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April 1st, 2010
Renesas Electronics Corporation

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M16C/65 Group

Operation of SI/O3,4

1. Abstract

In transmitting data in this mode, choose functions from those listed in Table 1. Operations of the circled items are described below.

2. Introduction

This application note is applied to the M16C/65 group microcomputers.

This application note can be used with other M16C Family MCUs which have the same special function registers (SFRs) as the above group. Check the manual for any modifications to functions. Careful evaluation is recommended before using the program described in this application note.

3. Chosen functions

Table 1. Chosen functions

Item	Set-up		Item	Set-up	
Transfer clock source	<input type="radio"/>	Internal clock (f1SIO/f2SIO/f8SIO/f32SIO)	SOUTi initial value set function	<input type="radio"/>	Not use
	<input type="checkbox"/>	External clock (CLKi pin)		<input type="checkbox"/>	Used
Transfer format	<input type="radio"/>	LSB first	SOUTi output control function (SOUTi status after transmission)	<input type="checkbox"/>	High-impedance
	<input type="checkbox"/>	MSB first		<input type="radio"/>	Last bit level retained

4. Operation

(1) Transfer begins upon writing the SI/Oi transmit data. The transmit data is sent out from the SOUTi pin synchronously with falling edges of the transfer clock.

(2) When SOUT finishes sending one byte of data, the interrupt request bit is set to “1”.

(3) When the SM26 bit or the SM27 bit in the S34C2 register is set to “1” (last bit level retained), after the transfer is completed, SOUT holds the last data.

Note:

- Data can only be written to the SI/Oi transmit/receive register (i = 3, 4; addresses 0270h, 0274h) when the device is idle neither sending nor receiving data.

Figure 1 shows the operation timing.

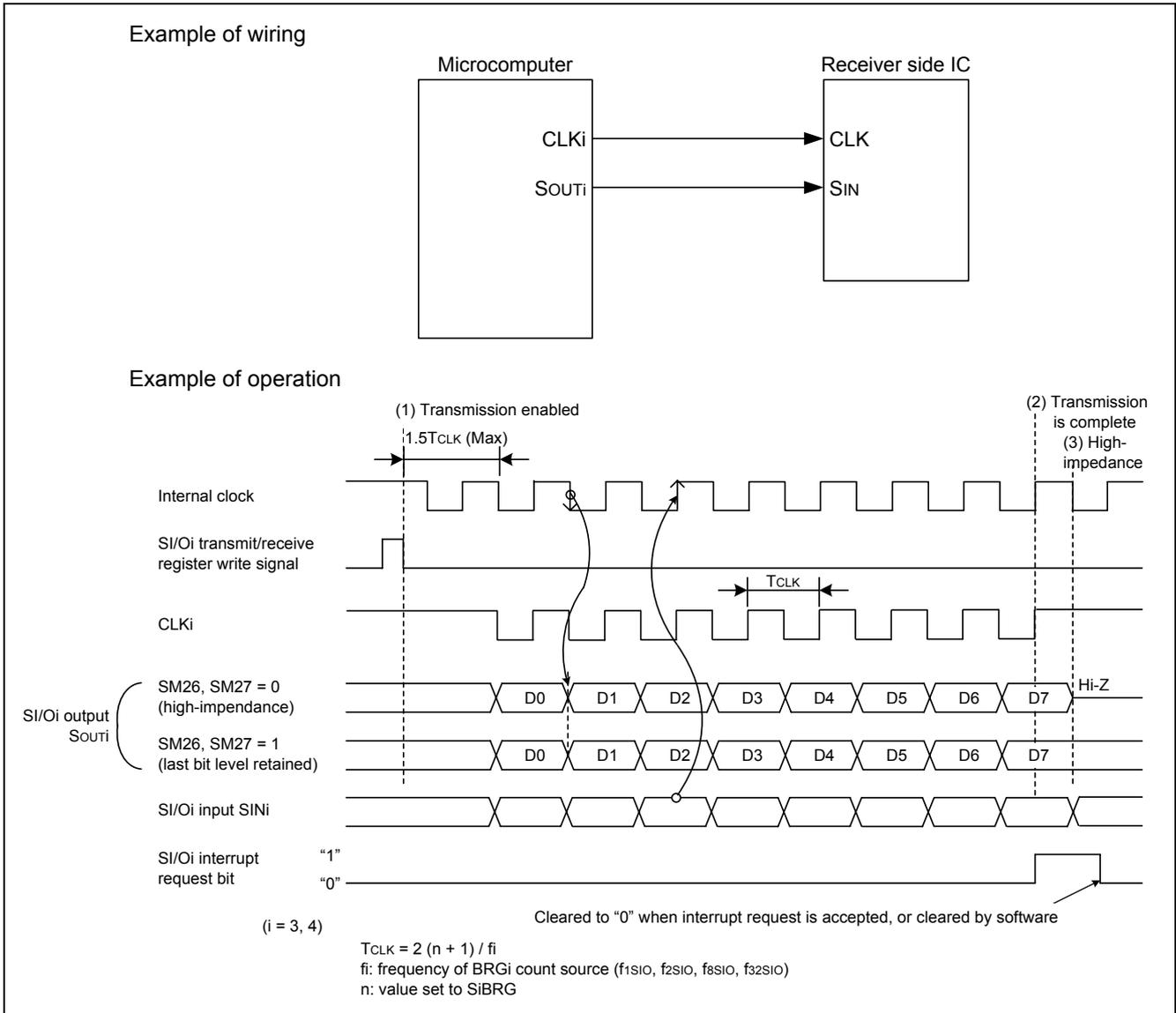
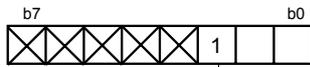


Figure 1. Operation timing of transmission in SI/O3, 4 mode

5. Set-up procedure

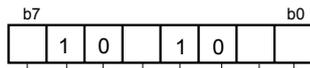
Clearing the protect (set to write-enabled state)



Protect register [Address 000Ah]
PRCR

Enables writing to port P9 direction register (address 03F3h) and SI/Oi control register (i=3, 4) (addresses 0272h and 0276h)
1 : Write-enabled

Setting SI/Oi transmit/receive control register (i = 3, 4) (Note 1)

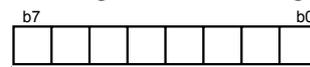


SI/Oi transmit/receive control register (i = 3, 4) [Address 0272h, 0276h]
SiC (i = 3, 4)

- Internal synchronous clock select bit
b1 b0
0 0 : Selecting f1SIO or f2SIO
0 1 : Selecting f8SIO
1 0 : Selecting f32SIO
1 1 : Do not be set
- Souti output disable bit
0 : Souti output
- SI/Oi port select bit
1 : Souti output, CLK function
- CLK polarity select bit
0 : Transmit data is output at falling edge of transfer clock and receive data is input at rising edge
1 : Transmit data is output at rising edge of transfer clock and receive data is input at falling edge
- Transfer format select bit
0 : LSB first
- Synchronous clock select bit
1 : Internal clock
- Souti initial value set bit (Effective when bit 6 = 0)
0 : L output
1 : H output

Note 1: Be sure to set the protect register and SI/Oi control register successively.

Setting SI/Oi bit rate generator (i = 3, 4)



SI/Oi bit rate generator (i = 3, 4) [Address 0273h, 0277h]
SiBRG (i = 3, 4)

Can be set to 00h to FFh (Note 1)

Note 1: Write to SI/Oi bit rate generator when transmission/reception is halted.
Use the MOV instruction to write into the SiBRG register.

Writing transmit data

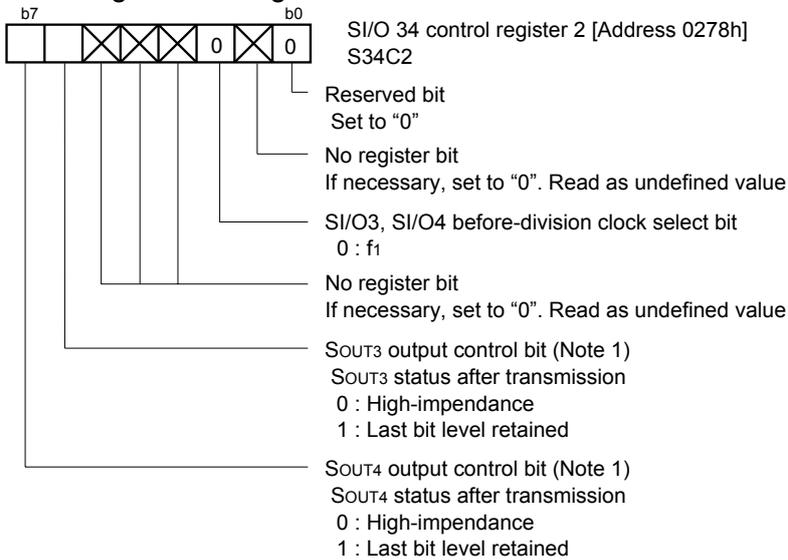


SI/Oi transmit/receive register (i=3, 4) [Address 0270h, 0274h]
SiTRR (i=3, 4)

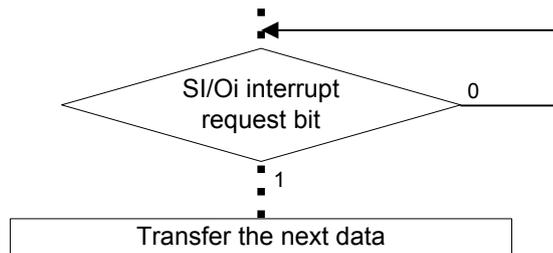
Setting transmission data (Note 1)

Note 1: Write to SI/Oi transmit/receive register when transmission/reception is halted.
Write the value into the SiTRR register each time 1-byte data is received, even when data is only received.

Setting SI/O 34 register 2



Note 1: Bits SM26 and SM27 are valid when the SMi3 bit in registers S3C and S4C are set to "1" (Sout, CLK).



6. Reference

Hardware manual

M16C/65 Group Hardware Manual

(Use the most recent version of the document on the Renesas Technology Web site.)

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Revision

Rev.	Issue date	Revised	
		Page	Point
1.00	2009.10	-	First edition issued

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