R8C/25 Group and R8C/27 Group

Differences between R8C/25 Group and R8C/27 Group

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1. Abstract

This document is reference material for identifying differences between the R8C/25 Group and R8C/27 Group.

2. Introduction

This document applies to the following microcomputers (MCUs):

- MCUs: R8C/25 Group and R8C/27 Group

3. Group Differences

3.1 Function and Specification Differences

Table 3.1 and Table 3.2 list differences in the functions and specifications.

Table 3.1 Function and Specification Differences (1) [1]

Item		R8C/25 Group	R8C/27 Group
Memory	ROM/RAM	• 16 KB/1 KB • 24 KB/2 KB • 32 KB/2 KB • 48 KB/2.5 KB • 64 KB/3 KB	• 8 KB/512 B • 16 KB/1 KB • 24 KB/1.5 KB • 32 KB/1.5 KB
Voltage Detection Circuits	Voltage detection 0	• Voltage detection circuit: Included	• Voltage detection circuit: Included [2]
	Voltage detection 1	• Monitor: Included • Voltage monitor 1 interrupt: Included	• Monitor: Included [2] • Voltage monitor 1 interrupt: Included [2]
I/O Ports		• I/O ports: 41 • Input ports: 3 • Ports for LED drive: 8	• I/O ports: 25 • Input ports: 3 • Ports for LED drive: 8 [2]
Clock Generation Circuits		• XCIN clock oscillation circuit can be used. • Pins XIN, XOUT, XCIN, and XCOUT are independent.	• XCIN clock oscillation circuit can be used. [2] • Pins XIN and XCIN, and XOUT and XCOUT are shared. [2]
Interrupts		• Interrupt sources: 26 • External interrupt inputs: 8 ($\overline{\text{INT}}$ x 4, key input x 4)	• Interrupt sources: 24 [2] • External interrupt inputs: 7 ($\overline{\text{INT}}$ x 3, key input x 4)
Supply voltage		• VCC = 3.0 to 5.5 V (f(XIN) = 20 MHz) • VCC = 2.7 to 5.5 V (f(XIN) = 10 MHz) • VCC = 2.2 to 5.5 V (f(XIN) = 5 MHz)	• VCC = 3.0 to 5.5 V (f(XIN) = 20 MHz) [3] • VCC = 3.0 to 5.5 V (f(XIN) = 16 MHz) [4] • VCC = 2.7 to 5.5 V (f(XIN) = 10 MHz) • VCC = 2.2 to 5.5 V (f(XIN) = 5 MHz) [2]
Current Consumption		• Typical 10 mA (VCC = 5 V, f(XIN) = 20 MHz) • Typical 6 mA (VCC = 3 V, f(XIN) = 10 MHz) • Typical 2.0 μA (VCC = 3 V, wait mode) (f(XCIN) = 32 kHz) • Typical 0.7 μA (VCC = 3 V, stop mode)	• Typical 10 mA (VCC = 5 V, f(XIN) = 20 MHz) [2] • Typical 6 mA (VCC = 3 V, f(XIN) = 10 MHz) [2] • Typical 2.0 μA (VCC = 3 V, wait mode) (f(XCIN) = 32 kHz) [2] • Typical 0.7 μA (VCC = 3 V, stop mode) [2]

Notes:
1. Refer to the hardware user's manual for details and electrical characteristics.
2. These only apply to the N and D versions in the R8C/27 Group
3. This applies to all versions except for the K version in the R8C/27 Group.
4. This only applies to the K version in the R8C/27 Group.

Table 3.2 Function and Specification Differences (3) (1)

Item		R8C/25 Group	R8C/27 Group
Timer RA	Count source	• fC32: Included	• fC32: Included (2)
	TRBO pin	Differences are in ports share I/O pins. Refer to 3.2 Pin Function Differences.	
Timer RC		Not included	Included
Timer RD		Included	Not included
Timer RE (Real-Time Clock Mode)		Included	Included (2)
Timer RE (Output Compare Mode)	Count source	fC4: Included	fC4: Included (2)
Serial Interface	TXD1 pin	Differences are in ports share I/O pins. Refer to 3.2 Pin Function Differences.	
	RXD1 pin		
Clock Synchronous Serial Interface (Clock Synchronous Serial I/O with Chip Select	SSI pin	Differences are in ports share I/O pins. Refer to 3.2 Pin Function Differences.	
A/D Converter	A/D conversion start conditions	• Capture: Included	• Capture: Not included
Package		• 52-pin molded-plastic LQFP • 64-pin molded-plastic FLGA	• 32-pin molded-plastic LQFP

Notes:
1. Refer to the hardware user's manual for details and electrical characteristics.
2. These only apply to the N and D versions in the R8C/27 Group.

3.2 Pin Function Differences

Table 3.3 lists pin function differences.

Table 3.3 Pin Function Differences

Peripheral Function Pin	Assigned I/O Port	
	R8C/25 Group	R8C/27 Group
XCIN	P4_3	P4_6 (1)
XCOUT	P4_4	P4_7 (1)
INT1	P1_5, P1_7	P1_5, P1_7, P3_6
INT2	P6_6	—
INT3	P6_7	P3_3
TRAO	P3_0	P3_7
TRBO	P3_1	P1_3, P3_1
TRCCLK	—	P3_3
TRCTRG	—	P1_1
TRCIOA	—	P1_1
TRCIOB	—	P1_2
TRCIOC	—	P3_4, P5_3
TRCIOD	—	P3_5, P5_4
TRDIOA0	P2_0	—
TRDIOA1	P2_4	—
TRDIOB0	P2_1	—
TRDIOB1	P2_5	—
TRDIOC0	P2_2	—
TRDIOC1	P2_6	—
TRDIOD0	P2_3	—
TRDIOD1	P2_7	—
TRDCLK	P2_0	—
TREO	P6_0	P0_4
CLK1	P6_5	P0_5
RXD1	P6_7	P3_6, P3_7, P4_5
TXD1	P6_6	P0_0, P3_6, P3_7
SSI	P3_3	P1_6, P3_3

Note:
1. These only apply to the N and D versions in the R8C/27 Group.

3.3 SFR Differences

Table 3.4 to Table 3.5 list differences in the SFRs. Table 3.7 lists the differences in option function select area.

Table 3.4 SFR Differences (1)

R8C/25 Group	R8C/27 Group	Remarks
VCA2	VCA2	Reset values are different and bit 5 deleted. (2)
VW0C	VW0C (1)	
VW1C	VW1C	• Reset values are different. (2) • Bits 2 and 3 deleted and functions in bits 6 and 7 changed (2)
P0	P0	Reset values are different.
P1	P1	Reset values are different.
P2	—	
PD2	—	
P3	P3	Reset values are different. Bit 0 deleted and bit 6 added
PD3	PD3	Bit 0 deleted and bit 6 added
P4	P4	Reset values are different. Bits 3 and 4 deleted
PD4	PD4	Bits 3 and 4 deleted
—	P5	
—	PD5	
P6	—	
PD6	—	
—	PINSR1	
—	PINSR2	
—	PINSR3	
—	P1DRR (1)	
P2DRR	—	
PMR	PMR	Bits 0, 3, 5, and 6 added and functions in bit 4 changed
PUR0	PUR0	Bits 4 and 5 deleted and functions in bits 6 and 7 changed
PUR1	PUR1	Bits 0, 4, and 5 deleted, functions in bit 1 changed, and bits 2 and 3 added
CM0	CM0	Bits 1 added, functions in bit 4 changed, and bit 7 deleted
FRA2	FRA2	Functions in bits 0, 1, and 2 changed. (3)
FRA4	FRA4 (1)	
FRA6	FRA6 (1)	
FRA7	FRA7 (1)	
CPSRF	CPSRF (1)	
TRAMR	TRAMR	Functions in bits 4, 5, and 6 changed (2)
—	TRCIC	
TRD0IC	—	
TRD1IC	—	
INT2IC	—	
INTEN	INTEN	Bits 4 and 5 deleted
INTF	INTF	Bits 4 and 5 deleted
U1SR	—	
—	TRCMR	
—	TRCCR1	
—	TRCIER	
—	TRCSR	

Note:
1. These only apply to the N and D versions in the R8C/27 Group.
2. These only apply to the J and K versions in the R8C/27 Group.
3. This only applies to the K version in the R8C/27 Group.

Table 3.5 SFR Differences (2)

R8C/25 Group	R8C/27 Group	Remarks
—	TRCIOR0	
—	TRCIOR1	
—	TRC	
—	TRCGRA	
—	TRCGRB	
—	TRCGRC	
—	TRCGRD	
—	TRCCR2	
—	TRCDF	
—	TRCOER	
TRDSTR	—	
TRDMR	—	
TRDPMR	—	
TRDFCR	—	
TRDOER1	—	
TRDOER2	—	
TRDOCR	—	
TRDDF0	—	
TRDDF1	—	
TRDCR0	—	
TRDIORA0	—	
TRDIORC0	—	
TRDSR0	—	
TRDIER0	—	
TRDPOCR0	—	
TRD0	—	
TRDGRA0	—	
TRDGRB0	—	
TRDGRC0	—	
TRDGRD0	—	
TRDCR1	—	
TRDIORA1	—	
TRDIORC1	—	
TRDSR1	—	
TRDIER1	—	
TRDPOCR1	—	
TRD1	—	
TRDGRA1	—	
TRDGRB1	—	
TRDGRC1	—	
TRDGRD1	—	
TREHR	TREHR (1)	
TREWK	TREWK (1)	
ADCON0	ADCON0	Bit 5 deleted

Note:
1. These only apply to the N and D versions in the R8C/27 Group.

Table 3.6 Option Function Select Area Differences

R8C/25 Group	R8C/27 Group	Remarks
OFS	OFS	• Bit 6 added (2)

Notes:
1. The option function select area is allocated in the flash memory, not in the SFRs.
2. This only applies to the J and K versions in the R8C/27 Group.

3.4 Interrupt Vector Differences

Table 3.8 lists differences in the fixed vector table and Table 3.9 lists differences in the relocatable vector table.

Table 3.7 Differences in Fixed Vector Table

Vector addresses Addresses (L) to (H)	Interrupt Source of R8C/25 Group	Interrupt Source of R8C/27 Group
0FFF0h to 0FFF3h	Watchdog timer Oscillation stop detection Voltage monitor 1 Voltage monitor 2	Watchdog timer Oscillation stop detection Voltage monitor 1 (1) Voltage monitor 2

Note:
1. This only applies to the N and D versions in the R8C/27 Group.

Table 3.8 Relocatable Vector Table Differences

Software Interrupt Number	Interrupt Source of R8C/25 Group	Interrupt Source of R8C/27C Group
7	—	Timer RC
8	Timer RD (channel 0)	—
9	Timer RD (channel 1)	—
21	$\overline{\text{INT2}}$	—

4. Reference Documents

R8C/25 Group User's Manual: Hardware Rev.3.00
R8C/27 Group User's Manual: Hardware Rev.2.10
The latest versions can be downloaded from the Renesas Electronics website.

Technical Update/Technical News
The latest information can be downloaded from the Renesas Electronics website.

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Revision History	R8C/25 Group and R8C/27 Group Differences between R8C/25 Group and R8C/27 Group

Rev.	Date	Description	
		Page	Summary
1.00	Aug. 6, 2010	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins

   Handle unused pins in accord 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 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. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment 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 moment 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 moment 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 moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has 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. Moreover, 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.

5. Differences between Products

   Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

   — The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.

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