RX Family

Specification Differences Between the RSPI and SCI (Simple SPI Mode) and Selection Guide

Introduction

This document describes the specification differences between the serial peripheral interface (RSPI) and simple SPI mode (simple SPI) of the serial communications interface (SCI) and also describes the procedure to select whether to use the RSPI or simple SPI.

Target Device

RX Family *[1]

Notes: 1. The RX610, RX62N, RX621, RX62T, and RX62G Groups do not have the simple SPI.

Contents

1. Specifications

Table 1.1 lists the Specification Differences Between the RSPI and Simple SPI in the RX66N. Some specifications vary depending on the product.

Table 1.1 Specification Differences Between the RSPI and Simple SPI

Item		RSPI	Simple SPI
Bit rate *1	Master	Maximum 40 Mbps	SCI7-SCI11: Maximum 30 Mbps SCI0-SCI6, SCI12: Maximum 15 Mbps
	Slave	Maximum 30 Mbps	SCI7-SCI11: Maximum 15 Mbps SCI0-SCI6, SCI12: Maximum 7.5 Mbps
Transfer function	Clock polarity	Selectable	Selectable
	Clock phase	Selectable	Selectable
Data format	MSB first/ LSB first	Selectable	Selectable
	Transfer bit length	Selectable from 8, 9, 10, 11, 12, 13, 14, 15, 16, 20, 24, or 32	8 bits fixed
	Transmit/ receive buffer	32 bits × 4-stage buffer	8 bits × 1-stage buffer
	Shift register	32 bits	8 bits
	Maximum frames	4 frames	1 frame
	Parity	Whether or not to add a parity bit can be selected.	Parity bit cannot be added.
Slave select pin output control		Hardware control with the dedicated pin	Software control with the general port
Pin control when a mode fault occurs		Place pins PSPCK and MOSI in high-impedance to release the SPI bus	Place pins SCK and SMOSI in high-impedance to release the SPI bus
Error detection	Overrun	Detectable	Detectable
	Underrun	Detectable	None
	Mode fault	Detectable	Detectable
	Parity	Detectable	Not detectable
Interrupt sources		Receive buffer full, transmit buffer empty, mode fault, overrun, underrun, parity error, RSPI idle	Receive data full, transmit data empty, receive error, transmit end

Notes: 1. The specifications vary depending on the product. Refer to the Timing of On-Chip Peripheral Modules section in the Electrical Characteristics chapter of the corresponding User's Manual: Hardware.

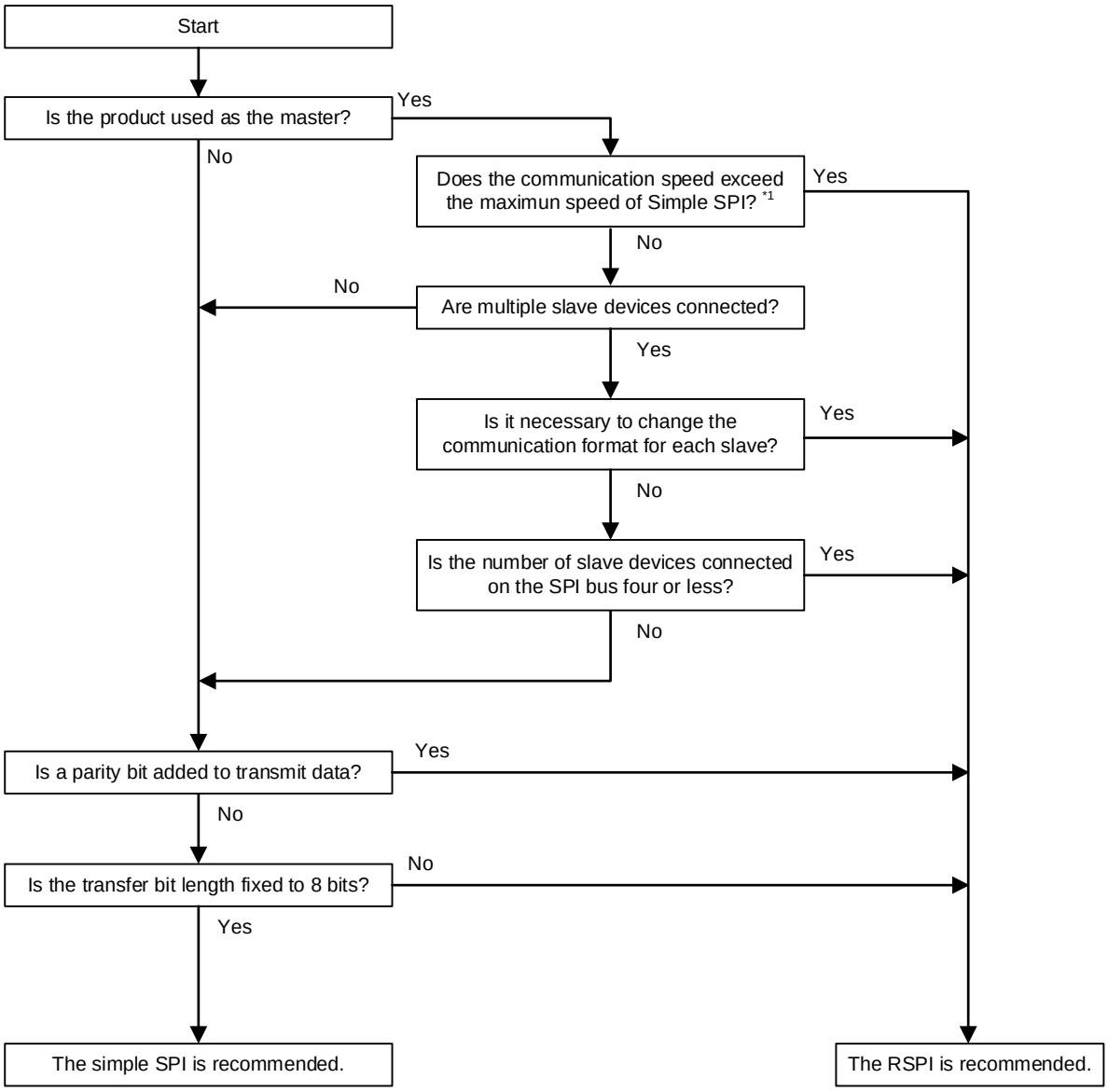
2. Reference Application Note

For additional information associated with this document, refer to the following application note.

RX Family RSPI Sequence Control and Interrupt Generation Timing (R01AN1105)

3. Flowchart for Selecting the SPI Module

Figure 3.1 shows a flowchart for selecting the recommended SPI module based on the differences between the RSPI and simple SPI in the RX66N Group. Some specifications vary with the product.



Notes: 1. The communication speed varies depending on the product.

Figure 3.1 Selecting the SPI Module

4. Reference Documents

User's Manual: Hardware

RX66N Group User's Manual: Hardware (R01UH0825)

The latest version can be downloaded from the Renesas Electronics website.

Technical Update/Technical News

The latest version can be downloaded from the Renesas Electronics website.

User's Manual: Development Tools

The latest version can be downloaded from the Renesas Electronics website.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Aug.18.14	—	First edition issued
1.01	May.30.23	3	1.Specifications Changed device. Updated the description of the following items whose specifications have changed due to the device change. - Bit rate - Error detection - Interrupt sources
		4	3.Flowchart for Selecting the SPI Module Updated the Figure 3.1 Selecting the SPI Module.
		5	4. Reference Documents Changed User's Manual.

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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