
R8C/38A, R8C/38C, R8C/38M Groups

Differences between R8C/38A, R8C/38C, and R8C/38M Groups

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Abstract

This document is reference material for identifying differences between the R8C/38A Group, R8C/38C Group, and R8C/35M Group.

Products

R8C/38A, R8C/38C, R8C/38M Groups

For more details and electrical characteristics, refer to the hardware user's manual and technical updates.

Contents

1.	Differences between Groups	3
1.1	Function and Specification Differences	3
1.2	Pin Function Differences	5
1.3	Differences of SFRs	5
1.4	Interrupt Vector Differences	6
2.	Notes	6
3.	Reference Documents	7

1. Groups Differences

1.1 Function and Specification Differences

Table 1.1 and Table 1.2 list differences in the functions and specifications.

Table 1.1 Function and Specification Differences (1) (1)

Item		R8C/38A Group	R8C/38C Group	R8C/38M Group
Voltage Detection Circuit	Voltage detection 2	Detection voltage can be selected. (VCC or LVCMP2 pin)	Detection voltage cannot be selected.	Detection voltage can be selected. (VCC or LVCMP2 pin)
High-Speed On-Chip Oscillator		Not included (2)	Included (3)	
Power Control	• Select 10b for bits CM37 and CM36	Not available	Available	Not available
	• Enter stop mode while bits CM37 and CM36 are 00b in high-speed on-chip oscillator mode	—	Available	Not available
	• Select 11b for bits CM37 and CM36 in low-speed clock mode.	Available		Not available
Interrupts		• Number of interrupt sources: 45 • External interrupt inputs: 9 (INT x 5, key input x 4)	• Number of interrupt sources: 41 • External interrupt inputs: 9 (INT x 5, key input x 4)	• Number of interrupt sources: 45 • External interrupt inputs: 9 (INT x 5 and key input x 4)
Serial Interface (4)	td(C-Q) TXDi output delay time	Maximum 70 ns (VCC = 5.0 V)	Maximum 50 ns (VCC = 5.0 V)	• When selecting external clock: Maximum 90 ns (VCC = 5.0 V) • When selecting internal clock: Maximum 10 ns (VCC = 5.0 V)
	tsu(D-C) RXDi input setup time	Minimum 50 ns (VCC = 5.0 V)		• When selecting external clock: Minimum 10 ns (VCC = 5.0 V) • When selecting internal clock: Minimum 90 ns (VCC = 5.0 V)

Notes:

1. For more details and electrical characteristics, refer to the hardware user's manual and technical updates.
2. The R8C/38A Group does not include the high-speed on-chip oscillator, it cannot be selected as the count source of peripheral functions.
3. Electrical characteristics are different. Refer to the documents for each group.
4. Functions and specification differences vary depending on supply voltage and temperature conditions. Refer to the Electrical Characteristics for details.

Table 1.2 Function and Specification Differences (2) (1)

Item		R8C/38A Group	R8C/38C Group	R8C/38M Group
A/D Converter	Conversion rate per pin ($\phi_{AD} = f_{AD}$)	Minimum 43 ϕ_{AD} cycles for 8-bit and 10-bit resolution	Minimum 44 ϕ_{AD} cycles for 8-bit and 10-bit resolution	
	Sampling time ($\phi_{AD} = f_{AD}$)	15 ϕ_{AD} cycles	16 ϕ_{AD} cycles	
	A/D conversion execution time	Open-circuit detection disabled: 40 ϕ_{AD} cycles Open-circuit detection enabled: 42 ϕ_{AD} cycles	Open-circuit detection disabled: 40 ϕ_{AD} cycles + 1 to 3 fAD cycles Open-circuit detection enabled: 42 ϕ_{AD} cycles + 1 to 3 fAD cycles	
Comparator A		Included	Not included	Included
Flash Memory	Program operation (programming to the flash memory) while auto-erase is suspended for the suspend function.	Cannot be performed	Can be performed	
	Interval from erase start/restart until following suspend request	Minimum: 33 ms	Minimum: 0 ms	
	Suspend interval necessary for auto-erase to be completed	Minimum: 33 ms	Minimum: 0 ms	
Current Consumption		<ul style="list-style-type: none"> • Typ. 6.5 mA (VCC = 5.0 V, f(XIN) = 20 MHz) • Typ. 3.5 mA (VCC = 3.0 V, f(XIN) = 20 MHz) • Typ. 3.5 μA (VCC = 3.0 V, wait mode (f(XCIN) = 32 kHz)) 	<ul style="list-style-type: none"> • Typ. 7.0 mA (VCC = 5.0 V, f(XIN) = 20 MHz) • Typ. 3.5 mA (VCC = 3.0 V, f(XIN) = 10 MHz) • Typ. 4.0 μA (VCC = 3.0 V, wait mode (f(XCIN) = 32 kHz)) 	<ul style="list-style-type: none"> • Typ. 6.5 mA (VCC = 5.0 V, f(XIN) = 20 MHz) • Typ. 3.5 mA (VCC = 3.0 V, f(XIN) = 10 MHz) • Typ. 3.5 μA (VCC = 3.0 V, wait mode (f(XCIN) = 32 kHz))

Note:

1. For more details, refer to the hardware user's manual and technical updates.

1.2 Pin Function Differences

Table 1.3 lists differences in pin functions.

Table 1.3 Pin Function Differences

Peripheral Function Pin	Assigned I/O Ports		
	R8C/38A Group	R8C/38C Group	R8C/38M Group
IVCMP	P1_7		—
IVCMP1	—		P1_7
LVCOUT2	P1_6	—	P1_6
LVCOUT1	P1_3	—	P1_3
LVREF	P1_2	—	P1_2
LVCMP2	P1_1	—	P1_1
LVCMP1	P1_0	—	P1_0

The symbol "—" indicates there is no pin for the peripheral function.

1.3 Differences of SFRs

Table 1.4 lists differences in the SFRs.

Table 1.4 Differences of SFRs (1)

R8C/38A Group	R8C/38C Group	R8C/38M Group	Differences to R8C/38A Group	
			R8C/38C Group	R8C/38M Group
CM3	CM3	CM3	Functions changed in bits 6 and 7	
FRA0	FRA0	FRA0	Functions added to bits 0, 1, and 3	
—	FRA1	FRA1	Register added	
—	FRA2	FRA2	Register added	
—	FRA3	FRA3	Register added	
—	FRA4	FRA4	Register added	
—	FRA5	FRA5	Register added	
—	FRA6	FRA6	Register added	
—	FRA7	FRA7	Register added	
CMPA	CMPA	CMPA	Bits 0 to 3 deleted	
VCA2	VCA2	VCA2	<ul style="list-style-type: none"> • Bits 1 to 4 deleted • Functions changed in bits 6 and 7 	
VW2C	VW2C	VW2C	Function changed in bit 7	
DTCEN2	DTCEN2	DTCEN2	Functions changed in bits 4 and 5	
TRCCR1	TRCCR1	TRCCR1	Functions changed in bits 4 to 6	
TRDCR0	TRDCR0	TRDCR0	Functions changed in bits 0 to 2	
TRDCR1	TRDCR1	TRDCR1	Functions changed in bits 0 to 2	
TRGCR	TRGCR	TRGCR	Functions changed in bits 0 to 2	
ADMOD	ADMOD	ADMOD	Function changed in bit 2	

The symbol "—" indicates there is no SFR.

Note:

1. For more details, refer to the hardware user's manual and technical updates.

1.4 Interrupt Vector Differences

Table 1.5 lists Differences in Fixed Vector Table and Table 1.6 lists Differences in Relocatable Vector Table.

Table 1.5 Differences in Fixed Vector Table

Vector addresses	Interrupt Source of R8C/38A Group	Interrupt Source of R8C/38C Group	Interrupt Source of R8C/38M Group
0FFF0h to 0FFF3h	Watchdog timer Oscillation stop detection Voltage monitor 1/comparator A1 Voltage monitor 2/comparator A2	Watchdog timer Oscillation stop detection Voltage monitor 1 Voltage monitor 2	Watchdog timer Oscillation stop detection Voltage monitor 1/comparator A1 Voltage monitor 2/comparator A2

Table 1.6 Differences in Relocatable Vector Table

Software Interrupt Number	Interrupt Source of R8C/38A Group	Interrupt Source of R8C/38C Group	Interrupt Source of R8C/38M Group
50	Voltage monitor 1/comparator A1	Voltage monitor 1	Voltage monitor 1/comparator A1
51	Voltage monitor 2/comparator A2	Voltage monitor 2	Voltage monitor 2/comparator A2

2. Notes

Each product has different oscillation circuit constants of XIN-XOUT, XCIN-XCOUT. Therefore, contact an oscillator manufacturer when selecting an oscillator and oscillation circuit constants so that a stable operation clock can be obtained on the user system and conditions for mass-production. Be careful especially when the voltage and temperature range is wide. The wiring pattern of the feedback resistor, damping resistor, and the load capacity should be considered in advance when designing a circuit.

In addition, although compatibility in characteristics is fully considered when designing each device, actual values such as operating margin, A/D conversion accuracy, noise immunity, noise radiation may be different within the range of electrical characteristics due to different manufacturing processes. Therefore, perform sufficient system evaluations for each individual product before starting mass production.

3. Reference Documents

R8C/38A Group User's Manual: Hardware Rev.0.10

R8C/38C Group User's Manual: Hardware Rev.1.10

R8C/38M Group User's Manual: Hardware Rev.1.00

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

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Revision History	R8C/38A, R8C/38C, R8C/38M Groups Differences between R8C/38A, R8C/38C, and R8C/38M Groups
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Rev.	Date	Description	
		Page	Summary
1.00	Jun. 24, 2010	—	First edition issued
2.00	Sep. 12, 2011	—	Document number changed (previous number: REJ05B1376)
		Full page	Differences of R8C/38M Group added, and descriptions reviewed
		3, 4	Differences of Power Control, A/D Converter Sampling Time, A/D Converter A/D conversion execution time in Tables 1.1 and 1.2 added, and Notes 3 and 4 added
		5	Table 1.3 Assigned I/O ports for LVCOU1 and LVREF revised

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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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