8-bit MICROCOMPUTER 38000 Series

- Differences Between The 3804L Group/3804H Group/3804 Group -

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REJ99B2001-0100

3804L/3804H/3804 Groups Products

3804L Group* Part Number		ROM size	RAM size
Flash Memory ver.	**M38049FFLSP/HP/KP/WG**	60 K	2048

3804H Group Part Number		ROM size	RAM size
Flash Memory ver.	M38049FFHSP/FP/HP/KP (Note)	60 K	2048

3804 Group Part Number		ROM size	RAM size
Mask ROM ver.	**M38044M4-XXXSP/FP/HP**	16 K	640
	M38047M6-XXXSP/FP/HP	24 K	1024
	M38047M8-XXXSP/FP/HP	32 K	
	M38049MC-XXXSP/FP/HP	48 K	2048
	M38049MF-XXXSP/FP/HP	60 K	
Flash Memory ver.	M38049FFSP/FP/HP (Note)	60 K	

* 3804L features
  - Reduced current consumption in 32 kHz (low-speed) wait mode (Flash memory version)
  - Reduced EMI (unwanted radiation) noise level

Note: Recommended to replace. Please consider a replacement with 3804L Group.

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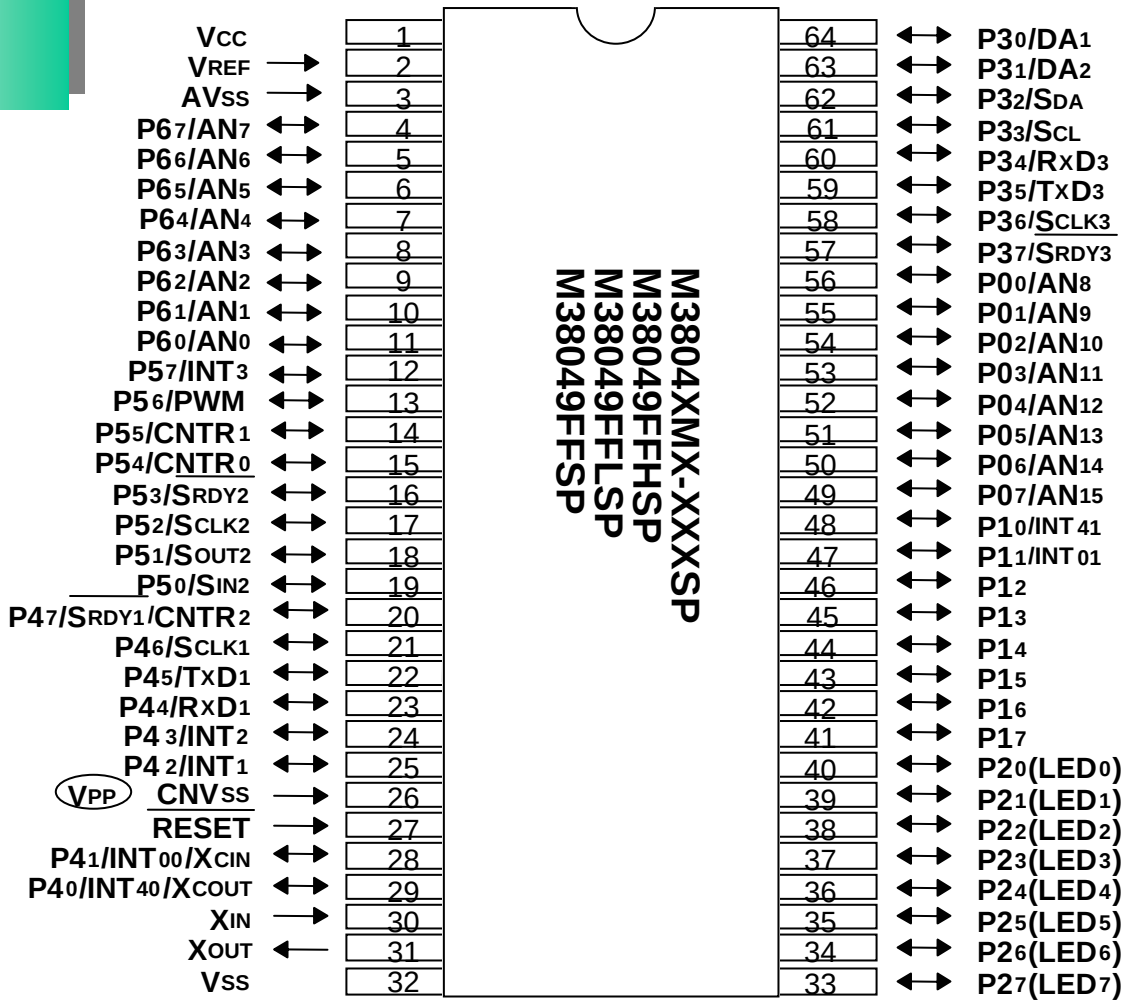
3804L/3804H/3804 Groups Pin Configuration (SP)

Completely Pin Compatible



Outline SP: PRDP0064BA-A (64P4B) (1.78mm pitch)

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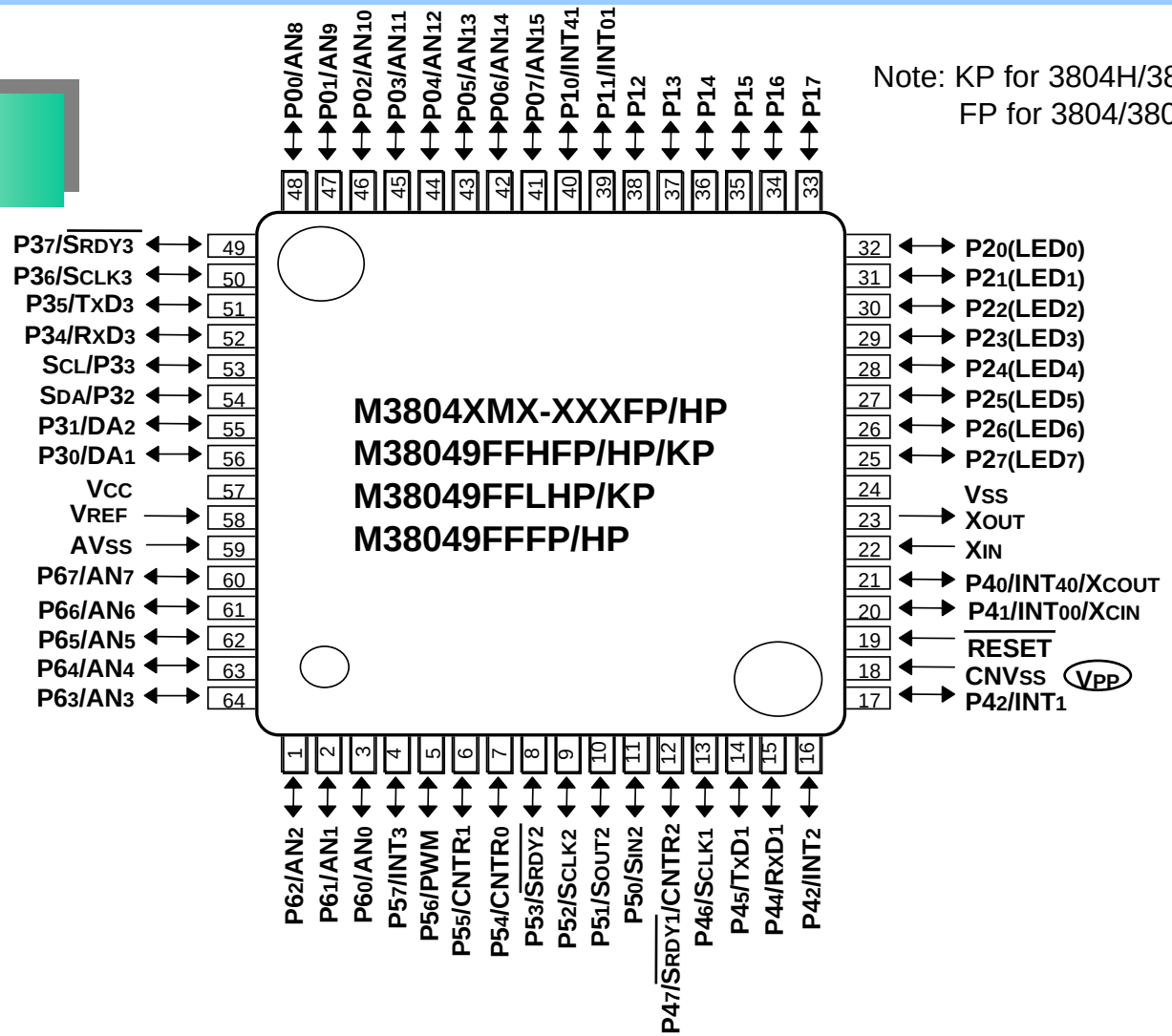
3804L/3804H/3804 Groups Pin Configuration (FP/HP/KP)

Completely Pin Compatible

Note: KP for 3804H/3804L Groups only.
FP for 3804/3804H Groups only.



Outline KP :PLQP0064GA-A (64P6U-A) (0.8mm pitch, 14mm square, 1.7mm mounting height)
FP : PRQP0064GA-A (64P6N-A) (0.8mm pitch, 14mm square, 3.05mm mounting height)
HP : PLQP0064KB-A (64P6Q-A) (0.5mm pitch, 10mm square, 1.7mm mounting height)

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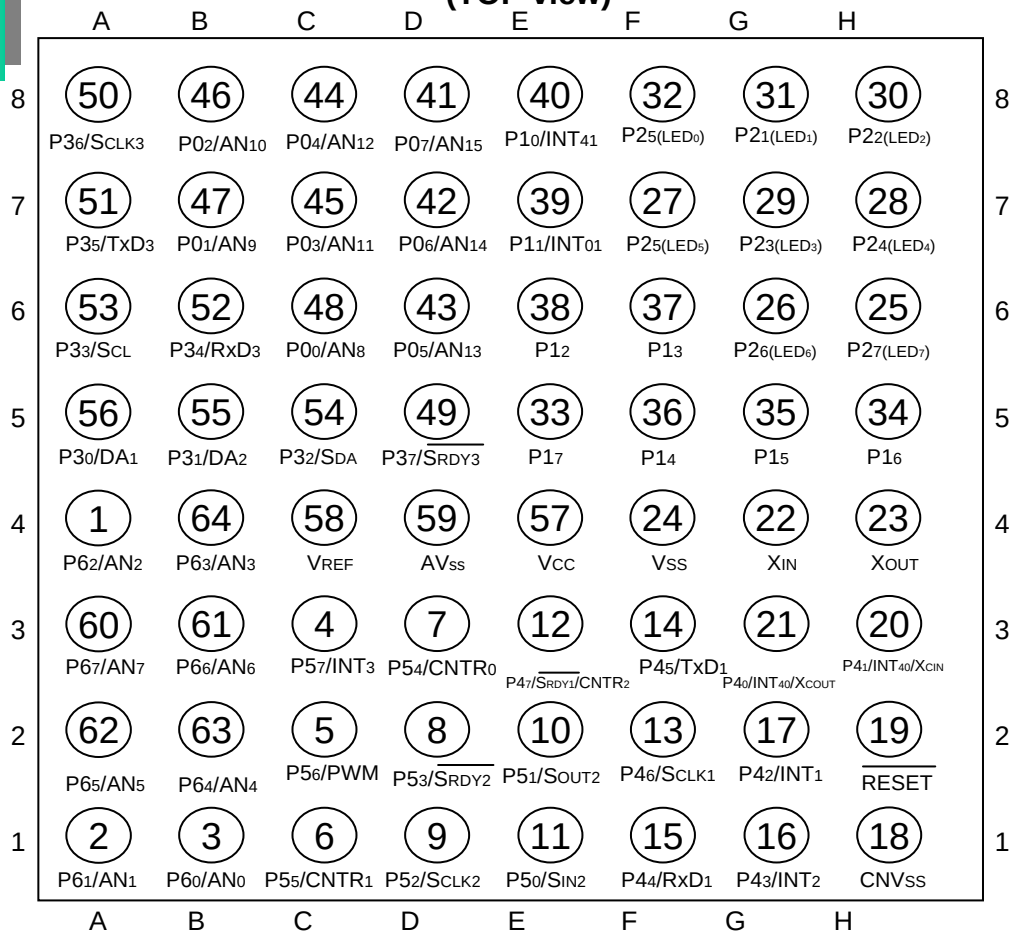
3804L Groups Pin Configuration (WG)

Completely Pin Compatible

(TOP view)



30 P22(LED2)

The pin number corresponds to the flat package.

Package top view

M38049FFLWG

Outline WG: PTLG0064JA-A (64F0G) (6mm □ FLGA package, 1.05mm height)

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Differences Between 3804L/3804H/3804 Groups

	3804L Group	3804H Group	3804 Group	
	Flash Memory ver.	Flash Memory ver.	Mask ROM ver.	Flash Memory ver.
Program Memory	Flash memory	Flash memory	Mask ROM	Flash memory
Program Memory/RAM size	60K/2K	60K/2K	16K/640, 24K/1K, 32K/1K, 48K/2K, 60K/2K	60K/2K
Package	SP, HP, KP, WG	SP, FP, HP, KP	SP, FP, HP	SP, FP, HP
Operating Power Source Voltage	2.7 to 5.5 V	2.7 to 5.5V	2.7 to 5.5 V	4.0 to 5.5V
Flash Memory ID Code	Addresses FFD4 to FFDAh	Addresses FFD4 to FFDAh	–	–
Flash Memory ROM Code Protect	Address FFDBh	Address FFDBh	–	–
Flash Memory Control Register	Flash Memory control registers 0 to 2 Addresses 0FE0h to 0FE2h	Flash Memory control registers 0 to 2 Addresses 0FE0h to 0FE2h	–	Flash Memory control register Address 0FFEh Flash command register Address 0FFFh
Program/Erase Power Source	Single power source (Vcc = 2.7 to 5.5 V)	Single power source (Vcc = 2.7 to 5.5 V)	–	Dual power source (Vcc = 5 V ± 0.5 V, Vpp = 11.7 to 12.6 V)
Program/Erase Mode	CPU Rewrite Mode Parallel I/O Mode Standard serial I/O Mode	CPU Rewrite Mode Parallel I/O Mode Standard serial I/O Mode	–	CPU Rewrite Mode Parallel I/O Mode Standard serial I/O Mode
Time until Flash Memory can Operate after Returning from Stop Mode	Needed: 100 μsec	Needed: 100 μsec	Not needed	Not needed
Power Source Circuit Characteristics Internal Power Source Stable Time at Power-on : td (P-R)	Needed	Needed	Not needed	Not needed
Electrical Characteristics Recommended Operating Conditions	The power source current of the Flash memory version differs between the Groups. Also, the operating conditions differs according to different operating voltages. For details, refer to the corresponding datasheet.			

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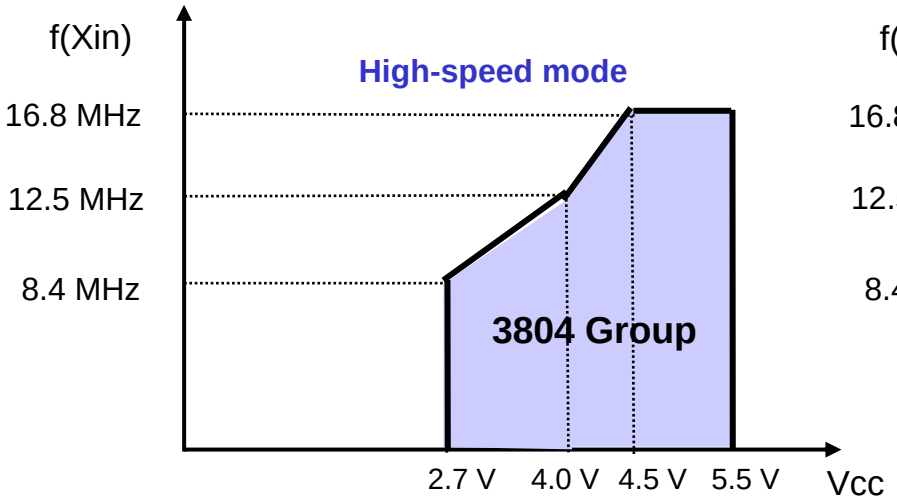
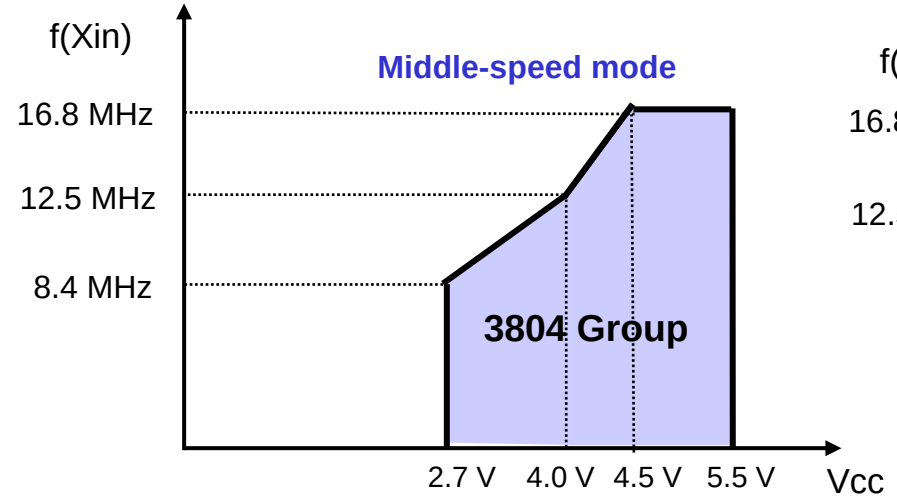
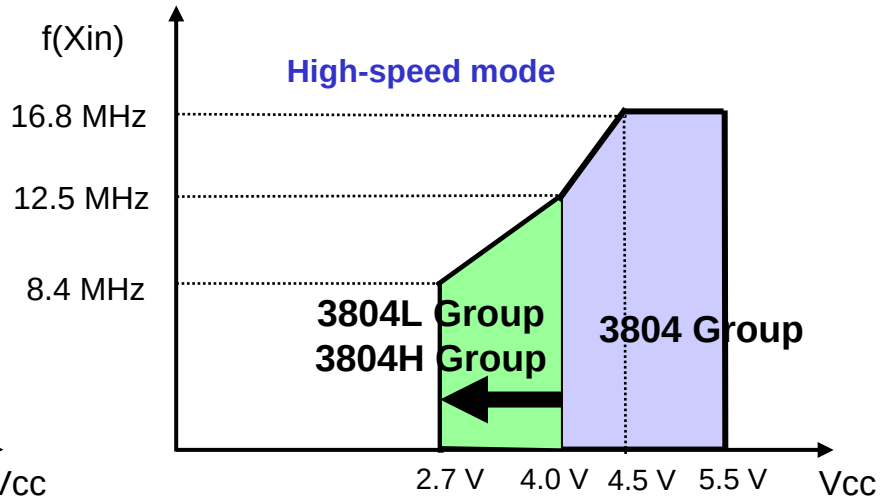
Improvement in 3804L(H)/3804 Groups Operating Frequency Characteristics

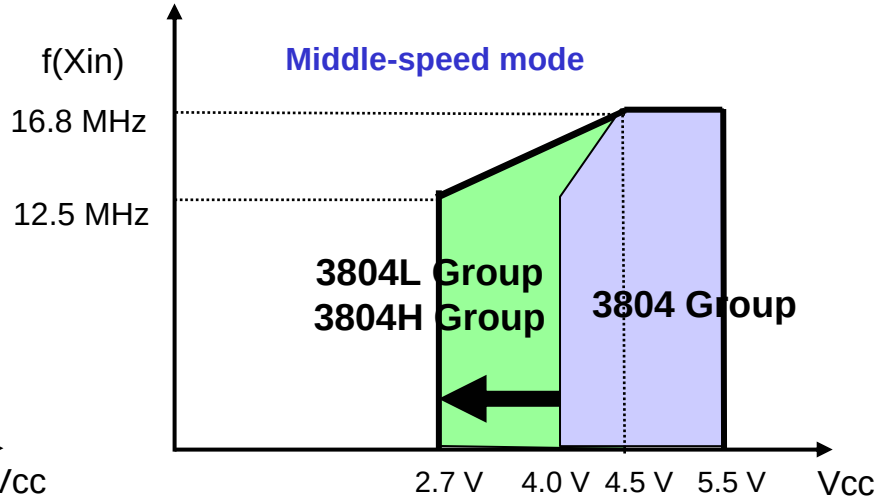
Mask version





Flash memory version





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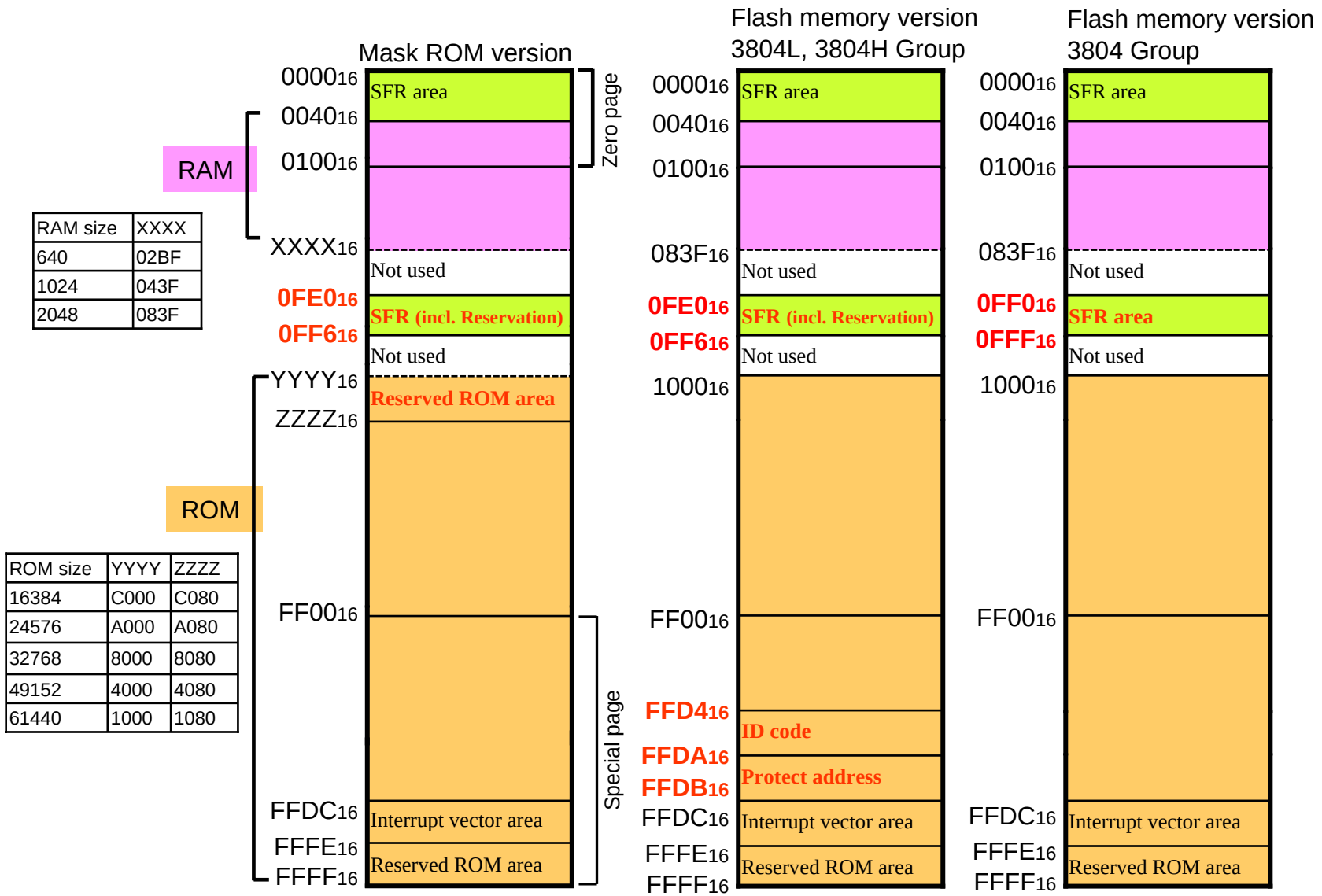
Differences Between Memory Maps of 3804L/3804H/3804 Groups



RAM size	XXXX
640	02BF
1024	043F
2048	083F

ROM size	YYYY	ZZZZ
16384	C000	C080
24576	A000	A080
32768	8000	8080
49152	4000	4080
61440	1000	1080

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Replacement Notes (1)

According to the differences in the specifications shown in P.6, the following notes are suggested. Please also refer to P.6.

1. Program Memory

Depending on the memory type, program/erase specifications as well as applicable programmers and adaptors differ. Confirm the programmer applicable for your product.

2. Packages

- The WG-package product is available only in the 3804L Group.
- In the 3804L Group, the FP package product is not available, but the thin KP package product is available for 0.8 mm-pitch. As a 0.8 mm-pitch, the KP package has better excellence in thinness, heat radiation, and stress characteristics than FP package. Confirm the mounting pad design standards of FP package and KP package on Renesas Surface Mount Package User's Manual (Document No.: REJ11K0001)

3. Operating Power Source Voltage

- The operating power source voltage for the 3804 Group Mask ROM version and the 3804H/3804L Groups ranges from 2.7 to 5.5V. It ranges from 4.0 to 5.5 V for 3804 Group Flash memory version. Confirm the operating power source voltage for your product.

4. Flash Memory ID Code and ROM Code Protect

In the 3804H/3804L Groups Flash memory version, ID codes are assigned to addresses FFD4 to $FFDA_{16}$, and ROM code protect is assigned to address $FFDB_{16}$. Please note that these addresses are included in the user ROM area. The data of these addresses must be set to programming data before programming.

5. Flash Memory Control Registers

- In the 3804H/3804L Group Flash memory version, Flash Memory control registers 0 to 2 are assigned to addresses 0FE0 to $0FE2_{16}$.
- In the 3804 Group Flash memory version, Flash Memory control register is assigned to address $0FFE_{16}$ and Flash command register is assigned to address $0FFF_{16}$.
- In the Mask ROM versions, nothing is allocated to these addresses, so writing can be performed to them. When read, their values are undefined.

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Replacement Notes (2)

6. Program/Erase Power Source, Program/Erase Mode

The program/erase power source voltage as well as the absolute maximum ratings of the pins differ between 3804 Group Flash memory version and 3804H/3804L Groups. Further more, the program specification (pin used, program algorithm, etc) differs, too. Make sure to connect the specified programmer with your product to prevent a voltage that exceeds the ratings from being applied to the pins.

7. Stop Mode

In the 3804H and 3804 L Groups, waiting time (more than 100 μsec) until Flash memory can operate after returning from stop mode is necessary. Use oscillation stabilization time setting function after the STP instruction is released to set it.

8. Internal Power Source Stable Time at Power-on

In the 3804H and 3804 L Groups, internal power source stable time at power-on (td (P-R): max. 2msec) is necessary. Set Vcc to more than 2.7 V and reset input “L” to td(P-R) + XIN16 cycles or more.

9. Oscillation Circuit Constants

The oscillation circuit structure differs between the 3804, 3804H, and 3804L Groups.
The XIN-XOUT and XCIN-XCOUT oscillation circuit constants differ from product to product. Contact the oscillator manufacturer to select an appropriate oscillator and oscillation circuit constants so that the product used for mass production will obtain an stable operating clock with your system and conditions. Additional consideration is required when the voltage range or the temperature range is wide.
Also, we recommend considering the wiring patterns of the feedback resistors, the damping resistors, and the load capacity beforehand when designing circuits.

10. Differences between Mask ROM and Flash Memory Versions

The Flash memory and Mask ROM versions differ in their manufacturing processes and mask patterns because of the different ROM types used. Because of these differences, characteristics values, operation margins, noise immunity, noise radiation, and oscillation circuit constants may vary.
When developing application products, perform careful system evaluations for each product. Additional care is required when replacing products (for example, replacing a Mask ROM version with a Flash memory version). Careful system evaluations should be performed with replacement products before the mass production phase of application products.

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Program change at replacing

Details about a program are described as follows regarding whether the same program can be used without change when replacing between standards, Spec. H and Spec. L of the 3804 Group. Please make sure to check there are some differences of memory size in every product. Refer to the datasheets and technical updates of the 3804 Group for detailed specifications of products. Confirm the operation using replaced product.

Note: Program checksum

When calculating the checksum of ROM area by a program, make sure to check the difference of areas for calculation.
When the unused area and reserved ROM area are included in target areas of replaced products, the read values are undefined and calculated values of the checksum are also undefined.

(1) Standard flash memory version → Spec. L flash memory version

1. When using the addresses FFD4h to FFDAh, check the followings:
   The codes written in these addresses are the ID codes of the Spec. L flash memory version when using a serial programmer. To input this code is necessary as the ID code for flash memory reprogramming by a serial programmer. Check the above only when using a serial programmer because the addresses can be executed as an instruction.
2. The bits 7 to 2 of the address FFDBh are the protect set bits of the Spec. L flash memory version when using a parallel programmer. When the set condition is not unexpected, to change a program is necessary. Since the protect set bits do not affect when using a serial programmer, there is no problem. This address can be executed as an instruction same as the addresses FFD4h to FFDAh.
3. When accessing the addresses 0FE0h to 0FEFh, to change a program not to access these addresses is necessary.
4. Nothing is assigned on the addresses 0FFEh and 0FFFh of Spec. L flash memory version. To change a program is not necessary even if programming in standard flash memory version is performed.
5. To change a program is necessary when the oscillation stabilization time after the STP instruction is released is less than 100 μ sec in stop mode. Set 100 μ sec or more by the oscillation stabilization time setting function after the STP instruction which uses timer 1 is released.
6. When using CPU rewrite mode, to change general processes regarding CPU rewrite mode is necessary.

(2) Spec. H flash memory version → Spec. L flash memory version

To change a program is not necessary.

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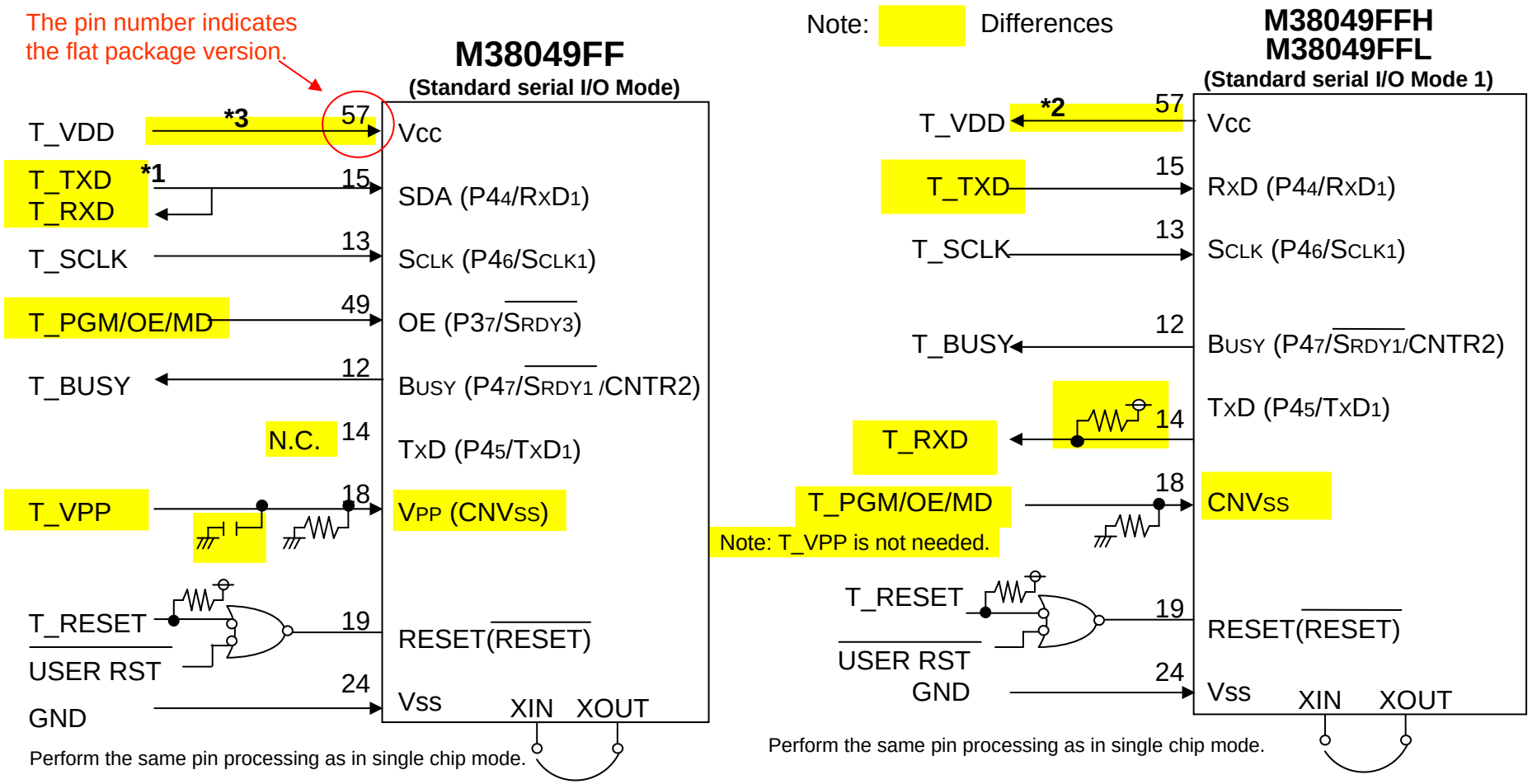
Reference: M38049FF and M38049FFH (L) Serial Rewriting Circuit when Using a Suisei Electronics System Serial Unit



- As programming specifications differ for each product, specify the part number before programming.
- As the MCU programming pins are common, writing can be performed on the same board in the QzROM/Flash memory versions.

*1: For the standard version, connect both the serial unit's T_TXD and T_RXD to SDA (RxD pin), and leave TxD pin open.
*2: Supply the power source voltage (Vcc) from the user so that it will meet the Vcc of the output buffer used on the programmer.
*3: The VDD power source is supplied from the programmer. When the user power consumption is high (20 mA or more for other than the MCU), supply the VDD from the user.

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Renesas
3804L/3804H/3804 Groups Development Support Tools

Except programmers and on-chip debugging emulators, development support tools are common to the Groups.

Development Support Tool		Part Number
Assembler package		M3T-SRA74 (Simulator debugger incl. Integrated Development Environment with HEW)
Compiler Package		M3T-ICC740 (Simulator debugger incl. Integrated Development Environment with HEW)
Simulator Debugger		M3T-SRA74, M3T-ICC740 or M3T-PD38SIM accessory (discontinued)
On-chip Debugging Emulator (3804L Group)		E8a (incl. HEW, 740 E8a emulator debugger, M3T-SRA74 free evaluation version, M3T-ICC740 free evaluation version, FDT free evaluation version, and more)
Compact Emulator System	Compact Emulator	M38000T2-CPE (incl. 740 Compact emulator debugger, M3T-ICC740 (with HEW), and M3T-SRA74 (with HEW))
	Emulator MCU	M38049RLSS
PC4701 Emulator System (Discontinued Product)	Emulator Debugger	740 PC4701 emulator debugger or M3T-PD38 (discontinued)
	Emulator	PC4701U (emulator debugger license bundled)
	Emulation Pod	M38000TL2-FPD (low voltage operation supported) (discontinued)
	Emulator MCU	M38049RLSS
Accessory	Package Converter	(Refer to the next page)
	Pin processing board	M38007T-ADS (pin processing board for Emulator MCU)

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Connecting Emulator and Target System

PC4701 System (discontinued)

Emulation Pod
M38000TL2-FPD
(discontinued)

*Emulator Pod Probe type
30-pin narrow pitch connector x 1

Compact emulator system

Compact emulator
M38000T-CPE

M3T-28DP-WS *1 M3T-28DP-WT

RSS type emulator MCU
M38049RLSS

*1. This converter is included in Emulator Pod Package.
*2. These 3 parts are as one set.
*3. These 4 parts are as one set.
*4. Available from Tokyo Eletech Corporation.
* The ● mark indicates the location of No.1 pin.

M38007T-PRB

64-pin SDIP socket
(SP package)

M3T-64LCC-QSD
64-pin 0.5 mm pitch QFP
(HP package)

M3T-64LCC-QSD

YQSOCKET064SDF2
(Sold Separately) *4

YQPACK064SD
(Sold Separately) *4

NQPACK064SD-ND (Sold Separately) *4
64-pin 0.5 mm pitch QFP
(HP package)

HP package sample
Board-mounted evaluation

HQPACK064SD
(Sold Separately) *4

HP package version

M3T-64DIP-DMS

*2

M3T-DUMMY64
64-pin 0.8 mm pitch QFP
(FP package)

*3

M3T-FLX-64NSA
64pin
0.8 mm pitch QFP/LQFP
(FP/KP package)

FP/KP package board-mounted evaluation

FP package :
HQPACK064SA (Sold Separately) *4
KP package :
HQPACK064SA160 (Sold Separately) *4

FP/KP package version

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3804H/3804L Groups
Suisei Electronics System Flash Memory Programmers

Main unit	Serial/Parallel Unit	
	On-board reprogramming	Off-board reprogramming
	M38049FFH **M38049FFL** Flash memory version (Serial programming)	**M38049FFH** **M38049FFL** Flash memory version (Parallel programming)
EFP-S2V EFP-S2 in common	EF1SRP-01US2	EF1CNT-96P + Parallel unit EF3803F-64H (for HP) EF3803F-64F (for FP) EF3803F-64U (for KP) EF3803F-64S (for SP) EF3803F-64FL (for WG)
	EF1CNT-96P + EF1SRP-01U	
EFP-I	EF1SRP-01U	Parallel unit EF3803F-64H (for HP) EF3803F-64F (for FP) EF3803F-64U (for KP) EF3803F-64S (for SP) EF3803F-64FL (for WG)

EF1CNT-96P: Connector converter unit
Each unit for EFP-I can be connected to EFP-S2 or EFP-S2V by EF1CNT-96P.

As a Renesas Flash memory/QzROM programmer, the **Flash Development Toolkit (FDT)** and the **E8** can be used together for on-board programming. (IC socket boards are required for the QzROM on-board programming.)

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3804 Group Programmers

Tools	3804 Group Products
RENESAS Programming Adapter	PCA4738HF-64 (for 0.5 mm-pitch LQFP package)
	PCA4738FF-64 (for 0.8 mm-pitch QFP package)
	PCA4738SF-64 (for 1.778 mm-pitch SDIP package)
Flash Memory Programmer	EFP-I for Serial Interface Available from Suisei Electronics System Co., Ltd.
	R4945, R4945A for Parallel Interface Available from ADVANTEST Corp. (RENESAS Programming Adapter required)
	AF9709, AF9708, AF9723 for Standard Parallel Interface Available from Flash Support Group, Inc. (RENESAS Programming Adapter required)

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April 1st, 2010
Renesas Electronics Corporation

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