

DS2101 D/A Board

RTI Reference

Release 2021-A – May 2021

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

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

This publication contains proprietary information that is protected by copyright. All rights are reserved. The publication may be printed for personal or internal use provided all the proprietary markings are retained on all printed copies. In all other cases, the publication must not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of dSPACE GmbH.

© 1999 - 2021 by:
dSPACE GmbH
Rathenaustraße 26
33102 Paderborn
Germany

This publication and the contents hereof are subject to change without notice.

AUTERA, ConfigurationDesk, ControlDesk, MicroAutoBox, MicroLabBox, SCALEXIO, SIMPHERA, SYNECT, SystemDesk, TargetLink and VEOS are registered trademarks of dSPACE GmbH in the United States or other countries, or both. Other brand names or product names are trademarks or registered trademarks of their respective companies or organizations.

Contents

About This Reference 5

General Information on the DS2101 Blockset 9

 Overview of the DS2101 Blockset..... 9

DAC Unit 11

DS2101_Bx..... 12

 Block Description (DS2101_Bx)..... 12

 Unit Page (DS2101_Bx)..... 13

 Range Page (DS2101_Bx)..... 14

 Initialization Page (DS2101_Bx)..... 14

 Termination Page (DS2101_Bx)..... 15

 Advanced Page (DS2101_Bx)..... 16

Index 17

About This Reference

Content

This RTI Reference provides a full description of the Real-Time Interface (RTI) software support for the DS2101 D/A Board, which can be controlled by the DS1006 Processor 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_s1.slx` and you are asked to edit the `<model>_usr.c` file, you actually have to edit the `smd_1007_s1_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 DS2101 Blockset

Overview of the DS2101 Blockset

About this board

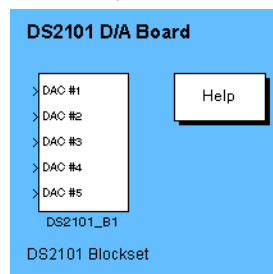
The DS2101 D/A Board provides 6 parallel D/A channels. You can choose between various channel numbers, resolutions and speeds.

RTI blockset

The Real-Time Interface (RTI) board library for the DS2101 D/A Board provides the RTI blocks that implement the functionality and I/O capabilities of the DS2101 board in Simulink models.

DS2101

After you double-click the corresponding board library icon in the library `rtlibm` the Library: `rtlibm/DS2101` opens:



The following I/O units can be accessed by the RTI blockset for the DS2101:

- [DAC Unit](#) on page 11

Demo model

For Simulink models, that shows how to use the RTI blocks of the DS2101 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`.

DAC Unit

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

DS2101_Bx

Where to go from here

Information in this section

Block Description (DS2101_Bx).....	12
Unit Page (DS2101_Bx).....	13
Range Page (DS2101_Bx).....	14
Initialization Page (DS2101_Bx).....	14
Termination Page (DS2101_Bx).....	15
Advanced Page (DS2101_Bx).....	16

Block Description (DS2101_Bx)

Block



Purpose

To provide write access to 5 parallel D/A converters.

I/O mapping

For details on the I/O connector pinouts of the DS2101, refer to [DAC Unit \(DS2101 Features !\[\]\(758ebdf4629c903da74c2e079717ae32_img.jpg\)](#)).

I/O characteristics

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

Output Voltage Range	Simulink Input
±5 V DC	±1
±10 V DC	±1
0 ... 10 V DC	0 ... 1

- The board provides its outputs in unlatched mode, which means that each channel is converted and output immediately.
- The resolution of all channels is 12 bits.

Dialog pages	<p>The dialog settings can be specified on the following pages:</p> <ul style="list-style-type: none">▪ Unit Page (DS2101_Bx) on page 13▪ Range Page (DS2101_Bx) on page 14▪ Initialization Page (DS2101_Bx) on page 14▪ Termination Page (DS2101_Bx) on page 15▪ Advanced Page (DS2101_Bx) on page 16
Related RTLib functions	<p>This RTI block is implemented by using the RTLib functions, which are described in the <i>DS2101 RTLib Reference</i>:</p> <ul style="list-style-type: none">▪ ds2101_init▪ ds2101_set_errmode▪ ds2101_set_range▪ ds2101_out▪ ds2101_out_uni

Unit Page (DS2101_Bx)

Purpose	To specify the board number.
Dialog settings	<p>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.</p>
Related topics	<div>References<div><div><div>Advanced Page (DS2101_Bx).....</div><div>16</div></div><div><div>Block Description (DS2101_Bx).....</div><div>12</div></div><div><div>Initialization Page (DS2101_Bx).....</div><div>14</div></div><div><div>Range Page (DS2101_Bx).....</div><div>14</div></div><div><div>Termination Page (DS2101_Bx).....</div><div>15</div></div></div></div>

Range Page (DS2101_Bx)

Purpose	To specify the output voltage range.										
Dialog settings	<p>Range Lets you select the output voltage ranges of ± 5 V, ± 10 V or 0 ... 10 V for each channel.</p> <p>To assign one output voltage range to all of the channels displayed, specify the desired value before pushing the Set all button.</p>										
Related topics	<p>References</p> <table> <tr> <td>Advanced Page (DS2101_Bx).....</td> <td>16</td> </tr> <tr> <td>Block Description (DS2101_Bx).....</td> <td>12</td> </tr> <tr> <td>Initialization Page (DS2101_Bx).....</td> <td>14</td> </tr> <tr> <td>Termination Page (DS2101_Bx).....</td> <td>15</td> </tr> <tr> <td>Unit Page (DS2101_Bx).....</td> <td>13</td> </tr> </table>	Advanced Page (DS2101_Bx).....	16	Block Description (DS2101_Bx).....	12	Initialization Page (DS2101_Bx).....	14	Termination Page (DS2101_Bx).....	15	Unit Page (DS2101_Bx).....	13
Advanced Page (DS2101_Bx).....	16										
Block Description (DS2101_Bx).....	12										
Initialization Page (DS2101_Bx).....	14										
Termination Page (DS2101_Bx).....	15										
Unit Page (DS2101_Bx).....	13										

Initialization Page (DS2101_Bx)

Purpose	To specify the initial voltage value.
Description	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.
Dialog settings	<p>Initialization value Lets you select the initial output voltage at the start of the simulation.</p> <p>To assign one value to all of the five channels, specify the desired value in the lowest row before pushing the Set all button.</p> <div> <p>Note</p> <p>The valid values must remain within the displayed output voltage range.</p> </div>

Related topics

References



Advanced Page (DS2101_Bx).....	16
Block Description (DS2101_Bx).....	12
Range Page (DS2101_Bx).....	14
Termination Page (DS2101_Bx).....	15
Unit Page (DS2101_Bx).....	13

Termination Page (DS2101_Bx)

Purpose	To specify the termination voltage value.
Description	<p>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.</p> <p>The specified termination values of I/O channels are set when the simulation executes its termination function by setting the <code>simState</code> 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.</p>
Dialog settings	<p>Output on termination Lets you assign the output voltage on termination for each channel. Either keep the current output voltage when the simulation terminates or mark the checkbox of the channel to be configured and specify the desired output value.</p> <p>To assign one termination output value to all of the channels, mark the checkbox in the lowest row and specify the desired value before pushing the Set all button.</p> <div><p>Note</p><p>Valid values must remain within the displayed output voltage range.</p></div>

Related topics

References

Advanced Page (DS2101_Bx).....	16
Block Description (DS2101_Bx).....	12
Initialization Page (DS2101_Bx).....	14
Range Page (DS2101_Bx).....	14
simState (RTI and RTI-MP Implementation Reference )	
Stop RTP (ControlDesk Platform Management )	
Unit Page (DS2101_Bx).....	13

Advanced Page (DS2101_Bx)

Purpose

To specify the I/O error handling.

Description

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*.

Dialog settings

Reaction on I/O error Lets you select for each channel that the block's output voltage will be set to zero if an I/O error signal is generated by the hardware.

To assign one value to all of the channels, specify the desired value in the lowest row before pushing the Set all button.

Note

The termination values set on the Termination Page (DS2101_Bx) have no effect if an I/O error occurs.

Related topics

References

Block Description (DS2101_Bx).....	12
Initialization Page (DS2101_Bx).....	14
Range Page (DS2101_Bx).....	14
Termination Page (DS2101_Bx).....	15
Unit Page (DS2101_Bx).....	13

C

Common Program Data folder 6

D

Documents folder 7

DS2101_Bx 12

 Advanced page 16

 block description 12

 Initialization page 14

 Range page 14

 Termination page 15

 Unit page 13

L

Local Program Data folder 7

