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User's Manual

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The revision list can be viewed directly by clicking the title page.
The revision list summarizes the locations of revisions and additions.
Details should always be checked by referring to the relevant text.

H8/3802, H8/38004, H8/38002S, H8/38104 Group

Hardware Manual

Renesas 8-Bit Single-Chip Microcomputer
H8 Family / H8/300L Super Low Power Series

H8/3802 Group	H8/3802	H8/38002S Group	H8/38002S
	H8/3801		H8/38001S
	H8/3800		H8/38000S
H8/38004 Group	H8/38004	H8/38104 Group	H8/38104
	H8/38003		H8/38103
	H8/38002		H8/38102
	H8/38001		H8/38101
	H8/38000		H8/38100

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Rev.7.00 2010.03

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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 may occur due to the false recognition of the pin state as an input signal. 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 type number, confirm that the change will not lead to problems.

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

Configuration of This Manual

This manual comprises the following items:

1. General Precautions in the Handling of MPU/MCU Products
2. Configuration of This Manual
3. Preface
4. Contents
5. Overview
6. Description of Functional Modules
   - CPU and System-Control Modules
   - On-Chip Peripheral Modules

   The configuration of the functional description of each module differs according to the module. However, the generic style includes the following items:

   i) Feature
   ii) Input/Output Pin
   iii) Register Description
   iv) Operation
   v) Usage Note

When designing an application system that includes this LSI, take notes into account. Each section includes notes in relation to the descriptions given, and usage notes are given, as required, as the final part of each section.

7. List of Registers
8. Electrical Characteristics
9. Appendix
10. Main Revisions for This Edition (only for revised versions)

The list of revisions is a summary of points that have been revised or added to earlier versions. This does not include all of the revised contents. For details, see the actual locations in this manual.

11. Index

Preface

The H8/3802 Group, H8/38004 Group, and H8/38104 Group are single-chip microcomputers made up of the high-speed H8/300L CPU employing Renesas technology's original architecture as their cores, and the peripheral functions required to configure a system. The H8/300L CPU has an instruction set that is compatible with the H8/300 CPU. Below is a table listing the product specifications for each group.

Item		H8/3802 Group		H8/38004 Group		H8/38002S Group	H8/38104 Group	
		ZTAT	Mask ROM	Flash ROM	Mask ROM	Mask ROM	Flash ROM	Mask ROM
Memory	ROM	16 k	8 k to 16 k	16 k/32 k	32 k	8 k to 16 k	16 k/32 k	8 k to 32 k
	RAM	1 k	512 or 1 k	1 k	1 k	512 k	1 k	512 or 1 k
Operating voltage and operating frequency	4.5 to 5.5 V	16 MHz	16 MHz	—	16 MHz	—	20 MHz	20 MHz
	2.7 to 5.5 V	10 MHz	10 MHz	—	16 MHz	—	20 MHz	20 MHz
	1.8 to 5.5 V	4 MHz	4 MHz	—	—	—	—	—
	2.7 to 3.6 V	—	—	10 MHz	—	10 MHz	—	—
	1.8 to 3.6 V	—	—	4 MHz (2.2 V or more)	—	4 MHz	—	—
I/O ports	Input	9	9	9	9	9	9	9
	Output	6	6	6	5	6	5	5
	I/O	39	39	39	39	39	39	39
Timers	Clock (timer A)	1	1	1	1	1	1	1
	Compare (timer F)	1	1	1	1	1	1	1
	AEC	1	1	1	1	1	1	1
	WDT			1		1		
	WDT (discrete)				1		1	1
SCI	UART/Clock frequency	1 ch	1 ch	1 ch	1 ch	1 ch	1 ch	1 ch
A-D (resolution × input channels)		10 bit × 4 ch	10 bit × 4 ch	10 bit × 4 ch	10 bit × 4 ch	10 bit × 4 ch	10 bit × 4 ch	10 bit × 4 ch
LCD	seg	25	25	25	25	25	25	25
	com	4	4	4	4	4	4	4
External interrupt (internal wakeup)		11(8)	11(8)	11(8)	11(8)	11(8)	11(8)	11(8)
POR (power-on reset)		—	—	—	—	—	1	1
LVD		—	—	—	—	—	1	1

Item	H8/3802 Group		H8/38004 Group		H8/38002S Group	H8/38104 Group	
	ZTAT	Mask ROM	Flash ROM	Mask ROM	Mask ROM	Flash ROM	Mask ROM
Package	FP-64A	FP-64A	FP-64A	FP-64A	FP-64A	FP-64A	FP-64A
	FP-64E	FP-64E	FP-64E	FP-64E	FP-64K*	FP-64E	FP-64E
			TNP-64B	TNP-64B	TNP-64B		
	DP-64S	DP-64S					
		die	die				
Operating temperature	Standard specifications: –20 to 75°C, WTR: –40 to 85°C						

Note: * Under development.

Target Users: This manual was written for users who will be using the H8/3802 Group, H8/38004 Group, H8/38002S Group, and H8/38104 Group in the design of application systems. Target users are expected to understand the fundamentals of electrical circuits, logical circuits, and microcomputers.

Objective: This manual was written to explain the hardware functions and electrical characteristics of the H8/3802 Group, H8/38004 Group, H8/38002S Group, and H8/38104 Group to the target users.
Refer to the H8/300L Series Software Manual for a detailed description of the instruction set.

Notes on reading this manual:

- In order to understand the overall functions of the chip
  Read the manual according to the contents. This manual can be roughly categorized into parts on the CPU, system control functions, peripheral functions and electrical characteristics.
- In order to understand the details of the CPU's functions
  Read the H8/300L Series Software Manual.
- In order to understand the details of a register when its name is known
  Read the index that is the final part of the manual to find the page number of the entry on the register. The addresses, bits, and initial values of the registers are summarized in section 14, List of Registers.

Example: Bit order: The MSB is on the left and the LSB is on the right.

Notes:
The following limitations apply to H8/38004, H8/38002, H8/38104, and H8/38102 programming and debugging when the on-chip emulator is used.

1. Pin P95 is not available because it is used exclusively by the on-chip emulator.
2. Pins P33, P34, and P35 are unavailable for use. In order to use these pins additional hardware must be mounted on the user board.

3. The address range H'7000 to H'7FFF is used by the on-chip emulator and is unavailable to the user.
4. The address range H'F780 to H'FB7F must not be accessed under any circumstances.
5. When the on-chip emulator is being used, pin P95 is I/O, pins P33 and P34 are input, and pin P35 is output.
6. When using the on-chip emulator, pins OSC1 and OSC2 should be connected to an oscillator, or an external clock should be supplied to pin OSC1, even if the on-chip oscillator of the H8/38104 Group is selected.

Related Manuals: The latest versions of all related manuals are available from our web site. Please ensure you have the latest versions of all documents you require. http://www.renesas.com/eng/

H8/3802 Group, H8/38004 Group, H8/38002S Group, H8/38104 Group Manuals:

Document Title	Document No.
H8/3802 Group, H8/38004 Group, H8/38002S Group, H8/38104 Group Hardware Manual	This manual
H8/300L Series Software Manual	REJ09B0214

User's Manuals for Development Tools:

Document Title	Document No.
H8S, H8/300 Series C/C++ Compiler, Assembler, Optimizing Linkage Editor User's Manual	REJ10B2039
H8S, H8/300 Series Simulator/Debugger User's Manual	REJ10B0211
High-performance Embedded Workshop User's Manual	REJ10J2037

Application Notes:

Document Title	Document No.
H8S, H8/300 Series C/C++ Compiler Package Application Note	REJ05B0464

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