DS4003 Digital I/O Board

RTLib Reference

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dSPACE

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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

Contents

This RTLib Reference (Real-Time Library) gives detailed descriptions of the C functions needed to program a DS4003 Digital I/O Board. The C functions can be used to program RTI-specific Simulink S-functions, or to implement your real-time models manually using C programs.

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.

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.

Macros

Introduction

The base address of an I/O board in a PHS-bus-based system has to be defined by using the `DSxxxx_n_BASE` macro.

Base Address of the I/O Board

DSxxxx_n_BASE Macros

When using I/O board functions, you always need the board's base address as a parameter. This address can easily be obtained by using the `DSxxxx_n_BASE` macros, where `DSxxxx` is the board name (for example, DS2001) and `n` is an index which counts boards of the same type. The board with the lowest base address is given index 1. The other boards of the same type are given consecutive numbers in order of their base addresses.

The macros reference an internal data structure which holds the addresses of all I/O boards in the system. The initialization function of the processor board (named `init`) creates this data structure. Hence, when you change an I/O board base address, it is not necessary to recompile the code of your application. For more information on the processor board's initialization function, refer to ds1006_init (DS1006 RTLib Reference 🕮) or init (DS1007 RTLib Reference 🕮).

Note

The `DSxxxx_n_BASE` macros can be used only after the processor board's initialization function `init` is called.

Example

This example demonstrates the use of the `DSxxxx_n_BASE` macros. There are two DS2001 boards, two DS2101 boards, and one DS2002 board connected to a PHS bus. Their base addresses have been set to different addresses. The following table shows the I/O boards, their base addresses, and the macros which can be used as base addresses:

Board	Base Address	Macro
DS2001	00H	DS2001_1_BASE
DS2002	20H	DS2002_1_BASE
DS2101	80H	DS2101_1_BASE
DS2001	90H	DS2001_2_BASE
DS2101	A0H	DS2101_2_BASE

Board Initialization

Introduction

Before you can use the DS4003, you have to perform the initialization process.

ds4003_init

Syntax

```
void ds4003_init (phs_addr_t base)
```

Include file

```
ds4003.h
```

Purpose

To initialize the DS4003.

Description

This is the basic initialization function for the DS4003. All setup parameters are set to default values as given below:

- All bit groups of all ports are set to direct (non-strobed) input mode.
- Generation of PHS-bus I/O errors is disabled (for DS4001 compatibility).
- Auto reset on I/O error is disabled.
- The interrupt mode is set to transparent (non-latched) mode.

Note

- The initialization function of the processor board must be called before the `DS4003_init` function.
- The `DS4003_init` function must be called before any other DS4003 function can be used.

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

Return value

None

Messages

The following messages are defined:

ID	Type	Message	Description
201	Error	ds4003_init(): Invalid PHS-bus base address 0x????????	The value of the base parameter is not a valid PHS-bus address. This error may be caused if the PHS-bus connection of the I/O board is missing. Check the connection.
-175	Error	ds4003_init(0x??): Board not found!	No DS4003 board could be found at the specified PHS-bus address. Check if the `DS4003_n_BASE` macro corresponds to the I/O board used.
-53	Warning	ds4003_init(0x??): Jumper setting is not matching SW default initialization! STP register 0x???????? instead of 0x????????	The value of the STP register could not be verified because the jumper setting is not correct.

Execution times

For information, refer to Function Execution Times on page 33.

Example

This example show how to use the function:

```
void main(void)
{
   init();
   ds4003_init(DS4003_1_BASE);
   …
}
```

The DS4003 at address `DS4003_1_BASE` is initialized.

Related topics

References

Base Address of the I/O Board.....7

Digital I/O Unit

Introduction

The DS4003 provides 96 bidirectional TTL digital I/O lines, divided into three 32-bit ports.

Note

You have to initialize the DS4003 with the `ds4003_init` function before you can use one of these functions.

Where to go from here

Information in this section

Information in other sections

Digital I/O Unit (DS4003 Features 🕮)
The DS4003 offers a digital I/O unit to handle a great number of digital signals.

ds4003_pio_init

Syntax

```
void ds4003_pio_init (
   phs_addr_t base,
   long port,
   long dir,
   long mode)
```

Include file

```
ds4003.h
```

Purpose

To set the data direction and input mode.

Description

This function allows to set the data direction and input mode in groups of 8 bit for each port.

Note

Groups being configured as outputs can be read back only if their input mode is set to direct (non-strobed).

I/O mapping

For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

port Specifies the port number within the range 1 … 3.

dir Specifies the I/O data direction. The following symbols can be combined using the logical OR operation to set the data direction for individual bit groups:

Predefined Symbol	Meaning
DS4003_IN_0	Sets bit group 0 to input
DS4003_OUT_0	Sets bit group 0 to output
DS4003_IN_1	Sets bit group 1 to input
DS4003_OUT_1	Sets bit group 1 to output
DS4003_IN_2	Sets bit group 2 to input
DS4003_OUT_2	Sets bit group 2 to output
DS4003_IN_3	Sets bit group 3 to input
DS4003_OUT_3	Sets bit group 3 to output

The following symbols are predefined to set all bit groups:

Predefined Symbol	Meaning
DS4003_IN	Sets all bit groups to input
DS4003_OUT	Sets all bit groups to output

mode Specifies the input mode for the individual bit groups. The following symbols can be combined using the logical OR operation:

Predefined Symbol	Meaning
DS4003_STRB_0	Sets bit group 0 to strobed input mode
DS4003_NON_STRB_0	Sets bit group 0 to non-strobed input mode
DS4003_STRB_1	Sets bit group 1 to strobed input mode
DS4003_NON_STRB_1	Sets bit group 1 to non-strobed input mode
DS4003_STRB_2	Sets bit group 2 to strobed input mode
DS4003_NON_STRB_2	Sets bit group 2 to non-strobed input mode
DS4003_STRB_3	Sets bit group 3 to strobed input mode
DS4003_NON_STRB_3	Sets bit group 3 to non-strobed input mode

The following symbols are predefined to set all bit groups:

Predefined Symbol	Meaning
DS4003_STRB	Sets all bit groups to strobed input mode
DS4003_NON_STRB	Sets all bit groups to direct input mode

Return value

None

Messages

The following message is defined:

ID	Type	Message	Description
-50	Error	ds4003_pio_init(0x??): Board not initialized!	The DS4003 has not been initialized by a preceding call to the `ds4003_init` function.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Base Address of the I/O Board....7
ds4003_init....9
ds4003_pio_initialize....15

ds4003_pio_initialize

Syntax

```
void ds4003_pio_initialize (
   phs_addr_t base,
   long port,
   long dir,
   long mode,
   long data)
```

Include file

```
ds4003.h
```

Purpose

To set the data direction, input mode and initialization values of the I/O lines.

Description

This function sets the data direction and input mode in groups of 8 bit for each port.

The I/O lines specified as outputs, are initialized with the data specified in the `data` parameter, before setting the line as output.

Note

- The `ds4003_init` function must be called before this function can be used.
- Groups being configured as outputs can be read back only if their input mode is set to direct (non-strobed).

I/O mapping

For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

port Specifies the digital I/O port within the range 1 … 3.

dir Specifies the I/O data direction. The following symbols can be combined using the logical OR operation to set the data direction for individual bit groups:

Predefined Symbol	Meaning
`DS4003_IN_0`	Sets bit group 0 to input
`DS4003_OUT_0`	Sets bit group 0 to output
`DS4003_IN_1`	Sets bit group 1 to input
`DS4003_OUT_1`	Sets bit group 1 to output
`DS4003_IN_2`	Sets bit group 2 to input

Predefined Symbol	Meaning
DS4003_OUT_2	Sets bit group 2 to output
DS4003_IN_3	Sets bit group 3 to input
DS4003_OUT_3	Sets bit group 3 to output

The following symbols are predefined to set all bit groups:

Predefined Symbol	Meaning
DS4003_IN	Sets all bit groups to input
DS4003_OUT	Sets all bit groups to output

mode Specifies the input mode for the individual bit groups. The following symbols can be combined using the logical OR operation:

Predefined Symbol	Meaning
DS4003_STRB_0	Sets bit group 0 to strobed input mode
DS4003_NON_STRB_0	Sets bit group 0 to non-strobed input mode
DS4003_STRB_1	Sets bit group 1 to strobed input mode
DS4003_NON_STRB_1	Sets bit group 1 to non-strobed input mode
DS4003_STRB_2	Sets bit group 2 to strobed input mode
DS4003_NON_STRB_2	Sets bit group 2 to non-strobed input mode
DS4003_STRB_3	Sets bit group 3 to strobed input mode
DS4003_NON_STRB_3	Sets bit group 3 to non-strobed input mode

The following symbols are predefined to set all bit groups:

Predefined Symbol	Meaning
DS4003_STRB	Sets all bit groups to strobed input mode
DS4003_NON_STRB	Sets all bit groups to direct input mode

data Specifies the initial values for pins configured as output within the range 0x00000000 … 0xFFFFFFFF.

Return value

None

Messages

The following messages are defined:

ID	Type	Message	Description
-50	Error	ds4003_pio_initialize(0x??): Board not initialized!	The DS4003 has not been initialized by a preceding call to the `ds4003_init` function.
-54	Error	ds4003_pio_initialized(0x??): Specified value is not matching jumper setup!	The function could not initialize the peripheral board to the specified setting. Check if Manual Setup (setup by jumper) is used. In this case the specified setting in the set-function must match the jumper setup. If the board is not

ID	Type	Message	Description
			setup manually by jumpers, a hardware failure could cause this error.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Base Address of the I/O Board 7
ds4003_init 9
ds4003_pio_init 13

ds4003_set_error_mode

Syntax

```
void ds4003_set_error_mode (
   phs_addr_t base,
   long mode)
```

Include file

```
ds4003.h
```

Purpose

To set the error mode.

Description

This function enables or disables automatic generation of PHS-bus I/O errors if one of the ports signals an error.

The error mode is enabled by default to ensure compatibility to the DS4001 Digital I/O board.

For further information, refer to Error Handling (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

mode Specifies the automatic error generation. The following symbols are predefined:

Predefined Symbol	Meaning
DS4003_ERR_DISABLE	Automatic error generation disabled
DS4003_ERR_ENABLE	Automatic error generation enabled

Return value

None

Messages

The following message is defined:

ID	Type	Message	Description
-50	Error	ds4003_set_error_mode(0x??):Board not initialized!	The DS4003 has not been initialized by a preceding call to the `ds4003_init` function.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Base Address of the I/O Board....7
ds4003_init....9
ds4003_set_int_mode....18
ds4003_set_reset_mode....19

ds4003_set_int_mode

Syntax

```
void ds4003_set_int_mode (
   phs_addr_t base,
   long mode)
```

Include file

```
ds4003.h
```

Purpose

To set the interrupt mode.

Description

The interrupt mode can be either set to transparent mode or to latched mode. In transparent mode the interrupt signal is directly used as the input signal of the interrupt controller. In latched mode the interrupt signal is latched to ensure proper interrupt operation in case of short interrupt pulses.

Transparent interrupt mode is selected by default.

For further information, refer to Interrupts Provided by the DS4003 (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

mode Specifies the interrupt mode. The following symbols are predefined:

Predefined Symbol	Meaning
`DS4003_INT_TRANS`	Transparent mode
`DS4003_INT_LATCH`	Latched mode

Return value

None

Messages

The following message is defined:

ID	Type	Message	Description
-50	Error	ds4003_set_int_mode(0x??): Board not initialized!	The DS4003 has not been initialized by a preceding call to the `ds4003_init` function.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_set_reset_mode

Syntax

```
void ds4003_set_reset_mode (
   phs_addr_t base,
   long mode)
```

Include file

```
ds4003.h
```

Purpose

To set the automatic reset mode.

Description

This function enables or disables the automatic reset mode of the DS4003. If auto reset is enabled, an I/O error sets all bit groups of all ports to direct (non-strobed) input mode.

Auto reset on I/O error is disabled by default.

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

mode Specifies the automatic reset mode. The following symbols are predefined:

Predefined Symbol	Meaning
`DS4003_RST_DISABLE`	Automatic reset mode disabled
`DS4003_RST_ENABLE`	Automatic reset mode enabled

Return value

None

Messages

The following message is defined:

ID	Type	Message	Description
-50	Error	ds4003_set_reset_mode(0x??):Board not initialized!	The DS4003 has not been initialized by a preceding call to the `ds4003_init` function.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_bit_in

Syntax

```
UInt32 ds4003_bit_in (
   phs_addr_t base,
   long port,
   long mask)
```

Include file	`ds4003.h`
Purpose	To read selected bits of a digital I/O line.
Description	The 32-bit digital I/O lines of the specified port is read and the bits specified by the `mask` parameter are returned through the return value. For all I/O groups configured for direct input mode, the actual state of the I/O lines is reflected. Groups being configured for strobed input mode reflect the state of the I/O lines at the last strobe pulse. I/O groups being programmed as outputs can be read back if their input mode is set to direct.
I/O mapping	For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).
Parameters	**base** Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7. **port** Specifies the port number within the range 1 … 3. **mask** Specifies the bitmask for I/O lines to be read.
Return value	This function returns the state of the I/O lines.
Execution times	For information, refer to Function Execution Times on page 33.
Related topics	References Base Address of the I/O Board....7 ds4003_bit_out....22 ds4003_in32....23 ds4003_init....9 ds4003_pio_init....13

ds4003_bit_out

Syntax

```
void ds4003_bit_out (
   phs_addr_t base,
   long port,
   long mask,
   UInt32 data)
```

Include file

```
ds4003.h
```

Purpose

To write data to bits of a 32-bit digital I/O line.

Description

The bits of data specified by the `mask` parameter are written to the 32-bit digital I/O line of the specified port. All other bits remain unchanged. The I/O groups corresponding to the `mask` parameter must be programmed for output. I/O groups with their input mode set to direct can be read back.

Additional PACK pulse The 32 bit of the port can be written only at the same time. So the function reads the bit values, modifies them according to your specifications and writes the values back to the port. Due to this, an additional PACK pulse occurs. To avoid the additional PACK pulse, use the `ds4003_out32` function.

I/O mapping

For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

port Specifies the port number within the range 1 … 3.

mask Specifies the bitmask for I/O lines to be written.

data Specifies the data to be written.

Return value

None

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_in32

Syntax

```
UInt32 ds4003_in32 (
   phs_addr_t base,
   long port)
```

Include file

```
ds4003.h
```

Purpose

To read a complete digital I/O line.

Description

The digital I/O line of the specified port is read. For all I/O groups configured for direct input mode, the actual state of the I/O lines is reflected. Groups being configured for strobed input mode reflect the state of the I/O lines at the last strobe pulse. I/O groups being programmed as outputs can be read back if their input mode is set to direct.

I/O mapping

For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

port Specifies the port number within the range 1 … 3.

Return value

This function returns the state of the I/O lines.

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_out32

Syntax

```
void ds4003_out32 (
   phs_addr_t base,
   long port,
   UInt32 data)
```

Include file

```
ds4003.h
```

Purpose

To write data to a digital I/O line.

Description

The value data is written to the digital I/O line of the specified port. All I/O groups must be programmed for output. I/O groups with their input mode set to direct can be read back.

I/O mapping

For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

port Specifies the port number within the range 1 … 3.

data Specifies the data to be written.

Return value

None

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_clear_int_flag

Syntax

```
void ds4003_clear_int_flag (
   phs_addr_t base,
   long mask)
```

Include file

```
ds4003.h
```

Purpose

To clear the interrupt flags in the DS4003's interrupt control register.

Description

The interrupt flags in the DS4003's interrupt control register (CTL) specified by the `mask` parameter are cleared.

For further information, refer to Interrupts Provided by the DS4003 (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

mask Specifies the bitmask for the interrupt flags to be cleared. The following symbols can be combined using the logical OR operation:

Predefined Symbol	Meaning
DS4003_INT1	Interrupt flag 1
DS4003_INT2	Interrupt flag 2
DS4003_INT3	Interrupt flag 3
DS4003_INT4	Interrupt flag 4
DS4003_INT5	Interrupt flag 5
DS4003_INT6	Interrupt flag 6

Return value

None

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Base Address of the I/O Board 7
ds4003_init 9
ds4003_int_pending 26

ds4003_int_pending

Syntax

```
long ds4003_int_pending (
   phs_addr_t base,
   long mask)
```

Include file

```
ds4003.h
```

Purpose

To test for pending interrupts.

Description

The interrupt flags in the DS4003's interrupt control register (CTL) specified by the `mask` parameter are tested.

For further information, refer to Interrupts Provided by the DS4003 (DS4003 Features 🕮).

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

mask Specifies the bitmask for the interrupt flags to be tested. The following symbols can be combined using the logical OR operation:

Predefined Symbol	Meaning
`DS4003_INT1`	Interrupt flag 1
`DS4003_INT2`	Interrupt flag 2
`DS4003_INT3`	Interrupt flag 3
`DS4003_INT4`	Interrupt flag 4
`DS4003_INT5`	Interrupt flag 5

Predefined Symbol	Meaning
DS4003_INT6	Interrupt flag 6

Return value

This function returns the result of the test:

Value	Meaning
1	At least one of the specified interrupt flags is set in the CTL register
0	No interrupt flag is set in the CTL register

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Base Address of the I/O Board....7
ds4003_clear_int_flag....25
ds4003_init....9

ds4003_read_status

Syntax

```
long ds4003_read_status (phs_addr_t base)
```

Include file

```
ds4003.h
```

Purpose

To read the DS4003's status register.

Description

This function returns the contents of the DS4003's status register, i.e. the state of the various error flags.

For further information, refer to Error Handling (DS4003 Features 🕮).

Note

The latched error flags are cleared by a status register read operation. Thus, if multiple error flags shall be tested at the same time, a software copy of the status register must be used.

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

Return value

This function returns the contents of the DS4003's status register. The following symbols are predefined to mask out the required flags:

Predefined Symbol	Meaning
DS4003_ERRA	Error flag (port A)
DS4003_ERRB	Error flag (port B)
DS4003_ERRC	Error flag (port C)
DS4003_LERRA	Latched error flag (port A)
DS4003_LERRB	Latched error flag (port B)
DS4003_LERRC	Latched error flag (port C)

Execution times

For information, refer to Function Execution Times on page 33.

Example

This example shows how to use the function:

```
long status;
status = ds4003_read_status(DS4003_1_BASE);
error1 = ((status & DS4003_ERRA) != 0);
error2 = ((status & DS4003_ERRB) != 0);
error3 = ((status & DS4003_ERRC) != 0);
error1_latched = ((status & DS4003_LERRA) != 0);
error2_latched = ((status & DS4003_LERRB) != 0);
error3_latched = ((status & DS4003_LERRC) != 0);
```

Related topics

Basics

Error Handling (DS4003 Features 🕮)

References

Base Address of the I/O Board....7
ds4003_init....9

ds4003_clear_release_flag

Syntax

```
void ds4003_clear_release_flag (phs_addr_t base)
```

Include file	`ds4003.h`
Purpose	To clear the output release flag in the DS4003's release flag register.
Description	The output release flag in the DS4003's release flag register is cleared. This flag controls the RELEASE output signal available on all 3 digital I/O line output connectors.
I/O mapping	For details on the I/O mapping, refer to Digital I/O Unit (DS4003 Features 🕮).
Parameters	**base** Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.
Return value	None
Execution times	For information, refer to Function Execution Times on page 33.
Related topics	References Base Address of the I/O Board....7 ds4003_init....9 ds4003_read_release_flag....29 ds4003_set_release_flag....30

ds4003_read_release_flag

Syntax	`long ds4003_read_release_flag (phs_addr_t base)`
Include file	`ds4003.h`
Purpose	To read the state of the output release flag in the DS4003's release flag register.

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

Return value

This function returns the state of the output release flag:

Value	Meaning
1	Flag is set
0	Flag is not set

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

ds4003_set_release_flag

Syntax

```
void ds4003_set_release_flag (phs_addr_t base)
```

Include file

```
ds4003.h
```

Purpose

To set the output release flag.

Description

The output release flag in the DS4003's release flag register is set. This flag controls the RELEASE output signal available on all 3 digital I/O line output connectors.

Parameters

base Specifies the PHS-bus base address. Refer to Base Address of the I/O Board on page 7.

Return value

None

Execution times

For information, refer to Function Execution Times on page 33.

Related topics

References

Function Execution Times

Introduction

To give you the mean function execution times and basic information on the test environment used.

Where to go from here

Information in this section

Information on the Test Environment

Introduction

The execution times of the C functions can vary, since they depend on different factors. The measured execution times are influenced by the test environment used.

Test environment

The execution time of a function can vary, since it depends on different factors, for example:

- CPU clock and bus clock frequency of the processor board used
- Optimization level of the compiler
- Use of inlining parameters

The test programs that are used to measure the execution time of the functions listed below have been generated and compiled with the default settings of the

down<xxxx> tool (optimization and inlining). The execution times in the tables below are always the mean measurement values.

The properties of the processor boards used are:

	DS1006
CPU clock	2.6 GHz / 3.0 GHz
Bus clock	133 MHz

Measured Execution Times

Introduction

Execution times are available for the following RTLib units:

- Initialization
- Digital I/O unit

Note

The following execution times contain mean values for a sequence of I/O accesses. The execution time of a single call might be lower because of buffered I/O access.

Initialization

The following execution time has been measured for the initialization function:

Function	**Mean Execution Time**	
	DS1006 with 2.6 GHz	**DS1006 with 3.0 GHz**
ds4003_init	62.68 µs	58.73 µs

Digital I/O unit

The following execution times have been measured for the digital I/O unit:

Function	**Mean Execution Time**	
	DS1006 with 2.6 GHz	**DS1006 with 3.0 GHz**
ds4003_set_error_mode	1.40 µs	1.37 µs
ds4003_set_int_mode	1.40 µs	1.37 µs
ds4003_set_reset_mode	1.40 µs	1.37 µs
ds4003_pio_init	2.19 µs	2.16 µs
ds4003_pio_initialize	1.61 µs	1.59 µs
ds4003_in32	0.60 µs	0.58 µs
ds4003_out32	0.03 µs	0.01 µs
ds4003_bit_in	0.60 µs	0.58 µs
ds4003_bit_out	0.62 µs	0.59 µs

Function	Mean Execution Time	
	DS1006 with 2.6 GHz	DS1006 with 3.0 GHz
ds4003_read_status	0.01 µs	0.01 µs
ds4003_clear_int_flag	0.03 µs	0.01 µs
ds4003_int_pending	0.60 µs	0.58 µs
ds4003_set_release_flag	0.61 µs	0.59 µs
ds4003_clear_release_flag	0.61 µs	0.58 µs
ds4003_read_release_flag	0.60 µs	0.58 µs

Related topics

References

Information on the Test Environment..... 33

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