MICROCONTROLLER SUPPORT TOOL

FUJITSU

FUJITSU SEMICONDUCTOR LIMITED

Fujitsu Semiconductor Microcontroller Development Environments

Flow of Development "V-model"

Coarse

Development granularity

Fine

Request/requirement

Define requirements

ESL/Sim technology, etc.

Design

Implementation

Detailed design

Coding/compile

Unit testing

SOFTUNE

High performance debugger

On-chip debugger

Integration testing

Mass production

System testing

Tuning

Compliance testing

Testing

1

2

Development System (hardware tools)

Fujitsu Semiconductor provides development tools such as emulators and adapters for developing software for the FR family and F^{2}MC family.

Support hardware

Support software

Development support tool

32 bit

16 bit

8 bit

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

System Configuration

SOFTUNE Integrated Development Environment (Debugger)

USB 2.0 HS

MB2100-01-E
84.8mm x 53.6mm x 21.3mm 70.3g

Communication speed maximum 50Mbps

Single-wire coaxial connection (maximum 10m)

Mass production board of target device

Flash microcontroller

CPU

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

F^{2}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

BGM adapter
(On-chip in-circuit emulator)

MB2146-08-E

USB cable (included)

Personal computer

Workbench emulator debugging software

SOFTUNE V3 Professional pack

Evaluation board (Starter kit)

MB2146-4xx-E

Mass-production product *

MB95200 series

Pre-mounted

*: Pre-mounted on the evaluation board

Development System (hardware tools)

Support hardware

Support software

Development support tool

32 bit

16 bit

8 bit

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

System Configuration

∗: Optional product

F²MC-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
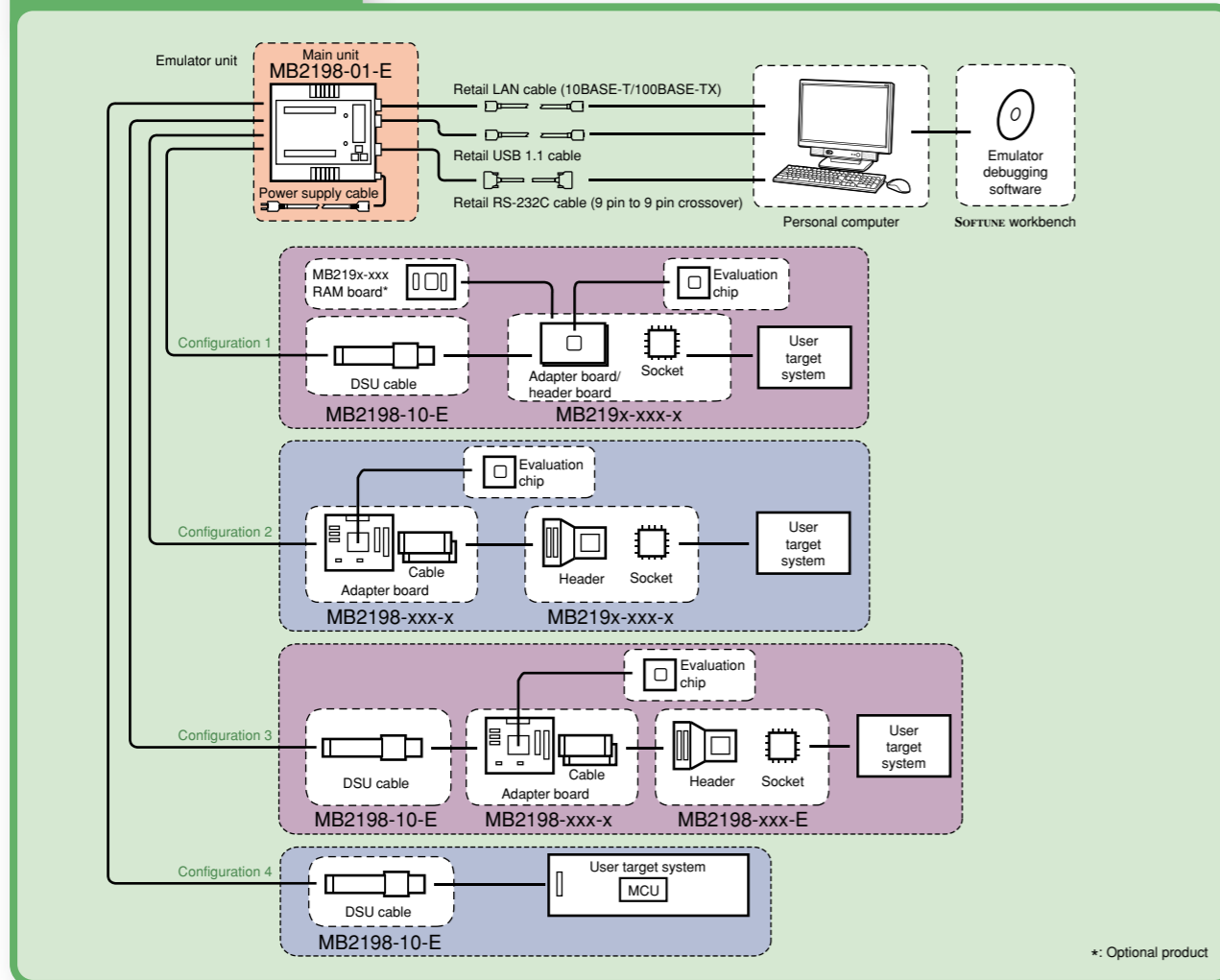
System Configuration
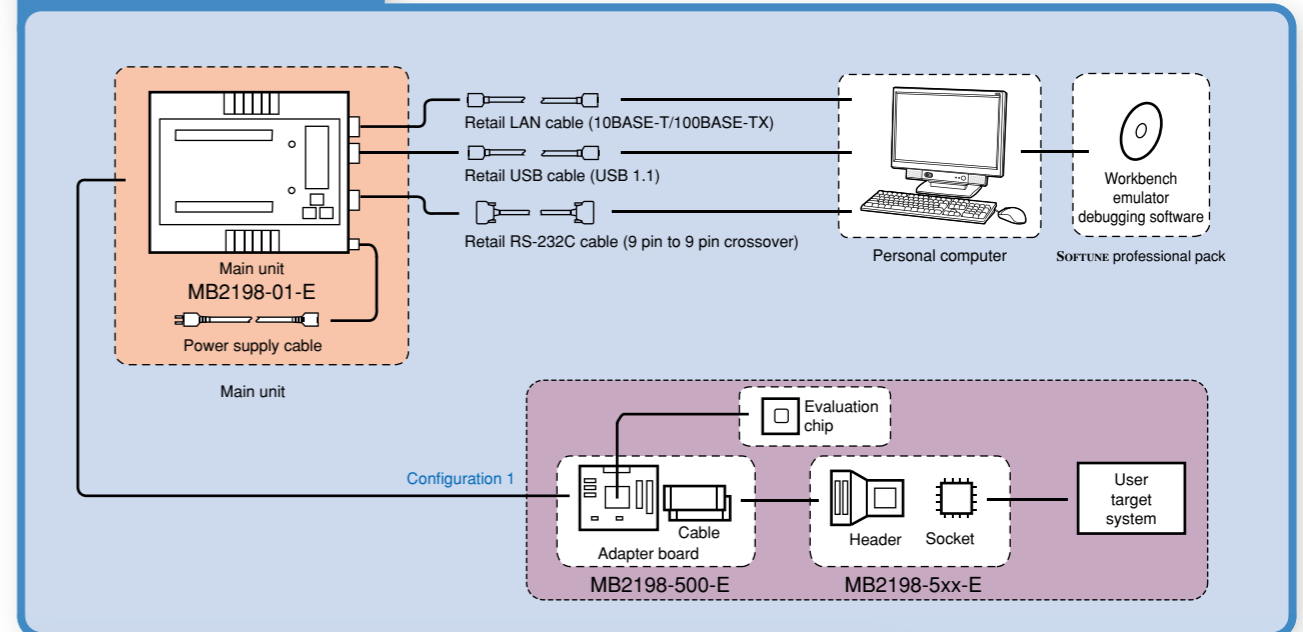
Example System Configuration for the MB96300 Series
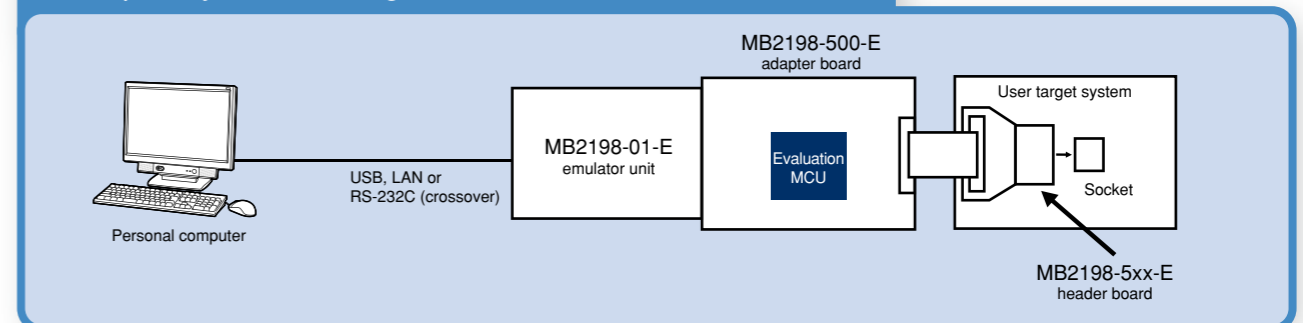
Development System (hardware tools)

F²MC-16LX Family 16-bit Microcontroller

● Features of the MB2147-01-E (version that supports high speeds)
- Supports a maximum microcontroller operating frequency of 33MHz
- Supports microcontroller operating voltages of +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.))
- 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)
- C0 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
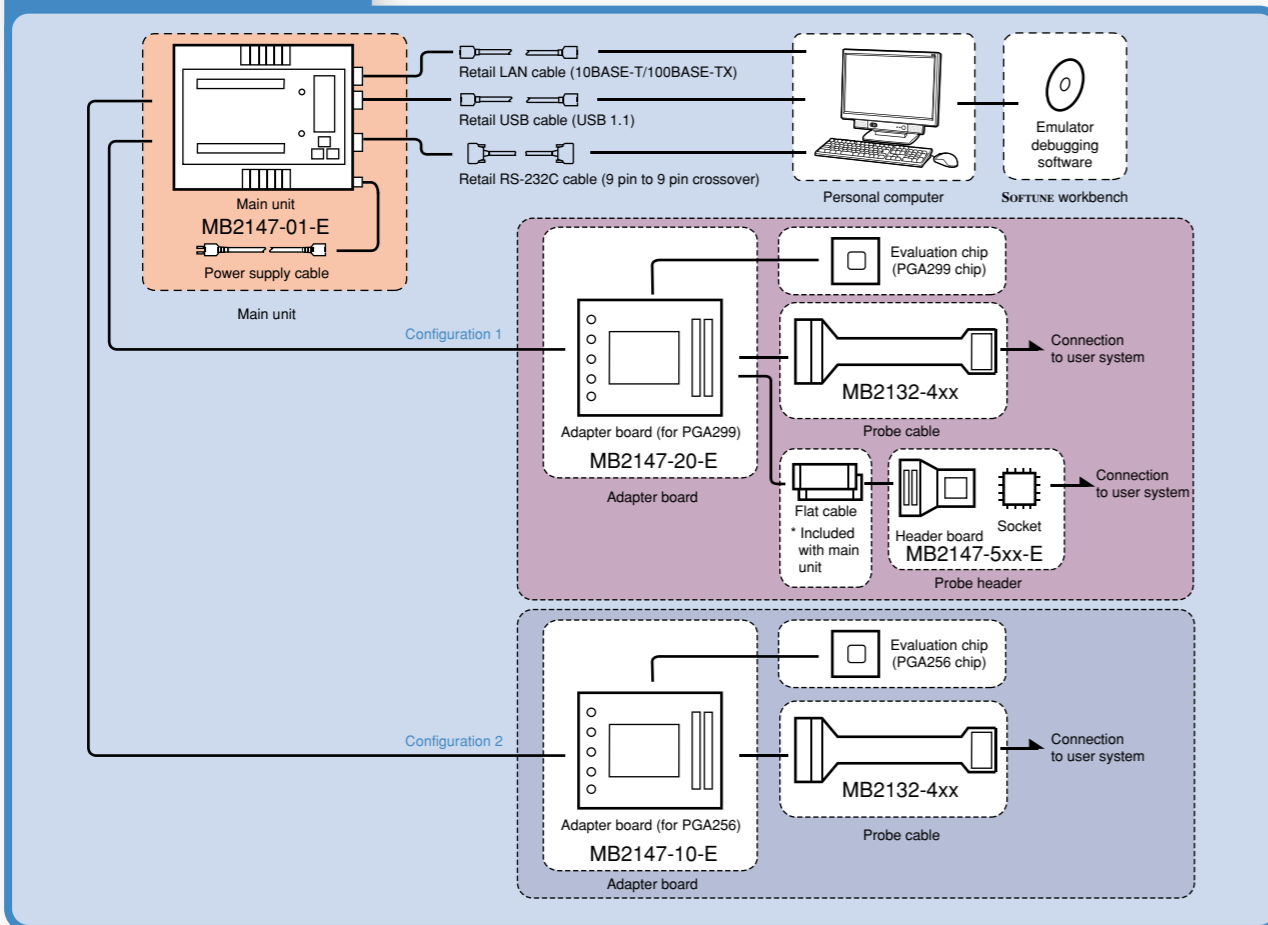
F²MC-8FX Family 8-bit Microcontroller MB95100 Series

● Features of the MB2146-09A-E (BGM adapter)
- Supports microcontroller operating voltages of +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.))
- Compact development environment, with small lightweight BGM adapter
- Because the monitor program executes in a dedicated memory space,
  it does not consume any of the user memory space
- Supports continuous execution, step execution, instruction break,
  data break, and sequential break
- Time measurement
- RAM monitoring
- Capable of instruction trace (maximum 16 branches)
- Host interface: Able to connect using USB

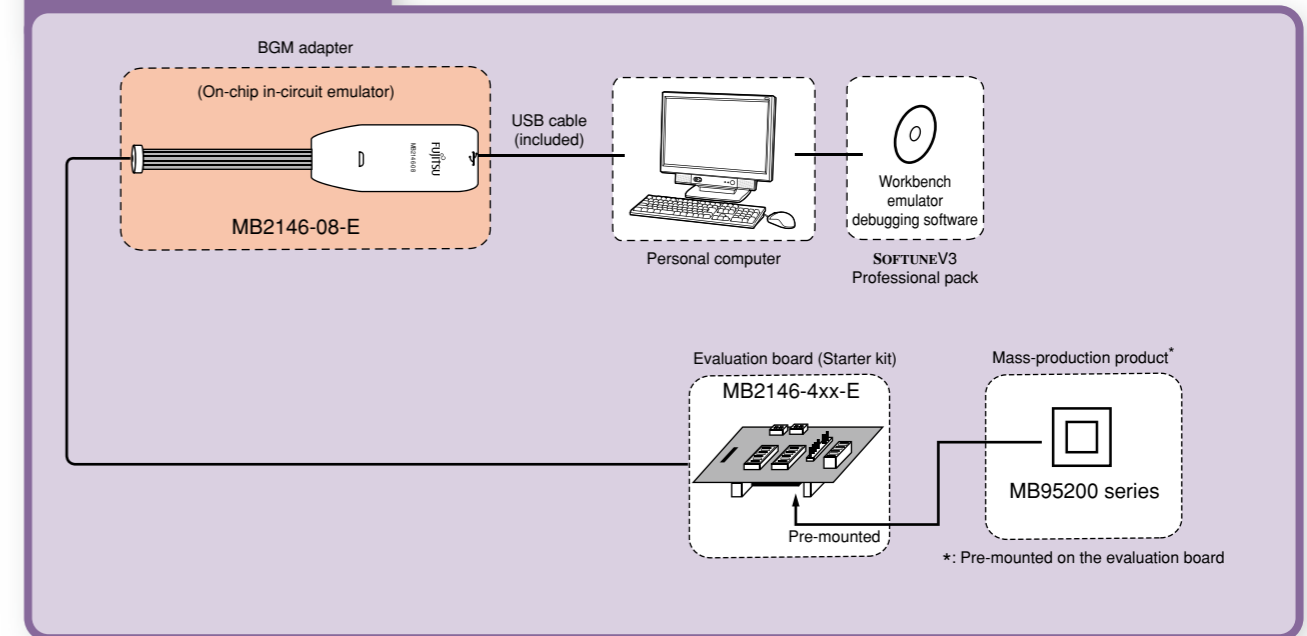### System Configuration
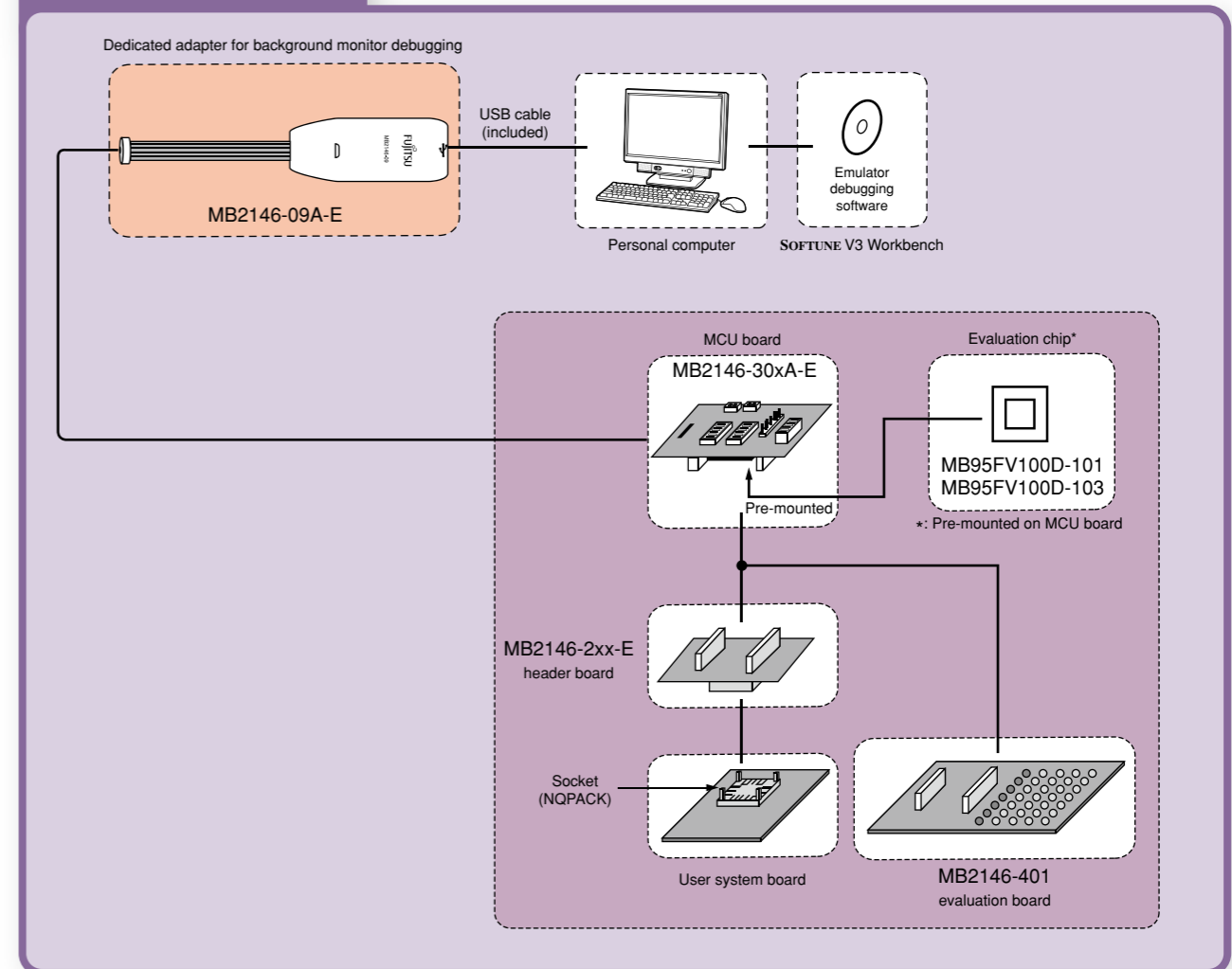
Development Tool

Fujitsu Semiconductor provides ICE, evaluation boards, monitor debuggers, ROM writers, etc.
for developing software for the FR family and F^{2}MC family.

■ FR Family Development Tool Lineup

System configuration	Series	ICE Main unit*1	DSU cable	Adapter board	Header board	Evaluation chip	Evaluation board Main board	Daughter board	Parallel writers*2 Made by Flash Support Group Supported writers	Made by Minato Electronics Supported writers	Serial writers*3 Made by Fujitsu Semiconductor	Made by YDC	SOFTUNE V6 professional pack	SOFTUNE REALOS	Remarks
Configuration 1	MB91301	MB2198-01-E	MB2198-10-E	MB2198-100-E	MB2198-101-E	MB91V301ACR-ES	MB91906EB	MB91914EB	-	-	Yes	Being planned			RAM board: MB2198-90 ROM replacement unit:MB2197-90
	MB91307	MB2198-01-E	MB2198-10-E	MB2197-170A	MB2197-172	MB91V307RCR-ES	MB91906EB	MB91915EB	-	-	Yes	-			RAM board: MB2197-91 ROM replacement unit:MB2197-90
Configuration 2	MB91210	MB2198-01-E	-	MB2198-150-E	MB2198-141-E (For LQFP144) MB2198-142-E (For LQFP100)	MB91V210PB-ESE1	-	-	AF9709C/AF9723B	-	Yes	-	SP365030118QAC (1 license) SP365030118QBC (3 licenses) SP365030118QCC (5 licenses) SP365030118QDC (10 licenses)	- SOFTUNE μT-REALOS/FR (μT-Kernel) -SP3650P1218RCC (integration license) -SP3650P1218EVC (evaluation license) - SOFTUNE REALOS/FR Spec.4 (μITRON4.0) -SP365001518RCC (integration license) -P365001518EVC (evaluation license) - SOFTUNE REALOS/FR (μITRON3.0) -SP365000218RCC (integration license) -SP365000218EVC (evaluation license)	
	MB91220	MB2198-01-E	-	MB2198-130-E	MB2198-132-E	MB91V220CR-ES	-	-	AF9709C/AF9723B	-	Yes	-			
	MB91230	MB2198-01-E	-	MB2198-130-E	MB2198-121-E	MB91V230CR-ES	MB91920EB	-	AF9709C/AF9723B	MODEL 1890A/1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91245	MB2198-01-E	-	MB2198-130-E	MB2198-123	MB91V245ACR-ES	-	-	AF9709C/AF9723B	-	Yes	-			
	MB91260B	MB2198-01-E	-	MB2198-130-E	MB2198-122-E (For QFP100) MB2198-126-E (For LQFP100)	MB91V260BCR-ES	MB91921EB	-	AF9709C/AF9723B	MODEL 1890A/1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91265A	MB2198-01-E	-	MB2198-130-E	MB2198-128-E	MB91V265ACR-ES	-	-	AF9709C/AF9723B	MODEL 1890A/1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91270	MB2198-01-E	-	MB2198-130-E	MB2198-129-E	MB91V280CR-ES	-	-	AF9709C/AF9723B	-	Yes	Yes			
	MB91350A	MB2198-01-E	-	MB2198-110-E	MB2198-111-E (For MB91354A, MB91355A, MB91F355A LQFP176) MB2198-112-E (For MB91352A, MB91353A, MB91F353A LQFP120)	MB91V350APB-ES	MB91906EB	MB91916EB (Daughter board for MB91F355A) MB91922EB (Daughter board for MB91F353A)	AF9709C/AF9723B	MODEL 1890A/1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91625	MB2198-01-E	-	MB2198-700-E	MB2198-704-E	MB91V650 PB-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR100SQF2-NB (Made by Sunhayato)	-	-	-	-			
	MB91635A	MB2198-01-E	-	MB2198-700-E	MB2198-702-E	MB91V650 PB-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR144SQF-NB (Made by Sunhayato)	AF9709C/AF9723B	-	Yes	Yes			
	MB91640A/ MB91645A	MB2198-01-E	-	MB2198-700-E	MB2198-703-E (For MB91640, single power supply)	MB91V650 PB-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR176SQF-NB (Made by Sunhayato)	AF9709C/AF9723B	-	Yes	-			
	MB91660	MB2198-01-E	-	MB2198-700-E	MB2198-701-E	MB91V650 PB-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR120SUS-NB (Made by Sunhayato)	AF9709C/AF9723B	-	Yes	Yes			
	MB91665	MB2198-01-E	-	MB2198-700-E	MB2198-701-E	MB91V650 PB-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR120SUS-NB (Made by Sunhayato)	-	-	-	-			
Configuration 3	MB91F463N	MB2198-01-E	MB2198-10-E	MB2198-300A	MB2198-304A-E	MB91V460RB-ES	-	-	-	-	Yes	-			
	MB91F464A	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-606 (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-606SK	-	-	-	Yes	-			NQPACK100SD-ND and HQPACK100SD must be obtained separately
	MB91F465B/ MB91F467B/ MB91F466H	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-664 MB2198-604B (No level shifter) MB2198-634B (Has level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-604SK	-	-	-	Yes	-			NQPACK144SD-ND and HQPACK144SD must be obtained separately
	MB91F465K	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-609 (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-609SK	-	-	-	Yes	-			NQPACK120SD and HQPACK120SD must be obtained separately

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

*2 : See the following website for information on parallel writers: http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/pararell.html
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.

*3 : See the following website for information on serial writers: http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/serial.html

Support hardware

Support software

Development support tool

32 bit

16 bit

8 bit

Development Tool

Support hardware
Support software
Development support tool
32 bit
16 bit
8 bit

■ FR Family Development Tool Lineup

System configuration	Series	Main unit*1	DSU cable	Adapter board	Header board	Evaluation chip	Main board	Daughter board	Flash Support Group (Supported writers)	Minato Electronics (Supported writers)	Fujitsu Semiconductor	YDC	SOFTUNE V6 professional pack	SOFTUNE REALOS	Remarks
Configuration 3	MB91F465P	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-616-E (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	-	-	-	-	Yes	-	SP365030118QAC (1 license) SP365030118QBC (3 licenses) SP365030118QCC (5 licenses) SP365030118QDC (10 licenses)	- SOFTUNE µT-REALOS/FR (µT-Kernel) -SP3650P1218RCC (integration license) -SP3650P1218EVC (evaluation license) - SOFTUNE REALOS/FR Spec.4 (µITRON4.0) -SP365001518RCC (integration license) -P365001518EVC (evaluation license) - SOFTUNE REALOS/FR (µITRON3.0) -SP365000218RCC (integration license) -SP365000218EVC (evaluation license)	NQPACK176SD and HQPACK176SD must be obtained separately
	MB91F465X	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-602-E (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-603-E (FlexRay Evaluationboard), MB2198-602SK-E	-	-	-	Yes	-			NQPACK100SD and HQPACK100SD must be obtained separately
	MB91F467C/ MB91F463C/ MB91F465C	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-607-E (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-607SK-E	-	-	-	Yes	-			NQPACK144SD-ND and HQPACK144SD must be obtained separately
	MB91F465D/ MB91F467D	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-605 (No level shifter) MB2198-635 (Has level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-605SK-E	-	-	-	Yes	-			NQPACK208SD and HQPACK208SD must be obtained separately
	MB91F467S	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-649-E (Has level shifter)	MB91FV460B2RB-ESE1 (Pre-mounted on adapter board)	MB2198-619SK-E	-	-	-	Yes	-			
	MB91F467T	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-620-E (No level shifter) MB2198-650-E (Has level shifter)	MB91FV460B2RB-ESE1 (Pre-mounted on adapter board)	MB2198-620SK-E	-	-	-	Yes	-			
	MB91F467R (Single power supply device)	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-601 (No level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-601SK-E	-	-	-	Yes	-			NQPACK176SD and HQPACK176SD must be obtained separately
	MB91F467R (Dual power supply device)	MB2198-01-E	MB2198-10-E	MB2198-300A	MB2198-305-E (Has level shifter)	MB91V460RB-ES	MB2198-601SK-E	-	-	-	Yes	-			
	MB91F469G	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-608 (No level shifter) MB2198-638 (Has level shifter)	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-608SK-E	-	-	-	Yes	-			CSPACK256Y2027FJ02 must be obtained separately
	MB91F469Q	MB2198-01-E	MB2198-10-E	MB2198-600A6-E, MB2198-600A4 (Supports GHS)	MB2198-617-E	MB91V460RB-ES (Pre-mounted on adapter board)	MB2198-608SK-E	-	-	-	Yes	-			CSPACK256Y2027FJ02 must be obtained separately
	MB91470/ MB91480	MB2198-01-E	MB2198-10-E	MB2198-160-E	MB2198-161-E MB2198-162-E	MB91FV470BGL-ESE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR144TQF-NB BBF2004-FR100SQF-NB	-	-	Yes	Yes			Power-on debugging adapter board: MB2198-169
	MB91490	MB2198-01-E	MB2198-10-E	MB2198-160A-E (Scheduled for release in December 2009)	MB2198-163-E (Scheduled for release in December 2009) MB2198-164-E (Scheduled for release in December 2009)	MB91FV470BGL-ESE1	BBF2004-MB (Made by Sunhayato)	- BBF2004-FR64SQF-NB	-	-	-	-			Power-on debugging adapter board: MB2198-169
	MB91605A	MB2198-01-E	MB2198-10-E	MB2198-81-E (MB91605A adapter)	-	MB91605APMC-GE1	-	-	-	-	Yes	-			
Configuration 4	MB91305	MB2198-01-E	MB2198-10-E	-	-	MB91305PMC-G-BNDE1	MB91925EB	-	-	-	Yes	-			
	MB91310	MB2198-01-E	MB2198-10-E	-	-	MB91FV310APFV-ESE1	MB91918EB	-	-	MODEL 1890A/ 1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91313A	MB2198-01-E	MB2198-10-E	-	-	MB91F313APMC-GE1	BBF2004-MB (Made by Sunhayato)	BBF2004-FR120SQF-CB	AF9709C/AF9723B	-	Yes	-			
	MB91314A	MB2198-01-E	MB2198-10-E	-	-	MB91F314APMC-GE1	-	-	AF9709C/AF9723B	-	Yes	-			
	MB91319	MB2198-01-E	MB2198-10-E	-	-	MB91FV319APMT-ESE1	-	-	-	MODEL 1890A/ 1930/1931/1893 MODEL 1940	Yes	Yes			
	MB91345	MB2198-01-E	MB2198-10-E	-	-	MB91F345BPFT-GE1, MB91F346BPFT-GE1	-	-	-	-	Yes	-			
	MB91F467M	MB2198-01-E	MB2198-10-E	-	-	MB91F467MAPMC-GSE2, MB91F467MAPMC-GSE1	-	-	-	-	Yes	-			
	MB91610	MB2198-01-E	MB2198-10-E	-	-	MB91F610PMC	MB91934EB	-	AF9709C/AF9723B	-	Yes	-			
On-chip debugger	MB91725	MB2100-01-E	-	-	-	-	BBF2004-MB	BBF2004-FR144SCL-CB	-	-	Yes	-	T-REALOS/FR planned	µT-REALOS/FR planned	Supports on-chip debugging
	MB91770	MB2100-01-E	-	-	-	-	BBF2004-MB	BBF2004-FR144SCL-CB	-	-	Yes	-			Supports on-chip debugging

*Table header groupings: ICE (Main unit*1, DSU cable, Adapter board, Header board, Evaluation chip); Evaluation board (Main board, Daughter board); Flash memory writer — Parallel writers*2 (Made by Flash Support Group, Made by Minato Electronics), Serial writers*3 (Made by Fujitsu Semiconductor, Made by YDC).*

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

*2 : See the following website for information on parallel writers: http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/pararell.html
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.

*3 : See the following website for information on serial writers: http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/serial.html

Development Tool

■ F²MC-16LX Family Development Tool Lineup

ICE

System configuration	Series	Package	ICE — Main unit*1	Adapter board	Probe cable	Evaluation chip
Configuration 1	MB90330A	LQFP-120P (0.4mm,14×14mm) FPT-120P-M24	MB2147-01-E	MB2147-20-E	MB2132-491 (Includes one set: NQPACK120SE, HQPACK120SE)	MB90V330ACR-ES (PGA-299C)
		LQFP-120P (0.5mm,16×16mm) FPT-120P-M21			MB2132-492 (Includes one set: NQPACK120SD, HQPACK120SD)	
	MB90335	LQFP-64P (0.65mm,12×12mm) FPT-64P-M23	MB2147-01-E	MB2147-20-E	MB2132-493 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB90V330ACR-ES (PGA-299C)
	MB90340E	LQFP-100P (0.5mm,14×14mm) FPT-100P-M20	MB2147-01-E	MB2147-20-E	MB2147-581-E (Includes one set: NQPACK100SD-ND, HQPACK100SD)	MB90V340E-101 (Single clock system device) or MB90V340E-102 (Dual clock system device) (PGA-299C)
		QFP-100P (0.65mm,14×20mm) FPT-100P-M06			MB2147-582-E (Includes one set: NQPACK100RB179-A, HQPACK100RB179)	
	MB90350E	LQFP-64P (0.65mm,12×12mm) FPT-64P-M23	MB2147-01-E	MB2147-20-E	MB2147-540-E (Includes one set: NQPACK064SB, HQPACK064SB140)	MB90V340E-101CR-ES/103CR-ES (Single clock system device) MB90V340E-102CR-ES/104CR-ES (Dual clock system device) (PGA-299C)
		LQFP-64P (0.5mm,10×10mm) FPT-64P-M24			MB2147-542-E (Includes one set: NQPACK064SD-ND, HQPACK064SD)	
	MB90360E	LQFP-48P (0.5mm,7×7mm) FPT-48P-M26	MB2147-01-E	MB2147-20-E	MB2147-521-E (Includes one set: NQPACK048SD, HQPACK048SD)	
	MB90390	LQFP-120P (0.5mm,16×16mm) FPT-120P-M21	MB2147-01-E	MB2147-20-E	MB2132-469 (Includes one set: NQPACK120SD, HQPACK120SD)	MB90V390HBCR-ES (PGA-299C)
	MB90800	QFP-100P (0.65mm,14×20mm) FPT-100P-M06	MB2147-01-E	MB2147-20-E	MB2147-582 (Includes one set: NQPACK100RB179-A, HQPACK100RB179)	MB90V800-101CR-ES (Single clock) MB90V800-201CR-ES (Dual clock) (PGA-299C)
	MB90820B	QFP-80P (0.8mm,14×20mm) FPT-80P-M06	MB2147-01-E	MB2147-20-E	MB2147-560 (Includes one set: NQPACK080RA, HQPACK080RA)	MB90V820CR-ES (PGA-299C)
		LQFP-80P (0.5mm,12×12mm) FPT-80P-M21			MB2147-561 (Includes one set: NQPACK080SD, HQPACK080SD)	
		LQFP-80P (0.65mm,14×14mm) FPT-80P-M22			MB2147-562 (Includes one set: NQPACK080SB, HQPACK080SB160)	
	MB90860E	LQFP-100P (0.5mm,14×14mm) FPT-100P-M20	MB2147-01-E	MB2147-20-E	MB2147-581 (Includes one set: NQPACK100SD-ND, HQPACK100SD)	MB90V340E-101CR-ES (Single clock system device), MB90V340E-102CR-ES (Dual clock system device) (PGA-299C)
		QFP-100P (0.65mm,14×20mm) FPT-100P-M06			MB2147-582 (Includes one set: NQPACK100RB179-A, HQPACK100RB179)	

Evaluation board / Flash memory writer

Evaluation board — Main board	Daughter board	Flash memory writer — Parallel writers*2 Made by Flash Support Group (Supported writers)	Made by Minato Electronics (Supported writers)	Serial writers*2 Made by Fujitsu Semiconductor	Made by YDC	SOFTUNE V3 professional pack	SOFTUNE REALOS/907
MB2031-01	MB2031-20	-	AF9709C/AF9723B	Yes	Yes	SP3607Z008-P01 (1 license) SP3607Z008-P03 (3 licenses) SP3607Z008-P05 (5 licenses) SP3607Z008-P10 (10 licenses)	SP3607M008BA (integration license) SP3607M008EV (evaluation license)
	-	-	AF9709C/AF9723B	Yes	Yes		
-	-	-	AF9709C/AF9723B	Yes	Yes		
BBF2004-MB (Made by Sunhayato)	BBF2004-100SCL-NB (Made by Sunhayato) BBF2001-100CL2-NB (Made by Sunhayato)	-	AF9709C/AF9723B	Yes	Yes		
BBF2004-MB (Made by Sunhayato)	BBF2004-64CL-NB (Made by Sunhayato) BBF2004-64SCL-NB (Made by Sunhayato)	-	AF9709C/AF9723B	Yes	Yes		
-	-	-	AF9709C/AF9723B	Yes	Yes		
-	-	-	AF9709C/AF9723B	Yes	Yes		
BBF2004-MB (Made by Sunhayato)	BBF2001-100CL2-NB (Made by Sunhayato)	-	AF9709C/AF9723B	Yes	Yes		
-	-	-	AF9709C/AF9723B	Yes	-		
BBF2004-MB (Made by Sunhayato)	BBF2004-100SCL-NB (Made by Sunhayato) BBF2001-100CL2-NB (Made by Sunhayato)	-	AF9709C/AF9723B	Yes	Yes		

＊1 : Requires either an RS-232C cable, USB cable, or LAN cable.
＊2 : See the following website for information on the parallel and serial writers. http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/
    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.

■ F²MC-16LX Family Development Tool Lineup

System configuration	Series	Package	ICE Main unit*1	ICE Adapter board	ICE Probe cable	ICE Evaluation chip	Evaluation board Main board	Evaluation board Daughter board	Flash memory writer — Parallel writers*2 Made by Flash Support Group (Supported writers)	Flash memory writer — Parallel writers*2 Made by Minato Electronics (Supported writers)	Flash memory writer — Serial writers*2 Made by Fujitsu Semiconductor	Flash memory writer — Serial writers*2 Made by YDC	SOFTUNE V3 professional pack	SOFTUNE REALOS/907
Configuration 1	MB90880	LQFP-100P (0.5mm,14×14mm) FPT-100P-M20 / QFP-100P (0.65mm,14×20mm) FPT-100P-M06	MB2147-01-E	MB2147-20-E	MB2147-581 (Includes one set: NQPACK100SD-ND, HQPACK100SD) / MB2147-582 (Includes one set: NQPACK100RB179-A, HQPACK100RB179)	MB90V880A-101CR-ES (Single clock system device), MB90V880A-102CR-ES (Dual clock system device) (PGA-299C)	BBF2004-MB (Made by Sunhayato)	BBF2004-100SCL-NB (Made by Sunhayato) BBF2001-100CL2-NB (Made by Sunhayato)	AF9709C/AF9723B	-	Yes	Yes	SP3607Z008-P01 (1 license) SP3607Z008-P03 (3 licenses) SP3607Z008-P05 (5 licenses) SP3607Z008-P10 (10 licenses)	SP3607M008BA (integration license) SP3607M008EV (evaluation license)
Configuration 1	MB90920	LQFP-120P (0.5mm,16×16mm) FPT-120P-M21	MB2147-01-E	MB2147-20-E	MB2132-469 (Includes one set: NQPACK120SD, HQPACK120SD)	MB90V920-101CR-ES (Single clock system device), MB90V920-102CR-ES (Dual clock system device) (PGA-299C)	-	-	AF9709C/AF9723B	-	Yes	Yes		
Configuration 1	MB90950	LQFP-100P (0.5mm,14×14mm) FPT-100P-M20 / QFP-100P (0.65mm,14×20mm) FPT-100P-M06	MB2147-01-E	MB2147-20-E	MB2147-581 (Includes one set: NQPACK100SD-ND, HQPACK100SD) / MB2147-582 (Includes one set: NQPACK100RB179-A, HQPACK100RB179)	MB90V950JACR-ES/MB90V950MACR-ES (Single clock system device), MB90V950JASCR-ES/MB90V950MASCR-ES (Dual clock system device) (PGA-299C)	BBF2004-MB (Made by Sunhayato)	BBF2004-100SCL-NB (Made by Sunhayato) BBF2001-100CL2-NB (Made by Sunhayato)	AF9709C/AF9723B	-	Yes	Yes		
Configuration 1	MB90960	LQFP-48P(0.5mm,7×7mm) FPT-48P-M26	MB2147-01-E	MB2147-20-E	MB2147-521 (Includes one set: NQPACK048SD, HQPACK048SD)	MB90V340E-101CR-ES/MB90V340E-103CR-ES (Single clock system device), MB90V340E-102CR-ES/MB90V340E-104CR-ES (Dual clock system device) (PGA-299C)	-	-	AF9709C/AF9723B	-	Yes	Yes		
Configuration 1	MB90980	LQFP-64P(0.5mm,10×10mm) FPT-64P-M24	MB2147-01-E	MB2147-20-E	MB2147-541 (Includes one set: NQPACK064SD-ND, HQPACK064SD)	MB90V485BCR-ES (PGA-299C)	-	-	AF9709C/AF9723B	-	Yes	-		
Configuration 1	MB90990	LQFP-48P(0.5mm,7×7mm) FPT-48P-M26	MB2147-01-E	MB2147-20-E	MB2147-521 (Includes one set: NQPACK048SD, HQPACK048SD)	MB90V340F-101CR-ES/MB90V340F-103CR-ES (Single clock system device), MB90V340F-102CR-ES/MB90V340F-104CR-ES (Dual clock system device) (PGA-299C)	-	-	AF9709C/AF9723B	-	Yes	Yes		
Configuration 2	MB90385	LQFP-48P (0.5mm,7×7mm) FPT-48P-M26	MB2147-01-E	MB2147-10-E	MB2132-466 (Includes one set: NQPACK048SD, HQPACK048SD)	MB90V495GCR-ES (PGA-256C)	-	-	AF9709C/AF9723B	-	Yes	Yes		
Configuration 2	MB90455	LQFP-48P (0.5mm, 7×7mm) FPT-48P-M26	MB2147-01-E	MB2147-10-E	MB2132-466 (Includes one set: NQPACK048SD, HQPACK048SD)	MB90V495GCR-ES (PGA-256C)	-	-	AF9709C/AF9723B	-	Yes	Yes		
Configuration 2	MB90460	SH-DIP-64P DIP-64P-M01 / QFP-64P (1.0mm,14×20mm) FPT-64P-M06 / LQFP-64P (0.65mm,12×12mm) FPT-64P-M23	MB2147-01-E	MB2147-10-E	MB2132-434 / MB2132-434 + 64SD-64QF-8L / MB2132-461 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB90V460CR-ES (PGA-256C)	-	-	AF9709C/AF9723B	MODEL 1890A/1930/1931/1893	Yes	Yes		
Configuration 2	MB90895	LQFP-48P (0.5 mm, 7×7 mm) FPT-48P-M26	MB2147-01-E	MB2147-10-E	MB2132-466 (Includes one set: NQPACK048SD, HQPACK048SD)	MB90V495GCR-ES (PGA-256C)	-	-	AF9709C/AF9723B	-	Yes	Yes		

*1 : Requires either an RS-232C cable, USB cable, or LAN cable.
*2 : See the following website for information on the parallel and serial writers. http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/
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.

Support hardware
Support software
Support software tool
Development support tool
32 bit
16 bit
8 bit

Development Tool

■ F²MC-16FX Family Development Tool Lineup

Series	Package	ICE Main unit *1	Adapter board	Header board	Evaluation chip	Evaluation board Main board	Daughter board
MB96310	FPT-48P-M26 for the LQFP-48 (0.5mm, 7x7mm)	MB2198-01-E	MB2198-500-E	MB2198-509-E	MB96V300BRB-ES	-	MB2198-590-E (Extension trace board)
MB96320	FPT-80P-M21 for the LQFP-80 (0.5mm, 12x12mm)	MB2198-01-E	MB2198-500-E	MB2198-505-E	MB96V300BRB-ES	MB2198-555-E	MB2198-590-E (Extension trace board)
MB96330	FPT-144P-M08 for the LQFP-144 (0.5mm, 20x20mm)	MB2198-01-E	MB2198-500-E	MB2198-506-E	MB96V300BRB-ES	MB2198-556-E	MB2198-590-E (Extension trace board)
MB96340	FPT-100P-M22 for the QFP-100 (0.65mm, 14x20mm) / FPT-100P-M20 for the LQFP-100 (0.5mm, 14x14mm)	MB2198-01-E	MB2198-500-E	MB2198-501-E / MB2198-502	MB96V300BRB-ES	BBF2004-MB (Made by Sunhayato)	BBF2001-100CL2-NB (Made by Sunhayato) / BBF2004-100SCL-NB (Made by Sunhayato)
MB96350	FPT-64P-M24 for the LQFP-64 (0.5mm, 10x10mm) / FPT-64P-M23 for the LQFP-64 (0.65mm, 12x12mm)	MB2198-01-E	MB2198-500-E	MB2198-503-E / MB2198-504	MB96V300BRB-ES	BBF2004-MB (Made by Sunhayato)	BBF2004-64SCL-NB (Made by Sunhayato) / BBF2004-64CL-NB (Made by Sunhayato)
MB96370	FPT-144P-M08 for the LQFP-144 (0.5mm, 20x20mm) / FPT-144P-M12 for the LQFP-144 (0.4mm, 16x16mm)	MB2198-01-E	MB2198-500-E	MB2198-507-E / MB2198-508-E	MB96V300BRB-ES	MB2198-557-E	MB2198-590-E (Extension trace board)
MB96380	FPT-120P-M21 for the LQFP-120 (0.5mm, 16x16mm)	MB2198-01-E	MB2198-500-E	MB2198-16FX-120P-M21	MB96V300BRB-ES	MB2198-560-E	MB2198-590-E (Extension trace board)
MB96390	FPT-100P-M20 for the LQFP-100 (0.5mm, 14x14mm)	MB2198-01-E	MB2198-500-E	MB2198-510-E	MB96V300BRB-ES	MB2198-558-E	MB2198-590-E

Flash memory writer Parallel writers*2 Made by Flash Support Group Supported writers	Serial writers*2 Made by Fujitsu Semiconductor	Made by YDC	SOFTUNE V3 professional pack
-	-	-	SP3607Z008-P01 (1 license) SP3607Z008-P03 (3 licenses) SP3607Z008-P05 (5 licenses) SP3607Z008-P10 (10 licenses)
-	Yes	-	
AF9709C,AF9723B	Yes	-	
AF9709C,AF9723B	Yes	Yes	
-	Yes	Yes	
-	Yes	-	
AF9709C,AF9723B	Yes	Yes	
-	Yes	-	

＊1 : Requires either an RS-232C cable, USB cable, or LAN cable.
＊2 : See the following website for information on the parallel and serial writers.
http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/
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.

■ F²MC-8FX Family Development Tool Lineup

Series	Part Number	Package	ICE BGM adapter	MCU board	Header board *1	Evaluation chip
MB95100AM	MB95F104AJS/104AJW/104AMS/104AMW/104ANS/104ANW/106AJS/106AJW/106AMS/106AMW/106ANS/106ANW, MB95108AM, MB95F108AMS/108ANS/108AMW/108ANW/108AJS/108AJW	LQFP-64P(0.5mm, 10×10mm) FPT-64P-M03 / LQFP-64P(0.65mm,12×12 mm) FPT-64P-M09	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-220 (Includes one set: NQPACK064SD, HQPACK064SD) / MB2146-221 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB95FV100D-103 (Pre-mounted on MCU board)
MB95100B	MB95107B MB95F108BS MB95F108BW	LQFP-64P(0.5mm,10×10mm) FPT-64P-M03 / LQFP-64P(0.65mm,12×12mm) FPT-64P-M09	MB2146-09A-E (Includes USB cable)	MB2146-301A-E	MB2146-220 (Includes one set: NQPACK064SD, HQPACK064SD) / MB2146-221 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB95FV100D-101 (Pre-mounted on MCU board)
MB95110B	MB95116B MB95F118BS MB95F118BW	LQFP-48P(0.5mm,7×7mm) FPT-48P-M26	MB2146-09A-E (Includes USB cable)	MB2146-301A-E	MB2146-210 (Includes one set: NQPACK048SD, HQPACK048SD)	MB95FV100D-101 (Pre-mounted on MCU board)
MB95110M	MB95F114JS/114JW/114MS/114MW/114NS/114NW/116MAS/116NAS/116MAW/116NAW/118NS/118MS/118MW/118NW/118JS/118JW	LQFP-52P(0.65mm,10×10 mm) FPT-52P-M01	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-260 (Includes one set: NQPACK052SB, HQPACK052SB)	MB95FV100D-103 (Pre-mounted on MCU board)
MB95120	MB95F128D	LQFP-100P(0.5mm,14×14mm) FPT-100P-M20 / QFP-100P(0.65mm,14×20mm) FPT-100P-M06	MB2146-09A-E (Includes USB cable)	MB2146-301A-E	MB2146-250 (Includes one set: NQPACK100SD-ND, HQPACK100SD) / MB2146-251 (Includes one set: NQPACK100RB, HQPACK100RB)	MB95FV100D-101 (Pre-mounted on MCU board)

Evaluation board	Flash memory writer Parallel writers*2 Made by Flash Support Group Supported writers	Made by Hi-Lo Systems	Made by Data I/O	Serial writers*2 Made by Fujitsu Semiconductor	SOFTUNE V3 professional pack	Remarks
MB2146-401	AF9709C, AF9710, AF9723B	-	-	Yes	SP3603Z008-P01 (1 license) SP3603Z008-P03 (3 licenses) SP3603Z008-P05 (5 licenses) SP3603Z008-P10 (10 licenses)	- Starter kit (3V version) Part number: MB2146-401-01A - Starter kit (5V version) Part number:MB2146-401-03A
MB2146-401	AF9709C, AF9710, AF9723B	-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B	-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B	-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B	-	-	Yes		

＊1 : 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.
For inquiries, contact Tokyo Eletech Corporation TEL : +81-3-5295 -1661 FAX : +81-3-5295 -1663

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

■ F²MC-8FX Family Development Tool Lineup

Series	Part Number	Package	ICE BGM adapter	ICE MCU board	ICE Header board *1	ICE Evaluation chip
MB95120MB	MB95F124JB/124MB/124NB/ 126JB/126MB/126NB/128MB/ 128NB/128JB	LQFP-100P(0.5mm,14×14mm) FPT-100P-M05 / QFP-100P(0.65mm,14×20mm) FPT-100P-M06	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-250 (Includes one set: NQPACK100SD-ND, HQPACK100SD) MB2146-251 Includes one set: NQPACK100RB, HQPACK100RB)	MB95FV100D-103 (Pre-mounted on MCU board)
MB95130MB	MB95F133JBS/133JBW/133MBS/ 133MBW/133NBS/133NBW/ 134JBS/134JBW/134MBS/ 134MBW/134NBS/134NBW/ 136MBS/136NBS/136MBW/ 136NBW/136JBS/136JBW	SOP-28P(1.27mm, 8.6×17.75mm) FPT-28P-M17 / SSOP-30P(0.65mm, 5.6×9.7mm) FPT-30P-M02	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-270 (Includes: SSA-28YR1-M17) MB2146-271 (Includes: SSA-30BK1-M02)	MB95FV100D-103 (Pre-mounted on MCU board)
MB95140	MB95F146S MB95F146W	LQFP-32P(0.8 mm, 7×7mm) FPT-32P-M21	MB2146-09A-E (Includes USB cable)	MB2146-301A-E	MB2146-200 (Includes one set: NQPACK032SA, HQPACK032SA)	MB95FV100D-101 (Pre-mounted on MCU board)
MB95150M	MB95156M MB95F156M MB95F156N MB95F156J	LQFP-48P(0.5mm,7×7mm) FPT-48P-M26 / LQFP-52P(0.65mm,10×10mm) FPT-52P-M01	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-213 (Includes one set: NQPACK048SD, HQPACK048SD) MB2146-261 (Includes one set: NQPACK052SB, HQPACK052SB)	MB95FV100D-103 (Pre-mounted on MCU board)
MB95160	MB95166D MB95F166D	LQFP-64P(0.5mm,10×10mm) FPT-64P-M24 / LQFP-64P(0.65mm,12×12mm) FPT-64P-M23	MB2146-09A-E (Includes USB cable)	MB2146-301A-E	MB2146-222 (Includes one set: NQPACK064SD, HQPACK064SD) MB2146-223 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB95FV100D-101 (Pre-mounted on MCU board)
MB95160MA	MB95F168MA MB95F168NA MB95F168JA	LQFP-64P(0.5mm,10×10mm) FPT-64P-M24 / LQFP-64P(0.65mm,12×12mm) FPT-64P-M23	MB2146-09A-E (Includes USB cable)	MB2146-303A-E	MB2146-222 (Includes one set: NQPACK064SD, HQPACK064SD) MB2146-223 (Includes one set: NQPACK064SB, HQPACK064SB140)	MB95FV100D-101 (Pre-mounted on MCU board)
MB95200H	MB95F202H MB95F203H MB95F204H MB95F202K MB95F203K MB95F204K	SDIP-24 / SOP-20	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95210H	MB95F212H MB95F213H MB95F214H MB95F212K MB95F213K MB95F214K	DIP-8 / SOP-8	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95220H	MB95F222H MB95F223H MB95F222K MB95F223K	DIP-16 / SOP-16	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95260H	MB95F262H *3 MB95F262K *3 MB95F263H *3 MB95F263K *3 MB95F264H *3 MB95F264K *3	QFN-32 / SDIP-24 / SOP-20 / TSSOP-20	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95270H	MB95F272H *3 MB95F272K *3 MB95F273H *3 MB95F273K *3 MB95F274H *3 MB95F274K *3	DIP-8 / SOP-8	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95280H	MB95F282H *3 MB95F282K *3 MB95F283H *3 MB95F283K *3 MB95F284H *3 MB95F284K *3	DIP-16 / SOP-16	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)
MB95R200	MB95R203A *3	SDIP-24 SOP-20	MB2146-08-E (Includes USB cable)	-	-	- (built-in on-chip debugger)

*1 : 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.
For inquiries, contact Tokyo Eletech Corporation   TEL : +81-3-5295 -1661   FAX : +81-3-5295 -1663

Evaluation board		Parallel writers*2 Made by Flash Support Group Supported writers	Parallel writers*2 Made by Hi-Lo Systems	Parallel writers*2 Made by Data I/O	Serial writers*2 Made by Fujitsu Semiconductor	SOFTUNE V3 professional pack	Remarks
MB2146-401	AF9709C, AF9710, AF9723B		-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B		-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B		-	-	Yes	SP3603Z008-P01 (1 license) SP3603Z008-P03 (3 licenses) SP3603Z008-P05 (5 licenses) SP3603Z008-P10 (10 licenses)	- Starter kit (3V version) Part number: MB2146-401-01A - Starter kit (5V version) Part number: MB2146-401-03A
MB2146-401	AF9709C, AF9710, AF9723B		-	-	Yes		
MB2146-401	AF9709C		-	-	Yes		
MB2146-401	AF9709C, AF9710, AF9723B		-	-	Yes		
MB2146-410-E	AF9723B		ALL-100 + ADP-MB95F204-SD	Optima Sprint + SP-S5416	Yes		
			ALL-100 + ADP-MB95F204-S	FlashPAK II + FP-PAK-S830			
MB2146-410-E	AF9723B		ALL-100 + ADP-MB95F214-DP8	FlashPAK II + FP-PAK-D914	Yes		Starter kit Part number: MB2146-410-01-E
			ALL-100 + ADP-MB95F214-S	FlashPAK II + FP-PAK-S941			
MB2146-410-E	-		-	Optima Sprint + SP-S5428	Yes		
			-	FlashPAK II + FP-PAK-S941			
MB2146-420-E	-		ALL-100 + ADP-MB95F264-QN32	FlashPAK II + FP-PAK-L975	Yes	SP3603Z008-P01 (1 license) SP3603Z008-P03 (3 licenses) SP3603Z008-P05 (5 licenses) SP3603Z008-P10 (10 licenses)	
			ALL-100 + ADP-MB95F204-SD	Optima Sprint + SP-S5416			
			ALL-100 + ADP-MB95F204-S	FlashPAK II + FP-PAK-S830			
			-	FlashPAK II + FP-PAK-S957			
MB2146-420-E	-		ALL-100 + ADP-MB95F214-DP8	FlashPAK II + FP-PAK-D914	Yes		Starter kit Part number: MB2146-420-01-E
			ALL-100 + ADP-MB95F214-S	FlashPAK II + FP-PAK-S941			
MB2146-420-E	-		-	-	Yes		
			-	FlashPAK II + FP-PAK-S941			
MB2146-430-E	-		-	-	Yes		Starter kit Part number: MB2146-430-01-E

*2 : See the following website for information on the parallel and serial writers. http://jp.fujitsu.com/microelectronics/products/micom/tools/hard/writer/
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.
*3 : Under development

Evaluation Board

Fujitsu Semiconductor provides evaluation boards for developing embedded systems equipped with an FR family F^{2}MC.

Evaluation Board for the FR Family and F^{2}MC-16LX/FX (BBF2004)

■Features
This is an evaluation board manufactured by Sunhayato that supports the F^{2}MC-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 F^{2}MC-8FX (MB95100) Series (MB2146-401)

■Features
This evaluation board supports the Fujitsu F^{2}MC-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 F^{2}MC-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 a 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

F^{2}MC-8FX MB95200 Series Starter Kit

This is a starter kit for the F^{2}MC-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 an 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 MB95R203 (8 KByte FRAM, 496 Byte RAM)
- Board functions
  Buzzer, temperature sensor, LED, serial (RS-232C), interrupt button, LIN/UART pins, I^{2}C, 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, BGM adapter pins

Evaluation Board

Support hardware

Support software

Development support tool

32
bit

16
bit

8
bit

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 F^{2}MC-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).
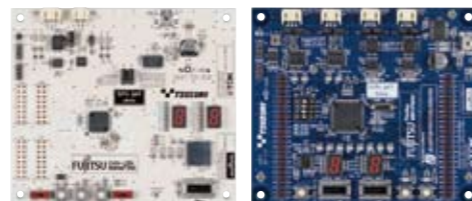
Developer: TSUZUKI DENSAN Co., Ltd.
2-5-3, Nishi-shinbashi, Minato-ku, Tokyo, 105-8420, Japan
E-mail : pd-bitspot@tsuzuki-densan.co.jp
URL : http://www.tsuzuki-densan.co.jp/bitspot/

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

CAN-MOTOR [CAN-100]
■Microcontroller: 32bit-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-F^{2}MC-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})
  *1: Does not support config, diag, etc.
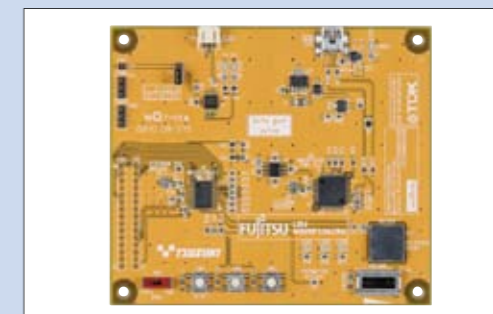
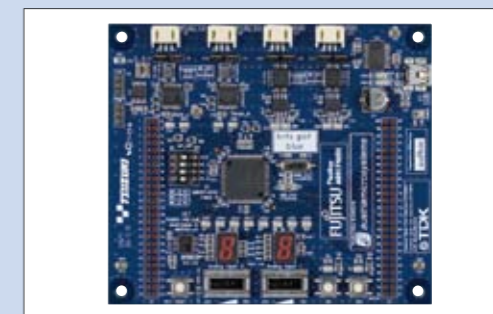## Kit for Learning CAN-LIN communication (bits pot white)

CAN-LIN [CAL-100]
■Microcontroller: 16bit-F^{2}MC-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 LIN2.0*^{2})
  *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 AS8221C).
- 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.

bits pot yellow LIN — LIN — bits pot white CAN-LIN — CAN — bits pot red CAN-MOTOR

bits pot blue FlexRay — FlexRay — bits pot blue FlexRay
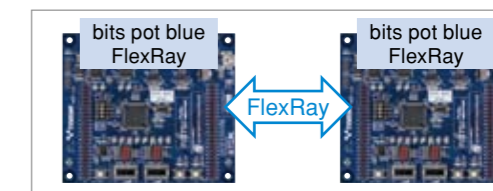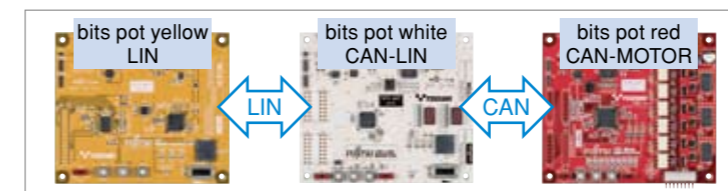
Program Writing Support

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.

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

[Request for pre-programmed products]

Fujitsu Semiconductor factory
Fujitsu Electronics
Programming house

Pre-programmed products

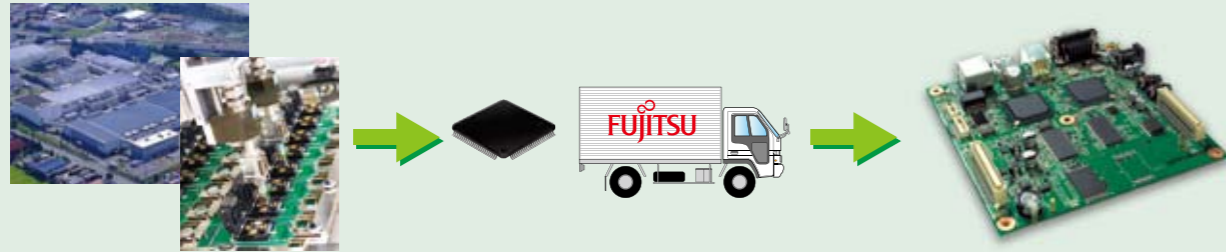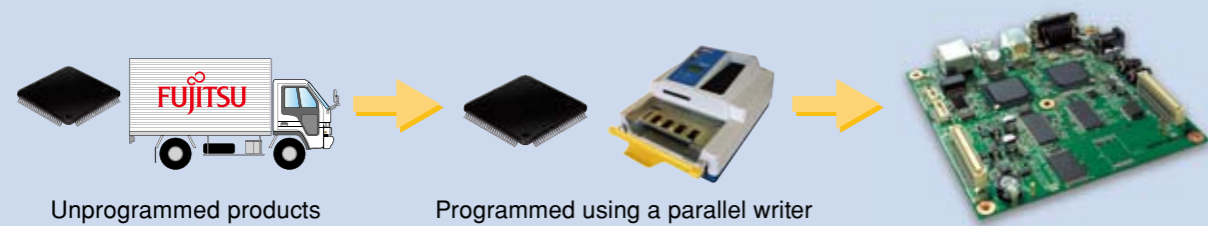Mounted by the customer

Advantage: Large lots

The case of products programmed by the customer

[Request for programming prior to mounting]

Unprogrammed products

Programmed using a parallel writer

Mounted by the customer

Advantage: Short delivery time

[Request for on-board programming]

Unprogrammed products

Mounted by the customer

On-board programmer
(programmed after mounting)

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

Parallel writer		F2MC-8FX	F2MC-16LX	F2MC-16FX	FR family
Flash Support Group, Inc.					
Single unit programmers	AF9709C	Yes	Yes	Yes	Yes
	AF9710	Yes	Yes		
Gang programmers	AF9723B	Yes	Yes		Yes
Minato Electronics Inc.					
Single unit programmers	MODEL1881XP		Yes		Yes
	MODEL1995/2		Yes		Yes
Gang programmers	MODEL1893		Yes		Yes
	MODEL1931		Yes		Yes
	MODEL1930+SU3000LX		Yes		Yes
	MODEL1940		Yes		Yes
	MODEL1895		Yes		Yes
	MODEL1896		Yes		Yes
Data I/O Corporation (USA)*					
Single unit programmers	OPTIMA	Yes	Yes		Yes
	DUAL-Package	Yes	Yes		Yes
Gang programmers	OCTAL	Yes	Yes		Yes
	FlashPAK/FlashPAK II	Yes	Yes		Yes

*: Data I/O Corporation (USA) (Represented in Japan by Toyo Corporation)

■Onboard programming support

● Serial on-board writers

Serial on-board writers		F2MC-8FX	F2MC-16LX	F2MC-16FX	FR family
Fujitsu Semiconductor Limited	Flash USB Programmer (BGM adapter: MB2146-09A-E must be acquired separately)	Yes	Yes		Yes
	Flash MCU Programmer	Yes	Yes	Yes	Yes
Yokogawa Digital Computer Corporation	AF420/AF320/ AF620/AF520	Yes	Yes	Yes	Yes
Flash Support Group, Inc.	AF9101/03	Yes	Yes		Yes
Kyoei	I.S.P-300		Yes		Yes

32 bit
16 bit
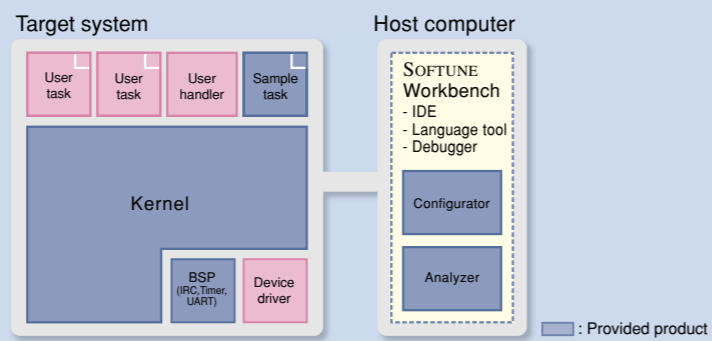8 bit

SOFTUNE™ REALOS™ series

Fujitsu Semiconductor provides a real-time OS for developing software
for Fujitsu microcontrollers (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 (refer to P31)
- REALOS analyzer (refer to P31)
- Sample programs
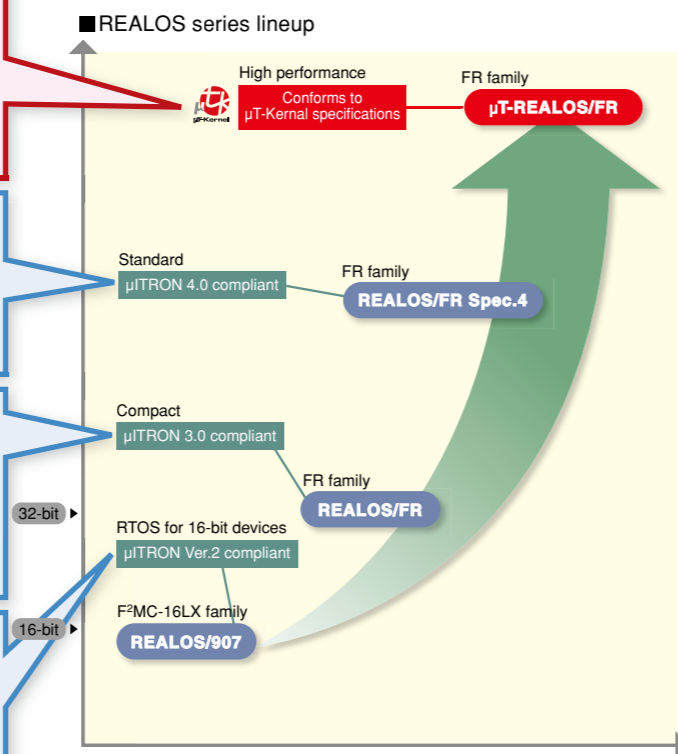- μITRON specification compatible API (under development)

Target system

| User task | User task | User handler | Sample task |

Kernel

BSP (IRC,Timer, UART) | Device driver

Host computer

SOFTUNE Workbench
- IDE
- Language tool
- Debugger

Configurator

Analyzer

: Provided product

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.

■REALOS series lineup

High performance

Conforms to μT-Kernal specifications

FR family
μT-REALOS/FR

Standard
μITRON 4.0 compliant
FR family
REALOS/FR Spec.4

Compact
μITRON 3.0 compliant
FR family
REALOS/FR

32-bit ▶

RTOS for 16-bit devices
μITRON Ver.2 compliant

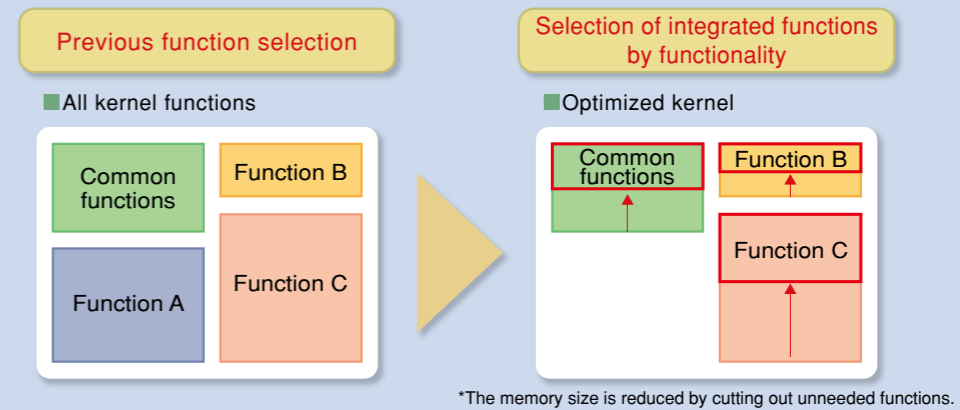16-bit ▶

F²MC-16LX family
REALOS/907

SOFTUNE μT-REALOS/FR

"SOFTUNE μT-REALOS/FR" is a real-time OS that conforms to the μT-Kernel specifications. This is the optimal kernel for FR that is packed with many years of development know-how.

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.

Previous function selection

Selection of integrated functions by functionality

■All kernel functions

■Optimized kernel

| Common functions | Function B |
| Function A | Function C |

| Common functions | Function B |
| | Function C |

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

- **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.
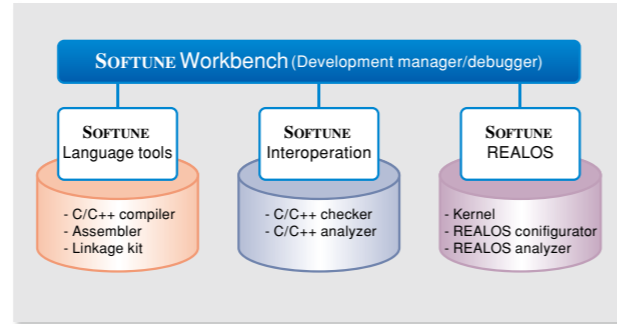
32 bit

16 bit

8 bit

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.
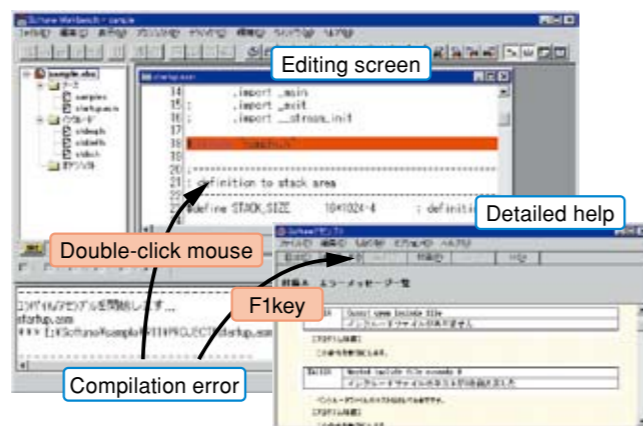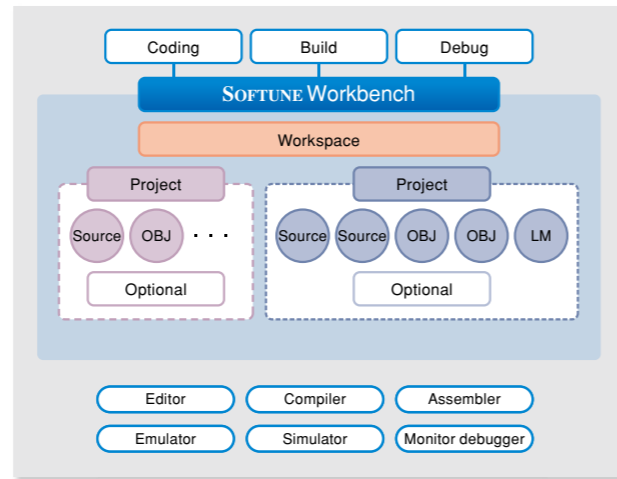
Structure of SOFTUNE

- 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 improving quality.
  Projects integrated with "C/C++ Checker" for verifying
  coding and "C/C++ Analyzer" for structural analysis.

- Equipped with tools for simplifying the use of the μITRON
  compliant "REALOS". (Configurator and analyzer)

SOFTUNE Workbench (Development manager/debugger)

SOFTUNE Language tools	SOFTUNE Interoperation	SOFTUNE REALOS
- C/C++ compiler - Assembler - Linkage kit	- C/C++ checker - C/C++ analyzer	- Kernel - REALOS conifigurator - REALOS analyzer

Manager functions

Work progresses based on a "project file" that contains all of the necessary information for developing a program.
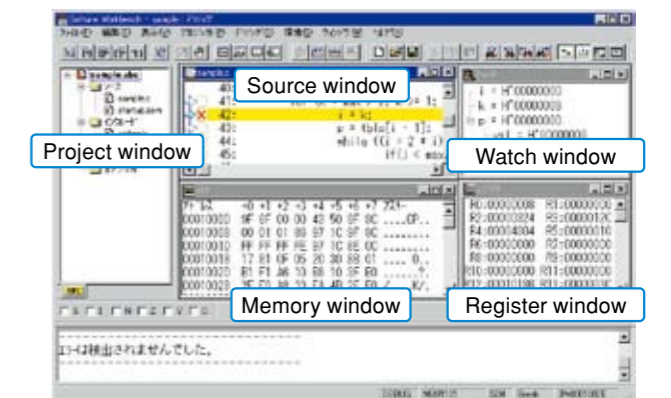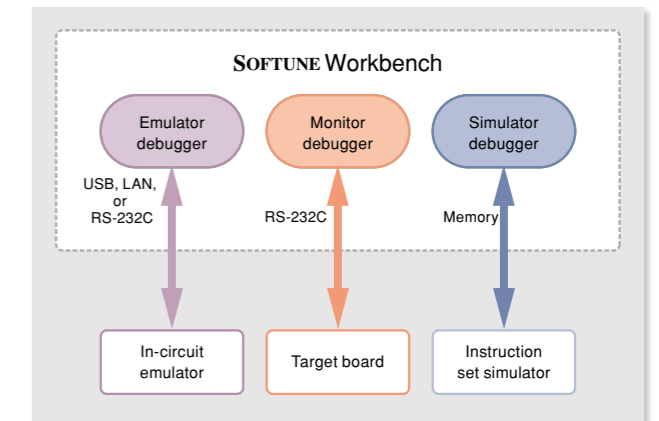
- Utilizing projects
  The development environment can be easily constructed
  both for the case of a single person performing multiple
  jobs in parallel or for a group working on a single
  development by using project files.

- 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.
    (Mifes 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.

Coding | Build | Debug

SOFTUNE Workbench

Workspace

Project — Source, OBJ · · · Optional

Project — Source, Source, OBJ, OBJ, LM — Optional

Editor | Compiler | Assembler
Emulator | Simulator | Monitor debugger

Editing screen
Detailed help
Double-click mouse
F1key
Compilation error

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

SOFTUNE Workbench

Emulator debugger	Monitor debugger	Simulator debugger
USB, LAN, or RS-232C	RS-232C	Memory
In-circuit emulator	Target board	Instruction set simulator

Source window
Project window
Watch window
Memory window
Register window

Support hardware

Support software

Development support tool

32 bit

16 bit

8 bit

SOFTUNE™ series
(Integrated Development Environment)

SOFTUNE REALOS Development Support Functions

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.
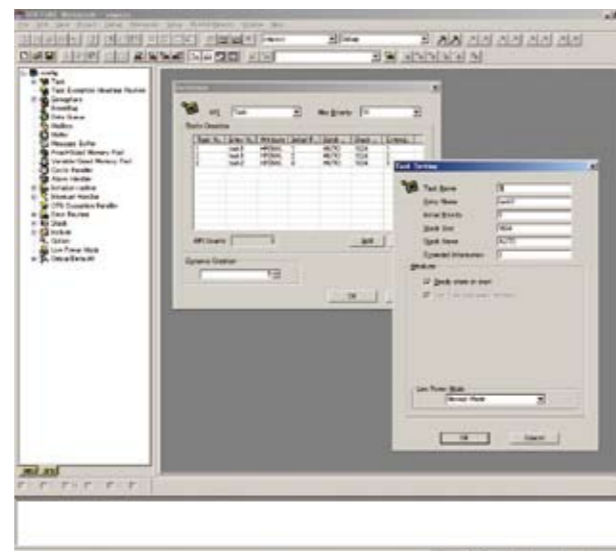
● REALOS analyzer

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
- Stack information
- Task context switches
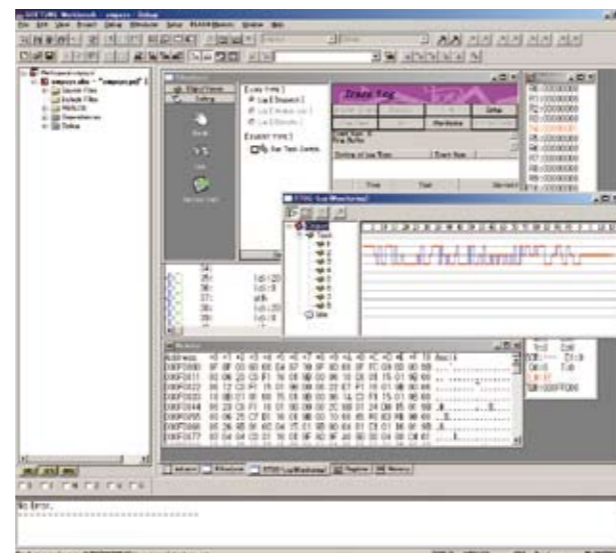
■ List of products

Product name	Version	Family	Part number	Component products
SOFTUNE professional pack	V6	FR	SP365030118QAC (1 license) SP365030118QBC (3 licenses) SP365030118QCC (5 licenses) SP365030118QDC (10 licenses)	Workbench C/C++ compiler Assembler pack C/C++ analyzer C/C++ checker
	V3	F²MC-16	SP3607Z008-P01 (1 license) SP3607Z008-P03 (3 licenses) SP3607Z008-P05 (5 licenses) SP3607Z008-P10 (10 licenses)	Workbench C compiler Assembler pack C analyzer C checker
		F²MC-8FX	SP3603Z008-P01 (1 license) SP3603Z008-P03 (3 licenses) SP3603Z008-P05 (5 licenses) SP3603Z008-P10 (10 licenses)	

Product name	Compliant specification	Part number	Component products
SOFTUNE μT-REALOS/FR	μT-Kernel	SP3650P1218RCC (integration license)	Kernel, configurator, REALOS analyzer, kernel source
		SP3650P1218EVC (evaluation license)	Kernel, configurator, REALOS analyzer
SOFTUNE REALOS/FR Spec.4	μITRON4.0	SP365001518RCC (integration license)	Kernel, configurator, REALOS analyzer, kernel source
		SP365001518EVC (evaluation license)	Kernel, configurator, REALOS analyzer
REALOS/FR Spec.4 for MULTI		SP365001618RCC (integration license)	Kernel, configurator, REALOS analyzer, kernel source
		SP365001618EVC (evaluation license)	Kernel, configurator, REALOS analyzer
SOFTUNE REALOS/FR	μITRON3.0	SP365000218RCC (integration license) SP365000218EVC (evaluation license)	Kernel, configurator, REALOS analyzer, kernel source
REALOS/FR for MULTI		SP365001018RCC (integration license) SP365001018EVC (evaluation license)	Kernel, configurator, REALOS analyzer, kernel source
SOFTUNE REALOS/907	μITRON Ver2.01	SP3607M008EV (evaluation license) SP3607M008BA (integration license)	Kernel, configurator, REALOS analyzer, kernel source

■ List of functions

● System requirements

Item	Specification
Type	IBM PC/AT or compatible
OS	Windows Vista, Windows XP, Windows 2000
Memory	256 MByte or more (512 MByte or more recommended)
Hard disk	300 MByte or more (1 GByte or more recommended)

● Function overview

Item	Specification
Project management	Editor, make/build management, various optional settings, integrated debugger, integrated REALOS (RTOS) configurator
C/C++ compiler	ANSI compliant, optimization options (speed, size, or debug priority)
Debugger	[CPU execution control] Run/stop/reset, breakpoint settings, stepped execution (assembly level/high level language level) [Event functions and trace functions] Event settings (data/instruction), trace function maximum 64K frames, instruction trace, data trace [View/write memory] Symbolic debugging and various windows (variable watch, memory, registers) [RTOS integration] Integrated REALOS analyzer (display running tasks, display object information) [Emulator connection] USB/RS232C/LAN [Other] On-demand load function (function that reduces the time to download debugging information), on-chip debugging support, monitor debugger support
Other	Interoperation with external tools (commercial editors and commercial code checking tools)

32 bit

16 bit

8 bit

Development Supporting Tool
(Development Environment / OS / Middleware / tools)

Fujitsu Semiconductor provides development support tools for developing embedded systems using FR and F^2MC.

■ Integrated Development Environments

Product name	Overview	Inquiries
SOFTUNE	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. - 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 http://jp.fujitsu.com/fsl/en/
MULTI5.0	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

Product name	Overview	Inquiries
SOFTUNE REALOS	- A µITRON compliant real-time OS for the Fujitsu F^2MC-16LX/FR family microcontrollers. - Can be used for a broad range of development, from products with tight resource limitations to large-scale systems. - An analyzer is included as a debugging support tool.	Fujitsu Semiconductor Limited http://jp.fujitsu.com/fsl/en/
SOFTUNE uT-REALOS	- A µT-Kernel compliant real-time OS for the Fujitsu FR family of 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.	Fujitsu Semiconductor Limited http://jp.fujitsu.com/fsl/en/
EB tresos	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 tresos ECU development tool for AUTOSAR compliant vehicle-mounted products. EB tresos AutoCore/AUTOSAR compliant middleware (BSW and RTE) Graphical user interface for EB tresos Studio and embedded software configuration Real-time OS for AUTOSAR compliant real-time OS	Elektrobit Nippon KK TEL : +81-3-5775-6160 http://www.elektrobit.com/
osCAN	osCAN is a pre-emptive, real-time, multitasking operating system that has the optimal functions for operating on a microcontroller. Features: - Seamless integration with CANbedded 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	Vector Japan Co., Ltd. TEL : +81-3-5769-6972 (Embedded software department) http://www.vector-japan.co.jp/

■ Middleware

Product name	Overview	Inquiries
RELC	- 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 start-up 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 patents, quality, and support. - RELC delivers compression and decompression speeds approximately 2 times faster the the ZLIB free software. - The decompression function is also available as a hardware macro (RTL).	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/
eFILE32	- 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 F^2MC-16 family and FR family, with the ARM7 and 9 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.	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/
eTCP/IP	- eTCP/IP is a TCP/IP stack for embedded devices offering high compatibility, implementation in small amounts of memory, high performance, and finely 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 F^2MC-16 family and FR family, with the ARM7 and 9 also supported for ASIC.	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/
Multi Device File Access Library(MDF) for FR V02	- 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 PCs and embedded devices.	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/
Cryptography/ authentication library	- This is a library for cryptography (RSA, AES, DES, 3DES), authentication (SHA-1, MD5), and pseudo-random number generation (FIPS186-2) processing.	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/
JPEG library	- 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.	Fujitsu Electronics Inc. http://jp.fujitsu.com/fei/en/

Support hardware

Support software

Development support tool

32 bit

16 bit

8 bit

Development Supporting Tool
(Development Environment / OS / Middleware / tools)

■ Middleware

Product name	Overview	Inquiries
KASAGO (TCP/IP stack)	- 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.	Zuken Elmic, Inc. TEL : +81-45-664-5171 http://www.elwsc.co.jp/
CANdriver	- 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	Vector Japan Co., Ltd. TEL : +81-3-5769-6972 (Embedded software department) http://www.vector-japan.co.jp/
LINdriver	- 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	Vector Japan Co., Ltd. TEL : +81-3-5769-6972 (Embedded software department) http://www.vector-japan.co.jp/
MICROSAR product group (AUTOSAR embedded software product)	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.	Vector Japan Co., Ltd. TEL : +81-3-5769-6972 (Embedded software department) http://www.vector-japan.co.jp/

■ Analysis Tools

Product name	Overview	Inquiries
PGRelief	This is a static analysis tool for identifying bugs in C/C++ source code. - Identifies bug locations from data structures and processing flows. - Checks conformance with SEC coding standards and MISRA-C guidelines. - Analysis is perform by integration with SOFTUNE make/build, allowing checking and correction of bugs by simple operations.	Fujitsu Software Technologies Limited TEL : +81-45-475-9820 http://jp.fujitsu.com/fst/services/pgr/
QAC/MCM	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 integrate with SOFTUNE make/build to check violations of standards, etc.	Toyo Corporation Software Solutions TEL : +81-3-3245-1248 http://www.toyo.co.jp/ss/

■ CASE Tools

Product name	Overview	Inquiries
IBM Rational Rose® Technical Developer	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.	IBM Corporation http://www-01.ibm.com/software/awdtools/developer/technical/
IBM Rational Test RealTime™	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.	IBM Corporation http://www-01.ibm.com/software/awdtools/test/realtime/index.html
Telelogic Rhapsody	Rhapsody is a development environment for improving the efficiency of model driver development (MDD) which promotes development focusing on "models" 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.	Itochu Techno-Solutions Corporation TEL : +81-3-6417-5434 http://www.ctc-g.co.jp/solutions/embedded/index.html
Telelogic Statemate	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.	Itochu Techno-Solutions Corporation TEL : +81-3-6417-5434 http://www.ctc-g.co.jp/solutions/embedded/index.html
visual STATE	- This is a tool for designing using state charts, generating code, testing, and creating documents for embedded applications. - Enables simply 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	IAR Systems TEL : +81-3-5298-4800 http://www.iarsys.co.jp/
MATLAB®/ Simulink®	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.	MathWorks Japan TEL : +81-3-6367-6700 http://www.mathworks.co.jp/
ZIPC	- 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.	CATS Co. Ltd. TEL : +81-45-473-2816 http://www.zipc.com/

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Support hardware
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Development Supporting Tool
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■ CASE Tools

Product name	Overview	Inquiries
SystemDesk	- 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.	dSPACE Japan TEL : +81-3-5798-5460 http://www.dspace.jp/
TargetLink	- 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	dSPACE Japan TEL : +81-3-5798-5460 http://www.dspace.jp/

■ Verification Tools

Product name	Overview	Inquiries
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/

■ Verification Tools

Product name	Overview	Inquiries
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/

Support hardware

Support software

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