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.

ADVANCE INFORMATION

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. ADVANCE INFORMATION for preproduction products; subject to change without notice.

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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

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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.

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.

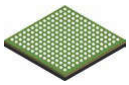
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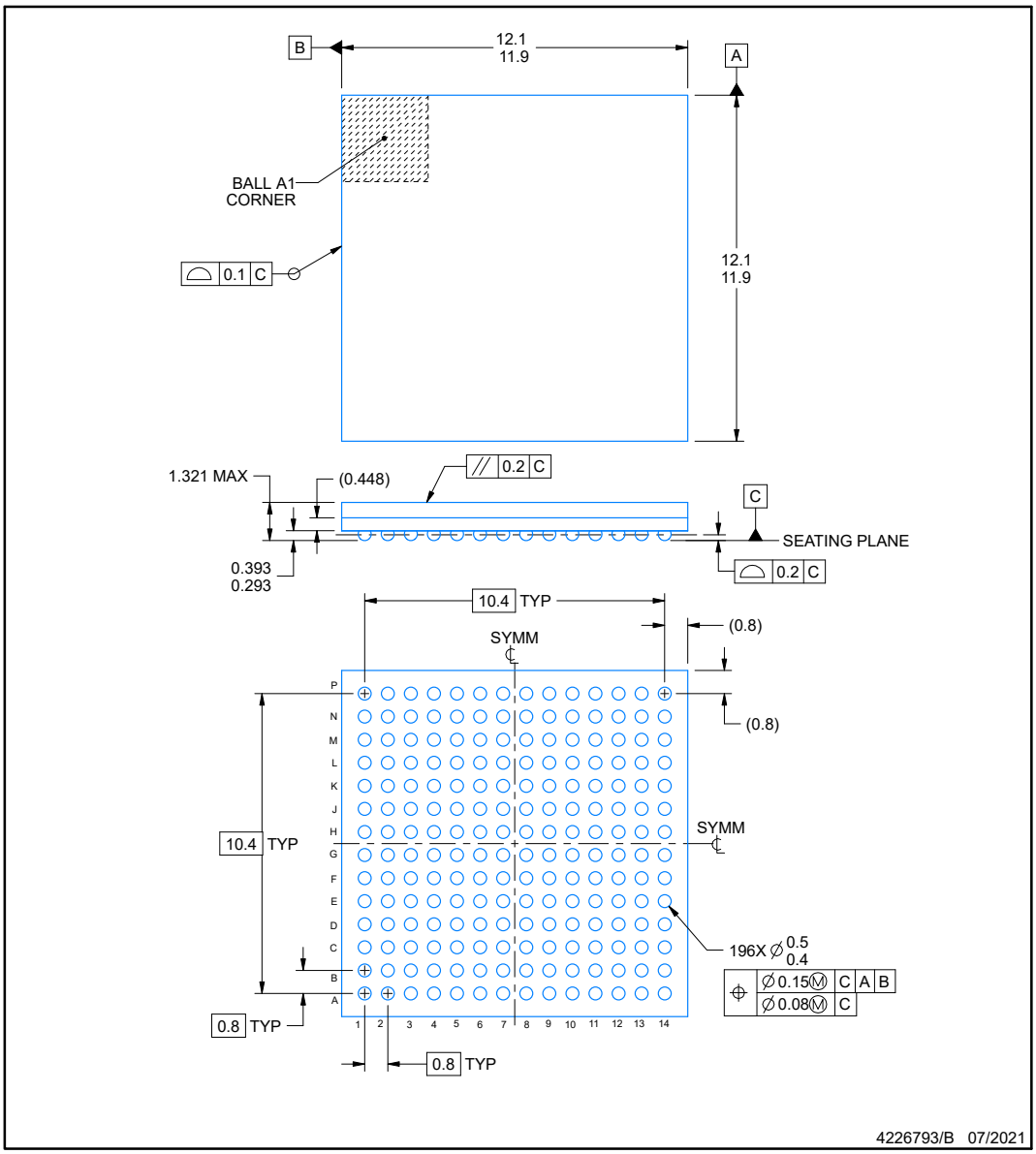
PACKAGE OUTLINE

ACP0196A



FCBGA - 1.321 mm max height

BALL GRID ARRAY



NOTES:

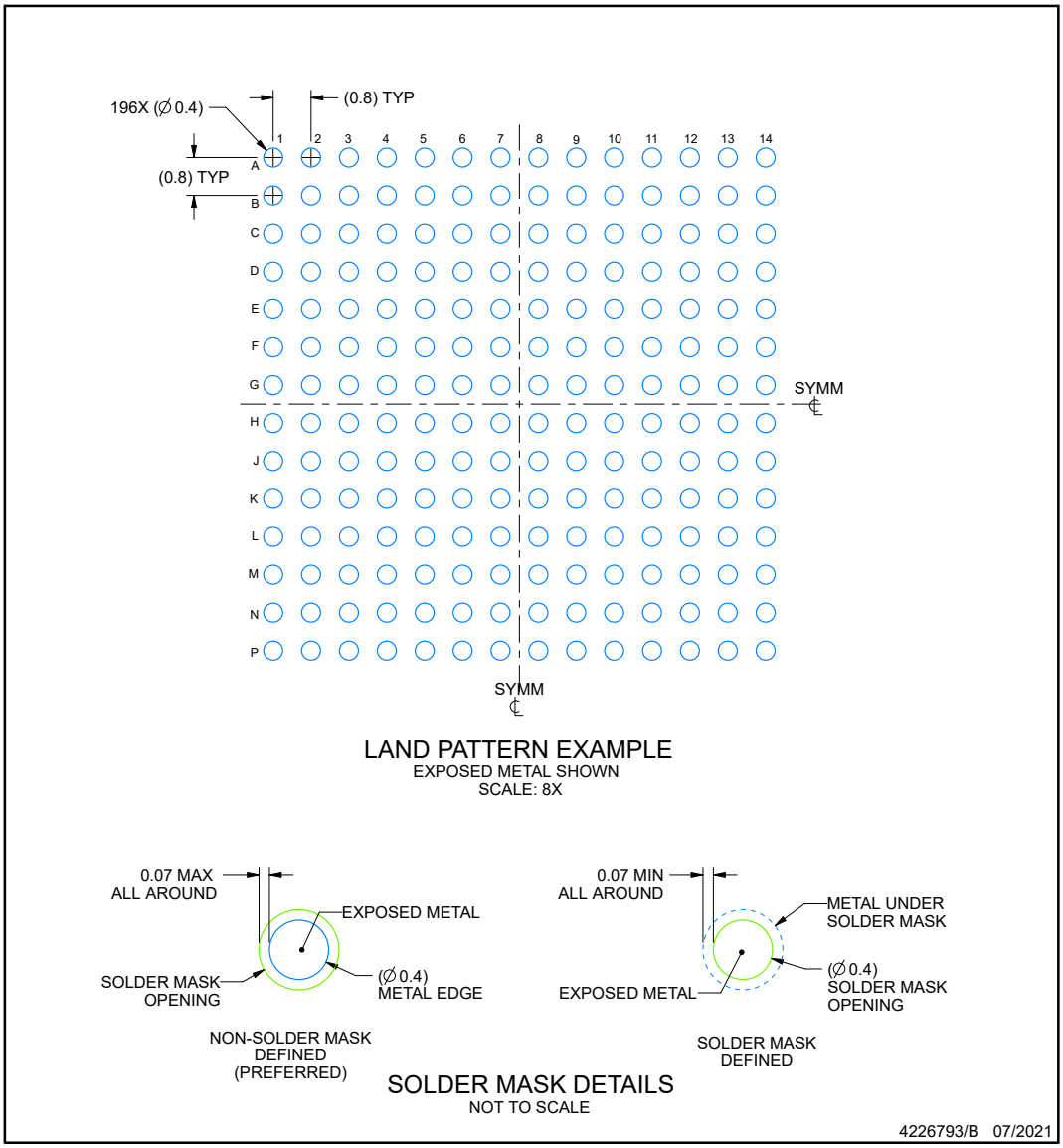
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

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EXAMPLE BOARD LAYOUT

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

BALL GRID ARRAY



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).

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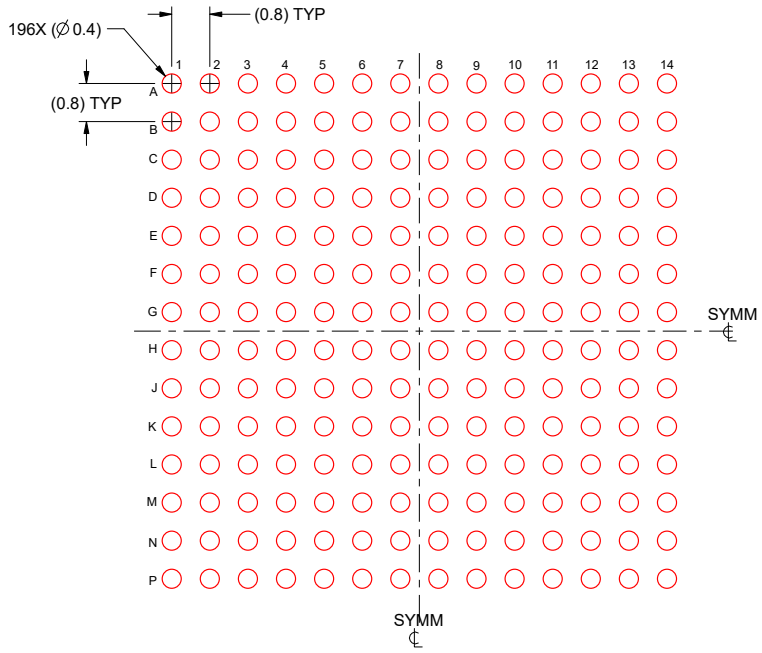
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ADVANCE INFORMATION

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.

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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)
TX08DACP	Active	Production	FCCSP (ACP) | 196	160 | JEDEC TRAY (5+1)	-	Call TI | Snagcu	Level-3-260C-168 HR	0 to 70	(TX08D, TX7364)

(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.

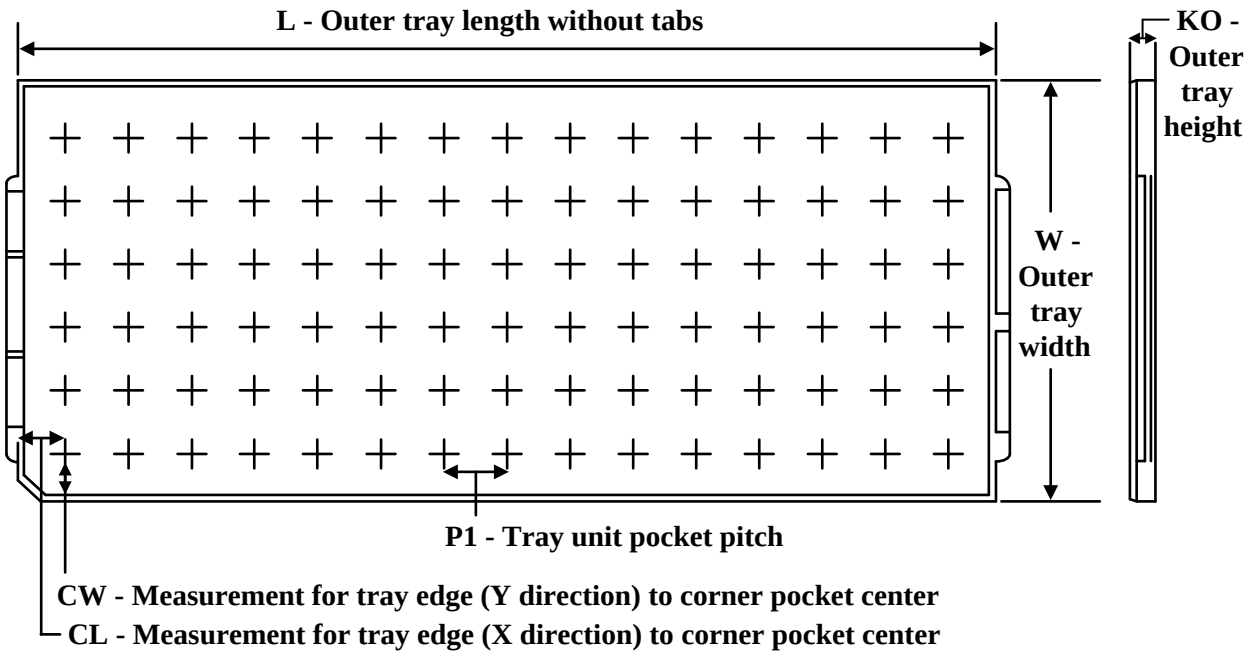
(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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.

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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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