

RX Family

Specification Differences Between the RIIC and SCI(Simple I²C Mode) and Selection Guide

Abstract

This document describes the specification differences between the I²C bus interface (RIIC) and simple I²C mode (simple I²C) of the serial communications interface (SCI) and also describes the procedure to select whether to use the RIIC or simple I²C.

Products

RX family MCU equipped with RIIC and simple I²C

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1. Specifications

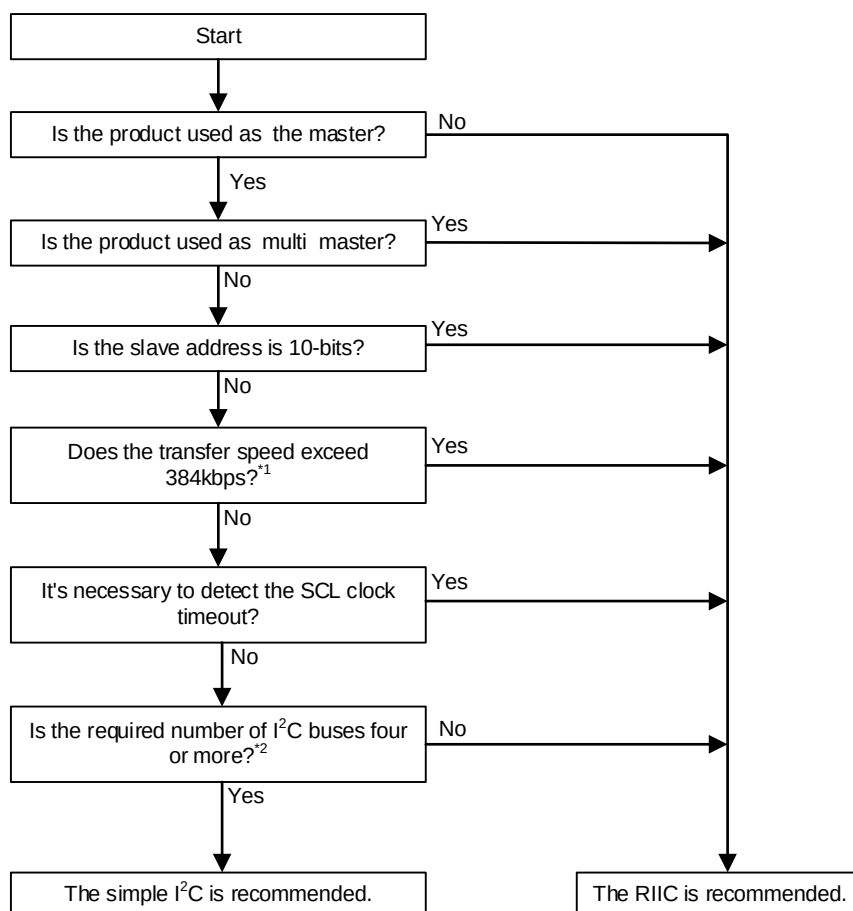
Table 1.1 lists the Specification Differences Between the RIIC and Simple I²C. Some specifications vary depending on the product.

Table 1.1 Specification Differences Between the RIIC and Simple I²C

Item	RIIC	Simple I ² C
Communications format	I ² C bus format or SMBus format	Only I ² C bus format
Slave address format	7-bit address or 10-bit address	7-bit address
Operating mode	Single master mode, multi-master mode and slave mode are supported	Only single-master mode is supported
Transfer speed	Maximum 1Mbps	Maximum 384kbps
SDA output delay function	Timing of the output of transmitted data, including the acknowledge bit, can be delayed.	Timing of the output of transmitted data, including the acknowledge bit, can be delayed.
Timeout function	The internal timeout function is capable of detecting long-interval stop of the SCL clock.	No timeout detection function.
Noise cancellation	The interface incorporates digital noise filters for both the SCL and SDA signals.	The interface incorporates digital noise filters for both the SCL and SDA signals.
	The width for noise cancellation by the filters is adjustable by software.	The width for noise cancellation by the filters is adjustable by software.
Issuing and detecting conditions	Start, restart, and stop conditions are automatically generated	Start, restart, and stop conditions are automatically generated.
	Start conditions are detectable.	Start conditions are detectable.
	Stop conditions are detectable.	Stop conditions are detectable.
I ² C bus monitor function	Monitor output and input values to SCL and SDA.	The input values can be read by port read.
Reset from bus hang-up	Can be reset by resetting the internal state of I ² C.	Can be reset by disabling transmission / reception operation.
Low power consumption function	Module stop state can be set.	Module stop state can be set.
Event link function	Supported.	Supported.

2. Flowchart for Selecting the I²C Module

Figure 2-1 shows a flowchart for selecting the recommended I²C module based on the differences between the RIIC and simple I²C in the RX72M Group. Some specifications vary with the product.



Notes: 1. The transfer speed of RIIC and Simple I²C differs depending on the product.

2. The number of RIIC and Simple I²C differs depending on the product.

Figure 2-1 Flowchart for selecting the I²C Module

3. Reference Documents

User's Manual: Hardware

RX72M Group User's Manual: Hardware Rev.1.00 (R01UH0804EJ0100)

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

Technical Update/Technical News

The latest information 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	Mar.10.20	—	First release.

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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