Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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MB96630 Series

F²MC-16FX 16-Bit Microcontroller

MB96630 series is based on Cypress's advanced F²MC-16FX architecture (16-bit with instruction pipeline for RISC-like performance). The CPU uses the same instruction set as the established F²MC-16LX family thus allowing for easy migration of F²MC-16LX Software to the new F²MC-16FX products.
F²MC-16FX product improvements compared to the previous generation include significantly improved performance - even at the same operation frequency, reduced power consumption and faster start-up time.

For high processing speed at optimized power consumption an internal PLL can be selected to supply the CPU with up to 32MHz operation frequency from an external 4MHz to 8MHz resonator. The result is a minimum instruction cycle time of 31.2ns going together with excellent EMI behavior. The emitted power is minimized by the on-chip voltage regulator that reduces the internal CPU voltage. A flexible clock tree allows selecting suitable operation frequencies for peripheral resources independent of the CPU speed.

Features

■ Technology

0.18µm CMOS

■ CPU
- F²MC-16FX CPU
- Optimized instruction set for controller applications (bit, byte, word and long-word data types, 23 different addressing modes, barrel shift, variety of pointers)
- 8-byte instruction queue
- Signed multiply (16-bit × 16-bit) and divide (32-bit/16-bit) instructions available

■ System clock
- On-chip PLL clock multiplier (×1 to ×8, ×1 when PLL stop)
- 4MHz to 8MHz crystal oscillator (maximum frequency when using ceramic resonator depends on Q-factor)
- Up to 8MHz external clock for devices with fast clock input feature
- 32.768kHz subsystem quartz clock
- 100kHz/2MHz internal RC clock for quick and safe startup, clock stop detection function, watchdog
- Clock source selectable from mainclock oscillator, subclock oscillator and on-chip RC oscillator, independently for CPU and 2 clock domains of peripherals
- The subclock oscillator is enabled by the Boot ROM program controlled by a configuration marker after a Power or External reset
- Low Power Consumption - 13 operating modes (different Run, Sleep, Timer, Stop modes)

■ On-chip voltage regulator

Internal voltage regulator supports a wide MCU supply voltage range (Min=2.7V), offering low power consumption

■ Low voltage detection function

Reset is generated when supply voltage falls below programmable reference voltage

■ Code Security

Protects Flash Memory content from unintended read-out

■ DMA

Automatic transfer function independent of CPU, can be assigned freely to resources

■ Interrupts
- Fast Interrupt processing
- 8 programmable priority levels
- Non-Maskable Interrupt (NMI)

■ CAN
- Supports CAN protocol version 2.0 part A and B
- ISO16845 certified
- Bit rates up to 1Mbps
- 32 message objects
- Each message object has its own identifier mask
- Programmable FIFO mode (concatenation of message objects)
- Maskable interrupt
- Disabled Automatic Retransmission mode for Time Triggered CAN applications
- Programmable loop-back mode for self-test operation

■ USART
- Full duplex USARTs (SCI/LIN)
- Wide range of baud rate settings using a dedicated reload timer
- Special synchronous options for adapting to different synchronous serial protocols
- LIN functionality working either as master or slave LIN device
- Extended support for LIN-Protocol to reduce interrupt load

■ I²C
- Up to 400kbps
- Master and Slave functionality, 7-bit and 10-bit addressing

- A/D converter
  - SAR-type
  - 8/10-bit resolution
  - Signals interrupt on conversion end, single conversion mode, continuous conversion mode, stop conversion mode, activation by software, external trigger, reload timers and PPGs
  - Range Comparator Function
  - Scan Disable Function
- Source Clock Timers

  Three independent clock timers (23-bit RC clock timer, 23-bit Main clock timer, 17-bit Sub clock timer)
- Hardware Watchdog Timer
  - Hardware watchdog timer is active after reset
  - Window function of Watchdog Timer is used to select the lower window limit of the watchdog interval
- Reload Timers
  - 16-bit wide
  - Prescaler with $1/2^1$, $1/2^2$, $1/2^3$, $1/2^4$, $1/2^5$, $1/2^6$ of peripheral clock frequency
  - Event count function
- Free-Running Timers
  - Signals an interrupt on overflow, supports timer clear upon match with Output Compare (0, 4)
  - Prescaler with 1, $1/2^1$, $1/2^2$, $1/2^3$, $1/2^4$, $1/2^5$, $1/2^6$, $1/2^7$, $1/2^8$ of peripheral clock frequency
- Input Capture Units
  - 16-bit wide
  - Signals an interrupt upon external event
  - Rising edge, Falling edge or Both (rising & falling) edges sensitive
- Output Compare Units
  - 16-bit wide
  - Signals an interrupt when a match with Free-running Timer occurs
  - A pair of compare registers can be used to generate an output signal
- Programmable Pulse Generator
  - 16-bit down counter, cycle and duty setting registers
  - Can be used as 2 × 8-bit PPG
  - Interrupt at trigger, counter borrow and/or duty match
  - PWM operation and one-shot operation
  - Internal prescaler allows 1, 1/4, 1/16, 1/64 of peripheral clock as counter clock or of selected Reload timer underflow as clock input
  - Can be triggered by software or reload timer
  - Can trigger ADC conversion
  - Timing point capture
  - Start delay
- Quadrature Position/Revolution Counter (QPRC)
  - Up/down count mode, Phase difference count mode, Count mode with direction
  - 16-bit position counter
  - 16-bit revolution counter
  - Two 16-bit compare registers with interrupt
  - Detection edge of the three external event input pins AIN, BIN and ZIN is configurable
- Real Time Clock
  - Operational on main oscillation (4MHz), sub oscillation (32kHz) or RC oscillation (100kHz/2MHz)
  - Capable to correct oscillation deviation of Sub clock or RC oscillator clock (clock calibration)
  - Read/write accessible second/minute/hour registers
  - Can signal interrupts every half second/second/minute/hour/day
  - Internal clock divider and prescaler provide exact 1s clock
- External Interrupts
  - Edge or Level sensitive
  - Interrupt mask bit per channel
  - Each available CAN channel RX has an external interrupt for wake-up
  - Selected USART channels SIN have an external interrupt for wake-up
- Non Maskable Interrupt
  - Disabled after reset, can be enabled by Boot-ROM depending on ROM configuration block
  - Once enabled, can not be disabled other than by reset
  - High or Low level sensitive
  - Pin shared with external interrupt 0
- I/O Ports
  - Most of the external pins can be used as general purpose I/O
  - All push-pull outputs (except when used as I^2C SDA/SCL line)
  - Bit-wise programmable as input/output or peripheral signal
  - Bit-wise programmable input enable
  - One input level per GPIO-pin (either Automotive or CMOS hysteresis)
  - Bit-wise programmable pull-up resistor
- Built-in On Chip Debugger (OCD)
  - One-wire debug tool interface
  - Break function:
    - Hardware break: 6 points (shared with code event)
    - Software break: 4096 points
  - Event function
    - Code event: 6 points (shared with hardware break)
    - Data event: 6 points
    - Event sequencer: 2 levels + reset
  - Execution time measurement function
  - Trace function: 42 branches
  - Security function
- Flash Memory
  - Dual operation flash allowing reading of one Flash bank while programming or erasing the other bank
  - Command sequencer for automatic execution of programming algorithm and for supporting DMA for programming of the Flash Memory
  - Supports automatic programming, Embedded Algorithm
  - Write/Erase/Erase-Suspend/Resume commands
  - A flag indicating completion of the automatic algorithm
  - Erase can be performed on each sector individually
  - Sector protection
  - Flash Security feature to protect the content of the Flash
  - Low voltage detection during Flash erase or write

Contents

1. Product Lineup

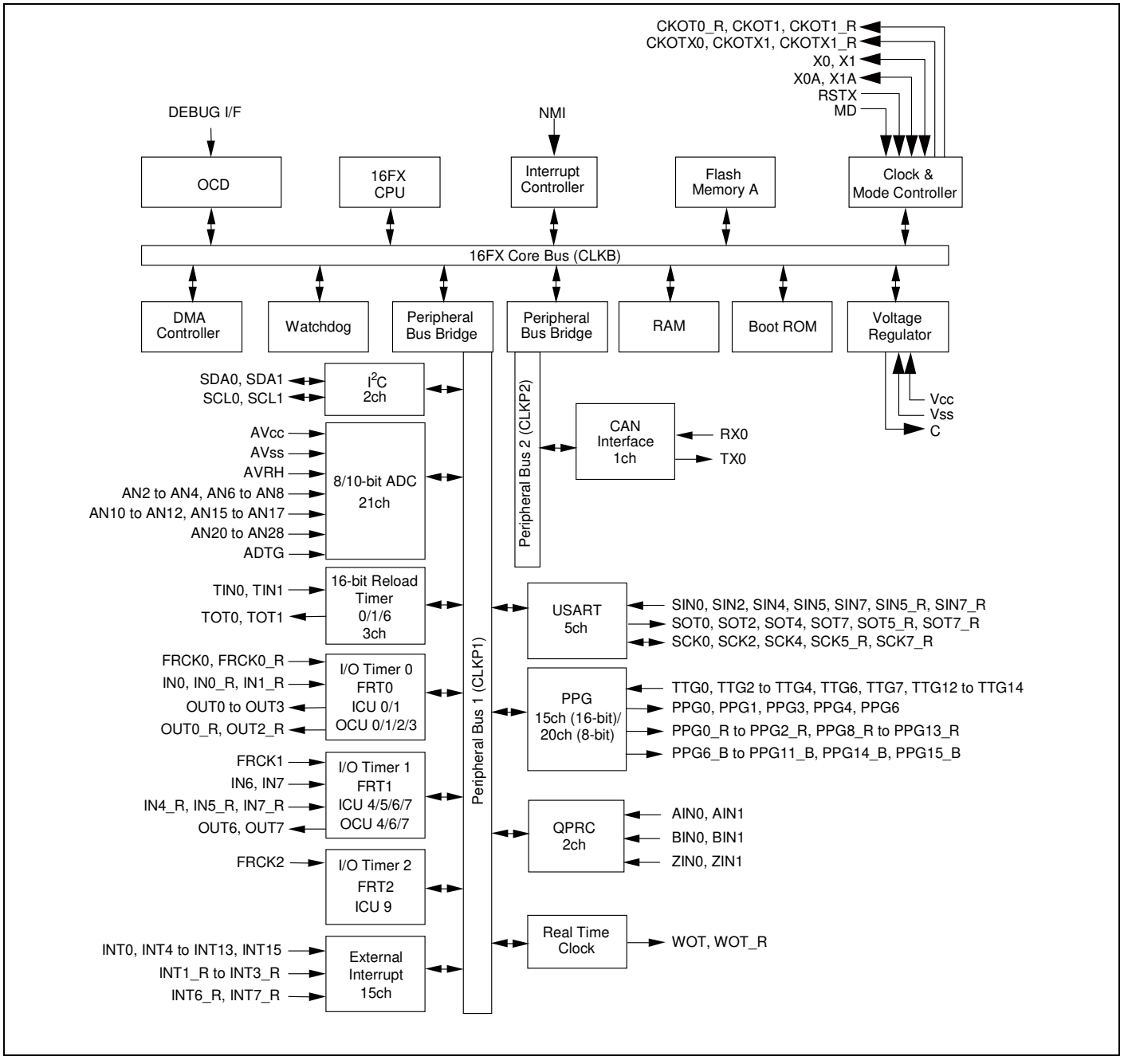
Features			MB96630	Remark
Product Type			Flash Memory Product	
Subclock			Subclock can be set by software	
Dual Operation Flash Memory		RAM	-	
64.5KB + 32KB		10KB	MB96F633R, MB96F633A	Product Options R: MCU with CAN A: MCU without CAN
128.5KB + 32KB		16KB	MB96F635R, MB96F635A	
256.5KB + 32KB		24KB	MB96F636R	
384.5KB + 32KB		28KB	MB96F637R	
Package			LQFP-80 FPT-80P-M21	
DMA			4ch	
USART			5ch	LIN-USART 0/2/4/5/7
	with automatic LIN-Header transmission/reception		Yes (only 1ch)	LIN-USART 0
	with 16 byte RX-and TX-FIFO		No	
I^2C			2ch	I^2C 0/1
8/10-bit A/D Converter			21ch	AN 2 to 4/6 to 8/ 10 to 12/15 to 17/20 to 28
	with Data Buffer		No	
	with Range Comparator		Yes	
	with Scan Disable		Yes	
	with ADC Pulse Detection		No	
16-bit Reload Timer (RLT)			3ch	RLT 0/1/6
16-bit Free-Running Timer (FRT)			3ch	FRT 0 to 2
16-bit Input Capture Unit (ICU)			7ch (1 channel for LIN-USART)	ICU 0/1/4 to 7/9 (ICU 9 for LIN-USART)
16-bit Output Compare Unit (OCU)			7ch	OCU 0 to 4/6/7 (OCU 4 for FRT clear)
8/16-bit Programmable Pulse Generator (PPG)			15ch (16-bit) / 20ch (8-bit)	PPG 0 to 4/6 to 15
	with Timing point capture		Yes	
	with Start delay		Yes	
	with Ramp		No	
Quadrature Position/Revolution Counter (QPRC)			2ch	QPRC 0/1
CAN Interface			1ch	CAN 0 32 Message Buffers
External Interrupts (INT)			15ch	INT 0 to 13/15
Non-Maskable Interrupt (NMI)			1ch	
Real Time Clock (RTC)			1ch	
I/O Ports			62 (Dual clock mode) 64 (Single clock mode)	
Clock Calibration Unit (CAL)			1ch	
Clock Output Function			2ch	
Low Voltage Detection Function			Yes	Low voltage detection function can be disabled by software
Hardware Watchdog Timer			Yes	
On-chip RC-oscillator			Yes	
On-chip Debugger			Yes	

Note:

All signals of the peripheral function in each product cannot be allocated by limiting the pins of package.

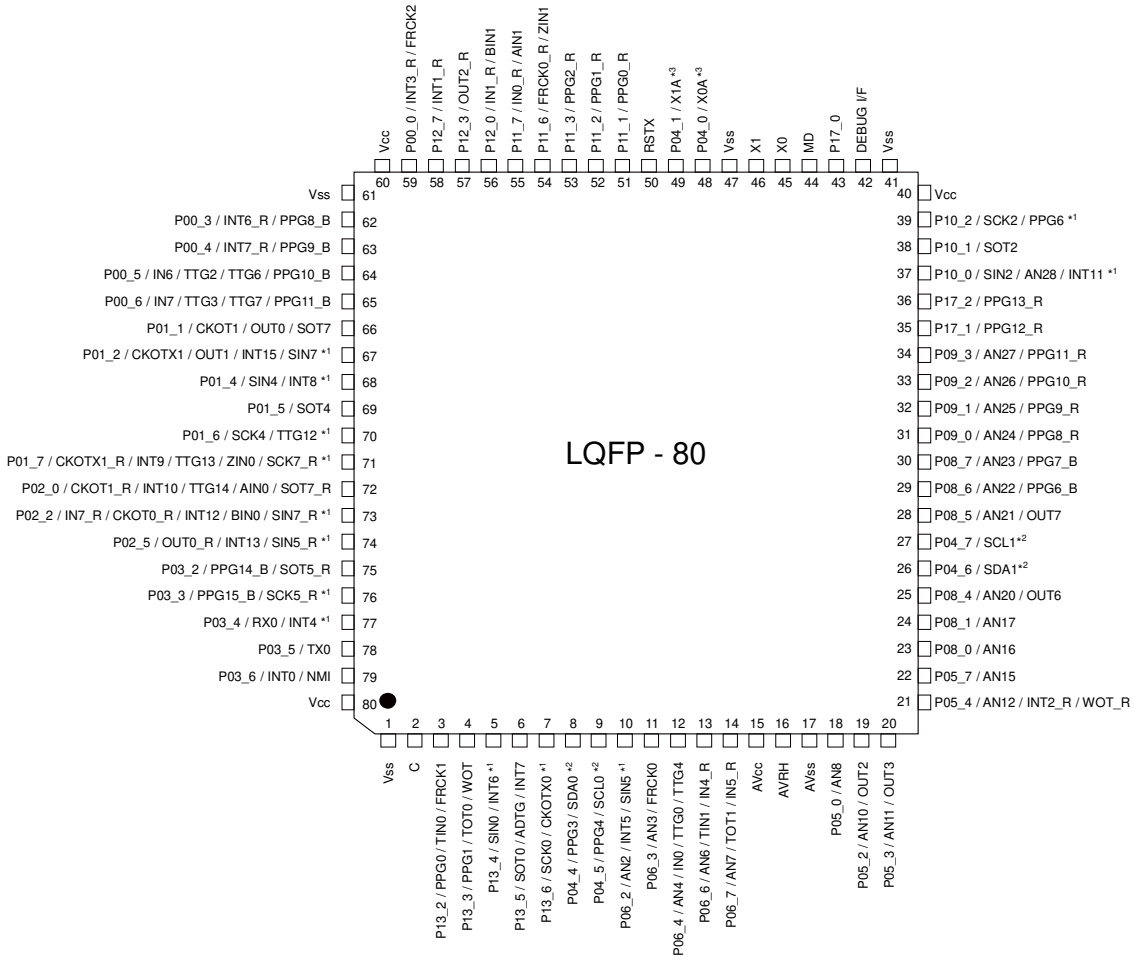
It is necessary to use the port relocate function of the general I/O port according to your function use.

2. Block Diagram



3. Pin Assignment

(Top view)



(FPT-80P-M21)

*1: CMOS input level only

*2: CMOS input level only for I^2C

*3: Please set ROM Configuration Block (RCB) to use the subclock.

Other than those above, general-purpose pins have only Automotive input level.

4. Pin Description

Pin name	Feature	Description
ADTG	ADC	A/D converter trigger input pin
AINn	QPRC	Quadrature Position/Revolution Counter Unit n input pin
ANn	ADC	A/D converter channel n input pin
AVcc	Supply	Analog circuits power supply pin
AVRH	ADC	A/D converter high reference voltage input pin
AVss	Supply	Analog circuits power supply pin
BINn	QPRC	Quadrature Position/Revolution Counter Unit n input pin
C	Voltage regulator	Internally regulated power supply stabilization capacitor pin
CKOTn	Clock Output function	Clock Output function n output pin
CKOTn_R	Clock Output function	Relocated Clock Output function n output pin
CKOTXn	Clock Output function	Clock Output function n inverted output pin
CKOTXn_R	Clock Output function	Relocated Clock Output function n inverted output pin
DEBUG I/F	OCD	On Chip Debugger input/output pin
FRCKn	Free-Running Timer	Free-Running Timer n input pin
FRCKn_R	Free-Running Timer	Relocated Free-Running Timer n input pin
INn	ICU	Input Capture Unit n input pin
INn_R	ICU	Relocated Input Capture Unit n input pin
INTn	External Interrupt	External Interrupt n input pin
INTn_R	External Interrupt	Relocated External Interrupt n input pin
MD	Core	Input pin for specifying the operating mode
NMI	External Interrupt	Non-Maskable Interrupt input pin
OUTn	OCU	Output Compare Unit n waveform output pin
OUTn_R	OCU	Relocated Output Compare Unit n waveform output pin
Pnn_m	GPIO	General purpose I/O pin
PPGn	PPG	Programmable Pulse Generator n output pin (16bit/8bit)
PPGn_R	PPG	Relocated Programmable Pulse Generator n output pin (16bit/8bit)
PPGn_B	PPG	Programmable Pulse Generator n output pin (16bit/8bit)
RSTX	Core	Reset input pin
RXn	CAN	CAN interface n RX input pin
SCKn	USART	USART n serial clock input/output pin
SCKn_R	USART	Relocated USART n serial clock input/output pin
SCLn	I^2C	I^2C interface n clock I/O input/output pin
SDAn	I^2C	I^2C interface n serial data I/O input/output pin
SINn	USART	USART n serial data input pin
SINn_R	USART	Relocated USART n serial data input pin
SOTn	USART	USART n serial data output pin
SOTn_R	USART	Relocated USART n serial data output pin
TINn	Reload Timer	Reload Timer n event input pin
TOTn	Reload Timer	Reload Timer n output pin
TTGn	PPG	Programmable Pulse Generator n trigger input pin

Pin name	Feature	Description
TXn	CAN	CAN interface n TX output pin
Vcc	Supply	Power supply pin
Vss	Supply	Power supply pin
WOT	RTC	Real Time clock output pin
WOT_R	RTC	Relocated Real Time clock output pin
X0	Clock	Oscillator input pin
X0A	Clock	Subclock Oscillator input pin
X1	Clock	Oscillator output pin
X1A	Clock	Subclock Oscillator output pin
ZINn	QPRC	Quadrature Position/Revolution Counter Unit n input pin

5. Pin Circuit Type

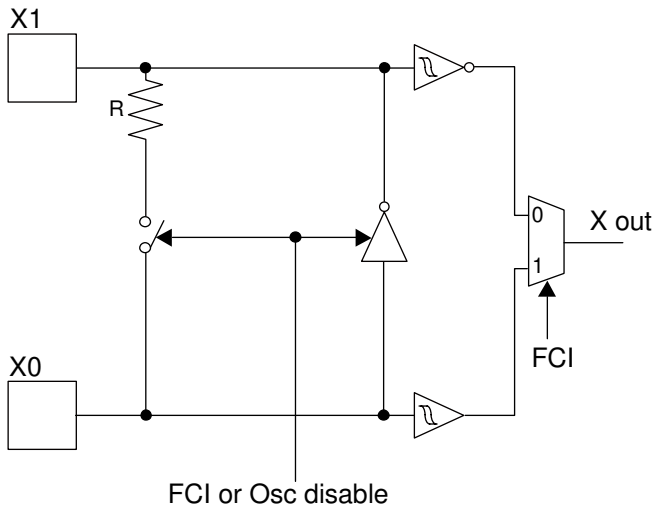
Pin no.	I/O circuit type*	Pin name
1	Supply	V_{ss}
2	F	C
3	H	P13_2 / PPG0 / TIN0 / FRCK1
4	H	P13_3 / PPG1 / TOT0 / WOT
5	M	P13_4 / SIN0 / INT6
6	H	P13_5 / SOT0 / ADTG / INT7
7	M	P13_6 / SCK0 / CKOTX0
8	N	P04_4 / PPG3 / SDA0
9	N	P04_5 / PPG4 / SCL0
10	I	P06_2 / AN2 / INT5 / SIN5
11	K	P06_3 / AN3 / FRCK0
12	K	P06_4 / AN4 / IN0 / TTG0 / TTG4
13	K	P06_6 / AN6 / TIN1 / IN4_R
14	K	P06_7 / AN7 / TOT1 / IN5_R
15	Supply	AV_{cc}
16	G	AVRH
17	Supply	AV_{ss}
18	K	P05_0 / AN8
19	K	P05_2 / AN10 / OUT2
20	K	P05_3 / AN11 / OUT3
21	K	P05_4 / AN12 / INT2_R / WOT_R
22	K	P05_7 / AN15
23	K	P08_0 / AN16
24	K	P08_1 / AN17
25	K	P08_4 / AN20 / OUT6
26	N	P04_6 / SDA1
27	N	P04_7 / SCL1
28	K	P08_5 / AN21 / OUT7
29	K	P08_6 / AN22 / PPG6_B
30	K	P08_7 / AN23 / PPG7_B
31	K	P09_0 / AN24 / PPG8_R
32	K	P09_1 / AN25 / PPG9_R
33	K	P09_2 / AN26 / PPG10_R
34	K	P09_3 / AN27 / PPG11_R
35	H	P17_1 / PPG12_R
36	H	P17_2 / PPG13_R
37	I	P10_0 / SIN2 / AN28 / INT11
38	H	P10_1 / SOT2

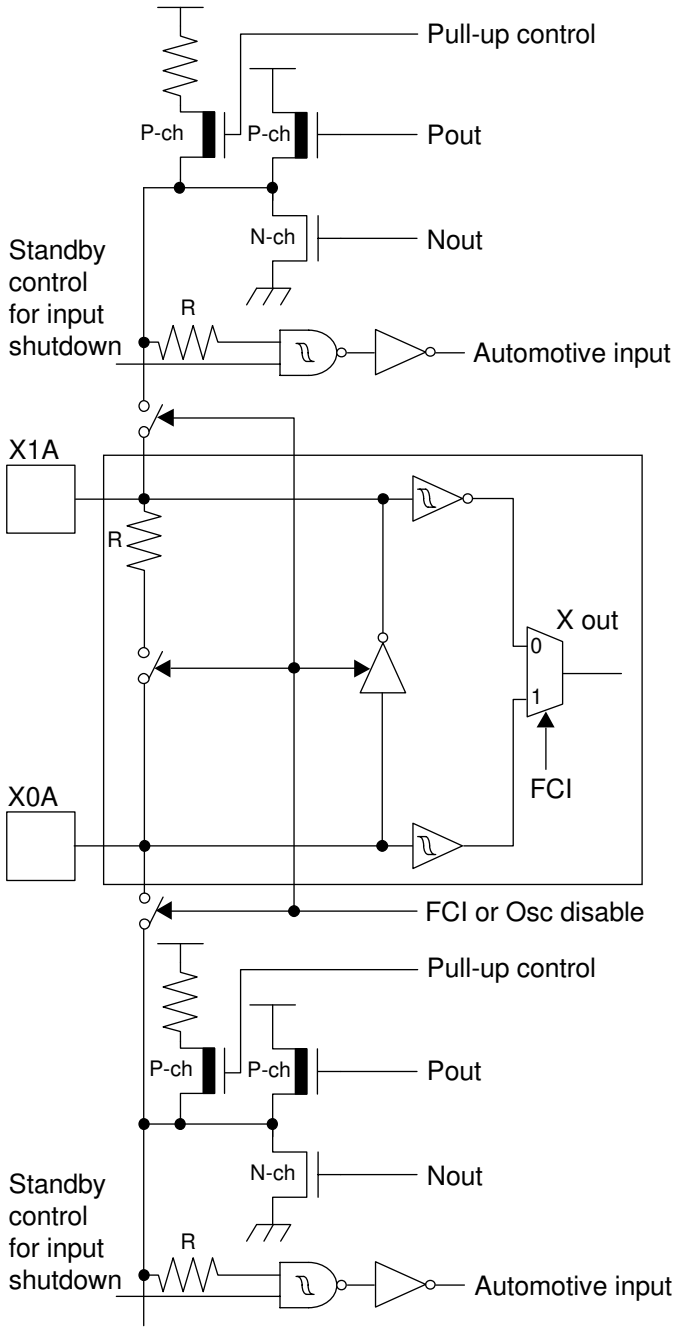
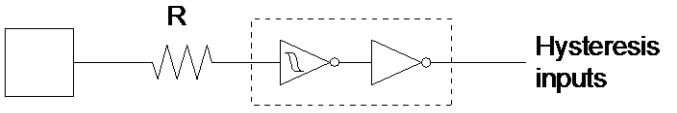
Pin no.	I/O circuit type*	Pin name
39	M	P10_2 / SCK2 / PPG6
40	Supply	Vcc
41	Supply	Vss
42	O	DEBUG I/F
43	H	P17_0
44	C	MD
45	A	X0
46	A	X1
47	Supply	Vss
48	B	P04_0 / X0A
49	B	P04_1 / X1A
50	C	RSTX
51	H	P11_1 / PPG0_R
52	H	P11_2 / PPG1_R
53	H	P11_3 / PPG2_R
54	H	P11_6 / FRCK0_R / ZIN1
55	H	P11_7 / IN0_R / AIN1
56	H	P12_0 / IN1_R / BIN1
57	H	P12_3 / OUT2_R
58	H	P12_7 / INT1_R
59	H	P00_0 / INT3_R / FRCK2
60	Supply	Vcc
61	Supply	Vss
62	H	P00_3 / INT6_R / PPG8_B
63	H	P00_4 / INT7_R / PPG9_B
64	H	P00_5 / IN6 / TTG2 / TTG6 / PPG10_B
65	H	P00_6 / IN7 / TTG3 / TTG7 / PPG11_B
66	H	P01_1 / CKOT1 / OUT0 / SOT7
67	M	P01_2 / CKOTX1 / OUT1 / INT15 / SIN7
68	M	P01_4 / SIN4 / INT8
69	H	P01_5 / SOT4
70	M	P01_6 / SCK4 / TTG12
71	M	P01_7 / CKOTX1_R / INT9 / TTG13 / ZIN0 / SCK7_R
72	H	P02_0 / CKOT1_R / INT10 / TTG14 / AIN0 / SOT7_R
73	M	P02_2 / IN7_R / CKOT0_R / INT12 / BIN0 / SIN7_R
74	M	P02_5 / OUT0_R / INT13 / SIN5_R
75	H	P03_2 / PPG14_B / SOT5_R
76	M	P03_3 / PPG15_B / SCK5_R
77	M	P03_4 / RX0 / INT4

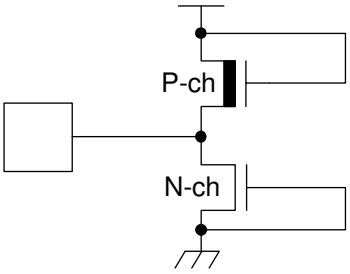
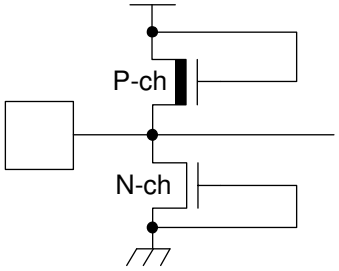
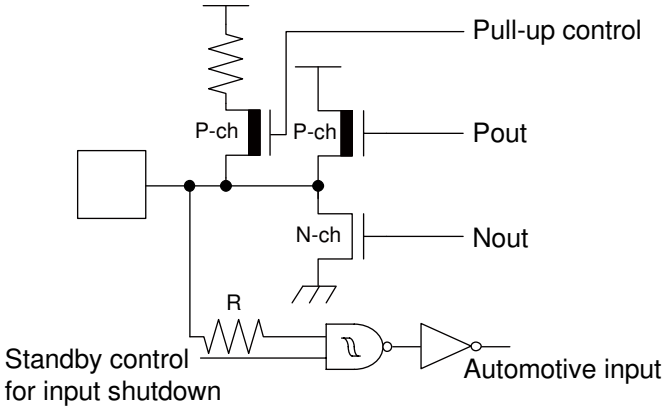
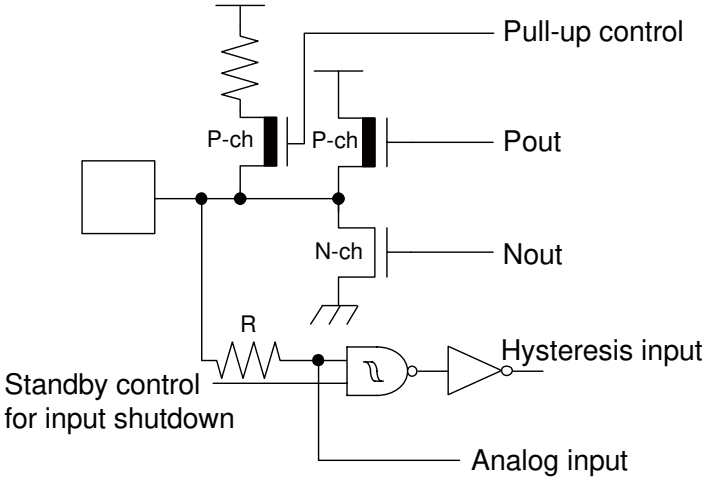
Pin no.	I/O circuit type*	Pin name
78	H	P03_5 / TX0
79	H	P03_6 / INT0 / NMI
80	Supply	Vcc

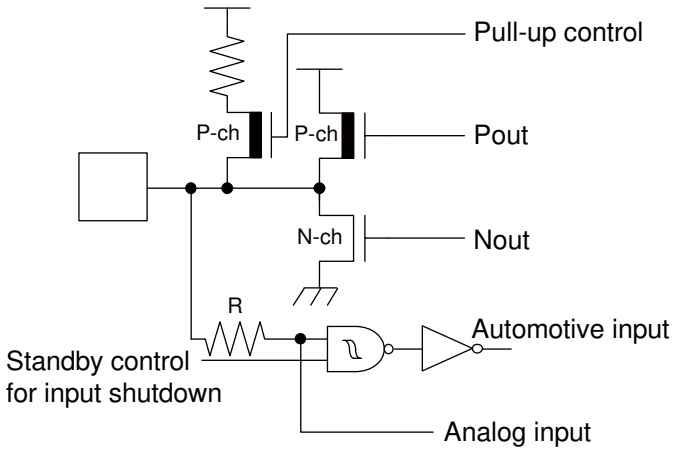
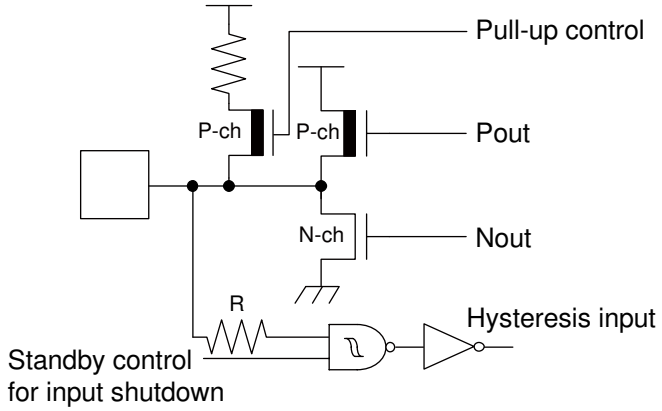
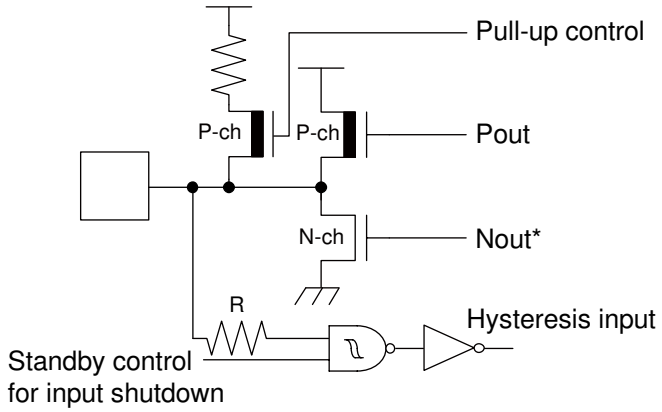
*: See “I/O Circuit Type” for details on the I/O circuit types.

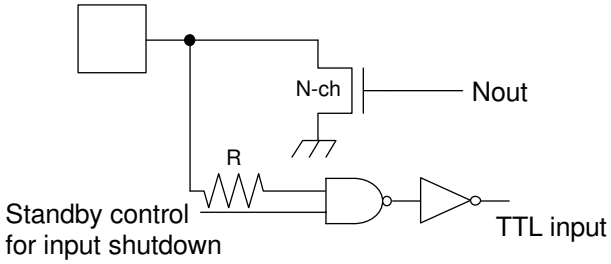
6. I/O Circuit Type

Type	Circuit	Remarks
A		High-speed oscillation circuit: • Programmable between oscillation mode (external crystal or resonator connected to X0/X1 pins) and Fast external Clock Input (FCI) mode (external clock connected to X0 pin) • Feedback resistor = approx. 1.0MΩ • The amplitude: 1.8V±0.15V to operate by the internal supply voltage

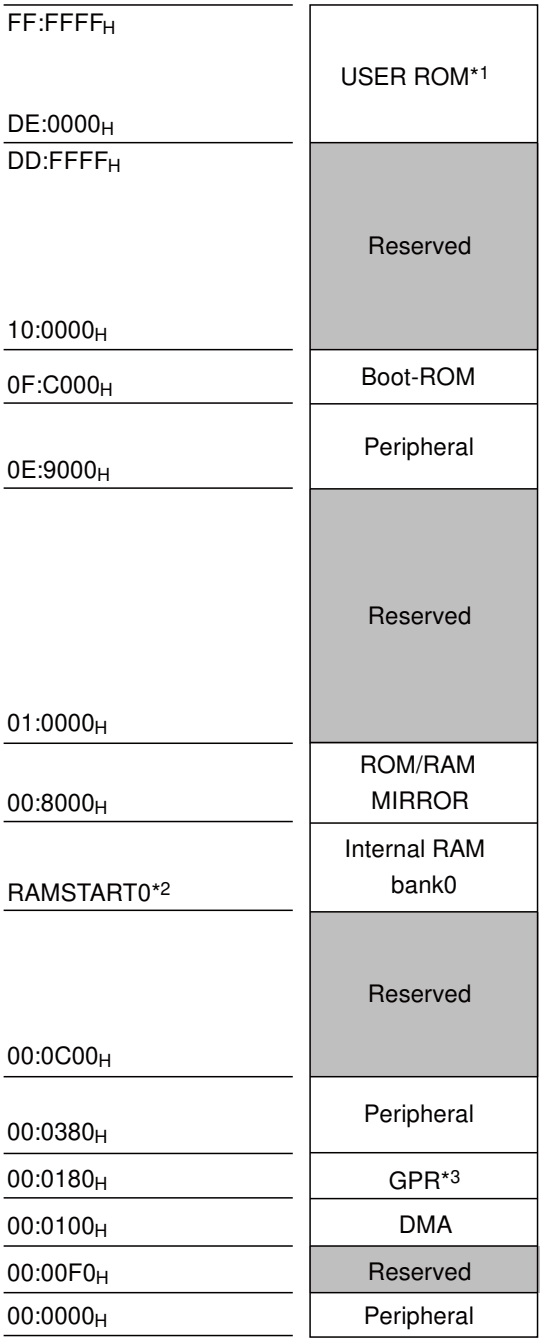
Type	Circuit	Remarks
B		Low-speed oscillation circuit shared with GPIO functionality: • Feedback resistor = approx. 5.0MΩ • GPIO functionality selectable (CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA), Automotive input with input shutdown function and programmable pull-up resistor)
C		CMOS hysteresis input pin

Type	Circuit	Remarks
F		Power supply input protection circuit
G		• A/D converter ref+ (AVRH) power supply input pin with protection circuit • Without protection circuit against V_{CC} for pins AVRH
H		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • Automotive input with input shutdown function • Programmable pull-up resistor
I		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • CMOS hysteresis input with input shutdown function • Programmable pull-up resistor • Analog input

Type	Circuit	Remarks
K		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • Automotive input with input shutdown function • Programmable pull-up resistor • Analog input
M		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • CMOS hysteresis input with input shutdown function • Programmable pull-up resistor
N		• CMOS level output (I_{OL} = 3mA, I_{OH} = -3mA) • CMOS hysteresis input with input shutdown function • Programmable pull-up resistor *: N-channel transistor has slew rate control according to I^2C spec, irrespective of usage.

Type	Circuit	Remarks
O		• Open-drain I/O • Output 25mA, Vcc = 2.7V • TTL input

7. Memory Map



*1: For details about USER ROM area, see “User ROM Memory Map For Flash Devices” on the following pages.

*2: For RAMSTART Addresses, see the table on the next page.

*3: Unused GPR banks can be used as RAM area.

GPR: General-Purpose Register

The DMA area is only available if the device contains the corresponding resource.

The available RAM and ROM area depends on the device.

8. RAMSTART Addresses

Devices	Bank 0 RAM size	RAMSTART0
MB96F633	10KB	$00:5A00_H$
MB96F635	16KB	$00:4200_H$
MB96F636	24KB	$00:2200_H$
MB96F637	28KB	$00:1200_H$

9. User ROM Memory Map For Flash Devices

CPU mode address	Flash memory mode address	MB96F633 Flash size 64.5KB + 32KB	MB96F635 Flash size 128.5KB + 32KB	MB96F636 Flash size 256.5KB + 32KB	MB96F637 Flash size 384.5KB + 32KB	
$FF:FFFF_H$ $FF:0000_H$	$3F:FFFF_H$ $3F:0000_H$	SA39 - 64KB	SA39 - 64KB	SA39 - 64KB	SA39 - 64KB	Bank A of Flash A
$FE:FFFF_H$ $FE:0000_H$	$3E:FFFF_H$ $3E:0000_H$	Reserved	SA38 - 64KB	SA38 - 64KB	SA38 - 64KB	
$FD:FFFF_H$ $FD:0000_H$	$3D:FFFF_H$ $3D:0000_H$		Reserved	SA37 - 64KB	SA37 - 64KB	
$FC:FFFF_H$ $FC:0000_H$	$3C:FFFF_H$ $3C:0000_H$			SA36 - 64KB	SA36 - 64KB	
$FB:FFFF_H$ $FB:0000_H$	$3B:FFFF_H$ $3B:0000_H$			Reserved	SA35 - 64KB	
$FA:FFFF_H$ $FA:0000_H$	$3A:FFFF_H$ $3A:0000_H$				SA34 - 64KB	
$F9:FFFF_H$ $DF:A000_H$					Reserved	
$DF:9FFF_H$ $DF:8000_H$	$1F:9FFF_H$ $1F:8000_H$	SA4 - 8KB	SA4 - 8KB	SA4 - 8KB	SA4 - 8KB	Bank B of Flash A
$DF:7FFF_H$ $DF:6000_H$	$1F:7FFF_H$ $1F:6000_H$	SA3 - 8KB	SA3 - 8KB	SA3 - 8KB	SA3 - 8KB	
$DF:5FFF_H$ $DF:4000_H$	$1F:5FFF_H$ $1F:4000_H$	SA2 - 8KB	SA2 - 8KB	SA2 - 8KB	SA2 - 8KB	
$DF:3FFF_H$ $DF:2000_H$	$1F:3FFF_H$ $1F:2000_H$	SA1 - 8KB	SA1 - 8KB	SA1 - 8KB	SA1 - 8KB	
$DF:1FFF_H$ $DF:0000_H$	$1F:1FFF_H$ $1F:0000_H$	SAS - 512B*	SAS - 512B*	SAS - 512B*	SAS - 512B*	Bank A of Flash A
$DE:FFFF_H$ $DE:0000_H$		Reserved	Reserved	Reserved	Reserved	

*: Physical address area of SAS-512B is from $DF:0000_H$ to $DF:01FF_H$.
Others (from $DF:0200_H$ to $DF:1FFF_H$) is mirror area of SAS-512B.
Sector SAS contains the ROM configuration block RCBA at CPU address $DF:0000_H$ -$DF:01FF_H$.
SAS can not be used for E^2PROM emulation.

10. Serial Programming Communication Interface

USART pins for Flash serial programming (MD = 0, DEBUG I/F = 0, Serial Communication mode)

MB96630		
Pin Number	**USART Number**	**Normal Function**
5	USART0	SIN0
6		SOT0
7		SCK0
37	USART2	SIN2
38		SOT2
39		SCK2
68	USART4	SIN4
69		SOT4
70		SCK4

11. Interrupt Vector Table

Vector number	Offset in vector table	Vector name	Cleared by DMA	Index in ICR to program	Description
0	$3FC_H$	CALLV0	No	-	CALLV instruction
1	$3F8_H$	CALLV1	No	-	CALLV instruction
2	$3F4_H$	CALLV2	No	-	CALLV instruction
3	$3F0_H$	CALLV3	No	-	CALLV instruction
4	$3EC_H$	CALLV4	No	-	CALLV instruction
5	$3E8_H$	CALLV5	No	-	CALLV instruction
6	$3E4_H$	CALLV6	No	-	CALLV instruction
7	$3E0_H$	CALLV7	No	-	CALLV instruction
8	$3DC_H$	RESET	No	-	Reset vector
9	$3D8_H$	INT9	No	-	INT9 instruction
10	$3D4_H$	EXCEPTION	No	-	Undefined instruction execution
11	$3D0_H$	NMI	No	-	Non-Maskable Interrupt
12	$3CC_H$	DLY	No	12	Delayed Interrupt
13	$3C8_H$	RC_TIMER	No	13	RC Clock Timer
14	$3C4_H$	MC_TIMER	No	14	Main Clock Timer
15	$3C0_H$	SC_TIMER	No	15	Sub Clock Timer
16	$3BC_H$	LVDI	No	16	Low Voltage Detector
17	$3B8_H$	EXTINT0	Yes	17	External Interrupt 0
18	$3B4_H$	EXTINT1	Yes	18	External Interrupt 1
19	$3B0_H$	EXTINT2	Yes	19	External Interrupt 2
20	$3AC_H$	EXTINT3	Yes	20	External Interrupt 3
21	$3A8_H$	EXTINT4	Yes	21	External Interrupt 4
22	$3A4_H$	EXTINT5	Yes	22	External Interrupt 5
23	$3A0_H$	EXTINT6	Yes	23	External Interrupt 6
24	$39C_H$	EXTINT7	Yes	24	External Interrupt 7
25	398_H	EXTINT8	Yes	25	External Interrupt 8
26	394_H	EXTINT9	Yes	26	External Interrupt 9
27	390_H	EXTINT10	Yes	27	External Interrupt 10
28	$38C_H$	EXTINT11	Yes	28	External Interrupt 11
29	388_H	EXTINT12	Yes	29	External Interrupt 12
30	384_H	EXTINT13	Yes	30	External Interrupt 13
31	380_H	-	-	31	Reserved
32	$37C_H$	EXTINT15	Yes	32	External Interrupt 15
33	378_H	CAN0	No	33	CAN Controller 0
34	374_H	-	-	34	Reserved
35	370_H	-	-	35	Reserved
36	$36C_H$	-	-	36	Reserved
37	368_H	-	-	37	Reserved
38	364_H	PPG0	Yes	38	Programmable Pulse Generator 0
39	360_H	PPG1	Yes	39	Programmable Pulse Generator 1

Vector number	Offset in vector table	Vector name	Cleared by DMA	Index in ICR to program	Description
40	$35C_H$	PPG2	Yes	40	Programmable Pulse Generator 2
41	358H	PPG3	Yes	41	Programmable Pulse Generator 3
42	354H	PPG4	Yes	42	Programmable Pulse Generator 4
43	350H	-	-	43	Reserved
44	34CH	PPG6	Yes	44	Programmable Pulse Generator 6
45	348H	PPG7	Yes	45	Programmable Pulse Generator 7
46	344H	PPG8	Yes	46	Programmable Pulse Generator 8
47	340H	PPG9	Yes	47	Programmable Pulse Generator 9
48	33CH	PPG10	Yes	48	Programmable Pulse Generator 10
49	338H	PPG11	Yes	49	Programmable Pulse Generator 11
50	334H	PPG12	Yes	50	Programmable Pulse Generator 12
51	330H	PPG13	Yes	51	Programmable Pulse Generator 13
52	32CH	PPG14	Yes	52	Programmable Pulse Generator 14
53	328H	PPG15	Yes	53	Programmable Pulse Generator 15
54	324H	-	-	54	Reserved
55	320H	-	-	55	Reserved
56	31CH	-	-	56	Reserved
57	318H	-	-	57	Reserved
58	314H	RLT0	Yes	58	Reload Timer 0
59	310H	RLT1	Yes	59	Reload Timer 1
60	30CH	-	-	60	Reserved
61	308H	-	-	61	Reserved
62	304H	-	-	62	Reserved
63	300H	-	-	63	Reserved
64	2FCH	RLT6	Yes	64	Reload Timer 6
65	2F8H	ICU0	Yes	65	Input Capture Unit 0
66	2F4H	ICU1	Yes	66	Input Capture Unit 1
67	2F0H	-	-	67	Reserved
68	2ECH	-	-	68	Reserved
69	2E8H	ICU4	Yes	69	Input Capture Unit 4
70	2E4H	ICU5	Yes	70	Input Capture Unit 5
71	2E0H	ICU6	Yes	71	Input Capture Unit 6
72	2DCH	ICU7	Yes	72	Input Capture Unit 7
73	2D8H	-	-	73	Reserved
74	2D4H	ICU9	Yes	74	Input Capture Unit 9
75	2D0H	-	-	75	Reserved
76	2CCH	-	-	76	Reserved
77	2C8H	OCU0	Yes	77	Output Compare Unit 0
78	2C4H	OCU1	Yes	78	Output Compare Unit 1
79	2C0H	OCU2	Yes	79	Output Compare Unit 2
80	2BCH	OCU3	Yes	80	Output Compare Unit 3
81	2B8H	OCU4	Yes	81	Output Compare Unit 4

Vector number	Offset in vector table	Vector name	Cleared by DMA	Index in ICR to program	Description
82	2B4H	-	-	82	Reserved
83	2B0H	OCU6	Yes	83	Output Compare Unit 6
84	2ACH	OCU7	Yes	84	Output Compare Unit 7
85	2A8H	-	-	85	Reserved
86	2A4H	-	-	86	Reserved
87	2A0H	-	-	87	Reserved
88	29CH	-	-	88	Reserved
89	298H	FRT0	Yes	89	Free-Running Timer 0
90	294H	FRT1	Yes	90	Free-Running Timer 1
91	290H	FRT2	Yes	91	Free-Running Timer 2
92	28CH	-	-	92	Reserved
93	288H	RTC0	No	93	Real Time Clock
94	284H	CAL0	No	94	Clock Calibration Unit
95	280H	-	-	95	Reserved
96	27CH	IIC0	Yes	96	I^2C interface 0
97	278H	IIC1	Yes	97	I^2C interface 1
98	274H	ADC0	Yes	98	A/D Converter 0
99	270H	-	-	99	Reserved
100	26CH	-	-	100	Reserved
101	268H	LINR0	Yes	101	LIN USART 0 RX
102	264H	LINT0	Yes	102	LIN USART 0 TX
103	260H	-	-	103	Reserved
104	25CH	-	-	104	Reserved
105	258H	LINR2	Yes	105	LIN USART 2 RX
106	254H	LINT2	Yes	106	LIN USART 2 TX
107	250H	-	-	107	Reserved
108	24CH	-	-	108	Reserved
109	248H	LINR4	Yes	109	LIN USART 4 RX
110	244H	LINT4	Yes	110	LIN USART 4 TX
111	240H	LINR5	Yes	111	LIN USART 5 RX
112	23CH	LINT5	Yes	112	LIN USART 5 TX
113	238H	-	-	113	Reserved
114	234H	-	-	114	Reserved
115	230H	LINR7	Yes	115	LIN USART 7 RX
116	22CH	LINT7	Yes	116	LIN USART 7 TX
117	228H	-	-	117	Reserved
118	224H	-	-	118	Reserved
119	220H	-	-	119	Reserved
120	21CH	-	-	120	Reserved
121	218H	-	-	121	Reserved
122	214H	-	-	122	Reserved
123	210H	-	-	123	Reserved

Vector number	Offset in vector table	Vector name	Cleared by DMA	Index in ICR to program	Description
124	20CH	-	-	124	Reserved
125	208H	-	-	125	Reserved
126	204H	-	-	126	Reserved
127	200H	-	-	127	Reserved
128	1FCH	-	-	128	Reserved
129	1F8H	-	-	129	Reserved
130	1F4H	-	-	130	Reserved
131	1F0H	-	-	131	Reserved
132	1ECH	-	-	132	Reserved
133	1E8H	FLASHA	Yes	133	Flash memory A interrupt
134	1E4H	-	-	134	Reserved
135	1E0H	-	-	135	Reserved
136	1DCH	-	-	136	Reserved
137	1D8H	QPRC0	Yes	137	Quadrature Position/Revolution counter 0
138	1D4H	QPRC1	Yes	138	Quadrature Position/Revolution counter 1
139	1D0H	ADCRC0	No	139	A/D Converter 0 - Range Comparator
140	1CCH	-	-	140	Reserved
141	1C8H	-	-	141	Reserved
142	1C4H	-	-	142	Reserved
143	1C0H	-	-	143	Reserved