32-bit Microcontroller Integrating CAN for Advanced Function Automotive Systems MB91461

A 32-bit RISC microcontroller mounting CAN capable of 3.3V operation adopting an FR60 core that realizes high performance and low power consumption as a CPU. Optimal for the control of commercial and automotive devices including audio products.

Overview

In recent years, automobiles have been incorporating an increasing number of electronic parts. The computerization of the electrical system, ITS (Intelligent Transportation System), and multimedia functions are expected to advance further. In such systems, real-time control is becoming increasingly important and high-performance microcontrollers are required. Nevertheless, the standby power consumption of each control unit is limited because power consumption increases in concurrence with the advanced function development of automobile systems.

This product is a microcontroller that can realize a high-performance, low power consumption system with an FR60 core, a 32-bit RISC CPU. Though external bus access is basic in order to support a large address space, a 4KB command cache memory and a 64KB large-density RAM are incorporated to speed up CPU command execution. It also has built-in resources optimal for the control of automotive devices and commercial devices including CAN controllers, LIN-UART, various I^2C interfaces and timers, A/D converters, and PPG. Furthermore, standby current consumption can be reduced drastically using the shutdown mode function. This product adopts an LQFP-176-pin package.

Product Features

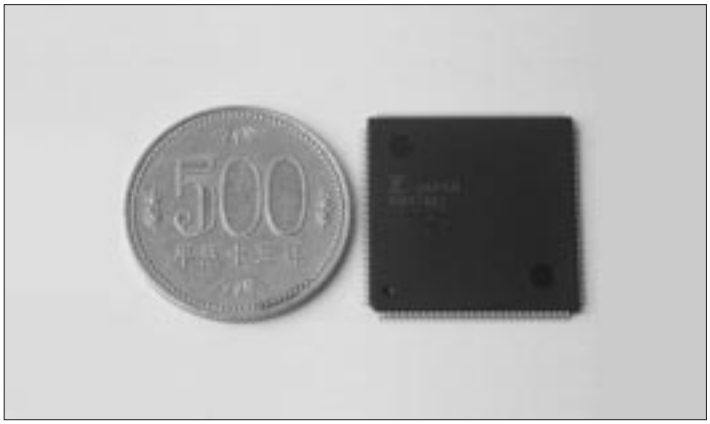
Fig.1 presents a block diagram and **Fig.2** illustrates the pin assignments.

The resources mounted on this product have the following features.

FR60 core

An FR60 core that has command compatibility with the FR series is adopted. FR60 is FUJITSU's 32-bit RISC CPU

Photo 1 External View



core in which high performance and low power consumption are realized. It has a maximum operation frequency of 80MHz (reference oscillation 20MHz, PLL4 multiplication).

Built-in RAM density

Command cache 4Kbytes+64Kbytes (command/data common RAM)

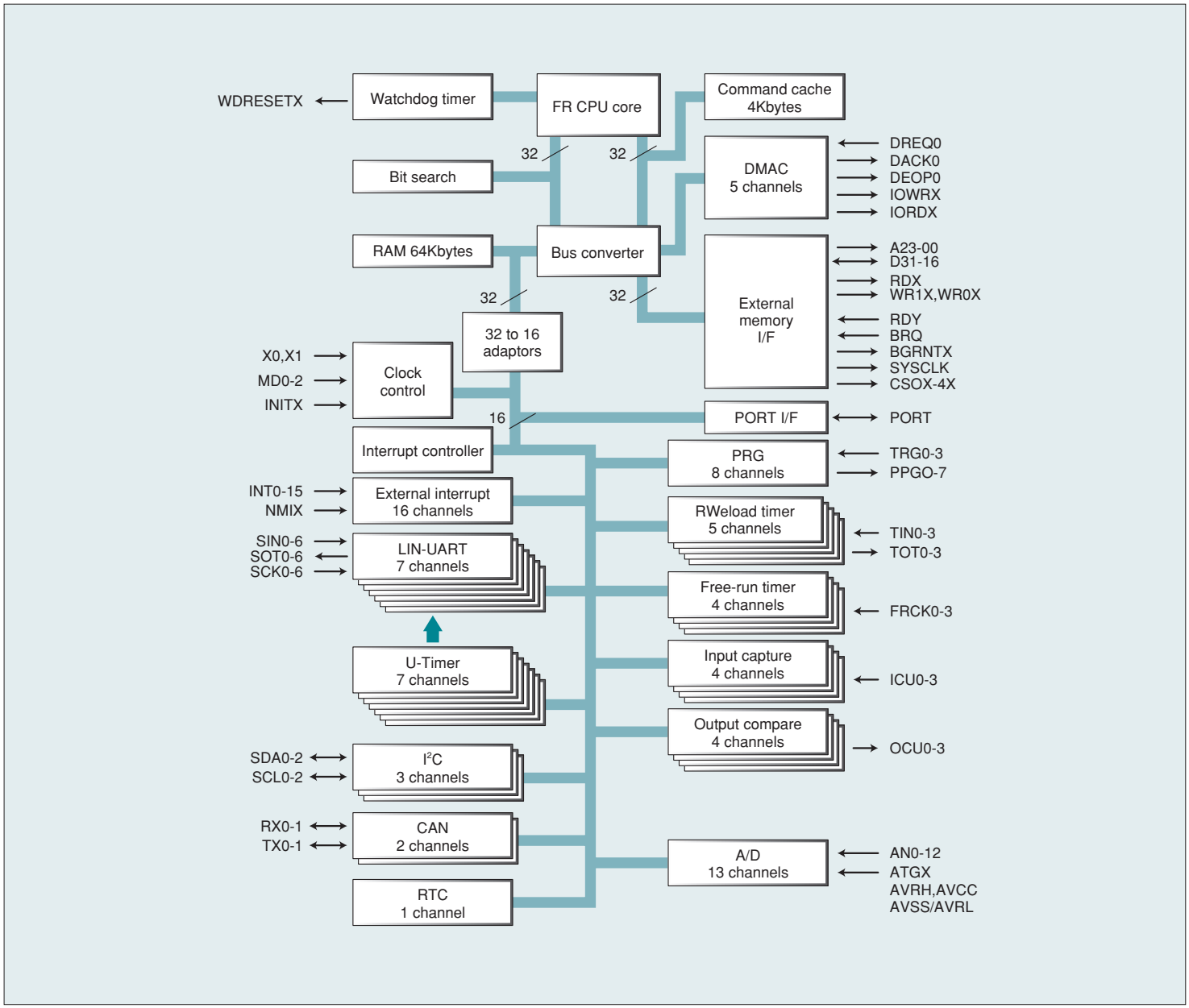
CAN controller

It conforms to Part A and Part B of CAN specification version 2.0. 32-message buffers for data and ID are incorporated with sequencing. Communication speed of up to 1Mbps is supported.

Various timers

- 16-bit free-run timer×4 channels
- Input capture×4 channels

Figure 1 Block Diagram

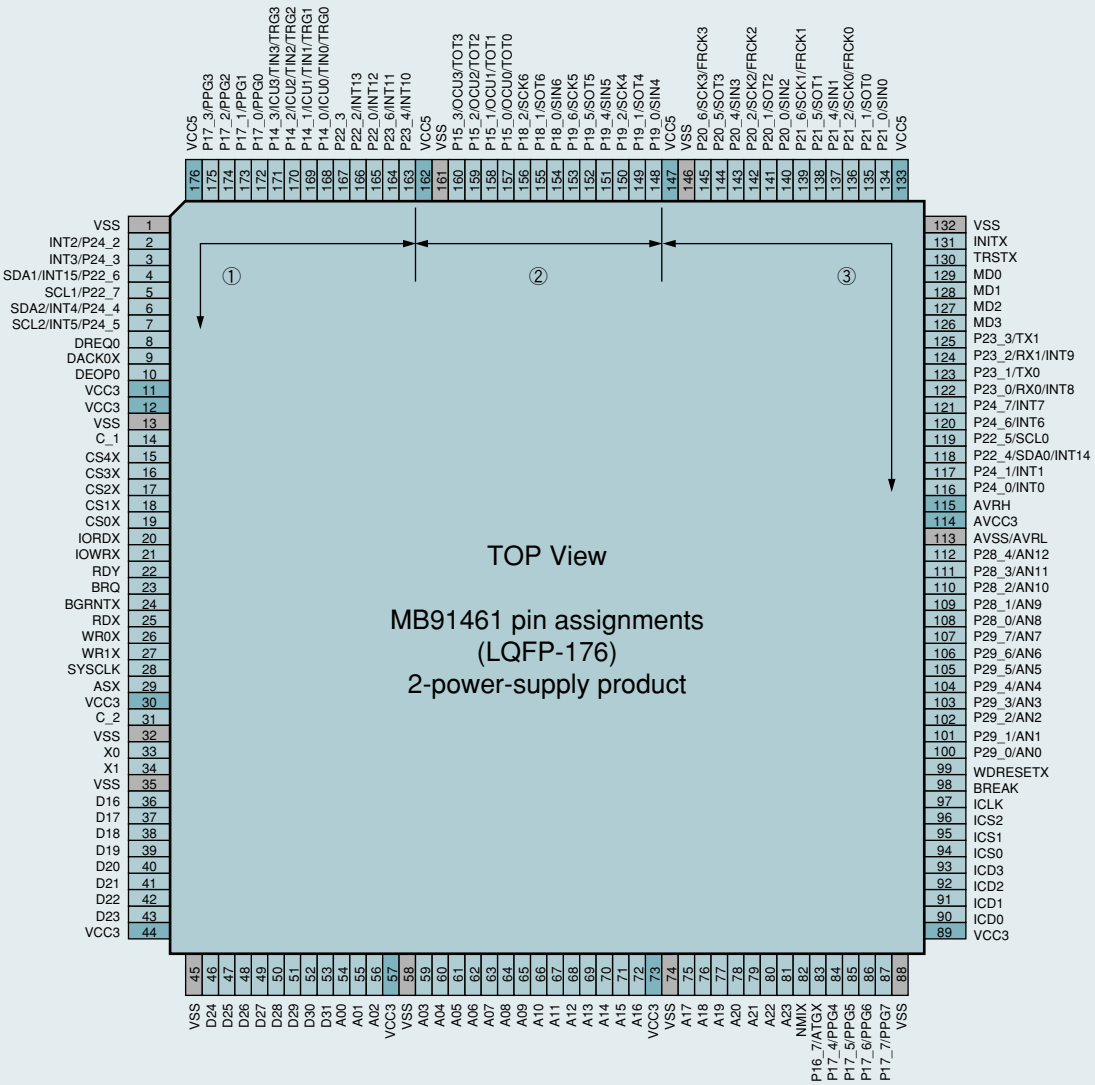


- Output compare×4 channels
- 16-bit PPG×8 channels
- 16-bit reload timer×5 channels

Various interfaces

- LIN-supporting UART×7 channels
- I²C interface×3 channels
- External bus interface

Figure 2 Pin Assignments



∗1 : Terminals supporting 3.3V/5V are divided into three I/O blocks (①, ②, and③). Terminal setup is possible with 3.3V or 5V for each core block. Input of 5V amplitude is possible for the I²C terminal ① only when 5V is supplied to the power supply. The input threshold value for I²C is the value using 3.3V as a reference, regardless of the I/O power-supply voltage.

∗2 : When I/O block ① or ③ is used as a 5V terminal, 5V input is required for the INT terminal and thus 5V supply is required for I/O block ③.

High-speed A/D converter

This product mounts 13 channels of a sequential-conversion-type A/D converter, which realizes conversion time of 1μs and 10-bit resolution.

Low power consumption mode (sleep/stop/shutdown mode function)

This product has three low power consumption modes: sleep mode (program in stop status), stop mode (device in stop status), and shutdown mode (power supply in cut status). In the shutdown mode, the power supply is cut off for everything except for RAM (64KB) and the shutdown control circuit drastically reducing current consumption at standby.

Terminals supporting 3V type/5V type

Though the CPU power supply is 3V type, terminals supporting 3V type/5V type are divided into three blocks, and terminal setting for 3V type or 5V type is possible for each block (please see the hardware manual for setting details).

Other peripheral functions

- External interrupt×16 channels
- DMAC×5 channels
- Real-time clock
- Watchdog timer
- Debugging support unit (DSU4)
- Power-supply voltage: 3.0V to 3.6V/4.5V to 5.5V
- Package: FPT-176P-M07 (LQFP-176-pin)

Development environment

This product, like the conventional FR series, is supported by SOFTUNE™ V6, a FUJITSU integrated software development environment. The SOFTUNE V6 application software is designed to simplify programming tasks in order to meet the diversified needs of program designers.

Table 1 presents the configuration of development tools. *

NOTES

* SOFTUNE is a trademark of FUJITSU LIMITED.

Table 1 Development Tools

Hardware	Emulator	MB2198-01
	Adapter board	MB2198-300
	Header board	MB2198-301
Software	SOFTUNE V6 Workbench	
	SOFTUNE V6 C compiler	
	SOFTUNE V6 assembler	
	SOFTUNE V6 C/C ++ analyzer	
	SOFTUNE V6 C checker	
	SOFTUNE V6 REALOS/FR	