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The MB91520 series is a Cypress 32-bit microcontroller designed for automotive devices. This series contains the FR81S CPU which is compatible with the FR family.

Note: This series is a composition of the end of the above-mentioned each name of articles of presence, According to Presence of sub-clock, CSV initial value and LVD initial value. Please see "ORDERING INFORMATION" for details.

Features

FR81S CPU Core

- 32-bit RISC, load/store architecture, pipeline 5-stage structure
- Maximum operating frequency: 80 MHz (Source oscillation = 4.0 MHz and 20 multiplied (PLL clock multiplication system))
- General-purpose register : 32 bits × 16 sets
- 16-bit fixed length instructions (basic instruction), 1 instruction per cycle
- Instructions appropriate to embedded applications
 - Memory-to-memory transfer instruction
 - Bit processing instruction
 - Barrel shift order etc.
- High-level language support instructions
- Function entry/exit instructions
- Register content multi-load and store instructions
- Bit search instructions
Logical 1 detection, 0 detection, and change-point detection
- Branch instructions with delay slot
- Overhead reduction during branch process
- Register interlock function
- Easy assembler writing
- The support at the built-in / instruction level of the multiplier
- Signed 32-bit multiplication: 5 cycles
- Signed 16-bit multiplication: 3 cycles
- Interrupt (PC/PS saving)
6 cycles (16 priority levels)
- The Harvard architecture allows simultaneous execution of program and data access.
- Instruction compatibility with the FR Family
- Built-in memory protection function (MPU)
 - Eight protection areas can be specified commonly for instructions and the data.
 - Control access privilege in both privilege mode and user mode.
- Built-in FPU (floating point arithmetic)
 - IEEE754 compliant
 - Floating-point register 32-bit × 16 sets

Peripheral Functions

- Clock generation (equipped with SSCG function)
 - Main oscillation (4MHz to 16MHz)
 - Sub oscillation (32kHz) or none sub oscillation
 - PLL multiplication rate : 1 to 20 times
 - Equipped with a 100kHz CR oscillator
- Built-in program flash memory capacity
MB91F522:256+64KB
MB91F523:384+64KB
MB91F524:512+64KB
MB91F525:768+64KB
MB91F526:1024+64KB
- Flash memory for built-in data (WorkFlash) 64KB
- Built-in RAM capacity
 - Main RAM
MB91F522:48KB
MB91F523:48KB
MB91F524:64KB
MB91F525:96KB
MB91F526:128KB
 - Backup RAM 8KB
- General-purpose ports:
MB91F52xB 44 sets (No sub oscillation), 42 sets (sub oscillation)
MB91F52xD 56 sets (No sub oscillation), 54 sets (sub oscillation)
MB91F52xF 76 sets (No sub oscillation), 74 sets (sub oscillation)
MB91F52xJ 96 sets (No sub oscillation), 94 sets (sub oscillation)
MB91F52xK 120 sets (No sub oscillation), 118 sets (sub oscillation)
MB91F52xL 152 sets (No sub oscillation), 150 sets (sub oscillation)
Included I²C open drain corresponding ports:16 sets
- External bus interface
 - 22-bit address, 16-bit data
- DMA Controller
 - Up to 16 channels can be started simultaneously.
 - 2 transfer factors (Internal peripheral request and software)
- A/D converter (successive approximation type)
 - 12-bit resolution : Max.48ch (32ch+16ch)
 - Conversion time : 1.4μs

- D/A converter (R-2R type)
 - 8-bit resolution : 2ch
- External interrupt input: 8 channels × 2 units total
16 channels
 - Level ("H" / "L"), or edge detection (rising or falling) enabled
- Multi-function serial communication (built-in transmission/reception FIFO memory) : Max.12 channels
 - 5V tolerant input: 4 channels ch.6, ch.8, ch.9, ch.11
CMOS hysteresis input
< UART (Asynchronous serial interface) >
 - Full-duplex double buffering system, 64-step transmission FIFO memory, 64-step reception FIFO memory
 - Parity or no parity is selectable.
 - Built-in dedicated baud rate generator
 - An external clock can be used as the transfer clock
 - Parity, frame, and overrun error detection functions provided
 - DMA transfer support
< CSIO (Synchronous serial interface) >
 - Full-duplex double buffering system, 64-step transmission FIFO memory, 64-step reception FIFO memory
 - SPI supported; master and slave systems supported; 5 to 16, 20, 24, 32-bit data length can be set.
 - Built-in dedicated baud rate generator (Master operation)
 - An external clock can be entered. (Slave operation)
 - Overrun error detection function is provided
 - DMA transfer support
 - Serial chip select SPI function
< LIN (Asynchronous Serial Interface for LIN) >
 - Full-duplex double buffering system, 64-step transmission FIFO memory, 64-step reception FIFO memory
 - LIN protocol revision 2.1 supported
 - Master and slave systems supported
 - Framing error and overrun error detection
 - LIN synch break generation and detection; LIN synch delimiter generation
 - Built-in dedicated baud rate generator
 - An external clock can be adjusted by the reload counter
 - DMA transfer support
 - Hard assist function
< I²C >
 - 2 channels ch.3 , ch.4 Standard mode/fast mode supported.
 - 6 channels ch.5 to ch.8, ch.10, ch.11 Standard mode supported.
 - Full-duplex double buffering system, 64-step transmission FIFO memory, 64-step reception FIFO memory
 - Standard mode (Max. 100kbps) / fast mode (Max. 400kbps) supported
 - DMA transfer supported (for transmission only)
- CAN Controller (CAN) : 3 channels
 - Transfer speed : Up to 1Mbps
 - 128-transmission/reception message buffering : 1 channel (ch.0), 64-transmission/reception message buffering : 2 channels (ch.1 and ch.2)
- PPG: 16-bit × Max. 48 channels
 - LED drive output 4 channels 11ch to 14ch
 - Reload timer : 16-bit × Max.8 channels
 - Free-run timer : 16-bit × 3 channels
32-bit × Max 3 channels
- Input capture :
 - 16-bit × 4 channels (linked to the free-run timer)
 - 32-bit × Max 6 channels (linked to the free-run timer)
- Output compare :
 - 16-bit × 6 channels (linked to the free-run timer)
 - 32-bit × Max 6 channels (linked to the free-run timer)
- Waveform generator : 6 channels
- Up/Down counter
 - 8/16-bit Up/Down counter × 2 channels
- Real-time clock (RTC) (for day, hours, minutes, seconds)
 - Main or sub oscillation frequency can be selected for the operation clock
- Calibration: Real-time clock (RTC) of the subclock drive
 - The main clock to sub clock ratio can be corrected by setting the real-time clock prescaler
- Clock Supervisor
 - Monitoring abnormality (by damaged quartz, etc.) of suboscillation (32kHz) (dual clock products) of the outside and main oscillation (4 MHz)
 - When abnormality is detected, it switches to the CR clock.
 - Initial value ON/OFF can be selected by the part number.
- 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 cascade mode
- CRC generation
- Watchdog timer
 - Hardware watchdog
 - Software watchdog (possible to set the valid range for counter clearing)
- NMI (non-maskable interrupt)
- Interrupt controller
- Interrupt request batch read
 - The interrupt existence from two or more peripherals can be read by a series of register.
- I/O relocation
 - Peripheral function pins can be reassigned.
- Low-power consumption mode
 - Sleep / Stop / Watch / Sub RUN mode
 - Stop (power shutdown) / Watch (power shutdown) mode

- Power-on reset
- Low-voltage detection reset (independently monitor the external power supply and the internal power supply)
 - The external power supply can select initial value ON/OFF by the part number.
- Device Package : 176/144/120/100/80/64
- CMOS 90nm Technology
- Power supplies
 - 5V Power supply
 - The internal 1.2V is generated from 5V with the voltage step-down circuit

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1. Product Lineup

Product lineup comparison 64 pins

	MB91F522B	MB91F523B	MB91F524B	MB91F525B	MB91F526B
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(128+8)KB	
External BUS I/F (22address/16data/4cs)	None				
DMA Transfer	16ch				
16-bit Base Timer	None				
Free-run Timer	16bit×3ch, 32bit×1ch				
Input capture	16bit×4ch, 32bit×5ch				
Output Compare	16bit×6ch, 32bit×4ch				
16-bit Reload Timer	7ch				
PPG	16bit×21ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×13ch (1unit), 12bit×13ch (1unit)				
D/A converter (8bit)	1ch				
Multi-Function Serial Interface	8ch ^{*1}				
CAN	64msg×2ch/128msg×1ch				
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)	44 ports				
SSCG	Yes				
Sub clock	Yes				
CR oscillator	Yes				
OCD (On Chip Debug)	Yes				
TPU (Timing Protection Unit)	Yes				
Key code register	Yes				
Waveform generator	6ch				
NMI request function	Yes				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V ^{*2}				
Package	LQD064				

*1: Only channel 5, channel 6 and channel 11 support the I²C (standard mode).

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

Product lineup comparison 80 pins

	MB91F522D	MB91F523D	MB91F524D	MB91F525D	MB91F526D
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(128+8)KB	
External BUS I/F (22address/16data/4cs)	None				
DMA Transfer	16ch				
16-bit Base Timer	1ch				
Free-run Timer	16bit×3ch, 32bit×2ch				
Input capture	16bit×4ch, 32bit×5ch				
Output Compare	16bit×6ch, 32bit×4ch				
16-bit Reload Timer	7ch				
PPG	16bit×27ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×16ch (1unit), 12bit×16ch (1unit)				
D/A converter (8bit)	1ch				
Multi-Function Serial Interface	9ch*1				
CAN	64msg×2ch/128msg×1ch				
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)	56 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	6ch				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V *2				
Package	LQH080				

*1: Only channel 5, channel 6 and channel 11 support the I²C (standard mode).

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

Product lineup comparison 100 pins

	MB91F522F	MB91F523F	MB91F524F	MB91F525F	MB91F526F
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(128+8)KB	
External BUS I/F (22address/16data/4cs)	None				
DMA Transfer	16ch				
16-bit Base Timer	1ch				
Free-run Timer	16bit×3ch, 32bit×3ch				
Input capture	16bit×4ch, 32bit×6ch				
Output Compare	16bit×6ch, 32bit×6ch				
16-bit Reload Timer	8ch				
PPG	16bit×34ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×21ch (1unit), 12bit×16ch (1unit)				
D/A converter (8bit)	2ch				
Multi-Function Serial Interface	12ch ^{*1}				
CAN	64msg×2ch/128msg×1ch				
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)	76 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	6ch				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V ^{*2}				
Package	LQI100				

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

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

Product lineup comparison 120 pins

	MB91F522J	MB91F523J	MB91F524J	MB91F525J	MB91F526J
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(128+8)KB	
External BUS I/F (22address/16data/4cs)	None				
DMA Transfer	16ch				
16-bit Base Timer	2ch				
Free-run Timer	16bit×3ch, 32bit×3ch				
Input capture	16bit×4ch, 32bit×6ch				
Output Compare	16bit×6ch, 32bit×6ch				
16-bit Reload Timer	8ch				
PPG	16bit×38ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×26ch (1unit), 12bit×16ch (1unit)				
D/A converter (8bit)	2ch				
Multi-Function Serial Interface	12ch ^{*1}				
CAN	64msg×2ch/128msg×1ch				
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)	96 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	6ch				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V ^{*2}				
Package	LQM120				

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

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

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

Product lineup comparison 144 pins

	MB91F522K	MB91F523K	MB91F524K	MB91F525K	MB91F526K
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(128+8)KB	
External BUS I/F (22address/16data/4cs)	Yes				
DMA Transfer	16ch				
16-bit Base Timer	2ch				
Free-run Timer	16bit×3ch, 32bit×3ch				
Input capture	16bit×4ch, 32bit×6ch				
Output Compare	16bit×6ch, 32bit×6ch				
16-bit Reload Timer	8ch				
PPG	16bit×44ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×32ch (1unit), 12bit×16ch (1unit)				
D/A converter (8bit)	2ch				
Multi-Function Serial Interface	12ch ^{*1}				
CAN	64msg×2ch/128msg×1ch				
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)	120 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	6ch				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V ^{*2}				
Package	LQS144, LQN144				

*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 2.8V±8% (2.576V to 3.024V). 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.

Product lineup comparison 176 pins

	MB91F522L	MB91F523L	MB91F524L	MB91F525L	MB91F526L
System Clock	On chip PLL Clock multiple method				
Minimum instruction execution time	12.5ns (80MHz)				
Flash Capacity (Program)	(256+64)KB	(384+64)KB	(512+64)KB	(768+64)KB	(1024+64)KB
Flash Capacity (Data)	64KB				
RAM Capacity	(48+8)KB	(64+8)KB	(96+8)KB	(96+8)KB	(128+8)KB
External BUS I/F (22address/16data/4cs)	Yes				
DMA Transfer	16ch				
16-bit Base Timer	2ch				
Free-run Timer	16bit×3ch, 32bit×3ch				
Input capture	16bit×4ch, 32bit×6ch				
Output Compare	16bit×6ch, 32bit×6ch				
16-bit Reload Timer	8ch				
PPG	16bit×48ch				
Up/down Counter	2ch				
Clock Supervisor	Yes				
External Interrupt	8ch×2units				
A/D converter	12bit×32ch (1unit), 12bit×16ch (1unit)				
D/A converter (8bit)	2ch				
Multi-Function Serial Interface	12ch ^{*1}				
CAN	64msg×2ch/128msg×1ch				
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	6ch				
Operation guaranteed temperature (T _A)	-40°C to +125°C				
Power supply	2.7V to 5.5V ^{*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 2.8V±8% (2.576V to 3.024V). 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.

Table for clock supervisor and external low voltage detection reset initial value ON/OFF

Clock	CSV Initial value	LVD Initial value	Function
single	ON	ON	S
		OFF	U
	OFF	ON	H
		OFF	K
Dual	ON	ON	W
		OFF	Y
	OFF	ON	J
		OFF	L

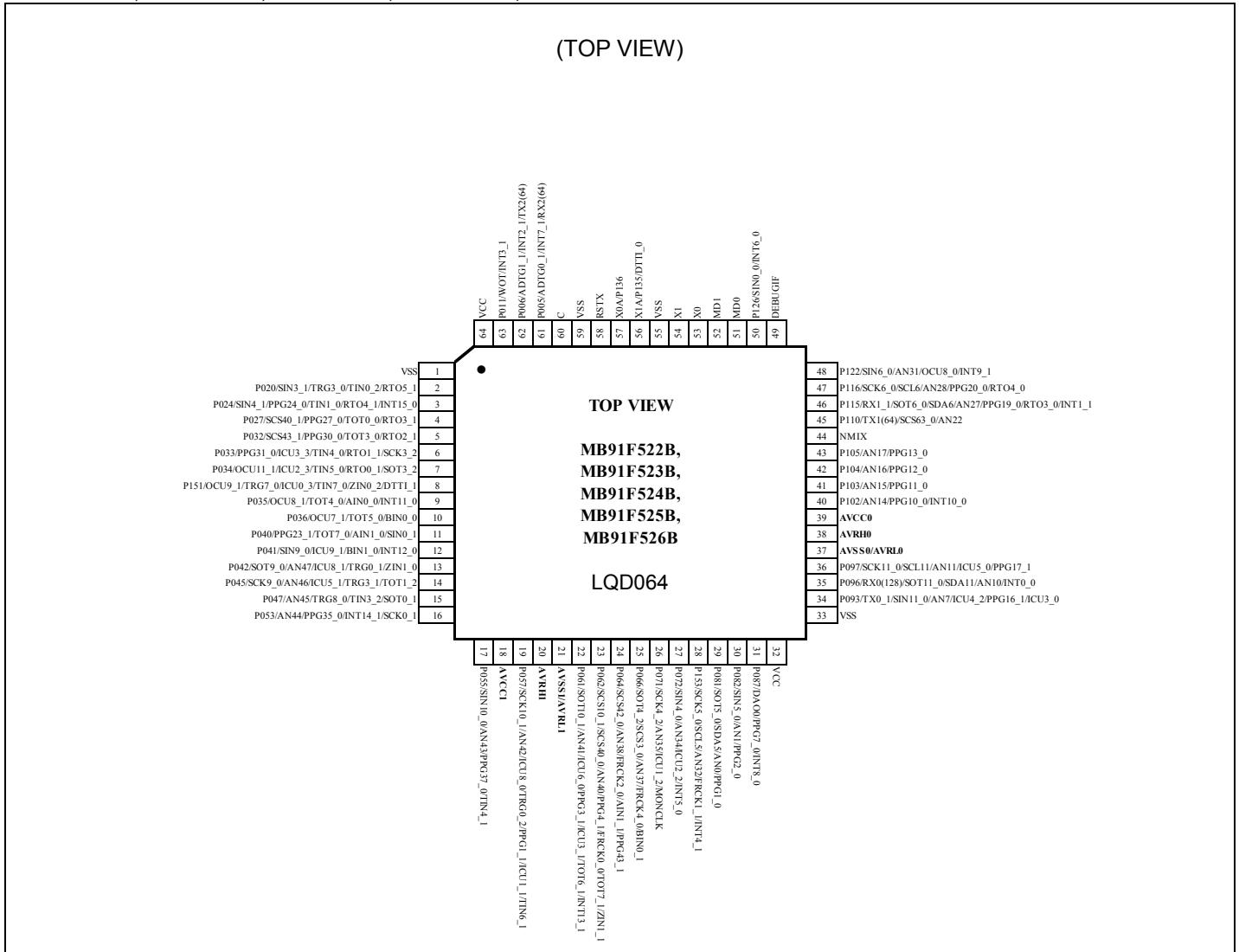
MB 9 1 F 5 2 X □ △ ○

- ↳ Revision: B, C, D, E
- ↳ Function: See the table for clock supervisor and external low voltage detection reset initial value ON/OFF.
- ↳ PKG Type: B 64 pin
D 80 pin
F 100 pin
J 120 pin
K 144 pin
L 176 pin
- ↳ Memory Size: 2 256 KB
3 384 KB
4 512 KB
5 768 KB
6 1 MB

2. Pin Assignment

MB91F52xB

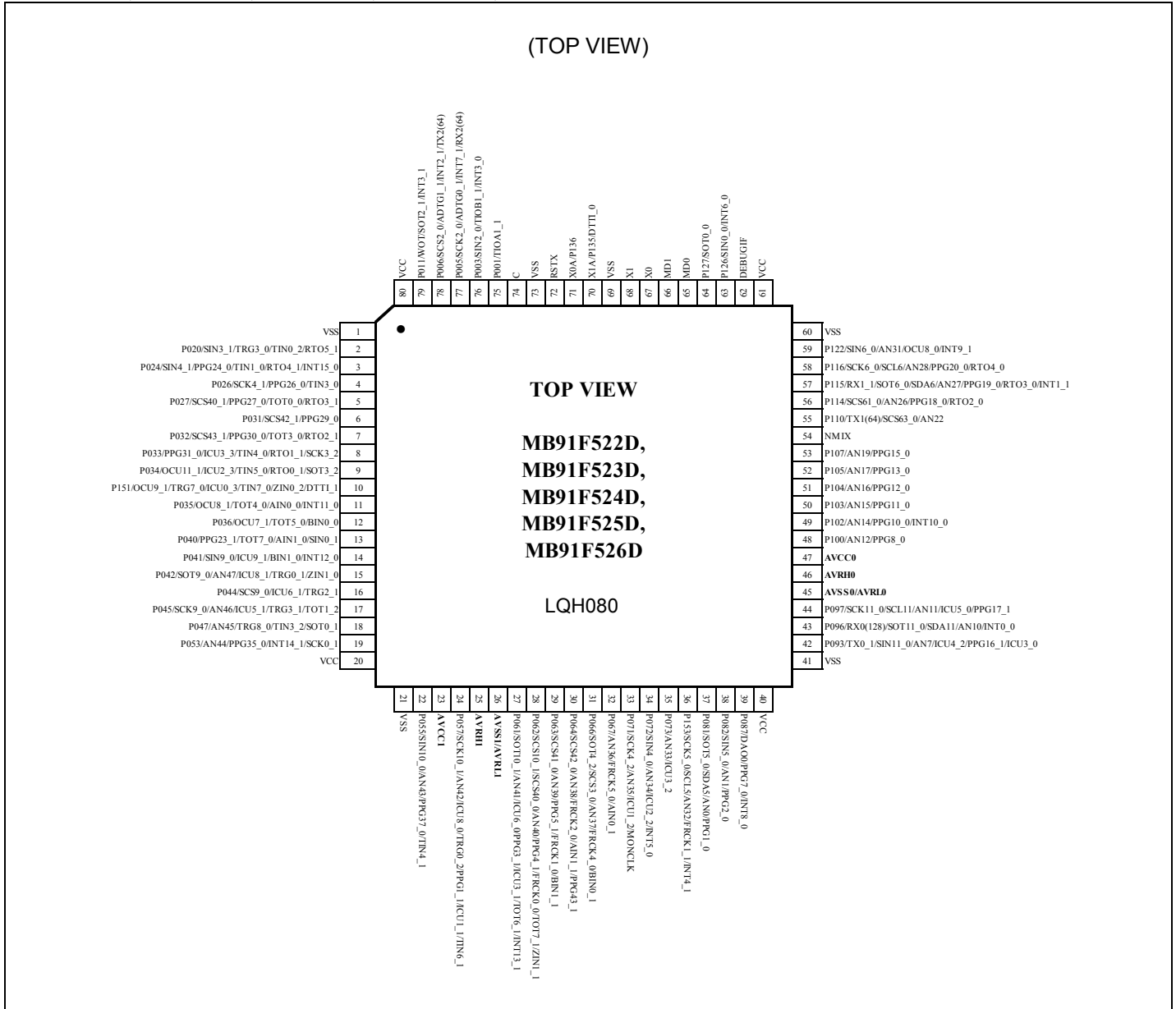
MB91F522B, MB91F523B, MB91F524B, MB91F525B, MB91F526B



* In a single clock product, pin 56 and pin 57 are the general-purpose ports.

MB91F52xD

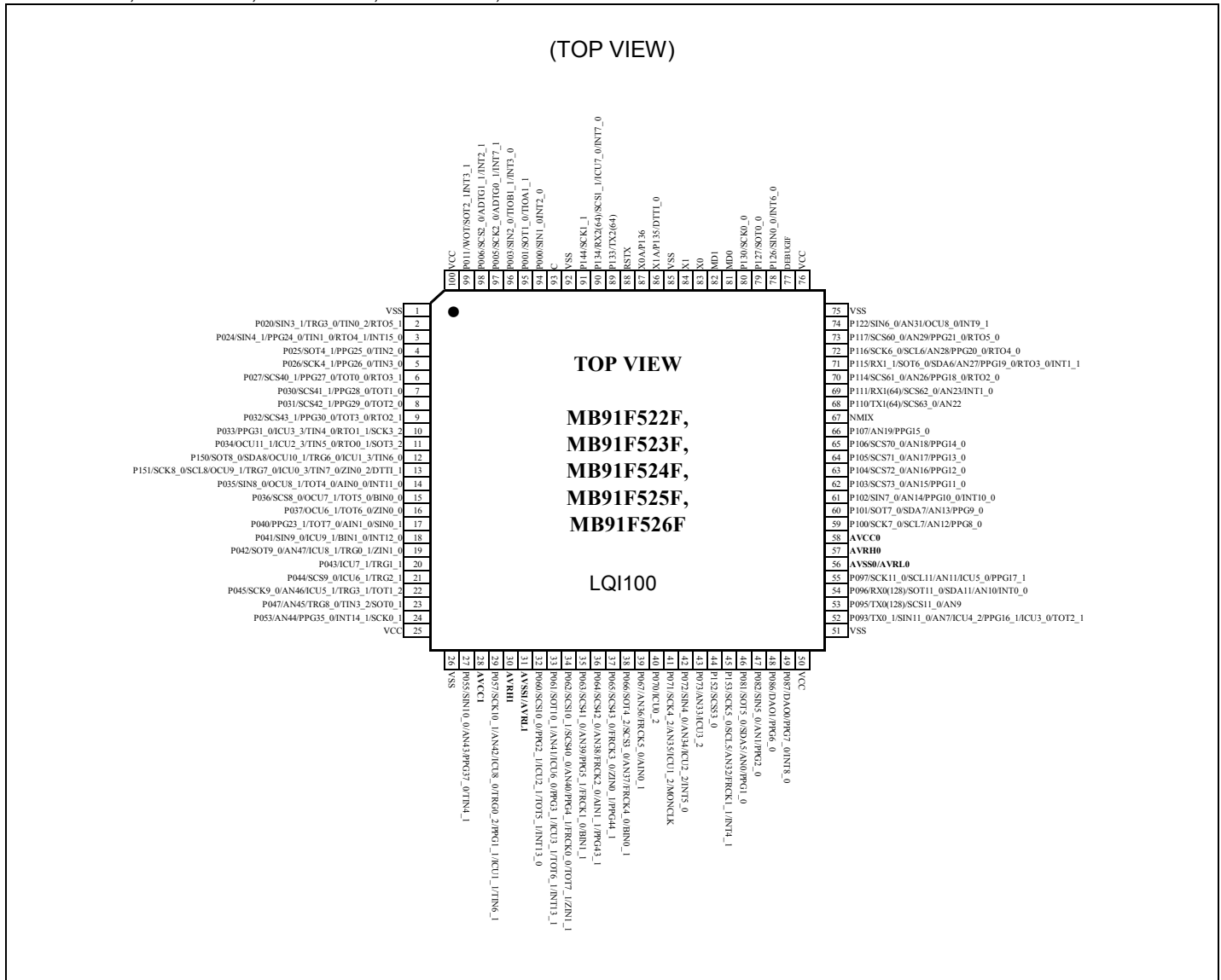
MB91F522D, MB91F523D, MB91F524D, MB91F525D, MB91F526D



* In a single clock product, pin 70 and pin 71 are the general-purpose ports.

MB91F52xF

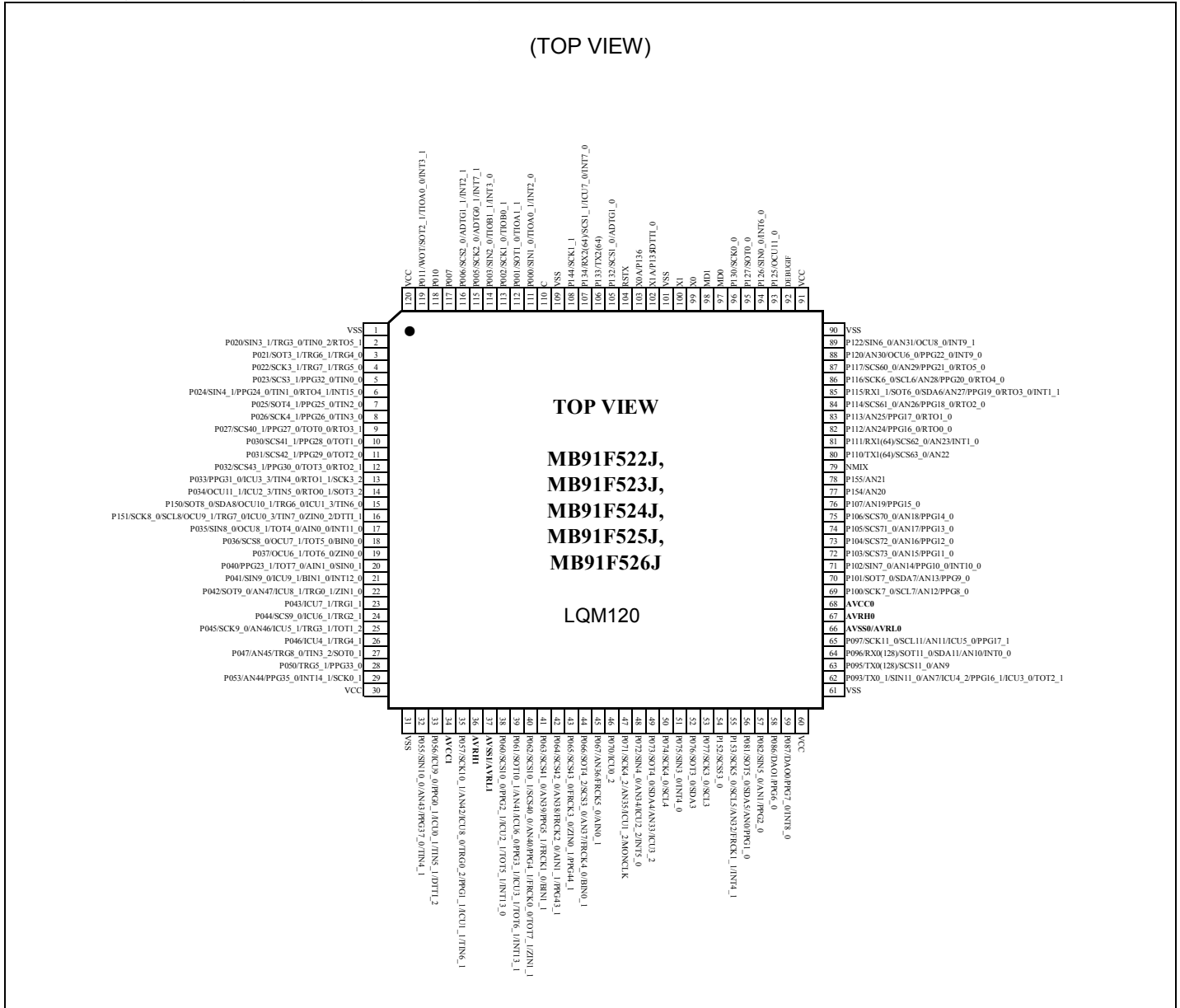
MB91F522F, MB91F523F, MB91F524F, MB91F525F, MB91F526F



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

MB91F52xJ

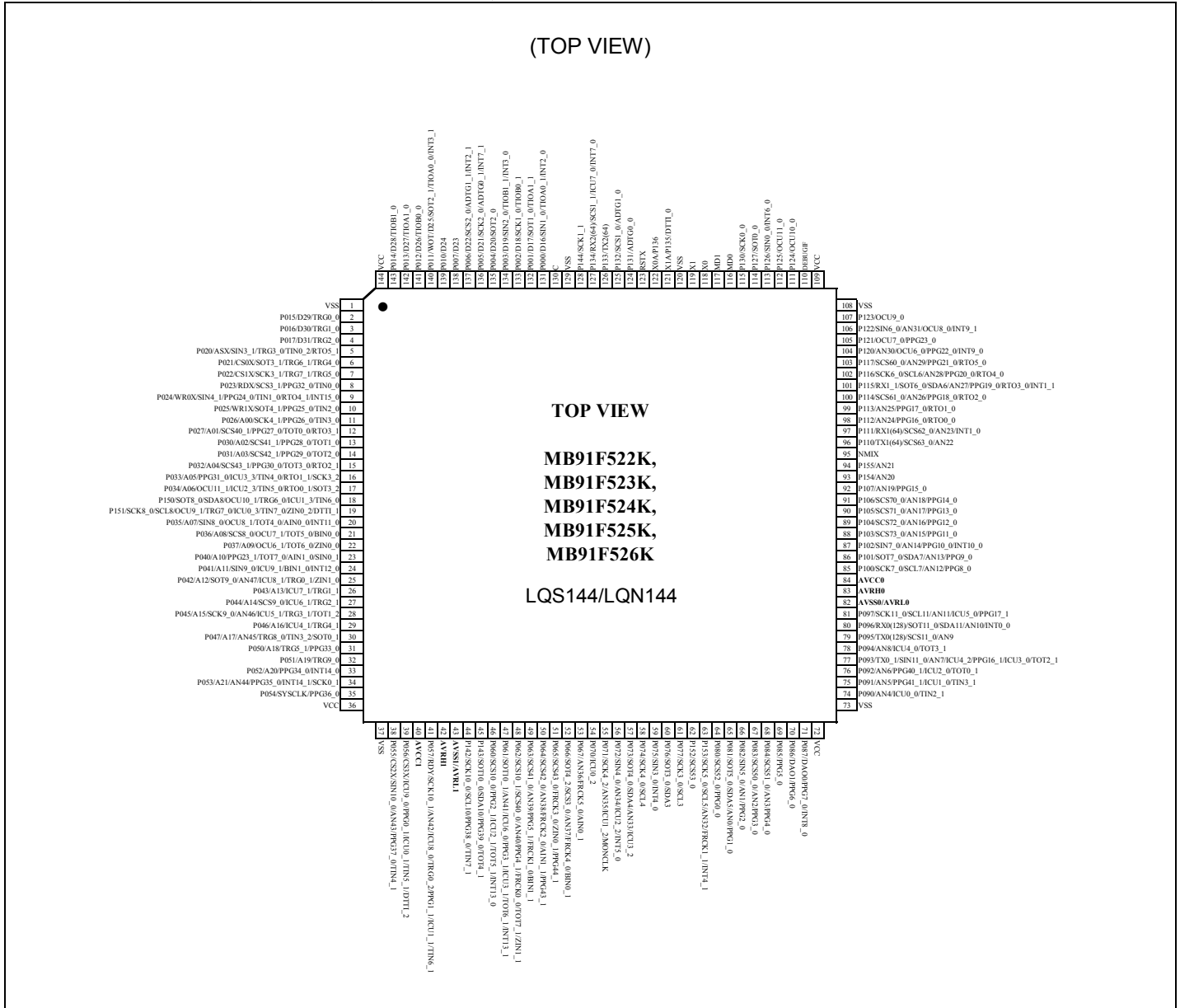
MB91F522J, MB91F523J, MB91F524J, MB91F525J, MB91F526J



* In a single clock product, pin 102 and pin 103 are the general-purpose ports.

MB91F52xK

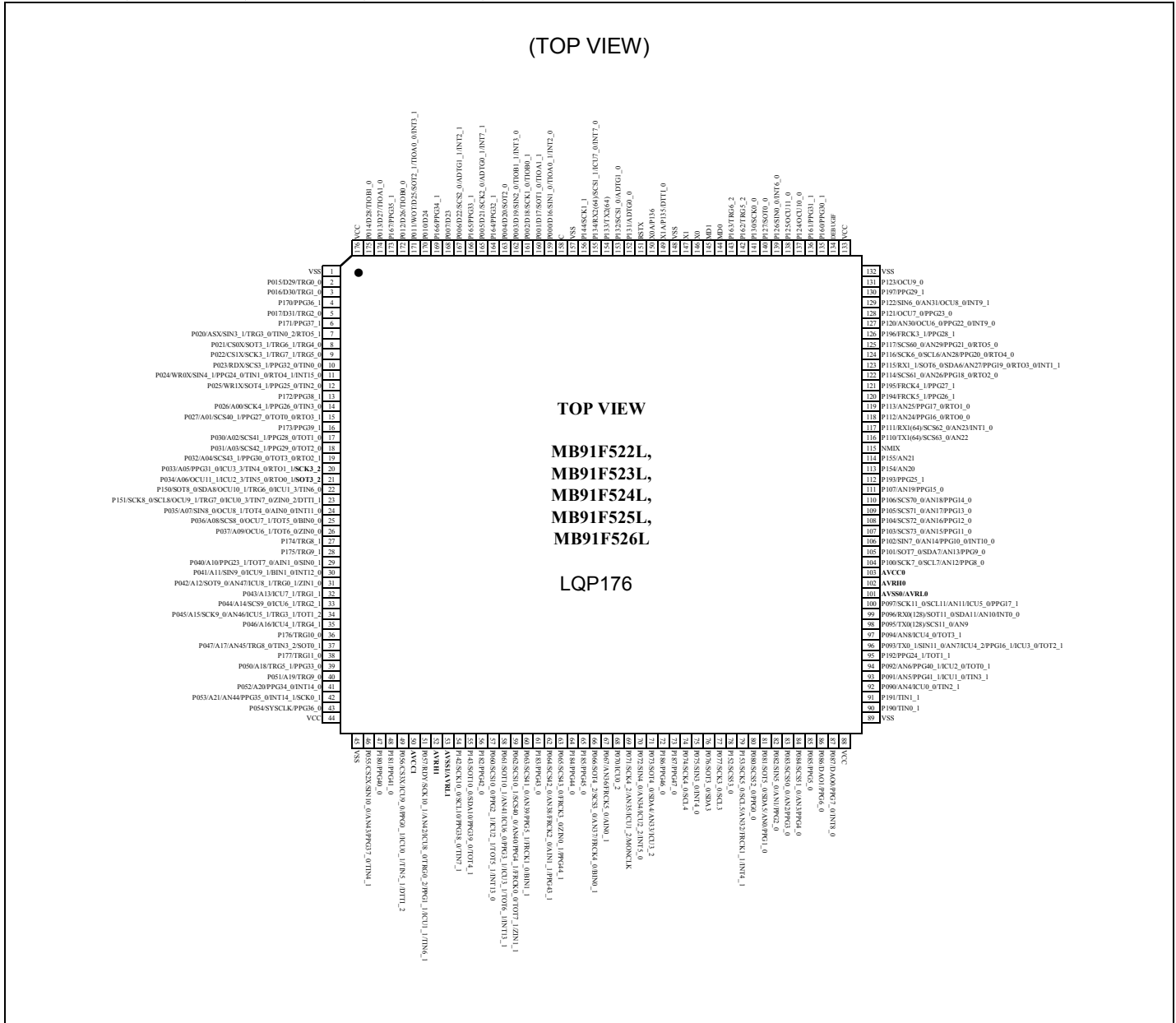
MB91F522K, MB91F523K, MB91F524K, MB91F525K, MB91F526K



* In a single clock product, pin 121 and pin 122 are the general-purpose ports.

MB91F52xL

MB91F522L, MB91F523L, MB91F524L, MB91F525L, MB91F526L



* In a single clock product, pin 149 and pin 150 are the general-purpose ports.

3. Pin Description

Pin no.						Pin Name	Polarity	I/O circuit types* ⁸	Function* ⁹
64	80	100	120	144	176				
-	-	-	-	2	2	P015	-	A	General-purpose I/O port
						D29	-		External bus data bit29 I/O (0)
						TRG0_0	-		PPG trigger 0 input (0)
-	-	-	-	3	3	P016	-	A	General-purpose I/O port
						D30	-		External bus data bit30 I/O (0)
						TRG1_0	-		PPG trigger 1 input (0)
-	-	-	-	-	4	P170	-	A	General-purpose I/O port
						PPG36_1	-		PPG ch.36 output (1)
-	-	-	-	4	5	P017	-	A	General-purpose I/O port
						D31	-		External bus data bit31 I/O (0)
						TRG2_0	-		PPG trigger 2 input (0)
-	-	-	-	-	6	P171	-	A	General-purpose I/O port
						PPG37_1	-		PPG ch.37 output (1)
2 ^{*1}	2 ^{*1}	2 ^{*1}	2 ^{*1}	5	7	P020	-	F	General-purpose I/O port
						ASX ^{*2, *3, *4, *5}	-		External bus/Address strobe output
						SIN3_1	-		Multi-function serial ch.3 serial data input (1)
						TRG3_0	-		PPG trigger 3 input (0)
						TIN0_2	-		Reload timer ch.0 event input (2)
						RTO5_1	-		Waveform generator ch.5 output pin (1)
-	-	-	3 ^{*1}	6	8	P021	-	A	General-purpose I/O port
						CS0X ^{*5}	-		External bus chip select 0 output
						SOT3_1	-		Multi-function serial ch.3 serial data output (1)
						TRG6_1	-		PPG trigger 6 input (1)
						TRG4_0	-		PPG trigger 4 input (0)
-	-	-	4 ^{*1}	7	9	P022	-	F	General-purpose I/O port
						CS1X ^{*5}	-		External bus chip select 1 output
						SCK3_1	-		Multi-function serial ch.3 clock I/O (1)
						TRG7_1	-		PPG trigger 7 input (1)
						TRG5_0	-		PPG trigger 5 input (0)
-	-	-	5 ^{*1}	8	10	P023	-	A	General-purpose I/O port
						RDX ^{*5}	-		External bus/Read strobe output
						SCS3_1	-		Serial chip select 3 output (1)
						PPG32_0	-		PPG ch.32 output (0)
						TIN0_0	-		Reload timer ch.0 event input (0)

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
						WROX ^{*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)

Pin no.						Pin Name	Polarity	I/O circuit types*8	Function*9
64	80	100	120	144	176				
9 ^{*1}	11 ^{*1}	14 ^{*1}	17 ^{*1}	20	24	P035	-	I	General-purpose I/O port
						A07 ^{*2, *3, *4, *5}	-		External bus/Address bit7 output
						SIN8_0 ^{*2, *3}	-		Multi-function serial ch.8 serial data input (0)
						OCU8_1	-		Output compare ch.8 output (1)
						TOT4_0	-		Reload timer ch.4 output (0)
						AIN0_0	-		U/D counter ch.0 AIN input (0)
						INT11_0	-		INT11 External interrupt input (0)
10 ^{*1}	12 ^{*1}	15 ^{*1}	18 ^{*1}	21	25	P036	-	A	General-purpose I/O port
						A08 ^{*2, *3, *4, *5}	-		External bus/Address bit8 output (0)
						SCS8_0 ^{*2, *3}	-		Serial chip select 8 I/O (0)
						OCU7_1	-		Output compare ch.7 output (1)
						TOT5_0	-		Reload timer ch.5 output (0)
						BIN0_0	-		U/D counter ch.0 BIN input (0)
-	-	16 ^{*1}	19 ^{*1}	22	26	P037	-	A	General-purpose I/O port
						A09 ^{*4, *5}	-		External bus/Address bit9 output (0)
						OCU6_1	-		Output compare ch.6 output (1)
						TOT6_0	-		Reload timer ch.6 output (0)
						ZIN0_0	-		U/D counter ch.0 ZIN input (0)
-	-	-	-	-	27	P174	-	A	General-purpose I/O port
						TRG8_1	-		PPG trigger 8 input (1)
-	-	-	-	-	28	P175	-	A	General-purpose I/O port
						TRG9_1	-		PPG trigger 9 input (1)
11 ^{*1}	13 ^{*1}	17 ^{*1}	20 ^{*1}	23	29	P040	-	A	General-purpose I/O port
						A10 ^{*2, *3, *4, *5}	-		External bus/Address bit10 output (0)
						PPG23_1	-		PPG ch.23 output (1)
						TOT7_0	-		Reload timer ch.7 output (0)
						AIN1_0	-		U/D counter ch.1 AIN input (0)
						SIN0_1	-		Multi-function serial ch.0 serial data input (1)
12 ^{*1}	14 ^{*1}	18 ^{*1}	21 ^{*1}	24	30	P041	-	I	General-purpose I/O port
						A11 ^{*2, *3, *4, *5}	-		External bus/Address bit11 output (0)
						SIN9_0	-		Multi-function serial ch.9 serial data input (0)
						ICU9_1	-		Input capture ch.9 input (1)
						BIN1_0	-		U/D counter ch.1 BIN input (0)
						INT12_0	-		INT12 External interrupt input (0)

Pin no.						Pin Name	Polarity	I/O circuit types*8	Function*9
64	80	100	120	144	176				
13 *1	15 *1	19 *1	22 *1	25	31	P042	-	B	General-purpose I/O port
						A12 ^{*2, *3, *4, *5}	-		External bus/Address bit12 output
						SOT9_0	-		Multi-function serial ch.9 serial data output (0)
						AN47	-		ADC analog 47 input
						ICU8_1	-		Input capture ch.8 input (1)
						TRG0_1	-		PPG trigger 0 input (1)
						ZIN1_0	-		U/D counter ch.1 ZIN input (0)
-	-	20 *1	23 *1	26	32	P043	-	A	General-purpose I/O port
						A13 ^{*4, *5}	-		External bus/Address bit13 output (0)
						ICU7_1	-		Input capture ch.7 input (1)
						TRG1_1	-		PPG trigger 1 input (1)
-	16 *1	21 *1	24 *1	27	33	P044	-	A	General-purpose I/O port
						A14 ^{*3, *4, *5}	-		External bus/Address bit14 output (0)
						SCS9_0	-		Serial chip select 9 I/O (0)
						ICU6_1	-		Input capture ch.6 input (1)
						TRG2_1	-		PPG trigger 2 input (1)
14 *1	17 *1	22 *1	25 *1	28	34	P045	-	G	General-purpose I/O port
						A15 ^{*2, *3, *4, *5}	-		External bus/Address bit15 output (0)
						SCK9_0	-		Multi-function serial ch.9 clock I/O (0)
						AN46	-		ADC analog 46 input
						ICU5_1	-		Input capture ch.5 input (1)
						TRG3_1	-		PPG trigger 3 input (1)
						TOT1_2	-		Reload timer ch.1 output (2)
-	-	-	26 *1	29	35	P046	-	A	General-purpose I/O port
						A16 ^{*5}	-		External bus/Address bit16 output (0)
						ICU4_1	-		Input capture ch.4 input (1)
						TRG4_1	-		PPG trigger 4 input (1)
-	-	-	-	-	36	P176	-	A	General-purpose I/O port
						TRG10_0	-		PPG trigger 10 input (0)
15 *1	18 *1	23 *1	27 *1	30	37	P047	-	B	General-purpose I/O port
						A17 ^{*2, *3, *4, *5}	-		External bus/Address bit17 output (0)
						AN45	-		ADC analog 45 input
						TRG8_0	-		PPG trigger 8 input (0)
						TIN3_2	-		Reload timer ch.3 event input (2)
						SOT0_1	-		Multi-function serial ch.0 serial data output (1)
-	-	-	-	-	38	P177	-	A	General-purpose I/O port
						TRG11_0	-		PPG trigger 11 input (0)

Pin no.						Pin Name	Polarity	I/O circuit types* ⁸	Function* ⁹
64	80	100	120	144	176				
-	-	-	28 ^{*1}	31	39	P050	-	A	General-purpose I/O port
						A18 ^{*5}	-		External bus/Address bit18 output
						TRG5_1	-		PPG trigger 5 input (1)
						PPG33_0	-		PPG ch.33 output (0)
-	-	-	-	32	40	P051	-	A	General-purpose I/O port
						A19	-		External bus/Address bit19 output
						TRG9_0	-		PPG trigger 9 input (0)
-	-	-	-	33	41	P052	-	A	General-purpose I/O port
						A20	-		External bus/Address bit20 output
						PPG34_0	-		PPG ch.34 output (0)
						INT14_0	-		INT14 External interrupt input (0)
16 ^{*1}	19 ^{*1}	24 ^{*1}	29 ^{*1}	34	42	P053	-	B	General-purpose I/O port
						A21 ^{*2, *3, *4, *5}	-		External bus/Address bit21 output
						AN44	-		ADC analog 44 input
						PPG35_0	-		PPG ch.35 output (0)
						INT14_1	-		INT14 External interrupt input (1)
						SCK0_1	-		Multi-function serial ch.0 clock I/O (1)
-	-	-	-	35	43	P054	-	A	General-purpose I/O port
						SYSCLK	-		External bus/System clock output
						PPG36_0	-		PPG ch.36 output (0)
17 ^{*1}	22 ^{*1}	27 ^{*1}	32 ^{*1}	38	46	P055	-	G	General-purpose I/O port
						CS2X ^{*2, *3, *4, *5}	-		External bus chip select 2 output
						SIN10_0	-		Multi-function serial ch.10 serial data input (0)
						AN43	-		ADC analog 43 input
						PPG37_0	-		PPG ch.37 output (0)
						TIN4_1	-		Reload timer ch.4 event input (1)
-	-	-	-	-	47	P180	-	A	General-purpose I/O port
						PPG40_0	-		PPG ch.40 output (0)
-	-	-	-	-	48	P181	-	A	General-purpose I/O port
						PPG41_0	-		PPG ch.41 output (0)
-	-	-	33 ^{*1}	39	49	P056	-	A	General-purpose I/O port
						CS3X ^{*5}	-		External bus chip select 3 output
						ICU9_0	-		Input capture ch.9 input (0)
						PPG0_1	-		PPG ch.0 output (1)
						ICU0_1	-		Input capture ch.0 input (1)
						TIN5_1	-		Reload timer ch.5 event input (1)
						DTTI_2	-		Waveform generator ch.0-ch.5 input pin (2)

Pin no.						Pin Name	Polarity	I/O circuit types*8	Function*9
64	80	100	120	144	176				
19 *1	24 *1	29 *1	35 *1	41	51	P057	-	G	General-purpose I/O port
						RDY ^{*2, *3, *4, *5}	-		External bus/Ready input (0)
						SCK10_1	-		Multi-function serial ch.10 clock I/O (1)
						AN42	-		ADC analog 42 input
						ICU8_0	-		Input capture ch.8 input (0)
						TRG0_2	-		PPG trigger 0 input (2)
						PPG1_1	-		PPG ch.1 output (1)
						ICU1_1	-		Input capture ch.1 input (1)
						TIN6_1	-		Reload timer ch.6 event input (1)
-	-	-	-	44	54	P142	-	F	General-purpose I/O port
						SCK10_0 / SCL10	-		Multi-function serial ch.10 clock I/O (0)/ I ² C bus serial clock I/O
						PPG38_0	-		PPG ch.38 output (0)
						TIN7_1	-		Reload timer ch.7 event input (1)
-	-	-	-	45	55	P143	-	F	General-purpose I/O port
						SOT10_0 / SDA10	-		Multi-function serial ch.10 serial data output (0)/ I ² C bus serial data I/O
						PPG39_0	-		PPG ch.39 output (0)
						TOT4_1	-		Reload timer ch.4 output (1)
-	-	-	-	-	56	P182	-	A	General-purpose I/O port
						PPG42_0	-		PPG ch.42 output (0)
-	-	32	38	46	57	P060	-	A	General-purpose I/O port
						SCS10_0	-		Serial chip select 10 I/O (0)
						PPG2_1	-		PPG ch.2 output (1)
						ICU2_1	-		Input capture ch.2 input (1)
						TOT5_1	-		Reload timer ch.5 output (1)
						INT13_0	-		INT13 External interrupt input (0)
22	27	33	39	47	58	P061	-	B	General-purpose I/O port
						SOT10_1	-		Multi-function serial ch.10 serial data output (1)
						AN41	-		ADC analog 41 input
						ICU6_0	-		Input capture ch.6 input (0)
						PPG3_1	-		PPG ch.3 output (1)
						ICU3_1	-		Input capture ch.3 input (1)
						TOT6_1	-		Reload timer ch.6 output (1)
						INT13_1	-		INT13 External interrupt input (1)

Pin no.						Pin Name	Polarity	I/O circuit types*8	Function*9
64	80	100	120	144	176				
23	28	34	40	48	59	P062	-	B	General-purpose I/O port
						SCS10_1	-		Serial chip select 10 I/O (1)
						SCS40_0	-		Serial chip select 40 I/O (0)
						AN40	-		ADC analog 40 input
						PPG4_1	-		PPG ch.4 output (1)
						FRCK0_0	-		Free-run timer 0 clock input (0)
						TOT7_1	-		Reload timer ch.7 output (1)
						ZIN1_1	-		U/D counter ch.1 ZIN input (1)
-	29	35	41	49	60	P063	-	B	General-purpose I/O port
						SCS41_0	-		Serial chip select 41 output (0)
						AN39	-		ADC analog 39 input
						PPG5_1	-		PPG ch.5 output (1)
						FRCK1_0	-		Free-run timer 1 clock input (0)
						BIN1_1	-		U/D counter ch.1 BIN input (1)
-	-	-	-	-	61	P183	-	A	General-purpose I/O port
						PPG43_0	-		PPG ch.43 output (0)
24	30	36	42	50	62	P064	-	B	General-purpose I/O port
						SCS42_0	-		Serial chip select 42 output (0)
						AN38	-		ADC analog 38 input
						FRCK2_0	-		Free-run timer 2 clock input (0)
						AIN1_1	-		U/D counter ch.1 AIN input (1)
						PPG43_1	-		PPG ch.43 output (1)
-	-	37	43	51	63	P065	-	A	General-purpose I/O port
						SCS43_0	-		Serial chip select 43 output (0)
						FRCK3_0	-		Free-run timer 3 clock input (0)
						ZIN0_1	-		U/D counter ch.0 ZIN input (1)
						PPG44_1	-		PPG ch.44 output (1)
-	-	-	-	-	64	P184	-	A	General-purpose I/O port
						PPG44_0	-		PPG ch.44 output (0)
-	-	-	-	-	65	P185	-	A	General-purpose I/O port
						PPG45_0	-		PPG ch.45 output (0)
25	31	38	44	52	66	P066	-	B	General-purpose I/O port
						SOT4_2	-		Multi-function serial ch.4 serial data output (2)
						SCS3_0	-		Serial chip select 3 I/O (0)
						AN37	-		ADC analog 37 input
						FRCK4_0	-		Free-run timer 4 clock input (0)
						BIN0_1	-		U/D counter ch.0 BIN input (1)
-	32	39	45	53	67	P067	-	B	General-purpose I/O port
						AN36	-		ADC analog 36 input
						FRCK5_0	-		Free-run timer 5 clock input (0)
						AIN0_1	-		U/D counter ch.0 AIN input (1)