

High-performance 32-bit Microcontroller with Built-in HDMI-CEC Reception Function and 11-channel Serial Interface for Application in AV Devices

MB91313 Series

A 32-bit microcontroller with built-in HDMI-CEC reception functions on the base of a high-performance 32-bit FR microcontroller—optimal for application in AV device systems.

Overview

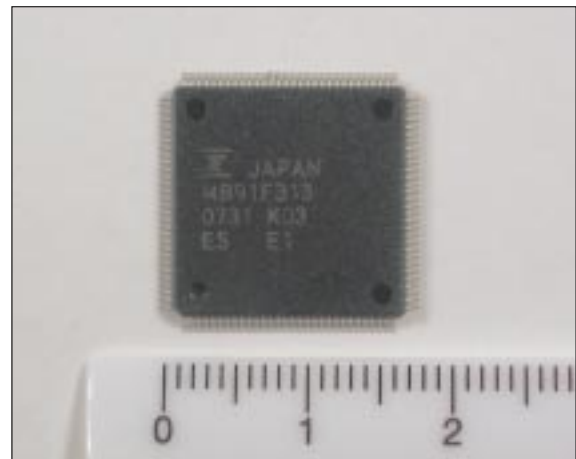
We have added “MB91313 Series” to the well-received 32-bit FR microcontrollers to further expand the lineup of microcontrollers for AV device systems. This product is optimal for AV receivers, high-end PC tuners and captures, VCRs, video cameras and still cameras, projectors, TVs, printers, interphone FAX machines, medical image devices, and other image processing devices.

Conventionally, CEC reception operation was conducted using software in the sub-microcontroller. Since this new product can automatically obtain data and determine startup even in standby mode, it can reduce the current consumption. This enables the incorporation of sub-microcontroller functions into this product, which is optimal for system control, leading to a reduction in the number of device parts. Conventional microcontrollers had to process all HDMI-CEC reception functions (hereafter referred to as CEC functions) by software and many man-hours were spent on software development. This product can reduce the CPU processing load and software development man-hours because it delivers the CEC functions with hardware.

Product Features

- Adopting a high-performance 32-bit FR core (high-speed processing of 42MIPS@33MHz)

Photo 1 External View



Execution of 1 instruction per cycle by pipeline processing. Complete Harvard bus architecture realizes improved CPU performance and contributes to higher additional values and system performance. It also has reinforced optimal instructions (28 instructions) for built-in purposes such as bit operation and resource control in addition to the RISC-type high-speed instructions (137 instructions). It thus realizes a compact program size.

Built-in CEC functions

This product has 2 channels with built-in CEC functions to automatically obtain the CEC signals to control between devices. Automatic reception with hardware eliminates the necessity for reception programs and software development man-hours can thus be reduced. It also integrates the functions that had been executed by the sub-microcontroller and the number of parts in the system can thus be reduced. It can be used for remote controller reception as well.

Rich built-in serial interfaces (11 channels total)

This product has 11 built-in channels of serial communication macro as the serial interface for controlling various devices for image and sound processing. This macro can support clock-synchronous communication (up to 8Mbps), clock-asynchronous

communication, and I²C communication (100Kbps, 400Kbps) by software switching, enabling the product to address the demands of various applications.

In addition, 3 out of the 11 channels have built-in FIFO for 16bytes transmission and FIFO for 16bytes reception, realizing data transmission and reception with reduced CPU loads.

Flexible clock control

Since the CPU clock, peripheral function clock, and external bus clock can be set up individually using the PLL multiplication function (1- to 2-fold) and clock gear function (1 to 16 frequency divisions), flexible power management is possible. It also offers rich low power consumption modes including sleep mode to stop the clock only in the CPU and stop mode to stop all clocks including oscillation.

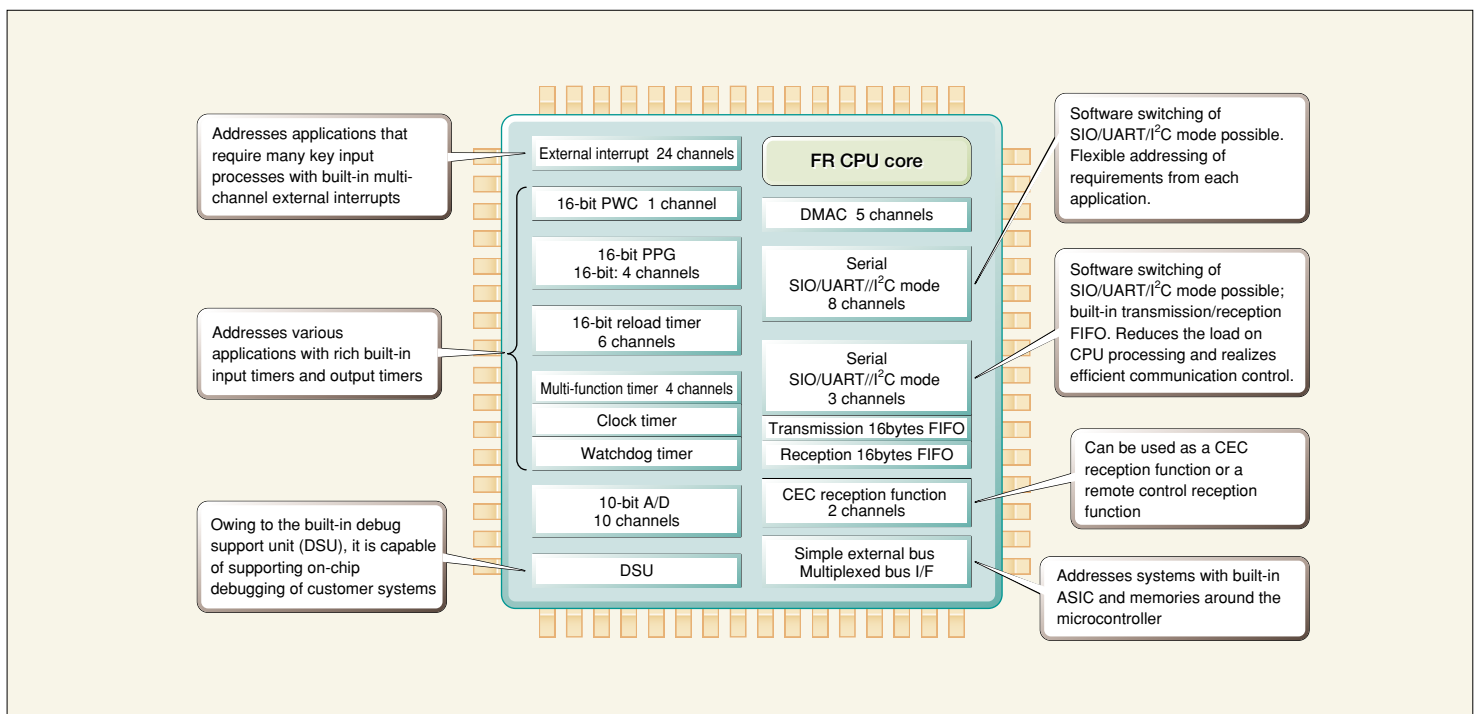
Built-in DMAC

This product has a built-in DMAC capable of parallel operation with the CPU. It achieves performance and efficiency improvement in system processes by combining with serial communication and PPG.

5V tolerant addressed

Some of the external interrupt terminals and serial terminals (3

Figure 1 Features of the MB91F313 Series



channels) support 5V tolerance. It does not require connection of an external level converter when connecting to the I²C of a 5V interface and so forth.

Rich lineup of timers

This product has a rich lineup of built-in input and output timers to realize various applications. PPG has a built-in remote control transmission support function; PWC has a built-in remote control reception function; and the multi-function timer has a built-in HSYNC count mode to realize optimal functions for TV applications.

Built-in Flash memory product available

This product has a built-in 544Kbytes Flash memory for programs. It also has 32Kbytes of instruction execution RAM to enable on-board Flash memory programming.

On-chip debugging supported

This product has a built-in debug support unit (DSU) to support debugging of the customers' mass production system. A small cable has been prepared for miniaturized applications.

Figure 1 presents the features of this product and **Figure 2** an example of HDMI-CEC system configuration.

Product Lineup

Table 1 presents the product configuration.

Development Environment

This product has a built-in debug support unit circuit and thus supports on-chip debugging of our customers' mass production systems by using MB2198-01, an emulator for the FR family. It is also supported by SOFTUNE V6, a FUJITSU integrated software development application designed to simplify programming tasks in an integrated environment. This development environment will contribute to improving the development efficiency for both hardware and software.

Figure 2 HDMI-CEC System Configuration Example

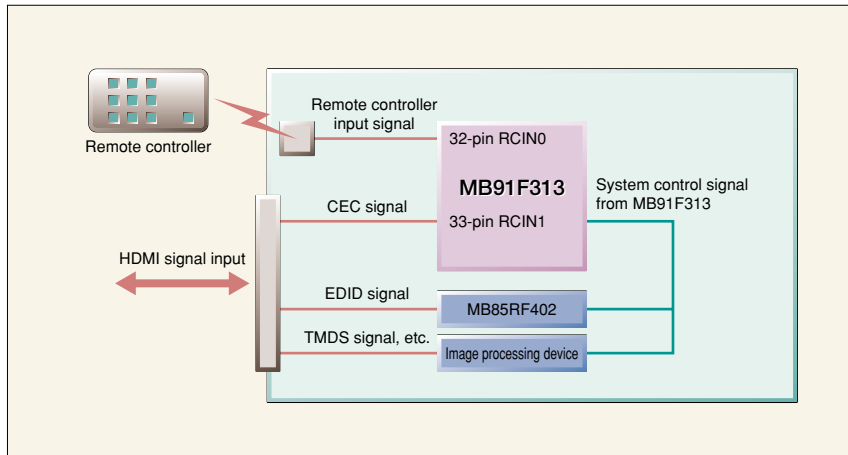


Table 1 MB91F313 Product Configuration

Flash/RAM	544Kbytes/32Kbytes
I-cache/D-cache	—
Package pin number	120-pin
Maximum operation frequency	33MHz
External bus	33MHz multiplexed bus
DMAC	5 channels
HDMI-CEC/remote controller reception	2 channels
Timer	<ul style="list-style-type: none"> • Multifunction timer: 4 channels Selection from event timer/interval timer/ICU/H-Sync counter possible • Reload timer: 6 channels • PWC: 1 channel • PPG: 4 channels
Multifunction serial I/F	11 channels, some are 5V withstand voltage terminals Selection from SIO/UART/I ² C mode possible, channels with 16bytes FIFO
External interrupt	10 channels
10-bit A/D	10 channels
Clock timer	Included
Watchdog timer	Included
On-chip debugging	Supported (DSU4)

*Terminals of each peripheral function have dual applications. Please check the combination of peripheral functions that can be actually used with reference to the pin assignments on the product specification document.

Table 2 lists the available development tools and **Figure 3** presents the hardware configuration. An evaluation board (**Table 3**) to assist in initial introduction is also available. This will simplify program development. For supported writers, please see **Table 4**. *

NOTES

* HDMI: the HDMI logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

Table 2 Development Tools

Hardware	Main unit MB2198-01
	DSU cable MB2198-10 (small cable MB2198-202)
Software	SOFTUNE V6 workbench
	SOFTUNE V6 C compiler
	SOFTUNE V6 assembler
	SOFTUNE V6 C analyzer
	SOFTUNE V6 C checker
	SOFTUNE V6 REALOS/FR

Table 3 List of Supported Evaluation Boards

Serial writer	Outline
Evaluation board by Sanhayato Corp.	Simple evaluation board (under development)

Table 4 List of Supported Writers

Serial writer	Outline
Serial programmer by Yokogawa Digital Computer Corporation	Handy-type general-purpose serial programmer
FUJITSU USB programmer	Programmer capable of rewriting via an adapter (MB2146-09 A-E) by installing the software in a PC. The interface with the PC is USB.
FUJITSU PC serial programmer	Programmer capable of rewriting via an RS232C driver by installing the software in a PC. The interface with the PC is RS232C.

Figure 3 On-chip Debugger Environment

