



8 Bit MICROCOMPUTER 38000 Series

- *3850 Group (Spec. A)* -

- 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

1. Feature of 3850 Group (Spec. A)

- Maximum operating frequency : 12.5MHz (Minimum instruction execution time 0.32 μ s)
 - > **High-speed operation, Improve low-voltage operating frequency**
- High-accuracy A/D converter : 10-bit resolution, absolute accuracy \pm 4LSB 9ch
 - > **Multi-channel A/D**
- Software pull-up resistor included
 - > **External pull-up can be reduced**
- A/D can be converted with typical 40 μ s 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

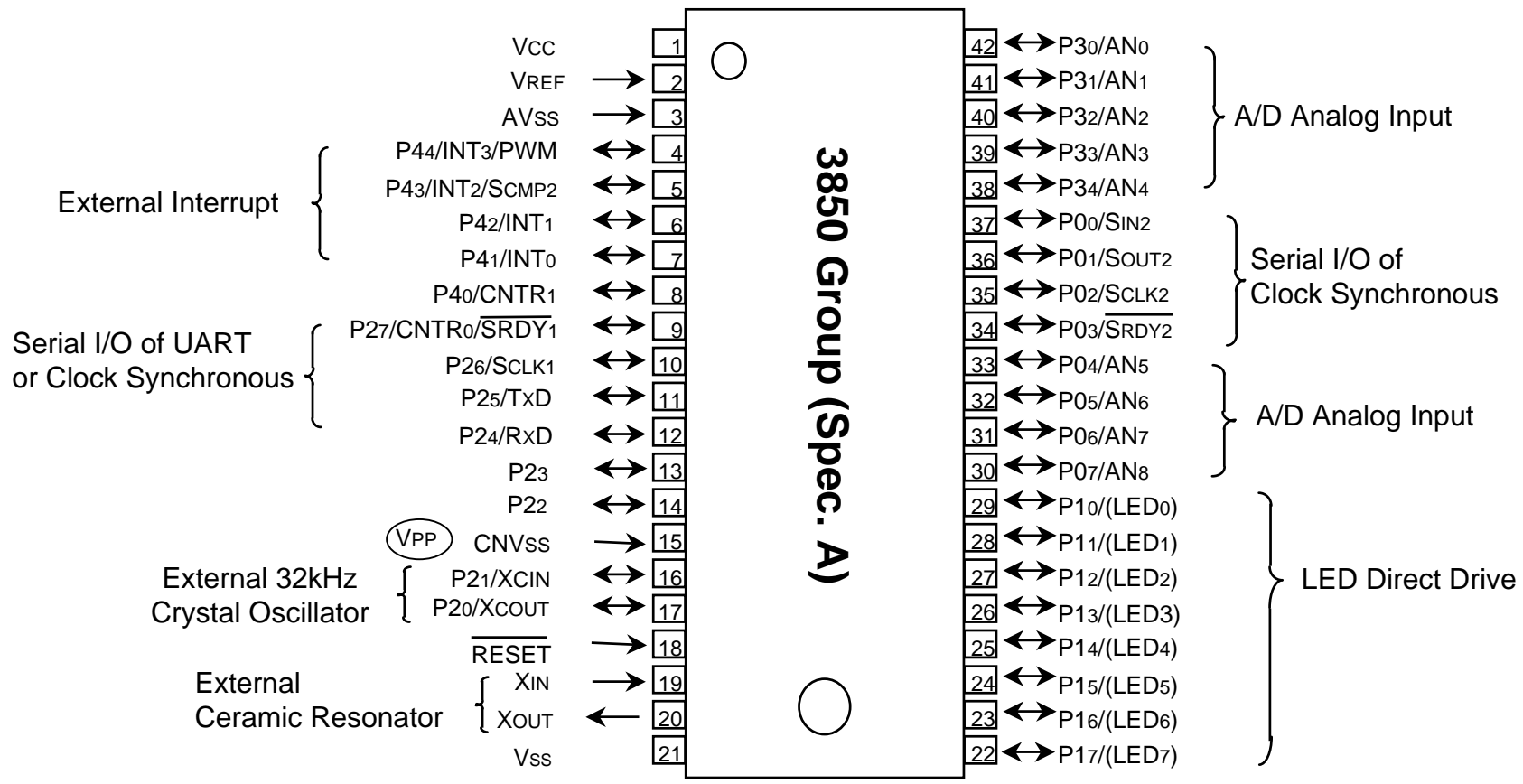
Product Outline

- 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.

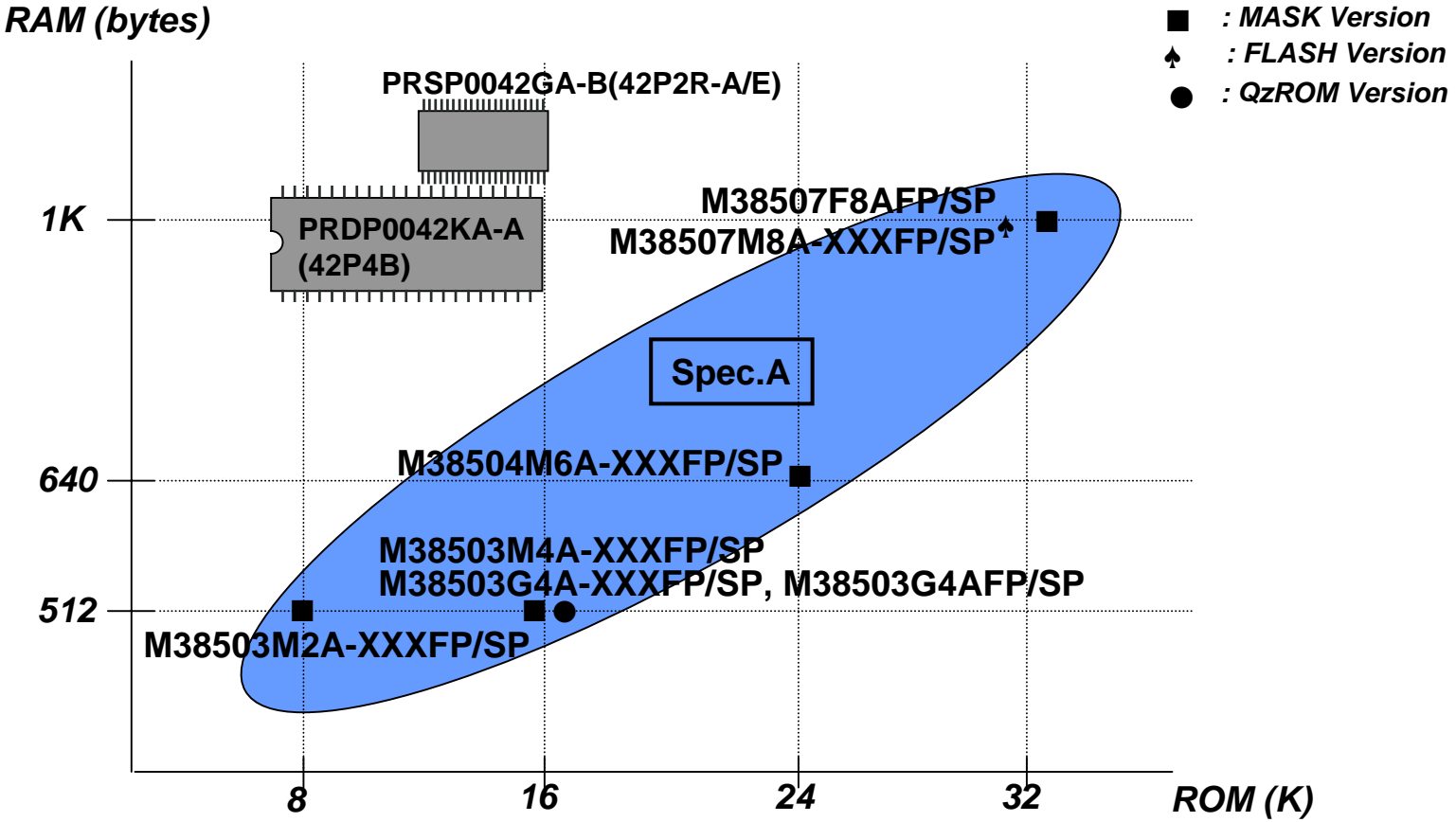
3.Pin Assignment of 3850 Group (Spec.A)



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

^{VPP} is for Flash memory version

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

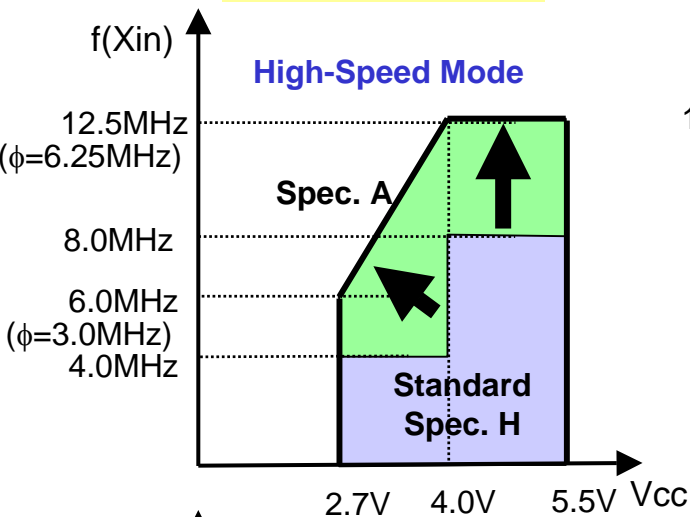


5. 3850 Group (Spec.A) Lineup

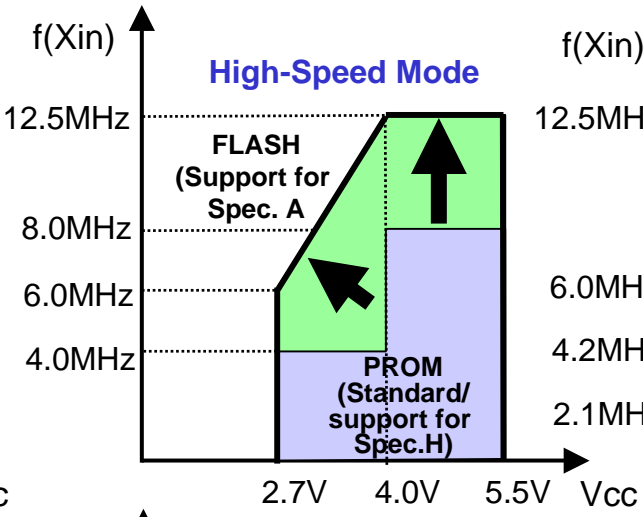
Part Number	ROM size (byte) () inside shows user ROM size	RAM Size (B)	Package	Remarks		
M38503M2A-XXXFP/SP	8192(8062)	512	PRSP0042GA-B (42P2R-A/E) (FP:SSOP) (PRDP0042BA-A (42P4B) (SP:SDIP)	Mask ROM Version		
M38503M4A-XXXFP/SP	16384(16254)	512				
M38504M6A-XXXFP/SP	24576(24446)	640				
M38507M8A-XXXFP/SP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

6. Improvement of 3850 Group Operating Frequency Characteristics

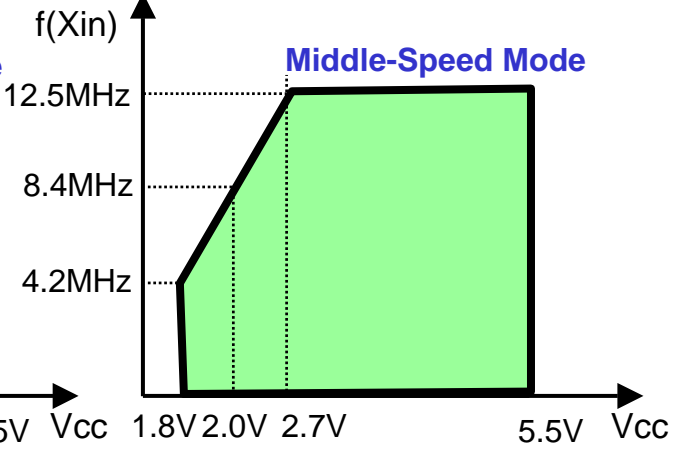
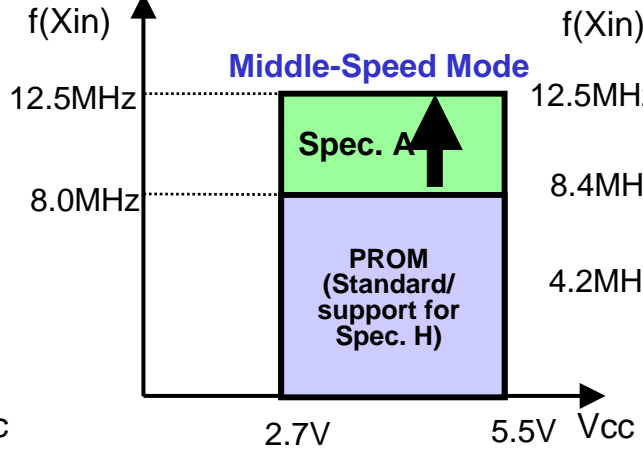
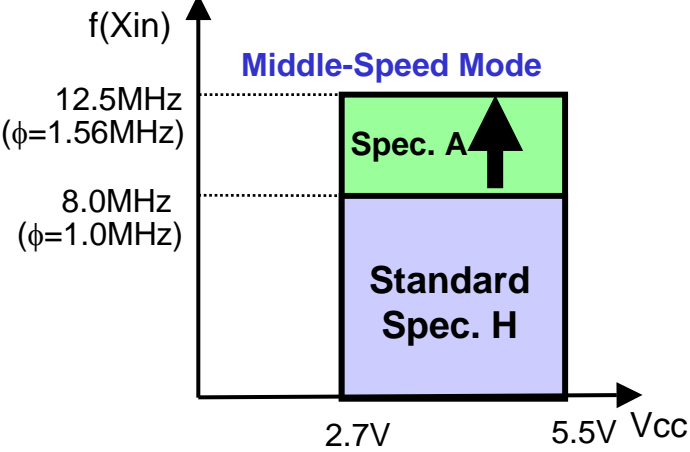
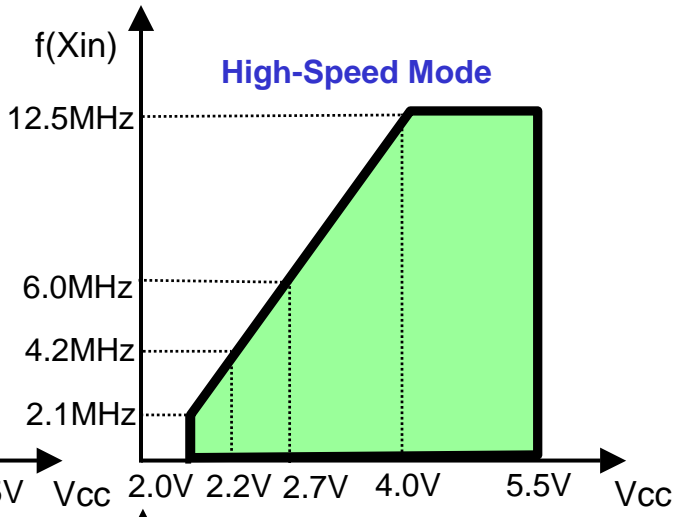
Mask Version



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 Suisai 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 Suisai 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 : P30 to P34, P04 to P07	5 ch : P30 to P34	5 ch : P30 to P34
High Current Port	8 pins : P10 to P17	8 pins : P10 to P17	5 pins : P13 to P17
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 7.0V
	Input Voltage CNVss	-0.3 to Vcc + 0.3V (MASK, FLASH) -0.3 to 8.0V (QzROM)	-0.3 to Vcc + 0.3V
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-XCOOUT 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

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

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

Send any inquiries to <http://www.renesas.com/inquiry>.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: “Standard”, “High Quality”, and “Specific”. The recommended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as “Specific” without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as “Specific” or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is “Standard” unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.
 - “Standard”: Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.
 - “High Quality”: Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.
 - “Specific”: Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.