**8bit & 32bit**

**ABOV I2C API**

**User Guide**

Application Note

Version 1.00

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# Overview

This document describes the firmware for the ABOV\_I2C\_Driver.

It has the goal of helping the developer to understand how this firmware works, and how to tailor the application.

# Function block diagram

## I2C Function Description

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1. START and STOP conditions are always generated by the master.  
 The bus is busy between START and STOP condition.

2. Every byte put on the SDAn line must be 8-bits long and it has to be followed by an ACK bit.  
 The transmitter releases the SDAn line(High) during the acknowledge clock pulse.  
 So the receiver is able to pull down the SDAn line during the acknowledge clock pulse.

3. The I2C is byte-oriented and interrupt-based. So byte complete, Interrupt is generated.  
 And clock line held low while interrupts are served by slave.  
 Data transfer continues when the slave is ready for another byte of data and releases clock line.

## I2C Master Mode

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| --- |
| main.c    I2C IRQ |

## I2C Slave Mode

|  |
| --- |
| main.c    I2C IRQ |

# How to use in main application

## Public Macro

The macros on the left side are user specific.

Modification is required for the user application.

|  |  |
| --- | --- |
| #define I2C\_DEVICE\_ADDRESS 0xA0  #define I2C\_SLAVE\_OWN\_ADDR 0xA0  #define I2C\_SPEED 10000  #define I2C\_MAX\_BUFFER\_SIZE 20  #define I2C\_MAX\_CHANNEL 2  #define I2C\_CH0 0  #define I2C\_CH1 1 | #define I2C\_ACK\_DISABLE 0  #define I2C\_ACK\_ENABLE 1  #define I2C\_WRITE\_MODE 0  #define I2C\_READ\_MODE 1  #define I2C\_IDLE 0  #define I2C\_BUSY 1  #define I2C\_FALSE 0  #define I2C\_TRUE 1 |

## I2C Initialization

‘USI\_I2C\_Initial()’ function is required to use I2C functionality.

This function includes the following.

- Peri. Clock Enable / I2C Block Reset / I2C Interrupt Enable

- I2C Enable / I2C Ack Enable / Set Slave Own Address / Set I2C Speed / Set I2C Data Hold Time

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| --- |
| [example of use]  USI\_I2C\_Initial(I2C\_CH0, I2C\_SPEED, I2C\_SLAVE\_OWN\_ADDR, I2C\_ACK\_ENABLE); |

## I2C Master – Write / Read

Using ‘USI\_I2C\_MasterTransferData()’ function, you can use both I2C Write and I2C Read functions.

This function includes the following parameter.

- I2C channel number / slave device address

- write data buffer / write data length / read data buffer / read data length

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| --- |
| [example of use]  (case1) I2C Write 4-byte  🡪 USI\_I2C\_MasterTransferData(I2C\_CH0, I2C\_DEVICE\_ADDRESS, \*u8TxDat, 4, \*u8RxDat, 0);  (case2) I2C Read 4-byte  🡪 USI\_I2C\_MasterTransferData(I2C\_CH0, I2C\_DEVICE\_ADDRESS, \*u8TxDat, 0, \*u8RxDat, 4);  (case3) I2C Write 1-byte , Read 3-byte  🡪 USI\_I2C\_MasterTransferData(I2C\_CH0, I2C\_DEVICE\_ADDRESS, \*u8TxDat, 1, \*u8RxDat, 3);  (case4) I2C Write 3-byte , Read 1-byte  🡪 USI\_I2C\_MasterTransferData(I2C\_CH0, I2C\_DEVICE\_ADDRESS, \*u8TxDat, 3, \*u8RxDat, 1); |

## I2C Slave – Set Transmit Buffer

Using ‘USI\_I2C\_SetSlaveData()’ function, you can set transmit buffer data.

The buffer data can be modified by the user.

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| [example of use]  USI\_I2C\_SetSlaveData(I2C\_CH0); |

## Example of use in main application

This is example of use in main application.

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# How to port to other device

## Main (main.c)

1) Include header file 🡪 #include "ABOV\_USI\_I2C.h"

2) Call ‘USI\_I2C\_InterruptHandler()’ function at the I2C IRQ.

🡪 Example) void I2C0\_Handler(void){ USI\_I2C\_InterruptHandler(I2C\_CH0); }  
 void I2C1\_Handler(void){ USI\_I2C\_InterruptHandler(I2C\_CH1); }

3) Use functions as below in user application.

🡪 Example) USI\_I2C\_Initial(I2C\_CH0, I2C\_SPEED, I2C\_SLAVE\_OWN\_ADDR, I2C\_ACK\_ENABLE);  
 USI\_I2C\_MasterTransferData(I2C\_CH0, I2C\_DEVICE\_ADDRESS, \*u8TxDat, 4, \*u8RxDat, 0);  
 USI\_I2C\_SetSlaveData(I2C\_CH1);

## Header file (ABOV\_USI\_I2C.h)

It needs to change public typedef as below.

I2C Control Register and I2C Status Register may differ from product to product,

So the corresponding bits must be checked.

|  |
| --- |
|  |

## Source file (ABOV\_USI\_I2C.c)

1) Exchange device header file 🡪 #include "user\_device\_name.h"

2) Exchange name of register as below

- SCUCG relevant registers and their sub bits

- I2C relevant registers and their sub bits

- Interrupt relevant registers and their sub bits

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