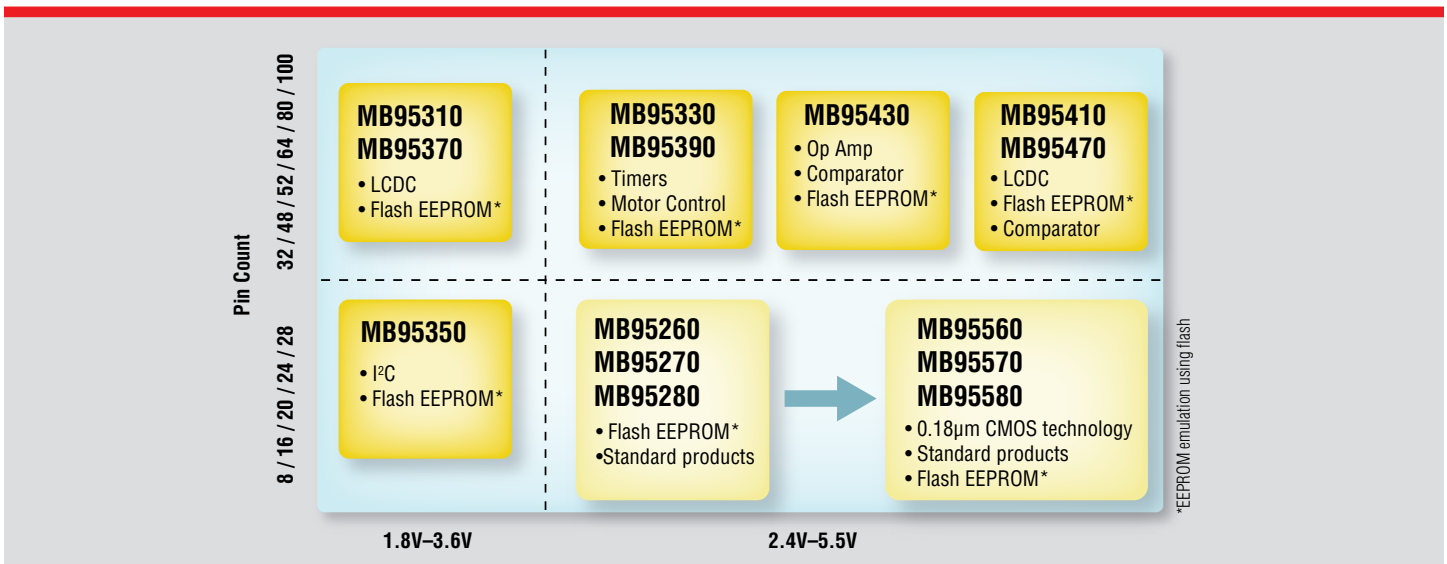


F²MC-8FX Microcontroller Family

MB95300, MB95400, MB95500 Series



Fujitsu F²MC-8FX Low-Pin-Count 8-bit Microcontrollers

Description

The Fujitsu F²MC-8FX low-pin-count 8-bit 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 MB95500 Series are general-purpose, single-chip microcontrollers. MB95500 series use 0.18µm CMOS process technology and provide a migration path for MB95200 series for higher performance and lower power. This series will have many products added to it in the near future with highly integrated peripherals. 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 MB95500 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 a 190pix or 128pix size segmented LCD display. The MB95400 series contains a built-in voltage comparator and operational amplifier. MB95410 and MB95470 Series support 288pix and 224pix size LCD displays respectively.

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 Background Monitor Debug (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 288 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: I²C, 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

Family Series	Features	Package	Example Application	
MB95F260/270/280 Migration to MB95560/570/580 Entry products with Dual Flash (EEPROM) Functions	2.4V–5.5V 4/8/16KB+4KB ROM 240/496B RAM	8/16 bits Timers 8/10bits ADC DUAL Flash	8/16/20-pins (SOP/TSSOP)	Vacuum Cleaners, DC Fans, Small Kitchen appliances, Alarm
MB95F350/350L More communications Channels	1.8V–3.6V 8/12/20KB ROM 240/496B RAM	8/16bits Timers 8/10bits ADC 2ch X I²C	SSOP24-pins TSSOP24-pins QFN32-pins	Battery Charger, Set Top Box, Shaver
MB95F330/390 DC Motor driven function with Competitive Cost	2.4V–5.5V 8/12/20/36/60KB ROM 240/496/1K/2KB RAM	8/16bits Composite Timer Motor Control/ Waveform generator (BLDC/Induction) 1Ch X I ² C	SDIP32-pins LQFP32/48-pins QFN32/48-pins	Washing Machine, Aircon, LCD Backlight, Power Meter
MB95F310/370 3V, 4COM LCDC Driver Function	1.8V–3.6V 20/36/60KB ROM 496/1K/2KB RAM	8/16bits Composite Timer 4COM LCDC 1Ch X I ² C	LQFP64/80-pins (0.5mm/0.65mm)	Blood Pressure Monitor, Thermostat, Remote Controller, single phase/ low cost energy meter
MB95F430 More Analog Peripherals (Comparator and Op-Amp)	2.4V–5.5V 8/12/20KB ROM 240/496B RAM	Comparator OPAMP 1Ch X I ² C	SDIP32-pins LQFP32-pins	Induction heater or Cooker
MB95F410/470 5V, 8COM LCDC Driver Function	2.4V–5.5V 4/8/16KB ROM 240/496B RAM	8/16bits Composite Timer 8COM LCDC 1Ch X I ² C	LQFP64/80-pins (0.5mm/0.65mm)	Home Appliances, Thermostat, Utility meters

Product Line-up

MB95260/
MB95560 MB95270/
MB95570 MB95280/
MB95580 MB95310 MB95330 MB95350 MB95370 MB95390 MB95430 MB95410 MB95470

CPU core		F ² MC-8FX (8-bit CISC CPU)											
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	Yes	Yes	Yes	Yes
Clock supervisor	Yes	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	Yes
Maximum number of I/O ports	17	5	13	71	29	29	21	55	45	29	75	59	59
	2ch	1ch	1ch	2ch	2ch	2ch	2ch	2ch	2ch	1ch	1ch	1ch	1ch
Composite timer	Built in PWC (Pulse Width Counter), PWM (Pulse Width Modulation), input capture function												
8/16bit PPG timer	-	-	-	2ch	3ch	3ch	-	2ch	3ch	1ch	2ch	2ch	2ch
Watchdog timer	Hardware/software watchdog timer												
LIN-UART/UART	1ch / -	-	1ch / -	2ch / 1ch	1ch / 1ch	1ch / 1ch	2ch / -	1ch / 1ch	1ch / 1ch	1ch / -	3ch	3ch	3ch
I ² C	-	-	-	1ch	1ch	1ch	1ch	1ch	1ch	1ch	1ch	1ch	1ch
AVD converter	6ch	2ch	5ch	4ch	8ch	8ch	6ch	4ch	12ch	8ch	8ch	8ch	8ch
AVD converter		Selectable from 8-bit or 10-bit resolution											
External interrupts	6ch	2ch	6ch	8ch	10ch	10ch	6ch	8ch	8ch	8ch	8ch	8ch	8ch
Operating voltage	2.4V - 5.5V 1.8V - 3.6V 1.8V - 3.6V 1.8V - 3.6V 1.8V - 3.6V 2.4V - 5.5V 2.4V - 5.5V 2.4V - 5.5V 2.4V - 5.5V 2.4V - 5.5V 2.4V - 5.5V 2.4V - 5.5V												
Guaranteed operating temperature	-40°C to +85°C												
Package	SOP 20 SDIP	DIP 16 SOP	LQFP 32 QFN	LQFP 80	LQFP 32 QFN	LQFP 32 SDIP	LQFP 64	LQFP 48 QFN	LQFP 32 SDIP	LQFP 80	LQFP 64	LQFP 64	LQFP 64
	24 TSSOP 20 QFN 32	SOP 8 DIP 8	SOP 16 QFN 32	16 QFN 32	TSSOP 24 QFN 32	32	32	32	32	32	32	32	32
LCDC operation	-	-	-	160 pix.	-	-	128 pix.	-	-	288 pix.	-	224 pix.	-
Motor control	-	-	-	1ch	-	-	-	1ch	-	-	-	-	-
Voltage comparator	-	-	-	-	-	-	-	-	4ch	1ch	1ch	1ch	1ch
Operational amplifier	-	-	-	-	-	-	-	-	1ch	-	-	-	-

Yes = Available

- = Not available

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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 MB2146-08-E, SOFTUNE™
- User can evaluate all the listed MCUs and their peripherals based on starterkit 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

- MB2146-420A-01-E: MB95260/MB95560 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 I²C host and slave communication
- FMCDC-MB95260H-EK-01: MB95260 series with EEPROM emulation



Product Number Guide

Part #	MB95F262 MB95F272 MB95F282 MB95F332 MB95F352 MB95F562 MB95F572 MB95F582	MB95F263 MB95F273 MB95F283 MB95F333 MB95F353 MB95F563 MB95F573 MB95F583	MB95F264 MB95F274 MB95F284 MB95F314 MB95F374 MB95F354 MB95F394 MB95F434 MB95414 MB95474 MB95F564 MB95F574 MB95F584	MB95F334	MB95F316 MB95F376 MB95F396 MB95F416 MB95F476	MB95F318 MB95F378 MB95F398 MB95F478
ROM (KB)	8	12	20	20	36	60
RAM (bytes)	240	496	496	1008	1008	2032

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