Fujitsu Semiconductor Microcontroller Development Environments

Flow of Development “V-model”

- Request/requirement
- Define requirements
- Design
- Detailed design
- Implementation
- Coding/compile
- High performance debugger
- Integration testing
- Testing
- On-chip debugger
- Unit testing
- Tuning
- Compliance testing
- System testing
- Mass production

Support hardware
- Development System
  - (32-bit Microcontroller MB95200 series)
  - (32-bit Microcontroller MB95100 series)
- Development Tools
  - (32-bit Microcontroller)
  - (16-bit Microcontroller)
  - (8-bit Microcontroller MB95200 series)
- Program Writing Support
- Evaluation Boards
- Development System (32-bit Microcontroller)
- Development System (16-bit Microcontroller)
- Development System (8-bit Microcontroller)

Support software
- REALOS
  - Features of the REALOS Series
- SOFTUNE µT-REALOS/FR
- SOFTUNE
  - Configuration/Functions
  - List of products/List of functions
- Development support tool
  - Integrated Development Environments
  - Real-time Operating Systems
  - Middleware
  - Analysis Tools
  - CASE Tools
  - Verification Tools
Development System (hardware tools)

Fujitsu Semiconductor provides development tools such as emulators and adapters for developing software for the FR family and F’MC family.

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 the 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 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

F’MC-8FX Family 8-bit Microcontroller MB95200 Series

- Features of the MB2146-08-B (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

- MB2100-01-E
  - 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

- MB2146-08-E
  - Communication speed maximum 50Mbps
  - Single-wire coaxial connection (maximum 10m)
  - Built-in debugging circuit
  - Run to Break
  - Event setting
  - Trace (instruction & data)
  - Dedicated DMA for debugging
  - Memory access

- Communication speed maximum 50Mbps
- Single-wire coaxial connection (maximum 10m)
- Built-in debugging circuit
- Run to Break
- Event setting
- Trace (instruction & data)
- Dedicated DMA for debugging
- Memory access
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 devices. 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 4096, 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

**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 devices. 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 high-speeds: 33MHz
- Supports microcontroller operating voltages of +2.7V to +5.5V
- Emulator memory (1M x 4 areas)
- Source-level debugging (assembler, C, mixed display)
- 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 execution time between 2 points, measure elapsed cycles)
- Code coverage measurement function (measures program execution coverage)
- Host Interface: Equipped standard with RS-232C (max. 115kbps), LAN (10BASE-T, 100BASE-TX), and USB1.1

#### F'MC-8FX Family 8-bit Microcontroller MB95100 Series
- Supports microcontroller operating voltages of +2.7V to +5.5V
- Emulator memory 1M x 4 areas
- Source-level debugging (assembler, C, mixed display)
- 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 execution time between 2 points, measure elapsed cycles)
- Code 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

- Personal computer
- Emulator debugging software
- Host Interface: USB

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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>Series</th>
<th>Main unit*1</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>
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<tbody>
<tr>
<td>MB2510</td>
<td>MB2198-01-D</td>
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### Flash memory writer

<table>
<thead>
<tr>
<th>Parallel writer*2</th>
<th>Serial writer*3</th>
<th>SOFTUNE V6 professional pack</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>MODEL 1940</td>
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</tbody>
</table>

### Support hardware

- ROM replacement unit:MB2197-90

### Support software

- Development support tool

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1. Requires either an RS-232C cable, USB cable, or LAN cable.

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- SOFTUNE REALOS/FR (μITRON 3.0) -SP365030118QBC (evaluation license)
- SP365001518RCC (integration license) -SP3650P1218RCC (μT-Kernel)
- SP365000218RCC (evaluation license) -SOFTUNE REALOS/FR (μITRON 3.0)
- SP3650P1218EVC (integration license)
- SP3650P1218RCC (μT-Kernel)
- SP365030118QDC (10 licenses)
- SP365030118QDC (5 licenses)
- SP365030118QDC (3 licenses)
- SP365030118QDC (1 license)
- SP36500218RCC (evaluation license) -SOFTUNE REALOS/FR (μITRON 3.0)
- SP365001518RCC (integration license) -SP3650P1218RCC (μT-Kernel)
- SP365000218RCC (evaluation license) -SOFTUNE REALOS/FR (μITRON 3.0)
- SP3650P1218EVC (integration license)
- SP3650P1218RCC (μT-Kernel)
- SP365000218RCC (evaluation license) -SOFTUNE REALOS/FR (μITRON 3.0)
- SP365001518RCC (integration license) -SP3650P1218RCC (μT-Kernel)
- SP365000218RCC (evaluation license) -SOFTUNE REALOS/FR (μITRON 3.0)
## Development Tool

### FR Family Development Tool Lineup

<table>
<thead>
<tr>
<th>FR Family Development Tool Lineup</th>
<th>I/O</th>
<th>ICE</th>
<th>Evaluation board</th>
<th>Main board</th>
<th>Daughter board</th>
<th>Main unit</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>
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### Flash Memory Writer

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Flash memory writer type</th>
<th>Support hardware</th>
<th>Support software</th>
<th>Development support tool</th>
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<tbody>
<tr>
<td>Fujitsu</td>
<td>Parallel writers*2</td>
<td>Supports GHS</td>
<td>Spec.4 (μITRON4.0)</td>
<td>Power-on debugging adapter board: MB2198-169</td>
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<td></td>
<td>Serial writers*3</td>
<td>Supports GHS</td>
<td>SOFTUNE REALOS/FR</td>
<td>Power-on debugging adapter board: MB2198-169</td>
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<td>SP365000218RCC</td>
<td>Power-on debugging adapter board: MB2198-169</td>
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<td>SP365000218RCC</td>
<td>Power-on debugging adapter board: MB2198-169</td>
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<tr>
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<td></td>
<td></td>
<td>SP365000218RCC</td>
<td>Power-on debugging adapter board: MB2198-169</td>
</tr>
</tbody>
</table>

### Remarks


### Notes

- Supports GHS: Supports GHS means the board supports the GHS (Gigabit High-Speed) interface.

- Power-on debugging adapter board: MB2198-169

- Support software: SOFTUNE REALOS/FR

- Parallel writers: Supports parallel writers SP3650000218RCC (integration license) SP3650000218RCC (evaluation license)

- Serial writers: Supports serial writers SP3650000218RCC (integration license) SP3650000218RCC (evaluation license)

- Development support tool: SOFTUNE REALOS/FR

- Remarks:
  - SOFTUNE REALOS/FR: SOFTUNE REALOS/FR (μITRON4.0) (evaluation license)
  - Power-on debugging adapter board: MB2198-169

### Additional Information

- Model: MB2198-100A

- Model: MB2198-100A

- Model: MB2198-100A

- Model: MB2198-100A

- Model: MB2198-100A

- Model: MB2198-100A

- Model: MB2198-100A

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- Model: MB2198-100A

- Model: MB2198-100A
Development Tool

**FMC-16LX Family Development Tool Lineup**

<table>
<thead>
<tr>
<th>Series</th>
<th>Package</th>
<th>ICE</th>
<th>Minimum*1</th>
<th>Adapter board</th>
<th>Probe cable</th>
<th>Evaluation chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB82335A</td>
<td>LQFP-120P (0.4mm,14x14mm)</td>
<td>MB2147-01-E</td>
<td>MB2132-491 (Includes one set: HQPACK1030SE, HQPACK1030SS)</td>
<td>MB2147-01-E</td>
<td>MB2132-491 (Includes one set: HQPACK1030SE, HQPACK1030SS)</td>
<td>MB2147-01-E</td>
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<tr>
<td></td>
<td>FPT-120P-M24</td>
<td>MB2147-02-E</td>
<td>MB2132-492 (Includes one set: HQPACK1030SD, HQPACK1030SS)</td>
<td>MB2147-02-E</td>
<td>MB2132-492 (Includes one set: HQPACK1030SD, HQPACK1030SS)</td>
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<td>MB82335B</td>
<td>LQFP-120P (0.5mm,15x15mm)</td>
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<td>MB2132-493 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
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<td>MB2132-493 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
<td>MB2147-01-E</td>
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<td>FPT-120P-M23</td>
<td>MB2147-02-E</td>
<td>MB2132-494 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
<td>MB2147-02-E</td>
<td>MB2132-494 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
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<td>MB82340E</td>
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<td>MB82350E</td>
<td>LQFP-100P (0.5mm,10x10mm)</td>
<td>MB2147-01-E</td>
<td>MB2132-501 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
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<td>MB2132-501 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
<td>MB2147-01-E</td>
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<td>MB82360E</td>
<td>QFP-80P (0.65mm,12x12mm)</td>
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<td>MB2132-503 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
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<td>MB82370E</td>
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<td>MB2147-01-E</td>
<td>MB2132-505 (Includes one set: HQPACK1024SB, HQPACK1024SS)</td>
<td>MB2147-01-E</td>
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<td>FPT-80P-M22</td>
<td>MB2147-02-E</td>
<td>MB2132-506 (Includes one set: HQPACK1024SD, HQPACK1024SS)</td>
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<td>MB2132-506 (Includes one set: HQPACK1024SD, HQPACK1024SS)</td>
<td>MB2147-02-E</td>
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</tbody>
</table>

*1: 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.

**System configuration**

- **Series Package**
  - **ICE Evaluation board**
  - **Flash memory writer**
  - **SOFTUNE V3**
  - **REALOS/907**

**Configuration**

- **13 MB90330A LQFP-120P (0.4mm,14x14mm)**
  - MB2147-01-E
  - MB2147-02-E
  - MB2132-491 (Includes one set: HQPACK1030SE, HQPACK1030SS)
  - MB2132-492 (Includes one set: HQPACK1030SD, HQPACK1030SS)
  - MB2132-493 (Includes one set: HQPACK1024SB, HQPACK1024SS)
  - MB2132-494 (Includes one set: HQPACK1024SD, HQPACK1024SS)
  - MB2147-01-E
  - MB2147-02-E
  - MB2132-491 (Includes one set: HQPACK1030SE, HQPACK1030SS)
  - MB2132-492 (Includes one set: HQPACK1030SD, HQPACK1030SS)
  - MB2132-493 (Includes one set: HQPACK1024SB, HQPACK1024SS)
  - MB2132-494 (Includes one set: HQPACK1024SD, HQPACK1024SS)
  - MB2147-01-E
  - MB2147-02-E
  - MB2132-491 (Includes one set: HQPACK1030SE, HQPACK1030SS)
  - MB2132-492 (Includes one set: HQPACK1030SD, HQPACK1030SS)
  - MB2132-493 (Includes one set: HQPACK1024SB, HQPACK1024SS)
  - MB2132-494 (Includes one set: HQPACK1024SD, HQPACK1024SS)

**Development Tool**
## FMC-16LX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Series</th>
<th>Package</th>
<th>Minimum</th>
<th>Adapter board</th>
<th>Probe cable</th>
<th>Evaluation chip</th>
<th>ICE</th>
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<tbody>
<tr>
<td></td>
<td>WB3101</td>
<td>LQFP-102P (5.0mm x 14mm)</td>
<td>WB2147-1</td>
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### Evaluation board

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<tr>
<th></th>
<th>Main board</th>
<th>Daughter board</th>
<th>Portable memory writer</th>
<th>Made by YDC</th>
<th>Made by Minato Electronics</th>
<th>Made by Fujitsu Support software</th>
<th>Made by Tran Software Support hardware</th>
<th>Made by Tran Software Support hardware</th>
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<tbody>
<tr>
<td>MB23040-4S</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*1: 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.*
Development Tool

### FMC-16FX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Package</th>
<th>Main unit 1</th>
<th>Evaluation chip</th>
<th>Main board</th>
<th>Daughter board</th>
</tr>
</thead>
</table>

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.

**Supported writers:**
- Made by Fujitsu
- Made by Flash Support Group
- Made by Hi-Lo Systems
- Made by Data I/O
- Made by Semitronic

**Flash memory writer:**
- Made by SOFTUNE V3 professional pack

**Notes:**
- *NQPACKs are used for connecting to each header board. Care is required when designing the foot patterns of printer circuit boards because the dimensions of the foot patterns of the NQPACKs are slightly different from the mass production packages.
- *Inquire about the parallel and serial writers in advance. Visit the following website for more information:
- 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-8FX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Package</th>
<th>Main unit 1</th>
<th>Evaluation chip</th>
<th>Main board</th>
<th>Daughter board</th>
</tr>
</thead>
</table>

**Supported writers:**
- Made by Flash Support Group
- Made by Hi-Lo Systems
- Made by Data I/O
- Made by Fujitsu

**Flash memory writer:**
- Made by SOFTUNE V3 professional pack

**Notes:**
- Starter kit (32 versions): MB2146-401-03A
- Starter kit (16 versions): MB2146-401-01A
- Starter kit (8 versions): MB2146-401-00A

For inquiries, contact Tokyo Eletech Corporation:
TEL: +81-3-5295-1661
FAX: +81-3-5295-1663
# Development Tool

## FMC-8FX Family Development Tool Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Package</th>
<th>BGM adapter</th>
<th>MCU board</th>
<th>ICE</th>
<th>Evaluation chip</th>
</tr>
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<tbody>
<tr>
<td>MB91512M</td>
<td>MB91512LB/12LB/12LB/12LB/12LB/12LB/12LB/12LB/12LB/12LB</td>
<td>LQFP-100P (1.27mm, 10×10mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
<tr>
<td>MB91516M</td>
<td>MB91516LB/16LB/16LB/16LB/16LB/16LB/16LB/16LB/16LB/16LB</td>
<td>LQFP-100P (1.27mm, 10×10mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
<tr>
<td>MB915144</td>
<td>MB915144</td>
<td>LQFP-32P (1.27mm, 10×10mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
<tr>
<td>MB91510M</td>
<td>MB91510M</td>
<td>LQFP-64P (1.27mm, 15×15mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
<tr>
<td>MB91510D</td>
<td>MB91510D</td>
<td>LQFP-64P (1.27mm, 15×15mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
<tr>
<td>MB91516MA</td>
<td>MB91516MA</td>
<td>LQFP-64P (1.27mm, 15×15mm)</td>
<td>MB2146-01A</td>
<td>MB2146-01A-E</td>
<td>MB2146-220</td>
<td>MB2146-310</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Flash memory writer</th>
<th>Parallel writer*2</th>
<th>Serial writer*2</th>
<th>SOFT/HINE V3</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made by Flash Support Group</td>
<td>Made by Hi-Lo Systems</td>
<td>Made by Data I/O</td>
<td>Made by Fujitsu Semiconductor</td>
<td>Professional pack</td>
<td></td>
</tr>
<tr>
<td>MB2146-401</td>
<td>MB2146-401</td>
<td>MB2146-401-E</td>
<td>MB2146-401-E</td>
<td>MB2146-401-E</td>
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<tr>
<td>MB2146-420</td>
<td>MB2146-420</td>
<td>MB2146-420-E</td>
<td>MB2146-420-E</td>
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<td>Yes</td>
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<tr>
<td>MB2146-430</td>
<td>MB2146-430</td>
<td>MB2146-430-E</td>
<td>MB2146-430-E</td>
<td>MB2146-430-E</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*1: NOCPACKs are used for connecting to each header board. Care is required when designing the foot patterns of printed circuit boards because the dimensions of the foot patterns of the NOCPACKs are slightly different from those of the mass production packages.

*2: Support hardware.

*3: Under development.

For inquiries, contact TEL: +81-3-5295-1691 FAX: +81-3-5295-1693

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* See the following website for information on parallel and serial writers: http://www.fujitsu.com/microelectronics/products/mcu/matchwriter/ 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.

* Under development.
Evaluation Board

Fujitsu Semiconductor provides evaluation boards for developing embedded systems equipped with an FR family F²MC.

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

**Features**
- This is an evaluation board manufactured by Sunhayato that supports the FMC-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

### Evaluation Board for the F²MC-8FX (MB95100) Series (MB2146-401)

**Features**
- This evaluation board supports the Fujitsu F²MC-8FX MB95100 series. This makes it possible to perform simple operational testing of the MCU before embedding it into your system, contributing to increased development efficiency. This evaluation board can be used to perform debugging using tools that incorporate an emulator debugger (ICE). This board can be used as a common evaluation board that supports each model of the F²MC-8FX MB95100 series.

### 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

### F²MC-8FX MB95200 Series Starter Kit

This is a starter kit for the F²MC-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: MB2146-430-01-E
- Starter kit with Flash microcontroller: MB2146-410-01-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 (MB2146-430-01-E).
  - Equipped with an MB95FR203 (8 KByte FRAM, 496 Byte RAM)
  - Board functions
    - Buzzer, temperature sensor, LED, 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 (MB2146-410-01-E).
  - Equipped with an MB95F204K (16 KByte Flash, 496 Byte RAM)
  - Board functions
    - Buzzer, temperature sensor, LED, interrupt button, serial (RS-232C), LIN/_UART pins, I²C, BGM adapter pins

Sunhayato Corporation
Sales department: TEL : +81-3-3984-7791  FAX : +81-3-3971-0535
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 I/F using each of the 8-, 16-, and 32-bit F2MC-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-shinbashi, 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-FR80Lite 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-F2MC-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-F2MC-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] Note: One set consists of two boards.
- 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 AS8212C).
- Connecting with bits pot red or blue, it communicates by CAN.

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).

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 mass production and shipping. The most efficient mass production method for you can be chosen based on delivery schedules and production volumes.

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

[Request for pre-programmed products]

Advantage: Large lots

The case of products programmed by the customer

[Request for programming prior to mounting]

Advantage: Short delivery time

[Request for on-board programming]

Advantages: Short delivery times, high maintainability

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>FMC-8FX</th>
<th>FMC-16LX</th>
<th>FMC-16FX</th>
<th>FR family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Support Group, Inc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single unit programmers</td>
<td>AF9709C</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Gang programmers</td>
<td>AF9710</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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<tr>
<td></td>
<td>AF9723B</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Minato Electronics Inc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single unit programmers</td>
<td>MODELE181XPA</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Gang programmers</td>
<td>MODELE1853</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
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<td>MODELE1891</td>
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<td>MODELE1940</td>
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<td>MODELE1954</td>
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<td></td>
<td>MODELE1956</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</table>

Data I/O Corporation (USA)*

| Single unit programmers | MODEL1897X | Yes | Yes | Yes |
| Gang programmers | MODEL1898X | Yes | Yes | Yes |

Onboard programming support

Serial on-board writers

<table>
<thead>
<tr>
<th>Serial on-board writers</th>
<th>FMC-8FX</th>
<th>FMC-16LX</th>
<th>FMC-16FX</th>
<th>FR family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fujitsu Semiconductor Limited</td>
<td>Flash USB Programmer (BGA adapter: MB2146-09A-E must be acquired separately)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td></td>
<td>Flash MCU Programmer</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Yokogawa Digital Computer Corporation</td>
<td>AF/P20/A320</td>
<td>Yes</td>
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<td>Yes</td>
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<td></td>
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<td>AF/P20/A400</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Flash Support Group, Inc.</td>
<td>AF9101/03</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Data I/O Corporation (USA) (Represented in Japan by Toyo Corporation)
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 (refer to P31)
- REALOS analyzer (refer to P31)
- Sample programs
- µITRON specification compatible API (under development)

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.

FR family

- Standard
- µT-REALOS/FR
- µT-Kernel compliant
- µITRON compatible
- µITRON 3.0
- µITRON 4.0

Features

- µT-Kernel compliant kernel
  The µT-Kernel specifications offer excellent migratability and reusability of software between µT-Kernel specifications by strict standardization. Furthermore, the µT-Kernel specifications are compatible with the T-Kernel specifications aimed at large-scale embedded systems, allowing for migration with few changes.

- High-speed, lightweight kernel
  The kernel overhead is extremely small compared to earlier REALOS products. Furthermore, memory usage can be kept to a minimum according to the functions used because of the unique kernel structure.

- Power-saving function support
  Customizable power-saving functionality is supported as a original function. This allows extremely finely tuned power-saving design.

- Interoperation with performance tuning tools
  Optimization of applications is assisted by operating together with performance tuning tools.

*The memory size is reduced by cutting out unneeded functions.

Support hardware

Support software

Development support tool
Structure of SOFTUNE 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)
  - Debugging is supported by the on-chip in-circuit emulator (BGM adapter). Debugging can be performed using a single serial line.
  - Equipped with continuous execution, stepped execution, and forced break functions
  - Software breakpoints: 256 points
  - Host interface: Connectable via USB

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.
        - (Miles V1.0/V3.0, WZ Editor, Tomaru, PowerEditor, Codewright32, TextPAD32, etc.)

- 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.

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

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  - An editor is built-in as standard, offering a plethora of functions such as keyword highlighting and auto-indenting.
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      - (Miles V1.0/V3.0, WZ Editor, Tomaru, PowerEditor, Codewright32, TextPAD32, etc.)

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.
Support tools are available for increasing the efficiency of the "REALOS" kernel, a real-time OS which conforms to the industry standard 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 configured by setting the necessary items by following the configurator screens.

### REALOS analyzer

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**
- **Task context switches**

### 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>REALOS configurator</td>
<td>V6</td>
<td>FR</td>
<td>SP36503116QAC (1 license)</td>
<td>Workbench</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP36503116QBC (3 licenses)</td>
<td>C/C++ compiler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP36503116QCC (5 licenses)</td>
<td>Assembler pack</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP36503116QDC (10 licenses)</td>
<td>C/C++ analyzer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workbench</td>
<td>C/C++ checker</td>
</tr>
</tbody>
</table>

### List of functions

#### 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 Vista, Windows XP, Windows 2000</td>
</tr>
<tr>
<td>Memory</td>
<td>256 MByte or more (512 MByte or more recommended)</td>
</tr>
<tr>
<td>Hard disk</td>
<td>300 MByte or more (1 GByte or more recommended)</td>
</tr>
</tbody>
</table>

#### Function overview

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project management</td>
<td>Editor, make/build management, various optional settings, integrated debugger, integrated REALOS (RTOS) configurator</td>
</tr>
<tr>
<td>C/C++ compiler</td>
<td>ANSI compliant, optimization options (speed, size, or debug priority)</td>
</tr>
<tr>
<td>Debugger</td>
<td>GDI execution/monitor, run/step/watch, breakpoint settings, stepped execution (assembly/汇编/汇编语言 level), [Event functions and trace functions] Event settings [data/instruction], trace function maximum edit frames, instruction trace, data trace</td>
</tr>
</tbody>
</table>

### List of interoperation with external tools

- Commercial editors
- Commercial code checking tools
### Integrated Development Environments

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
<th>Inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOFTUNE</strong></td>
<td>An integrated development environment that is user-friendly and highly-efficient. - Integrates language tools and debugger tools that increase the efficiency of the work cycle of coding, compiling, and debugging. - Facilitates users with various configurations when developing a program. - Interoperates with a variety of tools, supporting seamless development with <strong>SOFTUNE</strong>.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jp.fujitsu.com/fsl/en">http://jp.fujitsu.com/fsl/en</a></td>
</tr>
<tr>
<td><strong>MULTI5.0</strong></td>
<td>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, linker, 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.</td>
<td>Advanced Data Controls Corp. TEL: +81-3-3576-6351 <a href="http://www.adac.co.jp/">http://www.adac.co.jp/</a></td>
</tr>
</tbody>
</table>

### Real-Time Operating System

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>SOFTUNE REAL OS</strong></td>
<td>- <strong>μT-Kernel</strong> compliant real-time OS for the Fujitsu FR family microcontrollers. - Can be used for a broad range of development, from products with light resource limitations to large-scale systems. - An analyzer is included as a debugging support tool.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jp.fujitsu.com/fsl/en">http://jp.fujitsu.com/fsl/en</a></td>
</tr>
<tr>
<td><strong>μT-REAL OS</strong></td>
<td>- <strong>μT-Kernel</strong> compliant real-time OS for the Fujitsu FR family microcontrollers. - The kernel overhead is extremely small, making it optimal for products that demand power-saving functionality and real-time performance. - An analyzer is included as a debugging support tool.</td>
<td>Fujitsu Semiconductor Limited <a href="http://jp.fujitsu.com/fsl/en">http://jp.fujitsu.com/fsl/en</a></td>
</tr>
<tr>
<td><strong>EB tressos</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 tressos ECU development tool for AUTOSAR compliant vehicle-mounted products. EB tressos AutoCore/AUTOSAR compatible middleware (BSW and RTE) Graphical user interface for EB tressos Studio and embedded software configuration Real-time OS for AUTOSAR compliant real-time OS</td>
<td>Elektrobit Nippon KK TEL: +81-3-5757-6160 <a href="http://www.elektrobit.com">http://www.elektrobit.com</a></td>
</tr>
<tr>
<td><strong>osCAN</strong></td>
<td>osCAN is a pre-emptive, real-time, multitasking operating system that has the optimal functions for operating on a microcontroller. Features: - Seamless integration with CAN-bonded from Vector - Wide range of supported processors - Static OS that is compact and fast - All OS objects can be specified using a graphical configuration tool before compilation - Conforms to OSEK/VDX2.2, providing long-term usability and stability</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5769-6972 <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
</tr>
</tbody>
</table>

### Middleware

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>RELIC</strong></td>
<td>- Data compression/decompression library that can be embedded in devices. - Compression reduces the time to read from Flash memory, and is useful for reducing the startup time of digital home electronics, etc. - Utilizes a lossless compression scheme from Fujitsu Laboratories that can be embedded in products securely in terms of compression performance, quality, and support. - RELIC delivers compression and decompression speeds approximately 2 times faster than the ZLIB free software. - The decompression function is also available as a hardware macro (RTL).</td>
<td>Fujitsu Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/en</a></td>
</tr>
<tr>
<td><strong>eFILE32</strong></td>
<td>- This is a file system for embedded applications that has a broad track record for utilization in mobile phones, etc. - Supported MCUs are the Fujitsu FMC-16 family and FR family, with the ARM7TDMI and ARM9TDMI also supported for ASIC. - Supports FAT12, FAT16, FAT32, and VFAT, and also supports Japanese filenames. - Supports FAT and file system recovery functionality for power cuts. - Supports multiple drives, and can handle multiple devices/media simultaneously.</td>
<td>Fujitsu Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/en</a></td>
</tr>
<tr>
<td><strong>eTCP/IP</strong></td>
<td>- eTCP/IP is a TCP/IP stack for embedded devices offering high compatibility, implementation in small amounts of memory, high performance, and fine detailed control. - Broad track record of utilization in wireless LAN projectors, printers, mobile phones, etc. - The interface supports the ITRON TCP/IP API and socket interface, delivers high compatibility between various platforms. - Supported MCUs are the Fujitsu FMC-16 family and FR family, with the ARM7TDMI and ARM9TDMI also supported for ASIC.</td>
<td>Fujitsu Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/en</a></td>
</tr>
<tr>
<td><strong>Multi Device File Access Library (MDFL) for FR V02</strong></td>
<td>- Used for handling PC-compatible data on a target embedded device. - Because the embedded device and PC data are managed in the same files and directories, it is easy to pass data between PICs and embedded devices.</td>
<td>Fujitsu Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/en</a></td>
</tr>
<tr>
<td><strong>Cryptography/authentication library</strong></td>
<td>- This is a library for cryptography (RSA, AES, DES, 3DES), authentication (SHA-1, MD5), and pseudo-random number generation (FIPS186-2) processing.</td>
<td>Fujitsu Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/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 Electronics Inc. <a href="http://jp.fujitsu.com/fei/en">http://jp.fujitsu.com/fei/en</a></td>
</tr>
</tbody>
</table>
**Development Supporting Tool**

**Middleware**

<table>
<thead>
<tr>
<th>Product name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>KASAGO (TCP/IP stack)</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>Zukan Emic, Inc. TEL: +81-45-684-5171 <a href="http://www.emic.co.jp/">http://www.emic.co.jp/</a></td>
</tr>
<tr>
<td>CANdriver</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 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.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
</tr>
<tr>
<td>LINdriver</td>
<td>- Satisfies all requirements of the current LIN specifications (supports LIN 1.2/1.3 and LIN 2.0). - Enables simple implementation of a CAN-LIN gateway when combined with the Vector CANbedded component</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5769-6972 (Embedded software department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
</tr>
<tr>
<td>MICROSAR (AUTOSAR embedded software product)</td>
<td>Configuration: - MICROSAR RTE: AUTOSAR RTE - MICROSAR BSW: AUTOSAR Basic Software - MICROSAR Configuration Suite/MICROSAR EAD: AUTOSAR BSW configurator set Features: - Strong experience and track record with previous CANbedded and osCAN products - Full BSW supporting AUTOSAR specification release 3.0 - Covers applications from development to ECU implementation in concert with the DaVinci Tool Suite (from prototypes and evaluation units to mass production products) - Can be configured in combination with MCAL from other manufacturers or EAD - Full featured technical service and training, assistance migrating to AUTOSAR, etc.</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5769-6972 (Embedded software department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.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>PGRRelf</td>
<td>This is a static analysis tool for identifying bugs in C/C++ source code. - Identifies bugs locations from data structures and processing flows - Checks conformance with SEC coding standards and MISRA-C guidelines - Analysis is performed by integration with SOFTUNE make/build, allowing checking and correction of bugs by simple operations.</td>
<td>Fujitsu Software Technologies Limited TEL: +81-45-745-9823 <a href="http://jp.fujitsu.com/st/services/pgr/">http://jp.fujitsu.com/st/services/pgr/</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: +81-3-3245-3248 <a href="http://www.toyo.co.jp/ss/">http://www.toyo.co.jp/ss/</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>This is a cross-platform tool 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/developer/technical/">http://www-01.ibm.com/software/awdtools/developer/technical/</a></td>
</tr>
<tr>
<td>IBM Rational Test RealTime™</td>
<td>This is a cross-platform tool 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 Rhapsody</td>
<td>Rhapsody is a development environment for improving the efficiency of model driven development (MDD) which promotes development focusing on &quot;models&quot; created using UML. Even among the uncountable development tools that use UML, this is a unique development environment that optimizes the development process specifically for embedded development.</td>
<td>Itochu Techno-Solutions Corporation TEL: +81-3-6417-5434 <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>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>Itochu Techno-Solutions Corporation TEL: +81-3-6417-5434 <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 - Enables design in 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: +81-3-5028-4800 <a href="http://www.iarsys.co.jp/">http://www.iarsys.co.jp/</a></td>
</tr>
<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: +81-3-6367-6700 <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>
</tbody>
</table>

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## CASE Tools

<table>
<thead>
<tr>
<th>Product name</th>
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</tr>
</thead>
<tbody>
<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 Tresos (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>

## Verification Tools

<table>
<thead>
<tr>
<th>Product name</th>
<th>Overview</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CANape</td>
<td>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</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5798-6984 (Compliance tool department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
</tr>
<tr>
<td>RAMScope</td>
<td>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 =&gt; 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) =&gt; Maximum 128ch/1ms sampling performance (can support 1024ch by special order) =&gt; 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</td>
<td>Yokogawa Digital Computer Corporation TEL: +81-422-52-5698 (Instrument business vehicle instrument center) <a href="http://www.yokogawa-digital.com/">http://www.yokogawa-digital.com/</a></td>
</tr>
<tr>
<td>CANalyzer</td>
<td>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: - Simplicity 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</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5798-6971 (Development tool department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
</tr>
<tr>
<td>SystemDesk</td>
<td>CANoe is an all-rounder 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 - Test function covers from ECU testing to automatic report creation - Supports CAN, LIN, MOST, and FlexRay</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5798-6971 (Development tool department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
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<td>TargetLink</td>
<td>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 - Test function covers from ECU testing to automatic report creation - Supports CAN, LIN, MOST, and FlexRay</td>
<td>Vector Japan Co., Ltd. TEL: +81-3-5798-6971 (Development tool department) <a href="http://www.vector-japan.co.jp/">http://www.vector-japan.co.jp/</a></td>
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