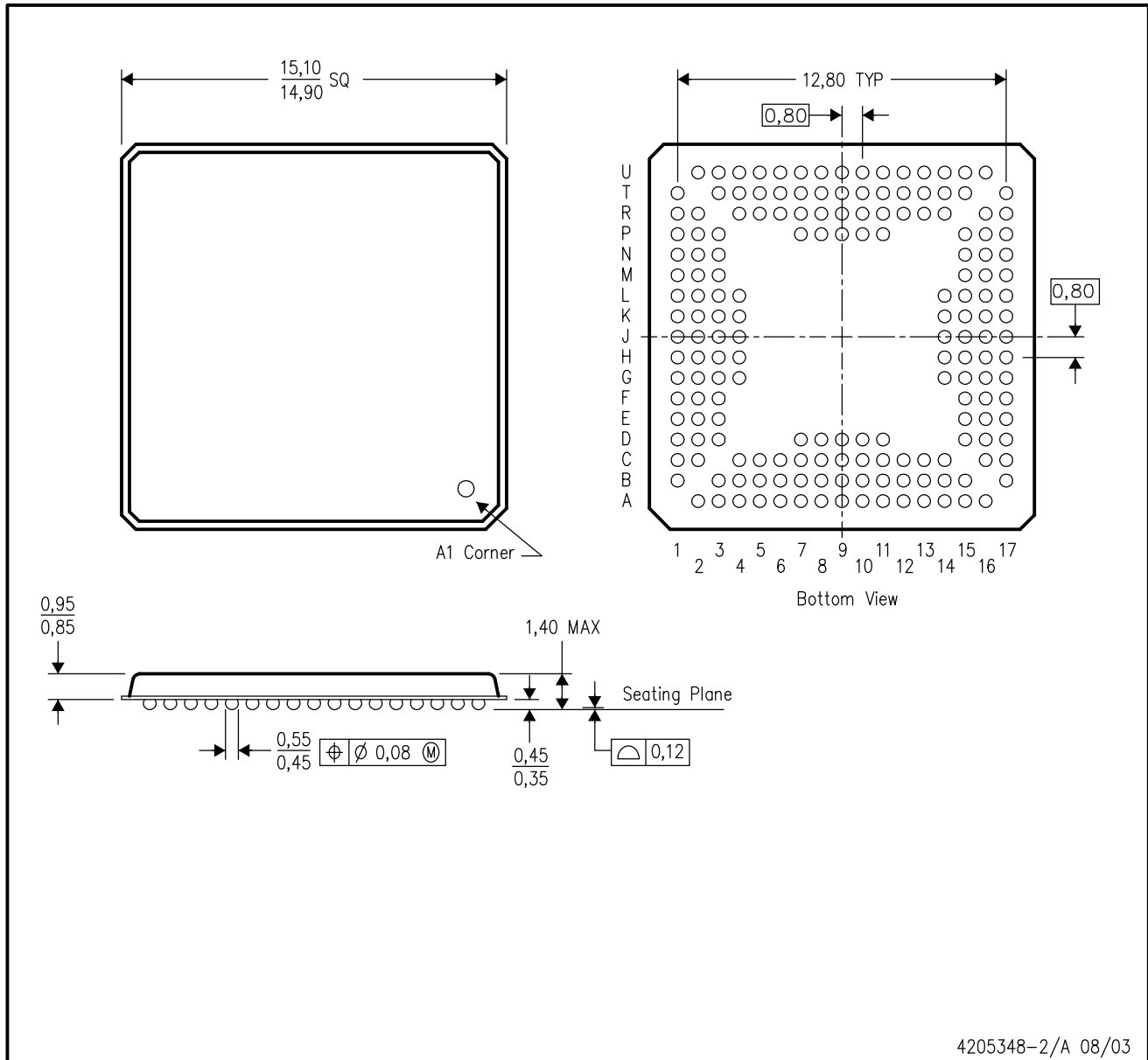
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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.

ZGW (S-PBGA-N176)

PLASTIC BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. MicroStar BGA™ configuration
 - D. This package is lead-free.

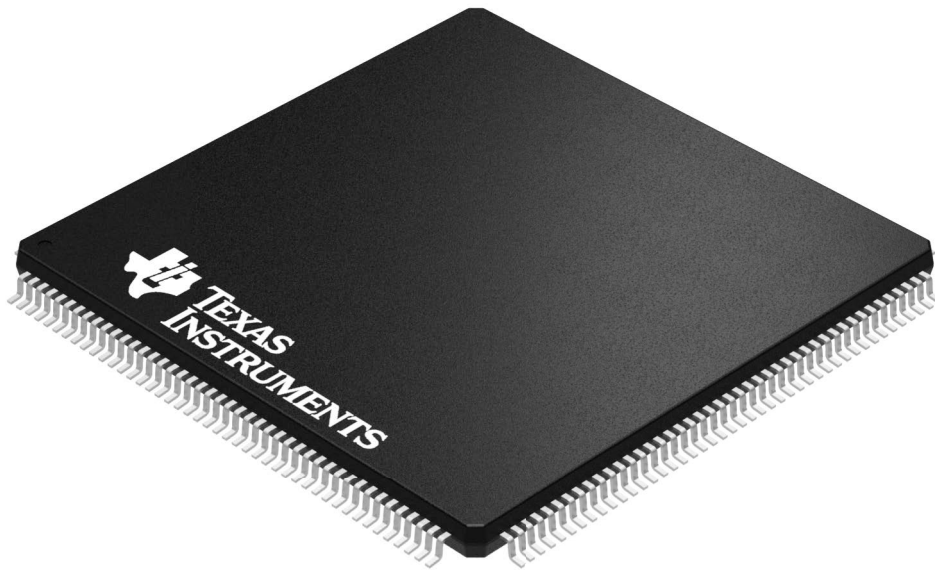
MicroStar BGA is a trademark of Texas Instruments.

GENERIC PACKAGE VIEW

PGF 176

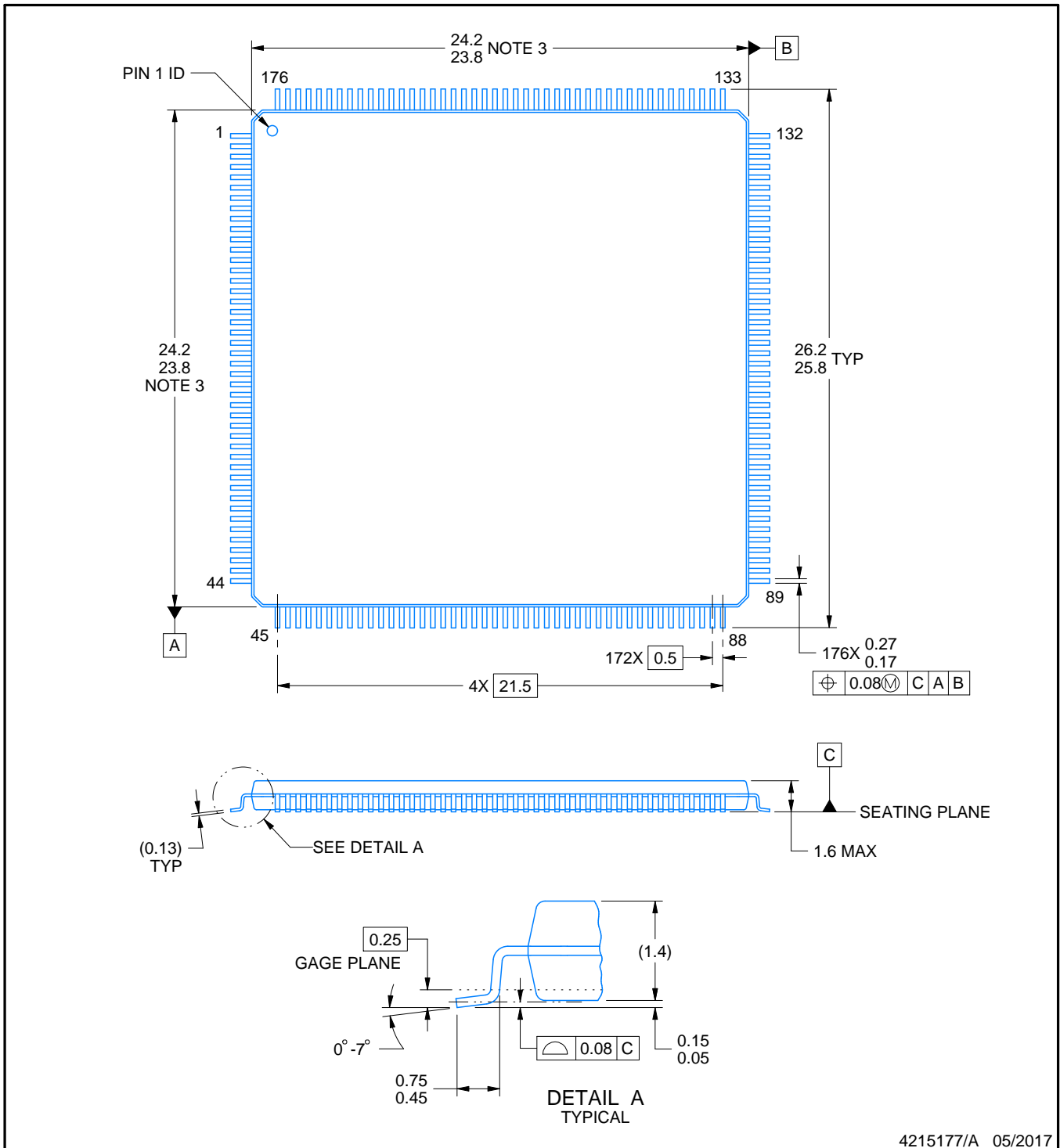
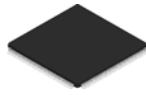
LQFP - 1.6 mm max height

PLASTIC QUAD FLATPACK



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040134/C



4215177/A 05/2017

NOTES:

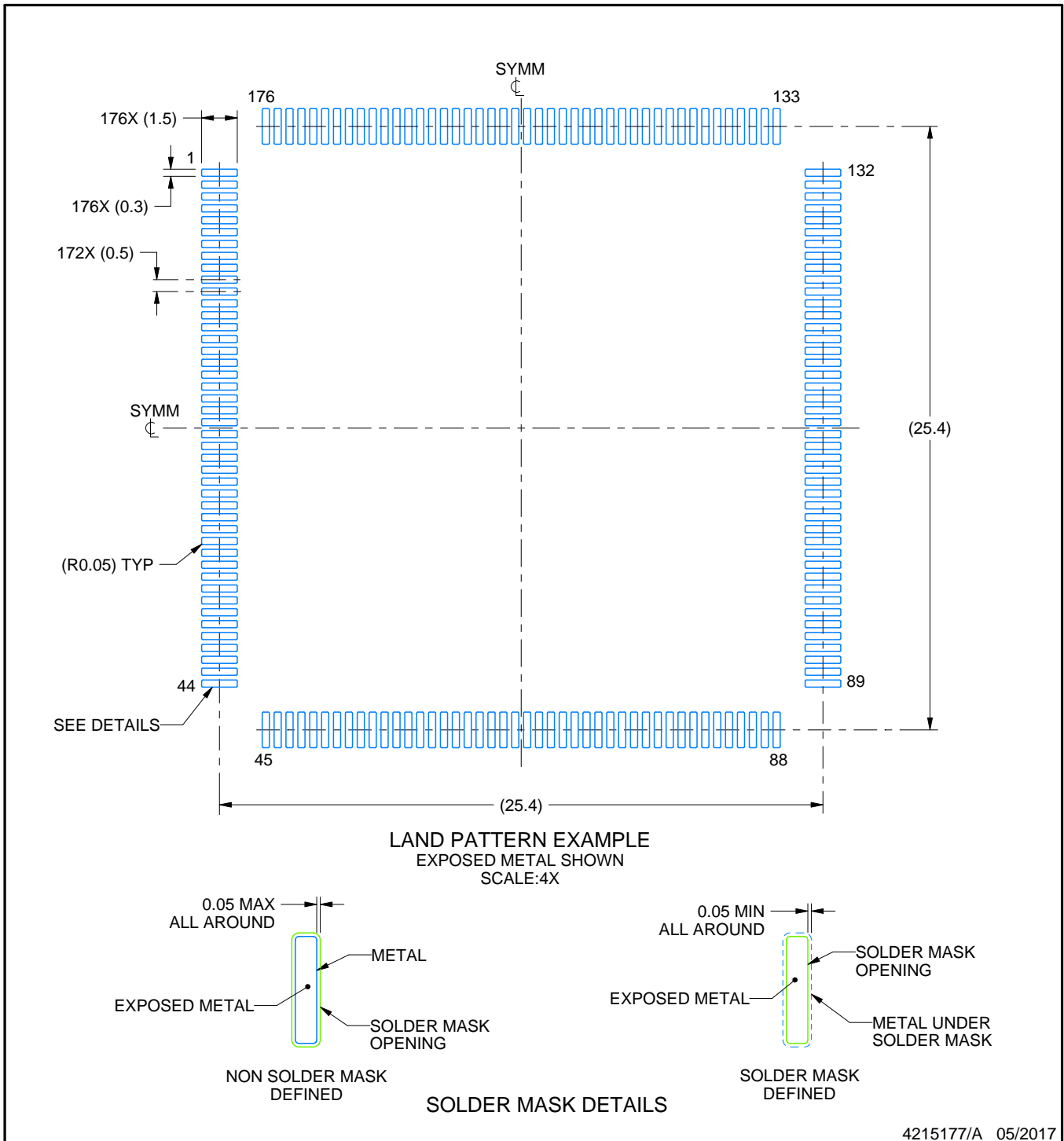
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs.
4. Reference JEDEC registration MS-026.

EXAMPLE BOARD LAYOUT

PGF0176A

LQFP - 1.6 mm max height

PLASTIC QUAD FLATPACK



NOTES: (continued)

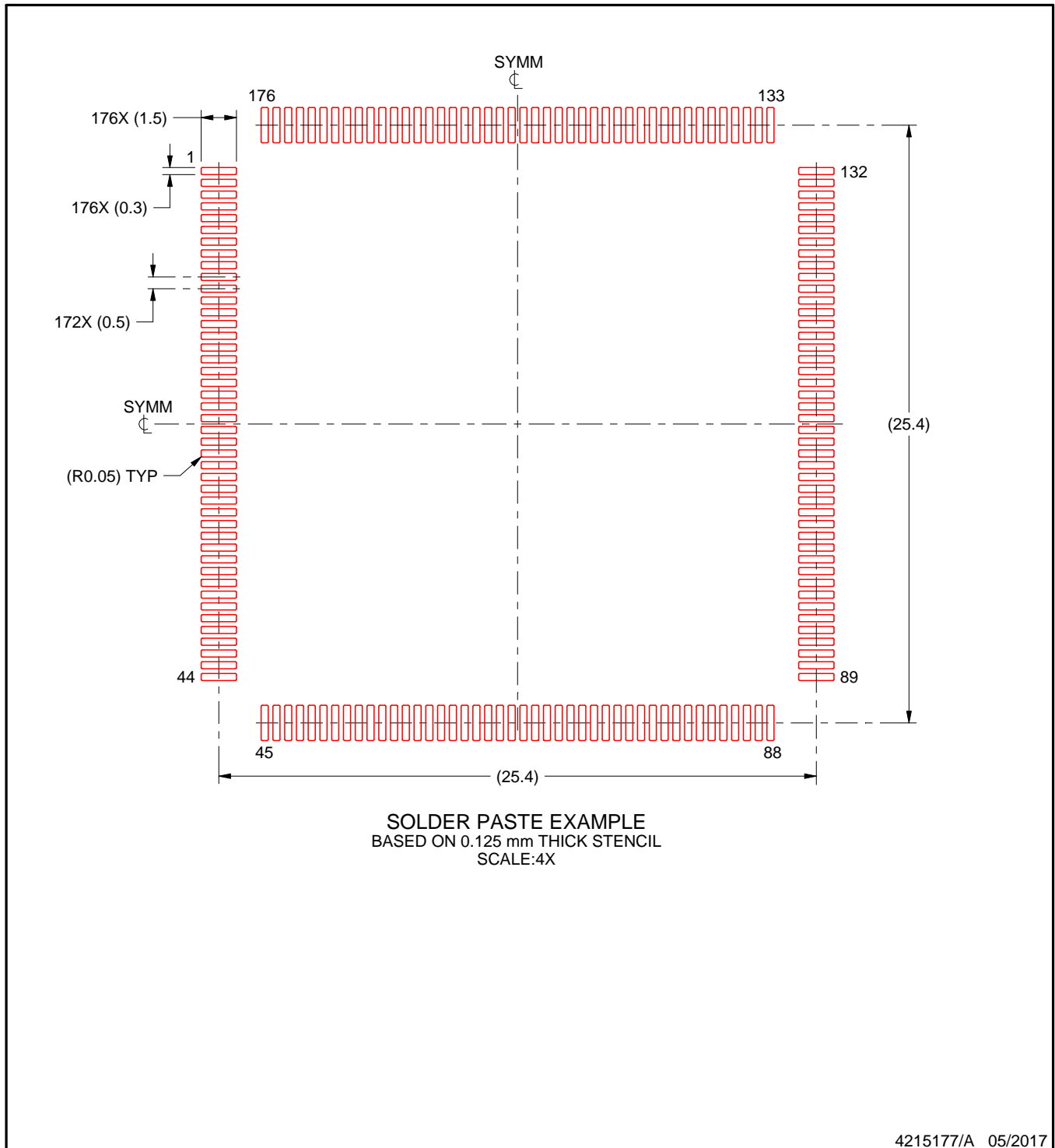
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PGF0176A

LQFP - 1.6 mm max height

PLASTIC QUAD FLATPACK



NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

IMPORTANT NOTICE

Texas Instruments Incorporated (TI) reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

TI's published terms of sale for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>) apply to the sale of packaged integrated circuit products that TI has qualified and released to market. Additional terms may apply to the use or sale of other types of TI products and services.

Reproduction of significant portions of TI information in TI data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such reproduced documentation. Information of third parties may be subject to additional restrictions. Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyers and others who are developing systems that incorporate TI products (collectively, "Designers") understand and agree that Designers remain responsible for using their independent analysis, evaluation and judgment in designing their applications and that Designers have full and exclusive responsibility to assure the safety of Designers' applications and compliance of their applications (and of all TI products used in or for Designers' applications) with all applicable regulations, laws and other applicable requirements. Designer represents that, with respect to their applications, Designer has all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. Designer agrees that prior to using or distributing any applications that include TI products, Designer will thoroughly test such applications and the functionality of such TI products as used in such applications.

TI's provision of technical, application or other design advice, quality characterization, reliability data or other services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using TI Resources in any way, Designer (individually or, if Designer is acting on behalf of a company, Designer's company) agrees to use any particular TI Resource solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

Designer is authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY DESIGNER AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Unless TI has explicitly designated an individual product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949 and ISO 26262), TI is not responsible for any failure to meet such industry standard requirements.

Where TI specifically promotes products as facilitating functional safety or as compliant with industry functional safety standards, such products are intended to help enable customers to design and create their own applications that meet applicable functional safety standards and requirements. Using products in an application does not by itself establish any safety features in the application. Designers must ensure compliance with safety-related requirements and standards applicable to their applications. Designer may not use any TI products in life-critical medical equipment unless authorized officers of the parties have executed a special contract specifically governing such use. Life-critical medical equipment is medical equipment where failure of such equipment would cause serious bodily injury or death (e.g., life support, pacemakers, defibrillators, heart pumps, neurostimulators, and implantables). Such equipment includes, without limitation, all medical devices identified by the U.S. Food and Drug Administration as Class III devices and equivalent classifications outside the U.S.

TI may expressly designate certain products as completing a particular qualification (e.g., Q100, Military Grade, or Enhanced Product). Designers agree that it has the necessary expertise to select the product with the appropriate qualification designation for their applications and that proper product selection is at Designers' own risk. Designers are solely responsible for compliance with all legal and regulatory requirements in connection with such selection.

Designer will fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of Designer's non-compliance with the terms and provisions of this Notice.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View TSB43CB43APGF](#) on WIN SOURCE

 [Texas Instruments](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management