DS2002 Multi-Channel A/D Board

RTI Reference

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dSPACE

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- Local dSPACE companies and distributors: http://www.dspace.com/go/locations
- For countries not listed, contact dSPACE GmbH in Paderborn, Germany.
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You can also use the support request form: http://www.dspace.com/go/supportrequest. If you are logged on to mydSPACE, you are automatically identified and do not need to add your contact details manually.

If possible, always provide the relevant dSPACE License ID or the serial number of the CmContainer in your support request.

Software Updates and Patches

dSPACE strongly recommends that you download and install the most recent patches for your current dSPACE installation. Visit http://www.dspace.com/go/patches for software updates and patches.

Important Notice

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About This Reference

Content

This RTI Reference provides a full description of the Real-Time Interface (RTI) software support for the DS2002 Multi-Channel A/D Board, which can be controlled by the DS1006 Processor Board and DS1007 PPC Processor Board.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazard that, if not avoided, could result in property damage.
Note	Indicates important information that you should take into account to avoid malfunctions.
Tip	Indicates tips that can make your work easier.
	Indicates a link that refers to a definition in the glossary, which you can find at the end of the document unless stated otherwise.
	Precedes the document title in a link that refers to another document.

Naming conventions

dSPACE user documentation uses the following naming conventions:

%name% Names enclosed in percent signs refer to environment variables for file and path names.

< > Angle brackets contain wildcard characters or placeholders for variable file and path names, etc.

Examples:

- Where you find terms such as `rti<XXXX>` replace them by the RTI platform support you are using, for example, `rti1007`.
- Where you find terms such as `<model>` or `<submodel>` in this document, replace them by the actual name of your model or submodel. For example, if the name of your Simulink model is `smd_1007_sl.slx` and you are asked to edit the `<model>_usr.c` file, you actually have to edit the `smd_1007_sl_usr.c` file.

RTI block name conventions All I/O blocks have default names based on dSPACE's board naming conventions:

- Most RTI block names start with the board name.
- A short description of functionality is added.
- Most RTI block names also have a suffix.

Suffix	Meaning
B	Board number (for PHS-bus-based systems)
M	Module number (for MicroAutoBox II)
C	Channel number
G	Group number
CON	Converter number
BL	Block number
P	Port number
I	Interrupt number

A suffix is followed by the appropriate number. For example, DS2201IN_B2_C14 represents a digital input block located on a DS2201 board. The suffix indicates board number 2 and channel number 14 of the block. For more general block naming, the numbers are replaced by variables (for example, DS2201IN_Bx_Cy).

Special folders

Some software products use the following special folders:

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

`%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>`

or

`%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>`

Documents folder A standard folder for user-specific documents.

`%USERPROFILE%\Documents\dSPACE\<ProductName>\<VersionNumber>`

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

`%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\<ProductName>`

Accessing dSPACE Help and PDF Files

After you install and decrypt dSPACE software, the documentation for the installed products is available in dSPACE Help and as PDF files.

dSPACE Help (local) You can open your local installation of dSPACE Help:

- On its home page via Windows Start Menu
- On specific content using context-sensitive help via **F1**

dSPACE Help (Web) You can access the Web version of dSPACE Help at www.dspace.com.

To access the Web version, you must have a *mydSPACE* account.

PDF files You can access PDF files via the icon in dSPACE Help. The PDF opens on the first page.

General Information on the DS2002 Blockset

Overview of the DS2002 Blockset

About this board

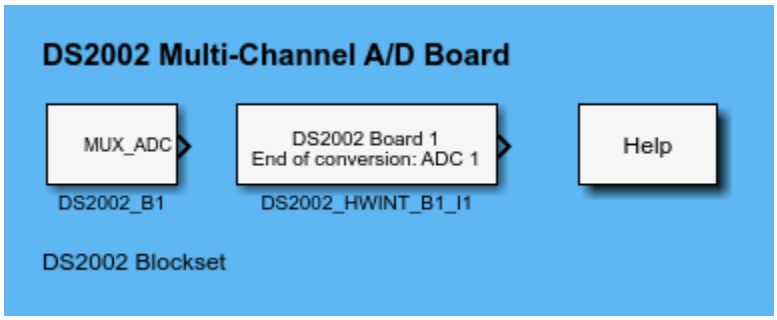
The DS2002 Multi-Channel A/D Board provides 32 A/D channels of 2 independent A/D converters. You can choose between various channel numbers, resolutions and speeds.

RTI blockset

The Real-Time Interface (RTI) board library for the DS2002 Multi-Channel A/D Board provides the RTI blocks that implement the functionality and I/O capabilities of the DS2002 board in Simulink models.

DS2002

After you double-click the corresponding board library icon in the rtilibm library, the Library: rtilibm/DS2002 opens:



The following I/O units can be accessed by the RTI blockset for the DS2002:

- ADC Unit on page 11
- Interrupts on page 15

Demo model

For Simulink models that show how to use the RTI blocks of the DS2002 board, refer to the RTI demo library of your processor board. You can also find the model files at `<RCP_HIL_InstallationPath>\Demos\<ProcessorBoard>\RTI`.

Related topics

Basics

ADC Unit (DS2002 Features 🕮)
Interrupts (DS2002 Features 🕮)

References

ADC Unit 11
ADC Unit (DS2002 RTLib Reference 🕮)
Interrupts 15

ADC Unit

Objective	The Library: rtilibm/DS2002 provides access to the ADC unit of the DS2002.
Demo model	For a demo model using the ADC unit, refer to `<RCP_HIL_InstallationPath>\Demos\<ProcessorBoard>\RTI\demom_ds2002_1.slx`. This is the DS2002, DS2101 model, which you can find in the processor board's RTI demo library.

DS2002_Bx

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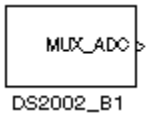
Block Description (DS2002_Bx)

Block



Purpose

To get access to up to 32 multiplexed channels of 2 A/D converters (ADC1, ADC2).

Note

Because the A/D conversion works in polling mode, do not specify an *end of conversion* interrupt using the HWINT block. Otherwise the processor will be blocked. For further information, refer to Limitations (DS2002 Features 🕮).

I/O mapping

For details on the I/O mapping, refer to ADC Unit (DS2002 Features 🕮).

I/O characteristics

- The scaling between the analog input voltage and the output of the block is:

Input Voltage Range	Simulink Output
±5 V DC	±1.0
±10 V DC	±1.0

- The width of the block output vector matches the number of selected channels.
- The DS2002 board uses 2 parallel A/D converters. Channels 1 … 16 are multiplexed to the first converter and channels 17 … 32 are multiplexed to the second converter.

- For optimized data conversion you should distribute your inputs across the 2 A/D converters of the board. The DS2002 board is able to convert channel pairs 1/17, 2/18, … 16/32 in parallel. For example, use channels 1, 2, 17 and 18 if your application needs 4 input channels.

Note

When starting, data conversion takes place for all selected channels. A second conversion must not be started until the first one has finished completely and all sampled data has been read out. For this reason all channels must be sampled in a single task, and thus only one DS2002 block could be used in a Simulink model.

Dialog pages

The dialog settings can be specified on the following pages:

- Unit Page (DS2002_Bx) on page 13
- Parameters Page (DS2002_Bx) on page 14

Related RTLib functions

ds2002_block_init, ds2002_init, ds2002_set_range, ds2002_set_shmode, ds2002_set_wordlen, ds2002_block_in

Unit Page (DS2002_Bx)

Purpose

To specify the board number, and to select a set of channels of the 2 A/D converters.

Dialog settings

Board number Lets you select the board number in the range 1 … 16. If your system contains several boards of the same type, RTI uses the board number to distinguish between them.

ADC1 Lets you select a set of up to 16 channels (channels 1 … 16) of the first A/D converter.

ADC2 Lets you select a set of up to 16 channels (channels 17 … 32) of the second A/D converter.

To select all or none of the 32 channels of both converters, push the All or the None button, respectively.

Related topics

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Parameters Page (DS2002_Bx)

Purpose

To specify the input voltage range and the bit resolution.

Dialog settings

Input voltage range Lets you select the input voltage ranges of ±5 V or ±10 V for each channel. To select all of the channels, specify the desired value before pushing the **Set all** button.

Resolution of the converters Lets you specify the bit resolution of 4, 8, 12 or 16 bits for each of the 2 converters.

Tip

You can achieve faster conversion times by lowering the resolution of the converters. For detailed information, refer to Faster A/D Conversion via Short-Cycling (DS2002 Features 🕮).

Related topics

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Interrupts

Objective

The Library: rtilibm/DS2002 provides access to the hardware interrupts of the DS2002.

DS2002_HWINT_Bx_Iy

Where to go from here

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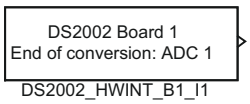
Block Description (DS2002_HWINT_Bx_Iy)

Block



Purpose

To make the hardware interrupts of the DS2002 board available as trigger sources in a block diagram.

Note

Because the A/D conversion works in polling mode, do not specify an *end of conversion* interrupt using the HWINT block. Otherwise the processor will be blocked. For further information, refer to Limitations (DS2002 Features 🕮).

Dialog pages

The dialog settings can be specified on the following page:

- Unit Page (DS2002_HWINT_Bx_Iy) on page 16

Unit Page (DS2002_HWINT_Bx_Iy)

Purpose

To specify the hardware interrupts of the DS2002 board as trigger sources.

Dialog settings

Board number Lets you select the board number in the range 1 … 16. If your system contains several boards of the same type, RTI uses the board number to distinguish between them.

Type Lets you select the type of the interrupt source. An interrupt on end of conversion is available for each of the 2 converters:

Interrupt No.	Interrupt Type
1	End of conversion ADC 1
2	End of conversion ADC 2

Related topics

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