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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

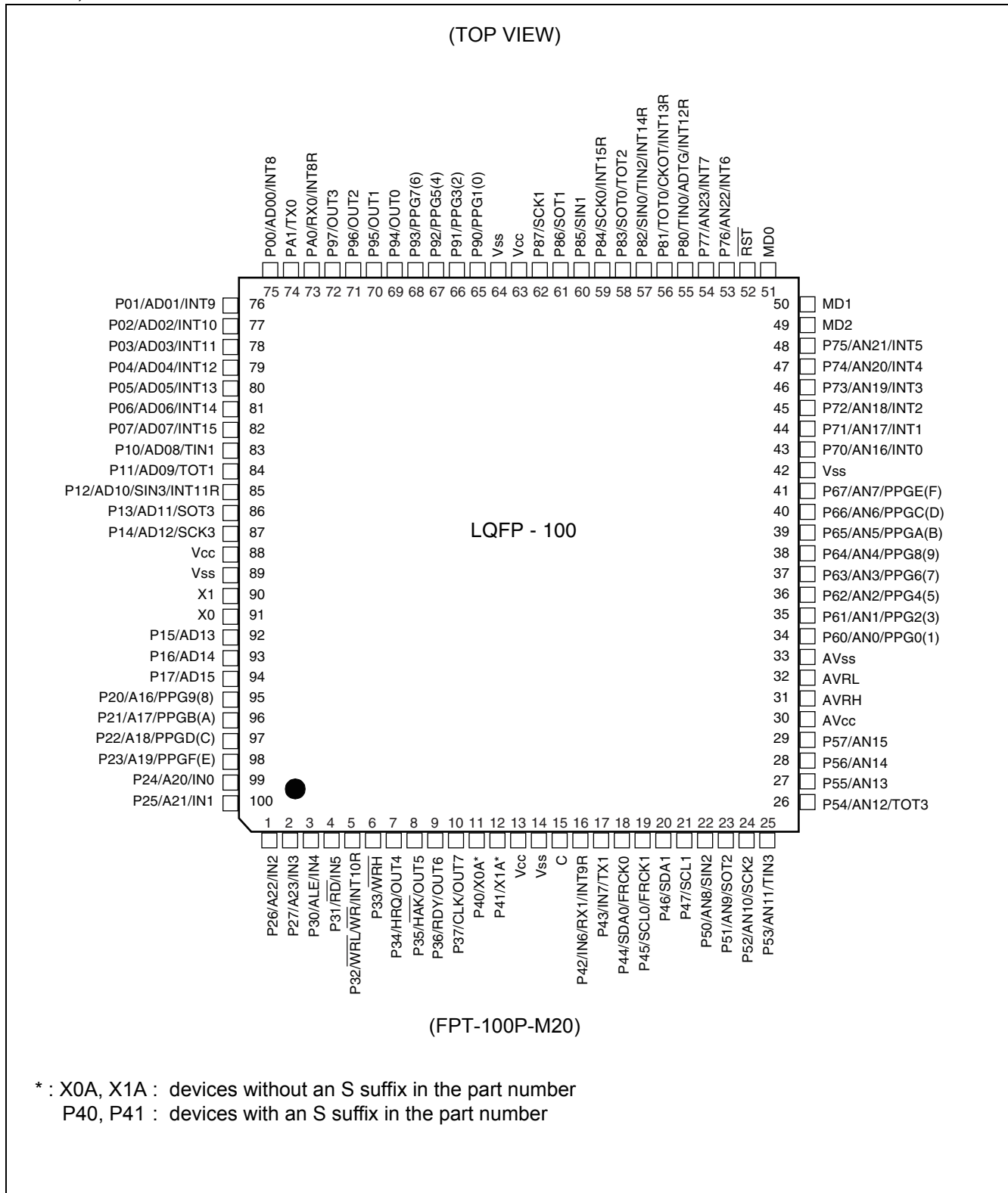
Product Status	Obsolete
Core Processor	F ² MC-16LX
Core Size	16-Bit
Speed	24MHz
Connectivity	CANbus, EBI/EMI, LINbus, SCI, UART/USART
Peripherals	DMA, POR, WDT
Number of I/O	82
Program Memory Size	128KB (128K x 8)
Program Memory Type	Mask ROM
EEPROM Size	-
RAM Size	6K x 8
Voltage - Supply (Vcc/Vdd)	3.5V ~ 5.5V
Data Converters	A/D 16x8/10b
Oscillator Type	External
Operating Temperature	-40°C ~ 105°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/mb90347espmc-gs-566e1

1. Product Lineup

Part Number			
Parameter	MB90V340E-101, MB90V340E-102	MB90F342E(S), MB90F342CE(S), MB90F345E(S), MB90F345CE(S), MB90F346E(S), MB90F346CE(S), MB90F347E(S), MB90F347CE(S), MB90F349E(S), MB90F349CE(S)	MB90341E(S), MB90341CE(S), MB90342E(S), MB90342CE(S), MB90346E(S), MB90346CE(S), MB90347E(S), MB90347CE(S), MB90348E(S), MB90348CE(S), MB90349E(S), MB90349CE(S)
Type	Evaluation products	Flash memory products	MASK ROM products
CPU	F ² MC-16LX CPU		
System clock	On-chip PLL clock multiplier (×1, ×2, ×3, ×4, ×6, 1/2 when PLL stops) Minimum instruction execution time : 42 ns (4 MHz osc. PLL × 6)		
ROM	External	512 Kbytes : MB90F345E(S), MB90F345CE(S) 256 Kbytes : MB90F342E(S), MB90F342CE(S), MB90F349E(S), MB90F349CE(S) 128 Kbytes : MB90F347E(S), MB90F347CE(S) 64 Kbytes : MB90F346E(S), MB90F346CE(S)	256 Kbytes : MB90342E(S), MB90342CE(S), MB90349E(S), MB90349CE(S) 128 Kbytes : MB90341E(S), MB90341CE(S), MB90347E(S), MB90347CE(S), MB90348E(S), MB90348CE(S) 64 Kbytes : MB90346E(S), MB90346CE(S)
RAM	30 Kbytes	20 Kbytes : MB90F345E(S), MB90F345CE(S) 16 Kbytes : MB90F342E(S), MB90F342CE(S), MB90F349E(S), MB90F349CE(S) 6 Kbytes : MB90F347E(S), MB90F347CE(S) 2 Kbytes : MB90F346E(S), MB90F346CE(S)	16 Kbytes : MB90341E(S), MB90341CE(S), MB90342E(S), MB90342CE(S), MB90348E(S), MB90348CE(S), MB90349E(S), MB90349CE(S) 6 Kbytes : MB90347E(S), MB90347CE(S) 2 Kbytes : MB90346E(S), MB90346CE(S)
Emulator-specific power supply*	Yes	—	
Technology	0.35 μm CMOS with regulator for built-in power supply	0.35 μm CMOS with built-in power supply regulator + Flash memory with Charge pump for programming voltage	
Operating voltage range	5 V ± 10%	3.5 V to 5.5 V : When normal operating (not using A/D converter) 4.0 V to 5.5 V : When using the A/D converter/Flash programming 4.5 V to 5.5 V : When using the external bus	
Temperature range	—	−40°C to +105°C	
Package	PGA-299	QFP-100, LQFP-100	
LIN-UART	5 channels	4 channels	
	Wide range of baud rate settings using a dedicated baud rate generator (reload timer) Special synchronous options for adapting to different synchronous serial protocols LIN functionality working either as master or slave LIN device		
I ² C (400 kbps)	2 channels	Devices with a C suffix in the part number : 2 channels Devices without a C suffix in the part number : —	

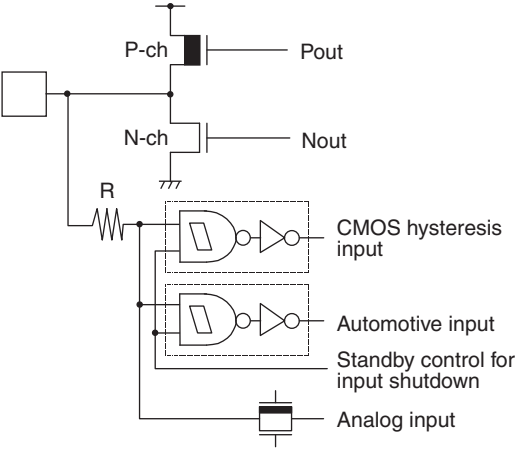
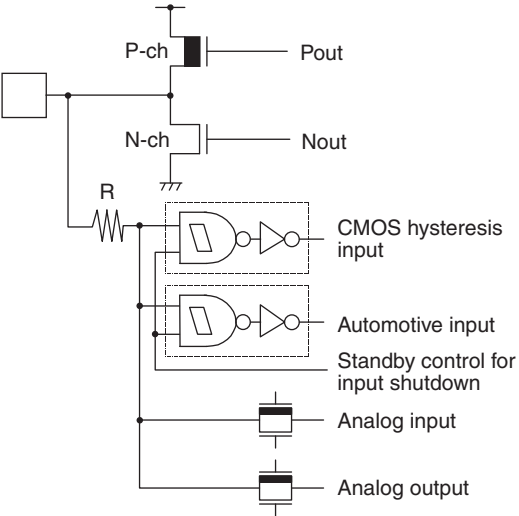
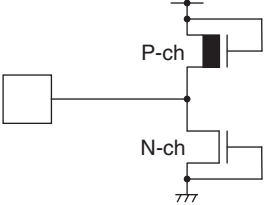
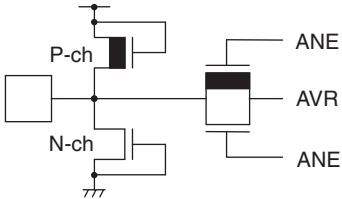
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Pin No.		Pin name	I/O Circuit type*3	Function
QFP100*1	LQFP100*2			
86	84	P11	G	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD09		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.
		TOT1		Output pin for the reload timer
87	85	P12	N	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD10		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.
		SIN3		Serial data input pin for UART3
		INT11R		External interrupt request input pin
88	86	P13	G	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD11		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.
		SOT3		Serial data output pin for UART3
89	87	P14	G	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD12		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.
		SCK3		Clock I/O pin for UART3
90	88	V _{CC}	—	Power (3.5 V to 5.5 V) input pin
91	89	V _{SS}	—	GND pin
92	90	X1	A	Main clock output pin
93	91	X0		Main clock input pin
94	92	P15	G	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD13		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.
95	93	P16	G	General purpose I/O pin. The register can be set to select whether to use a pull-up resistor. This function is enabled in single-chip mode.
		AD14		I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.

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Type	Circuit	Remarks
I		■ CMOS level output ($I_{OL} = 4 \text{ mA}$, $I_{OH} = -4 \text{ mA}$) ■ CMOS hysteresis input (with function to disconnect input during standby) ■ Automotive input (with function to disconnect input during standby) ■ A/D converter analog input
J		■ CMOS level output ($I_{OL} = 4 \text{ mA}$, $I_{OH} = -4 \text{ mA}$) ■ D/A analog output ■ CMOS hysteresis input (with function to disconnect input during standby) ■ Automotive input (with function to disconnect input during standby) ■ A/D converter analog input
K		Power supply input protection circuit
L		■ A/D converter reference voltage power supply input pin, with the protection circuit ■ Flash memory devices do not have a protection circuit against V_{CC} for pin AVRH

5. Sequence for Turning On the Power Supply to the A/D Converter and Analog Inputs

Make sure to turn on the A/D converter power supply (AV_{CC} , $AVRH$, $AVRL$) and analog inputs ($AN0$ to $AN23$) after turning-on the digital power supply (V_{CC}).

Turn-off the digital power after turning off the A/D converter supply and analog inputs. In this case, make sure that the voltage does not exceed $AVRH$ or AV_{CC} (turning on/off the analog and digital power supplies simultaneously is acceptable).

6. Connection of Unused A/D Converter Pins when the A/D Converter is Used

Connect unused pins of A/D converter to $AV_{CC} = V_{CC}$, $AV_{SS} = AVRH = AVRL = V_{SS}$.

7. Crystal Oscillator Circuit

The X0, X1 pins and X0A, X1A pins may be possible causes of abnormal operation. Make sure to provide bypass capacitors via the shortest distance from X0, X1 pins and X0A, X1A pins, crystal oscillator (or ceramic oscillator) and ground lines, and make sure, to the utmost effort, that the oscillation circuit lines 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.

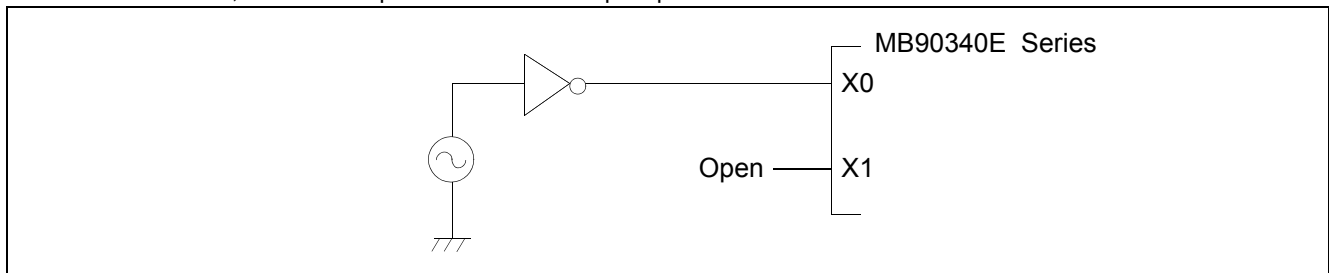
For each of the mass-production products, request an oscillator evaluation from the manufacturer of the oscillator you are using.

8. Pull-up/down resistors

The MB90340E Series does not support internal pull-up/down resistors (except for the pull-up resistors built into ports 0 to 3). Use external components where needed.

9. Using external clock

To use an external clock, drive the X0 pin and leave the X1 pin open.



10. Precautions when not using a sub clock signal

If you do not connect pins X0A and X1A to an oscillator, use pull-down handling on the X0A pin, and leave the X1A pin open.

11. Notes on operation in PLL clock mode

If PLL clock mode is selected, the microcontroller attempt to be working with the self-oscillating circuit even when there is no external oscillator or the external clock input is stopped. Performance of this operation, however, cannot be guaranteed.

12. Notes on Power-On

To prevent the internal regulator circuit from malfunctioning, set the voltage rise time during power-on to 50 μ s or more (0.2 V to 2.7 V)

Address	Register	Abbreviation	Access	Resource name	Initial value
0000A5 _H	Automatic Ready Function Select Register	ARSR	W	External Memory Access	0011XX00 _B
0000A6 _H	External Address Output Control Register	HACR	W		00000000 _B
0000A7 _H	Bus Control Signal Selection Register	ECSR	W		0000000X _B
0000A8 _H	Watchdog Control Register	WDTC	R,W	Watchdog Timer	XXXXXX11 _B
0000A9 _H	Time Base Timer Control Register	TBTC	W,R/W	Time Base Timer	1XX00100 _B
0000AA _H	Watch Timer Control Register	WTC	R,R/W	Watch Timer	1X001000 _B
0000AB _H	Reserved				
0000AC _H	DMA Enable L Register	DERL	R/W	DMA	00000000 _B
0000AD _H	DMA Enable H Register	DERH	R/W		00000000 _B
0000AE _H	Flash Control Status Register (Flash memory devices only. Otherwise reserved)	FMCS	R,R/W	Flash Memory	000X0000 _B
0000AF _H	Reserved				
0000B0 _H	Interrupt Control Register 00	ICR00	W,R/W	Interrupt Control	00000111 _B
0000B1 _H	Interrupt Control Register 01	ICR01	W,R/W		00000111 _B
0000B2 _H	Interrupt Control Register 02	ICR02	W,R/W		00000111 _B
0000B3 _H	Interrupt Control Register 03	ICR03	W,R/W		00000111 _B
0000B4 _H	Interrupt Control Register 04	ICR04	W,R/W		00000111 _B
0000B5 _H	Interrupt Control Register 05	ICR05	W,R/W		00000111 _B
0000B6 _H	Interrupt Control Register 06	ICR06	W,R/W		00000111 _B
0000B7 _H	Interrupt Control Register 07	ICR07	W,R/W		00000111 _B
0000B8 _H	Interrupt Control Register 08	ICR08	W,R/W		00000111 _B
0000B9 _H	Interrupt Control Register 09	ICR09	W,R/W		00000111 _B
0000BA _H	Interrupt Control Register 10	ICR10	W,R/W		00000111 _B
0000BB _H	Interrupt Control Register 11	ICR11	W,R/W		00000111 _B
0000BC _H	Interrupt Control Register 12	ICR12	W,R/W		00000111 _B
0000BD _H	Interrupt Control Register 13	ICR13	W,R/W		00000111 _B
0000BE _H	Interrupt Control Register 14	ICR14	W,R/W		00000111 _B
0000BF _H	Interrupt Control Register 15	ICR15	W,R/W		00000111 _B
0000C0 _H	D/A Converter Data 0	DAT0	R/W	D/A Converter	XXXXXXXX _B
0000C1 _H	D/A Converter Data 1	DAT1	R/W		XXXXXXXX _B
0000C2 _H	D/A Control 0	DACR0	R/W		XXXXXXXX0 _B
0000C3 _H	D/A Control 1	DACR1	R/W		XXXXXXXX0 _B

(Continued)

Address	Register	Abbreviation	Access	Resource name	Initial value
007924 _H	Input Capture 2	IPCP2	R	Input Capture 2/3	XXXXXXXX _B
007925 _H	Input Capture 2	IPCP2	R		XXXXXXXX _B
007926 _H	Input Capture 3	IPCP3	R		XXXXXXXX _B
007927 _H	Input Capture 3	IPCP3	R		XXXXXXXX _B
007928 _H	Input Capture 4	IPCP4	R	Input Capture 4/5	XXXXXXXX _B
007929 _H	Input Capture 4	IPCP4	R		XXXXXXXX _B
00792A _H	Input Capture 5	IPCP5	R		XXXXXXXX _B
00792B _H	Input Capture 5	IPCP5	R		XXXXXXXX _B
00792C _H	Input Capture 6	IPCP6	R	Input Capture 6/7	XXXXXXXX _B
00792D _H	Input Capture 6	IPCP6	R		XXXXXXXX _B
00792E _H	Input Capture 7	IPCP7	R		XXXXXXXX _B
00792F _H	Input Capture 7	IPCP7	R		XXXXXXXX _B
007930 _H	Output Compare 0	OCCP0	R/W	Output Compare 0/1	XXXXXXXX _B
007931 _H	Output Compare 0	OCCP0	R/W		XXXXXXXX _B
007932 _H	Output Compare 1	OCCP1	R/W		XXXXXXXX _B
007933 _H	Output Compare 1	OCCP1	R/W		XXXXXXXX _B
007934 _H	Output Compare 2	OCCP2	R/W	Output Compare 2/3	XXXXXXXX _B
007935 _H	Output Compare 2	OCCP2	R/W		XXXXXXXX _B
007936 _H	Output Compare 3	OCCP3	R/W		XXXXXXXX _B
007937 _H	Output Compare 3	OCCP3	R/W		XXXXXXXX _B
007938 _H	Output Compare 4	OCCP4	R/W	Output Compare 4/5	XXXXXXXX _B
007939 _H	Output Compare 4	OCCP4	R/W		XXXXXXXX _B
00793A _H	Output Compare 5	OCCP5	R/W		XXXXXXXX _B
00793B _H	Output Compare 5	OCCP5	R/W		XXXXXXXX _B
00793C _H	Output Compare 6	OCCP6	R/W	Output Compare 6/7	XXXXXXXX _B
00793D _H	Output Compare 6	OCCP6	R/W		XXXXXXXX _B
00793E _H	Output Compare 7	OCCP7	R/W		XXXXXXXX _B
00793F _H	Output Compare 7	OCCP7	R/W		XXXXXXXX _B
007940 _H	Timer Data 0	TCDT0	R/W	Free-run Timer 0	00000000 _B
007941 _H	Timer Data 0	TCDT0	R/W		00000000 _B
007942 _H	Timer Control Status 0	TCCSL0	R/W		00000000 _B
007943 _H	Timer Control Status 0	TCCSH0	R/W		0XXXXXXXX _B
007944 _H	Timer Data 1	TCDT1	R/W	Free-run Timer 1	00000000 _B
007945 _H	Timer Data 1	TCDT1	R/W		00000000 _B
007946 _H	Timer Control Status 1	TCCSL1	R/W		00000000 _B
007947 _H	Timer Control Status 1	TCCSH1	R/W		0XXXXXXXX _B

(Continued)

9. CAN Controllers

The CAN controller has the following features:

- Conforms to CAN Specification Version 2.0 Part A and B
- Supports transmission/reception in standard frame and extended frame formats
- Supports transmission of data frames by receiving remote frames
- 16 transmission/reception message buffers
- 29-bit ID and 8-byte data
- Multi-level message buffer configuration
- Provides full-bit comparison, full-bit mask, acceptance register 0/acceptance register 1 for each message buffer as ID acceptance mask
- Two acceptance mask registers in either standard frame format or extended frame formats
- Bit rate programmable from 10 kbps to 2 Mbps (when input clock is at 16 MHz)

List of Control Registers (1)

Address		Register	Abbreviation	Access	Initial Value
CAN0	CAN1				
000070 _H	000080 _H	Message Buffer Valid Register	BVALR	R/W	00000000 _B 00000000 _B
000071 _H	000081 _H				
000072 _H	000082 _H	Transmit Request Register	TREQR	R/W	00000000 _B 00000000 _B
000073 _H	000083 _H				
000074 _H	000084 _H	Transmit Cancel Register	TCANR	W	00000000 _B 00000000 _B
000075 _H	000085 _H				
000076 _H	000086 _H	Transmission Complete Register	TCR	R/W	00000000 _B 00000000 _B
000077 _H	000087 _H				
000078 _H	000088 _H	Receive Complete Register	RCR	R/W	00000000 _B 00000000 _B
000079 _H	000089 _H				
00007A _H	00008A _H	Remote Request Receiving Register	RRTRR	R/W	00000000 _B 00000000 _B
00007B _H	00008B _H				
00007C _H	00008C _H	Receive Overrun Register	ROVRR	R/W	00000000 _B 00000000 _B
00007D _H	00008D _H				
00007E _H	00008E _H	Reception Interrupt Enable Register	RIER	R/W	00000000 _B 00000000 _B
00007F _H	00008F _H				

List of Control Registers (2)

Address		Register	Abbreviation	Access	Initial Value
CAN0	CAN1				
007B00 _H	007D00 _H	Control Status Register	CSR	R/W, W R/W, R	0XXXX0X1 _B 00XXX000 _B
007B01 _H	007D01 _H				
007B02 _H	007D02 _H	Last Event Indicator Register	LEIR	R/W	000X0000 _B XXXXXXXX _B
007B03 _H	007D03 _H				
007B04 _H	007D04 _H	Receive And Transmit Error Counter	RTEC	R	00000000 _B 00000000 _B
007B05 _H	007D05 _H				
007B06 _H	007D06 _H	Bit Timing Register	BTR	R/W	11111111 _B X1111111 _B
007B07 _H	007D07 _H				
007B08 _H	007D08 _H	IDE Register	IDER	R/W	XXXXXXXX _B XXXXXXXX _B
007B09 _H	007D09 _H				
007B0A _H	007D0A _H	Transmit RTR Register	TRTRR	R/W	00000000 _B 00000000 _B
007B0B _H	007D0B _H				
007B0C _H	007D0C _H	Remote Frame Receive Waiting Register	RFWTR	R/W	XXXXXXXX _B XXXXXXXX _B
007B0D _H	007D0D _H				
007B0E _H	007D0E _H	Transmit Interrupt Enable Register	TIER	R/W	00000000 _B 00000000 _B
007B0F _H	007D0F _H				
007B10 _H	007D10 _H	Acceptance Mask Select Register	AMSR	R/W	XXXXXXXX _B XXXXXXXX _B
007B11 _H	007D11 _H				
007B12 _H	007D12 _H				XXXXXXXX _B XXXXXXXX _B
007B13 _H	007D13 _H				
007B14 _H	007D14 _H	Acceptance Mask Register 0	AMR0	R/W	XXXXXXXX _B XXXXXXXX _B
007B15 _H	007D15 _H				
007B16 _H	007D16 _H				XXXXXXXX _B XXXXXXXX _B
007B17 _H	007D17 _H				
007B18 _H	007D18 _H	Acceptance Mask Register 1	AMR1	R/W	XXXXXXXX _B XXXXXXXX _B
007B19 _H	007D19 _H				
007B1A _H	007D1A _H				XXXXXXXX _B XXXXXXXX _B
007B1B _H	007D1B _H				

List of Message Buffers (DLC Registers and Data Registers) (3)

Address		Register	Abbreviation	Access	Initial Value
CAN0	CAN1				
007AF0 _H to 007AF7 _H	007CF0 _H to 007CF7 _H	Data Register 14 (8 bytes)	DTR14	R/W	XXXXXXXX _B to XXXXXXXX _B
007AF8 _H to 007AFF _H	007CF8 _H to 007CFF _H	Data Register 15 (8 bytes)	DTR15	R/W	XXXXXXXX _B to XXXXXXXX _B

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Interrupt cause	EI ² OS Support	DMA channel number	Interrupt vector		Interrupt control register	
			Number	Address	Number	Address
UART 2 RX / UART 4 RX	Y2	14	#39	FFFF60 _H	ICR14	0000BE _H
UART 2 TX / UART 4 TX	Y1	15	#40	FFFF5C _H		
Flash Memory	N	—	#41	FFFF58 _H	ICR15	0000BF _H
Delayed Interrupt	N	—	#42	FFFF54 _H		

Y1 : Usable

Y2 : Usable, with EI²OS stop function

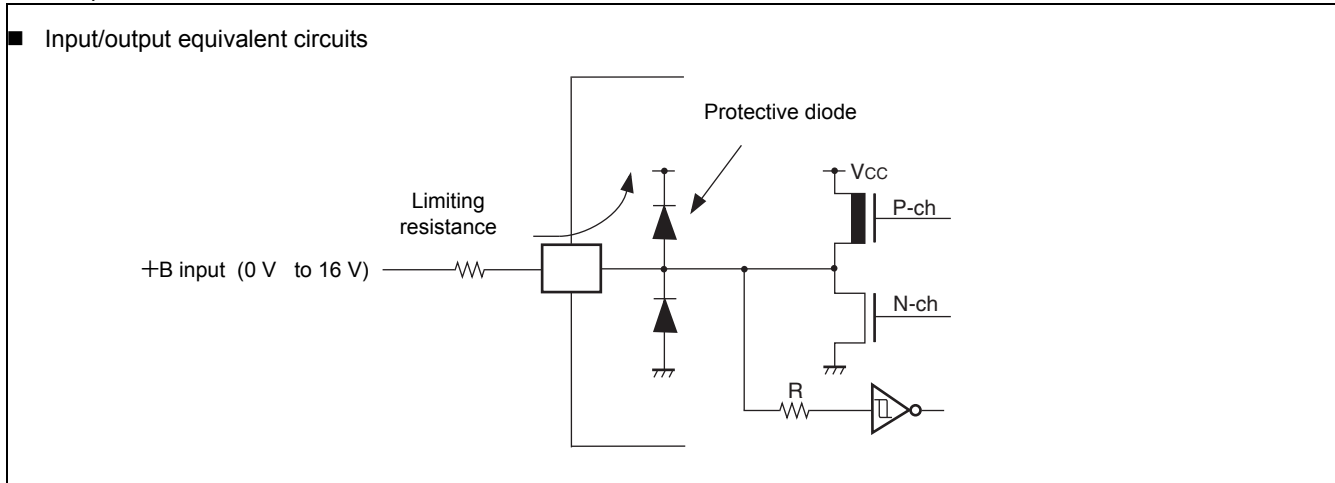
N : Unusable

Note:

- The peripheral resources sharing the ICR register have the same interrupt level.
- When two peripheral resources share the ICR register, only one can use Extended Intelligent I/O Service at a time.
- When either of the two peripheral resources sharing the ICR register specifies Extended Intelligent I/O Service, the other one cannot use interrupts.

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- Note that if a +B signal is input when the microcontroller power supply is off (not fixed at 0 V) , 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-on reset.
- Care must be taken not to leave the +B input pin open.
- Sample recommended circuits:



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

*7: The average output current is defined as the value of the average current flowing over 100 ms at any one of the corresponding pins.

*8: The average total output current is defined as the value of the average current flowing over 100 ms at all of the corresponding pins.

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.

11.4 AC Characteristics

11.4.1 Clock Timing

($T_A = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $V_{CC} = 5.0\text{ V} \pm 10\%$, $f_{CP} \leq 24\text{ MHz}$, $V_{SS} = AV_{SS} = 0\text{ V}$)

Parameter	Symbol	Pin	Value			Unit	Remarks
			Min	Typ	Max		
Clock frequency	f_C	X0, X1	3	—	16	MHz	When using an oscillation circuit
			4	—	16	MHz	PLL multiplied by 1 When using an oscillation circuit
			4	—	12	MHz	PLL multiplied by 2 When using an oscillation circuit
			4	—	8	MHz	PLL multiplied by 3 When using an oscillation circuit
			4	—	6	MHz	PLL multiplied by 4 When using an oscillation circuit
			—	—	4	MHz	PLL multiplied by 6 When using an oscillation circuit
			3	—	24	MHz	When using an external clock*
	f_{CL}	X0A, X1A	—	32.768	100	kHz	
Clock cycle time	t_{CYL}	X0, X1	62.5	—	333	ns	When using an oscillation circuit
		X0, X1	41.67	—	333	ns	When using an external clock
	t_{CYLL}	X0A, X1A	10	30.5	—	μs	
Input clock pulse width	P_{WH}, P_{WL}	X0	10	—	—	ns	Duty ratio is about 30% to 70%.
	P_{WHL}, P_{WLL}	X0A	5	15.2	—	μs	
Input clock rise and fall time	t_{CR}, t_{CF}	X0	—	—	5	ns	When using external clock
Internal operating clock frequency (machine clock)	f_{CP}	—	1.5	—	24	MHz	When using main clock
	f_{CPL}	—	—	8.192	50	kHz	When using sub clock
Internal operating clock cycle time (machine clock)	t_{CP}	—	41.67	—	666	ns	When using main clock
	t_{CPL}	—	20	122.1	—	μs	When using sub clock

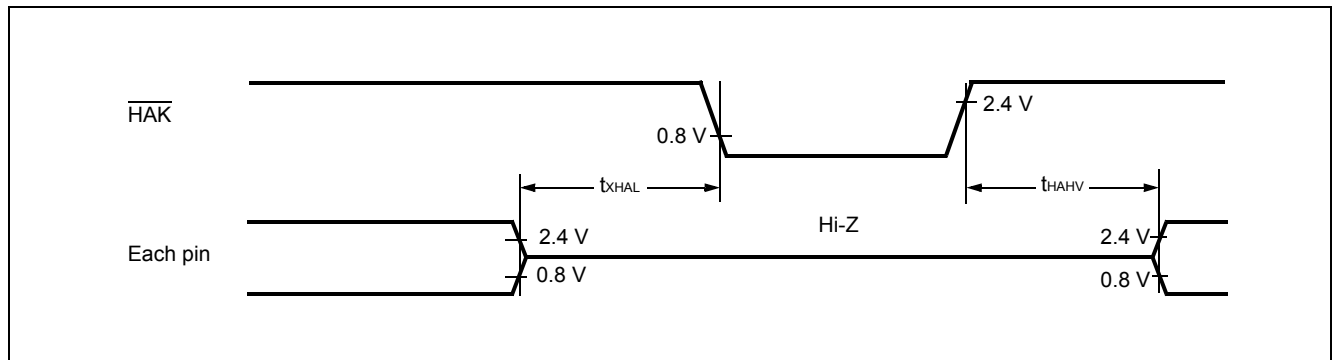
* : When selecting the PLL clock, the range of clock frequency is limited. Use this product within the range as mentioned in "Relation between the external clock frequency and machine clock frequency".

11.4.8 Hold Timing

($T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$, $V_{CC} = 5.0\text{ V} \pm 10\%$, $V_{SS} = 0.0\text{ V}$, $f_{CP} \leq 24\text{ MHz}$)

Parameter	Symbol	Pin	Condition	Value		Unit
				Min	Max	
Pin floating $\rightarrow \overline{\text{HAK}} \downarrow$ time	t_{XHAL}	$\overline{\text{HAK}}$	—	30	t_{CP}	ns
$\overline{\text{HAK}} \uparrow$ time $\rightarrow$ Pin valid time	t_{HAHV}	$\overline{\text{HAK}}$	—	t_{CP}	$2 t_{CP}$	ns

Note: : There is more than 1 cycle from when HRQ reads in until the $\overline{\text{HAK}}$ is changed.



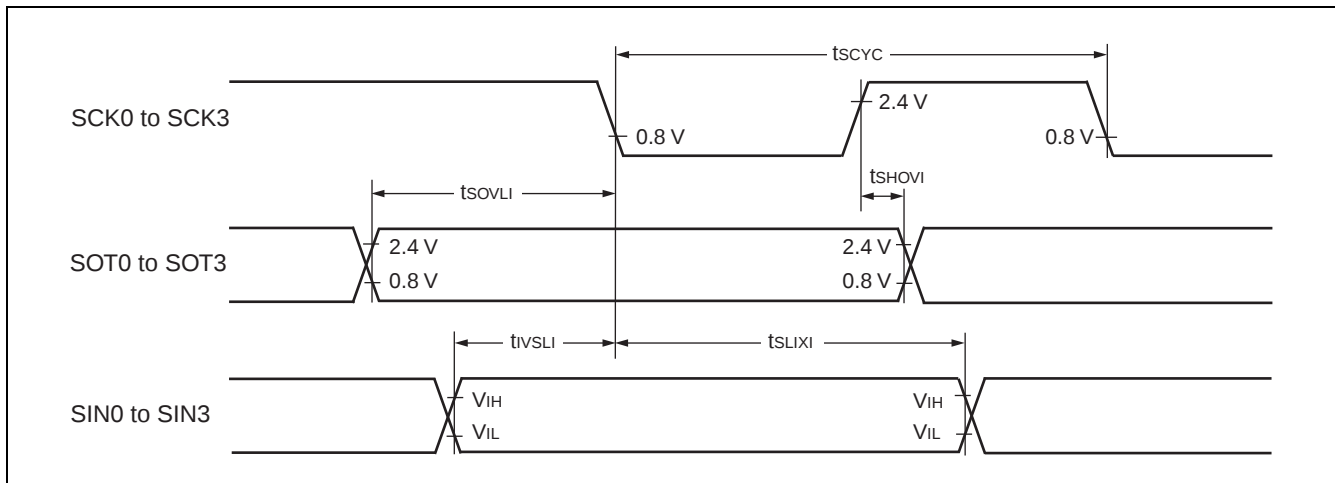
■ Bit setting: ESCR:SCES = 0, ECCR:SCDE = 1

($T_A = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $V_{CC} = 5.0\text{ V} \pm 10\%$, $f_{CP} \leq 24\text{ MHz}$, $V_{SS} = 0\text{ V}$)

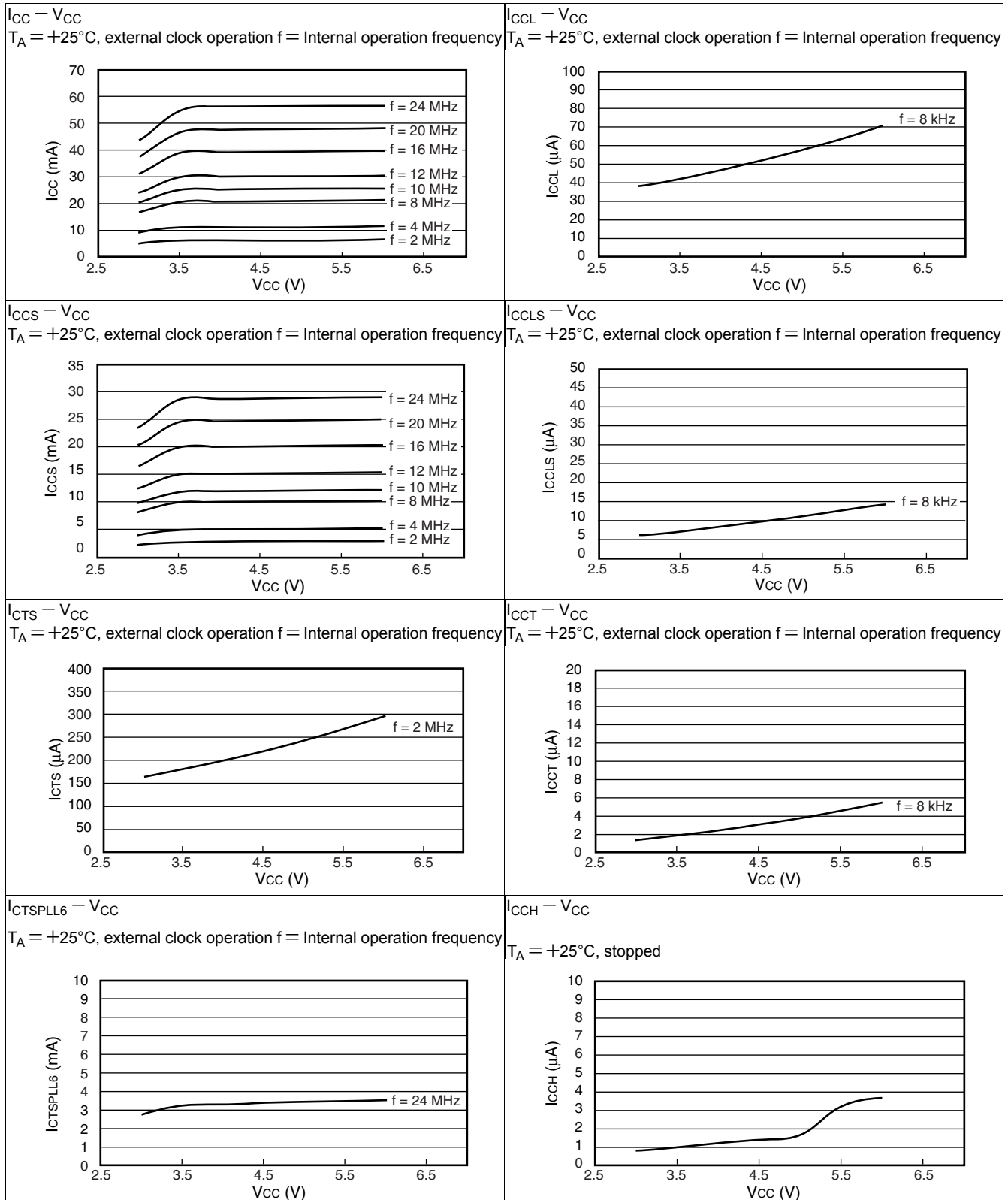
Parameter	Symbol	Pin	Condition	Value		Unit
				Min	Max	
Serial clock cycle time	t_{SCYC}	SCK0 to SCK3	Internal clock operation output pins are $C_L = 80\text{ pF} + 1\text{ TTL}$.	$5 t_{CP}$	—	ns
SCK $\uparrow \rightarrow$ SOT delay time	t_{SHOVI}	SCK0 to SCK3, SOT0 to SOT3		-50	+50	ns
Valid SIN $\rightarrow$ SCK $\downarrow$	t_{IVSLI}	SCK0 to SCK3, SIN0 to SIN3		$t_{CP} + 80$	—	ns
SCK $\downarrow \rightarrow$ Valid SIN hold time	t_{SLIXI}	SCK0 to SCK3, SIN0 to SIN3		0	—	ns
SOT $\rightarrow$ SCK $\downarrow$ delay time	t_{SOVLI}	SCK0 to SCK3, SOT0 to SOT3		$3 t_{CP} - 70$	—	ns

Note:

- C_L is load capacity value of pins when testing.
- t_{CP} is internal operating clock cycle time (machine clock) . Refer to “Clock Timing”.

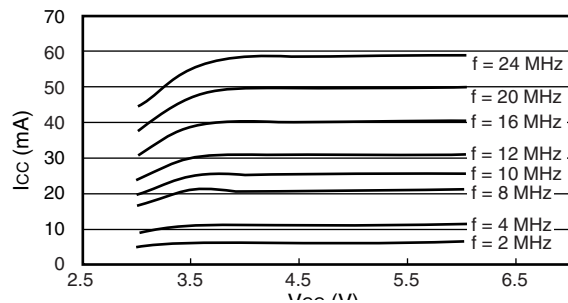


■ MB90F349E, MB90F349ES, MB90F349CE, MB90F349CES

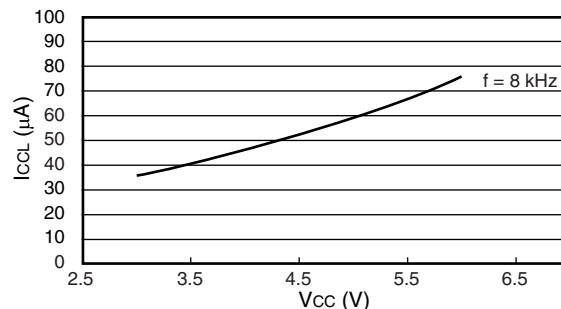


■ MB90F345E, MB90F345ES, MB90F345CE, MB90F345CES

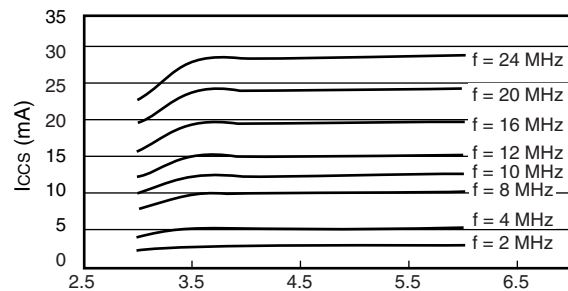
$I_{CC} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



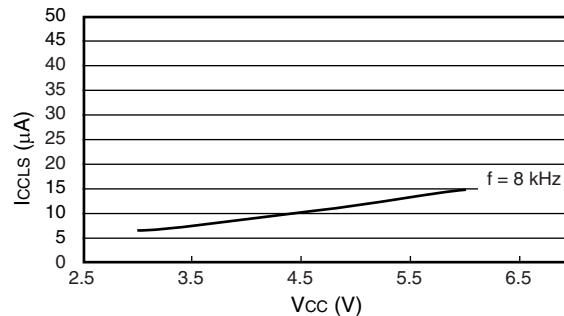
$I_{CCL} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



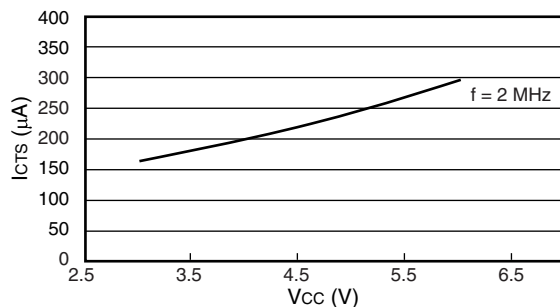
$I_{CCS} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



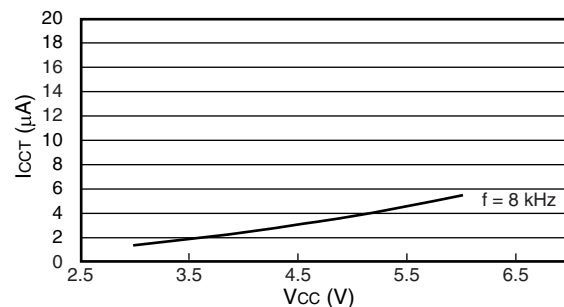
$I_{CCLS} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



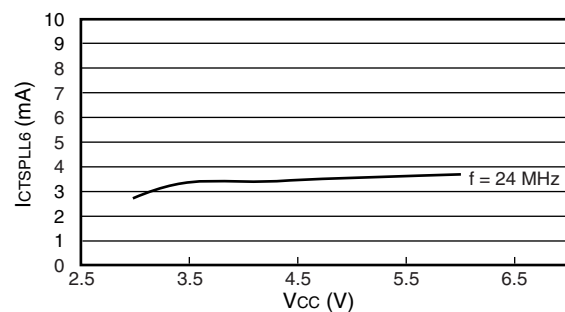
$I_{CTS} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



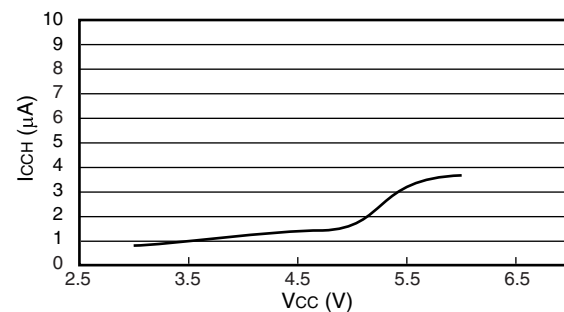
$I_{CCT} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



$I_{CTSPLL6} - V_{CC}$
 $T_A = +25^\circ\text{C}$, external clock operation f = Internal operation frequency



$I_{CCH} - V_{CC}$
 $T_A = +25^\circ\text{C}$, stopped



13. Ordering Information

Part number	Package	Remarks
MB90F342EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90F342ESPF		
MB90F342CEPF		
MB90F342CESPF		
MB90F342EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90F342ESPMC		
MB90F342CEPMC		
MB90F342CESPMC		
MB90F345EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90F345ESPF		
MB90F345CEPF		
MB90F345CESPF		
MB90F345EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90F345ESPMC		
MB90F345CEPMC		
MB90F345CESPMC		
MB90F346EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90F346ESPF		
MB90F346CEPF		
MB90F346CESPF		
MB90F346EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90F346ESPMC		
MB90F346CEPMC		
MB90F346CESPMC		

(Continued)

Part number	Package	Remarks
MB90F347EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90F347ESPF		
MB90F347CEPF		
MB90F347CESPF		
MB90F347EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90F347ESPMC		
MB90F347CEPMC		
MB90F347CESPMC		
MB90F349EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90F349ESPF		
MB90F349CEPF		
MB90F349CESPF		
MB90F349EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90F349ESPMC		
MB90F349CEPMC		
MB90F349CESPMC		
MB90341EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90341ESPF		
MB90341CEPF		
MB90341CESPF		
MB90341EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90341ESPMC		
MB90341CEPMC		
MB90341CESPMC		
MB90342EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90342ESPF		
MB90342CEPF		
MB90342CESPF		
MB90342EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90342ESPMC		
MB90342CEPMC		
MB90342CESPMC		

(Continued)

(Continued)

Part number	Package	Remarks
MB90346EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90346ESPF		
MB90346CEPF		
MB90346CESPF		
MB90346EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90346ESPMC		
MB90346CEPMC		
MB90346CESPMC		
MB90347EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90347ESPF		
MB90347CEPF		
MB90347CESPF		
MB90347EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90347ESPMC		
MB90347CEPMC		
MB90347CESPMC		
MB90348EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90348ESPF		
MB90348CEPF		
MB90348CESPF		
MB90348EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90348ESPMC		
MB90348CEPMC		
MB90348CESPMC		
MB90349EPF	100-pin plastic QFP (FPT-100P-M06)	
MB90349ESPF		
MB90349CEPF		
MB90349CESPF		
MB90349EPMC	100-pin plastic LQFP (FPT-100P-M20)	
MB90349ESPMC		
MB90349CEPMC		
MB90349CESPMC		
MB90V340E-101CR	299-pin ceramic PGA (PGA-299C-A01)	For evaluation
MB90V340E-102CR		