**APPLICATION
EXAMPLES
INCLUDED**

Code 7790

coreA2B

*lab*CORE board for A²B® bus

OVERVIEW

coreA2B

Code 7790

*core*A2B is a *lab*CORE hardware extension for the Analog Devices Automotive Audio Bus (A^{2}B®). With this board, *lab*CORE can connect to A^{2}B® in four user-selectable modes.

*core*A2B can replace the master or a slave node. It can listen passively to the bus ("sniffing"). In Proxy mode, *core*A2B can actively receive and insert user-specified signals from a fully-operational bus. In this mode, *core*A2B gains full control over any signal on the bus without any need for its reconfiguration.

Additionally, *core*A2B can also be used as an A^{2}B® evaluation board, allowing to use all capabilities of analyzing and manipulating signals in ACQUA.

KEY FEATURES

Testing of built-in and aftermarket hands-free systems, wired and wireless headsets used in vehicles

Recording and digital injection of background noise via A^{2}B®

APPLICATIONS

Experimental development and optimization of vehicle hands-free terminals with objective evaluation of sound quality

Optimizing positioning of hands-free microphones and loudspeakers in vehicles

Testing and design verification of A2B® buses and devices

Measuring and manipulating data on A2B® buses

Inserting and receiving configuration and audio data into/from A2B® buses

Developing new A2B® configurations and devices

Troubleshooting existing A2B® buses and devices

AUTOMOTIVE AUDIO BUS

DETAILS

DESCRIPTION

Automotive Audio Bus (A^{2}B®) is a digital bus system for vehicles developed by Analog Devices. It is designed to transmit audio data, control commands, and other information between audio devices across a two-wire bus system. A^{2}B® connects all devices (nodes) in a daisy chain configuration. This significantly reduces the amount of wiring required for the complex audio systems of modern vehicles with multiple amplifiers, microphones, and loudspeakers.

coreA2B provides four modes to connect to any A^{2}B® bus:
› Master
› Slave
› Bus monitor
› Proxy

The mode can be chosen by the user depending on a particular task. Additionally, coreA2B can also be used as an A^{2}B® evaluation board, enabling to use all capabilities of analyzing and manipulating signals in ACQUA.

The bus works in duplex mode in order for the master to send data to slaves, but also for slaves to send data back to the master. This way, a slave can be a sink, e.g., an amplifier for a loudspeaker, but also a source, e.g., a microphone. Additionally, it is possible to exchange status data and other information across the bus.

Having access to the bus is vital for performing comprehensive tests and measurements in a vehicle with an A^{2}B® system. Only then it is possible to test, evaluate, develop, and tune the audio system.

See table below for individual requirements and features of each mode.

| coreA2B modes | Requirements | | | Features | | | |
| | Bus config. must be accessible | coreA2B takes node position | Position on bus | Configuration data | | Audio data | |
				Insert	Receive	Insert	Receive
Master	Yes	Yes	Replaces master	•		•	•
Slave	Yes	Yes	Replaces any slave		•	•	•
Bus monitor	Only sniffing bit	No	Arbitrary[1]		•		•
Proxy	No	No	Arbitrary[1]	•	•	•	•
Evaluation board	n/a	Yes	Replaces master	•[2]		•	•

GENERAL REQUIREMENTS

Hardware

*lab*CORE (Code 7700)
› Modular multi-channel hardware platform
*core*BUS (Code 7710)
› *lab*CORE I/O bus mainboard

Software

ACQUA (Code 6810)
› Advanced Communication Quality Analysis Software, full license version

SCOPE OF DELIVERY

*core*A2B (Code 7790)
› *lab*CORE extension board for A^{2}B®
Initial equipping
› *core*A2B is installed to *lab*CORE during production
Retrofitting
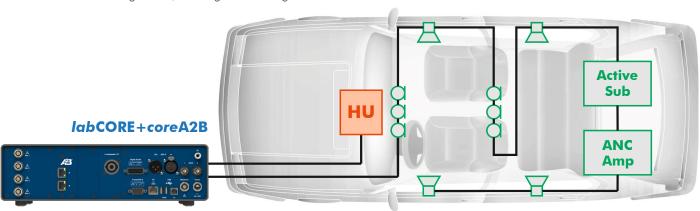› Send in *lab*CORE to HEAD acoustics for installation

IN PRACTICE

Proxy mode

The Proxy mode is the most versatile mode for *core*A2B. In conjunction with *lab*CORE and ACQUA, Proxy mode enables *core*A2B to receive, mix, and insert arbitrary signals to the bus without interference with the original, unaltered signal. The board can be connected anywhere on the bus (preferably between master and first slave) and taps into its audio and I^{2}C data. The bus doesn't need reconfiguration, "sniffing bit" is disregarded.

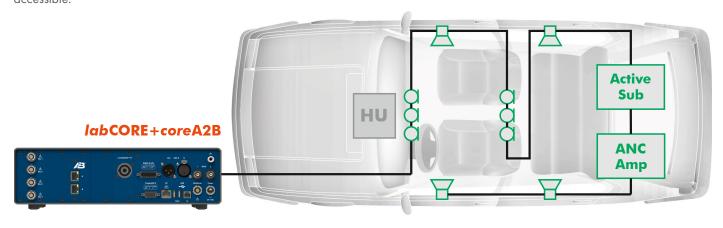In this mode *core*A2B doesn't occupy the master or any slave node position.

All of the digital data on the bus (configuration and audio) between the master and all slaves behind *core*A2B can be manipulated in ACQUA as required

*lab*CORE+*core*A2B

Master mode

In Master mode, *lab*CORE with *core*A2B replaces the bus master and thus takes control over the bus. It is able to insert and receive audio data into / from the bus and can insert configuration data for slave nodes. Up to 10 slave devices can be connected to *core*A2B. For this mode, configuration of the bus must be accessible.

In this mode, *core*A2B replaces the original master (e.g., head unit). Setup is performed via a configuration file exported from the Analog Devices SigmaStudio® software tool. *core*A2B supplies bus-powered slaves, externally powered slaves may need manual triggering to power on.
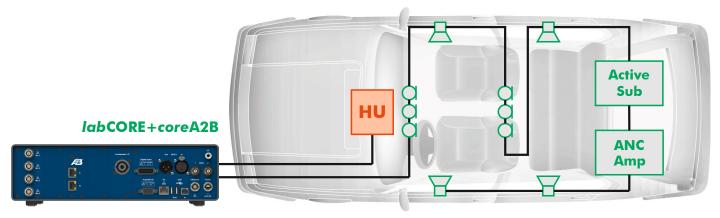

*lab*CORE+*core*A2B

Slave mode

In Slave mode, *lab*CORE with *core*A2B replaces one slave on the bus. It is able to insert and receive audio data into / from the bus and can receive configuration data from the bus master. The configuration of the bus must be accessible.

This mode enables *core*A2B to act as a slave node on an existing bus. The master's configuration file has to be accessible to add *core*A2B to the bus as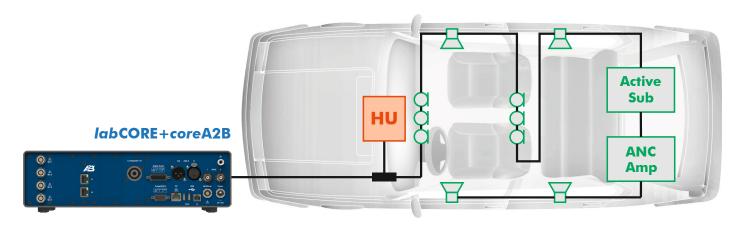 a new slave node. In this mode, *core*A2B can send and receive audio data as well as receive configuration data. It can be inserted at any position on the bus, taking one of the 10 slave node positions.

Bus monitor mode

In Bus monitor mode, *lab*CORE with *core*A2B only "sniffs" configuration and audio data on the bus. Therefore it is not able to insert any data, but also does not occupy a node position on the bus. The configuration of the bus does not have to be accessible, but the "sniffing bit" of the bus must be set.

This mode is for analyzing data traffic on the bus without interference, e.g., for troubleshooting an existing bus. *core*A2B acts as a neutral instance, sniffing out audio and configuration data at an arbitrary point on the bus (preferably between master and first slave). To allow *core*A2B to receive audio data, the "sniffing bit" for the bus must be set.

Evaluation board

In conjunction with an adapter cable, *core*A2B can also serve as an evaluation board for A^{2}B®. Setup of the bus is performed via the Analog Devices SigmaStudio™ software tool. As an evaluation board, *core*A2B operates in Master mode and enables to use all capabilities of analyzing, filtering, and manipulating signals that ACQUA offers.

The board enables to examine, measure, test, manipulate, and perform design verification of A^{2}B® buses and devices. With the multiple inputs and outputs of *lab*CORE and ACQUA's capabilities of analyzing, filtering, and manipulating signals, *core*A2B is a full-featured test, measurement, and development platform for A^{2}B® configurations and devices.

1. Due to the design of A2B® buses, *core*A2B can only access data of downstream slave nodes. Thus, it is recommended to establish the connection between the master and the first slave in order to access all data on the bus.
2. Via the freely available software tool Analog Devices SigmaStudio®.

Automotive Audio Bus® (A2B®) is a trademark of Analog Devices, Inc.

SigmaStudio® is a trademark of Analog Devices, Inc.

HEAD acoustics

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