Infineon Technologies - MB96F6B5RBPMC-GSE1 Datasheet

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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	F²MC-16FX
Core Size	16-Bit
Speed	32MHz
Connectivity	CANbus, I²C, LINbus, SCI, UART/USART
Peripherals	DMA, LCD, LVD, POR, PWM, WDT
Number of I/O	79
Program Memory Size	160KB (160K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	8K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 27x8/10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-LQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb96f6b5rbpmc-gse1

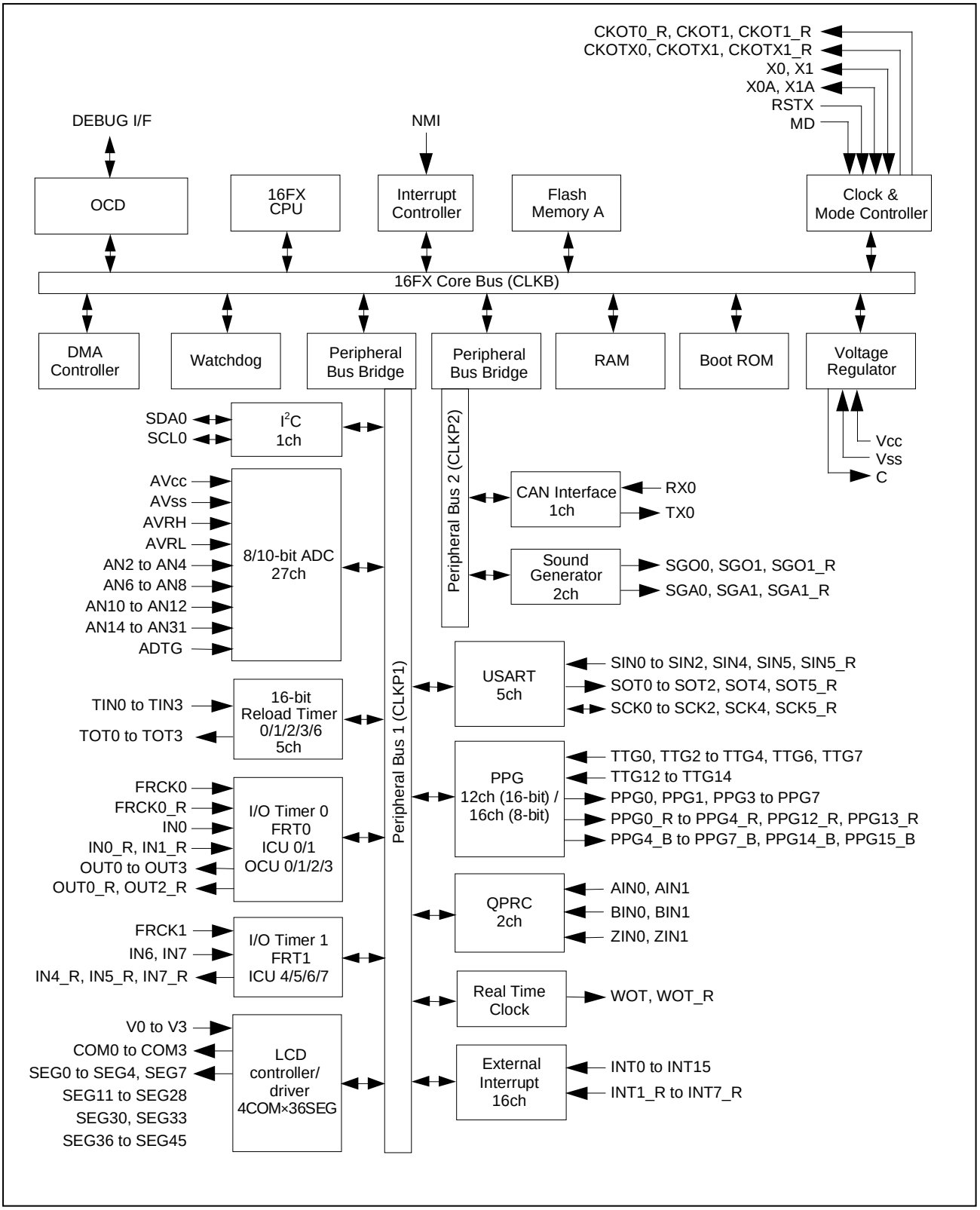
1. Product Lineup

Features			MB966B0	Remark
Product Type			Flash Memory Product	
Subclock			Subclock can be set by software	
Dual Operation Flash Memory		RAM	-	
128.5KB + 32KB		8KB	MB96F6B5R, MB96F6B5A	Product Options R: MCU with CAN A: MCU without CAN
256.5KB + 32KB		16KB	MB96F6B6R	
Package			LQFP-100 FPT-100P-M20	
DMA			4ch	
USART			5ch	LIN-USART 0 to 2/4/5
	with automatic LIN-Header transmission/reception		2ch	LIN-USART 0/1
	with 16 byte RX- and TX-FIFO			
I^2C			1ch	I^2C 0
8/10-bit A/D Converter			27ch	AN 2 to 4/6 to 8/10 to 12/ 14 to 31
	with Data Buffer		No	
	with Range Comparator		Yes	
	with Scan Disable		Yes	
	with ADC Pulse Detection		Yes	
16-bit Reload Timer (RLT)			5ch	RLT 0 to 3/6
16-bit Free-Running Timer (FRT)			2ch	FRT 0/1
16-bit Input Capture Unit (ICU)			6ch (5 channels for LIN-USART)	ICU 0/1/4 to 7 (ICU 0/1/4 to 6 for LIN-USART)
16-bit Output Compare Unit (OCU)			4ch	OCU 0 to 3
8/16-bit Programmable Pulse Generator (PPG)			12ch (16-bit) / 16ch (8-bit)	PPG 0 to 7/12 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)			16ch	INT 0 to 15
Non-Maskable Interrupt (NMI)			1ch	
Sound Generator (SG)			2ch	SG 0/1
LCD Controller			4COM × 36SEG	COM 0 to 3 SEG 0 to 4/7/11 to 28/30/ 33/36 to 45
Real Time Clock (RTC)			1ch	
I/O Ports			77 (Dual clock mode) 79 (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	

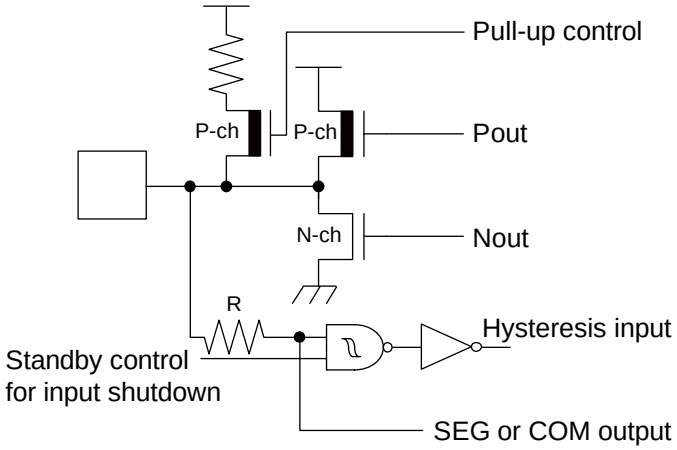
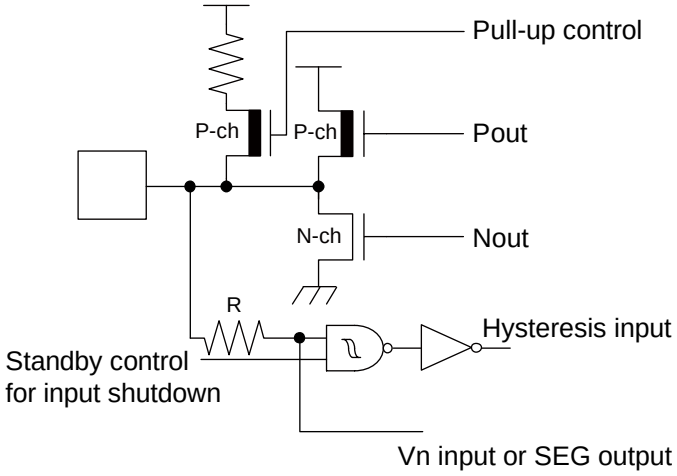
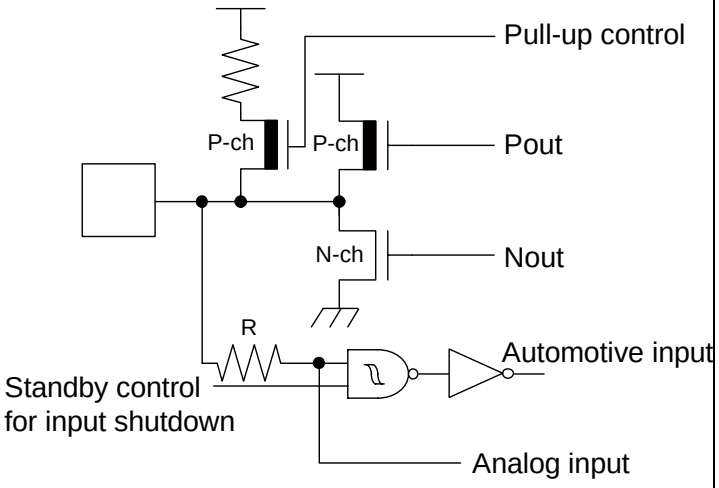
Note:

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



Pin name	Feature	Description
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
TXn	CAN	CAN interface n TX output pin
Vn	LCD	LCD voltage reference 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

Type	Circuit	Remarks
P		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • CMOS hysteresis inputs with input shutdown function • Programmable pull-up resistor • SEG or COM output
Q		• CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA) • CMOS hysteresis inputs with input shutdown function • Programmable pull-up resistor • Vn input or SEG output
V		• CMOS level output (programmable I_{OL} = 4mA, I_{OH} = -4mA and I_{OL} = 20mA, I_{OH} = -20mA) • Automotive input with input shutdown function • Programmable pull-up resistor • Analog input

Vector number	Offset in vector table	Vector name	Cleared by DMA	Index in ICR to program	Description
121	218_H	SG1	No	121	Sound Generator 1
122	214_H	-	-	122	Reserved
123	210_H	-	-	123	Reserved
124	$20C_H$	-	-	124	Reserved
125	208_H	-	-	125	Reserved
126	204_H	-	-	126	Reserved
127	200_H	-	-	127	Reserved
128	$1FC_H$	-	-	128	Reserved
129	$1F8_H$	-	-	129	Reserved
130	$1F4_H$	-	-	130	Reserved
131	$1F0_H$	-	-	131	Reserved
132	$1EC_H$	-	-	132	Reserved
133	$1E8_H$	FLASHA	Yes	133	Flash memory A interrupt
134	$1E4_H$	-	-	134	Reserved
135	$1E0_H$	-	-	135	Reserved
136	$1DC_H$	-	-	136	Reserved
137	$1D8_H$	QPRC0	Yes	137	Quadrature Position/Revolution counter 0
138	$1D4_H$	QPRC1	Yes	138	Quadrature Position/Revolution counter 1
139	$1D0_H$	ADCRC0	No	139	A/D Converter 0 - Range Comparator
140	$1CC_H$	ADCPD0	No	140	A/D Converter 0 - Pulse detection
141	$1C8_H$	-	-	141	Reserved
142	$1C4_H$	-	-	142	Reserved
143	$1C0_H$	-	-	143	Reserved

■Static Electricity

Because semiconductor devices are particularly susceptible to damage by static electricity, you must take the following precautions:

1. Maintain relative humidity in the working environment between 40% and 70%. Use of an apparatus for ion generation may be needed to remove electricity.
2. Electrically ground all conveyors, solder vessels, soldering irons and peripheral equipment.
3. Eliminate static body electricity by the use of rings or bracelets connected to ground through high resistance (on the level of 1 MΩ).
   Wearing of conductive clothing and shoes, use of conductive floor mats and other measures to minimize shock loads is recommended.
4. Ground all fixtures and instruments, or protect with anti-static measures.
5. Avoid the use of Styrofoam or other highly static-prone materials for storage of completed board assemblies.

12.3 Precautions for Use Environment

Reliability of semiconductor devices depends on ambient temperature and other conditions as described above.

For reliable performance, do the following:

1. Humidity

   Prolonged use in high humidity can lead to leakage in devices as well as printed circuit boards. If high humidity levels are anticipated, consider anti-humidity processing.
2. Discharge of Static Electricity

   When high-voltage charges exist close to semiconductor devices, discharges can cause abnormal operation. In such cases, use anti-static measures or processing to prevent discharges.
3. Corrosive Gases, Dust, or Oil

   Exposure to corrosive gases or contact with dust or oil may lead to chemical reactions that will adversely affect the device. If you use devices in such conditions, consider ways to prevent such exposure or to protect the devices.
4. Radiation, Including Cosmic Radiation

   Most devices are not designed for environments involving exposure to radiation or cosmic radiation. Users should provide shielding as appropriate.
5. Smoke, Flame
   CAUTION: Plastic molded devices are flammable, and therefore should not be used near combustible substances.
   If devices begin to smoke or burn, there is danger of the release of toxic gases.

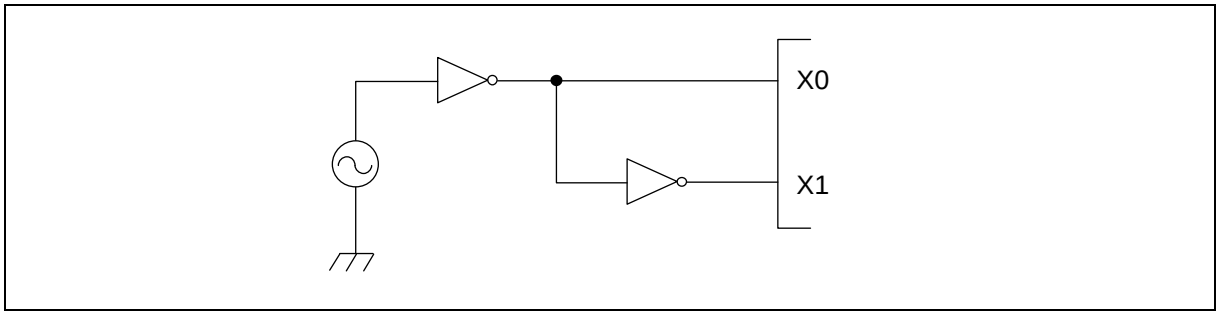
Customers considering the use of Cypress products in other special environmental conditions should consult with sales representatives.

13.3.2 Single phase external clock for Sub oscillator

When using a single phase external clock for the Sub oscillator, “External clock mode” must be selected and X0A/P04_0 pin must be driven. X1A/P04_1 pin can be configured as GPIO.

13.3.3 Opposite phase external clock

When using an opposite phase external clock, X1 (X1A) pins must be supplied with a clock signal which has the opposite phase to the X0 (X0A) pins. Supply level on X0 and X1 pins must be 1.8V.



13.4 Notes on PLL clock mode operation

If the microcontroller is operated with PLL clock mode and no external oscillator is operating or no external clock is supplied, the microcontroller attempts to work with the free oscillating PLL. Performance of this operation, however, cannot be guaranteed.

13.5 Power supply pins (V_{cc}/V_{ss})

It is required that all V_{CC}-level as well as all V_{SS}-level power supply pins are at the same potential. If there is more than one V_{CC} or V_{SS} level, the device may operate incorrectly or be damaged even within the guaranteed operating range.

V_{cc} and V_{ss} pins must be connected to the device from the power supply with lowest possible impedance.

The smoothing capacitor at V_{cc} pin must use the one of a capacity value that is larger than Cs.

Besides this, as a measure against power supply noise, it is required to connect a bypass capacitor of about 0.1µF between V_{cc} and V_{ss} pins as close as possible to V_{cc} and V_{ss} pins.

13.6 Crystal oscillator and ceramic resonator circuit

Noise at X0, X1 pins or X0A, X1A pins might cause abnormal operation. It is required to provide bypass capacitors with shortest possible distance to X0, X1 pins and X0A, X1A pins, crystal oscillator (or ceramic resonator) and ground lines and to the utmost effort, that the lines of oscillation circuit do not cross the lines of other circuits.

It is highly recommended to provide a printed circuit board art work surrounding X0, X1 pins and X0A, X1A pins with a ground area for stabilizing the operation.

It is highly recommended to evaluate the quartz/MCU or resonator/MCU system at the quartz or resonator manufacturer, especially when using low-Q resonators at higher frequencies.

13.7 Turn on sequence of power supply to A/D converter and analog inputs

It is required to turn the A/D converter power supply (AV_{CC}, AVRH, AVRL) and analog inputs (ANn) on after turning the digital power supply (V_{CC}) on.

It is also required to turn the digital power off after turning the A/D converter supply and analog inputs off. In this case, AVRH must not exceed AV_{CC} . Input voltage for ports shared with analog input ports also must not exceed AV_{CC} (turning the analog and digital power supplies simultaneously on or off is acceptable).

14. Electrical Characteristics

14.1 Absolute Maximum Ratings

Parameter	Symbol	Condition	Rating		Unit	Remarks
			Min	Max		
Power supply voltage*1	V_{CC}	-	V_{SS} - 0.3	V_{SS} + 6.0	V	
Analog power supply voltage*1	AV_{CC}	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$V_{CC} = AV_{CC}$*2
Analog reference voltage*1	AVRH, AVRL	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$AV_{CC} \geq$ AVRH, $AV_{CC} \geq$ AVRL, AVRH > AVRL, AVRL ≥ AV_{SS}
LCD power supply voltage*1	V0 to V3	-	V_{SS} - 0.3	V_{SS} + 6.0	V	V0 to V3 must not exceed V_{CC}
Input voltage*1	V_I	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$V_I \leq V_{CC}$ + 0.3V*3
Output voltage*1	V_O	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$V_O \leq V_{CC}$ + 0.3V*3
Maximum Clamp Current	I_{CLAMP}	-	-4.0	+4.0	mA	Applicable to general purpose I/O pins *4
Total Maximum Clamp Current	$\Sigma\|I_{CLAMP}\|$	-	-	26	mA	Applicable to general purpose I/O pins *4
"L" level maximum output current	I_{OL}	-	-	15	mA	Normal port
	I_{OLHCO}	-	-	20	mA	High current port
"L" level average output current	I_{OLAV}	-	-	4	mA	Normal port
	$I_{OLAVHCO}$	-	-	15	mA	High current port
"L" level maximum overall output current	ΣI_{OL}	-	-	64	mA	Normal port
	ΣI_{OLHCO}	-	-	150	mA	High current port
"L" level average overall output current	ΣI_{OLAV}	-	-	32	mA	Normal port
	$\Sigma I_{OLAVHCO}$	-	-	100	mA	High current port
"H" level maximum output current	I_{OH}	-	-	-15	mA	Normal port
	I_{OHHCO}	-	-	-20	mA	High current port
"H" level average output current	I_{OHAV}	-	-	-4	mA	Normal port
	$I_{OHAVHCO}$	-	-	-15	mA	High current port
"H" level maximum overall output current	ΣI_{OH}	-	-	-64	mA	Normal port
	ΣI_{OHHCO}	-	-	-150	mA	High current port
"H" level average overall output current	ΣI_{OHAV}	-	-	-32	mA	Normal port
	$\Sigma I_{OHAVHCO}$	-	-	-100	mA	High current port
Power consumption*5	P_D	T_A= +125°C	-	416*6	mW	
Operating ambient temperature	T_A	-	-40	+125*7	°C	
Storage temperature	T_{STG}	-	-55	+150	°C	

*1: This parameter is based on $V_{SS} = AV_{SS}$ = 0V.

*2: AV_{CC} and V_{CC} must be set to the same voltage. It is required that AV_{CC} does not exceed V_{CC} and that the voltage at the analog inputs does not exceed AV_{CC} when the power is switched on.

*3: V_I and V_O should not exceed V_{CC} + 0.3V. V_I should also not exceed the specified ratings. However if the maximum current to/from an input is limited by some means with external components, the I_{CLAMP} rating supersedes the V_I rating. Input/Output voltages of general I/O ports depend on V_{CC}.

14.2 Recommended Operating Conditions

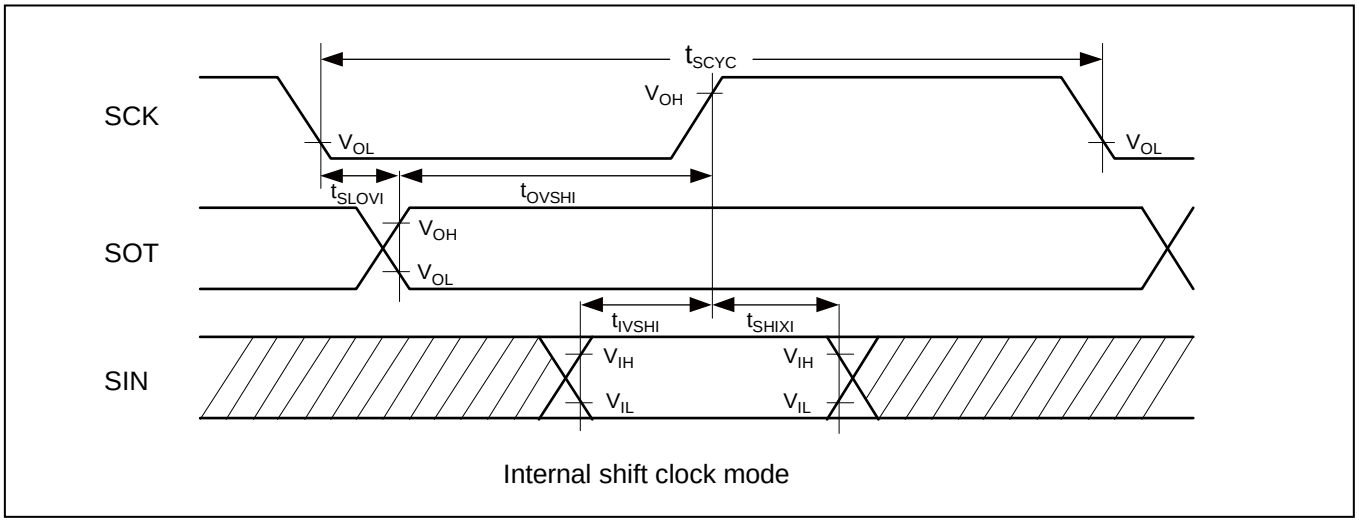
(V_{SS} = AV_{SS} = 0V)

Parameter	Symbol	Value			Unit	Remarks
		Min	Typ	Max		
Power supply voltage	V_{CC}, AV_{CC}	2.7	-	5.5	V	
		2.0	-	5.5	V	Maintains RAM data in stop mode
Smoothing capacitor at C pin	C_S	0.5	1.0 to 3.9	4.7	µF	1.0µF (Allowance within ± 50%) 3.9µF (Allowance within ± 20%) Please use the ceramic capacitor or the capacitor of the frequency response of this level. The smoothing capacitor at V_{CC} must use the one of a capacity value that is larger than C_S.

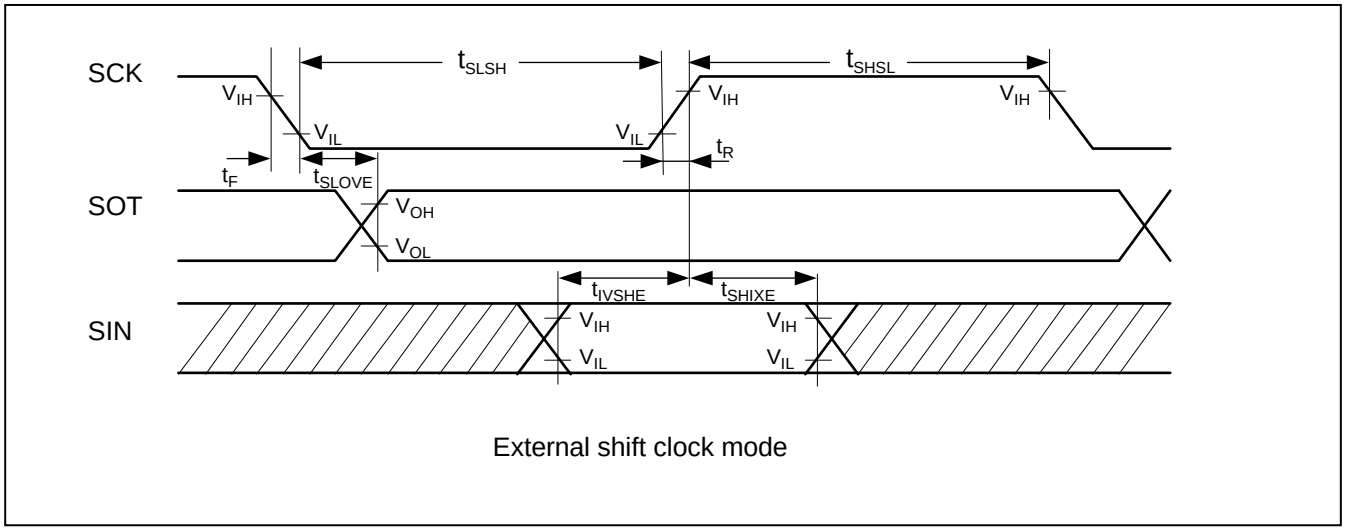
WARNING

The recommended operating conditions are required in order to ensure the normal operation of the semiconductor device. All of the device's electrical characteristics are warranted when the device is operated within these ranges.
Always use semiconductor devices within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in device failure. No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their representatives beforehand.

t_{SCYC}	N
$4 \times t_{CLKP1}$	2
$5 \times t_{CLKP1}$, $6 \times t_{CLKP1}$	3
$7 \times t_{CLKP1}$, $8 \times t_{CLKP1}$	4
...	...



Internal shift clock mode



External shift clock mode

14.4.10 I^2C Timing

(V_{CC} = AV_{CC} = 2.7V to 5.5V, V_{SS} = AV_{SS} = 0V, T_A = - 40°C to + 125°C)

Parameter	Symbol	Conditions	Typical mode		High-speed mode*4		Unit
			Min	Max	Min	Max	
SCL clock frequency	f_{SCL}	C_L = 50pF, R = (V_p/I_{OL})*1	0	100	0	400	kHz
(Repeated) START condition hold time SDA ↓ → SCL ↓	t_{HDSTA}		4.0	-	0.6	-	µs
SCL clock "L" width	t_{LOW}		4.7	-	1.3	-	µs
SCL clock "H" width	t_{HIGH}		4.0	-	0.6	-	µs
(Repeated) START condition setup time SCL ↑ →SDA ↓	t_{SUSTA}		4.7	-	0.6	-	µs
Data hold time SCL ↓ → SDA ↓ ↑	t_{HDDAT}		0	3.45*2	0	0.9*3	µs
Data setup time SDA ↓ ↑ → SCL ↑	t_{SUDAT}		250	-	100	-	ns
STOP condition setup time SCL ↑ → SDA ↑	t_{SUSTO}		4.0	-	0.6	-	µs
Bus free time between "STOP condition" and "START condition"	t_{BUS}		4.7	-	1.3	-	µs
Pulse width of spikes which will be suppressed by input noise filter	t_{SP}	-	0	(1-1.5) × t_{CLKP1}*5	0	(1-1.5) × t_{CLKP1}*5	ns

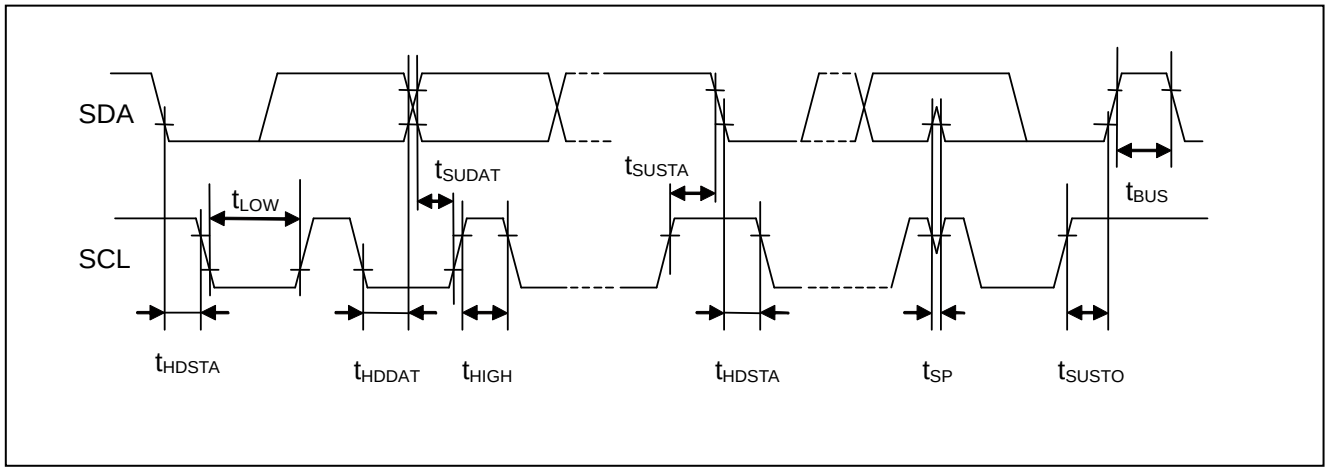
*1: R and C_L represent the pull-up resistance and load capacitance of the SCL and SDA lines, respectively. Vp indicates the power supply voltage of the pull-up resistance and I_{OL} indicates V_{OL} guaranteed current.

*2: The maximum t_{HDDAT} only has to be met if the device does not extend the "L" width (t_{LOW}) of the SCL signal.

*3: A high-speed mode I^2C bus device can be used on a standard mode I^2C bus system as long as the device satisfies the requirement of "t_{SUDAT} ≥ 250ns".

*4: For use at over 100 kHz, set the peripheral clock1 (CLKP1) to at least 6MHz.

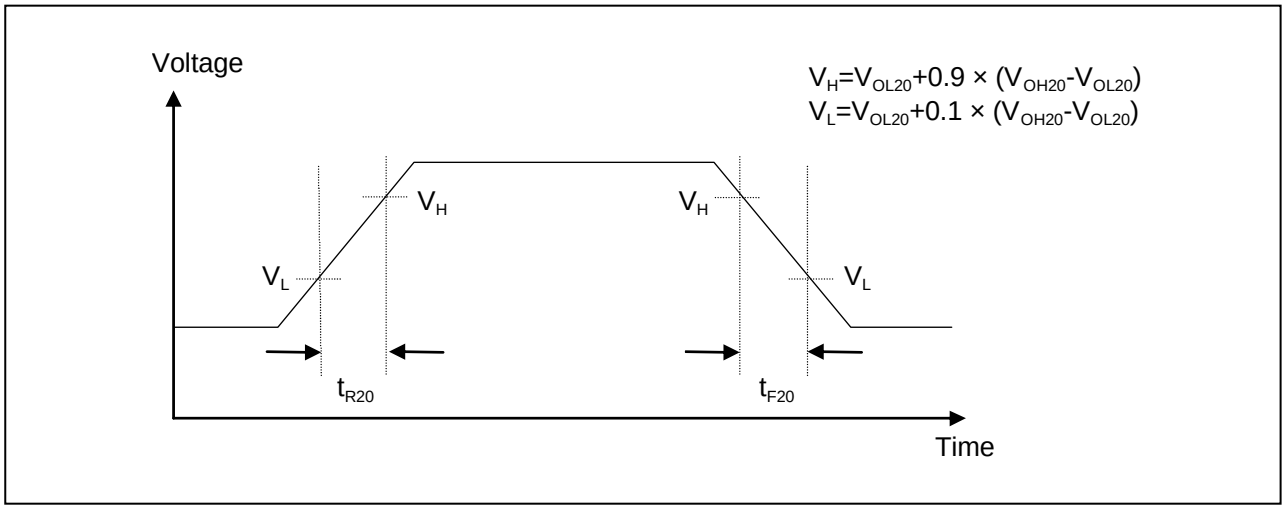
*5: t_{CLKP1} indicates the peripheral clock1 (CLKP1) cycle time.



14.6 High Current Output Slew Rate

(V_{CC} = AV_{CC} = 2.7V to 5.5V, V_{SS} = AV_{SS} = 0V, T_A = - 40°C to + 125°C)

Parameter	Symbol	Pin name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Output rise/fall time	t_{R20}, t_{F20}	P08_m, P09_m, P10_m	Outputs driving strength set to "20mA"	15	-	75	ns	C_L=85pF



14.8 Flash Memory Write/Erase Characteristics

(V_{CC} = AV_{CC} = 2.7V to 5.5V, V_{SS} = AV_{SS} = 0V, T_A = - 40°C to + 125°C)

Parameter		Conditions	Value			Unit	Remarks
			Min	Typ	Max		
Sector erase time	Large Sector	T_A ≤ + 105°C	-	1.6	7.5	s	Includes write time prior to internal erase.
	Small Sector	-	-	0.4	2.1	s	
	Security Sector	-	-	0.31	1.65	s	
Word (16-bit) write time	Large Sector	T_A ≤ + 105°C	-	25	400	µs	Not including system-level overhead time.
	Small Sector	-	-	25	400	µs	
Chip erase time		T_A ≤ + 105°C	-	8.31	40.05	s	Includes write time prior to internal erase.

Note:

While the Flash memory is written or erased, shutdown of the external power (V_{CC}) is prohibited. In the application system where the external power (V_{CC}) might be shut down while writing or erasing, be sure to turn the power off by using a low voltage detection function.

To put it concrete, change the external power in the range of change ration of power supply voltage (-0.004V/µs to +0.004V/µs) after the external power falls below the detection voltage (V_{DLX})[*1].

Write/Erase cycles and data hold time

Write/Erase cycles (cycle)	Data hold time (year)
1,000	20 [*2]
10,000	10 [*2]
100,000	5 [*2]

*1: See "14.7 Low Voltage Detection Function Characteristics".

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

16. Ordering Information

MCU with CAN controller

Part number	Flash memory	Package*
MB96F6B5RBPMC-GSE1	Flash A (160.5KB)	100-pin plastic LQFP (FPT-100P-M20)
MB96F6B5RBPMC-GSE2		
MB96F6B6RBPMC-GSE1	Flash A (288.5KB)	100-pin plastic LQFP (FPT-100P-M20)
MB96F6B6RBPMC-GSE2		

*: For details about package, see “Package Dimension ".

MCU without CAN controller

Part number	Flash memory	Package*
MB96F6B5ABPMC-GSE1	Flash A (160.5KB)	100-pin plastic LQFP (FPT-100P-M20)
MB96F6B5ABPMC-GSE2		

*: For details about package, see "Package Dimension".

Page	Section	Change Results
12	Pin Circuit Type	Added the Pin name Pin no.23, SGO1 Pin no.24, SGA1 Pin no.28, SGO1_R Pin no.29, SGA1_R
		Changed the I/O circuit type Pin no.30 to 34, 37 to 40 K → V
13		Changed the I/O circuit type Pin no.41 to 43, 47, 49 K → V Pin no.46, 48 I → W
14		Added the Pin name Pin no.81, SGO0 Pin no.82, SGA0
16	I/O Circuit Type	Changed the figure of type B
		Changed the Remarks of type B (CMOS hysteresis input with input shutdown function, I_{OL} = 4mA, I_{OH} = -4mA, Programmable pull-up resister) → (CMOS level output (I_{OL} = 4mA, I_{OH} = -4mA), Automotive input with input shutdown function and programmable pull-up resistor)
17		Changed the figure of type G
20		Added the Type V
21		Added the Type W
22	Memory Map	Changed the START addresses of Boot-ROM $0F:E000_H$ → $0F:C000_H$
24	User Rom Memory Map For Flash Devices	Changed the annotation Others (from $DF:0200_H$ to $DF:1FFF_H$) are all ROM Mirror area for SAS-512B. → Others (from $DF:0200_H$ to $DF:1FFF_H$) is mirror area of SAS-512B.
26	Interrupt Vector Table	Changed the Description of CALLV0 to CALLV7 Reserved → CALLV instruction
		Changed the Description of RESET Reserved → Reset vector
		Changed the Description of INT9 Reserved → INT9 instruction
		Changed the Description of EXCEPTION Reserved → Undefined instruction execution
27	Interrupt Vector Table	Changed the Vector name of Vector number 64 PPGRLT → RLT6

Page	Section	Change Results
		Changed the Description of Vector number 64 Reload Timer 6 can be used as PPG clock source → Reload Timer 6
28		Added Vector name to Vector number 95 SG0
29		Added Vector name to Vector number 121 SG1
30 to 33	Handling Precautions	Added a section
35	Handling Devices	Added the description to “3. External clock usage” (3) Opposite phase external clock
		Changed the description in “7. Turn on sequence of power supply to A/D converter and analog inputs” In this case, the voltage must not exceed AVRH or AV_{CC} (turning the analog and digital power supplies simultaneously on or off is acceptable). → In this case, AVRH must not exceed AV_{CC}. Input voltage for ports shared with analog input ports also must not exceed AV_{CC} (turning the analog and digital power supplies simultaneously on or off is acceptable).
36		Added the description “12. Mode Pin (MD)”
37	Electrical Characteristics 1. Absolute Maximum Ratings	Added Symbols of High current port
		Changed the annotation *3 Input/Output voltages of standard ports depend on V_{CC}. → Input/Output voltages of general I/O ports depend on V_{CC}.
38		Changed the annotation *4 Note that if the +B input is applied during power-on, the power supply is provided from the pins and the resulting supply voltage may not be sufficient to operate the Power reset (except devices with persistent low voltage reset in internal vector mode). → Note that if the +B input is applied during power-on, the power supply is provided from the pins and the resulting supply voltage may not be sufficient to operate the Power reset.
		Added the annotation *4 The DEBUG I/F pin has only a protective diode against V_{SS}. Hence it is only permitted to input a negative clamping current (4mA). For protection against positive input voltages, use an external clamping diode which limits the input voltage to maximum 6.0V.
39	2. Recommended Operating Conditions	Added the Value and Remarks to “Power supply voltage” Min: 2.0V Typ: - Max: 5.5V Remarks: Maintains RAM data in stop mode
		Changed the Value of “Smoothing capacitor at C pin” Typ: 1.0μF → 1.0μF to 3.9μF Max: 1.5μF → 4.7μF
		Changed the Remarks of “Smoothing capacitor at C pin” Deleted “(Target value)” Added “3.9μF (Allowance within ± 20%)”
40	3. DC Characteristics (1) Current Rating	Deleted “(Target value)” from Remarks
		Added the Symbol to “Power supply current in Run modes” I_{CCRCH}, I_{CCRCL}

Page	Section	Change Results
		Changed the Conditions of I_{CCPLL}, I_{CCMAIN}, I_{CCSUB} in “Power supply current in Run modes” “Flash 0 wait” is added
		Changed the Value of “Power supply current in Run modes” I_{CCPLL} TYP:28.5mA→ 28mA (T_A = +25°C) I_{CCMAIN} TYP:5mA→ 3.5mA (T_A = +25°C) Max: 10mA → 8mA (T_A = +105°C) Max: 11.5mA → 9.5mA (T_A = +125°C) I_{CCSUB} TYP:0.5mA→ 0.1mA (T_A = +25°C) Max: 6mA → 3.3mA (T_A = +105°C) Max: 7.5mA → 4.8mA (T_A = +125°C)
41		Added the Symbol to “Power supply current in Sleep modes” I_{CCSRCH}, I_{CCSRCL}
		Changed the Conditions of $I_{CCSMAIN}$ in “Power supply current in Sleep modes” “SMCR:LPMSS=0” is added
		Changed the Value of “Power supply current in Sleep modes” I_{CCSPLL} Typ: 10mA → 9.5mA (T_A = +25°C) $I_{CCSMAIN}$ Typ: 3mA → 1.1mA (T_A = +25°C) Max: 8mA → 4.7mA (T_A = +105°C) Max: 9.5mA → 6.2mA (T_A = +125°C) I_{CCSSUB} Typ: 0.3mA → 0.04mA (T_A = +25°C) Max: 4.5mA → 2.7mA (T_A = +105°C) Max: 6mA → 4.2mA (T_A = +125°C)
42		Added the Symbol to “Power supply current in Timer modes” I_{CCTPLL}
		Changed the Conditions of $I_{CCTMAIN}$, I_{CCTRCH} in “Power supply current in Timer modes” “SMCR:LPMSS=0” is added
42	3. DC Characteristics (1) Current Rating	Changed the Value of “Power supply current in Timer modes” $I_{CCTMAIN}$ Max: 335µA → 330µA (T_A = +25°C) Max: 1320µA → 1200µA (T_A = +105°C) Max: 2300µA → 2155µA (T_A = +125°C) I_{CCTRCH} Max: 245µA → 215µA (T_A = +25°C) Max: 1230µA → 1110µA (T_A = +105°C) Max: 2205µA → 2065µA (T_A = +125°C) I_{CCTRCL} Max: 105µA → 75µA (T_A = +25°C) Max: 1030µA → 910µA (T_A = +105°C) Max: 2005µA → 1870µA (T_A = +125°C) I_{CCTSUB} Max: 90µA → 65µA (T_A = +25°C) Max: 1000µA → 885µA (T_A = +105°C) Max: 1980µA → 1845µA (T_A = +125°C)
43		Changed the Value of “Power supply current in Stop mode” I_{CCH} Max: 90µA → 60µA (T_A = +25°C) Max: 1000µA → 880µA (T_A = +105°C) Max: 1980µA → 1840µA (T_A = +125°C)
		Added the Symbol $I_{CCFLASHPD}$

Page	Section	Change Results
		Changed the Value and condition of “Power supply current for active Low Voltage detector” I_{CCLVD} Typ: 5µA, Max: 15µA, Remarks: nothing → Typ: 5µA, Max: -, Remarks: T_A = +25°C Typ: -, Max: 12.5µA, Remarks: T_A = +125°C
		Changed the condition of “Flash Write/Erase current” $I_{CCFLASH}$ Typ: 12.5mA, Max: 20mA, Remarks: nothing → Typ: 12.5mA, Max: -, Remarks: T_A = +25°C Typ: -, Max: 20mA, Remarks: T_A = +125°C
		Changed the annotation *2 The power supply current is measured with a 4MHz external clock connected to the Main oscillator and a 32kHz external clock connected to the Sub oscillator. → When Flash is not in Power-down / reset mode, $I_{CCFLASHPD}$ must be added to the Power supply current. The power supply current is measured with a 4MHz external clock connected to the Main oscillator and a 32kHz external clock connected to the Sub oscillator. The current for "On Chip Debugger" part is not included.
44	3. DC Characteristics (2) Pin Characteristics	Added the Symbol for High Drive type V_{OH20}, V_{OL20}
		Added the Symbol for DEBUG I/F pin V_{OLD}
45	3. DC Characteristics (2) Pin Characteristics	Changed the Pin name of “Input capacitance” Other than Vcc, Vss, AVcc, AVss, AVRH, AVRL, P08_m, P09_m, P10_m → Other than C, Vcc, Vss, AVcc, AVss, AVRH, AVRL, P08_m, P09_m, P10_m
		Deleted the annotation “I_{OH} and I_{OL} are target value.”
		Added the annotation “In the case of high current outputs, set “1” to the bit in the Port High Drive Register.”

Page	Section	Change Results
		Added the Description “Zero transition voltage” “Full scale transition voltage”
59	6. High Current Output Slew Rate	Added the item of “6. High Current Output Slew Rate”
60	7. Low Voltage Detection Function Characteristics	Added the Value of “ Power supply voltage change rate” Max: +0.004 V/µs
		Added “Hysteresis width” (V_{HYS})
		Added “Stabilization time” ($T_{LVDSTAB}$)
		Added “Detection delay time” (t_d)
		Deleted the Remarks
		Added the annotation *1, *2
61		Added the figure for “Hysteresis width”
		Added the figure for “Stabilization time”
62	8. Flash Memory Write/Erase Characteristics	Changed the Value of “Sector erase time”
		Added “Security Sector” to “Sector erase time”
		Changed the Parameter “Half word (16 bit) write time” → “Word (16-bit) write time”
		Changed the Value of “Chip erase time”
		Changed the Remarks of “Sector erase time” Excludes write time prior to internal erase → Includes write time prior to internal erase
		Added the Note and annotation *1
		Deleted “(targeted value)” from title “ Write/Erase cycles and data hold time”
63 to 65	Example Characteristics	Added a section
66	Ordering Information	Changed part number MCU with CAN controller MB96F6B6RAPMC-GSE1* → MB96F6B6RBPMC-GSE1 MB96F6B6RAPMC-GSE2* → MB96F6B6RBPMC-GSE2
		Added part number MCU with CAN controller MB96F6B5RBPMC-GSE1 MB96F6B5RBPMC-GSE2 MCU without CAN controller MB96F6B5ABPMC-GSE1 MB96F6B5ABPMC-GSE2
Revision 1.1		
-	-	Company name and layout design change

NOTE: Please see “Document History” about later revised information.

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**	-	KSUN	01/31/2014	Migrated to Cypress and assigned document number 002-04721 No change to document contents or format.
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