

AFE8104, AFE8108 7.4GHz Transceiver With 12GSPS DACs and 6GSPS ADCs

1 Features

- Eight (AFE8108)/ four (AFE8104) RF sampling 12GSPS transmit DACs
- Eight (AFE8108)/ four (AFE8104) RF sampling 6GSPS receive ADCs
- Maximum RF signal bandwidth:
 - 8T8R: 800MHz.
 - 4T4R: 1600MHz
 - 2T2R: 2400MHz
- RF frequency range: up to 7.4GHz
- Single DUC/DDCs per chain
- Supports TDD operation with fast switching between TX and RX
- Internal PLL/VCO to generate DAC/ADC clocks
- Support for external clock at DAC or ADC rate
- Digital Data Interface:
 - JESD204B and JESD204C
 - 8 SerDes transceivers up to 32.5Gbps
 - 8b/10b and 64b/66b Encoding
 - 12-bit, 16-bit, 24-bit and 32-bit resolution
 - Subclass 1 multi-device synchronization
- Fast Boot Up time option: <500ms
- Package:
 - 17mm × 17mm FCBGA, 0.8mm pitch

2 Applications

- [Radar](#)
- [Seeker front end](#)
- [Software defined radio \(SDR\)](#)
- [Communications Testers](#)
- [EW](#)

3 Description

The AFE810x is a high performance, wide bandwidth multi-channels transceiver, integrating eight (AFE8108)/ four (AFE8104) RF sampling transmitter chains and eight (AFE8108)/ four (AFE8104) RF sampling receiver chains.

Each receiver chain includes a 6GSPS ADC (analog-to-digital converter), two digital peak detectors to assist an external autonomous automatic gain controller and RF overload detectors for device reliability protection. The single digital down converters (DDC) provides up to 800MHz of signal BW in 8 channels mode, 1600MHz in 4 channels and up to 2400MHz in 2 channels mode.

Each transmitter chain includes a digital up converters (DUCs) supporting up to 800MHz (8T), 1600MHz (4T) or 2400MHz (2T) of signal bandwidth. The output of the DUCs drives a 12GSPS DAC (digital to analog converter) with a mixed mode output option to enhance 2nd Nyquist operation.

Package Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE ⁽²⁾
AFE8104 AFE8108	ANG (FCBGA, 400)	17mm × 17mm
AFE8104 AFE8108	AQC (FCBGA, 400)	17mm × 17mm

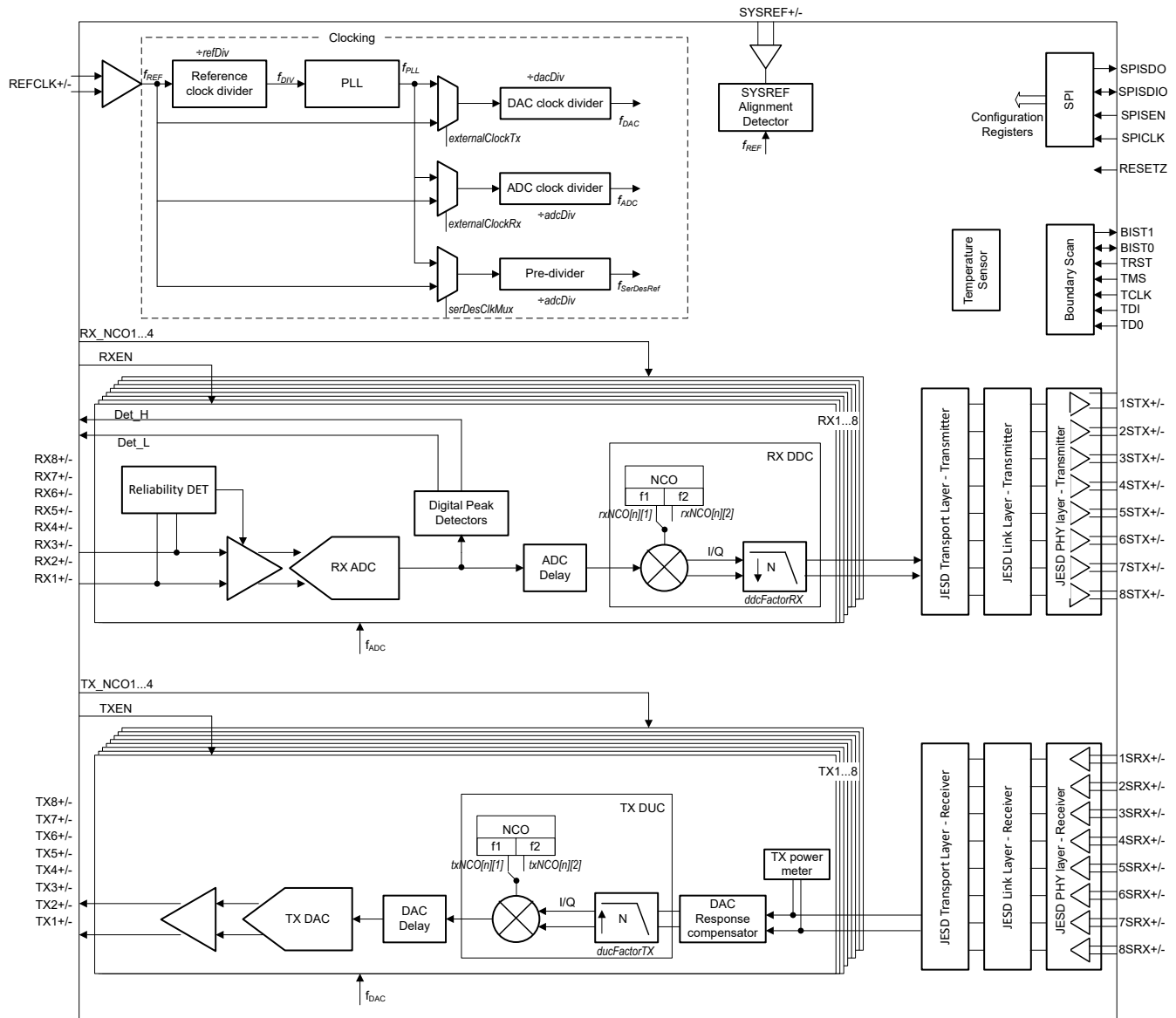
(1) For all available packages, see [Section 6](#).

(2) The package size (length × width) is a nominal value and includes pins, where applicable.

Device Information

PART NUMBER	NUMBER OF TX CHAINS	NUMBER OF RX CHAINS	PACKAGE
AFE8108	8	8	ANG
	8	8	AQC
AFE8104	4	4	ANG
	4	4	AQC





AFE8108 Functional Block Diagram

4 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

4.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.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.

4.2 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.

Linked content is 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](#).

4.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

4.4 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.

4.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

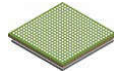
5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

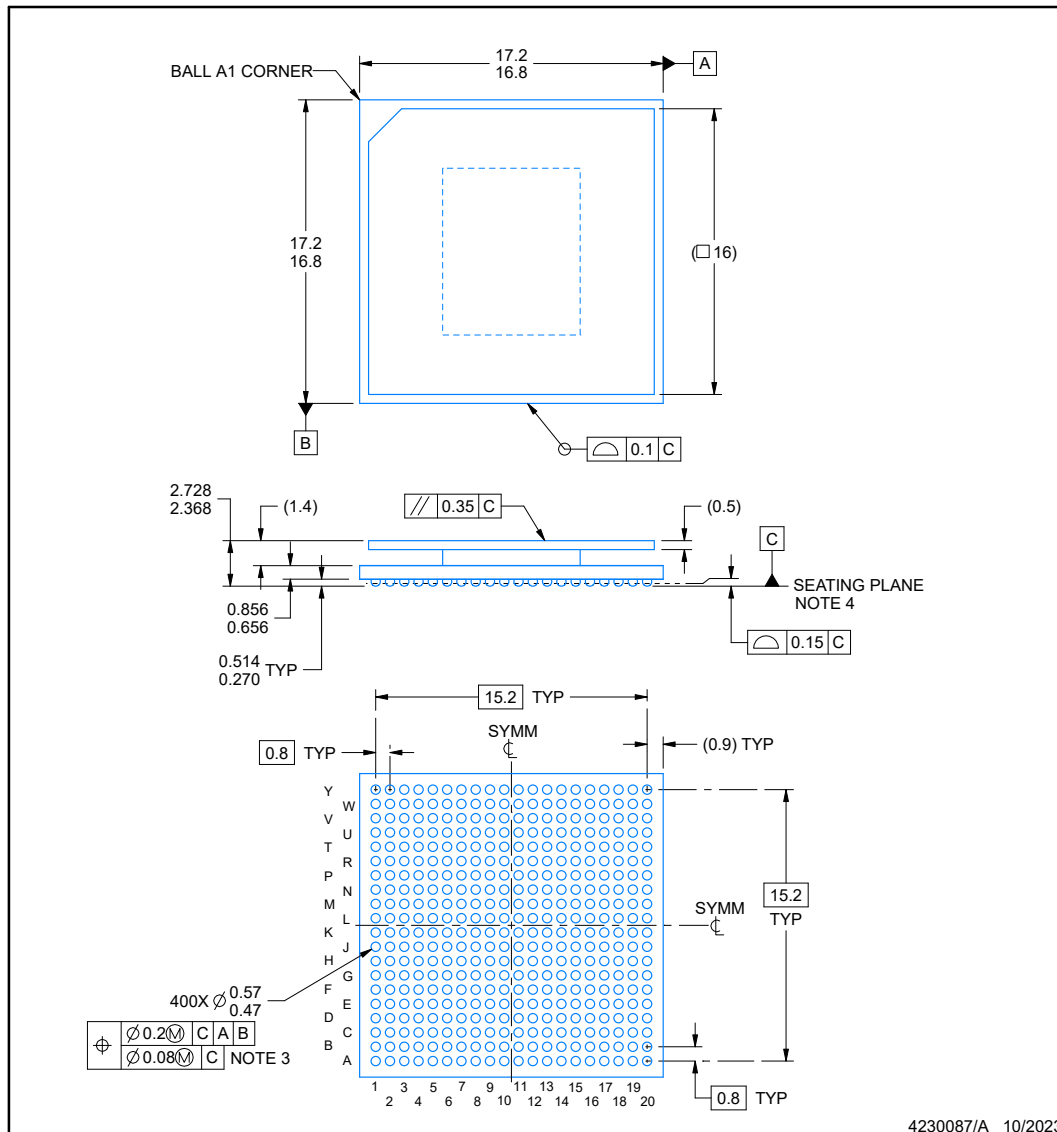
Changes from Revision * (May 2026) to Revision A (August 2026)	Page
• Deleted Status column from Device Information table.....	1

6 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.

ANG0400A**PACKAGE OUTLINE****FCBGA - 2.728 mm max height**

BALL GRID ARRAY



4230087/A 10/2023

NOTES:

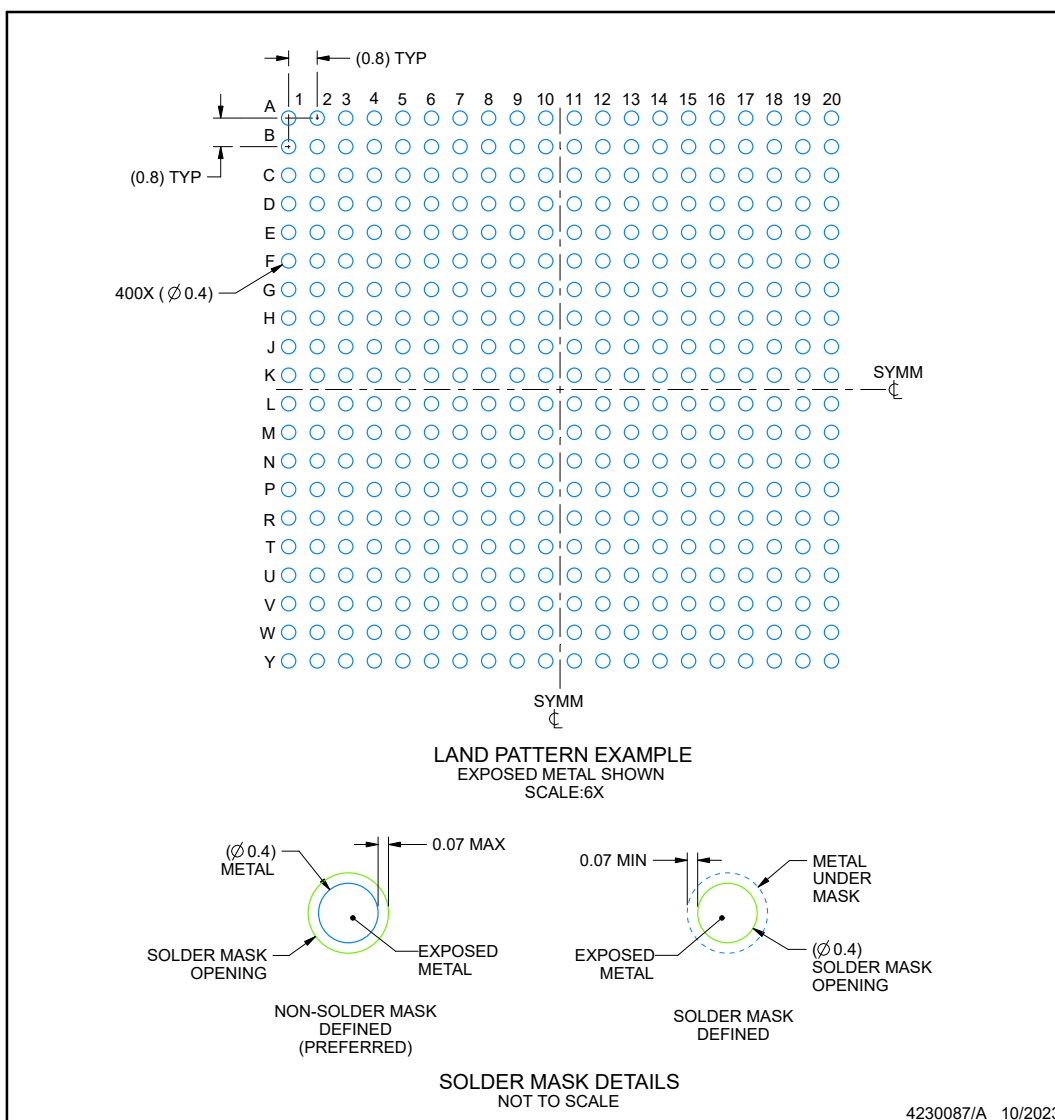
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Dimension is measured at the maximum solder ball diameter, parallel to primary datum C.
4. Primary datum C and seating plane are defined by the spherical crowns of the solder balls.
5. The lids are electrically floating (e.g. not tied to GND).

EXAMPLE BOARD LAYOUT

ANG0400A

FCBGA - 2.728 mm max height

BALL GRID ARRAY

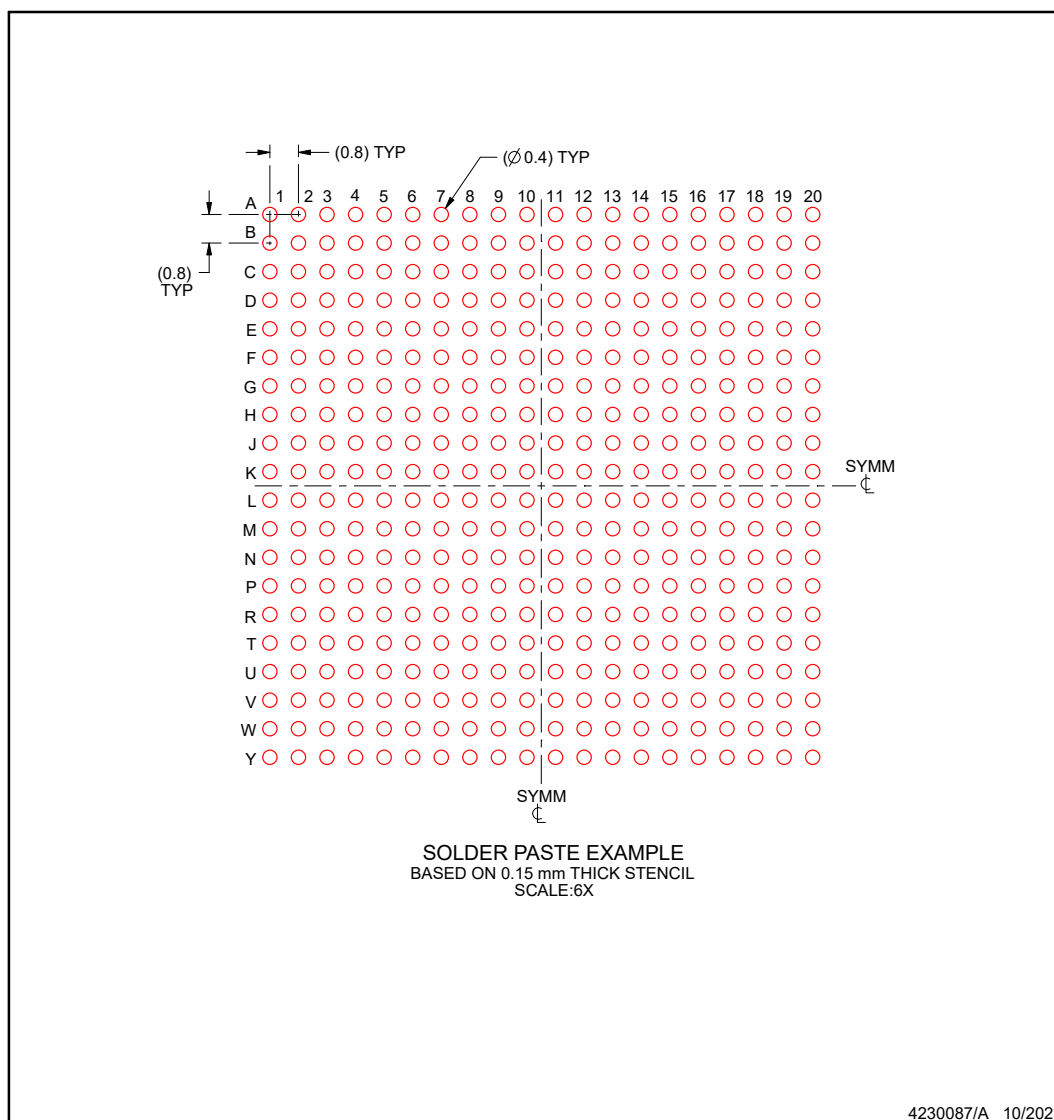


NOTES: (continued)

- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SPRU811 (www.ti.com/lit/spru811).

EXAMPLE STENCIL DESIGN**ANG0400A****FCBGA - 2.728 mm max height**

BALL GRID ARRAY

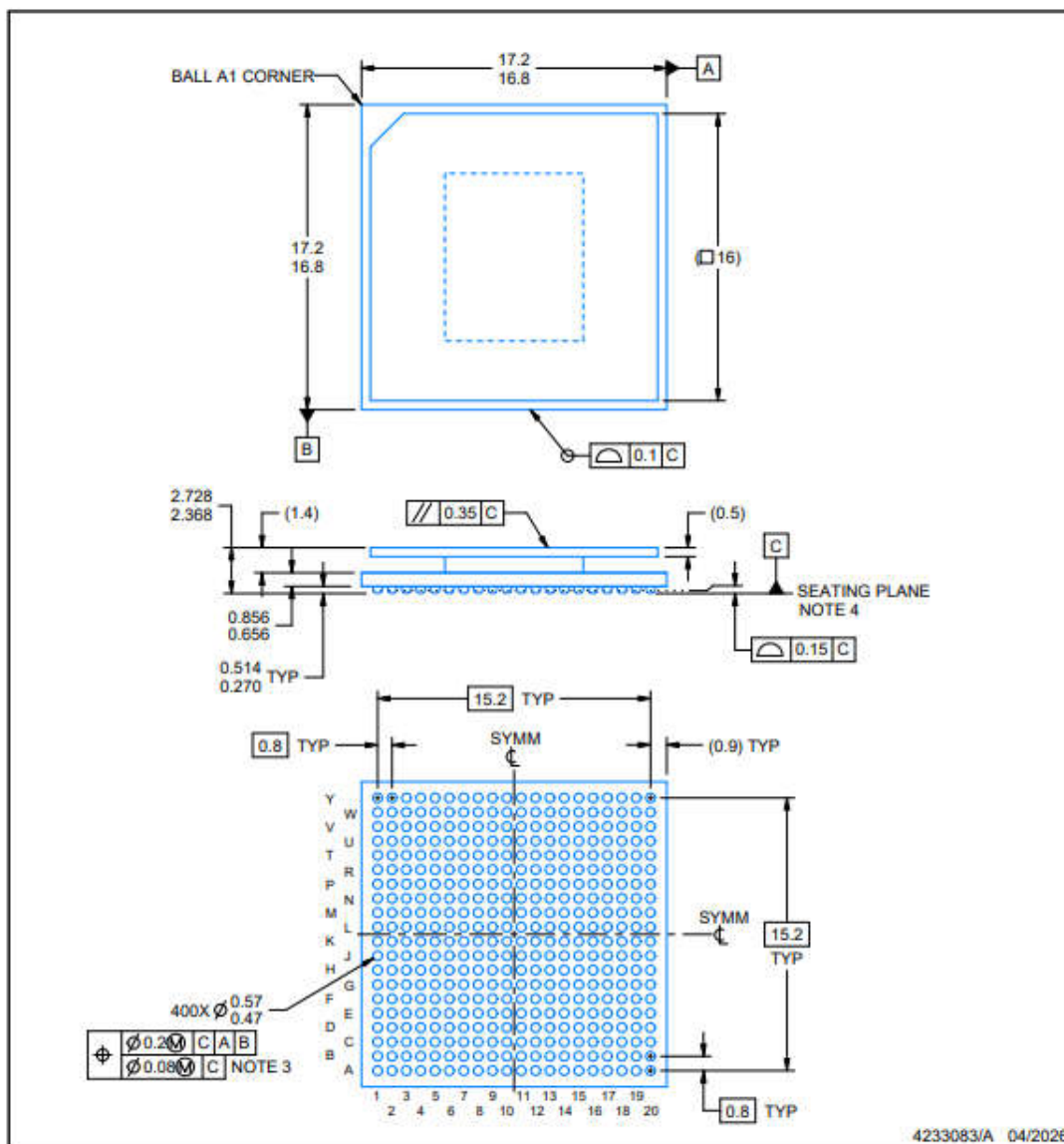


NOTES: (continued)

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

AQC0400A **PACKAGE OUTLINE**
FCBGA - 2.728 mm max height

BALL GRID ARRAY

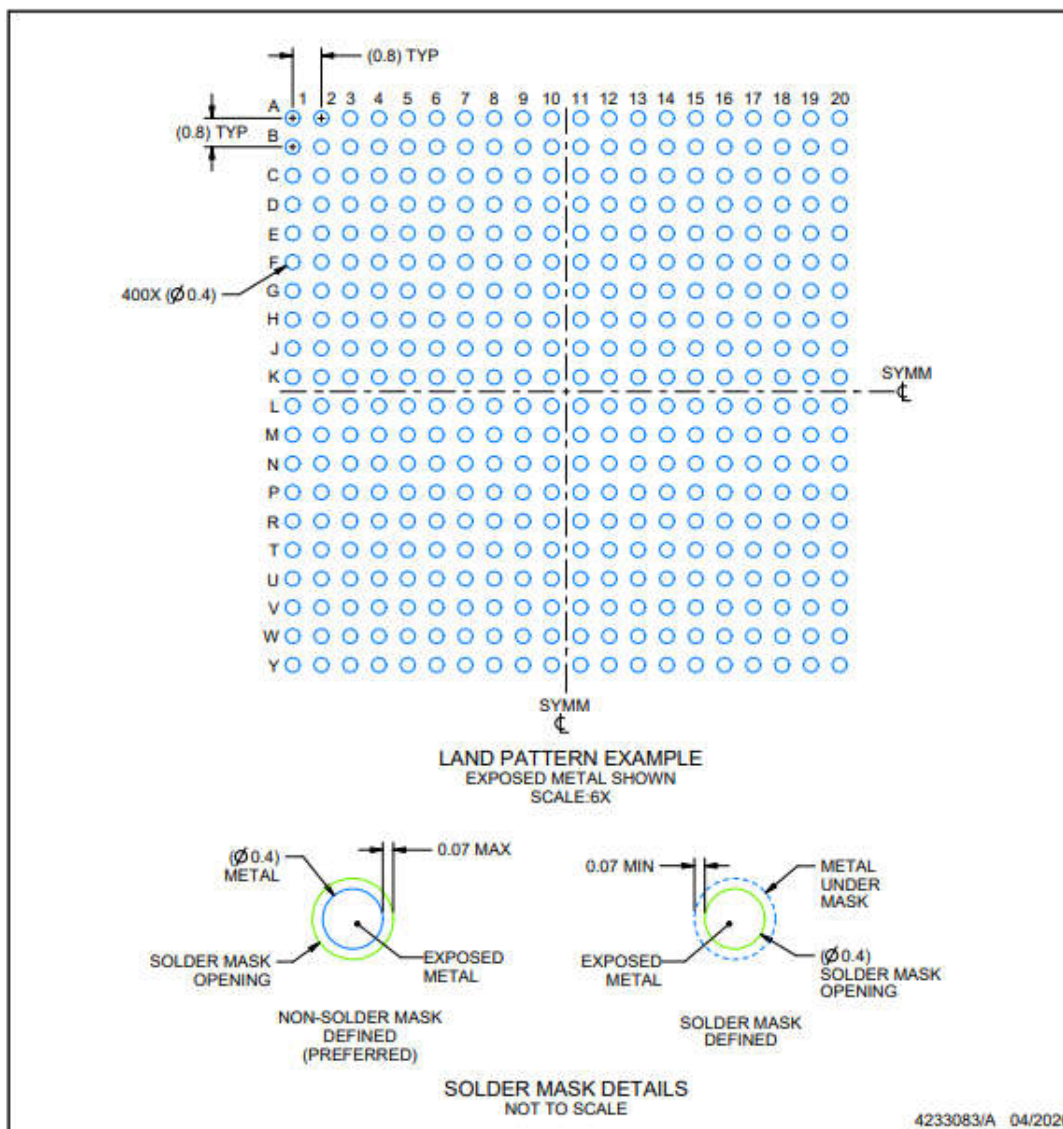


NOTES:

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. Dimension is measured at the maximum solder ball diameter, parallel to primary datum C.
4. Primary datum C and seating plane are defined by the spherical crowns of the solder balls.
5. The lids are electrically floating (e.g. not tied to GND).

EXAMPLE BOARD LAYOUT**AQC0400A****FCBGA - 2.728 mm max height**

BALL GRID ARRAY



NOTES: (continued)

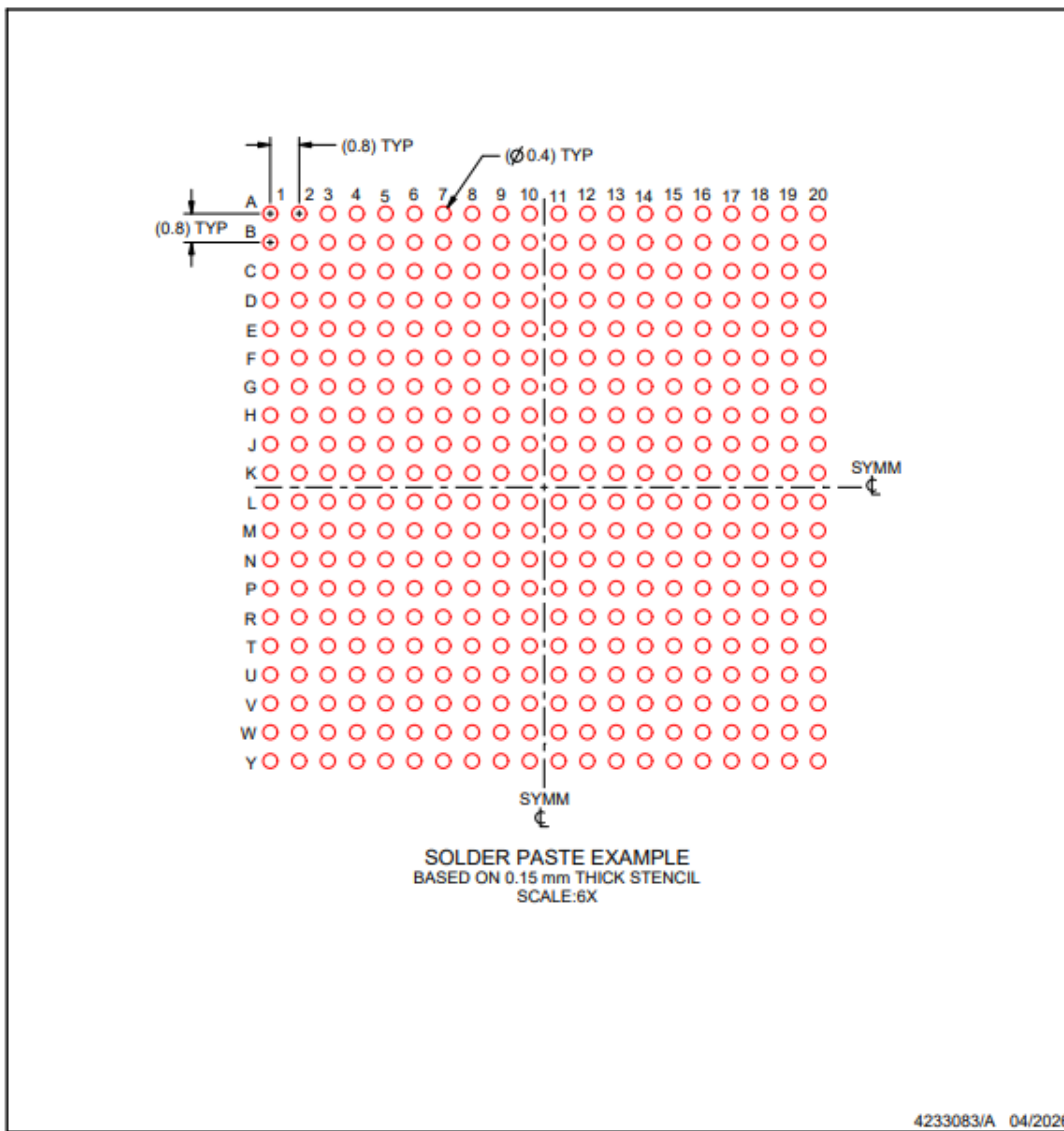
6. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
For more information, see Texas Instruments literature number SPRU811 (www.ti.com/lit/spru811).

EXAMPLE STENCIL DESIGN

AQC0400A

FCBGA - 2.728 mm max height

BALL GRID ARRAY



NOTES: (continued)

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

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
AFE8104ANG	Active	Production	FCBGA (ANG) 400	90 JEDEC TRAY (5+1)	-	SNAGCU	Level-3-260C-168 HR	-40 to 85	AFE8104
AFE8104AQC	Active	Production	FCBGA (AQC) 400	90 JEDEC TRAY (5+1)	-	Call TI	Call TI	-40 to 85	AFE8104 SNPB
AFE8108ANG	Active	Production	FCBGA (ANG) 400	90 JEDEC TRAY (5+1)	-	SNAGCU	Level-3-260C-168 HR	-40 to 85	AFE8108
AFE8108AQC	Active	Production	FCBGA (AQC) 400	90 JEDEC TRAY (5+1)	-	Call TI	Call TI	-40 to 85	AFE8108 SNPB

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

⁽²⁾ **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.

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

⁽⁴⁾ **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.

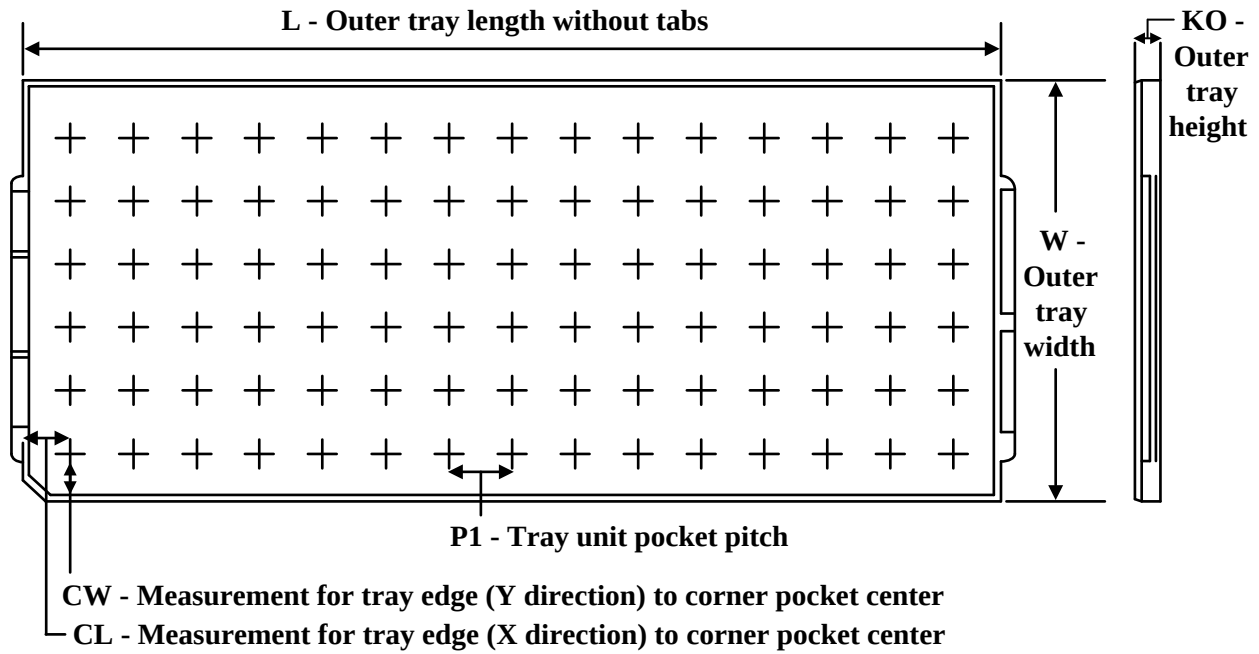
⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **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.

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.

TRAY


Chamfer on Tray corner indicates Pin 1 orientation of packed units.

*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	Unit array matrix	Max temperature (°C)	L (mm)	W (mm)	K0 (μm)	P1 (mm)	CL (mm)	CW (mm)
AFE8104ANG	ANG	FCBGA	400	90	6 x 15	150	315	135.9	7620	19.5	21	19.2
AFE8104AQC	AQC	FCBGA	400	90	6 x 15	150	315	135.9	7620	19.5	21	19.2
AFE8108ANG	ANG	FCBGA	400	90	6 x 15	150	315	135.9	7620	19.5	21	19.2
AFE8108AQC	AQC	FCBGA	400	90	6 x 15	150	315	135.9	7620	19.5	21	19.2

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025