8 Bit MICROCOMPUTER 38000 Series

- 3850 Group (Spec. A) -

Renesas Technology Corp.

REJ99B1034-0101

1. Feature of 3850 Group (Spec. A)

The 3850 group supports for the following requests!!
- Want to use A/D conversion in low-speed mode
- Want to use 7-segment LED
- Want more than 8 A/D ports
- Want 2 serial I/O
- Want to execute higher-speed process

- Maximum operating frequency : 12.5MHz (Minimum instruction execution time 0.32μs)

  > High-speed operation, Improve low-voltage operating frequency
- High-accuracy A/D converter : 10-bit resolution, absolute accuracy ± 4LSB 9ch

  > Multi-channel A/D
- Software pull-up resistor included

  > External pull-up can be reduced
- A/D can be converted with typical 40μs at 32-kHz operation

  > A/D can be converted in low-speed mode
- Serial I/O (UART or clock synchronous) : 1
  (Clock synchronous) : 1
- Watchdog timer

  > Countermeasure for software out of control
- High current output port which can drive LED directly : 8

  > 7-segment LED connectable
- Package FP(SSOP) : PRSP0042GA-B(42P2R-A/E)
  SP(SDIP) : PRDP0042KA-A(42P4B)
- Flash memory version : M38507F8ASP/FP
- QzROM version : M38503G4ASP/FP, M38503G4A-XXXSP/FP
- Support for lead-free (lead-free products for QzROM products)

2. Product Outline of 3850 Group (Spec. A)

☆ : New spec. for 3850 group (Spec.A)
☆ ☆ : New spec. only for QzROM

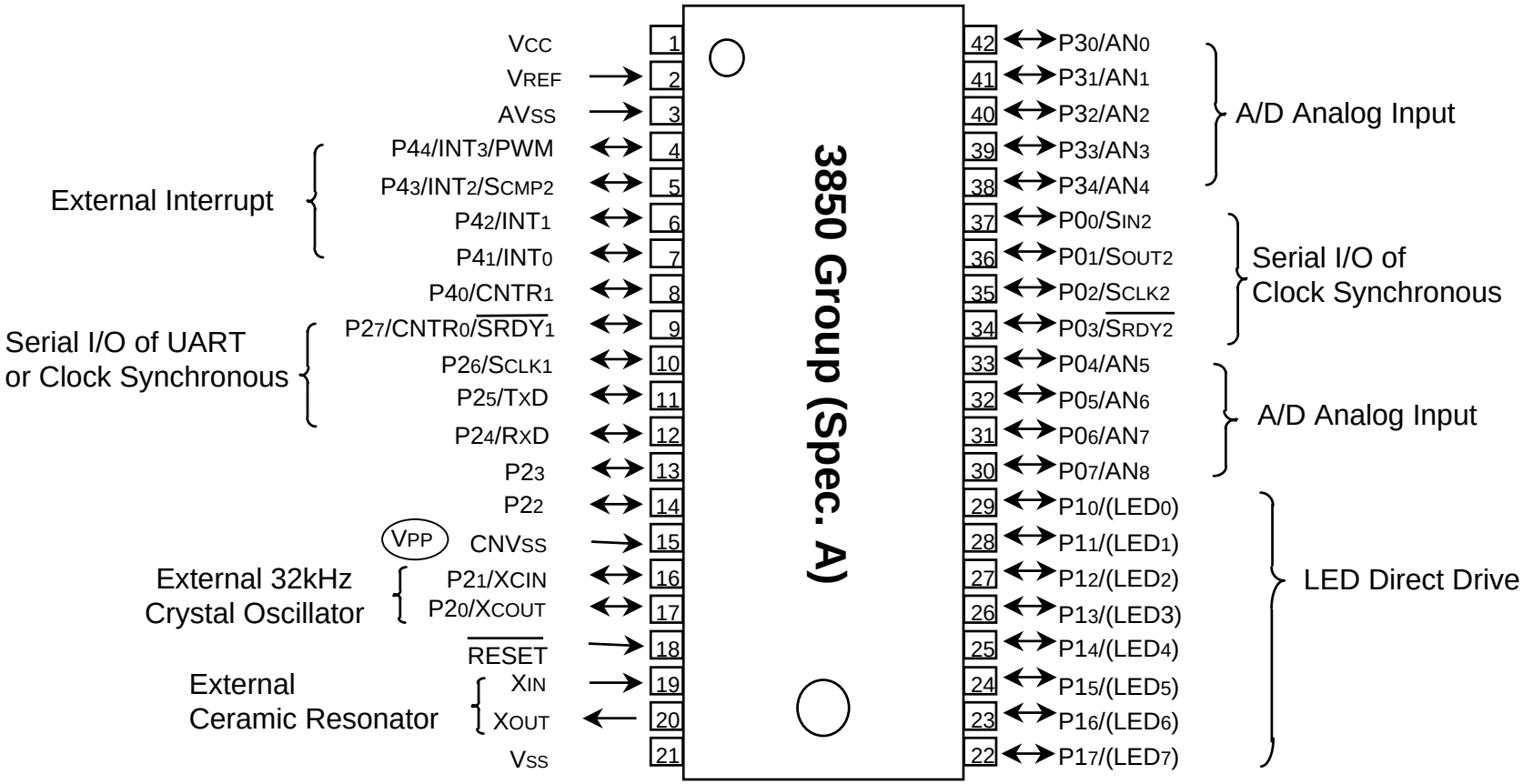
Product Outline

- Memory size (ROM/RAM)
  - Mask ROM version 8 K/512, 16 K/512, 24 K/640, 32 K/1 Kbytes
  - Flash memory version 32 K/1 Kbytes
  - QzROM version 16 K/512 bytes
- Operating Supply Voltage
  - **High-speed mode · · · · · · 4.0 to 5.5V (at 12.5MHz) ☆**
  - **High-speed mode · · · · · 2.7 to 5.5V (at 6MHz) ☆**
  - **High-speed mode · · · · · · 2.2 to 5.5V (at 4.2MHz) ☆ ☆**
  - **High-speed mode · · · · · · 2.0 to 5.5V (at 2.1MHz) ☆ ☆**
  - **Middle-speed mode · · · ·2.7 to 5.5V (at 12.5MHz) ☆**
  - **Middle-speed mode · · · ·2.2 to 5.5V (at 8.4MHz) ☆ ☆**
  - **Middle-speed mode · · · ·1.8 to 5.5V (at 4.2MHz) ☆ ☆**
  - Low-speed mode · · · · · · · ·2.7 to 5.5V (at 32kHz)
  - **Low-speed mode · · · · · · 1.8 to 5.5V (at 32kHz) ☆ ☆**
- **Minimum instruction execution time · · · · · · · · · · · 0.32µs (oscillation frequency 12.5MHz, in high-speed mode) ☆**
- **Maximum clock oscillation frequency (high-speed mode, maximum value) · · · · 12.5MHz (Vcc=4.0 to 5.5V) ☆**
- **A/D converter ·10-bit resolution : 9ch ☆**
  - **Operating supply voltage when using A/D converter : Vcc=2.7 to 5.5V (Mask version, Flash memory version)**
  - **Vcc=2.2 to 5.5V (QzROM version) ☆ ☆**
- Serial I/O (UART or clock synchronous) · · · · · · · · · · ·8 bit : 1 ch
  - (Clock synchronous) · · · · · · · · · · · · · · · · · · ·8 bit : 1 ch
- Timer ·8-bit prescaler : 3 ch, 8-bit timer : 4 ch
- Interrupt · External : 7 factors, internal factors : 8, software : 1 factor
- Programmable I/O · 34 pins **(32 with software pull-up resistor other than P22, P23) ☆**
- 8-bit PWM (with 8-bit prescaler)
- Watchdog timer
- Clock generation circuit· ·2 circuits included (ceramic resonator, 32kHz crystal oscillator)
- LED direct drive (port P1) ·8 pins
- Package · FP : 42-pin plastic-molded SSOP (PRSP0042GA-B(42P2R-A/E))
  - SP : 42-pin plastic-molded SDIP (PRDP0042KA-A(42P4B))

Application

Home Appliances : Refrigerator, washing machine, air conditioners, microwave oven, dishwasher, etc.
Consumer Appliances : Camera, home audio system, telephone, charger, etc.

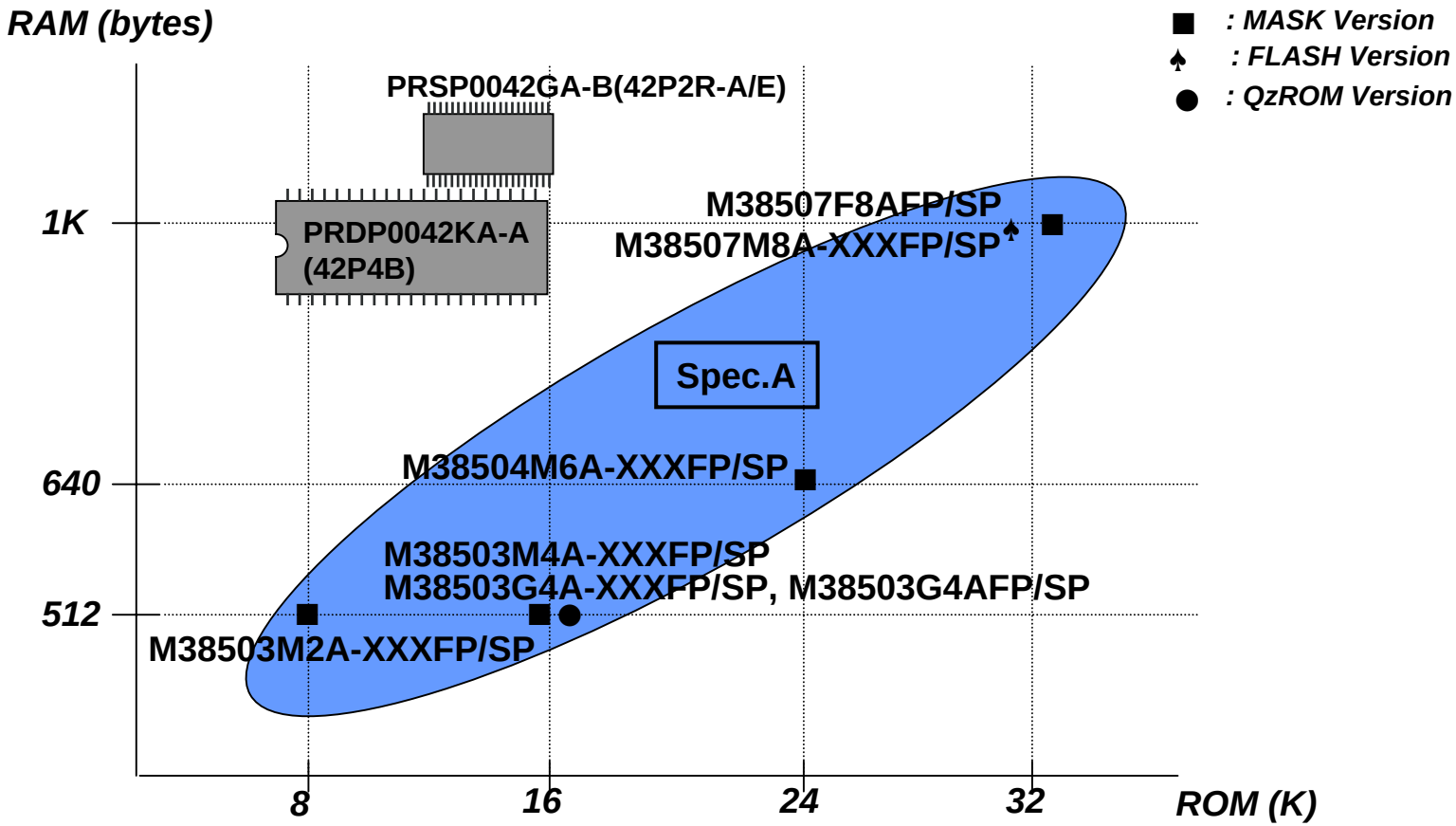
3.Pin Assignment of 3850 Group (Spec.A)



Dimensions : PRSP0042GA-B(42P2R-A/E)
PRDP0042KA-A(42P4B)

VPP is for Flash memory version

4. 3850 Group (Spec. A) Development (ROM/RAM/ Package)

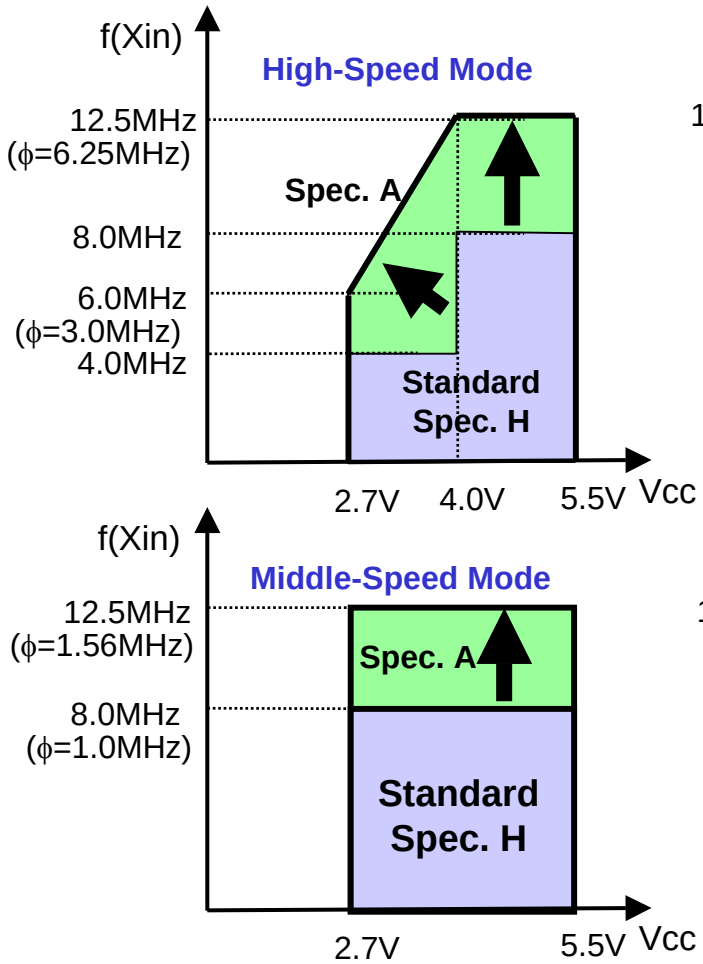


5. 3850 Group (Spec.A) Lineup

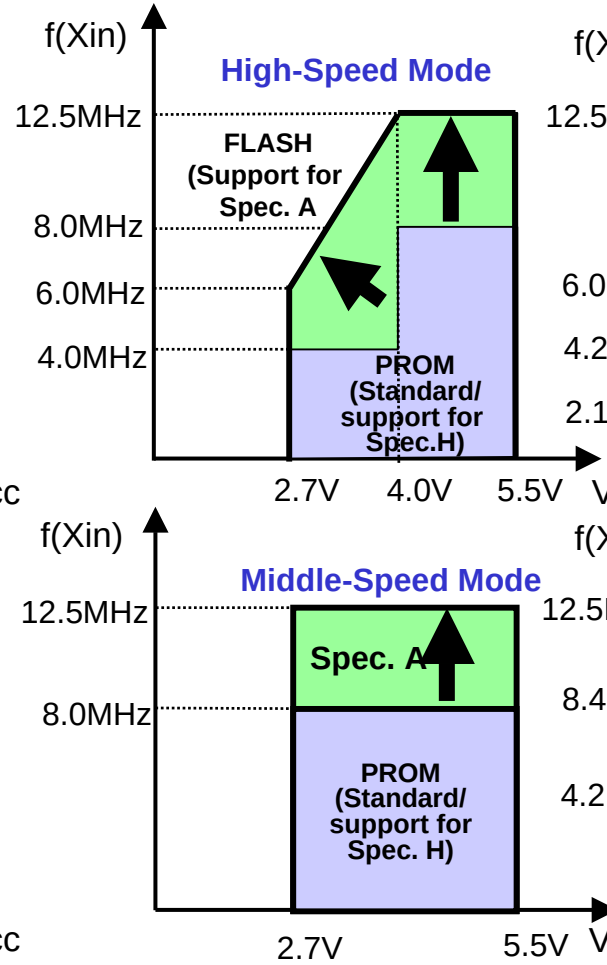
Part Number	ROM size (byte) () inside shows user ROM size	RAM Size (B)	Package	Remarks
M38503M2A-XXXFP/SP	8192(8062)	512	PRSP0042GA-B (42P2R-A/E) (FP:SSOP) (PRDP0042BA-A (42P4B) (SP:SDIP)	Mask ROM Version
M38503M4A-XXXFP/SP	16384(16254)	512		
M38504M6A-XXXFP/SP	24576(24446)	640		
M38507M8A-XXXFP/SP	32768(32638)	1024		
M38507F8AFP/SP	32768	1024		Flash Memory Version
M38503G4A-XXXFP/SP	16384(16254)	512		QzROM Version
M38503G4AFP/SP				

6. Improvement of 3850 Group Operating Frequency Characteristics

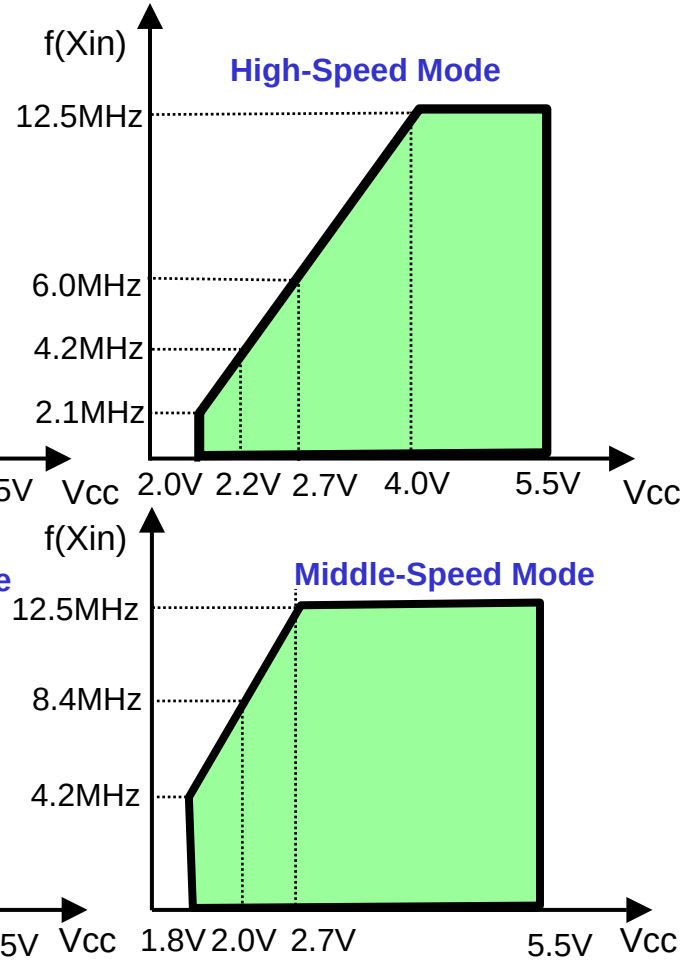
Mask Version



Flash Memory Version



QzROM Version



8. 3850 Group (Spec. A) Development Support Tool List

3850 Group (Spec. A) Support Product		Part Number	Remarks
Assembler Package		M3T-SRA74	With integrated development environment(HEW)
C Compiler Package		M3T-ICC740	IAR Systems' C compiler with IDE(HEW)
Simulator Debugger			Used under a HEW environment
Simulator Debugger		M3T-PD38SIM	Discontinued Product
Compact Emulator System	Compact Emulator	M38000T2-CPE	M3T-ICC740,M3T-SRA74 with IDE(HEW)included
	Emulator MCU	M38507ARLSS	
Emulator System (Discontinued Product)	Emulator Debugger	M3T-PD38	Discontinued Product
	Emulator	PC4701U	Emulator debugger bundled
	Emulation Pod	M38000TL2-FPD	Discontinued Product
	Emulator MCU	M38507ARLSS	
Accessory Tool	Package Conversion Board	M3T-42DIP-DMS	Convert a system for PRSP0042GA-B (42P2R-A/E) to the emulator MCU
		M3T-DCT42B-450	
		M3T-42DIP-DMS	Convert a system for PRSP0042GA-B (42P2R-A/E) to the emulator MCU (chip can be mounted)
		M3T-SSOP42B-450	
	Pin Process Board	M38517T-ADS	Emulator MCU support pin process board
Flash Memory Programmer		EFP-I	Made by Suisei Electronics System Co., Ltd.
		PRO201/204/208	Made by Hi-Lo Systems Co., Ltd.
		M3A-0806	M16C Flash Starter
		HS6400FDIW3SR (Flash Development Toolkit)	Available for on-board programming using E8 emulator
QzROM Programmer		EFP-I	Made by Suisei Electronics System Co., Ltd.
		HS6400FDIW3SR (Flash Development Toolkit)	Available for on-board/off-board programming using E8 emulator and IC socket board(R0K303850A000BR /R0K303850A010BR)

7. Differences among 3850 Group (Spec. A), (Spec. H) and (Standard)

	3850 Group (Spec.A)	3850 Group (Spec.H)	3850 Group (Standard)
Related Product	M38503M2A-XXXFP/SP M38503M4A-XXXFP/SP M38504M6A-XXXFP/SP M38507M8A-XXXFP/SP M38507F8AFP/SP M38503G4A-XXXFP/SP M38503G4AFP/SP M38507ARLSS (emulator MCU)	M38503M2H-XXXFP/SP(NOTES) M38503M4H-XXXFP/SP(NOTES) M38504M6-XXXFP/SP(NOTES) M38504E6-XXXFP/SP(NOTES) M38504E6FP/SP(NOTES) M38504E6SS(NOTES) M38507M8-XXXFP/SP(NOTES) M38507F8FP/SP M38517RSS (emulator MCU)	M38503M2-XXXFP/SP(NOTES) M38503M4-XXXFP/SP(NOTES) M38503E4-XXXFP/SP(NOTES) M38503E4FP/SP(NOTES) M38503E4SS(NOTES)
Serial I/O	2 ch ; Serial I/O1 (UART or clock synchronous) Serial I/O 2 (clock synchronous)	2 ch ; Serial I/O1 (UART or clock synchronous) Serial I/O 2 (clock synchronous)	1 ch ; Serial I/O (UART or clock synchronous)
A/D Converter	Operable in low-speed mode	Operable in low-speed mode	Cannot operate in low-speed mode
Analog Channel	9 ch : $P3_0$ to $P3_4$, $P0_4$ to $P0_7$	5 ch : $P3_0$ to $P3_4$	5 ch : $P3_0$ to $P3_4$
High Current Port	8 pins : $P1_0$ to $P1_7$	8 pins : $P1_0$ to $P1_7$	5 pins : $P1_3$ to $P1_7$
Software Pull-Up Resistor	Included (P0 to P4)	–	–
Operating Supply Voltage	2.7 to 5.5V (MASK, FLASH) 1.8 to 5.5V (QzROM)	2.7 to 5.5V	2.7 to 5.5V
Max. Operating Frequency	12.5MHz	8MHz	8MHz
Absolute Max. Ratings – Supply Voltage	-0.3 to 6.5V	-0.3 to 6.5V	-0.3 to 7.0V
Absolute Max. Ratings – Input Voltage CNVss	-0.3 to Vcc + 0.3V (MASK, FLASH) -0.3 to 8.0V (QzROM)	-0.3 to Vcc + 0.3V	-0.3 to 13.0V
ROM Size	MASK : 8K, 16K, 24K, 32K Flash : 32K QzROM : 16K	MASK : 8K, 16K, 24K, 32K Flash : 32K PROM : 24K	MASK : 8K, 16K Flash : – PROM : 16K

Refer to each datasheet for details of absolute maximum ratings, electrical characteristics and recommended operating conditions.
The oscillation circuit constants of XIN-XOUT, XCIN-XCOUT will depend on each product. So that the product used for mass production obtains the stabilized operation clock on the user system and its condition, contact the resonator manufacturer and select the resonator and oscillation circuit constants. Be careful especially when range of voltage and temperature is wide. We recommend to design the circuit in consideration of the wiring pattern of the feed-back resistor, the dumping resistor and the load capacity in advance.

(NOTES) :
Replacement recommended products
Refer to the last page

9. Differences of 3850 Group (Spec. A), QzROM Version

	3850 Group (Spec.A)		
Related Products	M38503M2A-XXXFP/SP M38503M4A-XXXFP/SP M38504M6A-XXXFP/SP M38507M8A-XXXFP/SP	M38507F8AFP/SP	M38503G4A-XXXFP/SP M38503G4AFP/SP
Memory	Mask ROM	Flash memory	QzROM
ROM Size	8K, 16K, 24K, 32K	32K	16K
Operating Supply Voltage	2.7 to 5.5V	2.7 to 5.5V	1.8 to 5.5V
Supply Voltage When Using A/D Converter	2.7 to 5.5V	2.7 to 5.5V	2.2 to 5.5V
Oscillation Circuit	In QzROM version, the main clock and sub clock have the different oscillation circuit to support low-voltage operation.		
Absolute Maximum Ratings Applied Voltage CNVss	-0.3 to VCC + 0.3V	-0.3 to VCC + 0.3V	-0.3 to 8.0V
Electrical Characteristics Recommended Operating Conditions	There are the differences in the following items since QzROM version supports for low voltage operation. Refer to each datasheet for details. Oscillation frequency, “H” input voltage, “L” input voltage, A/D converter absolute accuracy, power source current		
ID Code on Flash Memory	—	FFD4 to FFDAh	—
ROM Code Protect on Flash Memory	—	FFDBh	—
Protect Address on QzROM	—	—	FFDBh

Refer to each datasheet for details of absolute maximum ratings, electrical characteristics and recommended operating conditions.
The oscillation circuit constants of XIN-XOUT, XCIN-XCOUT will depend on each product. So that the product used for mass production obtains the stabilized operation clock on the user system and its condition, contact the resonator manufacturer and select the resonator and oscillation circuit constants. Be careful especially when range of voltage and temperature is wide. We recommend to design the circuit in consideration of the wiring pattern of the feed-back resistor, the dumping resistor and the load capacity in advance.

10. Replacement Recommended Products for 3850 Group

Replacing the following “Standard” and “Spec. H” of the 3850 group with “Spec. A” is recommended.
Consider to use a replaced product for a new system.

Related Products		Replaced Products (Spec. A)	
Standard	M38503M2-XXXFP/SP	M38503M2A-XXXFP/SP	M38503G4A-XXXFP/SP M38503G4AFP/SP (QzROM)
	M38503M4-XXXFP/SP	M38503M4A-XXXFP/SP	
	M38503E4-XXXFP/SP	M38507F8AFP/SP	
	M38503E4FP/SP	M38507F8AFP/SP	
	M38503E4SS	M38507F8AFP/SP	
Spec. H	M38503M2H-XXXFP/SP	M38503M2A-XXXFP/SP	
	M38503M4H-XXXFP/SP	M38503M4A-XXXFP/SP	
	M38504E6-XXXFP/SP	M38507F8AFP/SP	
	M38504E6FP/SP	M38507F8AFP/SP	
	M38504E6SS	M38507F8AFP/SP	
	M38504M6-XXXFP/SP	M38504M6A-XXXFP/SP	
	M38507M8-XXXFP/SP	M38507M8A-XXXFP/SP	

Refer to “7. *Differences among 3850 Group (Spec. A), (Spec. H) and (Standard)*” for the differences of specifications.
The AC line noise immunity of “Spec. A” has the equal immunity with “standard” and “Spec. H”.
As for the products whose mask ROM version, Flash memory version, one-time PROM version, QzROM version and memory size in the same group are different, the actual value such as characteristic value, operation margin, A/D conversion accuracy, noise immunity and noise radiation may differ within the limits of electrical characteristics depending on differences of manufacturing processes, on-chip ROM and layout pattern. When replacing and using these products, perform sufficient system evaluations each product after checking product specifications.

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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