A2B 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 I2S/TDM to I2S/TDM
    - Clock synchronous, phase-aligned in all nodes
    - Low latency subordinate-to-subordinate communication
  - Control and status information I2C to I2C
  - GPIO over distance
- Bus power or local power subordinate nodes
- Configurable with SigmaStudio+ graphical software tool
- AEC-Q100 qualified for automotive applications

BASELINE A2B TRANSCEIVER FEATURES

- Configurable as A2B main or last subordinate nodes
- Programmable via I2C interface
- 8-bit to 32-bit multichannel I2S/TDM interface
  - I2S/TDM/PDM programmable data rate
  - I2C mailbox
  - PDM inputs for 4 high dynamic range microphones on main or subordinate nodes
- Support for receiving I2S/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
- I2S/TDM crossbar switch
  - Flexible mapping of Tx/Rx TDM channel data to A2B slots
- Support for I2C 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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GENERAL DESCRIPTION

The Automotive Audio Bus (A2B®) provides a multichannel, I2S/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. A2B 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.

A2B 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 A2B transceiver chip is programmable over a control bus (I2C) for configuration and read back. An extension of this control bus is embedded in the A2B data stream, which grants direct access to registers and status information on subordinate node transceivers, as well as I2C to I2C 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 I2S/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 A2B 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 A2B 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>AD2430</th>
<th>AD2438</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main capable/subordinate capable</td>
<td>Yes/Yes¹</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Maximum number subordinate nodes²</td>
<td>2</td>
<td>Specification defined by the most restrictive device data sheet in systems with AD2421, AD2422, AD2425, AD2426, AD2427, AD2428, AD2430, AD2431, AD2432, AD2433, or AD2435</td>
</tr>
<tr>
<td>Functional TRX blocks</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Maximum number audio channels</td>
<td>Up to 7 slots</td>
<td>Up to 64 slots with maximum of 32 slots in one direction</td>
</tr>
<tr>
<td>I2S/TDM support</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PDM microphone inputs</td>
<td>4 mics</td>
<td>4 mics</td>
</tr>
<tr>
<td>PWM support</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Available A2B bus power</td>
<td>Up to 700 mW</td>
<td>Up to 700 mW</td>
</tr>
<tr>
<td>Maximum node to node cable length</td>
<td>Up to 15 m</td>
<td>Up to 15 m</td>
</tr>
<tr>
<td>Package</td>
<td>32-lead LFCSP</td>
<td>32-lead LFCSP</td>
</tr>
</tbody>
</table>

¹ Last subordinate node only.
² 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.

I2C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).