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R8C/15, R8C/17, R8C/19, R8C/1B Groups

Differences of R8C/15, R8C/17, R8C/19 and R8C/1B Groups

1. Abstract

The following document is for the reference when checking the differences of the R8C/15, R8C/17, R8C/19 and R8C/1B groups.

2. Introduction

The application example described in this document is applied to the following MCUs:

- Applicable MCU: R8C/15, R8C/17, R8C/19 and R8C/1B Groups

3. Replacement from R8C/14, 15, 16, 17 Groups to R8C/1A, 1B Groups

The R8C/1A, 1B groups are the upward compatible products for the R8C/14, 15, 16, 17 groups. It is easy to replace the R8C/14, 15, 16, 17 groups to the R8C/1A, 1B groups since the R8C/1A, 1B groups keep the compatibility in all. Refer to **4. Description of Differences** and the hardware manual for details.

3.1 Upward Compatibility of Functions

Additional functions for the R8C/1A, 1B groups are shown below:

(1) Add 1ch clock asynchronous serial I/O (UART1).

(2) SSU or I^2C bus can be selected by a program. (Select SSU after reset)

(3) Add the program suspend function.

(4) Reduce suspend transition time from Max. 8ms (R8C/14, 15, 16, 17 groups) to Max. (97 + CPU clock x 6 cycles) μs.

(5) Low power consumption operation with Typ.110μA is feasible in low-speed on-chip oscillator mode by adding the low-power consumption read mode function.

3.2 Upward Compatibility of Pins

Changes in the R8C/1A, 1B groups are shown below:

(1) The SSI pin of SSU can be selected to P1_6 or P3_3 by the program. (Select P3_3 after reset.)

(2) The VREF pin is not shared with the AVCC pin but used separately. The VREF pin is also used with P4_2 (input port). The VREF pin supports for input of VCC or below voltage.

3.3 Software Compatibility

The R8C/1A, 1B groups can use the R8C/14, 15, 16, 17 groups software. However, characteristics such as timing may be changed depending on the improvement of the function and revision of the Flash memory specification. Execute the sufficient evaluation for the software and note the following points:

(1) As for the replacement of the R8C/16, 17 groups, set the bit 7 in the port mode register (PMR) to “1” before setting I^2C bus, and then select I^2C bus. SSU is selected after reset.

(2) The STOP bit in the IIC bus status register (ICSR) is indeterminate after reset in the R8C/1A, 1B groups.

(3) When using the erase suspend function, electrical characteristics such as transition time to a suspend and an interval up to the following suspend request, etc. have been improved.

(4) The high-speed on-chip oscillator frequency may be changed up to 10% (1) during auto-programming or auto-erasing in the R8C/18, 19, 1A, 1B groups. When the high-speed on-chip oscillator is assumed as the clock source and using peripheral functions, consider the change of frequency.

NOTES:

1. Change rate to 8MHz frequency adjusted when shipping

4. Description of Differences

4.1 Differences of Functions and Specifications

Table 4.1 lists the Differences of Functions and Specifications.

Table 4.1 Differences of Functions and Specifications(1)

Item	R8C/15 Group	R8C/17 Group	R8C/19 Group	R8C/1B Group
Flash Memory 4KB Version	None		Included	
SDIP Package	None		Included	
High-Speed On-Chip Oscillator	8MHz ± 7% (0 to +60°C / 5V ± 5%)		8MHz ± 3% (0 to +60°C / 5V ± 5%)	
Flash Memory Start Time in Reset Sequence	CPU clock x 72 cycles		CPU clock x 11 cycles	
Serial Interface	UART0		UART0 / UART1	
SSU/I^{2}C bus(2)	SSU	I^{2}C bus(2)	None	SSU or I^{2}C bus(2)
AD Converter / Comparator	AD converter		Comparator	AD converter
AD Reference Voltage	Same electrical potential as Vcc		Support for input of Vcc or below	
I/O Port	I/O port : 13 Input port : 2		I/O port : 13 Input port : 3	
Program Suspend Function	None		Included	
Transition Time to Erase Suspend	Max. 8ms		Max. 97 + CPU clock x 6 cycles	
Erase Suspend Request Interval	Min. 10ms		Min.650µs	
Low-Power Consumption Read Mode	None		Included	

NOTES:
1. Refer to the hardware manual for details and electrical characteristics.
2. I^{2}C bus is a trademark of Koninklijke Philips Electronics N.V.

4.2 Differences of Pin Functions

Table 4.2 lists the Differences of Pin Functions.

Table 4.2 Differences of Pin Functions

R8C/15 Group	R8C/17 Group	R8C/19 Group	R8C/1B Group
P1_6/CLK0		(NOTES1)	P1_6/CLK0/SSI01
P3_3/TCIN/$\overline{\text{INT3}}$/SSI/CMP1_0	P3_3/TCIN/$\overline{\text{INT3}}$/CMP1_0	P3_3/TCIN/$\overline{\text{INT3}}$/CMP1_0	P3_3/TCIN/$\overline{\text{INT3}}$/SSI00/CMP1_0
P3_4/$\overline{\text{SCS}}$/CMP1_1	P3_4/SDA/CMP1_1	P3_4/CMP1_1	P3_4/$\overline{\text{SCS}}$/SDA/CMP1_1
P3_5/SSCK/CMP1_2	P3_5/SCL/CMP1_2	P3_5/CMP1_2	P3_5/SSCK/SCL/CMP1_2
P3_7/$\overline{\text{CNTR0}}$/SSO	P3_7/$\overline{\text{CNTR0}}$	P3_7/$\overline{\text{CNTR0}}$/TXD1	P3_7/$\overline{\text{CNTR0}}$/SSO/TXD1
P4_5/$\overline{\text{INT0}}$		P4_5/$\overline{\text{INT0}}$/RXD1	
AVCC/VREF		P4_2/VREF	
VCC		VCC/AVCC	

NOTES:
1. No difference from the R8C/15, 17 groups.

4.3 Differences of SFRs

Table 4.3 lists the Differences of SFRs.

Table 4.3 Differences of SFRs

R8C/15 Group	R8C/17 Group	R8C/19 Group	R8C/1B Group	Remarks
SSUAIC	IIC2AIC	–	SSUAIC/IIC2AIC	
–		S1TIC		
–		S1RIC		
–		U1MR		
–		U1BRG		
–		U1TB		
–		U1C0		
–		U1C1		
–		U1RB		
UCON		UCON		Bit 1, 4, 5 added
SSCRH	ICCR1	–	SSCRH/ICCR1	
SSCRL	ICCR2	–	SSCRL/ICCR2	
SSMR	ICMR	–	SSMR/ICMR	
SSER	ICIER	–	SSER/ICIER	
SSSR	ICSR	–	SSSR/ICSR	Initial value of bit 7 in ICSR register changed
SSMR2	SAR	–	SSMR2/SAR	
SSTDR	ICDRT	–	SSTDR/ICDRT	
SSRDR	ICDRR	–	SSRDR/ICDRR	
AD		AD	(NOTES1)	Function changed
ADCON2		ADCON2	(NOTES1)	Function changed
ADCON0		ADCON0	ADCON0	Function of bit 7 changed
ADCON1		ADCON1	(NOTES1)	Function of bit 3,5 deleted
P4		P4		Bit 2 added
–		PMR		
FMR4		FMR4		Bit 2,3,4,7 added

NOTES:
1. No difference from the R8C/15, 17 groups.

4.4 Differences of Interrupt Vectors

Table 4.4 lists the Differences of Relocatable Vector Tables.

Table 4.4 Differences of Relocatable Vector Tables

Interrupt Factor of R8C/15 Group	Interrupt Factor of R8C/17 Group	Interrupt Factor of R8C/19 Group	Interrupt Factor of R8C/1B Group	Software Interrupt Number
AD		Comparator	(NOTES1)	14
SSU	I^2C bus	–	SSU/I^2C bus	15
–		UART 1 transmit		19
–		UART1 receive		20

NOTES:
1. No difference from the R8C/15, 17 groups.

5. Hardware Manual

R8C/14, R8C/15 Groups Hardware Manual
R8C/16, R8C/17 Groups Hardware Manual
R8C/18, R8C/19 Groups Hardware Manual
R8C/1A, R8C/1B Groups Hardware Manual
(Please visit our website for the most updated document available.)

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		Page	Summary
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