

# FUJITSU

## CMOS 8-BIT SINGLE-CHIP FLEXIBLE MICROCONTROLLER

## MB89710 SERIES

### PRELIMINARY

Notice: This is not a final specification. Some parametric limits are subject to change.

TM209-A879: September 1987

#### DESCRIPTION

The Fujitsu MB89710 Series Flexible Microcontrollers are the new generation CMOS 8-bit single-chip microcontrollers, which have powerful architecture and efficient instruction set designed for high speed real time controller applications.

The MB89713/89715 are designed based on a highly efficient 16-bit CPU core with 8-bit data bus (called F<sup>2</sup>MC<sup>TM</sup>-8 family CPU core) that has an efficient instruction set and high speed nested interrupt capability.

The MB89713/89715 provide a set of basic resources: an 8K x 8 bits/16K x 8 bits mask ROM (program memory) a 260 x 8 bits/516 x 8 bits static RAM (data memory) 53 I/O lines (five 8-bit, two 5-bit, and one 3-bit parallel ports), a watchdog timer, eleven-source three-programmable-priority-level nested interrupt, and an 8MHz clock generator.

In addition to these features, they have another of specific resources: Real Time I/O ports (4 inputs and 4 outputs), PWM/Timer module configured as 8 bits x 2 channels or 16 bits x one channel, a UART module with full-duplex serial communication capability, and a serial interface for I/O expansion.

The high performance realized by these features is useful for high speed real time control applications such as printers, lap-top personal computer, facsimile machines, copy machines, automobile meters, and servo controllers.

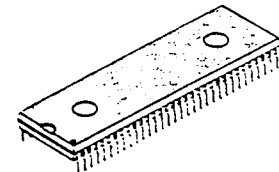
The MB89713/89715 are fabricated by the silicon-gate CMOS process, and packaged in a 64-pin plastic shrink DIP (suffix -P) or a 64-pin plastic QFP (suffix -PF). They operate with a single +5V power supply and a clock of at most 8MHz. The instruction execution time is at least 5 $\mu$ s at 8MHz clock.

In addition to these mask ROM versions, the external ROM versions, MB89T713/89T715, the piggyback evaluation devices, MB89PV713/89PV715, and OTP/EPROM versions are provided for users' efficient development.

Also, development tools are supported.

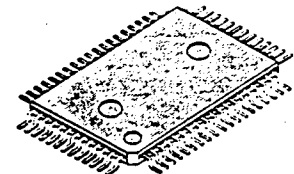
F<sup>2</sup>MC (Fujitsu Flexible Micro Controller) is a trademark of FUJITSU LIMITED.

MB89713P/MB89715P



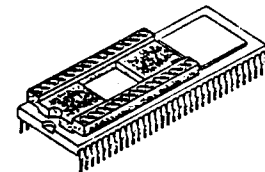
64-PIN PLASTIC SHRINK DIP  
(DIP-64P-M01)

MB89713PF/MB89715PF



64-PIN PLASTIC QFP  
(FPT-64P-M01)

MB89PV713C/MB89PV715C



64-PIN CERAMIC DIP MODULE  
(MDIP-64C-P01)

MB89PV713CF/MB89PV715CF

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64-PIN CERAMIC QFP MODULE  
(MQP-64C-P01)

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

**FEATURES**

- F<sup>2</sup>MC™-8 Family CPU Core:
  - \* 16-Bit Architecture
  - \* 8-Bit Data Bus
  - \* 64K x 8 Bit Internal Program/Data Memory Space
  - \* 128K x 8 Bit External Data Memory Space
  - \* Memory Mapped I/O
  - \* Powerful and Compact Instruction Set
    - Bit and Word Operations, Multiply and Divide
  - \* Instruction Count - 135
  - \* Instruction Execution Time - Min 0.5µs at 8MHz Clock
- Basic Resources:
  - \* ROM - 8K x 8 Bits (MB89713), 16K x 8 Bits (MB89715)
  - \* RAM - 260 x 8 Bits (MB89713), 516 x 8 Bits (MB89715)
  - \* I/O - 53 Ports: Push-Pull Buffered Ports - 43; Open-Drain Buffered Ports - 8
  - \* Watchdog Timer
  - \* Power-On Reset
  - \* Interrupt - 11 Sources (including 3 External Interrupt Inputs), Nested, 3 Programmable Priority Levels, High Speed (2µs at 8MHz),
  - \* Standby - Halt Mode, Stop Mode
  - \* Intel Type Bus Interface for External Memory and I/O Access
  - \* Clock Generator - 8MHz
- Specific Resources:
  - \* Real Time I/O - 4 Output Compare Channels and 4 Input Capture Channels
  - \* PWM/Timer - 8 Bitz x 2 Channel or 16 Bits x 1 Channel
  - \* A/D Converter - 8 Bits x 8 Channels
  - \* UART - One Channel, Full-Duplex and Double Buffering
  - \* Serial Interface for I/O Expansion - One Channel
- Single +5V Power Supply, -40°C to +85°C, Max 8MHz Clock
- Process - Silicon-Gate CMOS Technology
- Package - 64-Pin Plastic Shrink DIP, 64-Pin Plastic QFP
- Development Support Devices:
  - \* Piggyback Evaluation Devices - MB89PV713, MB89PV715
  - \* External ROM Devices - MB89T713, MB89T715
  - \* OTP/EPROM Devices - MB89P713, MB89W715
- Development Support Tools:
  - \* Host Machine - IBM PC/XT, PC/AT, or Equivalent
  - \* Software Tools - C Compiler, Macro Assembler, Linker/Library Manger
  - \* Hardware Tools - In-Circuit Emulator (MB2120 Series + Host Emulator)

F<sup>2</sup>MC is a trademark of FUJITSU LIMITED.

## MB89710 SERIES OVERVIEW

Feature	MB89713	MB89715
Data bus width	8-bits	8-bits
Address bus width	16-bits	16-bits
ROM	8K bytes	16K bytes
RAM	260 bytes	516 bytes
Direct access memory address	64KB Main Memory (ROM/RAM, ext memory) plus 64K byte banks of Data Memory	
Interrupt sources	10 internal/3 external	
Priority levels	3 plus NMI	
Timers/counters	1x21 bits/1x16 bits/1x16 or 2x8 bits	
Watchdog timer	1x21 bit	
General purpose I/O	53, selectable in/out/bidirectional	
Serial I/O	1 channel x 8-bits	
Real time I/O	Input capture/output compare	
A/D converter	8 channels/8-bit resolution	
UART	full duplex/synchronous/asynchronous	
PWM	1x16 bits or 2x8 bits	
Standby modes	sleep & stop	
Instruction cycle time	0.5 $\mu$ S/8 MHz	
Packages	64 pin shrink DIP/quad flat pack	