F²MC-16LX Microcontrollers with a High-Performance CAN Supporting a Host of Automobile Onboard Network Macros
MB90340 Series

FUJITSU is now marketing a new series of microcontrollers featuring an enhanced communications function and high-speed 16-bit CAN to support the increased number of memory devices in use today. A variety of models are available, with ROM densities ranging from 64 to 384K-byte and RAM densities ranging from 2 to 30K-byte.

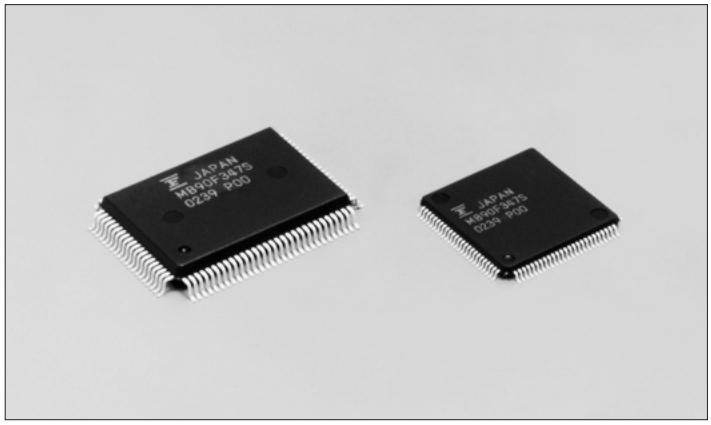
Product Description

In recent years, Controller Area Networks (CANs) have been widely adopted in power trains and systems for automotive body control systems and diagnosis of onboard networks in automobiles. The CAN-based networks consist of large numbers of units interconnected for communications. As individual units must handle growing quantities of information, today's CPUs need to provide advanced controls. This creates a need for increased program sizes and enhanced throughput, prompting FUJITSU to add MB90340 Series to its F²MC-16LX lineup.

Fig. 1 lists the CAN-mounted F²MC-16LX/FR products. The zone enclosed within the dotted line shows the position of this new product among the FUJITSU's CAN-supporting microcontrollers.

This series is comprised of high-performance microcontrollers featuring enhanced CPU throughput, a multi-channel A/D converter, flash memory security, a variety of memory lineups, a LIN-compatible UART, and an I²C® bus-compatible 100-pin configuration. The microcontrollers can be flexibly applied to various applications, including car audio, car air conditioners, and other networks used in automotive body control.

Photo 1 External View



Product Features

Table 1 lists the product features.

High-speed operation

The internal operating frequency of 24MHz (max.) pushes the operation speed up by 1.5 times compared to the existing F²MC-16LX. The PLL clock multiplier circuit permits frequency multiplications ranging from ×4 up to ×8 of the conventional model, as well as the use of external 4MHz×6 multiplication (at an internal operating frequency of 24MHz).

Multi-channel high-speed A/D converter

A 10-bit or 8-bit A/D converter is available with 16-channel and 24-channel models. The A/D conversion speed is twice that of the conventional models.

A variety of memory lineups

Table 2 shows the product lineup.

The ROM density ranges from 64 to 384K-byte, and the RAM density from 2 to 30K-byte. The versatility of these lineups expands the domains of application.

Flash security function

This function prevents external devices from reading the content in the flash microcontroller memory. In this way, the function prevents the outflow of data when using a parallel or serial writer.

Automotive I/O

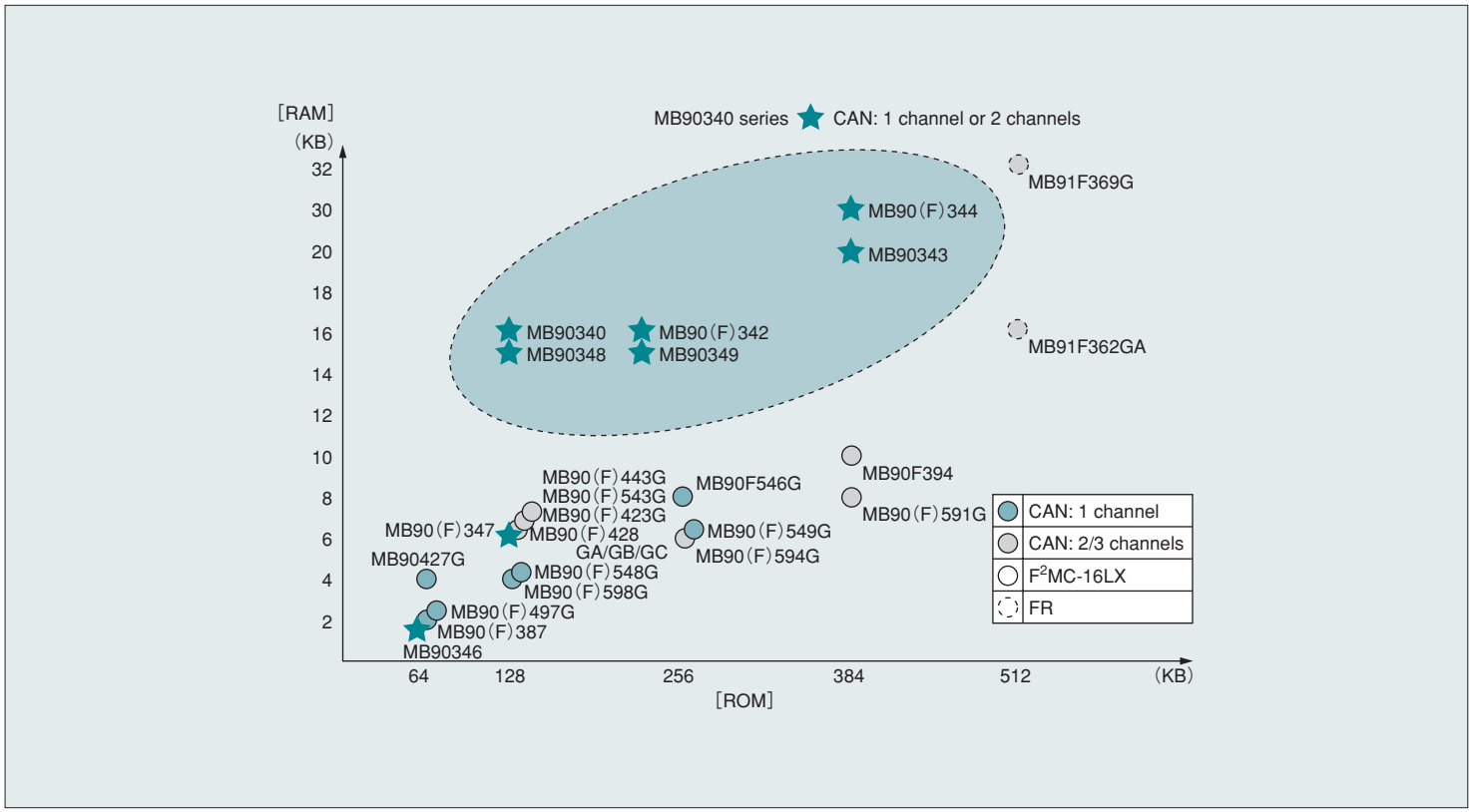
- VIH≧0.8Vcc
- VIL≦0.5Vcc

This is best suited for electronic auto parts, as automobile specifications often set lower threshold than usual. In addition, support at the typical CMOS level can be switched by software.

LIN-compatible UART

LIN (Local Interconnect Network) is a communications protocol for automotive engineering LANs composed of master and slave units. If the master unit is connected to a CAN (as often is the case), this LIN-compatible UART helps reduce the load on the software. Compatibility with conventional UART is also available.

Figure 1 CAN-Mounted F²MC-16LX/FR Products



I²C bus-mounted models (designated by the suffix "C")

Maximum two I²C bus channels can be installed. Each channel can be used for communications with other unit CPUs and/or E2PROM.

Fig. 2 shows a typical configuration of a car audio system, and **Fig. 3** shows a typical configuration of a system for auto-air conditioner control.

Development Environment

This product supports the latest software/hardware development environments.

For the hardware, an adapter board (W110×D199×H20mm) is installed to a main unit (W150×D210×H46mm) composed of an integrated conventional main unit and emulation pod. Selection of the probe is based on the corresponding package and number of pins assigned. Software can be developed in a suitable environment supporting FUJITSU's integrated development environment SOFTUNE™ V3 Workspace.

Table 3 lists development tools involved. *

NOTES

*SOFTUNE is a trademark of FUJITSU LIMITED.

*I²C is a registered trademark of Philips Corporation.

Figure 2 Typical Car Audio System Configuration

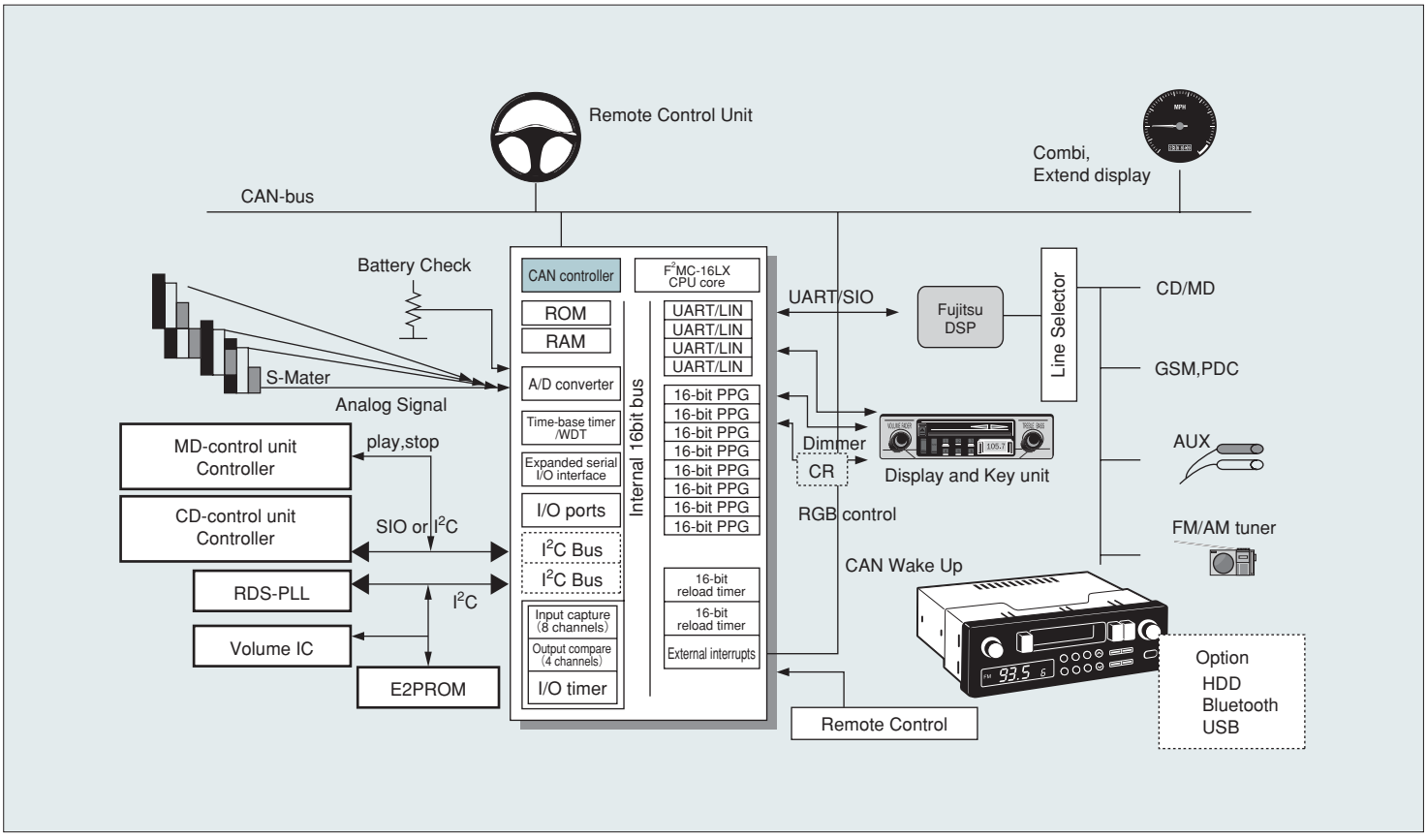


Figure 3 Typical Auto-Air Conditioner Control System Configuration

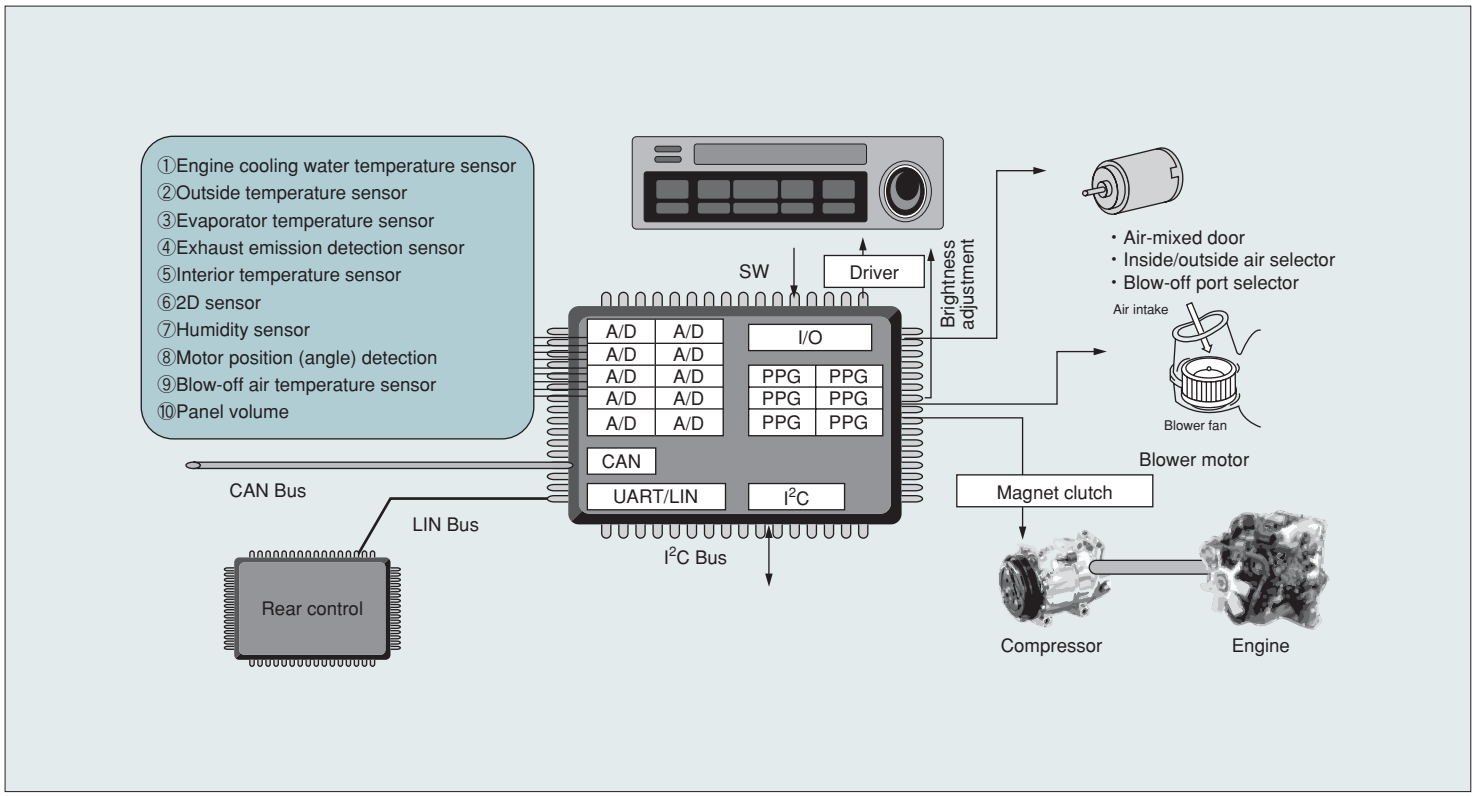


Table 1 Product Features

	Mask, Flash	EVA：MB90V340（S）
CPU	F^2MC-16LX CPU	
System clock	PLL clock multiplier circuit（×1, ×2, ×3, ×4, ×6, ×8, 1/2 when the PLL is set OFF）	
Minimum instruction execution time	42ns（4MHz osc. PLL×6）	
Sub-clock（32kHz）	“S” suffix OFF: ON, “S” suffixed: —	
16-bit reload timer	4 channels	
16-bit I/O timer	2 channels	
16-bit output compare	8 channels	
16-bit input capture	8 channels	
8/16-bit programmable pulse generator	8-bit×16 channels（16-bit×8 channels）	
A/D converter	“C” suffixed: 24 channels, “C” suffix OFF: 16 channels	24 channels
I^2C	“C” suffixed: 2 channels, “C” suffix OFF: —	2 channels
LIN-compatible UART	4 channels	5 channels
CAN	1 channel, 2 channels	3 channels
External interrupt	16 channels（Edge- or level-dependent programming available）	
Package	QFP-100，LQFP-100	PGA-299
Supply voltage	3.5V to 5.5V（4.5V to 5.5V when A/D converter is used）	4.5V to 5.5V
Operating temperature	−40℃ to +105℃	——

Table 2 Product Lineup

Model	Memory Type	Onboard Memory		CAN	I²C	A/D
		ROM (byte)	RAM (byte)			
MB90346 (S) MB90346C (S)	Mask ROM	64K-byte	2K-byte	1 channel	— 2 channels	16 channels 24 channels
MB90347 (S) MB90347C (S)	Mask ROM	128K-byte	6K-byte	1 channel	— 2 channels	16 channels 24 channels
MB90F347 (S) MB90F347C (S)	Flash Memory			1 channel	— 2 channels	16 channels 24 channels
MB90348 (S) MB90348C (S)	Mask ROM		15.7K-byte	1 channel	— 2 channels	16 channels 24 channels
MB90341 (S) MB90341C (S)	Mask ROM			2 channels	— 2 channels	16 channels 24 channels
MB90349 (S) MB90349C (S)	Mask ROM	256K-byte		1 channel	— 2 channels	16 channels 24 channels
MB90342 (S) MB90342C (S)	Mask ROM			2 channels	— 2 channels	16 channels 24 channels
MB90F342 (S) MB90F342C (S)	Flash Memory			2 channels	— 2 channels	16 channels 24 channels
MB90343 (S) MB90343C (S)	Mask ROM	384K-byte	20K-byte	2 channels	— 2 channels	16 channels 24 channels
MB90344 (S) MB90344C (S)	Mask ROM		30K-byte	2 channels	— 2 channels	16 channels 24 channels
MB90F344 (S) MB90F344C (S)	Flash Memory			2 channels	— 2 channels	16 channels 24 channels

Table 3 Development Tools

Hardware	High-speed supporting main unit	MB2147-01
	High-speed supporting adapter board	MB2147-20
	Probe : 0.65mm pitch for QFP-100 14×20mm	MB2147xxx (under development)
	Probe : 0.5mm pitch for LQFP-100 14×14mm	MB2147581
Software	SOFTUNE V3 Workbench (Workspace-compatible)	
	SOFTUNE V3 C Compiler (Workspace-compatible)	
	SOFTUNE V3 Assembler (Workspace-compatible)	
	SOFTUNE V3 C Analyzer (Workspace-compatible)	
	SOFTUNE V3 C Checker (Workspace-compatible)	

* SOFTUNE versions are not compatible with the older ICE-compliant 2141A/B; Workspace cannot be used.