NEC

Microcontroller Development Tools Selection Guide

May 2000

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About This Guide

NEC Electronics is pleased to offer a diverse selection of development tools for our K Series® microcontrollers, V800 Series™ embedded RISC microcontrollers, and digital signal processors (DSPs).

NEC development environments are based on IBM®-compatible PCs and include some or all of the following: design development boards, software packages, control programs, in-circuit emulators, emulation boards, emulation probes, conversion sockets, program adapters, and PROM programmers. As illustrated below, designers can use these tools to efficiently assemble, compile, or debug software developed for NEC microcontroller- and DSP-based systems.

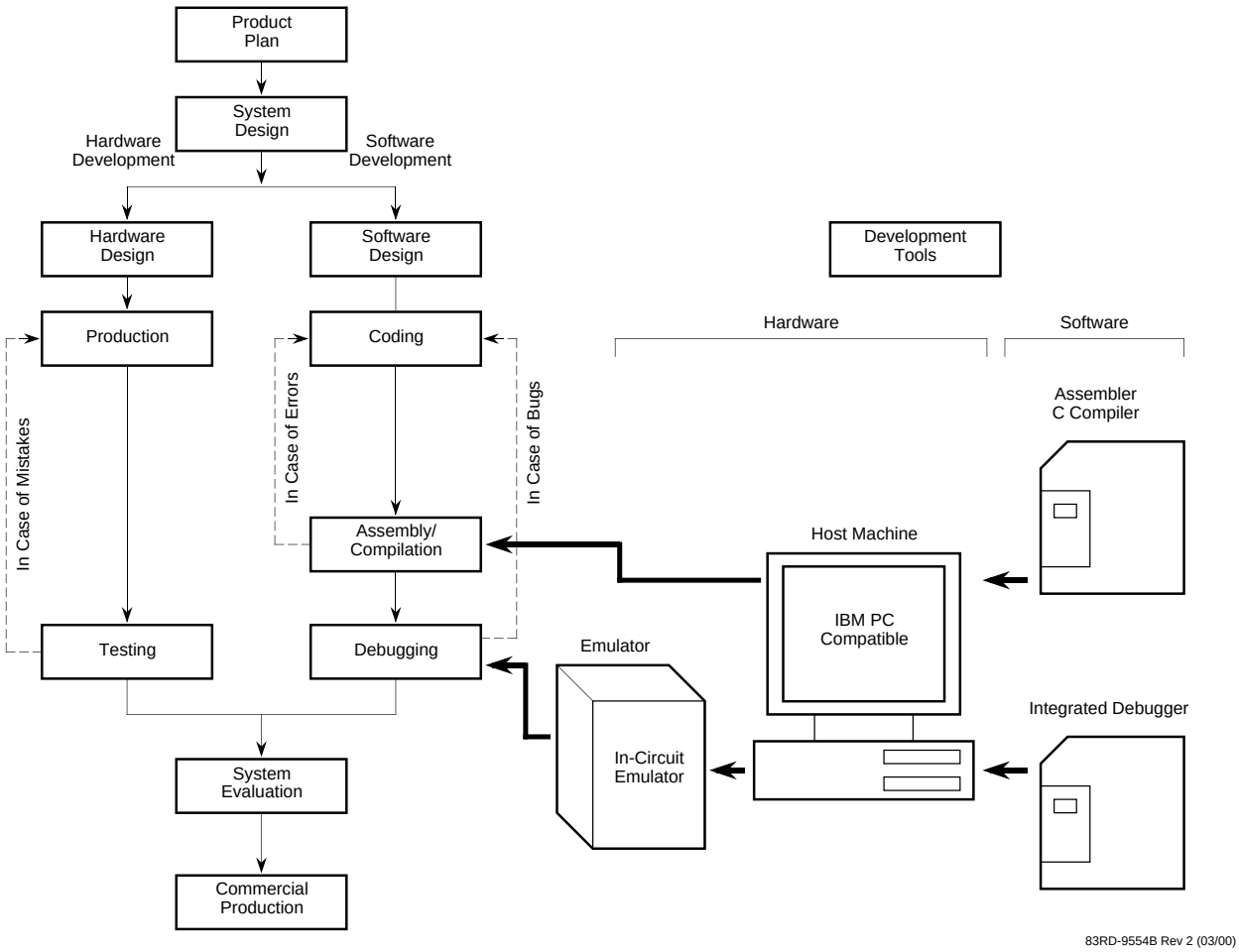
The guide describes typical development systems and tools for the following products:

- 75XL, K0, K0S, and K4 microcontrollers
- V800 Series embedded RISC microcontrollers
- Digital signal processors

Dimensions and footprints for the various conversion socket adapters and a list of third-party development tools are also provided.

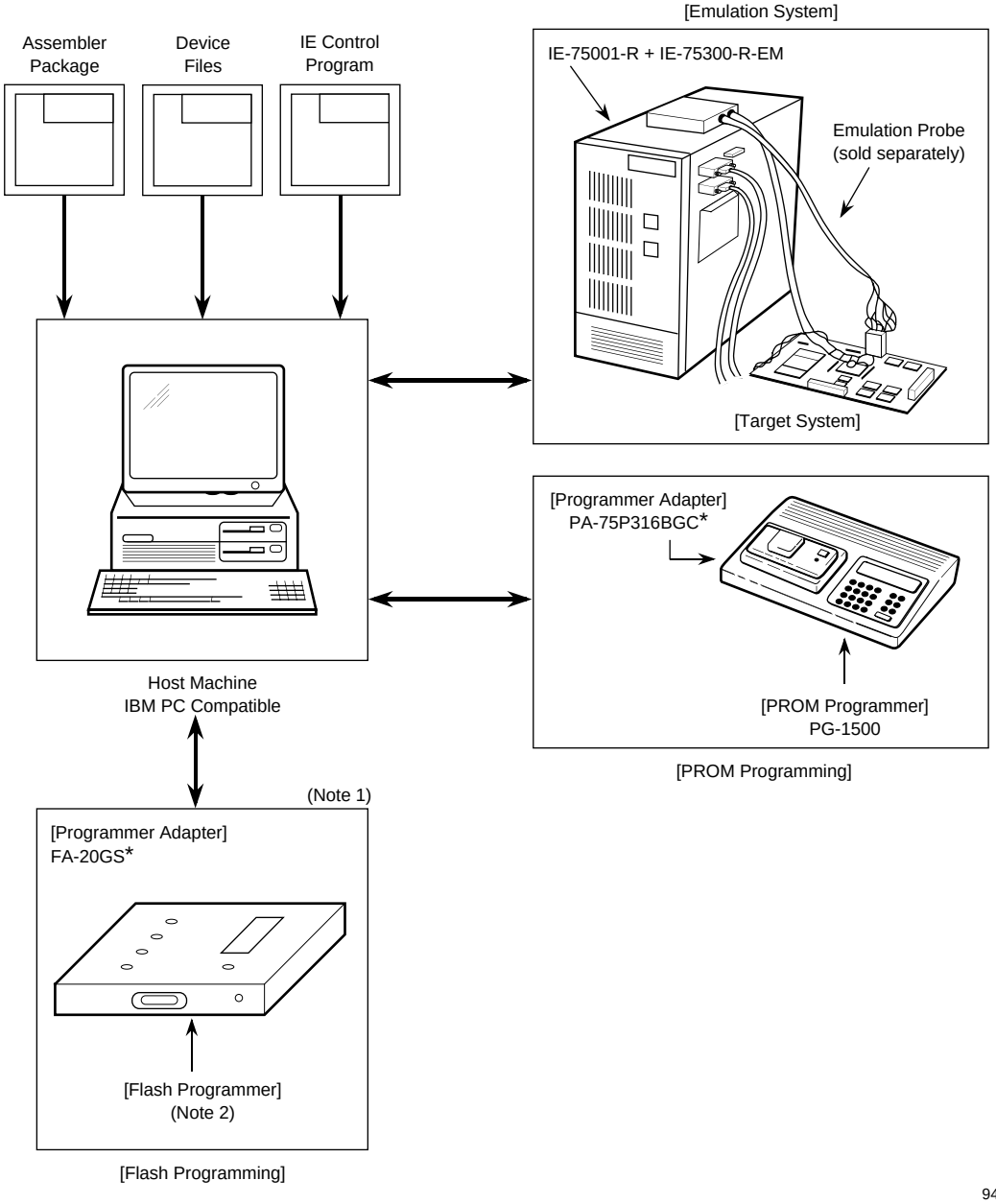
For information about development tools for NEC microcontrollers, please call Development Tools Marketing at 408-588-6565.

Development Flow



83RD-9554B Rev 2 (03/00)

Typical Development Environment for 75XL Microcontrollers



94YL-0223B Rev 4 (03/00)

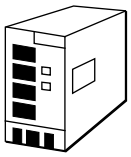
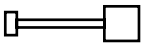
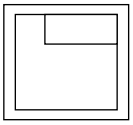
Notes:

*Arbitrary part numbers (sold separately).

(1) Only for flash EEPROM products.

(2) PG-FP3 or FL-PR3 or FlashMaster.

Development Tools for 75XL Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter (Note 2)	Software Packages
Device Name	Package					
						
µPD750004CU µPD750006CU µPD750008CU µPD75P0016CU µPD750104CU µPD750106CU µPD750108CU µPD75P0116CU	42-pin SDIP (600 mil)	IE-75001-R	IE-75300-R-EM	EP-75008CU-R	General socket	• RA75X relocatable assembler • DGWIN-I3HD-IE75 debugger (Note 3)
µPD750004GB-MTX µPD750006GB-MTX µPD750008GB-MTX µPD75P0016GB-MTX µPD750104GB-MTX µPD750106GB-MTX µPD750108GB-MTX µPD75P0116GB-MTX	44-pin QFP (10 x 10 mm)			EP-75008GB-R (Note 1)	EV-9200G-44	
µPD750064CU µPD750066CU µPD750068CU µPD75P0076CU	42-pin SDIP (600 mil)			EP-750068CU-R	General socket	
µPD750064GT µPD750066GT µPD750068GT µPD75P0076GT	42-pin SSOP (375 mil)			EP-750068GT-R (Note 1)	EV-9500GT-42	
µPD753012AGC-3B9 µPD753016AGC-3B9 µPD753017AGC-3B9 µPD75P3018AGC-3B9	80-pin QFP (14 x 14 mm)			EP-753017GC-R (Note 1)	EV-9200GC-80	
µPD753012AGK-9EU µPD753016AGK-9EU µPD753017AGK-9EU µPD75P3018AGK-9EU	80-pin QFP (12 x 12 mm)			EP-753017GK-R (Note 1)	EV-TGK-080SDW	

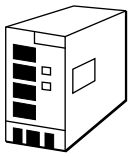
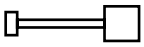
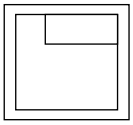
Notes:

(1) Includes one required socket adapter as shown in the conversion socket/adapter column.

(2) EV-9200xx-xx is a socket and the EV-950xxx-xx is an adapter.

(3) Optional. Must be purchased separately. Not included with in-circuit emulator.

Development Tools for 75XL Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter (Note 2)	Software Packages
Device Name	Package					
						
µPD753304P µPD753304W	42-pin SDIP (600 mil)	IE-75001-R	IE75300-R-EM	EP-753304-DU	General socket	• RA75X relocatable assembler • DGWIN-I3HD-IE75 debugger (Note 3)
µPD753036GC µPD75P3036GC	80-pin QFP (14 x 14 mm)			EP-75336GC-R (Note 1)	EV-9200GC-80	
µPD753036GK µPD75P3036GK	80-pin QFP (12 x 12 mm)			EP-75336GK-R (Note 1)	EV-TGK-080SDW	
µPD753104GC µPD753106GC µPD753108GC µPD75P3116GC	64-pin QFP (14 x 14 mm)			EP-753108GC-R (Note 1)	EV-9200GC-64	
µPD753104GK µPD753106GK µPD753108GK µPD75P3116GK	64-pin QFP (12 x 12 mm)			EP-753108GK-R (Note 1)	EV-TGK-064SBW	
µPD753204GT µPD753206GT µPD753208GT µPD75P3216GT	48-pin SSOP (375 mil)			EP-753208GT-R (Note 1)	EV-9500GT-48	
µPD754144GS-BA5 µPD754202GS-BA5 µPD754244GS-BA5 µPD754264GS-BA5 µPD75F4264GS-BA5	20-pin SOP (300 mil)			EP-754144GS-R (Note 1)	EV-9500GS-20	
µPD754144GS-GJG µPD754202GS-GJG µPD754244GS-GJG	20-pin SSOP (300 mil)				EV-9501GS-20	
µPD754302GS µPD754304GS µPD75P4308GS	36-pin SSOP (300 mil)			EP-754304GS-R (Note 1)	EV-9500GS-36	

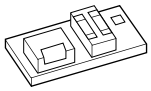
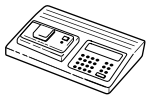
Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.

(2) EV-9200xx-xx is a socket and the EV-950xxx-xx is an adapter.

(3) Optional. Must be purchased separately. Not included with in-circuit emulator.

Flash/PROM Programmers for 75XL Microcontrollers

Target PROM	Program Adapter	Flash/PROM Programmer
		
µPD75P0016CU, µPD75P0116CU	PA-75P008CU	PG-1500
µPD75P0016GB-MTX, µPD75P0116GB-MTX	PA-75P0016GB	
µPD75P0076CU, µPD75P0076GT	PA-75P0076CU	
µPD75P0016CU, µPD75P0116CU	PA-75P008CU	
µPD75P3018AGK-9EU	PA-75P3018AGK-9EU	
µPD75P3018AGC-3B9	PA-75P316BGC	
µPD75P3116GC	PA-75P3116GC	
µPD75P3116GK	PA-75P3116GK	
µPD75P3036GC	PA-75P328GC	
µPD75P3216GT	PA-75P3216GT	
µPD75P3036GT	PA-75P336GK	
µPD75P4308GS	PA-75P4308GS	
µPD75F4264GS-BA5	FA-20GS	(Note 1)

Note:

(1) PG-FP3 or FL-PR3 or FlashMaster

K Series Hardware Tools

IE-78K0-NS, IE-78K0S-NS, and IE-78K4-NS In-Circuit Emulators (ICEs) are used with a separately available emulation board, emulation probe, conversion socket/ conversion adapter, and interface adapter. Each ICE uses an integrated debugger (ID78Kxx-NS) as control software. In the case of the IE-78K0-NS, a separately available I/O board may be necessary, depending on the target device.

IE-78K0-NS-PA Performance Board connects to the separately available IE-78K0-NS ICE and expands its functions by adding a coverage function and improved tracer and timer functions.

IE-78xxxx-NS-EMx Emulation Boards for the K0, K0S, and K4 microcontrollers connect to a separately available in-circuit emulator.

IE-70000-MC-PS Power Unit for the in-circuit emulator included with the ICE unit.

Interface Adapter connects an ICE to the host computer.

PC Interface	Interface Adapter
ISA bus for an IBM® PC/AT-compatible host	IE-70000-PC-IF-C
PCI bus	IE-70000-PCI-IF-A
PC Card™ socket (for laptop use)	IE-70000-CD-IF-A

PG-1500 PROM Programmer is used with the adapter supplied or with a separately available PROM programmer adapter. The PG-1500 can program all representative internal PROMs, from 256 Kb to 4 Mb models, in K0, K0S, and K4 microcontrollers.

PA-7xPxxxx PROM Program Adapter connects to the PG-1500 PROM programmer and is suitable for each device package.

IE-78K0-NS-P0x I/O Board is mounted with an FPGA and used with an emulation board for certain target devices.

NP-xxxx Emulation Probe connects the target system to an ICE installed with an emulation board. A suitable probe is available for each device package. A conversion socket or conversion adapter corresponding to the device package is included with the probe.

Conversion Sockets/Conversion Adapters facilitate connection of the emulation probe and target system. They come with the emulation probe and are also available separately.

Manufacturer	Conversion Adapter/Socket
NEC	EV-9xxxxx-xx socket
Tokyo Electech Corp.	EV-Txx-xxxxxx adapter
Tokyo Electech Corp.	Adapters for probe or device: EV-NQ PACK xxx EV-XQ PACK xxx EV-YQ PACK xxx EV-HQ PACK xxx

PG-FP3, FL-PR3 (from Naito Densei Machida Mfg., Ltd.) and FlashMaster are flash programmers for NEC microcontrollers with flash memory. The programmers are used with the device mounted on the target system (for on-board writing) or with a separately available flash memory writing adapter.

FA-xxxx Flash Memory Writing Adapter connects to the PG-FP3 flash programmer. A model is available for each device package.

LCE-K0S In-Circuit Emulator is a real-time, low-cost ICE for K0S microcontrollers. The unit includes an emulation board, power supply, and ribbon cables to connect the target system and PC interface. NP-xxx emulation probes can be used with the unit, which is also capable of programming flash K0S devices.

LCE-789xxx-EM Emulation Board connects to the separately available LCE-K0S.

K0S Family Software Tools

RA78K0S Assembler Package for the K0S family translates a program written in mnemonics into object code that can be executed by a microcontroller. In addition, the assembler can also create a symbol table and automatically optimize branch instructions. The project manager integrates the RA78K0S, CC78K0S, ID78K0S, ID78K0S-NS, and SM78K0S, providing an environment in which a program can be efficiently developed through simple operations.

Part Number	Description
	Project manager
ST78K0S	Structured assembler preprocessor
RA78K0S	Assembler (used in a Windows® environment with the project manager and in an MS-DOS®-based environment without the project manager)
LK78K0S	Linker
OC78K0S	Object converter
LB78K0S	Librarian
LCNV78K0S	List converter
Idea-L	Light editor

CC78K0S C Compiler for the K0S family translates a program written in C language into object code that can be executed by a microcontroller. The compiler has a function to output debugging ifnromation to the ID78K0S or ID-78K0S-NS integrated debugger. The CC78K0S can be used in a Windows environment with the project manager and in an MS-DOS-based environment without the project manager.

CC78K0S-L C Library Source File contains the object library for the CC78K0S C compiler. Use of the source file does not depend on the type of operating environment.

DF789xxx Device File contains information for a specific device and is used in combination with the RA78K0S, CC78K0S, ID78K0S, ID78K0S-NS, and SM78K0S, which are sold separately. Requirements for the operating environment and host computer differ depending on the combination of software.

ID78K0S and ID78K0S-NS Integrated Debuggers are Windows-based software programs that support the IE-78001-R-A and IE-78K0S-NS in-circuit emulators. With improved C-compatible functions, these debuggers integrate the source program, disassemble display, and memory display with the trace result to display trace results with the source program.

Part Number	Description
ID78K0S	Supports IE-78001-R-A ICE
ID78K0S-NS	Supports IE-78K0S-NS ICE

SM78K0S System Simulator for the K0S family is Windows-based and can be used to perform source-level debugging while simulating operation of the target device on the host computer. You can also verify the logic and performance of the application independently of hardware development, thereby enhancing development efficiency and improving software quality.

RX78K0S Real-Time Operating System for the K0S family conforms to the μITRON specification and is supplied with the Configurator tool used to create the nucleus of the RX78K0S and multiple information tables. The operating system is used with the RA78K0S assembler package and DF780xxx device file, both of which are sold separately. The RX78K0S is MS-DOS-based software that can be run from the MS-DOS prompt in Windows and only with a device with internal RAM of 1 KB.

MX78K0S Embedded Operating System is an operating system that complies with a subset of the μITRON operating system specification. This operating system can be used for task management, event management, and time management. Task management controls the execution sequence and selects the task to be executed next. The MX78K0S is MS-DOS-based and can be run from the MS-DOS prompt in Windows.

PG-1500 Controller is a control program that controls the PG-1500 PROM writer by connecting the PROM writer and host machine with a serial or parallel interface. The PG-1500 controller is MS-DOS-based software than cannot be used in Windows (including from the MS-DOS prompt).

K0 Family Software Tools

RA78K0 Assembler Package for the K0 family translates a program written in mnemonics into object code that can be executed by a microcontroller. In addition, the assembler can also create a symbol table and automatically optimize branch instructions. The project manager integrates the RA78K0, CC78K0, ID78K0, ID78K0-NS, and SM78K0, providing an environment in which a program can be efficiently developed through simple operations.

Part Number	Description
	Project manager
ST78K0	Structured assembler preprocessor
RA78K0	Assembler (used in a Windows® environment with the project manager and in an MS-DOS®-based environment without the project manager)
LK78K0	Linker
OC78K0	Object converter
LB78K0	Librarian
LCNV78K0	List converter
Idea-L	Light editor

CC78K0 C Compiler for the K0 family translates a program written in C language into object code that can be executed by a microcontroller. The compiler has a function to output debugging information to the ID78K0 or ID-78K0-NS integrated debugger. The CC78K0 can be used in a Windows environment with the project manager and in an MS-DOS-based environment without the project manager.

CC78K0-L C Library Source File contains the object library included in the CC78K0 C compiler. Its use does not depend on the type of operating environment.

DF780xxx Device File contains information for a specific device and is used in combination with the RA78K0, CC78K0, ID78K0, ID78K0-NS, and SM78K0, which are sold separately. Requirements for the operating environment and host computer differ depending on the combination of software.

ID78K0 and ID78K0-NS Integrated Debuggers are Windows-based software programs that support the IE-78001-R-A and IE-78K0-NS in-circuit emulators. With improved C-compatible debugging functions, these debuggers can display trace results with the source program using an integrating window function that associates the source program, disassemble display, and memory display with the trace result.

Part Number	Description
ID78K0	Supports IE-78001-R-A ICE
ID78K0-NS	Supports IE-78K0-NS ICE

SM78K0 System Simulator for the K0 family is Windows-based and can be used to debug the target system at the source level while operation of the target device on the host computer is being simulated. The SM78K0 enable you to verify the logic and performance of the application independently of hardware development, thereby enhancing development efficiency and improving software quality.

RX78K0 Real-Time Operating System for the K0S family conforms to the μITRON specification and is supplied with the Configurator tool used to create the nucleus of the RX78K0 and multiple information tables. The operating system is used with the RA78K0 assembler package and DF780xxx device file, both of which are sold separately. The RX78K0 is MS-DOS-based software that can be run from the MS-DOS prompt in Windows and only with a device whose internal RAM size is 1 KB.

MX78K0 Embedded Operating System is an operating system that complies with a subset of the μITRON operating system specification. This operating system can be used for task management, event management, and time management. Task management controls the execution sequence of tasks and selects the task to be executed next. The MX78K0 is MS-DOS-based and can be run from the MS-DOS prompt in Windows.

PG-1500 Controller is a control program that controls the PG-1500 PROM writer by connecting the PROM writer and host machine with a serial or parallel interface. The PG-1500 controller is MS-DOS-based software than cannot be used in Windows (including from the MS-DOS prompt).

K4 Family Software Tools

RA78K4 Assembler Package for the K4 family translates a program written in mnemonics into object code that can be executed by a microcontroller. In addition, the assembler can also create a symbol table and automatically optimize branch instructions. The project manager integrates the RA78K4, CC78K4, ID78K4, ID78K4-NS, and SM78K4, providing an environment in which a program can be efficiently developed through simple operations.

Part Number	Description
	Project manager
ST78K4	Structured assembler preprocessor
RA78K4	Assembler (used in a Windows® environment with the project manager and in an MS-DOS®-based environment without the project manager)
LK78K4	Linker
OC78K4	Object converter
LB78K4	Librarian
LCNV78K4	List converter
Idea-L	Light editor

CC78K4 C Compiler for the K4 family translates a program written in C language into object code that can be executed by a microcontroller. The compiler has a function to output debugging information to the ID78K4 or ID-78K4-NS integrated debugger. The CC78K0S can be used in a Windows environment with the project manager and in an MS-DOS-based environment without the project manager.

CC78K4-L C Library Source File contains the object library for the CC78K4 C compiler. Use of the source file does not depend on the type of operating environment.

DF784xxx Device File contains information for a specific device and is used in combination with the RA78K4, CC78K4, ID78K4, ID78K4-NS, and SM78K4, which are sold separately. Requirements for the operating environment and host computer differ depending on the combination of software.

ID78K4 and ID78K4-NS Integrated Debuggers are Windows-based software programs that support the IE-78001-R-A and IE-78K4-NS in-circuit emulators. With improved C-compatible functions, these debuggers integrate the source program, disassemble display, and memory display with the trace result to display trace results with the source program.

Part Number	Description
ID78K4	Supports IE-784000-R ICE
ID78K4-NS	Supports IE-78K4-NS ICE

SM78K4 System Simulator for the K4 family is Windows-based and can be used to perform source-level debugging while simulating operation of the target device on the host computer. You can also verify the logic and performance of the application independently of hardware development, thereby enhancing development efficiency and improving software quality.

RX78K4 Real-Time Operating System for the K4 family conforms to the μITRON specification and is supplied with the Configurator tool used to create the nucleus of the RX78K4 and multiple information tables. The operating system is used with the RA78K4 assembler package and DF780xxx device file, both of which are sold separately. The RX78K4 is MS-DOS-based software that can be run from the MS-DOS prompt in Windows and only with a device with internal RAM of 1 KB.

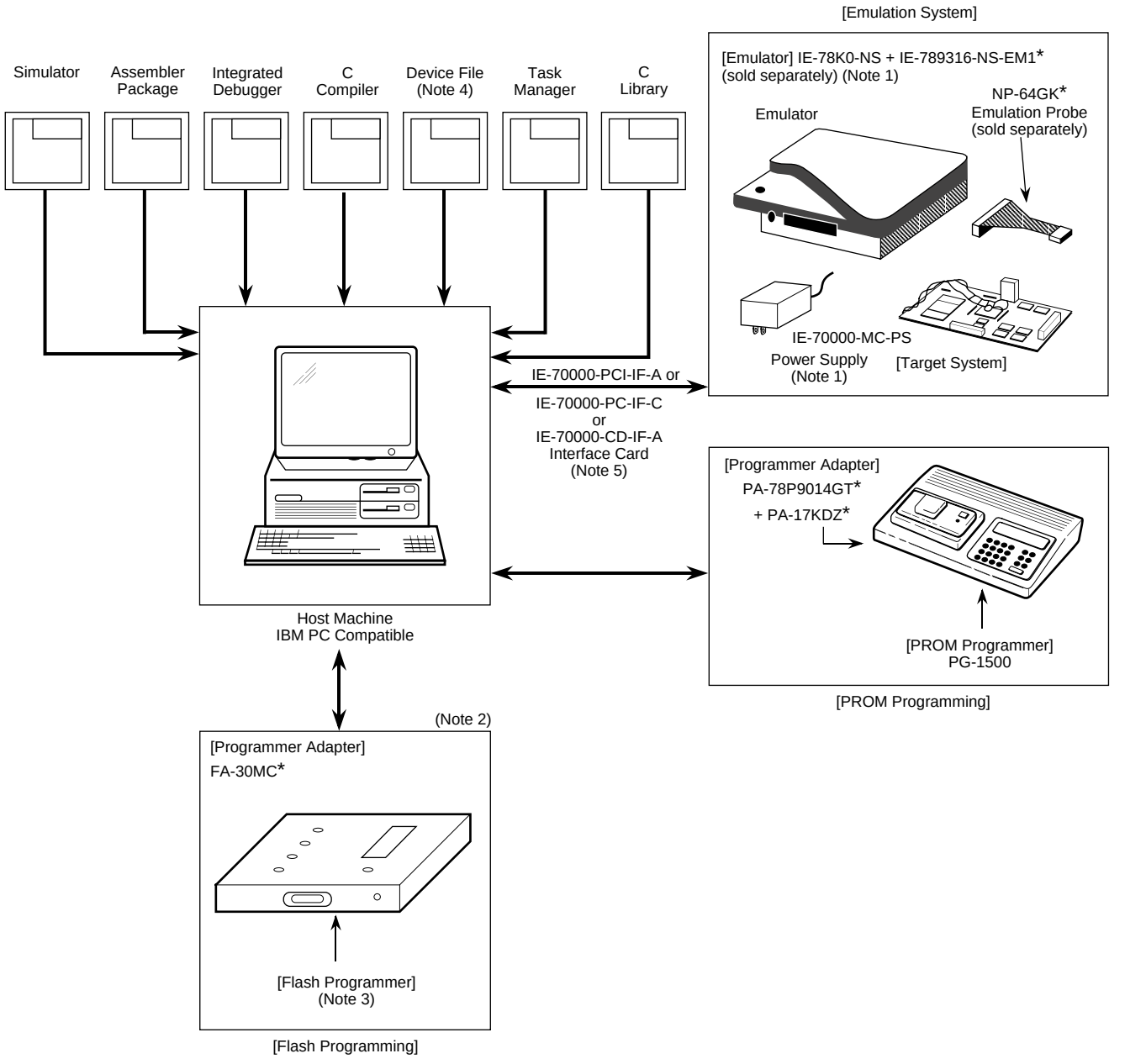
MX78K4 Embedded Operating System is an operating system that complies with a subset of the μITRON operating system specification. This operating system can be used for task management, event management, and time management. Task management controls the execution sequence and selects the task to be executed next. The MX78K4 is MS-DOS-based and can be run from the MS-DOS prompt in Windows.

PG-1500 Controller is a control program that controls the PG-1500 PROM writer by connecting the PROM writer and host machine with a serial or parallel interface. The PG-1500 controller is MS-DOS-based software than cannot be used in Windows (including from the MS-DOS prompt)

K0S Emulators

Feature		IE-78K0S-NS	LCE-78K0S
Target device		μPD789xxx	Check for devices supported
Clock source	External	User-installed clock	User-installed crystal oscillator
	Internal	Fixed clock	Same
Memory mapping	Internal ROM	Up to 60 KB	Same
	Internal RAM	Up to 1 KB	Same
	Target memory	On target system	Not supported
	Stack	Assign stack boundary so program will break on illegal stack access	Same
Event setting		Address, data, status (program run, data read, data write, data read/write)	Same
		1- or 8-bit external trigger input	Not supported
		Up to 6 events (4 bus, 2 execution, 1 external trigger) can be used at any given time to trigger break events.	Up to three break trigger or trace events are supported at any given time.
Break		Up to 32K event-based breaks can be registered. Up to 10 can be activated at any time.	Up to 64 K fetch events and up to 256 data values can be registered. Data values can be qualified as address, read, write or read/write.
		Unlimited number of software breaks	Same
Trace		32 KB – 8 KB buffer size	Same (implemented trace buffer size is 64 bits/frame by 64K frames)
		Unconditional trace, qualified trace, sectional trace	Same
Emulation function		Real-time, break, and step execution	Same
Program debugging		Records the execution flow of a program (up to 64 KB available); indicates whether specified read, write, and fetch instructions have been actually executed	Not supported
Power source select		Internal: V_{DD}= 5 V ± 5% External: V_{DD} = 3.3 V low power emulation	Power source: V_{CC}=5 V and V_{PP}=10 V; K0S Evachip and K0S Realchip can be operated either at V_{DD}=5 V or V_{DD}=3 V.
Flash programming		Not supported	3-wire serial I/O on K0S family; check for devices supported

Typical New Smile Development Environment for K0S Microcontrollers



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Notes:

* Arbitrary part numbers (sold separately).

(1) The integrated debugger software and power supply are included with the IE-78K0S-NS.

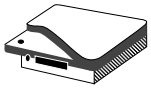
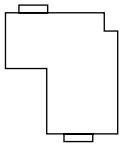
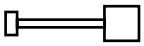
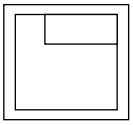
(2) Only for Flash EEPROM products.

(3) PG-FP3 or FL-PR3 or FlashMaster.

(4) Device file is included with the assembler package.

(5) For desktop PC, use IE-70000-PC-IF-C or IE-70000-PCI-IF-A. For laptop PC, use IE-70000-CD-IF-A.

New Smile Development Tools for K0S Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD789011GT µPD789012GT µPD78P9014GT	28-pin SOP (375 mil)	IE-78K0S-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A	IE-789014-NS-EM1	NP-28GT (Note 1)	28GT-ICDUMMYSET	• RA78K0S relocatable assembler • CC78K0S C compiler (Note 3) • CL78K0S C library (Note 4) • SM78K0S simulator (Note 5) • MX78K0S task manager (small real-time operating system)
µPD789011CT µPD789012CT µPD78P9014CT	28-pin SDIP (400 mil)			NP-28CT (Note 1)	Generic SDIP socket	
µPD789022GB-8ES µPD789024GB-8ES µPD789025GB-8ES µPD789026GB-8ES µPD78F9026AGB-8ES	44-pin QFP (10 x 10 mm)		IE-789026-NS-EM1	(a) NP-44GB or (b) NP-44GB-TQ (Note 2)	(a) EV-9200G-44 or (b) EV-TGB-044SAP	
µPD789022CU µPD789024CU µPD789025CU µPD789026CU µPD78F9026ACU	42-pin SDIP (600 mil)			NP-42CU (Note 1)	Generic SDIP socket	
µPD789101AMC µPD789102AMC µPD789104AMC µPD789111AMC µPD789112AMC µPD789114AMC µPD78F9116AMC µPD789121AMC µPD789122AMC µPD789124AMC µPD789131AMC µPD789134AMC µPD78F9136AMC	30-pin SSOP (300 mil)		IE-789136-NS-EM1	NP-36GS (Note 1)	NGS-30	
µPD789166GB-8ES µPD789167GB-8ES µPD789176GB-8ES µPD789177GB-8ES µPD78F9177GB-8ES µPD789166YGB-8ES µPD789167YGB-8ES µPD789176YGB-8ES µPD789177YGB-8ES µPD78F9177YGB-8ES	44-pin QFP (10 x 10 mm)		IE-789177-NS-EM1	(a) NP-44GB or (b) NP-44GB-TQ (Note 2)	(a) EV-9200G-44 or (b) EV-TGB-044SAP	

Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.

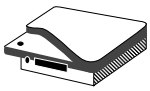
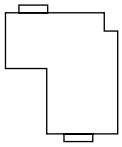
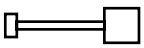
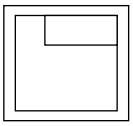
(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

(3) To use the CC78K0S, the RA78K0S is required.

(4) Optional. Includes standard and runtime library source files.

(5) Check for devices supported.

New Smile Development Tools for K0S Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD789166YGA-9EU µPD789167YGA-9EU µPD789176YGA-9EU µPD789177YGA-9EU µPD78F9177YGA-9EU	48-pin TQFP (7 x 7 mm)	IE-78K0S-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A	IE-789177-NS-EM1	NP-48GA (Note 1)	EV-TGA-048SDP	• RA78K0S relocatable assembler • CC78K0S C compiler (Note 3) • CL78K0S C library (Note 4) • SM78K0S simulator (Note 5) • MX78K0S task manager (small real-time operating system)
µPD789304GC-AB8 µPD789306GC-AB8 µPD78F9306GC-AB8	64-pin QFP (14 x 14 mm)		IE-789316-NS-EM1	(a) NP-64GC or (b) NP-64GC-TQ (Note 2)	(a) EV-9200GC-64 or (b) EV-TGC-064SAP	
µPD789304GK-9ET µPD789306GK-9ET µPD78F9306GK-9ET	64-pin TQFP (12 x 12 mm)			NP-64GK (Note 1)	EV-TGK-064SBW	
µPD789314GC-AB8 µPD789316GC-AB8 µPD78F9316GC-AB8	64-pin QFP (14 x 14 mm)			(a) NP-64GC or (b) NP-64GC-TQ (Note 2)	(a) EV-9200GC-64 or (b) EV-TGC-064SAP	
µPD789314GK-9ET µPD789316GK-9ET µPD78F9316GK-9ET	64-pin TQFP (12 x 12 mm)			NP-64GK (Note 1)	EV-TGK-064SBW	
µPD789405AGC-8BT µPD789406AGC-8BT µPD789407AGC-8BT µPD789415AGC-8BT µPD789416AGC-8BT µPD789417AGC-8BT µPD78F9418AGC-8BT	80-pin QFP (14 x 14 mm)		IE-789418-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 2)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	
µPD789405AGK-9EU µPD789406AGK-9EU µPD789407AGK-9EU µPD789415AGK-9EU µPD789416AGK-9EU µPD789417AGK-9EU µPD78F9418AGK-9EU	80-pin QFP (12 x 12 mm)			NP-80GK (Note 1)	EV-TGK-080SDW	
µPD789800GB-8ES µPD78F9801GB-8ES	44-pin QFP (10 x 10 mm)		IE-789801-NS-EM1	(a) NP-44GB or (b) NP-44GB-TQ (Note 2)	(a) EV-9200G-44 or (b) EV-TGB-044SAP	
µPD789830P µPD78F9831GC-8EU	100-pin LQFP (14 x 14 mm)		IE-789831-NS-EM1	NP-100GC (Note 1)	EV-TGC-100SDW	
µPD789841GB-8ES µPD789842GB-8ES µPD78F9842GB-8ES µPD789841GB-3BS-MTX µPD789842GB-3BS-MTX µPD78F9842GB-3BS-MTX	44-pin QFP (10 x 10 mm)		IE-789842-NS-EM1	(a) NP-44GB or (b) NP-44GB-TQ (Note 2)	(a) EV-9200G-44 or (b) EV-TGB-044SAP	

Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.

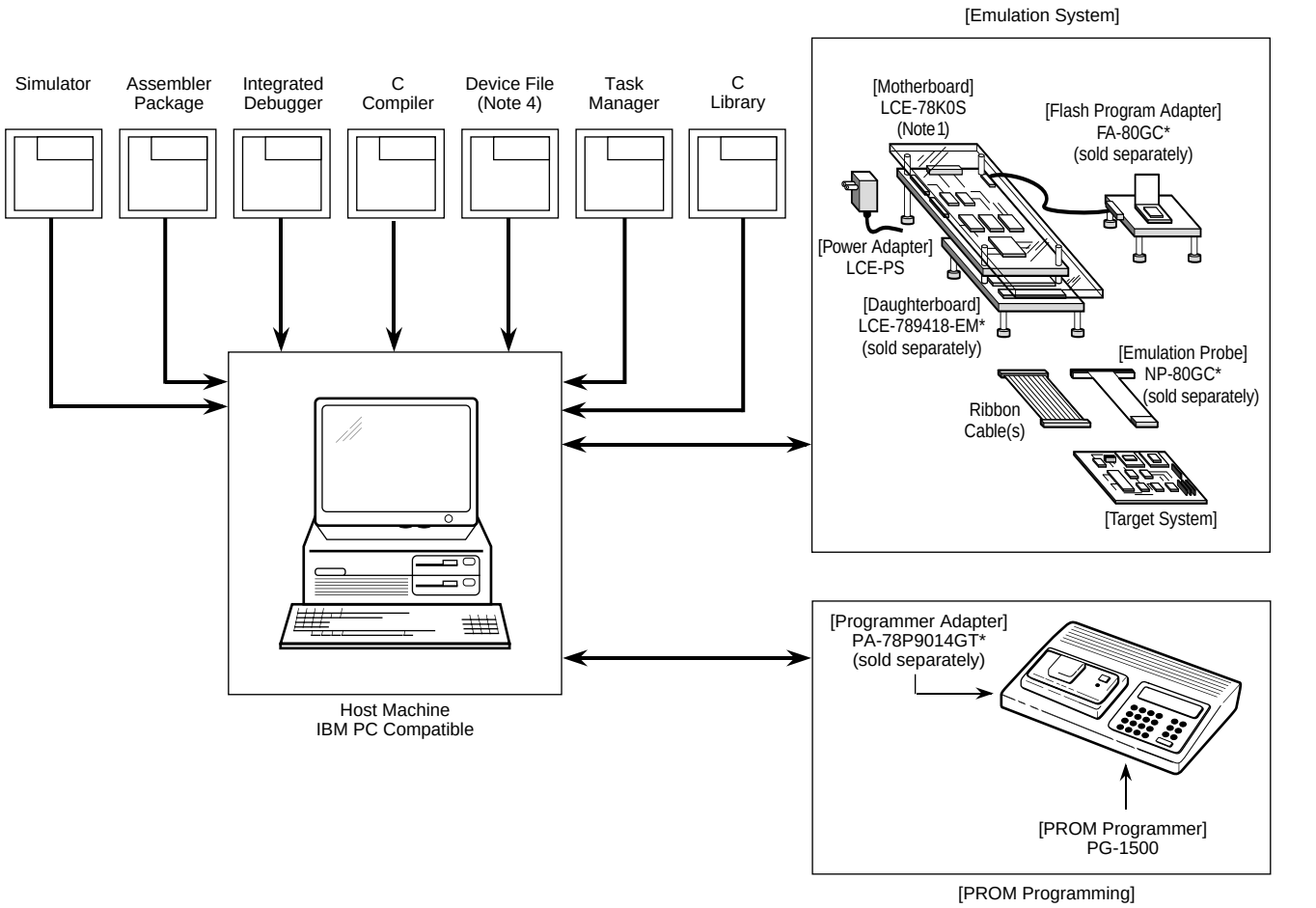
(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

(3) To use the CC78K0S, the RA78K0S is required.

(4) Optional. Includes standard and runtime library source files.

(5) Check for devices supported.

Typical Low-Cost Emulator Development Environment for K0S Microcontrollers



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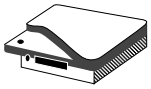
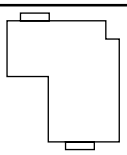
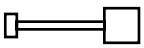
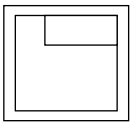
Notes:

* Arbitrary part numbers.

(1) The LCE-78K0S motherboard operates in conjunction with a LCE-789xxx-EM daughterboard.

LCE Development Tools for K0S Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter (Note 3)	Software Packages
Device Name	Package					
						
µPD789011GT µPD789012GT µPD78P9014GT	28-pin SOP (375 mil)	LCE-78K0S	LCE-789014-EM	NP-28GT (Note 1)	28GT-ICDUMMYSET	• RA78K0S relocatable assembler
µPD789011CT µPD789012CT µPD78P9014CT	28-pin SDIP (400 mil)			NP-28CT (Note 1)	Generic SDIP socket	• CC78K0S C compiler (Note 4)
µPD789101AMC µPD789102AMC µPD789104AMC µPD789111AMC µPD789112AMC µPD789114AMC µPD78F9116AMC µPD789121AMC µPD789122AMC µPD789124AMC µPD789131AMC µPD789134AMC µPD78F9136AMC	30-pin SSOP (300 mil)		LCE-789136-EM	NP-36GS (Note 1)	NGS-30	• CL78K0S C library (Note 5) • SM78K0S simulator (Note 6) • MX78K0S task manager (small real-time operating system)
µPD789166GB-8ES µPD789167GB-8ES µPD789176GB-8ES µPD789177GB-8ES µPD78F9177GB-8ES µPD789166YGB-8ES µPD789167YGB-8ES µPD789176YGB-8ES µPD789177YGB-8ES µPD78F9177YGB-8ES	44-pin QFP (10 x 10 mm)		LCE-789177-EM	(a) NP-44GB or (b) NP-44GB-TQ (Note 2)	(a) EV-9200G-44 or (b) EV-TGB-044SAP	

Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.

(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

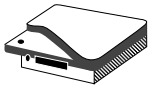
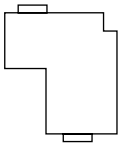
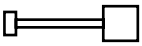
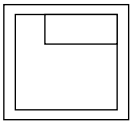
(3) Probe and socket are not required in LCE configuration.

(4) To use the CC78K0S, the RA78K0S is required.

(5) Optional. Includes standard and runtime library source files.

(6) Check for supported devices.

LCE Development Tools for K0S Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe (Note 3)	Conversion Socket/Adapter (Note 3)	Software Packages
Device Name	Package					
						
µPD789166YGA-9EU µPD789167YGA-9EU µPD789176YGA-9EU µPD789177YGA-9EU µPD78F9177YGA-9EU	48-pin TQFP (7 x 7 mm)	LCE-78K0S	LCE-789177-EM	NP-48GA (Note 1)	EV-TGA-048SDP	• RA78K0S relocatable assembler • CC78K0S C compiler (Note 4) • CL78K0S C library (Note 5) • SM78K0S simulator (Note 6) • MX78K0S task manager (small real-time operating system)
µPD789405AGC-8BT µPD789406AGC-8BT µPD789407AGC-8BT µPD789415AGC-8BT µPD789416AGC-8BT µPD789417AGC-8BT µPD78F9418AGC-8BT	80-pin QFP (14 x 14 mm)		LCE-789418-EM	(a) NP-80GC or (b) NP-80GC-TQ (Note 2)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	
µPD789405AGK-9EU µPD789406AGK-9EU µPD789407AGK-9EU µPD789415AGK-9EU µPD789416AGK-9EU µPD789417AGK-9EU µPD78F9418AGK-9EU	80-pin QFP (12 x 12 mm)			NP-80GK (Note 1)	EV-TGK-080SDW	

Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.

(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

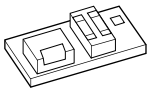
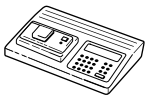
(3) Probe and socket are not required in LCE configuration.

(4) In order to use the CC78K0S, the RA78K0S is required.

(5) Optional. Includes standard and runtime library source files.

(6) Check for devices supported .

Flash/PROM Programmers for K0S Microcontrollers

Target Device	Program Adapter	Programmer (Note 1)
		
μPD78P9014GT	PA-78P9014GT + PA-17KDZ	PG-1500
μPD78P9014CT	PA-78P9014CT + PA-17KDZ	
μPD78F9116AMC, μPD78F9136AMC	FA-30MC	PG-FP3 or FLPR3 or
μPD78F9026ACU	FA-42CU	FlashMaster (Note 2)
μPD78F9026AGB-8ES, μPD78F9801GB-8ES, μPD78F9177GB-8ES, μPD78F9177YGB-8ES μPD78F9842GB-3BS-MTX, μPD78F9842GB-8ES	FA-44GB-8ES	
μPD78F9177YGA-9EU	FA-48GA	
μPD78F9306GC-AB8, μPD78F9316GC-AB8	FA-64GC	
μPD78F9306GK-9ET, μPD78F9316GK-9ET	FA-64GK	
μPD78F9418AGC-8BT	FA-80GC	
μPD78F9418AGK-9EU	FA-80GK-9EU	
μPD78F9831GC-8EU	FA-100GC	

Notes:

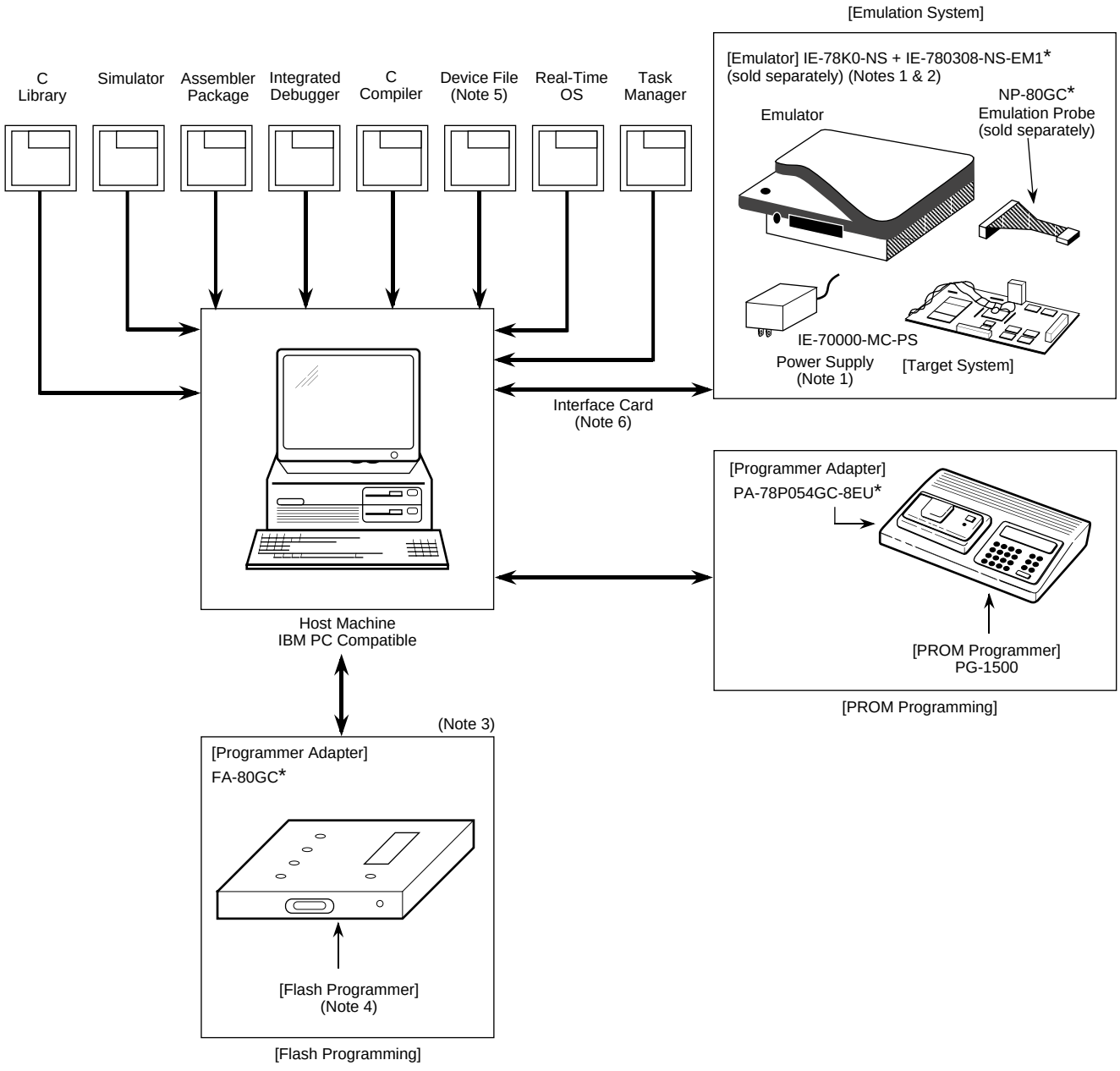
(1) Check for devices supported.

(2) FA-xxx program adapter and flash programmers are not required in LCE configuration.

K0 Emulators

Feature		IE-78K0-NS (K0 Emulator)	IE-78K0-NS + IE-78K0-NS-PA (K0 Emulator + Option Board)
Target device		μPD780xxx	Same
System clock		According to specifications of emulation board	Same
Clock supply	External	Pulse input	Same
	Internal	Mounted on emulation board	
Substitute memory capacity		64 KB	Same
Mapping unit	Internal ROM	4 KB	Same
	Internal high-speed RAM	64 bytes	
	Internal low-speed RAM	128 bytes	
	External expansion memory	8 KB	
Emulation function		• Real-time execution • Break execution • Step execution	Same
Real-time internal RAM monitor		2 KB memory space	Same
Event detection		• Program execution detection (2) • Bus event detection (4) • External trigger detection • Trigger (open-drain) output (1)	Same plus • Program exec. detection (10) • Bus event detection (12)
Event integration		• Path condition • Trace qualify condition • Delay condition • Trigger condition	Same
Break factor		• Event break • Manual break • Common break • Fail-safe break	Same plus • External independent event input • Timeout break
Real-time trace	Trace factor	• All traces • Qualify trace	Same plus sectional trace
	Trace capacity	32 bits x 8 KB	48 bits x 8 KB
	Trace content	Address, data, and status	Same plus • External sense trace (16) • Time stamp • Snapshot
Execution time		Up to 4 minutes 28 seconds with a resolution of 62.5 ns	Same
Event interval time		None	11 minutes (160 ns resolution) 24 hours (20.56 μs)
Coverage		None	64 KB space
Low voltage		Based on the emulation board	Same
Dimensions		240 (w) x 197 (d) x 73 (h) mm	Same

Typical New Smile Development Environment for K0 Microcontrollers



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Notes:

* Arbitrary part numbers sold separately.

(1) The integrated debugger software and power supply are included with the IE-78K0-NS.

(2) With IE-780XXX-NS-EM4, the IE-78K0-NS-P0X is also required.

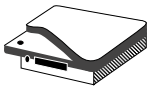
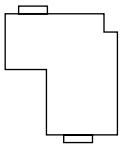
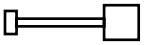
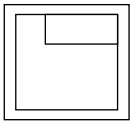
(3) Only for flash EEPROM products.

(4) PG-FP3 or FL-PR3 or FlashMaster.

(5) The device file is included with the assembler package.

(6) For desktop PC, use IE-70000-PC-IF-C or IE-70000-PCI-IF-A.
For laptop PC, use IE-70000-CD-IF.

New Smile Development Tools for K0 Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD780021AGC-AB8 µPD780022AGC-AB8 µPD780023AGC-AB8 µPD780024AGC-AB8 µPD780031AGC-AB8 µPD780032AGC-AB8 µPD780033AGC-AB8 µPD780034AGC-AB8 µPD78F0034AGC-AB8 µPD780021AYGC-AB8 µPD780022AYGC-AB8 µPD780023AYGC-AB8 µPD780024AYGC-AB8 µPD780031AYGC-AB8 µPD780032AYGC-AB8 µPD780033AYGC-AB8 µPD780034AYGC-AB8 µPD78F0034AYGC-AB8	64-pin QFP (14 x 14 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780034-NS-EM1	(a) NP-64GC or (b) NP-64GC-TQ (Note 2)	(a) EV-9200GC-64 or (b) EV-TGC-064SAP	• RA78K0S relocatable assembler • CC78K0S C compiler (Note 4) • CL78K0S C library (Note 5) • SM78K0S simulator (Note 6) • MX78K0S task manager (small real-time operating system)
µPD780021AGK-9ET µPD780022AGK-9ET µPD780023AGK-9ET µPD780024AGK-9ET µPD780031AGK-9ET µPD780032AGK-9ET µPD780033AGK-9ET µPD780034AGK-9ET µPD78F0034AGK-9ET	64-pin LQFP (12 x 12 mm)			NP-64GK (Note 3)	EV-TGK-064SBW	

Notes:

(1) Option board (optional)

(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

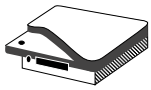
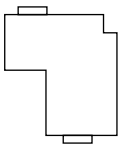
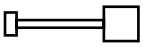
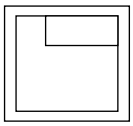
(3) Requires one socket adapter as shown in the conversion socket/adapter column.

(4) To use the CC78K0, the RA78K0 is required.

(5) Optional. Includes standard and runtime library source files.

(6) Check for devices supported.

New Smile Development Tools for K0 Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD780021AYGK-9ET µPD780022AYGK-9ET µPD780023AYGK-9ET µPD780024AYGK-9ET µPD780031AYGK-9ET µPD780032AYGK-9ET µPD780033AYGK-9ET µPD780034AYGK-9ET µPD78F0034AYGK-9ET	64-pin LQFP (12 x 12 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780034-NS-EM1	NP-64GK (Note 2)	EV-TGK-064SBW	• RA78K0S relocatable assembler • CC78K0S C compiler (Note 3) • CL78K0S C library (Note 4)
µPD780021ACW µPD780022ACW µPD780023ACW µPD780024ACW µPD780031ACW µPD780032ACW µPD780033ACW µPD780034ACW µPD78F0034ACW µPD780021YACW µPD780022AYCW µPD780023AYCW µPD780024AYCW µPD780031AYCW µPD780032AYCW µPD780033AYCW µPD780034AYCW µPD78F0034AYCW	64-pin SDIP (750 mil)			NP-64CW (Note 2)	Generic SDIP socket	• SM78K0S simulator (Note 5) • MX78K0S task manager (small real-time operating system)

Notes:

(1) Option Board (optional)

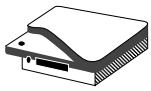
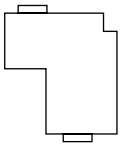
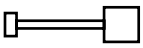
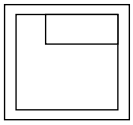
(2) Requires one socket adapter as shown in the conversion socket/adapter column.

(3) To use the CC78K0, the RA78K0 is required.

(4) Optional. Includes standard and runtime library source files.

(5) Check for devices supported.

New Smile Development Tools for K0 Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD780053GC-8BT µPD780054GC-8BT µPD780055GC-8BT µPD780056GC-8BT µPD780058GC-8BT µPD78F0058GC-8BT µPD780053YGC-8BT µPD780054YGC-8BT µPD780055YGC-8BT µPD780056YGC-8BT µPD780058YGC-8BT µPD78F0058YGC-8BT	80-pin QFP (14 x 14 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780308-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 2)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	• RA78K0 relocatable assembler • CC78K0 C compiler (Note 4) • CL78K0 C library (Note 5) • SM78K0 simulator (Note 6)
µPD780053GK-9EU µPD780054GK-9EU µPD780055GK-9EU µPD780056GK-9EU µPD780058GK-9EU µPD78F0058GK-9EU µPD780053YGK-9EU µPD780054YGK-9EU µPD780055YGK-9EU µPD780056YGK-9EU µPD780058YGK-9EU µPD78F0058YGK-9EU	80-pin QFP (12 x 12 mm)			NP-80GK (Note 3)	EV-TGK-080SDW	• RX78K0 real-time operating system • MX78K0 task manager (small real-time operating system)
µPD780076GC-AB8 µPD780078GC-AB8 µPD78F0078GC-AB8	64-pin QFP (14 x 14 mm)		IE-780078-NS-EM1	(a) NP-64GC or (b) NP-64GC-TQ (Note 2)	(a) EV-9200GC-64 or (b) EV-TGC-064SAP	

Notes:

(1) Option board (optional)

(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

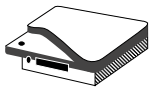
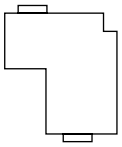
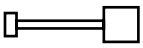
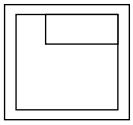
(3) Requires one socket adapter as shown in the conversion socket/adapter column.

(4) To use the CC78K0, the RA78K0 is required.

(5) Optional. Includes standard and runtime library source files.

(6) Check for devices supported.

New Smile Development Tools for K0 Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD780306GC-8EU µPD780308GC-8EU µPD78P0308GC-8EU µPD780306YGC-8EU µPD780308YGC-8EU µPD78P0308YGC-8EU	100-pin QFP (14 x 14 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780308-NS-EM1	NP-100GC (Note 2)	EV-TGC-100SDW	• RA78K0 relocatable assembler • CC78K0 C compiler (Note 3)
µPD780306GF-3BA ** µPD780308GF-3BA** µPD78P0308GF-3BA** µPD780306YGF-3BA** µPD780308YGF-3BA** µPD78P0308YGF-3BA**	100-pin QFP (14 x 20 mm)			NP-100GF (Note 2)	EV-9200GF-100	• CL78K0 C library (Note 4) • SM78K0 simulator (Note 5)
µPD78P0308KL-T µPD78P0308YKL-T	100-pin ceramic LCC w/window (14 x 20 mm)					• RX78K0 real-time operating system
µPD78042FGF-3B9 µPD78043FGF-3B9 µPD78044FGF-3B9 µPD78045FGF-3B9 µPD78P048AGF-3B9	80-pin QFP (14 x 20 mm)		IE-78048-NS-EM1	NP-80GF (Note 2)	EV-9200G-80	• MX78K0 task manager (small real-time operating system)
µPD78P048AKL-S	80-pin ceramic LCC w/window (14 x 20 mm)					
µPD78062GC-8EU µPD78063GC-8EU µPD78064GC-8EU	100-pin QFP (14 x 14 mm)			NP-100GC (Note 2)	EV-TGC-100SDW	

Notes:

** MUB-K0-K0S (Multi-Use Board) is also available.

(1) Option board (optional)

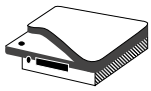
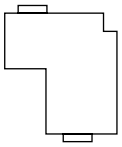
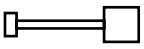
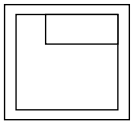
(2) Requires one socket adapter as shown in the conversion socket/adapter column.

(3) To use the CC78K0, the RA78K0 is required.

(4) Optional. Includes standard and runtime library source files.

(5) Check for devices supported.

New Smile Development Tools for K0 Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
μPD78P064GC-8EU μPD78062YGC-8EU μPD78063YGC-8EU μPD78064YGC-8EU	100-pin QFP (14 x 14 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780308-NS-EM1	NP-100GC (Note 2)	EV-TGC-100SDW	• RA78K0 relocatable assembler • CC78K0 C compiler (Note 4) • CL78K0 C library (Note 5) • SM78K0 simulator (Note 6) • RX78K0 real-time operating system • MX78K0 task manager (small real-time operating system)
μPD78062GF-3BA μPD78063GF-3BA μPD78064GF-3BA μPD78062YGF-3BA μPD78063YGF-3BA μPD78064YGF-3BA μPD78P064GF-3BA	100-pin QFP (14 x 20 mm)			NP-100GF (Note 2)	EV-9200GF-100	
μPD78070AGC-8EU*	100-pin QFP (14 x 14 mm)		IE-78078-NS-EM1	NP-100GC (Note 2)	EV-TGC-100SDW	
μPD78070AGF-3BA*	100-pin QFP (14 x 20 mm)			NP-100GF (Note 2)	EV-9200GF-100	
μPD780701YGC μPD78F0701YGC	80-pin QFP (14 x 14 mm)		IE-780701-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 3)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	
μPD780955GF(A)-3B9	80-pin QFP (14 x 20 mm)		IE-780955-NS-EM1	NP-80GF (Note 2)	EV-9200G-80	
μPD780957GC(A)-8EU μPD780958GC(A)-8EU	100-pin QFP (14 x 14 mm)		IE-780958-NS-EM4 + IE-78K0-NS-P01	NP-100GC (Note 2)	EV-TGC-100SDW	
μPD780982GC-AB8 μPD780983GC-AB8 μPD780984GC-AB8 μPD780988GC-AB8 μPD78F0988GC-AB8	64-pin QFP (14 x 14 mm)		IE-780988-NS-EM4 + IE-78K0-NS-P01	(a) NP-64GC or (b) NP-64GC-TQ (Note 3)	(a) EV-9200GC-64 or (b) EV-TGC-064SAP	
μPD780982CW μPD780983CW μPD780986CW μPD780988CW μPD78F0988CW	64-pin SDIP (750 mil)			NP-64CW (Note 2)	Generic SDIP socket	

Notes:

* Design and development board (DDB-K0070A) is also available.

(1) Option board (optional)

(2) Requires one socket adapter as shown in the conversion socket/adapter column.

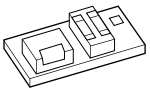
(3) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

(4) In order to use the CC78K0, the RA78K0 is required.

(5) Optional. Includes standard and runtime library source files.

(6) Check for devices supported.

Flash/PROM Programmers for K0 Microcontrollers

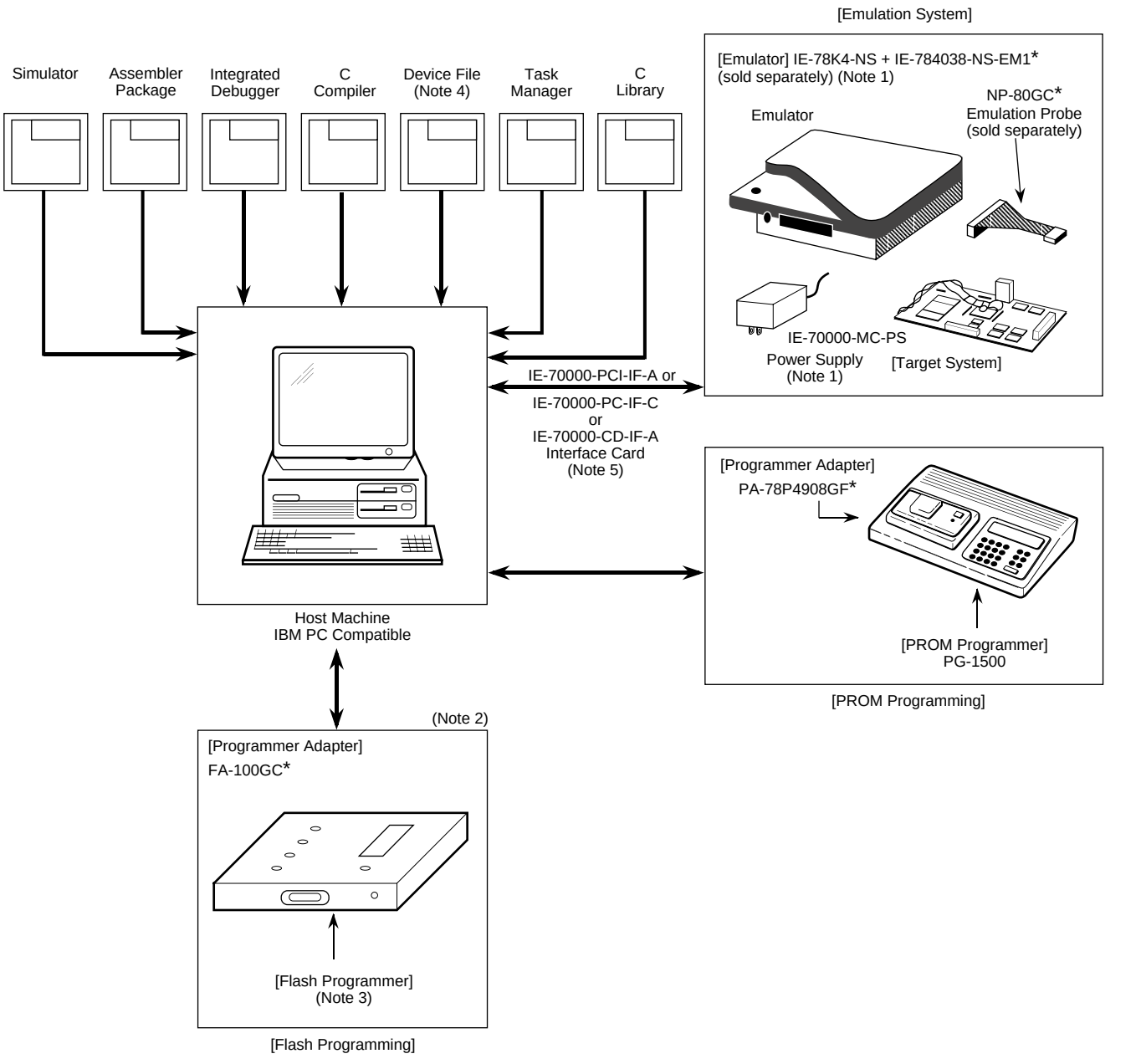
Target Device	Program Adapter	Programmer
		
μPD78P064GC-8EU, μPD78P0308GC-8EU, μPD78P0308YGC-8EU	PA-78P0308GC-8EU	PG-1500
μPD78P0308GF-3BA, μPD78P064GF-3BA, μPD78P0308YGF-3BA	PA-78P0308GF	
μPD78P0308KL-T, μPD78P0308YKL-T	PA-78P0308KL-T	
μPD78P048AGF-3B9	PA-78P048GF	
μPD78P048AKL-S	PA-78P048KL-S	
μPD78F0034AGC-AB8, μPD78F0078GC-AB8, μPD78F0034AYGC-AB8, μPD78F0988GC-AB8	FA-64GC	PG-FP3 or FL-PR3 or FlashMaster (Note 1)
μPD78F0034ACW, μPD78F0034AYCW, μPD78F0988CW	FA-64CW	
μPD78F0034AGK-9ET, μPD78F0034AYGK-9ET	FA-64GK	
μPD78F0058GC-8BT, μPD78F0058YGC-8BT, μPD78F0701YGC	FA-80GC	
μPD78F0058GK-9EU, μPD78F0058YGK-9EU	FA-80GK-9EU	

Note:
(1) Check for devices supported.

K4 Emulators

Feature		IE-78K4-NS
Target device		μPD784xxx
System clock		Same as target device
Clock supply	External	Pulse input
	Internal	Mounted on emulation board
Substitute memory capacity		1 MB
Mapping unit	Internal ROM	8 KB
	External RAM	512 bytes
	Peripheral RAM	256 bytes
	External substitute memory	• 64 KB space or less: 4 KB • 1 MB space or less: 64 KB • 1 MB space or more: 1 MB
Emulation function		Real-time, break and step execution
Real-time internal RAM monitor		Entire internal RAM area
Event detection		Program execution, bus event, external trigger, and trigger (open-drain) output
Event integration		Path condition, sequential condition,trace qualify condition, section trace start/end condition, and trigger output condition (trace delay)
Break factor		Event, manual, common, and fail safe
Real-time trace	Trace factor	All traces, qualify trace, and sectional trace
	Trace capacity	96-bit x 32 KB
	Trace content	Address, data, and status
Execution time measurement		Up to 14 minutes 33 seconds with a resolution of 204.45 ns
Pin mask		Maskable RESET, HLDRQ, NMI, WAIT and hardware STOP
Low voltage		Based on the I/O emulation board
Dimensions		240 (w) x 197 (d) x 73 (h) mm

Typical New Smile Development Environment for K4 Microcontrollers



83RD-9533B Rev 4c (03/00)

Notes:

* Arbitrary part numbers sold separately.

(1) The integrated debugger software and power supply are included with the IE-78K4-NS.

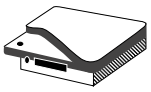
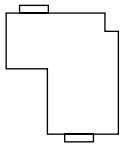
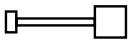
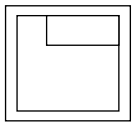
(2) Only for flash EEPROM products.

(3) PG-FP3, FL-PR3 or FlashMaster.

(4) Device file is included with the assembler package.

(5) For desktop PC, use IE-70000-PC-IF-C or IE-70000-PCI-IF-A.
For laptop PC, use IE-70000-CD-IF-A (only available for New Smile systems).

New Smile Development Tools for K4 Microcontrollers

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD784031GC-8BT µPD784035GC-8BT µPD784036GC-8BT µPD784037GC-8BT µPD784038GC-8BT µPD78P4038GC-8BT µPD784031YGC-8BT µPD784035YGC-8BT µPD784036YGC-8BT µPD784037YGC-8BT µPD784038YGC-8BT µPD78P4038YGC-8BT	80-pin QFP (14 x 14 x 1.4 mm)	IE-78K4-NS + (IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A)	IE-784038-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 1)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	• RA78K4 relocatable assembler • CC78K4 C compiler (Note 3) • CL78K4 C library (Note 4) • SM78K4 simulator (Note 5) • RX78K4 real-time operating system
µPD78P4038KK-T	80-pin LCC (14 x 14 mm)					
µPD784031GK µPD784035GK µPD784036GK µPD784037GK µPD784038GK µPD78P4038GK µPD784031YGK µPD784035YGK µPD784036YGK µPD784037YGK µPD784038YGK µPD78P4038YGK	80-pin TQFP (12 x 12 mm)			NP-80GK (Note 2)	EV-TGK-080SDW	
µPD784044GC-3B9 µPD784046GC-3B9 µPD78F4046GC-3B9 µPD784054GC-3B9	80-pin QFP (14 x 14 mm)		IE-784046-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 1)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	
µPD784214AGC-8EU µPD784215AGC-8EU µPD784216AGC-8EU µPD78F4216AGC-8EU µPD784214AYGC-8EU µPD784215AYGC-8EU µPD784216AYGC-8EU µPD78F4216AYGC-8EU µPD784217AGC-8EU µPD784218AGC-8EU µPD78F4218AGC-8EU µPD784217AYGC-8EU µPD784218AYGC-8EU µPD78F4218AYGC-8EU	100-pin QFP (14 x 14 mm)		IE-784225-NS-EM1	NP-100GC (Note 2)	EV-TGC-100SDW	

Notes:

(1) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.

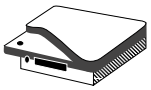
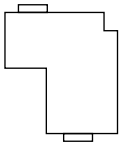
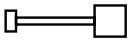
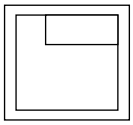
(2) Requires one socket adapter as shown in the conversion socket/adapter column.

(3) To use the CC78K4, the RA78K4 is required.

(4) Optional. Includes standard and runtime library source files.

(5) Check for supported devices.

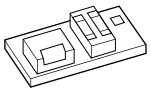
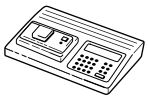
New Smile Development Tools for K4 Microcontrollers (cont)

Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
µPD784214AGF-3BA µPD784215AGF-3BA µPD784216AGF-3BA µPD78F4216AGF-3BA µPD784214AYGF-3BA µPD784215AYGF-3BA µPD784216AYGF-3BA µPD78F4216AYGF-3BA µPD784217AGF-3BA µPD784218AGF-3BA µPD78F4218AGF-3BA µPD784217AYGF-3BA µPD784218AYGF-3BA µPD78F4218AYGF-3BA	100-pin QFP (14 x 20 mm)	IE-78K4-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A	IE-784225-NS-EM1	NP-100GF (Note 1)	EV-9200GF-100	• RA78K4 relocatable assembler • CC78K4 C compiler (Note 3) • CL78K4 C library (Note 4) • SM78K4 simulator (Note 5) • RX78K4 real-time operating system
µPD784224GC-8BT µPD784225GC-8BT µPD78F4225GC-8BT µPD784224YGC-8BT µPD784225YGC-8BT µPD78F4225YGC-8BT	80-pin QFP (14 x 14 mm)		IE-784225-NS-EM1	(a) NP-80GC or (b) NP-80GC-TQ (Note 2)	(a) EV-9200GC-80 or (b) EV-TGC-080SBP	
µPD784224GK-9EU µPD784225GK-9EU µPD78F4225GK-9EU µPD784224YGK-9EU µPD784225YGK-9EU µPD78F4225YGK-9EU	80-pin TQFP (12 x 12 mm)			NP-80GK (Note 1)	EV-TGK-080SDW	
µPD784907GF-3BA µPD784908GF-3BA µPD78P4908GF-3BA	100-pin QFP (14 x 20 mm)		IE-784908-NS-EM1	NP-100GF (Note 1)	EV-9200GF-100	

Notes:

(1) Requires one socket adapter as shown in the conversion socket/adapter column.
(2) The (a) probe requires one (a) socket adapter and the (b) probe requires one (b) socket adapter as shown in the socket/adapter column.
(3) To use the CC78K4, the RA78K4 is required.
(4) Optional. Includes standard and runtime library source files.
(5) Check for devices supported.

Flash/PROM Programmers for K4 Microcontrollers

Target Device	Program Adapter	Programmer
		
μPD78P4038KK-T	PA-78P4026KK	PG-1500
μPD78P4038GC-8BT, μPD78P4038YGC-8BT	PA-78P4038GC-8BT	
μPD78P4038GK, μPD78P4038YGK	PA-78P4038GK	
μPD78P4908GF-3BA	PA-78P4908GF	
μPD78F4046GC-3B9	FA-80GC	PG-FP3 or FL-PR3 or
μPD78F4225GC-8BT, μPD78F4225YGC-8BT	FA-80GC	FlashMaster (Note 1)
μPD78F4225GK-9EU, μPD78F4225YGK-9EU	FA-80GK-9EU	
μPD78F4216AGC-8EU, μPD78F4216AYGC-8EU, μPD78F4218AGC-8EU, μPD78F4218AYGC-8EU	FA-100GC	
μPD78F4216AGF-3BA, μPD78F4218AYGF-3BA, μPD78F4218AGF-3BA, μPD78F4216AYGF-3BA	FA-100GF-3BA	

Note:
(1) Check for devices supported.

V800 Series Hardware Tools

ICE-V850 / ICE-V850E in-circuit emulator for the V850 and V850E, respectively, is used with a separately available emulation board, emulation extension probe, conversion socket/adapter, and interface adapter. It uses the ID850 integrated debugger as control software.

IE-703xxxx-MC-EM1 emulation board connects to the separately available in-circuit emulator and is available for each subseries of V850 and V850E microcontrollers.

SC-xxx-SDx emulation extension probe connects the target system to the in-circuit emulator installed with an emulation board. A suitable probe is available for each device package.

IC-70000-MC-PS power unit for the in-circuit emulator is included with the ICE unit.

Interface adapter connects an in-circuit emulator to the host PC.

PC Interface	Interface Adapter
ISA bus for an IBM® PC/AT-compatible host	IE-70000-PC-IF-C
PCI bus	IE-70000-PCI-IF-A
PC Card™ socket (for laptop use)	IE-70000-CD-IF-A

PG-1500 PROM programmer is used with the adapter supplied or with a separately available PROM programmer adapter. The PG-1500 is used to program microcontrollers that have an internal PROM in standalone mode or are under the control of a host PC. The PG-1500 can program PROMs ranging in size from 256 KB to 4 MB.

Conversion sockets/adapters facilitate connection of the emulation probe and target system. Both are supplied with the emulation probe and are also available separately. The EV-NQ PACK xxx, EV-XQ PACK xxx, EV-YQ PACK xxx, and EV-HW PACK xxx conversion adapters take a probe or a device.

PA-70P3xxx PROM program adapter connects to the PG-1500 and is available for each device package.

PG-FP3, FL-PR3 (made by Naito Densei Machida Mf., Ltd.), and FlashMaster flash programmers for NEC microcontrollers with internal flash memory are used with the device mounted on the target system for on-board writing or with a separately available flash memory writing adapter.

FA-[V850E/xxx, V850/xxx, V85x]-xxx flash memory writing adapter connects to the PG-Fp3 and is available for each device package (xxx indicates the device pin count).

V850 Family Software Tools

CA850 C compiler for the V850 and V85E families translates a program written in C language into object code that can be executed by a microcontroller. The CA850 also has a function to output debugging information to the ID850 integrated debugger. The CA850 can be used in Windows using the included project manager. Without the project manager, the CA850 can be used in an MS-DOS box in Windows.

AS850 assembler package for the V850 and V850E families translates a program written in assembly language into object code that be executed by a microcontroller. The assembler package also has functions to create a symbol table and to automatically optimize branch and pipeline instructions. The project manager integrates the CA850, AS850, ID850, and SM850 to create an environment where a program can be developed efficiently through simple operations. The CA850 package contains the following components.

	Project Manager
AS850	Assembler
LD850	Linker
HX850	Object converter
AR850	Librarian
Idea-L	Light editor

D (F, P) 3xxx device files contain information peculiar to a specific device that can be used in combination with the C compiler and assembler.

ID850 integrated debugger supports the ICE-V850 and ICE-V850E in-circuit emulators for the V850 and V850E families. The ID850 is Windows-based and has improved C-compatible debugging functions and can display the results of tracing with the source program using an integrating window function that associates the source program, disassemble display, and memory display with the trace result.

SM850 system simulator for the V850 and V850E families can be used to debug the target system as the C or assembler source level while simulating the operation of the target system on the host machine. Using SM850, the logic and performance of the application can be verified independently of hardware development. Therefore, development efficiency can be enhanced and software quality improved.

RX850 real-time operating system for the V850 family conforms to the μITRON specifications and is supplied with a configuration tool used to create the nucleus of the RX850 and multiple information tables. The RX850 is used with the CAA850 compiler package and is sold separately.

PG-1500 controller controls the PG-1500 PROM writer from the host PC by connecting the PG-1500 and host machine with a serial or parallel interface. The PG-1500 is MS-DOS-based software and cannot be used in Windows (including from the MS-DOS prompt).

V830 Family Software Tools

CA830 C compiler for the V830 and V830E families translates a program written in C language into object code that can be executed by a microcontroller. The CA830 also has a function to output debugging information to the ID830 integrated debugger. The CA830 can be used in Windows using the included project manager. Without the project manager, the CA830 can be used in an MS-DOS box in Windows.

AS830 assembler package for the V830 and V830E families translates a program written in assembly language into object code that be executed by a microcontroller. The assembler package also has functions to create a symbol table and to automatically optimize branch and pipeline instructions. The project manager integrates the CA830, AS830, ID830, and SM830 to create an environment where a program can be developed efficiently through simple operations. The CA830 package contains the following components.

	Project Manager
AS830	Assembler
LD830	Linker
HX830	Object converter
AR830	Librarian
Idea-L	Light editor

D (F, P) 3xxx device files contain information peculiar to a specific device that can be used in combination with the C compiler and assembler.

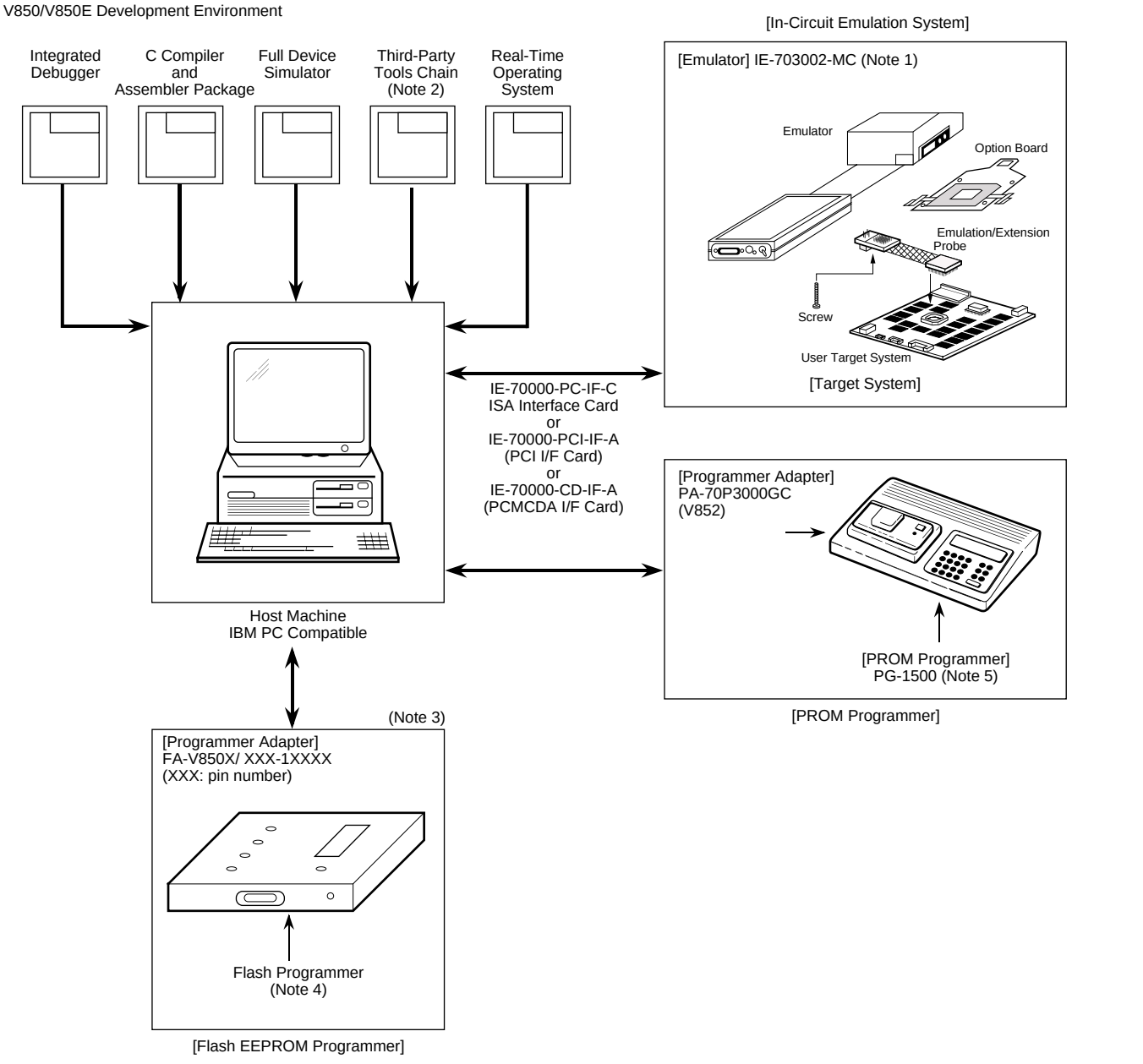
ID830 integrated debugger supports the ICE-V830 and ICE-V830E in-circuit emulators for the V830 and V830E families. The ID830 is Windows-based and has improved C-compatible debugging functions and can display the results of tracing with the source program using an integrating window function that associates the source program, disassemble display, and memory display with the trace result.

SM830 system simulator for the V830 and V830E families can be used to debug the target system as the C or assembler source level while simulating the operation of the target system on the host machine. Using SM830, the logic and performance of the application can be verified independently of hardware development. Therefore, development efficiency can be enhanced and software quality improved.

RX830 real-time operating system for the V830 family conforms to the μITRON specifications and is supplied with a configuration tool used to create the nucleus of the RX830 and multiple information tables. The RX830 is used with the CAA830 compiler package and is sold separately.

PG-1500 controller controls the PG-1500 PROM writer from the host PC by connecting the PG-1500 and host machine with a serial or parallel interface. The PG-1500 is MS-DOS-based software and cannot be used in Windows (including from the MS-DOS prompt).

Typical Development Environment for V800 Series RISC Microcontrollers



V850-95vC-0755B (03/00)

Notes:

(1) Includes power supply.

(2) For use with third-party software tools, order IE-V850-3RD. See third-party section for contact information and product offerings.

(3) Only for flash EEPROM products.

(4) PG-FP3 or FL-PR3.

(5) Controller software included with PG-1500.

Development Tools for V800 Series RISC Microcontrollers

Family	Device Number	In-Circuit Emulator	Emulation Board	Conversion Socket/Adapter	OTP/ Flash Programming Board	Flash/PROM Programmer	Software Packages	Starter Kit
V852	μPD70P3002GC-25-7EU μPD703002GC-25-xxx-7EU	IE-703002-MC (Note 1) + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A	Not required (Note 2) EV-YQPACK100SD EV-YQSOCK100SDN	EV-HQPACK100SD EV-NQPACK100SD	PA-70P3000GC	PG-1500	NEC CA850 compiler NEC SM850 simulator NEC ID850 debugger (ID850 included with emulator)	RTE-V852-PC
V853, V853A	μPD70F3003AGC-25/33-8EU μPD703003AGC-25/33-8EU μPD703004AGC-25/33-8EU μPD703003AGC(A)-25/33-8EU μPD70F3025AGC-25/33-8EU μPD703025AGC-25/33-8EU		IE-703003-MC-EM1 (Note 2) EV-YQPACK100SD EV-YQSOCK100SDN CSPACK121A1312N02 CSICE121A1312N02	EV-HQPACK100SD EV-NQPACK100SD		FA-V853-100GC PG-FP3 or FL-PR3		RTE-V853-PC and / or CEB-V850/SA1
V854	μPD703008YGJ-8EU μPD70F3008YGJ-8EU		IE-703008-MC-EM1 (Note 2)	EV-HQPACK144SD EV-NQPACK144SD EV-YQPACK144SD EV-YQSOCK144SDN	FA-V854-100GC			RTE-V854-PC (Note 3)
V850/ SA1	μPD70F3017AS1-YJC μPD70F3017AGC-8EU μPD70F3017AYS1-YJC μPD70F3017AYGC-8EU μPD703014AGC-8EU μPD703014AYGC-8EU μPD703015AS1-YJC μPD703015AGC-8EU μPD703015AYS1-YJC μPD703015AYGC-8EU μPD703017AS1-YJC μPD703017AGC-8EU μPD703017AYS1-YJC μPD703017AYGC-8EU		IE-703017-MC-EM1 (Note 2)	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN	FA-V850/SA1-100GC			RTE-V850/SA-PC and / or CEB-V850/SA1
V850/ SB1*	μPD70F3033AYGF-3BA μPD70F3033AGF-3BA μPD70F3033AYGC-8EU μPD70F3033AGC-8EU μPD703033AYGF-3BA μPD703033AGF-3BA μPD703033AYGC-8EU μPD703033AGC-8EU μPD703031AYGF-3BA μPD703031AGF-3BA μPD703031AYGC-8EU μPD703031AGC-8EU μPD70F3032AYGF-3BA μPD70F3032AGF-3BA μPD703032AYGF-3BA μPD703032AGF-3BA		IE-703037-MC-EM1 (Note 2)	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN CSPACK121A1312N02 CSICE121A1312N02	FA-V850/SB1-100GC			RTE-V850/SB1-PC and / or CEB-V850/SB1

Notes:

* Also automotive microcontrollers

(1) NEC debugger and power supply are included.

(2) Probe extension cables (SC-100SDN or SC-100SDN/PR) are optional.

(3) Third-party compilers and debuggers: GHS and GNUPro

Development Tools for V800 Series RISC Microcontrollers (cont)

Family	Device Number	In-Circuit Emulator	Emulation Board	Conversion Socket/Adapter	OTP/ Flash Programming Board	Flash/PROM Programmer	Software Packages	Starter Kit
V850/ SF1*	µPD70F3079YGF-3BA µPD70F3079YGC-8EU	IE-703002-MC (Notes 1 and 3)	IE-703079-MC-EM1 (Note 2)	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN	FA-V850/SF1-100GC	PG-FP3 or FL-PR3	NEC CA850 compiler NEC SM850 simulator	TBD
V850S/ CAN	µPD703079YGF-3BA µPD703079YGC-8EU µPD703078YGF-3BA µPD703078YGC-8EU							
V850E/ MS1	µPD70F3102AGJ-33-8EU µPD70F3102AF1-33-FA1 µPD703101AGJ-33-8EU µPD703101AF1-33-FA1 µPD703102AGJ-33-8EU µPD703102AF1-33-FA1 µPD703100AGJ-33-8EU µPD703100AF1-33-FA1 µPD703100AGJ-40-8EU µPD703100AF1-40-FA1	IE-703102-MC (Notes 1 and 3)	IE-703102-MC-EM1 (5 V) or IE-703102-MC-EM1-A (3 V) (Note 2)	EV-HQPACK144SD EV-NQPACK144SD EV-YQPACK144SD EV-YQSOCK144SDN	FA-V850E/MS1-144GJ		NEC D850 debugger (ID850 included with emulator) (Note 4)	RTE-V850E/MS1-PC and / or CEB-V850E/MS1
V850E/ MA1	µPD703103GJ µPD703105GJ µPD703106GJ µPD703107GJ µPD70F3107GJ	IE-V850E-MC-A (Notes 1 and 3)	IE-703107-MC-EM1 (Note 2)		FA-V850E/MA1-144GJ			RTE-V850E/ MA1CB and/or CEB-V850E/MA1
V850E/ IA1*	µPD70F3116GJ-UEN µPD703117GJ-UEN	IE-V850E-MC (Notes 1 and 3)	IE-703116-MC-EM1 (Note 2)		FA-V850E/IA1-144GJ		NEC CA850 compiler NEC ID850 debugger	TBD
V850E/ GA1	µPD703127GJ-UEN		IE-703127-MC-EM1 (Note 2)		TBD	TBD		
V830	µPD705100GJ-100-8EU	PARTNER-ET-II	Not required	Not required	Not required		GHS Tools MULTIV830	RTE-V830-PC
V831	µPD705101GM-100-8ED	RTE-1000-TP-V831 (Midas) PT-V831/2-TP (Midas)	RTE required if no target: RTE-V831-PC				GHS or GNU	RTE-V831-PC RT-V831
V832	µPD705102GM-143-8ED	RTE-1000-TP-V831 (Midas)	RTE required if no target: RTE-V832-PC					RTE-V832-PC
	µPD705102GM-133-8ED	PT-V831/2-TP (Midas)						

Notes:

*Also automotive microcontrollers

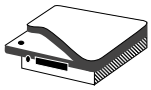
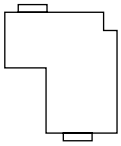
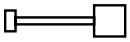
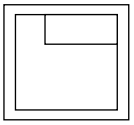
(1) Interface card required: IE-70000-PCI-IF-A, IE-70000-PC-IF-C, or IE-70000-CD-IF-A.

(2) Probe extension cables (SC-100SDN or SC-100SDN/PR) are optional.

(3) NEC debugger and power supply are included.

(4) Third-party compilers and debuggers: GHS and GNUPro

Development Tools for K Series Microcontrollers for Automotive Applications

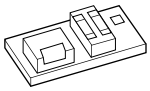
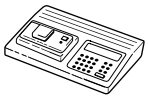
Target Device		In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapter	Software Packages
Device Name	Package					
						
K0S Family						
µPD789860MC µPD789861MC	20-pin SOP (300 mil)	IE-78K0S-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A (Note 1)	IE-789860-NS-EM1	NP-20GS	EV-9500GS-20	• RA78K0S/K0 relocatable assembler • CC78K0S/K0 C compiler • CL78K0S/K0 C library • SM78K0S/K0 simulator • MX78K0S/K0 task manager (small real-time operating system)
K0 Family						
µPD780701YGC µPD780702YGC µPD78F0701YGC	80-pin QFP (14 x 14 mm)	IE-78K0-NS + IE-70000-PC-IF-C or IE-70000-PCI-IF-A or IE-70000-CD-IF-A + IE-78K0-NS-PA (Note 1)	IE-780701-NS-EM1	NP-80GC-TQ	EV-NQPACK080SB + EV-YQPACK080SB + EV-YQSOCK080SB	
µPD780814GK µPD780816GK µPD78F0818GK	64-pin QFP (12 x 12 mm)		IE-780818-NS-EM4 + IE-78K0-NS-P04	NP-64GK	EV-NQPACK064SB + EV-YQPACK064SB + EV-YQSOCK064SB	
µPD780824BGC µPD780826BGC µPD78F0828BGC	80-pin QFP (14 x 14 mm)		IE-780828-NS-EM4 + IE-78K0-NS-P04	NP-80GC-TQ	EV-NQPACK080SB + EV-YQPACK080SB + EV-YQSOCK080SB	
µPD780831YGC µPD780832YGC µPD78F0833YGC			IE-780831-NS-EM4 + IE-78K0-NS-P02			
µPD780834GC µPD78F0835GC	100-pin LQFP (14 x 14 mm)		IE-780835-NS-EM1	NP-100GC-TQ	EV-NQPACK100SD + EV-YQPACK100SD + EV-YQSOCK100SD (Note 2)	
µPD780851BGC µPD780852BGC µPD78F0852BGC	80-pin QFP (14 x 14 mm)		IE-780852-NS-EM4 + IE-78K0-NS-P04	NP-80GC-TQ	EV-NQPACK080SB + EV-YQPACK080SB + EV-YQSOCK080SB	

Notes:

(1) Power supply (IE-70000-MC-PS) is included.

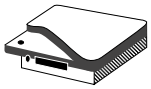
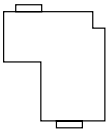
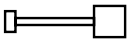
(2) Set of three

Flash/PROM Programmers for K Series Microcontrollers for Automotive Applications

Target Device	Program Adapter	Programmer
		
K0S Family		
μPD78F9861MC	FA-20MC	PG-FP3 or FL-PR3
K0 Family		
μPD78F0818GK	FA-64GK	PG-FP3 or FL-PR3 or FlashMaster (Note 1)
μPD78F0852BGC, μPD78F0833YGC, μPD78F0828BGC, μPD78F0701YGC	FA-80GC	
μPD78F0835GC	FA-100GC	

Note:
(1) Check for devices supported.

Development Tools for V850 Family Microcontrollers for Automotive Applications

Target Device		Package	In-Circuit Emulator	Emulation Board	Emulation Probe	Conversion Socket/Adapters	Software Packages
Family	Device Name						
V850/Indy3	µPD70F3029YGC	100-pin LQFP 14 x 14 mm	IE-703002-MC + IE-70000-PC-IF-C or	IE-703028-MC-EM1	NP-100GC-TQ	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN	• CA850 compiler
V850/CANdy	µPD70F3044YGC			IE-703044-MC-EM1			
V850/SB1	µPD70F3033AYGF-3BA µPD70F3033AGF-3BA µPD70F3033AYGC-8EU µPD70F3033AGC-8EU µPD703033AYGF-3BA µPD703033AGF-3BA µPD703033AYGC-8EU µPD703033AGC-8EU µPD703031AYGF-3BA µPD703031AGF-3BA µPD703031AYGC-8EU µPD703031AGC-8EU µPD70F3032AYGF-3BA µPD70F3032AGF-3BA µPD703032AYGF-3BA µPD703032AGF-3BA		IE-70000-PCI-IF-A or IE-70000-CD-IF-A (Note 3)	IE-703037-MC-EM1	(Note 1)	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN CSPACK121A1312N02† CSICE121A1312N02†	• SM850 simulator
V850/SF1 V850S/CAN	µPD70F3079YGF-3BA µPD70F3079YGC-8EU µPD703079YGF-3BA µPD703079YGC-8EU µPD703078YGF-3BA µPD703078YGC-8EU			IE-703079-MC-EM1		EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN	
V850E/IA1	µPD70F3116GJ* µPD703117GJ*	144-pin LQFP 20 x 20 mm	IE-V850E-MC + IE-70000-PC-IF-C or	IE-703116-MC-EM1*	(Note 2)	EV-HQPACK144SD EV-NQPACK144SD	
V850E/CA1	µPD703121GJ* µPD70F3123GJ*			IE-703123-MC-EM1*		EV-YQPACK144SD EV-YQSOCK144SDN	
V850E/CA2	µPD703140GC* µPD70F3140GC*	100-pin LQFP 14 x 14 mm	IE-70000-PCI-IF-A or IE-70000-CD-IF-A (Note 3)	IE-703140-MC-EM1*	(Note 1)	EV-HQPACK100SD EV-NQPACK100SD EV-YQPACK100SD EV-YQSOCK100SDN	

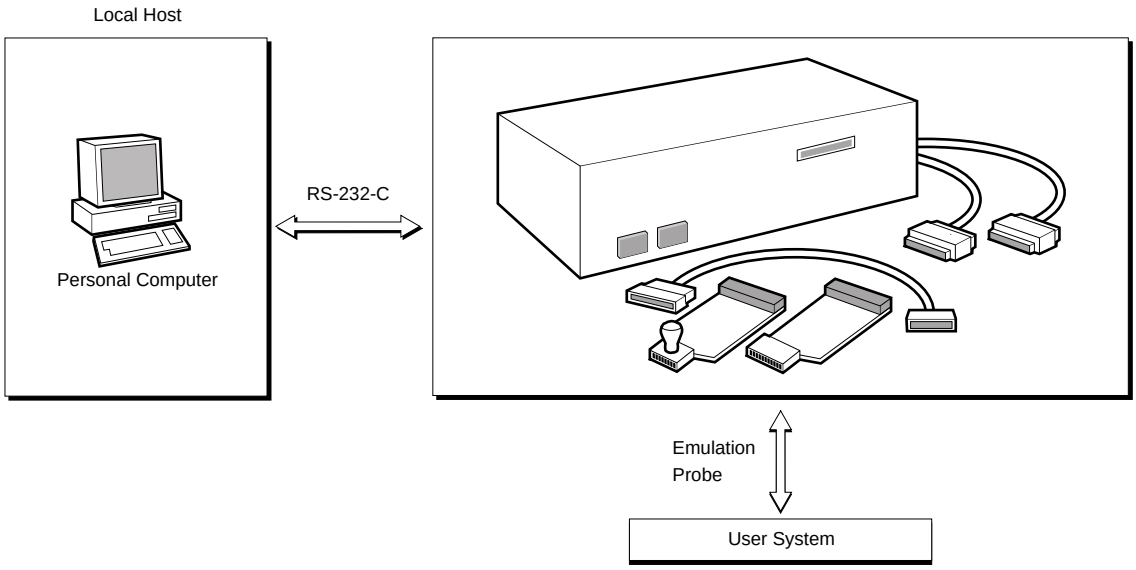
Notes:
(1) Probe extension cables (SC-100SDN or SC-100SDN/PR) are optional.
(2) Probe extension cables (SC-144SDN or SC-144SDN/PR) are optional.
(3) Power Supply (IE-70000-MC-PS) is included.
* Under development.
† For -3BA packages only.

Program Adapter Development Tools for V850 Family Microcontrollers for Automotive Applications

Family	Target Device	Program Adapter	Flash/PROM Programmer	Starter Kit
V850/Indy3	μPD70F3029YGC	FA-V850E/IA1-144GJ	PG-FP3 or FL-PR3	RTE-V850/SB1-PC* and / or CEB-V850/SB1*
V850/CANdy	μPD70F3044YGC	FA-V850/CANdy-100GC		
V850/SB1	μPD70F3033AYGF-3BA μPD70F3033AGF-3BA μPD70F3033AYGC-8EU μPD70F3033AGC-8EU μPD703033AYGF-3BA μPD703033AGF-3BA μPD703033AYGC-8EU μPD703033AGC-8EU μPD703031AYGF-3BA μPD703031AGF-3BA μPD703031AYGC-8EU μPD703031AGC-8EU μPD70F3032AYGF-3BA μPD70F3032AGF-3BA μPD703032AYGF-3BA μPD703032AGF-3BA	FA-V850/SB1-100GC		
V850/SF1 V850S/CAN	μPD70F3079YGF-3BA μPD70F3079YGC-8EU μPD703079YGF-3BA μPD703079YGC-8EU μPD703078YGF-3BA μPD703078YGC-8EU	FA-V850/SF1-100GC		TBD
V850E/IA1	μPD70F3116GJ* μPD703117GJ*	FA-V850E/IA1-144GJ		
V850E/CA1	μPD703121GJ* μPD70F3123GJ*	FA-V850/CA1-144GJ		
V850E/CA2	μPD703140GC* μPD70F3140GC*	FA-V850/CA2-100GC		

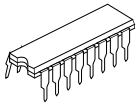
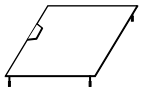
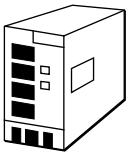
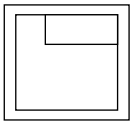
* Under development.

Typical Development Environment for Digital Signal Processors



83vB-9710B (12/95)

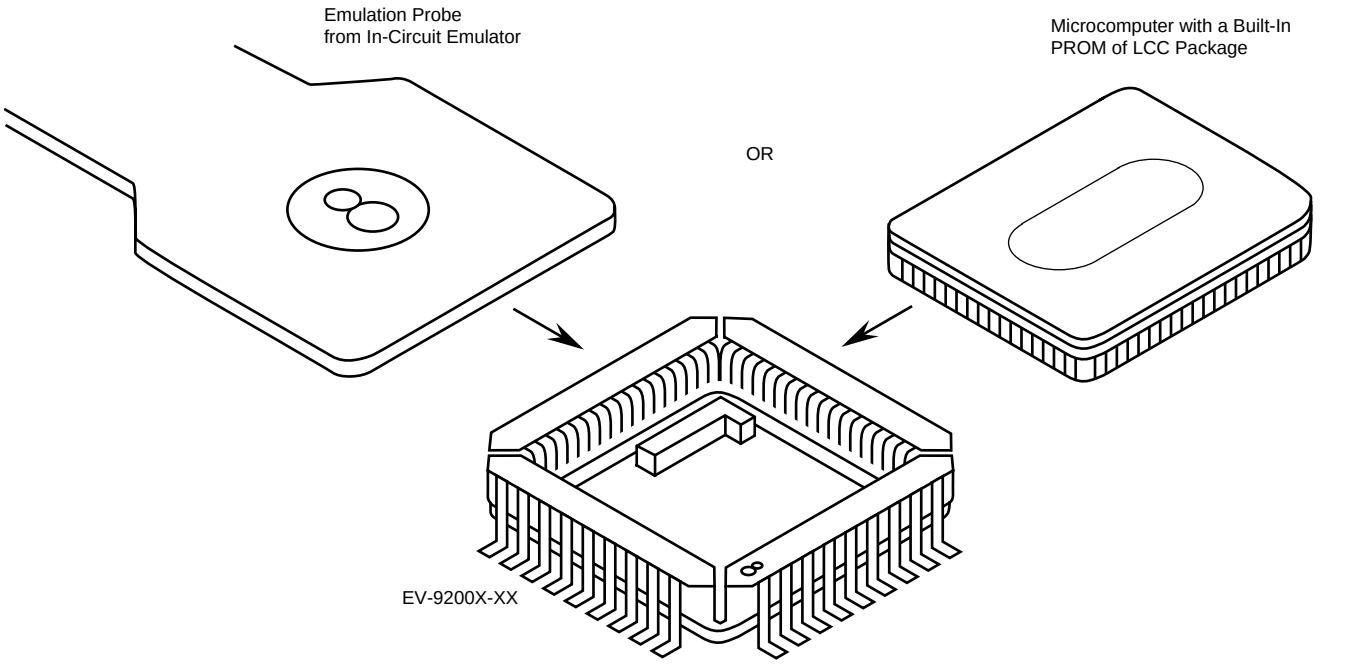
Development Tools for Digital Signal Processors

Target Device		Design Development Board	PC-Based Development Tool	Standalone Emulator	Software Packages
Device Name	Package				
					
772X					
µPD77C25C µPD77C25L µPD77C25LK µPD77C25GW	28-pin DIP 44-pin PLCC 28-pin PLCC 32-pin SOP	—	—	EVAKIT-77C25	RA77C25 relocatable assembler and SIMSD-I5DD-77C25 simulator and SDMSD-I5DD-77C25 screen debugger
µPD77P25C µPD77P25D µPD77P25GW µPD77P25L	28-pin DIP 28-pin ceramic DIP 32-pin SOP 44-pin PLCC				
SPRX Family					
µPD77016	160-pin QFP	—	IE-77016-PC-EM1 IE-77016-CM-EM6	—	WB77016 workbench and SIM77016 simulator
µPD77015 µPD77017 µPD77018	100-pin TQFP				

Conversion Socket Diagrams and Footprints

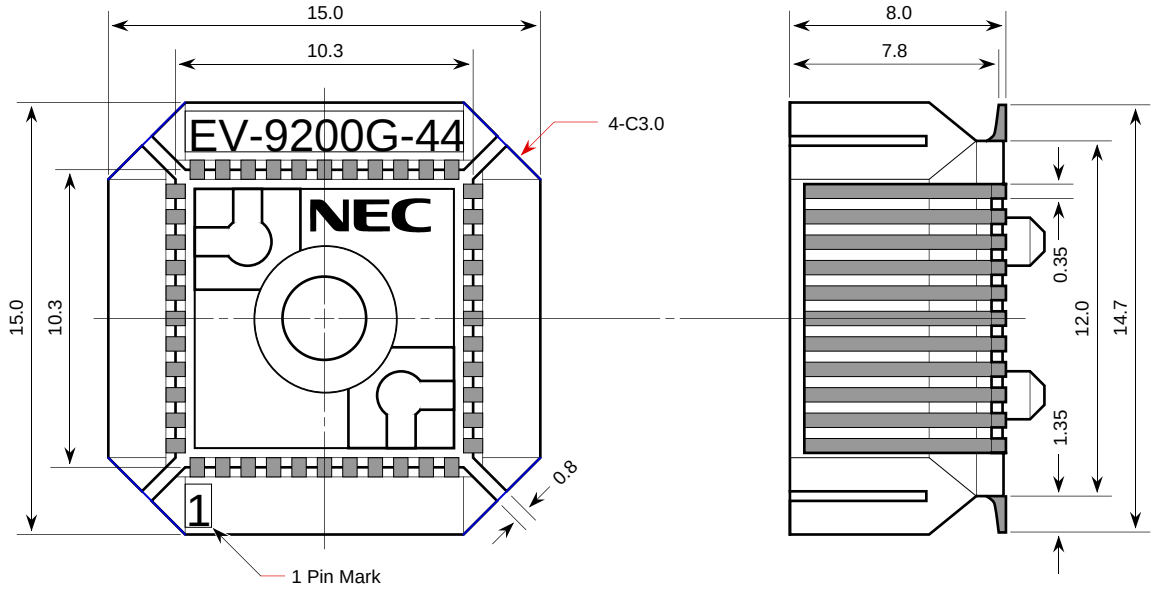
This section provides diagrams and recommended printed circuit board footprints for the conversion sockets listed in this selection guide. Conversion sockets are designed for surface mounting. In the early stages of development, a target system will probably contain a conversion socket fitted to the tip of the in-circuit emulator probe or to the PROM/flash version of the device.

Conversion Socket Used To Connect Emulation Probe for Flat Integrated Circuit Package



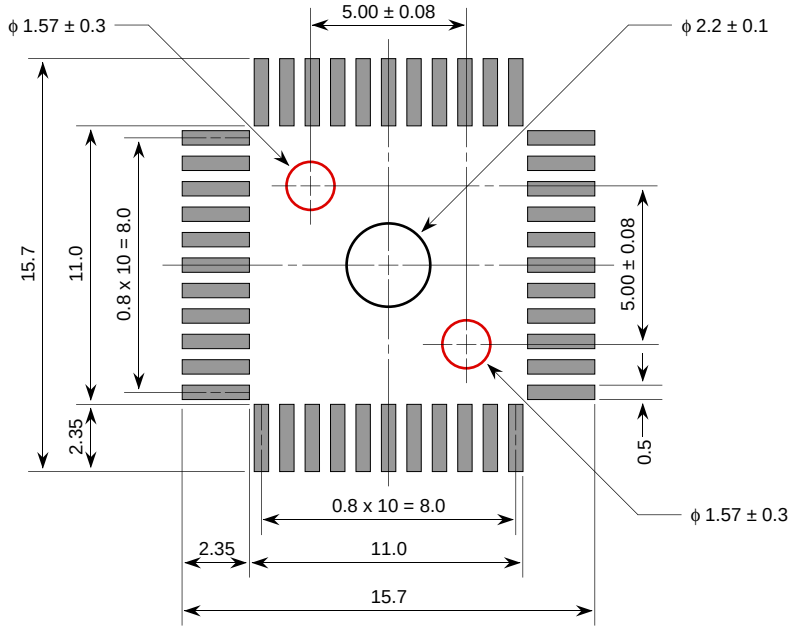
83vB-9713B (2/98)

EV-9200G-44 Socket Dimensions



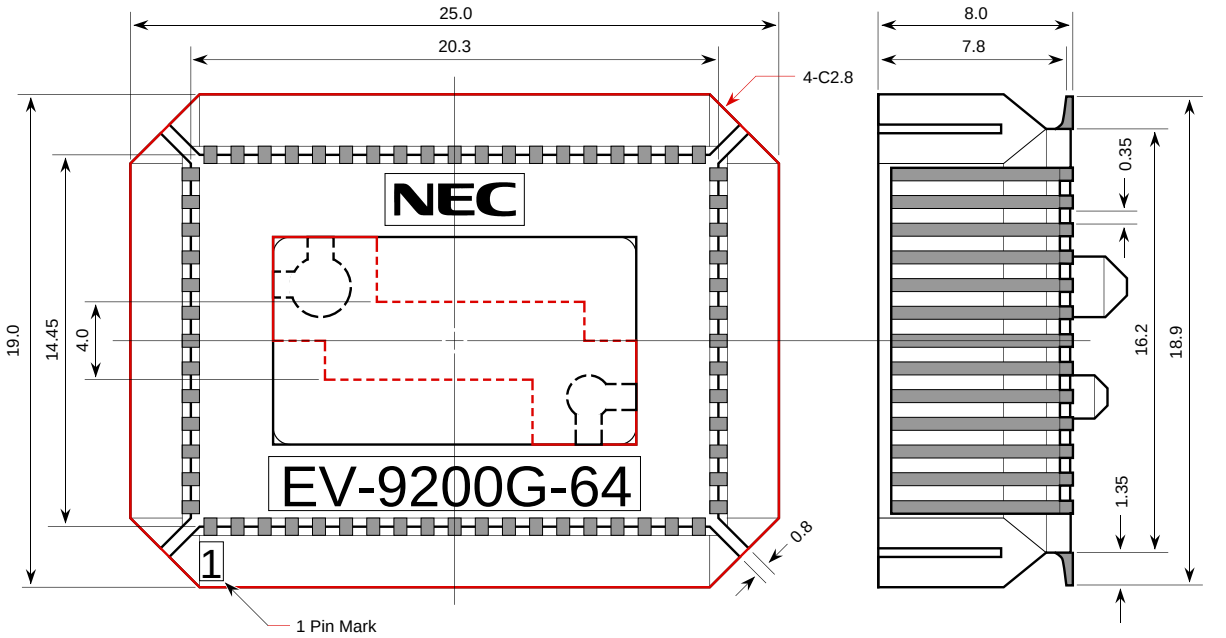
83FM-7993B (11/93)

EV-9200G-44 Recommended Printed Circuit Board Footprint



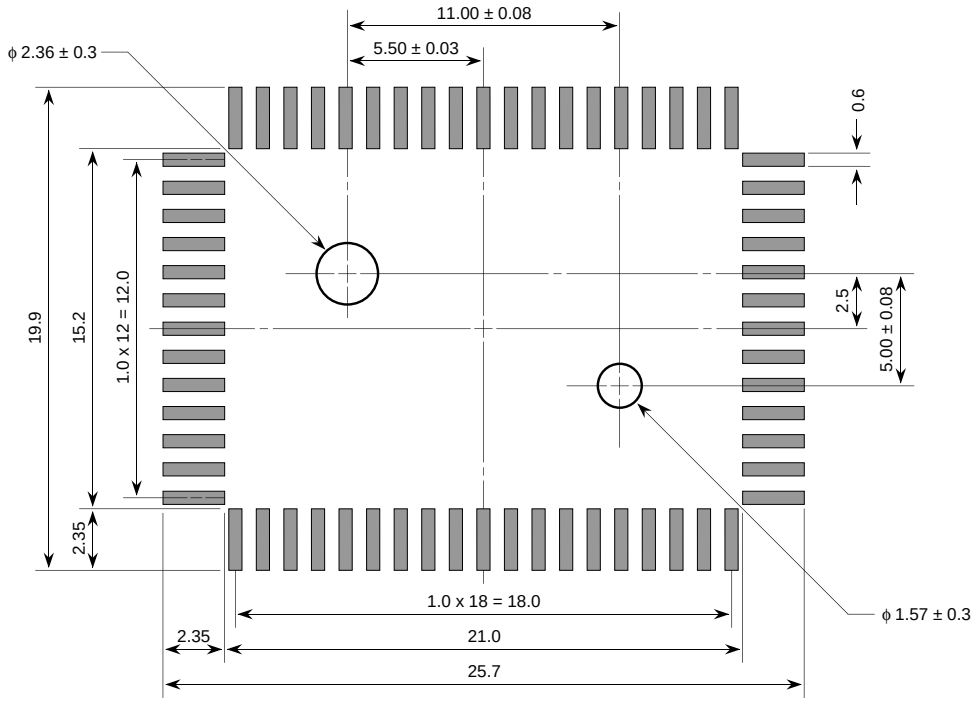
83FM-7994B (11/93)

EV-9200G-64 Socket Dimensions



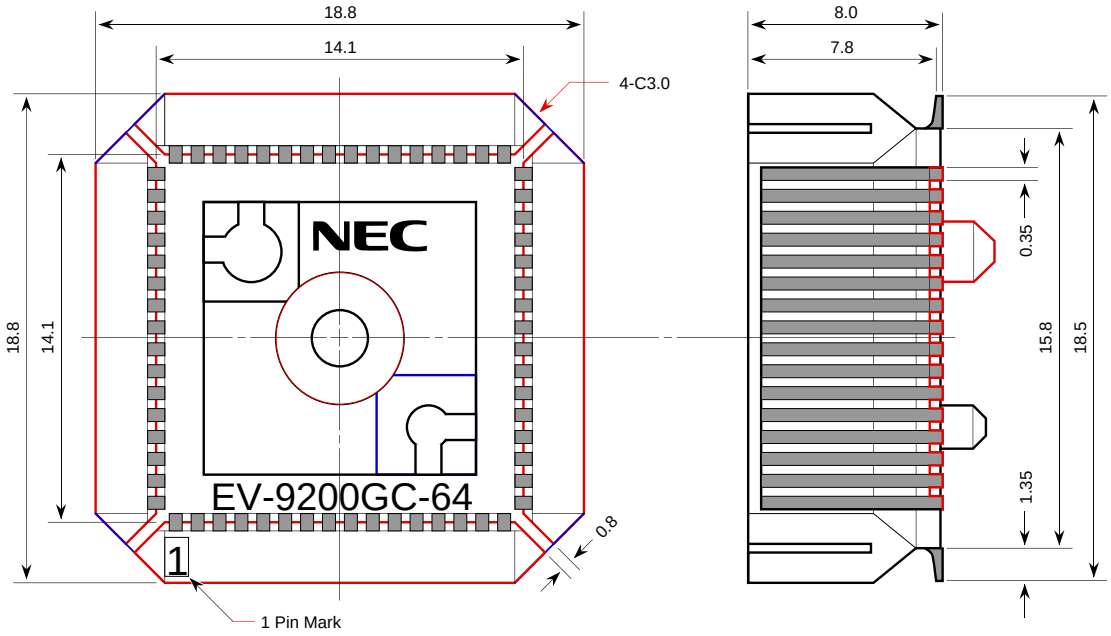
83FM-7995B (11/93)

EV-9200G-64 Recommended Printed Circuit Board Footprint



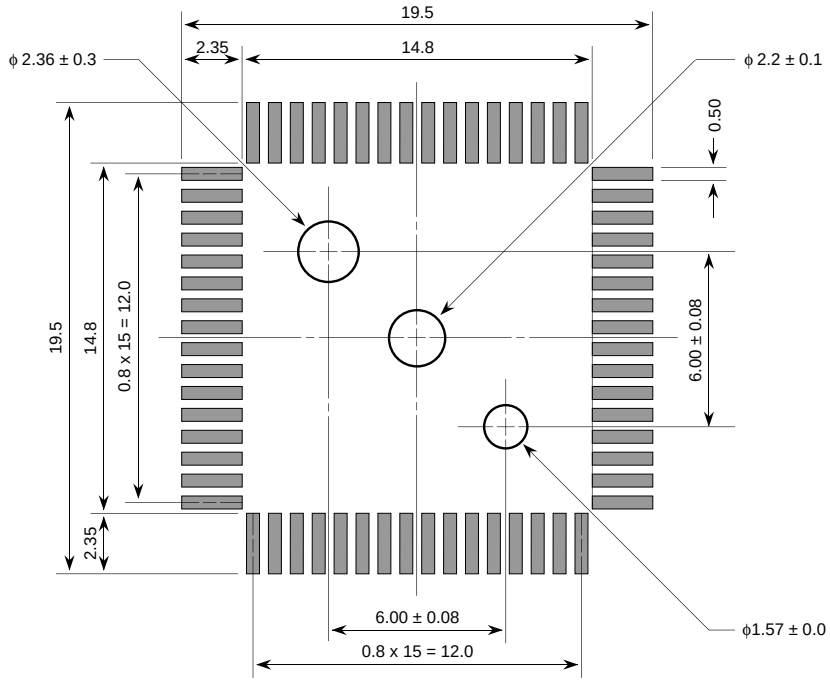
83FM-7996B (11/93)

EV-9200GC-64 Socket Dimensions



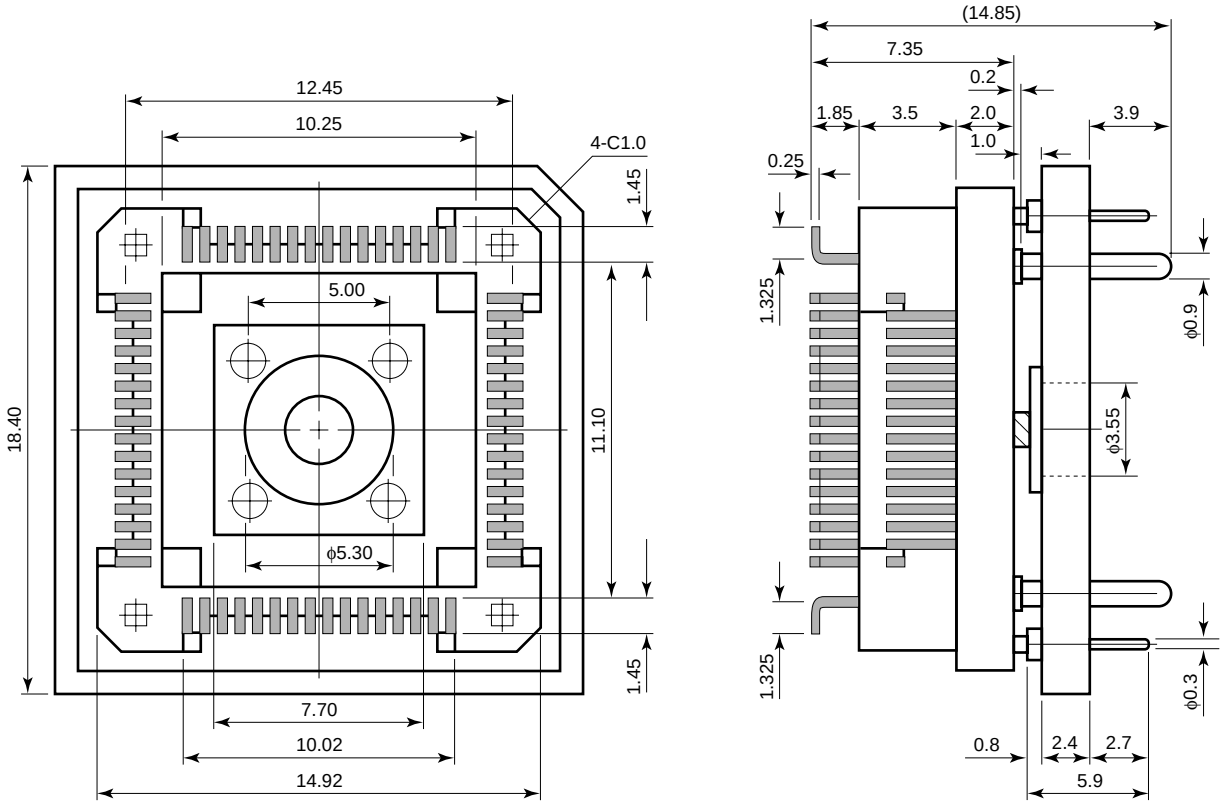
83FM-7997B (11/93)

EV-9200GC-64 Recommended Printed Circuit Board Footprint



83FM-7998B (11/93)

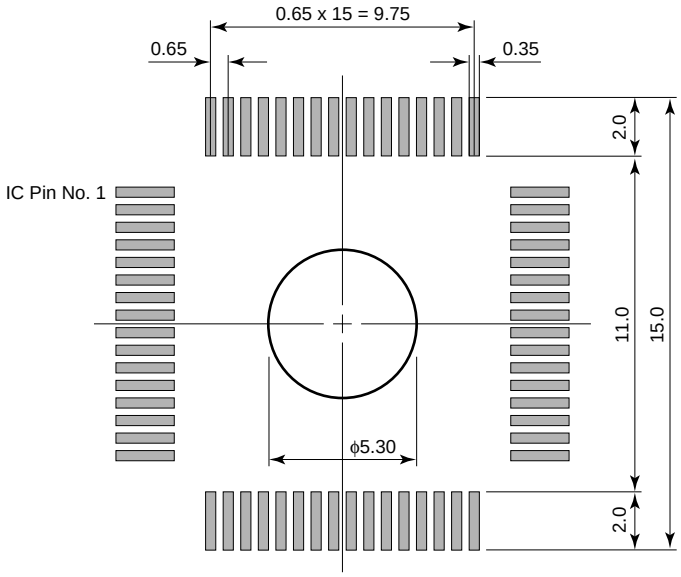
EV-TGK-064SBW Socket Dimensions



Note: Dimensions in mm

EV-TGK-064SBWa (2/98)

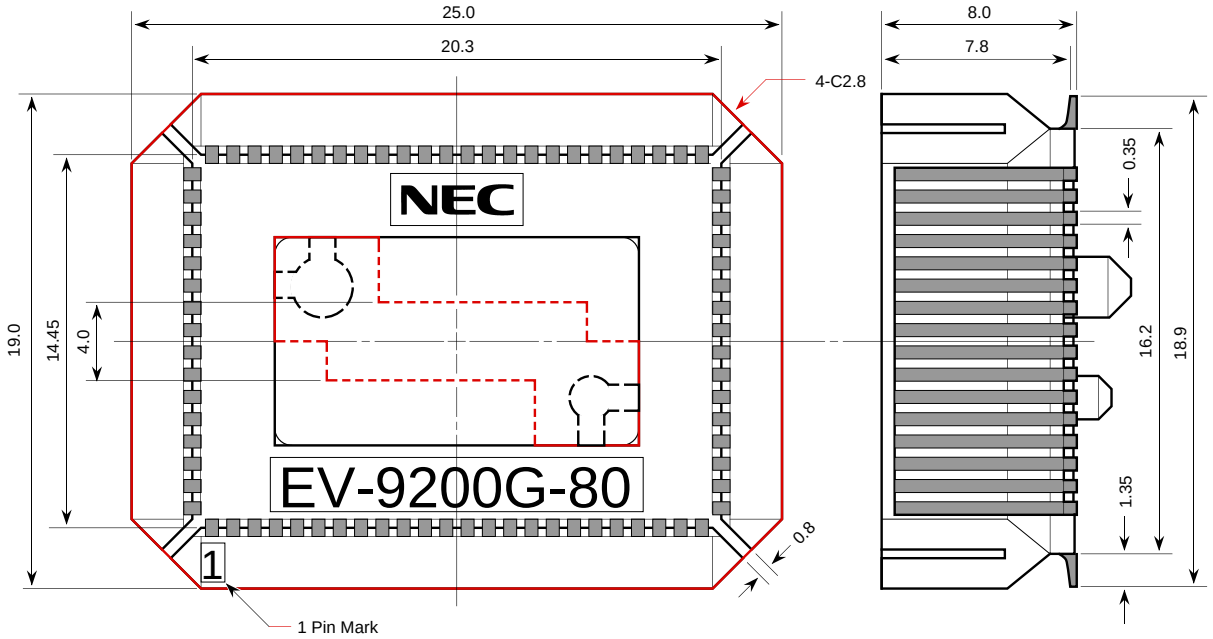
EV-TGK-064SBW Recommended Printed Circuit Board Footprint



Note: Dimensions in mm

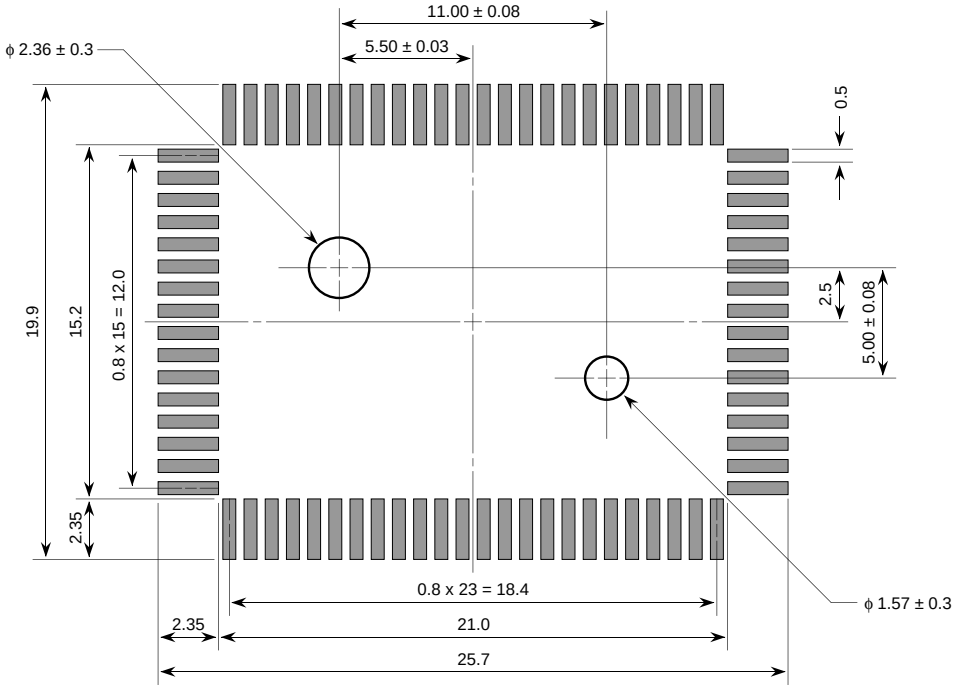
EV-TGK-064SBWb (2/98)

EV-9200G-80 Socket Dimensions



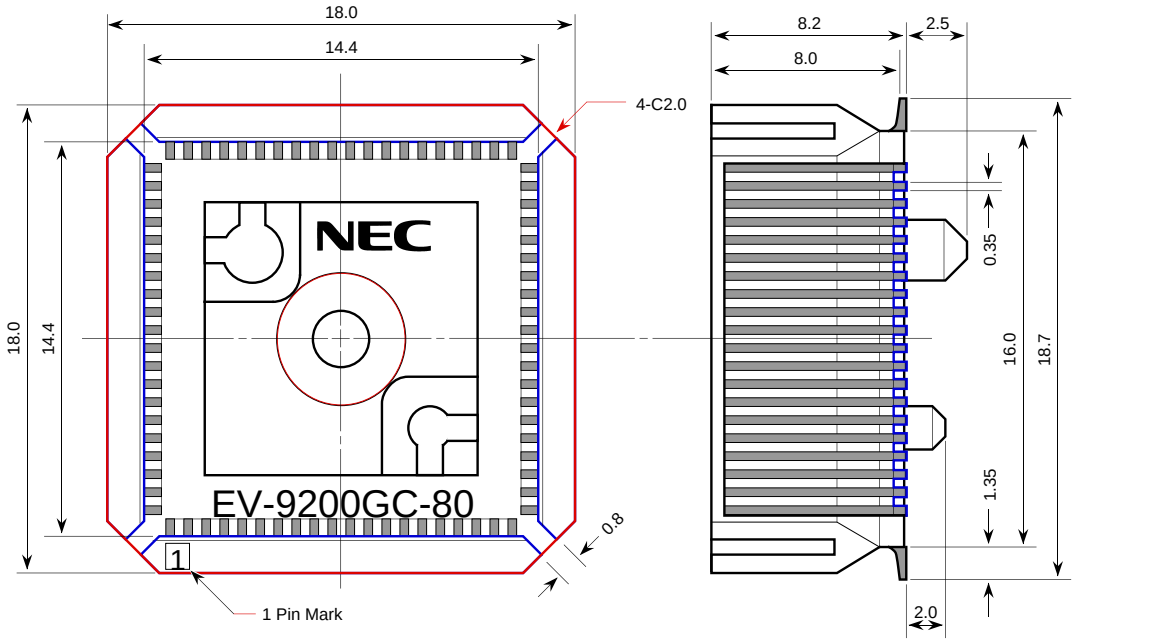
83FM-8001B (11/93)

EV-9200G-80 Recommended Printed Circuit Board Footprint



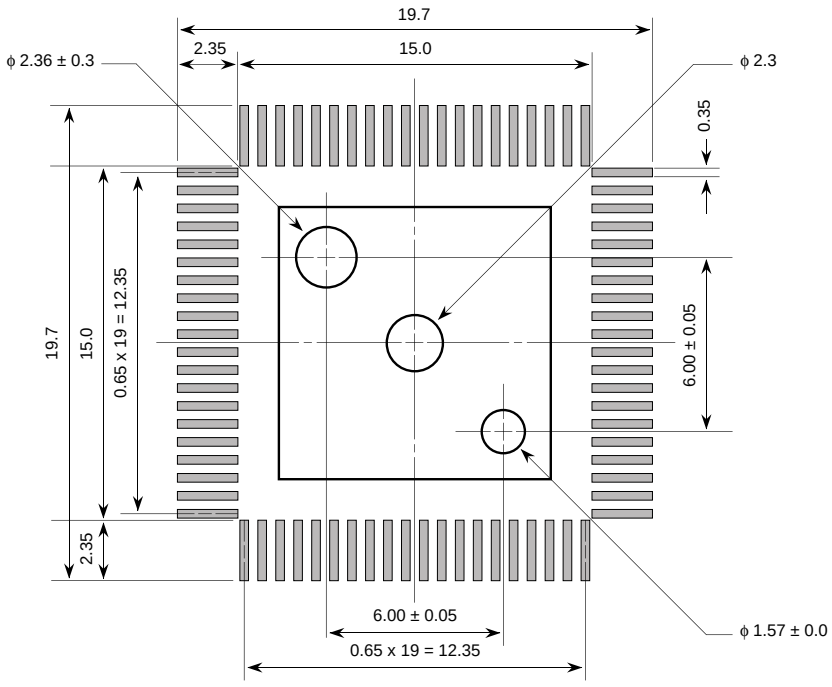
83FM-8002B (11/93)

EV-9200GC-80 Socket Dimensions



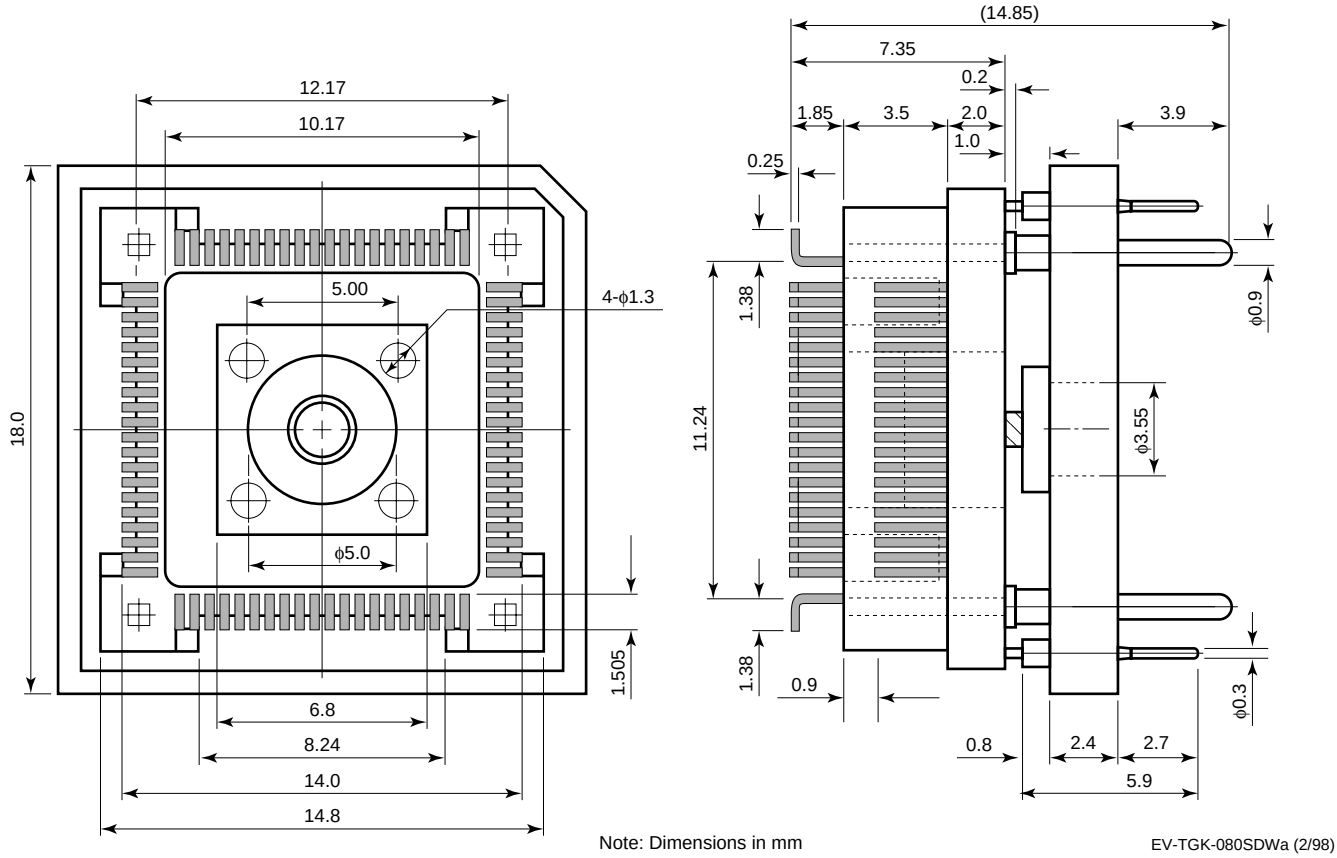
83FM-8003B (11/93)

EV-9200GC-80 Recommended Printed Circuit Board Footprint



83FM-8004B

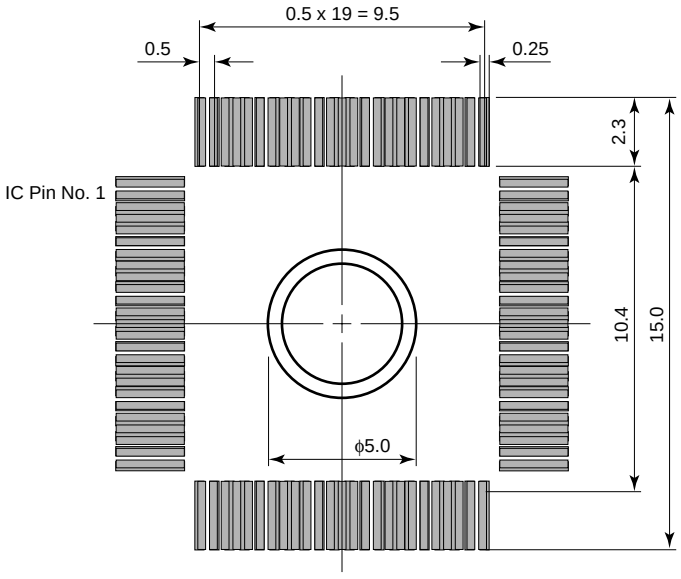
EV-TGK-080SDW Socket Dimensions



Note: Dimensions in mm

EV-TGK-080SDWa (2/98)

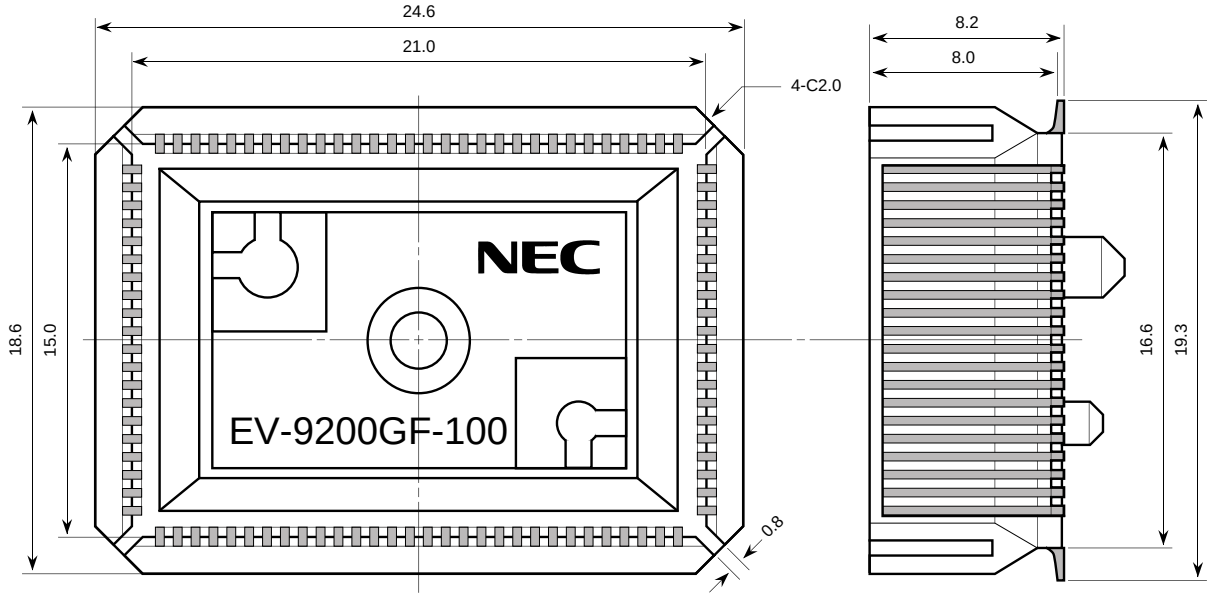
EV-TGK-080SDW Recommended Printed Circuit Board Footprint



Note: Dimensions in mm

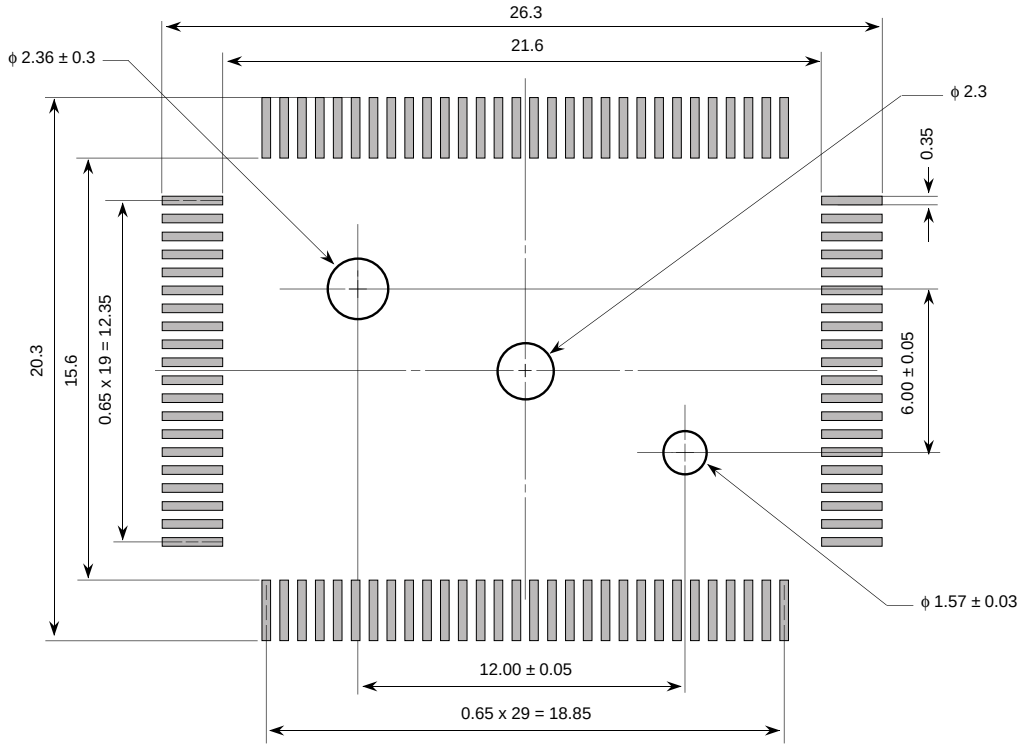
EV-TGC-100SDWb (2/98)

EV-9200GF-100 Socket Dimensions



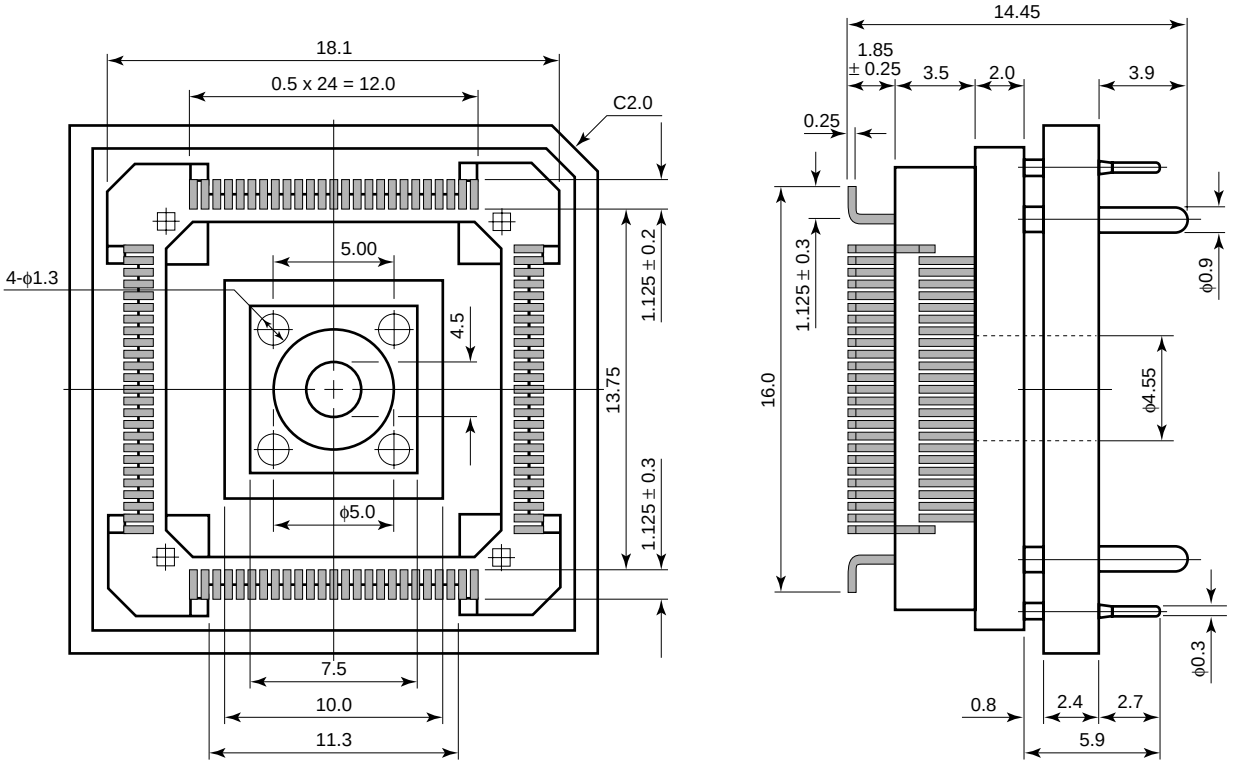
83vB-9716B (11/93)

EV-9200GF-100 Recommended Printed Circuit Board Footprint



83vB-9717B (11/93)

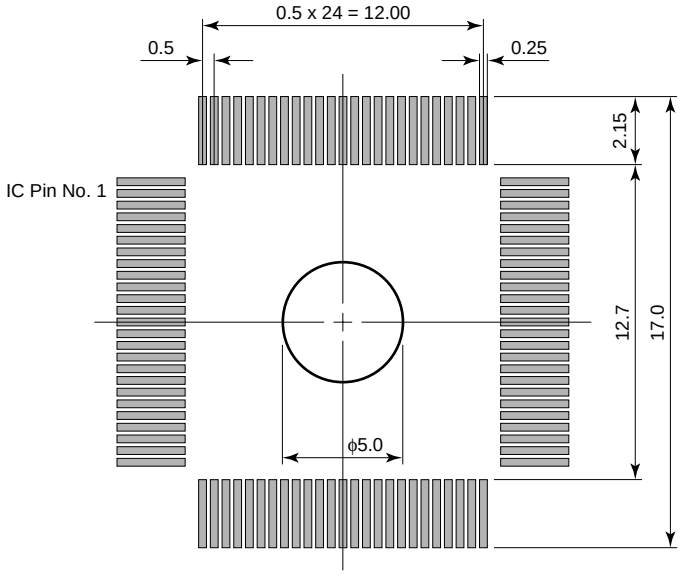
EV-TGC-100SDW Socket Dimensions



Note: Dimensions in mm

EV-TGC-100SDWa (2/98)

EV-TGC-100SDW Recommended Printed Circuit Board Footprint



Note: Dimensions in mm

EV-TGC-100SDWb (2/98)

Third-Party Development Tools

A number of other companies provide hardware and software tools that support specific NEC microcontroller and DSP devices. The tables on the following pages briefly summarize these products.

For additional information about product features, availability and pricing, please write, call, or fax the vendor directly.

Third-Party Vendors

- **Accelerated Technology**
  720 Oak Circle Drive East
  Mobile, AL 36609
  TEL 334-661-5770
  FAX 334-661-5788

- **Advin Systems, Inc.**
  1050-L East Duane Ave.
  Sunnyvale, CA 94086
  TEL 408-243-7000
  FAX 408-736-2503

- **Ashling Microsystems Ltd.**
  Intec 2, Wade Road,
  Basingstoke, Hants, RG24 8NE, UK
  TEL (01256) 811998
  FAX (01256) 811761
  Email: sales.uk@ashling.com
  www.ashling.com

- **Baradine Products Ltd.**
  P.O. Box 86757
  North Vancouver, B.C.
  Canada V7L 4L3
  TEL 604-988-9853
  FAX 604-988-9899

- **BP Microsystems, Inc.**
  1000 North Post Oak Road #225
  Houston, TX 77055
  TEL 800-225-2102
  FAX 713-688-0920
  www.bpmicro.com

- **CMX Corporation**
  5 Grant Street, Suite C
  Framingham, MA 01701
  TEL 508-872-7675
  FAX 508-620-6628
  Email: cmx@cmx.com

- **Red Hat (Cygnus)**
  1325 Chesapeake Terrace
  Sunnyvale, CA 94089
  TEL 408-542-9600
  FAX 408-542-9699
  Email: info@cygnus.com
  www.cygnus.com

- **Data I/O Corporation**
  10525 Willows Road NE
  P.O. Box 97046
  Redmond, WA 98073-9746
  TEL 800-426-1045
  TEL 425-881-6444
  FAX 425-869-7423

- **EDI Corp.**
  2611 S. Highland Drive
  Las Vegas, NV 89109
  TEL 702-735-4997
  FAX 702-735-8339

- **Emulation Solutions**
  422 Ives Terrace
  Sunnyvale, CA 94087
  TEL 408-745-1524
  FAX 408-745-1526
  www.adapters.com

- **Emulation Technology, Inc.**
  2344 Walsh Avenue
  Building F
  Santa Clara, CA 95051-1301
  TEL 408-982-0660
  FAX 408-982-0664

- **Fusion Technologies, Inc.**
  2719 McKee Road
  San Jose, CA 95127
  TEL 408-929-8875
  FAX 408-923-7820
  Email: fusiontek@sprintmail.com

- **Grammar Engine, Inc.**
  921 Eastwind Drive, Suite 122
  Westerville, OH 43081
  TEL 800-776-6423
  FAX 614-899-7888
  Email: info@gei.com
  www.gei.com

- **Green Hills Software, Inc.**
  30 West Sola Street
  Santa Barbara, CA 93101
  TEL 805-965-6044
  FAX 805-965-6343

- **IAR System Software, Inc.**
  One Maritime Plaza, Suite 1770
  San Francisco, CA 94111
  TEL 415-765-5500
  FAX 415-765-5503

- **Intermetrics Microsystems Software, Inc.**
  333 Elm Street
  Dedham, MA 02026-4530
  TEL 617-320-9400
  FAX 617-320-9212
  (DSP – C compiler for μPD77016)

- **Microsystem Synthesis, Inc.**
  33 Lyman Street, Suite 204
  Westborough, MA 01581
  TEL 508-870-0840
  FAX 508-898-3092

- **NDK Corporation**
  (via NEC Electronics Inc.)

- **OESS**
  5550 Cerritos Avenue
  Cypress, CA 90630
  TEL 714-220-1878
  FAX 714-220-1870

- **Sophia Systems**
  711-B Charcot Avenue
  San Jose, CA 95131
  TEL 408-943-9300
  FAX 408-943-9303

- **Tektronix, Inc.**
  P.O. Box 500
  Beaverton, OR 97077-0001
  TEL 800-426-2200 (U.S.)
  TEL 416-747-5000 (Canada)

- **Tokyo Eletech Corporation**
  (via NEC Electronics Inc.)

- **Wind River Systems**
  1010 Atlantic Avenue
  Alameda, CA 94501
  TEL 800-545-WIND
  TEL 510-748-4100
  FAX 510-814-2010

- **Xeltek**
  3563 Ryder Street
  Santa Clara, CA 95051-0707
  TEL 408-524-1929
  FAX 408-245-7084
  Email: info@xeltek.com
  www.xeltek.com

- **Yamaichi Electronics USA, Inc.**
  2235 Zanker Road
  San Jose, CA 95131
  TEL 408-456-0797
  FAX 408-456-0799
  www.yeu.com

Third-Party Development Tools for Microcontrollers

Company	Product	Part Number	Host	Device(s) Supported
Advin Systems, Inc. 1050-L East Duane Ave. Sunnyvale, CA 94086 TEL 408-243-7000 FAX 408-736-2503	Universal programmers	pilot-μ128-plus pilot-μ84-plus pilot-μ44-plus pilot-mvp pilot-146 pilot-145		
	Supporting devices	Microcontrollers	PC/DOS	μPD17P104 CS μPD17P137A CT μPD74P008 GB μPD75P004 GB μPD75P0016 GB μPD75P308 GF μPD75P308A GF μPD75P316 GF μPD75P316A GF μPD75P316B μPD75P3116 GC μPD78P014 CW μPD78P018 CW μPD78P018GC μPD78P054 GK μPD78P064 GC μPD78P214 CW μPD78P214 GC μPD78P238 GJ μPD78P352 KG μPD78P7012 GC
Ashling Microsystems Ltd Intec 2, Wade Road, Basingstoke, Hants, RG24 8NE UK TEL (01256) 811998 FAX (01256) 811761 Email: sales.uk@ashling.com www.ashling.com	CTNEC 87 emulator	Contact Ashling Microsystems	Windows	78C10/C24
	ADVICE emulator* *Distributor of Yokogawa product: ADVICE emulator in Europe only		Windows NT, 9X, Solaris	K0, K4, V20, V25, V30, V35, V40, V50, V820 V850
Baradine Products Ltd. P.O. Box 86757 North Vancouver, B.C. Canada V7L 4L3 TEL 604-988-9853 FAX 604-988-9899	PROM programmer base unit	Micro Burner 512		
	Adapters	MB14QAD MB14SAD MB14PAD MB14FAD MB214QAD MB214SAD MB214PAD MB312QAD MB312SAD MB312PAD		μPD78CP14 QUIP μPD78CP14 shrink DIP μPD78CP14 68-pin PLCC μPD78CP14 64-pin QFP μPD78CP214 QUIP μPD78CP214 shrink DIP μPD78CP214 68-pin PLCC μPD78CP312 QUIP μPD78CP312 shrink DIP μPD78CP312 68-pin PLCC

Third-Party Development Tools for Microcontrollers (cont)

Company	Product	Part Number	Host	Device(s) Supported
BP Microsystems, Inc. 1000 North Post Oak Road #225 Houston, TX 77055 TEL 800-225-2102 FAX 713-688-0920 www.bpmicro.com	- Single site engineering programmers - Multi-site manual production programmer - Multi-site automated fine pitch programming systems		DOS,Windows, NT	Call vendor
CMX Corporation 5 Grant Street, Suite C Framingham, MA 01701 TEL 508-872-7675 FAX 508-620-6628 Email: cmx@cmx.com	Real-time operating system	CMX-RTX™ CMX-Tiny+	Windows 95/98	K Series
Data I/O Corporation 10525 Willows Road NE P.O. Box 97046 Redmond, WA 98073-9746 TEL 800-426-1045 TEL 425-881-6444 FAX 425-869-7423 (Note 1)	S CHIP-OTP devices	—	—	µPD70P3002GC, µPD70P3000, µPD70P3002KP, µPD75P0016, µPD75P008, µPD75P036, µPD75P038, µPD75P108B, µPD75P116, µPD216A, µPD75P218, µPD75P218KB, µPD75P238, µPD75P238KF, µPD75P308, µPD75P316, µPD75P316A, µPD75P316AGF, µPD75P328, µPD75P336GC, µPD75P402, µPD75P402CT, µPD75P402GB, µPD75P516, µPD75P518, µPD77P20, µPD77P230, µPD77P25, µPD77P56, µPD78P014CW, µPD78P014GC, µPD78P044GF, µPD78P054GC, µPD78P058KK, µPD78P083GB, µPD17K,
EDI Corp. 2611 S. Highland Drive Las Vegas, NV 89109 TEL 702-735-4997 FAX 702-735-8339	ROM emulator SMT conversion sockets	—	—	K Series
Grammar Engine, Inc. 921 Eastwind Drive, Suite 122 Westerville, OH 43081 TEL 800-776-6423 FAX 800-943-3443 Email: info@gei.com www.gei.com	ROM emulator; emulation cables	—	—	K Series, V800 Series
Green Hills 30 West Sola Avenue Santa Barbara, CA 93101 TEL 805-965-6044 FAX 805-965-6343 Email: ghs.com	C, C++, E++ optimizing compilers		Windows 95/98 Windows NT SPARC/Solaris	V810 V830 V850 V850E
IAR System Software, Inc. One Maritime Plaza, Suite 1770 San Francisco, CA 94111 TEL 415-765-5500 FAX 415-765-5503	C compiler C-spy debugger	Call vendor	Windows	K0, K0S, K4 Families V850, V850E

Notes:

(1) Consult Data I/O literature for exact programmers and adapters supported.

Third-Party Development Tools for Microcontrollers (cont)

Company	Product	Part Number	Host	Device(s) Supported
Microsystem Synthesis, Inc. 33 Lyman Street, Suite 204 Westborough, MA 01581 TEL 508-870-0840 FAX 508-898-3092	IDE System (Integrated Development Environment System)	IDE-78K0xx	Windows 95/98 Windows NT	K0 Family
		IDE-78K4xx	Windows 95/98	K4 Family
Sophia Systems 711-B Charcot Avenue San Jose, CA 95131 TEL 408-467-9911 FAX 408-943-9303	Macro assembler	MASM7811 MASM312	Windows NT	µPD7810/11/C10/C11 µPD78310/12
	Emulator	SA98-7810/11 SA98-78312		µPD7810/11/C10/C11 (Note 1) µPD78310/12
Xeltek 3563 Ryder Street Santa Clara, CA 95051-0707 TEL 408-524-1929 FAX 408-245-7084 Email: info@xeltek.com www.xeltek.com	PROM programmer	SUPERPRO III®	—	µPD75P008GB, µPD75P036CW, µPD75P036GC, µPD75P056CW µPD75P056GC, µPD75P108CW, µPD75P108DW, µPD75P108G, µPD75P116CW, µPD75P116GF, µPD75P216ACW, µPD75P308GF, µPD75P308K, µPD75P316AGF, µPD75P316AK, µPD75P316GF, µPD75P328GC, µPD75P336GC, µPD75P336GK, µPD75P516GF, µPD75P516K, µPD75P54CS, µPD75P54G, µPD75P56CS, µPD75P56G, µPD75P64CS, µPD75P64G, µPD75P66CS, µPD75P66G, µPD78P014CW, µPD78P014DW, µPD78P014GC, µPD78P014YCW, µPD78P014YDW, µPD78P014YGC, µPD17K, µPD70P3000GC, µPD70P3002GC, µPD70F3003GC
	Supporting devices	Microcontrollers		

Notes:

(1) Requires a probe change.

Third-Party Development Tools for V800 Series

Company	Product	Part Number	Host	Device(s) Supported
Accelerated Technology 720 Oak Circle Drive East Mobile, AL 36609 TEL 334-661-5770 TEL 800-468-6853 FAX 334-661-5788			Windows 95/98 Windows NT Sun	V850 V850E V831 V832
Avocet Systems, Inc. 120 Union Street P.O. Box 490 Rockport, Maine 04856 TEL 207-236-9055 TEL 800-448-8500 FAX 207-236-6713 www.avocetsystems.com	Softaid UEM in-circuit emulator protocol AvSYS real-time operating system protocol			Call vendor
Red Hat (Cygnus) 1325 Chesapeake Terrace Sunnyvale, CA 94089 TEL 408-542-9600 FAX 408-542-9699 www.cygnus.com	Assembler, C++ compiler, linker, libraries, debugger		Sun OS Solaris Windows 95/98 Windows NT	V85X V85XE V850 V850E
Microsystem Synthesis, Inc. 33 Lyman Street, Suite 204 Westborough, MA 01581 TEL 508-870-0840 FAX 508-898-3092	Core development system	IDE-V851	Windows 95/98 Windows NT	V852 V853
Softaid, Inc. 8310 Guilford Road Columbia, MD 21046 TEL 410-290-7760 FAX 410-381-3253	Emulator		PC/DOS	
			PC/Windows	
			Windows 95 Windows NT	
	C source debugger for UEM emulators			
	Emulator for handheld terminals	UEM V30/MX		
Sophia Systems 711-B Charcot Avenue San Jose, CA 95131 TEL 408-943-9300 FAX 408-943-9303	Emulator	SA98-861V10	PC/DOS	
		SA98-V40/V50		
		SA98-V25		
		SA58-V33		V800 Series
		SA98-V53		
	Locate utility for Microsoft C	FS Locates		
	C source debugger for SA98	MicroSCOPE		

Third-Party Development Tools for DSP and Speech Devices

Company	Product	Part Number	Host	Device(s) Supported
Data I/O Corporation 10525 Willows Road NE P.O. Box 97046 Redmond, WA 98073-9746 TEL 800-426-1045 TEL 425-881-6444 FAX 425-869-7423	EPROM/OTP programmers	(Note 1)	—	μPD77P20D, μPD77P230R, μPD77P25C/D/L, μPD77P56CR
Signix	Filter design/simulation package	DISPRO	PC/DOS	(Note 2)

Notes:

(1) Consult Data I/O literature for the exact programmers and adapters supported.

(2) The DISPRO package can generate filter coefficients for several types of filters. With software available from NEC, these coefficients can be imported into source programs for μPD7720, μPD77C25, μPD77220, μPD77230, and μPD77240 DSP devices. Contact NEC Electronics, DSP Engineering Group, to obtain the appropriate software.

Third-Party Development Tools for Hardware Adapters and Accessories

Company	Product	Part Number	Host	Device(s) Supported
EDI Corp. 2611 S. Highland Drive Las Vegas, NV 89109 TEL 702-735-4997 FAX 702-735-8339	Emulation probe adapters and accessories	Various custom and semi-custom adapters	N/A	Call vendor
Emulation Solutions 422 Ives Terrace Sunnyvale, CA 94087 TEL 408-745-1524 FAX 408-745-1526 www.adapters.com				
Emulation Technology, Inc. 2344 Walsh Avenue Building F Santa Clara, CA 95051-1301 TEL 408-982-0660 FAX 408-982-0664				
OESS 5550 Cerritos Avenue Cypress, CA 90630 TEL 714-220-1878 FAX 714-220-1870				
Tokyo Eletech Corporation (via NEC Electronics Inc.)	Various sockets and connectors	—	—	—
Yamaichi Electronics USA 2235 Zanker Road San Jose, CA 95131 TEL 408-456-0797 FAX 408-456-0799 www.yeu.com	1. Protype sockets: QPFs 2. Production sockets: QPFs 3. Test and burn-in sockets: QPFs, BGAs, SOPs, SSOPs, Shrink DIPs	Call Yamaichi Electronics		V800 Series K4 Family K0S Family K0 Family 75XL Family