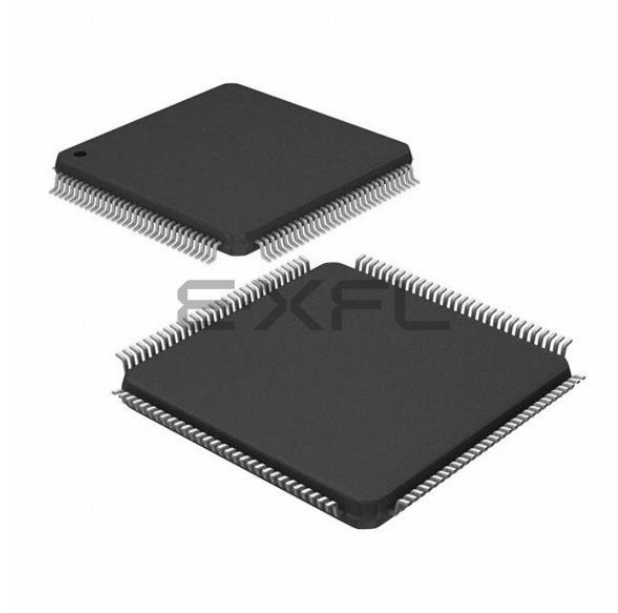
Infineon Technologies - MB90922NCSPMC-GS-183E1 Datasheet



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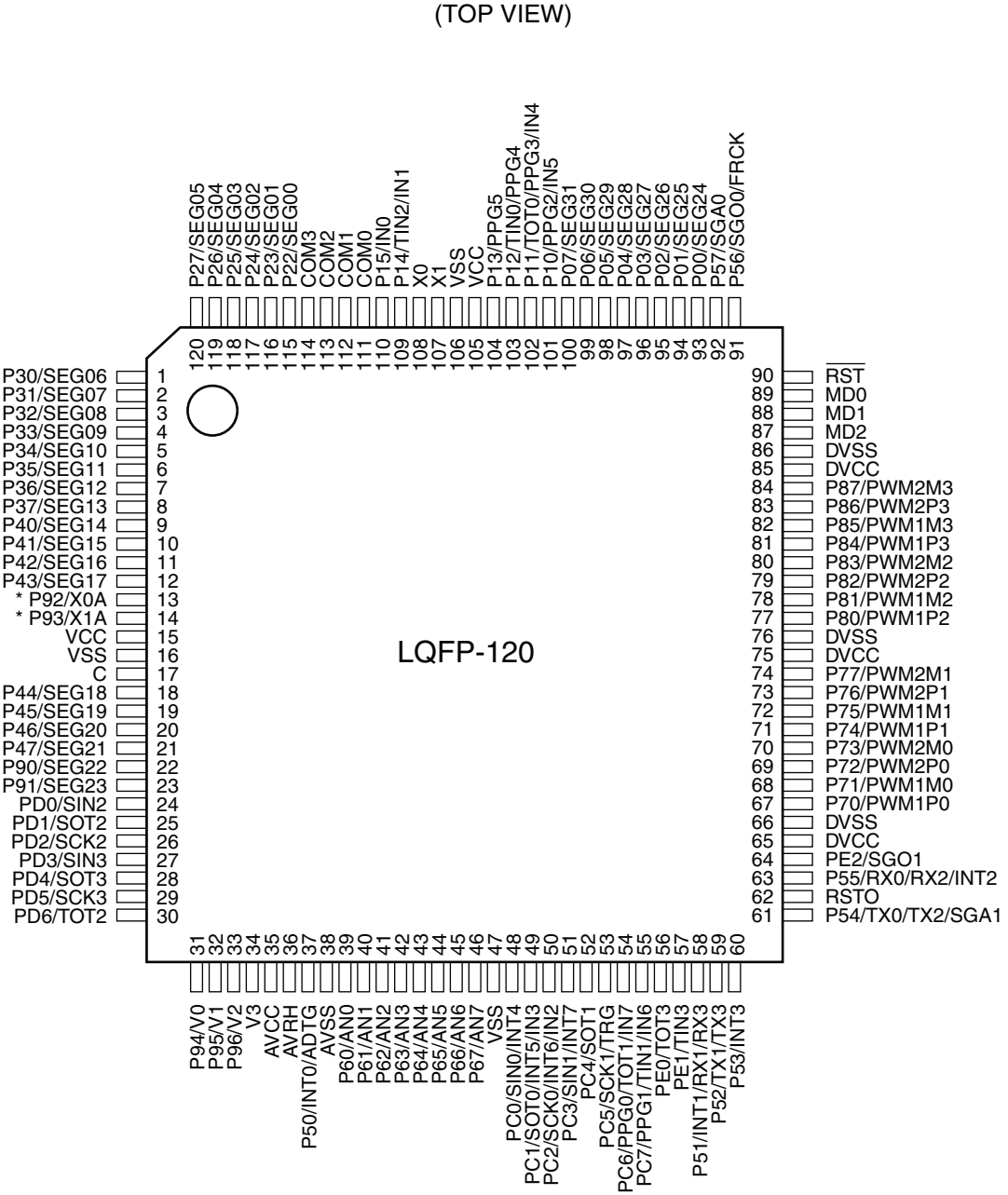
What is "Embedded - Microcontrollers"?

"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 "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	F²MC-16LX
Core Size	16-Bit
Speed	32MHz
Connectivity	CANbus, LINbus, UART/USART
Peripherals	LCD, LVD, POR, PWM, WDT
Number of I/O	93
Program Memory Size	256KB (256K x 8)
Program Memory Type	Mask ROM
EEPROM Size	-
RAM Size	10K x 8
Voltage - Supply (Vcc/Vdd)	4V ~ 5.5V
Data Converters	A/D 8x8/10b
Oscillator Type	External
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	120-LQFP
Supplier Device Package	120-LQFP (16x16)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb90922ncspmc-gs-183e1

■ PIN ASSIGNMENT



(FPT-120P-M21)

* : MB90V920-101, MB90F922NCS,MB90F923NCS,MB90F924NCS,MB90922NCS : P92, P93
MB90V920-102, MB90F922NC,MB90F923NC,MB90F924NC : X0A, X1A

■ PIN DESCRIPTIONS

Pin no.	Pin name	I/O circuit type*1	Function
108	X0	A	High-speed oscillation input pin
107	X1		High-speed oscillation output pin
13	X0A	B	Low-speed oscillation input pin
	P92	I	General-purpose I/O port
14	X1A	B	Low-speed oscillation output pin
	P93	I	General-purpose I/O port
90	$\overline{\text{RST}}$	C	Reset input pin
93	P00	F	General-purpose I/O port
	SEG24		LCD controller/driver segment output pin
94	P01	F	General-purpose I/O port
	SEG25		LCD controller/driver segment output pin
95	P02	F	General-purpose I/O port
	SEG26		LCD controller/driver segment output pin
96	P03	F	General-purpose I/O port
	SEG27		LCD controller/driver segment output pin
97	P04	F	General-purpose I/O port
	SEG28		LCD controller/driver segment output pin
98	P05	F	General-purpose I/O port
	SEG29		LCD controller/driver segment output pin
99	P06	F	General-purpose I/O port
	SEG30		LCD controller/driver segment output pin
100	P07	F	General-purpose I/O port
	SEG31		LCD controller/driver segment output pin
101	P10	I	General-purpose I/O port
	PPG2		16-bit PPG ch.2 output pin
	IN5		Input capture ch.5 trigger input pin
102	P11	I	General-purpose I/O port
	TOT0		16-bit reload timer ch.0 TOT output pin
	PPG3		16-bit PPG ch.3 output pin
	IN4		Input capture ch.4 trigger input pin
103	P12	I	General-purpose I/O port
	TIN0		16-bit reload timer ch.0 TIN input pin
	PPG4		16-bit PPG ch.4 output pin

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Pin no.	Pin name	I/O circuit type*1	Function
61	P54	I	General-purpose I/O port
	TX0		CAN interface 0 TX output pin
	TX2		CAN interface 2 TX output pin
	SGA1		Sound generator ch.1 SGA output pin
63	P55	I	General-purpose I/O port
	RX0		CAN interface 0 RX input pin
	RX2		CAN interface 2 RX input pin
	INT2		INT2 external interrupt input pin
91	P56	I	General-purpose I/O port
	SGO0		Sound generator ch.0 SGO output pin
	FRCK		Free-run timer clock input pin
92	P57	I	General-purpose I/O port
	SGA0		Sound generator ch.0 SGA output pin
39	P60	H	General-purpose I/O port
	AN0		A/D converter input pin
40	P61	H	General-purpose I/O port
	AN1		A/D converter input pin
41	P62	H	General-purpose I/O port
	AN2		A/D converter input pin
42	P63	H	General-purpose I/O port
	AN3		A/D converter input pin
43	P64	H	General-purpose I/O port
	AN4		A/D converter input pin
44	P65	H	General-purpose I/O port
	AN5		A/D converter input pin
45	P66	H	General-purpose I/O port
	AN6		A/D converter input pin
46	P67	H	General-purpose I/O port
	AN7		A/D converter input pin
67	P70	L	General-purpose output-only port
	PWM1P0		Stepping motor controller ch.0 output pin
68	P71	L	General-purpose output-only port
	PWM1M0		Stepping motor controller ch.0 output pin
69	P72	L	General-purpose output-only port
	PWM2P0		Stepping motor controller ch.0 output pin

(Continued)

Pin no.	Pin name	I/O circuit type*1	Function
70	P73	L	General-purpose output-only port
	PWM2M0		Stepping motor controller ch.0 output pin
71	P74	L	General-purpose output-only port
	PWM1P1		Stepping motor controller ch.1 output pin
72	P75	L	General-purpose output-only port
	PWM1M1		Stepping motor controller ch.1 output pin
73	P76	L	General-purpose output-only port
	PWM2P1		Stepping motor controller ch.1 output pin
74	P77	L	General-purpose output-only port
	PWM2M1		Stepping motor controller ch.1 output pin
77	P80	L	General-purpose output-only port
	PWM1P2		Stepping motor controller ch.2 output pin
78	P81	L	General-purpose output-only port
	PWM1M2		Stepping motor controller ch.2 output pin
79	P82	L	General-purpose output-only port
	PWM2P2		Stepping motor controller ch.2 output pin
80	P83	L	General-purpose output-only port
	PWM2M2		Stepping motor controller ch.2 output pin
81	P84	L	General-purpose output-only port
	PWM1P3		Stepping motor controller ch.3 output pin
82	P85	L	General-purpose output-only port
	PWM1M3		Stepping motor controller ch.3 output pin
83	P86	L	General-purpose output-only port
	PWM2P3		Stepping motor controller ch.3 output pin
84	P87	L	General-purpose output-only port
	PWM2M3		Stepping motor controller ch.3 output pin
22	P90	F	General-purpose I/O port
	SEG22		LCD controller/driver segment output pin
23	P91	F	General-purpose I/O port
	SEG23		LCD controller/driver segment output pin
31	P94	G	General-purpose I/O port
	V0		LCD controller/driver reference power supply pin
32	P95	G	General-purpose I/O port
	V1		LCD controller/driver reference power supply pin

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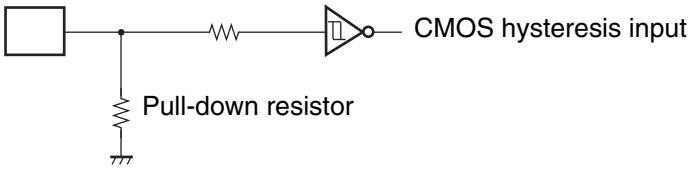
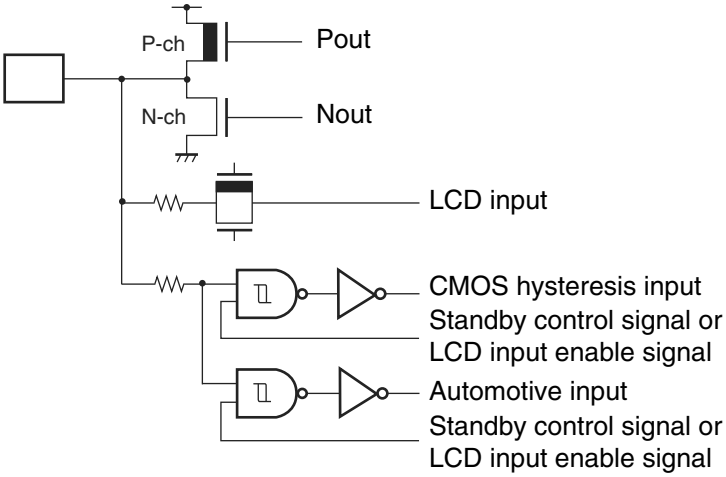
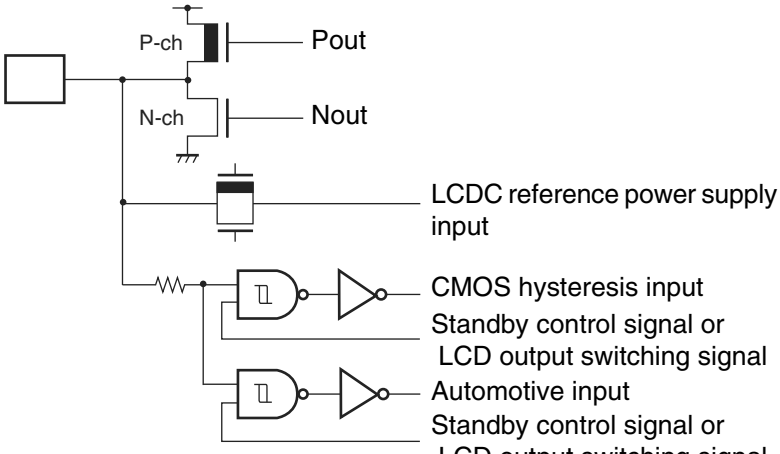
Pin no.	Pin name	I/O circuit type*1	Function
26	PD2	I	General-purpose I/O port
	SCK2		UART ch.2 serial clock I/O pin
27	PD3	J	General-purpose I/O port
	SIN3		UART ch.3 serial data input pin
28	PD4	I	General-purpose I/O port
	SOT3		UART ch.3 serial data output pin
29	PD5	I	General-purpose I/O port
	SCK3		UART ch.3 serial clock I/O pin
30	PD6	I	General-purpose I/O port
	TOT2		16-bit reload timer ch.2 TOT output pin
56	PE0	I	General-purpose I/O port
	TOT3		16-bit reload timer ch.3 TOT output pin
57	PE1	I	General-purpose I/O port
	TIN3		16-bit reload timer ch.3 TIN input pin
64	PE2	I	General-purpose I/O port
	SGO1		Sound generator ch.1 SGO output pin
62	RSTO	N	Internal reset signal output pin
65, 75, 85	DVCC	—	Power supply input pins dedicated for high current output buffer
66, 76, 86	DVSS	—	Power supply GND pins dedicated for high current output buffer
35	AVCC	—	A/D converter dedicated power supply input pin
38	AVSS	—	A/D converter dedicated power supply GND pin
36	AVRH	—	A/D converter Vref+ input pin. Vref- is fixed to AVSS.
89	MD0	D	Mode setting input pin. Connect to VCC pin.
88	MD1	D	Mode setting input pin. Connect to VCC pin.
87	MD2	D/E*2	Mode setting input pin. Connect to VSS pin.
17	C	—	External capacitor pin. Connect a 0.1 μF capacitor between this pin and the VSS pin.
15, 105	VCC	—	Power supply input pins
16, 47, 106	VSS	—	GND power supply pins

*1 : For I/O circuit type, refer to “ ■ I/O CIRCUIT TYPES”.

*2 : The I/O circuit type is D for Flash memory products and E for evaluation products.

Type	Circuit	Remarks
E		Input-only pin (with pull-down resistance) • Attached pull-down resistance: approx. 50 kΩ • CMOS hysteresis input (V_{IH}/V_{IL} = 0.8 V_{CC}/0.2 V_{CC}) Note: The MD2 pin of the evaluation products uses this circuit type.
F		LCD output common general-purpose port • CMOS output (I_{OH}/I_{OL} = ±4 mA) • Hysteresis input (V_{IH}/V_{IL} = 0.8 V_{CC}/0.2 V_{CC}) • Automotive input (V_{IH}/V_{IL} = 0.8 V_{CC}/0.5 V_{CC})
G		LCDC reference power supply common general-purpose port • CMOS output (I_{OH}/I_{OL} = ±4 mA) • CMOS hysteresis input (V_{IH}/V_{IL} = 0.8 V_{CC}/0.2 V_{CC}) • Automotive input (V_{IH}/V_{IL} = 0.8 V_{CC}/0.5 V_{CC})

(Continued)

Address	Register name	Symbol	Read/write	Resource name	Initial value
000083H	(Disabled)				
000084H	PWM control register 2	PWC2	R/W	Stepping motor controller 2	000000X0B
000085H	(Disabled)				
000086H	PWM control register 3	PWC3	R/W	Stepping motor controller 3	000000X0B
000087H	(Disabled)				
000088H	LCD output control register 3	LOCR3	R/W	LCDC	XXXXX111B
000089H	(Disabled)				
00008AH	A/D setting register 0	ADSR0	R/W	A/D converter	00000000B
00008BH	A/D setting register 1	ADSR1	R/W		00000000B
00008CH	Port input level select 0	PIL0	R/W	Port input level select	00000000B
00008DH	Port input level select 1	PIL1	R/W		XXXX0000B
00008EH	Port input level select 2	PIL2	R/W		XXXX0000B
00008FH to 00009DH	(Disabled)				
00009EH	Program address detection control register	PACSR	R/W	Address match detection	XXXX0X0XB
00009FH	Delayed Interrupt/Release Register	DIRR	R/W	Delay interrupt	XXXXXXX0B
0000A0H	Power saving mode control register	LPMCR	R/W	Power saving control circuit	00011000B
0000A1H	Clock select register	CKSCR	R/W, R		11111100B
0000A2H to 0000A7H	(Disabled)				
0000A8H	Watchdog timer control register	WDTC	R, W	Watchdog timer	XXXXX111B
0000A9H	Time-base timer control register	TBTC	R/W, W	Time-base timer	1XX00100B
0000AAH	Watch timer control register	WTC	R/W, W, R	Watch timer (sub clock)	10001000B
0000ABH to 0000ADH	(Disabled)				
0000AEH	Flash memory control status register	FMCS	R/W	Flash interface	000X0000B
0000AFH	(Disabled)				

(Continued)

Address	Register name	Symbol	Read/write	Resource name	Initial value
0000D4H	Lower timer control status register 2	TMCSR2L	R/W	16-bit reload timer 2	00000000B
0000D5H	Higher timer control status register 2	TMCSR2H	R/W		XXX10000B
0000D6H	Lower timer control status register 3	TMCSR3L	R/W	16-bit reload timer 3	00000000B
0000D7H	Higher timer control status register 3	TMCSR3H	R/W		XXX10000B
0000D8H	Lower sound control register 1	SGCRL1	R/W	Sound generator 1	00000000B
0000D9H	Higher sound control register 1	SGCRH1	R/W		0XXXX100B
0000DAH	Lower PPG3 control status register	PCNTL3	R/W	16-bit PPG3	00000000B
0000DBH	Higher PPG3 control status register	PCNTH3	R/W		00000001B
0000DCH	Lower PPG4 control status register	PCNTL4	R/W	16-bit PPG4	00000000B
0000DDH	Higher PPG4 control status register	PCNTH4	R/W		00000001B
0000DEH	Lower PPG5 control status register	PCNTL5	R/W	16-bit PPG5	00000000B
0000DFH	Higher PPG5 control status register	PCNTH5	R/W		00000001B
0000E0H	Serial mode register 2	SMR2	R/W, W	UART (LIN/SCI) 2	00000000B
0000E1H	Serial control register 2	SCR2	R/W, W		00000000B
0000E2H	Reception/transmission data register 2	RDR2/ TDR2	R/W		00000000B
0000E3H	Serial status register 2	SSR2	R/W, R		00001000B
0000E4H	Extended communication control register 2	ECCR2	R/W, R		000000XXB
0000E5H	Extended status control register 2	ESCR2	R/W		00000100B
0000E6H	Baud rate generator register 20	BGR20	R/W		00000000B
0000E7H	Baud rate generator register 21	BGR21	R/W, R		00000000B
0000E8H	Serial mode register 3	SMR3	R/W, W	UART (LIN/SCI) 3	00000000B
0000E9H	Serial control register 3	SCR3	R/W, W		00000000B
0000EAH	Reception/transmission data register 3	RDR3/ TDR3	R/W		00000000B
0000EBH	Serial status register 3	SSR3	R/W, R		00001000B
0000ECH	Extended communication control register 3	ECCR3	R/W, R		000000XXB
0000EDH	Extended status control register 3	ESCR3	R/W		00000100B
0000EEH	Baud rate generator register 30	BGR30	R/W		00000000B
0000EFH	Baud rate generator register 31	BGR31	R/W, R		00000000B
001FF0H	Program address detection register 0	PADR0	R/W	Address match detection	XXXXXXXXB
001FF1H	Program address detection register 1	PADR0	R/W		XXXXXXXXB
001FF2H	Program address detection register 2	PADR0	R/W		XXXXXXXXB
001FF3H	Program address detection register 3	PADR1	R/W		XXXXXXXXB
001FF4H	Program address detection register 4	PADR1	R/W		XXXXXXXXB
001FF5H	Program address detection register 5	PADR1	R/W		XXXXXXXXB

(Continued)

Address	Register name	Symbol	Read/write	Resource name	Initial value
003700H to 0037FFH	Area reserved for CAN Controller 2. Refer to "■ CAN CONTROLLERS"				
003800H to 0038FFH	Area reserved for CAN Controller 3. Refer to "■ CAN CONTROLLERS"				
003900H to 00391FH	(Disabled)				
003920H	PPG0 down counter register	PDCR0	R	16-bit PPG0	11111111B
003921H					11111111B
003922H	PPG0 cycle setting register	PCSR0	W		11111111B
003923H					11111111B
003924H	PPG0 duty setting register	PDUT0	W	16-bit PPG0	00000000B
003925H					00000000B
003926H	PPG0 output division setting register	PPGDIV0	R/W, R		11111100B
003927H	(Disabled)				
003928H	PPG1 down counter register	PDCR1	R	16-bit PPG1	11111111B
003929H					11111111B
00392AH	PPG1 cycle setting register	PCSR1	W		11111111B
00392BH					11111111B
00392CH	PPG1 duty setting register	PDUT1	W		00000000B
00392DH					00000000B
00392EH	PPG1output division setting register	PPGDIV1	R/W, R		11111100B
00392FH	(Disabled)				
003930H	PPG2 down counter register	PDCR2	R	16-bit PPG2	11111111B
003931H					11111111B
003932H	PPG2 cycle setting register	PCSR2	W		11111111B
003933H					11111111B
003934H	PPG2 duty setting register	PDUT2	W		00000000B
003935H					00000000B
003936H	PPG2 output division setting register	PPGDIV2	R/W, R		11111100B
003937H to 00393FH	(Disabled)				
003940H	Input capture register 4	IPCP4	R	Input capture 4/5	XXXXXXXXB
003941H					XXXXXXXXB
003942H	Input capture register 5	IPCP5	R		XXXXXXXXB
003943H					XXXXXXXXB

(Continued)

Address	Register name	Symbol	Read/write	Resource name	Initial value
003970H to 003973H	(Disabled)				
003974H	Frequency data register 1	SGFR1	R/W	Sound generator 1	XXXXXXXXB
003975H	Amplitude data register 1	SGAR1	R/W		00000000B
003976H	Decrement grade register 1	SGDR1	R/W		XXXXXXXXB
003977H	Tone count register 1	SGTR1	R/W		XXXXXXXXB
003978H to 00397FH	(Disabled)				
003980H	PWM1 compare register 0	PWC10	R/W	Stepping motor controller 0	XXXXXXXXB
003981H					XXXXXXXXB
003982H	PWM2 compare register 0	PWC20	R/W		XXXXXXXXB
003983H					XXXXXXXXB
003984H	PWM1 select register 0	PWS10	R/W		00000000B
003985H	PWM2 select register 0	PWS20	R/W		X0000000B
003986H, 003987H	(Disabled)				
003988H	PWM1 compare register 1	PWC11	R/W	Stepping motor controller 1	XXXXXXXXB
003989H					XXXXXXXXB
00398AH	PWM2 compare register 1	PWC21	R/W		XXXXXXXXB
00398BH					XXXXXXXXB
00398CH	PWM1 select register 1	PWS11	R/W		00000000B
00398DH	PWM2 select register 1	PWS21	R/W		X0000000B
00398EH, 00398FH	(Disabled)				
003990H	PWM1 compare register 2	PWC12	R/W	Stepping motor controller 2	XXXXXXXXB
003991H					XXXXXXXXB
003992H	PWM2 compare register 2	PWC22	R/W		XXXXXXXXB
003993H					XXXXXXXXB
003994H	PWM1 select register 2	PWS12	R/W		00000000B
003995H	PWM2 select register 2	PWS22	R/W		X0000000B
003996H, 003997H	(Disabled)				

(Continued)

List of Control Registers(2)

Address				Register	Abbre-viation	Access	Initial Value
CAN0	CAN1	CAN2	CAN3				
000040H	000070H	0039C0H	0039D0H	Message buffer valid register	BVALR	R/W	00000000B
000041H	000071H	0039C1H	0039D1H				00000000B
000042H	000072H	0039C2H	0039D2H	Transmit request register	TREQR	R/W	00000000B
000043H	000073H	0039C3H	0039D3H				00000000B
000044H	000074H	0039C4H	0039D4H	Transmit cancel register	TCANR	W	00000000B
000045H	000075H	0039C5H	0039D5H				00000000B
000046H	000076H	0039C6H	0039D6H	Transmit complete register	TCR	R/W	00000000B
000047H	000077H	0039C7H	0039D7H				00000000B
000048H	000078H	0039C8H	0039D8H	Receive complete register	RCR	R/W	00000000B
000049H	000079H	0039C9H	0039D9H				00000000B
00004AH	00007AH	0039CAH	0039DAH	Remote request receive register	RRTRR	R/W	00000000B
00004BH	00007BH	0039CBH	0039DBH				00000000B
00004CH	00007CH	0039CCH	0039DCH	Receive overrun register	ROVRR	R/W	00000000B
00004DH	00007DH	0039CDH	0039DDH				00000000B
00004EH	00007EH	0039CEH	0039DEH	Receive interrupt enable register	RIER	R/W	00000000B
00004FH	00007FH	0039CFH	0039DFH				00000000B
003C08H	003D08H	003E08H	003F08H	IDE register	IDER	R/W	XXXXXXXXB
003C09H	003D09H	003E09H	003F09H				XXXXXXXXB
003C0AH	003D0AH	003E0AH	003F0AH	Transmit RTR register	TRTRR	R/W	00000000B
003C0BH	003D0BH	003E0BH	003F0BH				00000000B
003C0CH	003D0CH	003E0CH	003F0CH	Remote frame receive wait register	RFWTR	R/W	XXXXXXXXB
003C0DH	003D0DH	003E0DH	003F0DH				XXXXXXXXB
003C0EH	003D0EH	003E0EH	003F0EH	Transmit interrupt enable register	TIER	R/W	00000000B
003C0FH	003D0FH	003E0FH	003F0FH				00000000B
003C10H	003D10H	003E10H	003F10H	Acceptance mask select register	AMSR	R/W	XXXXXXXXB
003C11H	003D11H	003E11H	003F11H				XXXXXXXXB
003C12H	003D12H	003E12H	003F12H				XXXXXXXXB
003C13H	003D13H	003E13H	003F13H				XXXXXXXXB
003C14H	003D14H	003E14H	003F14H	Acceptance mask register 0	AMR0	R/W	XXXXXXXXB
003C15H	003D15H	003E15H	003F15H				XXXXXXXXB
003C16H	003D16H	003E16H	003F16H				XXXXX---B
003C17H	003D17H	003E17H	003F17H				XXXXXXXXB
003C18H	003D18H	003E18H	003F18H	Acceptance mask register 1	AMR1	R/W	XXXXXXXXB
003C19H	003D19H	003E19H	003F19H				XXXXXXXXB
003C1AH	003D1AH	003E1AH	003F1AH				XXXXX---B
003C1BH	003D1BH	003E1BH	003F1BH				XXXXXXXXB

List of Message Buffers (ID Registers)

Address				Register	Abbre-viation	Access	Initial Value
CAN0	CAN1	CAN2	CAN3				
003A00H to 003A1FH	003B00H to 003B1FH	003700H to 00371FH	003800H to 00381FH	General-purpose RAM	—	R/W	XXXXXXXXB to XXXXXXXXB
003A20H	003B20H	003720H	003820H	ID register 0	IDR0	R/W	XXXXXXXXB XXXXXXXXB
003A21H	003B21H	003721H	003821H				
003A22H	003B22H	003722H	003822H				XXXXX---B XXXXXXXXB
003A23H	003B23H	003723H	003823H				
003A24H	003B24H	003724H	003824H	ID register 1	IDR1	R/W	XXXXXXXXB XXXXXXXXB
003A25H	003B25H	003725H	003825H				
003A26H	003B26H	003726H	003826H				XXXXX---B XXXXXXXXB
003A27H	003B27H	003727H	003827H				
003A28H	003B28H	003728H	003828H	ID register 2	IDR2	R/W	XXXXXXXXB XXXXXXXXB
003A29H	003B29H	003729H	003829H				
003A2AH	003B2AH	00372AH	00382AH				XXXXX---B XXXXXXXXB
003A2BH	003B2BH	00372BH	00382BH				
003A2CH	003B2CH	00372CH	00382CH	ID register 3	IDR3	R/W	XXXXXXXXB XXXXXXXXB
003A2DH	003B2DH	00372DH	00382DH				
003A2EH	003B2EH	00372EH	00382EH				XXXXX---B XXXXXXXXB
003A2FH	003B2FH	00372FH	00382FH				
003A30H	003B30H	003730H	003830H	ID register 4	IDR4	R/W	XXXXXXXXB XXXXXXXXB
003A31H	003B31H	003731H	003831H				
003A32H	003B32H	003732H	003832H				XXXXX---B XXXXXXXXB
003A33H	003B33H	003733H	003833H				
003A34H	003B34H	003734H	003834H	ID register 5	IDR5	R/W	XXXXXXXXB XXXXXXXXB
003A35H	003B35H	003735H	003835H				
003A36H	003B36H	003736H	003836H				XXXXX---B XXXXXXXXB
003A37H	003B37H	003737H	003837H				
003A38H	003B38H	003738H	003838H	ID register 6	IDR6	R/W	XXXXXXXXB XXXXXXXXB
003A39H	003B39H	003739H	003839H				
003A3AH	003B3AH	00373AH	00383AH				XXXXX---B XXXXXXXXB
003A3BH	003B3BH	00373BH	00383BH				
003A3CH	003B3CH	00373CH	00383CH	ID register 7	IDR7	R/W	XXXXXXXXB XXXXXXXXB
003A3DH	003B3DH	00373DH	00383DH				
003A3EH	003B3EH	00373EH	00383EH				XXXXX---B XXXXXXXXB
003A3FH	003B3FH	00373FH	00383FH				

(Continued)

List of Message Buffers (Data register)

Address				Register	Abbre-viation	Access	Initial Value
CAN0	CAN1	CAN2	CAN3				
003A80H to 003A87H	003B80H to 003B87H	003780H to 003787H	003880H to 003887H	Data register 0 (8 bytes)	DTR0	R/W	XXXXXXXXB to XXXXXXXXB
003A88H to 003A8FH	003B88H to 003B8FH	003788H to 00378FH	003888H to 00388FH	Data register 1 (8 bytes)	DTR1	R/W	XXXXXXXXB to XXXXXXXXB
003A90H to 003A97H	003B90H to 003B97H	003790H to 003797H	003890H to 003897H	Data register 2 (8 bytes)	DTR2	R/W	XXXXXXXXB to XXXXXXXXB
003A98H to 003A9FH	003B98H to 003B9FH	003798H to 00379FH	003898H to 00389FH	Data register 3 (8 bytes)	DTR3	R/W	XXXXXXXXB to XXXXXXXXB
003AA0H to 003AA7H	003BA0H to 003BA7H	0037A0H to 0037A7H	0038A0H to 0038A7H	Data register 4 (8 bytes)	DTR4	R/W	XXXXXXXXB to XXXXXXXXB
003AA8H to 003AAFH	003BA8H to 003BAFH	0037A8H to 0037AFH	0038A8H to 0038AFH	Data register 5 (8 bytes)	DTR5	R/W	XXXXXXXXB to XXXXXXXXB
003AB0H to 003AB7H	003BB0H to 003BB7H	0037B0H to 0037B7H	0038B0H to 0038B7H	Data register 6 (8 bytes)	DTR6	R/W	XXXXXXXXB to XXXXXXXXB
003AB8H to 003ABFH	003BB8H to 003BBFH	0037B8H to 0037BFH	0038B8H to 0038BFH	Data register 7 (8 bytes)	DTR7	R/W	XXXXXXXXB to XXXXXXXXB
003AC0H to 003AC7H	003BC0H to 003BC7H	0037C0H to 0037C7H	0038C0H to 0038C7H	Data register 8 (8 bytes)	DTR8	R/W	XXXXXXXXB to XXXXXXXXB
003AC8H to 003ACFH	003BC8H to 003BCFH	0037C8H to 0037CFH	0038C8H to 0038CFH	Data register 9 (8 bytes)	DTR9	R/W	XXXXXXXXB to XXXXXXXXB
003AD0H to 003AD7H	003BD0H to 003BD7H	0037D0H to 0037D7H	0038D0H to 0038D7H	Data register 10 (8 bytes)	DTR10	R/W	XXXXXXXXB to XXXXXXXXB
003AD8H to 003ADFH	003BD8H to 003BDFH	0037D8H to 0037DFH	0038D8H to 0038DFH	Data register 11 (8 bytes)	DTR11	R/W	XXXXXXXXB to XXXXXXXXB
003AE0H to 003AE7H	003BE0H to 003BE7H	0037E0H to 0037E7H	0038E0H to 0038E7H	Data register 12 (8 bytes)	DTR12	R/W	XXXXXXXXB to XXXXXXXXB
003AE8H to 003AEFH	003BE8H to 003BEFH	0037E8H to 0037EFH	0038E8H to 0038EFH	Data register 13 (8 bytes)	DTR13	R/W	XXXXXXXXB to XXXXXXXXB
003AF0H to 003AF7H	003BF0H to 003BF7H	0037F0H to 0037F7H	0038F0H to 0038F7H	Data register 14 (8 bytes)	DTR14	R/W	XXXXXXXXB to XXXXXXXXB
003AF8H to 003AFFH	003BF8H to 003BFFH	0037F8H to 0037FFH	0038F8H to 0038FFH	Data register 15 (8 bytes)	DTR15	R/W	XXXXXXXXB to XXXXXXXXB

(Continued)

Interrupt source	EI²OS corresponding	Interrupt vector			Interrupt control register		Priority *2
		Number		Address	ICR	Address	
UART 1 RX	◎	#37	25H	FFFF68H	ICR13	0000BDH*1	High
UART 1 TX	△	#38	26H	FFFF64H			
UART 0 RX	◎	#39	27H	FFFF60H	ICR14	0000BEH*1	
UART 0 TX	△	#40	28H	FFFF5CH			
Flash memory status	×	#41	29H	FFFF58H	ICR15	0000BFH*1	
Delay interrupt generator module	×	#42	2AH	FFFF54H			Low

◎ : Usable, and has expanded intelligent I/O services (EI²OS) stop function
○ : Usable
△ : Usable when interrupt sources sharing ICR are not in use
× : Unusable

*1 : • Peripheral functions that share the ICR register have the same interrupt level.
• If the expanded intelligent I/O service (EI²OS) is used with peripheral functions that share the ICR register, only one of the peripheral functions that share the register can be used.
• When the expanded intelligent I/O service (EI²OS) is specified for one of the peripheral functions that shares the ICR register, interrupts cannot be used from the other peripheral functions that share the register.

*2 : Priority applies when interrupts of the same level are generated.

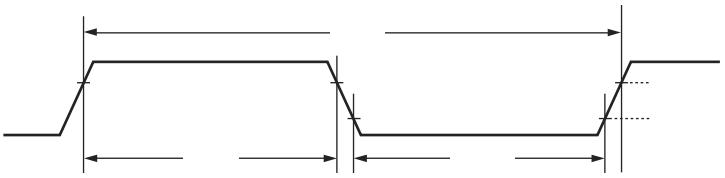
4. AC Characteristics

(1) Clock timing

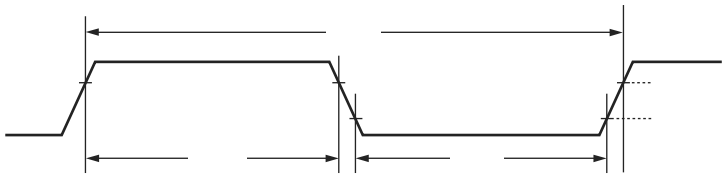
(V_{CC} = 5.0 V ±10%, V_{SS} = DV_{SS} = AV_{SS} = 0.0 V, T_A = –40 °C to +105 °C)

Parameter	Symbol	Pin name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Clock frequency	F_C	X0, X1	—	3	—	16	MHz	1/2 (PLL stopped) When using the oscillator circuit
				3	—	32	MHz	1/2 (PLL stopped) When using an external clock
				4	—	32	MHz	PLL multiplied by 1
				3	—	16	MHz	PLL multiplied by 2
				3	—	10.7	MHz	PLL multiplied by 3
				3	—	8	MHz	PLL multiplied by 4
				3	—	5.33	MHz	PLL multiplied by 6
				3	—	4	MHz	PLL multiplied by 8
	F_{LC}	X0A, X1A		—	32.768	—	kHz	
Clock cycle time	t_{CYL}	X0, X1		62.5	—	333	ns	When using an oscillator
				31.25	—	333	ns	External clock input
	t_{LCYL}	X0A, X1A		—	30.5	—	µs	
Input clock pulse width	P_{WH}, P_{WL}	X0		5	—	—	ns	Use duty ratio of 50% ± 3% as a guideline
	P_{WLH}, P_{WLL}	X0A		—	15.2	—	µs	
Input clock rise and fall time	tcr, tcf	X0		—	—	5	ns	When using an external clock signal
Internal operating clock frequency	F_{CP}	—		1.5	—	32	MHz	Using main clock (PLL clock)
	F_{LCP}	—		—	8.192	—	kHz	Using sub clock
Internal operating clock cycle time	t_{CP}	—		31.25	—	666	ns	Using main clock (PLL clock)
	t_{LCP}	—		—	122.1	—	µs	Using sub clock

• X0, X1 clock timing



• X0A, X1A clock timing



(4) UART0/1/2/3 (LIN/SCI)

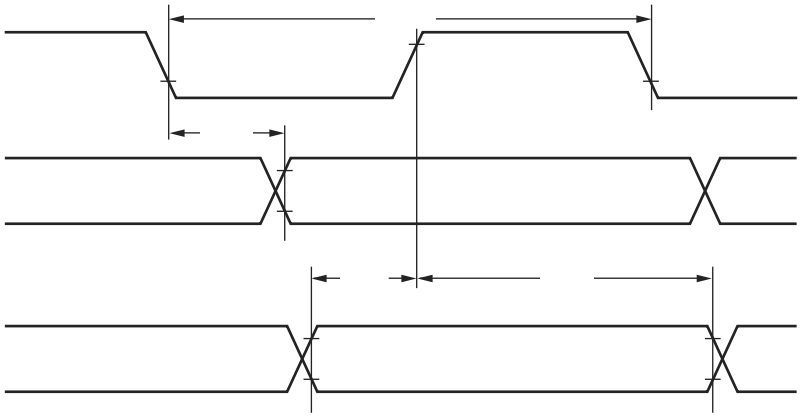
- **Bit setting: ESCR0/1/2/3:SCES=0, ECCR0/1/2/3:SCDE=0**

(V_{CC} = 5.0 V±10 %, V_{SS} = AV_{SS} = 0.0 V, T_A = − 40 °C to +105 °C)

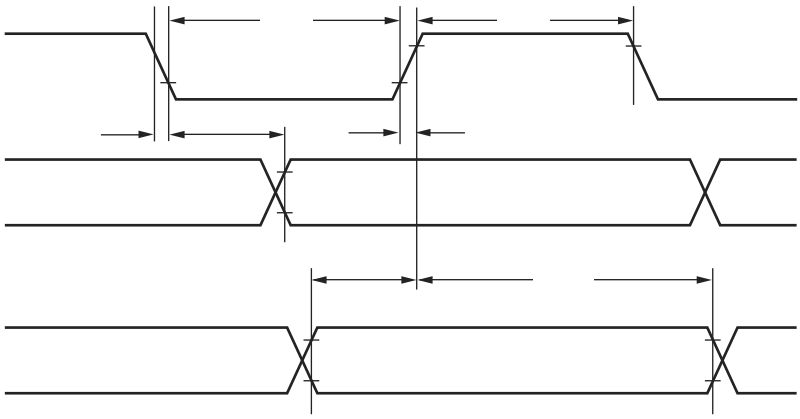
Parameter	Symbol	Pin name	Conditions	Value		Unit
				Min	Max	
Serial clock cycle time	t_{SCYC}	SCK0 to SCK3	Internal shift clock mode output pin C_L = 80 pF + 1TTL	5 t_{CP}	—	ns
SCK ↓ → SOT delay time	t_{SLOVI}	SCK0 to SCK3, SOT0 to SOT3		− 50	+ 50	ns
Valid SIN → SCK ↑	t_{IVSHI}	SCK0 to SCK3, SIN0 to SIN3		t_{CP} + 80	—	ns
SCK ↑ → valid SIN hold time	t_{SHIXI}			0	—	ns
Serial clock “L” pulse width	t_{SLSH}	SCK0 to SCK3	External shift clock mode output pin C_L = 80 pF + 1TTL	3 t_{CP} − t_R	—	ns
Serial clock “H” pulse width	t_{SHSL}			t_{CP} + 10	—	ns
SCK ↓ → SOT delay time	t_{SLOVE}	SCK0 to SCK3, SOT0 to SOT3		—	2 t_{CP} + 60	ns
Valid SIN → SCK ↑	t_{IVSHE}	SCK0 to SCK3, SIN0 to SIN3		30	—	ns
SCK ↑ → valid SIN hold time	t_{SHIXE}			t_{CP} + 30	—	ns
SCK ↓ time	t_F	SCK0 to SCK3		—	10	ns
SCK ↑ time	t_R			—	10	ns

Notes : • Depending on the machine clock frequency to be used, the maximum baud rate may be limited by some parameters. These parameters are shown in “MB90920 series hardware manual”.
• C_L is the load capacitance connected to the pin during testing.
• t_{CP} is the internal operating clock cycle time. Refer to “ (1) Clock timing”.

- Internal shift clock mode



- External shift clock mode



5. A/D Converter

(1) Electrical Characteristics

(V_{CC} = AV_{CC} = AVRH = 4.0 V to 5.5 V, V_{SS} = AV_{SS} = 0.0 V, T_A = –40 °C to +105 °C)

Parameter	Symbol	Pin name	Value			Unit	Remarks
			Min	Typ	Max		
Resolution	—	—	—	—	10	bit	
Total error	—	—	– 3.0	—	+ 3.0	LSB	
Non-linear error	—	—	– 2.5	—	+ 2.5	LSB	
Differential linear error	—	—	– 1.9	—	+ 1.9	LSB	
Zero transition voltage	V_{OT}	AN0 to AN7	AV_{SS} – 1.5 LSB	AV_{SS} + 0.5 LSB	AV_{SS} + 2.5 LSB	V	1 LSB = (AVRH – AV_{SS}) / 1024
Full scale transition voltage	V_{FST}	AN0 to AN7	AVRH – 3.5 LSB	AVRH – 1.5 LSB	AVRH + 0.5 LSB	V	
Sampling time	t_{SMP}	—	0.4	—	16500	µs	4.5 V ≤ AVcc ≤ 5.5 V
			1.0				4.0 V ≤ AVcc ≤ 4.5 V
Compare time	t_{CMP}	—	0.66	—	—	µs	4.5 V ≤ AVcc ≤ 5.5 V
			2.2				4.0 V ≤ AVcc ≤ 4.5 V
A/D conversion time	t_{CNV}	—	1.44	—	—	µs	*1
Analog port input current	I_{AIN}	AN0 to AN7	– 0.3	—	+ 10	µA	
Analog input voltage	V_{AIN}	AN0 to AN7	0	—	AVRH	V	
Reference voltage	AV+	AVRH	AVss + 2.7	—	AV_{CC}	V	
Power supply current	I_A	AV_{CC}	—	2.3	6.0	mA	
	I_{AH}		—	—	5	µA	*2
Reference voltage supply current	I_R	AVRH	—	520	900	µA	V_{AVRH} = 5.0 V
	I_{RH}		—	—	5	µA	*2
Inter-channel variation	—	AN0 to AN7	—	—	4	LSB	

*1 : The time per channel (4.5 V ≤ AV_{CC} ≤ 5.5 V, and internal operating frequency = 32 MHz) .

*2 : Defined as supply current (when V_{CC} = AV_{CC} = AVRH = 5.0 V) with A/D converter not operating, and CPU in stop mode.

■ ORDERING INFORMATION

Part number	Package	Remarks
MB90F922NCPMC MB90F922NCSPMC MB90922NCSPMC MB90F923NCPMC MB90F923NCSPMC MB90F924NCPMC MB90F924NCSPMC	120-pin plastic LQFP (FPT-120P-M21)	
MB90V920-101CR MB90V920-102CR	299-pin ceramic PGA (PGA-299C-A01)	For evaluation