AFE7922 2T2R RF Sampling AFE with 12GSPS DACs and 3GSPS ADCs

1 Features

- Request full data sheet
- Dual RF sampling 12GSPS transmit DACs
- Dual RF sampling 3GSPS receive ADCs
- Maximum RF signal bandwidth: 400MHz
- RF frequency range: 400MHz to 6GHz
- Digital step attenuators (DSA):
  - TX: 40dB range, 0.125dB steps
  - RX: 25dB range, 0.5dB steps
- Single or dual-band DUC or DDCs
- Optional Internal PLL or VCO for DAC or ADC clocks or external clock at DAC or ADC sample rate
- SerDes data interface:
  - JESD204B and JESD204C compatible
  - 8 SerDes transceivers up to 29.5Gbps
  - Subclass 1 multidevice synchronization
- Package: 17mm × 17mm FCBGA, 0.8mm pitch

2 Applications

- Macro remote radio unit (RRU)
- Small cell base station
- Repeater
- Distributed Antenna Systems (DAS)
- Fixed Wireless Access (FWA)

3 Description

The AFE7922 is a high performance, wide bandwidth multichannel transceiver, integrating two RF sampling transmitter chains and two RF sampling receiver chains. The high dynamic range of the transmitter and receiver chains allows the device to generate and receive 3G, 4G, and 5G signals from wireless base stations, while the wide bandwidth capability of the AFE7922 is designed for multiband 4G and 5G base stations.

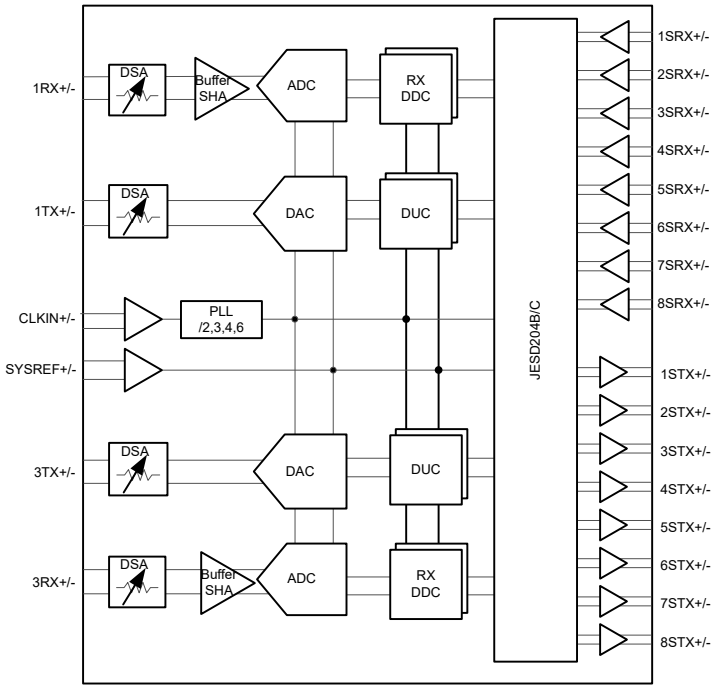
The TX signal paths support interpolation and digital up conversion options that deliver up to 400MHz of signal bandwidth per TX channel. The output of the DUCs drives a 12GSPS DAC (digital to analog converter) with a mixed mode output option to enhance 2nd Nyquist operation. The DAC output includes a variable gain amplifier (TX DSA) with 40dB range and 1dB analog and 0.125dB digital steps.

Each receiver chain includes a 25dB range DSA (Digital Step Attenuator), followed by a 3GSPS ADC (analog-to-digital converter). Each receiver channel has an analog peak power detector and various digital power detectors to assist an external or internal autonomous automatic gain controller, and RF overload detectors for device reliability protection. Flexible decimation options provide optimization of signal bandwidth of up to 400MHz per RX channel.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)
AFE7922	ABJ (FC-BGA, 400)	17mm × 17mm

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



Functional Block Diagram

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4 Device and Documentation Support

4.1 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.

4.2 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.
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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.

DATE	REVISION	NOTES
July 2025	*	Initial Release

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.

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)
AFE7922IABJ	Active	Production	FCBGA (ABJ) | 400	90 | JEDEC TRAY (5+1)	-	SNAGCU | SNAGCU	Level-3-260C-168 HR	-40 to 85	AFE7922I

(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.

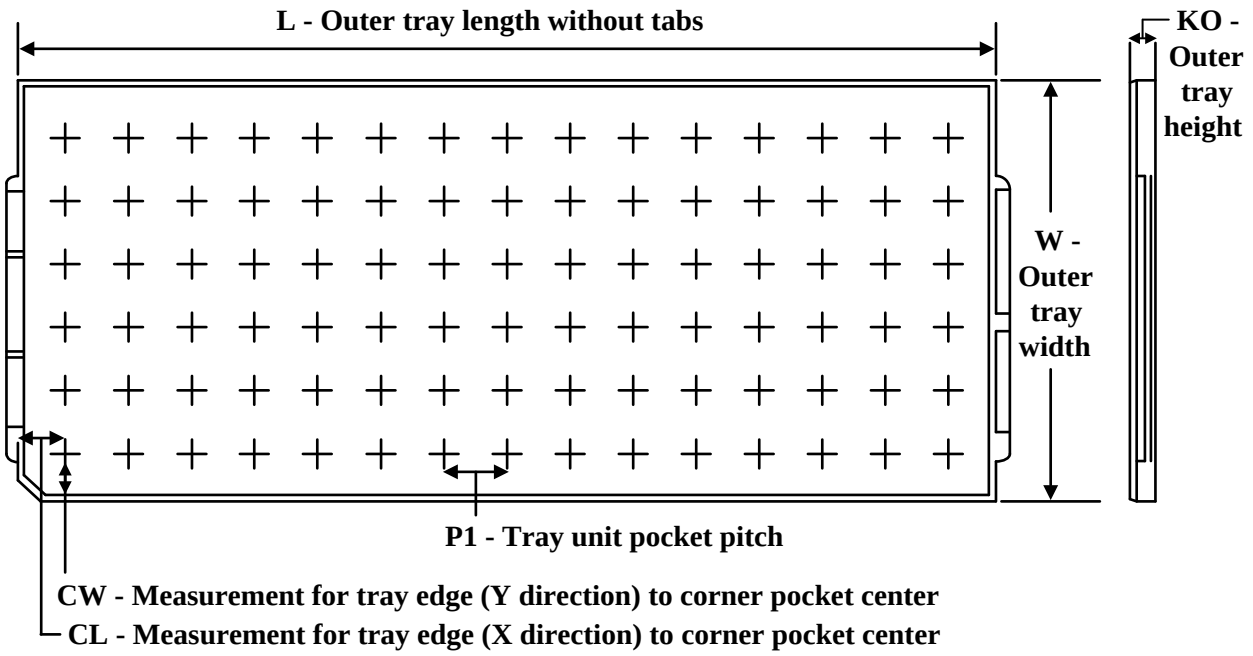
(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(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.

TRAY



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

*All dimensions are nominal

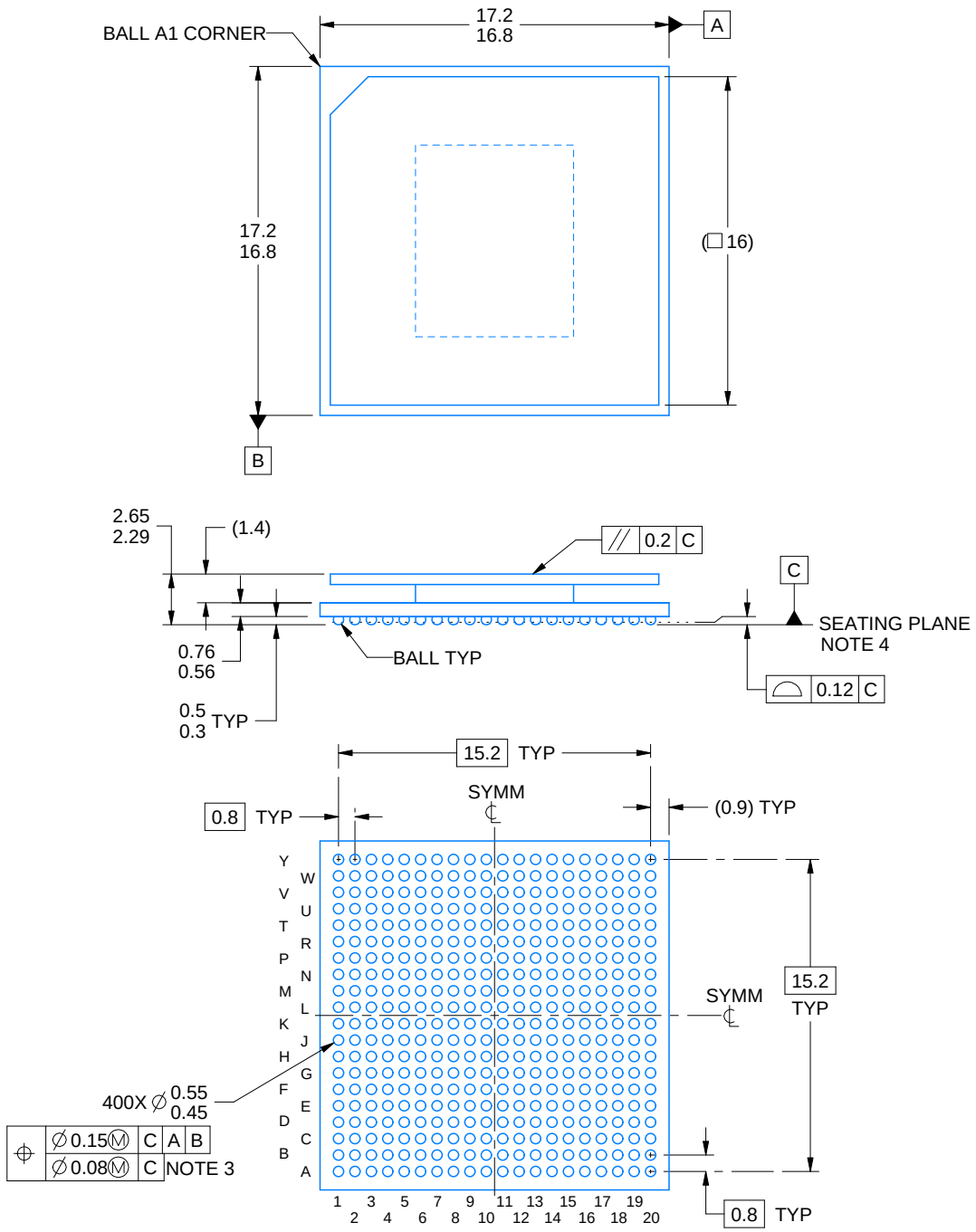
Device	Package Name	Package Type	Pins	SPQ	Unit array matrix	Max temperature (°C)	L (mm)	W (mm)	K0 (µm)	P1 (mm)	CL (mm)	CW (mm)
AFE7922IABJ	ABJ	FCBGA	400	90	6 x 15	150	315	135.9	7620	19.5	21	19.2

PACKAGE OUTLINE

ABJ0400A

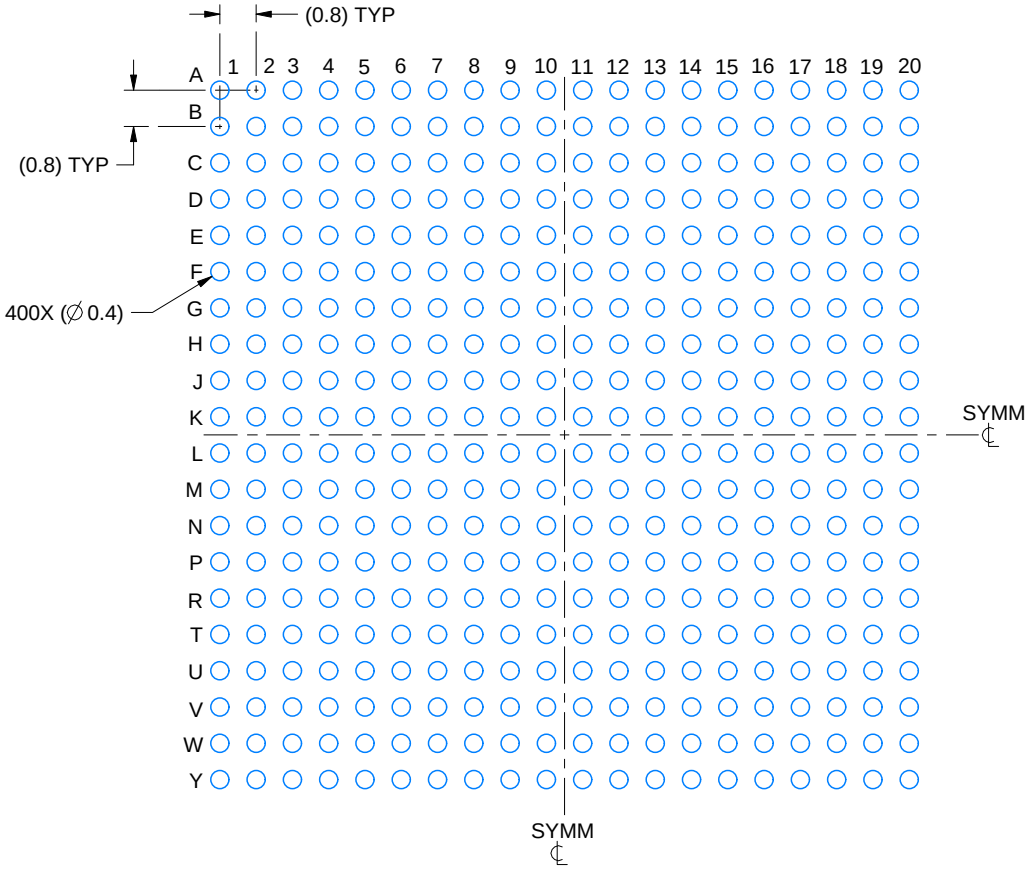
FCBGA - 2.65 mm max height

BALL GRID ARRAY

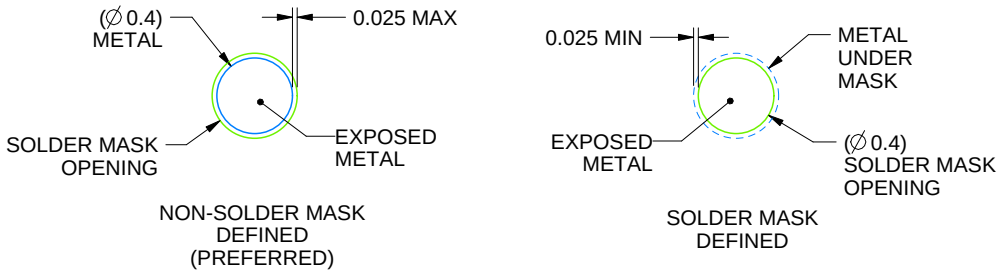


NOTES:

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).



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:6X



SOLDER MASK DETAILS
NOT TO SCALE

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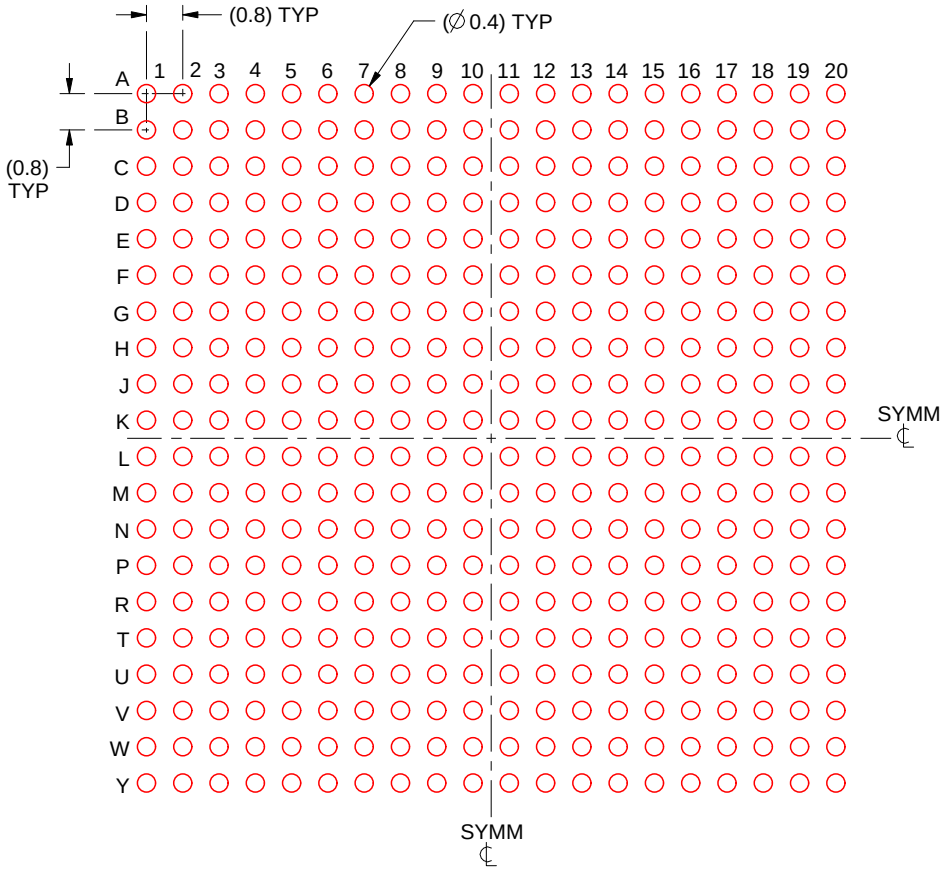
NOTES: (continued)

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).



SOLDER PASTE EXAMPLE
BASED ON 0.15 mm THICK STENCIL
SCALE:6X

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NOTES: (continued)

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

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