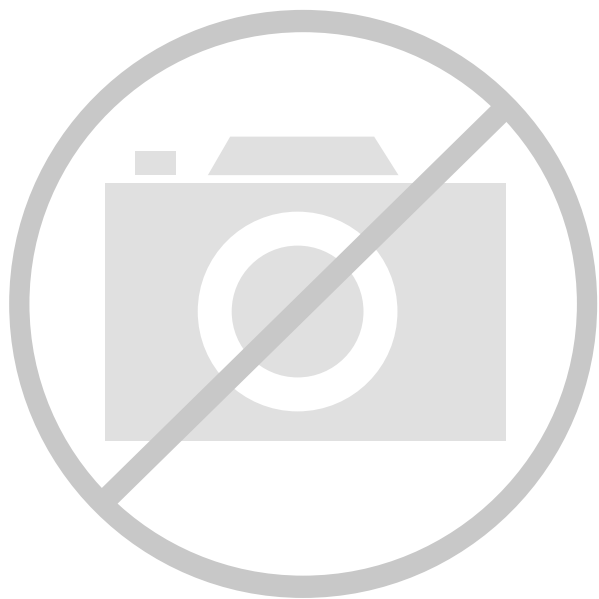




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What is "[Embedded - Microcontrollers](#)"?

"[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	FR81S
Core Size	32-Bit Single-Core
Speed	80MHz
Connectivity	CANbus, CSIO, EBI/EMI, I ² C, LINbus, SPI, UART/USART
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	152
Program Memory Size	1.0625MB (1.0625M x 8)
Program Memory Type	FLASH
EEPROM Size	64K x 8
RAM Size	136K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 48x12b; D/A 2x8b
Oscillator Type	External
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	176-LQFP
Supplier Device Package	176-LQFP (24x24)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb91f526lwepmc-gsk5e2

Product Lineup Comparison 176 Pins

	MB91F522L	MB91F523L	MB91F524L	MB91F525L	MB91F526L
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5 ns (80 MHz)				
Flash Capacity (Program)	(256+64) KB	(384+64) KB	(512+64) KB	(768+64) KB	(1024+64) KB
Flash Capacity (Data)	64 KB				
RAM Capacity	(48+8) KB	(64+8) KB	(96+8) KB	(128+8) KB	
External BUS I/F (22 address/16 data/4 cs)	Yes				
DMA Transfer	16 ch				
16-bit Base Timer	2 ch				
Free-run Timer	16 bit × 3 ch, 32 bit × 3 ch				
Input capture	16 bit × 4 ch, 32 bit × 6 ch				
Output Compare	16 bit × 6 ch, 32 bit × 6 ch				
16-bit Reload Timer	8 ch				
PPG	16 bit × 48 ch				
Up/down Counter	2 ch				
Clock Supervisor	Yes				
External Interrupt	8 ch × 2 units				
A/D converter	12 bit × 32 ch (1 unit), 12 bit × 16 ch (1 unit)				
D/A converter (8 bit)	2 ch				
Multi-Function Serial Interface	12 ch ^{*1}				
CAN	64 msg × 2 ch/128 msg × 1 ch				
Hardware Watchdog Timer	Yes				
CRC Formation	Yes				
Low-voltage detection reset	Yes				
Flash Security	Yes				
ECC Flash/WorkFlash	Yes				
ECC RAM	Yes				
Memory Protection Function (MPU)	Yes				
Floating point arithmetic (FPU)	Yes				
Real Time Clock (RTC)	Yes				
General-purpose port (#GPIOs)	152 ports				
SSCG	Yes				
Sub clock	Yes				
CR oscillator	Yes				
NMI request function	Yes				
OCD (On Chip Debug)	Yes				
TPU (Timing Protection Unit)	Yes				
Key code register	Yes				
Waveform generator	6 ch				
Operation guaranteed temperature (T _A)	-40 °C to +125 °C				
Power supply	2.7 V to 5.5 V ^{*2}				
Package	LQP176				

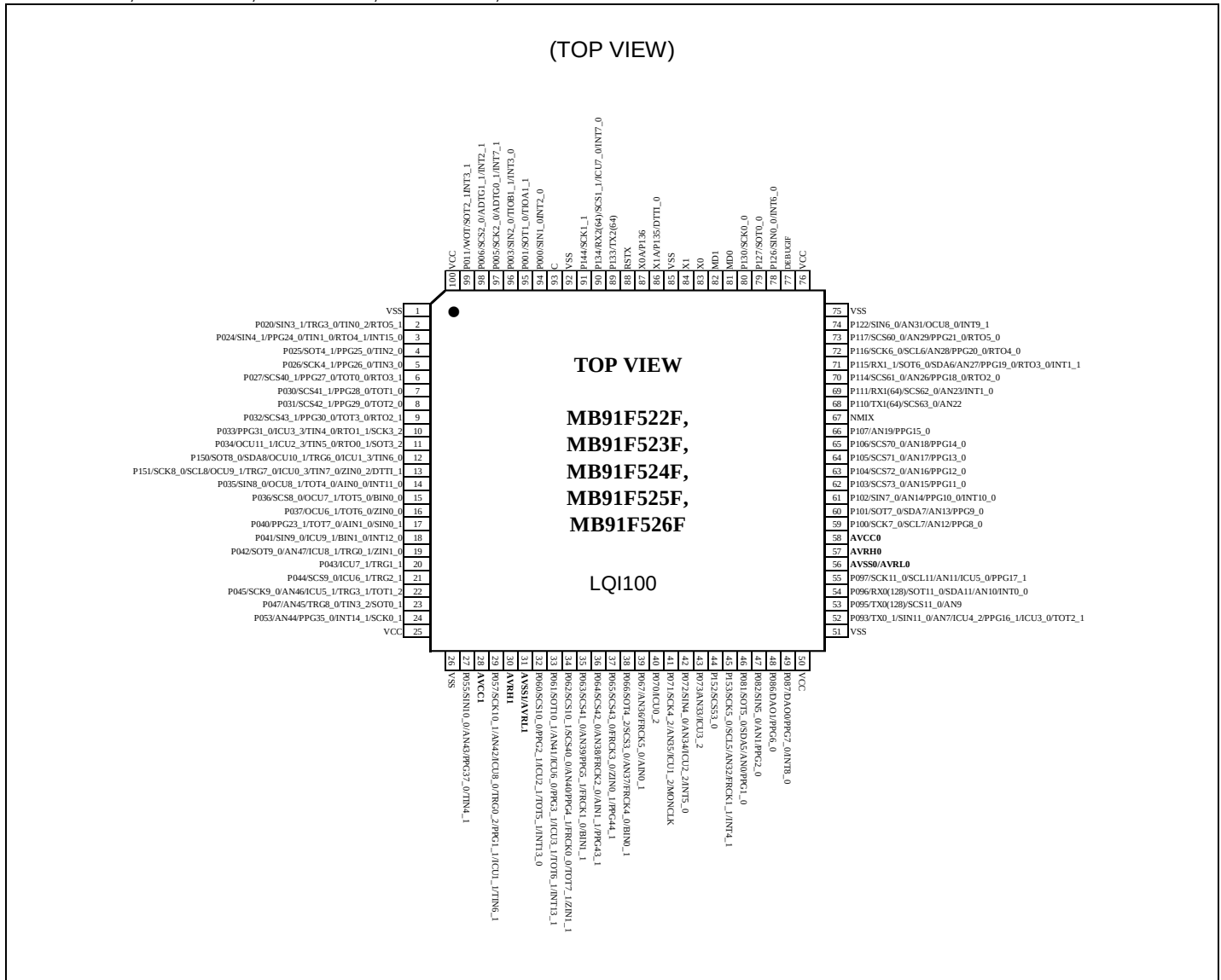
*1: Only channel 3 and channel 4 support the I²C (fast mode/standard mode).

Only channel 5, channel 6, channel 7, channel 8, channel 10 and channel 11 support the I²C (standard mode).

*2: The initial detection voltage of the external low voltage detection is 2.8 V ± 8 % (2.576 V to 3.024 V). This LVD setting and internal LVD cannot be used to reliably generate a reset before voltage dips below minimum guaranteed operation voltage, as these detection levels are below the minimum guaranteed MCU operation voltage. Below the minimum guaranteed MCU operation voltage, MCU operations are not guaranteed with the exception of LVD.

MB91F52xF

MB91F522F, MB91F523F, MB91F524F, MB91F525F, MB91F526F



* In a single clock product, pin 86 and pin 87 are the general-purpose ports.

Pin No.						Pin Name	Polarity	I/O Circuit types*8	Function*9
64	80	100	120	144	176				
3*1	3*1	3*1	6*1	9	11	P024	-	F	General-purpose I/O port
						WR0X *2, *3, *4, *5	-		External bus/Write strobe 0 output
						SIN4_1	-		Multi-function serial ch.4 serial data input (1)
						PPG24_0	-		PPG ch.24 output (0)
						TIN1_0	-		Reload timer ch.1 event input (0)
						RTO4_1	-		Waveform generator ch.4 output pin (1)
						INT15_0	-		INT15 External interrupt input (0)
-	-	4*1	7*1	10	12	P025	-	A	General-purpose I/O port
						WR1X *4, *5	-		External bus/Write strobe 1 output
						SOT4_1	-		Multi-function serial ch.4 serial data output (1)
						PPG25_0	-		PPG ch.25 output (0)
						TIN2_0	-		Reload timer ch.2 event input (0)
-	-	-	-	-	13	P172	-	A	General-purpose I/O port
						PPG38_1	-		PPG ch.38 output (1)
-	4*1	5*1	8*1	11	14	P026	-	F	General-purpose I/O port
						A00 *3, *4, *5	-		External bus/Address bit0 output (0)
						SCK4_1	-		Multi-function serial ch.4 clock I/O (1)
						PPG26_0	-		PPG ch.26 output (0)
						TIN3_0	-		Reload timer ch.3 event input (0)
4*1	5*1	6*1	9*1	12	15	P027	-	A	General-purpose I/O port
						A01 *2, *3, *4, *5	-		External bus/Address bit1 output (0)
						SCS40_1	-		Serial chip select 40 I/O (1)
						PPG27_0	-		PPG ch.27 output (0)
						TOT0_0	-		Reload timer ch.0 output (0)
						RTO3_1	-		Waveform generator ch.3 output pin (1)
-	-	-	-	-	16	P173	-	A	General-purpose I/O port
						PPG39_1	-		PPG ch.39 output (1)
-	-	7*1	10*1	13	17	P030	-	A	General-purpose I/O port
						A02 *4, *5	-		External bus/Address bit2 output (0)
						SCS41_1	-		Serial chip select 41 output (1)
						PPG28_0	-		PPG ch.28 output (0)
						TOT1_0	-		Reload timer ch.1 output (0)
-	6*1	8*1	11*1	14	18	P031	-	A	General-purpose I/O port
						A03 *3, *4, *5	-		External bus/Address bit3 output (0)
						SCS42_1	-		Serial chip select 42 output (1)
						PPG29_0	-		PPG ch.29 output (0)
						TOT2_0 *3	-		Reload timer ch.2 output (0)

Pin No.						Pin Name	Polarity	I/O Circuit types*8	Function*9
64	80	100	120	144	176				
5*1	7*1	9*1	12*1	15	19	P032	-	A	General-purpose I/O port
						A04*2, *3, *4, *5	-		External bus/Address bit4 output (0)
						SCS43_1	-		Serial chip select 43 output (1)
						PPG30_0	-		PPG ch.30 output (0)
						TOT3_0	-		Reload timer ch.3 output (0)
						RTO2_1	-		Waveform generator ch.2 output pin (1)
6*1	8*1	10*1	13*1	16	20	P033	-	A	General-purpose I/O port
						A05*2, *3, *4, *5	-		External bus/Address bit5 output (0)
						PPG31_0	-		PPG ch.31 output (0)
						ICU3_3	-		Input capture ch.3 input (3)
						TIN4_0	-		Reload timer ch.4 event input (0)
						RTO1_1	-		Waveform generator ch.1 output pin (1)
						SCK3_2	-		Multi-function serial ch.3 clock I/O (2)
7*1	9*1	11*1	14*1	17	21	P034	-	A	General-purpose I/O port
						A06*2, *3, *4, *5	-		External bus/Address bit6 output (0)
						OCU11_1	-		Output compare ch.11 output (1)
						ICU2_3	-		Input capture ch.2 input (3)
						TIN5_0	-		Reload timer ch.5 event input (0)
						RTO0_1	-		Waveform generator ch.0 output pin (1)
						SOT3_2	-		Multi-function serial ch.3 serial data output (2)
-	-	12	15	18	22	P150	-	F	General-purpose I/O port
						SOT8_0/ SDA8	-		Multi-function serial ch.8 serial data output (0)/ I ² C bus serial data I/O
						OCU10_1	-		Output compare ch.10 output (1)
						TRG6_0	-		PPG trigger 6 input (0)
						ICU1_3	-		Input capture ch.1 input (3)
						TIN6_0	-		Reload timer ch.6 event input (0)
8*1	10*1	13	16	19	23	P151	-	F	General-purpose I/O port
						SCK8_0/ SCL8*2, *3	-		Multi-function serial ch.8 clock I/O (0)/ I ² C bus serial clock I/O
						OCU9_1	-		Output compare ch.9 output (1)
						TRG7_0	-		PPG trigger 7 input (0)
						ICU0_3	-		Input capture ch.0 input (3)
						TIN7_0	-		Reload timer ch.7 event input (0)
						ZIN0_2	-		U/D counter ch.0 ZIN input (2)
						DTTI_1	-		Waveform generator ch.1 input pin (1)

CAUTION: Plastic molded devices are flammable, and therefore should not be used near combustible substances. If devices begin to smoke or burn, there is danger of the release of toxic gases.

Customers considering the use of Cypress products in other special environmental conditions should consult with sales representatives.

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
000C00 _H	DCCR0 [R/W] W 0----000 --00--00 00000000 0-000000				DMA Controller [S]
000C04 _H	DCSR0 [R/W] H 0-----000		DTCR0 [R/W] H 00000000 00000000		
000C08 _H	DSAR0 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C0C _H	DDAR0 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C10 _H	DCCR1 [R/W] W 0----000 --00--00 00000000 0-000000				
000C14 _H	DCSR1 [R/W] H 0-----000		DTCR1 [R/W] H 00000000 00000000		
000C18 _H	DSAR1 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C1C _H	DDAR1 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C20 _H	DCCR2 [R/W] W 0----000 --00--00 00000000 0-000000				
000C24 _H	DCSR2 [R/W] H 0-----000		DTCR2 [R/W] H 00000000 00000000		
000C28 _H	DSAR2 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C2C _H	DDAR2 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C30 _H	DCCR3 [R/W] W 0----000 --00--00 00000000 0-000000				
000C34 _H	DCSR3 [R/W] H 0-----000		DTCR3 [R/W] H 00000000 00000000		
000C38 _H	DSAR3 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C3C _H	DDAR3 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C40 _H	DCCR4 [R/W] W 0----000 --00--00 00000000 0-000000				
000C44 _H	DCSR4 [R/W] H 0-----000		DTCR4 [R/W] H 00000000 00000000		
000C48 _H	DSAR4 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C4C _H	DDAR4 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C50 _H	DCCR5 [R/W] W 0----000 --00--00 00000000 0-000000				
000C54 _H	DCSR5 [R/W] H 0-----000		DTCR5 [R/W] H 00000000 00000000		
000C58 _H	DSAR5 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C5C _H	DDAR5 [R/W] W XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX				
000C60 _H	DCCR6 [R/W] W 0----000 --00--00 00000000 0-000000				

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
00132C _H	ADCOMP16/ADCOMPB16[R/W] H,W 00000000 00000000		ADCOMP17/ADCOMPB17[R/W] H,W 00000000 00000000		12-bit A/D converter 1/2 unit
001330 _H	ADCOMP18/ADCOMPB18[R/W] H,W 00000000 00000000		ADCOMP19/ADCOMPB19[R/W] H,W 00000000 00000000		
001334 _H	ADCOMP20/ADCOMPB20[R/W] H,W 00000000 00000000		ADCOMP21/ADCOMPB21[R/W] H,W 00000000 00000000		
001338 _H	ADCOMP22/ADCOMPB22[R/W] H,W 00000000 00000000		ADCOMP23/ADCOMPB23[R/W] H,W 00000000 00000000		
00133C _H	ADCOMP24/ADCOMPB24[R/W] H,W 00000000 00000000		ADCOMP25/ADCOMPB25[R/W] H,W 00000000 00000000		
001340 _H	ADCOMP26/ADCOMPB26[R/W] H,W 00000000 00000000		ADCOMP27/ADCOMPB27[R/W] H,W 00000000 00000000		
001344 _H	ADCOMP28/ADCOMPB28[R/W] H,W 00000000 00000000		ADCOMP29/ADCOMPB29[R/W] H,W 00000000 00000000		
001348 _H	ADCOMP30/ADCOMPB30[R/W] H,W 00000000 00000000		ADCOMP31/ADCOMPB31[R/W] H,W 00000000 00000000		
00134C _H	ADTCS0[R/W] B,H,W 00000000 0010----		ADTCS1[R/W] B,H,W 00000000 0010----		
001350 _H	ADTCS2[R/W] B,H,W 00000000 0010----		ADTCS3[R/W] B,H,W 00000000 0010----		
001354 _H	ADTCS4[R/W] B,H,W 00000000 0010----		ADTCS5[R/W] B,H,W 00000000 0010----		
001358 _H	ADTCS6[R/W] B,H,W 00000000 0010----		ADTCS7[R/W] B,H,W 00000000 0010----		
00135C _H	ADTCS8[R/W] B,H,W 00000000 0010----		ADTCS9[R/W] B,H,W 00000000 0010----		
001360 _H	ADTCS10[R/W] B,H,W 00000000 0010----		ADTCS11[R/W] B,H,W 00000000 0010----		
001364 _H	ADTCS12[R/W] B,H,W 00000000 0010----		ADTCS13[R/W] B,H,W 00000000 0010----		
001368 _H	ADTCS14[R/W] B,H,W 00000000 0010----		ADTCS15[R/W] B,H,W 00000000 0010----		
00136C _H	ADTCS16[R/W] B,H,W 00000000 0010----		ADTCS17[R/W] B,H,W 00000000 0010----		
001370 _H	ADTCS18[R/W] B,H,W 00000000 0010----		ADTCS19[R/W] B,H,W 00000000 0010----		
001374 _H	ADTCS20[R/W] B,H,W 00000000 0010----		ADTCS21[R/W] B,H,W 00000000 0010----		
001378 _H	ADTCS22[R/W] B,H,W 00000000 0010----		ADTCS23[R/W] B,H,W 00000000 0010----		
00137C _H	ADTCS24[R/W] B,H,W 00000000 0010----		ADTCS25[R/W] B,H,W 00000000 0010----		
001380 _H	ADTCS26[R/W] B,H,W 00000000 0010----		ADTCS27[R/W] B,H,W 00000000 0010----		
001384 _H	ADTCS28[R/W] B,H,W 00000000 0010----		ADTCS29[R/W] B,H,W 00000000 0010----		
001388 _H	ADTCS30[R/W] B,H,W 00000000 0010----		ADTCS31[R/W] B,H,W 00000000 0010----		
00138C _H	ADTCD0[R] B,H,W 10--0000 00000000		ADTCD1[R] B,H,W 10--0000 00000000		

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
001448 _H	ADNCS0[R/W] B,H,W 0-000-00	ADNCS1[R/W] B,H,W 0-000-00	ADNCS2[R/W] B,H,W 0-000-00	ADNCS3[R/W] B,H,W 0-000-00	12-bit A/D converter 1/2 unit
00144C _H	ADNCS4[R/W] B,H,W 0-000-00	ADNCS5[R/W] B,H,W 0-000-00	ADNCS6[R/W] B,H,W 0-000-00	ADNCS7[R/W] B,H,W 0-000-00	
001450 _H	ADNCS8[R/W] B,H,W 0-000-00	ADNCS9[R/W] B,H,W 0-000-00	ADNCS10[R/W] B,H,W 0-000-00	ADNCS11[R/W] B,H,W 0-000-00	
001454 _H	ADNCS12[R/W] B,H,W 0-000-00	ADNCS13[R/W] B,H,W 0-000-00	ADNCS14[R/W] B,H,W 0-000-00	ADNCS15[R/W] B,H,W 0-000-00	
001458 _H	ADPRTF0[R] B,H,W 00000000 00000000 00000000 00000000				
00145C _H	ADEOCF0[R] B,H,W 11111111 11111111 11111111 11111111				
001460 _H	ADCS0[R] B,H,W 0-----		ADCH0[R] B,H,W ---00000	ADMD0[R/W] B,H,W 0---0000	
001464 _H	ADSTPCS0[R/W] B,H,W 00000000	ADSTPCS1[R/W] B,H,W 00000000	ADSTPCS2[R/W] B,H,W 00000000	ADSTPCS3[R/W] B,H,W 00000000	
001468 _H	ADSTPCS4[R/W] B,H,W 00000000	ADSTPCS5[R/W] B,H,W 00000000	ADSTPCS6[R/W] B,H,W 00000000	ADSTPCS7[R/W] B,H,W 00000000	
00146C _H	—				12-bit A/D converter 2/2 unit
001470 _H	ADTSS1[R/W] B,H,W -----0	—	—	—	
001474 _H	ADTSE1[R/W] B,H,W ----- 00000000 00000000				
001478 _H	ADCOMP32/ADCOMPB32[R/W] H,W 00000000 00000000		ADCOMP33/ADCOMPB33[R/W] H,W 00000000 00000000		
00147C _H	ADCOMP34/ADCOMPB34[R/W] H,W 00000000 00000000		ADCOMP35/ADCOMPB35[R/W] H,W 00000000 00000000		
001480 _H	ADCOMP36/ADCOMPB36[R/W] H,W 00000000 00000000		ADCOMP37/ADCOMPB37[R/W] H,W 00000000 00000000		
001484 _H	ADCOMP38/ADCOMPB38[R/W] H,W 00000000 00000000		ADCOMP39/ADCOMPB39[R/W] H,W 00000000 00000000		
001488 _H	ADCOMP40/ADCOMPB40[R/W] H,W 00000000 00000000		ADCOMP41/ADCOMPB41[R/W] H,W 00000000 00000000		
00148C _H	ADCOMP42/ADCOMPB42[R/W] H,W 00000000 00000000		ADCOMP43/ADCOMPB43[R/W] H,W 00000000 00000000		
001490 _H	ADCOMP44/ADCOMPB44[R/W] H,W 00000000 00000000		ADCOMP45/ADCOMPB45[R/W] H,W 00000000 00000000		12-bit A/D converter 2/2 unit
001494 _H	ADCOMP46/ADCOMPB46[R/W] H,W 00000000 00000000		ADCOMP47/ADCOMPB47[R/W] H,W 00000000 00000000		
001498 _H to 0014B4 _H	—	—	—	—	

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
001A54 _H	PHDUT0 [W] H,W XXXXXXXX XXXXXXXX		PLDUT0 [W] H,W XXXXXXXX XXXXXXXX		PPG0 * for communication
001A58 _H	PCMDDT0 [R/W] H,W 00000000 00000000		—	—	
001A5C _H	PCN1 [R/W] B,H,W 00000000 000000-0		PCSR1 [W] H,W XXXXXXXX XXXXXXXX		PPG1 * for communication
001A60 _H	PDUT1 [W] H,W XXXXXXXX XXXXXXXX		PTMR1 [R] H,W 11111111 11111111		
001A64 _H	PCN201 [R/W] B,H,W --000000 ----110		PSDR1 [R/W] H,W 00000000 00000000		PPG1 * for communication
001A68 _H	PTPC1 [R/W] H,W 00000000 00000000		PCMDWD1 [R/W] B,H,W ----- ----0000		
001A6C _H	PHCSR1 [W] H,W XXXXXXXX XXXXXXXX		PLCSR1 [W] H,W XXXXXXXX XXXXXXXX		
001A70 _H	PHDUT1 [W] H,W XXXXXXXX XXXXXXXX		PLDUT1 [W] H,W XXXXXXXX XXXXXXXX		
001A74 _H	PCMDDT1 [R/W] H,W 00000000 00000000		—	—	
001A78 _H	PCN2 [R/W] B,H,W 00000000 000000-0		PCSR2 [W] H,W XXXXXXXX XXXXXXXX		PPG2 * for communication
001A7C _H	PDUT2 [W] H,W XXXXXXXX XXXXXXXX		PTMR2 [R] H,W 11111111 11111111		
001A80 _H	PCN202 [R/W] B,H,W --000000 ----110		PSDR2 [R/W] H,W 00000000 00000000		PPG2 * for communication
001A84 _H	PTPC2 [R/W] H,W 00000000 00000000		PCMDWD2 [R/W] B,H,W ----- ----0000		
001A88 _H	PHCSR2 [W] H,W XXXXXXXX XXXXXXXX		PLCSR2 [W] H,W XXXXXXXX XXXXXXXX		
001A8C _H	PHDUT2 [W] H,W XXXXXXXX XXXXXXXX		PLDUT2 [W] H,W XXXXXXXX XXXXXXXX		
001A90 _H	PCMDDT2 [R/W] H,W 00000000 00000000		—	—	
001A94 _H	PCN3 [R/W] B,H,W 00000000 000000-0		PCSR3 [W] H,W XXXXXXXX XXXXXXXX		PPG3 * for communication
001A98 _H	PDUT3 [W] H,W XXXXXXXX XXXXXXXX		PTMR3 [R] H,W 11111111 11111111		
001A9C _H	PCN203 [R/W] B,H,W --000000 ----110		PSDR3 [R/W] H,W 00000000 00000000		
001AA0 _H	PTPC3 [R/W] H,W 00000000 00000000		PCMDWD3 [R/W] B,H,W ----- ----0000		
001AA4 _H	PHCSR3 [W] H,W XXXXXXXX XXXXXXXX		PLCSR3 [W] H,W XXXXXXXX XXXXXXXX		
001AA8 _H	PHDUT3 [W] H,W XXXXXXXX XXXXXXXX		PLDUT3 [W] H,W XXXXXXXX XXXXXXXX		
001AAC _H	PCMDDT3 [R/W] H,W 00000000 00000000		—	—	PPG4
001AB0 _H	PCN4 [R/W] B,H,W 00000000 000000-0		PCSR4 [W] H,W XXXXXXXX XXXXXXXX		
001AB4 _H	PDUT4 [W] H,W XXXXXXXX XXXXXXXX		PTMR4 [R] H,W 11111111 11111111		

(4) Multi-function Serial

(4-1) CSIO timing

(4-1-1) Bit setting: SMR: MD2 = 0, SMR: MD1 = 1, SMR : MD0 = 0, SMR: SCINV = 0, SCR:SPI = 0

(TA: -40 °C to +125 °C, V_{CC} = AV_{CC} = 5.0 V ± 10 %/V_{CC} = AV_{CC} = 3.3 V±0.3 V, V_{SS} = AV_{SS} = 0.0 V)

Parameter	Symbol	Pin Name	Conditions	Value		Unit	Remarks
				Min	Max		
Serial clock cycle time	t _{SCYC}	SCK0 to SCK11	-	4t _{CPP}	-	ns	Internal shift clock mode output pin : C _L = 50 pF
SCK ↓ → SOT delay time	t _{SLOVI}	SCK0 to SCK2, SCK5 to SCK11 SOT0 to SOT2, SOT5 to SOT11		-30	30	ns	
		SCK3 , SCK4 SOT3 , SOT4		-300	300	ns	
Valid SIN → SCK ↑ setup time	t _{IVSHI}	SCK0 to SCK2, SCK5 to SCK11 SIN0 to SIN2, SIN5 to SIN11		34	-	ns	
		SCK3 , SCK4 SIN3 , SIN4		300	-	ns	
SCK ↑ → Valid SIN hold time	t _{SHIXI}	SCK0 to SCK11 SIN0 to SIN11		0	-	ns	
Serial clock "H" pulse width	t _{SHSL}	SCK0 to SCK11	-	t _{CPP} +10	-	ns	External shift clock mode output pin: C _L = 50 pF
Serial clock "L" pulse width	t _{SLSH}			2t _{CPP} -10	-	ns	
SCK ↓ → SOT delay time	t _{SLOVE}	SCK0 to SCK2, SCK5 to SCK11 SOT0 to SOT2, SOT5 to SOT11		-	33	ns	
		SCK3 , SCK4 SOT3 , SOT4		-	300	ns	
Valid SIN → SCK ↑ setup time	t _{IVSHE}	SCK0 to SCK11 SIN0 to SIN11		10	-	ns	
SCK ↑ → Valid SIN hold time	t _{SHIXE}			20	-	ns	
SCK fall time	t _F	SCK0 to SCK11		-	5	ns	
SCK rise time	t _R	SCK0 to SCK11		-	5	ns	

Notes:

AC characteristic in CLK synchronized mode.

C_L is the load capacitance applied to pins during testing.

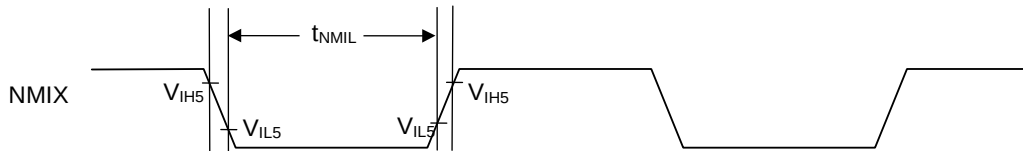
The maximum baud rate is limited by internal operation clock used and other parameters. Please use ch.3 and ch.4 with maximum baud rate 400 kbps or less.

See Hardware Manual for details.

(7) NMI input timing

(T_A: -40 °C to +125 °C, V_{CC} = AV_{CC} = 5.0 V ± 10 %/V_{CC} = AV_{CC} = 3.3 V ± 0.3 V, V_{SS} = AV_{SS} = 0.0 V)

Parameter	Symbol	Pin Name	Conditions	Value		Unit	Remarks
				Min	Max		
Input pulse width	t _{NMIL}	NMIX	—	4t _{CPP}	—	ns	

• NMIX input timing

(8) Low voltage detection (External low-voltage detection)

(T_A: -40 °C to +125 °C, V_{SS} = AV_{SS} = 0.0 V)

Parameter	Symbol	Pin Name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Power supply voltage range	V _{DP5}	VCC	-	2.7	-	5.5	V	
Detection voltage*3	V _{DL}		*1	-8%	LVD5F_SEL[3:0]	+8%	V	LVD5F_SEL[3:0] are programmable. Refer to the hardware manual.
Hysteresis width	V _{HYS}		-	-	0.1	-	V	When power-supply voltage rises
Low voltage detection time	T _d	-	-	-	-	30	μs	
Power supply voltage regulation	-	VCC	-	-2	-	2	V/ms	*2

*1: If the fluctuation of the power supply is faster than the low voltage detection time, there is a possibility to generate or release after the power supply voltage has exceeded the detection voltage range.

*2: Please suppress the change of the power supply within the range of the power-supply voltage regulation to do a low voltage detection by detecting voltage (V_{DL}).

*3: The initial detection voltage of the external low voltage detection is 2.8 V ± 8 % (2.576 V to 3.024 V).

This LVD setting cannot be used to reliably generate a reset before voltage dips below minimum guaranteed MCU operation voltage, as this detection level is below the minimum guaranteed MCU operation voltage (2.7 V).

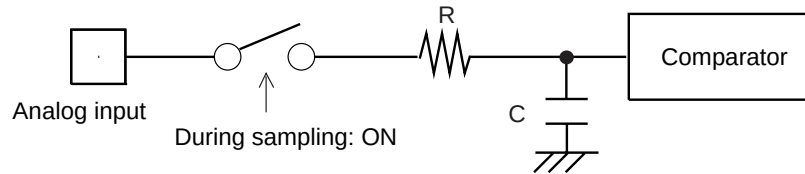
Below the minimum guaranteed MCU operation voltage, MCU operations are not guaranteed with the exception of LVD.

(3) Notes on Using A/D Converter

<About the output impedance of the analog input of external circuit>

When the external impedance is too high, the sampling period for analog voltages may not be sufficient. In this case, it is recommended to connect the capacitor (approx. 0.1 μF) to the analog input pin.

- Analog input circuit model



	R	C	
12-bit A/D	1.9 k Ω (Max)	8.30 pF (Max)	(4.5 V $\leq$ AV _{CC} $\leq$ 5.5 V)
	4.3 k Ω (Max)	8.30 pF (Max)	(3.0 V $\leq$ AV _{CC} $\leq$ 3.6 V)

Note: Listed values must be considered as reference values.

Flash Memory
(1) Electrical Characteristics

Parameter	Value			Unit	Remarks
	Min	Typ	Max		
Sector erase time	–	200	800	ms	8 Kbytes sector* ¹ , excluding internal preprogramming time
	–	300	1100	ms	8 Kbytes sector* ¹ , including internal preprogramming time
	–	400	2000	ms	64 Kbytes sector* ¹ , excluding internal preprogramming time
	–	700	3700	ms	64 Kbytes sector* ¹ , including internal preprogramming time
8-bit writing time	–	9	288	μs	Exclusive of overhead time at system level* ¹
16-bit writing time	–	12	384	μs	Exclusive of overhead time at system level* ¹
ECC writing time	–	9	288	μs	Exclusive of overhead time at system level* ¹
Erase cycle* ² / Data retain time	1,000 cycles/ 20 years, 10,000 cycles/ 10 years, 100,000 cycles/ 5 years	–	–	–	Average T _A = +85 °C* ³

*1: The guaranteed value for erasure up to 100,000 cycles.

*2: Number of erase cycles for each sector.

*3: This value comes from the technology qualification (using Arrhenius equation to translate high temperature measurements into normalized value at + 85 °C).

(2) Notes

While the Flash memory is written or erased, shutdown of the external power (V_{CC}) is prohibited.

In the application system where V_{CC} might be shut down while writing or erasing, be sure to turn the power off by using an external voltage detection function.

To put it concretely, after the external power supply voltage falls below the detection voltage (V_{DL}*), hold V_{CC} at 2.7 V or more within the duration calculated by the following expression:

$$Td^*[\mu s] + (\text{period of PCLK} [\mu s] \times 257) + 50 [\mu s]$$

*: See "4.AC Characteristics (8) Low-voltage detection (External low-voltage detection) "

14. Ordering Information MB91F52xxxC*¹

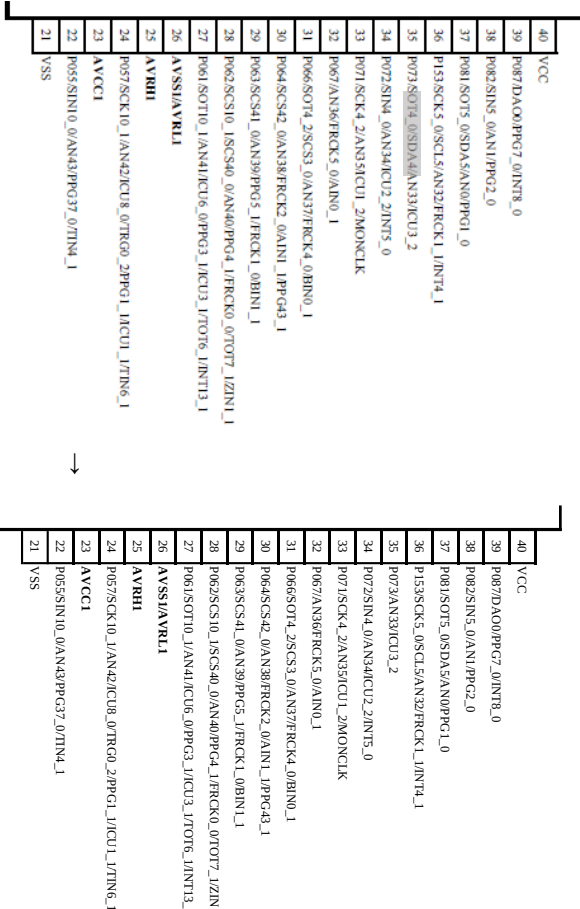
Part Number	Sub Clock	CSV Initial Value	LVD Initial Value	Package* ²
MB91F526LWCPMC	Yes	ON	ON	LQP • 176 pin, Plastic
MB91F526LYCPMC			OFF	
MB91F526LJCPMC		OFF	ON	
MB91F526LLCPMC			OFF	
MB91F525LWCPMC		ON	ON	
MB91F525LYCPMC			OFF	
MB91F525LJCPMC		OFF	ON	
MB91F525LLCPMC			OFF	
MB91F524LWCPMC		ON	ON	
MB91F524LYCPMC			OFF	
MB91F524LJCPMC		OFF	ON	
MB91F524LLCPMC			OFF	
MB91F523LWCPMC		ON	ON	
MB91F523LYCPMC			OFF	
MB91F523LJCPMC		OFF	ON	
MB91F523LLCPMC			OFF	
MB91F522LWCPMC		ON	ON	
MB91F522LYCPMC			OFF	
MB91F522LJCPMC		OFF	ON	
MB91F522LLCPMC			OFF	
MB91F526LSCPMC	None	ON	ON	
MB91F526LUCPMC			OFF	
MB91F526LHCPMC		OFF	ON	
MB91F526LKCPMC			OFF	
MB91F525LSCPMC		ON	ON	
MB91F525LUCPMC			OFF	
MB91F525LHCPMC		OFF	ON	
MB91F525LKCPMC			OFF	
MB91F524LSCPMC		ON	ON	
MB91F524LUCPMC			OFF	
MB91F524LHCPMC		OFF	ON	
MB91F524LKCPMC			OFF	
MB91F523LSCPMC		ON	ON	
MB91F523LUCPMC			OFF	
MB91F523LHCPMC		OFF	ON	
MB91F523LKCPMC			OFF	
MB91F522LSCPMC		ON	ON	
MB91F522LUCPMC			OFF	
MB91F522LHCPMC		OFF	ON	
MB91F522LKCPMC			OFF	

Part Number	Sub Clock	CSV Initial Value	LVD Initial Value	Package* ²
MB91F526JWCPMC	Yes	ON	ON	LQM • 120 pin, Plastic
MB91F526JYCPMC			OFF	
MB91F526JJCPMC		OFF	ON	
MB91F526JLCPMC			OFF	
MB91F525JWCPMC		ON	ON	
MB91F525JYCPMC			OFF	
MB91F525JJCPMC		OFF	ON	
MB91F525JLCPMC			OFF	
MB91F524JWCPMC		ON	ON	
MB91F524JYCPMC			OFF	
MB91F524JJCPMC		OFF	ON	
MB91F524JLCPMC			OFF	
MB91F523JWCPMC		ON	ON	
MB91F523JYCPMC			OFF	
MB91F523JJCPMC		OFF	ON	
MB91F523JLCPMC			OFF	
MB91F522JWCPMC		ON	ON	
MB91F522JYCPMC			OFF	
MB91F522JJCPMC		OFF	ON	
MB91F522JLCPMC			OFF	
MB91F526JSCPMC	None	ON	ON	
MB91F526JUCPMC			OFF	
MB91F526JHCPMC		OFF	ON	
MB91F526JKCPMC			OFF	
MB91F525JSCPMC		ON	ON	
MB91F525JUCPMC			OFF	
MB91F525JHCPMC		OFF	ON	
MB91F525JKCPMC			OFF	
MB91F524JSCPMC		ON	ON	
MB91F524JUCPMC			OFF	
MB91F524JHCPMC		OFF	ON	
MB91F524JKCPMC			OFF	
MB91F523JSCPMC		ON	ON	
MB91F523JUCPMC			OFF	
MB91F523JHCPMC		OFF	ON	
MB91F523JKCPMC			OFF	
MB91F522JSCPMC		ON	ON	
MB91F522JUCPMC			OFF	
MB91F522JHCPMC		OFF	ON	
MB91F522JKCPMC			OFF	

Part Number	Sub Clock	CSV Initial Value	LVD Initial Value	Package*
MB91F526BWDPMC1	Yes	ON	ON	LQD • 64 pin, Plastic
MB91F526BJDPMC1		OFF	ON	
MB91F525BWDPMC1		ON	ON	
MB91F525BJDPMC1		OFF	ON	
MB91F524BWDPMC1		ON	ON	
MB91F524BJDPMC1		OFF	ON	
MB91F523BWDPMC1		ON	ON	
MB91F523BJDPMC1		OFF	ON	
MB91F522BWDPMC1		ON	ON	
MB91F522BJDPMC1		OFF	ON	
MB91F526BSDPMC1	None	ON	ON	
MB91F526BHDPMC1		OFF	ON	
MB91F525BSDPMC1		ON	ON	
MB91F525BHDPMC1		OFF	ON	
MB91F524BSDPMC1		ON	ON	
MB91F524BHDPMC1		OFF	ON	
MB91F523BSDPMC1		ON	ON	
MB91F523BHDPMC1		OFF	ON	
MB91F522BSDPMC1		ON	ON	
MB91F522BHDPMC1		OFF	ON	

*: For details of the package, see [Package Dimensions](#).

Page	Section	Change Results				
Cypress Document Number: 002-04662						
Rev *B						
1	■Features	Corrected the following description. · Clock generation (equipped with SSCG function) · Main oscillation (4MHz to 16MHz) · Sub oscillation (32kHz to 100kHz) or none sub oscillation · PLL multiplication rate : 1 to 20 times ↓ · Clock generation (equipped with SSCG function) · Main oscillation (4MHz to 16MHz) · Sub oscillation (32kHz) or no sub oscillation · PLL multiplication rate : 1 to 20 times · Equipped with a 100kHz CR oscillator				
2	■Features	Corrected the following description. · Base timer : Max. 2 channels · 16-bit timer · Any of four PWM/PPG/PWC/reload timer functions can be selected and used · A 32-bit timer can be used in 2 channels of cascade mode ↓ · Base timer : Max. 2 channels · 16-bit timer · Any of four PWM/PPG/PWC/reload timer functions can be selected and used · As for the PWC function and the reload timer function, a pair of 16-bit timers can be used as one 32-bit timer in the cascaded mode				
6	■Product Lineup	Corrected the following description for Product lineup comparison(64 pin). <table><tr><td>Multi-Function Serial Interface</td><td>8ch</td></tr></table> ↓ <table><tr><td>Multi-Function Serial Interface</td><td>8ch*1</td></tr></table>	Multi-Function Serial Interface	8ch	Multi-Function Serial Interface	8ch*1
Multi-Function Serial Interface	8ch					
Multi-Function Serial Interface	8ch*1					
6	■Product Lineup	Added the following sentences under Product lineup comparison(64 pin) *1: Only channel 5, channel 6 and channel 11 support the I²C (standard mode).				
7	■Product Lineup	Corrected the following description for Product lineup comparison(80 pin). <table><tr><td>Multi-Function Serial Interface</td><td>9ch</td></tr></table> ↓ <table><tr><td>Multi-Function Serial Interface</td><td>9ch*1</td></tr></table>	Multi-Function Serial Interface	9ch	Multi-Function Serial Interface	9ch*1
Multi-Function Serial Interface	9ch					
Multi-Function Serial Interface	9ch*1					
7	■Product Lineup	Added the following sentences under Product lineup comparison(80 pin) *1: Only channel 5, channel 6 and channel 11 support the I²C (standard mode).				
8	■Product Lineup	Corrected the following description for Product lineup comparison(100 pin). <table><tr><td>Multi-Function Serial Interface</td><td>12ch</td></tr></table> ↓ <table><tr><td>Multi-Function Serial Interface</td><td>12ch*1</td></tr></table>	Multi-Function Serial Interface	12ch	Multi-Function Serial Interface	12ch*1
Multi-Function Serial Interface	12ch					
Multi-Function Serial Interface	12ch*1					
8	■Product Lineup	Added the following sentences under Product lineup comparison(100 pin) *1: Only channel 5, channel 6, channel 7, channel 8 and channel 11 support the I²C (standard mode).				

Page	Section	Change Results
14	■ Pin Assignment MB91F52xD	- Bottom 

Page	Section	Change Results																
24	■PIN Description	A List of "Pin Description" modified. (Error) <table><tr><td>Function*2</td></tr><tr><td>General-purpose I/O port</td></tr><tr><td>External Bus chip select 3 output pin(0)</td></tr><tr><td>Input capture ch.9 input pin(0)</td></tr><tr><td>PPG ch.0 output pin(1)</td></tr><tr><td>Input capture ch.0 input pin(1)</td></tr><tr><td>Reload timer ch.5 event input pin(1)</td></tr><tr><td>Waveform generator ch.0 to ch.5 input pin(2)</td></tr></table> (Correct) <table><tr><td>Function*9</td></tr><tr><td>General-purpose I/O port</td></tr><tr><td>External Bus chip select 3 output pin</td></tr><tr><td>Input capture ch.9 input pin(0)</td></tr><tr><td>PPG ch.0 output pin(1)</td></tr><tr><td>Input capture ch.0 input pin(1)</td></tr><tr><td>Reload timer ch.5 event input pin(1)</td></tr><tr><td>Waveform generator ch.0 to ch.5 input pin(2)</td></tr></table>	Function*2	General-purpose I/O port	External Bus chip select 3 output pin(0)	Input capture ch.9 input pin(0)	PPG ch.0 output pin(1)	Input capture ch.0 input pin(1)	Reload timer ch.5 event input pin(1)	Waveform generator ch.0 to ch.5 input pin(2)	Function*9	General-purpose I/O port	External Bus chip select 3 output pin	Input capture ch.9 input pin(0)	PPG ch.0 output pin(1)	Input capture ch.0 input pin(1)	Reload timer ch.5 event input pin(1)	Waveform generator ch.0 to ch.5 input pin(2)
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Reload timer ch.5 event input pin(1)																		
Waveform generator ch.0 to ch.5 input pin(2)																		

Page	Section	Change Results																				
46	■During Power-on	The following sentence modified as following: (Error) To prevent a malfunction of the voltage step-down circuit built in the device, the voltage rising must be monotonic increasing during power-on. Power-on prohibits that the voltage goes up and down and voltage rising stops temporarily. (Correct) To prevent a malfunction of the voltage step-down circuit built in the device, the voltage rising must be monotonic during power-on.																				
142,143	11. Electrical Characteristics Recommended operating conditions	The following sentence modified as following: (Error) *1: When it is used outside recommended operation guarantee range (range of the operation guarantee), contact your sales representative. Moreover, minimum value with an effective external low-voltage detection reset becomes a voltage until generating low-voltage detection reset. (Correct) *1: When it is used outside recommended operation guarantee range (range of the operation guarantee), contact your sales representative. Detection voltage of the external low voltage detection reset (initial) is 2.8V±8% (2.576V to 3.024V). This detection voltage (2.576V) is below the minimum operation guarantee voltage (2.7V). Between this detection voltage and the minimum operation guarantee voltage, MCU functions are not guaranteed except for the low voltage detector. Note that although the detection level is below the minimum operation guarantee voltage, the LVD reset factor flag is set as the voltage drops below the detection level.																				
156, 157	11. Electrical Characteristics AC Characteristics	Added (3-2) Power-on Conditions for MB91F52xxxE																				
184	11. Electrical Characteristics AC Characteristics (4-4) I2C timing	The following sentence modified as following: (Error) <table border="1"><thead><tr><th colspan="2">High-speed mode*3</th><th rowspan="2">Unit</th><th rowspan="2">Remarks</th></tr><tr><th>Min</th><th>Max</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td></tr></tbody></table> Notes: Only ch.3 and ch.4 are standard mode/high-speed mode correspondence. *3: A high-speed mode I2C bus device can be used (Correct) <table border="1"><thead><tr><th colspan="2">Fast mode*3</th><th rowspan="2">Unit</th><th rowspan="2">Remarks</th></tr><tr><th>Min</th><th>Max</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td></tr></tbody></table> Notes: Only ch.3 and ch.4 are standard mode/fast mode correspondence. *3: A fast mode I2C bus device can be used	High-speed mode*3		Unit	Remarks	Min	Max					Fast mode*3		Unit	Remarks	Min	Max				
High-speed mode*3		Unit	Remarks																			
Min	Max																					
Fast mode*3		Unit	Remarks																			
Min	Max																					