

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# 78K0R/Kx3 Microcontroller

## Sample Program

## Operation Manual

**(3-Wire Serial I/O (Slave Transmission/Reception, Single  
Transmission/Reception Mode) (Serial Array Unit), C Source)**

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This software is for reference only and NEC Electronics does not guarantee its operation.  
Thoroughly evaluate this software on your set prior to use.

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January, 2008

1st Product Solution Group, Multipurpose Microcomputer Systems Division,  
Microcomputer Operations Unit  
NEC Electronics Corporation

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## 1. OVERVIEW

This manual explains the sample program functions of 3-wire serial I/O processing (slave transmission/reception (single transmission/reception mode)).

In this sample program, slave transmission/reception (single transmission/reception mode) operation in 3-wire serial I/O communication is performed.

The communication conditions are as follows.

- $f_{CLK} = 8 \text{ MHz}$
- CSI20 (unit 1, channel 0) is used.
- 9600 bps, 8-bit data
- LSB first
- Number of transmit/receive data: 10
- Transmit data: 3A
- Receive data
- INTCSI20 transfer end interrupt servicing is used.

## 2. RESOURCES USED

Resource	Description	Remark
Main clock specification	Internal high-speed oscillator used (8 MHz (TYP.))	Supplied to CPU and peripheral hardware
	High-speed system clock used (20 MHz)	Oscillated by initial processing
Subclock	XT1 (32.768 kHz)	Oscillated by initial processing
Related hardware	Peripheral enable register 0 (PER0)	
	Serial clock select register 1 (SPS1)	Clock used: CKm0 ( $1/2^4$ of main clock), 0.5 MHz (2 $\mu$ s)
	Serial mode register 10 (SMR10)	
	Serial communication operation setting register 10 (SCR10)	Transmission/reception, data length: 8 bits
	Serial data register 10 (SDR10)	Sets the transfer rate.
	Serial flag clear trigger register 10 (SIR10)	Used to clear an error flag.
	Serial channel start register 1 (SS1)	
	Serial channel stop register 1 (ST1)	
	Serial output register 1 (SO1)	
	Serial output enable register 1 (SOE1)	
	Port input mode register 14 (PIM14)	
	Port output mode register 14 (POM14)	
	Port mode register 14 (PM14)	
	Port register 14 (P14)	
	SIO20 register (SIO20)	
I/O	Output: P142 (clock output), P144 (data output)	
Interrupt	Not used	
Others	Not used	

### 3. SOFTWARE CONFIGURATION

#### Files

File Name	Processing Outline
K0R_def.h	Definition file
K0R_init.c	Initialization processing
K0R_ext.h	External declaration
K0R_main.c	Main processing
K0R_sfr_set.c	3-wire serial I/O processing Slave transmission/reception (single transmission/reception mode)

#### 4. FUNCTION EXPLANATIONS

[File name]

K0R\_main.c

Function

Function Name	Processing Outline	Argument	Return Value
main	Main routine	None	None

Function explanations

Function name	main
Processing	Main routine
Argument	–
Return value	–
Description	Executes initialization processing and then starts transmission operation.
Remark	–

[File name]

K0R\_sfr\_set.c

Functions

Function Name	Processing Outline	Argument	Return Value
SER_STRIN	Initializes 3-wire serial I/O.	None	None
SER_STRST	Starts 3-wire serial I/O operation.	None	None
SER_STRBK	Aborts 3-wire serial I/O operation.	None	None
SER_STRRE	Resumes 3-wire serial I/O operation.	None	None
SER_STRSP	Stops 3-wire serial I/O operation.	None	None
SER_STRIT	3-wire serial I/O transmission/reception	None	None

## Function explanations

Function name	SER_STRIN
Processing	Initializes 3-wire serial I/O.
Argument	–
Return value	–
Description	Executes initialization.
Remark	–

Function name	SER_STRST
Processing	Starts 3-wire serial I/O operation.
Argument	–
Return value	–
Description	Enables clock output.
Remark	–

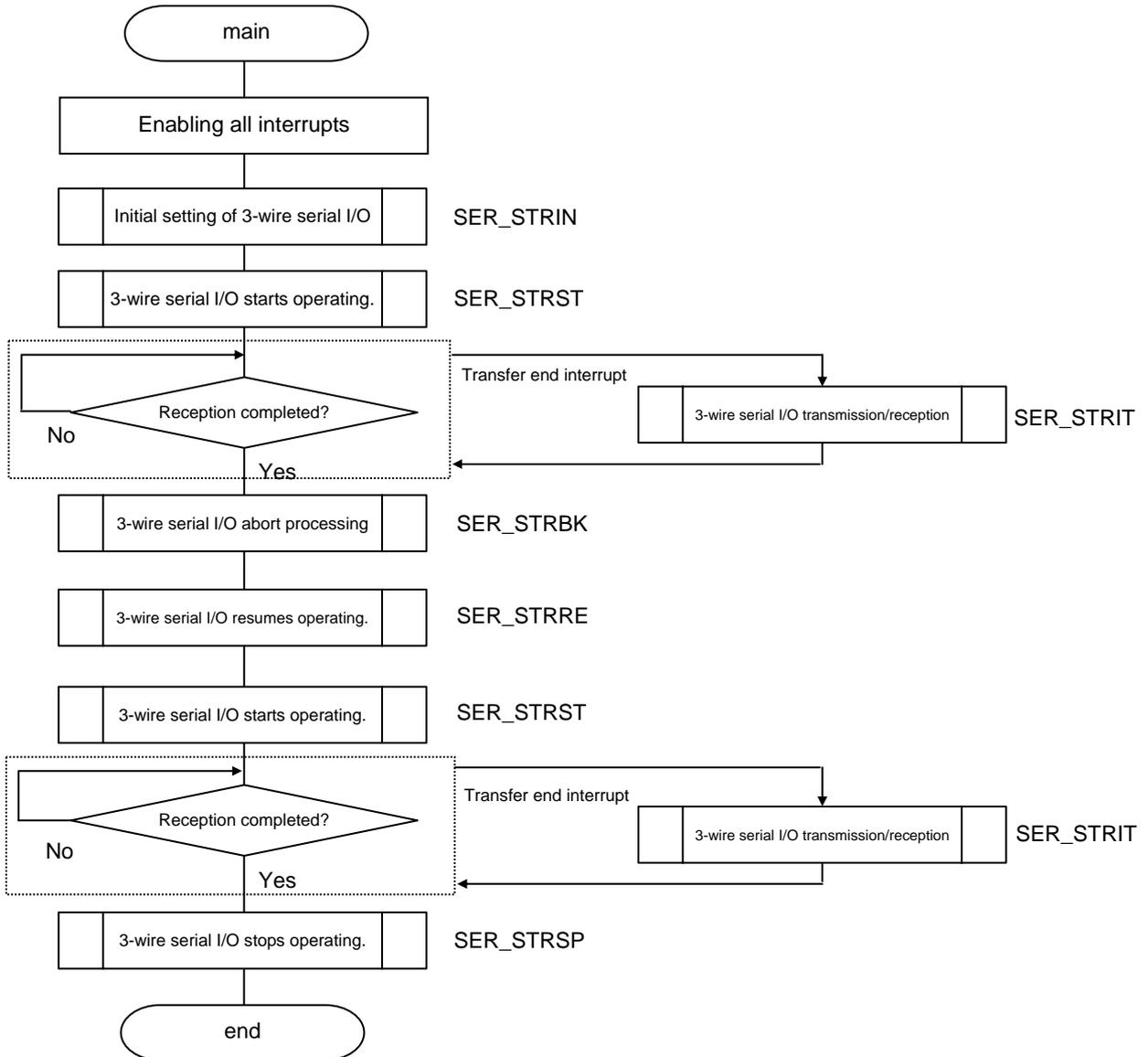
Function name	SER_STRBK
Processing	Aborts 3-wire serial I/O operation.
Argument	–
Return value	–
Description	Performs transmission/reception operation abort processing.
Remark	–

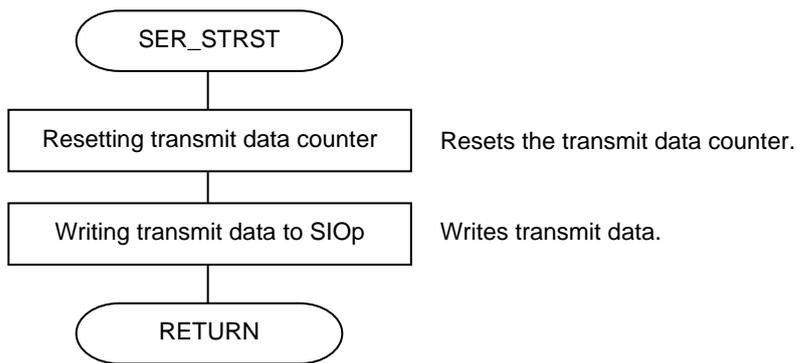
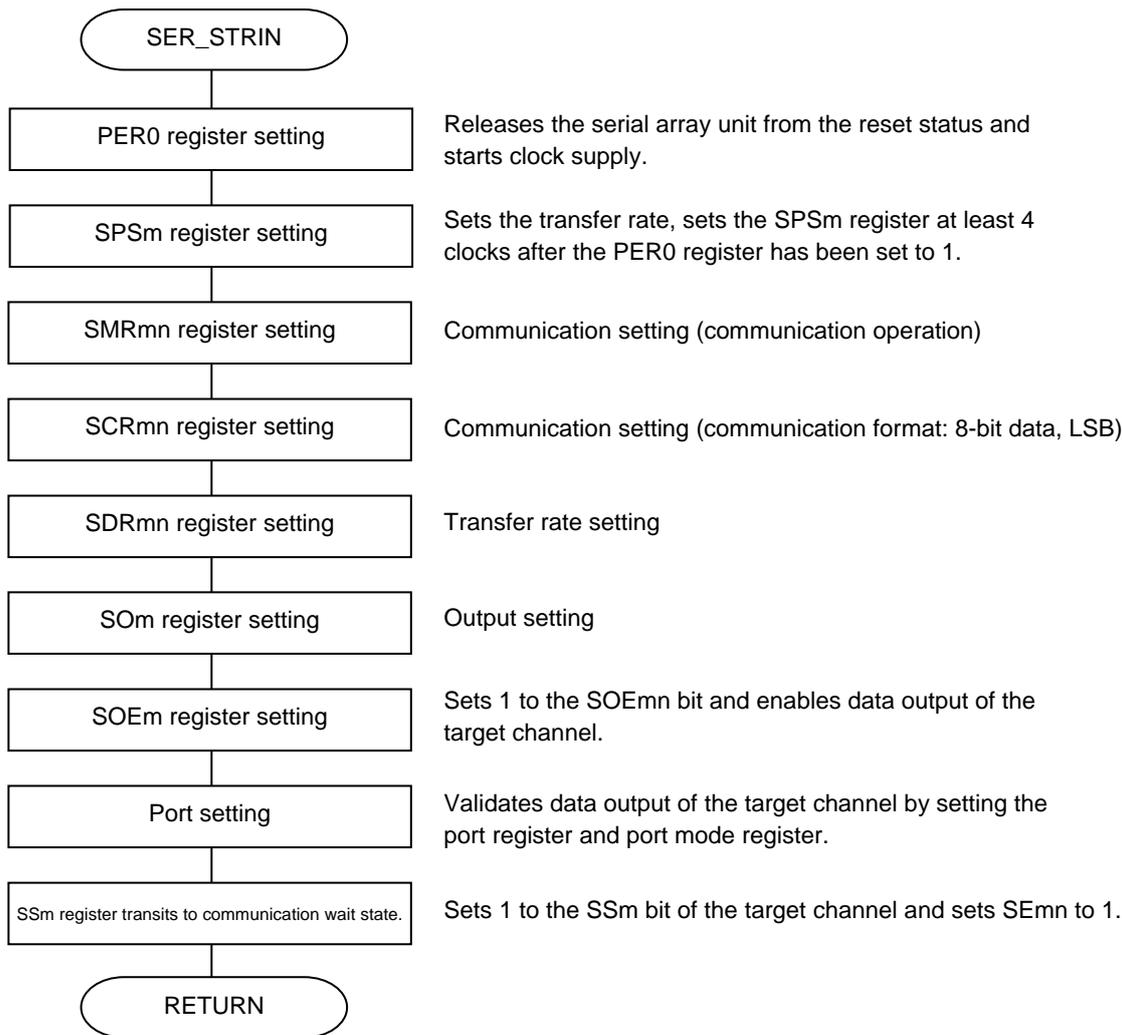
Function name	SER_STRRE
Processing	Resumes 3-wire serial I/O operation.
Argument	–
Return value	–
Description	Performs transmission/reception operation resume processing.
Remark	–

Function name	SER_STRSP
Processing	Stops 3-wire serial I/O operation.
Argument	–
Return value	–
Description	Performs transmission/reception operation stop processing.
Remark	–

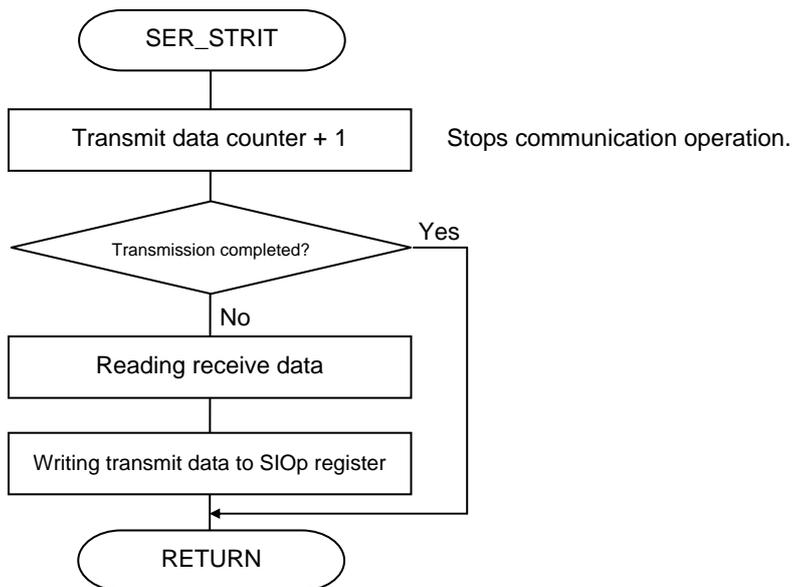
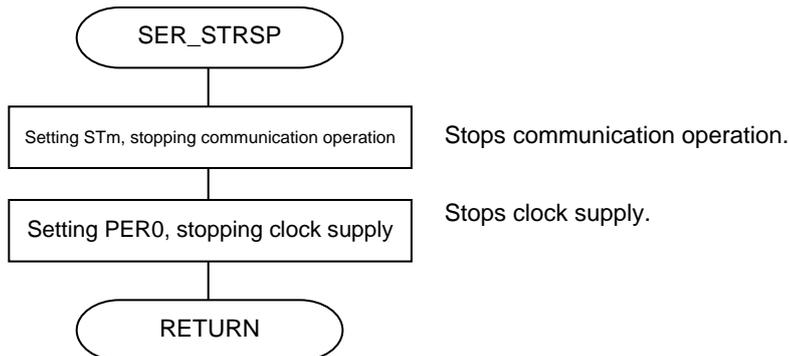
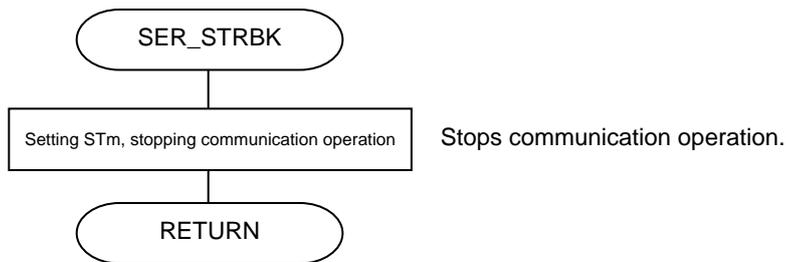
Function name	SER_STRIT
Processing	3-wire serial I/O transmission/reception
Argument	–
Return value	–
Description	<p>INTCSI20 transfer end interrupt servicing</p> <p>An interrupt is generated when transfer has been completed.</p> <p>When this interrupt is generated, receive data of 1 byte is read and then 1-byte data is transmitted.</p> <p>The transmission/reception interrupt ends when processing of the transmit data has been completed.</p>
Remark	–

5. FLOWCHARTS

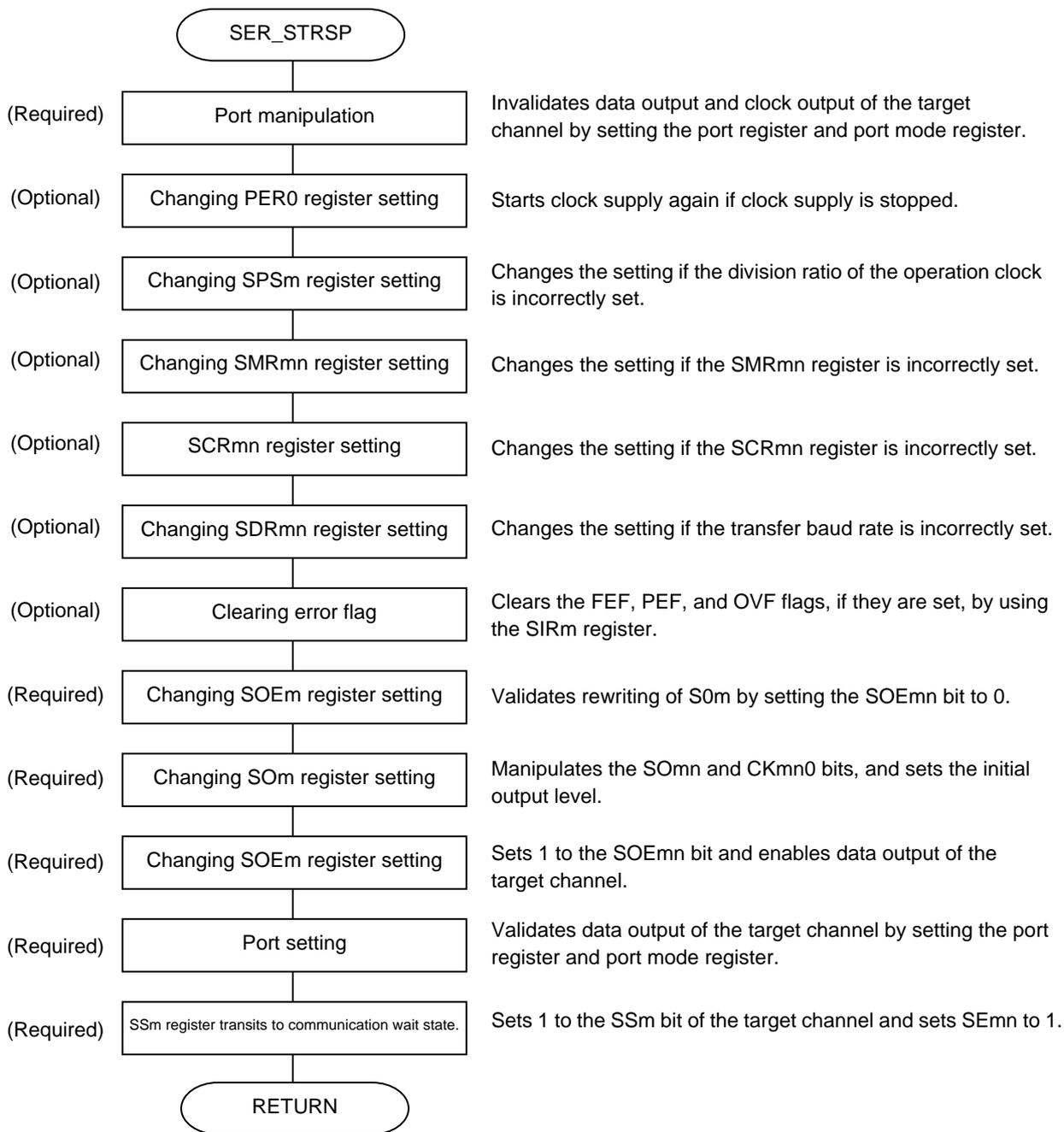




**Remark** m: Unit number (m = 0, 1), n: Channel number (n = 0 to 3), p: CSI number (p = 00, 01, 10, 20)  
 m = 1, n = 0, p = 00 for this sample program.



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