Fujitsu Semiconductor Microcontroller Development Environments

Flow of Development “V-model”
FR Family 32-bit Microcontroller On-chip Debugger

- Features of the MB2100-01-E emulator
  - Debug using a flash microcontroller on a mass-production board
  - Connect to a flash microcontroller using a single-wire coaxial cable
  - Read from and write to memory without stopping the CPU
  - Connect to a flash microcontroller at up to 10 m
  - Configure traces and multiple events
  - Security function with password
  - Compact size and light weight 84.8mm x 53.6mm x 21.3mm, 70.3g
  - Connect using USB 2.0 High Speed
  - The power supply is USB bus-powered
  - Power supply isolation
  - Supports all flash microcontrollers that includes the single-wire coaxial cable debugging interface

New 8FX Family 8-bit Microcontroller MB95200 Series

- Features of the MB2146-08-E (BGM adapter)
  - Supports microcontroller operating voltages of +2.9 to +5.5V
  - The upper and lower limits on the microcontroller operating voltage and operating frequency vary between each of the devices. For the operating voltage and operating frequency of each MCU, see the documentation related to that device (data sheet, hardware manual, etc.)
  - Compact development environment, with small lightweight BGM adapter
  - Debugging possible over single-wire serial
  - Because the monitor program executes in a dedicated memory space, it does not consume any of the user memory space
  - Built-in continuous execution, step execution, and forced break functions
  - Software breakpoints: 256 points
  - Host interface: Able to connect using USB1.1

System Configuration

- FR Family 32-bit Microcontroller On-chip Debugger
  - Mass-production board of target device
  - Flash microcontroller
  - CPU
  - Single-wire coaxial connection (maximum 10m)
  - Communication speed maximum 50Mbps
  - The connection is by a single microcontroller pin only
  - Built-in debugging circuit
  - Run to Break
  - Event setting
  - Trace (instruction & data)
  - Dedicated DMA for debugging
  - Memory access

- New 8FX Family 8-bit Microcontroller MB95200 Series
  - BGM adapter
  - Personal computer
  - Workbench emulator
  - debugging software
  - Integrated development environment
  - Communication speed maximum 50Mbps
  - Single-wire coaxial connection (maximum 10m)
  - The connection is by a single microcontroller pin only
  - Built-in debugging circuit
  - Run to Break
  - Event setting
  - Trace (instruction & data)
  - Dedicated DMA for debugging
  - Memory access

Support for hardware development tools

- Fujitsu Semiconductor provides development tools such as emulators and adapters for developing software for the FR family and FMC family.

Development System (hardware tools)
FR Family 32-bit Microcontroller

- Features of the MB2198-01-E emulator
  - Supported DSU: DSU3, DSU4
  - Power supply voltage: Supports linear +2.7V to +5.5V
    (The upper and lower limits on the microcontroller operating voltage and operating frequency vary between each of the MCU. For the operating voltage and operating frequency of each MCU, see the documentation related to that device (data sheet, hardware manual, etc.).)
  - Capable of source-level debugging (assembler, C, mixed display)
  - Simple GUI operation using pull-down menu buttons
  - Real-time trace function
  - Multiple window display, including source code, variables, registers, memory, trace, etc.
  - Hardware break x 5, Software break x 4, Code event x 2, Data event x 2
  - Execution cycle measurement function
  - Host interface: Equipped standard with RS-232C (max. 115kbps), LAN (10BASE-T, 100BASE-TX), and USB1.1

System Configuration

Example System Configuration for the MB96300 Series

FMC-16FX Family 16-bit Microcontroller

- Features of the MB2198-01-E emulator
  - Supported DSU: DSU4
  - Power supply voltage: Supports linear +2.7V to +5.5V
    (The upper and lower limits on the microcontroller operating voltage and operating frequency vary between each of the MCU. For the operating voltage and operating frequency of each MCU, see the documentation related to that device (data sheet, hardware manual, etc.).)
  - Capable of source-level debugging (assembler, C, mixed display)
  - Simple GUI operation using pull-down menu buttons
  - Real-time trace function
  - Multiple window display, including source code, variables, registers, memory, trace, etc.
  - Hardware break x 4, Software break x 2048, Data break x 4
  - Execution cycle measurement function
  - Host interface: Equipped standard with RS-232C (max. 115kbps), LAN (10BASE-T, 100BASE-TX), and USB1.1
Development System (hardware tools)

**F'MC-16LX Family 16-bit Microcontroller**

- Supports a maximum microcontroller operating frequency of 33MHz
- Supports microcontroller operating voltages of +2.7V to +5.5V
- Emulator memory (1M x 4 areas)
- Capable of source-level debugging (assembler, C, mixed display)
- Simple GUI operation using pull-down menu buttons
- On-the-fly function (execute commands during microcontroller execution)
- Powerful real-time trace function
- Multiple window display, including source code, variables, registers, memory, trace, etc.
- Event triggers that allow a wide variety of conditions to be specified (code x 8, data x 8)
- Sequential control by sequencer (4 conditionals, 3 levels)
- Performance measurement function (function to measure the execution time between 2 points, measure elapsed cycles)
- CC coverage measurement function (measures program execution coverage)
- Host interface: Equipped standard with RS-232C (max. 115kbps), LAN (10BASE-T, 100BASE-TX), and USB1.1

**System Configuration**

- MB2147-01-E
- MB2147-10-E
- MB2147-20-E
- MB2132-4xx
- MB2132-5xx
- MB2147-5xx
- MB2147-6xx

**Configuration 1**

- Personal computer
- Emulator
- Debugging software
- System Configuration
- SOFTUNE integrated development environment

**Configuration 2**

- MB2147-01-E
- MB2147-20-E
- MB2147-10-E
- MB2132-4xx
- MB2132-5xx
- MB2132-6xx

* Included with main unit MB2147-5xx-E
**Development Tool**

Fujitsu Semiconductor provides ICE, evaluation boards, monitor debuggers, ROM writers, etc. for developing software for the FR family and FMC family.

### FR Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Series</th>
<th>Main unit2</th>
<th>DSU cable</th>
<th>Adapter board</th>
<th>Header board</th>
<th>Evaluation chip</th>
<th>Main board</th>
<th>Daughter board</th>
</tr>
</thead>
</table>

**Notes:**
- See P5 for details on the system configuration.
- Requires either an RS-232C cable, USB cable, or LAN cable.

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### Parallel Writers


### Serial Writers


When using a parallel writer, you may require adapters or other equipment in addition to the writer itself. Contact the individual writer manufacturers for details.
## FR Family Development Tool Lineup

### Main unit/DSU cable/Adapter board/Header board/Configuration/Device configuration

<table>
<thead>
<tr>
<th>Main unit/DSU cable/Adapter board/Header board/Configuration/Device configuration</th>
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<tbody>
<tr>
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<td>MB2198-10E</td>
<td>MB2198-10E</td>
<td>MB2198-162-E</td>
<td>MB2198-165-E</td>
<td>MB2198-305-E</td>
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<td>MB2198-01E</td>
<td>MB2198-10E</td>
<td>MB2198-10E</td>
<td>MB2198-162-E</td>
<td>MB2198-165-E</td>
<td>MB2198-305-E</td>
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### Evaluation board

<table>
<thead>
<tr>
<th>Evaluation chip</th>
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<tr>
<td>MB91V460RB-ES</td>
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</tbody>
</table>

### Main board/Daughter board

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<thead>
<tr>
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<tbody>
<tr>
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### Parallel writers

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<tr>
<th>Supported writers</th>
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<tbody>
<tr>
<td>Support hardware</td>
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<tr>
<td>Support software</td>
<td>Development support tool</td>
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Support hardware

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<thead>
<tr>
<th>MODEL 1940</th>
<th>MODEL 1930/1931/1893</th>
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<tr>
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Development tool

<table>
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## Development Tool

### FMC-16LX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Package</th>
<th>Main board</th>
<th>Daughter board</th>
<th>Main memory writer</th>
<th>Adapter board</th>
<th>Evaluation chip</th>
<th>Evaluation board</th>
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<tbody>
<tr>
<td>M2031-01</td>
<td>MB2031-01</td>
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<td>-</td>
<td>-</td>
<td>MB2031-01</td>
<td>-</td>
</tr>
</tbody>
</table>

### System Configuration

- Requires either an RS-232C cable, USB cable, or LAN cable.
- See P7 for details on the system configuration.

### FMC-16LX Family Development Tool Lineup

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<th>Package</th>
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<th>Evaluation board</th>
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<tbody>
<tr>
<td>MB224-100</td>
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### System Configuration

- Requires either an RS-232C cable, USB cable, or LAN cable.
- See P7 for details on the system configuration.

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1. See P7 for details on the system configuration.
2. Requires either an RS-232C cable, USB cable, or LAN cable.
   When using a parallel writer, you may require adapters or other equipment in addition to the writer itself. Contact the individual writer manufacturers for details.
### FMC-16LX Family Development Tool Lineup

#### System configuration

<table>
<thead>
<tr>
<th>Series</th>
<th>Package</th>
<th>Main-unit*2</th>
<th>Adapter board</th>
<th>Probe cable</th>
<th>Evaluation chip</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>MB2147-32</td>
<td>MB2147-32</td>
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<td>MB9V2054/5,5MAS</td>
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<tr>
<td>NOS010</td>
<td>LQFP-48P (0.5mm,7×7mm)</td>
<td>MB2147-32</td>
<td>MB2147-32</td>
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<td>MB9V2054/5,5MAS</td>
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<tr>
<td>NOS020</td>
<td>LQFP-120P (0.5mm,16×16mm)</td>
<td>MB2147-52</td>
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<td>MB9V2054/5,5MAS</td>
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<td>MB2147-32</td>
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<td>MB9V2054/5,5MAS</td>
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<td>NOS030</td>
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<td>MB9V2054/5,5MAS</td>
</tr>
</tbody>
</table>

#### Support hardware

- **Development support tool**
  - **ICE Evaluation board**
  - **Flash memory writer**

#### Support software

- **SOFTUNE V3**
  - Professional Pack
  - Made by Minato Electronics

### Configuration

#### 1: See P7 for details on the system configuration.

#### 2: Requires either an RS-232C cable, USB cable, or LAN cable.

#### 3: See the following website for information on the parallel and serial writers.


When using a parallel writer, you may require adapters or other equipment in addition to the writer itself. Contact the individual writer manufacturers for details.

### Evaluation board

<table>
<thead>
<tr>
<th>Main board</th>
<th>Daughter board</th>
<th>Made by</th>
<th>Made by</th>
<th>Made by</th>
<th>Made by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Path Support Group</td>
<td>Mobile Electronics</td>
<td>Semiconductor</td>
<td>YDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supported writers</td>
<td>Supported writers</td>
<td>Supported writers</td>
<td>YDC</td>
</tr>
</tbody>
</table>

### Software usage

- **AF9700C/AF9723B**
  - Yes
  - Yes
  - Schedule for support

### Additional information

- **MODEL**
  - 1890A/1930/1931/1893
  - Yes
  - Yes
  - Yes

- **AF9700C/AF9723B**
  - Yes
  - Yes
  - Yes

- **SP93072308**
  - P01 (1 license): SP9307230801
  - P02 (3 licenses): SP9307230802

- **SP93070048**
  - (Integration license): SP9307004801
  - (Evaluation license): SP9307004802

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* See P7 for details on the system configuration.

* Requires either an RS-232C cable, USB cable, or LAN cable.
## FMC-16FX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Package</th>
<th>Main unit</th>
<th>ICE</th>
<th>Evaluation board</th>
<th>Part numbers</th>
<th>Flash memory writer</th>
<th>SOFTUNE V3 Professional Pack</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Made by Fujitsu</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>Made by YDC</td>
</tr>
</tbody>
</table>

**ICE**
- Requires either an RS-232C cable, USB cable, or LAN cable.
- Some writers are available as a kit. Please see the following websites for information:
  - [https://sunhayato.com/en/products/c5x/c5x-tools/](https://sunhayato.com/en/products/c5x/c5x-tools/)

**Flash memory writer**
- *Parallel writers* (2)
- *Serial writers* (2)

### Parallel writers (2)

<table>
<thead>
<tr>
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### Serial writers (2)

<table>
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<th>Made by YDC</th>
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</table>

### SOFTUNE V3 Professional Pack
- *AF9703C, AF9723B*
- *SP3607Z008-PS1* (3 licenses)
- *SP3607Z008-PS3* (3 licenses)
- *SP3607Z008-PS5* (5 licenses)
- *SP3607Z008-PS10* (10 licenses)
### New 8FX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Package</th>
<th>DIP adapter</th>
<th>ICE</th>
<th>BUO board</th>
<th>Header board</th>
<th>Evaluation chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>QFN-32</td>
<td>MB2146-06-E (includes USB cable)</td>
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<td>-</td>
<td>-</td>
<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652K</td>
<td>SDIP-24</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>QFN-32</td>
<td>MB2146-06-E (includes USB cable)</td>
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<td>-</td>
<td>(built-in on-chip debugger)</td>
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<td>MB2146H</td>
<td>MB214652H</td>
<td>SDIP-24</td>
<td>MB2146-06-E (includes USB cable)</td>
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<td>-</td>
<td>-</td>
<td>(built-in on-chip debugger)</td>
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<td>-</td>
<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>QFN-32</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
<td>-</td>
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<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>SDIP-24</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
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<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>QFN-32</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(built-in on-chip debugger)</td>
</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>SDIP-24</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
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<td>MB2146H</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>MB2146H</td>
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</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
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<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>MB2146H</td>
<td>MB214652H</td>
<td>SDIP-24</td>
<td>MB2146-06-E (includes USB cable)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(built-in on-chip debugger)</td>
</tr>
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</table>

### Flash memory writer

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Made by Flash Support Group</th>
<th>Made by Hi-Lo Systems</th>
<th>Made by Data I/O</th>
<th>Made by Fujitsu Semiconductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB2146-424A-01-E</td>
<td>-</td>
<td>ALU IC + ADP-MB9F192-BW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MB2146-424A-03-E</td>
<td>-</td>
<td>ALU IC + ADP-MB9F192-BW</td>
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<tr>
<td>MB2146-424A-05-E</td>
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<td>ALU IC + ADP-MB9F192-BW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MB2146-424A-10-E</td>
<td>-</td>
<td>ALU IC + ADP-MB9F192-BW</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Remarks

- **Starter kit** (Equipped with an MB95F264K (5V version))
  - Part number: MB2146-420A-01-E

**Development Tool**

[See the following website for information on the parallel and serial writers.](http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/)

1. When using a parallel writer, you may require adapters or other equipment in addition to the writer itself. Contact the individual writer manufacturers for details.
2. Under developing.
This is a USB evaluation kit supporting Fujitsu Semiconductor 32-bit FR80 family MB91665 series microcontrollers. This kit can run USB host and USB function application software using Fujitsu Semiconductor original USB microcontroller middleware.

The evaluation kit includes the following:
- USB middleware (sample)
- Application software (sample)
- Evaluation board
- Integrated development environment

Features
- This is an evaluation board supporting the Fujitsu Semiconductor FR family MB91590 series.
- Equipped with RF and D-sub video inputs, D-sub video output, CAN/LIN/UART I/O, LEDs, and switches (detachable).
- This board contributes to improving the development efficiency because it can perform a simplified evaluation of operations before a mounting attempt in a customer's system.

Evaluation Board for FR Family MB91590 (MB2198-751-E)

Evaluation Board for the FR Family and F²MC-16LX/FX (BBF2004)

Features
- This is an evaluation board supported by Sunhayato that supports the F²MC-16LX/FX and FR family. This makes it possible to perform simple operational testing of the MCU before embedding it into your system, contributing to increased development efficiency. This board is made up of a main board and a daughter board. By changing the daughter board, this evaluation board can be used to perform debugging using tools that incorporate an emulator debugger (ICE), to evaluate microcontrollers with built-in flash memory, and as a serial writer. The main board is common to all models, and can support different models by changing the daughter board.

Sunhayato Corporation
Sales department: TEL: +81-3-3984-7791 FAX: +81-3-3971-0535

Microcontroller Starter Kit (Jouet Bleu)

The Jouet Bleu (Blue Toy) is a microcontroller starter kit for people learning about microcontrollers and embedded systems. It can be used as an effective tool for educating students and new recruits about developing embedded software.

Features
- Microcontroller board equipped with a high-performance 16-bit microcontroller
- Software development environment
- Enables learning about microcontrollers from the basics to applications
- Notebook PCs can be used for software development

Sunhayato Corporation
Sales department: TEL: +81-3-3984-7791 FAX: +81-3-3971-0535

New 8FX MB95200 Series Starter Kit

This is a starter kit for the New 8FX MB95200 series of Fujitsu low pin count 8-bit microcontrollers. The MB95200 series starter kit includes a BGM adapter and evaluation board, and is optimal for evaluating performance and functionality and testing operation before embedding an MCU into users' system. The SOFTUNE V3 integrated development environment (evaluation version), various sample software, application notes, etc. are available on the Fujitsu Semiconductor website and can be downloaded free of charge.

The following two starter kits are available.
- Starter kit with FRAM microcontroller: MB2146-430A-01-E
- Starter kit with Flash microcontroller: MB2146-420A-01-E

FRAM microcontroller evaluation board
- This evaluation board is equipped with a FRAM microcontroller as the target MCU together with a variety of peripheral resources. The target MCU can be evaluated easily by connecting using a BGM adapter. This board is included in the FRAM Microcontroller Starter Kit (MB2146-430A-01-E).
- Equipped with an MB95R204A (8 KByte FRAM, 496 Byte RAM)
- Board functions
  - Buzzer, temperature sensor, LED, serial (RS-232C), interrupt button, LIN/UART pins, I²C, BGM adapter pins

Flash microcontroller evaluation board
- This evaluation board is equipped with a Flash microcontroller as the target MCU together with a variety of peripheral resources. The target MCU can be evaluated easily by connecting using a BGM adapter. This board is included in the Flash Microcontroller Starter Kit (MB2146-420A-01-E).
- Equipped with an MB95F264K (20 KByte Flash, 496 Byte RAM)
- Board functions
  - Buzzer, temperature sensor, LED, interrupt button, serial (RS-232C), LIN/UART pins, BGM adapter pins

FR80 MB91665 Series USB Evaluation Kit (MB91972EVB-1/MB91972EVB-2)

Features
- This is a USB evaluation kit supporting Fujitsu Semiconductor 32-bit FR80 family MB91665 series microcontrollers.
- This kit can run USB host and USB function application software using Fujitsu Semiconductor original USB microcontroller middleware.

The evaluation kit includes the following:
- USB middleware (sample)
- Application software (sample)
- Evaluation board
- Integrated development environment

Features
- Equipped with an MB95R204A (8 KByte FRAM, 496 Byte RAM)
- Board functions
  - Buzzer, temperature sensor, LED, serial (RS-232C), interrupt button, LIN/UART pins, I²C, BGM adapter pins
**Evaluation Board**

Bits pot* is a series of microcontroller boards that allows you to easily get to know, evaluate, and study microcontrollers. There is a series of five-color boards equipped with the microcontroller providing how to learn in-vehicle network technology, CAN, LIN, FlexRay and USB interface using each of the 8-, 16-, and 32-bit New 8FX/16FX/FR microcontrollers. A combination of the kits can easily construct in-vehicle networks, control USB devices in a standalone configuration, etc. Furthermore, the development environment, text books, and sample software required for developing software can all be downloaded from the website, creating a starter kit that allows you to study in-vehicle networks and USB from the basics to applications.

*“bits pot” means putting a lot of things (functions) in a small jar (board).

**Developer:** TSUZUKI DENSAN Co., Ltd.
2-5-3, Nishi-shinbashı, Minato-ku, Tokyo, 105-8420, Japan
E-mail: pd-bitspot@tsuzuki-densan.co.jp
URL: http://www.tsuzuki-densan.co.jp/bitspot/

Kit for Learning CAN communication and brushless DC motor control (bits pot red)

**CAN-MOTOR [CAN-100]**
- Microcontroller: 32bit-FR60Lite MB91F267N
- Brushless DC motor control using MOTOR driver circuit
- Motor control using temperature sensor
- Connecting with bits pot white, it controls the motor by the CAN communication.

Kit for Learning USB (bits pot black)

**USB [USB-100]**
- Microcontroller: 32bit-FR80 MB91F662
- Learn mouse function using HID class driver
- Fabricate a humidity gauge using a humidity sensor
- Learn about FRAM (ferroelectric memory)

Kit for Learning LIN communication (bits pot yellow)

**LIN [LIN-100]**
- Microcontroller: 8bit-FMC-8FX MB95F136J
- Buzzer output control using slide volume
- LED control using temperature sensor
- Connecting with bits pot white, it communicates by LIN using LIN slave sample software (supports LIN 2.0*)
  *1: Does not support config, diag, etc.

Kit for Learning CAN-LIN communication (bits pot white)

**CAN-LIN [CAL-100]**
- Microcontroller: 16bit-FMC-16FX MB96F356
- Basic function of board by SW operation (LED, 7seg, temperature sensor, and buzzer)
- Control motor and receive motor RPM and temperature sensor information using CAN communication with a bits pot red
- Connecting with bits pot yellow, it communicates by LIN using LIN master sample software (supports LIN 2.0*)
  *2: Does not support config, diag, etc.

Kit for Learning FlexRay communication (bits pot blue)

**FlexRay [FLR-100]**
- Microcontroller: 32bit-FR60 MB91F465X
- Basic function operation of FR60 MB91460 series
- Understand the FlexRay communication specifications by connecting two bits pot blue
- The bus evaluation is also possible with the FlexRay transceiver (austriamicrosystems company’s AS8211C)
- Connecting with bits pot red or blue, it communicates by CAN.

Learning CAN/LIN communication with a particular aim is also possible by combining with a bits pot white (CAN-LIN), bits pot red (CAN-Motor), or bits pot yellow (LIN), and sample programs are also available depending on the combination.

The bits pot blue (FlexRay) has two board per set, allowing you to quickly learn FlexRay, which is the next generation in vehicle network technology.
Program Writing Support

Fujitsu Semiconductor provides a support environment for writing programs that is tailored to the needs of our customers from development through to mass production and shipping. The most efficient mass production method for you can be chosen based on delivery schedules and production volumes.

- **Pre-programmed device support**
  - Programmed externally: Can be handled by a programming house
    - Can also handle small programming volumes
    - Provides pre-programmed products with short delivery times
  - Pre-programmed products: Can be programmed when shipped from the factory
    - Same shipping format as mask ROM products
    - Can handle short delivery times similar to mask ROM products

- **Programming before mounting support**
  - **Parallel writers for microcontrollers with built-in Flash**
    - New 8FX (MB9S200 ~)
    - F2MC-16LX
    - F2MC-16FX
    - FR
    - FM3
    - Supported, △: Under developing, -: Not supported

- **Onboard programming support**
  - **Serial on-board writers**
    - Supported, △: Under planning, -: Not supported

---

### The case of delivery of products that have been programmed by Fujitsu Semiconductor or an authorized agent

- **Advantage**: Large lots

### The case of products programmed by the customer

- **Advantage**: Short delivery time

---

### Pre-programmed device support

- Programmed externally: Can be handled by a programming house
  - Can also handle small programming volumes
  - Provides pre-programmed products with short delivery times
- Pre-programmed products: Can be programmed when shipped from the factory
  - Same shipping format as mask ROM products
  - Can handle short delivery times similar to mask ROM products

### Programming before mounting support

#### Parallel writers for microcontrollers with built-in Flash

<table>
<thead>
<tr>
<th>Parallel writer</th>
<th>New 8FX (MB9S200 ~)</th>
<th>F2MC-16LX</th>
<th>F2MC-16FX</th>
<th>FR</th>
<th>FM3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single unit programmers</td>
<td>AP9109C</td>
<td>-</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<tr>
<td>Gang programmers</td>
<td>AP9710</td>
<td>-</td>
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<tr>
<td>Minato Electronics Inc.</td>
<td>MODELE810XP</td>
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<tr>
<td>MODELE895-2</td>
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<td>O</td>
<td>-</td>
<td>O</td>
<td>-</td>
</tr>
<tr>
<td>MODELE893</td>
<td>-</td>
<td>O</td>
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<td>O</td>
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</tr>
<tr>
<td>MODELE891</td>
<td>-</td>
<td>O</td>
<td>-</td>
<td>O</td>
<td>-</td>
</tr>
<tr>
<td>MODELE830+SU500LX</td>
<td>-</td>
<td>O</td>
<td>-</td>
<td>O</td>
<td>-</td>
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<td>MODELE840</td>
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<td>MODELE866</td>
<td>-</td>
<td>O</td>
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<tr>
<td>Data I/O Corporation (USA) (Represented in Japan by Toyo Corporation)</td>
<td>FlashPAK II</td>
<td>O</td>
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<tr>
<td>Minato Electronics Inc.</td>
<td>MODELE810XP</td>
<td>-</td>
<td>O</td>
<td>-</td>
<td>O</td>
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<tr>
<td>MODELE895-2</td>
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<tr>
<td>MODELE893</td>
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<td>MODELE891</td>
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<td>MODELE830+SU500LX</td>
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<td>O</td>
<td>-</td>
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</tbody>
</table>

#### Sequential on-board writers

<table>
<thead>
<tr>
<th>Sequential on-board writers</th>
<th>New 8FX (MB9S200 ~)</th>
<th>F2MC-16LX</th>
<th>F2MC-16FX</th>
<th>FR</th>
<th>FM3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash USB Programmer (BGM stager: MB2416-08E must be acquired separately)</td>
<td>-</td>
<td>O</td>
<td>-</td>
<td>O</td>
<td>△</td>
</tr>
<tr>
<td>Fujitsu Semiconductor Limited</td>
<td>Flash USB Programmer (BGM stager: MB2416-08E must be acquired separately)</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Flash MCU Programmer</td>
<td>-</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Flash USB Direct Programmer</td>
<td>-</td>
<td>O</td>
<td>O</td>
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</tr>
<tr>
<td>Yokogawa Digital Computer Corporation</td>
<td>AF820/AF920</td>
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<td>O</td>
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<td>O</td>
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<tr>
<td>AF820/AF920</td>
<td>-</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>△</td>
</tr>
<tr>
<td>Flash Support Group, Inc.</td>
<td>AP9101/03</td>
<td>-</td>
<td>O</td>
<td>-</td>
<td>O</td>
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<tr>
<td>Key</td>
<td>LS-P-301</td>
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<td>O</td>
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### Onboard programming support
Fujitsu AUTOSAR Development Environment

Fujitsu Semiconductor provides an AUTOSAR compliant development environment.

About AUTOSAR

AUTOSAR (Automotive Open System Architecture) is a standardization organization established in July 2003 mainly by Daimler-Chrysler, BMW AG, Robert Bosch GmbH in order to modularize and commonize automotive software. The AUTOSAR software platform was prepared as a solution for the demands for in-vehicle system software and is being investigated by various OEM and ECU manufacturers for its application to in-vehicle software.

- Standardizing software frameworks
- Standardizing design processes
- Commonizing and modularizing application software by introducing a common runtime environment (RTE)
- Providing a microcontroller abstraction layer (MCAL) that absorbs the hardware differences and commonizes upper layer software

Scalable AUTOSAR compliant with HIS recommended specifications

The Herstellerinitiative Software (HIS) software initiative was established by five German automobile manufacturers Audi, BMW, Daimler, Porsche, and Volkswagen in order to assist with ECU related standardized manufacturers Audi, BMW, Daimler, Porsche, and Volkswagen in order to assist with ECU related standardized

- Providing a microcontroller abstraction layer (MCAL) that absorbs the hardware differences and commonizes upper layer software

System configuration example

Application Layer

AUTOSAR

AUTOSAR OS

Complex Drivers

MCAL

OS/BSW

Microcontroller

PARTS

Version Provided by Support MCU

Automotive OS

MCAL

MCAL

AUTOSAR OS

AUTOSAR Runtime Environment(RTE)

Type Software

MCU

LIN

FLEXRAY

CAN

Complex Drivers

Application Layer

Note: The MCAL configuration changes depending on target microcontrollers.

Product lineup

<table>
<thead>
<tr>
<th>PMRTS</th>
<th>Version</th>
<th>Provided by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OS/BSW</td>
<td>R2.0/2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R3.0/3.1 HIS recommended version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB91465 series (32-bit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB91500 series (32-bit)</td>
</tr>
<tr>
<td>2</td>
<td>AUTOSAR OS</td>
<td>R2.0/2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R3.0/3.1 HIS recommended version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB91465 series (32-bit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB91500 series (32-bit)</td>
</tr>
</tbody>
</table>

Types of AUTOSAR MCAL

Examples in AUTOSAR MCAL R3.0 for FMC-16FX

<table>
<thead>
<tr>
<th>Category</th>
<th>Product name</th>
<th>Model</th>
<th>Description</th>
<th>Usage period</th>
<th>Storage period</th>
<th>Area</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>License</td>
<td>Evaluation license</td>
<td>SP360802518QAC</td>
<td>Can only be used for customer’s development.</td>
<td>3 months</td>
<td>Limited countries</td>
<td>No source code</td>
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<td>Development license</td>
<td>SP360802519QAC</td>
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<td>World wide</td>
<td>No source code</td>
<td></td>
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<tr>
<td></td>
<td>Production license</td>
<td>SP360802519QAC- MB90Fxxx</td>
<td>Can only be used for customer’s mass-production integration.</td>
<td>Unlimted</td>
<td>World wide</td>
<td>Source code available</td>
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<tr>
<td></td>
<td>Basic Support Service</td>
<td>-</td>
<td>Bug support</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Limited countries</td>
<td>Included as standard with Development/Production license</td>
</tr>
<tr>
<td></td>
<td>Basic Upgrade Support Service</td>
<td>SP360802710MAC BAS</td>
<td>Extends the period of basic support (5 months)</td>
<td>6 months</td>
<td>Limited countries</td>
<td>Extends the basic support by 6 months to have the support for 12 months. Can only be purchased once.</td>
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<tr>
<td></td>
<td>Extended Support Service</td>
<td>SP360802710MAC-EXT</td>
<td>Bug support</td>
<td>12 months</td>
<td>Limited countries</td>
<td>Extends the basic support by 6 months to have the support for 12 months. Can only be purchased once.</td>
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<tr>
<td></td>
<td>Premium Support Service</td>
<td>SP360802710MAC-PRE</td>
<td>Bug support</td>
<td>24 months</td>
<td>Limited countries</td>
<td>Extends the basic support by 6 months to have the support for 12 months. Can only be purchased once.</td>
<td></td>
</tr>
</tbody>
</table>
Fujitsu Semiconductor provides a real-time OS for developing software for Fujitsu microcontrollers (FM3 family, FR family and F2MC-16 family).

### Features of the REALOS Series

- µT-Kernel specifications and µITRON specifications
- High-speed, lightweight kernel optimized for Fujitsu microcontrollers (kernel code size: from 0.8 KB, kernel data size (TCB): from 21 Bytes)
- Highly responsive interrupts
- Supports custom power-saving functions
- Includes kernel source code, royalty payments not required

### System configuration

- Kernel conforms to µT-Kernel specifications and µITRON specifications
- REALOS configurator
- REALOS-aware debugging tool
- Sample programs
- µITRON Extension (Including only µT-Kernel compliant products) *Under developing

### µT-REALOS/M3

`µT-REALOS/M3` is a real-time OS that conforms to the µT-Kernel specifications. This is the optimal kernel for FM3 to support various development environments.

### Series Lineup

#### µT-Kernel compliant OS
This OS conforms to the µT-Kernel specifications that are the successor to the µITRON specifications. µT-REALOS/FR has excellent migratability, many functions, and power-saving functionality. The kernel overhead is extremely small. This is the most advanced RTOS to conform to the µT-Kernel specifications.

#### µITRON 4.0 compliant OS
This OS conforms to the industry standard µITRON specifications. REALOS/FR Spec. 4 has many functions and simple power-saving functions. This RTOS can be used in large-scale systems that conform to µITRON 4.0.

#### µITRON 3.0 compliant OS
This OS conforms to the industry standard µITRON specifications. REALOS/FR is a compact RTOS that can be used in devices with tight resource limitations. Use this to develop products that demand tight memory size limitations and large production volumes.

#### µITRON 2.0 compliant OS
This OS conforms to the industry standard µITRON specifications. REALOS/907 is an extremely small RTOS that can be used in 16-bit devices. Use this to develop products that demand large production volumes.

### µT-Kernel compliant kernel
The µT-Kernel specifications offer excellent migratability and reusability of software among µT-Kernel specifications by strong standardization. Furthermore, the µT-Kernel specifications are compatible with the T-Kernel specifications aimed at large-scale embedded system development, allowing migration with virtually no modifications.

### High-speed, lightweight kernel
The kernel overhead is extremely small compared to earlier REALOS products. Furthermore, the memory size can be kept to a minimum depending on the functions to be used according to its unique kernel structure.

### Energy-saving function support
Customizable energy-saving functions are supported as original functions. This allows for extremely detailed energy-saving designs.

### Development environment support
The following development environments supporting FM3 are available:

- **[Development Environment]**
  - RealView Development Suite v4.0 or later
  - RealView MDK (MDK-ARM)
  - IAR EWARM
- **[JTAG Emulator]**
  - RealView ICE
  - ULINK
  - J-LINK
  - EjSCATT *Under planning

### OS-aware tool support
*Under planning
We will provide a tool equivalent to the OS-aware debugging tool that has been acquiring a favorable reputation in the earlier REALOS series.
REALOS Development Support Functions

Support tools are available for increasing the efficiency of the "REALOS" kernel, a real-time OS which conforms to the µT-Kernel specifications and µITRON specifications, and for increasing the efficiency of developing application programs that use the REALOS kernel.

- REALOS configurator
  - The REALOS configurator provides a configurator that assists in configuring conditionals when creating the REALOS kernel. The kernel can be easily reconfigured by the necessary item settings according to the configurator screens.

- REALOS-aware debugging tools
  - REALOS analyzer (for FR and FMC-16)
    - The REALOS analyzer graphically analyzes and displays the performance and task state transitions of systems that incorporate REALOS. This allows the operation of the system to be grasped visually.
      - Object display
      - OS breaks (execution break, access break, dispatch break, service call/system call break)
      - Service call/system call issued
      - Task transition diagram
      - Stack information
      - Task context watch

- C++-aware tool for FM3
  - Under planning

### List of products

<table>
<thead>
<tr>
<th>Product name</th>
<th>Version</th>
<th>Family</th>
<th>Part number</th>
<th>Component products</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFTUNE Professional Pack</td>
<td>V6</td>
<td>FR</td>
<td>SP365030118QAD (1 license)</td>
<td>Workbench C/C++ compiler Assembler pack C/C++ analyzer C/C++ checker</td>
</tr>
<tr>
<td>SOFTUNE Professional Pack</td>
<td>V3</td>
<td>FMC-16</td>
<td>SP365020D8-P01 (1 license)</td>
<td>Workbench C compiler Assembler pack C analyzer C checker</td>
</tr>
<tr>
<td>SOFTUNE Professional Pack</td>
<td>V3</td>
<td>FMC-8FX</td>
<td>SP365020D8-P01 (1 license)</td>
<td>Workbench C compiler Assembler pack C analyzer C checker</td>
</tr>
</tbody>
</table>

### System requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>IBM PC/AT or compatible</td>
</tr>
<tr>
<td>OS</td>
<td>Windows 7, Windows Vista, Windows XP</td>
</tr>
<tr>
<td>Memory</td>
<td>256 MB/byte or more (512 MB/byte or more recommended)</td>
</tr>
<tr>
<td>Hard disk</td>
<td>300 MB/byte or more (1 GB/byte or more recommended)</td>
</tr>
</tbody>
</table>
SOFTUNE™ series
(Integrated Development Environment)

SOFTUNE is an integrated development environment that was designed to respond to the various demands of program developers and pursues ease of use.

Structure of SOFTUNE

- Unification of manager section and debugger section. Errors that are found can be fixed on the spot, and the result can be debugged immediately.
- Assists in development using the C/C++ languages.
- Equipped with tools for simplifying the use of the µITRON compliant "REALOS". (Configurator and analyzer)

Manager functions

Work progresses based on a "project file" that contains all of the necessary information for developing a program.

- Utilizing projects: The development environment can be easily constructed both for the case of a single person performing multiple jobs in parallel or for a group working on a single development by using project files.
- Delivering excellent usability: Editor provided as standard. An editor is built-in as standard, offering a plethora of functions such as keyword highlighting and auto-indenting.
- Error jump and online help: Errors that occur during a build are displayed in the output window at the bottom of the screen. Jumping to the tag or displaying error details from the errors shown in this window are easily possible.
- Able to interoperate with third-party editors: In response to the demand for using familiar editors, integration with third-party editors is also possible.
- Customizable usage environment: The development environment can be customized to suit every individual such as by interoperating with source control tools when sharing files or calling file conversion tools.

Debugger Functions

Three types of debugger functions are supported that need to be used at various different stages of the development cycle. Select the optimal debugging environment to match your circumstances.

- Easy to read screen information: The screen layout can be arranged freely by selecting and positioning the required windows. Furthermore, selecting the information to display or viewing only the necessary information are also possible.
- Simple environment settings:
  - Debugging environment provides a setup wizard: The setup wizard supports settings such as selecting the emulator and board communication lines and the states of windows. The required settings can be made simply by following the on-screen directions.
  - MCU operating environment: A "CPU information file" that describes device-specific information for all models of supported MCUs is provided as standard. This allows all of the necessary information such as I/O port locations, ROM/RAM capacities, and starting addresses to be configured automatically.
  - Saving and restoring the debugging environment: The previous debugging environment settings can be saved and the same settings would be restored the next time. (Window layout, breakpoint settings, memory map information, etc.)
- On-chip debugging (F2MC-8FX family):
  - Equipped with continuous execution, stepped execution, and forced break functions
  - Software breakpoints: 256 points
  - Host interface: Connectable via USB
This section introduces the development supporting tools for developing embedded systems for the FM3 family, FR family, and F2MC family.

### Tools supporting FM3 Family (ARM Cortex-M3 core)

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Debugger</th>
<th>Overview</th>
<th>Compiler support</th>
<th>Emulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computex</td>
<td>CSIDE</td>
<td>This inherits the PARMCE idea and actualizes comfortable operations through its ease of use such as compatibility and connections without any dedicated power. In addition, this supports multicore, Serial Wire Debug (SWD) and Serial Wire Viewer (SWV) by ARM CoreSight™ technology, and Embedded Trace Macrocell (ETM).</td>
<td>IAR, KEIL, GNU, PALMCE3, J-Link</td>
<td></td>
</tr>
<tr>
<td>IAR Systems</td>
<td>EWARM</td>
<td>Embedded WorkBench for ARM is a development environment with integrated C/C++ compiler, assembler, linker, editor, and C/GPP™ debugger that allows a user to perform the full sequence of operations from creating a project to editing files, compiling, assembling, linking, and debugging applications.</td>
<td>IARz, ISO C/C++, and Extended Embedded C++</td>
<td>ArtyICE, ARM RealView ICE, J-Link, Macraigor Wiggler, and RTI based JTAG interface</td>
</tr>
<tr>
<td>KEIL Systems</td>
<td>UVISION4</td>
<td>This is an integrated software development environment for microcontrollers based on Cortex-M, Cortex-A, ARM 7, and ARM 9 that also supports the use of full-spec real-time OS and libraries for networking, file systems, and peripherals.</td>
<td>ARM, GNU AEABI-compliant, ULINK2, ULINKpro, J-Link</td>
<td></td>
</tr>
</tbody>
</table>
| Yokogawa Digital Computer Corporation | microVIEW PLUS | - High-performance JTAG tool  
- High-speed JTAG communication  
- Improved download speeds  
- Advanced JTAG clock setting is available.  
- Hot-plug support  
- Capability of connecting to a target without dropping the target's power supply  
- SVW/SWD support  
- Multicore support  
- Completes implements multicore debugging (ARM environments and SMP environments)  
- Supports up to 8 cores  
- OS-platform support  
- Original OS also supported  
- Debugger: microVIEW-PLUS  
- Original debugger that completely controls leading edge advice product functions.  
- Sophisticated GUI improves the debugging efficiency.  
- User-friendly interface and variety of functions significantly improve the complex debugging operations.  
- Simple operation  
- Effective monitoring  
- Customizable GUI  
Your preferred debug window can be defined over a TCL link library. | RVDS, IAR, KEIL, GNU | advical,ULINK |

### Tools supporting FR Family and F2MC Family (Fujitsu original core)

#### Integrated Development Environments

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
</table>
| SOFTUNE      | An integrated development environment that is user friendly and highly-efficient.  
- Integrate language tools and debugger tools that increase the efficiency of the work cycle of coding, compiling, and debugging.  
- Frees users from the hassles of configuring settings when developing a program.  
- Interoperates with a variety of tools, supporting seamless development with SOFTUNE. | Fujitsu Semiconductor Limited  
| MULTIS.0     | MULTI 5.0 is an integrated development environment that supports each of the phases in the process of system development. It consists of a compiler, builder, editor, debugger, etc. and is GUI based, focusing on ease of use. This provides a total solution that increases the reliability, safety, and performance of developed products and contributes to shortening development times and reducing development costs through various functions and new technologies such as the DoubleCheck static source code analysis tool and TimeMachine dynamic analysis tool. | Advanced Data Controls Corp.  
TEL: +81-3-3576-5351  
http://www.adac.co.jp/ |
### Real-Time Operating System

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- In can be used for a broad range of development, from products with tight resource limitations to large-scale systems.</td>
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<td></td>
<td>- An analyzer is included as a debugging support tool.</td>
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<td></td>
<td>- The kernel overhead is extremely small, making it optimal for products that demand power-saving functionality and real-time performance.</td>
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<tr>
<td></td>
<td>- An analyzer is included as a debugging support tool.</td>
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<tr>
<td><strong>osCAN</strong></td>
<td>EB, which is a full member of JASPAR that is working to standardize electronic control unit (ECU) software evaluation work and vehicle-mounted LAN interface ratings, provides the EB treos ECU development tool for AUTOSAR compliant vehicle-mounted products. EB treos AutoCons/AUTOSAR compliant middleware (BSW and RTE)</td>
<td>Elektrobit Nippon K.K. TEL.: +81-3-5775-6160 <a href="http://www.elektrobit.com/">http://www.elektrobit.com/</a></td>
</tr>
<tr>
<td></td>
<td>Graphical user interface for EB treos Studio and embedded software configuration Real-time OS for AUTOSAR compliant real-time OS</td>
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<tr>
<td><strong>MICROSAR product group (AUTOSAR embedded software product)</strong></td>
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<tr>
<td></td>
<td>Conformance:</td>
<td></td>
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<td></td>
<td>- MICROSR RTE: AUTOSAR RTE</td>
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<tr>
<td></td>
<td>- MICROSR BSW: AUTOSAR Basic Software</td>
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<tr>
<td></td>
<td>- MICROSR Configuration Suite: MICROSR EAD: AUTOSAR BSW configurator set</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Features:</td>
<td></td>
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<tr>
<td></td>
<td>- Strong experience and track record with previous CANbaddied and osCAN products</td>
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<tr>
<td></td>
<td>- Full BSW supporting AUTOSAR specification release 3.0</td>
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<td></td>
<td>- Covers applications from development to ECU implementation in concert with the DaVinci Tool Suite (from prototypes and evaluation units to mass production products)</td>
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<td></td>
<td>- Can be configured in combination with MCAL from other manufacturers or EAD</td>
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<td></td>
<td>- Full featured technical service and training, assistance migrating to AUTOSAR, etc.</td>
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<tr>
<td><strong>JPEG library</strong></td>
<td>This is middleware that performs compression and decompression (non-reversible) of image data in compliance with the DCT method baseline and process from the JPEG standards.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jg.fujitsu.com/en/">http://jg.fujitsu.com/en/</a></td>
</tr>
<tr>
<td><strong>KASAGO (TCP/IP stack)</strong></td>
<td>This is a TCP/IP protocol stack (supports IPv4/IPv6 dual stacks) specialized for embedded systems. Focuses on compactness and fast responsiveness to deliver efficient communication.</td>
<td>Zuken Elmic, Inc. TEL.: +81-45-664-5171 <a href="http://www.elec.co.jp/">http://www.elec.co.jp/</a></td>
</tr>
<tr>
<td><strong>CANdriver</strong></td>
<td>Provides a hardware independent interface to the upper level software layer, making it possible to use and reuse components without regard to the hardware platform parameters. Parameters for initializing the hardware can be configured in advance using a settings/generation tool</td>
<td>Vector Japan Co., Ltd. TEL.: +81-3-5769-6972 (Embedded software department) <a href="http://www.vectorJapan.co.jp/">http://www.vectorJapan.co.jp/</a></td>
</tr>
<tr>
<td><strong>LINdriver</strong></td>
<td>Satisfies all requirements of the current LIN specifications (supports LIN 1.2/1.3 and LIN 2.0)</td>
<td>Vector Japan Co., Ltd. TEL.: +81-3-5769-6972 (Embedded software department) <a href="http://www.vectorJapan.co.jp/">http://www.vectorJapan.co.jp/</a></td>
</tr>
<tr>
<td><strong>KPT AUTOSAR BSW Package</strong></td>
<td>This software package consists of BSW (basic software) for the hardware-independent layer optimized for “F'MC-16FX family” and the ECU Spectrum integrated tool for generating ECU configuration and RTE (AUTOSAR Runtime Environment). Features of this software package include the code size optimization for 16-bit microcontrollers with small ROM sizes, and it allows AUTOSAR to be introduced even on ECU with small configurations regardless of ROM sizes.</td>
<td>KPT Cummins Infosystems Limited TEL.: +81-3-6913-6501 <a href="http://www.kptcummins.com/japanese/index.html">http://www.kptcummins.com/japanese/index.html</a></td>
</tr>
</tbody>
</table>

### Middleware

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REL</strong></td>
<td>- This is a data compression and decompression library. It can be incorporated into devices using microcontrollers.</td>
<td>Fujitsu Electronics Inc. <a href="http://jg.fujitsu.com/en/">http://jg.fujitsu.com/en/</a></td>
</tr>
<tr>
<td></td>
<td>- Useful for reducing data transfer time and packet communication time.</td>
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<tr>
<td></td>
<td>- Useful for efficient usage of flash memory and write time reduction.</td>
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<td></td>
<td>- Employs a Fujitsu Laboratories' lossless data compression method that is secure in terms of compression patents.</td>
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<td></td>
<td>- The decompression function is also available as a hardware macro.</td>
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<td></td>
<td>- Because the embedded device and PC data are managed in the same files and directories, it is easy to pass data between PCs and embedded devices.</td>
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<td></td>
<td>- Supports exFAT, which is employed in the &quot;SDXC&quot; the large capacity SD card standards.</td>
<td></td>
</tr>
<tr>
<td><strong>Cryptography and security library</strong></td>
<td>Library for encryption (AES ECB/CBC, AES CTR, DES, 3DES, RSA, RSA-OAEP), hash functions (SHA-1, SHA-2, MD5), message authentication (HMAC SHA-1, HMAC MD5, AES CMAC), digital signatures (DSA, ECDSA, RSA-PSS, PKCS#1v1.5), pseudo random number generation (FIPS186-2 Appendix 3.1.1), key exchange (DH, ECDH), and modular exponentiation arithmetic.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jg.fujitsu.com/en/">http://jg.fujitsu.com/en/</a></td>
</tr>
<tr>
<td><strong>JPEG library</strong></td>
<td>This is middleware that performs compression and decompression (non-reversible) of image data in compliance with the DCT method baseline and process from the JPEG standards.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jg.fujitsu.com/en/">http://jg.fujitsu.com/en/</a></td>
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<td>Zuken Elmic, Inc. TEL.: +81-45-664-5171 <a href="http://www.elec.co.jp/">http://www.elec.co.jp/</a></td>
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<td>Vector Japan Co., Ltd. TEL.: +81-3-5769-6972 (Embedded software department) <a href="http://www.vectorJapan.co.jp/">http://www.vectorJapan.co.jp/</a></td>
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<tr>
<td><strong>LINdriver</strong></td>
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<td>Vector Japan Co., Ltd. TEL.: +81-3-5769-6972 (Embedded software department) <a href="http://www.vectorJapan.co.jp/">http://www.vectorJapan.co.jp/</a></td>
</tr>
</tbody>
</table>

**Support hardware**

- **32 bit**
- **16 bit**
- **8 bit**

**Support software**

- **Development software**
- **Development environment**
Analysis Tools

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGRelief</td>
<td>This is a static analysis tool for identifying bugs in C/C++ source code.</td>
<td>Fujitsu Software Technologies Limited TEL: +81-45-475-5600 <a href="http://pg.fujitsu.com">http://pg.fujitsu.com</a></td>
</tr>
<tr>
<td>QAC/MCM</td>
<td>QAC is a static analysis tool for C source code that is used to improve the quality of software. MCM is an optional product for QAC that can evaluate conformance with MISRA C coding standards. QAC/MCM integrates with SOFTUNE make/build to check violations of standards, etc.</td>
<td>Toyo Corporation Software Solutions TEL: +81-3-3245-1248 <a href="http://www.toyo.co.jp">http://www.toyo.co.jp</a></td>
</tr>
</tbody>
</table>

CASE Tools

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Rational Rose Technical Developer</td>
<td>Supports the most powerful model-driven development, such as executing models and generating completely executable code. This allows developers of specialist systems and embedded systems to also realize a high level of productivity.</td>
<td>IBM Corporation <a href="http://www-01.ibm.com/software/awdtools/technical/">http://www-01.ibm.com/software/awdtools/technical/</a></td>
</tr>
<tr>
<td>IBM Rational Test RealTime™</td>
<td>This is a cross-platform solution for component testing and runtime analysis. In particular, this is for developers writing code for embedded, real-time, and other types of cross-platform software products.</td>
<td>IBM Corporation <a href="http://www-01.ibm.com/software/awdtools/test/realtime/index.html">http://www-01.ibm.com/software/awdtools/test/realtime/index.html</a></td>
</tr>
<tr>
<td>Telelogic Statemate</td>
<td>Statemate is a graphical modeling toolset for system engineers. This offers powerful support for the upper development processes by functions for graphically modeling request specifications, detailed specifications, and function specifications.</td>
<td>Ichiu Techno-Solutions Corporation TEL: +81-3-6417-6434 <a href="http://www.ctc-g.co.jp/solutions/embedded/index.html">http://www.ctc-g.co.jp/solutions/embedded/index.html</a></td>
</tr>
<tr>
<td>visual STATE</td>
<td>- This is a tool for designing using state charts, generating code, testing, and creating documents for embedded applications. - Enables simple design under the concept of drawing a sketch, and reduces design man-hours - Errors detected in design upper phase using powerful formal verification tool - Improved quality by automated tests and coverage analysis - Price half that of equivalent products</td>
<td>IAR Systems TEL: +81-3-5298-4800 <a href="http://www.iarsys.co.jp/">http://www.iarsys.co.jp/</a></td>
</tr>
</tbody>
</table>

Analysis Tools

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATLAB®/Simulink®</td>
<td>MATLAB provides functions and analysis environment for efficiently developing scientific calculation programs. Simulink is a simulation environment for efficiently designing and verifying real-time systems that runs in MATLAB. Algorithms designed based on models using Simulink can be automatically converted into C code for embedded systems using Real-Time Workshop Embedded Coder. MATLAB/Simulink can perform advance evaluation of C code for embedded systems using PIL simulation by interoperating with the SOFTUNE debugger.</td>
<td>MathWorks Japan TEL: +81-3-6337-6700 <a href="http://www.mathworks.co.jp/">http://www.mathworks.co.jp/</a></td>
</tr>
<tr>
<td>ZIPC</td>
<td>- This is a CASE tool that uses extended hierarchical state transition chart design methods. - C source is automatically generated from the state transition chart. - Supports REALOS system calls. - Offers debugging using state transition charts integrated with SOFTUNE.</td>
<td>CATS Co. Ltd. TEL: +81-45-473-2816 <a href="http://www.zipc.com/">http://www.zipc.com/</a></td>
</tr>
<tr>
<td>SystemDesk</td>
<td>- Designs AUTOSAR compliant software components and graphically models hardware independent software architectures. - Automatically generates the AUTOSAR definition file, and interoperates with the TargetLink automatic code generation tool to create RUNNABLE. - Configuring the network between ECU and assigning functions to multiple ECU can be easily performed using this tool, and the AUTOSAR runtime environment is automatically generated for each ECU. - Interoperates with BSW tools such as Treesa (EB) to create production SW packages.</td>
<td>dSPACE Japan TEL: +81-3-5798-5460 <a href="http://www.dspace.jp/">http://www.dspace.jp/</a></td>
</tr>
<tr>
<td>TargetLink</td>
<td>- Directly generates C code for mass production from MATLAB/Simulink/Stateflow. - Generates ANSI C code efficiently that is suitable for the code developed by an actual programmer. - Embedded simulation and test environment that uses an actual processor. - Further optimized for the processor. - Can generate AUTOSAR compliant code</td>
<td>dSPACE Japan TEL: +81-3-5798-5460 <a href="http://www.dspace.jp/">http://www.dspace.jp/</a></td>
</tr>
</tbody>
</table>

* IBM, Rational, Rational Rose, and Rational TestRose are trademarks of IBM Corporation USA in the USA and other countries.
## Verification Tools

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
</table>
| CANoe        | CANoe is an all-round tool for developing, testing, and analyzing networks and ECU, and supports users throughout the entire development process.  
- Capable of network-wide simulation and analysis using simulation nodes created using CAPL.NET or models created using MATLAB/Simulink  
- Features:
  - Able to simplify the operation by user control panel  
  - The test function covers from ECU testing to automatic report creation  
  - Supports CAN, LIN, MOST, and FlexRay | Vector Japan Co., Ltd.  
TEL: +81-3-5769-6971  
(Development tool department)  
http://www.vector-japan.co.jp/ |
| CANalyzer    | CANalyzer is a general-purpose analysis tool for distributed network systems that make it possible to easily monitor, analyze, and send messages on a network.  
- Features:
  - Simplifies testing using the user display panel  
  - Capable of performing various tests of bus data, and displaying in a window or recording in a log file  
  - Capable of evaluation by offline playback using log files  
  - Sending and evaluation of messages using the programming function using CAPL  
  - Supports CAN, LIN, MOST, and FlexRay | Vector Japan Co., Ltd.  
TEL: +81-3-5769-6971  
(Development tool department)  
http://www.vector-japan.co.jp/ |
| CANape       | CANape is software that provides a complete development environment for measurement, compliance, and diagnosis.  
- Features:
  - Capable not only of measurement, compliance, and diagnosis of the memory built into an ECU, but is also able to measure and output vehicle-mounted networks such as CAN, LIN, and FlexRay as well as measure analog, GPS, audio, and video, and therefore supports various hardware  
  - Capable of evaluating and printing measurement data after measurement, and managing compliance data after compliance | Vector Japan Co., Ltd.  
TEL: +81-3-5769-6984  
(Compliance tool department)  
http://www.vector-japan.co.jp/ |
| RAMScope     | RAMScope is a unit for extracting in real-time the data from built-in RAM using debugging interfaces such as NBD, AUD, RTD, NEXUS that are incorporated in vehicle-mounted MCUs. Because the extracted RAM data is saved directly into PC memory, a large amount of data can be accumulated, making it easy to analyze the operation of a control application.  
- Features:
  - Capable of monitoring RAM without stopping operation right from the microcontroller start-up  
  - Communication program to monitor RAM not needed  
  - Almost no effect on microcontroller operation  
  - Capable of monitoring RAM synchronized to the microcontroller control cycle (scanstart function)  
  - Capable of tuning (overwriting) RAM  
  - 10μs/1ch high frequency monitor (differs between microcontrollers)  
  - Maximum 128ch/1ms sampling performance (can support 1024ch by special order)  
  - When used with CAN: 100ch/1ms + CAN: 64Bytes/1ms  
  - Saves logs with CAN and RAM on the same time axis (GT110)  
  - The target and RAMScope main unit are electrically isolated  
  - Synchronization of RAM values and external data by additional A/D and D/A units | Yokogawa Digital Computer Corporation  
TEL: +81-422-52-5698  
(Instrument business vehicle instrument center)  
http://www.yokogawa-digital.com/ |