Product Overview

Multiplexers in Hearing Aids

In modern day hearing aids, multiplexers are used to select the audio signal either from omnidirectional or directional microphones to suppress ambient noise and provide a clear audio signal to the user. Since the audio signals need to be multiplexed before pre-amplification to provide the best noise filtering, select a multiplexer with minimal ON resistance and low total harmonic distortion (THD). Moreover, hearing aids are battery powered portable devices, so the design must be as compact and power efficient as possible.

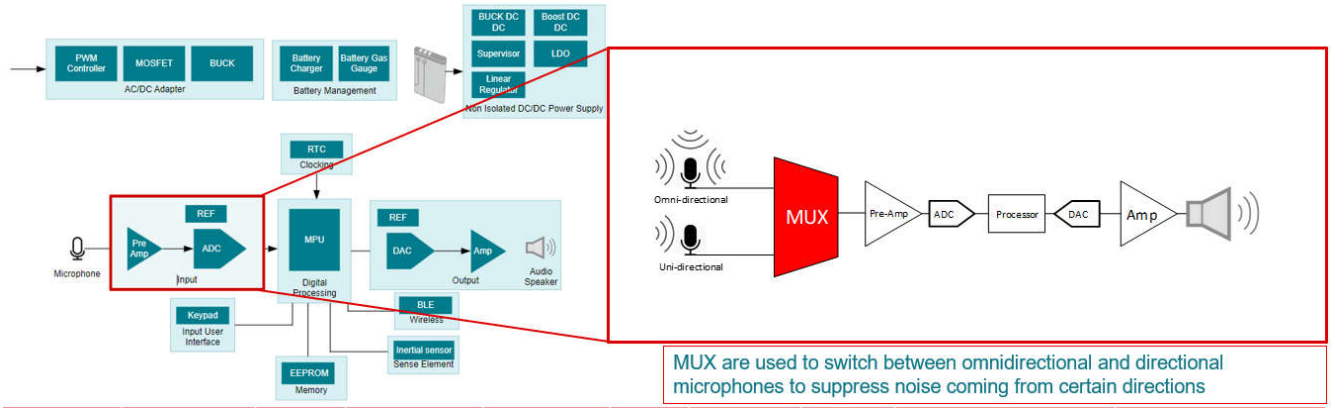

Figure 1. Hearing-Aid Block Diagram

Design Considerations

- RON: Low RON (<1Ω) is needed to maintain audio signal integrity
- Total harmonic distortion (THD) or RON flatness must be kept minimal to maintain audio signal integrity
- Supply Voltage Range: A low-voltage switch must be chosen to support the operating range.
- Package size: The smallest package must be chosen to keep the design compact
- Leakage: Low leakage current to maintain that the battery lasts long enough

Table 1. Recommended Parts

Device	Configuration	I/O Voltage	Supply Voltage	R-ON	C-ON/OFF	Leakage Current	THD
TMUX4827	2:1 x 2	-12V to +12V	1.8V to 5.5V	0.13Ω	40/70pF	20nA	0.0008%
TMUX2889	2:1 x 2	-5.5V to +5.5V	1.8V to 5.5V	0.15Ω	40/70pF	20nA	0.0008%
TS5A12301E	2:1 x 1	0V to 5.5V	2.25V to 5.5V	0.5Ω	112/28pF	2nA	0.003%
TS5A3159	2:1 x 1	0V to 5.5V	1.65V to 5.5V	0.75Ω	84/23pF	2.8nA	0.015%

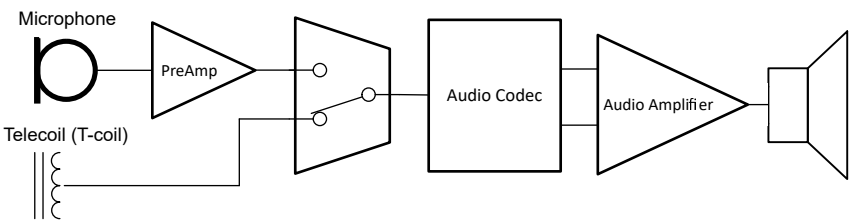

Figure 2. Typical Application

Additional Resources

- Learn about multiplexer parameters with this *TI precision lab video*
- Ask a question on our *TI E2E™ forum*
- Product Page: *Hearing Aid*

For more devices, browse through the *online parametric tool* where you can sort by desired voltage, channel numbers, on-state resistance, and other features.

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