DS2102 High-Resolution D/A Board

RTI Reference

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dSPACE

How to Contact dSPACE

Mail:	dSPACE GmbH Rathenaustraße 26 33102 Paderborn Germany
Tel.:	+49 5251 1638-0
Fax:	+49 5251 16198-0
E-mail:	info@dspace.de
Web:	http://www.dspace.com

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  Tel.: +49 5251 1638-941 or e-mail: support@dspace.de

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dSPACE GmbH
Rathenaustraße 26
33102 Paderborn
Germany

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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 DS2102 High-Resolution D/A Board, which can be controlled by the DS1006 board and the 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.

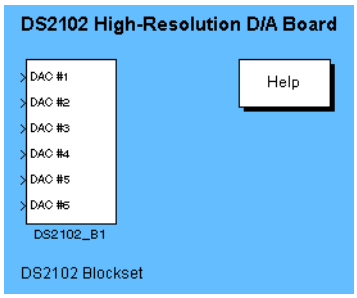
General Information on the DS2102 Blockset

Overview of the DS2102 Blockset

About this board

The Real-Time Interface (RTI) board library for the DS2102 High-Resolution D/A Board provides the RTI block that implements the functionality and I/O capabilities of the DS2102 board in Simulink models.

After you double-click the corresponding board library icon in the library **rtilibm** the **Library: rtilibm/DS2102** opens:



The following I/O unit can be accessed by the RTI blockset for the DS2102:

- DAC Unit on page 11

Demo model

For Simulink models, that shows how to use the RTI blocks of the DS2102 board, refer to the RTI demo library of your processor board. You can find the model files also at `<RCP_HIL_InstallationPath>\Demos\<ProcessorBoard>\RTI`.

Related topics

References

DAC Unit.....11
DS2102 RTLib Reference

DAC Unit

Objective	The DAC Unit provides write access to 6 parallel D/A converters.
Demo model	For a demo model using the DAC unit, refer to `<RCP_HIL_InstallationPath>\Demos\<ProcessorBoard>\RTI\demom_ds2003_1.slx`. This is the DS2003, DS2102 model, which you can find in the processor board's RTI demo library.

DS2102_Bx

Where to go from here

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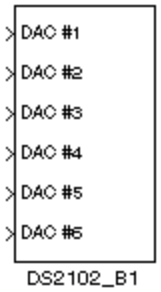
Block Description (DS2102_Bx)

Block



Purpose

To provide write access to 6 parallel D/A converters with 16-bit resolution each.

Description

This block holds the 6 parallel D/A converter in one block. Nevertheless, you can use each channel in a different subsystem by creating multiple instances of this block. However, in the overall model each channel can be used only once.

I/O mapping

For details on the I/O connector pinouts of the DS2102, refer to DAC Unit (DS2102 Features 🕮).

I/O characteristics

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

Output Voltage Range	Simulink Input
±5 V	±1
±10 V	±1
0 … 10 V	0 … 1

- The board provides its outputs in unlatched mode, which means that each channel pair is converted and output immediately.

You can select the output voltage range on the Range page.

Initialization and termination

- During the model initialization phase, an initial output voltage value is written to each D/A channel. This is especially useful if a channel is written from within a triggered or enabled subsystem that is not executed right from the start of the simulation. With the Initialization value all channels have defined outputs during this simulation phase. The initial output voltage can be specified on the Initialization page.
- When the simulation terminates, all channels keep their last output values by default. If you want to set user-defined output values on termination, this can be done on the Termination page. Use these settings to drive your external hardware into a safe final condition.

  The specified termination values of I/O channels are set when the simulation executes its termination function by setting the `simState` variable to STOP. If you stop the real-time application by using ControlDesk's Stop RTP command, the processor resets immediately without executing termination functions. The current values of the I/O channels are kept and the specified termination values are not set.

Reaction on I/O error

- Via the I/O error line, malfunctions on the processor board are reported to the peripherals and a peripheral failure is signaled to the processor board. Malfunctions may occur from watchdog time-outs, reset of the processor, power failures and hardware error conditions, for example.
- The default setting for the reaction on I/O error is *none*.
- The termination values set on the Termination page have no effect if an I/O error occurs.

You can specify the reaction on I/O error signals on the Advanced 1 page.

Deglitcher

The deglitcher unit can be used to reduce voltage spikes (glitches) during output voltage transitions. The glitch produces noise at the output, which can be troublesome in applications like high precision control or complex waveform generation. However, the settling time of the DAC outputs increases if the deglitcher is used. You can activate the deglitcher unit on the Advanced 2 page.

Dialog pages

The dialog settings can be specified on the following pages:

- Unit Page (DS2102_Bx) on page 14
- Range Page (DS2102_Bx) on page 15
- Initialization Page (DS2102_Bx) on page 15
- Termination Page (DS2102_Bx) on page 16
- Advanced 1 Page (DS2102_Bx) on page 16
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Related RTLib functions

ds2102_init (DS2102 RTLib Reference 🕮), ds2102_set_dglmode (DS2102 RTLib Reference 🕮), ds2102_set_errmode (DS2102 RTLib Reference 🕮), ds2102_set_range (DS2102 RTLib Reference 🕮), ds2102_out (DS2102 RTLib Reference 🕮), ds2102_out_uni (DS2102 RTLib Reference 🕮)

Related topics

References

simState (RTI and RTI-MP Implementation Reference 🕮)
Stop RTP (ControlDesk Platform Management 🕮)

Unit Page (DS2102_Bx)

Purpose

To specify the board identification.

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

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Range Page (DS2102_Bx)

Purpose

To specify the output voltage range.

Dialog settings

Range Lets you select output voltage ranges of ±5 V DC, ±10 V DC, or 0 … 10 V DC. They are selectable for each channel. To assign one value to all of the six channels, specify the desired value in the lowest row before pushing the Set all button.

Related topics

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Initialization Page (DS2102_Bx)

Purpose

To specify the initialization state of the D/A converters.

Dialog settings

Initialization value Lets you specify the initial output voltage at the start of the simulation. Valid values must remain within the displayed output voltage range. They are selectable for each channel. To assign one value to all of the six channels, specify the desired value in the lowest row before pushing the Set all button.

Related topics

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Termination Page (DS2102_Bx)

Purpose

To specify the termination state of the D/A converters.

Dialog settings

Output on termination Lets you specify the output voltage at the end of the simulation. If you select the checkbox of the channel to be configured, you can specify the desired output value. Otherwise the current output voltage will be kept when the simulation terminates. This is selectable for each channel. To assign one termination output value to all of the channels, select the checkbox in the lowest row and specify the desired value before pushing the **Set all** button. Valid values must remain within the displayed output voltage range.

The specified termination values of I/O channels are set when the simulation executes its termination function by setting the `simState` variable to STOP. If you stop the real-time application by using ControlDesk's **Stop RTP** command, the processor resets immediately without executing termination functions. The current values of the I/O channels are kept and the specified termination values are not set.

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Stop RTP (ControlDesk Platform Management 🕮)
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Advanced 1 Page (DS2102_Bx)

Purpose

To specify the behavior of the D/A converters, if an I/O error occurs.

Dialog settings

Reaction on I/O error Lets you select the output voltage if an I/O error signal is generated by the hardware. If you select *none*, the current output voltage will be kept. If you select *set output to zero*, the output voltage of the channel to be configured will be set to zero. This is selectable for each channel. To assign one value to all of the channels, specify the desired value in the lowest row before pushing the **Set all** button.

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Advanced 2 Page (DS2102_Bx)

Purpose

To specify the use of the deglitcher mode for each channel.

Dialog settings

Deglitcher Lets you enable (*active*) or disable (*disabled*) the deglitcher unit. This is selectable for each channel. To assign one deglitcher mode to all of the channels, specify the desired value in the lowest row before pushing the **Set all** button.

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