Infineon Technologies - MB96F683RBPMC-GSE2 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	65
Program Memory Size	96KB (96K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	4K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 14x8/10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	80-LQFP
Supplier Device Package	80-LQFP (12x12)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb96f683rbpmc-gse2

- 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
  - ADC Pulse Detection 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
  - 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
- 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
- Stepping Motor Controller
  - Stepping Motor Controller with integrated high current output drivers
  - Four high current outputs for each channel
  - Two synchronized 8/10-bit PWMs per channel
  - Internal prescaling for PWM clock: 1, 1/4, 1/5, 1/6, 1/8, 1/10, 1/12, 1/16 of peripheral clock
  - Dedicated power supply for high current output drivers
- LCD Controller
  - LCD controller with up to 4COM × 32SEG
  - Internal or external voltage generation
  - Duty cycle: Selectable from options: 1/2, 1/3 and 1/4
  - Fixed 1/3 bias
  - Programmable frame period
  - Clock source selectable from four options (main clock, peripheral clock, subclock or RC oscillator clock)
  - Internal divider resistors or external divider resistors
  - On-chip data memory for display
  - LCD display can be operated in Timer Mode
  - Blank display: selectable
  - All SEG, COM and V pins can be switched between general and specialized purposes
- Sound Generator
  - 8-bit PWM signal is mixed with tone frequency from 16-bit reload counter
  - PWM clock by internal prescaler: 1, 1/2, 1/4, 1/8 of peripheral clock
- 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 interrupt 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, cannot 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 erases or writes

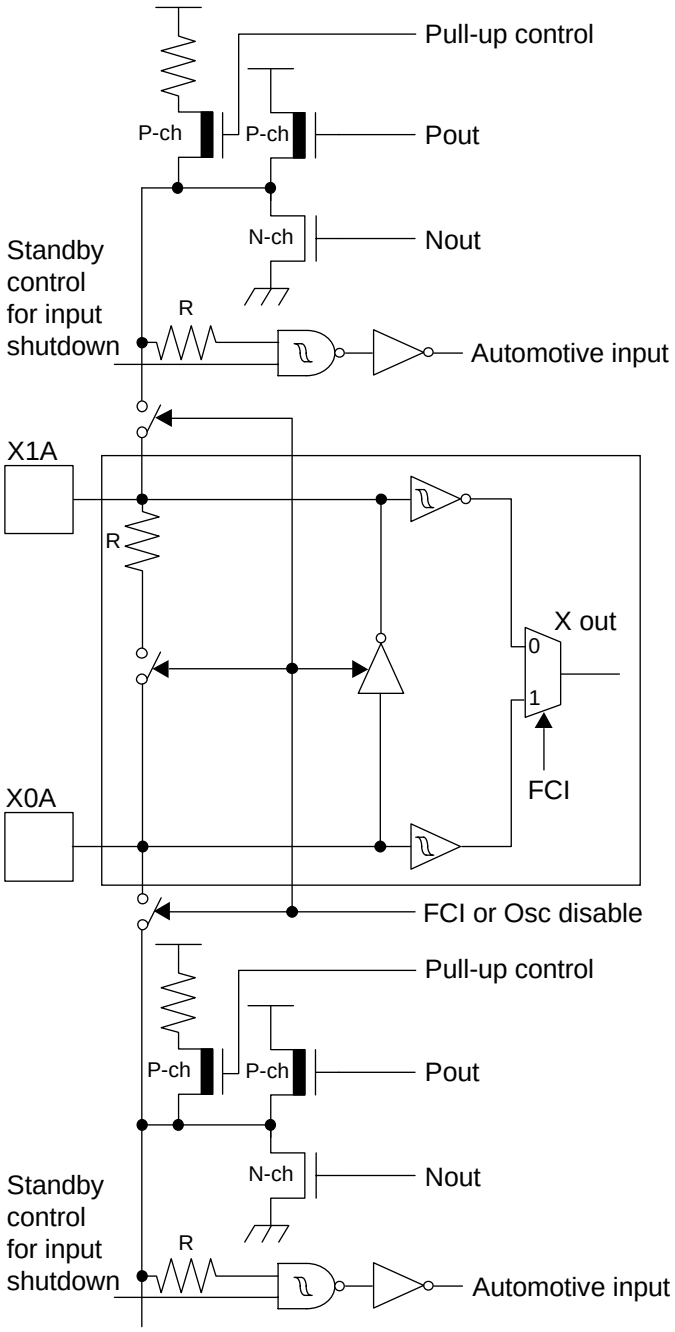
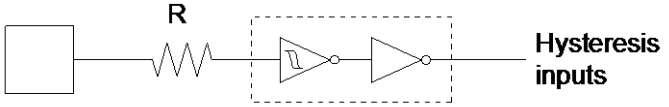
1. Product Lineup

Features		CY96680	Remark
Product Type		Flash Memory Product	
Subclock		Subclock can be set by software	
Dual Operation Flash Memory	RAM	-	
64.5KB + 32KB	4KB	CY96F683R, CY96F683A	Product Options R: MCU with CAN A: MCU without CAN
128.5KB + 32KB	4KB	CY96F685R, CY96F685A	
Package		LQFP-80 LQH080	
DMA		2ch	
USART		2ch	LIN-USART 0/1
	with automatic LIN-Header transmission/reception	Yes (only 1ch)	LIN-USART 0
	with 16 byte RX- and TX-FIFO	No	
I^2C		1ch	I^2C 0
8/10-bit A/D Converter		14ch	AN 8 to 13/16 to 23
	with Data Buffer	No	
	with Range Comparator	Yes	
	with Scan Disable	Yes	
	with ADC Pulse Detection	Yes	
16-bit Reload Timer (RLT)		3ch	RLT 1/2/6
16-bit Free-Running Timer (FRT)		2ch	FRT 0/1
16-bit Input Capture Unit (ICU)		4ch (2 channels for LIN-USART)	ICU 0/1/4/5 (ICU 0/1 for LIN-USART)
8/16-bit Programmable Pulse Generator (PPG)		4ch (16-bit) / 8ch (8-bit)	PPG 0 to 3
	with Timing point capture	Yes	
	with Start delay	No	
	with Ramp	No	
CAN Interface		1ch	CAN 0 32 Message Buffers
Stepping Motor Controller (SMC)		2ch	SMC 0/1
External Interrupts (INT)		7ch	INT 0 to 4/6/7
Non-Maskable Interrupt (NMI)		1ch	
Sound Generator (SG)		1ch	SG 0
LCD Controller		4COM × 32SEG	COM 0 to 3 SEG 1 to 12/19 to 24/ 30/36 to 39/42/45 to 47/ 52 to 56
Real Time Clock (RTC)		1ch	
I/O Ports		63 (Dual clock mode) 65 (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	

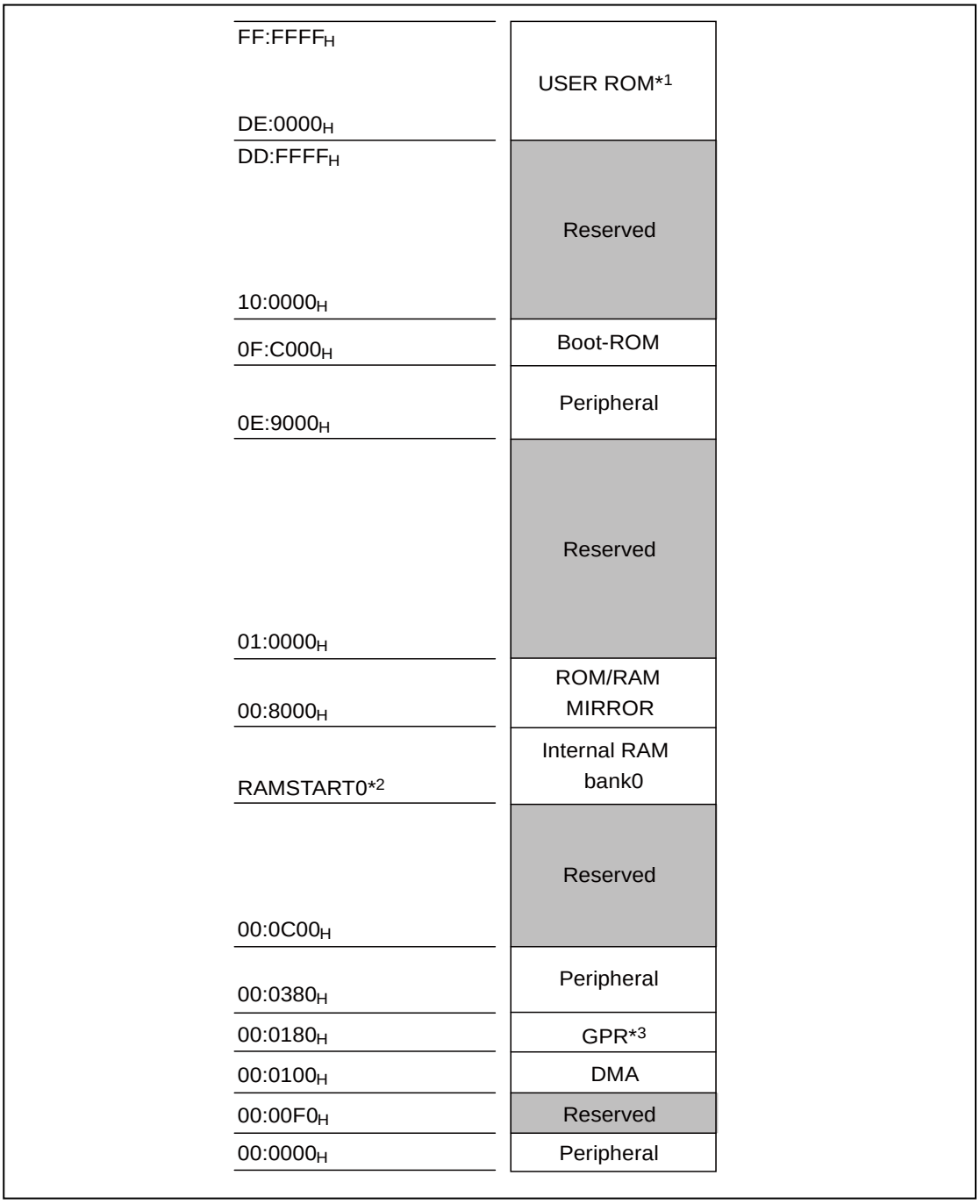
Note:
All signals of the peripheral function in each product cannot be allocated by limiting the pins of package.
It is necessary to use the port relocate function of the general I/O port according to your function use.

Pin No.	I/O Circuit Type*	Pin Name
77	M	P03_4 / RX0 / INT4
78	H	P03_5 / TX0
79	H	P03_6 / INT0 / NMI
80	Supply	V_{CC}

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

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

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.

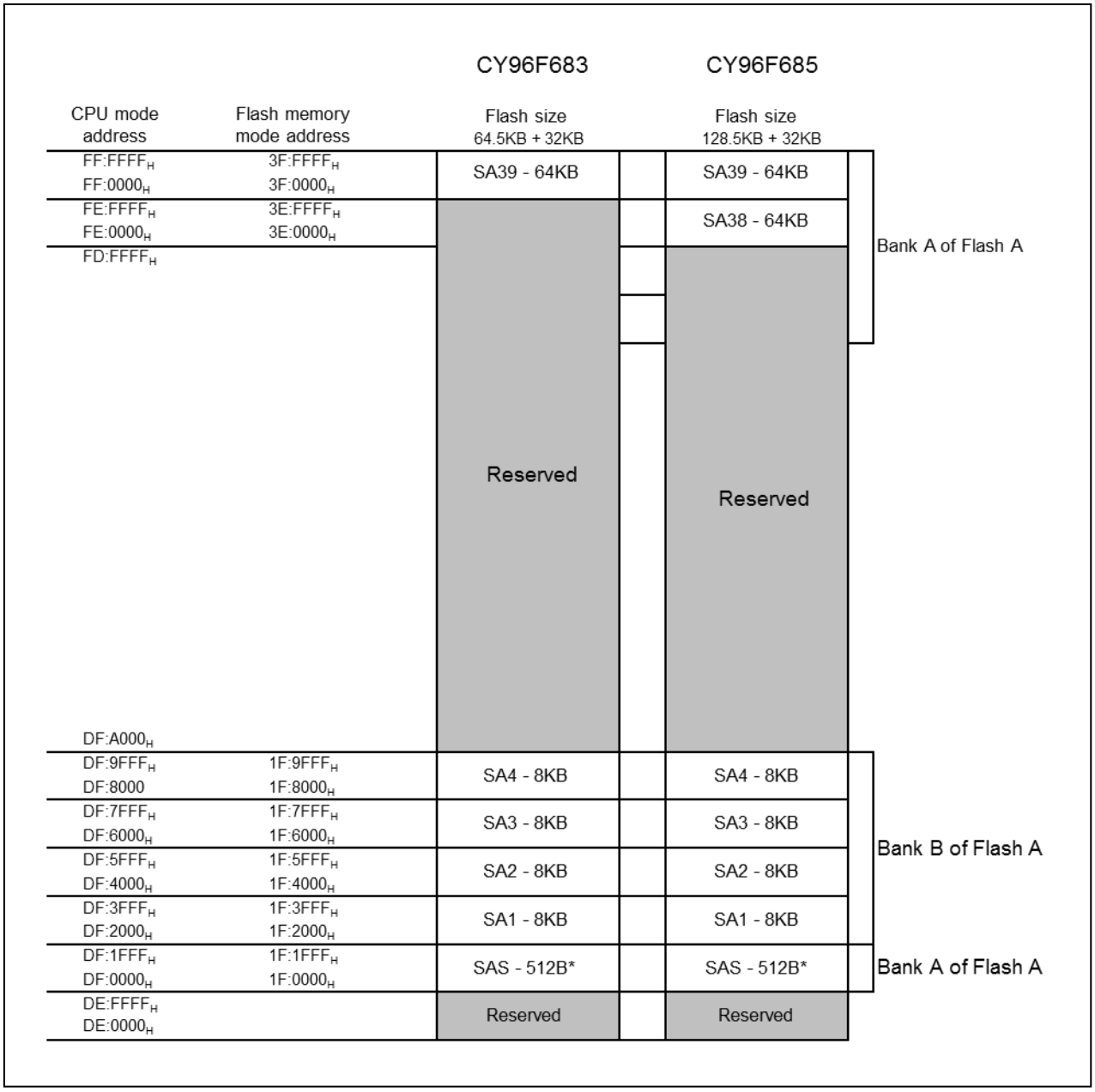
*3: Unused GPR banks can be used as RAM area.

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.

9. User ROM Memory Map For Flash Devices



*: 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 cannot be used for E^{2}PROM emulation.

10. Serial Programming Communication Interface

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

CY96680		
Pin Number	**USART Number**	**Normal Function**
37	USART0	SIN0
38		SOT0
39		SCK0
3	USART1	SIN1
4		SOT1
5		SCK1

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	$3A4_H$	-	-	22	Reserved
23	$3A0_H$	EXTINT6	Yes	23	External Interrupt 6
24	$39C_H$	EXTINT7	Yes	24	External Interrupt 7
25	398_H	-	-	25	Reserved
26	394_H	-	-	26	Reserved
27	390_H	-	-	27	Reserved
28	$38C_H$	-	-	28	Reserved
29	388_H	-	-	29	Reserved
30	384_H	-	-	30	Reserved
31	380_H	-	-	31	Reserved
32	$37C_H$	-	-	32	Reserved
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

■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.

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	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$AV_{CC} \geq AVRH$, $AVRH \geq AV_{SS}$
SMC Power supply*1	DV_{CC}	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$V_{CC} = AV_{CC} = DV_{CC}$*2
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	$V_I \leq (D)V_{CC} + 0.3V$*3
Output voltage*1	V_O	-	V_{SS} - 0.3	V_{SS} + 6.0	V	$V_O \leq (D)V_{CC} + 0.3V$*3
Maximum Clamp Current	I_{CLAMP}	-	-4.0	+4.0	mA	Applicable to general purpose I/O pins *4
Total Maximum Clamp Current	$\Sigma\|I_{CLAMP}\|$	-	-	21	mA	Applicable to general purpose I/O pins *4
"L" level maximum output current	I_{OL}	-	-	15	mA	Normal port
	I_{OLSMC}	T_A= -40°C	-	52	mA	High current port
		T_A= +25°C	-	39	mA	
		T_A= +85°C	-	32	mA	
		T_A= +105°C	-	30	mA	
"L" level average output current	I_{OLAV}	-	-	4	mA	Normal port
	$I_{OLAVSMC}$	T_A= -40°C	-	40	mA	High current port
		T_A= +25°C	-	30	mA	
		T_A= +85°C	-	25	mA	
		T_A= +105°C	-	23	mA	
"L" level maximum overall output current	ΣI_{OL}	-	-	46	mA	Normal port
	ΣI_{OLSMC}	-	-	180	mA	High current port
"L" level average overall output current	ΣI_{OLAV}	-	-	23	mA	Normal port
	$\Sigma I_{OLAVSMC}$	-	-	90	mA	High current port
"H" level maximum output current	I_{OH}	-	-	-15	mA	Normal port
	I_{OHSMC}	T_A= -40°C	-	-52	mA	High current port
		T_A= +25°C	-	-39	mA	
		T_A= +85°C	-	-32	mA	
		T_A= +105°C	-	-30	mA	
"H" level average output current	I_{OHAV}	-	-	-4	mA	Normal port
	$I_{OHAVSMC}$	T_A= -40°C	-	-40	mA	High current port
		T_A= +25°C	-	-30	mA	
		T_A= +85°C	-	-25	mA	
		T_A= +105°C	-	-23	mA	
"H" level maximum overall output current	ΣI_{OH}	-	-	-46	mA	Normal port
	ΣI_{OHSMC}	-	-	-180	mA	High current port
"H" level average overall output current	ΣI_{OHAV}	-	-	-23	mA	Normal port
	$\Sigma I_{OHAVSMC}$	-	-	-90	mA	High current port
Power consumption*5	P_D	T_A= +105°C	-	317*6	mW	
Operating ambient temperature	T_A	-	-40	+105	°C	
Storage temperature	T_{STG}	-	-55	+150	°C	

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

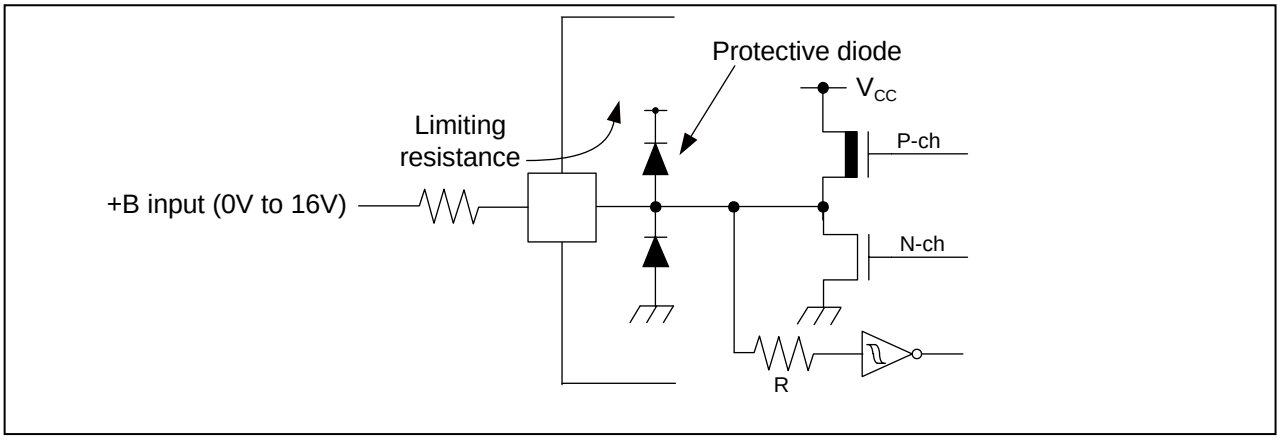
*2: AV_{CC} and V_{CC} and D_{VCC} must be set to the same voltage. It is required that AVCC does not exceed V_{CC}, DV_{CC} and that the voltage at the analog inputs does not exceed AV_{CC} when the power is switched on.

*3: V_I and V_O should not exceed V_{CC} + 0.3V. VI 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 ICLAMP rating supersedes the VI rating. Input/Output voltages of high current ports depend on DV_{CC}. Input/Output voltages of standard ports depend on V_{CC}.

*4:

- Applicable to all general purpose I/O pins (Pnn_m).
- Use within recommended operating conditions.
- Use at DC voltage (current).
- The +B signal should always be applied a limiting resistance placed between the +B signal and the microcontroller.
- The value of the limiting resistance should be set so that when the +B signal is applied the input current to the microcontroller pin does not exceed rated values, either instantaneously or for prolonged periods.
- Note that when the microcontroller drive current is low, such as in the power saving modes, the +B input potential may pass through the protective diode and increase the potential at the V_{CC} pin, and this may affect other devices.
- Note that if a +B signal is input when the microcontroller power supply is off (not fixed at 0V), the power supply is provided from the pins, so that incomplete operation may result.
- 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.
- The DEBUG I/F pin has only a protective diode against VSS. 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.

- Sample recommended circuits:



*5: The maximum permitted power dissipation depends on the ambient temperature, the air flow velocity and the thermal conductance of the package on the PCB.
The actual power dissipation depends on the customer application and can be calculated as follows:
$PD = P_{IO} + P_{INT}$
$PIO = \Sigma (V_{OL} \times I_{OL} + V_{OH} \times I_{OH})$ (I/O load power dissipation, sum is performed on all I/O ports)
$P_{INT} = V_{CC} \times (I_{CC} + I_A)$ (internal power dissipation)
I_{CC} is the total core current consumption into V_{CC} as described in the “DC characteristics” and depends on the selected operation mode and clock frequency and the usage of functions like Flash programming.
I_A is the analog current consumption into AV_{CC}.

*6: Worst case value for a package mounted on single layer PCB at specified T_A without air flow.

WARNING

Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

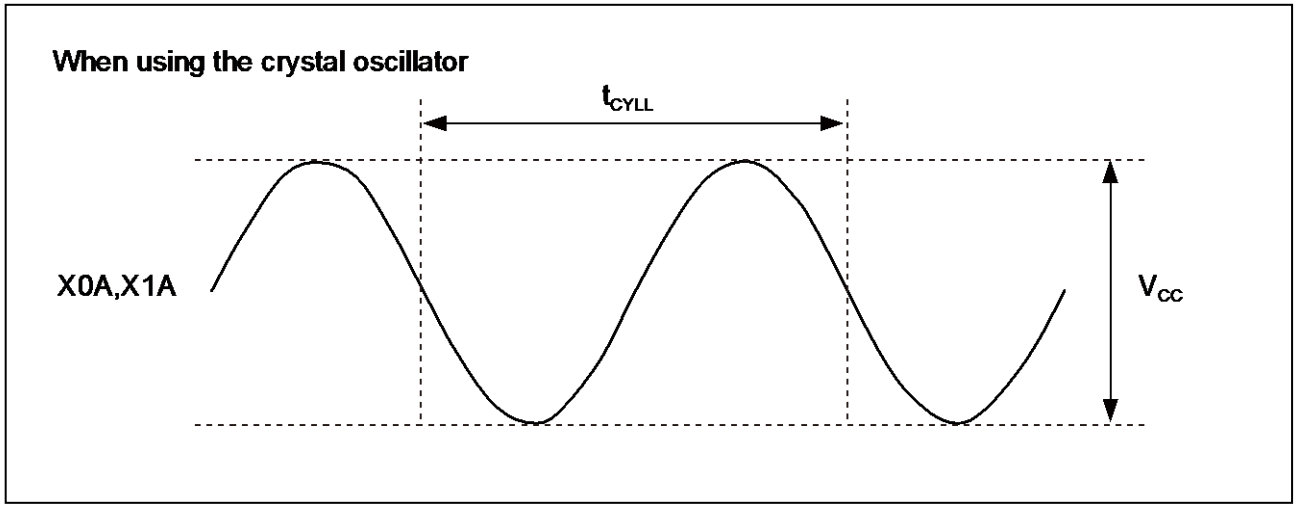
Parameter	Symbol	Pin Name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Power supply current in Sleep modes*1	I_{CCSPLL}	V_{CC}	PLL Sleep mode with CLKS1/2 = CLKP1/2 = 32MHz (CLKRC and CLKSC stopped)	-	6.5	-	mA	T_A = +25°C
				-	-	13	mA	T_A = +105°C
	$I_{CCSMAIN}$		Main Sleep mode with CLKS1/2 = CLKP1/2 = 4MHz, SMCR:LPMSS = 0 (CLKPLL, CLKRC and CLKSC stopped)	-	0.9	-	mA	T_A = +25°C
				-	-	4	mA	T_A = +105°C
	I_{CCSRCH}		RC Sleep mode with CLKS1/2 = CLKP1/2 = CLKRC = 2MHz, SMCR:LPMSS = 0 (CLKMC, CLKPLL and CLKSC stopped)	-	0.5	-	mA	T_A = +25°C
				-	-	3.5	mA	T_A = +105°C
	I_{CCSRCL}		RC Sleep mode with CLKS1/2 = CLKP1/2 = CLKRC = 100kHz (CLKMC, CLKPLL and CLKSC stopped)	-	0.06	-	mA	T_A = +25°C
				-	-	2.7	mA	T_A = +105°C
	I_{CCSSUB}		Sub Sleep mode with CLKS1/2 = CLKP1/2 = 32kHz, (CLKMC, CLKPLL and CLKRC stopped)	-	0.04	-	mA	T_A = +25°C
				-	-	2.5	mA	T_A = +105°C

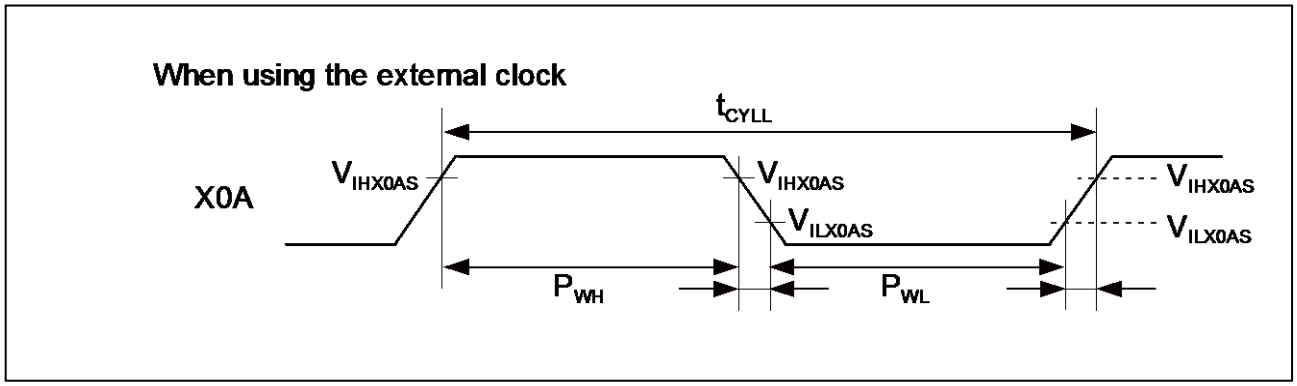
Parameter	Symbol	Pin Name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Power supply current in Timer modes*2	I_{CCTPLL}	V_{CC}	PLL Timer mode with CLKPLL = 32MHz (CLKRC and CLKSC stopped)	-	1800	2245	µA	T_A = +25°C
				-	-	3140	µA	T_A = +105°C
	$I_{CCTMAIN}$		Main Timer mode with CLKMC = 4MHz, SMCR:LPMSS = 0 (CLKPLL, CLKRC and CLKSC stopped)	-	285	325	µA	T_A = +25°C
				-	-	1055	µA	T_A = +105°C
	I_{CCTRCH}		RC Timer mode with CLKRC = 2MHz, SMCR:LPMSS = 0 (CLKPLL, CLKMC and CLKSC stopped)	-	160	210	µA	T_A = +25°C
				-	-	970	µA	T_A = +105°C
	I_{CCTRCL}		RC Timer mode with CLKRC = 100kHz (CLKPLL, CLKMC and CLKSC stopped)	-	30	70	µA	T_A = +25°C
				-	-	820	µA	T_A = +105°C
	I_{CCTSUB}		Sub Timer mode with CLKSC = 32kHz (CLKMC, CLKPLL and CLKRC stopped)	-	25	55	µA	T_A = +25°C
				-	-	800	µA	T_A = +105°C

14.4.2 Sub Clock Input Characteristics

(V_{CC} = AV_{CC} = DV_{CC} = 2.7V to 5.5V, V_{SS} = AV_{SS} = DV_{SS} = 0V, T_A = - 40°C to + 105°C)

Parameter	Symbol	Pin Name	Conditions	Value			Unit	Remarks
				Min	Typ	Max		
Input frequency	f_{CL}	X0A, X1A	-	-	32.768	-	kHz	When using an oscillation circuit
			-	-	-	100	kHz	When using an opposite phase external clock
		X0A	-	-	-	50	kHz	When using a single phase external clock
Input clock cycle	t_{CYLL}	-	-	10	-	-	µs	
Input clock pulse width	-	-	P_{WH}/t_{CYLL}, P_{WL}/t_{CYLL}	30	-	70	%	





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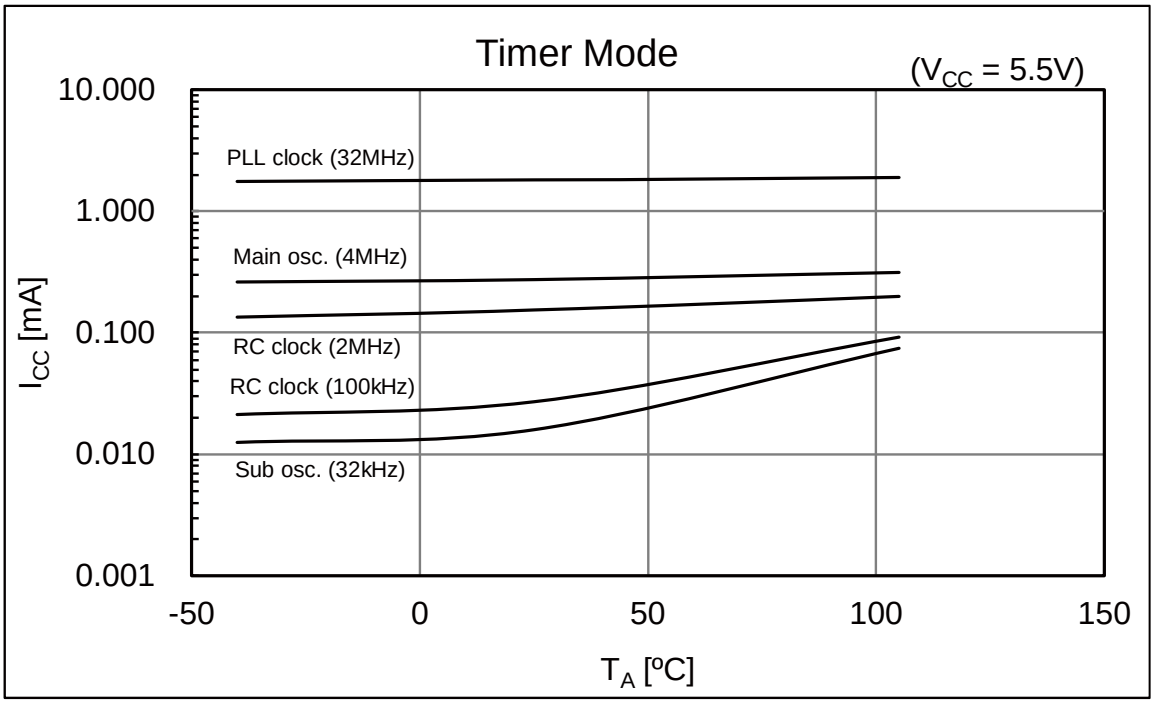
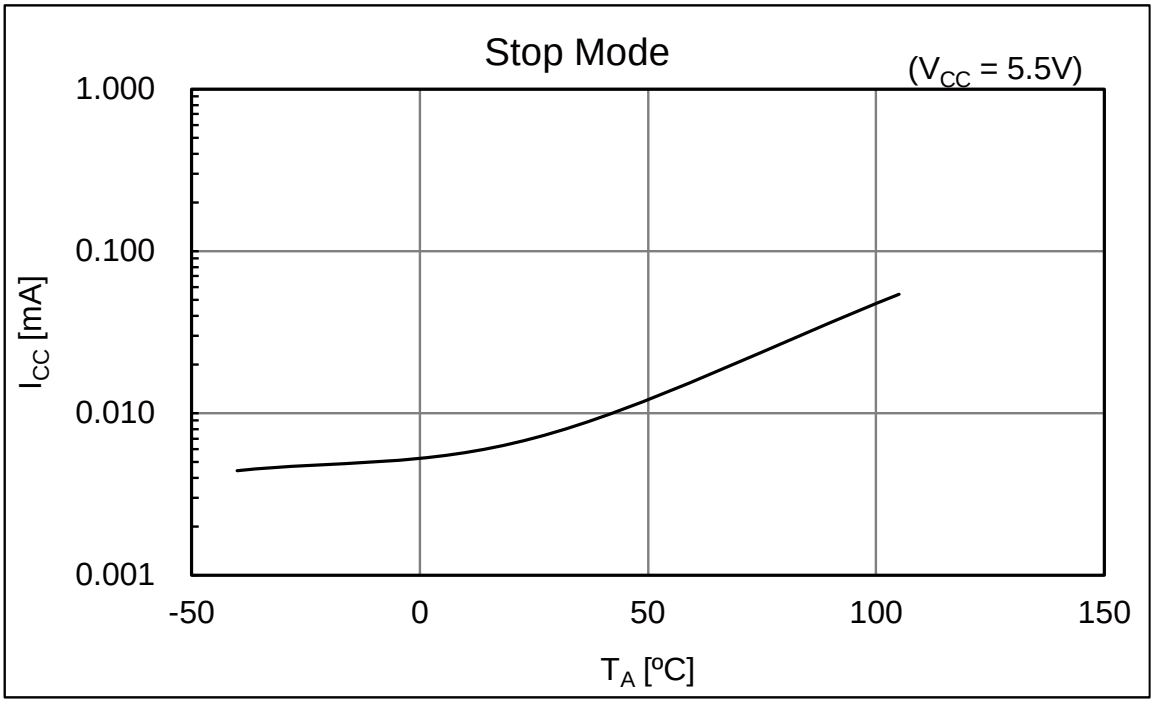
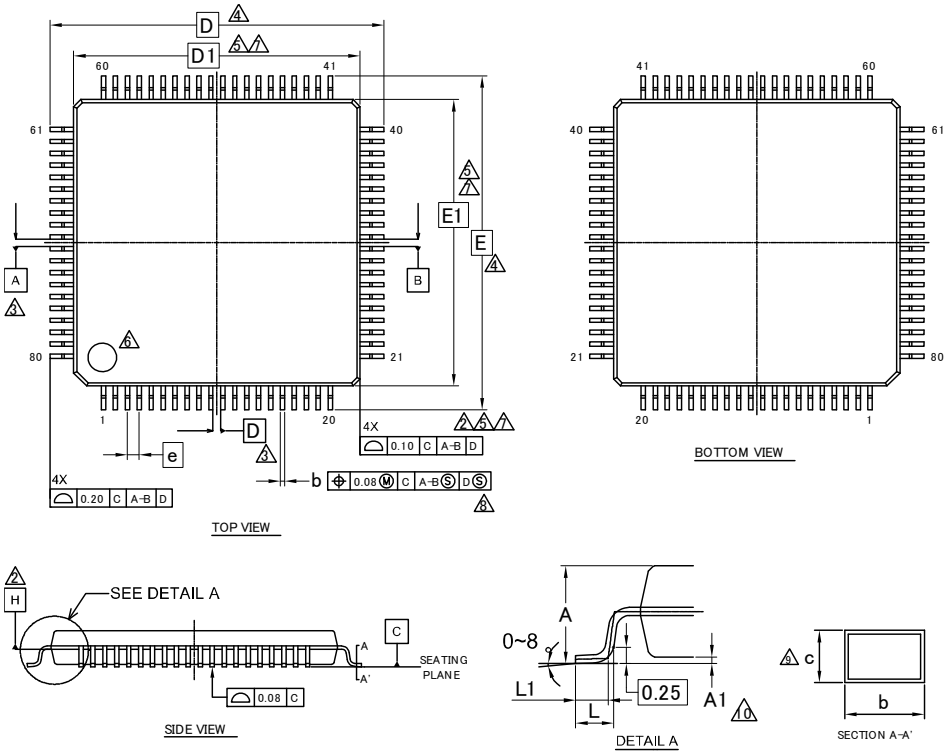

Timer Mode
(V_{CC} = 5.5V)
10.000
1.000
0.100
0.010
0.001
I_{CC} [mA]
PLL clock (32MHz)
Main osc. (4MHz)
RC clock (2MHz)
RC clock (100kHz)
Sub osc. (32kHz)
-50
0
50
100
150
T_A [ºC]


Stop Mode
(V_{CC} = 5.5V)
1.000
0.100
0.010
0.001
I_{CC} [mA]
-50
0
50
100
150
T_A [ºC]

■Used setting

Mode	Selected Source Clock	Clock/Regulator and FLASH Settings
Run mode	PLL	CLKS1 = CLKS2 = CLKB = CLKP1 = CLKP2 = 32MHz
	Main osc.	CLKS1 = CLKS2 = CLKB = CLKP1 = CLKP2 = 4MHz
	RC clock fast	CLKS1 = CLKS2 = CLKB = CLKP1 = CLKP2 = 2MHz
	RC clock slow	CLKS1 = CLKS2 = CLKB = CLKP1 = CLKP2 = 100kHz
	Sub osc.	CLKS1 = CLKS2 = CLKB = CLKP1 = CLKP2 = 32kHz
Sleep mode	PLL	CLKS1 = CLKS2 = CLKP1 = CLKP2 = 32MHz Regulator in High Power Mode, (CLKB is stopped in this mode)
	Main osc.	CLKS1 = CLKS2 = CLKP1 = CLKP2 = 4MHz Regulator in High Power Mode, (CLKB is stopped in this mode)
	RC clock fast	CLKS1 = CLKS2 = CLKP1 = CLKP2 = 2MHz Regulator in High Power Mode, (CLKB is stopped in this mode)
	RC clock slow	CLKS1 = CLKS2 = CLKP1 = CLKP2 = 100kHz Regulator in Low Power Mode, (CLKB is stopped in this mode)
	Sub osc.	CLKS1 = CLKS2 = CLKP1 = CLKP2 = 32kHz Regulator in Low Power Mode, (CLKB is stopped in this mode)
Timer mode	PLL	CLKMC = 4MHz, CLKPLL = 32MHz (System clocks are stopped in this mode) Regulator in High Power Mode, FLASH in Power-down / reset mode
	Main osc.	CLKMC = 4MHz (System clocks are stopped in this mode) Regulator in High Power Mode, FLASH in Power-down / reset mode
	RC clock fast	CLKMC = 2MHz (System clocks are stopped in this mode) Regulator in High Power Mode, FLASH in Power-down / reset mode
	RC clock slow	CLKMC = 100kHz (System clocks are stopped in this mode) Regulator in Low Power Mode, FLASH in Power-down / reset mode
	Sub osc.	CLKMC = 32 kHz (System clocks are stopped in this mode) Regulator in Low Power Mode, FLASH in Power-down / reset mode
Stop mode	stopped	(All clocks are stopped in this mode) Regulator in Low Power Mode, FLASH in Power-down / reset mode

17. Package Dimension



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	——	——	1.70
A1	0.05	——	0.15
b	0.15	——	0.27
c	0.09	——	0.20
D	14.00 BSC.		
D1	12.00 BSC.		
e	0.50 BSC		
E	14.00 BSC.		
E1	12.00 BSC.		
L	0.45	0.60	0.75
L1	0.30	0.50	0.70

NOTES

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

002-11501 **

PACKAGE OUTLINE, 80 LEAD LQFP
12.0X12.0X1.7 MM LQH080 Rev **

18. Major Changes

Spansion Publication Number: MB96680_DS704-00002

Page	Section	Change Results
Revision 2.0		
40	Electrical Characteristics 3. DC Characteristics (1) Current Rating	Changed the Value of “Power supply current in Timer modes” I_{CCTPLL} Typ: 1880µA → 1800µA (T_A = +25°C)
Revision 2.1		
-	-	Company name and layout design change
Rev.*B		
-	Marketing Part Numbers changed from an MB prefix to a CY prefix.	
6, 8, 64, 65	1. Product Lineup 3. Pin Assignment 16. Ordering Information 17. Package Dimension	Package description modified to JEDEC description. FPT-80P-M21 → LQH080
64	16. Ordering Information	Revised Marketing Part Numbers as follows: Before) **MCU with CAN controller** MB96F683RBPMC-GSE1 MB96F683RBPMC-GSE2 MB96F685RBPMC-GSE1 MB96F685RBPMC-GSE2 **MCU without CAN controller** MB96F683ABPMC-GSE1 MB96F683ABPMC-GSE2 MB96F685ABPMC-GSE1 MB96F685ABPMC-GSE2 After) **MCU with CAN controller** MB96F683RBPMC-GS-UJE1 MB96F685RBPMC-GS-UJE1 **MCU without CAN controller** MB96F683ABPMC-GS-UJE1

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

Document History

Document Title: CY96680 Series F²MC-16FX 16-Bit Microcontroller
Document Number: 002-04705

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	-	TORS	01/31/2014	Migrated to Cypress and assigned document number 002-04705 No change to document contents or format.
*A	5147098	TORS	08/22/2016	Updated to Cypress format.
*B	6003420	MIYH	12/25/2017	Revised the following items: Marketing Part Numbers changed from an MB prefix to a CY prefix. 1. Product Lineup 3. Pin Assignment 16. Ordering Information 17. Package Dimension For details, please see 18. Major Changes.