

### A<sup>2</sup>B BUS FEATURES

#### Line topology

- Single main node, up to 16 subordinate nodes
- Up to 15 m between nodes and up to 80 m overall cable length

#### Communication over distance

- Synchronous data
  - Multichannel I<sup>2</sup>S/TDM to I<sup>2</sup>S/TDM
  - Clock synchronous, phase-aligned in all nodes
  - Low latency subordinate-to-subordinate communication

Control and status information I<sup>2</sup>C to I<sup>2</sup>C

GPIO over distance

Bus power or local power subordinate nodes

Configurable with SigmaStudio+ graphical software tool

AEC-Q100 qualified for automotive applications

### BASELINE A<sup>2</sup>B TRANSCEIVER FEATURES

Configurable as A<sup>2</sup>B main or last subordinate nodes

Programmable via I<sup>2</sup>C interface

8-bit to 32-bit multichannel I<sup>2</sup>S/TDM interface

I<sup>2</sup>S/TDM/PDM programmable data rate

I<sup>2</sup>C mailbox

PDM inputs for 4 high dynamic range microphones on main or subordinate nodes

Support for receiving I<sup>2</sup>S/TDM data on nodes with up to 4 PDM microphones

Unique ID register for each transceiver

Support for crossover or straight-through cabling

Programmable settings to optimize EMC performance

### AD2430/AD2438 TRANSCEIVER ENHANCEMENTS

Cable diagnostics with integrated line power switches

Supports 3.3 V input at VIN in low voltage input (LVI) mode for local powered subordinate node

Dedicated hardware reset pin

I<sup>2</sup>S/TDM crossbar switch

Flexible mapping of Tx/Rx TDM channel data to A<sup>2</sup>B slots

Support for I<sup>2</sup>C fast mode plus (1 MHz)

Support for in-cabin LED control using 4 PWM outputs

8 GPIO pins with configurable pin mapping

### AUTOMOTIVE APPLICATIONS

Hands free/speech recognition

Microphone arrays

In-car telematics and emergency call systems

Overhead consoles

In-car communications

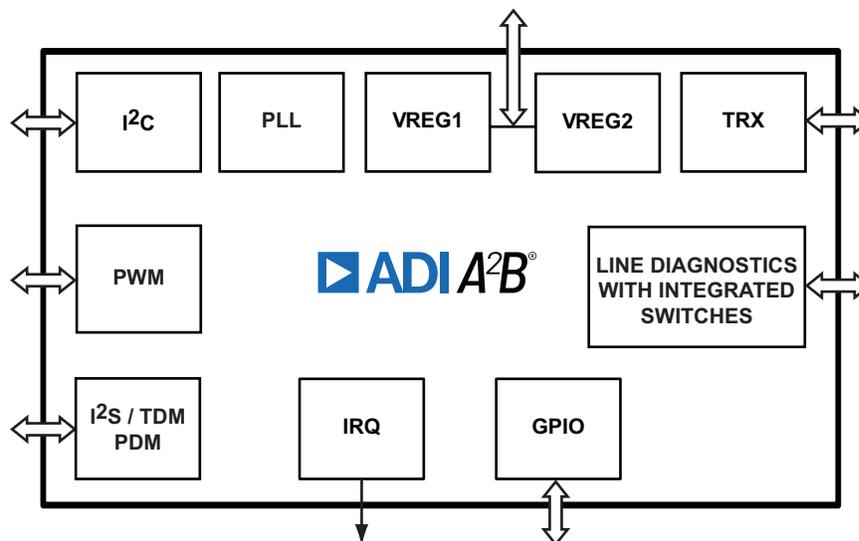


Figure 1. Functional Block Diagram

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# AD2430/AD2438

## GENERAL DESCRIPTION

The Automotive Audio Bus (A<sup>2</sup>B<sup>®</sup>) provides a multichannel, I<sup>2</sup>S/TDM link over distances of up to 15 m between nodes. It embeds bidirectional synchronous pulse-code modulation (PCM) data (for example, digital audio), clock, and synchronization signals onto a single unshielded twisted pair (UTP) differential cable. A<sup>2</sup>B supports a direct point to point connection and allows multiple, daisy-chained nodes at different locations to contribute and/or consume time division multiplexed channel content.

A<sup>2</sup>B is a single-main, multiple-subordinate node system where the transceiver at the host controller is the main transceiver. The main node generates clock, synchronization, and framing for all subordinate nodes. The main A<sup>2</sup>B transceiver chip is programmable over a control bus (I<sup>2</sup>C) for configuration and read back. An extension of this control bus is embedded in the A<sup>2</sup>B data stream, which grants direct access to registers and status information on subordinate node transceivers, as well as I<sup>2</sup>C to I<sup>2</sup>C communication from the host to a peripheral in a subordinate node.

The transceiver can connect directly to general-purpose digital signal processors (DSPs) or microprocessors, field-programmable gate arrays (FPGAs), application-specific integrated circuits (ASICs), microphones, analog-to-digital converters (ADCs), digital-to-analog converters (DACs), and codecs through a multichannel I<sup>2</sup>S/TDM interface. It also provides a pulse density modulation (PDM) interface for direct connection of up to four PDM digital microphones. The transceiver's pulse width modulated (PWM) outputs can control LED drivers or voltage regulators. GPIO status and control is directly conveyed between nodes.

Additionally, the transceiver also supports an A<sup>2</sup>B bus powering feature, where the main node supplies voltage and current to the subordinate nodes over the same daisy-chained, twisted pair wire cable as used for the communication link.

Complete technical specifications are available for the A<sup>2</sup>B transceiver. Contact your nearest Analog Devices sales office to complete the nondisclosure agreement (NDA) required to receive additional product information.

Table 1. Product Comparison Guide

Feature	AD2430	AD2438
Main capable/subordinate capable	Yes/Yes <sup>1</sup>	Yes/No
Maximum number subordinate nodes <sup>2</sup>	2	Specification defined by the most restrictive device data sheet in systems with AD2421, AD2422, AD2425, AD2426, AD2427, AD2428, AD2430, AD2431, AD2432, AD2433, or AD2435
Functional TRX blocks	1	1
Maximum number audio channels	Up to 7 slots	Up to 64 slots with maximum of 32 slots in one direction
I <sup>2</sup> S/TDM support	Yes	Yes
PDM microphone inputs	4 mics	4 mics
PWM support	Yes	Yes
Available A <sup>2</sup> B bus power	Up to 700 mW	Up to 700 mW
Maximum node to node cable length	Up to 15 m	Up to 15 m
Package	32-lead LFCSP	32-lead LFCSP

<sup>1</sup> Last subordinate node only.

<sup>2</sup> Interoperable with AD242x and AD243x products. Refer to the respective product data sheet for further details. Specification defined by the most restrictive device data sheet in systems with AD2421, AD2422, AD2425, AD2426, AD2427, AD2428, AD2430, AD2431, AD2432, AD2433, or AD2435.

I<sup>2</sup>C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).