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Renesas Electronics Corporation

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## M16C/62A Group, M16C/62N Group

SI/O3,4 setup procedures

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### 1.0 Abstract

The following article introduces SI/O3,4 setup procedures and its application example.

### 2.0 Introduction

The explanation of this issue is applied in the following condition.

Applicable MCU: M16C/62A Group, M16C/62N Group

### 3.0 Description of the application example

This chapter describes the procedures of data transmit/receive using SI/O3,4 for M16C/62A group and M16C/62N group.

### 3.1 Setup procedures

The setup procedures for “3.0 Description of the application example” and the setting value will be shown to use an internal clock for SI/O3 and an external clock for SI/O4. The connection example is shown in Fig.3.1.

Refer to M16C/62A group and M16C/62N group datasheet for the details of each register.

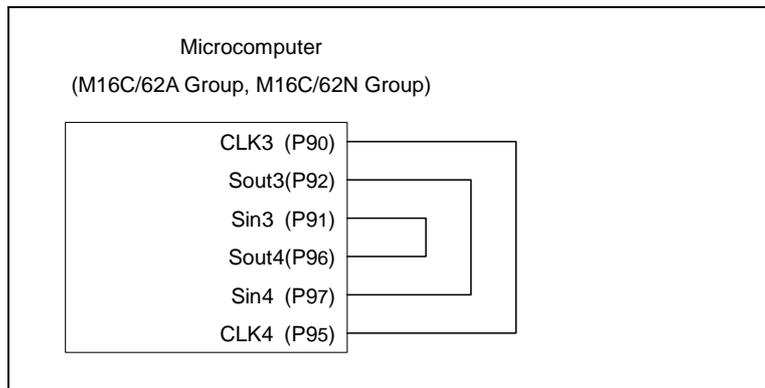
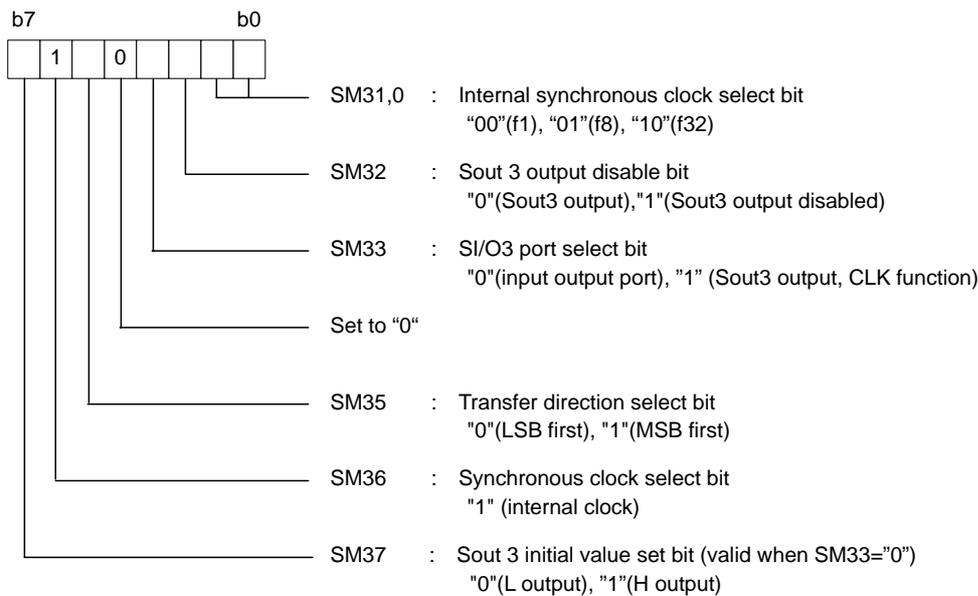


Fig. 3.1 An example of connection

(1) Set SI/O3 control register (S3C)

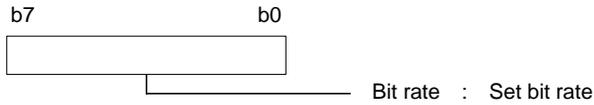
- Set synchronous clock select bit to “1” ( internal clock)
- Set internal synchronous clock select bit and transfer direction select bit.



(Note) Please write in this register after setting protect register (000A16 address) bit 2 to “1”.

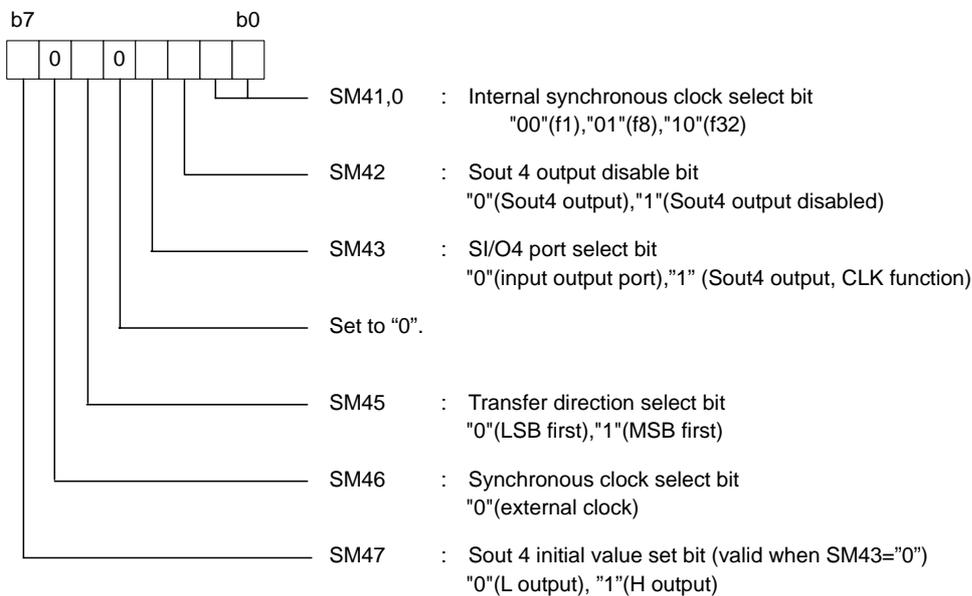
### (2) Set SI/O3 bit rate (S3BRG)

- Set SI/O3 bit rate.



### (3) Set SI/O4 control register (S4C)

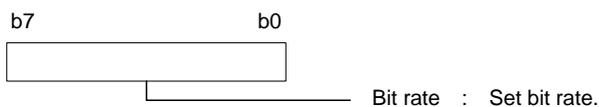
- Set synchronous clock select bit to "0" (external clock).
- Set transfer direction select bit.



(Note) Please write in this register after setting protect register (000A16 address) bit 2 to "1".

### (4) Set SI/O4 bit rate generator

- Set SI/O4 bit rate.





## 4.0 Program sample

A sample program of transmit/receive using SI/O3 for internal clock and SI/O4 external clock will be shown below.

```

/*****/
/*  FILE NAME : rej05b0264_src.c          */
/*  Ver       : 1.00                      */
/*  CPU       : M16C/62A                  */
/*  FUNCTION  : The SI/O3,4 setting procedure in the C language. */
/*-----*/
/*  Copyright (C) 2003, Renesas Technology Corp.      */
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/*  All rights reserved.                          */
/*****/
/*****/
/*  include file          */
/*****/
#include "sfr62a.h"      // Special Function Register Header File

/*****/
/*  Function declaration */
/*****/
void  init(void);
void  sio3_int(void);

/*****/
/*  Global variable declaration */
/*****/
char  snd_data3[8] = {0x01, 0x03, 0x07, 0x0f, 0x1f, 0x3f, 0x7f, 0xff};
char  snd_data4[8] = {0xff, 0x7f, 0x3f, 0x1f, 0x0f, 0x07, 0x03, 0x01};
char  snd_cnt = 0;

/*****/
/*  main function          */
/*          */
/*  main()                */
/*  SIO3/4 sample program */
/*  Pin Connection       */
/*  P9_0(CLK3) ---> P9_5(CLK4) */
/*  P9_1(Sin3) <--- P9_6(Sout4) */
/*  P9_2(Sout3) ---> P9_7(Sin4) */
/*****/
void main(void)
{
    // Port initialize.
    pd8 = 0x1f; // P8_0-P8_4 is an output port.
    pd4 = 0xff; // P4 is an output port.
    pd3 = 0xff; // P3 is an output port.
    pd2 = 0xff; // P2 is an output port.
    pd1 = 0xff; // P1 is an output port.
    p8  = 0;    //
    p4  = 0;    //
    p3  = 0;    //
    p2  = 0;    //
    p1  = 0;    //

    // TA0 & SIO3,4 initialize.
    ta0mr = 0x80; // Timer-mode(f32)
    ta0   = 0x8fff; // Set value
    ta0ic = 0;     // LV = 0

    prcr = 7; // Protect OFF
    s3c  = 0x49; // (1) f8 internal-clock

```

```

prcr = 0;           // Protect ON
s3brg = 0x80;      // (2) Set BRG

prcr = 7;          // Protect OFF
s4c   = 0x09;      // (3) f8 external-clock
prcr = 0;          // Protect ON
s4brg = 0x80;      // (4) Set BRG

s3ic  = 3;         // (5) LV = 3
s4ic  = 0;         //      LV = 0
ifsr  = 0;         // (6) SIO3, SIO4 select

asm("fset I");     // (7) interrupt enable.

p1 = snd_data3[snd_cnt];
p2 = snd_data4[snd_cnt];
s4trr = snd_data4[snd_cnt]; // (8) data set.
s3trr = snd_data3[snd_cnt]; // (9) data set and data transfer start.

while(1)
{
    p8_0 = !p8_0;
}

/*****
/*   TA0 & SIO3,4 initialization   */
*****/
void init(void)
{
    ta0mr = 0x80;           // Timer-mode(f32)
    ta0   = 0x8fff;        // Set value
    ta0ic = 0;             // LV = 0

    prcr  = 7;             // Protect OFF
    s3c   = 0x49;          // f8 internal-clock
    s3brg = 0x80;          // Set BRG

    prcr = 7;             // Protect OFF
    s4c   = 0x09;          // f8 external-clock
    s4brg = 0x80;          // Set BRG
    prcr = 0;             // Protect ON

    s3ic  = 3;             // LV = 3
    s4ic  = 0;             // LV = 0
    ifsr  = 0;             // SIO3, SIO4 select
}

/*****
/*   SIO3,4 interrupt routine   */
*****/
#pragma INTERRUPT/B sio3_int
void sio3_int(void)
{
    p8_1 = !p8_1;         //

    p3 = s3trr;           // Reading a received-data.
    p4 = s4trr;           //

    ta0   = 0x8fff;       // Set value
    ta0s = 1;             // TA0 start
    while(ir_ta0ic == 0)
    {
        ;                 // Wait
    }
    ta0s = 0;             // TA0 stop
    ir_ta0ic = 0;         // interrupt request clear
}

```

```
snd_cnt++;  
if(snd_cnt == 9)  
{  
    snd_cnt = 0;           // Send counter reset  
}  
p1    = snd_data3[snd_cnt];  
p2    = snd_data4[snd_cnt];  
s4trr = snd_data4[snd_cnt]; // SIO4 send data set.  
s3trr = snd_data3[snd_cnt]; // SIO3 send data set and data transfer start.  
}
```

## 5.0 Reference

### Datasheet

Refer to

- M16C/62A Group datasheet
- M16C/62N Group datasheet

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## 6.0 Web-site and contact for support

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REVISION HISTORY	M16C/62A Group, M16C/62N Group Application Note SI/O3,4 setup procedures
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Rev.	Date	Description	
		Page	Summary
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