TX08D 8-Channel Ultrasound Transmitter

1 Features

- 8-Channel transmitter, each channel includes:
  - 5-level pulser with on-chip beamforming
  - Active T/R switch
  - Integrated floating supplies
- 5-Level Pulser supports:
  - Maximum output voltage: ±100V
  - Minimum output voltage: ±1V
  - Maximum output current: 2A
  - Support 4A output current mode
  - True return to zero to discharge to ground
  - Second harmonic of –45dBc at 5MHz
  - –3dB Bandwidth with 220Ω || 240pF load
    - –20MHz for a ±100V supply
    - 35MHz for a ±100V supply in 4A
  - Integrated jitter: 100fs from 100Hz to 20kHz
  - CW mode close-in phase noise: –154dBc/Hz at 1kHz offset for 5MHz signal
- Active T/R switch with:
  - Turn ON resistance: 8Ω
  - Turn ON and OFF time: 300ns
  - Channel based T/R switch on and off controls
- On-chip beamformer for pulser with:
  - Channel based T/R switch on and off controls
  - Delay resolution: Half beamformer clock period, minimum 1.56ns
  - Maximum delay: 2^{14} beamformer clock period
  - Per channel 960 × 32 bits memory to store waveform and delay values.
- High-speed (400MHz maximum), 2-lane LVDS serial programming interface
  - Very low programming time: < 500ns for delay profile update
  - 32-bit Checksum feature to detect wrong SPI writes
- Internal temperature sensor and automatic thermal shutdown
- No specific power sequencing requirement
- Error flag register to detect multiple faulty condition
- Integrated passives for the floating supplies and bias voltages
- Small package: FCCSP-196 (12mm × 12mm) with 0.8mm pitch

2 Applications

- Ultrasound pulser imaging system
- Piezoelectric driver

3 Description

The TX08D is a transmitter solution for ultrasound imaging systems. The device supports eight channels with each channel consisting of pulser transmit/receive (T/R) switches.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)
TX08D	ACP (FCCSP, 196)	12mm × 12mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.

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ADVANCE INFORMATION

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. 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 * (October 2023) to Revision A (January 2024)	Page
• Changed data sheet title from: TX08D 8-Channel Transmitter to: TX08D 8-Channel Ultrasound Transmitter..	1

6 Mechanical, Packaging, and Orderable Information

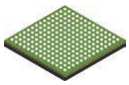
The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

ADVANCE INFORMATION

ADVANCE INFORMATION

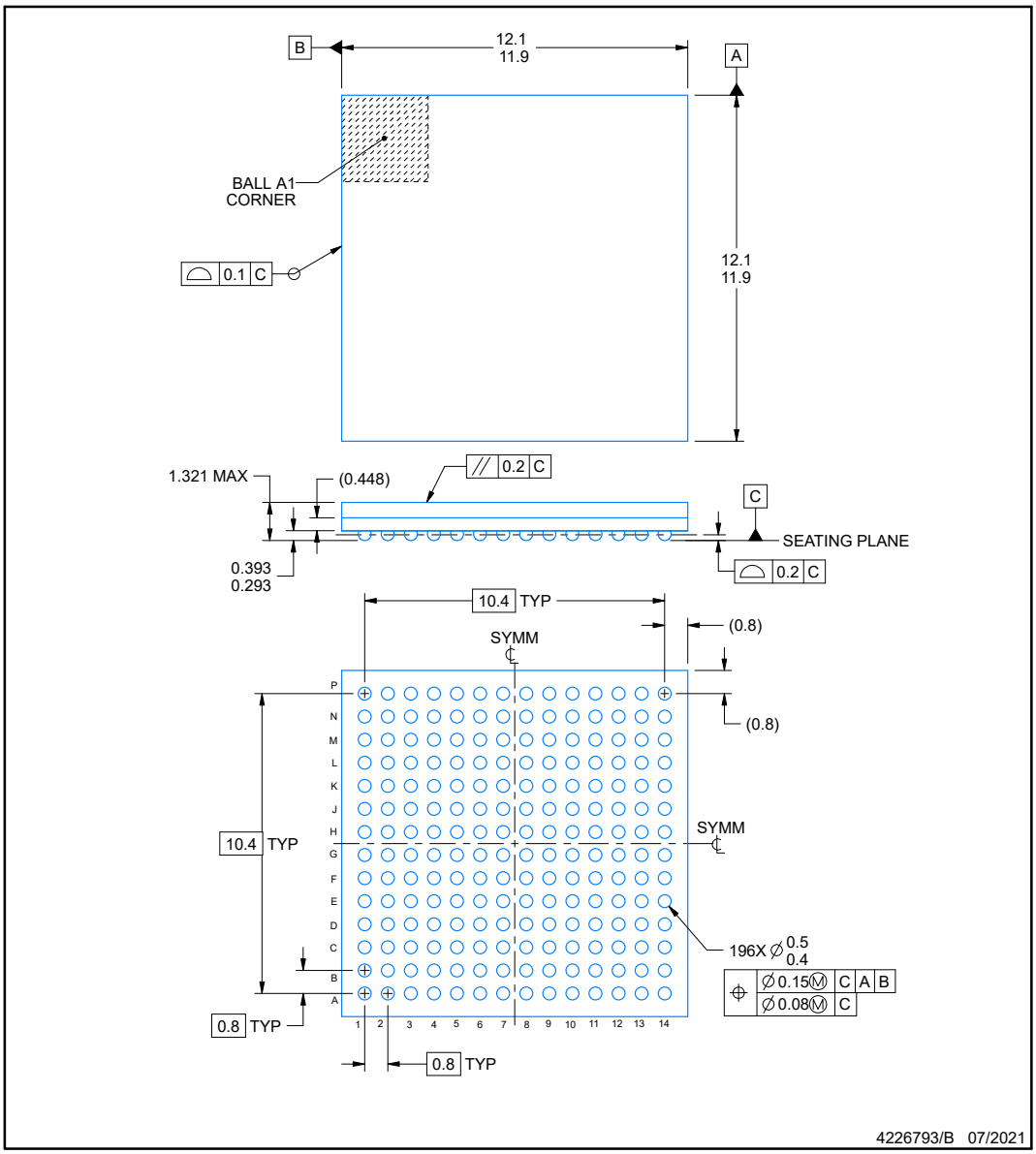
PACKAGE OUTLINE

ACP0196A



FCBGA - 1.321 mm max height

BALL GRID ARRAY



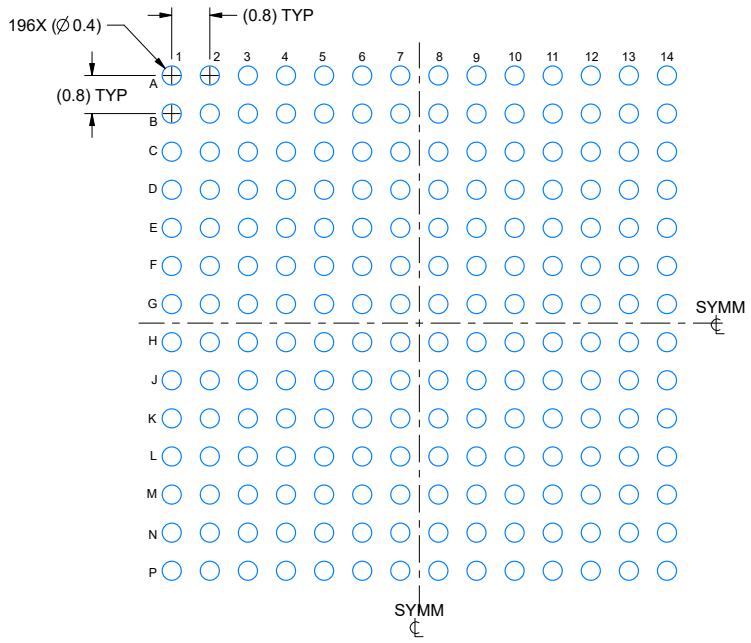
NOTES:

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.

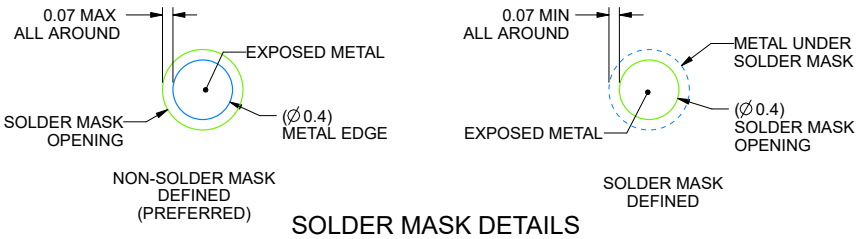
EXAMPLE BOARD LAYOUT

ACP0196A — **FCBGA - 1.321 mm max height**

BALL GRID ARRAY



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 8X



SOLDER MASK DETAILS
NOT TO SCALE

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NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
For information, see Texas Instruments literature number SPRAA99 (www.ti.com/lit/spraa99).

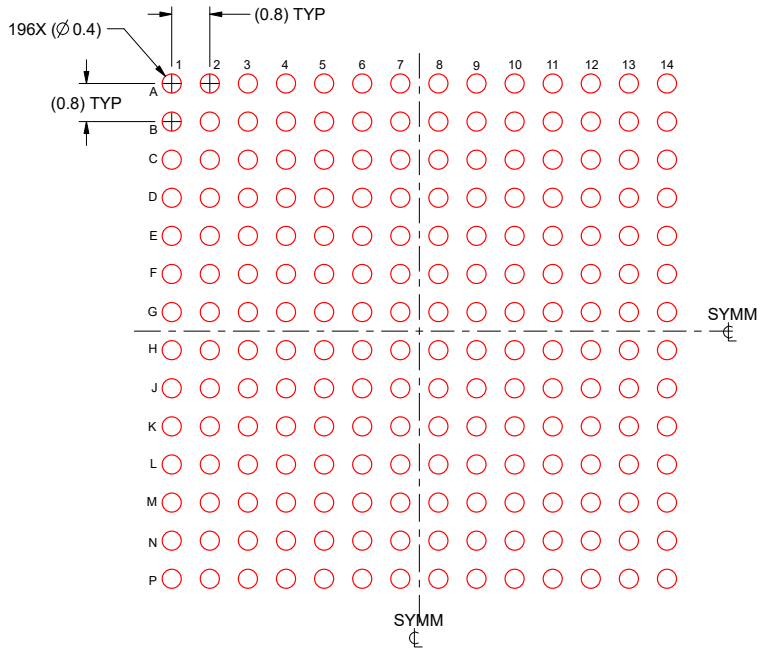
ADVANCE INFORMATION

ADVANCE INFORMATION

EXAMPLE STENCIL DESIGN

ACP0196A — **FCBGA - 1.321 mm max height**

BALL GRID ARRAY



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 8X

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NOTES: (continued)

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

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PTX08DACP	ACTIVE	FCCSP	ACP	196	160	TBD	Call TI	Call TI	0 to 70		Samples
TX08DACP	ACTIVE	FCCSP	ACP	196	160	RoHS & Green	Call TI | SNAGCU	Level-3-260C-168 HR	0 to 70	(TX08D, TX7364)	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.

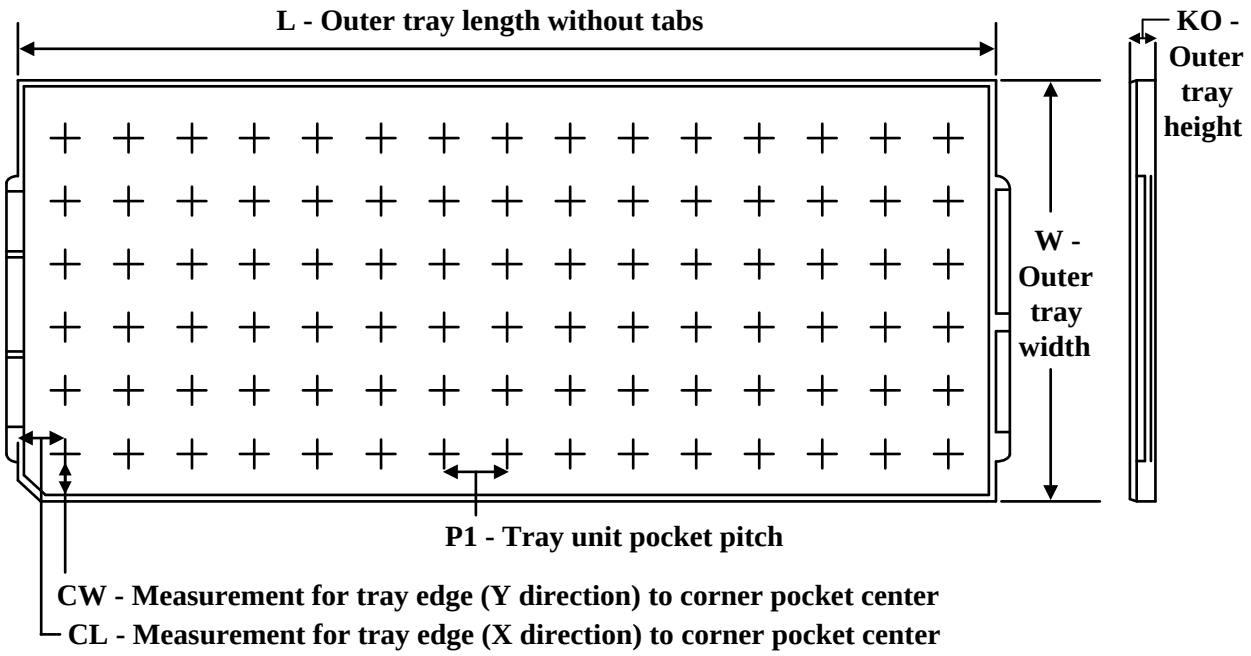
(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(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 finish/Ball material - Orderable Devices 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.

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)
TX08DACP	ACP	FCCSP	196	160	8 x 20	150	315	135.9	7620	15.4	11.2	19.65

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