

# New Lineup of F<sup>2</sup>MC-8FX Family MB95110H/120H/130H Series

FUJITSU introduces three new 8-bit microcontroller series to “F<sup>2</sup>MC-8FX Family”. All of the new microcontrollers series are designed to operate on 5V and are ideal for use in white home appliances such as microwave ovens, rice cookers and refrigerators as well as in other applications.

## Product Description

Recently, electronics equipment has been coming out with advanced features, though 8-bit microcontrollers are continuing to play an active role as the main CPU in white home appliances, toys, wattmeters, and other such metering instruments. Last year, FUJITSU announced the 8-bit microcontroller series “F<sup>2</sup>MC-8FX Family” based on the consideration that the 8-bit market is still in great demand in the Asian region in particular. The company commenced the volume production of three series of 64-pin and 48-pin packaged products.

FUJITSU is now introducing three new series to the lineup: the 100-pin packaged product “MB95120H Series”, the 48-pin packaged product “MB95110H Series”, and the 28-pin packaged product “MB95130H Series”. All of these new products are designed to operate on 5V. FUJITSU is currently conducting promotional sales activities with a focus on white home appliances.

## Product Features

The entire product lineup in this Family offers the following features.

### ■ Expanded standby reset to resource input function

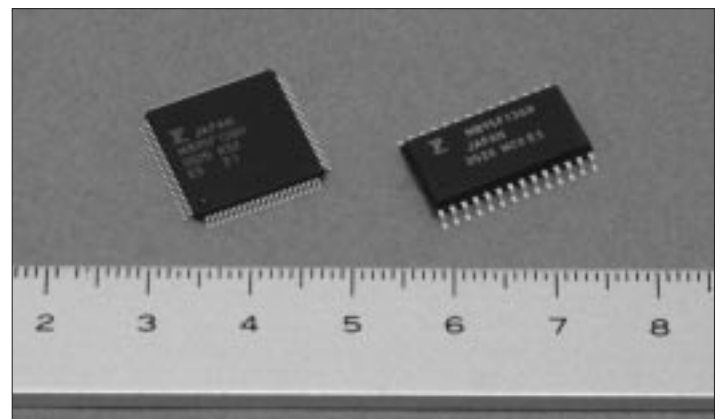
Resetting of the CPU stop mode is attainable not only through external interruption but also through data input or clock input for communication system macros (UART/SIO, LIN-

UART, and I<sup>2</sup>C), trigger input for A/D converters, or trigger input for 16-bit PPG timers. For example, for F<sup>2</sup>MC-8FX set in the stop mode, the stop mode can be simply reset by the first data transmission for UART communication, thus contributing to eliminate the need for a dedicated external interruption terminal for resetting.

### ■ 8-/16-bit composite timer

The 8-/16-bit composite timer can be configured with any function among the interval timer, PWM output, PWC (input pulse width measurement), and input capture, depending on the need of the user. This ensures a flexible response in cases such as when an additional timer output function becomes necessary for the changed specifications of the user system after the selection of MCU. In addition, the

Photo 1 External View (MB95F128H/136H)



capability of selecting any function at the discretion of the user allows the use of the same MCU for any other application. This timer can be used with either an 8-bit or 16-bit counter.

### ■ 8-/10-bit A/D converter

The A/D converter incorporated in F<sup>2</sup>MC-8FX allows the selection of either resolution, 8-bit or 10-bit, using software.

Internal conversion time may be selected using software in response to the external impedance. At an internal operating frequency of 10MHz, the minimum conversion time may be set to 1.7 $\mu$ s. This enables faster data acquisition, which is ideal for applications involving numerous sensors.

**Table 1** Product Configuration and Available Functions

Model	MB95110H Series	MB95120H Series	MB95130H Series
	MB95F118H	MB95F128H	MB95F136H
Class	Flash product	Flash product	Flash product
ROM size	60Kbytes	60Kbytes	32Kbytes
RAM size	2Kbytes	2Kbytes	1Kbytes
CPU clock system	1 channel/2 channels	2 channels	1 channel/2 channels
CPU function	Number of basic instructions: 136    Data bit length: 1-, 8-, 16-bit length Minimum instruction execution time: 100ns/10MHz    Maximum memory area: 64Kbytes		
I/O port (max.)	40	86	19
Time-base timer	Interruption interval at a 10 MHz main clock oscillation frequency: 0.2ms, 1.64ms, 6.6ms, 52.4ms.		
Watchdog timer	Reset occurring interval at a 10 MHz main clock oscillation frequency: approx. 105ms to 210ms or approx. 210ms to 419ms Reset occurring interval at a 32.768 kHz subclock oscillation frequency: approx. 250ms to 500ms or 500ms to 1s.		
8-/16-bit composite timer	16-bit $\times$ 2 channels (8-bit $\times$ 4 channels)	16-bit $\times$ 2 channels (8-bit $\times$ 4 channels)	16-bit $\times$ 1 channel (8-bit $\times$ 2 channels)
	Integrated with interval function, PWM function, PWC function, and input capture function, which are selective.		
8-/16-bit PPG timer	16-bit $\times$ 2 channels (8-bit $\times$ 4 channels)	16-bit $\times$ 2 channels (8-bit $\times$ 4 channels)	16-bit $\times$ 1 channel (8-bit $\times$ 2 channels)
	Allowable output of square waveform at any desired period and duty factor; multiple channels can be simultaneously activated.		
16-bit PPG timer	1 channel	2 channels	1 channel
	Allowable output of square waveform at any desired period and duty factor; selective continuous mode and one-shot mode; external trigger supported.		
16-bit reload timer	—	1 channel	—
	Selective among continuous/one-shot/event count mode; allowable output of square waveform.		
Watch pre-scaler	Interval time with the subclock running at an oscillating frequency of 32.768 kHz: 125ms, 250ms, 500ms, 1s.		
Watch counter	A maximum of 63 clock counts available from the watch pre-scaler; allowable 1-minute count.		
UART/SIO	1 channel	1 channel	1 channel
	Either mode selective synchronous or asynchronous to clock; built-in dedicated baud rate generator.		
LIN/UART	1 channel	1 channel	1 channel
	Either mode selective synchronous, asynchronous to clock or LIN; built-in dedicated baud rate generator.		
I <sup>2</sup> C bus	1 channel	1 channel	—
	Compatible with Philips I <sup>2</sup> C specifications; master/slave transmission supported.		
A/D converter	8 channels	12 channels	8 channels
	Selective between 8- or 10-bit resolution; selective between sampling and conversion time.		
External interruption	8 channels	12 channels	8 channels
	The trigger mode is Rise edge, Fall edge, or both.		
Wild register	Allowable correction of a maximum of 3bytes Mask ROM data		
LCD controller	—	40seg $\times$ 4com	—
Reset in response to any detected voltage drop	Optional (available with 5V models); allowable supply of internal reset signal in response to the detection of any voltage drop.		
Power-saving mode	Stop mode/Sleep mode/Subclock mode/Watch mode		
Package	QFP-48 (0.8mm pitch)	QFP-100 (0.65mm pitch), LQFP-100 (0.5mm pitch)	SOP-28 (1.27mm pitch)
Operating voltage	2.5V to 5.5V		

**Watch pre-scaler/Watch counter**

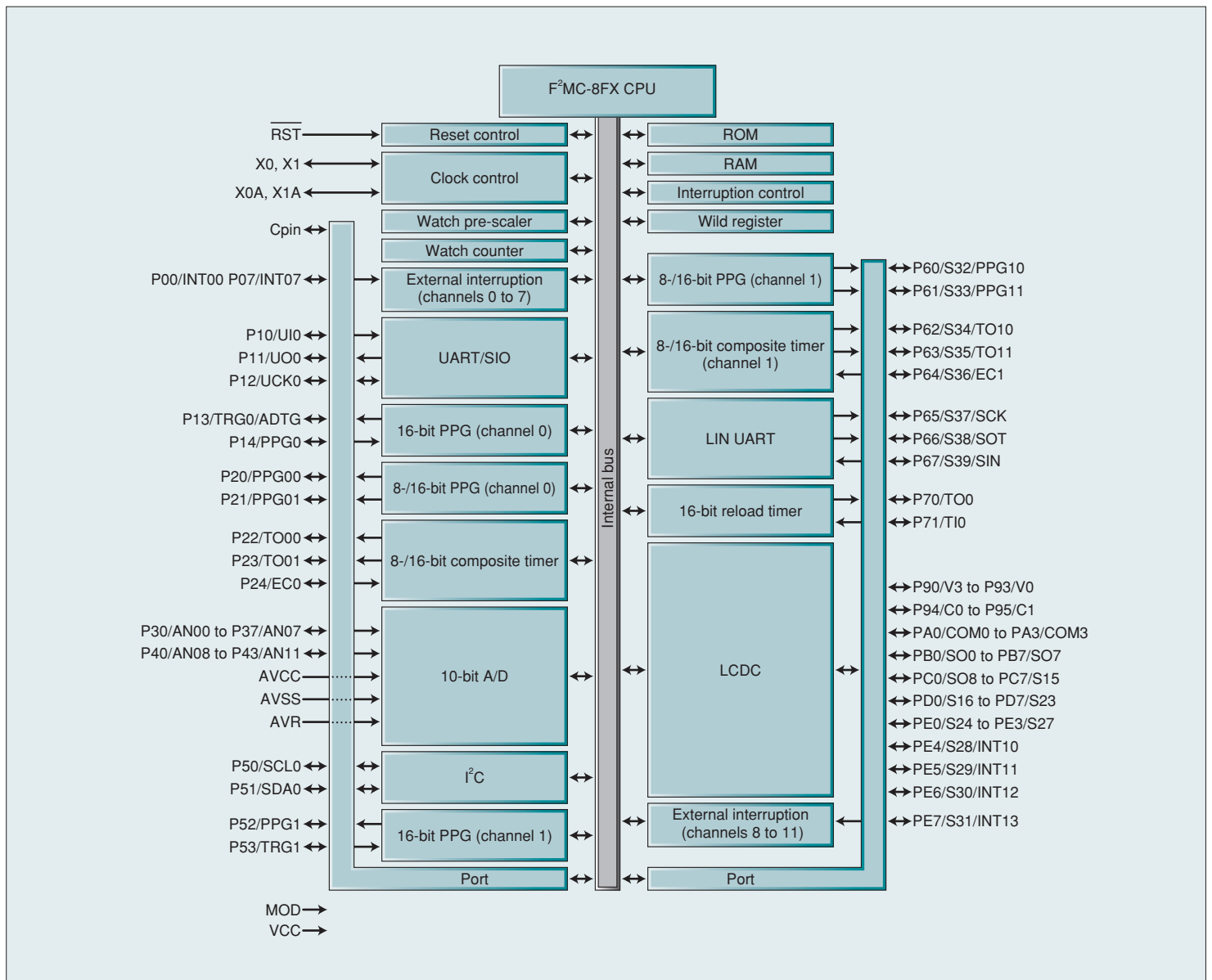
In applications that are maintained in a standby state for a prolonged period of time to save power consumption, a function may be required that sets the MCU to perform interval counting for the longest possible period of time to enable repetition of automatic resetting. The new series provides interval counting of up to 63 sec. with the use of the clock pre-scaler, allowing counting by the subclock and the clock counter operating by the counting clock from the clock pre-scaler. This contributes to power consumption saving of

the entire system in the applications described above.

**Features of MB95120H Series**

- LCD controller: 40 seg×4 com, max. 160 pixels : With blinking function
- Main clock and subclock 2 channels
- Integrated dual-operation Flash memory of 60Kbytes (MB95F128H)
- Package: LQFP-100-pin (14mm×14mm, 0.5mm pitch)  
QFP-100-pin (14mm×20mm, 0.65mm pitch)

Figure 1 Block Diagram (MB95F128H)



**Features of MB95130H Series**

- Main clock and subclock 1 channel/2 channels (optional)
- Integrated one-sector Flash memory composed of a single sector (MB95F136H)
- Package: SOP-28-pin (8.6mm×17.75mm, 1.27mm pitch)

**Features of MB95110H Series**

- Main clock and subclock 1 channel/2 channels (optional)
- Integrated dual-operation Flash memory of 60Kbytes (MB95F118H)
- Package: QFP-48-pin (12mm×12mm, 0.8mm pitch)

Table 1 provides a list of available functions, and Fig.1 presents a block diagram of MB95F128H.

**Typical Applications**

Figs.2 and 3 illustrate typical applications of MB95F136H and MB95F128H, respectively.

MB95F136H features a smaller number of pins through an allowable configuration with many macros relating to the timer. It can implement the system that contains a motor installed at the suction port of a vacuum cleaner for increased suction.

Figure 2 Typical Application of MB95F136H (Vacuum Cleaner: Local Control)

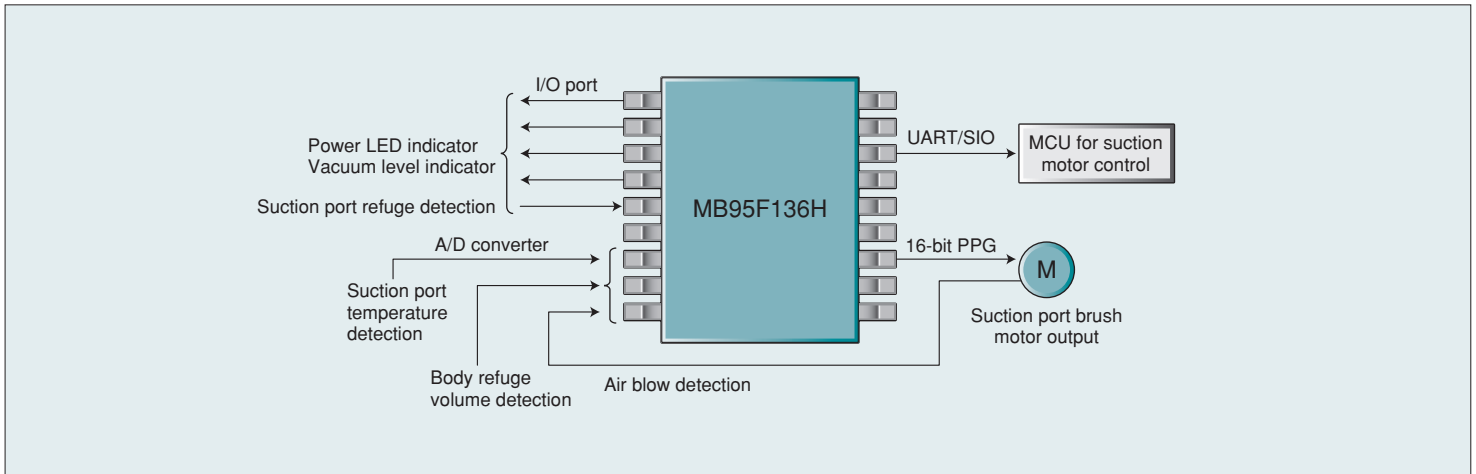
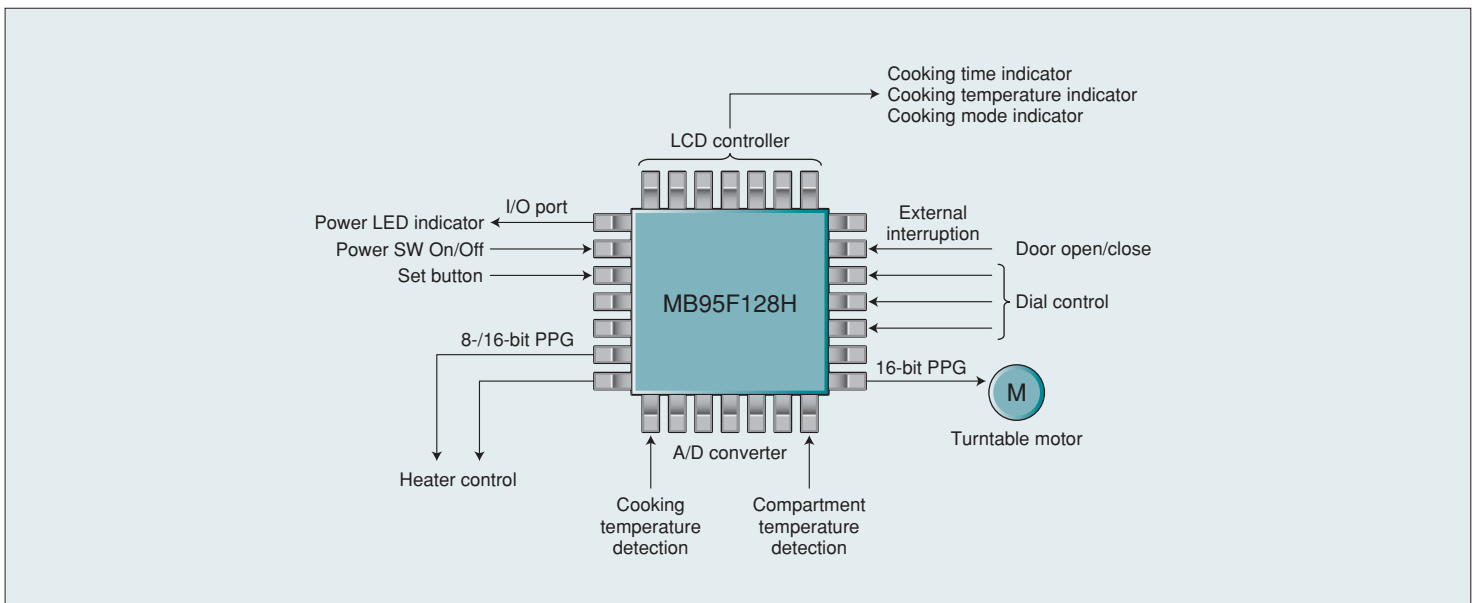


Figure 3 Typical Application of MB95F128H (Microwave Oven)



MB95F128H incorporates an LCD controller and it can be incorporated in rice cookers, microwave ovens, etc. that use LCD displays. In addition, due to the six available channels for the timer usable as 16-bit PPG, both heater control and turntable control of microwave ovens can be achieved with a single MCU.

## Development Environment

**Fig.4** presents the configuration of the development environment hardware for the F<sup>2</sup>MC-8FX, and **Table 2** provides a list of the development tools supported.

For this product family, the MCU board configured with the evaluation chip “MB95FV100B” is available for common use throughout the entire product lineup. Thus, for the development of any device type with a different package, the software can be developed in the development environment without changing the evaluation chips. Once developed, the software asset can be directly expanded to the differently packaged product, thus contributing to saving software development man-hours. The software can be developed with F<sup>2</sup>MC-8FX-compatible version of FUJITSU’s integrated development environment SOFTUNE™ V3.

## Future Development

FUJITSU will continue to expand F<sup>2</sup>MC-8FX Family product lineup (**Fig.5**). FUJITSU is also focusing on the expansion of various packages and ROM/RAM densities as well as Mask products, not limited to Flash memory, that are superior in price and power consumption, thereby offering customers a wide choice of options. \*

### NOTES

\* SOFTUNE is a trademark of FUJITSU LIMITED.

**Table 2** Development Tools List

	MB95110H Series	MB95120H Series	MB95130H Series
Background monitor debugging dedicated adaptor	MB2146-09 (BGM Adaptor)		
MCU board (configured with evaluation chip)	MB2146-303 (MB95FV100B-103: intended specifically for 5V products)		
Header board for package conversion	MB2146-212 (0.8mm, 12×12mm)	MB2146-250 (0.5mm, 14×14mm) MB2146-251 (0.65mm, 14×20mm)	MB2146-270 (1.27mm, 8.6×17.75mm)
Evaluation board	MB2146-401		
Software	SOFTUNE V3 Workbench SOFTUNE V3 Assembler SOFTUNE V3 C Checker	SOFTUNE V3 C Compiler SOFTUNE V3 C Analyzer	

**Figure 4** Development Environment Hardware Configuration Diagram

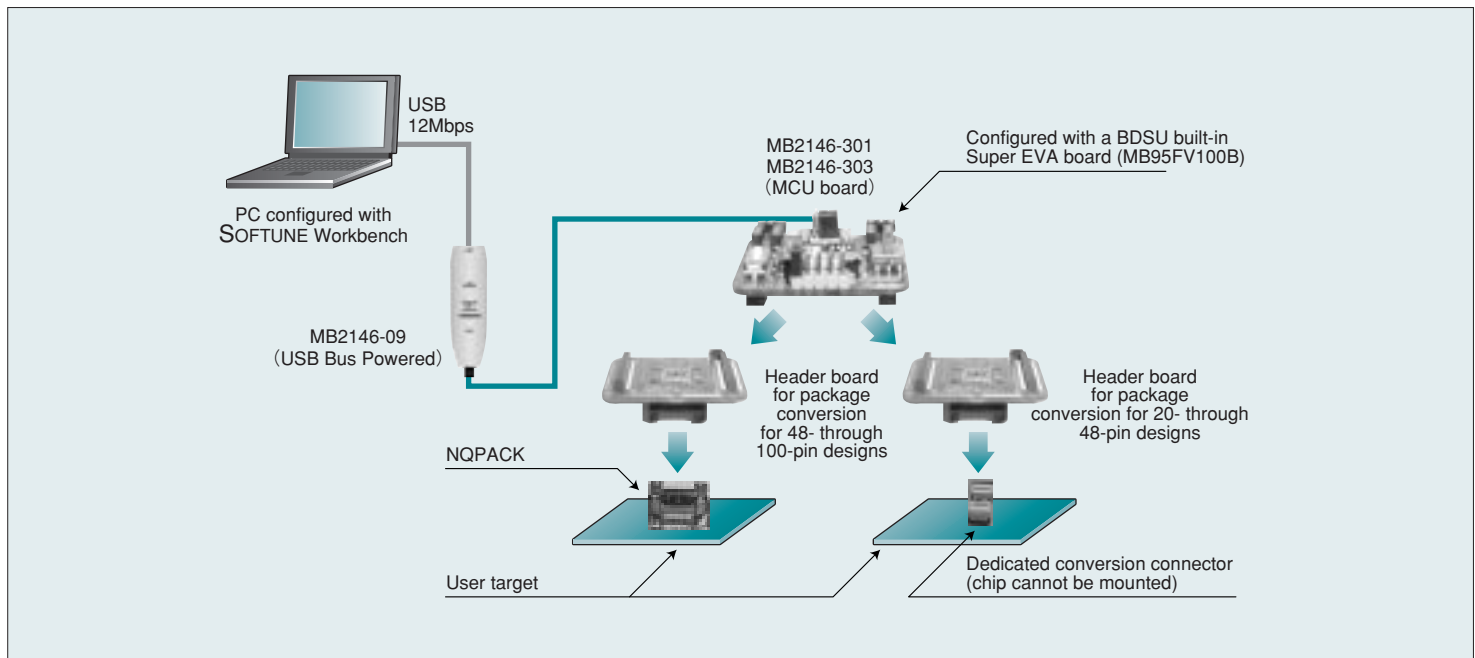


Figure 5 Product Lineup Plan

