

Switching Ultrasonic and Ultrasound Signals with TMUX9832



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ABSTRACT

Ultrasound multiplexers, like the TMUX9832, enhance system performance by enabling simultaneous signal collection, reducing complexity and supporting scalability. This application note explores three key uses cases - ultrasound imaging, flowmeters, and non destructive testing - to demonstrate how multiplexers can be used to improve data acquisition efficiency and simply system expansion in various industries.

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1 Introduction

Multiplexers play a crucial role in efficiently processing transmitted and received data across various applications, particularly in the realm of ultrasonic technologies. By enabling the simultaneous collection of multiple signals, multiplexers and signal switches enhance the performance of a system while also minimizing the complexity, creating a more efficient overall system. By minimizing complexity, scalability becomes easily implemented, making this simple for systems to significantly increase the data acquisition source (often transducers) with ease. This application note includes three common use cases where a system can benefit by integrating an ultrasound multiplexer, such as the TMUX9832.

2 Ultrasound

In ultrasound systems a multiplexer such as the TMUX9832 can facilitate the management of complex signal data, aiding in probe selection and expanding the functionality of the system. Along with this versatility in applications that the multiplexers can provide, the multiplexers also reduce the transducer or pulser count leading to a reduction in overall cost and complexity. Alternatively, in systems where more transducer density is desired, an ultrasound multiplexer can help scale systems up to as many transducers as needed by simply adding more multiplexers while sharing the same processing stages. Please see Compact 128-Channel Switch Design for Ultrasound Application for more information expanding ultrasound systems with TMUX9832. Overall, multiplexers are essential in optimizing functionality and performance of an ultrasound system.

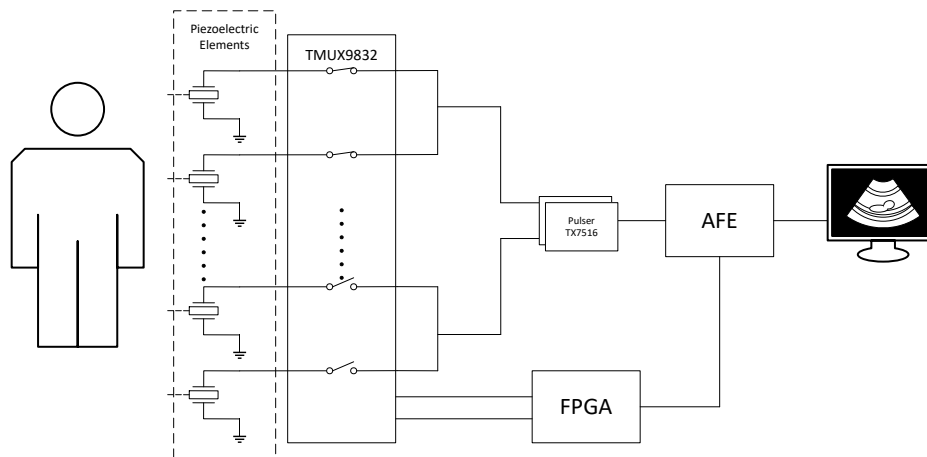


Figure 2-1. Ultrasound Block Diagram

3 Flowmeter

In flowmeters, the TMUX9832 can be used to streamline measurement of fluid dynamics. By allowing the processing of several transducer pairs at once, using a multiplexer improves responsiveness and precision of flow measurements. Using a multiplexer, more transducer elements can be added while not over-inflating the need for extra signal processing elements. This enables a more holistic view of the flow measurements, allowing for more noise to be filtered out. Alternatively, using multiplexers can also reduce the number of transducers needed allowing for the transducer elements (often piezo electric) to share inputs to the signal processing stages. Overall, a multiplexer is a great way to enhance accuracy, efficiency and flexibility within a flowmeter system.

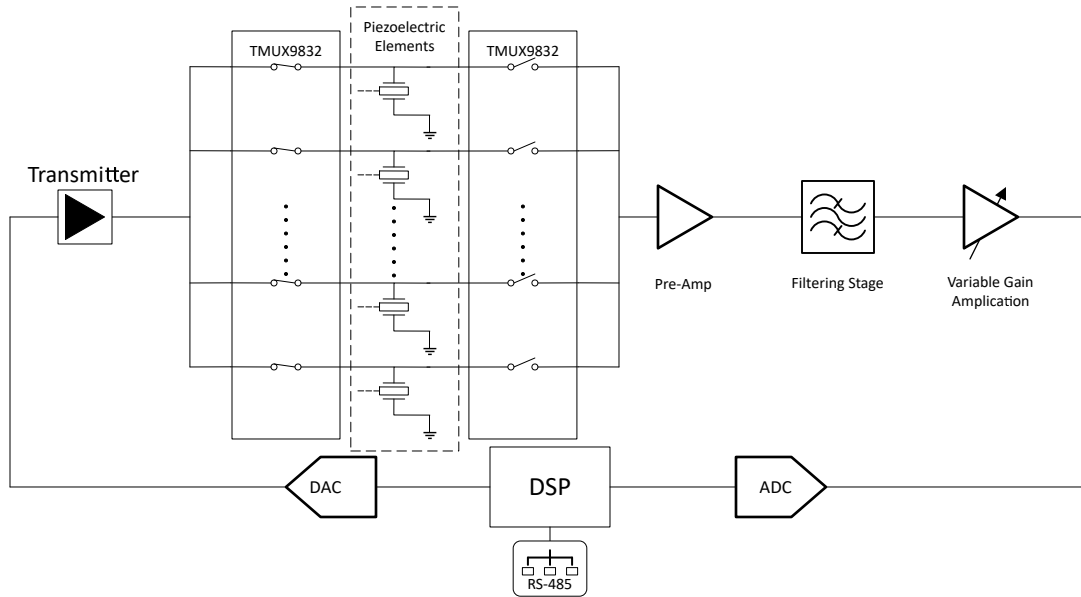


Figure 3-1. Flowmeter block diagram

4 Non-Destructive Testing

Another use case where the TMUX9832 can be used to enhance a system is in Non-Destructive Testing. By allowing for multi-channel signal acquisition simultaneously the collected data from multiple transducers provides a more comprehensive view of larger areas or more precise view of smaller areas. By rapidly switching between channels, the system efficiency isn't compromised resulting in high-quality signal acquisition. Furthermore, the transducer elements can be shared across multiple pulsers and signal processing chains, providing an extra benefit of reduce cost and complexity. In summary, using an ultrasound multiplexer such as the TMUX9832 enhances the effectiveness and reduces the cost and complexity of non-destructive testing by improving functionality, maintaining signal integrity while reducing the need for an abundance of extra components to achieve this.

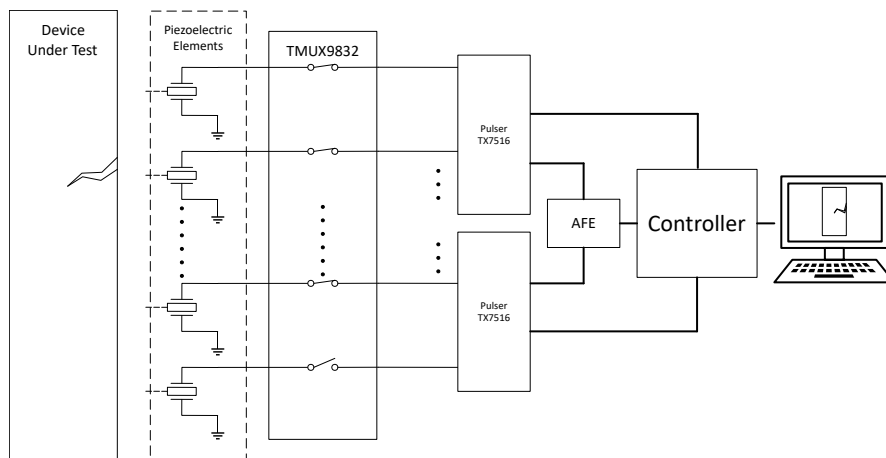


Figure 4-1. Non-Destructive Test (NDT) Block Diagram

5 Summary

The TMUX9832 can be a vital addition in a variety of ultrasonic technology applications by enabling simultaneous data collection, improving system performance and reducing over complexity. This simplification allows for easy scalability, making this possible to expand data acquisition sources, such as transducers. By incorporating a multiplexer such as the TMUX9832, systems can enhance the overall efficiency and functionality.

6 References

- Texas Instruments, [TMUX9832 No High Voltage Bias, Beyond the Supply, 220 V 1:1, 32-Channel Switch With Latch-Up Immunity](#), data sheet.
- Texas Instruments, [TMUX9616x 220-V High Voltage 1:1, 16-Channel Switch with Latch-Up Immunity](#), data sheet.

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