# Application Note

# EI2C_MasterSlave

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# Table of Contents

## 1. Preface

This application note describes sample software for the EI2C Master and Slave control functions using the EI2C driver.
This document helps the user check operation of a product under development and develop its program.

## 2. Technical Term

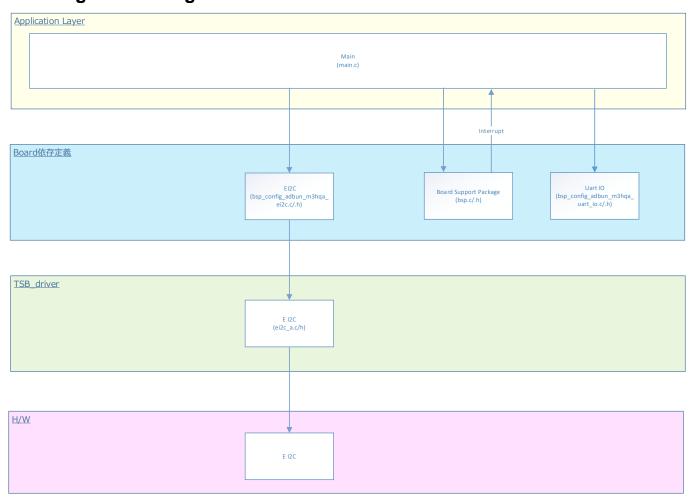| Term/Abbreviation | Definition |
|---|---|
| EI2C | Inter-Integrated Circuit interface version A |
| BSP | Board Support Package |
| UART | Universal Asynchronous Receiver Transmitter |

## 3. Reference Document

| Document | Notes |
|---|---|
| Data sheet | Refer to the data sheet of MCU to be used. |
| Reference manual | Refer to the reference manual of each IP to be used. |
| Application note<br>MCU User Guide | Refer to the MCU user manual to be used. |
| Driver API list | Refer to the MCU Doc folder to be used. |

# 4. Target Sample Program

| Sample Program | Outline |
|---|---|
| EI2C_MasterSlave | Sample program of EI2C_MasterSlave function |

# 5. Configuration Diagram

# 6. Sample Program：EI2C_MasterSlave

This is sample software to check the operation of EI2C Master and Slave according to the command input from the terminal emulator.

## 6.1. Outlines of Operation

It is divided into Master operation and Slave operation.
Master: Enter commands (write, read) from the terminal emulator.
 Slave: When a Request from Master is received, EI2C control is used and the result is output according to the command.
  Slave_address is displayed in the terminal emulator as "sa xx".

Command list

| Command | function | Parameters (hex) | | Input sample | Note |
|---|---|---|---|---|---|
| | | 1 | 2 | | |
| write | Data transmission | XX | XX… | "write"<br>"write 60"<br>"write 6011223344" | ・[dataA_form1]: Send INIT_SLAVE with no parameters<br>・[dataA_form2]: Send INIT_WDATA with no parameters<br>・The transmission size is the total number of bytes of [dataA_form1] + [dataA_form2] |
| | | [dataA_form1] (Slave_address) (1 byte) | [dataA_form2] (Master_tx_data) (max 4 byte) | | |
| read | Data transmission + Data reception | XX | XX… | "read"<br>"read 60"<br>"read 600001" | ・[dataB_form1]: Same specifications as [dataA_form1]<br>・[dataB_form2]: This is the read size when reading from the Sub Address or later of [dataB_form1]. Send INIT_RNUM with no parameters<br>・Send / receive size Send: Number of bytes in [dataB_form1] Receive: Number of bytes in [dataB_form2] |
| | | [dataB_form1] (Slave_address) (1 byte) | [dataB_form2] (Master_tx_data) (1 byte, 2 byte) | | |
| slave | Switch to Slave Mode | - | - | "slave" | ・[dataC_form1]: Same specifications as [dataA_form1]<br>・After switching, wait for the Slave Address to be received.<br>・If you make a request more than the number of times set in SLAVE_CONTINUE, it will return from Slave mode to Master mode |
| | | - | - | | |

Note 1）"XX" is a hex number. For 0x12, enter "12".
Note 2）The parameter of [ ] is accepted even if it is not specified.

## 6.2. Function to Use

The functions to use are as follows.
For the Port assignment of each channel, refer to the MCU user manual.

| IP | Channel | Objective |
|---|---|---|
| EI2C | BSP_ EI2C_1 | For EI2C control. Works as a Master Device or Slave Device |
| UART | BSP_UART_1 | For terminal emulator communication.<br>Used for operation log output and command input |

## 6.3. Interrupt to Use

| Interrupt | Outlines |
|---|---|
| INTI2C1NST | EI2C ch.1 Status interrupt |
| INTI2C1ATX | EI2C ch.1 Send buffer empty interrupt |
| INTI2C1BRX | EI2C ch.1 Receive buffer empty interrupt |
| INTUART0RX | UART ch0 Receive interrupt. For terminal emulator |
| INTUART0TX | UART ch0 Transmission interrupt. For terminal emulator |
| INTUART0ERR | UART ch0 Error interrupt. For terminal emulator |

## 6.4. Configuration

"main.c" configuration setting.

| Configuration | Current Value | Description |
|---|---|---|
| INIT_SLAVE | Slave Address | - |
| INIT_WDATA | 11, 22, 33, 44 | 4 bytes are used as write data |
| INIT_RNUM | 0x02 | Number of read request bytes of 2 bytes |
| Sub address | Start sub Address | - |
| PARAM A Size Max | 0x04 | Number of received bytes of [dataA_form2] |
| PARAM B Size Max | 0x02 | Number of received bytes of [dataB_form2] |
| SLAVE_CONTINUE | 10 | When Slave is operating, if you make a request that exceeds the number of times set in SLAVE_CONTINUE, it will return from Slave mode to Master mode |

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## 6.5. Example of Terminal Emulator Output
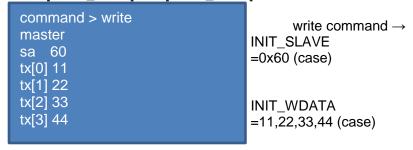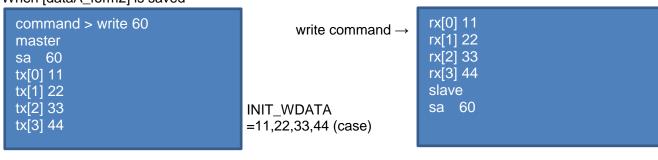### 6.5.1. Normal Operation
**Write Command**

**Master**                                           **Slave (slave address C0)**
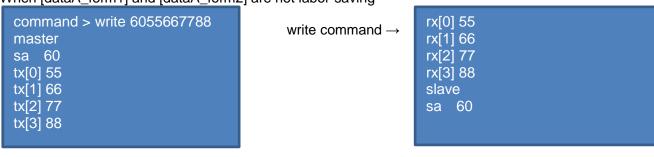
When [dataA_form1] and [dataA_form2] are saved

```
command > write
master
sa   60
tx[0] 11
tx[1] 22
tx[2] 33
tx[3] 44
```

write command →

INIT_SLAVE
=0x60 (case)

INIT_WDATA
=11,22,33,44 (case)

```
rx[0] 11
rx[1] 22
rx[2] 33
rx[3] 44
slave
sa   60
```

When [dataA_form2] is saved

```
command > write 60
master
sa   60
tx[0] 11
tx[1] 22
tx[2] 33
tx[3] 44
```

write command →

INIT_WDATA
=11,22,33,44 (case)

```
rx[0] 11
rx[1] 22
rx[2] 33
rx[3] 44
slave
sa   60
```

When [dataA_form1] and [dataA_form2] are not labor-saving

```
command > write 6055667788
master
sa   60
tx[0] 55
tx[1] 66
tx[2] 77
tx[3] 88
```

write command →

```
rx[0] 55
rx[1] 66
rx[2] 77
rx[3] 88
slave
sa   60
```

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**Read Command**

**Master**                                                          **Slave (slave address C0)**

When [dataB_form1] and [dataB_form2] are saved

```
command > read
master
sa   60
rx[0] 11
rx[1] 22
```
read command →
```
tx[0] 11
tx[1] 22
slave
sa   60
```

INIT_SLAVE
=0x60 (case)

INIT_RNUM
=0x0002 (case)

When [dataB_form2] is saved

```
command > read 60
master
sa   60
rx[0] 11
rx[1] 22
```
read command →
```
tx[0] 11
tx[1] 22
slave
sa   60
```

INIT_RNUM
=0x0002 (case)

When [dataB_form1] and [dataB_form2] are not labor-saving

```
command > read 600001
master
sa   60
rx[0] 11
```
read command →
```
tx[0] 11
slave
sa   60
```

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**Slave Command**

**Master**                                                                                          **Slave**

```
 -------------------
| I2C master mode |
 -------------------
command >
```

slave command →

```
 -------------------
| I2C master mode |
 -------------------
command > slave
 -------------------
| I2C slave mode |
 -------------------
slave
sa    60
```

### 6.5.2. Case of Error Occurrence
Nothing.

# 7. EI2C Driver

## 7.1. List of driver
The EI2C is controlled by using the following interface.
For an example of use, refer to the source code.

| Driver | Control Outlines |
|---|---|
| EI2C_init | EI2C Register initialization |
| EI2C_restartcondition | Generate restart condition |
| EI2C_startcondition | Generate start condition |
| EI2C_slave_init | Slave mode setting |

## 7.2. Details
See "3. Reference Documents" for more information.

## 8. Revision History

| Revision | Date | Description |
|---|---|---|
| 1.0 | 2022-04-08 | First release |

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