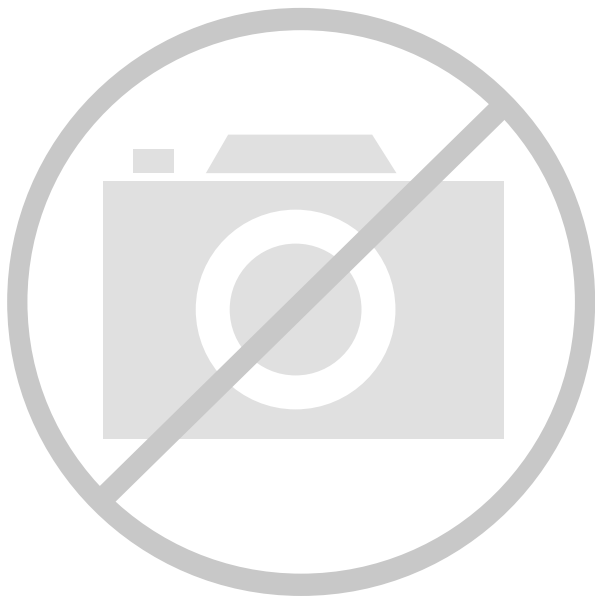




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What is "[Embedded - Microcontrollers](#)"?

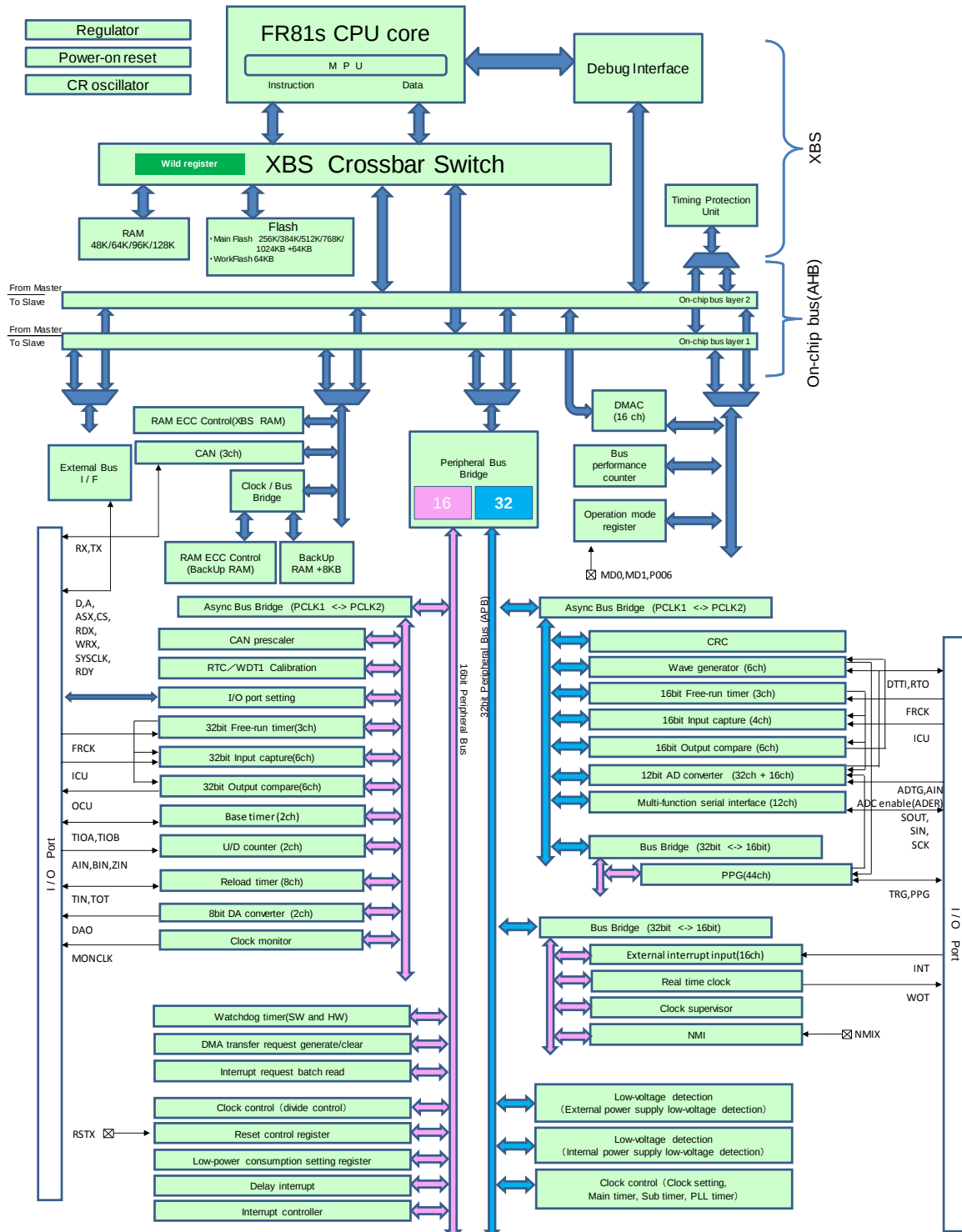
"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" 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, I ² C, LINbus, SPI, UART/USART
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	120
Program Memory Size	576KB (576K x 8)
Program Memory Type	FLASH
EEPROM Size	64K x 8
RAM Size	72K 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	144-LQFP
Supplier Device Package	144-LQFP (20x20)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb91f524kwdpmc-gsk5e2

MB91F522K, MB91F523K, MB91F524K, MB91F525K, MB91F526K



Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
000E20 _H	PFR00 [R/W] B,H,W 00000000	PFR01 [R/W] B,H,W 00000000	PFR02 [R/W] B,H,W 00000000	PFR03 [R/W] B,H,W 00000000	Port Function Register
000E24 _H	PFR04 [R/W] B,H,W 00000000	PFR05 [R/W] B,H,W 00000000	PFR06 [R/W] B,H,W 00000000	PFR07 [R/W] B,H,W 00000000	
000E28 _H	PFR08 [R/W] B,H,W 00000000	PFR09 [R/W] B,H,W 00000000	PFR10 [R/W] B,H,W 00000000	PFR11 [R/W] B,H,W 00000000	
000E2C _H	PFR12 [R/W] B,H,W 00000000	PFR13 [R/W] B,H,W -0000000	PFR14 [R/W] B,H,W ---000--	PFR15 [R/W] B,H,W --000000	
000E30 _H	—	—	—	—	
000E34 _H	—	—	—	—	
000E38 _H	PFR16 [R/W] B,H,W 00000000	PFR17 [R/W] B,H,W 00000000	PFR18 [R/W] B,H,W 00000000	PFR19 [R/W] B,H,W 00000000	
000E3C _H	—	—	—	—	Reserved
000E40 _H	PDDR00 [R] B,H,W XXXXXXXXXX	PDDR01 [R] B,H,W XXXXXXXXXX	PDDR02 [R] B,H,W XXXXXXXXXX	PDDR03 [R] B,H,W XXXXXXXXXX	Port Direct Read Register
000E44 _H	PDDR04 [R] B,H,W XXXXXXXXXX	PDDR05 [R] B,H,W XXXXXXXXXX	PDDR06 [R] B,H,W XXXXXXXXXX	PDDR07 [R] B,H,W XXXXXXXXXX	
000E48 _H	PDDR08 [R] B,H,W XXXXXXXXXX	PDDR09 [R] B,H,W XXXXXXXXXX	PDDR10 [R] B,H,W XXXXXXXXXX	PDDR11 [R] B,H,W XXXXXXXXXX	
000E4C _H	PDDR12 [R] B,H,W XXXXXXXXXX	PDDR13 [R] B,H,W -XXXXXXXXX	PDDR14 [R] B,H,W ---XXX--	PDDR15 [R] B,H,W --XXXXXX	
000E50 _H	—	—	—	—	
000E54 _H	—	—	—	—	
000E58 _H	PDDR16 [R] B,H,W XXXXXXXXXX	PDDR17 [R] B,H,W XXXXXXXXXX	PDDR18 [R] B,H,W XXXXXXXXXX	PDDR19 [R] B,H,W XXXXXXXXXX	
000E5C _H	—	—	—	—	Reserved
000E60 _H	EPFR00 [R/W] B,H,W 00000000	EPFR01 [R/W] B,H,W -0-0-000	EPFR02 [R/W] B,H,W ----0000	EPFR03 [R/W] B,H,W ---000-0	Extended Port Function Register
000E64 _H	EPFR04 [R/W] B,H,W ----00-0	EPFR05 [R/W] B,H,W ----0000	EPFR06 [R/W] B,H,W ----000-	EPFR07 [R/W] B,H,W ---00000	
000E68 _H	EPFR08 [R/W] B,H,W ---00000	EPFR09 [R/W] B,H,W ----00-	EPFR10 [R/W] B,H,W ----0000	EPFR11 [R/W] B,H,W ----0000	
000E6C _H	EPFR12 [R/W] B,H,W ----0000	EPFR13 [R/W] B,H,W -----00	EPFR14 [R/W] B,H,W -----00	EPFR15 [R/W] B,H,W -----000	
000E70 _H	—	—	—	—	
000E74 _H	—	—	—	—	
000E78 _H	—	—	EPFR26 [R/W] B,H,W 00000000	EPFR27 [R/W] B,H,W ---0----	
000E7C _H	EPFR28 [R/W] B,H,W --000-0-	EPFR29 [R/W] B,H,W 00000000	—	—	
000E80 _H	—	EPFR33 [R/W] B,H,W -----00-	EPFR34 [R/W] B,H,W -----00-	EPFR35 [R/W] B,H,W ---00000	

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
0012A0 _H	TMRR0 [R/W] H,W 00000000 00000001		TMRR1 [R/W] H,W 00000000 00000001		Waveform generator 0/1/2
0012A4 _H	TMRR2 [R/W] H,W 00000000 00000001		—	—	
0012A8 _H	DTSCR0 [R/W] B,H,W 00000000	DTSCR1 [R/W] B,H,W 00000000	DTSCR2 [R/W] B,H,W 00000000	—	
0012AC _H	—	DTIR0 [R/W] B,H,W 000000--	—	DTMNS0 [R/W] B,H,W 00---000	
0012B0 _H	—	SIGCR10 [R/W] B,H,W 00000000	—	SIGCR20 [R/W] B,H,W 000000-1	
0012B4 _H	PICS0 [R/W] B,H,W 000000-- -----				
0012B8 _H to 0012CC _H	—	—	—	—	Reserved
0012D0 _H	FRS5 [R/W] B,H,W --00--00 --00--00 --00--00 --00--00				16-bit Free-run timer selection A/D activation compare
0012D4 _H	FRS6 [R/W] B,H,W --00--00 --00--00 --00--00 --00--00				16-bit Free-run timer selection A/D activation compare
0012D8 _H	FRS7 [R/W] B,H,W --00--00 --00--00 --00--00 --00--00				
0012DC _H to 0012FC _H	—	—	—	—	Reserved
001300 _H	—				Reserved
001304 _H	ADTSS0[R/W] B,H,W -----0	—	—	—	12-bit A/D converter 1/2 unit
001308 _H	ADTSE0[R/W] B,H,W 00000000 00000000 00000000 00000000				
00130C _H	ADCOMP0/ADCOMPB0[R/W] H,W 00000000 00000000		ADCOMP1/ADCOMPB1[R/W] H,W 00000000 00000000		
001310 _H	ADCOMP2/ADCOMPB2[R/W] H,W 00000000 00000000		ADCOMP3/ADCOMPB3[R/W] H,W 00000000 00000000		
001314 _H	ADCOMP4/ADCOMPB4[R/W] H,W 00000000 00000000		ADCOMP5/ADCOMPB5[R/W] H,W 00000000 00000000		
001318 _H	ADCOMP6/ADCOMPB6[R/W] H,W 00000000 00000000		ADCOMP7/ADCOMPB7[R/W] H,W 00000000 00000000		
00131C _H	ADCOMP8/ADCOMPB8[R/W] H,W 00000000 00000000		ADCOMP9/ADCOMPB9[R/W] H,W 00000000 00000000		
001320 _H	ADCOMP10/ADCOMPB10[R/W] H,W 00000000 00000000		ADCOMP11/ADCOMPB11[R/W] H,W 00000000 00000000		
001324 _H	ADCOMP12/ADCOMPB12[R/W] H,W 00000000 00000000		ADCOMP13/ADCOMPB13[R/W] H,W 00000000 00000000		
001328 _H	ADCOMP14/ADCOMPB14[R/W] H,W 00000000 00000000		ADCOMP15/ADCOMPB15[R/W] H,W 00000000 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	
001B18 _H	PCN210 [R/W] B,H,W --000000 ----110		PSDR10 [R/W] H,W 00000000 00000000		PPG10
001B1C _H	PTPC10 [R/W] H,W 00000000 00000000		—	—	
001B20 _H	PCN11 [R/W] B,H,W 00000000 000000-0		PCSR11 [W] H,W XXXXXXXX XXXXXXXXX		PPG11
001B24 _H	PDUT11 [W] H,W XXXXXXXX XXXXXXXXX		PTMR11 [R] H,W 11111111 11111111		PPG11
001B28 _H	PCN211 [R/W] B,H,W --000000 ----110		PSDR11 [R/W] H,W 00000000 00000000		
001B2C _H	PTPC11 [R/W] H,W 00000000 00000000		—	—	
001B30 _H	PCN12 [R/W] B,H,W 00000000 000000-0		PCSR12 [W] H,W XXXXXXXX XXXXXXXXX		PPG12
001B34 _H	PDUT12 [W] H,W XXXXXXXX XXXXXXXXX		PTMR12 [R] H,W 11111111 11111111		
001B38 _H	PCN212 [R/W] B,H,W --000000 ----110		PSDR12 [R/W] H,W 00000000 00000000		
001B3C _H	PTPC12 [R/W] H,W 00000000 00000000		—	—	
001B40 _H	PCN13 [R/W] B,H,W 00000000 000000-0		PCSR13 [W] H,W XXXXXXXX XXXXXXXXX		PPG13
001B44 _H	PDUT13 [W] H,W XXXXXXXX XXXXXXXXX		PTMR13 [R] H,W 11111111 11111111		
001B48 _H	PCN213 [R/W] B,H,W --000000 ----110		PSDR13 [R/W] H,W 00000000 00000000		
001B4C _H	PTPC13 [R/W] H,W 00000000 00000000		—	—	
001B50 _H	PCN14 [R/W] B,H,W 00000000 000000-0		PCSR14 [W] H,W XXXXXXXX XXXXXXXXX		PPG14
001B54 _H	PDUT14 [W] H,W XXXXXXXX XXXXXXXXX		PTMR14 [R] H,W 11111111 11111111		
001B58 _H	PCN214 [R/W] B,H,W --000000 ----110		PSDR14 [R/W] H,W 00000000 00000000		
001B5C _H	PTPC14 [R/W] H,W 00000000 00000000		—	—	
001B60 _H	PCN15 [R/W] B,H,W 00000000 000000-0		PCSR15 [W] H,W XXXXXXXX XXXXXXXXX		PPG15
001B64 _H	PDUT15 [W] H,W XXXXXXXX XXXXXXXXX		PTMR15 [R] H,W 11111111 11111111		
001B68 _H	PCN215 [R/W] B,H,W --000000 ----110		PSDR15 [R/W] H,W 00000000 00000000		
001B6C _H	PTPC15 [R/W] H,W 00000000 00000000		—	—	
001B70 _H	PCN16 [R/W] B,H,W 00000000 000000-0		PCSR16 [W] H,W XXXXXXXX XXXXXXXXX		PPG16
001B74 _H	PDUT16 [W] H,W XXXXXXXX XXXXXXXXX		PTMR16 [R] H,W 11111111 11111111		

Address	Address offset value / Register name				Block
	+0	+1	+2	+3	
00230C _H to 0023FC _H	—				Reserved
002400 _H	SEEARX [R] B,H,W -0000000 00000000		DEEARX [R] B,H,W -0000000 00000000		XBS RAM ECC control
002404 _H	EECSR _X [R/W] B,H,W ----00--	—	EFEAR _X [R/W] B,H,W -0000000 00000000		
002408 _H	—	EFECR _X [R/W] B,H,W -----0 00000000 00000000			
00240C _H to 002FFC _H	—				Reserved
003000 _H	SEEARA [R] B,H,W -----000 00000000		DEEARA [R] B,H,W -----000 00000000		Backup RAM ECC control
003004 _H	EECSRA [R/W] B,H,W ----00--	—	EFEARA [R/W] B,H,W -----000 00000000		
003008 _H	—	EFECRA [R/W] B,H,W -----0 00000000 00000000			
00300C _H	TEAR0 _X [R] B,H,W 000----- -0000000 00000000				RAM/ diagnosis XBS RAM
003010 _H	TEAR1 _X [R] B,H,W 000----- -0000000 00000000				
003014 _H	TEAR2 _X [R] B,H,W 000----- -0000000 00000000				
003018 _H	TAEAR _X [R/W] B,H,W -1111111 11111111		TASAR _X [R/W] B,H,W -0000000 00000000		
00301C _H	TFECR _X [R/W] B,H,W ----0000	TICR _X [R/W] B,H,W ----0000	TTCR _X [R/W] B,H,W -----00 00001100		
003020 _H	TSRCR _X [W] B,H,W 0-----	—	—	TKCCR _X [R/W] B,H,W 00----00	
003024 _H to 00302C _H	—				Reserved
003030 _H	TEAR0A[R] B,H,W 000----- -000 00000000				RAM/ diagnosis Backup RAM
003034 _H	TEAR1A[R] B,H,W 000----- -000 00000000				
003038 _H	TEAR2A[R] B,H,W 000----- -000 00000000				
00303C _H	TAEARA[R/W] B,H,W -----111 11111111		TASARA[R/W] B,H,W -----000 00000000		
003040 _H	TFECRA [R/W] B,H,W ----0000	TICRA [R/W] B,H,W ----0000	TTCRA [R/W] B,H,W -----00 00001100		RAM/ diagnosis Backup RAM
003044 _H	TSRCRA [R/W] B,H,W 0-----	—	—	TKCCRA [R/W] B,H,W 00----00	

Interrupt Factor	Interrupt Number		Interrupt Level	Offset	Default Address for TBR	RN
	Decimal	Hexa Decimal				
Multi-function serial interface ch.8 (reception completed)	45	2D	ICR29	348 _H	000FFF48 _H	29* ¹
Multi-function serial interface ch.8 (status)						
16-bit ICU 0 (fetching) / 16-bit ICU 1 (fetching)						
Main timer	46	2E	ICR30	344 _H	000FFF44 _H	30
Sub timer						
PLL timer						
Multi-function serial interface ch.8 (transmission completed)						
16-bit ICU 2 (fetching) / 16-bit ICU 3 (fetching)	47	2F	ICR31	340 _H	000FFF40 _H	31* ¹ , * ⁴
Clock calibration unit (sub oscillation)						
Multi-function serial interface ch.9 (reception completed)						
Multi-function serial interface ch.9 (status)	48	30	ICR32	33C _H	000FFF3C _H	32
A/D converter 0/1/7/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31						
Clock calibration unit (CR oscillation)						
Multi-function serial interface ch.9 (transmission completed)	49	31	ICR33	338 _H	000FFF38 _H	33
16-bit OCU 0 (match) / 16-bit OCU 1 (match)						
32-bit Free-run timer 4	50	32	ICR34	334 _H	000FFF34 _H	34* ⁵
16-bit OCU 2 (match) / 16-bit OCU 3 (match)						
32-bit Free-run timer 3/5	51	33	ICR35	330 _H	000FFF30 _H	35* ⁵
16-bit OCU 4 (match) / 16-bit OCU 5 (match)						
32-bit ICU6 (fetching/measurement)	52	34	ICR36	32C _H	000FFF2C _H	36* ¹
Multi-function serial interface ch.10 (reception completed)						
Multi-function serial interface ch.10 (status)						
32-bit ICU7 (fetching/measurement)	53	35	ICR37	328 _H	000FFF28 _H	37
Multi-function serial interface ch.10 (transmission completed)						
32-bit ICU8 (fetching/measurement)	54	36	ICR38	324 _H	000FFF24 _H	38* ¹
Multi-function serial interface ch.11 (reception completed)						
Multi-function serial interface ch.11 (status)						
32-bit ICU9 (fetching/measurement)	55	37	ICR39	320 _H	000FFF20 _H	39
WG dead timer underflow 0/1/2						
WG dead timer reload 0/1/2						
WG DTTI 0						
32-bit ICU4 (fetching/measurement)	56	38	ICR40	31C _H	000FFF1C _H	40
Multi-function serial interface ch.11 (transmission completed)						

11. Electrical Characteristics

Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit	Remarks
			Min	Max		
Power supply voltage *1,*2		V _{CC}	V _{SS} -0.3	V _{SS} +6.0	V	
Analog power supply voltage *1,*2		AV _{CC}	V _{SS} -0.3	V _{SS} +6.0	V	AVRH ≤ AV _{CC} ≤ V _{CC}
Analog reference voltage *1		AVRH	V _{SS} -0.3	V _{SS} +6.0	V	AVRH ≤ AV _{CC}
Input voltage *1		V _I	V _{SS} -0.3	V _{CC} +0.3	V	
Analog pin input voltage *1		V _{IA5}	V _{SS} -0.3	V _{CC} +0.3	V	
Output voltage *1		V _O	V _{SS} -0.3	V _{CC} +0.3	V	
Maximum clamp current		I _{CLAMP}	-	4.0	mA	*6
Total maximum clamp current		Σ I _{CLAMP}	-	20	mA	*6
"L" level maximum output current *3		I _{OL1}	-	15	mA	
		I _{OL2}	-	30	mA	
"L" level average output current *4		I _{OLAV1}	-	4	mA	*9
		I _{OLAV2}	-	12	mA	*10
"L" level total output current *5		ΣI _{OL1}	-	100	mA	
		ΣI _{OL2}	-	120	mA	
"H" level maximum output current*3		I _{OH1}	-	-15	mA	
		I _{OH2}	-	-30	mA	
"H" level average output current*4		I _{OHAV1}	-	-4	mA	*9
		I _{OHAV2}	-	-12	mA	*10
"H" level total output current *5		ΣI _{OH1}	-	-100	mA	
		ΣI _{OH2}	-	-120	mA	
Power consumption	T _A : -40 °C to +105 °C	P _D	-	882	mW	*8
	T _A : -40 °C to +125 °C		-	675	mW	*8
Operating temperature		T _A	-40	+105	°C	
			-40	+125	°C	
Storage temperature		T _{stg}	-55	+150	°C	

*1: These parameters are based on the condition that V_{SS} = AV_{SS} = 0.0 V

*2: Caution must be taken that AV_{CC}, AVRH do not exceed V_{CC} upon power-on and under other circumstances.

*3: The maximum output current is defined as the value of the peak current flowing through any one of the corresponding pins.

*4: The average output current is defined as the value of the average current flowing through any one of the corresponding pins for a 10 ms period. The average value is the operation current × the operation ratio.

*5: The total output current is defined as the maximum current value flowing through all of corresponding pins.

*6: · Corresponding pins: all general-purpose ports except P035, 041, 093, 122.

· Use within recommended operating conditions.

· Use at DC voltage (current).

· The + B signal should always be applied by connecting a limiting resistor between the + B signal and the microcontroller.

· The value of the limiting resistor should be set so that the current input to the microcontroller pin does not exceed rated values at any time regardless of instantaneously or constantly when the + B signal is input.

· Note that when the microcontroller drive current is low, such as in the low power consumption modes, the + B input potential can increase the potential at the V_{CC} pin via a protective diode, possibly affecting other devices.

· Note that if the + B signal is input when the microcontroller is off (not fixed at 0 V), since the power is supplied through the pin, the microcontroller may operate incompletely.

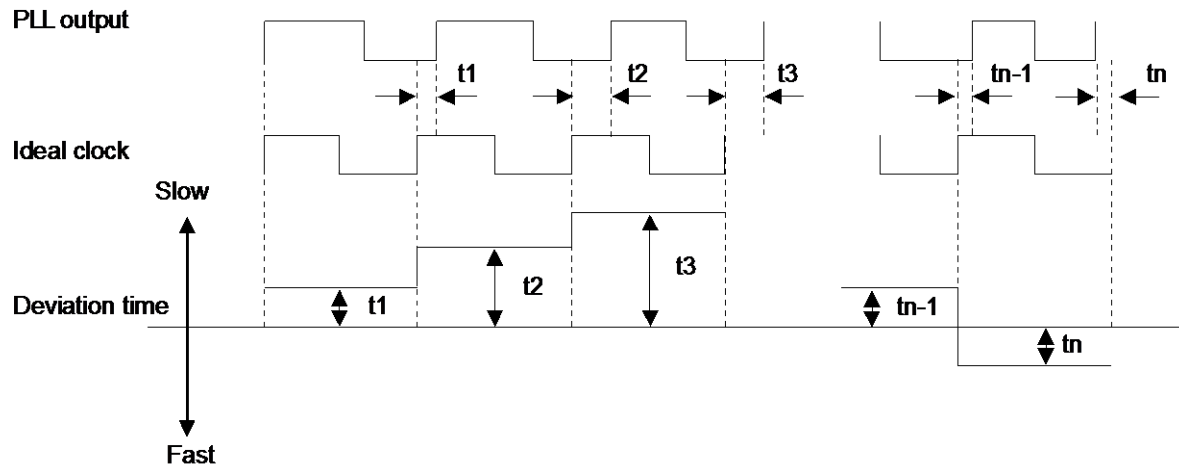
· Note that if the +B signal is input at power-on, since the power is supplied through the pin, the power-on reset may not function in the power supply voltage.

· Do not leave + B input pins open.

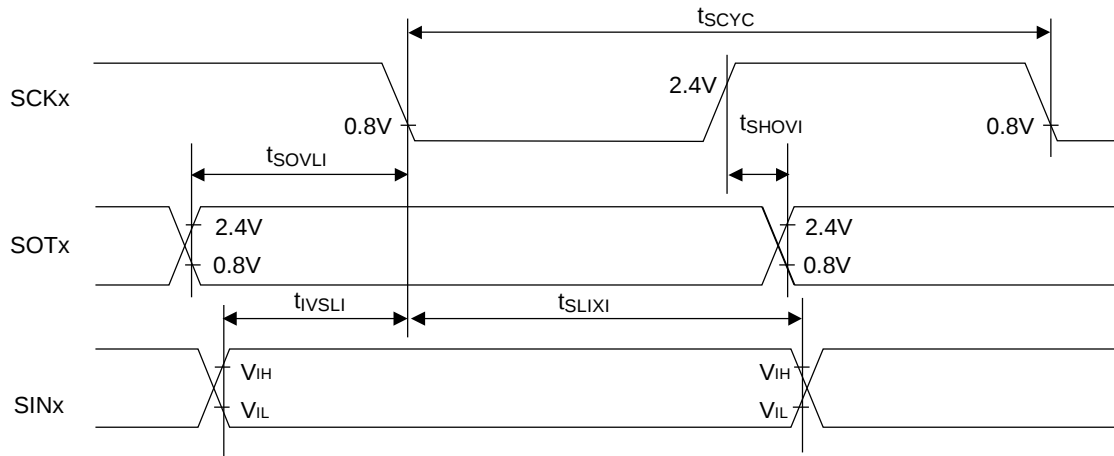
*7: When it is used under this condition, contact your sales representative.

• CAN PLL jitter

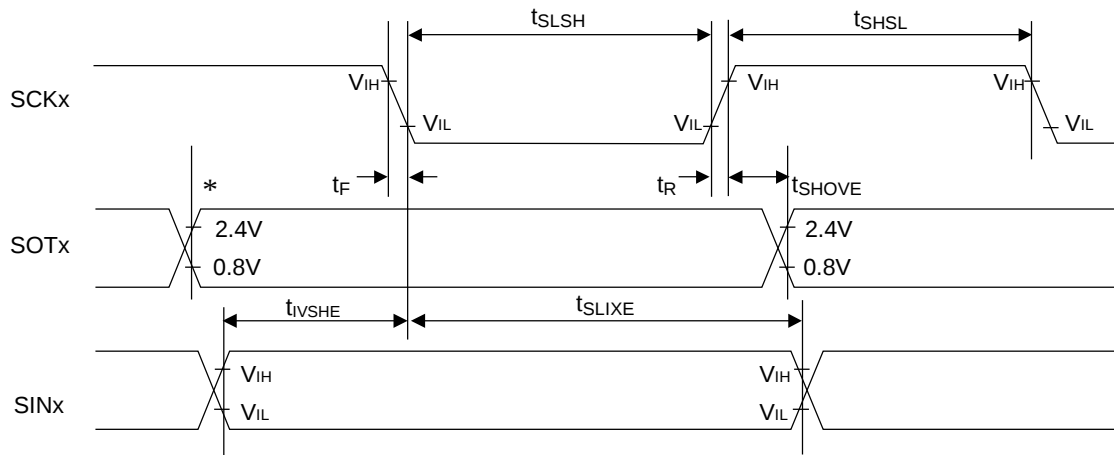
Deviation time from the ideal clock is assured per cycle out of 20, 000 cycles.



□ Internal shift clock mode



• External shift clock mode



*: It writes in the TDR register and, then, it changes.

(4-1-8) Bit setting: SMR:MD2 = 0, SMR:MD1 = 1, SMR:MD0 = 0,

When Serial chip select is used: SCSCR:CSEN = 1,

Serial clock output mark level "L" : SMR,SCSFR:SCINV = 1,

Serial chip select Inactive level "L" : SCSCR,SCSFR:CSLVL = 0

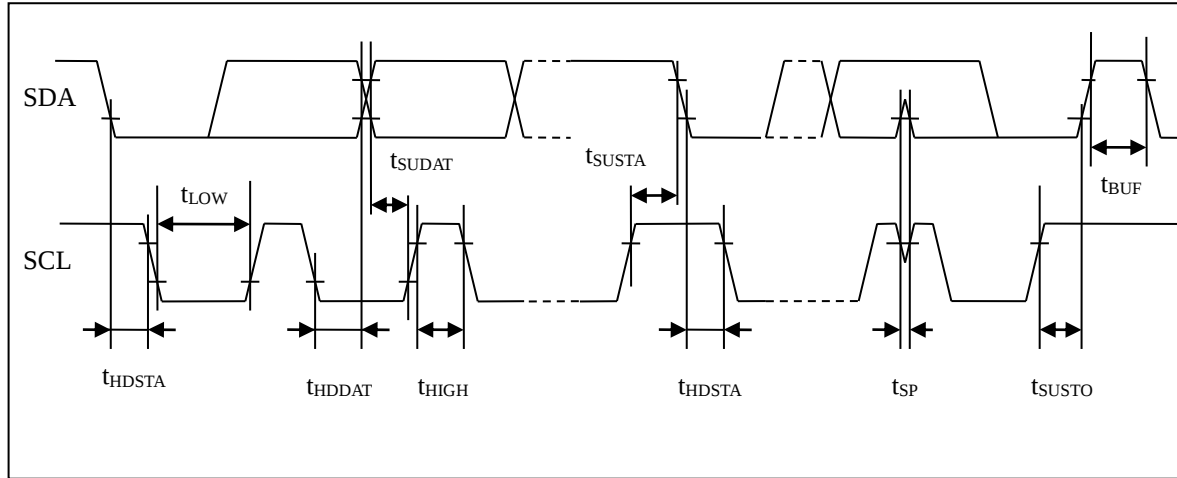
(TA: -40 °C to +125 °C, V_{CC} = AV_{CC} = 5.0 V ± 10 %/V_{CC} = AV_{CC} = 3.3 V ± 0.3 V, V_{SS} = AV_{SS} = 0.0 V)

Parameter	Symbol	Pin Name	Conditions	Value		Unit	Remarks
				Min	Max		
SCS↑→SCK↑ setup time	t _{CSU}	SCK1 , SCK2, SCK5 to SCK11 SCS1 , SCS2, SCS50 to SCS53, SCS60 to SCS63, SCS70 to SCS73, SCS8 to SCS11	-	t _{CSU} -50 *1	t _{CSU} +0 *1	ns	Internal shift clock mode output pin : C _L = 50 pF
		SCK3 , SCK4 SCS3 , SCS40 to SCS43		t _{CSU} -50 *1	t _{CSU} +300 *1	ns	
SCK↓→SCS↓ hold time	t _{CSH}	SCK1 , SCK2, SCK5 to SCK11 SCS1 , SCS2, SCS50 to SCS53, SCS60 to SCS63, SCS70 to SCS73, SCS8 to SCS11		t _{CSHD} -10 *2	t _{CSHD} +50 *2	ns	
		SCK3 , SCK4 SCS3 , SCS40 to SCS43		t _{CSHD} -300 *2	t _{CSHD} +50 *2	ns	
SCS deselect time	t _{CSDI}	SCS1 to SCS3, SCS40 to SCS43, SCS50 to SCS53, SCS60 to SCS63, SCS70 to SCS73, SCS8 to SCS11		t _{CSDS} -50 *3	t _{CSDS} +50 *3	ns	

" $t_{SUDAT} \geq 250 \text{ ns}$ ".

*4: t_{CPP} is the peripheral clock cycle time. Adjust the clock of the bus in the surrounding to 8 MHz or more when use I²C.

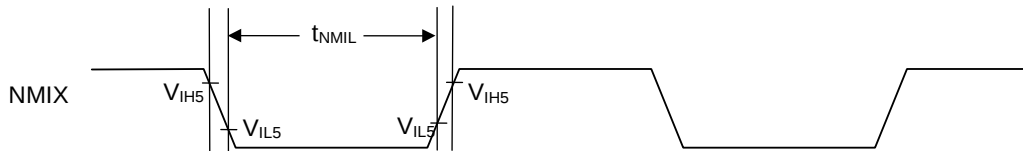
• I²C timing



(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.

(9) Low voltage detection (Internal low-voltage detection)

(TA: -40 °C to +125 °C, VSS = AVSS = 0.0 V)

Parameter	Symbol	Pin Name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Power supply voltage range	V _{RDP5}	-	-	0.6	-	1.4	V	
Detection voltage*2	V _{RDL}		*1	0.8	0.9	1.0	V	When power-supply voltage falls
Hysteresis width	V _{RHYS}		-	-	0.1	-	V	When power-supply voltage rises
Low voltage detection time	-	-	-	-	-	30	μs	

*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: The detection voltage of the internal low voltage detection is 0.9 V ± 0.1 V.

This LVD 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.

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

(10) External bus I/F (synchronous mode) timing

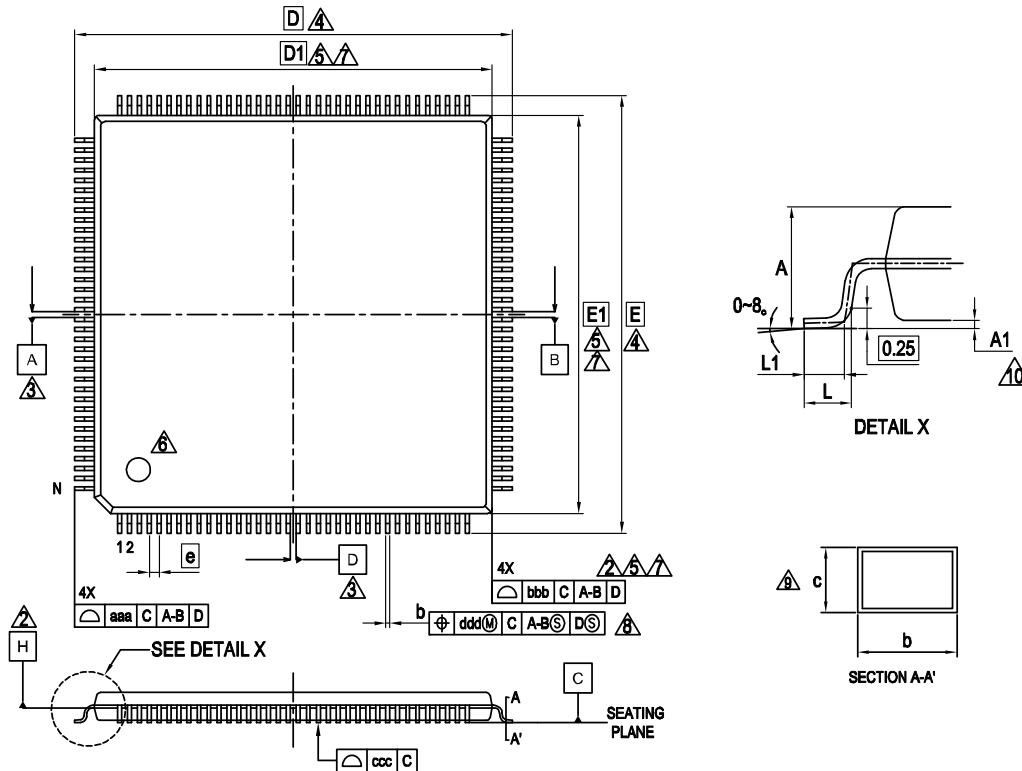
(TA: -40 °C to +105 °C, VCC = AVCC = 5.0 V ± 10 %/VCC = AVCC = 3.3 V ± 0.3 V, VSS = AVSS = 0.0 V)

(external load capacitance 50 pF)

Parameter	Symbol	Pin Name	Value		Unit	Remarks
			Min	Max		
Cycle time	t _{CYC}	SYSCLK	25	-	ns	V _{CC} = 5.0 V ± 10 %*1
			31.25			V _{CC} = 3.3 V ± 0.3 V
ASX delay time	t _{CHASL} , t _{CHASH}	SYSCLK ASX	0.5	18	ns	
CS0X to CS3X delay time	t _{CHCSL} , t _{CHCSH}	SYSCLK CS0X to CS3X	0.5	18	ns	
A00 to A21 delay time	t _{CHAV} , t _{CHAX}	SYSCLK A00 to A21	0.5	18	ns	
RDX delay time	t _{CHRL} , t _{CHRH}	SYSCLK RDX	0.5	18	ns	
RDX minimum pulse	t _{RLRH}	RDX	t _{CYC} × 2 - 20	-	ns	RWT = 1, set RWT to 1 or more.*2
Data setup → RDX↑time	t _{DSRH}	RDX D16 to D31	18+t _{CYC}	-	ns	Same as above
RDX↑→ data hold	t _{RHDH}		0	-	ns	

Part Number	Sub Clock	CSV Initial Value	LVD Initial Value	Package* ²
MB91F526FWCPMC	Yes	ON	ON	LQI • 100 pin, Plastic
MB91F526FYCPMC			OFF	
MB91F526FJCPMC		OFF	ON	
MB91F526FLCPMC			OFF	
MB91F525FWCPMC		ON	ON	
MB91F525FYCPMC			OFF	
MB91F525FJCPMC		OFF	ON	
MB91F525FLCPMC			OFF	
MB91F524FWCPMC		ON	ON	
MB91F524FYCPMC			OFF	
MB91F524FJCPMC		OFF	ON	
MB91F524FLCPMC			OFF	
MB91F523FWCPMC		ON	ON	
MB91F523FYCPMC			OFF	
MB91F523FJCPMC		OFF	ON	
MB91F523FLCPMC			OFF	
MB91F522FWCPMC		ON	ON	
MB91F522FYCPMC			OFF	
MB91F522FJCPMC		OFF	ON	
MB91F522FLCPMC			OFF	
MB91F526FSCPMC	None	ON	ON	
MB91F526FUCPMC			OFF	
MB91F526FHCPMC		OFF	ON	
MB91F526FKCPMC			OFF	
MB91F525FSCPMC		ON	ON	
MB91F525FUCPMC			OFF	
MB91F525FHCPMC		OFF	ON	
MB91F525FKCPMC			OFF	
MB91F524FSCPMC		ON	ON	
MB91F524FUCPMC			OFF	
MB91F524FHCPMC		OFF	ON	
MB91F524FKCPMC			OFF	
MB91F523FSCPMC		ON	ON	
MB91F523FUCPMC			OFF	
MB91F523FHCPMC		OFF	ON	
MB91F523FKCPMC			OFF	
MB91F522FSCPMC		ON	ON	
MB91F522FUCPMC			OFF	
MB91F522FHCPMC		OFF	ON	
MB91F522FKCPMC			OFF	

Part Number	Sub Clock	CSV Initial Value	LVD Initial Value	Package*
MB91F526FWDPMC	Yes	ON	ON	LQI • 100 pin, Plastic
MB91F526FJDPMC		OFF	ON	
MB91F525FWDPMC		ON	ON	
MB91F525FJDPMC		OFF	ON	
MB91F524FWDPMC		ON	ON	
MB91F524FJDPMC		OFF	ON	
MB91F523FWDPMC		ON	ON	
MB91F523FJDPMC		OFF	ON	
MB91F522FWDPMC		ON	ON	
MB91F522FJDPMC		OFF	ON	
MB91F526FSDPMC	None	ON	ON	
MB91F526FHDPMC		OFF	ON	
MB91F525FSDPMC		ON	ON	
MB91F525FHDPMC		OFF	ON	
MB91F524FSDPMC		ON	ON	
MB91F524FHDPMC		OFF	ON	
MB91F523FSDPMC		ON	ON	
MB91F523FHDPMC		OFF	ON	
MB91F522FSDPMC		ON	ON	
MB91F522FHDPMC		OFF	ON	
MB91F526DWDPMC	Yes	ON	ON	LQH • 80 pin, Plastic
MB91F526DJDPMC		OFF	ON	
MB91F525DWDPMC		ON	ON	
MB91F525DJDPMC		OFF	ON	
MB91F524DWDPMC		ON	ON	
MB91F524DJDPMC		OFF	ON	
MB91F523DWDPMC		ON	ON	
MB91F523DJDPMC		OFF	ON	
MB91F522DWDPMC		ON	ON	
MB91F522DJDPMC		OFF	ON	
MB91F526DSDPMC	None	ON	ON	
MB91F526DHDPMC		OFF	ON	
MB91F525DSDPMC		ON	ON	
MB91F525DHDPMC		OFF	ON	
MB91F524DSDPMC		ON	ON	
MB91F524DHDPMC		OFF	ON	
MB91F523DSDPMC		ON	ON	
MB91F523DHDPMC		OFF	ON	
MB91F522DSDPMC		ON	ON	
MB91F522DHDPMC		OFF	ON	

LQS144 , 144 Lead Plastic Low Profile Quad Flat Package


PACKAGE	LQS144		
SYMBOL	MIN.	NOM.	MAX.
A	—	—	1.70
A1	0.08	—	0.28
b	0.17	0.22	0.27
c	0.09	—	0.20
D	22.00 BSC.		
D1	20.00 BSC.		
e	0.50 BSC.		
E	22.00 BSC.		
E1	20.00 BSC.		
L	0.45	0.60	0.75
L1	0.30	0.50	0.70
aaa	—	—	0.20
bbb	—	—	0.10
ccc	—	—	0.08
ddd	—	—	0.08
N	144		

NOTES

- CONTROLLING DIMENSIONS ARE IN MILLIMETERS (mm)
- DATUM PLANE H IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.
- DATUMS A-B AND D TO BE DETERMINED AT DATUM PLANE H.
- TO BE DETERMINED AT SEATING PLANE C.
- DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PRE SIDE. DIMENSIONS D1 AND E1 INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
- DETAILS OF PIN 1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE INDICATED.
- REGARDLESS OF THE RELATIVE SIZE OF THE UPPER AND LOWER BODY SECTIONS, DIMENSIONS D1 AND E1 ARE DETERMINED AT THE LARGEST FEATURE OF THE BODY EXCLUSIVE OF MOLD FLASH AND GATE BURRS. BUT INCLUDING ANY MISMATCH BETWEEN THE UPPER AND LOWER SECTIONS OF THE MOLDER BODY.
- DIMENSION b DOES NOT INCLUDE DAMBER PROTRUSION. THE DAMBER PROTRUSION (S) SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED b MAXIMUM BY MORE THAN 0.08mm. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE LEAD FOOT.
- THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10mm AND 0.25mm FROM THE LEAD TIP.
- A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.

19. Major Changes

Spanision Publication Number: MB91F526L_DS705-00011

Page	Section	Change Results
Revision 1.0		
-	-	Initial release
Revision 2.0		
3	■FEATURES	Corrected the following description. 5V tolerant input: 4 channels ch.6, ch.8, ch.9, ch.11 Automotive input ↓ 5V tolerant input: 4 channels ch.6, ch.8, ch.9, ch.11 CMOS hysteresis input
33 to 36	■I/O CIRCUIT TYPE	Corrected the following description to "Type F, G, I, J, K, M". Schmitt input → CMOS hysteresis input Corrected the following description to "Type D, E". I ² C Schmitt input → I ² C hysteresis input
44 to 49	■BLOCK DIAGRAM	Corrected the following description. ●MB91F522B, MB91F523B, MB91F524B, MB91F525B, MB91F526B ●MB91F522D, MB91F523D, MB91F524D, MB91F525D, MB91F526D ●MB91F522F, MB91F523F, MB91F524F, MB91F525F, MB91F526F ●MB91F522J, MB91F523J, MB91F524J, MB91F525J, MB91F526J ●MB91F522K, MB91F523K, MB91F524K, MB91F525K, MB91F526K ●MB91F522L, MB91F523L, MB91F524L, MB91F525L, MB91F526L
138	■ELECTRICAL CHARACTERISTICS 2. Recommended operating conditions	Added the following description. *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
139,140	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the value of "ICCT5 When using sub clock 32kHz TA=+25°C". Max 1420μA → Max 2000μA
139	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the value of "Power supply voltage range". (TA:-40°C to +105°C,Vcc=AVcc=2.7V to 5.5V,VSS=AVSS=0.0V) ↓ (TA:-40°C to +105°C,Vcc=AVcc=5.0V±10%/3.3V±0.3V,VSS=AVSS=0.0V)
140,141	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the value of "Power supply voltage range". (TA:-40°C to +125°C,Vcc=AVcc=2.7V to 5.5V,VSS=AVSS=0.0V) ↓ (TA:-40°C to +125°C,Vcc=AVcc=5.0V±10%/3.3V±0.3V,VSS=AVSS=0.0V)
141	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the value of " Pull-up resistance R _{UP1} ". Vcc=3.3V±0.3V Min 49 Max 140 →Min 45 Max 140
141	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the following description. Pull-up resistance R _{UP2} Port pin other than P035,041,093,122 → P073,074,076,077
141	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Corrected the value of " Pull-up resistance R _{UP2} ". VCC=5.0V±10% Min 25 Max 100 →Min 25 Max 60 VCC=3.3V±0.3V Min 49 Max 140 →Min 33 Max 90
141	■ELECTRICAL CHARACTERISTICS 3.DC characteristics	Added the value of " Pull-up resistance R _{UP3} ". Pin name : Port pin other than P035,041,073,074,076,077,093,122 VCC=5.0V±10% Min 25 Max 100 VCC=3.3V±0.3V Min 45 Max 140

Page	Section	Change Results																																																																																																																																																																		
19	■PIN Description	A List of "Pin Description" modified.																																																																																																																																																																		
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		<table><tr><th colspan="6">Pin no.</th><th rowspan="2">Pin Name</th></tr><tr><th>64</th><th>80</th><th>100</th><th>120</th><th>144</th><th>176</th></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td><td>P015</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>D29</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>TRG0_0</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>3</td><td>3</td><td>P016</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>D30</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>TRG1_0</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>4</td><td>P170</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>PPG36_1</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>4</td><td>5</td><td>P017</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>D31</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>TRG2_0</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>6</td><td>P171</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>PPG37_1</td></tr><tr><td rowspan="6">2</td><td rowspan="6">2</td><td rowspan="6">2</td><td rowspan="6">2</td><td rowspan="6">5</td><td rowspan="6">7</td><td>P020</td></tr><tr><td>ASX</td></tr><tr><td>SIN3_1</td></tr><tr><td>TRG3_0</td></tr><tr><td>TIN0_2</td></tr><tr><td>RTO5_1</td></tr><tr><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">3</td><td rowspan="5">6</td><td rowspan="5">8</td><td>P021</td></tr><tr><td>CS0X</td></tr><tr><td>SOT3_1</td></tr><tr><td>TRG6_1</td></tr><tr><td>TRG4_0</td></tr><tr><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">7</td><td rowspan="5">9</td><td>P022</td></tr><tr><td>CS1X</td></tr><tr><td>SCK3_1</td></tr><tr><td>TRG7_1</td></tr><tr><td>TRG5_0</td></tr><tr><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">5</td><td rowspan="5">8</td><td rowspan="5">10</td><td>P023</td></tr><tr><td>RDX</td></tr><tr><td>SCS3_1</td></tr><tr><td>PPG32_0</td></tr><tr><td>TIN0_0</td></tr><tr><td rowspan="7">3</td><td rowspan="7">3</td><td rowspan="7">3</td><td rowspan="7">6</td><td rowspan="7">9</td><td rowspan="7">11</td><td>P024</td></tr><tr><td>WROX</td></tr><tr><td>SIN4_1</td></tr><tr><td>PPG24_0</td></tr><tr><td>TIN1_0</td></tr><tr><td>RTO4_1</td></tr><tr><td>INT15_0</td></tr></table>	Pin no.						Pin Name	64	80	100	120	144	176	-	-	-	-	2	2	P015							D29							TRG0_0	-	-	-	-	3	3	P016							D30							TRG1_0	-	-	-	-	-	4	P170							PPG36_1	-	-	-	-	4	5	P017							D31							TRG2_0	-	-	-	-	-	6	P171							PPG37_1	2	2	2	2	5	7	P020	ASX	SIN3_1	TRG3_0	TIN0_2	RTO5_1	-	-	-	3	6	8	P021	CS0X	SOT3_1	TRG6_1	TRG4_0	-	-	-	4	7	9	P022	CS1X	SCK3_1	TRG7_1	TRG5_0	-	-	-	5	8	10	P023	RDX	SCS3_1	PPG32_0	TIN0_0	3	3	3	6	9	11	P024	WROX	SIN4_1	PPG24_0	TIN1_0	RTO4_1	INT15_0
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