System Overview

Introduction   dSPACE provides the MicroAutoBox in different variants. This section gives you an overview on the MicroAutoBox's hardware concept and the differences of the MicroAutoBox variants.

Where to go from here   Information in this section

Hardware Concept

Hardware components   A MicroAutoBox system consists of two or three boards in a milled aluminum box:

■ One DS1401 base board

■ One or two I/O boards (DS15xx)

Optionally, the MicroAutoBox Embedded PC is integrated in a MicroAutoBox system.

The DS1401 base board and the I/O boards are connected via an internal bus (intermodule bus).

For details on MicroAutoBox's hardware package, refer to *Hardware* (📖 *MicroAutoBox II Hardware Installation and Configuration*).

DS1401 base board

The DS1401 base board provides the basic units of MicroAutoBox, for example, the PowerPC processor, the memory and the onboard power supply unit. Because the PowerPC is executing the real-time application, it is called the *Master PPC*.

I/O boards

The I/O boards that can be combined with the DS1401 base board particularly determine the I/O functionality of the whole MicroAutoBox system.

MicroAutoBox variant   A MicroAutoBox system consists of one or two I/O boards depending on the MicroAutoBox variant you have purchased. For example, MicroAutoBox II 1401/1511/1512 consists of the DS1401 base board and the DS1511 and DS1512 I/O Boards. The following variants exist:

- MicroAutoBox II 1401/1501
- MicroAutoBox II 1401/1504
- MicroAutoBox II 1401/1505/1507
- MicroAutoBox II 1401/1507
- MicroAutoBox II 1401/1511
- MicroAutoBox II 1401/1511/1512
- MicroAutoBox II 1401/1511/1514
- MicroAutoBox II 1401/1512/1513
- MicroAutoBox II 1401/1513
- MicroAutoBox II 1401/1513/1514
- MicroAutoBox with DS1552 Multi-I/O Module
- MicroAutoBox with DS1554 Engine Control I/O Module
- MicroAutoBox II with MicroAutoBox Embedded PC
  - Intel® Atom™ Processor N270
  - Intel® Core™ i7-3517UE Processor

For an overview of the variant-specific features, refer to *Feature Support* on page 42.

For information on the I/O boards revisions and the required boot firmware versions, refer to *Overview of Board Revisions* on page 24.

I/O board subcomponents	Depending on the I/O board type, the I/O board has specific functional subcomponents:

Digital I/O subsystem (Slave DIO MC)   The MicroAutoBox variants 1401/1501, 1401/1504, and 1401/1505/1507 also include a digital I/O subsystem based on the Motorola 68336 microcontroller. It is briefly named as *Slave DIO MC*. Among other I/O capabilities, the microcontroller provides timing management functions, which makes especially this subsystem useful for engine and chassis control. The Slave DIO MC has been supplemented with a 64-kWord external memory and a 4-kWord dual-port memory (DPMEM) for communication with the Master PPC (a Word is 16-bit wide). The PowerPC of the DS1401 is the master, whereas the Slave DIO MC is the slave.

CAN subsystem (Slave CAN MC)   A further subsystem of the I/O board providing CAN microcontrollers with two different clock rates, is used for connection to up to two CAN buses. It is briefly named as *Slave CAN MC*. The PPC of the DS1401 is the master, whereas the CAN microcontrollers are slaves.

FlexRay IP modules   FlexRay IP modules are used for connection to a FlexRay bus. No microcontroller is used.

Available I/O modules	On the DS1512 and the DS1514 I/O boards you can mount an I/O module, that is a piggyback board, to enlarge the I/O capability of your MicroAutoBox. An I/O module provides signal conditioning for the mapped I/O pins.

DS1552 Multi-I/O Module   With the DS1552 Multi-I/O Module you can extend your MicroAutoBox with the following features by using the RTI DS1552 I/O Extension Blockset or the *FPGA1401Tp1 with DS1552 Multi-I/O Module* framework from the RTI FPGA Programming Blockset.

The following features are provided by the RTI DS1552 I/O Extension Blockset:

- Analog input channels
    - *ADC 1552 Type 1 Unit* on page 146
    - *ADC 1552 Type 2 Unit* on page 155
- Analog output channels
    - *DAC 1552 Type 1 Unit* on page 183

- ■ Digital input channels for signal measurement
    - ■ *Bit I/O Unit (DIO 1552 Type 1)* on page 174
    - ■ *PWM Measurement (PWM2D) on the DIO 1552 Type 1 Unit* on page 290
    - ■ *Frequency Measurement (F2D) on the DIO 1552 Type 1 Unit* on page 308
- ■ Digital output channels for signal generation
    - ■ *Bit I/O Unit (DIO 1552 Type 1)* on page 174
    - ■ *PWM Generation (PWM) on the DIO 1552 Type 1 Unit* on page 220
    - ■ *Square-Wave Signal Generation (FREQ) on the DIO 1552 Type 1 Unit* on page 230
- ■ When using the RTI FPGA Programming Blockset, you can additionally use:
    - ■ Bidirectional digital channels
    - ■ Sensor supply channel
    - ■ Serial interface (RS232 and RS422/485)

    For further information, refer to *Hardware Supported by the RTI FPGA Programming Blockset* (📖 *RTI FPGA Programming Blockset Guide*).

DS1554 Engine Control I/O Module   With the DS1554 Engine Control I/O Module you can extend your MicroAutoBox with the following features only by using the *FPGA1401Tp1 with DS1554 Engine Control Module* framework from the RTI FPGA Programming Blockset:

- ■ Analog input channels
- ■ Digital output channels
- ■ Digital bidirectional channels
- ■ Additional channels for specific engine control features, such as:
    - ■ Crankshaft measurement
    - ■ Camshaft measurement
    - ■ Support of knock sensors

For further information, refer to *Hardware Supported by the RTI FPGA Programming Blockset* (📖 *RTI FPGA Programming Blockset Guide*).

MicroAutoBox Embedded PC   MicroAutoBox can be enhanced with the MicroAutoBox Embedded PC. The MicroAutoBox EmbeddedPC is powered via the

MicroAutoBox power input connector. With the common power input, you can control the power-on and power-off behavior of the entire system. With a connected keyboard and monitor, you can use the MicroAutoBox Embedded PC as host PC.

The MicroAutoBox Embedded PC provides standard connectors for several use cases, for example:

■ DVI-I connector for graphical devices

■ Ethernet interface 100/1000 Mbit/s (two RJ45 connectors, one LEMO connector)

■ USB connectors

For further information, refer to *Using MicroAutoBox Embedded PC* (📖 *MicroAutoBox II Hardware Installation and Configuration*) and *Data Sheet for MicroAutoBox Embedded PC* (📖 *MicroAutoBox II Hardware Installation and Configuration*)

Related topics

Basics

• *Feature Support* on page 42

Overview of Board Revisions

Introduction

MicroAutoBox was first released in October 1999. The major updates of the DS1401 Base Board and the I/O boards are listed below.

DS1401 base board revisions

Tip

The board revision is printed on a type plate on the bottom of your MicroAutoBox. You can also read the board revision on the DS1401 Properties page in your experimentation software.