

DS1007 PPC Processor Board

RTI Reference

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About This Reference

Content This document provides you with detailed information about the Real-Time Interface (RTI) of your DS1007 PPC Processor Board.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
	Indicates a hazard that, if not avoided, could result in property damage.
	Indicates important information that you should take into account to avoid malfunctions.
	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 RTI Blockset of the DS1007

Introduction Here you get basic information on the RTI Blockset of the DS1007 (RTI1007).

Where to go from here Information in this section

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Overview of RTI1007

About the board The DS1007 PPC Processor Board is the core of a DS1007 modular system (PHS-bus-based system with a DS1007 PPC Processor Board). It provides an on-board 32-bit PHS-bus interface and can handle up to 16 I/O boards simultaneously.

rtilibm After you enter **rti** in the MATLAB Command Window, the Real-Time Interface (RTI) board library for the DS1007 is displayed.

Note

If you have several RTIs installed and another board library appears, enter **rti1007** in the MATLAB Command Window to switch to the DS1007 board library.

The following components are available in the `rtilibm` window:

- Simulink calls the Simulink Library Browser from which all Simulink blocks can be accessed. For more information, refer to the Simulink user documentation by *MathWorks®*.
- Blocksets includes optional RTI blocks for the DS1007.
- Help displays this DS1007 RTI Reference.
- TaskLib offers RTI blocks for modeling interrupts in Simulink.
For details, see [TaskLib Block Reference \(RTI and RTI-MP Implementation Reference\)](#).
- EXTRAS offers RTI blocks for special purposes – for example, the service code for the dSPACE experiment software.
For details, see [Extras Block Reference \(RTI and RTI-MP Implementation Reference\)](#).
- DEMOS shows example models.
- DS1007 is a library comprising the RTI blocks for the I/O units directly provided by the DS1007. See below for details.
- DS2001 ... DS5101 represent the libraries comprising the RTI blocks for all I/O boards that can be connected to the DS1007. These libraries implement the I/O capabilities of the various dSPACE I/O boards in Simulink models. For details, refer to the corresponding *RTI References*.

Method

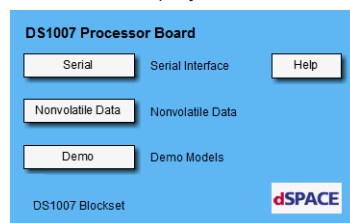
To open one of the `rtilibm` components

- 1 Double-click the corresponding button in the `rtilibm` window.

DS1007 Blockset

The DS1007 Blockset provides the RTI blocks that implement the I/O capabilities of the DS1007 board in Simulink models.

After you double-click the DS1007 button in the `rtilibm` window, the DS1007 Blockset is displayed:



The following I/O units can be accessed by this RTI blockset:

- [Serial Interface](#) on page 21
- [Nonvolatile Data Handling \(NVDATA\)](#) on page 13

Related topics

References

[Overview of Optional Blocksets](#)..... 11

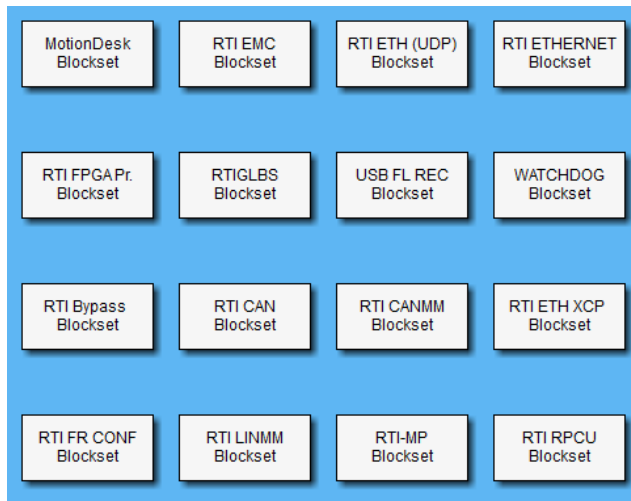
Overview of Optional Blocksets

Objective

The DS1007 blockset provides access to some optional RTI blocksets. The blockset buttons are only enabled if the blocksets were installed according to the required licenses.



Blocksets

Click the Blocksets button in the RTI board library window to display the library with the optional blocksets as follows:



An optional blockset is only enabled if it supports the active platform and, where required, an appropriate license is installed. For example, DS1007 supports the following optional blocksets:

- RTI Multiprocessor Systems Blockset (RTI-MP Blockset)
For further information, refer to [RTI-MP Blockset Reference \(RTI and RTI-MP Implementation Reference\)](#).
- RTI Gigalink Blockset (RTIGLBS Blockset)
For further information, refer to [RTI Gigalink Blockset Reference \(RTI and RTI-MP Implementation Reference\)](#).
- RTI USB Flight Recorder Blockset
For further information, refer to [RTI USB Flight Recorder Blockset Reference](#).
- RTI Ethernet Blockset
For further information, refer to [RTI Ethernet Blockset Reference](#).
- RTI FPGA Programming Blockset
For further information, refer to [RTI FPGA Programming Blockset - FPGA Interface Reference](#) and [RTI FPGA Programming Blockset - Processor Interface Reference](#).
- RTI RapidPro Control Unit Blockset (RTI RPCU Blockset)
For further information on the combination of a PHS-bus-based system and RapidPro, refer to [Prototyping Systems with RapidPro Hardware \(RapidPro](#)

[System – I/O Subsystem MPC565 Implementation Features](#) ). For further information on the blockset, refer to [RapidPro System – I/O Subsystem MPC565 RTI Reference](#) .

Related topics

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Nonvolatile Data Handling (NVDATA)



Introduction	Providing information on the RTI blocks used for implementing nonvolatile data handling.
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Where to go from here

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NVDATA_READ_BLx	15
To read a data set from the board's nonvolatile memory.	
NVDATA_WRITE_BLx	18
To write a data set to the board's nonvolatile memory.	

Information in other sections

Nonvolatile Data Handling (NVDATA) (DS1007 Features )
The DS1007 provides access to the board's nonvolatile memory by implementing the access in a real-time application or by using the board's web interface.
Using the Web Interface for Nonvolatile Data Handling (DS1007 Features )
The web interface of your DS1007 provides a configuration page which lets you manage the data sets stored in the board's nonvolatile memory.

General Information on the NVDATA Blockset

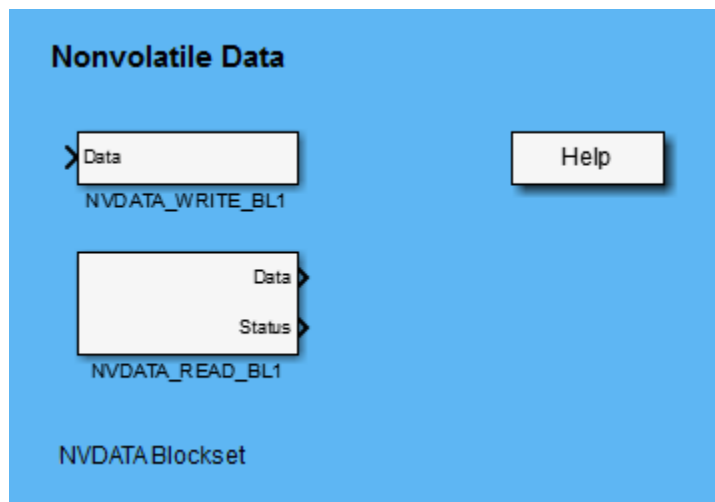
Introduction

To give you basic information on the RTI NVDATA Blockset.

Overview of the NVDATA Blockset

Access

Double-click the Nonvolatile Data button in the DS1007 Blockset to display the NVDATA Blockset.



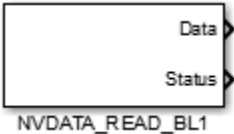
You can use the NVDATA blocks to implement access to the board's nonvolatile memory.

To access the nonvolatile memory, you always have to use a block pair consisting of an NVDATA_WRITE_BLx block and an NVDATA_READ_BLx block.

NVDATA_READ_BLx

Purpose	To read a data set from the board's nonvolatile memory.
Where to go from here	<div><div>Information in this section</div><div><div>Block Description (NVDATA_READ_BLx)..... 15</div><div>To describe the purpose and function of the block.</div><div>Parameters Page (NVDATA_READ_BLx)..... 16</div><div>To specify the data set to be read from the board's nonvolatile memory.</div></div></div> <div><div>Information in other sections</div><div><div>NVDATA_WRITE_BLx..... 18</div><div>To write a data set to the board's nonvolatile memory.</div></div></div>

Block Description (NVDATA_READ_BLx)

Block	<div></div>
Purpose	To read a data set from the board's nonvolatile memory.
Description	<p>In the block's Data tag setting, specify the name of the data set you want to read. The NVDATA_READ_BLx block must have the same settings as the NVDATA_WRITE_BLx block that wrote the data set.</p> <p>You can use up to 64 block pairs (NVDATA_READ_BLx and NVDATA_WRITE_BLx) within a model.</p>

I/O characteristics

The following table describes the ports of the block:

Port	Description
Output	
Data	<p>Outputs the specified data set. The name of the port corresponds to the name that you specified in the Data tag setting.</p> <p>Data type: Depends on the Data type setting</p> <p>Width: Depends on the Number of elements setting</p>
Status	<p>Indicates whether the data set that you want to read is valid. There must be one initial write access to the data set before a read access will be valid.</p> <p>Data type: UInt32</p> <p>Range: 0, 1</p> <ul style="list-style-type: none"> 0: Data set has not been previously written, i.e., it is still uninitialized. 1: Data set has been written at least once. <p>The Status port allows you to specify initial default values of a data set.</p>

Dialog pages

You can specify the dialog settings on the Parameters page (refer to [Parameters Page \(NVDATA_READ_BLx\)](#) on page 16).

Related RTLib functions

This RTI block is implemented using the following RTLib functions. The *DS1007 RTLib Reference* contains descriptions of these functions.

This RTI block is implemented using the following RTLib functions:

- NvData_read

Parameters Page (NVDATA_READ_BLx)

Purpose

To specify the data set to be read from the board's nonvolatile memory.

Dialog settings

Data tag Lets you specify a unique name for the data set. The name is used for the **Data** port and can consist of up to 63 characters.

Note

A valid data set name is a character string of letters, digits, and underscores. There are the following naming restrictions for the data set name:

- The first character must be a letter.
- The name must not be a keyword, such as **while** or **if**.

Number of elements Lets you specify the number of elements in the data set in the range 1 ... 64.

Data type Lets you specify the data type of the elements contained in the data set. You can specify only one data type for the entire data set.

Data Type	Meaning
Int8	8-bit integer values Allocates 1 byte
UInt8	8-bit integer values (unsigned) Allocates 1 byte
Int16	16-bit integer values Allocates 2 bytes
UInt16	16-bit integer values (unsigned) Allocates 2 bytes
Int32	32-bit integer values Allocates 4 bytes
UInt32	32-bit integer values (unsigned) Allocates 4 bytes
Single (Float32)	32-bit float values Allocates 4 bytes
Double (Float64)	64-bit float values Allocates 8 bytes

Related topics

References

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---	----

NVDATA_WRITE_BLx

Purpose To write a data set to the board's nonvolatile memory.

Where to go from here

Information in this section

[Block Description \(NVDATA_WRITE_BLx\)](#)..... 18

To describe the purpose and function of the block.

[Parameters Page \(NVDATA_WRITE_BLx\)](#)..... 19

To specify the data set to be written to the board's nonvolatile memory.

Information in other sections

[NVDATA_READ_BLx](#)..... 15

To read a data set from the board's nonvolatile memory.

Block Description (NVDATA_WRITE_BLx)

Block



Purpose To write a data set to the board's nonvolatile memory.

Description

The data set is identified by its name, which is specified by the block's Data tag setting. The data tag must therefore be unique in the model.

For each NVDATA_WRITE_BLx block there must be a NVDATA_READ_BLx block with the same settings.

You can use up to 64 block pairs (NVDATA_WRITE_BLx and NVDATA_READ_BLx) within a model.

I/O characteristics

The following table describes the ports of the block:

Port	Description
Input	
Data	<p>Reads the specified data set. The name of the port corresponds to the name that you specified in the Data tag setting.</p> <p>Data type: Depends on the Data type setting</p> <p>Width: Depends on the Number of elements setting</p>

Dialog pages

The dialog settings can be specified on the Parameters page (refer to [Parameters Page \(NVDATA_WRITE_BLx\)](#) on page 19).

Related RTLib functions

This RTI block is implemented using the following RTLib functions. The *DS1007 RTLib Reference* contains descriptions of these functions.

- `NvData_create`
- `NvData_createDataSet`
- `NvData_setName`
- `NvData_setType`
- `NvData_setDimension`
- `NvData_apply`
- `NvData_write`

Parameters Page (NVDATA_WRITE_BLx)

Purpose

To specify the data set to be written to the board's nonvolatile memory.

Dialog settings

Data tag Lets you specify a unique name for the data set. The name is used for the **Data** port and can consist of up to 63 characters.

Note

A valid data set name is a character string of letters, digits, and underscores. There are the following naming restrictions for the data set name:

- The first character must be a letter.
- The name must not be a keyword, such as `while` or `if`.

Number of elements Lets you specify the number of elements in the data set in the range 1 ... 64.

Data type Lets you specify the data type of the elements contained in the data set. You can specify only one data type for the entire data set.

Data Type	Meaning
Int8	8-bit integer values Allocates 1 byte
UInt8	8-bit integer values (unsigned) Allocates 1 byte
Int16	16-bit integer values Allocates 2 bytes
UInt16	16-bit integer values (unsigned) Allocates 2 bytes
Int32	32-bit integer values Allocates 4 bytes
UInt32	32-bit integer values (unsigned) Allocates 4 bytes
Single (Float32)	32-bit float values Allocates 4 bytes
Double (Float64)	64-bit float values Allocates 8 bytes

Related topics

References

[Block Description \(NVDATA_WRITE_BLx\).....](#) 18

Serial Interface

Where to go from here

Information in this section

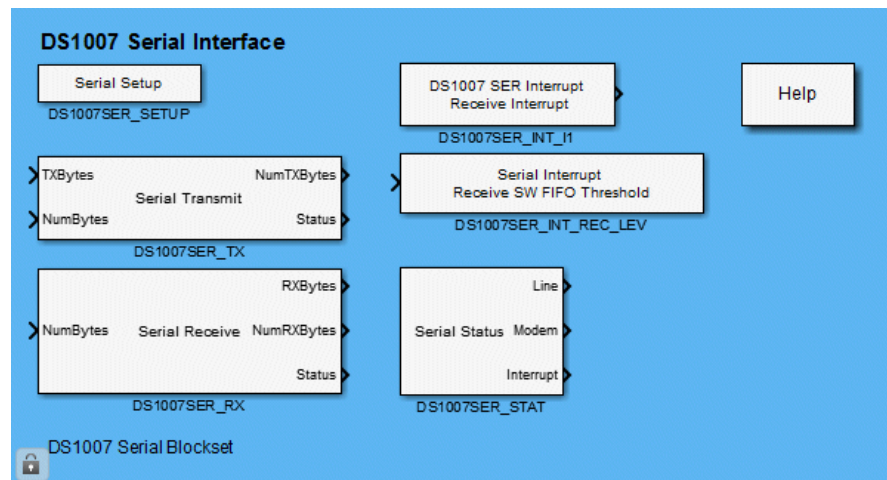
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DS1007SER_SETUP.....	25
To set the global parameters for the serial interface.	
DS1007SER_STAT.....	29
To read the contents of the UART status register.	
DS1007SER_TX.....	33
To send data via the serial interface.	
DS1007SER_RX.....	37
To read bytes from the serial interface.	
DS1007SER_INT_Ix.....	41
To make the interrupts of the serial interface available as trigger sources in the model.	
DS1007SER_INT_REC_LEV.....	43
To change the RX SW FIFO threshold during run time.	

General Information on the Serial Interface

Overview of the Serial Interface

Introduction

After you double-click the Serial button in the DS1007 Blockset window, the DS1007 Serial Blockset is displayed.



The Serial Interface blocks can be used to implement serial communication.

Basic principles

Refer to [Basic Principles of Serial Communication with RTI Blocks](#) on page 23.

Note


Although the serial blocks of different boards are almost the same, you must always use the board-specific serial blocks.

Library components

The library contains the following RTI blocks:

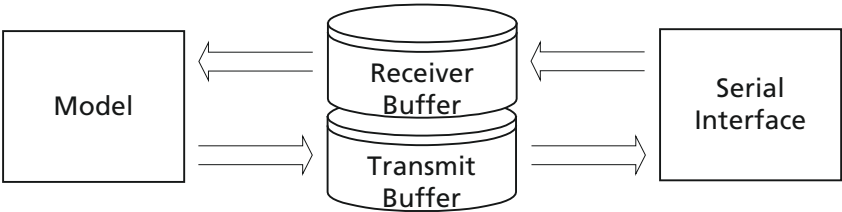
- [DS1007SER_SETUP](#) on page 25
- [DS1007SER_STAT](#) on page 29
- [DS1007SER_TX](#) on page 33
- [DS1007SER_RX](#) on page 37
- [DS1007SER_INT_Ix](#) on page 41
- [DS1007SER_INT_REC_LEV](#) on page 43

Basic Principles of Serial Communication with RTI Blocks

Purpose	This section explains the basic principles of serial communication with RTI blocks.
Where to go from here	<div>Information in this section Basics on the Buffer Used for Serial Communication.....23</div> <div>Information in other sections Serial Interface of the DS1007 (DS1007 Features )</div>

Basics on the Buffer Used for Serial Communication

Software FIFO buffer A software FIFO buffer is installed between your model and the UART. The buffer is a memory that provides the UART with additional space for data storage and ensures that the generic blocks are hardware-independent.



The software FIFO buffer stores data that will be written to the UART (transmit buffer) or that was read by it (receive buffer).

Transmit buffer To transmit data, you only have to write it to the transmit buffer (TX SW FIFO) with the DS1007SER_TX block. The data is then transmitted via the UART.

Receive buffer Data that is received via the serial interface is first copied to the UART buffer. When the number of received bytes exceeds the UART threshold or when the UART timeout is triggered, the bytes are copied to the receive buffer.

UART threshold The UART threshold is defined in the DS1007SER_SETUP block.

UART timeout The UART timeout is triggered when no signal is received during an interval of 4 signals after the last signal. The time value depends on

the number of bits per signal and the baud rate. The worst case is a signal with 12 bits (1 start bit, 8 data bits, 1 parity bit, and 2 stop bits) and a baud rate of 300 baud. In this case the timeout is 160 ms after the last signal is received.

To get the data into your model, use the DS1007SER_RX block. It reads the data from the receive buffer and copies it to an outport. To get a trigger signal when the receive buffer contains data, use the DS1007SER_INT_lx block.

DS1007SER_SETUP

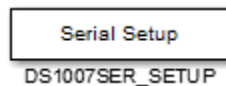
Where to go from here

Information in this section

Block Description (DS1007SER_SETUP)	25
To set the global parameters for the serial interface.	
UART Page (DS1007SER_SETUP)	26
To specify the UART parameters.	
FIFO Page (DS1007SER_SETUP)	27
To specify the software FIFO buffer.	
Advanced Page (DS1007SER_SETUP)	28
To specify the behavior on model termination.	

Block Description (DS1007SER_SETUP)

Block



Purpose

To set the global parameters for the serial interface.

Note

- This block has to be placed in the model if any of the other serial blocks is used for the corresponding board.
- This block must not be used more than once per channel.
- For the moment, RTI-MP allows you to use only one DS1007_SER_SETUP block in a multiprocessor system. If you need more than one DS1007_SER_SETUP block, contact dSPACE support.

I/O mapping

For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features !\[\]\(95b425611cbd2b8716a140cf67c81822_img.jpg\)](#)).

Dialog pages

The dialog settings can be specified on the following pages:

- UART Page (refer to [UART Page \(DS1007SER_SETUP\)](#) on page 26)
- FIFO Page (refer to [FIFO Page \(DS1007SER_SETUP\)](#) on page 27)
- Advanced Page (refer to [Advanced Page \(DS1007SER_SETUP\)](#) on page 28)

Related RTLib functions

This RTI block is implemented using the following RTLib functions:

- `dsrser_init`
- `dsrser_config`
- `dsrser_set`

Related topics**References**

Advanced Page (DS1007SER_SETUP).....	28
<code>dsrser_config</code> (DS1007 RTLib Reference )	
<code>dsrser_init</code> (DS1007 RTLib Reference )	
<code>dsrser_set</code> (DS1007 RTLib Reference )	
FIFO Page (DS1007SER_SETUP).....	27
UART Page (DS1007SER_SETUP).....	26

UART Page (DS1007SER_SETUP)

Purpose

To specify the UART parameters.

Dialog settings

Transceiver Lets you select the transceiver mode:

Transceiver Mode	Meaning
RS232	RS232 mode

Baud rate Lets you specify the baud rate in bits per second.

Mode	Baud Rate Range
RS232	5 ... 230,400 baud

For further information, refer to [Serial Interface of the DS1007 \(DS1007 Features !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\) \)](#).

Data bits Lets you choose the number of data bits. The valid values are: 5, 6, 7, 8.

Stop bits Lets you choose the number of stop bits. The valid values are: 1, 1.5 or 2. If you select 1.5 or 2, the number of stop bits depends on the number of specified data bits: For 5 data bits there are 1.5 stop bits; for 6, 7 and 8 data bits there are 2 stop bits.

Parity Lets you choose the parity mode:

Parity Mode	Meaning
No	No parity bits
Odd	Parity bit is set so that there is an odd number of "1" bits in the byte, including the parity bit

Parity Mode	Meaning
Even	Parity bit is set so that there is an even number of "1" bits in the byte, including the parity bit
Forced parity one	Parity bit is forced to a logical 1

Copy data to RX SW FIFO after reception of <value> byte(s) at latest Lets you choose the UART threshold at which data is copied from the UART to the receive buffer. Values are: 1, 4, 8, 14.

Note

Use the highest UART threshold possible to generate fewer interrupts, i.e., to decrease the UART's workload.

Enable RTS/CTS mode Lets you enable a hardware handshake (RTS/CTS).

Related topics

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FIFO Page (DS1007SER_SETUP)

Purpose To specify the software FIFO buffer.

Dialog settings

SW FIFO size Lets you specify the size of the software buffer. The size must be a power of two (2^n) and at least 64 bytes great. The maximum size depends on the available memory.

Overwrite mode Lets you choose the behavior of the receive buffer when an overrun occurs:

Overwrite Mode	Meaning
Discard new data	If the receive buffer is full, the new data is discarded.
Replace old data with FIFO method	If the receive buffer is full, the new data replaces the oldest data in the buffer. The number of bytes that are replaced is defined by Block size.

Block size Lets you specify the number of bytes that are deleted in RX SW FIFO overrun (see table above). Use this parameter to set up the appropriate data consistency for your model. Value range: 1 ... (SW FIFO size-1)

Related topics

References

Advanced Page (DS1007SER_SETUP).....	28
Block Description (DS1007SER_SETUP).....	25
UART Page (DS1007SER_SETUP).....	26

Advanced Page (DS1007SER_SETUP)

Purpose

To specify the behavior on model termination.

Dialog settings

Disable UART on termination Lets you choose the UART behavior on model termination. If the UART is disabled, data is neither transmitted nor received. No interrupts are generated in this case.

Related topics

References

Block Description (DS1007SER_SETUP).....	25
FIFO Page (DS1007SER_SETUP).....	27
UART Page (DS1007SER_SETUP).....	26

DS1007SER_STAT

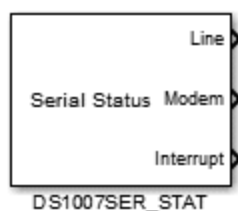
Where to go from here

Information in this section

Block Description (DS1007SER_STAT).....	29
To read the contents of the UART status register.	
Status Page (DS1007SER_STAT).....	32
To enable the status registers to be read.	

Block Description (DS1007SER_STAT)

Block



Purpose

To read the contents of the UART status register.

Note

- This block can only be used in interrupt-driven subsystems (see [DS1007SER_INT_Ix](#) on page 41).
- The Line status delivers correct results only if the block resides in a subsystem driven by the Line status interrupt.
 - The Modem status delivers correct results only if the block resides in a subsystem driven by the Modem status interrupt.
 - The Interrupt status is non-functional at the moment.

Description

The block reads the line, modem and interrupt statuses and writes the values to the outputs. If you do not want to evaluate a status register, you can disable its output with the block dialog.

I/O mapping

For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features !\[\]\(41aea2746216b27a6939d696d8e035da_img.jpg\)](#)).

I/O characteristics

The outputs show the values of the UART's register.

- The Line port outputs the 8 bits of the line status register. The following table shows the meanings of the individual bits:

Index	Meaning
1	Data ready (DR) indicator
2	Overrun error (OE) indicator
3	Parity error (PE) indicator
4	Framing error (FE) indicator
5	Break interrupt (BI) indicator
6	Transmitter holding register empty (THRE) indicator
7	Transmitter empty (TEMT) indicator
8	Error in receiver FIFO

- The Modem port outputs the 8 bits of the modem status register. The following table shows the meanings of the individual bits:

Index	Meaning
1	Clear-to-send (CTS) changed state
2	Data-set-ready (DSR) changed state
3	Ring-indicator (RI) changed state
4	Data-carrier-detect (DCD) changed state
5	Complement of CTS
6	Complement of DSR
7	Complement of RI
8	Complement of DCD

- The Interrupt port outputs the 8 bits of the interrupt status register. The following table shows the meanings of the individual bits:

Index	Meaning
1	Interrupt status: 0 if interrupt pending
2	Interrupt ID bit 1
3	Interrupt ID bit 2
4	Interrupt ID bit 3
5	Not relevant
6	Not relevant
7	FIFOs enabled (bit 0)
8	FIFOs enabled (bit 1)

- The following table shows the characteristics of the block outputs:

Port	Characteristics	Value
Line	Datatype	Boolean
	Range	0, 1
	Size	8
Modem	Datatype	Boolean
	Range	0, 1
	Size	8
Interrupt	Datatype	Boolean
	Range	0, 1
	Size	8

Dialog pages

The dialog settings can be specified on the following pages:

- Status Page (refer to [Status Page \(DS1007SER_STAT\)](#) on page 32)

Related RTLib functions

This RTI block is implemented using the following RTLib function:

- `dsr_status_read`

Related topics

References

[dsr_status_read \(DS1007 RTLib Reference !\[\]\(51514032c8ca341817228f39f1307b05_img.jpg\)\)](#)
[Status Page \(DS1007SER_STAT\)](#)..... 32

Status Page (DS1007SER_STAT)

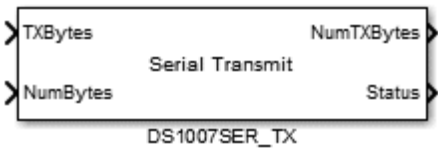
Purpose	To enable the status registers to be read.
Dialog settings	<div><div>Enable Line status port</div><div>Lets you enable the line status output of the UART.</div></div> <div><div>Enable Modem status port</div><div>Lets you enable the modem status output of the UART.</div></div> <div><div>Enable Interrupt status port</div><div>Lets you enable the interrupt status output of the UART.</div></div>
Related topics	<div>References</div> <div><div>Block Description (DS1007SER_STAT).....</div><div>29</div></div>

DS1007SER_TX

Where to go from here	Information in this section
	Block Description (DS1007SER_TX) 33 To send data via the serial interface.
	TX Parameters Page (DS1007SER_TX) 35 To specify the transmitting parameters.
	Advanced Page (DS1007SER_TX) 35 To specify the output.

Block Description (DS1007SER_TX)

Block



Purpose To send data via the serial interface.

Description The block sends the bytes of the TXBytes input via the serial interface during one sample step. The number of bytes to be sent can be either fixed or variable. If the number of bytes to be sent is fixed, you have to specify it with a block parameter. If the number of bytes to be sent is variable, you can specify it with either a block parameter or an inport. The status and the number of bytes that were sent are returned via outports.

You can disable the NumBytes input, NumTXBytes output and Status output with the block dialog.

I/O mapping For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features\)](#).

- I/O characteristics**
- The TXBytes input must be the stream of bytes to be written to the software buffer within one sample step.

- The NumBytes input must be the number of bytes to be sent within one sample step. The value must be less than or equal to the Maximum number of bytes block parameter. If it is less, only the specified number of bytes is sent.
- The NumTXBytes port outputs the number of bytes that could be written to the software buffer within the current sample step. You can use this output value and the NumTXBytes input to verify whether all the data could be sent.
- The Status port outputs the status of writing data to the software buffer within the current sample step. One of the following values is returned:

Return Value	Meaning
0	No error
202	The FIFO is filled or not all data could be copied to the FIFO

- The following table shows the characteristics of the block inputs and outputs:

Port	Characteristics	Value
TXBytes	Datatype	UInt8
	Range	0 ... 255
	Size	1 ... (SW FIFO size - 1)
NumBytes	Datatype	UInt32
	Range	1 ... (SW FIFO size - 1)
NumTXBytes	Datatype	UInt32
	Range	1 ... (SW FIFO size - 1)
Status	Datatype	Int32
	Range	int32

SW FIFO size is a block parameter. For further information, refer to [DS1007SER_SETUP](#) on page 25.

Dialog pages

The dialog settings can be specified on the following pages:

- Tx Parameters Page (refer to [TX Parameters Page \(DS1007SER_TX\)](#) on page 35)
- Advanced Page (refer to [Advanced Page \(DS1007SER_TX\)](#) on page 35)

Related RTLib functions

This RTI block is implemented using the following RTLib function:

- dsser_transmit

Related topics

References

Advanced Page (DS1007SER_TX)	35
DS1007SER_SETUP	25
dsser_transmit (DS1007 RTLib Reference )	
TX Parameters Page (DS1007SER_TX)	35

TX Parameters Page (DS1007SER_TX)

Purpose To specify the transmitting parameters.

Dialog settings

Transmission SW FIFO mode Lets you specify how to react if there is not enough free space in the transmit buffer:

Data Handling	Meaning
Discard all new data	All data in the sample step is discarded. Data consistency is ensured but you have to repeat the complete data from this sample step.
Write as much data as possible	The transmit buffer is filled until it is full. You only have to repeat bytes which did not fit into the transmit buffer.

Parameter flexibility Lets you specify whether the number of bytes to be sent is fixed (non-tunable) or variable (tunable).

Number of bytes Lets you specify the number of bytes to be sent within one sample step.

Maximum number of bytes Lets you specify the maximum number of bytes that can be sent within one sample step. The valid value range is:
1 ... (SW FIFO size-1) (SW FIFO size is a block parameter, see [DS1007SER_SETUP](#) on page 25).

Specify the number of bytes Lets you specify whether to set the number of bytes to be sent within one sample step via the NumBytes inport or the block parameter.

Related topics

References

Advanced Page (DS1007SER_TX)	35
Block Description (DS1007SER_TX)	33

Advanced Page (DS1007SER_TX)

Purpose To specify the output.

Dialog settings

Enable TXBytes port Lets you specify whether to output the number of bytes that could be sent or not.

Enable Status port Lets you specify whether to output the transmission status or not.

Related topics

References

Block Description (DS1007SER_TX).....	33
TX Parameters Page (DS1007SER_TX).....	35

DS1007SER_RX

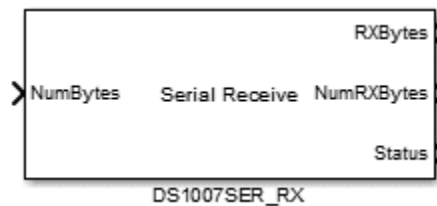
Where to go from here

Information in this section

Block Description (DS1007SER_RX).....	37
To read bytes from the serial interface.	
RX Parameters Page (DS1007SER_RX).....	39
To specify the receiving parameters.	
Advanced Page (DS1007SER_RX).....	40
To specify the output.	

Block Description (DS1007SER_RX)

Block



Purpose

To read bytes from the serial interface.

Description

The block receives bytes via a serial interface and writes them to the RXBytes output. The number of bytes to be received can be either fixed or variable. If the number of bytes to be received is fixed, you have to specify it with a block parameter. If the number of bytes to be received is variable, you can specify it with either a block parameter or an input. The status and the number of received bytes are returned via outputs.

You can disable the NumBytes input, NumRXBytes output and Status output with the block dialog.

Note

The run-time code of the block is not generated in `MdlOutputs()` but in `rti_mdl_sample_input()`. If this block is placed in an enabled subsystem, received data is therefore read from the RX SW FIFO even if the Enable input signal of the subsystem is 0.

I/O mapping

For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features !\[\]\(5eb1325dfdc3f1cad8426726c0db51cd_img.jpg\)\)](#).

I/O characteristics

- The NumBytes input must be the number of bytes to be read from the software buffer within one sample step.
- The RXBytes port outputs the stream of data that could be read from the software buffer within one sample step. If fewer than the expected number of bytes could be received, the last bytes of the output still contain the data from the previous sample step.
- The NumRXBytes port outputs the number of bytes that could be read from the software buffer within one sample step.
- The Status port outputs the reception status. One of the following values is returned:

Return Value	Meaning
0	No error
4	The operation failed with no effect on the input or output data. No data is written to or read from the FIFO.
5	No new data is read from the FIFO.
202	The FIFO is filled or not all data could be copied to the FIFO.

- The following table shows the characteristics of the block input and outputs:

Port	Characteristics	Value
NumBytes	Datatype	UInt32
	Range	1 ... (SW FIFO size - 1)
RXBytes	Datatype	UInt8
	Range	0 ... 255
	Size	1 ... (SW FIFO size - 1)
NumRXBytes	Datatype	UInt32
	Range	1 ... (SW FIFO size - 1)
Status	Datatype	Int32
	Range	Int32

SW FIFO size is a block parameter. For further information, refer to [DS1007SER_SETUP](#) on page 25.

Dialog pages

The dialog settings can be specified on the following pages:


- RX Parameters Page (refer to [RX Parameters Page \(DS1007SER_RX\)](#) on page 39)
- Advanced Page (refer to [Advanced Page \(DS1007SER_RX\)](#) on page 40)

Related RTLib functions

This RTI block is implemented using the following RTLib functions:

- `ds-ser_receive`
- `ds-ser_receive_term`

Related topics**References**

Advanced Page (DS1007SER_RX)	40
DS1007SER_SETUP	25
ds-ser_receive (DS1007 RTLib Reference )	
ds-ser_receive_term (DS1007 RTLib Reference )	
RX Parameters Page (DS1007SER_RX)	39

RX Parameters Page (DS1007SER_RX)

Purpose

To specify the receiving parameters.

Dialog settings

Reception mode Lets you specify how to react if there are fewer than the expected number of bytes in the receive buffer:

Data Handling	Meaning
Skip read operation	The new data is left in the receive buffer. The received data is collected in the receive buffer until the specified number of bytes is reached. Then it is copied to the <code>RXBytes</code> output.
Read available data anyway	All the available data is copied from the receive buffer to the <code>RXBytes</code> output.

Parameter flexibility Lets you specify whether the number of bytes to be received is fixed (non-tunable) or variable (tunable).

Number of bytes Lets you specify the number of bytes to be received within one sample step.

Maximum number of bytes Lets you specify the maximum number of bytes that can be received within one sample step. Value range: 1 ... (SW FIFO size-1) (SW FIFO size is a block parameter, see [DS1007SER_SETUP](#) on page 25).

Specify the number of bytes Lets you specify whether to set the number of bytes to be received within one sample step via the `NumBytes` input or the block parameter.

Related topics

References

Advanced Page (DS1007SER_RX)	40
Block Description (DS1007SER_RX)	37

Advanced Page (DS1007SER_RX)

Purpose To specify the output.

Dialog settings

Enable NumRXBytes port Lets you specify whether to output the number of bytes that could be received or not.

Enable Status port Lets you specify whether to output the transmission status or not.

Related topics

References

Block Description (DS1007SER_RX)	37
RX Parameters Page (DS1007SER_RX)	39

DS1007SER_INT_Ix

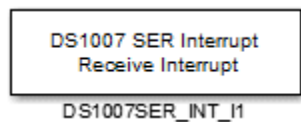
Where to go from here

Information in this section

Block Description (DS1007SER_INT_Ix)	41
To make the interrupts of the serial interface available as trigger sources in the model.	
Interrupt Page (DS1007SER_INT_Ix)	42
To specify the interrupt source.	

Block Description (DS1007SER_INT_Ix)

Block



Purpose

To make the interrupts of the serial interface available as trigger sources in the model.

I/O mapping

For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features\)](#).

I/O characteristics

The output triggers a function call to a subsystem if it is connected.

Dialog pages

The dialog settings can be specified on the following pages:

- [Interrupt Page](#) (refer to [Interrupt Page \(DS1007SER_INT_Ix\)](#) on page 42)

Related RTLib functions

This RTI block is implemented using the following RTLib functions:

- `ds1007ser_subint_handler_inst`
- `ds1007ser_subint_enable`
- `ds1007ser_subint_disable`

Related topics

References

dsrser_subint_disable (DS1007 RTLib Reference)	
dsrser_subint_enable (DS1007 RTLib Reference)	
dsrser_subint_handler_inst (DS1007 RTLib Reference)	
Interrupt Page (DS1007SER_INT_Ix)	42

Interrupt Page (DS1007SER_INT_Ix)

Purpose To specify the interrupt source.

Dialog settings

Interrupt source Lets you choose the interrupt type. The following table shows the available interrupt types:

Interrupt Type	Meaning
RX SW FIFO	Interrupt triggered when the number of bytes in the receive buffer reaches the specified threshold (see Initial RX SW FIFO threshold)
TX SW FIFO	Interrupt triggered when the transmit buffer is empty
Line status	Line status interrupt of the UART
Modem status	Modem status interrupt of the UART

Initial RX SW FIFO threshold Lets you specify the RX SW FIFO threshold for the receive interrupt in the range 1 ... (SW FIFO size -1) . The value should be a multiple of the UART threshold (see [DS1007SER_SETUP](#) on page 25). The RX SW FIFO threshold can be changed during run time by using the block [DS1007SER_INT_REC_LEV](#) on page 43.

Related topics

References

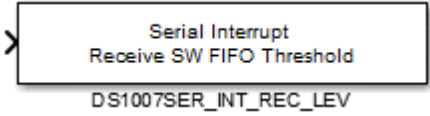
Block Description (DS1007SER_INT_Ix)	41
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DS1007SER_INT_REC_LEV

Where to go from here	Information in this section
	Block Description (DS1007SER_INT_REC_LEV).....43 To change the RX SW FIFO threshold during run time.
	Unit Page (DS1007SER_INT_REC_LEV).....44

Block Description (DS1007SER_INT_REC_LEV)

Block



Purpose To change the RX SW FIFO threshold during run time.

Description The block changes the RX SW FIFO threshold that is initially specified by the DS1007SER_INT_Ix block (see [DS1007SER_INT_Ix](#) on page 41).

I/O mapping For information on the I/O mapping, refer to [Serial Interface of the DS1007 \(DS1007 Features !\[\]\(e474458956c9a37fbf9586ddb60a7fa1_img.jpg\)](#)).





- I/O characteristics**
- The Receive SW FIFO Threshold input sets a new RX SW FIFO threshold.
 - The following table shows the characteristics of the block input:

Port	Characteristics	Value
Receive SW FIFO Threshold	Datatype	UInt32
	Range	1 ... (SW FIFO size - 1)

SW FIFO size is a block parameter. For further information, refer to [DS1007SER_SETUP](#) on page 25.

Dialog pages This block provides the Unit page (refer to [Unit Page \(DS1007SER_INT_REC_LEV\)](#) on page 44), but there are no settings to be specified.

Related RTLib functions	<p>This RTI block is implemented using the following RTLib functions:</p> <ul style="list-style-type: none">▪ dsser_config▪ dsser_fifo_reset▪ dsser_transmit_fifo_level▪ dsser_receive_fifo_level
-------------------------	--

Related topics	<div>References<div><div>DS1007SER_INT_Ix..... 41</div><div>DS1007SER_SETUP..... 25</div><div>dsser_config (DS1007 RTLib Reference )</div><div>dsser_fifo_reset (DS1007 RTLib Reference )</div><div>dsser_receive_fifo_level (DS1007 RTLib Reference )</div><div>dsser_transmit_fifo_level (DS1007 RTLib Reference )</div><div>Unit Page (DS1007SER_INT_REC_LEV)..... 44</div></div></div>
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Unit Page (DS1007SER_INT_REC_LEV)

Dialog settings	<p>There are no dialog settings on the Unit page to be specified.</p>
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Related topics	<div>References<div><div>Block Description (DS1007SER_INT_REC_LEV)..... 43</div></div></div>
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