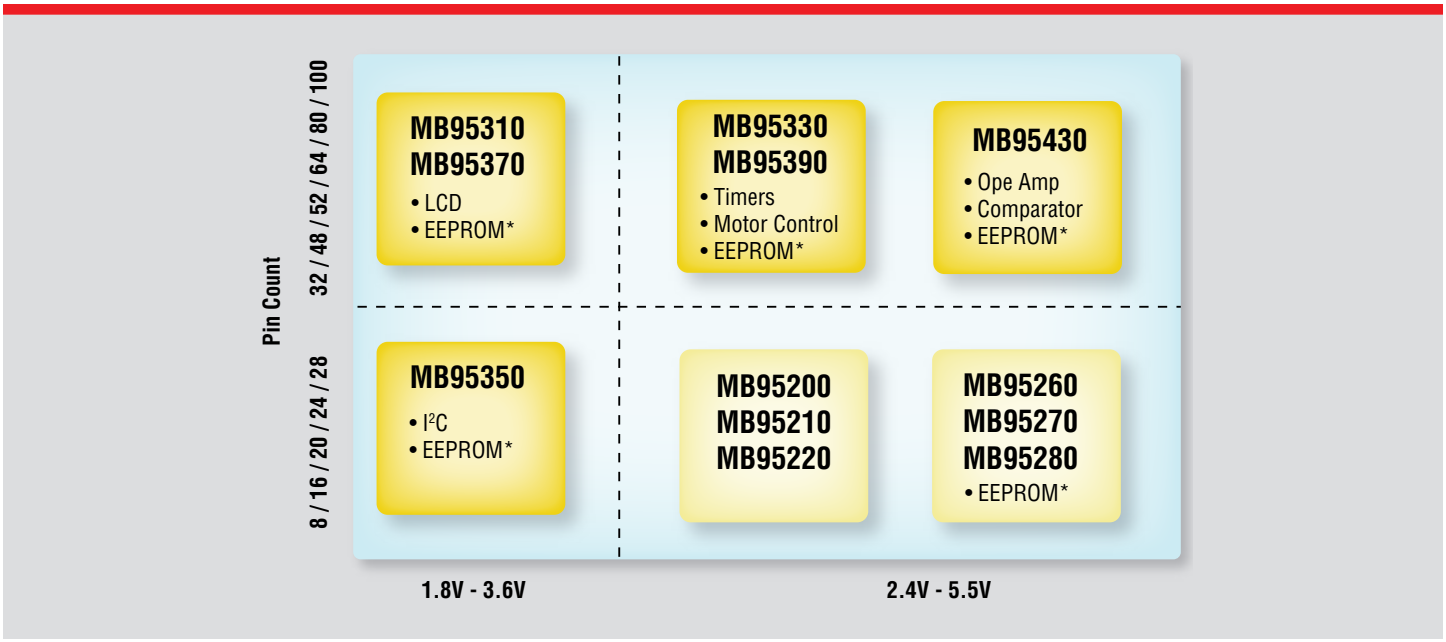
FS fact sheet

FUJITSU

Low-Pin-Count Microcontrollers

MB95200, MB95300, and MB95400 Series



Fujitsu F²MC-8FX Low-Pin-Count Microcontrollers

Description

The Fujitsu F²MC-8FX low-pin-count series meets the growing demand for microcontrollers (MCUs) in small-scale, low-cost applications such as home appliances, electrical tools, consumer healthcare products and after-market car accessories.

The MB95200, MB95300 and MB95400 families are general-purpose, single-chip microcontrollers. In addition to a compact instruction set, these microcontrollers contain a variety of peripheral controls capable of enabling BLDC motor control or 120 degree DC inverter motor control applications, an LCD controller, a voltage comparator and operation amplifier.

Flexible and highly functional, the devices can be used for system control and sub-micro control. For example, if I/O ports or A/D converters in the main microcontroller are insufficient due to system specification changes, the Fujitsu low-pin-count microcontrollers can support these functions as a sub-microcontroller. Or if the standby current of the main microcontroller is too large, the MCUs can manage the power supply.

The MB95200, MB95300 and MB95400 family devices feature high-performance, low-voltage, embedded flash; a precision on-chip RC oscillator; and an on-chip debug feature. The dual-operation flash memory supports a boot-loader implementation. The flash memory also supports a cost-effective emulation of an on-chip EEPROM by simultaneously executing the program code while writing or erasing data from one of the flash sectors.

The Fujitsu MB95300 series also contains built-in hardware, including a multi-pulse generator (MPG), which can be used for the multi-channel DC motor control, BLDC motor control and 120 degree DC inverter motor control operation; and an LCD controller, which can operate 190pix or 128pix size. The MB95400 series contains a built-in voltage comparator and operational amplifier.

The Fujitsu low-pin-count MCUs are easy to use and provide an optimal environment at each stage of the process from program development to writing to flash memory. The BGM adapter in-circuit emulator can be used for debugging and flash programming.

Key Features

High Quality and Reliability

- 100K write/erase cycles
- 20-year data retention
- 40°C to 85°C operating range

Safety and Security

- Flash content protection
- Low Voltage Detect (LVD) reset
- Clock supervisor
- Hardware watchdog timer

Dual-Operation Flash

- Dual-bank operation
- Memory for program and data storage
- Enables EEPROM emulation

On-chip Peripherals

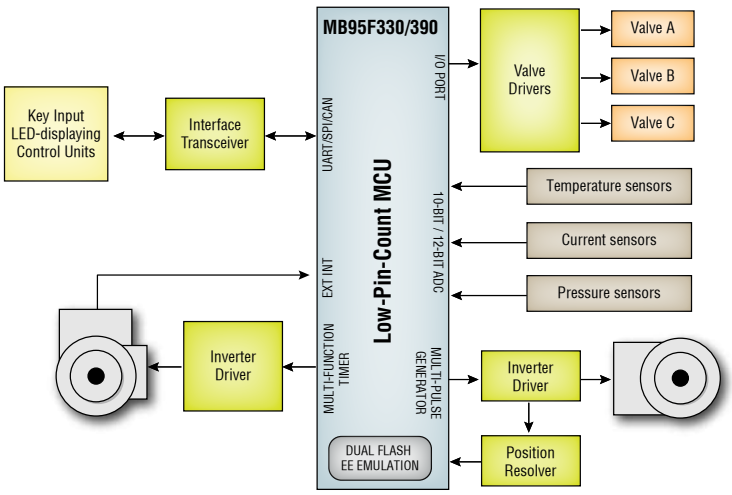
- Support for up to 160 pixel segmented LCD
- Multi-Pulse Generator (MPG)
- 8/16-bit PPG
- Waveform sequencer (including a 16-bit timer) equipped with a buffer and compare clear function)
- Communication interfaces: I^2C, LIN-UART, SPI

Ease of Use

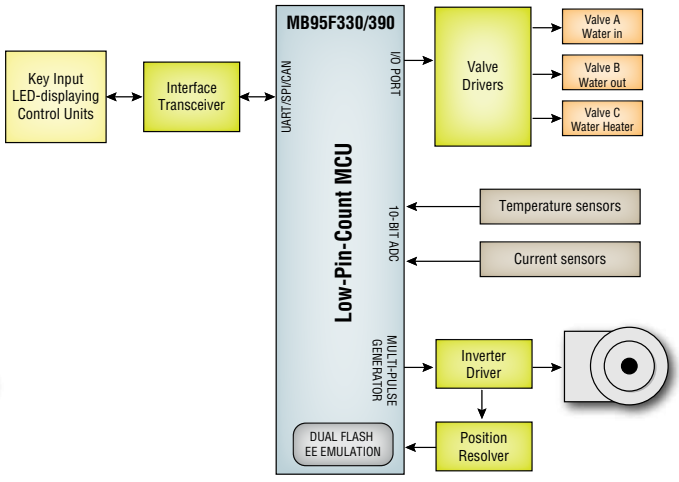
- +/-2% on-chip RC oscillator
- On-chip debug
- Single-wire debug interface
- Low-cost development environment
- Free download of IDE (SOFTUNE™) from the web
- EEPROM software, motor control and other peripheral libraries

Applications

120° DC Inverter Air-Conditoner



Inverter Washing Machine



Product Line-up

		MB95200	MB95210	MB95220	MB95260	MB95270	MB95280	MB95310	MB95330	MB95350	MB95370	MB95390	MB95430
CPU	CPU core	F²MC-8FX (8-bit CISC CPU)											
	Max. operating frequency	16.25MHz											
Internal CR oscillator	Main clock	Up to 16MHz (max)											
	Sub clock	Typ: 100kHz, min: 50kHz, max: 200kHz											
Memory type		Flash memory											
Dual operation flash / EEPROM		–	–	–	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clock supervisor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low-power consumption mode		Modes: stop, sleep, watch, time base timer											
Low-voltage detection circuit		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maximum number of I/O ports		17	5	13	17	5	13	71	29	21	55	45	29
Composite timer		2ch	1ch	1ch	2ch	1ch	1ch	2ch	2ch	2ch	2ch	2ch	1ch
		Selectable from 8-bit or 10-bit resolution Built in PWC (Pulse Width Counter), PWM (Pulse Width Modulation), input capture function											
8/16bit PPG timer		–	–	–	–	–	–	2ch	3ch	–	2ch	3ch	1ch
Watchdog timer		Hardware/software watchdog timer											
LIN-UART/UART		1ch / –	–	1ch / –	1ch / –	–	1ch / –	2ch / 1ch	1ch / 1ch	1ch / 1ch	2ch / –	1ch / 1ch	1ch / –
I²C		–	–	–	–	–	–	1ch	1ch	1ch	1ch	1ch	1ch
A/D converter		6ch	2ch	5ch	6ch	2ch	5ch	4ch	8ch	6ch	4ch	12ch	8ch
		Selectable from 8-bit or 10-bit resolution											
External interrupts		6ch	2ch	6ch	6ch	2ch	6ch	8ch	10ch	6ch	8ch	8ch	8ch
Operating voltage		2.4V – 5.5V						1.8V – 3.6V	2.4V – 5.5V	1.8V – 3.6V	1.8V – 3.6V	2.4V – 5.5V	2.4V – 5.5V
Guaranteed operating temperature		–40°C to +85°C											
Package		SOP 20 SDIP 24	SOP 8 DIP 8	DIP 16 SOP 16	SOP 20 SDIP 24 TSSOP 20 QFN 32	SOP 8 DIP 8	DIP 16 SOP 16 QFN 32	LQFP 80	LQFP 32 QFN 32 SDIP 32	SOP 24 TSSOP 24 QFN 32	LQFP 64	LQFP 48 QFN 32	LQFP 32 SDIP 32
LCDC operation		–	–	–	–	–	–	160 pix.	–	–	128 pix.		–
Motor control		–	–	–	–	–	–	–	1ch	–	–	1ch	–
Voltage comparator		–	–	–	–	–	–	–	–	–	–		4ch
Operational amplifier		–	–	–	–	–	–	–	–	–	–		1ch

Yes = Available – = Not available

Low-Pin-Count Microcontrollers

MB95200, MB95300 and MB95400 Series

Development Kit

Emulator Overview

- Low cost
- Small size (about 100mm x 70mm)
- USB interface to PC to run or debug SOFTUNE™

Starter Kit Overview Features

- Bundled with starter kit for emulator adapter, SOFTUNE™
- User can evaluate the MB95200 and MB95300 MCUs and its peripherals based on starter kit board and sample codes

SOFTUNE™ Debug System Platform

- Free Internet IDE download
- No size or time restriction on compiler IDE usage
- IDE is bundled with C-compiler, assembler, linker, simulator, emulator, and monitor debugger

Starter Kit / Evaluation Board Part Numbers

- MB2146-410A-01-E: MB95200 series
- MB2146-420A-01-E: MB95260 series with EEPROM emulation
- MB2146-440-E: MB95330 series with motor control
- MB2146-441-E: MB95390 series with motor control
- MB2146-450-E: MB95310 series with LCDC
- MB2146-451-E: MB95370 series with LCDC
- MB2146-460-E: MB95350 series with I^2C host and slave communication
- FMCDC-MB95260H-EK-01: MB95260 series with EEPROM emulation

Product Number Guide

Part #	MB95F202 MB95F212 MB95F222	MB95F262 MB95F272 MB95F282 MB95F332 MB95F352	MB95F203 MB95F213 MB95F223	MB95F263 MB95F273 MB95F283 MB95F333 MB95F353	MB95F204 MB95F214	MB95F264 MB95F274 MB95F284 MB95F314 MB95F374 MB95F354 MB95F394 MB95F434	MB95F334	MB95F316 MB95F376 MB95F396	MB95F318 MB95F378 MB95F398
ROM (KB)	4	8	8	12	16	20	20	36	60
RAM (bytes)	240	240	496	496	496	496	1008	1008	2032

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