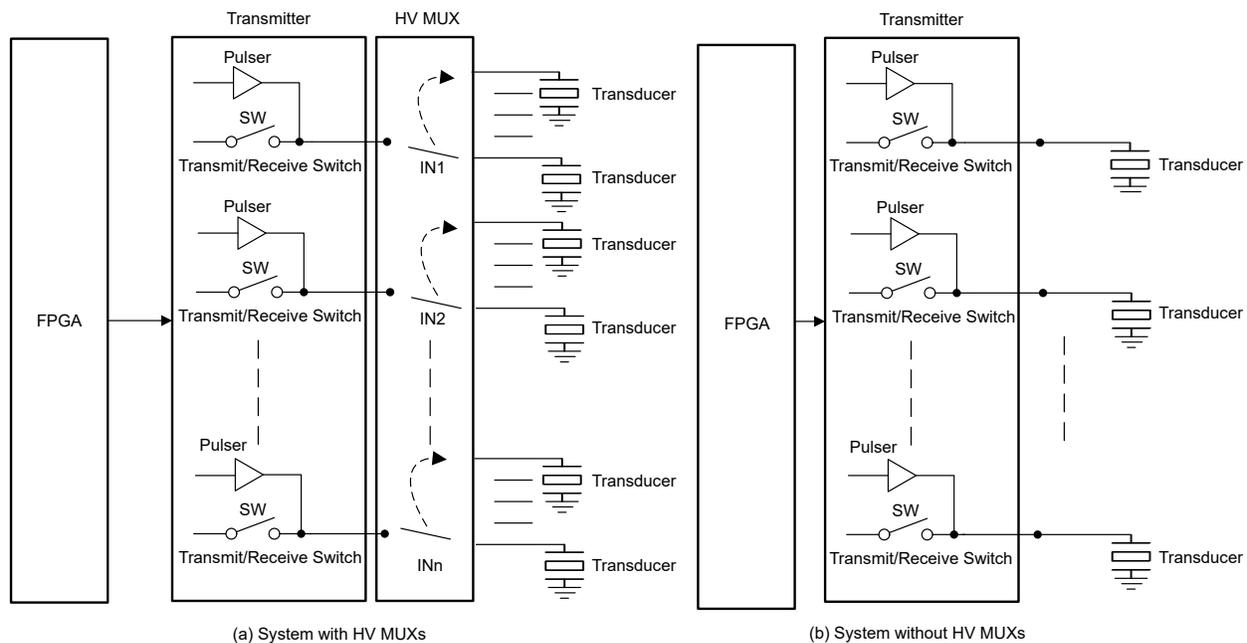


Optimizing the Size of Handheld Ultrasound Front-End Circuit Designs



In handheld ultrasound systems, acoustic aperture, lateral resolution, and signal-to-noise ratio are related to the channel of the transmitter device. More transmit channels mean higher image quality. The architecture of the handheld ultrasound probe transmitter subsystem, shown in the following image, can extend from 16-channels to 128 or more channels. Two common ways to implement this are: (a) through high-voltage multiplexer switches or (b) using integrated pulser (transmitter) devices.



Handheld Ultrasound Probe Transmitter Subsystem

Design Considerations

Comparing Different Transmitter Subsystem Architectures

Recommended TI Device	TX7332 × 4	TMUX9832 × 4 + TX7332	TX7516 × 2 + TMUX9832 × 4
Number of channels	128	128	128
Pulser type	Three-Level	Three-Level	Five-Level
Maximum output	±100 V 1.2 A to 0.3 A	±100 V 1.2 A to 0.3 A	±100 V 2 A to 4 A
–3-dB Bandwidth	20 MHz	20 MHz	35 MHz
Transmit or receive power consumption	18.1 mW/ch × 128 = 2316.8 mW	TX7332: 18.1 mW/ch × 32 = 579.2 mW TMUX9832: 9.5 mW × 4 = 38 mW Total: 617.8 mW	TX7516: 77 mW/ch × 32 = 2464 mW TMUX9832: 9.5 mW × 4 = 38 mW Total: 2502 mW
Area of front-end circuit (only semiconductor devices)	17 × 11 mm ² × 4 = 748 mm ²	17 × 11 mm ² + 7.5 × 7.5 mm ² × 4 = 412 mm ²	10 × 10 mm ² × 2 + 7.5 × 7.5 mm ² × 4 = 425 mm ²

For additional assistance, ask questions to TI audio engineers on the [TI E2E™ Data Converters Support Forum](#).

TI Resources

- [AFE5832LP and AFE5832 Ultrasound AFE for Ultra-Portable Applications](#) Application Brief
- [Highly Integrated Signal Chain Solutions TX7332 and AFE5832LP for Smart Ultrasound Probes](#) Application Report

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