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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 "<u>Embedded -</u> <u>Microcontrollers</u>"

#### Details

Product Status	Obsolete
Core Processor	F <sup>2</sup> 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-677e1

Email: info@E-XFL.COM

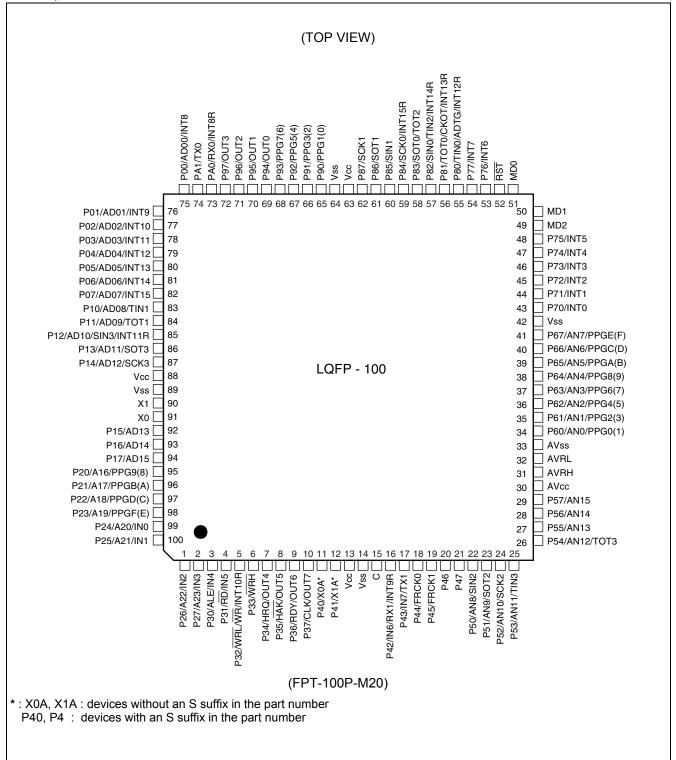
Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong



## 1. Product Lineup

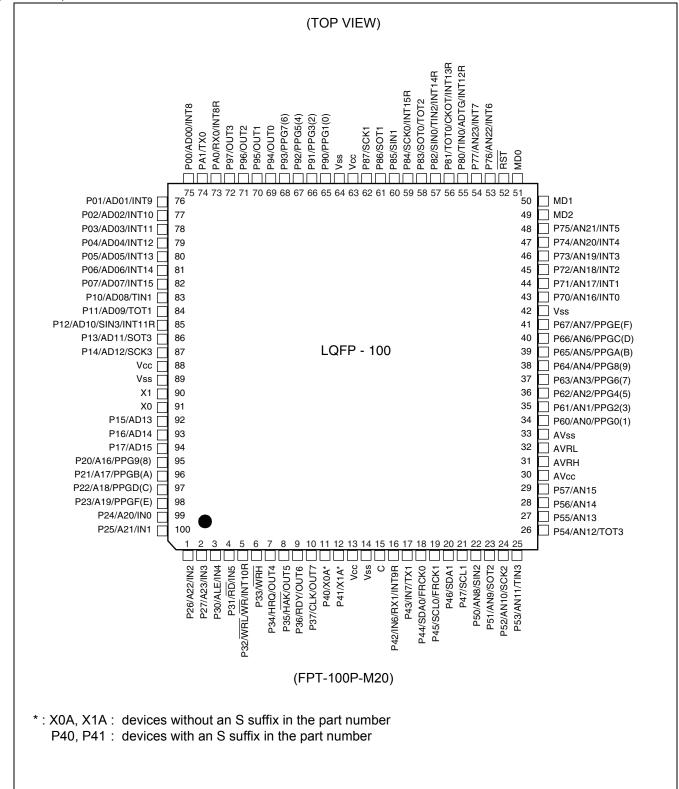
Part Number Parameter	MB90V340E-101, MB90V340E-102	MB90F342E(S), MB90F342CE(S), MB90F345E(S), MB90F345CE(S), MB90F346E(S), MB90F346CE(S), MB90F347E(S), MB90F347CE(S), MB90F349E(S), MB90F349CE(S)	MB90341E(S), MB90341CE(S), MB90342E(S), MB90342CE(S), MB90346E(S), MB90346CE(S), MB90347E(S), MB90347CE(S), MB90348E(S), MB90348CE(S), MB90349E(S), MB90349CE(S)			
Туре	Evaluation products	Flash memory products	MASK ROM products			
CPU	F <sup>2</sup> MC-16LX CPU					
System clock		Dn-chip PLL clock multiplier ( $\times$ 1, $\times$ 2, $\times$ 3, $\times$ 4, $\times$ 6, 1/2 when PLL stops) <i>I</i> inimum instruction execution time : 42 ns (4 MHz osc. PLL $\times$ 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 $\mu$ m CMOS with built-in power supply r Flash memory with Charge pump for progra				
Operating voltage range	5 V ± 10%	3.5 V to $5.5$ V : When normal operating (no 4.0 V to $5.5$ V : When using the A/D conver 4.5 V to $5.5$ V : When using the external bu	ter/Flash programming			
Temperature range	<b> </b>	-40°C to +105°C				
Package	PGA-299	QFP-100, LQFP-100				
	5 channels	4 channels				
LIN-UART 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						
l <sup>2</sup> C (400 kbps)	2 channels	Devices with a C suffix in the part number : Devices without a C suffix in the part numb				







## **MB90340E Series**

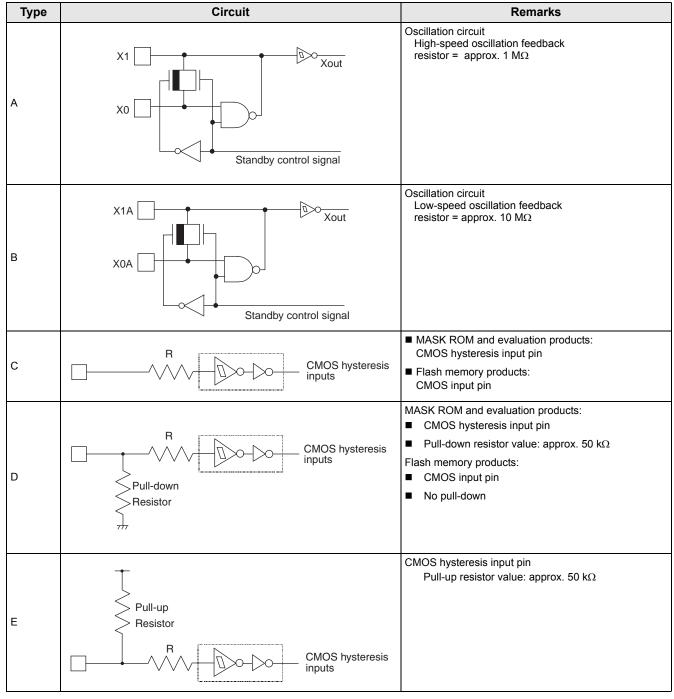




Pin No.		l/O Din name		
QFP100* <sup>1</sup>	LQFP100* <sup>2</sup>	Pin name	Circuit type* <sup>3</sup>	Function
		P43		General purpose I/O pin.
19	17	IN7	F	Trigger input pin for input capture.
10		TX1	]	TX Output pin for CAN1 (MB90341E/342E/F342E/F345E only)
		P44		General purpose I/O pin.
20	18	SDA0	н	Serial data I/O pin for I <sup>2</sup> C (devices with a C suffix in the part number)
		FRCK0		Input pin for the 16-bit Free-run Timer 0
		P45		General purpose I/O pin.
21	19	SCL0	н	Serial clock I/O pin for I <sup>2</sup> C (devices with a C suffix in the part number)
		FRCK1		Input pin for the 16-bit Free-run Timer
22	20	P46	H	General purpose I/O pin.
22	20	SDA1		Serial data I/O pin for I <sup>2</sup> C (devices with a C suffix in the part number)
23	21	P47	H	General purpose I/O pin.
23	21	SCL1		Serial clock I/O pin for I <sup>2</sup> C (devices with a C suffix in the part number)
		P50		General purpose I/O pin.
24	22	AN8	0	Analog input pin for the A/D converter
		SIN2		Serial data input pin for UART2
		P51		General purpose I/O pin.
25	23	AN9	I	Analog input pin for the A/D converter
		SOT2		Serial data output pin for UART2
		P52		General purpose I/O pin.
26	24	AN10	I	Analog input pin for the A/D converter
		SCK2		Clock I/O pin for UART2
		P53		General purpose I/O pin.
27	25	AN11	I	Analog input pin for the A/D converter
		TIN3		Event input pin for the reload timer
		P54		General purpose I/O pin.
28	26	AN12	I	Analog input pin for the A/D converter
		ТОТ3		Output pin for the reload timer
20	27	P55	1	General purpose I/O pin.
29	21	AN13	]'	Analog input pin for the A/D converter
20.21	28, 20	P56, P57	1.	General purpose I/O pins.
30, 31	28, 29	AN14, AN15	- J	Analog input pins for the A/D converter
32	30	AV <sub>CC</sub>	К	Analog power input pin for the A/D Converter



## 4. I/O Circuit Type







Туре	Circuit	Remarks
F	P-ch Pout N-ch Nout R 7/7 CMOS hysteresis input Automotive input Standby control for input shutdown	<ul> <li>CMOS level output (I<sub>OL</sub> = 4 mA, I<sub>OH</sub> = -4 mA)</li> <li>CMOS hysteresis input (with function to disconnect input during standby)</li> <li>Automotive input (with function to disconnect input during standby)</li> </ul>
G	P-ch P-ch Pout P-ch P-ch Pout P-ch Pout R R R CMOS hysteresis input Automotive input TTL input Standby control for input shutdown	<ul> <li>CMOS level output (I<sub>OL</sub> = 4 mA, I<sub>OH</sub> = -4 mA)</li> <li>CMOS hysteresis input (with function to disconnect input during standby)</li> <li>Automotive input (with function to disconnect input during standby)</li> <li>TTL input (with function to disconnect input during standby)</li> <li>Programmable pull-up resistor: 50 kΩ approx.</li> </ul>
н	P-ch Pout P-ch Pout N-ch Nout R 777 CMOS hysteresis input Automotive input Standby control for input shutdown	<ul> <li>CMOS level output (I<sub>OL</sub> = 3 mA, I<sub>OH</sub> = -3 mA)</li> <li>CMOS hysteresis input (with function to disconnect input during standby)</li> <li>Automotive input (with function to disconnect input during standby)</li> </ul>

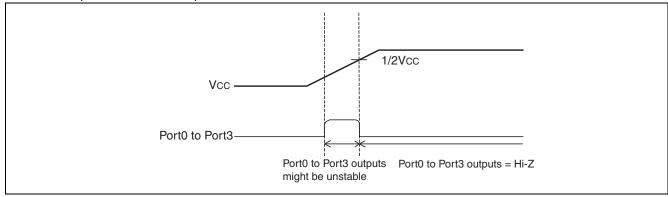


### 13. Stabilization of power supply voltage

A sudden change in the supply voltage may cause the device to malfunction even within the V<sub>CC</sub> supply voltage operating range. Therefore, the V<sub>CC</sub> supply voltage should be stabilized. For reference, the supply voltage should be controlled so that V<sub>CC</sub> ripple variations (peak- to-peak values) at commercial frequencies (50 MHz/60 MHz) fall below 10% of the standard V<sub>CC</sub> supply voltage and the coefficient of fluctuation does not exceed 0.1 V/ms at instantaneous power switching.

#### 14.Port 0 to Port 3 Output During Power-on (External-bus Mode)

As shown below, when the power is turned on in External-Bus mode, there is a possibility that output signal of Port 0 to Port 3 might be unstable irrespective of the reset input.



### 15.Notes on Using the CAN Function

To use the CAN function, please set the DIRECT bit of the CAN Direct Mode Register (CDMR) to 1.

### 16.Flash Security Function (except for MB90F346E)

A security bit is located in the area of the flash memory.

If protection code 01<sub>H</sub> is written in the security bit, the flash memory is in the protected state by security.

Therefore please do not write  $01_{H}$  in this address if you do not use the security function.

Refer to following table for the address of the security bit.

	Flash memory size	Address of the security bit
MB90F347E	Embedded 1 Mbit Flash Memory	FE0001 <sub>H</sub>
MB90F342E MB90F349E	Embedded 2 Mbits Flash Memory	FC0001 <sub>H</sub>
MB90F345E	Embedded 4 Mbits Flash Memory	F80001 <sub>H</sub>

### **17.Serial Communication**

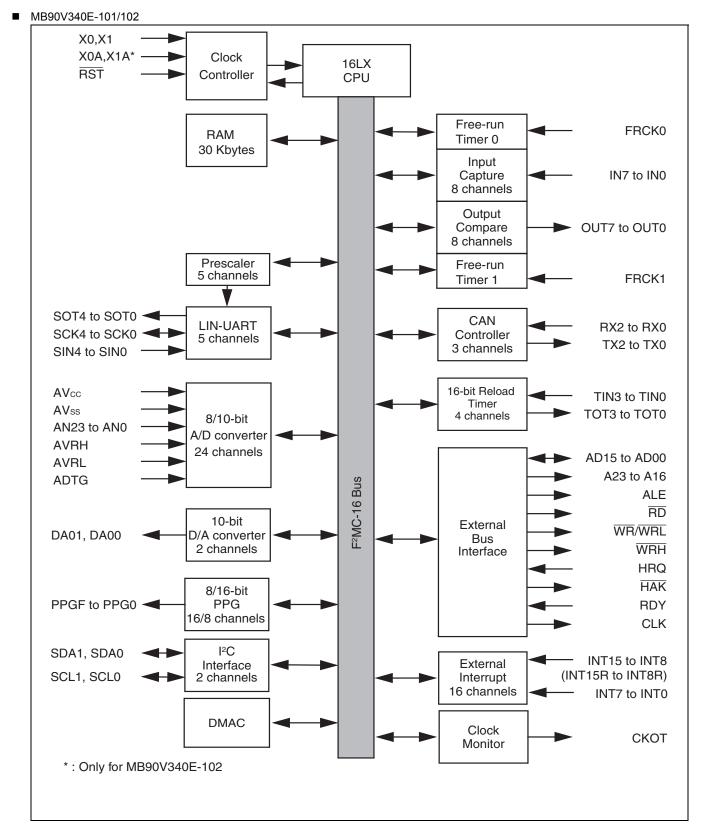
There is a possibility to receive wrong data due to the noise or other causes on the serial communication.

Therefore, design a printed circuit board so as to avoid noise.

Retransmit the data if an error occurs because of applying the checksum to the last data in consideration of receiving wrong data due to the noise.



### 6. Block Diagrams





## 7. Memory Map

	MB90V340E-101/102	MB90F345E(S)/F345CE(S)
000000H 0000EFH		000000н 0000EFн Peripheral
000100H	External access area	000100H External access area
	RAM 30 Kbytes	RAM 20 Kbytes
0078FFн 007900н		007900н Peripheral
007FFFH 008000H 00FFFFH	ROM (image of FF bank)	007FFFH 008000H 00FFFFH (image of FF bank)
F80000⊦ F8FFF⊦	BOM (F8 bank)	F80000H F8FFFFH ROM (F8 bank)
F90000H F9FFFH	ROM (F9 bank)	F90000н F9FFFFн ROM (F9 bank)
FA0000H FAFFFH	ROM (FA bank)	FA0000H FAFFFFH ROM (FA bank)
FB0000H FBFFFH	ROM (FB bank)	FB0000н FBFFFFн ROM (FB bank)
FC0000H FCFFFH	ROM (FC bank)	FC0000H FCFFFFH ROM (FC bank)
FD0000H FDFFFF	ROM (FD bank)	FD0000H ROM (FD bank)
FE0000H FEFFFH	ROM (FE bank)	FE0000H ROM (FE bank)
FF0000⊦ FFFFF⊦	BOM (FF bank)	FF0000н FFFFFFн ROM (FF bank)
	Not accessible	

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Address	Register	Abbreviation	Access	Resource name	Initial value	
0000A5 <sub>H</sub>	Automatic Ready Function Select Register	ARSR	W		0011XX00 <sub>B</sub>	
0000A6 <sub>H</sub>	External Address Output Control Register	HACR	W	External Memory Access	00000000 <sub>B</sub>	
0000A7 <sub>H</sub>	Bus Control Signal Selection Register	ECSR	W		0000000X <sub>B</sub>	
0000A8 <sub>H</sub>	Watchdog Control Register	WDTC	R,W	Watchdog Timer	XXXXX111 <sub>B</sub>	
0000A9 <sub>H</sub>	Time Base Timer Control Register	TBTC	W,R/W	Time Base Timer	1XX00100 <sub>B</sub>	
0000AA <sub>H</sub>	Watch Timer Control Register	WTC	R,R/W	Watch Timer	1X001000 <sub>B</sub>	
0000AB <sub>H</sub>	Reserved		•			
0000AC <sub>H</sub>	DMA Enable L Register	DERL	R/W	DMA	00000000 <sub>B</sub>	
0000AD <sub>H</sub>	DMA Enable H Register	DERH	R/W	DMA	00000000 <sub>B</sub>	
0000AE <sub>H</sub>	Flash Control Status Register (Flash memory devices only. Otherwise reserved)	FMCS	R,R/W	Flash Memory	000X0000 <sub>B</sub>	
0000AF <sub>H</sub>	Reserved	·		·	·	
0000B0 <sub>H</sub>	Interrupt Control Register 00	ICR00	W,R/W		00000111 <sub>B</sub>	
0000B1 <sub>H</sub>	Interrupt Control Register 01	ICR01	W,R/W		00000111 <sub>B</sub>	
0000B2 <sub>H</sub>	Interrupt Control Register 02	ICR02	W,R/W		00000111 <sub>B</sub>	
0000B3 <sub>H</sub>	Interrupt Control Register 03	ICR03	W,R/W		00000111 <sub>B</sub>	
0000B4 <sub>H</sub>	Interrupt Control Register 04	ICR04	W,R/W		00000111 <sub>B</sub>	
0000B5 <sub>H</sub>	Interrupt Control Register 05	ICR05	W,R/W		00000111 <sub>B</sub>	
0000B6 <sub>H</sub>	Interrupt Control Register 06	ICR06	W,R/W		00000111 <sub>B</sub>	
0000B7 <sub>H</sub>	Interrupt Control Register 07	ICR07	W,R/W		00000111 <sub>B</sub>	
0000B8 <sub>H</sub>	Interrupt Control Register 08	ICR08	W,R/W	Interrupt Control	00000111 <sub>B</sub>	
0000B9 <sub>H</sub>	Interrupt Control Register 09	ICR09	W,R/W		00000111 <sub>B</sub>	
0000BA <sub>H</sub>	Interrupt Control Register 10	ICR10	W,R/W		00000111 <sub>B</sub>	
0000BB <sub>H</sub>	Interrupt Control Register 11	ICR11	W,R/W		00000111 <sub>B</sub>	
0000BC <sub>H</sub>	Interrupt Control Register 12	ICR12	W,R/W		00000111 <sub>B</sub>	
0000BD <sub>H</sub>	Interrupt Control Register 13	ICR13	W,R/W		00000111 <sub>B</sub>	
0000BE <sub>H</sub>	Interrupt Control Register 14	ICR14	W,R/W	1	00000111 <sub>B</sub>	
0000BF <sub>H</sub>	Interrupt Control Register 15	ICR15	W,R/W	1	00000111 <sub>B</sub>	
0000C0 <sub>H</sub>	D/A Converter Data 0	DAT0	R/W		XXXXXXXXB	
0000C1 <sub>H</sub>	D/A Converter Data 1	DAT1	R/W	D/A Converter	XXXXXXXAB	
0000C2 <sub>H</sub>	D/A Control 0	DACR0	R/W	D/A Converter		
0000C3 <sub>H</sub>	D/A Control 1	DACR1	R/W	1	XXXXXXX0 <sub>B</sub>	



Address	Register	Abbreviation	Access	Resource name	Initial value
0000C4 <sub>H</sub> , 0000C5 <sub>H</sub>	Reserved		<b>I</b>		
0000C6 <sub>H</sub>	External Interrupt Enable 0	ENIR0	R/W		00000000 <sub>B</sub>
0000C7 <sub>H</sub>	External Interrupt Source 0	EIRR0	R/W		XXXXXXXAB
0000C8 <sub>H</sub>	External Interrupt Level Setting 0	ELVR0	R/W	External Interrupt 0	00000000 <sub>B</sub>
0000C9 <sub>H</sub>	External Interrupt Level Setting 0	ELVR0	R/W		00000000 <sub>B</sub>
0000CA <sub>H</sub>	External Interrupt Enable 1	ENIR1	R/W		00000000 <sub>B</sub>
0000CB <sub>H</sub>	External Interrupt Source 1	EIRR1	R/W		XXXXXXXX <sub>B</sub>
0000CC <sub>H</sub>	External Interrupt Level Setting 1	ELVR1	R/W	External Interrupt 1	00000000 <sub>B</sub>
0000CD <sub>H</sub>	External Interrupt Level Setting 1	ELVR1	R/W		00000000 <sub>B</sub>
0000CE <sub>H</sub>	External Interrupt Source Select	EISSR	R/W		00000000 <sub>B</sub>
0000CF <sub>H</sub>	PLL/Sub clock Control Register	PSCCR	W	PLL	XXXX0000 <sub>B</sub>
0000D0 <sub>H</sub>	DMA Buffer Address Pointer L Register	BAPL	R/W		XXXXXXXAB
0000D1 <sub>H</sub>	DMA Buffer Address Pointer M Register	BAPM	R/W		XXXXXXX <sub>B</sub>
0000D2 <sub>H</sub>	DMA Buffer Address Pointer H Register	BAPH	R/W		XXXXXXXAB
0000D3 <sub>H</sub>	DMA Control Register	DMACS	R/W		XXXXXXX <sub>B</sub>
0000D4 <sub>H</sub>	I/O Register Address Pointer L Register	IOAL	R/W	DMA	XXXXXXXX <sub>B</sub>
0000D5 <sub>H</sub>	I/O Register Address Pointer H Register	IOAH	R/W		XXXXXXXX <sub>B</sub>
0000D6 <sub>H</sub>	Data Counter L Register	DCTL	R/W		XXXXXXX <sub>B</sub>
0000D7 <sub>H</sub>	Data Counter H Register	DCTH	R/W		XXXXXXX <sub>B</sub>
0000D8 <sub>H</sub>	Serial Mode Register 2	SMR2	W,R/W		00000000 <sub>B</sub>
0000D9 <sub>H</sub>	Serial Control Register 2	SCR2	W,R/W		00000000 <sub>B</sub>
0000DA <sub>H</sub>	Reception/Transmission Data Register 2	RDR2/TDR2	R/W		00000000 <sub>B</sub>
0000DB <sub>H</sub>	Serial Status Register 2	SSR2	R,R/W		00001000 <sub>B</sub>
0000DC <sub>H</sub>	Extended Communication Control Register 2	ECCR2	R,W, R/W	UART2	000000XX <sub>B</sub>
0000DD <sub>H</sub>	Extended Status Control Register 2	ESCR2	R/W		00000100 <sub>B</sub>
0000DE <sub>H</sub>	Baud Rate Generator Register 20	BGR20	R/W		00000000 <sub>B</sub>
0000DF <sub>H</sub>	Baud Rate Generator Register 21	BGR21	R/W	1	00000000 <sub>B</sub>
0000E0 <sub>H</sub> to 0000EF <sub>H</sub>	Reserved for CAN Controller 2. Refer to "CAN	I Controllers"	•	·	
0000F0 <sub>H</sub> to 0000FF <sub>H</sub>	External				



Add	dress	Pagiatar	Abbreviation	Access	Initial Value
CAN0	CAN1	Register	Abbreviation	Access	
007AF0 <sub>H</sub> to 007AF7 <sub>H</sub>	007CF0 <sub>H</sub> to 007CF7 <sub>H</sub>	Data Register 14 (8 bytes)	DTR14	R/W	XXXXXXXXB to XXXXXXXXB
007AF8 <sub>H</sub> to 007AFF <sub>H</sub>	007CF8 <sub>H</sub> to 007CFF <sub>H</sub>	Data Register 15 (8 bytes)	DTR15	R/W	XXXXXXXXB to XXXXXXXXB

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



### **11.3 DC Characteristics**

Devenueter	Symb	Dia	Condition		Value		11	Domorko
Parameter	ol	Pin	Condition	Min	Тур	Max	Unit	Remarks
	V <sub>IHS</sub>			0.8 V <sub>CC</sub>		V <sub>CC</sub> + 0.3	v	Port inputs if CMOS hysteresis input levels are selected (except P12, P44, P45, P46, P47, P50, P82, P85)
	V <sub>IHA</sub>			0.8 V <sub>CC</sub>		$V_{CC} + 0.3$	V	Port inputs if Automotive input levels are selected
Input H	V <sub>IHT</sub>			2.0		$V_{CC} + 0.3$	V	Port inputs if TTL input levels are selected
voltage (At V <sub>CC</sub> = 5 V ± 10%)	V <sub>IHS</sub>			0.7 V <sub>CC</sub>		$V_{CC} + 0.3$	v	P12, P50, P82, P85 inputs if CMOS input levels are selected
	V <sub>IHI</sub>			0.7 V <sub>CC</sub>		V <sub>CC</sub> + 0.3	v	P44, P45, P46, P47 inputs if CMOS hysteresis input levels are selected
	V <sub>IHR</sub>			0.8 V <sub>CC</sub>		$V_{CC} + 0.3$	V	RST input pin (CMOS hysteresis)
	V <sub>IHM</sub>			$V_{\rm CC} - 0.3$		$V_{CC} + 0.3$	V	MD input pin
	V <sub>ILS</sub>			V <sub>SS</sub> – 0.3		0.2 V <sub>CC</sub>	v	Port inputs if CMOS hysteresis input levels are selected (except P12, P44, P45, P46, P47, P50, P82, P85)
	V <sub>ILA</sub>			$V_{\rm SS} - 0.3$		0.5 V <sub>CC</sub>	V	Port inputs if Automotive input levels are selected
Input L	V <sub>ILT</sub>			$V_{\rm SS} - 0.3$		0.8	V	Port inputs if TTL input levels are selected
voltage (At V <sub>CC</sub> = 5 V ± 10%)	V <sub>ILS</sub>			V <sub>SS</sub> - 0.3		0.3 V <sub>CC</sub>	v	P12, P50, P82, P85 inputs if CMOS input levels are selected
	V <sub>ILI</sub>			V <sub>SS</sub> - 0.3		0.3 V <sub>CC</sub>	v	P44, P45, P46, P47 inputs if CMOS hysteresis input levels are selected
	V <sub>ILR</sub>		<u> </u>	$V_{\rm SS} - 0.3$		0.2 V <sub>CC</sub>	V	RST input pin (CMOS hysteresis)
	V <sub>ILM</sub>			$V_{\rm SS} - 0.3$		$V_{SS} + 0.3$	V	MD input pin
Output H voltage	V <sub>OH</sub>	Normal outputs	$V_{CC} = 4.5 V,$ $I_{OH} = -4.0 mA$	V <sub>CC</sub> - 0.5			V	
Output H voltage	V <sub>OHI</sub>	I <sup>2</sup> C current outputs	$V_{CC} = 4.5 V,$ $I_{OH} = -3.0 mA$	V <sub>CC</sub> - 0.5			v	
Output L voltage	V <sub>OL</sub>	Normal outputs	$V_{CC} = 4.5 V,$ $I_{OL} = 4.0 mA$			0.4	v	
Output L voltage	V <sub>OLI</sub>	I <sup>2</sup> C current outputs	$V_{CC} = 4.5 V,$ $I_{OL} = 3.0 mA$			0.4	V	

(T\_A = -40°C to +105°C, V\_{CC} = 5.0 V  $\pm$  10%, f\_{CP}  $\leq$  24 MHz, V\_{SS} = AV\_{SS} = 0 V)





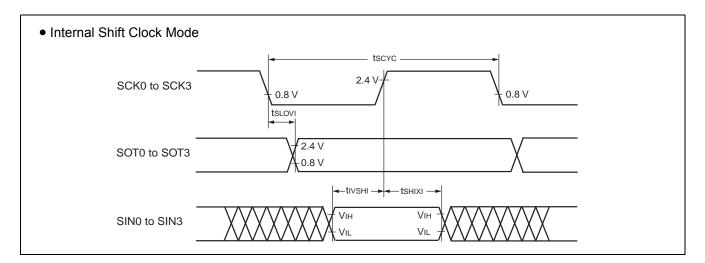
### 11.4.9 LIN-UART0/1/2/3 ■ Bit setting: ESCR:SCES = 0, ECCR:SCDE = 0

(T\_A = -40°C to +105°C, V\_{CC} = 5.0 V  $\pm$  10%, f\_{CP} \leq 24 MHz, V\_{SS} = 0 V)

Parameter	Symbol Pin		Condition	Va	Unit	
Farameter	Symbol	FIII	Condition	Min	Max	Unit
Serial clock cycle time	t <sub>SCYC</sub>	SCK0 to SCK3		5 t <sub>CP</sub>	—	ns
$SCK \downarrow \to SOT$ delay time	t <sub>SLOVI</sub>	SCK0 to SCK3, SOT0 to SOT3	Internal shift clock	-50	+50	ns
Valid SIN $\rightarrow$ SCK $\uparrow$	t <sub>IVSHI</sub>	SCK0 to SCK3, SIN0 to SIN3	mode output pins are $C_L = 80 \text{ pF} + 1 \text{ TTL}.$	t <sub>CP</sub> + 80		ns
$SCK\!\uparrow\!\to\!ValidSINholdtime$	t <sub>SHIXI</sub>	SCK0 to SCK3, SIN0 to SIN3		0		ns
Serial clock "L" pulse width	t <sub>SHSL</sub>	SCK0 to SCK3		3 t <sub>CP</sub> - t <sub>R</sub>		ns
Serial clock "H" pulse width	t <sub>SLSH</sub>	SCK0 to SCK3		t <sub>CP</sub> + 10		ns
$SCK \downarrow \to SOT$ delay time	t <sub>SLOVE</sub>	SCK0 to SCK3, SOT0 to SOT3			2 t <sub>CP</sub> + 60	ns
Valid SIN $\rightarrow$ SCK $\uparrow$	t <sub>IVSHE</sub>	SCK0 to SCK3, SIN0 to SIN3	External shift clock mode output pins are $C_L = 80 \text{ pF} + 1 \text{ TTL}.$	30		ns
$SCK \uparrow \to Valid SIN hold time$	t <sub>SHIXE</sub>	SCK0, SCK1, SIN0 to SIN3		t <sub>CP</sub> + 30		ns
SCK fall time	t <sub>F</sub>	SCK0 to SCK3			10	ns
SCK rise time	t <sub>R</sub>	SCK0 to SCK3			10	ns

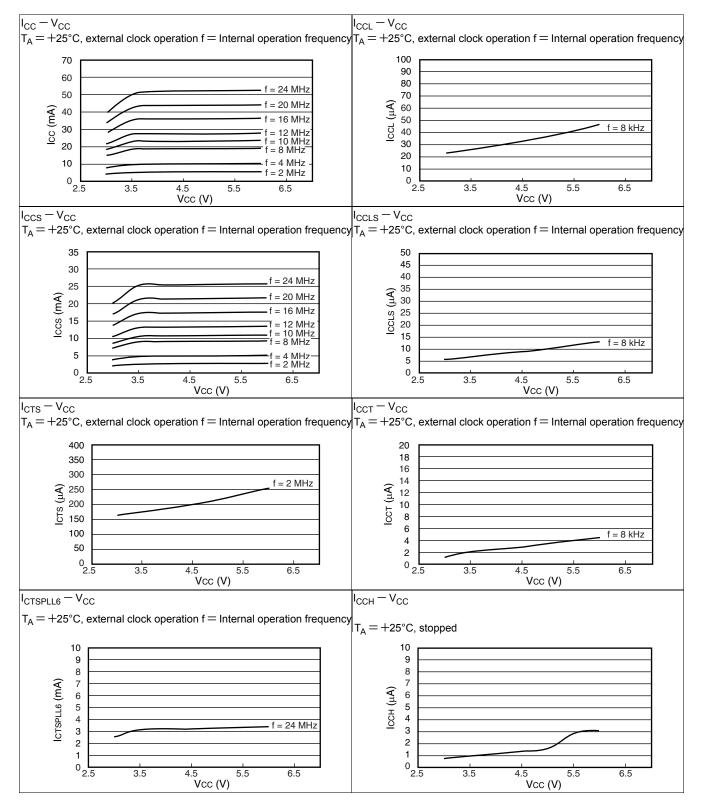
Note: • AC characteristic in CLK synchronized mode.

C<sub>L</sub> is load capacity value of pins when testing.
t<sub>CP</sub> is internal operating clock cycle time (machine clock). Refer to " (1) Clock Timing".



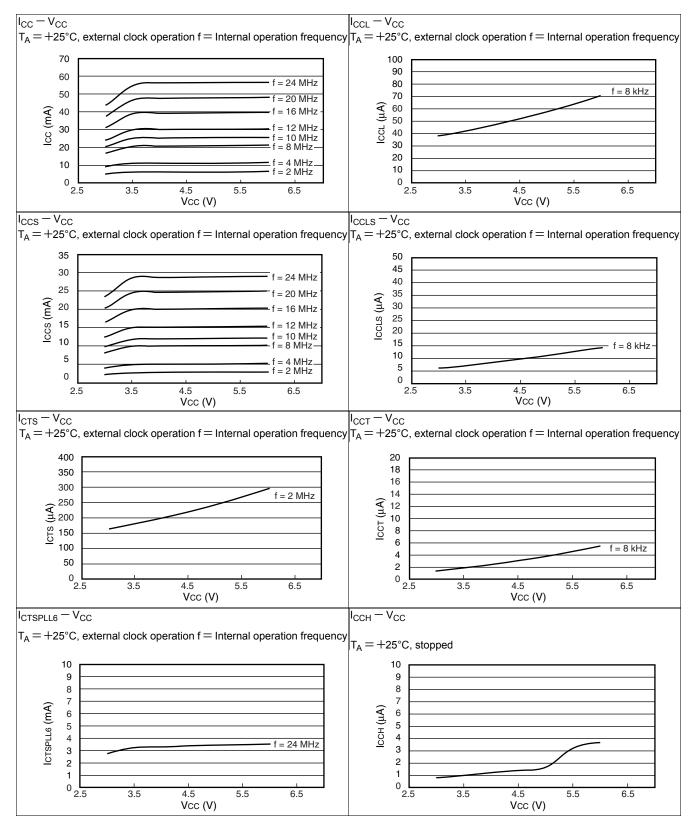


### ■ MB90F347E, MB90F347ES, MB90F347CE, MB90F347CES



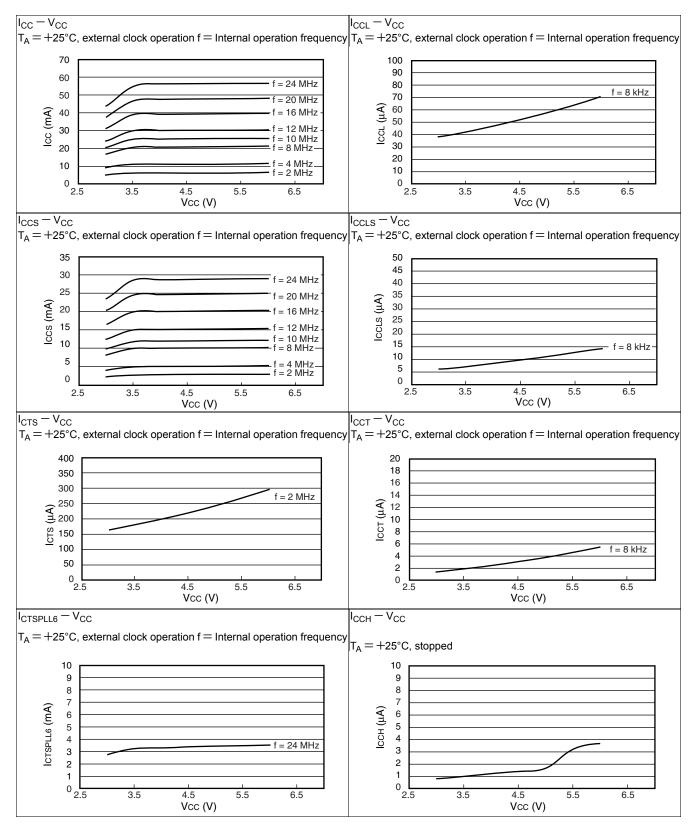


### ■ MB90F349E, MB90F349ES, MB90F349CE, MB90F349CES





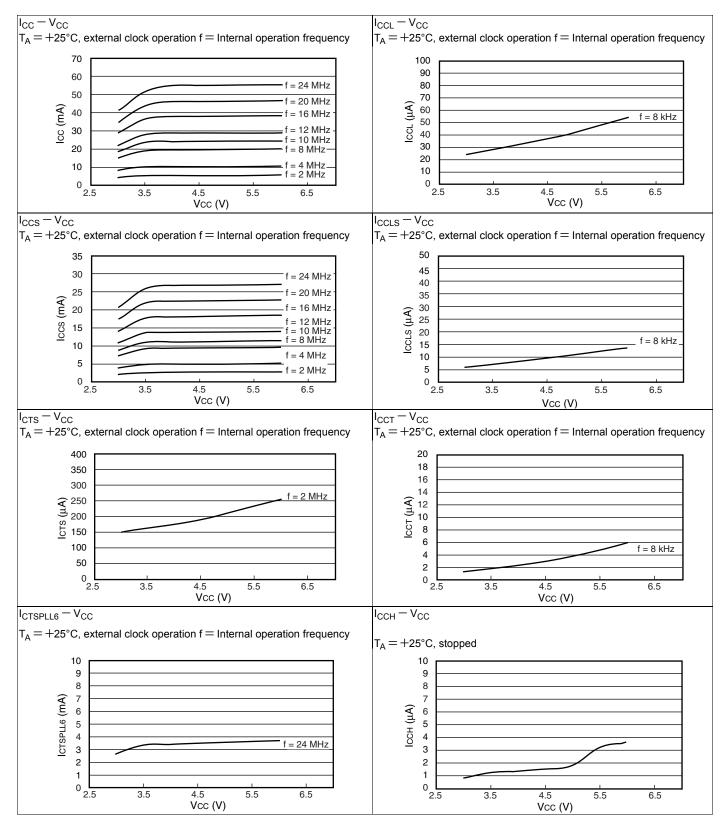
### ■ MB90F342E, MB90F342ES, MB90F342CE, MB90F342CES







#### ■ MB90346E, MB90346ES, MB90346CE, MB90346CES





## 15. Major Changes

### Spansiion Publication Number: DS07-13747-4E

Page	Section	Change Results
_	—	Deleted the part numbers; MB90F343E(S), MB90F343CE(S)
51	Electrical Characteristics Absolute Maximum Ratings	Added "*6" in remark for "L" level maximum output current and "H" level maximum output current. Added "*7" in remark for "L" level average output current and "H" level average output current. Added "*8" in remark for "L"level average overall output current and "H" level average overall output current.
52		Added as follows. "*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."

NOTE: Please see "Document History" about later revised information.

# **Document History**

Document Title: MB90340E Series F2MC-16LX 16-bit Microcontroller Datasheet Document Number: 002-04498					
Revision	ECN	Orig. of Change	Submission Date	Description of Change	
**	_	AKIH	08/23/2010	Migrated to Cypress and assigned document number 002-04498. No change to document contents or format.	
*A	5221535	AKIH	05/04/2016	Updated to Cypress template	



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