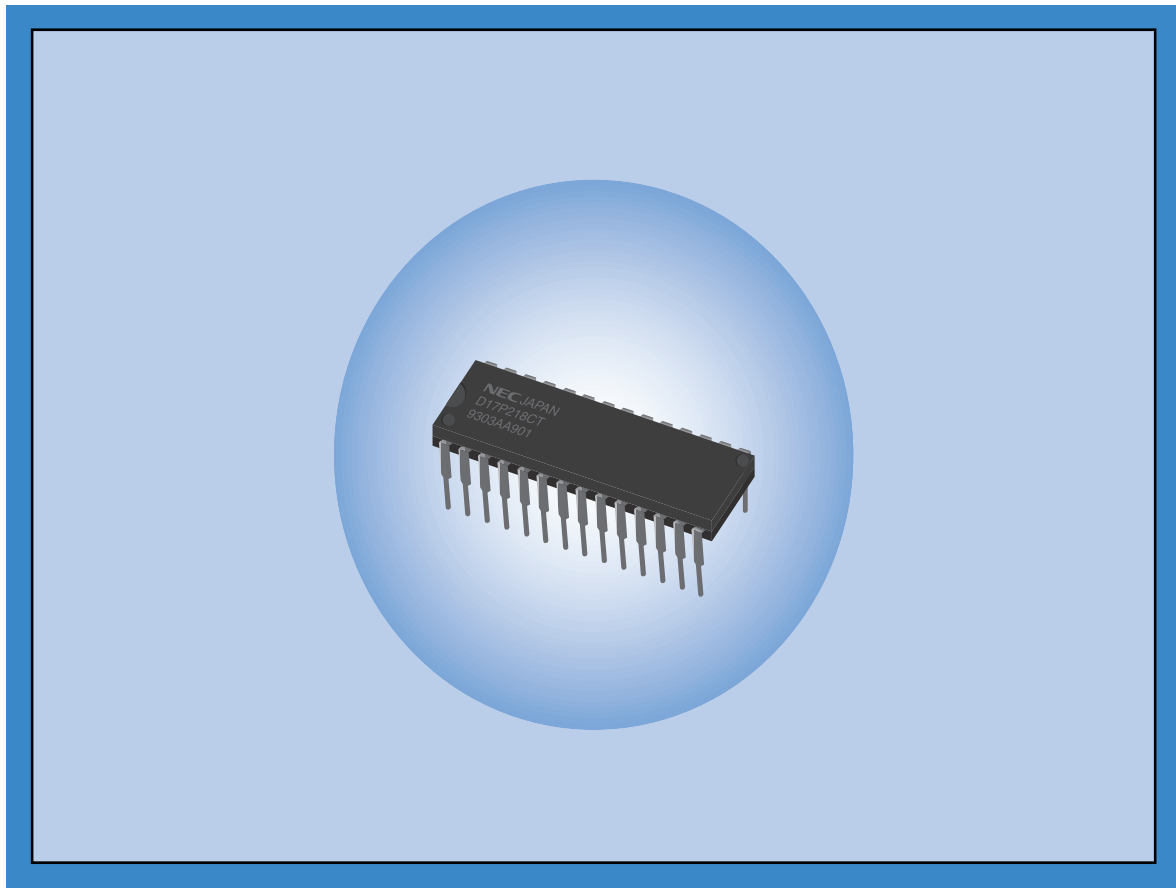


Microcontrollers for Remote Controllers



For General-Purpose Remote Controllers



69A
Series

$f_x = 3.5$ to 4.5 MHz ceramic oscillation

μ PD69A
4 KW/128

20 SSOP, 56 keys

High-speed instruction execution and low POC detection voltage selectable by mask option.

μ PD68A
2 KW/32

20 SSOP, 56 keys

μ PD67A
1 KW/32

20 SSOP, 56 keys



1724x Series

μPD17246
32 KB/447

30 SSOP

μPD17245
24 KB/447

30 SSOP

μPD17244
20 KB/447

30 SSOP

μPD17243
16 KB/447

30 SSOP

μPD17242
12 KB/447

30 SSOP

μPD17241
8 KB/447

30 SSOP

μPD17240
4 KB/447

30 SSOP

789088 Subseries

μPD789088
32 KB/576

30 SSOP

μPD789086
16 KB/384

30 SSOP



789467
Subseries

μPD789467
24 KB/512

52 LQFP

μPD789466
16 KB/512

52 LQFP

μPD789464
8 KB/256

52 LQFP

μPD789462
4 KB/256

52 LQFP

789327
Subseries

μPD789327
24 KB/512

52 LQFP

μPD789326
16 KB/512

52 LQFP

μPD789324
8 KB/256

52 LQFP

μPD789322
4 KB/256

52 LQFP



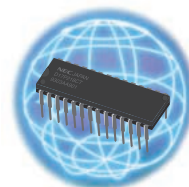
Part Number	μPD67A	μPD68A	μPD69A	μPD6P9
Major applications	AV, household electric appliances			
ROM size	1002 × 10 bits	2026 × 10 bits	4074 × 10 bits	
	Mask ROM			One-time PROM
RAM size	32 × 4 bits		128 × 4 bits	
Number of supported keys	32 (standard)/56 (when using key expansion pin)			
Operation clock frequency (fx)	3.5 to 4.5 MHz (ceramic oscillation)			
Instruction execution time	16 μs (@ fx = 4 MHz)		16 μs or 8 μs ^{Note 1} (@ fx = 4 MHz)	
Modulation carrier frequency	Each high-/low-level width can be set from 250 ns to 64 μs (@ fx = 4 MHz) via modulo registers			
Timers	9-bit programmable timer: 1 channel, timer clock: fx/64			
POC circuit	On chip			
RAM retention detector	On chip			
Power supply voltage (VDD)	2.0 to 3.6 V		2.0 to 3.6 V or 1.8 to 3.6 V ^{Note 2}	2.2 to 3.6 V
Package	20-pin plastic SSOP (7.62 mm (300))			
Development tools	Assembler			

Notes 1. Selectable by mask option in the μPD69A. Fixed in each product of the μPD6P9.

2. Selectable by mask option

μPD1724x Series

For preset remote controllers/
small-scale general-purpose applications



Part Number	μPD17240	μPD17241	μPD17242	μPD17243	μPD17244	μPD17245	μPD17246
Major applications	Preset remote controllers, toys, portable systems						
ROM size	2048 × 16 bits	4096 × 16 bits	6144 × 16 bits	8192 × 16 bits	10240 × 16 bits	12288 × 16 bits	16384 × 16 bits
RAM size	447 × 4 bits						
Carrier generator for infrared remote controller	On chip						
I/O ports	Input: 5, I/O: 19						
External interrupt	1						
Timers	2 channels						
Watchdog timer	On chip						
Low voltage detector	On chip						
RAM retention detector	On chip						
Instruction execution time (@ 4 MHz)	High-speed mode: 4 μs/Normal mode: 8 μs						
Power supply voltage (V _{DD})	2.0 to 3.6 V						
Package	30-pin plastic SSOP (7.62 mm (300))						
One-time PROM product	μPD17P246						
Development tools	Assembler, device file, integrated debugger, in-circuit emulator						



Part Number		μPD789086	μPD789088	μPD78F9088
Major applications		Preset remote controllers, toys, portable systems		
ROM size		16 KB	32 KB	
		Mask ROM		Flash memory
RAM size		384 bytes	576 bytes	
Operation clock frequency (fx)		1.0 to 5.0 MHz (ceramic/crystal oscillator)		
Instruction execution time		0.4 μs/0.8 μs/1.6 μs (@ fx = 5.0 MHz)		
General-purpose registers		8 bits × 8 registers		
Instruction set		<ul style="list-style-type: none">• 16-bit operations• Bit manipulation (set, reset, test) etc.		
I/O ports		24		
Timers		<ul style="list-style-type: none">• 8-bit timer: 3 channels• 16-bit timer: 1 channel• Watchdog timer: 1 channel		
Timer outputs		1		
Serial interface		UART/3-wire serial I/O mode: 1 channel		
Key return circuit		On chip		
Vectored interrupt sources	Maskable	Internal: 8, External: 2		
	Non-maskable	Internal: 1		
Reset		<ul style="list-style-type: none">• Reset by $\overline{\text{RESET}}$ signal input• Internal reset by watchdog timer• Reset via power-on-clear circuit		
Power supply voltage (V _{DD})		1.8 to 5.5 V		
Package		30-pin plastic SSOP (7.62 mm (300))		
Development tools		Assembler, C compiler, device file, integrated debugger, system simulator, in-circuit emulator		



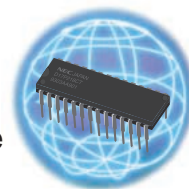
Part Number		μPD789322	μPD789324	μPD789326	μPD789327	μPD78F9328
Major applications		AV, air conditioners				
ROM size		4 KB	8 KB	16 KB	24 KB	32 KB
		Mask ROM				
RAM size		256 bytes		512 bytes		
LCD display RAM size		24 × 4 bits				
Operation clock frequency (fx)		• 1.0 to 5.0 MHz (Main system clock: Ceramic/crystal oscillation) • 32.768 kHz (Subsystem clock: Crystal oscillation)				
Instruction execution time		• 0.4 μs/1.6 μs (@ 5.0 MHz operation with main system clock fx) • 122 μs (@ 32.768 kHz operation with subsystem clock fxT)				
General-purpose registers		8 bits × 8 registers				
Instruction set		• 16-bit operations • Bit manipulation (set, reset, test) etc.				
I/O ports		21				
Timers		• 8-bit timer: 2 channels • Watch timer: 1 channel • Watchdog timer: 1 channel				
Timer output		1				
POC circuit		Mask option				On chip
Serial interface		3-wire serial I/O mode: 1 channel				
LCD controller/driver		• Segment signal outputs: 24 • Common signal outputs: 4				
Vectored interrupt sources	Maskable	Internal: 6, External: 2				
	Non-maskable	Internal: 1				
Reset		• Reset by $\overline{\text{RESET}}$ signal input • Internal reset by watchdog timer • Reset via power-on-clear circuit				
Power supply voltage (VDD)		1.8 to 5.5 V				
Package		52-pin plastic LQFP (10 × 10)				
Development tools		Assembler, C compiler, device file, integrated debugger, system simulator, in-circuit emulator				



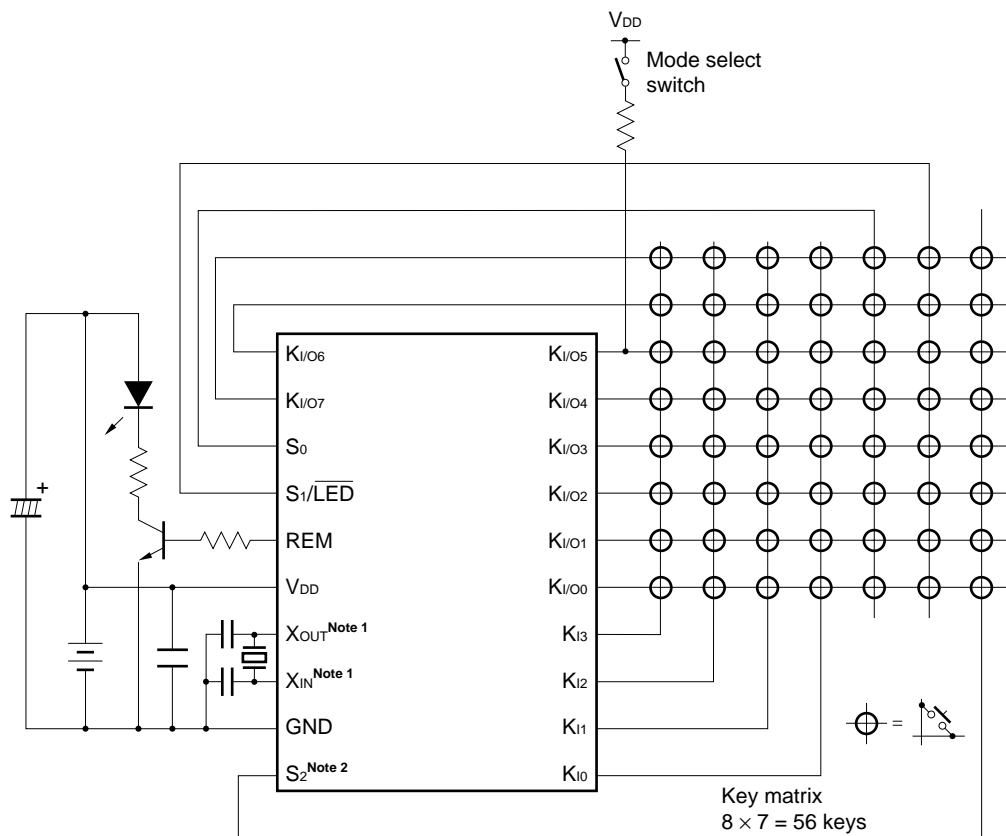
Part Number		μPD789462	μPD789464	μPD789466	μPD789467	μPD78F9468
Major applications		AV, air conditioners				
ROM size		4 KB	8 KB	16 KB	24 KB	32 KB
		Mask ROM				
RAM size		256 bytes		512 bytes		
LCD display RAM size		23 × 4 bits				
Operation clock frequency (fx)		• 1.0 to 5.0 MHz (Main system clock: Ceramic/crystal oscillation) • 32.768 kHz (Subsystem clock: Crystal oscillation)				
Instruction execution time		• 0.4 μs/1.6 μs (@ 5.0 MHz operation with main system clock fx) • 122 μs (@ 32.768 kHz operation with subsystem clock fxT)				
General-purpose registers		8 bits × 8 registers				
Instruction set		• 16-bit operations • Bit manipulation (set, reset, test) etc.				
I/O ports		18				
Timers		• 8-bit timer: 2 channels • Watch timer: 1 channel • Watchdog timer: 1 channel				
Timer output		1				
POC circuit		Mask option				On chip
A/D converter		8-bit resolution × 1 channel				
LCD controller/driver		• Segment signal outputs: 23 • Common signal outputs: 4 • On-chip booster				
Vectored interrupt sources	Maskable	Internal: 6, External: 2				
	Non-maskable	Internal: 1				
Reset		• Reset by RESET signal input • Internal reset by watchdog timer • Reset via power-on-clear circuit				
Power supply voltage (VDD)		1.8 to 5.5 V				
Package		52-pin plastic LQFP (10 × 10)				
Development tools		Assembler, C compiler, device file, integrated debugger, system simulator, in-circuit emulator				

Application

Remote control transmitter (56 keys; mode selection switch accommodated)



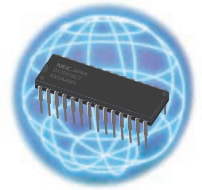
μPD69A Series



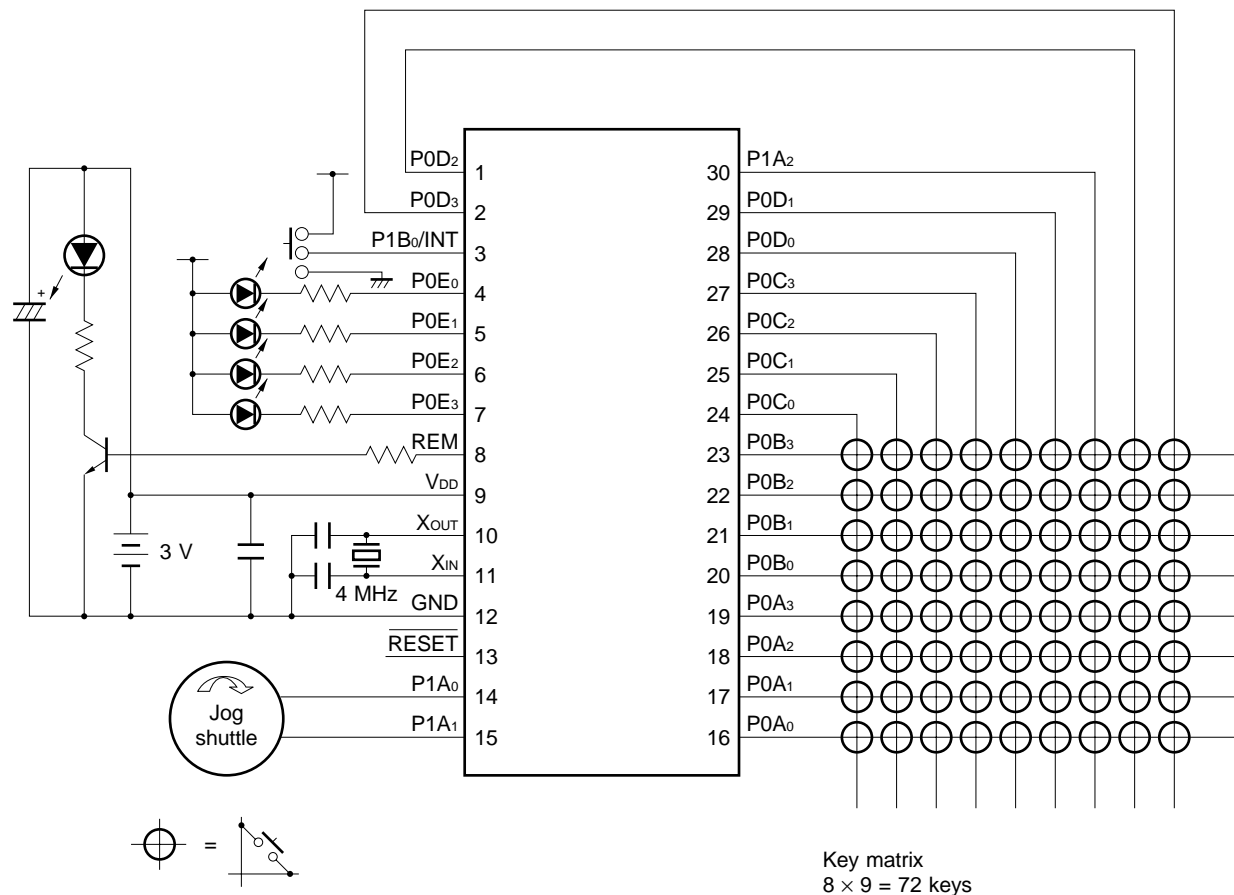
- Notes**
1. When incorporation of a capacitor for oscillation has not been specified by a mask option.
 2. S₂: Set to high level for STOP mode release

Application

Remote control transmitter
(72 keys accommodated)



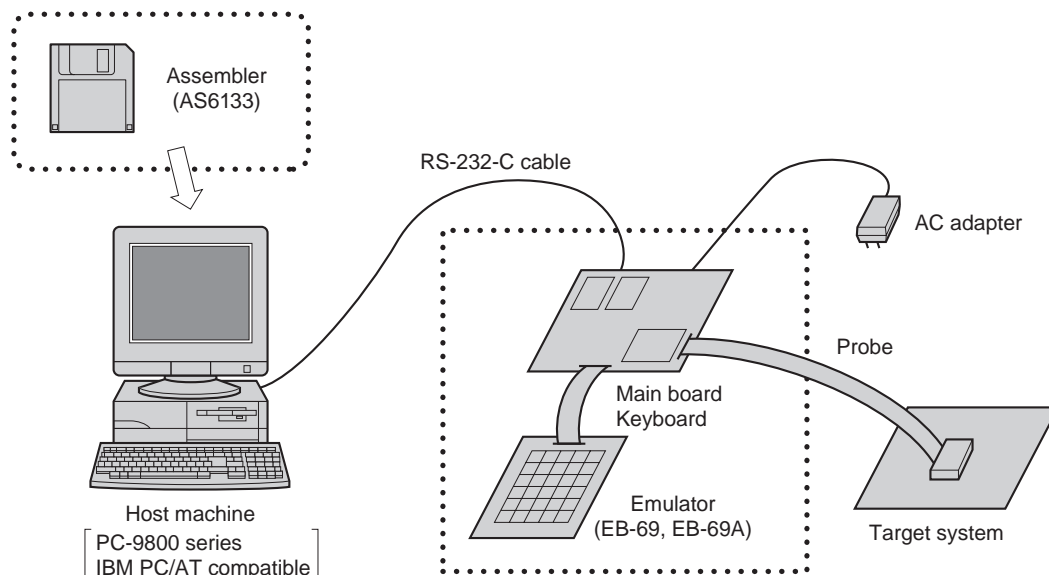
μPD1724x Series





The μ PD69A Series is developed in the following environment.

Development environment : PC-9800 series, IBM PC/AT™ compatibles



Remarks

1. RS-232-C cable, probe, and AC adapter are sold separately.
2. EB-69 and EB-69A (under development) are manufactured by Naito Densei Machida Mfg. Co., Ltd.

Software

◆ Assembler (AS6133)

- Features**
- Absolute assembler for μ PD69A series.
 - Output load module file to serve as EB-69 and EB-69A input and diagnostic lists.

Hardware

◆ Emulator (EB-69, EB-69A)

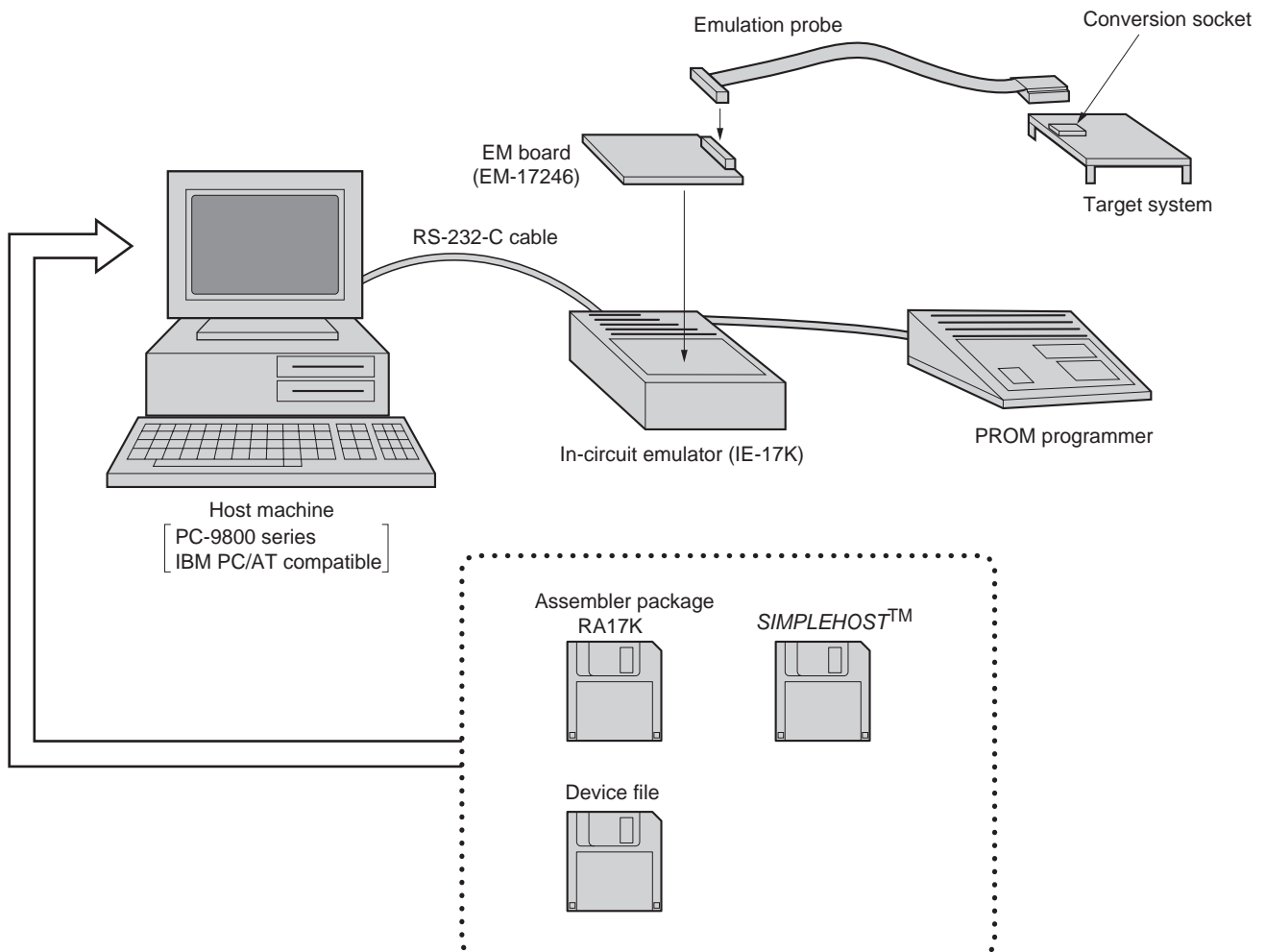
- Features**
- Operations such as key input and infrared LED light emission confirmation can be performed using the keyboard unit provided.
 - Connection to target is possible using the probe (sold separately).
 - Event functions including step execution and program execution break are included.
 - Guard functions including stack overflow and coverage break are included.

Remark EB-69 and EB-69A (under development) are manufactured by Naito Densei Machida Mfg. Co., Ltd.



The μ PD1724x Series is developed in the following environment.

Development environment : PC-9800 series, IBM PC/AT compatibles



Software

- RA17K (relocatable assembler package)
- Device file: Available for each product
- *SIMPLEHOST*: Compatible with RA17K

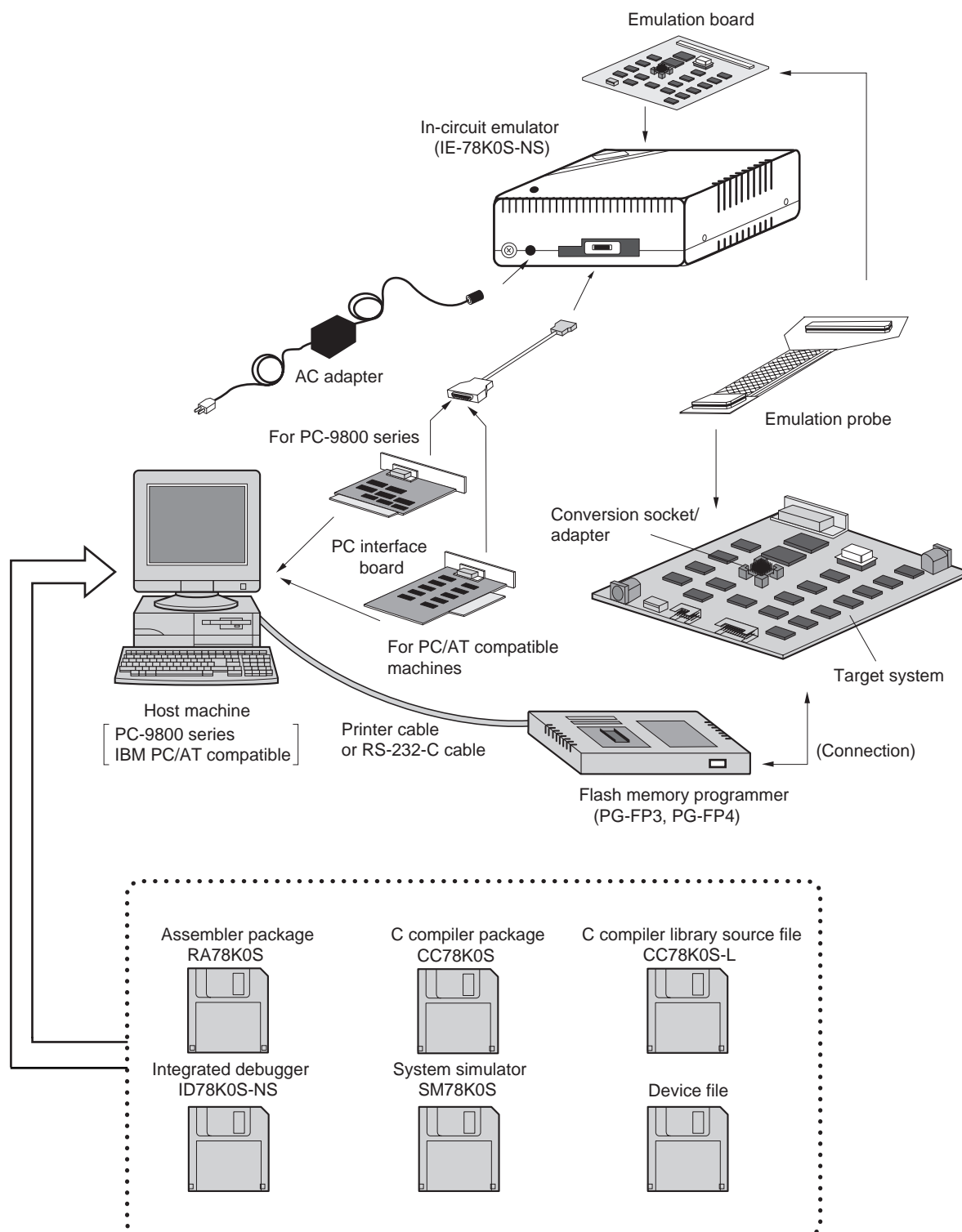
Hardware

- IE-17K or IE-17K- ET (in-circuit emulator)
- EM-17246 (EM board manufactured by Naito Densai Machida Mfg. Co., Ltd.)
- Emulation probe
- Conversion socket
- PC-9800 series or IBM PC/AT compatible
- PROM programmer (for writing to one-time PROM such as AF-9706, AF-9708, AF-9709 manufactured by Ando Electric Co., Ltd.)
- Programmer adapter (PA-17P236 manufactured by NEC)



The μ PD789088 subseries, 789327 subseries, and 789467 subseries are developed in the following environment.

Development environment : PC-9800 series, IBM PC/AT compatibles





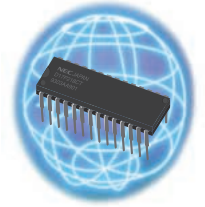
μPD789088 subseries, 789327 subseries, and 789467 subseries

Software

- RA78K0S (relocatable assembler package)
- CC78K0S (C compiler package)
- CC78K0S-L (C compiler library source file)
- ID78K0S-NS (integrated debugger)
- SM78K0S (system simulator)
- Device file: Available for each product

Hardware

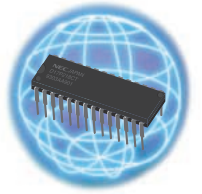
- IE-78K0S-NS (in-circuit emulator)
- IE-70000-MC-PS-B (AC adapter)
- IE-70000-98-IF-C/IE-70000-PC-IF-C/IE-70000-PCI-IF-A/IE-70000-CD-IF-A (PC interface board)
- Emulation board: Available for each product
- Emulation probe
- Conversion socket/adaptor
- PC-9800 series or IBM PC/AT compatible
- Flash memory adapter (PG-FP3/PG-FP4, FL-PR3/FL-PR4 manufactured by Naito Densetsu Machida Mfg. Co., Ltd.)
- Adapter for writing to flash memory (manufactured by Naito Densetsu Machida Mfg. Co., Ltd.)



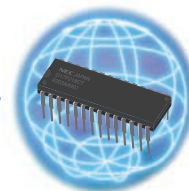
Please feel free to visit our Microprocessor home page for more information.

http://www.necel.com/micro/index_e.html

Memo



Memo



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