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7544 Group

Serial I/O

1. Abstract

This document describes serial I/O for 7544 Group.

2. Introduction

The application explained in this document applies to the following MCU.

- Applicable MCU: 7544 Group

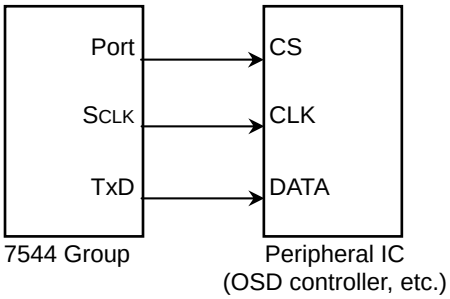
3. Description

3.1 Serial I/O Connection Examples

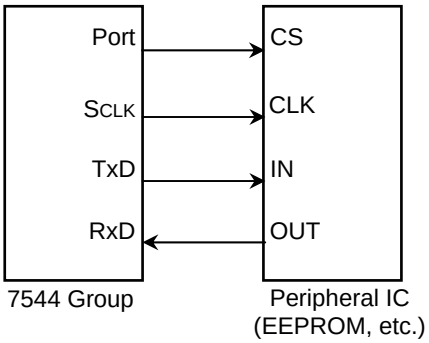
3.1.1 Controlling Peripheral IC Equipped with CS Pins

Figure 3.1 shows a connection example of serial I/O. This example is a connection with a peripheral IC equipped with a CS pin in clock synchronous serial I/O mode.

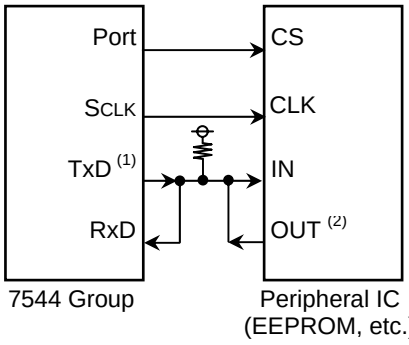
1. Transmission only
(Using the RxD pin as an I/O port)



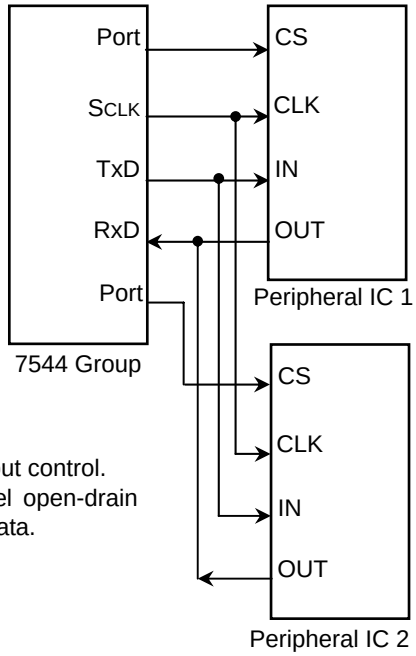
2. Transmission and reception



3. Transmission and reception
(When connecting RxD with TxD)



4. Connecting multiple ICs



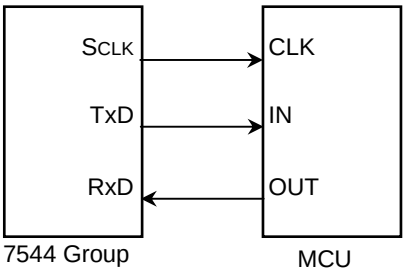
Notes:
1. Select an N-channel open-drain output for TxD pin output control.
2. Use the peripheral IC OUT pin which is an N-channel open-drain output and becomes high impedance while receiving data.
3. “Port” means an output port controlled by software.

Figure 3.1 Serial I/O Connection Examples (1/2)

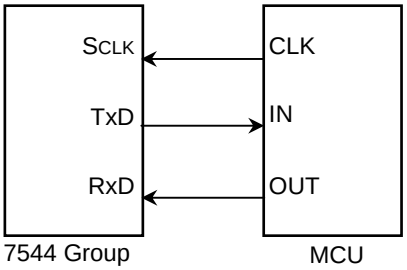
3.1.2 Connection with MCU

Figure 3.2 shows a connection example of serial I/O. This example shows a connection with another MCU.

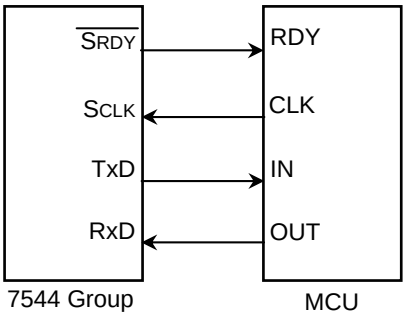
1. Selecting an internal clock in clock synchronous serial I/O mode



2. Selecting an external clock in clock synchronous serial I/O mode



3. Using the $\overline{\text{SRDY}}$ signal output function in clock synchronous serial I/O mode (selecting an external clock)



4. In UART mode

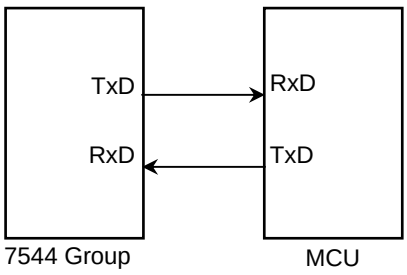


Figure 3.2 Serial I/O Connection Examples (2/2)

3.2 Serial I/O Transfer Data Format

Clock synchronous or clock asynchronous (UART) can be selected for serial I/O.
Figure 3.3 shows the serial I/O transfer data format.

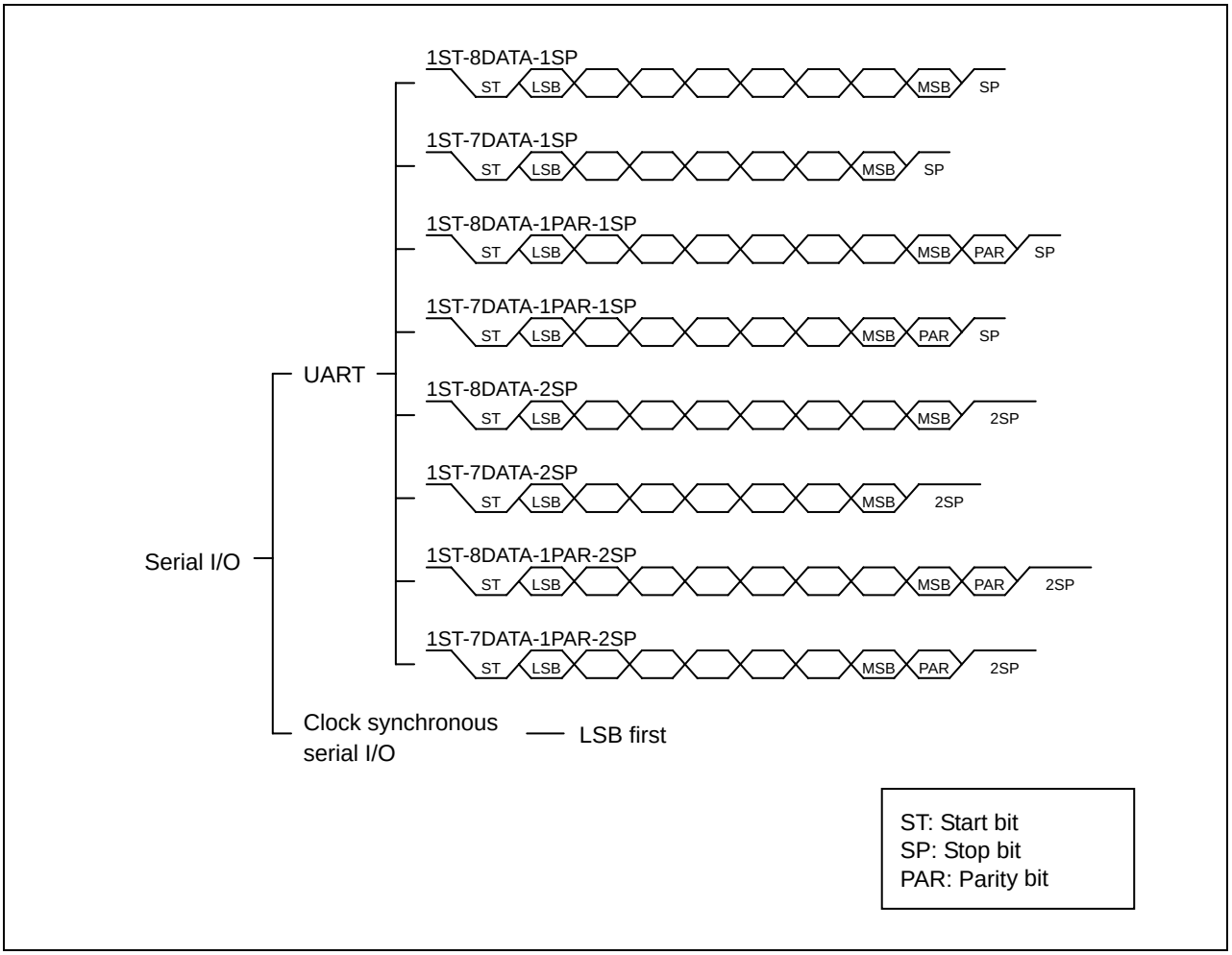


Figure 3.3 Serial I/O Transfer Data Format

3.3 Serial I/O Operation: Stop and Initialize

3.3.1 Clock Synchronous Serial I/O Mode

■ Stop/initialize transmit operation only when transmitting
Set the transmit enable bit to 0.

By setting the transmit enable bit to 0, the transmit operations listed below will be stopped and initialized:
- Stop supply of shift clock to transmit shift register
- Initialize transmit clock control circuit
- Transmit buffer empty flag becomes 0
- Transmit shift register shift complete flag becomes 0
- P11/TxD pin: I/O port P11

By setting the serial I/O enable bit to 0, pins P10/RxD, P11/TxD, P12/SCLK, and P13/$\overline{\text{SRDY}}$ all become I/O ports.

■ Stop/initialize receive operation only when receiving
Set the receive enable bit or serial I/O enable bit to 0.

By setting the receive enable bit to 0, the receive operations listed below will be stopped and initialized.
- Stop supply of shift clock to receive shift register
- Initialize receive clock control circuit
- Error flags (over-run, parity, framing, and summing error flags) become 0
- Receive buffer full flag becomes 0
- P10/RxD pin: I/O port P10

By setting the serial I/O enable bit to 0, the receive operations listed below will be stopped and initialized.
- Stop supply of shift clock to receive shift register
- Initialize receive clock control circuit
- Error flags (over-run, parity, framing, and summing error flags) become 0
- Receive buffer full flag becomes 0
- P10/RxD, P11/TxD, P12/SCLK, and P13/$\overline{\text{SRDY}}$ pins: I/O ports P10, P11, P12, and P13

■ Stop/initialize receive/transmit operation when both transmitting and receiving
Set the transmit enable bit and receive enable bit to 0 simultaneously.

3.3.2 UART Mode

■ Stop/initialize transmit operation
Set the transmit enable bit to 0.

■ Stop/initialize receive operation
Set the receive enable bit to 0.

3.4 Serial I/O Pin Function and Selection Method

3.4.1 Serial I/O

Table 3.1 shows the pin functions in clock synchronous serial I/O mode, and Table 3.2 shows the pin functions in UART mode.

Table 3.1 Pin Functions in Clock Synchronous Serial I/O Mode

Pin Name	Function	Serial I/O1 Control Register (Address 1A16)								Corresponding Direction Register
		b7	b6	b5	b4	b3	b2	b1	b0	
		SIOE	SIOM	RE	TE	TIC	SRDY	SCS	CSS	
P10/RxD	RxD	1	1	1	×	×	×	×	×	×
	P10	1	1	0	×	×	×	×	×	0/1
P11/TxD	TxD	1	1	×	1	×	×	×	×	×
	P11	1	1	×	0	×	×	×	×	0/1
P12/SCLK	SCLK (external clock input)	1	1	×	×	×	×	1	×	×
	SCLK (internal clock output)	1	1	×	1	×	×	0	×	×
P13/$\overline{\text{SRDY}}$	$\overline{\text{SRDY}}$	1	1	×	×	×	1	×	×	×
	P13	1	1	×	×	×	0	×	×	0/1

Note: When SIOE is 0, all pins become I/O ports regardless of the values set to b6 to b0.
×: This is not used for the pin's function setting.

Table 3.2 Pin Functions in UART Mode

Pin Name	Function	Serial I/O1 Control Register (Address 1A16)								Corresponding Direction Register
		b7	b6	b5	b4	b3	b2	b1	b0	
		SIOE	SIOM	RE	TE	TIC	SRDY	SCS	CSS	
P10/RxD	RxD	1	0	1	×	×	×	×	×	×
	P10	1	0	0	×	×	×	×	×	0/1
P11/TxD	TxD	1	0	×	1	×	×	×	×	×
	P11	1	0	×	0	×	×	×	×	0/1
P12/SCLK	SCLK (external clock input)	1	0	×	×	×	×	1	×	×
	P12	1	0	×	×	×	×	0	×	0/1
P13/$\overline{\text{SRDY}}$	P13	1	0	×	×	×	×	×	×	0/1

Note: When SIOE is 0, all pins become I/O ports regardless of the values set to b6 to b0.
×: This is not used for the pin's function setting.

4. Reference Document

Datasheet

7544 Group Datasheet

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