

3812 Group

SINGLE-CHIP 8-BIT CMOS MICROCOMPUTER

DESCRIPTION

The 3812 group is the 8-bit microcomputer based on the 740 family core technology.

The 3812 group has six 8-bit timers, and an 8-channel A-D converter as additional functions.

The various microcomputers in the 3812 group include variations of internal memory size and packaging. For details, refer to the section on part numbering.

FEATURES

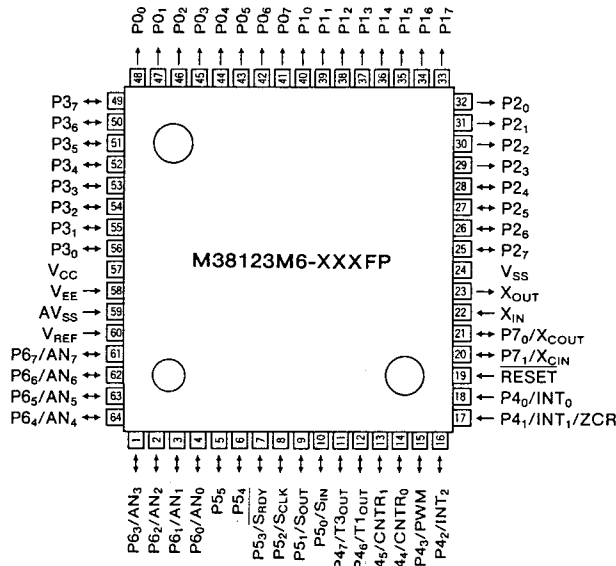
- Basic machine-language instructions 71
- The minimum instruction execution time 0.63 μ s
(at 6.3MHz oscillation frequency)
- Memory size
- ROM 4K to 60K bytes
- RAM 192 to 1024 bytes
- Programmable input/output ports 34
- High-breakdown-voltage output ports 28
- Software pull-up/pull-down resistors (P2₄-P2₇, P5₀-P5₅)
- Interrupts 14 sources, 13 vectors
- Timers 8-bit \times 6
- Serial I/O 8-bit \times 1 (Clock-synchronized)

- A-D converter 8-bit \times 8 channel
- Zero cross detection input 1 channel
- 2 Clock generating circuit
- Clock (X_{IN}-X_{OUT}) Internal feedback resistor
- Sub-clock (X_{CIN}-X_{COU}T) without internal feedback resistor
(connect to an external ceramic resonator or a quartz-crystal oscillator)
- Power source voltage
- In high-speed mode 4.0 to 5.5V
(at 6.3MHz oscillation frequency and high-speed selected)
- In middle-speed mode 2.8 to 5.5V
(at 6.3MHz oscillation frequency and middle-speed selected)
- In low-speed mode 2.8 to 5.5V
(at 32KHz oscillation frequency)
- Power dissipation
- In high-speed mode 38mW
(at 6.3MHz oscillation frequency)
- In low-speed mode 300 μ W
(at 32kHz oscillation frequency)
- Operating temperature range -10 to +85°C

APPLICATIONS

VCRs, tuners, musical instruments, office automation, etc.

PIN CONFIGURATION (TOP VIEW)

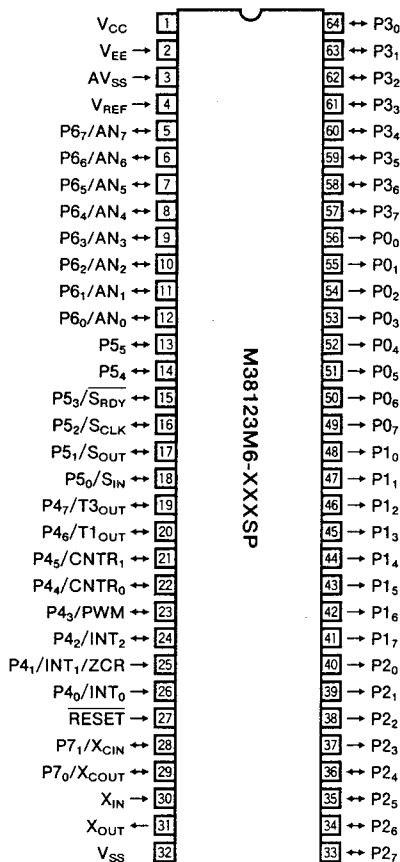


Package type : 64P6N-A

64-pin plastic-molded QFP

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PIN CONFIGURATION (TOP VIEW)

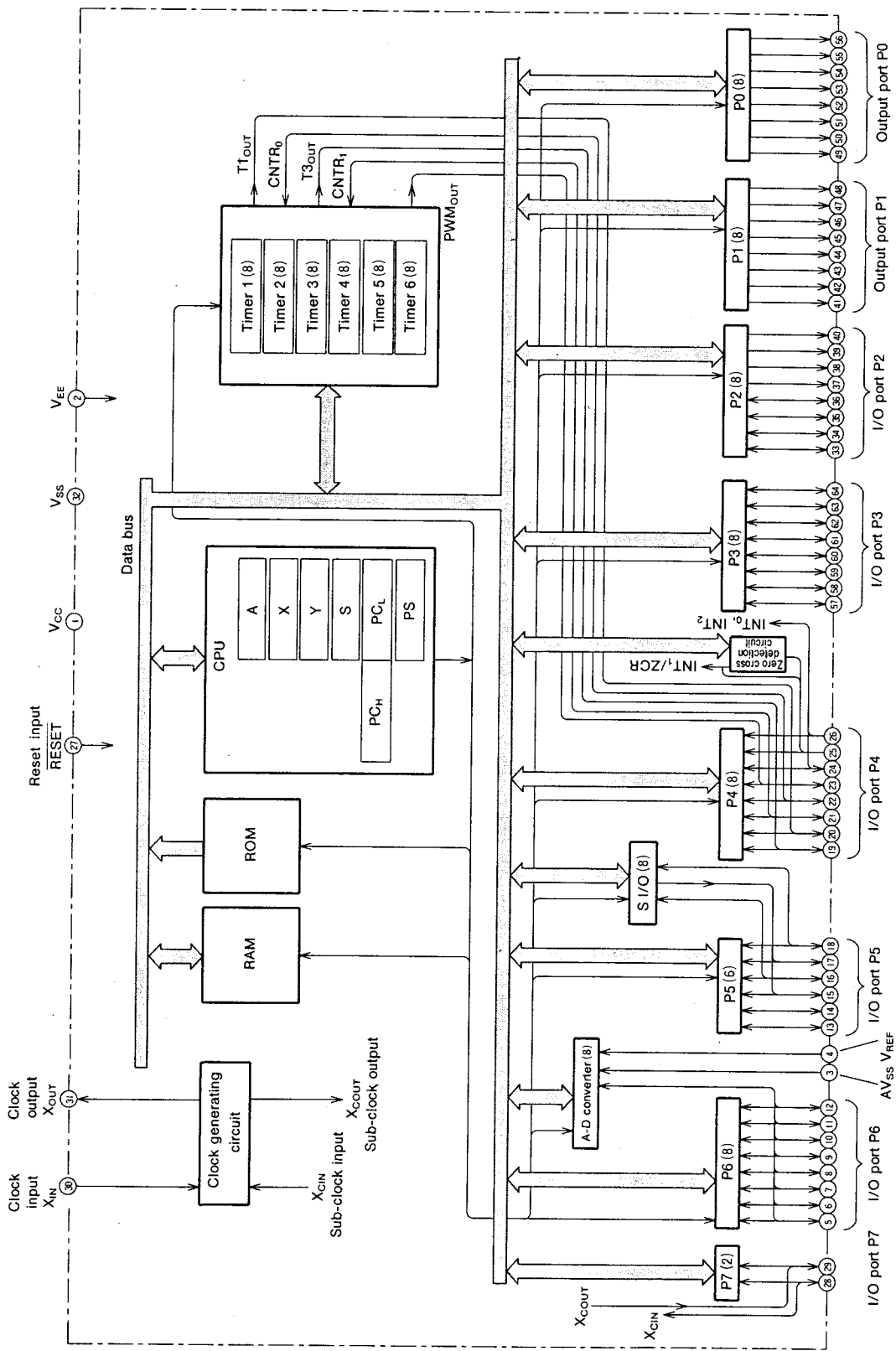


Package type : 64P4B

64-pin shrink plastic-molded DIP

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FUNCTIONAL BLOCK DIAGRAM (Package : 64P4B)



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PIN DESCRIPTION

Pin	Name	Function	
			Function except a port function
V _{CC} , V _{SS}	Power source	• Apply voltage of 4.0 to 5.5V to V _{CC} , and 0V to V _{SS} .	
V _{EE}	Pull-down power source input	• Applies voltage supplied to pull-down resistors of ports P0, P1, and P2 ₀ -P2 ₃ .	
V _{REF}	Analog reference voltage	• Reference voltage input pin for A-D converter	
AV _{SS}	Analog power source	• Analog power source input pin for A-D converter • Connect AV _{SS} to V _{SS} .	
RESET	Reset input	• Reset input pin for active "L"	
X _{IN}	Clock input	<ul style="list-style-type: none"> • Input and output signals for the internal clock generating circuit. • Feedback resistor is built in between X_{IN} pin and X_{OUT} pin. • Connect a ceramic resonator or a quartz-crystal oscillator between the X_{IN} and X_{OUT} pins to set the oscillation frequency. • If an external clock is used, connect the clock source to the X_{IN} pin and leave the X_{OUT} pin open. • This clock is used as the oscillating source of system clock. 	
X _{OUT}	Clock output		
P0 ₀ -P0 ₇	Output port P0	<ul style="list-style-type: none"> • 8-bit output port • Each port builds in pull-down resistor between the output and the V_{EE} pin. • The high-breakdown-voltage p-channel open-drain output • At reset these pins are set to the V_{EE} pin level. 	
P1 ₀ -P1 ₇	Output port P1		
P2 ₀ -P2 ₃	Output port P2	• 4-bit output port with the same function as port P0.	
P2 ₄ -P2 ₇	I/O port P2	<ul style="list-style-type: none"> • 4-bit I/O port • I/O direction register allows each pin to be individually programmed as either input or output. • At reset this port is set to input mode. • Pull-up/pull-down register and I/O direction register allow each pin to be programmed as pull-down. • TTL input level • CMOS 3-state output 	
P3 ₀ -P3 ₇	I/O port P3	<ul style="list-style-type: none"> • 8-bit I/O port with the same function as port P2₄-P2₇ • CMOS compatible input level • The high-breakdown-voltage P-channel open-drain. 	
P4 ₀ /INT ₀ , P4 ₁ /INT ₁ / ZCR	Input port P4	<ul style="list-style-type: none"> • 2-bit input port. • CMOS compatible input level 	<ul style="list-style-type: none"> External interrupt input pins A zero cross detection circuit input pin (P4₁) A PWM output pin (Timer output pin) Timer 2, Timer 4 input pins Timer 1, Timer 3 output pins
P4 ₂ /INT ₂	I/O port P4	<ul style="list-style-type: none"> • 6-bit CMOS I/O port with the same function as port P2₄-P2₇ • CMOS compatible input level • CMOS 3-state output 	
P4 ₃ /PWM			
P4 ₄ /CNTR ₀ , P4 ₅ /CNTR ₁			
P4 ₆ /T1 _{OUT} , P4 ₇ /T3 _{OUT}			

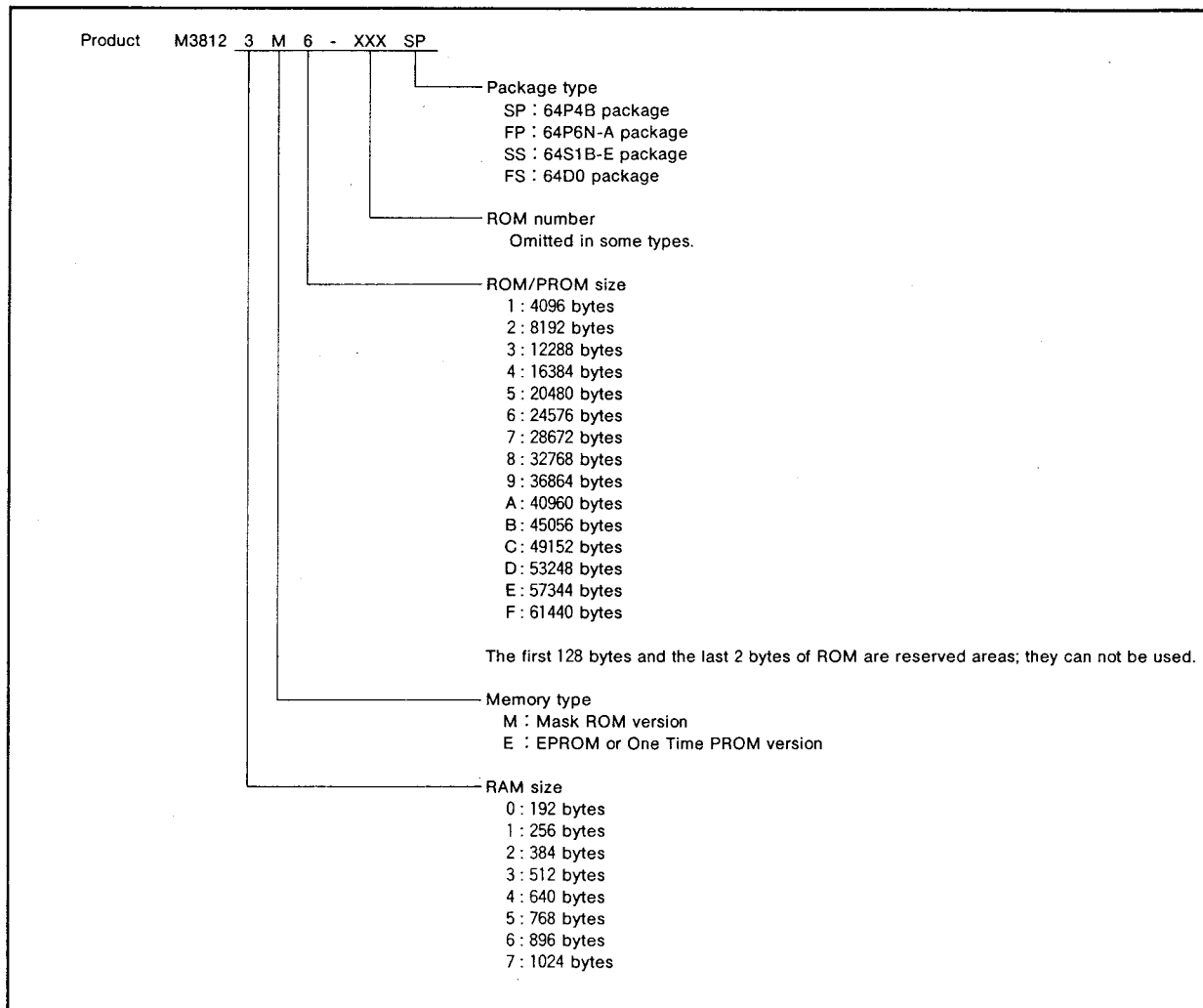
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PIN DESCRIPTION (Continued)

Pin	Name	Function	Function except a port function
P5 ₀ /S _{IN} , P5 ₁ /S _{OUT} , P5 ₂ /S _{CLK} , P5 ₃ /S _{RDY}	I/O port P5	<ul style="list-style-type: none"> 8-bit CMOS I/O port with the same function as port P2₄-P2₇ Keep the input voltage of this port between 0V and V_{CC}. The pull-up/pull-down register and I/O direction register allow each pin to be programmed as pull-up. CMOS compatible input level N-channel open-drain output 	Serial I/O pins
P5 ₄ , P5 ₅		<ul style="list-style-type: none"> 2-bit CMOS I/O port with the same function as port P2₄-P2₇ The pull-up/pull-down register and I/O direction register allow each pin to be programmed as pull-up. CMOS compatible input level CMOS 3-state output 	
P6 ₀ /AN ₀ - P6 ₇ /AN ₇	I/O port P6	<ul style="list-style-type: none"> 8-bit CMOS I/O port with the same function as port P2₄-P2₇ CMOS compatible input level CMOS 3-state output 	A-D converter input pins
P7 ₀ /X _{COU} , P7 ₁ /X _{CIN}	I/O port P7	<ul style="list-style-type: none"> 2-bit CMOS I/O port with the same function as port P2₄-P2₇ CMOS compatible input level CMOS 3-state output 	An I/O pin for the internal sub-clock generating circuit (connect a ceramic resonator or a quartz-crystal oscillator)

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PART NUMBERING



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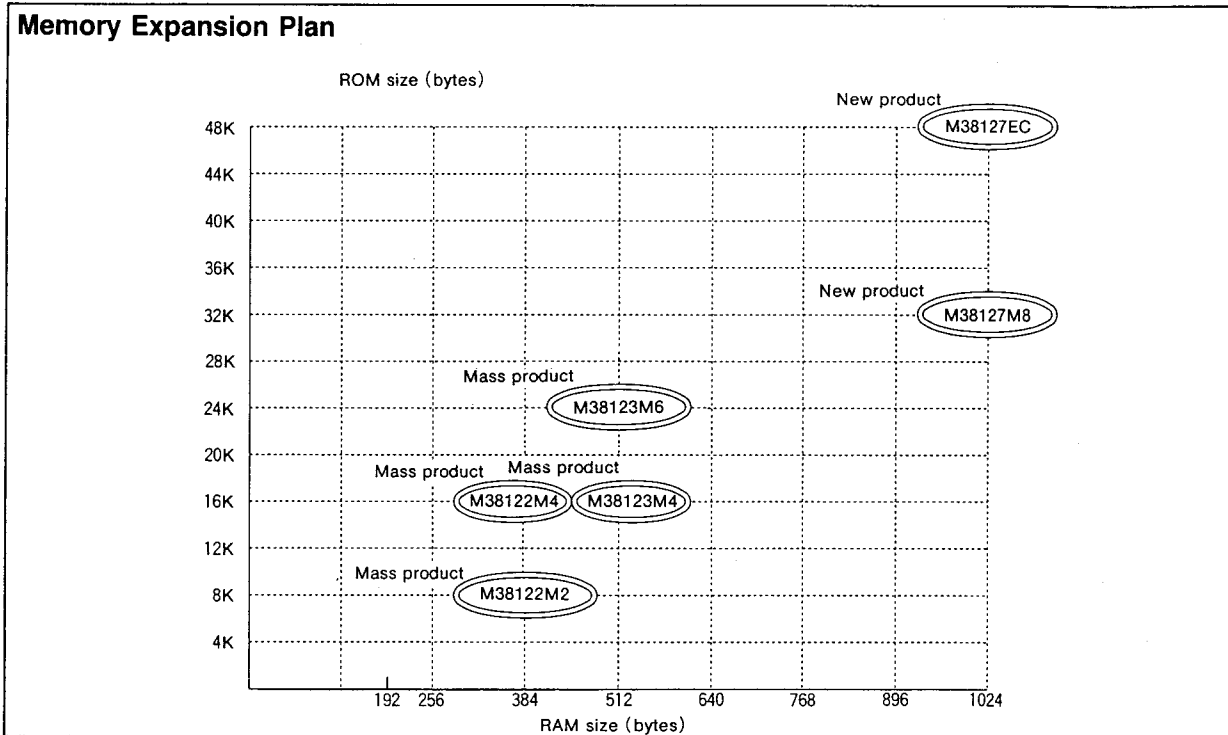
GROUP EXPANSION

Mitsubishi plans to expand the 3812 group as follows:

- (1) Support for mask ROM, One Time PROM, and EPROM versions
 - ROM/PROM size 8K to 48K bytes
 - RAM size 384 to 1024 bytes

(2) Packages

- 64P4B Shrink plastic molded DIP
- 64P6N-A Plastic molded QFP
- 64S1B-E Shrink ceramic DIP (EPROM version)
- 64D0 Ceramic LCC (EPROM version)



Currently supported products are listed below.

As of May 1996

Product	(P) ROM size (bytes) ROM size for User in ()	RAM size (bytes)	Package	Remarks	
M38122M2-XXXSP	8192	384	64P4B	Mask ROM version	
M38122M2-XXXFP	(8062)		64P6N-A	Mask ROM version	
M38122M4-XXXSP	16384 (16254)		64P4B	Mask ROM version	
M38122M4-XXXFP		64P6N-A	Mask ROM version		
M38123M4-XXXSP		512	64P4B	Mask ROM version	
M38123M4-XXXFP	64P6N-A		Mask ROM version		
M38123M6-XXXSP	24576 (24446)		64P4B	Mask ROM version	
M38123M6-XXXFP		64P6N-A	Mask ROM version		
M38127M8-XXXSP		32768 (32638)	64P4B	Mask ROM version	
M38127M8-XXXFP	64P6N-A		Mask ROM version		
M38127EC-XXXSP	49152 (49022)		1024	64P4B	One Time PROM version
M38127EC-XXXFP		64P6N-A		One Time PROM version	
M38127ECSP		64P4B		One Time PROM version (blank)	
M38127ECFP		64P6N-A		One Time PROM version (blank)	
M38127ECSS				64S1B-E	EPROM version
M38127ECFS				64D0	EPROM version



Keep safety first in your circuit designs!

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