DS2301 Direct Digital Synthesis Board

RTI Reference

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dSPACE

How to Contact dSPACE

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How to Contact dSPACE Support

If you encounter a problem when using dSPACE products, contact your local dSPACE representative:

- Local dSPACE companies and distributors: http://www.dspace.com/go/locations
- For countries not listed, contact dSPACE GmbH in Paderborn, Germany.
  Tel.: +49 5251 1638-941 or e-mail: support@dspace.de

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

Contents

About This Reference

Introduction

This RTI Reference provides a full description of the Real-Time Interface (RTI) software support for the DS2301 Direct Digital Synthesis 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 DS2301 Blockset

Introduction

Here you get basic information on the DS2301 blockset.

Overview of the DS2301 Blockset

Introduction

The blocks of the Real-Time Interface (RTI) board library for the DS2301 Direct Digital Synthesis Board allow you to exchange data between your Simulink application and an application running on one of the 6 DSPs. The communication is established via the dual-port memories of the DDS board.

Note

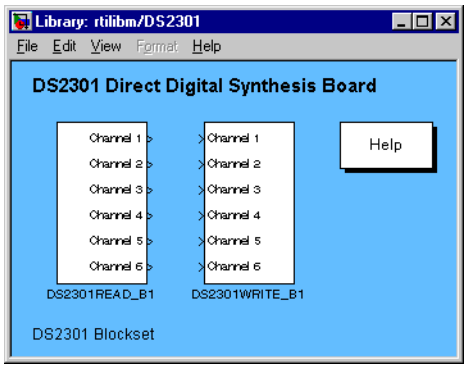
With RTI you cannot build applications for the DSPs on the DS2301 board based on Simulink block diagrams.

About the board

The DS2301 Direct Digital Synthesis Board is equipped with 6 DSPs and is designed for fast and flexible waveform generation. It computes each signal sample just-in-time on a DSP and outputs it immediately.

Library access

After you double-click the corresponding board library icon in the library rtilibm the Library: rtilibm/DS2301 opens:



Library components

The following I/O units can be accessed by the RTI blockset for the DS2301:

- Access to the DPMEM Areas of the DDS Board on page 11

Demo model

For Simulink models, that shows how to use the RTI blocks of the DS2301 board, refer to the RTI demo library of your processor board. You can find the model files also at `<RCP_HIL_InstallationPath>\Demos\ds100x`.

Access to the DPMEM Areas of the DDS Board

Introduction

The RTI block library provides read and write access to the dual-port memory areas of the DDS board.

Where to go from here

Information in this section

DS2301READ_Bx

Purpose

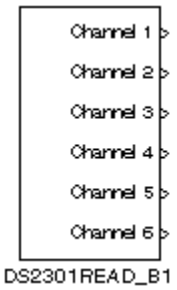
To provide read access to the 6 dual-port memory (DPMEM) areas of the DDS board.

Where to go from here

Information in this section

Block Description (DS2301READ_Bx)

Illustration



Purpose

To provide read access to the 6 dual-port memory (DPMEM) areas of the DDS board.

I/O mapping

For details on the I/O connector pinouts of the DS2301, refer to *C:\Program Files <x86>\Common Files\ dSPACE\Help <ReleaseVersion>\ Print\DS2301HardwareReference.pdf*.

I/O characteristics

- The block output labeled channel 1 refers to the first DSP on the DDS board, channel 2 refers to the second DSP, and so on.
- The DPMEM contents are read out as float values.

- Each output vector width matches the number of elements selected from the Number of elements entry on the DPMEM page.

Dialog pages

The dialog settings can be specified on the following pages:

- Unit Page (refer to Unit Page (DS2301READ_Bx) on page 13)
- DPMEM Page (refer to DPMEM Page (DS2301READ_Bx) on page 13)

Related RTLib functions

`ds2301_init`, `ds2301_read_block_float`

Unit Page (DS2301READ_Bx)

Purpose

To specify the board number.

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.

Related topics

References

DPMEM Page (DS2301READ_Bx)..... 13

DPMEM Page (DS2301READ_Bx)

Purpose

To specify the read memory areas of the 6 channels.

Dialog settings

Start address Lets you specify the index of the first memory cell to be read from the DPMEM. Valid addresses must remain within the range 1 … 4096. Selectable for all channels.

Number of elements Lets you specify the number of memory elements to be consecutively read. The sum of entries under Start address and Number of elements must not exceed 4097. Selectable for all channels.

To assign one value for the Start address and one value for the Number of elements to all the 6 channels, specify the desired values in the lowest row before pushing the Set all button.

Note

If you try to read from and to write to the same DPMEM address, the error message `Overlapping DPMEM areas detected` is generated. This avoids situations in which the sequence of the read/write accesses is undefined. In undefined situations only the structure of the block diagram would determine if the overlapping memory is first read or written.

Related topics

References

Unit Page (DS2301READ_Bx)..... 13

DS2301WRITE_Bx

Purpose

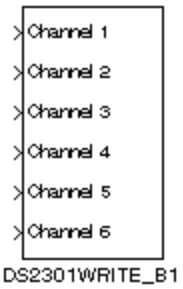
To provide write access to the 6 dual-port memory (DPMEM) areas of the DDS board.

Where to go from here

Information in this section

Block Description (DS2301WRITE_Bx)

Illustration



Purpose

To provide write access to the 6 dual-port memory (DPMEM) areas of the DDS board.

I/O mapping

For details on the I/O connector pinouts of the DS2301, refer to *C:\Program Files <x86>\Common Files\ dSPACE\Help <ReleaseVersion>\ Print\DS2301HardwareReference.pdf*.

I/O characteristics

- The block input labeled channel 1 refers to the first DSP on the DDS board, channel 2 refers to the second DSP, and so on.

- The number of memory elements written to the DPMEM is automatically inherited from the input vector's width.
- The DPMEM contents are written as float values.

Dialog pages

The dialog settings can be specified on the following pages:

- **Unit Page** (refer to Unit Page (DS2301WRITE_Bx) on page 16)
- **DPMEM Page** (refer to DPMEM Page (DS2301WRITE_Bx) on page 16)

Related RTLib functions

ds2301_init, ds2301_write, ds2301_write_block_float

Unit Page (DS2301WRITE_Bx)

Purpose

To specify the board number.

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.

Related topics

References

DPMEM Page (DS2301WRITE_Bx)..... 16

DPMEM Page (DS2301WRITE_Bx)

Purpose

To specify the DPMEM areas for write access.

Dialog settings

Start address Lets you specify the index of the first memory cell of the DPMEM that will be written. Valid addresses must remain within the range 1 … 4096. It is selectable for all channels.

To assign one value for the **Start address** to all the 6 channels, specify the desired value in the lowest row before pushing the **Set all** button.

Write simState Lets you select, whether the simulation control variable `simState` is written to the DPMEM. This variable can be used to synchronize the slave application and the Simulink model. It is selectable for all channels.

To write the control variable **simState** to all the 6 channels of the DDS, select the checkbox in the lowest row, specify the desired value and push the **Set all** button.

Writing the **simState** variable to the DPMEM is useful if the Simulink model and the slave application are to be started, paused or stopped synchronously. Then the slave application code can refer to the Simulink simulation state from the DPMEM.

Note

In contrast to the variables of the Simulink model written to the DPMEM, the simState variable is of type integer.

Note

If you try to read from and to write to the same DPMEM address, the error message **Overlapping DPMEM areas detected** is generated. This avoids situations in which the sequence of the read/write accesses is undefined. In undefined situations only the structure of the block diagram would determine if the overlapping memory is first read or written.

Related topics

References

Unit Page (DS2301WRITE_Bx)..... 16

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