MITSUBISHI
SEMICONDUCTORS
DATA SHEETS

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DEVELOPMENT SUPPORT TOOLS FOR
M16C FAMILY
(16-BIT MICROCOMPUTERS)

MITSUBISHI ELECTRIC

CONTENTS

5. PROM Programming Adapters

M16C Family

Overview of Tools for M16C Family

Development Support Tools Lineup

- Programming environment accommodating C language, assembly language and structured language
- Debugging environment enabling efficient development for team programming
- Accessory tools ready for connection to various target systems
- We offer various tools for each step of the process from software development through debugging and evaluation. We help you realize a consistent development environment by providing smooth operability and interfacing.
- With our strong third-party relationships, we continue to deliver a wide range of solutions for your development challenges.

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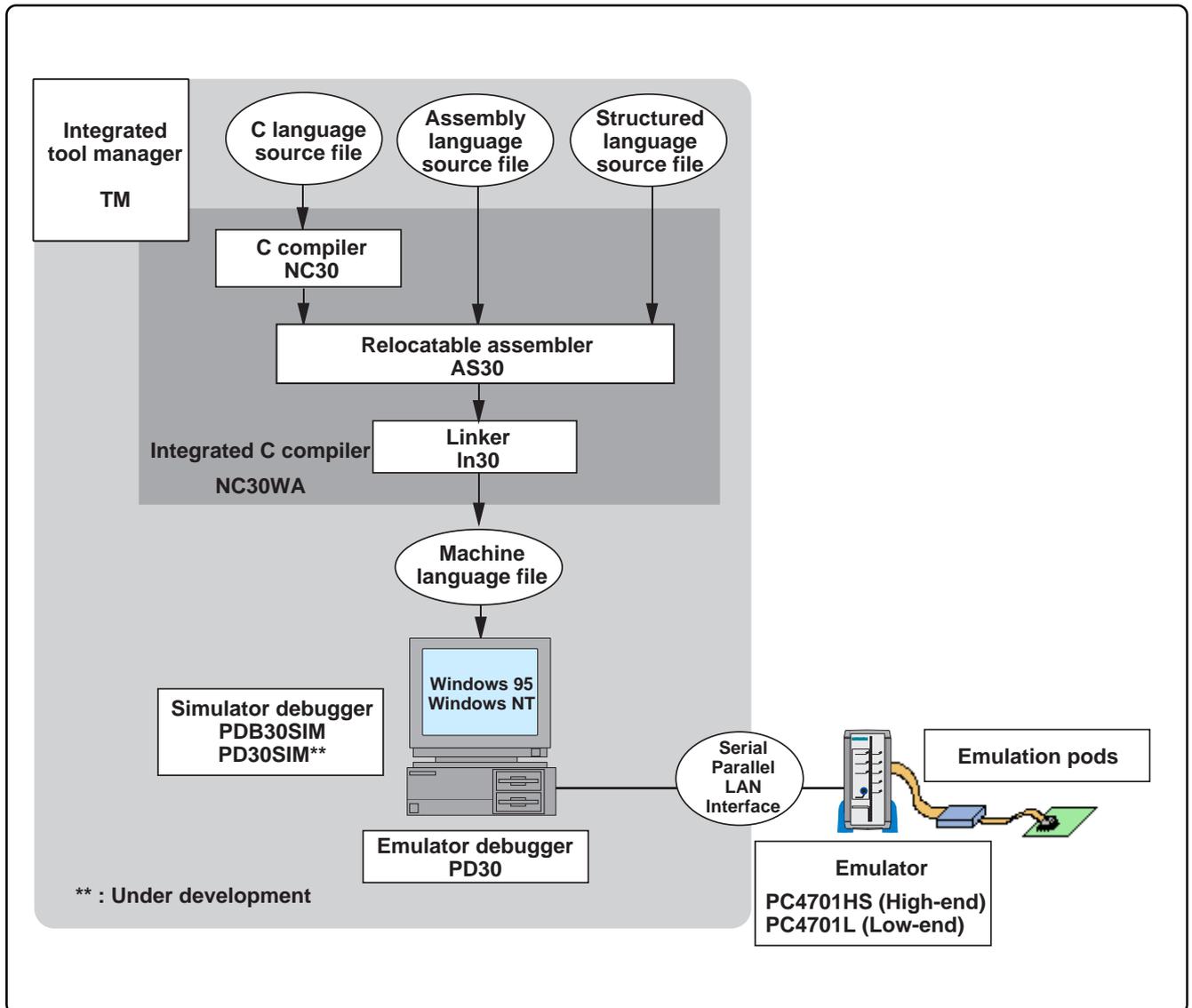
Programming Environment

Integrated C Compiler NC30WA

TM Integrated Tool Manager

Integrated Tool Manager for efficient program development with high operability under Windows 95 and NT.
User's system information is manageable in one project file.
Highly efficient development from programming through debugging with a mouse controlled menu driven user interface.

NC30 C Compiler

- Compliance with ANSI* standards
- Efficient coding and optimizing comparable to those of assemblers
- Various functional extensions, #pragma for writing into ROM
- Specifying the variables, near / far
- Stack size calculation function instruction

* ANSI: American National Standards Institute

AS30 Assembler

- Supports structured language.
- Generates optimized codes with effective use of MCU instructions sets.
- Wide variety of macro instructions
- Convenient utilities
- Standard object formats
  - IEEE-695
  - Motorola S format
  - Intel HEX format

Simulator Debugger PDB30SIM

Evaluates programs aside from target development to improve the efficiency of development.

High operability with a menu driven user interface common to PD30 emulator debugger.

* PDB30SIM is to be upgraded in June 1998, and renamed to 'PD30SIM'.

Debugging Environment

Emulator Debugger

PD30
- Supports PC4701HS (High-end version) and PC4701L (Low-end version)
- Ease of operation
- Various source-level debugging functions
- Support of customization function CB30

Emulator

PC4701HS / PC4701L
- Choice of PC4701HS (High-end version) and PC4701L (Low-end version)
- Compliant with international standards (UL/FCC standard and CE marking)
- High-speed downloading
- Standard real-time RAM monitor
- PC4701HS features the following additional functions:
  - Real-time trace
  - C0 coverage
  - State transition break
  - Standard LAN
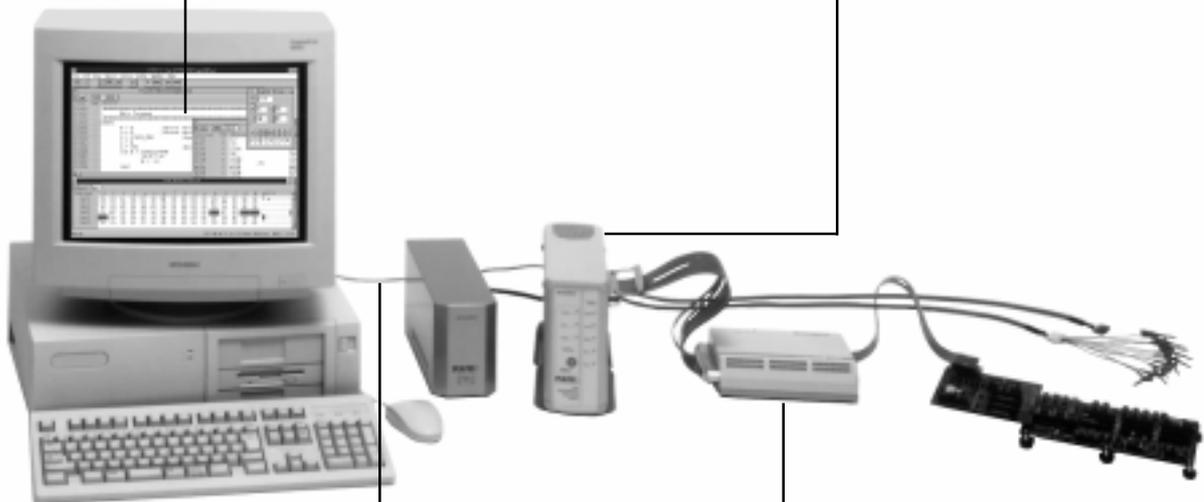
Interface

- RS-232C serial interface
- Parallel interface
- LAN interface
- Supports 10Base-5 and 10Base-T connectors.

* When using the parallel interface, the parallel interface board (separately available) is required.

* When using LAN interface with PC4701L, the PC4701L LAN Option (separately available) is required.

Emulation Pod

- Supports high-speed clocks.
- Supports low input voltages.
- Compliant with international standards

MCU Series	Emulation pod
M16C/61	M30610T-RPD-E
M16C/62	M30620T-RPD-E M30620TB-RPD-E (Under development)

Overview of Tools for M16C Family

Accessory Tools for Debugging

We offer various accessory tools, such as converters, to support a wide selection of product packages.

The accessory tools enable connecting your target system to the emulator without changing the target system.

For more information, refer to Mitsubishi Microcomputer Accessory Guide.
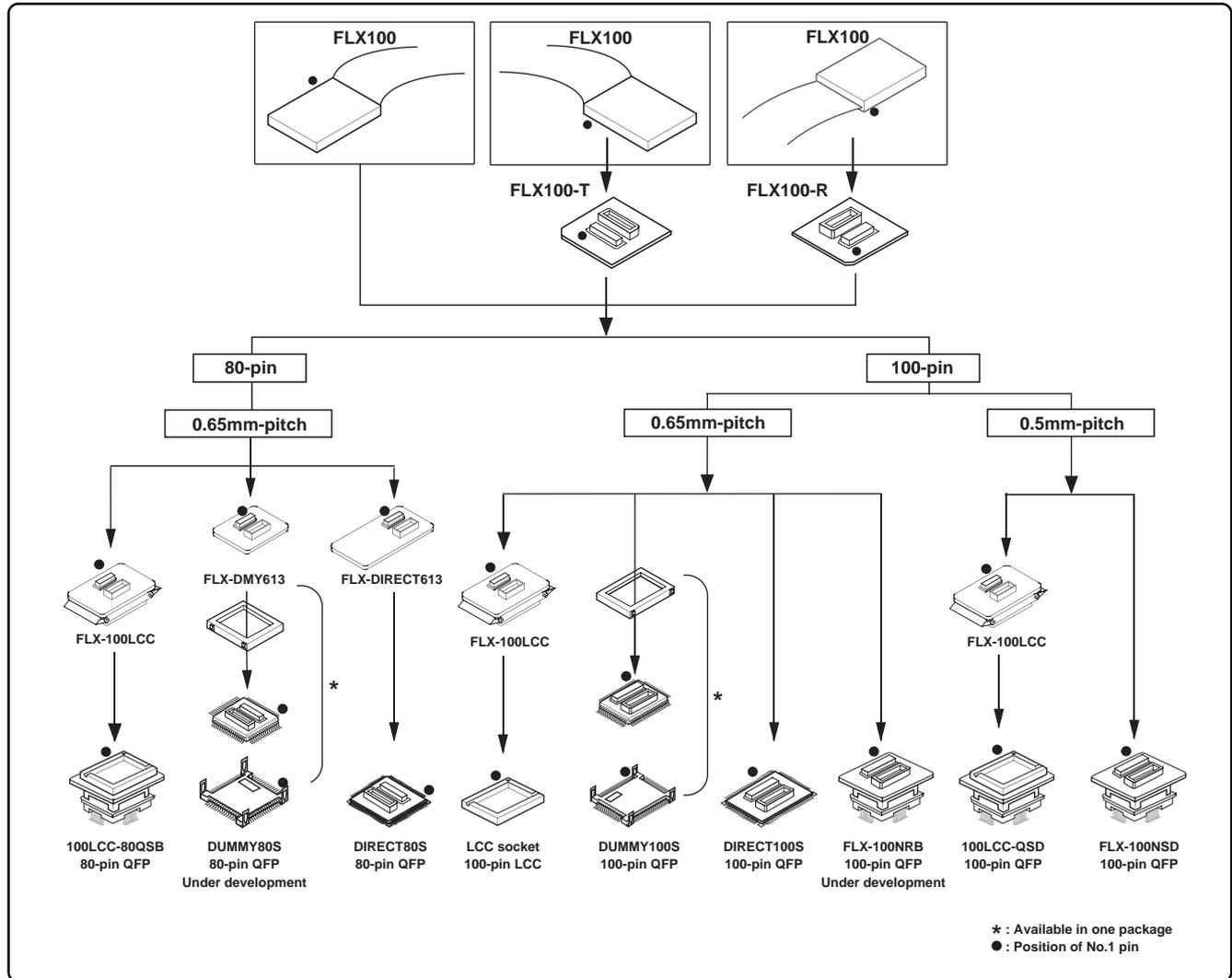
PROM Programming Adapters

PROM programming adapters are accessory tools to write programs into MCU (OTP and EPROM versions) with a PROM programmer commercially available*.

We offer four PROM programming adapters for M16C Family microcomputer packages.

PCA7413F-80	PCA7412F-100	PCA7412L-100	PCA7412G-100
80-pin	100-pin	100-pin	100-pin
0.65mm-pitch	0.65mm-pitch	0.65mm-pitch	0.5mm-pitch
QFP	QFP	LCC	QFP

  * We recommend the PROM programmers (R4945, R4945A) available from Advantest Corporation.

Accessory Tools for On-board Evaluation

For more information, refer to Mitsubishi Microcomputer Accessory Guide.
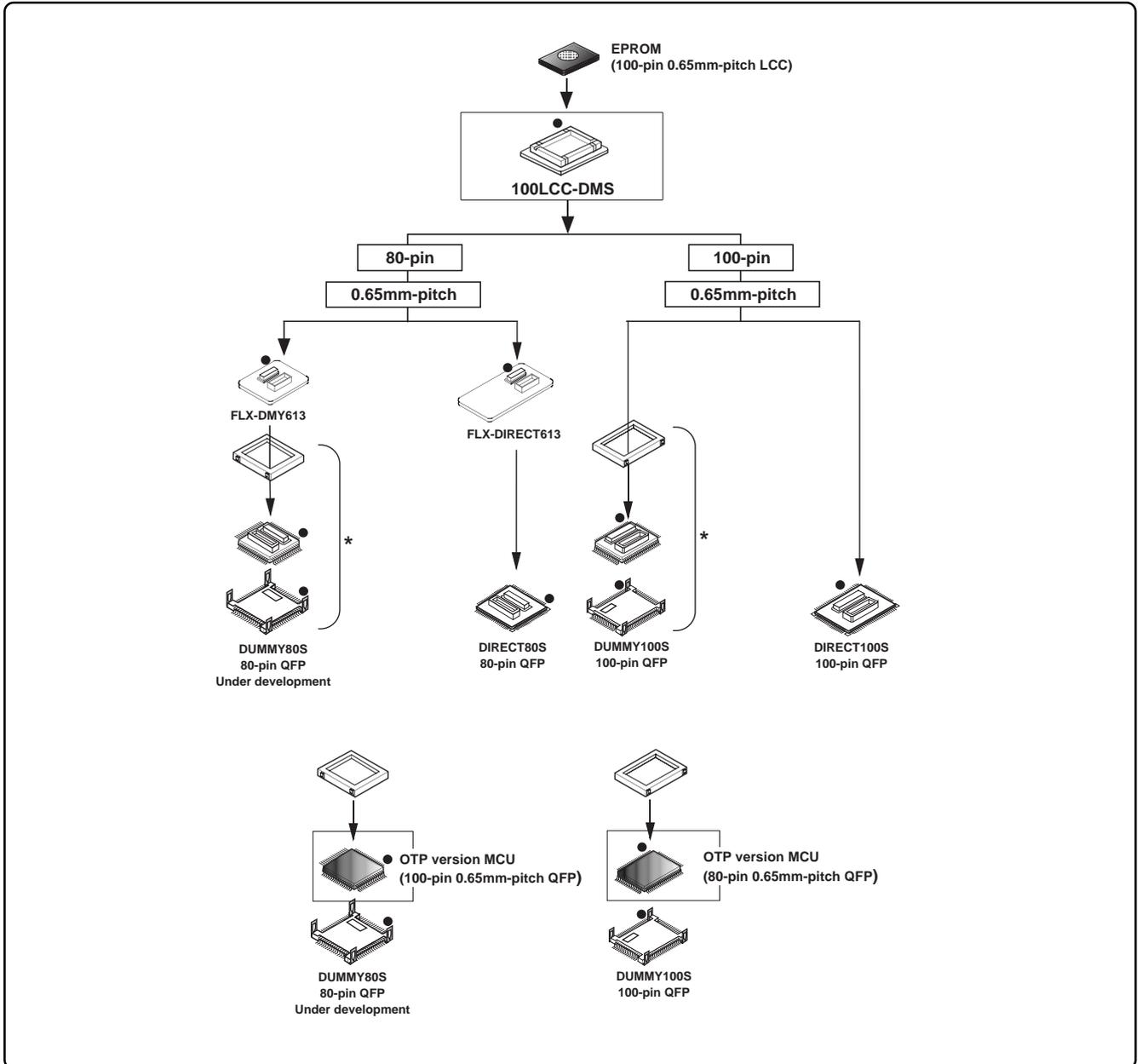
Overview of Tools for M16C Family

List of Development Support Tools

MCU Series	MCU Group	Integrated C Compiler	Simulator Debugger	Emulator Debugger	Emulator	Emulation Pod
M16C/60	M16C/61	NC30WA	PDB30SIM[*1]	PD30	PC4701HS (High-end) or PC4701L (Low-end)	M30610T-RPD-E
	M16C/62					M30620T-RPD-E[*2] M30620TB-RPD-E[*2]

[*1] PDB30SIM is to be upgraded in June 1998, and renamed to 'PD30SIM'.

[*2] Under development

PROM Programming Adapters

MCU Package Type	PROM Programming Adapter
80-pin QFP (0.65mm-pitch)	PCA7413F-80
100-pin QFP (0.65mm-pitch)	PCA7412F-100
100-pin LCC (0.65mm-pitch)	PCA7412L-100
100-pin LQFP (0.5mm-pitch)	PCA7412G-100

Optional Tools

Content	Product Name
Parallel Interface Board (for IBM PC/AT)	PCA4202G02
Optional LAN (PC4701HS comes standard with LAN.)	PC4701L LAN Option

I/O Emulation Board (for HP emulators)

MCU Series	MCU Group	HP Emulator	I/O Emulation Board
M16C/60	M16C/61	E3470B	M30610T-PRT

Operational Environment of Software Tools

Product	Host Machine	OS
NC30WA (Integrated C compiler) NC30 C compiler, AS30 Assembler and TM (Integrated tool manager) are bundled	IBM PC/AT compatibles	Windows 95 Windows NT (PD30SIM: from June 1998)
PDB30SIM (Simulator Debugger) To be renamed 'PD30SIM', and supporting Windows NT from June 1998.		
PD30 (Former PDB30, Emulator Debugger)		

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NC30WA

Description

NC30WA (V.3.00 Release 1) is an integrated C compiler for M16C/60 Series. NC30WA is a toolset with assembler (AS30), C compiler (NC30) and integrated tool manager (TM).

NC30

NC30 is based on ANSI standard and provides abundant functions suitable for embedded systems.

AS30

AS30 generates machine language files from assembly language source files for M16C Family.

TM

TM integrates tools from programming through debugging.

Recent Upgrade

On Feb. 16, 1998, NC30WA was upgraded from V.2.00 Release 1 to V.3.00 Release 1. New features are as follows.

- Integrated tool manager TM V.1.00 is bundled.
- Windows NT 4.0 is supported.

Operational Environment

Host Machine	OS
IBM PC/AT compatibles	Windows 95 Windows NT 4.0

Ordering Information

To order this product, specify S/R as follows.

Type name: MSCH-TOOL-S-CC

Comment: NC30WA-W95E
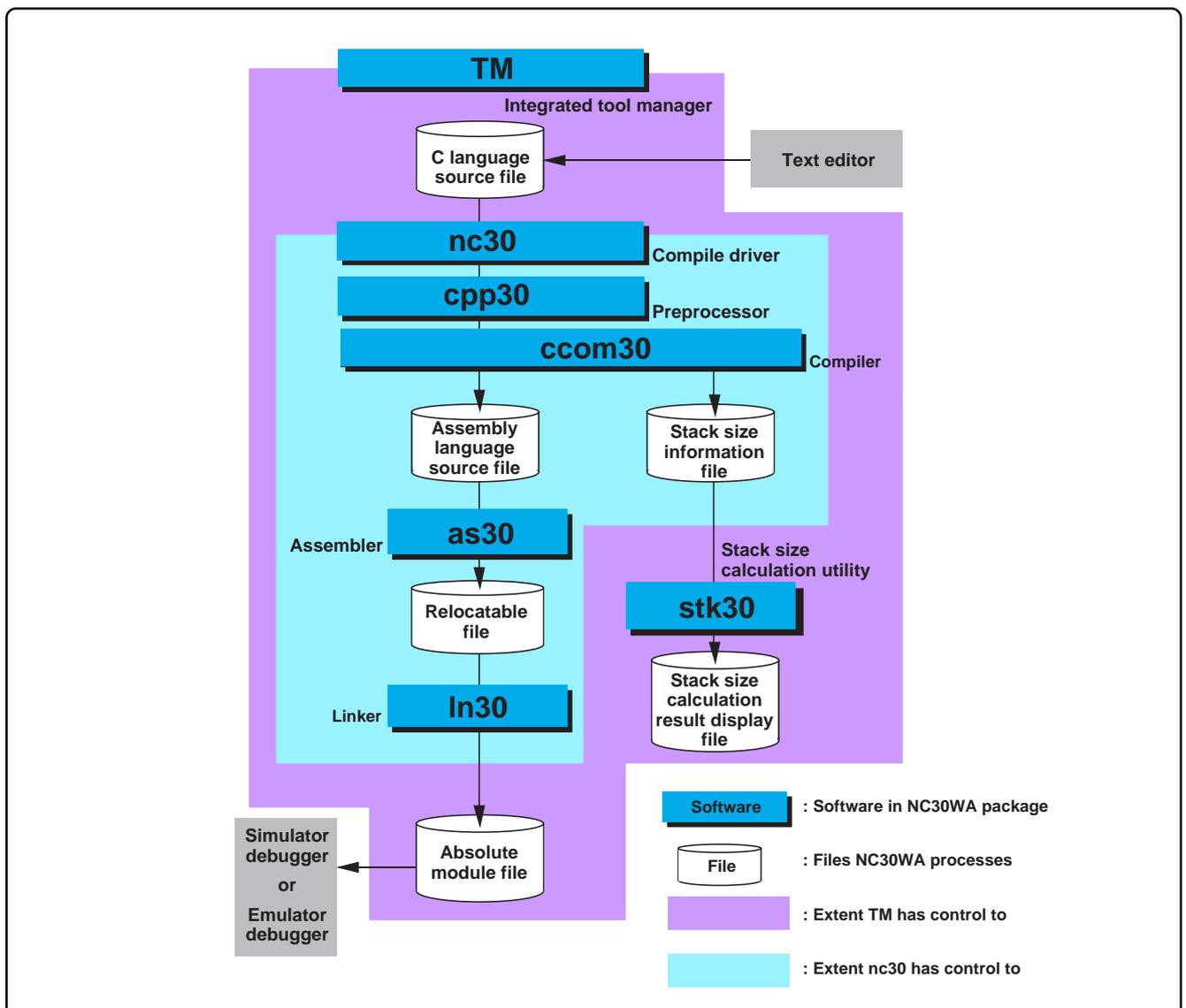
Features of NC30

- ANSI compatibility

  (1) Supports floating-point arithmetic. Its specifications conform to the IEEE (The Institute of Electrical and Electronics Engineers).

  (2) Generates most of the codes in reentrant structure.

  (3) Can initialize the structure and array of the auto variable.

- Optimization function

  (1) Command options

     Can choose between the code generation for program manipulation speed and the one for ROM code size, and also can optimize both of them.

  (2) C source-level optimization

     Optimizes constant propagation and loops at source-file-level.

- ROMable functions

  (1) Describes interrupt functions in C language source files.

  (2) Locates constant data in ROM area in C language.

  (3) Inline assemble description : Writes assembly language in C language source files.

  (4) Calls assembly language subroutine in C language source files. And arguments can be passed to the register by the extended feature.

  (5) Can define I/O addresses to C language variables.

  (6) Outputs stack size information for each source file. And provides stk30, which calculate stack size of the whole application software.

  (7) Declaration of inline functions: Supports the storage class specifier 'inline' and can declare inline functions.

- Specifying memory models of variables

  Following modifiers can specify addressing modes for each variable.

  (1) Modifier 'near'

     Variables accessing the addresses 00000_{16} to $0FFFF_{16}$ (64K or less)

  (2) Modifier 'far'

     Variables accessing the whole memory area in M16C/60 Series MCU (1MB)

     Additionally, '#pragma SBDATA', which specifies addressing modes with a SB register, is available. These features help use memory efficiently.

- C source level debugging information

  Outputs source-level debugging information, and enable C-source-level debugging with PC4701 emulator system.

- Standard library

  Provides 119 kinds of ROMable standard libraries in object files and source files.

- Calculating stack size

  Stack size calculation utility 'stk30' calculates stack sizes used in an application program.

Features of AS30

- Structured instructions

  Supports C language-like assignment statements and control statements (e.g. if, for). Can specify bit, byte or word type for variables. These structured instructions clarify program's control structure and improve productivity and maintainability.

- Optimized codes

  As branch instruction codes are optimized according to the location, a calculation of branch address is unnecessary. And the best addressing mode is selected automatically.

- Versatile macro instructions

  Frequent instructions are defined as macro instructions to clarify programs. AS30 supports character string manipulations in macro instructions as well as macro definitions and specifications of repeat counts.

- Tag files

  The assembler and linker generate tag files storing error information. With the tag files, source files can be efficiently modified.

- Library function

  The librarian generates a library of versatile subroutines, which improves the diversion rate of programs.

- Absolute address lists

  Generates an absolute address list file from relative address list files to aid in understanding overall program organization.

- Cross reference lists

  The cross referencer generates lists of definitions and references of labels and symbols in the source files. This list helps check dependencies of labels and symbols during debugging.

Features of TM

• Starting up tools

Registered tools used for application program development can be started up from TM individually.

• Setting using a mouse controlled user interface

Start options for compiler, assembler, linker, etc. can be specified with a mouse controlled user interface. And 'make file' is also specifiable.

• Automatic generation of 'makefile'

Automatically generates 'makefile' according to the relation of specified source files.

• Integrated help function of cross tools

On-line help for cross tools, such as compiler, assembler, linker, is available.

• PDF manuals

TM can start up Acrobat Reader from Main window to reference PDF manuals.

Main window

Help window

Output window

Wizard / Dialog
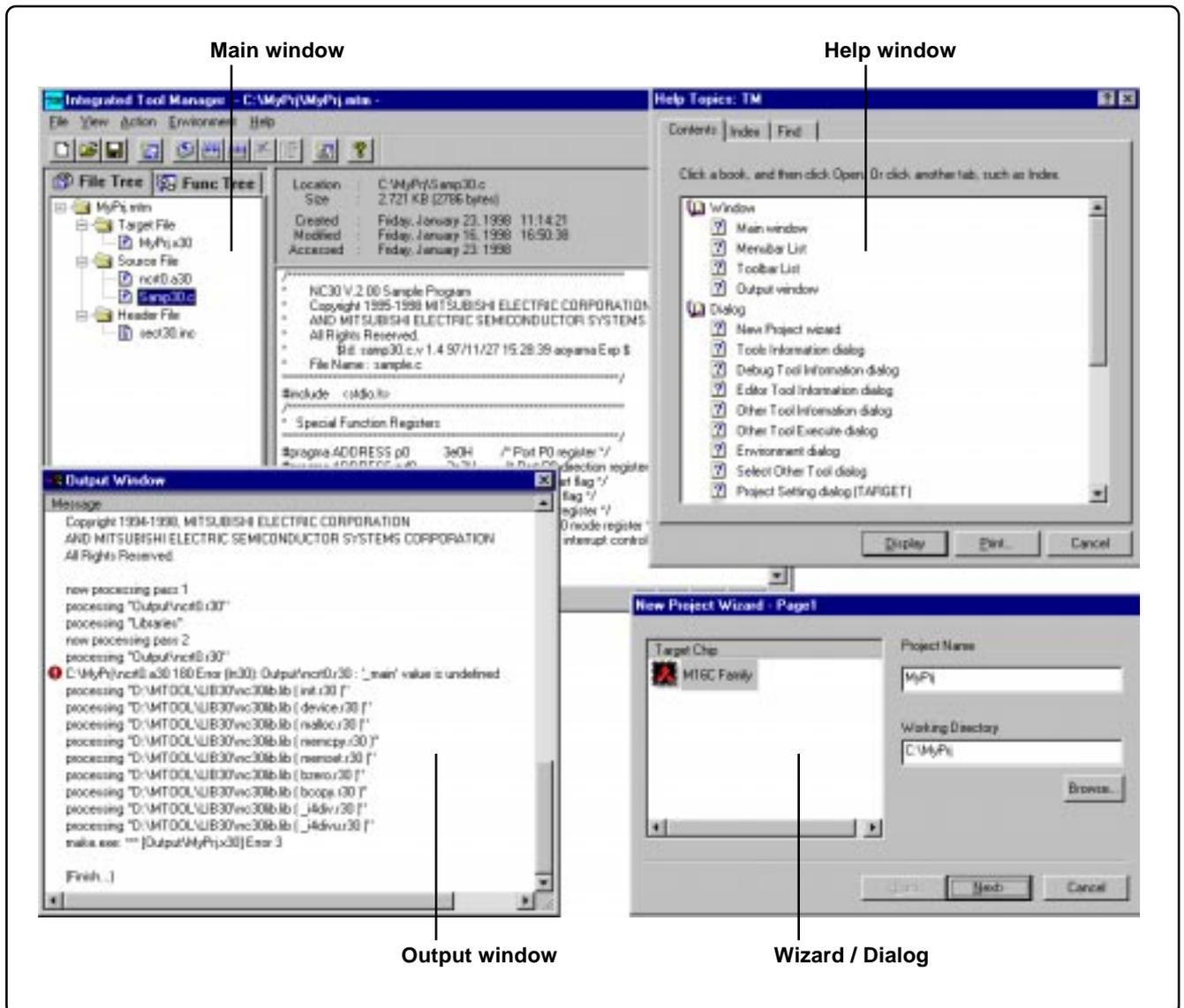
PDB30SIM

Description

PDB30SIM is a simulator debugger for Mitsubishi M16C/60 Series 16-bit microcomputers. PDB30SIM runs under Windows and supports debugging of application programs. PDB30SIM improves development efficiency through verification of program logic separate from the target system being developed.

Recent Upgrade

In June 1998, PD30SIM is to be upgraded from V.2.00 Release 1 to V.3.00 Release 1. Major changes are as follows.

• Renamed to "PD30SIM"

• Support for Windows NT 4.0

• Support for I/O simulation function

• Function to define simple key panels of the target system with GUI

Features

• Mouse controlled menu driven user interface

• GUI in common with PD30 emulator debugger for PC4701 emulators (PC4701HS / PC4701L)

• Instruction-by-instruction simulating application programs, break points settings, and reference to memory and register contents.

• C language and assembly language source level debugging

• RAM monitor function

Operating Environment

Host machine	OS
IBM PC/AT compatibles	Windows 95

Ordering Information

To order this product, specify S/R as follows.

Type name: MSCH-TOOL-S-SD

Comment: PDB30SIM-W95E

Multi-Window Function

(1) Main window

Window to provide general control over PDB30SIM. Basic debugging operations such as downloading programs, execution start/stop, stepping, partial execution by the cursor's location and specifying and canceling break points within this main window. And able to open the other windows.

(2) Source window

Window to show contents of source files continually. Basic debugging operations such as stepping, partial execution by the cursor's location and specifying and canceling break points within the source window.

(3) C watch window

Window to show C language variables. In addition, the window to show global variables, local variables in a file or a function is supported.

(4) Watch window

Window to monitor changes of variables and memory contents specified at assembly source level.

(5) Register window

Window to show contents of registers and flags.

(6) Dump window

Window to show continuous memory contents in a dump.

(7) Memory window

Window to show contents of addresses, labels and memory.

(8) Script window

Window to execute script commands and show the result of the execution.

(9) RAM monitor window

Window to show memory contents and bit values while executing the target program.

(1) Main window

(2) Source window

(8) Script window

(5) Register window

(3) C watch window (local)

(9) RAM monitor window

(4) Watch window

(3) C watch window (global)

PD30

Emulator Debugger for PC4701 Emulator

Description

PD30 (V.3.00 Release 1) is an emulator debugger for Mitsubishi M16C/60 Series 16-bit microcomputers. PD30 controls PC4701 emulators (PC4701HS / PC4701L) from a Windows-based PC to debug application software and target systems.

Recent Upgrade

On Feb. 16,1998, PD30 (Former PDB30) was upgraded from V.2.00 Release 2 to V.3.00 Release 1. New features are as follows.

• PDB30 is renamed to PD30.

• Windows NT 4.0 is supported.

• Time measurement function.

• Support of customization function CB30.

Features

• High-speed serial, parallel and LAN interface

• C language and assembly language source level debugging

• Real-time RAM monitor function

• Advanced features such as real-time trace and C0 coverage with the PC4701HS emulator

*For parallel interface, the PCA4202G02 parallel interface board is required.

*For LAN interface with the PC4701L, the PC4701L LAN option is required.

Emulators

To adjust respectively to a team and a personal use and to construct the debugging environment with a high cost performance, Mitsubishi Electric Corporation offers two kinds of emulators:

Emulator	Description
PC4701HS	High-end version (Conformity product for EMC and safety standards)
PC4701L	Low-end version (Conformity product for EMC and safety standards)

Operating Environment

Host machine	OS
IBM PC/AT compatible	Windows 95 Windows NT 4.0

Ordering Information

To order this product, specify S/R as follows.

Type name: MSCH-TOOL-S-ED

Comment: PD30-W95E

Serial interface or Parallel interface or LAN interface

Breakevent output cable

Emulation pod M30610T-RPD-E

External trace signal input cable

Host machine

Emulator power unit PC4701P

Emulator PC4701HS

Target system

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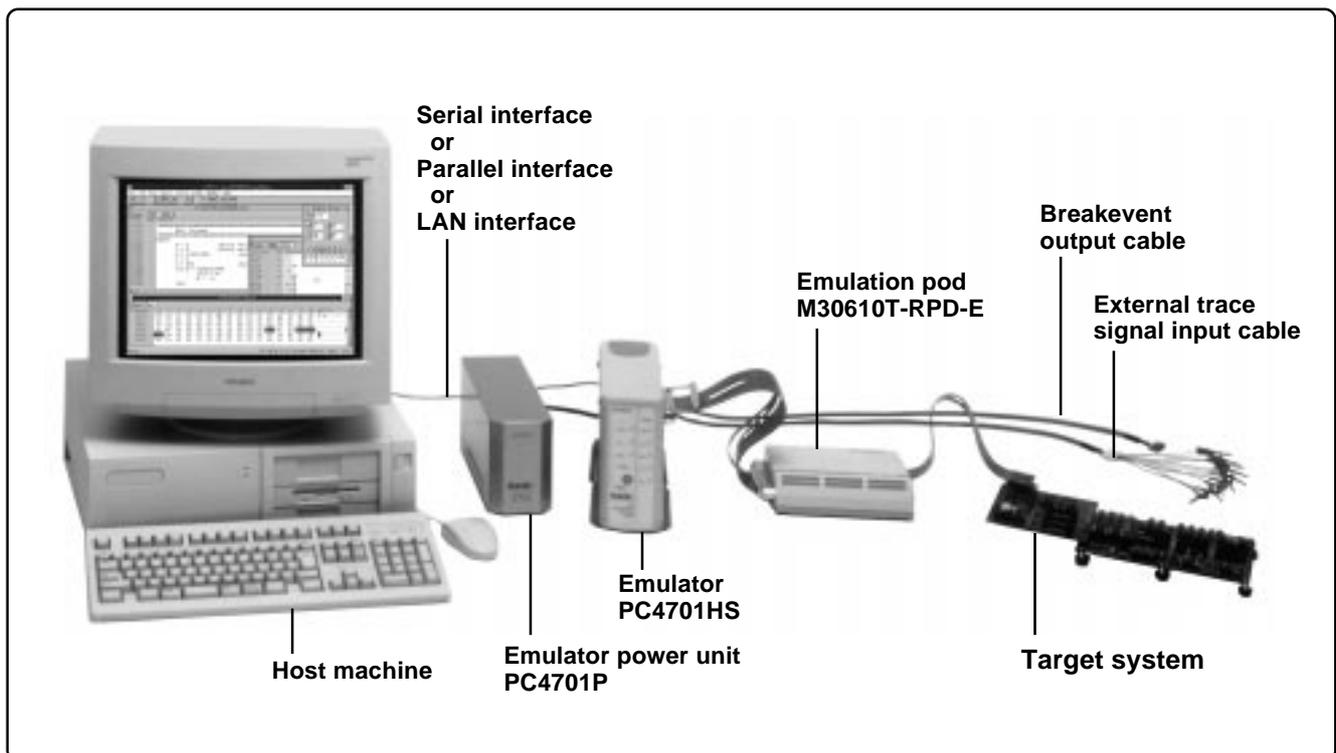
Multi-Window Function

PD30 multi-window function varies according to the emulator incorporated.

• Windows common to all emulators

(1) Main window

Window to provide general control over PD30. Basic debugging operations such as downloading programs, execution start/stop, stepping, partial execution by the cursor's location and specifying and canceling break points within this main window. And able to open the other windows.

(2) Source window

Window to show contents of source files continually. Basic debugging operations such as stepping, partial execution by the cursor's location and specifying and canceling break points within the source window.

(3) C watch window

Window to show C language variables. In addition, the window to show global variables, local variables in a file or in a function is supported.

(4) Watch window

Window to monitor changes of variables and memory contents specified at assembly language level.

(5) Register window

Window to show contents of registers and flags.

(6) Dump window

Window to show continuous memory contents in a dump.

(7) Memory window

Window to show contents of addresses, labels and memory.

(8) Script window

Window to execute script commands and show the result of commands are supported within the script window.

(9) RAM monitor window

Window to show memory contents and bit values while executing the target program.

(1) Main window   (3) C watch window (global)   (7) Memory window   (5) Register window

(9) RAM monitor window   (4) Watch window
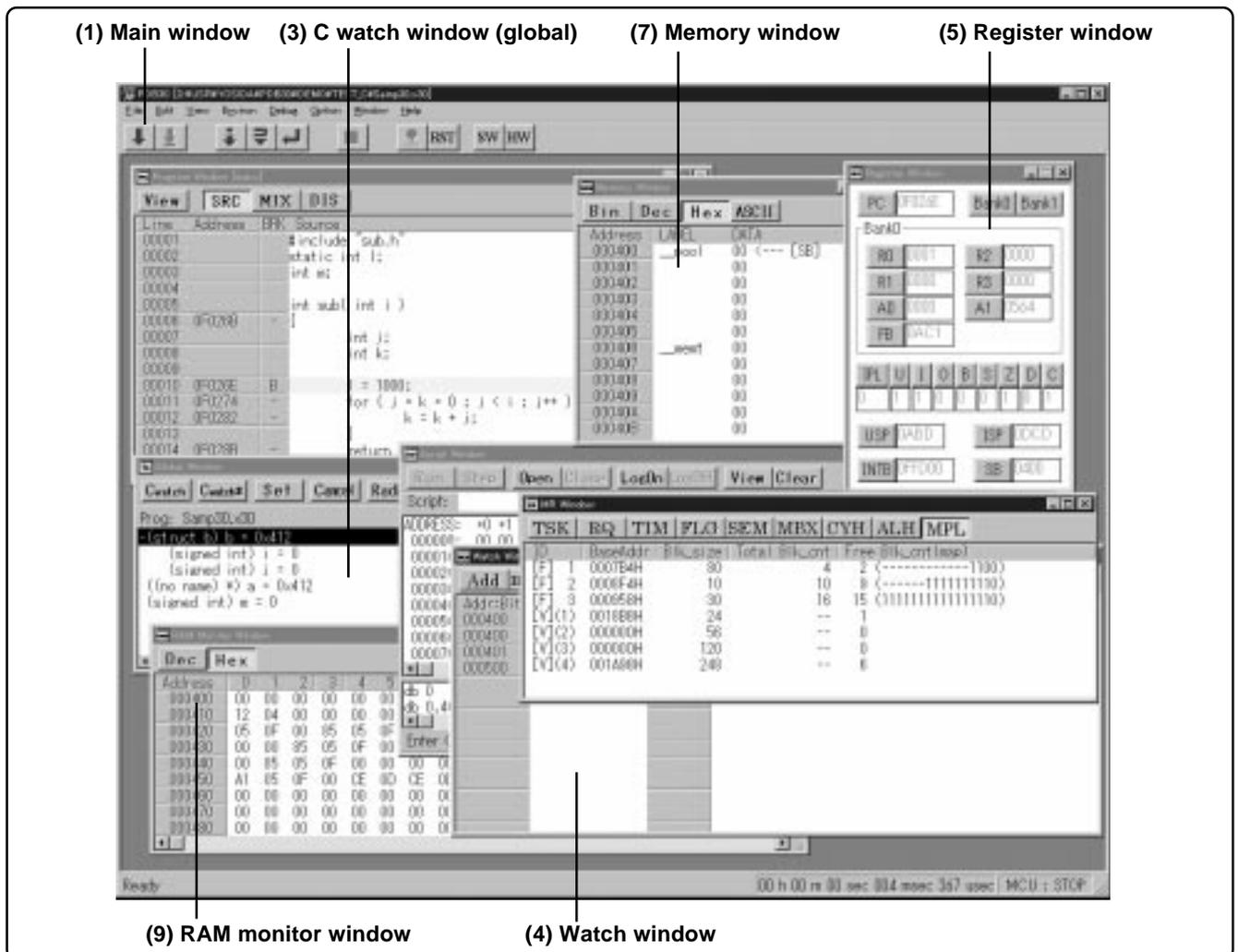
• Windows when using PC4701HS

(10) State transition break window

Window to specify breaks on transitions caused by changes of events such as access to memory, time-out, external triggers, etc. The state can be set up to four and the route can be set up to nine. The abnormality such as multiple interrupt can be detected by this function.

(11) Trace window

Window to reference program execution history (e.g. execution addresses, states of signals) in real-time.

(12) Protect window

Window to specify the protect function to break when accessing keepout area.

(13) State transition trace window

Window to specify conditions for trace events like a state transition break window.

(14) Coverage window

Windows to show coverage rates of C language

program functions. Following two windows are available: Coverage window to check start and end addresses and coverages of each function, and Coverage source window to see whether each source line is executed.

(15) Time measurement window

Window to set time measurement functions of the PC4701HS emulator and to reference the settings. Time measurement can measure execution time (Max, Min, Average) and the number of times. PC4701HS emulator can measure 4 points (Max.) at one time.

(16) MR trace window

Window to graphically show task execution histories of programs using real-time OS.

(17) MR analyze window

Window to show the results of statistical processing of measured data within the range specified with MR trace window. This window shows the occupancies of tasks in a CPU.

(10) State transition break window

(11) Trace window

(14) Coverage window

CB30 Custom Builder

By using CB30 you can easily create (program) custom commands and custom windows for PD30.

• Easy to create

    (1) The C-language subset is supported as the program description language.

    (2) An integrated development environment for programming, compiling, and debugging is provided.

• 10 sample window programs with source code are provided:

    (1) Animation Execution Window

    (2) Run Time MR Window

    (3) 8 Segmented-LED Window

    (4) 18 Segmented-LED Window

    (5) Mini Register Window

    (6) RTT Window with Source Reference

    (7) C Expression Break Window

    (8) Dump Window with Label/Bit Symbol Display

    (9) Graphic Run Time Memory Window

    (10) Multiplex Watch Window

(1) Animation Execution Window **(2) Run Time MR Window** **(3) 8 Segmented-LED Window**

(5) Mini Register Window **(6) RTT Window with Source Reference**

PC4701HS

High-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)

Description

PC4701HS is a high-end emulator designed for Mitsubishi 8,16-bit microcomputers. It can build emulator system for each MCU Family by being connected to the emulation pod and the host machine. For PC4701HS emulator system, following products listed in the table below are required.

Ordering Information

To order this product, specify S/R as follows.

Type name: PC4701HS

Features

• Supports future Mitsubishi 16-bit and 8-bit microcomputers simply by replacing the MCU dependent emulation pod and emulator MCU.

• Debugging functions such as high-level breaks and real-time trace.

• Performance evaluation functions such as C0 coverage and time measurement.

• Real-time RAM monitor

• Standard LAN interface (10Base-5, 10Base-T)

Products for PC4701HS System (M16C Family)

MCU Family	Products		
M16C Family	Emulator Debugger	PD30	
	Emulation Pod	for M16C/61 Group	M30610T-RPD-E
		for M16C/62 Group	M30620T-RPD-E (Under development)
			[Vcc=3V, 5MHz (0 wait) / 10MHz (1 wait)]
			[Vcc=5V, 10MHz (0 wait) / 16MHz (1 wait)]
			M30620TB-RPD-E (Under development)
			[Vcc=5V, 16MHz]

When using the parallel interface, the PCA4202G02 parallel interface board is required.

Serial interface
or
Parallel interface
or
LAN interface

Emulation pod
M30610T-RPD-E

Breakevent
output cable

Emulator
PC4701HS

Emulator power unit
PC4701P

Host machine

Target system

External trace
signal input cable

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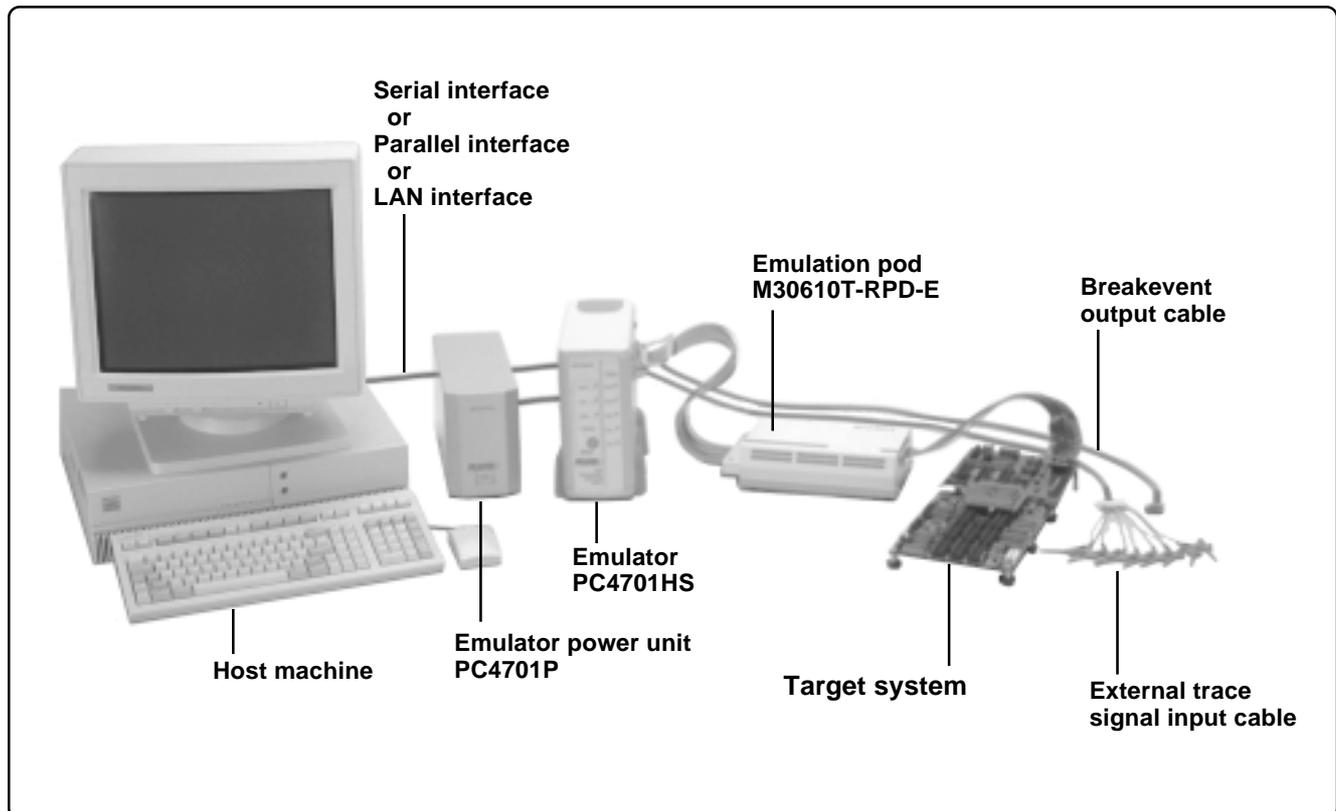
PC4701HS

High-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)

Contents

(1) PC4701HS main unit
(2) PC4701P power supply unit
(3) AC power supply cable for use in Japan
(4) Mitsubishi proprietary parallel interface cable (1.9 m)
(5) Serial interface cable (1.9 m)
(6) Serial 25-pin female to 25-pin female conversion cable

(7) Serial 9-pin female to 25-pin female conversion adapter
(8) 10Base-5 LAN interface cable (30 cm)
(9) 10Base-T LAN interface cable (1.9 m)
(10) 10Base-T relay adapter
(11) Break event output cable (1 m)
(12) External trace signal input cable (1 m)
(13) PC4701HS user's manuals (English and Japanese)
(14) User registration fax sheet

Specifications

Item		Description
Applicable MCU		M16C Family (16-bit)
		7700 Family (16-bit)
		740 Family (8-bit)
Software break		64 points
Hardware break		6 points (Bus detection, Interrupt, External trace signal)
Hardware break condition		AND, OR, state transition
Exception event detection		Access protect
Real-time trace		(a) 16K cycles (Bus, 8-bit external trace signal, 40-bit time stamp)
		(b) Can be recorded ON/OFF by events
		(c) Can be used for performance analysis and overhead measurement
Real-time RAM monitor		1024 bytes (Data, Access or not, Final access result)
Time measurement		(a) Measures from RUN to STOP and other 4 points interval (Phi count / 16 MHz clock count)
		(b) Max./Min. measurement time, cumulative time, pass count can be used.
C0 coverage		Available
Interface	Serial	Up to 38.4 kbps
	Parallel	Standard equipment
	LAN	Standard equipment (10Base-5, 10Base-T)
Event output		Break signals: One point
		Event signals: 6 points
External trace input		TTL level: 8 points
Power supply		Supplied from PC4701P power supply unit
External dimensions	Width	112mm
	Depth	242mm
	Height	197mm
Weight		2.3kg
Ambient environment condition (When operating)	Temperature	5 to 35°C
	Humidity	20 to 80%
	Dust and dirt	General office environment
Ambient environment condition (When stored)	Temperature	-10 to 60°C
	Humidity	0 to 90%
	Dust and dirt	General office environment
Overseas standards applied		(a) US Safety Standards (UL1950), also applied in Canada
		(b) US EMI Standards (FCC part 15 Class A)
		(c) CE marking (EN55022, EN50082-1, EN61000-3-2)

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PC4701HS

High-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)

PC4701P Specifications

Item		Description
AC supply voltage (converted automatically)		100 to 120V AC (50/60Hz)
		200 to 240V AC (50/60Hz)
Power consumption		60W maximum
DC output voltage		DC 5V
External dimensions	Width	90mm
	Depth	267mm
	Height	140mm
Weight		2.0kg
Overseas standards applied		(a) US Safety Standards (UL1950), also applied in Canada
		(b) US EMI Standards (FCC part 15 Class A)
		(c) CE marking (EN60950, EN55022, EN50082-1, EN61000-3-2)

PC4701HS External dimensions

Unit: mm
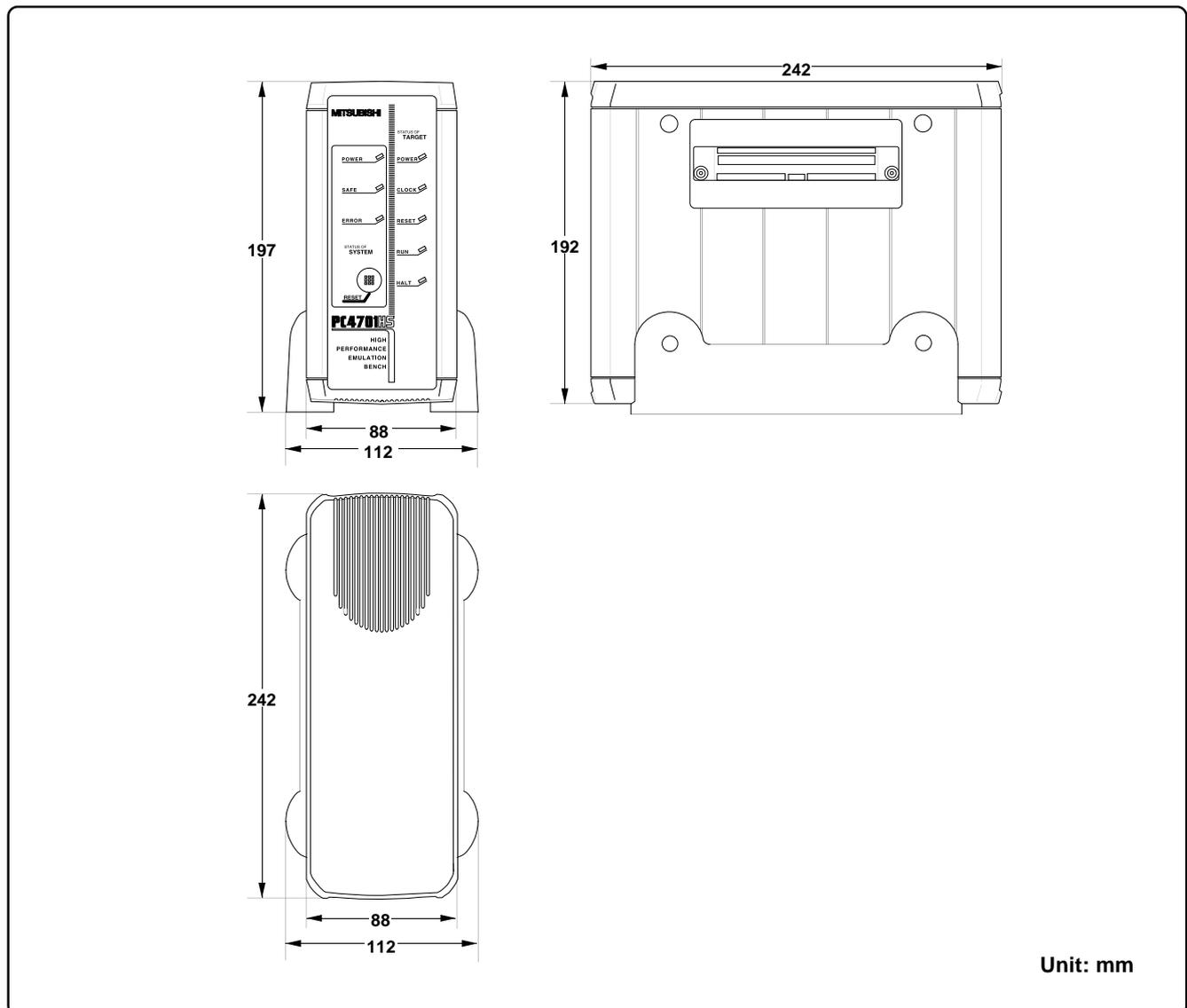
PC4701P External dimensions

140

90

267

132

267

90

Unit: mm

PC4701L

Low-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)
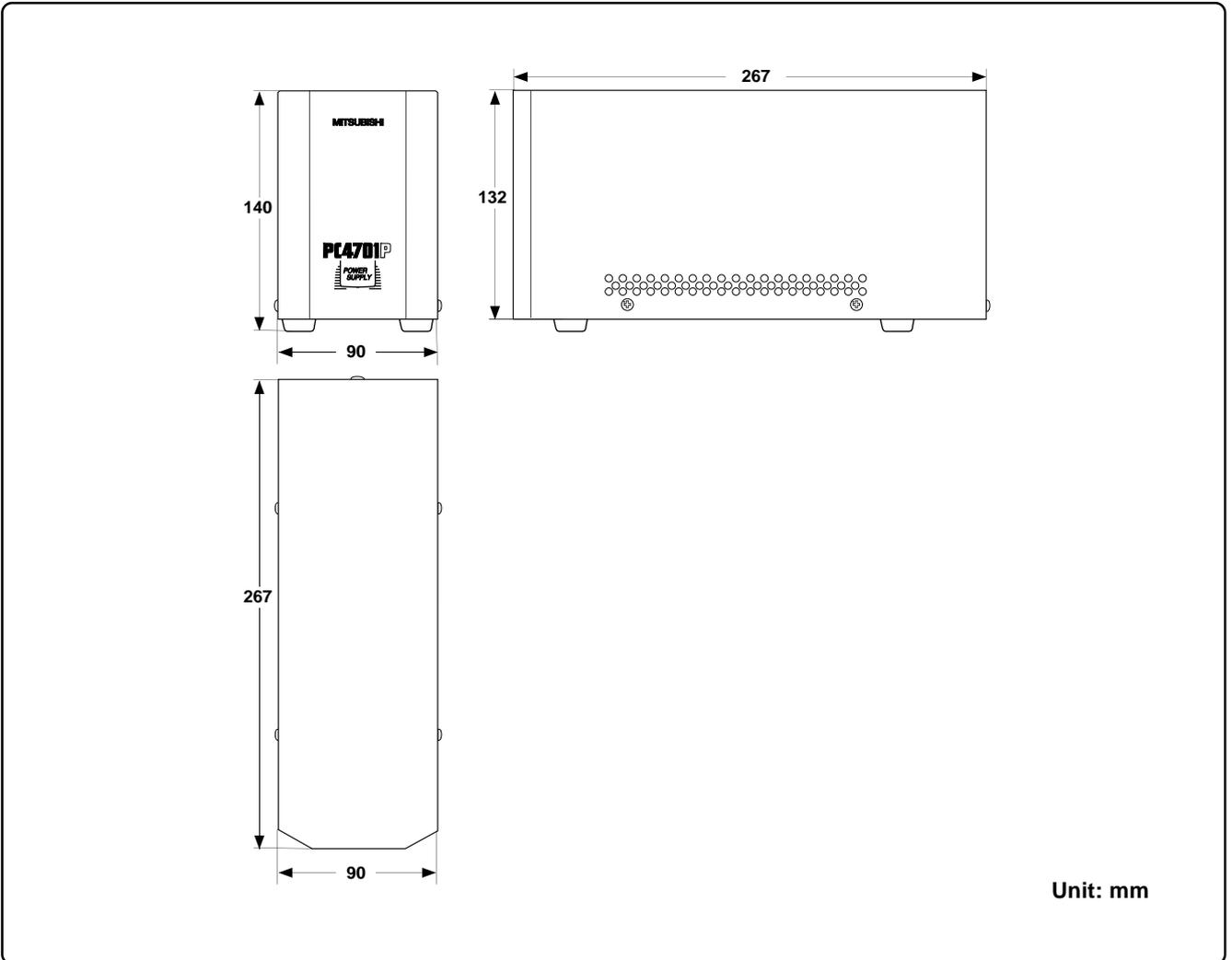
Description

PC4701L is a low-end emulator designed for Mitsubishi 8,16-bit MCUs. It can build emulator system for each Family by being connected to the emulation pod and the host machine. For PC4701L emulator system, following products listed in the table below are required.

Features

- Compact design including a power supply circuit
- Supports future Mitsubishi 16-bit and 8-bit microcomputers simply by replacing the MCU dependent emulation pod and emulator MCU
- Real-time RAM monitor
- Time measurement functions
- Optional LAN interface (10Base-5, 10Base-T)

Products for PC4701L System (M16C Family)

MCU Family	Products		
M16C Family	Emulator Debugger	PD30	
	Emulation Pod	for M16C/61 Group	M30610T-RPD-E
		for M16C/62 Group	M30620T-RPD-E (Under development) [Vcc=3V, 5MHz (0 wait) / 10MHz (1 wait)] [Vcc=5V, 10MHz (0 wait) / 16MHz (1 wait)]
			M30620TB-RPD-E (Under development) [Vcc=5V, 16MHz]

* For parallel interface, the PCA4202G02 parallel interface board is required.

* For LAN interface, the PC4701L LAN Option is required.

Ordering Information

To order this product, specify S/R as follows.

Type name: PC4701L

Serial interface
or
Parallel interface
or
LAN interface (option)

Emulation pod
M30610T-RPD-E

Target system

Emulator
PC4701L

Host machine

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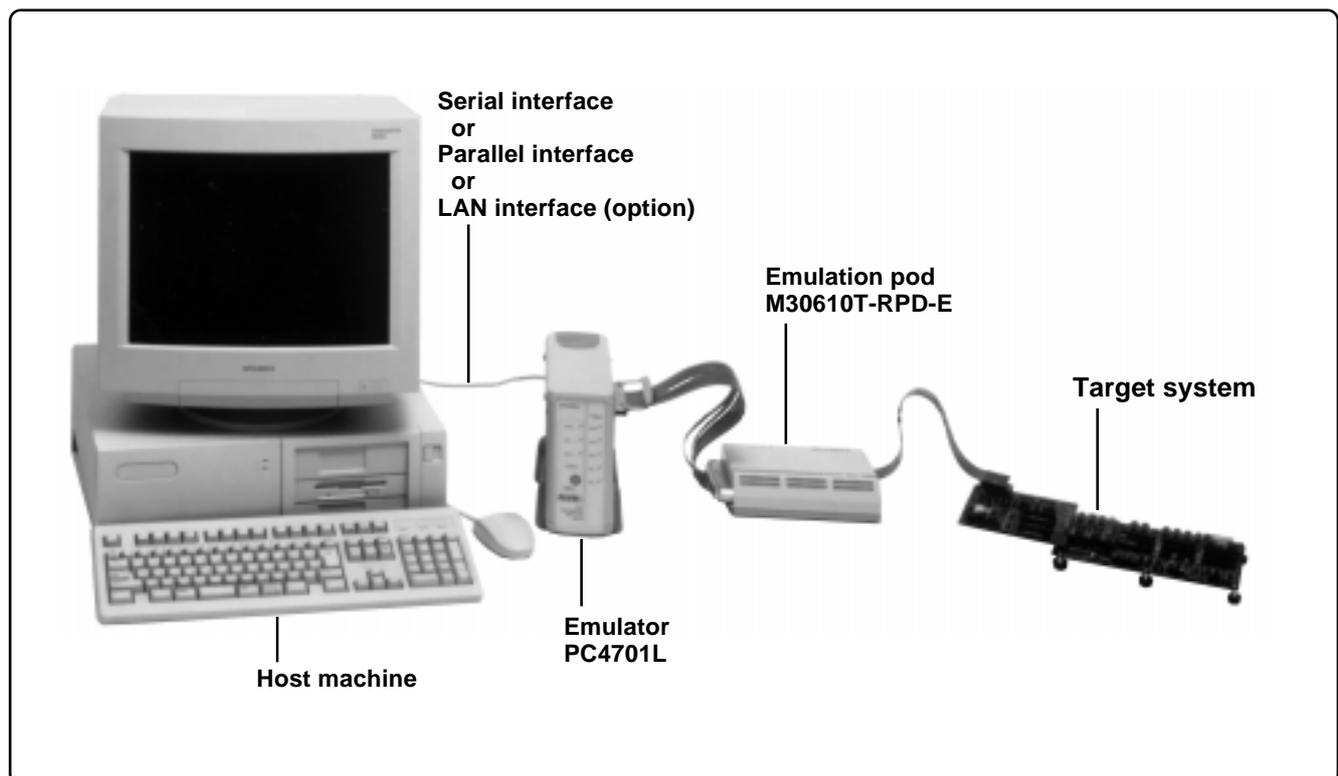
PC4701L

Low-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)

PC4701L Package Contents

(1) PC4701L main unit

(2) AC power supply cable for use in Japan

(3) Mitsubishi proprietary parallel interface cable (1.9m)

(4) Serial interface cable (1.9m)

(5) Serial 25-pin female to 25-pin female conversion cable

(6) Serial 25-pin female to 9-pin female conversion adapter

(7) PC4701L user's manuals (English and Japanese)

(8) User registration fax sheet

Specifications

Item		Description
Applicable MCU		M16C Family (16-bit)
		7700 Family (16-bit)
		740 Family (8-bit)
Software break		64 points
Hardware break		1 point (bus detection)
Real-time RAM monitor		1024 bytes (data, access or not, final access result)
Time measurement		From RUN to STOP (phi count, 16MHz clock count)
Interface	Serial	Up to 38.4 kbps
	Parallel	Standard equipment
	LAN	Optional product (10Base-5, 10Base-T)
AC supply voltage		100 to 120V AC (50/60Hz)
(converted automatically)		200 to 240V AC (50/60Hz)
Power consumption		40W maximum
External dimensions	Width	112mm
	Depth	242mm
	Height	197mm
Weight		2.5kg
Ambient environment condition (When operating)	Temperature	5 to 35°C
	Humidity	20 to 80%
	Dust and dirt	General office environment
Ambient environment condition (When stored)	Temperature	-10 to 60°C
	Humidity	0 to 90%
	Dust and dirt	General office environment
Conformity of safety standards		(a) US Safety Standards (UL1244), also applied in Canada
		(b) US EMI Standards (FCC part 15 Class A)
		(c) CE marking (EN60950, EN50081-1, EN50082-1)

9803

PC4701L

Low-End Emulator for 8,16-bit MCUs (EMC and Safety Standards)

PC4701L External dimensions

242

197

192

88

112

MITSUBISHI

STATUS OF
TARGET

POWER   POWER

SAFE   CLOCK

ERROR   RESET

STATUS OF
SYSTEM   RUN

RESET   HALT

PC4701L

HIGH
PERFORMANCE
EMULATION
BENCH

242

88

112

Unit: mm
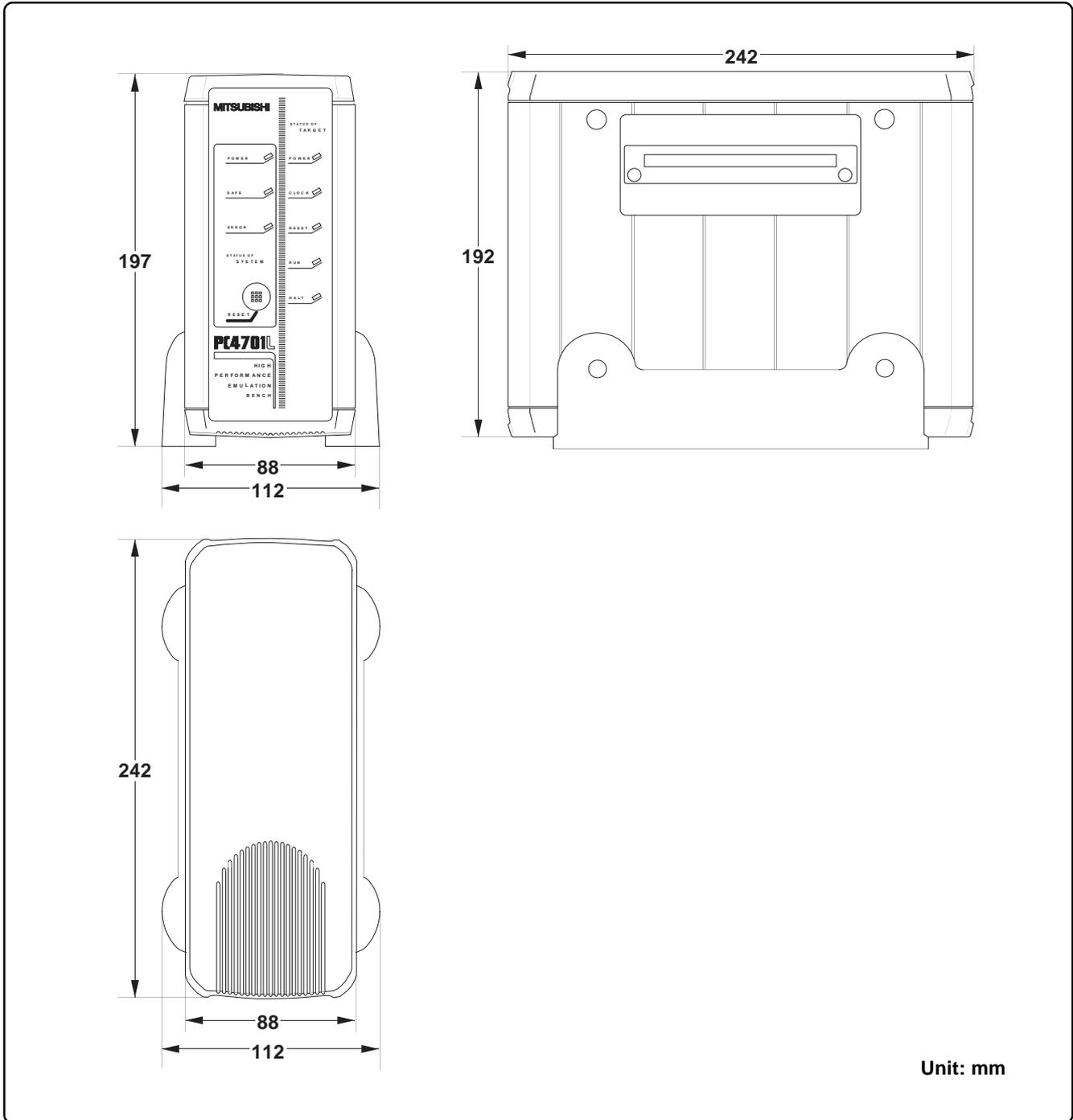
PC4701L LAN Option

Optional LAN Interface for PC4701L Emulator

Description

PC4701L LAN is an optional product which enables PC4701L emulator (for Mitsubishi 8,16-bit MCUs) to use the LAN interface.

The LAN interface realize PC4701L network environment with PD30 emulator debugger.

This modification does not spoil standard serial and parallel interfaces.

Features

• Small design to fit into PC4701L

• 10Base-5 and 10Base-T connections supported

• Fast download (15KB per second*)

    * Depends on the machine's performance and condition of LAN.

Contents

(1) PC4701 LAN (Built into PC4701L)

(2) Interface cable for 10Base-5

(3) Interface cable for 10Base-T

(4) Relay adapter for 10Base-T

(5) LAN interface setup manual

Ordering Information

The LAN interface installation by Mitsubishi Electric Semiconductor Systems involves disassembling, assembling and testing PC4701L.

To order this product, specify S/R as follows.

  Type name: MSCH-TOOL-H-ZZ

  Comment: PC4701L LAN Option

Send the PC4701L emulator main unit to your nearest Mitsubishi or its distributor when ordering the optional LAN interface.

Description

PCA4202G02 is a parallel interface board for PC4701/ PC4816B/PC4901 emulator system and PC. PCA4202G02 is inserted into an ISA bus of IBM PC/AT compatible.

Features

• I/O addresses can be specified with the DIP switch on the board, which avoids conflicts with the other applications.

• As PCA4202G02 does not use interrupts in a PC, it does not interfere with the other applications using interrupts.

Ordering Information

To order this product, specify S/R as follows.

Type name: PCA4202G02

9803
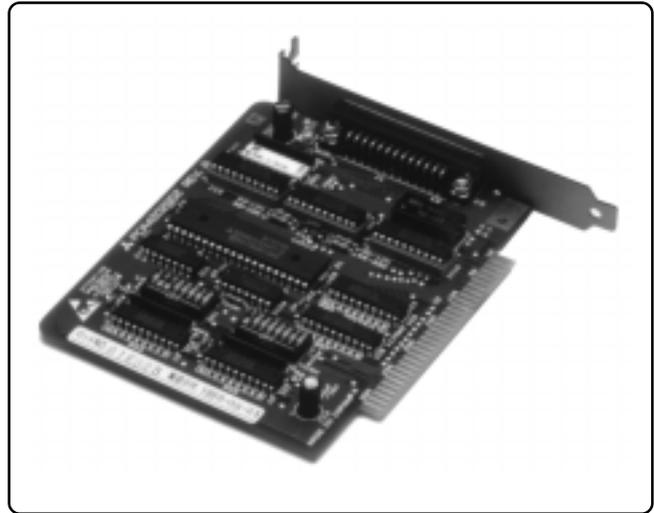
M30610T-RPD-E

Emulation Pod for M16C/61 Group (Conformity Product for EMC Standards)

Description

M30610T-RPD-E is an emulation pod for Mitsubishi M16C/61 Group 16-bit microcomputers. M30610T-RPD-E is connected to PC4701 emulator (PC4701HS /PC4701L) and emulates target MCUs.

Contents

(1) M30610T-RPD-E emulation pod

(2) Oscillator circuit board

- Main clock for 10MHz (OSC-3)
- Sub clock for 32kHz (OSC-2)

(3) FLX120-RPD 120-wire flexible cable to connect emulator

(4) FLX100 100-wire flexible cable to connect target system

(5) FLX-100LCC probe header (FLX100 to 100-pin 0.65mm-pitch LCC: 100D0)

(6) Instruction manuals (English and Japanese)

* When shipped, M30612SFP evaluation MCU and OSC-3 oscillator circuit board (for 10MHz) are mounted.

* To use M16C/60 Group MCUs, refer to the nearest Mitsubishi or its disributor.

Specifications

Item	Description
Emulator	• PC4701HS (High-end version, Overseas standards) • PC4701L (Low-end version, Overseas standards)
MCU	M16C/61 Group
Maximum operating clock frequency	16MHz (Vcc=5V, 1 wait) 7MHz (Vcc=3V, 1 wait)
MCU mode	Single chip mode Memory expansion mode Microprocessor mode
Target system voltage	2.7 to 5.5V
Power supply	Supplied from the emulator (DC)
Overseas standards applied	• US EMI Standards (FCC part 15 Class A) • CE marking (EN55022, EN50082-1)

Ordering Information

To order this product, specify S/R as follows.

Type name: M30610T-RPD-E
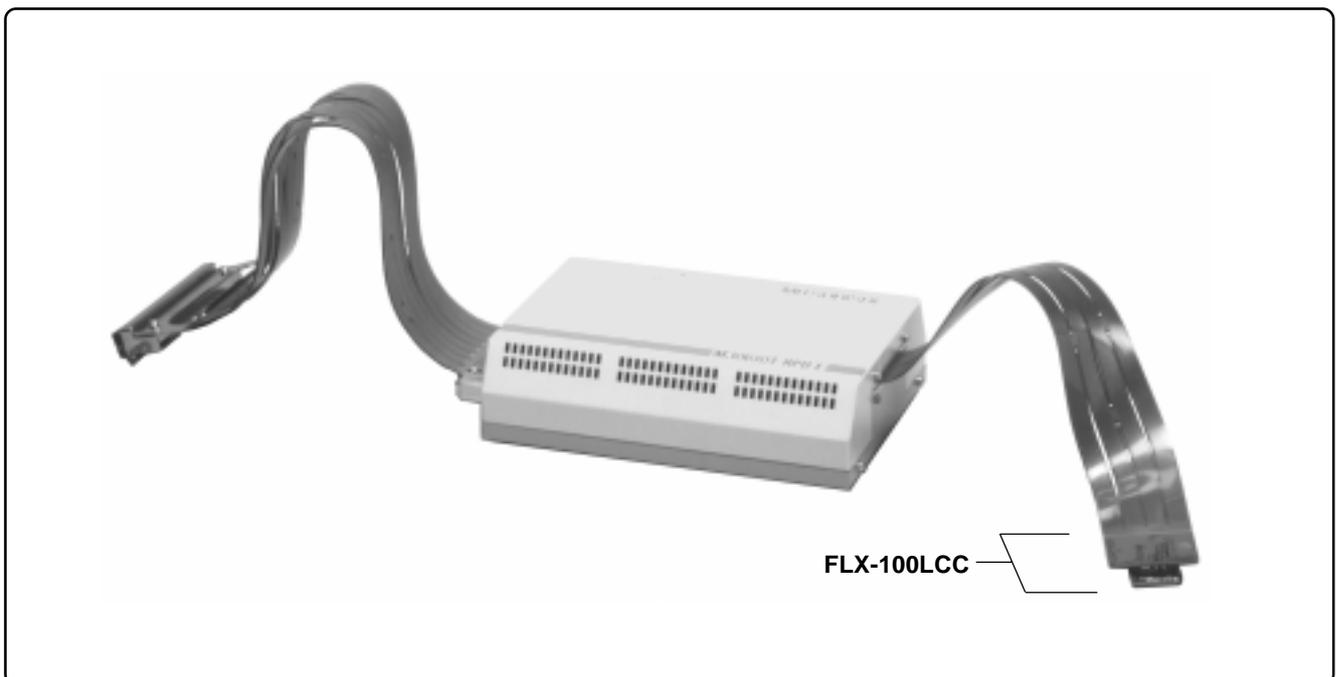
FLX-100LCC

Connection with target system

FLX100

FLX100

FLX100

FLX100-T

FLX100-R

80-pin

100-pin

0.65mm-pitch

0.65mm-pitch

0.5mm-pitch

FLX-DMY613

FLX-DIRECT613

FLX-100LCC

FLX-100LCC

FLX-100LCC

*

*

100LCC-80QSB
80-pin QFP

DUMMY80S
80-pin QFP
Under development

DIRECT80S
80-pin QFP

LCC socket
100-pin LCC

DUMMY100S
100-pin QFP

DIRECT100S
100-pin QFP

FLX-100NRB
100-pin QFP
Under development

100LCC-QSD
100-pin QFP

FLX-100NSD
100-pin QFP

✳ : Available in one package
● : Position of No.1 pin

Under Development

M30620T-RPD-E

Emulation Pod for M16C/62 Group

Description

M30620T-RPD-E is an emulation pod for Mitsubishi M16C/62 Group 16-bit microcomputers. M30620T-RPD-E is connected to PC4701 emulator (PC4701HS /PC4701L) and emulates target MCUs.

Contents

(1) M30620T-RPD-E emulation pod

(2) Evaluation MCU (M30620SFP), 2 pieces

(3) Oscillator circuit board
   - Main clock for 10MHz (OSC-3)
   - Sub clock for 32kHz (OSC-2)

(4) FLX120-RPD 120-wire flexible cable to connect an emulator

(5) FLX100 100-wire flexible cable to connect target system

(6) FLX-100LCC probe header (FLX100 to 100-pin 0.65mm-pitch LCC: 100D0)

(7) Instruction manuals (English and Japanese)

*When shipped, M30622MC evaluation MCU and OSC-3 oscillator circuit board (for 10MHz) are mounted.

*M30620T-RPD-E is an emulation pod for target system whose maximum operating frequency is 10MHz.

Specifications

Item	Description
Emulator	• PC4701HS (High-end version, Overseas standards)
	• PC4701L (Low-end version, Overseas standards)
MCU	M16C/62 Group
Maximum operating clock frequency	16MHz (Vcc=5V, 1 wait)
	10MHz (Vcc=5V, 0 wait)
	10MHz (Vcc=3V, 1 wait)
	5MHz (Vcc=3V, 0 wait)
MCU mode	Single chip mode
	Memory expansion mode
	Microprocessor mode
Target system voltage	2.7 to 5.5V
Power supply	Supplied from the emulator (DC)

* Subject to change without notice.

Under Development

M30620T-RPD-E

Emulation Pod for M16C/62 Group

Connection with target system

FLX100

FLX100

FLX100

FLX100-T

FLX100-R

80-pin

100-pin

0.65mm-pitch

0.65mm-pitch

0.5mm-pitch

FLX-DMY613

FLX-DIRECT613

FLX-100LCC

FLX-100LCC

FLX-100LCC

FLX-100LCC

*

*

100LCC-80QSB
80-pin QFP

DUMMY80S
80-pin QFP
Under development

DIRECT80S
80-pin QFP

LCC socket
100-pin LCC

DUMMY100S
100-pin QFP

DIRECT100S
100-pin QFP

FLX-100NRB
100-pin QFP
Under development

100LCC-QSD
100-pin QFP

FLX-100NSD
100-pin QFP

* : Available in one package
● : Position of No.1 pin

Under Development

M30620TB-RPD-E

Emulation Pod for M16C/62 Group

Description

M30620TB-RPD-E is an emulation pod for Mitsubishi M16C/62 Group 16-bit microcomputers. M30620TB-RPD-E is connected to PC4701 emulator (PC4701HS /PC4701L) and emulates target MCUs.

Contents

(1) M30620TB-RPD-E emulation pod

(2) Evaluation MCU (M30622MC), 2 pieces

(3) Oscillator circuit board
- Main clock for 16MHz (OSC-3)
- Sub clock for 32kHz (OSC-2)

(4) FLX120-RPD 120-wire flexible cable to connect an emulator

(5) FLX100 100-wire flexible cable to connect target system

(6) FLX-100LCC probe header (FLX100 to 100-pin 0.65mm-pitch LCC: 100D0)

(7) Instruction manuals (English and Japanese)

*When shipped, M30622MC evaluation MCU and OSC-3 oscillator circuit board (for 16MHz) are mounted.

*M30620TB-RPD-E is an emulation pod for target system whose maximum operating frequency is 16MHz.

Specifications

Item	Description
Emulator	• PC4701HS (High-end version, Overseas standards)
	• PC4701L (Low-end version, Overseas standards)
MCU	M16C/62 Group
Maximum operating clock frequency	16MHz (Vcc=5V)
MCU mode	Single chip mode Memory expansion mode Microprocessor mode
Target system voltage	4.8 to 5.2V
Power supply	Supplied from the emulator (DC)

* Subject to change without notice.

Under Development

M30620TB-RPD-E

Emulation Pod for M16C/62 Group

Connection with target system

FLX100

FLX100

FLX100

FLX100-T

FLX100-R

80-pin

100-pin

0.65mm-pitch

0.65mm-pitch

0.5mm-pitch

FLX-DMY613

FLX-DIRECT613

FLX-100LCC

FLX-100LCC

FLX-100LCC

FLX-100LCC

FLX-100LCC

FLX-100LCC

*

*

100LCC-80QSB
80-pin QFP

DUMMY80S
80-pin QFP
Under development

DIRECT80S
80-pin QFP

LCC socket
100-pin LCC

DUMMY100S
100-pin QFP

DIRECT100S
100-pin QFP

FLX-100NRB
100-pin QFP
Under development

100LCC-QSD
100-pin QFP

FLX-100NSD
100-pin QFP

✶ : Available in one package
● : Position of No.1 pin
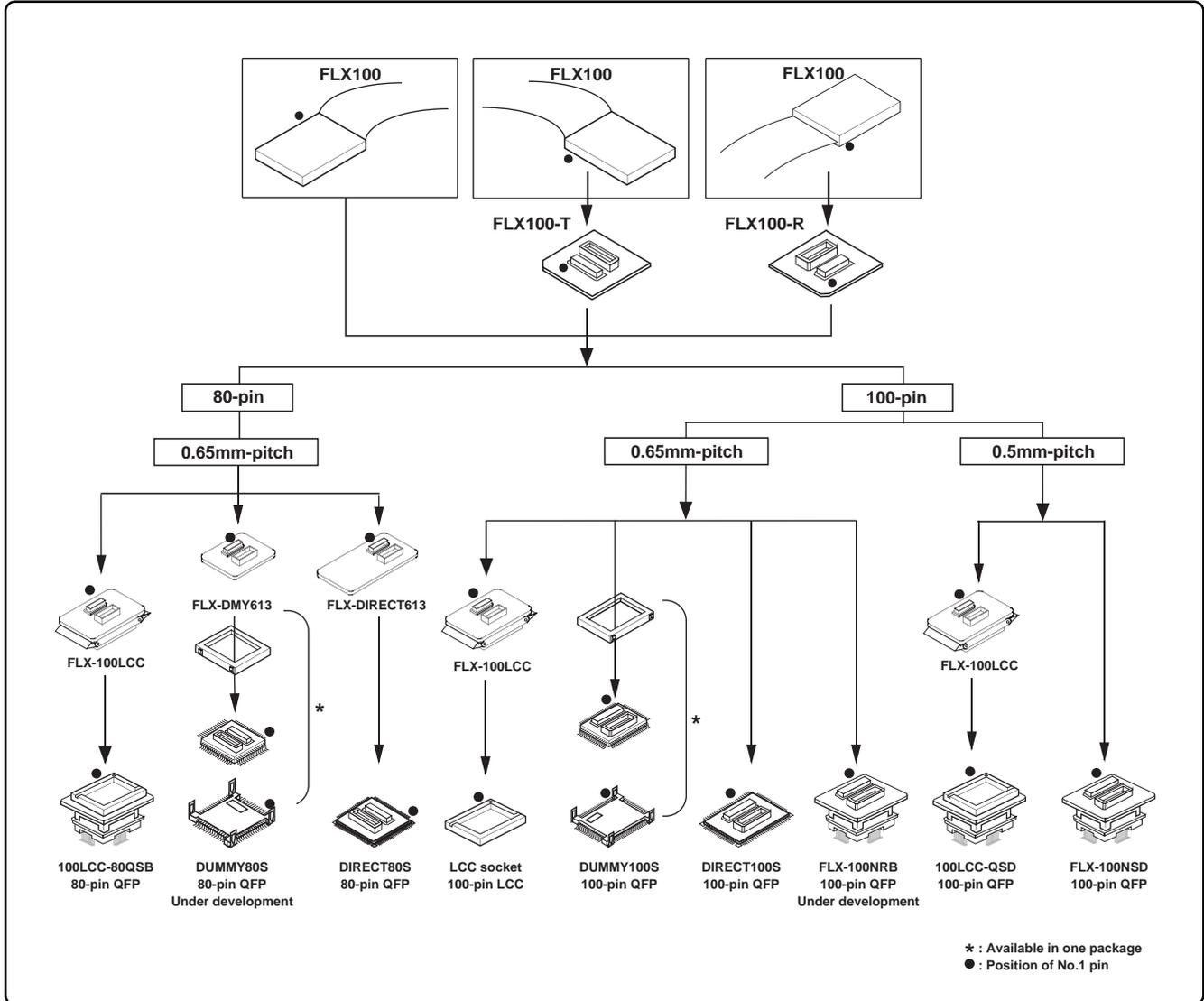
M30610T-PRT

Emulation Pod for M16C/61 Group (for HP Emulation Probe)

Description

M30610T-PRT is an I/O emulation board for Mitsubishi M16C/61 Group 16-bit microcomputers.

M30610T-PRT is used with Hewlett-Packard E3470B emulator system.

M30610T-PRT is installed in a RUN control probe of emulator system, and emulates I/O of M16C/61 Group MCU.

Contents

(1) M30610T-PRT I/O emulation board

(2) FLX-100LCC probe header (FLX100 to 100-pin 0.65mm-pitch LCC: 100D0)

(3) M30610T-PRT instruction manuals (English and Japanese)

Specifications

Item	Description
Emulator	Hewlett-Packard E3470B
MCU	M16C/61 Group MCUs
MCU mode	Single-chip mode
	Memory expansion mode
	Microprocessor mode
Evaluation MCU	M30612SFP
I/O emulation board clock	Main clock (X_{IN}): 10MHz
	Sub-clock (X_{CIN}): 32kHz
Max operating frequency of I/O emulation board	10MHz (Vcc=5V)
	7MHz (Vcc=3V, 1 wait)
Power supply range	2.7 to 5.5V
Power supply to I/O emulation board	(a) Supplied from the emulator.
	(b) I/O emulation board operating voltage is based on the power supply voltage of the target system. When the target system is not connected or when the power supply voltage of the target system is over 5.0V, the operating voltage is 5.0V.
Operating temperature	5 to 35°C (non-condensing)
Storage temperature	-10 to 60°C

Ordering Information

To order this product, specify S/R as follows.

Type name: MSCH-TOOL-H-ZZ

Comment: M30610T-PRT
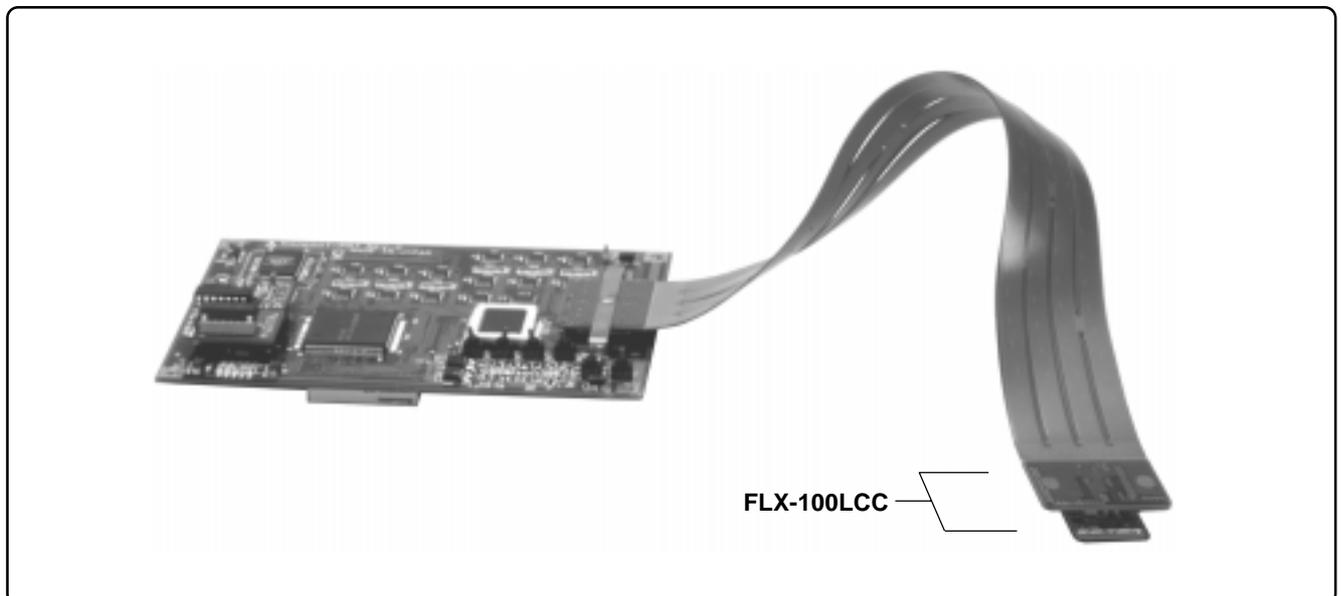
FLX-100LCC

Connection with target system

FLX100

FLX100

FLX100

FLX100-T

FLX100-R

80-pin

100-pin

0.65mm-pitch

0.65mm-pitch

0.5mm-pitch

FLX-DMY613

FLX-DIRECT613

FLX-100LCC

FLX-100LCC

FLX-100LCC

100LCC-80QSB
80-pin QFP

DUMMY80S
80-pin QFP
Under development

DIRECT80S
80-pin QFP

LCC socket
100-pin LCC

DUMMY100S
100-pin QFP

DIRECT100S
100-pin QFP

FLX-100NRB
100-pin QFP
Under development

100LCC-QSD
100-pin QFP

FLX-100NSD
100-pin QFP

✱ : Available in one package
● : Position of No.1 pin

PCA7413F-80

PROM Programming Adapter for 80-pin 0.65mm-pitch QFP (80P6S-A) of M16C/60 Series

Description

PCA7413F-80 is a PROM programming adapter for 16-bit PROM version microcomputers of Mitsubishi M16C/60 Series.

The adapter is used to write programs using a commercially available PROM programmer for M5M27C101, M5M27C201 or its equivalent.

Contents

(1) PCA7413F-80

Board to insert a programmable MCU, an IC socket for 80-pin 0.65mm-pitch QFP (80P6S-A) mounted

(2) PCA7412B

Interface board between PCA7413F-80 and PCA7476E

(3) PCA7476E

Board to connect to PROM programmer, pins for 32-pin standard-pitch IC socket of PROM programmer mounted

(4) PCA7413F-80 Instruction manual

PROM Programmer Requirements

- Programmable M5M27C101, M5M27C201 or its equivalent at programming voltage of 12.5V.
- Programming, verifying and erase check in specified area.
- Can supply approx. 10mA current from +5V power supply to external device.
- Can specify device type directly because no device identification code.

  * Advantest PROM programmers (R4945, R4945A) are recommended.

Specifications

Item	Description
MCU	80-pin 0.65mm-pitch QFP (80P6S-A) of M16C/60 Series MCUs
Operating clock frequency	8MHz
Operation clock supplier	Supplied from the ceramic oscillator of PCA7413F-80
Power supply	Supplied from the Vcc of the PROM programmer

Ordering Information

To order this product, specify S/R as follows.
  Type name: MSCH-TOOL-H-AD
  Comment: PCA7413F-80
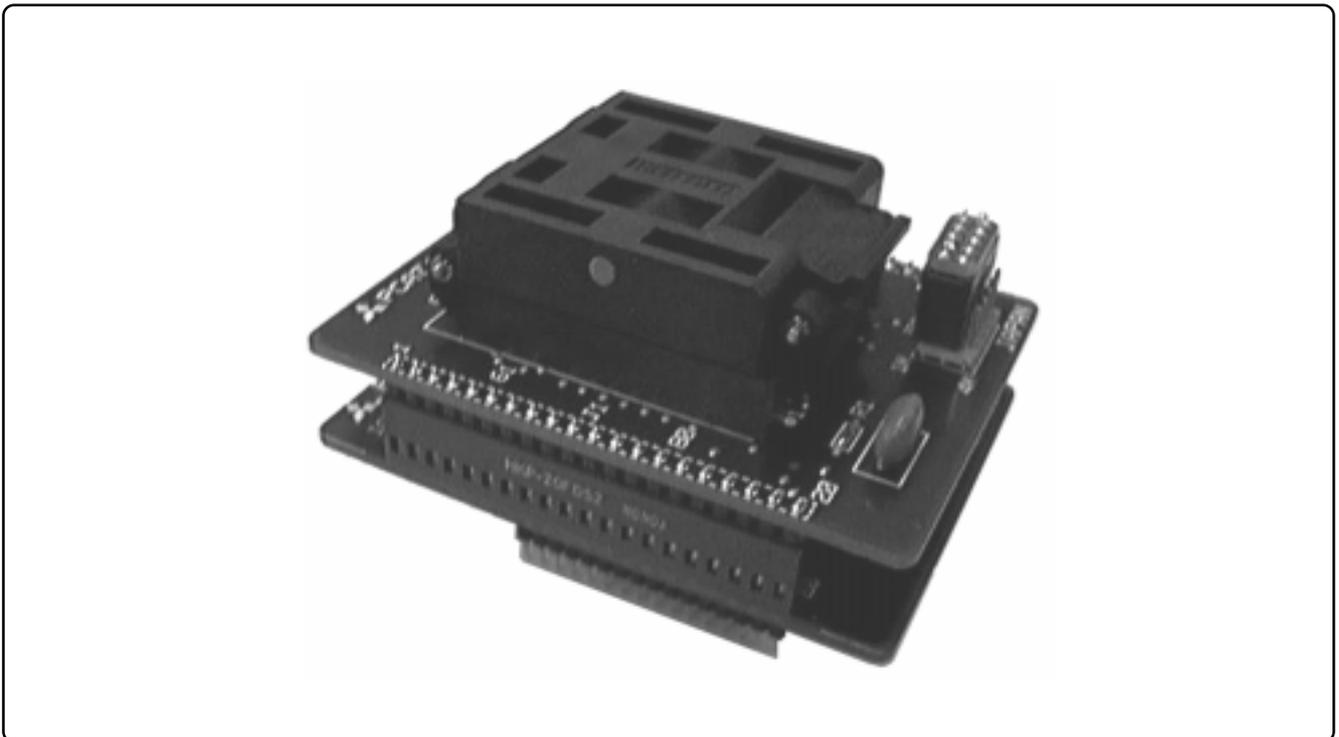
PCA7412F-100

PROM Programming Adapter for 100-pin 0.65mm-pitch QFP (100P6S-A) of M16C/60 Series

Description

PCA7412F-100 is a PROM programming adapter for 16-bit PROM version microcomputers of Mitsubishi M16C/60 Series.

The adapter is used to write programs using a commercially available PROM programmer for M5M27C101, M5M27C201 or its equivalent.

Contents

(1) PCA7412F-100

Board to insert a programmable MCU, IC socket for 100-pin 0.65mm-pitch QFP (100P6S-A) mounted

(2) PCA7412B

Interface board between PCA7412F-100 and PCA7476E

(3) PCA7476E

Board to connect to PROM programmer, pins for 32-pin standard-pitch IC socket of PROM programmer mounted

(4) PCA7412F-100 Instruction manual

PROM Programmer Requirements

• Programmable M5M27C101, M5M27C201 or its equivalent at programming voltage of 12.5V.
• Programming, verifying and erase check in specified area.
• Can supply approx. 10mA current from +5V power supply to external device.
• Can specify device type directly because no device identification code.

  * Advantest PROM programmers (R4945, R4945A) are recommended.

Specifications

Item	Description
MCU	100-pin 0.65mm-pitch QFP (100P6S-A) of M16C/60 Series MCUs
Operating clock frequency	8MHz
Operation clock supplier	Supplied from the ceramic oscillator of PCA7412F-100
Power supply	Supplied from the Vcc of the PROM programmer

Ordering Information

To order this product, specify S/R as follows:
   Type name: MSCH-TOOL-H-AD
   Comment: PCA7412F-100

9803

Description

PCA7412G-100 is a PROM programming adapter for 16-bit PROM version microcomputers of Mitsubishi M16C/60 Series.

The adapter is used to write programs using a commercially available PROM programmer for M5M27C101, M5M27C201 or its equivalent.

Contents

(1) PCA7412G-100

   Board to insert a programmable MCU, IC socket for 100-pin 0.5mm-pitch LQFP (100P6D-A) mounted

(2) PCA7412C

   Interface board between PCA7412G-100 and PCA7402E

(3) PCA7402E

   Board to connect to PROM programmer, pins for 32-pin standard-pitch IC socket of PROM programmer mounted

(4) PCA7412G-100 Instruction manual

PROM Programmer Requirements

- Programmable M5M27C101, M5M27C201 or its equivalent at programming voltage of 12.5V.
- Programming, verifying and erase check in specified area.
- Can supply approx. 10mA current from +5V power supply to external device.
- Can specify device type directly because no device identification code.

  * Advantest PROM programmers (R4945, R4945A) are recommended.

Specifications

Item	Description
MCU	100-pin 0.5mm-pitch LQFP (100P6D-A) of M16C/60 Series
Operating clock frequency	8MHz
Operation clock supplier	Supplied from the ceramic oscillator of PCA7412G-100
Power supply	Supplied from the Vcc of the PROM programmer

Ordering Information

To order this product, specify S/R as follows.
   Type name: MSCH-TOOL-H-AD
   Comment: PCA7412G-100
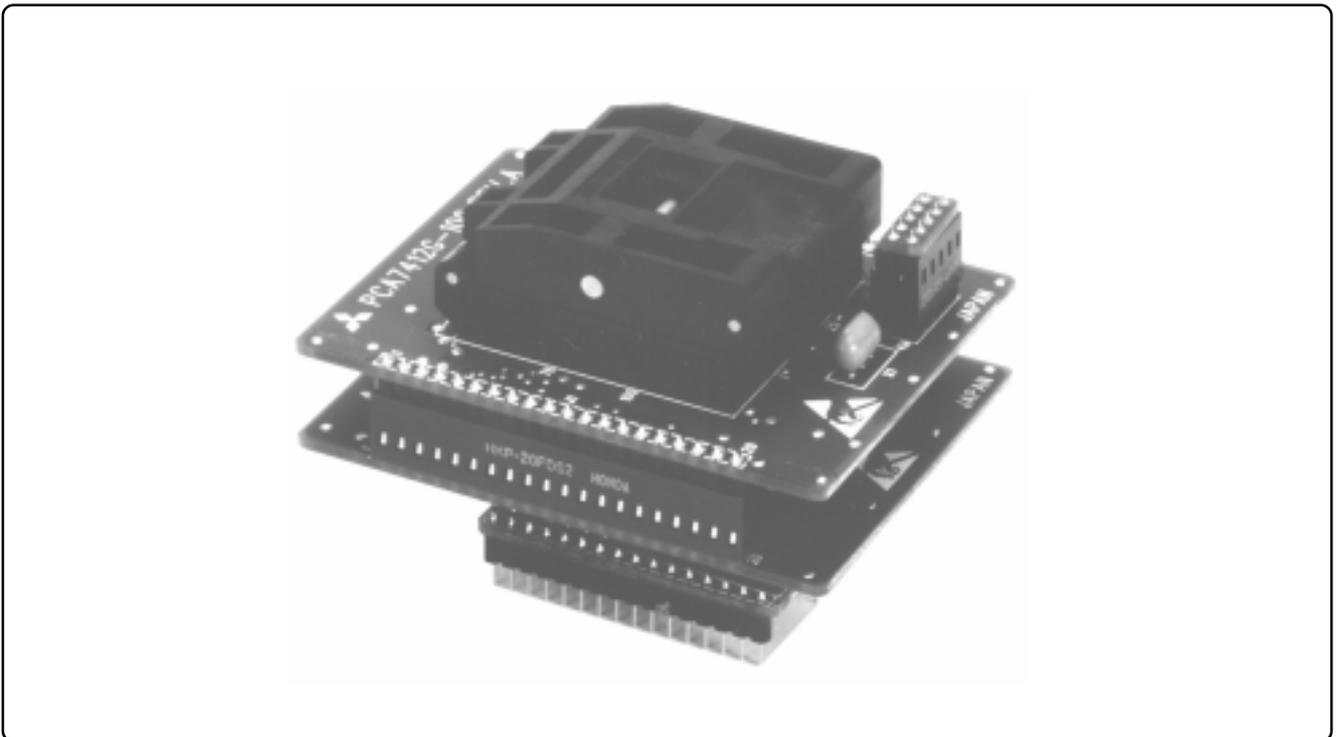
PCA7412L-100

PROM Programming Adapter for 100-pin 0.65mm-pitch LCC (100D0) of M16C/60 Series

Description

PCA7412L-100 is a PROM programming adapter for 16-bit PROM version microcomputers of Mitsubishi M16C/60 Series.

The adapter is used to write programs using a commercially available PROM programmer for M5M27C101, M5M27C201 or its equivalent.

Contents

(1) PCA7412L-100

Board to insert a programmable MCU, IC socket for 100-pin 0.65mm-pitch LCC (100D0) mounted

(2) PCA7412B

Interface board between PCA7412L-100 and PCA7476E

(3) PCA7476E

Board to connect to PROM programmer, pins for 32-pin standard-pitch IC socket of PROM programmer mounted

(4) PCA7412L-100 Instruction manual

PROM Programmer Requirements

• Programmable M5M27C101, M5M27C201 or its equivalent at programming voltage of 12.5V.

• Programming, verifying and erase check in specified area.

• Can specify device type directly because no device identification code.

   • Advantest PROM programmers (R4945, R4945A) are recommended.

Specifications

Item	Description
MCU	100-pin 0.65mm-pitch LCC (100D0) of M16C/60 Series
Operating clock frequency	8MHz
Operation clock supplier	Supplied from the ceramic oscillator of PCA7412L-100
Power supply	Supplied from the Vcc of the PROM programmer

Ordering Information

To order this product, specify S/R as follows.
   Type name: MSCH-TOOL-H-AD
   Comment: PCA7412L-100

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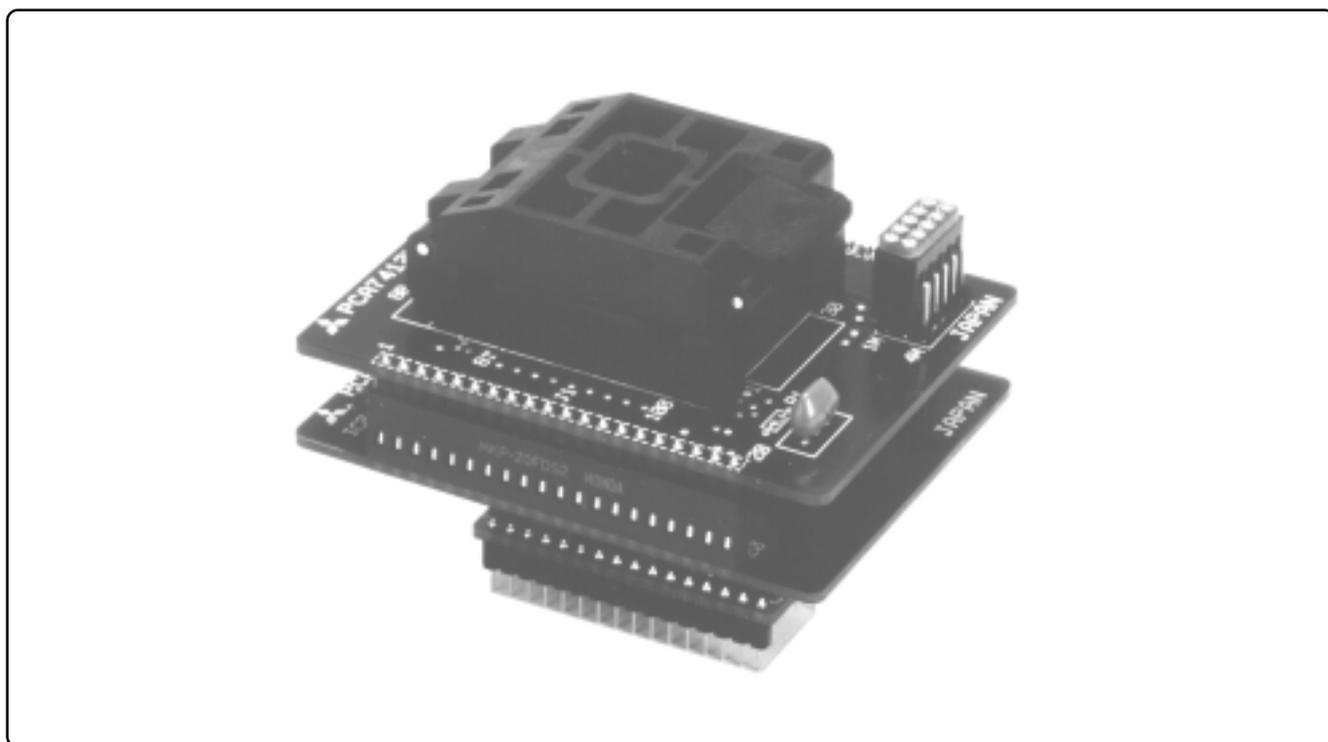
MITSUBISHI SEMICONDUCTORS DATA SHEETS
DEVELOPMENT SUPPORT TOOLS
FOR M16C FAMILY

Second Edition : Mar. 1998

MITSUBISHI SEMICONDUCTORS DATA SHEETS
DEVELOPMENT SUPPORT TOOLS
FOR M16C FAMILY

MITSUBISHI ELECTRIC CORPORATION