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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "<u>Embedded - Microcontrollers</u>"

Details	
Product Status	Not For New Designs
Core Processor	M16C/60
Core Size	16-Bit
Speed	24MHz
Connectivity	I ² C, IEBus, UART/USART
Peripherals	DMA, WDT
Number of I/O	113
Program Memory Size	256KB (256K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	20K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 26x10b; D/A 2x8b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	128-LQFP
Supplier Device Package	128-LFQFP (14x20)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/m30625fgpgp-u5c

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong

1.2 Performance Outline

Table 1.1 to 1.3 list Performance Outline of M16C/62P Group (M16C/62P, M16C/62PT)(128-pin version).

Table 1.1 Performance Outline of M16C/62P Group (M16C/62P, M16C/62PT)(128-pin version)

	Item	Performance
		M16C/62P
CPU	Number of Basic Instructions	91 instructions
	Minimum Instruction Execution	41.7ns(f(BCLK)=24MHz, VCC1=3.3 to 5.5V)
	Time	100ns(f(BCLK)=10MHz, VCC1=2.7 to 5.5V)
	Operating Mode	Single-chip, memory expansion and microprocessor mode
	Address Space	1 Mbyte (Available to 4 Mbytes by memory space expansion
	·	function)
	Memory Capacity	See Table 1.4 to 1.5 Product List
Peripheral	Port	Input/Output: 113 pins, Input: 1 pin
Function	Multifunction Timer	Timer A: 16 bits x 5 channels,
	Waltiful Clion Timer	Timer B: 16 bits x 6 channels,
		Three phase motor control circuit
	Serial Interface	3 channels
	Gorial Internace	Clock synchronous, UART, I ² C bus ⁽¹⁾ , IEBus ⁽²⁾
		2 channels
		Clock synchronous
	A/D Converter	10-bit A/D converter: 1 circuit, 26 channels
	D/A Converter	8 bits x 2 channels
	DMAC	2 channels
	CRC Calculation Circuit	CCITT-CRC
	Watchdog Timer	15 bits x 1 channel (with prescaler)
	Interrupt	Internal: 29 sources, External: 8 sources, Software: 4 sources,
		Priority level: 7 levels
	Clock Generation Circuit	4 circuits
		Main clock generation circuit (*),
		Subclock generation circuit (*),
		On-chip oscillator, PLL synthesizer
		(*)Equipped with a built-in feedback resistor.
	Oscillation Stop Detection	Stop detection of main clock oscillation, re-oscillation detection
	Function	function
	Voltage Detection Circuit	Available (option ⁽⁴⁾)
Electric	Supply Voltage	VCC1=3.0 to 5.5 V, VCC2=2.7V to VCC1 (f(BCLK=24MHz)
Characteristics		VCC1=2.7 to 5.5 V, VCC2=2.7V to VCC1 (f(BCLK=10MHz)
	Power Consumption	14 mA (VCC1=VCC2=5V, f(BCLK)=24MHz)
		8 mA (VCC1=VCC2=3V, f(BCLK)=10MHz) 1.8μA (VCC1=VCC2=3V, f(XCIN)=32kHz, wait mode)
		0.7μA (VCC1=VCC2=3V, stop mode)
Flash memory	Program/Erase Supply Voltage	3.3±0.3 V or 5.0±0.5 V
version	Program and Erase Endurance	100 times (all area)
	. Togram and Erase Endurance	or 1,000 times (user ROM area without block A and block 1)
		/ 10,000 times (block A, block 1) (3)
Operating Ambie	ent Temperature	-20 to 85°C,
. 5	•	-40 to 85°C (3)
Package		128-pin plastic mold LQFP
		1 1 2222 2 22

NOTES:

- 1. I²C bus is a registered trademark of Koninklijke Philips Electronics N. V.
- 2. IEBus is a registered trademark of NEC Electronics Corporation.
- 3. See **Table 1.8 Product Code** for the program and erase endurance, and operating ambient temperature. In addition 1,000 times/10,000 times are under development as of Jul., 2005. Please inquire about a release schedule.
- 4. All options are on request basis.



1.3 Block Diagram

Figure 1.1 is a M16C/62P Group (M16C/62P, M16C/62PT) 128-pin and 100-pin version Block Diagram, Figure 1.2 is a M16C/62P Group (M16C/62P, M16C/62PT) 80-pin version Block Diagram.

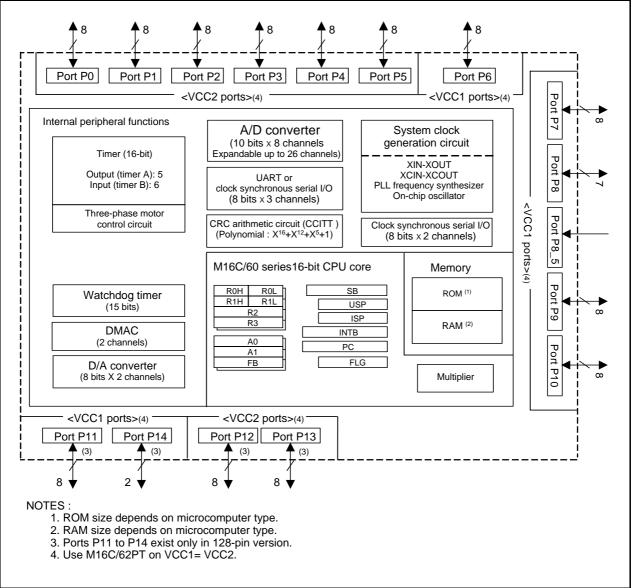


Figure 1.1 M16C/62P Group (M16C/62P, M16C/62PT) 128-pin and 100-pin version Block Diagram

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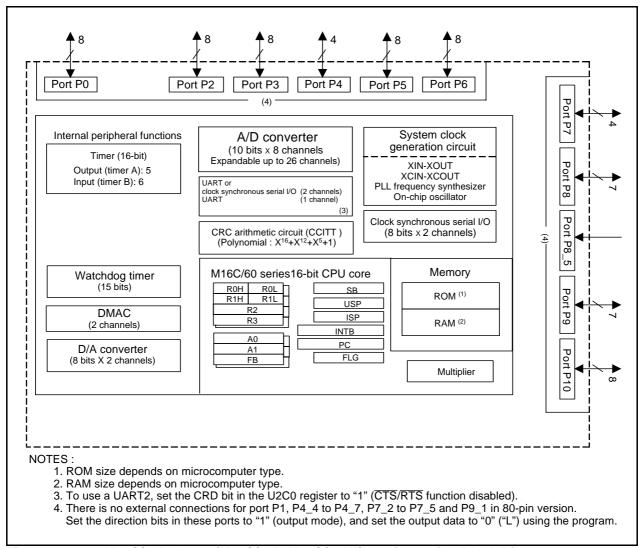


Figure 1.2 M16C/62P Group (M16C/62P, M16C/62PT) 80-pin version Block Diagram

included

Lead-free

D5

U3

U5

version

-20°C to 85°C

-40°C to 85°C

-20°C to 85°C

Internal ROM Internal ROM (User ROM Area Without Block A, (Block A, Block 1) Operating Block 1) Product Package Ambient Code Program Program Temperature Temperature Temperature and Erase and Erase Range Range Endurance Endurance 100 0°C to 60°C 100 0°C to 60°C -40°C to 85°C Flash memory D3 Lead-Version included D5 -20°C to 85°C D7 1,000 10,000 -40°C to 85°C -40°C to 85°C D9 -20°C to 85°C -20°C to 85°C 100 -40°C to 85°C U3 Lead-free 100 0°C to 60°C U5 -20°C to 85°C U7 1,000 10,000 -40°C to 85°C -40°C to 85°C U9 -20°C to 85°C -20°C to 85°C **ROM-less** D3 -40°C to 85°C Lead-

Table 1.8 Product Code of Flash Memory version and ROMless version for M16C/62P

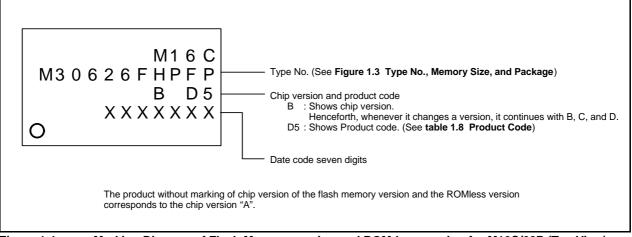


Figure 1.4 Marking Diagram of Flash Memory version and ROM-less version for M16C/62P (Top View)

Table 1.11 Pin Characteristics for 128-Pin Package (2)

Pin No.	Control Pin		Interrupt Pin	Timer Pin	UART Pin	Analog Pin	Bus Control Pi
51		P5_6					ALE
52		P5_5					HOLD
53		P5_4					HLDA
54		P13_3					
55		P13_2					
56		P13_1					
57		P13_0					
58		P5_3					BCLK
59		P5_2					RD
60		P5_1					WRH/BHE
61		P5_0					WRL/WR
62		P12_7					
63		P12_6					
64		P12_5					
65		P4_7					CS3
66		P4_6					CS2
67		P4_5					CS1
68		P4_4					CS0
69		P4_4 P4_3					A19
70		P4_3 P4_2					A18
71		P4_2					A17
72		P4_0					A16
73		P3_7					A15
74		P3_6					A14
75		P3_5					A13
76		P3_4					A12
77		P3_3					A11
78		P3_2					A10
79		P3_1					A9
80		P12_4					
81		P12_3					
82		P12_2					
83		P12_1					
84		P12_0					
85	VCC2						
86		P3_0					A8(/-/D7)
87	VSS						
88		P2_7				AN2_7	A7(/D7/D6)
89		P2_6				AN2_6	A6(/D6/D5)
90		P2_5				AN2_5	A5(/D5/D4)
91		P2_4				AN2_4	A4(/D4/D3)
92		P2_3				AN2_3	A3(/D3/D2)
93		P2_2				AN2_2	A2(/D2/D1)
94		P2_1				AN2_1	A1(/D1/D0)
95		P2_0				AN2_0	A0(/D0/-)
96		P1_7	INT5				D15
97		P1_6	ĪNT4				D14
98		P1_5	ĪNT3				D13
99		P1_4					D12
100		P1_3					D11

5. Electrical Characteristics

5.1 Electrical Characteristics (M16C/62P)

Table 5.1 Absolute Maximum Ratings

Symbol		Parameter	Condition	Rated Value	Unit
VCC1, VCC2	Supply Voltage		Vcc1=AVcc	-0.3 to 6.5	V
Vcc2	Supply Voltage		VCC2	-0.3 to Vcc1+0.1	V
AVcc	Analog Supply V	/oltage	Vcc1=AVcc	-0.3 to 6.5	V
Vı	Input Voltage	RESET, CNVSS, BYTE, P6_0 to P6_7, P7_2 to P7_7, P8_0 to P8_7, P9_0 to P9_7, P10_0 to P10_7, P11_0 to P11_7, P14_0, P14_1, VREF, XIN		-0.3 to Vcc1+0.3 ⁽¹⁾	V
		P0_0 to P0_7, P1_0 to P1_7, P2_0 to P2_7, P3_0 to P3_7, P4_0 to P4_7, P5_0 to P5_7, P12_0 to P12_7, P13_0 to P13_7		-0.3 to Vcc2+0.3 ⁽¹⁾	V
		P7_0, P7_1		-0.3 to 6.5	V
Vo	Output Voltage	P6_0 to P6_7, P7_2 to P7_7, P8_0 to P8_4, P8_6, P8_7, P9_0 to P9_7, P10_0 to P10_7, P11_0 to P11_7, P14_0, P14_1, XOUT		-0.3 to Vcc1+0.3 ⁽¹⁾	V
		P0_0 to P0_7, P1_0 to P1_7, P2_0 to P2_7, P3_0 to P3_7, P4_0 to P4_7, P5_0 to P5_7, P12_0 to P12_7, P13_0 to P13_7		-0.3 to Vcc2+0.3 ⁽¹⁾	V
		P7_0, P7_1		-0.3 to 6.5	V
Pd	Power Dissipation	on	–40°C <topr≤85°c< td=""><td>300</td><td>mW</td></topr≤85°c<>	300	mW
Topr	Operating Ambient	When the Microcomputer is Operating		-20 to 85 / -40 to 85	°C
	Temperature	Flash Program Erase		0 to 60	
Tstg	Storage Temper	rature		-65 to 150	°C

NOTES:

1. There is no external connections for port P1_0 to P1_7, P4_4 to P4_7, P7_2 to P7_5 and P9_1 in 80-pin version.

Table 5.5 D/A Conversion Characteristics (1)

Symbol	Parameter	Magazing Condition		Unit		
Symbol	Faranielei	Measuring Condition		Тур.	Max.	Offic
_	Resolution				8	Bits
_	Absolute Accuracy				1.0	%
tsu	Setup Time				3	μS
Ro	Output Resistance		4	10	20	kΩ
IVREF	Reference Power Supply Input Current	(NOTE 2)			1.5	mA

NOTES:

- 1. Referenced to Vcc1=VREF=3.3 to 5.5V, Vss=AVss=0V at $T_{opr} = -20$ to $85^{\circ}C$ / -40 to $85^{\circ}C$ unless otherwise specified.
- 2. This applies when using one D/A converter, with the D/A register for the unused D/A converter set to "00h". The resistor ladder of the A/D converter is not included. Also, when D/A register contents are not "00h", the IVREF will flow even if Vref id disconnected by the A/D control register.

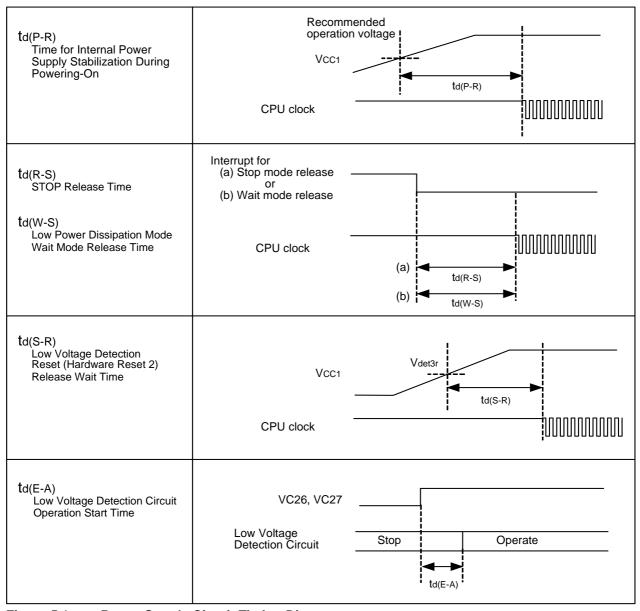


Figure 5.1 Power Supply Circuit Timing Diagram

VCC1=VCC2=5V

Table 5.11 Electrical Characteristics (1) (1)

		Б ,			Sta	andard		
Symbol				Measuring Condition	Min.	Тур.	Max.	Unit
Vон	HIGH Output Voltage ⁽³⁾	P6_0 to P6_7, P7_2 to P7_7 P8_6, P8_7, P9_0 to P9_7, I P11_0 to P11_7, P14_0, P14	P10_0 to P10_7,	IOH=-5mA	Vcc1-2.0		Vcc1	V
		P0_0 to P0_7, P1_0 to P1_7 P3_0 to P3_7, P4_0 to P4_7 P12_0 to P12_7, P13_0 to P	7, P5 0 to P5 7,	IOH=-5mA (2)	Vcc2-2.0		VCC2	
Vон	HIGH Output Voltage ⁽³⁾	P6_0 to P6_7, P7_2 to P7_7 P8_6, P8_7, P9_0 to P9_7, I P11_0 to P11_7, P14_0, P14	P10_0 to P10_7,	ΟΗ=-200μΑ	Vcc1-0.3		Vcc1	V
		P0_0 to P0_7, P1_0 to P1_7 P3_0 to P3_7, P4_0 to P4_7 P12_0 to P12_7, P13_0 to P	7, P5 0 to P5 7,	IOH=-200μA ⁽²⁾	Vcc2-0.3		VCC2	7 V
Vон	HIGH Outpu	t Voltage XOUT	HIGHPOWER	IOH=-1mA	Vcc1-2.0		Vcc1	V
			LOWPOWER	IOH=-0.5mA	Vcc1-2.0		VCC1	\ \
	HIGH Outpu	t Voltage XCOUT	HIGHPOWER	With no load applied		2.5		\ \
Vol. LOW Output Voltage (3) P6_0 to P6_7, P7_0 to P7_7, P8_0 to P7_10 to P9_7, P10_0 to P7_10 to P11_7, P14_0, P14_1		LOWPOWER	With no load applied		1.6]	
Vol	Output	P8_6, P8_7, P9_0 to P9_7, I	P10_0 to P10_7,	IOL=5mA			2.0	V
		P0_0 to P0_7, P1_0 to P1_7 P3_0 to P3_7, P4_0 to P4_7 P12_0 to P12_7, P13_0 to P	7, P5_0 to P5_7,	IOL=5mA (2)			2.0	V
Vol	LOW P6_0 to P6_7, P7_0 to P7_7 Output P8_6, P8_7, P9_0 to P9_7, I Voltage (3) P11_0 to P11_7, P14_0, P14		P10_0 to P10_7,	IOL=200μA			0.45	V
		P0_0 to P0_7, P1_0 to P1_7 P3_0 to P3_7, P4_0 to P4_7 P12_0 to P12_7, P13_0 to P	IOL=200μA (2)			0.45	V	
Vol	LOW Output	Voltage XOUT	HIGHPOWER	IOL=1mA			2.0	.,
			LOWPOWER	IOL=0.5mA			2.0	V
	LOW Output	Voltage XCOUT	HIGHPOWER	With no load applied		0		.,
			LOWPOWER	With no load applied		0		V
VT+-VT-	Hysteresis	HOLD, RDY, TAOIN to TA4II INTO to INT5, NMI, ADTRG, I TAOOUT to TA4OUT, KIO to SCL0 to SCL2, SDA0 to SDA	CTS0 to CTS2, CLK0 to CLK4, KI3, RXD0 to RXD2,		0.2		1.0	V
VT+-VT-	Hysteresis	RESET			0.2		2.5	V
lін	HIGH Input Current (3)		12_7, P13_0 to P13_7,	VI=5V			5.0	μА
lı∟	LOW Input Current (3)			VI=0V			-5.0	μА
RPULLUP	Pull-Up Resistance (3)	P0_0 to P0_7, P1_0 to P1_7, P2_0 to P2_7, P3_0 to P3_7,		VI=0V	30	50	170	kΩ
RfXIN	Feedback Ro	esistance XIN				1.5	1	ΜΩ
RfXCIN		esistance XCIN				15	1	MΩ
			1					

- NOTES: 1. Referenced to Vcc1=Vcc2=4.2 to 5.5V, Vss = 0V at T_{opr} = -20 to 85°C / -40 to 85°C, f(BCLK)=24MHz unless otherwise
 - specified.

 2. Where the product is used at Vcc1 = 5 V and Vcc2 = 3 V, refer to the 3 V version value for the pin specified value on Vcc2 port
 - 3. There is no external connections for port P1 $_0$ to P1 $_7$, P4 $_4$ to P4 $_7$, P7 $_2$ to P7 $_5$ and P9 $_1$ in 80-pin version.

Table 5.12 Electrical Characteristics (2) (1)

Symbol	Paramet	or.	Moos	uring Condition	,	Standar	b	Unit
Symbol	Faraniei	eı	ivieas	uning Condition	Min.	Тур.	Max.	Offic
Icc	Power Supply Current (Vcc1=Vcc2=4.0V to 5.5V)	In single-chip mode, the output	Mask ROM	f(BCLK)=24MHz No division, PLL operation		14	20	mA
	,	pins are open and other pins are Vss		No division, On-chip oscillation		1		mA
		outer puite die 1 ee	Flash Memory	f(BCLK)=24MHz, No division, PLL operation		18	27	mA
			,	No division, On-chip oscillation		1.8		mA
			Flash Memory Program	f(BCLK)=10MHz, VCC1=5.0V		15		mA
			Flash Memory Erase	f(BCLK)=10MHz, VCC1=5.0V		25		mA
			Mask ROM	f(XCIN)=32kHz Low power dissipation mode, ROM ⁽³⁾		25		μА
			Flash Memory	f(BCLK)=32kHz Low power dissipation mode, RAM ⁽³⁾		25		μА
				f(BCLK)=32kHz Low power dissipation mode, Flash Memory ⁽³⁾		420		μА
				On-chip oscillation, Wait mode		50		μА
			Mask ROM Flash Memory	f(BCLK)=32kHz Wait mode ⁽²⁾ , Oscillation capability High		7.5		μА
				f(BCLK)=32kHz Wait mode ⁽²⁾ , Oscillation capability Low		2.0		μА
				Stop mode Topr =25°C		0.8	3.0	μА
Idet4	Low Voltage Detection Diss	sipation Current (4)				0.7	4	μА
Idet3	Reset Area Detection Dissi	pation Current (4)				1.2	8	μА

- NOTES:

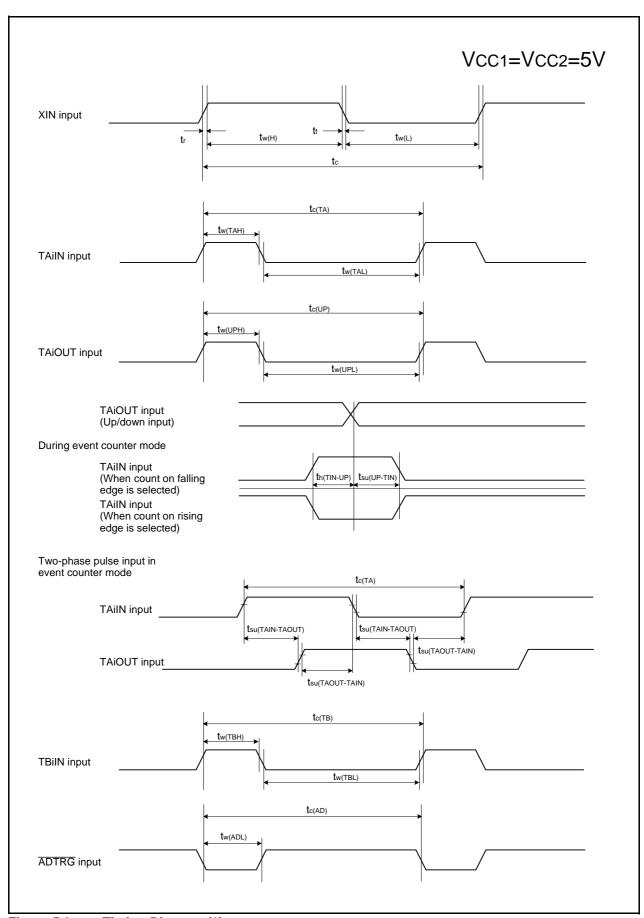
 1. Referenced to Vcc1=Vcc2=4.2 to 5.5V, Vss = 0V at Topr = -20 to 85°C / -40 to 85°C, f(BCLK)=24MHz unless otherwise specified.

 2. With one timer operated using fC32.

 3. This indicates the memory in which the program to be executed exists.

 4. Idea is dissipation current when the following bit is set to "1" (detection circuit enabled).

Idet4: VC27 bit in the VCR2 register Idet3: VC26 bit in the VCR2 register



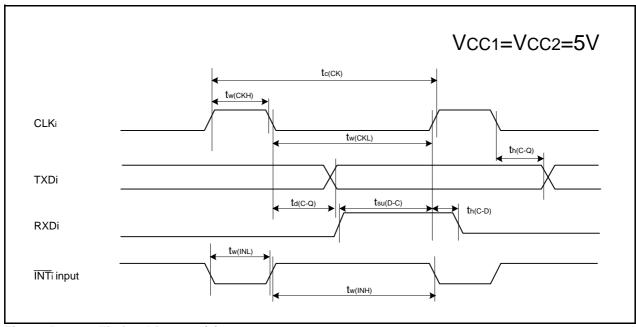


Figure 5.4 Timing Diagram (2)

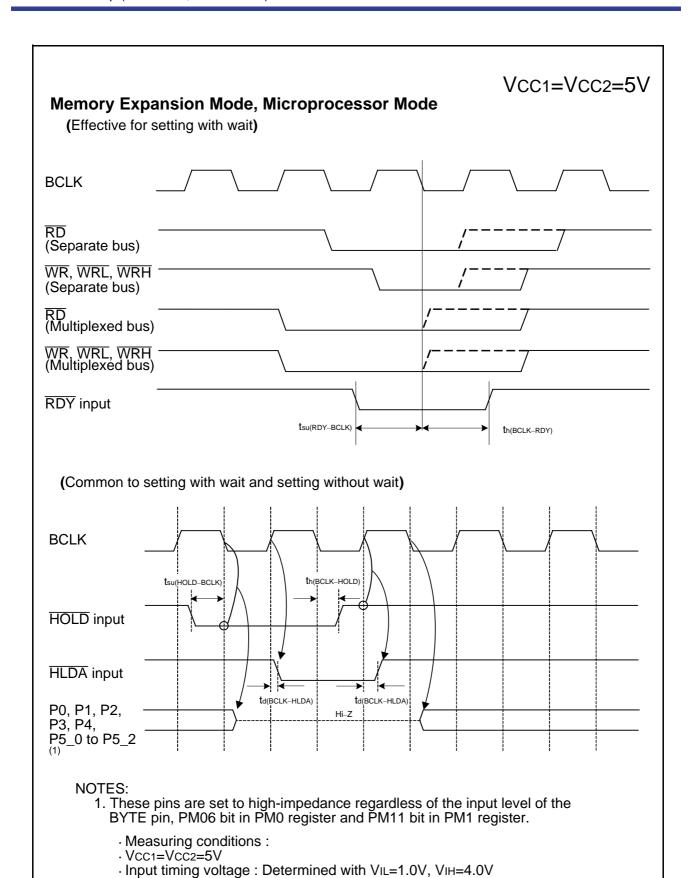


Figure 5.5 Timing Diagram (3)

• Output timing voltage : Determined with Vol=2.5V, VoH=2.5V

VCC1=VCC2=3V

Table 5.30 Electrical Characteristics (1) (1)

Symbol		Parameter		Measuring Condition	St	andard		Unit
Symbol		raiaiiielei		Measuring Condition	Min.	Тур.	Max.	Uiill
Vон	HIGH Output Voltage (3) P6_0 to P6_7, P7_2 to P7_7, P8_0 to P8_4, P8_6, P8_7, P9_0 to P9_7, P10_0 to P10_7, P11_0 to P11_7, P14_0, P14_1			IOH=-1mA	Vcc1-0.5		Vcc1	V
		P0_0 to P0_7, P1_0 to P1_7 P3_0 to P3_7, P4_0 to P4_7 P12_0 to P12_7, P13_0 to F	7, P5_0 to P5_7,	IOH=-1mA (2)	Vcc2-0.5		VCC2	
Vон	HIGH Output	Voltage XOUT	HIGHPOWER	IOH=-0.1mA	Vcc1-0.5		Vcc1	V
			LOWPOWER	IOH=-50μA	Vcc1-0.5		VCC1	, v
	HIGH Output	Voltage XCOUT	HIGHPOWER	With no load applied		2.5		V
			LOWPOWER	With no load applied		1.6		V
Vol	LOW Output Voltage (3)	P6_0 to P6_7, P7_0 to P7_7 P8_6, P8_7, P9_0 to P9_7, P11_0 to P11_7, P14_0, P1	P10_0 to P10_7,	IOL=1mA			0.5	V
		P0_0 to P0_7, P1_0 to P1_ P3_0 to P3_7, P4_0 to P4_1 P12_0 to P12_7, P13_0 to P	7, P5 0 to P5 7,	IOL=1mA (2)			0.5	V
Vol	LOW Output \	/oltage XOUT	HIGHPOWER	IOL=0.1mA			0.5	V
			IOL=50μA			0.5	\ \	
	LOW Output \	/oltage XCOUT	With no load applied		0		.,	
	LOWPOWER			With no load applied		0		V
VT+-VT-	Hysteresis	esis HOLD, RDY, TAQIN to TA4IN, TB0IN to TB5IN, INTO to INT5, NMI, ADTRG, CT50 to CT52, CLK0 to CLK4, TA0OUT to TA4OUT, KI0 to KI3, RXD0 to RXD2, SCL0 to SCL2, SDA0 to SDA2, SIN3, SIN4			0.2		0.8	V
VT+-VT-	Hysteresis	RESET			0.2	(0.7)	1.8	V
Іін	HIGH Input Current (3)	P0_0 to P0_7, P1_0 to P1_ P3_0 to P3_7, P4_0 to P4_ P6_0 to P6_7, P7_0 to P7_ P9_0 to P9_7, P10_0 to P10 P12_0 to P12_7, P13_0 to P10 XIN, RESET, CNVSS, BYTE	7, P5_0 to P5_7, 7, P8_0 to P8_7, 0_7, P11_0 to P11_7, P13_7, P14_0, P14_1,	VI=3V			4.0	μА
li∟	LOW Input Current (3)	out P0_0 to P0_7, P1_0 to P1_7, P2_0 to P2_7,		VI=0V			-4.0	μА
RPULLUP	Pull-Up Resistance (3)			VI=0V	50	100	500	kΩ
RfXIN	Feedback Res	sistance XIN				3.0		МΩ
RfXCIN	Feedback Res	sistance XCIN				25		МΩ
VRAM	RAM Retentio	n Voltage		At stop mode	2.0			V

NOTES:

- 1. Referenced to Vcc1 = Vcc2 = 2.7 to 3.3V, Vss = 0V at Topr = -20 to 85°C / -40 to 85°C, f(XIN)=10MHz no wait unless otherwise specified.
- 2. Vcc1 for the port P6 to P11 and P14, and Vcc2 for the port P0 to P5 and P12 to P13
- 3. There is no external connections for port P1_0 to P1_7, P4_4 to P4_7, P7_2 to P7_5 and P9_1 in 80-pin version.

Table 5.31 Electrical Characteristics (2) (1)

Cumbal	Doromot	•	Maga	uring Condition	;	Standard	t	Unit
Symbol	Paramet	eı	ivieas	suring Condition	Min.	Тур.	Max.	Unit
Icc	Power Supply Current (Vcc1=Vcc2=2.7V to 3.6V)	In single-chip mode, the output	Mask ROM	f(BCLK)=10MHz No division		8	11	mA
	,	pins are open and other pins are Vss		No division, On-chip oscillation		1		mA
			Flash Memory	f(BCLK)=10MHz, No division		8	13	mA
			,	No division, On-chip oscillation		1.8		mA
			Flash Memory Program	f(BCLK)=10MHz, VCC1=3.0V		12		mA
			Flash Memory Erase	f(BCLK)=10MHz, VCC1=3.0V		22		mA
			Mask ROM	f(XCIN)=32kHz Low power dissipation mode, ROM ⁽³⁾		25		μА
			Flash Memory	f(BCLK)=32kHz Low power dissipation mode, RAM ⁽³⁾		25		μА
				f(BCLK)=32kHz Low power dissipation mode, Flash Memory ⁽³⁾		420		μА
				On-chip oscillation, Wait mode		45		μА
			Mask ROM Flash Memory	f(BCLK)=32kHz Wait mode ⁽²⁾ , Oscillation capability High		6.0		μА
				f(BCLK)=32kHz Wait mode ⁽²⁾ , Oscillation capability Low		1.8		μА
				Stop mode Topr =25°C		0.7	3.0	μА
Idet4	Low Voltage Detection Diss	sipation Current (4)				0.6	4	μА
Idet3	Reset Area Detection Dissi	pation Current (4)				0.4	2	μА

- NOTES:

 1. Referenced to Vcc1=Vcc2=2.7 to 3.3V, Vss = 0V at Topr = -20 to 85°C / -40 to 85°C, f(BCLK)=10MHz unless otherwise specified.

 2. With one timer operated using fC32.

 3. This indicates the memory in which the program to be executed exists.

 4. Idea is dissipation current when the following bit is set to "1" (detection circuit enabled).

Idet4: VC27 bit in the VCR2 register Idet3: VC26 bit in the VCR2 register

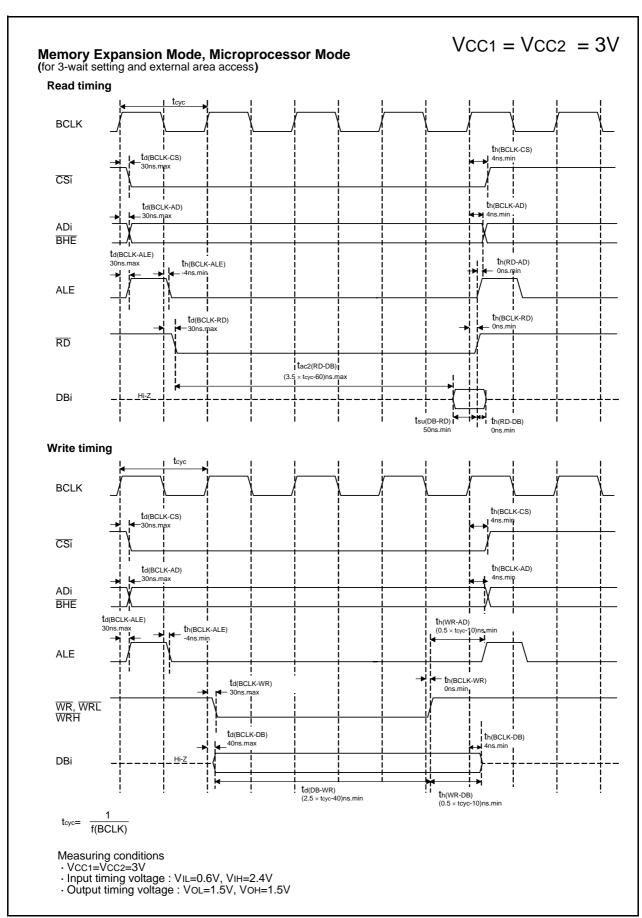


Figure 5.19 Timing Diagram (7)

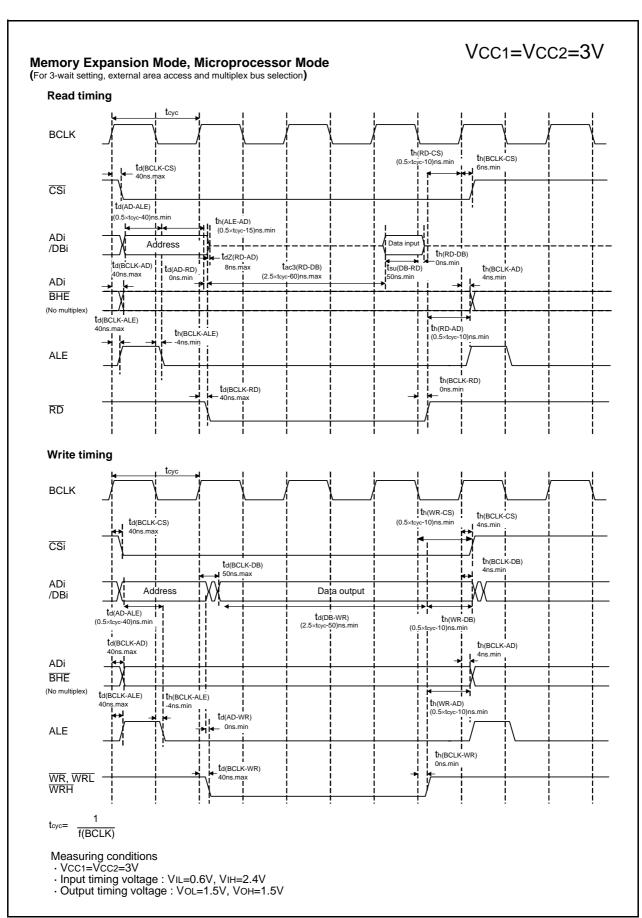
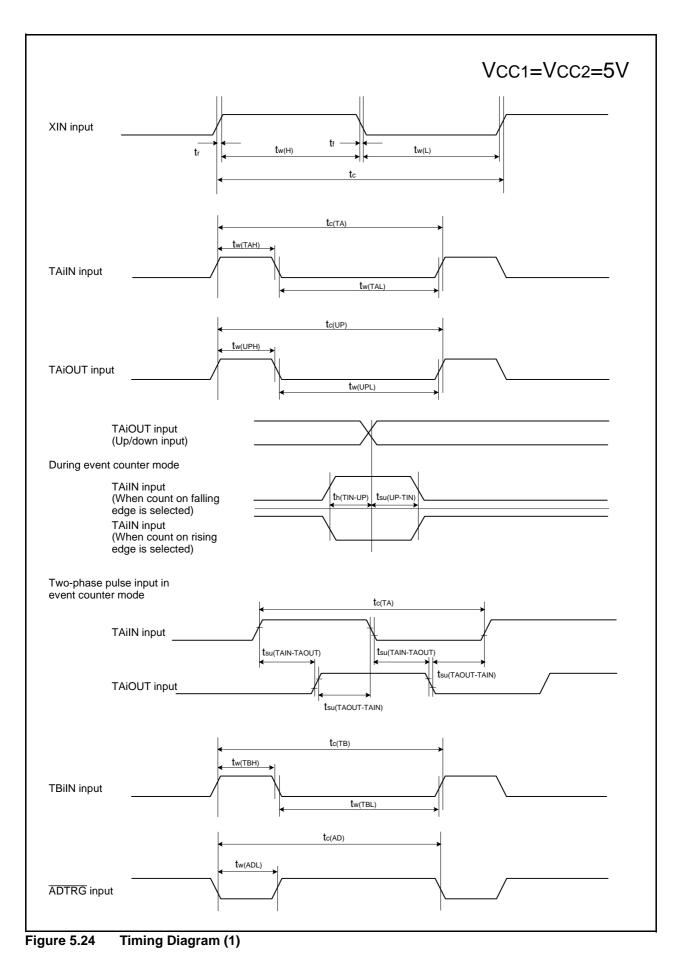


Figure 5.21 Timing Diagram (9)



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F	REVISION HISTORY		RY	M16C/62P Group (M16C/62P, M16C/62PT) Hardware Manual
	Data			Description
Rev.	Rev. Date Page			Summary
		33	Table 5.4	A-D Conversion Characteristics is revised.
			Table 5.5	D-A Conversion Characteristics revised.
		34,74	Table 5.6	to 5.7 and table 5.54 to 5.55 are revised.
		36	Table 5.1	1 is revised.
		38,55	Table 5.1	4 and 5.33 HLDA output deley time is deleted.
		41	Figure 5.1	1 is partly revised.
		41-43,	Table 5.2	7 to 5.29 and table 5.46 to 48 HLDA output deley time is added.
		58-60		
		44	Figure 5.2	2 Timing Diagram (1) XIN input is added.
		47-48	Figure 5.5	5 to 5.6 Read timing DB → DBi
		49-50	Figure 5.7	7 to 5.8 Write timing DB → DBi
		52	Figure 5.1	10 DB → DBi
		53	Table 5.3	0 is revised.
		58	Figure 5.1	11 is partly revised.
		61	_	12 Timing Diagram (1) XIN input is added.
		64-65	Figure 5.1	15 to 5.16 Read timing DB → DBi
		66-67	_	17 to 5.18 Write timing DB → DBi
		69	_	$20 \text{ DB} \rightarrow \text{DBi}$
		70-85	Electrical	Characteristics (M16C/62PT) is added.
2.10	Nov 07, 2003	8-9 23		to 1.7 Product List is partly revised. Note 1 is deleted. is revised.
		71		0 is revised.
		72		1 is deleted.
2.11	Jan 06, 2004	16		NOTE 3 VCC1 VCC2 → VCC1 > VCC2
	,			0 to 1.11 NOTE 1 VCC1 VCC2 → VCC1 > VCC2
		31		Power Supply Ripple Allowable Frequency Unit MHz → kHz
		12		and Figure 1.5 are added.
2.30	Sep 01, 2004	18, 20		1 to 1.13 are revised.
	, , , , ,	19,21		2 to 1.14 are revised.
		24	_	1 is partly revised.
			Note 3 is	
		25	Note 6 is	
		33		is revised.
				Table 5.4 is added.
		34		to 5.6 is partly revised.
		35		is revised.
		0.7		is revised.
		37	able 5.1	1 is revised.

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