To our customers,

Old Company Name in Catalogs and Other Documents

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April 1\textsuperscript{st}, 2010
Renesas Electronics Corporation

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The V850 Series development environment encompasses a range of tools designed to enable smoother, faster, and more precise development of application systems that employ NEC Electronics' original V850 Series of embedded RISC microcontrollers. Each tool is provided with functions that optimize the performance of the V850 Series.

**Development Environment Background**

The expanded scale of hardware and software in recent application systems has brought with it an increase in the level of complexity. Successful development in today's environment means being able to **easily expand and improve functions, and efficiently raise the performance of the system**. With its V850 Series, NEC Electronics now gives developers the opportunity to achieve this. To enable the development of systems that capitalize on the excellent features of these high-performance devices, NEC Electronics provides support in the following three key areas: reduced development time, improved system performance, and coordination with partners.
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## DEVELOPMENT ENVIRONMENT TOOL CHAIN

### DEVELOPMENT ENVIRONMENT FOR V850 SERIES (1/2)

**In-Circuit Emulator and On-Chip Debug Emulator Environment**

#### DEVELOPMENT ENVIRONMENT TOOL CHAIN

![Diagram of Development Environment Tool Chain]

**Note**

- RD850, RD850 Pro, and AZ850 can be used with ID850, ID850QB, MULTI, PARTNER, and WATCHPOINT.
- ATi: Accelerated Technology, Inc.
- CATS: CATS, Inc.
- GAIO: GAIO TECHNOLOGY CO., LTD.
- GHS: Green Hills Software, Inc.
- KMC: Kyoto Microcomputer Corporation
- Metrowerks: Metrowerks Corporation
- Midas Lab: Midas Lab Co., Ltd.
- Red Hat: Red Hat, Inc.
- Sophia Systems: Sophia Systems Co., Ltd.
- YDC: Yokogawa Digital Computer Corporation
- Others: NEC Electronics Corporation
DEVELOPMENT ENVIRONMENT FOR V850 SERIES (2/2)

ROM Emulator and Evaluation Board Environment

Note RD850, RD850 Pro, and AZ850 can be used with MULTI and PARTNER.

APPLY: Application Corporation
ATI: Accelerated Technology, Inc.
Cosmo: Cosmo, Inc.
GAIO: GAIO TECHNOLOGY CO., LTD.
GHS: Green Hills Software, Inc.
KMC: Kyoto Microcomputer Corporation
Lightwell: Lightwell Co., Ltd.
Metros: Metrowerks Corporation
Midoriya Electric Co.,Ltd.
Mispo: MISPO Co., Ltd.
Midoriya: Midoriya Electric Co., Ltd.
PMC: Personal Media Corporation
Others: NEC Electronics Corporation
The SP850 software package combines various V850 Series development tools and software products previously sold individually.

**Package Contents**
- C compiler package (CA850)
- Project manager (PM+)
- Integrated debugger (ID850, ID850NW)
- System simulator (SM850, SM+)
- Performance analysis tuning tool (TW850)

**Features**
- Integrated development environment from language tools to debugger and analysis tools
- Simple installation using integrated installer
- Enhanced linking functions for development tools and software products
- Optimized object debugging with compiler
- High-speed simulation of peripheral function operation
- Program performance analysis and tuning
- Management of different versions of the same tool
- Sample program for development tool operation verification (with user’s manual) included
- Timely version upgrade via development tools download service (ODS) as well as version upgrade via supply media

Note: Download from development tools download service (ODS).
COMPILERS

The following compilers are supported in the V850 Series.

CA850: C compiler package for V850 Series

Features
◆ Complies with ANSI-C standard for C language programming
◆ Includes powerful optimization functions
◆ Provides functions optimized for embedded systems
◆ Provides multiple utilities

Powerful Optimization Functions
The CA850 comes with "powerful optimization functions" that make the most of the device’s performance features. Users can select among six optimization levels, and can even set optimization levels for individual sources.

Functions Optimized for Embedded Systems
The CA850 provides functions optimized for development of the embedded systems.

Functions related to size reduction of ROM/RAM used and acceleration of execution speed
◆ Selection of register mode (software register bank function)
  → Setting a limit on the number of registers that can be used by the compiler (either 22 or 26 registers) reduces the interrupt overhead (saving to and restoring from registers).
◆ Run-time library is used for processing of function prologues and epilogues
  → Code size is reduced by library functions that can be called both when saving to registers and when restoring from registers (slightly accelerates execution speed).
◆ Structure/union packing function
  → This packing function fills holes between members of structures or unions due to alignment, which reduces code size (slightly accelerates execution speed).
◆ Register allocation function for external variables
  → When in 22 or 26 register mode, the user can freely allocate external variables to any usable register and can change the memory access to the register access. This can shrink the code size while accelerating execution speed.
Functions implemented via C language descriptions

- Data and variables can be allocated to specified memory areas.
  → Enables allocation of data and/or variables to memory areas that can be accessed at high speed
- Interrupt/exception handler processing can be coded in C language.
  → Register save/restore processing required in assembly code can be performed automatically by compiler
- Assembly code instructions can be inserted into C language source code.
  → Useful for partial, high-speed processing, etc.
- Access to peripheral I/O register can be handled as ordinary variable access.
  → Uses "device files" that contain definitions of peripheral I/O register names, interrupt request names, on-chip memory size, and other information
- Real-time OS (RX850, RX850 Pro) tasks can be coded
  → Reduces code not required for tasks

Accessory Utilities
The CA850 provides various utilities that can be used for development of embedded systems.

- **ROMization processor (romp850)**
  The initial values of variables must be set before running any applications when they are declared with initial values. The romp850 utility generates these initial values and the information to be copied. This ROMization processor's functions can also be used to generate information to be copied when ROM code is deployed to RAM before executing.

- **HEX converter (hx850)**
  This utility converts executable object files to a hexadecimal format. The following hexadecimal formats are supported.

  - Intel expanded hex format
  - Motorola S type format (standard address)
  - Motorola S type format (32-bit address)
  - Extended Tek hex format

- **Section file generator (sf850)**
  This utility allocates frequently used variables (among all variables used by an application) to an internal RAM area.

- **Dump command (dump850)**
  The dump command displays the contents of a specified object file or archive file in an easy-to-read format.

- **Disassembler (dis850)**
  This utility converts text-attribute data (program code) from object files or archive files into assembly language and displays the assembly language code.

- **Cross reference tool (cxref)**
  This utility outputs cross reference information, tag information, call tree information, function metrics (number of lines in function, function's call frequency, etc.), and call data base (function call information).

- **Memory layout visualization tool (rammap)**
  This utility displays a visualization of variable allocation information.
○ Link directive generator (LDG)
This utility can be used to generate (via the GUI) "link directive files" that specify the section allocation order, addresses, etc.

○ Stack usage tracer (stk850)
This utility statically estimates the stack size used by sets of functions within a project. Estimations can also be performed as the real-time OS task (RX850, RX850 Pro).
PROJECT MANAGER (PM+)

The project manager enables more efficient development by integrating tools such as a C compiler and debugger.

Features
- Enables editing, build, and debugging, as a series of operations
- Includes an editor function
  Includes a smart look-up function that provides a short-cut for coding function names and task names
- Menus and tool bars can be customized

- Tool options can be specified via dialog boxes
◆ Facilitates project management
   Enables management of source code and documents as well as version management using CVS. Multiple projects can be managed in the same workspace.

Wizard screens provide an easier way to register target device names and required source files, to specify whether or not a real-time OS will be used, and to set startup routines or link directive files.

◆ Wizards can be used to create projects

This is the “main project.”

This is the “library creation project.”

This kind of management is enabled.

Includes a “batch build” function that builds multiple projects as a single batch.
DEVELOPERS

The following debuggers are available.

- **ID850**: C source debugger for V850 Series (supporting MC series and G1 series)
- **ID850NW**: C source debugger for V850 Series (supporting the N-Wire emulator)
- **ID850QB**: C source debugger for V850 Series (supporting MINICUBE and IECUBE)

**Features**

- Source can be debugged.
  Source program in C and assembly language can be debugged.
- Wealth of debug functions
  By using the event functions of an in-circuit emulator (IE), break, trace, and time measurement, and coverage measurement can be executed.
  In addition, basic debugging such as break and run-break time measurement can be executed also for on-chip debugging (OCD) by using the event functions of the debug control unit (DCU).
- Saving debugging environments
  Debugging environments such as information on setting of breakpoints and events, downloading of files, and display status of windows can be saved as a project file.
  By loading this project file, the debugging environments can be restored.
- Function expansion by Tcl
  Batch processing and hook processing on the command line and creating user's original custom windows can be performed by using Tcl/Tk (Tool Command Language).
- Function expansion by TIP or ToolLink
  By using a task debugger (RD) and system performance analyzer (AZ) supporting TIP (Tool Interface Protocol) or ToolLink, debugging efficiency of a user program using a real-time OS (RX) can be dramatically enhanced.
# Debugger Usage Environment

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<td>PC 9800 series</td>
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<tr>
<td>V850E/A3, V850E/IA4, V850ES/K1</td>
<td></td>
<td>QB-V850EIA4-ZZZ</td>
<td>IBM PC/AT or compatible</td>
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<tr>
<td>V850ES/KE1, V850ES/KE1+, V850ES/KF1, V850ES/KF1+, V850ES/KG1, V850ES/KG1+, V850ES/KJ1, V850ES/KJ1+</td>
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<td>QB-V850ESKX1H-ZZZ</td>
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<tr>
<td>V850ES/SA2, V850ES/SA3</td>
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<td>IE-703239-G1-EM1</td>
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<tr>
<td>V850ES/FE2, V850ES/FF2, V850ES/FG2, V850ES/FJ2, µPD703229Y, µPD70F3229Y</td>
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<td>IE-703017-MC-EM1</td>
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* Manufactured by Midas Lab Co., Ltd.

Inquiries to:
- Naito Densei Machida Mfg. Co., Ltd. (Tel: 81-45-475-4191)
- CORE Corporation (Tel: 81-3-3795-5171)
- Application Corporation (Tel: 81-42-732-1377)
The following simulators are available.

- **SM+ for V850ES/Sx2**: Instruction + peripheral simulator for V850ES/SG1, V850ES/SG2, and V850ES/SJ2
- **SM+ for V850ES/Fx2**: Instruction + peripheral simulator for V850ES/FE2, V850ES/FF2, V850ES/FG2, and V850ES/FJ2
- **SM+ for V850**: Instruction simulator for V850E and V850ES Series

**Instruction + peripheral simulators**: Can simulate instruction execution by the CPU and internal peripheral functions such as timers and UART.

**Instruction simulators**: Can simulate only instruction execution by the CPU.

### Features

- **Target-less evaluation**
  - Microcontroller operations, including the operations of the on-chip peripheral units and interrupt servicing, in addition to the operation of the CPU, can be simulated.
  - Programs can be debugged in an early stage without an in-circuit emulator.

- **Same operability as debuggers for V850 Series**

- **Various simulation functions**
  - System debugging on PC (I/O panel window)
    - Dummy target systems can be organized by placing buttons and LEDs.
    - Panels having the same operability as Microsoft PowerPoint can be created.

  - Monitoring I/O waveform of microcontroller (timing chart window)
    - Waveforms can be monitored in an oscilloscope-like image.

  - Simulation of serial transmission/reception (serial window)
    - Transmits serial data to the microcontroller and displays reception of serial data from the microcontroller.
PERFORMANCE ANALYSIS TUNING TOOL

The following performance analysis tuning tool is supported by the V850 Series.

TW850: Tuning tool for V850 Series

The TW850 performance analysis tuning tool is a tuning tool for embedded software. It enables performance estimation, performance prediction, and performance improvement through easy operation. The TW850 tool can also be used for the V850E with on-chip cache and other system LSI devices.

Features

◆ Easy-to-use interface
  The wizard-type GUI allows easy specification of conditions. Moreover, profiling, performance analysis, and tuning are automatically performed.

◆ Profiling function
  Two profiling approaches are available, one in which trace data is analyzed during execution using the in-circuit emulator trace function, and another in which software analysis is performed by inserting probe code into the target program.

◆ Performance estimation
  Performance analysis changing the internal ROM size, instruction cache size, etc. is possible, and the analysis results can also be used for microcontroller selection.

◆ Analysis result output function
  The following analysis results are output.
  · Interfunction call relations, call count information
  · Function execution time information
  · Cache miss-hit information

◆ Performance tuning function
  The following types of tuning can be performed.
  · Instruction cache optimization
    (Optimum placement of functions so as to reduce cache miss-hits)
  · High-speed access memory allocation optimization
    (Allocation of functions that constitute bottlenecks to high-speed access memory such as internal ROM)
The following auto verification systems are supported in the V850 Series.

XO850: Auto verification system for V850 Series

XO850 is an auto verification system for the V850 Series.

At the test process (the final process in software development), this system performs auto execution and auto evaluation using the actual target hardware, providing support for test automation.

Features
- Improved execution of tedious repetitive and regression tests
  Full testing after each software revision is tedious and time-consuming. Test automation enables regression tests to be performed more easily, for improved software quality.
- Executes tests that are too complex or too large to be executed manually
  With the advent of ever more complex software, an increasing number of tests are endurance tests or other tests too complex for manual operation. Test scripts can be used to enable implementation of abnormality-related tests or other complex tests, and it saves time when implementing very large tests.
- Facilitates reproduction of abnormalities
  When an abnormality is discovered, it is often difficult to remember the execution steps that preceded the abnormality. Test automation includes recording these execution steps, which facilitates and helps ensure accuracy when reproducing the abnormality.

Configuration
Tests are performed using a host machine connected to the target system.
The XO850 Test Manager, which is installed in the host machine, manages the tests by executing the tests, gathering the test results, automatically comparing the test results to the expected values, etc.
Functions

◆ Support for creating test scenarios
  • Auto generation of test scenarios from virtual target’s operations
  • Auto generation of test scenarios from actual device’s operations
◆ Auto execution of test scenarios
  • Enables execution of multiple test iterations or multiple consecutive test scenarios
  • Enables execution of test scenarios concurrent with condition judgments
◆ Auto comparison of execution results and expected values
  • When execution of test scenario ends, the pass/fail results are automatically displayed in a readable format.
  • Displays a report describing the execution conditions for all test scenarios
◆ Use of upstream resources
  • Verification logs from design stages can be used to make test script generation more efficient.
  • Analysis of abnormalities found during testing is facilitated by links to a status transition table.
  • Coverage can be viewed at the status transition table level, enabling confirmation of a test’s coverage.

Use Conditions

◆ Load module
  The load module is generated by the V850 Series’ C compiler package (CA850). The RX850 and RX850 Pro real-time operating systems for the V850 Series are also supported when the real-time OS is used.
◆ Communication tools
  One of the following is required for communications between the host machine and the target device.
  • One serial communication channel for the device
The following IECUBE series in-circuit emulators are supported in the V850 Series.

QB-V850EIA4: In-circuit emulator for V850ES/I1, V850E/IA3, or V850E/IA4
QB-V850ESSX2: In-circuit emulator for V850ES/SG2 or V850ES/SJ2
QB-V850ESKX1H: In-circuit emulator for V850ES/KE1, V850ES/KE1+, V850ES/KF1, V850ES/KF1+, V850ES/KG1, V850ES/KG1+, V850ES/KJ1, or V850ES/KJ1+
QB-V850ESFX2: In-circuit emulator for V850ES/FE2, V850ES/FF2, V850ES/F2, V850ES/FJ2, or µPD703229

Features

◆ Low price
  • Price of 1/3 to 1/4 of the existing high-performance emulators
  • Debugger "ID850QB" and simple programmer "PG-FPL" are available as a package.

◆ Easy setup
  • Emulator and emulation board, which have conventionally been available separately, are combined.
  • USB (1.1/2.0) is employed for communication with the host machine.

◆ Many debugging functions
  • Functions equivalent to a high-performance emulator are realized (coverage and external memory emulation are optional).
  • Time measurement function as well as real-time monitor and RAM monitor functions that are frequently used are reinforced.

◆ Reinforced maintainability
  • Self-diagnostic function is provided to smoothly solve troubles.

◆ Small and lightweight
  • Palm size for easy transportation
ICUBE optional functions
The following functions are optionally available. They can be added by specifying an option when placing your order or by upgrading your IECUBE.

- Memory emulation function
  This function substitutes the external memory on the target system so that programs and data can be located in emulation memory and debugged.

- Coverage measurement function
  Percentage of executing load modules and sections can be measured.

- TimeMachine™ function
  This function is supported by a Green Hills Software (GHS) debugger. Consult a GHS tool distributor for the outline and specifications of this function.

---

**PG-FPL**
The PG-FPL is a simple programmer that is supplied with IECUBE.

**Features**
- Connects to a PC (via USB 1.1 or 2.0 cable), AC adapter not required.
- Write is also enabled via UART in the target device.
- Status display LEDs: power ON (green LED lit) and communication online (red LED blinking) display lamps
- Connection to target system selectable: via PG-FP4’s connector or a direct connection
- Able to supply power to the target system (up to 200 mA)
- Not able to supply clock to the target system
- Evaluation programmer for development (conditionally guaranteed for use with mass production)
- Target devices: Any device supported by IECUBE (except flash memory versions that use two power supplies)
### Socket for IECUBE

- **Extension probe (S and T types) (option)**
  - Connecting IECUBE to target system with probe

- **Exchange adapter**
  - Adapter whose pins need to be converted, depending on the product

- **Check pin adapter (option)**
  - Adapter for monitoring waveform

- **Space adapter (option)**
  - Adapter for adjusting height

- **YQ adapter**
  - Adapter for connecting IECUBE

- **Mount adapter (option)**
  - Adapter for mounting device (cover and unit)

- **Target connector**
  - Connector soldered onto the target system

### S-type socket

### T-type socket

### Remark

The YQ adapter (T type) includes guide screws (YQGUIDE-S3).

The exchange adapter (S type) differs according to the G1 emulator.

A check pin adapter that can be used with both T type and S type is currently under development.

The following products are identical (except 64-pin products):
- Check pin adapter (S type) and check pin adapter for G1 emulator
- Space adapter (S type) and space adapter for G1 emulator
- Mount adapter (S type) and mount adapter for G1 emulator
- Target connector (S type) and target connector for G1 emulator
- Space adapter (T type) and YQSOCKET for MC emulator
- YQ adapter (T type) and YQPACK for MC emulator
- Mount adapter (T type) and HQPACK for MC emulator
- Target connector (T type) and HQPACK for MC emulator

### Connections

When Connecting to IECUBE

<table>
<thead>
<tr>
<th>S Type</th>
<th>T Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IECUBE</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Target System</td>
<td>—</td>
</tr>
</tbody>
</table>

When Mounting on Device

<table>
<thead>
<tr>
<th>S Type</th>
<th>T Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑨top</td>
<td>⑩top</td>
</tr>
<tr>
<td>Device</td>
<td>—</td>
</tr>
<tr>
<td>⑨(bottom)</td>
<td>—</td>
</tr>
<tr>
<td>⑩</td>
<td>—</td>
</tr>
<tr>
<td>Target System</td>
<td>—</td>
</tr>
</tbody>
</table>

### \[\text{Pamphlet U15763EJSV0PF}\]
The following products are G1 series in-circuit emulators for V850 Series.

- **IE-V850ES-G1**: In-circuit emulator for V850ES
- **IE-703204-G1-EM1**: In-circuit emulator emulation board for V850ES/SA2 and V850ES/SA3
- **IE-703288-G1-EM1**: In-circuit emulator emulation board for V850ES/SQ2 and V850ES/SJ2
- **IE-703228-G1-EM1**: In-circuit emulator emulation board for V850ES/PM1
- **IE-703239-G1-EM1**: In-circuit emulator emulation board for V850ES/FE2, V850ES/FF2, V850ES/FG2, V850ES/FJ2, µPD703229Y
- **IE-703220-G1-EM1**: In-circuit emulator emulation board for V850ES/ST2

**Features**

- Attains a high approximation of an actual device by integrating emulator functions on a dedicated chip.
- Provides many debugging functions such as break, trace, coverage measurement, external memory emulation, and real-time RAM monitoring.
- Extension probe supplied as standard makes connection with the target system easy.
- Internal power supply and easy-to-carry housing
- Connectable to various types of computers.
Socket for G1 Emulator

- **Exchange adapter**
  - Adapter whose pins need to be converted, depending on the product

- **Check pin adapter**
  - (option)
  - Adapter for monitoring waveform

- **Space adapter**
  - (option)
  - Adapter for adjusting height

- **Target connector**
  - Connector to be soldered onto the target system

**Connections**

<table>
<thead>
<tr>
<th>Emulator</th>
<th>Device</th>
<th>Target system</th>
</tr>
</thead>
<tbody>
<tr>
<td>➁</td>
<td>➀</td>
<td>➂</td>
</tr>
<tr>
<td>➁</td>
<td>➀</td>
<td>➂</td>
</tr>
<tr>
<td>➁</td>
<td>➀</td>
<td>➂</td>
</tr>
<tr>
<td>➁</td>
<td>➀</td>
<td>➂</td>
</tr>
</tbody>
</table>

**Remark**
The exchange adapter differs from the exchange adapter for IECUBE (S type).
The following products are identical, although the product names are not the same (except 64-pin products):
- Check pin adapter and check pin adapter for IECUBE (S type)
- Space adapter and space adapter for IECUBE (S type)
- Mount adapter and mount adapter for IECUBE (S type)
- Target connector and target connector for IECUBE (S type)
MC SERIES

The following products are MC series in-circuit emulators for V850 Series.

IE-703002-MC: In-circuit emulator for V85x, V850/Sxx
IE-703003-MC-EM1: In-circuit emulator option board for V853
IE-703017-MC-EM1: In-circuit emulator option board for V850/SA1, V850/SB2
IE-703040-MC-EM1: In-circuit emulator option board for V850/SV1
IE-703079-MC-EM1: In-circuit emulator option board for V850/SF1
IE-703089-MC-EM1: In-circuit emulator option board for V850/SC1, V850/SC2, V850/SC3
IE-703102-MC: In-circuit emulator for V850E/MS1, V850E/MS2
IE-703102-MC-EM1: In-circuit emulator option board for V850E/MS1, V850E/MS2 (5 V type)
IE-703102-MC-EM1-A: In-circuit emulator option board for V850E/MS1 (3.3 V type)
IE-V850E-MC: In-circuit emulator for V850E (5 V type)
IE-703111-MC-EM1: In-circuit emulator option board for V850E/IA1
IE-703114-MC-EM1: In-circuit emulator option board for V850E/IA2
IE-V850E-MC-A: In-circuit emulator for V850E (3.3 V type)
IE-703166-MC-EM1: In-circuit emulator option board for V850E/SV2
IE-703107-MC-EM1: In-circuit emulator option board for V850E/MA1, V850E/MA2
IE-V850E-MC-EM1-A: In-circuit emulator core adapter for NB85E core (2.5 V type)
IE-V850E-MC-EM1-B: In-circuit emulator core adapter for NB85E core (3.3 V type)

Features
◆ Integration of conventional emulator functions in a single chip enables considerable penetrability
◆ Rich variety of emulator functions
◆ High-speed operation equivalent to the target device
◆ Connectable to a variety of PCs
When Connecting to Emulator

<table>
<thead>
<tr>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>YQSOCKET</td>
</tr>
<tr>
<td>YQPACK</td>
</tr>
<tr>
<td>HQPACK</td>
</tr>
<tr>
<td>NQPACK</td>
</tr>
</tbody>
</table>

When Mounting on Device

<table>
<thead>
<tr>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>YQGUIDE</td>
</tr>
<tr>
<td>Conversion socket for QFP</td>
</tr>
<tr>
<td>Conversion socket for BGA</td>
</tr>
</tbody>
</table>

**Remark** The following products are identical, although the product names are not the same (except 64-pin products).
- YQSOCKET and space adapter for IECUBE (T type)
- YQPACK and YQ adapter for IECUBE (T type)
- HQPACK and mount adapter for IECUBE (T type)
- NQPACK and target connector for IECUBE (T type)
Socket for MC Emulator (V850E/MA1 BGA Package)

-① CSICE
  Socket for emulator connection

-② LSPACK Note
  Pogo pin connector

-③ CSSOCKET
  CSP socket for connection to target system

Connections

<table>
<thead>
<tr>
<th>When Connecting to Emulator</th>
<th>When Mounting on Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulator</td>
<td>Cover for mounting on device</td>
</tr>
<tr>
<td>YQGUIDE</td>
<td>Spacing for mounting on device</td>
</tr>
<tr>
<td>①</td>
<td>Device</td>
</tr>
<tr>
<td>②</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td></td>
</tr>
<tr>
<td>Target system</td>
<td>Target system</td>
</tr>
</tbody>
</table>

Note  
LSPACK is provided with the cover for mounting on a device and the spacer for mounting on a device.

Socket for MC Emulator (V850/SA1, V850E/MS1 BGA Package)

-① CSICE
  Socket for emulator connection
  (The actual color is different)

-② CSPACK
  Socket for target connection

Connections

<table>
<thead>
<tr>
<th>When Connecting to Emulator</th>
<th>When Mounting on Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulator</td>
<td>Cover for mounting on device</td>
</tr>
<tr>
<td>YQGUIDE</td>
<td>Spacing for mounting on device</td>
</tr>
<tr>
<td>①</td>
<td>Device</td>
</tr>
<tr>
<td>②</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td></td>
</tr>
<tr>
<td>Target system</td>
<td>Target system</td>
</tr>
</tbody>
</table>
## In-Circuit Emulator Functions

<table>
<thead>
<tr>
<th>Features</th>
<th>In-Circuit Emulator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>QB-V850XXX (IECUBE)</td>
</tr>
<tr>
<td><strong>Maximum operating frequency</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Emulation memory capacity</strong></td>
<td></td>
</tr>
<tr>
<td>Internal ROM</td>
<td>1 MB</td>
</tr>
<tr>
<td>Internal RAM</td>
<td>60 KB</td>
</tr>
<tr>
<td>External memory (optional)</td>
<td>16 MB</td>
</tr>
<tr>
<td><strong>Event function</strong></td>
<td></td>
</tr>
<tr>
<td>Execution events</td>
<td>10</td>
</tr>
<tr>
<td>Access events</td>
<td>6</td>
</tr>
<tr>
<td><strong>Break function</strong></td>
<td></td>
</tr>
<tr>
<td>Hardware break</td>
<td>16</td>
</tr>
<tr>
<td>Software break</td>
<td>2000</td>
</tr>
<tr>
<td>Forcible break</td>
<td>Enabled</td>
</tr>
<tr>
<td>Step execution</td>
<td>Enabled</td>
</tr>
<tr>
<td>File safe break</td>
<td>Enabled</td>
</tr>
<tr>
<td><strong>Trace function</strong></td>
<td></td>
</tr>
<tr>
<td>Trace memory capacity</td>
<td>256K frames</td>
</tr>
<tr>
<td>Trace items</td>
<td>Branch, access, timestamp, interpolation function</td>
</tr>
<tr>
<td><strong>Time measuring function</strong></td>
<td></td>
</tr>
<tr>
<td>Program execution (start - end)</td>
<td></td>
</tr>
<tr>
<td>measuring</td>
<td></td>
</tr>
<tr>
<td>Inter-event measuring</td>
<td>Enabled (8)</td>
</tr>
<tr>
<td>Display items of inter-event</td>
<td></td>
</tr>
<tr>
<td>measuring result</td>
<td>Total value, pass count, maximum value, minimum value, average value</td>
</tr>
<tr>
<td>Timeout break</td>
<td>Enabled</td>
</tr>
<tr>
<td><strong>Real-time RAM monitor function</strong></td>
<td></td>
</tr>
<tr>
<td>Number of points</td>
<td>A</td>
</tr>
<tr>
<td>Maximum capacity</td>
<td>2 KB</td>
</tr>
<tr>
<td><strong>Coverage function</strong></td>
<td></td>
</tr>
<tr>
<td>Memory capacity</td>
<td>Internal ROM space</td>
</tr>
<tr>
<td>Execution coverage</td>
<td>+ any 1 MB space</td>
</tr>
<tr>
<td>Access coverage</td>
<td>(optional)</td>
</tr>
<tr>
<td><strong>Maskable pins</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RESET, WAIT, HLDRQ, NMI, STOP</td>
</tr>
<tr>
<td><strong>PC interface</strong></td>
<td>USB2.0, USB1.1</td>
</tr>
</tbody>
</table>
MINICUBE

The following products are on-chip debug emulator MINICUBE for V850 Series.

QB-V850MINI: On-chip debug emulator for V850E1 and V850ES
Supported devices as of October 2005.
V850E/MA3, V850E/ME2, V850E/IA4, V850E/SV2, V850E/RS1
V850ES/G2, V850ES/J2, V850ES/KJ1, V850ES/KJ1+, V850ES/FE2,
V850ES/FF2, V850ES/FG2, V850ES/FJ2
µPD70F3229Y

Features
◆ Low price
   Price 1/20 of the existing high-performance emulator and
debugger “ID850QB” also available in same package
◆ Easy setup
   USB (1.1/2.0) is employed for communication with the host
   machine. No power supply is necessary.
◆ Can write to on-chip flash memory.
   Evaluation can be started right away even if a flash memory programmer is not at hand.
◆ Debugging in in-circuit mode
   Supports debugging of V850ES/KE1(+), V850ES/KF1(+), and V850ES/KG1(+) that are not equipped
   with a debug unit, by using the self-check board supplied as an accessory.
◆ Reinforced maintainability
   Self-diagnosis using the self-check board supplied as an accessory for smoothly solving problems
◆ Small and lightweight
   Pocket-size for easy transportation

System configuration

Debugger
USB interface cable
MINICUBE
OCD cable
Adaptor
Connector
Self-check board
Microcontroller

Notes
1. Not only the adapter and connector supplied as standard, but also
   those available from the partners can be selected and purchased
   in accordance with the mounting area of the target system.
2. Optional exchange adapter and target connector are necessary for
   connecting a target system.
The following product is an on-chip debug emulator N-Wire emulator for V850 Series.

IE-70000-MC-NW-A: N-Wire emulator for Nx85ET

Features

- Ideal development environment for NB85ET and NU85ET core
- On-board debugging is possible when the target system has wiring and a connector for debugging.
- Supports high-speed operation in excess of 66 MHz
- ID850NW with identical operability to SM850 and ID850
- Includes internal ROM and RAM so user’s resources are not utilized
## On-Chip Debug Emulator Functions

<table>
<thead>
<tr>
<th>Feature</th>
<th>QB-V850MINI (MINICUBE)</th>
<th>IE-70000-MC-NW-A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum operating frequency</strong></td>
<td>Equivalent to target device</td>
<td>Equivalent to target device (minimum operation frequency is 2 MHz)</td>
</tr>
<tr>
<td><strong>Emulation memory capacity</strong></td>
<td>On-chip target device Flash ROM capacity</td>
<td>None</td>
</tr>
<tr>
<td><strong>Internal RAM</strong></td>
<td>None</td>
<td>Optional 2 MB x 2 banks</td>
</tr>
<tr>
<td><strong>External memory</strong></td>
<td>None</td>
<td>Optional 2 MB x 2 banks</td>
</tr>
<tr>
<td><strong>Event function</strong></td>
<td>2 execution/access alternate-function pins</td>
<td>8 (2 access alternate-function pins)</td>
</tr>
<tr>
<td><strong>Break function</strong></td>
<td>2 execution/access alternate-function pins</td>
<td>4 (2 execution alternate-function pins)</td>
</tr>
<tr>
<td><strong>Hardware break</strong></td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td><strong>Software break</strong></td>
<td>2000 (only number of ROM correction channels of target device can be set to internal ROM)</td>
<td>100 (Setting to internal ROM is disabled)</td>
</tr>
<tr>
<td><strong>Forcible break</strong></td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td><strong>Step execution</strong></td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td><strong>File safe break</strong></td>
<td>Disabled</td>
<td>Disabled</td>
</tr>
<tr>
<td><strong>Trace function</strong></td>
<td>No trace functions</td>
<td>None</td>
</tr>
<tr>
<td><strong>Program execution (start - end)</strong></td>
<td>Enabled</td>
<td>None</td>
</tr>
<tr>
<td><strong>Trace memory capacity</strong></td>
<td>2M frames</td>
<td>None</td>
</tr>
<tr>
<td><strong>Time measuring function</strong></td>
<td>Enabled (disabled for V850E/ME2, V850ESV2)</td>
<td>None</td>
</tr>
<tr>
<td><strong>Display items of inter-event measuring result</strong></td>
<td>Disabled</td>
<td>Disabled</td>
</tr>
<tr>
<td><strong>Real-time RAM monitor function</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Number of points</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Maximum capacity</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Coverage function</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Memory capacity</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Execution coverage</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Access coverage</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Maskable pins</strong></td>
<td>RESET, WAIT, HLDRQ, NMI, STOP</td>
<td>PCI, PCMCIA, network</td>
</tr>
<tr>
<td><strong>PC interface</strong></td>
<td>USB2.0, USB1.1</td>
<td>PCI, PCMCIA, network</td>
</tr>
</tbody>
</table>
RX850, RX850 Pro

The following real-time OSs are supported in the V850 Series.

<table>
<thead>
<tr>
<th>OS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX850</td>
<td>Real-time OS for V850 Series</td>
</tr>
<tr>
<td>RX850 Pro</td>
<td>Real-time OS for V850 Series</td>
</tr>
</tbody>
</table>

Why is a real-time OS needed?
With the recent advances in the performance and functionality of microcontrollers, not only have the systems to be developed become more complex, but also the quantity of the programs to be executed by these systems has increased. Because systems in the field of control equipment in particular are required to respond immediately to changes in external and internal events, many problems that cannot be solved by conventional interrupt servicing have arisen; hence the development of the real-time OS.
The real-time OS is designed to react promptly to event changes and interrupts and manages multiple processing programs by dividing them into task units, which are then executed in the optimal order.

Conventional program vs. Real-time OS

<table>
<thead>
<tr>
<th>Conventional program</th>
<th>Real-time OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task execution control</td>
<td>Task execution control</td>
</tr>
<tr>
<td>Interrupt management</td>
<td>Interrupt management</td>
</tr>
<tr>
<td>Memory management</td>
<td>Memory management</td>
</tr>
</tbody>
</table>

Real-time OS advantages

<For designing>
- Facilitates creation of application modules
- Software development can be focused solely on the application
- Management of program in task units
- Tasks can be set individually by prescribing an inter-task communication mode

<For debugging>
- Discrete task debugging enables multiple operators to debug simultaneously
- Only inter-task communication and synchronization testing are required for integrated debugging

<For program maintenance>
- Specification changes and function additions can be executed in task units, reducing the effect on the system as a whole
- Because the program consists of task units:
  - The internal structure is simplified, resulting in greater program legibility
  - The program can be reused in task units, even in other systems

The V850 Series real-time OSs have been designed as the natural successors of the 16-bit V Series and 78K Series real-time OSs. They offer the following high-performance environment.
- Compliance with industry standards (ITRON, μITRON specifications)
- Support for power management functions
- Capability to embed required functions only (selection of system calls to be used)
- Advanced task development support through task debugger (RD)
- Application operational analysis support through system performance analyzer (AZ)

<table>
<thead>
<tr>
<th>Real-Time OS</th>
<th>Specification</th>
<th>Performance</th>
<th>Description</th>
</tr>
</thead>
</table>
| RX850 µITRON3 | [Conditions]  
V853 (25 MHz)  
Program: Internal ROM  
Data/stack: Internal RAM  
- Maximum interrupt disable time: 7 µs  
- Task switching time: 11 µs (wup_tsk)  
- Code size: 3 to 7 KB | This OS is easy to port from the 78 K Series. It has a compact design to enable operation from the on-chip ROM and RAM of the V850. |
| RX850 Pro µITRON3 | [Conditions]  
V850E/MA1 (50 MHz)  
Program: External ROM  
Data/stack: Internal RAM  
- Maximum interrupt disable time: 8 µs  
- Task switching time: 20 µs (wup_tsk)  
- Code size: 5 to 13 KB | This is the RX850 OS but with enhanced functions. |
### System Call List (1/2)

<table>
<thead>
<tr>
<th>Control Module</th>
<th>System Call</th>
<th>Description</th>
<th>RX850</th>
<th>RX850 Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task management</td>
<td>cre_tsk</td>
<td>Creates a task</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>del_tsk</td>
<td>Deletes a task</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>sta_tsk</td>
<td>Activates a task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>exc_tsk</td>
<td>Terminates this task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>excd_tsk</td>
<td>Terminates and deletes this task</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>ter_tsk</td>
<td>Forcibly terminates another task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>dis_disp</td>
<td>Disables dispatch</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>ena_disp</td>
<td>Enables dispatch</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>chg_pri</td>
<td>Changes the priority level of a task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>rot_rdq</td>
<td>Rotates a ready queue of a task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>rel_wai</td>
<td>Forcibly releases a task from waiting</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>get_tid</td>
<td>Obtains the ID number of this task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>ref_tsk</td>
<td>Obtains task information</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>vget_tid</td>
<td>Obtains the ID number of a task</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td>Task-associated synchronous management</td>
<td>sus_tsk</td>
<td>Places a task in the suspended state</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>rsm_tsk</td>
<td>Resumes operation of a task in the suspended state</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>rsms_tsk</td>
<td>Forcibly resumes operation of a task in the suspended state</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>slp_tsk</td>
<td>Places this task in the wakeup waiting state</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>slps_tsk</td>
<td>Places this task in wakeup waiting state (with timeout)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>wup_tsk</td>
<td>Wakes up a task</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>can_wup</td>
<td>Invalidates a wakeup request</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Synchronous communication management</td>
<td>cre_sem</td>
<td>Creates a semaphore</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>del_sem</td>
<td>Deletes a semaphore</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>sig_sem</td>
<td>Returns a resource</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>wai_sem</td>
<td>Acquires a resource</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>preq_sem</td>
<td>Acquires a resource (polling)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>lwai_sem</td>
<td>Acquires a resource (with timeout)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>ref_sem</td>
<td>Obtains semaphore information</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>vget_sid</td>
<td>Obtains the ID number of a semaphore</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>cre_flg</td>
<td>Creates an event flag</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>del_flg</td>
<td>Deletes an event flag</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>set_flg</td>
<td>Sets a bit pattern</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>clr_flg</td>
<td>Clears a bit pattern</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>wai_flg</td>
<td>Checks a bit pattern</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>pol_flg</td>
<td>Checks a bit pattern (polling)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>lwai_flg</td>
<td>Checks a bit pattern (with timeout)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>ref_flg</td>
<td>Obtains event flag information</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>vget_flid</td>
<td>Obtains the ID number of an event flag</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>vset_flg1</td>
<td>Sets a bit pattern (1-bit event flag)</td>
<td>√</td>
<td>—</td>
</tr>
</tbody>
</table>

**Note** System calls related to event flags are supported.
### System Call List (2/2)

<table>
<thead>
<tr>
<th>Control Module</th>
<th>System Call</th>
<th>Description</th>
<th>RX850</th>
<th>RX850 Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtains version information</td>
<td>vclr_flg1</td>
<td>Clears a bit pattern (1-bit event flag)</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>vwai_flg1</td>
<td>Checks a bit pattern (1-bit event flag)</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>vpol_flg1</td>
<td>Checks a bit pattern (1-bit event flag, polling)</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>vtwai_flg1</td>
<td>Checks a bit pattern (1-bit event flag, with timeout)</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>vref_flg1</td>
<td>Obtains 1-bit event flag information</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>cre_mbx</td>
<td>Creates a mailbox</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>del_mbx</td>
<td>Deletes a mailbox</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>snd_msg</td>
<td>Sends a message</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>rcv_msg</td>
<td>Receives a message</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>prcv_msg</td>
<td>Receives a message (polling)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>trcv_msg</td>
<td>Receives a message (with timeout)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_mbx</td>
<td>Obtains mailbox information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>vget_mid</td>
<td>Obtains the ID number of a mailbox</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Interrupt management</td>
<td>def_int</td>
<td>Registers/cancels an indirectly started interrupt handler</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ret_int</td>
<td>Returns from a directly started interrupt handler</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ret_wup</td>
<td>Returns from waking up another task and a directly started interrupt handler</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>loc_cpu</td>
<td>Acknowledges a maskable interrupt and disables dispatch processing</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>unl_cpu</td>
<td>Acknowledges a maskable interrupt and enables dispatch processing</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>dis_int</td>
<td>Disables maskable interrupt acknowledgement</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ena_int</td>
<td>Enables maskable interrupt acknowledgement</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>chg_icr</td>
<td>Changes the interrupt control register contents</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_icr</td>
<td>Obtains the interrupt control register contents</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Memory pool management</td>
<td>cre_mpl</td>
<td>Creates a variable-length memory pool</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>del_mpl</td>
<td>Deletes a variable-length memory pool</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>get_blk</td>
<td>Obtains a variable-length memory block</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>pget_blk</td>
<td>Obtains a variable-length memory block (polling)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>tget_blk</td>
<td>Obtains a variable-length memory block (with timeout)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>rel_blk</td>
<td>Releases a variable-length memory block</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_mpl</td>
<td>Obtains variable-length memory pool information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>vget_pid</td>
<td>Obtains the ID number of a variable-length memory pool</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>get_blf</td>
<td>Obtains a fixed-length memory block</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>pget_blf</td>
<td>Obtains a fixed-length memory block (polling)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>tget_blf</td>
<td>Obtains a fixed-length memory block (with timeout)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_blf</td>
<td>Releases a fixed-length memory block</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_mpf</td>
<td>Obtains fixed-length memory pool information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Time management</td>
<td>set_tm</td>
<td>Sets the time of the system clock</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>get_tm</td>
<td>Obtains the time of the system clock</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>dry_tsk</td>
<td>Places the task in the time lapse waiting state</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>def_cyc</td>
<td>Registers/cancels a cyclic handler</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>act_cyc</td>
<td>Deletes the active state of a cyclic handler</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_cyc</td>
<td>Obtains cyclic handler information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>System management</td>
<td>get_ver</td>
<td>Obtains version information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ref_syst</td>
<td>Obtains system information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>def_svc</td>
<td>Registers/cancels the extended SVC handler</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>viss_svc</td>
<td>Calls the extended SVC handler</td>
<td>—</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Note** System calls related to event flags are supported.
OSEK/VDX SPECIFICATION-COMPLIANT OS

The following OSEK/VDX specification-compliant OS is supported by the V850 Series.

RX-OSEK850: OSEK/VDX specification-compliant OS for V850 Series

Features

◆ Kernel
  Compliant with the OSEK/VDX OS Ver. 2.0 specifications
  Four conformance classes (BCC1, BCC2, ECC1, and ECC2) are supported

◆ Communication
  Compliant with the OSEK/VDX COM Ver. 2.1 rev 1 specifications
  Three conformance classes (CCC1, CCC2, and CCC3) are supported.

◆ Configurator
  A configurator that simplifies the configuration of system information (OIL850) is provided as standard.
  The configuration file supports a format compliant with OIL Ver. 2.0.

◆ Task debugger (RD-OSEK850)
  An efficient task debugger for debugging applications that use the RX-OSEK850 is provided as standard.

◆ System performance analyzer (AZ-OSEK850)
  System performance analyzer for RX-OSEK850 (sold separately)

◆ Target devices
  V850 Series
TASK DEBUGGERS (RD850/RD850 Pro)

These RX Series dedicated task debuggers provide the functions essential for debugging applications that employ a real-time OS. The debuggers are supplied in the RX Series package as standard. The main functions of the task debuggers are shown below.

- Detailed display of OS resources such as tasks
- Display of referenced task sources

These task debuggers also enable connection with a variety of other debuggers.

---

RTOS resource selection buttons

A list of resources selected using the buttons on the left is displayed. The example above is the list appearing when the TSK button is clicked.

Details of the resource selected in the window on the left are displayed.
SYSTEM PERFORMANCE ANALYZER

The following system performance analyzer is supported in the V850 Series.

AZ850: System performance analyzer for the V850 Series

The system performance analyzer visually displays records of executed tasks and RTOS resource access data, thereby clarifying the task load status and making it easy to determine the tuning index.

Quantitative Evaluation Index
In a system constructed using a design → coding → debugging process, tuning work is necessary to optimize the CPU’s performance and resources, and is used to assess the system performance and analyze its operation, through which system performance and product quality can be raised.
Tuning work usually involves checking the following operations and then analyzing the system’s response performance.

Operation check
◆ Intertask operation check
  (Deadlock status, task run sequence, resource access status)
◆ Internal task operation check
  (System call/return value)
◆ Interrupt servicing operation check
  (Occurrence frequency, nesting depth, servicing time, enable/disable position)

Response Performance Analysis
◆ Adequacy of access division (task run time)
◆ Selection of optimal scheduling (task priority level)
◆ Optimal resource allocation (resource utilization efficiency, resource values)

Algorithms and the system configuration concept can be changed at the design stage, based on analysis results. The tool that supports this kind of analysis and modification is the system performance analyzer (AZ).

This performance analyzer, operated in combination with one of a variety of debuggers, has the following functions.

◆ Detection of bugs caused by system timing misses
◆ Detection of problems caused by the simultaneous operation of multiple tasks
◆ Verification/analysis of real-time system execution performance

The system performance analyzer displays trace data visually and provides the following functions for software operation control, thus facilitating task operation analysis.

◆ Detection of unnecessary system processing
◆ Support of source analysis
◆ Clarification of the system tuning index
The tools supported for this analyzer and their operating environments are shown in the table below.

<table>
<thead>
<tr>
<th>Target Device</th>
<th>AZ</th>
<th>Supported Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>V850 Series</td>
<td>AZ850</td>
<td>RX850</td>
</tr>
</tbody>
</table>

**Note** Some functions can also be executed using a partner debugger.

The performance analyzer consists of four windows:

- **Execution transition status display window**
  This window displays the object movement versus time relationship, with time indicated by the horizontal axis and object movement by the vertical axis. Analysis of system status changes caused by task switching or interrupts/exceptions, and object accesses based on real-time OS system calls are displayed as symbols, making it easy for the user to ascertain the sequence and transition of execution. These functions enable specification of the problems for the performance analysis.

- **CPU utilization rate display window**
  This window can be used to confirm the object execution time and CPU utilization rate that guide users in the analysis of the system overhead and indicate execution performance, so that the system performance can be evaluated from the viewpoint of the idle time and interrupt time.

- **Processing time pattern distribution display window**
  Users can analyze the causes of scheduling problems by viewing the statistical breakdown of the execution processing time, as well as the interrupt frequency and execution time maximum/average/minimum figures displayed in this window.

- **Trace display window**
  Trace data from the execution transition status can be viewed. This window can be used as a sub window of the execution transition status window so that timestamps of execution status transitions and values returned by system calls can be checked.
NETWORK LIBRARY

The following network library is supported by the V850E.

RX-NET: Network library for V850E

With the rapid spread of the Internet, network libraries are now being employed for many embedded systems such as portable information terminals. NEC Electronics has therefore provided the network library "RX-NET" for embedded systems that use the V850E.

Features
◆ Conforms to RFC
◆ Supports multi-socket interfaces
◆ Supports optional products such as PPP, FTP, Telnet, as well as TCP/IP basic set
◆ Device drivers provided
  Various LAN controller drivers and serial control drivers are included in the source. Since the device driver section is separate from the RX-NET library, device drivers other than those included in the package can also be imported.
◆ Supports NEC Electronics real-time OS (RX850 Pro)

Supported Devices
◆ V850E (only devices enabling misalignment)

Real-Time OSs
◆ Target Real-Time OS
  · RX850 Pro
◆ Required resources of real-time OS
  · 2 tasks
  · 1 cyclic startup handler
Package Contents

1. Basic set
   - TCP/IP protocol stack
     - TCP, UDP, IP, ICMP, ARP
   - LAN controller
     - LAN91C96 (manufactured by Standard Microsystems Corporation)
     - NE2000 compatible
   - Board support package (BSP) library
     - Includes library for driving SolutionGear-V850E/MA1

Note: Manufactured by NEC Electronics Corporation

2. Options
   - PPP (Point-to-Point Protocol)
     - Serial controller
       - TL16550C
   - DNS (Domain Name System)
   - FTP server (File Transfer Protocol)
   - Telnet server
   - SMTP/POP (Simple Mail Transfer Protocol/Post Office Protocol)
   - DHCP (Dynamic Host Configuration Protocol)
   - Web server

3. Evaluation version
   - Basic set + options + RX-FS850
Now that the employment of storage function in embedded devices has increased and many ordinary households have at least one PC, there has been a sharp increase in the amount of data being exchanged between embedded devices and PCs. The PC-compatible file system "RX-FS850" is designed for use with V850E.

**Features**

- Uses PC-compatible file system
  - Formats for hard disk drives
    - FAT (FAT12, FAT16, or FAT32)
    - Supports file names up to 254 characters long (VFAT)
  - Formats for CD-ROM drives
    - ISO-9660 Level 1
    - Joliet (supports file names up to 64 characters long)
    - Supports multi-session CDs
- Designed for multi-tasking
  - No need to set up exclusive control between tasks when issuing API
  - Includes file locking function to prevent concurrent write operations from multiple tasks to the same file
- UNIX API-compliant
- Supports hot swap
  - Enables hot swap such as for PC cards
- Auto buffering function
  - I/O buffer is acquired automatically for I/O processing.
- Compact design suitable for ROM programming

**Supported Devices**

- V850E Series

**Real-Time OS**

- Target real-time operating system
  - RX850 Pro
HIGH-SPEED FLOATING-POINT LIBRARY

The following product is offered as a high-speed floating-point library.

GOFAST: V850 Series high-speed floating-point library

This library increases the operation speed when using floating-point operations with V850 Series products that do not have an on-chip FPU.

Features
◆ Created based on FPT3.0 from USSOFT
◆ ANSI-C (JIS X 3010)-compliant

Supported Devices
◆ V850 Series

Supported Compilers
◆ GHS, GNUPro, IAR

Supported Mathematical Functions
Supported operations
- Double-precision operations: dpadd, dpsub, dpmul, dpdiv
- Single-precision operations: fpadd, fpsub, fpmul, fpdiv
- Conversion operations: dptofp, litodp, dptoli, ultodp, dptoul, litofp, fptoli, ultofp, fptoul
- GCC only: lltodp, ulltodp, dptoull, dptoll, fptoull, fptoll, lltodp, ultodp
- Compare: dpcmp, fpcmp
- GCC runtime functions: negdf2, negsf2, eqdf2, nedf2, ltdf2, ledf2, gtdf2, gedf2, eqsf2, nesf2, ltsf2, lesf2, gtsf2, gesf2

Basic operations
- Double-precision: fabs, ceil, floor, fmod, frexp, ldexp, sqrt
- Single-precision: fabsf, ceilf, floort, fmodf, frexpf, ldexpf, sqrtf

Transcendental functions
- Double-precision: asin, acos, atan, atan2, cos, cosh, exp, log, log10, pow, sin, sinh, tan, tanh
- Single-precision: acosf, asinf, atanf, atan2f, cosf, coshf, expf, logf, log10f, powf, sinf, sinhf, tanf, tanhf

Additional functions
- isnan, isnanf, isinf, isinff
SolutionGear®

The following products are available as RISC microcontroller reference platforms.

- SG-703107-1: V850E/MA1 CPU board
- SG-703107-1S: V850E/MA1 CPU board (socket version)
- SG-703111-1: V850E/ME2 CPU board
- SG-MOTHER-1: Motherboard

Features
The reference platform comprises the CPU board provided for each microcontroller, and a CPU-independent motherboard.

The reference platform sold by NEC Electronics comes in a set that includes the following.
- Binary including the rights to use the RX Series (μITRON) on the reference platform
- Binary including rights to use middleware on the reference platform
- Sample driver source code for peripheral devices incorporated on board
- Board circuit diagram
These features enable the following.

- Measuring of user program benchmarks using the actual CPU
- Evaluation of RTOS and middleware supplied by NEC Electronics
- Utilization of reference information when designing user target board
- Prototype development prior to user target board completion
- Utilization of reference information for device driver when porting RTOS to target board
- Utilization as object of comparison when doubts arise about target board operation.

By simply acquiring additional development tools, therefore, this reference platform can be used as a turnkey solution.

- Multi from Green Hills Software, Inc. or the remote monitor debugger of PARTNER from Midas Lab Co., Ltd. can be used.

**Target Device**
- V850E/MA1
- V850E/ME2

**Features of Motherboard**
- Hardware for speech I/O and other middleware
- Industry-standard (PC-compatible) PCI, ISA, PCMCIA, E-IDE, Ethernet, SIO, parallel, keyboard, mouse, and other interfaces
- Can be used with PC unit, power-supply, and peripheral equipment (ATX-compatible board size)
- Support of all CPUs in V850E (CPU independent)
- Support of partner tools such as Multi from Green Hills Software, Inc. and the PARTNER remote monitor debugger from Midas Lab Co., Ltd.

**Incorporated Software**
NEC Electronics provides the following RTOS and middleware on this board.

- \( \mu \)ITRON-compliant real-time OS, RX Series (RX850 Pro)
- TCP/IP software Library (RX-NET)
- Speech recognition middleware
- Text-to-speech middleware
- JPEG middleware
- Various device drivers (samples)
Applilet

The following product is provided as a device driver configuration tool.

Applilet: Device driver configuration tool

When Applilet is used, setup source files for on-chip peripheral functions can be automatically generated following a simple selection process that does not require consulting the manual.

**Operation steps**

1. **Set up on-chip peripheral functions**
   Select the target model, then enter settings as required for the peripheral functions to be used.

2. **Generate code**
   Source files for each function are generated automatically.

3. **Add or revise code as needed.**

4. **Build**
   The project files used by the Project Manager are also generated automatically. These project files are loaded before building the target object.

5. **Debug**
   Use a debugger or simulator to perform debugging.
Features

◆ Conflict check among interactive type input resources
  In addition to providing a digital I/O port function, ports provide various alternate functions. The conflict check function ensures that there is no overlap between ports being used by the I/O port function and ports being used by an alternate function.

◆ Port aliases
  The alternate functions of each port can be referenced.

◆ On-line help
  Help descriptions of various functions in automatically generated source code can be referenced.
The following flash memory programmer is available.

PG-FP4: Microcontroller general-purpose flash memory programmer

Features
- Supports programming of all NEC Electronics microcontrollers with on-chip flash memory
- USB support via host machine interface
- LCD panel allows checking of programmer setting information, error messages, checksum values, etc., even when used as a standalone unit
- Two user codes can be downloaded and valid code selection is supported
- Device-specific information required for programming can be freely set using parameter files
- On-board programming and programming via a program adapter are possible
- Portable A5 size
- Easily operable both as a standalone unit or on Windows 98/Me/2000/XP and Windows NT Ver. 4.0 by using a dedicated application (FlashPro4)
## Software Tools (1/2)

<table>
<thead>
<tr>
<th>Product</th>
<th>Target Device</th>
<th>Host Machine (Required OS in Parentheses)</th>
<th>Medium</th>
<th>Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software package</td>
<td>SP850</td>
<td>V850 Series</td>
<td>CD-ROM</td>
<td>SAB17SP850</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td></td>
<td>SBB17SP850</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td>SBB17SP850-x</td>
</tr>
<tr>
<td>Real-time OS</td>
<td>RX850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17RX703000-Note 1</td>
</tr>
<tr>
<td></td>
<td>RX850 Pro</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td></td>
<td>SBB17RX703000-Note 1</td>
</tr>
<tr>
<td>Compiler</td>
<td>CA850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17CA703000-Note 2, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td>SBB17CA703000</td>
</tr>
<tr>
<td>Debugger</td>
<td>ID850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17ID703000-Note 2, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td>SBB17ID703000</td>
</tr>
<tr>
<td>Simulator</td>
<td>SM850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17SM703000-Note 2, 4</td>
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<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td>SBB17SM703000</td>
</tr>
<tr>
<td></td>
<td>SM+ for V850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17SM703100 (Core version)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td>SBB17SM703100 (Peripheral version)</td>
</tr>
<tr>
<td></td>
<td>SM+ for V850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SAB17SM703289</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>SBB17SM703289</td>
</tr>
<tr>
<td>System performance analyzer</td>
<td>AZ850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>Supplied with RX850, RX850 Pro</td>
</tr>
<tr>
<td>Performance analysis tuning tool</td>
<td>TW850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>Note 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

1. ###: Number of copies licensed (precontract required)
2. The device file corresponding to the relevant product of the V850 Series is required (device files can be obtained by downloading the file using NEC Electronics' Development Tools Download service (ODS)).
3. ×: Number of licenses (5, 10, 20, or 50)
4. Supplied with SP850.

**Remark** Contact an NEC Electronics representative if the host machine to be used is not on the list above.
## Software Tools (2/2)

<table>
<thead>
<tr>
<th>Product</th>
<th>Target Device</th>
<th>Host Machine (Required OS in Parentheses)</th>
<th>Medium</th>
<th>Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network library</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX-NET TCP/IP</td>
<td>V850E</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B17***</td>
</tr>
<tr>
<td>RX-NET (PPP)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B18***</td>
</tr>
<tr>
<td>RX-NET (DNS)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B19***</td>
</tr>
<tr>
<td>RX-NET (FTP)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B20***</td>
</tr>
<tr>
<td>RX-NET (TELNET)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B21***</td>
</tr>
<tr>
<td>RX-NET (DHCP)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B22***</td>
</tr>
<tr>
<td>RX-NET (SMTP/POP)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B24***</td>
</tr>
<tr>
<td>RX-NET (Web server)</td>
<td></td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B38***</td>
</tr>
<tr>
<td><strong>File system</strong></td>
<td>RX-FS850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B38***</td>
</tr>
<tr>
<td><strong>Floating-point library</strong></td>
<td>GOFAST</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>μSAB17AP703100-###-B38***</td>
</tr>
<tr>
<td><strong>OSEK/VDX specification-compliant real-time OS</strong></td>
<td>RX-OSEK850</td>
<td>IBM PC/AT or compatible (Japanese Windows)</td>
<td>CD-ROM</td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IBM PC/AT or compatible (English Windows)</td>
<td>CD-ROM</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**Note**: Number of copies licensed (precontract required)

**Remark**: Contact an NEC Electronics representative if the host machine to be used is not on the list above.
When purchasing IECUBE, you can select which of the following sockets to include by changing the last section of the part name.
- Exchange adapter
- Target connector
- YQ connector (T type only)

These sockets can also be purchased separately.

**IECUBE ordering number**

<table>
<thead>
<tr>
<th>QB</th>
<th>V850ES/KX1H</th>
<th>S</th>
<th>100GC</th>
<th>CM</th>
</tr>
</thead>
</table>

**Specification of socket supplied as accessory**
- S: S type socket
- T: T type socket
- ZZZ: No socket

**Specification of the number of pins and package name**
- (omitted if socket is not supplied)

**Specification of optional function**
- M: Memory emulation function supported
- C: Coverage measurement function supported
- S: TimeMachine function supported
- CM: Coverage measurement function + memory emulation function supported

**Target device subseries name**

**Example 1**) Order code: QB-V850ESSX2-ZZZ

- Breakdown:
  - Target device subseries name: V850ES/SG2 or SJ2
  - Selection of supplied socket: No socket supplied
  - Selection of optional function: No optional function

**Example 2**) Order code: QB-V850ESFX2-T100GC-CM

- Breakdown:
  - Target device subseries name: V850ES/FE2, FF2, FG2, or FJ2
  - Selection of supplied socket: T type socket, 100-pin GC package
  - Selection of optional function: Coverage measurement function and memory emulation function added

---

**Package contents**

<table>
<thead>
<tr>
<th>IECUBE main unit</th>
<th>USB cable</th>
<th>Power supply</th>
<th>CD-ROM</th>
<th>PG-FPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(with optional function)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Exchange adapter**

- YQ connector (T type only)

---

**Target connector**
<table>
<thead>
<tr>
<th>Target Device</th>
<th>Package</th>
<th>Ordering Number</th>
<th>In-Circuit Emulator</th>
<th>Accessories</th>
<th>Socket</th>
<th>Target Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>V850ES/KE1 (+)</td>
<td>144-pin GJ</td>
<td>QB-V850ESKX1H-S144GJ</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>V850ES/KF1 (+)</td>
<td>100-pin GC</td>
<td>QB-V850ESKX1H-S100GC</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>V850ES/KG1 (+)</td>
<td>100-pin GF</td>
<td>QB-V850ESKX1H-S100GF</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>V850ES/KJ1 (+)</td>
<td>80-pin GC</td>
<td>QB-V850ESKX1H-S80GC</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>QB-100GF-TC-01S</td>
<td>QB-104GJ-YQ-01S</td>
<td>QB-144GJ-TC-01S</td>
</tr>
<tr>
<td>V850ES/KJ1 (+)</td>
<td>80-pin GK</td>
<td>QB-V850ESKX1H-S80GK</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>QB-100GF-TC-01S</td>
<td>QB-104GJ-YQ-01S</td>
<td>QB-144GJ-TC-01S</td>
</tr>
<tr>
<td>V850ES/KE1 (+)</td>
<td>64-pin GB</td>
<td>QB-V850ESKX1H-S64GB</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>QB-64GB-YQ-01T</td>
<td>QB-64GB-YQ-01T</td>
<td>QB-64GB-YQ-01T</td>
</tr>
<tr>
<td>V850ES/KE1 (+)</td>
<td>64-pin GK</td>
<td>QB-V850ESKX1H-S64GK</td>
<td>QB-V850ESKX1H Including Power supply USB cable</td>
<td>QB-64GB-YQ-01T</td>
<td>QB-64GB-YQ-01T</td>
<td>QB-64GB-YQ-01T</td>
</tr>
<tr>
<td>V850ES/A4</td>
<td>100-pin GC</td>
<td>QB-V850ESIA4-S100GC</td>
<td>QB-V850ESIA4 Including Power supply USB cable Simple programmer Debugger</td>
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</tr>
<tr>
<td>V850ES/A3</td>
<td>100-pin GF</td>
<td>QB-V850ESIA4-S100GF</td>
<td>QB-V850ESIA4 Including Power supply USB cable Simple programmer Debugger</td>
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</tr>
<tr>
<td>V850ES/K1</td>
<td>80-pin GC</td>
<td>QB-V850ESIA4-S80GC</td>
<td>QB-V850ESIA4 Including Power supply USB cable Simple programmer Debugger</td>
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<td>—</td>
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</tr>
<tr>
<td>V850ES/K1</td>
<td>80-pin GK</td>
<td>QB-V850ESIA4-S80GK</td>
<td>QB-V850ESIA4 Including Power supply USB cable Simple programmer Debugger</td>
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<td>—</td>
<td>—</td>
</tr>
<tr>
<td>V850ES/G2</td>
<td>64-pin GC</td>
<td>QB-V850ESSX2-S64GC</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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</tr>
<tr>
<td>V850ES/G2</td>
<td>64-pin GK</td>
<td>QB-V850ESSX2-S64GK</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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<tr>
<td>V850ES/S2</td>
<td>144-pin GJ</td>
<td>QB-V850ESSX2-S144GJ</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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<tr>
<td>V850ES/S2</td>
<td>144-pin GF</td>
<td>QB-V850ESSX2-S144GF</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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<td>—</td>
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<tr>
<td>V850ES/SS2</td>
<td>100-pin GC</td>
<td>QB-V850ESSX2-S100GC</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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<tr>
<td>V850ES/SS2</td>
<td>100-pin GF</td>
<td>QB-V850ESSX2-S100GF</td>
<td>QB-V850ESSX2 Including Power supply USB cable Simple programmer Debugger</td>
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<td>—</td>
<td>—</td>
</tr>
<tr>
<td>V850ES/FE2</td>
<td>—</td>
<td>QB-V850ESFX2-S64GB</td>
<td>QB-V850ESFX2 Including Power supply USB cable Simple programmer Debugger</td>
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<tr>
<td>V850ES/FE2</td>
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<td>QB-V850ESFX2-S64GK</td>
<td>QB-V850ESFX2 Including Power supply USB cable Simple programmer Debugger</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

- **Target Connector:**
  - Power supply
  - USB cable
  - Simple programmer
  - Debugger
- **Accessories:**
  - Exchange Adapter
  - YQ Connector (T Type Only)
- **Target Connector:**
  - QB-144GJ-TC-01S
  - QB-144GJ-YQ-01T
  - QB-64GB-YQ-01T

- **Under development:**
  - QB-144GJ-TC-01S
  - QB-144GJ-YQ-01T
  - QB-64GB-YQ-01T

This table provides the ordering numbers and corresponding accessories for various target devices and packages.
### Ordering Information

#### Ordering Number of Socket for IECUBE/Optional Products

<table>
<thead>
<tr>
<th>Target Device</th>
<th>Package</th>
<th>Exchange Adapter</th>
<th>YQ Connector</th>
<th>Target Connector</th>
<th>Mount Adapter</th>
<th>Space Adapter</th>
<th>Check Pin Adapter (Dedicated to S Type)</th>
<th>Check Pin Adapter (Common to S/T Type)</th>
<th>Extension Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>V850ESJK1(s)</td>
<td>144-pin</td>
<td>QB-144GE-UQ-02S</td>
<td>—</td>
<td>QB-144GE-TC-01S</td>
<td>QB-144GE-MA-01S</td>
<td>QB-144GE-SQ-01S</td>
<td>QB-144GE-CA-01S</td>
<td>QB-144GE-EP-01S</td>
<td>—</td>
</tr>
<tr>
<td>V850ESKG1(s)</td>
<td>100-pin</td>
<td>QB-100GE-UQ-02S</td>
<td>—</td>
<td>QB-100GE-TC-01S</td>
<td>QB-100GE-MA-01S</td>
<td>QB-100GE-SQ-01S</td>
<td>QB-100GE-CA-01S</td>
<td>QB-100GE-EP-01S</td>
<td>—</td>
</tr>
<tr>
<td>V850ESKE(s)</td>
<td>64-pin</td>
<td>QB-64GE-UQ-02S</td>
<td>—</td>
<td>QB-64GE-TC-01S</td>
<td>QB-64GE-MA-01S</td>
<td>QB-64GE-SQ-01S</td>
<td>QB-64GE-CA-01S</td>
<td>QB-64GE-EP-01S</td>
<td>—</td>
</tr>
</tbody>
</table>

- **Under development**
- **Socket required for connecting target system**
- **Optional socket for use according to purpose**

#### Mount adapter:
Adapter for mounting device

#### Space adapter:
Adapter for adjusting height

#### Check pin adapter:
Adapter for monitoring signal

#### Extension probe:
Probe for extending connection between IECUBE and target system
HARDWARE TOOLS (G1 EMULATOR)


1. In-circuit emulator (main unit)
2. Emulation board (connected inside main unit)
3. Emulation probe
4. Conversion adapter/conversion socket
5. PC interface cable (included with 1)
6. Power cable (included with 1)
<table>
<thead>
<tr>
<th>Target Device</th>
<th>In-Circuit Emulator</th>
<th>Conversion Adapter/Conversion Socket</th>
<th>Emulation Probe</th>
<th>PC Interface Board</th>
<th>Power Supply</th>
</tr>
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<tbody>
<tr>
<td>V850ES/SA2</td>
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<td>HQPACK100SD</td>
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<td>SDN</td>
<td>system via a</td>
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<td>YQGUIDE</td>
<td>flat cable and A/D</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BOARD.</td>
<td></td>
</tr>
</tbody>
</table>

Manufactured by Tokyo Eletech Corporation
Inquiries to: Daimaru Kogyo Ltd. Tokyo Electronics Department (Tel: 81-3-3820-7112)
Application Corporation (Tel: 81-42-732-1377)
HARDWARE TOOLS (MC EMULATOR 1/3)

V850E/SV2, V850E/MA1, V850E/MA2, NB85E, V850E/IA1, V850E/IA2

1. In-circuit emulator (main unit)
2. Option board
3. Power-supply unit
4. Conversion adapter/conversion socket (included with 2)
5. PC interface cable (included with 1)
<table>
<thead>
<tr>
<th>Target Device</th>
<th>In-Circuit Emulator</th>
<th>Conversion Adapter/Conversion Socket</th>
<th>Extension Probe (Option)</th>
<th>PC Interface Board</th>
<th>Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>V850E/MA1 144-pin LQFP 0.5 mm pitch</td>
<td>IE-V850E-MC A</td>
<td>NQPACK114SD YQPACK114SD HQPACK114SD YQSOCKET114SD YGUIDE</td>
<td>SC-144SD (flexible cable) SWEX-144SD-1 (coaxial cable)</td>
<td>IE-70000-PCI-IF-A</td>
<td>IE-70000-MC-PS-B</td>
</tr>
<tr>
<td>V850E/MA1 161-pin FBGA 13 x 13 mm</td>
<td>IE-V850E-MC A</td>
<td>CSSOCKET161A1413N01 (for target board) CSSOCKET161A1413N01S1 (fastener) LSPACK161A1413NO1 CSICE161A1413NO2</td>
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<tr>
<td>V850E/MA2 100-pin LQFP 0.5 mm pitch</td>
<td>IE-V850E-MC A</td>
<td>NQPACK100SD YQPACK100SD HQPACK100SD YQSOCKET100SD YGUIDE</td>
<td>SC-100SD (flexible cable) SWEX-100SD-1 (coaxial cable)</td>
<td>IE-70000-PCI-IF-A</td>
<td>IE-70000-MC-PS-B</td>
</tr>
<tr>
<td>NB85E (2.5 V)</td>
<td>IE-V850E-MC-EM1</td>
<td>SC-260AXK (coaxial cable)</td>
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<tr>
<td>NB85E (3.3 V)</td>
<td>IE-V850E-MC-EM1</td>
<td>SC-260AXK (coaxial cable)</td>
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</tbody>
</table>

**Notes 1.** Type without target socket guides
In the case of the type with guides, remove the N from the end of the order number.

**2.** NQPACK100SD, YQPACK100SD, HQPACK100SD, and YGUIDE are included.

**3.** For connection to the UDL board, use 2529-1357-50-1902 (manufactured by Sumitomo 3M, Ltd.) (included with the product).

**4.** For connection to the UDL board, use XH3A-0141-A (manufactured by Omron Corporation) (included with the product).

Manufactured by Tokyo EleTech
Inquiries to: Daimaru Kogyo, Ltd. Tokyo Electronics Department (Tel: 81-3-3820-7112) Application Corporation (Tel: 81-42-732-1377)

Manufactured by Naito Densei Machida Mfg. Co., Ltd.
Inquiries to: Naito Densei Machida Mfg. Co., Ltd. (Tel: 81-45-475-4191)
HARDWARE TOOLS (MC EMULATOR 2/3)

V850E/MS1, V850E/MS2

1. In-circuit emulator (main unit)
2. Option board
3. Power-supply unit
4. Conversion adapter/conversion socket (included with ②)
5. PC interface cable (included with ①)
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Target Device</th>
<th>In-Circuit Emulator</th>
<th>Conversion Adapter/ Conversion Socket</th>
<th>Extension Probe (Option)</th>
<th>PC Interface Board</th>
<th>Power Supply</th>
</tr>
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<tbody>
<tr>
<td>V850EMS1 (5 V)</td>
<td>IE-703102-EM1</td>
<td>NQPACK144SD</td>
<td>SC-144SDN</td>
<td>IE-70000-PCI1-IF-A</td>
<td>IE-70000-MC-PS-B</td>
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<td>144-pin LQFP</td>
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<td>YQPACK144SD</td>
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<td>Includes AC100 to 240 V power cable</td>
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<td>0.5 mm pitch</td>
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<td>HPACK144SD</td>
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<tr>
<td>V850EMS1 (5 V)</td>
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<td>YSOCKET144SDN</td>
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<td>157-pin FBGA</td>
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<td>YGUIDE</td>
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<td>HPACK144SD</td>
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<td>V850EMS1 (3 V)</td>
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<td>NQPACK144SD</td>
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<td>YQPACK144SD</td>
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<tr>
<td>0.5 mm pitch</td>
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<td>HPACK144SD</td>
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<tr>
<td>V850EMS1 (3 V)</td>
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<td>YSOCKET144SDN</td>
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<tr>
<td>157-pin FBGA</td>
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<td>YGUIDE</td>
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<td>14 x 14 mm</td>
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</tbody>
</table>

*Note* NQPACK100SD, YQPACK100SD, HPACK100SD, and YGUIDE are included.

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**Manufactured by Tokyo Eletech**
Inquiries to: Daimaru Kogyo, Ltd. Tokyo Electronics Department (Tel: 81-3-3820-7112) Application Corporation (Tel: 81-42-732-1377)

**Manufactured by Naito Densei Machida Mfg. Co., Ltd.**
Inquiries to: Naito Densei Machida Mfg. Co., Ltd. (Tel: 81-45-475-4191)
HARDWARE TOOLS (MC EMULATOR 3/3)

V853, V850/SA1, V850/SB1, V850/SB2, V850/SV1, V850/SF1, V850/SC1, V850/SC2, V850/SC3

1. In-circuit emulator (main unit)
2. Option board
3. Power-supply unit
4. Conversion adapter/conversion socket (included with 1 or 2)
5. PC interface cable (included with 1)

<table>
<thead>
<tr>
<th>Target Device</th>
<th>In-Circuit Emulator</th>
<th>Conversion Adapter/Conversion Socket</th>
<th>Extension Probe (Option)</th>
<th>PC Interface Board</th>
<th>Power Supply</th>
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<tbody>
<tr>
<td>V853 100-pin LQFP 0.5 mm pitch</td>
<td>IE-703002-MC Includes PC interface cable, external logic probe, NQPACK100SD, HQPACK100SD, YQPACK100SD, YQSOCKET100SD and YQGUIDE</td>
<td>NQPACK100SD Includes NQPACK100SD</td>
<td>SC-100SDN (flexible cable) SWEX-100SD-1 (coaxial cable)</td>
<td>IE-70000-CD-IF-A IE-70000-PCI-IF-A</td>
<td>IE-70000-MC-PS-B Includes AC100 to 240 V power cable</td>
</tr>
<tr>
<td>Target Device</td>
<td>In-Circuit Emulator</td>
<td>Conversion Adapter/Conversion Socket</td>
<td>Extension Probe (Option)</td>
<td>PC Interface Board</td>
<td>Power Supply</td>
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<td>V850/SC1, V850/SC2, V850/SC3, 144-pin LQFP 14 x 14 mm 0.5 mm pitch</td>
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<td>IE-703079-MC-EM1</td>
<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
<td>SWEX-100SD-1 (coaxial cable)</td>
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<td>V850/SV1 IE-703040-MC-EM1 NQPACK176SD SWEX-176SD-1</td>
<td>IE-703037-MC-EM1</td>
<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
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<td>IE-703037-MC-EM1</td>
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<td>V850/SB1, SB2 100-pin LQFP 0.5 mm pitch</td>
<td>IE-703017-MC-EM1</td>
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<td>IE-703017-MC-EM1</td>
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<td>V850/SA1 121-pin FPBGA</td>
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<td>SC-100SDB (flexible cable)</td>
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<tr>
<td>V850/SB1, SB2 100-pin LQFP 0.5 mm pitch</td>
<td>IE-703002-MC</td>
<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
<td>SC-100SDB (flexible cable)</td>
<td>SC-100SDB (flexible cable)</td>
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</tr>
<tr>
<td>V850/SF1 100-pin QFP 0.5 mm pitch</td>
<td>IE-703002-MC</td>
<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
<td>SC-100SDB (flexible cable)</td>
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<tr>
<td>V850/SF1 100-pin QFP 0.5 mm pitch</td>
<td>IE-703002-MC</td>
<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
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<td>V850/SV1 180-pin FBGA</td>
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<td>V850/SV1 176-pin LQFP 0.5 mm pitch</td>
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<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
<td>SC-100SDB (flexible cable)</td>
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<tr>
<td>V850/SV1 176-pin LQFP 0.5 mm pitch</td>
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<td>NQPACK100SD, YQPACK100SD, HQPACK100SD, YQSOCKET100SD, YQGUIDE</td>
<td>SC-100SDB (flexible cable)</td>
<td>SC-100SDB (flexible cable)</td>
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</tr>
</tbody>
</table>

**Notes**

1. The following conversion sockets are included.
   - NQPACK100RB, YQPACK100RB, HQPACK100RB, YQGUIDE

2. Type without target socket guides
   - In the case of the type with guides, remove the N from the end of the order number.

- Manufactured by Tokyo Eletech
- Inquiries to: Daimaru Kogyo, Ltd. Tokyo Electronics Department (Tel: 81-3-3820-7112) Application Corporation (Tel: 81-42-732-1377)
HARDWARE TOOLS (MINICUBE)


1. On-chip debug emulator (MINICUBE)
2. OCD cable (Supplied with 1)
3. USB interface cable (Supplied with 1)
4. KEL adapter (Supplied with 1)
5. KEL connector (Supplied with 1)

<table>
<thead>
<tr>
<th>On-Chip Debug Emulator</th>
<th>OCD Cable</th>
<th>USB Cable</th>
<th>Adapter</th>
<th>Target Connector for OCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>QB-V850MINI Supplied with QB-V850MINI</td>
<td>Supplied with QB-V850MINI</td>
<td></td>
<td>B-136 (Supplied with QB-V850MINI)</td>
<td>8830E-026-170S (26-pin KEL connector straight version)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Supplied with QB-V850MINI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B-137 (Straight version)</td>
<td>8830E-026-170L (26-pin KEL connector right-angle version)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B-137A (Right-angle version)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B-140 (One XF2E-1515-1 supplied)</td>
<td></td>
</tr>
<tr>
<td>SICA202P (One SICA2P20S supplied)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnecessary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remark A debugger (ID850QB) is supplied with IE-V850E1-CD-NW.

Manufactured by Lightwell
Inquiries to: Lightwell Co., Ltd. (Tel: 81-3-3392-3331)
Manufactured by KEL
Inquiries to: KEL Corporation (Tel: 81-42-374-5800)
Manufactured by Tyco Electronics AMP K.K.
Inquiries to: Tyco Electronics AMP K.K. (Tel: 81-44-844-8013)
Manufactured by OMRON Corporation
Inquiries to: OMRON Corporation (URL: http://www.omron.com/)
Manufactured by Tokyo Eletech
Inquiries to: Daimaru Kogyo, Ltd. Tokyo Electronics Department (Tel: 81-3-3820-7112)
Application Corporation (Tel: 81-42-732-1377)
Manufactured by HIROSE ELECTRIC CO., LTD.
Inquiries to: HIROSE ELECTRIC CO., LTD. (URL: http://www.hirose.com/index.html)
HARDWARE TOOLS (N-WIRE EMULATOR)

NB85ET, NU85ET

1. N-Wire emulator
   IE-70000-MC-NW-A
2. Power supply unit
   IE-70000-MC-PS-B
3. N-Wire connector (manufactured by KEL Corporation)
   8830E-026-170S: Straight type
   8830E-026-170L: Right-angle type
4. ROM probe
   EP-16000C: For 278000/2716000-type ROM
   EP-16384C: For 274096-type ROM
5. Target system
6. PC interface cable (included with 1)
HARDWARE TOOLS (FLASH MEMORY PROGRAMMER)

PG-FP4

1. Flash memory programmer (PG-FP4)
2. Target system
3. Power supply unit
4. Host machine interface (USB)
5. To host machine

Remarks

1. Install the control software of the PG-FP4 and the parameter file of the target device in the host machine.
   - PG-FP4 control software: Included with PG-FP4
   - Parameter file: Available via development tools download service (see the URL below)
     http://www.necel.com/micro/index_e.html

2. On-board programming can also be performed on the target system as well as using the program adapter.
<table>
<thead>
<tr>
<th>Product</th>
<th>Target Device</th>
<th>Order Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash programmer</td>
<td>All products (except V852)</td>
<td>PG-FP4, FL-PR4</td>
<td>Flash memory programmer</td>
</tr>
<tr>
<td>Program adapter</td>
<td>V850/SA1 (121-pin FBGA)</td>
<td>FA-121FPBGA</td>
<td>Flash program adapter for 121-pin FBGA (121S1-YJC)</td>
</tr>
<tr>
<td></td>
<td>V853 (121-pin FBGA)</td>
<td>FA-121F1-EA6-A</td>
<td>Flash program adapter for 121-pin FBGA (121F1-EA6)</td>
</tr>
<tr>
<td></td>
<td>V850/E/MS1 (157-pin FBGA)</td>
<td>FA-157FPBGA</td>
<td>Flash program adapter for 157-pin FBGA (157F1-FA1)</td>
</tr>
<tr>
<td></td>
<td>V850/E/MA1 (161-pin FBGA)</td>
<td>FA-161F1-EN4-A</td>
<td>Flash program adapter for 161-pin FBGA (161F1-EN4)</td>
</tr>
<tr>
<td></td>
<td>V853, V850/SA1, V850/E/IA2, V850/SB1, V850/SB2, V850/SF1, V850/ES/KG1, V850/ES/KG1+, V850/ES/SG2, V850/ES/PM1, V850/E/IA4, µP70F3229F, V850/ES/FG2 (100-pin LQFP)</td>
<td>FA-100GC-8EU-A</td>
<td>Flash program adapter for 100-pin LQFP (100GC-8EU, 100GC-8EA)</td>
</tr>
<tr>
<td></td>
<td>V850/SC1, V850/SC2, V850/SC3</td>
<td>FA-100GF-3BA-A</td>
<td>Flash program adapter for 100-pin QFP (100GF-3BA, 100GF-JBT)</td>
</tr>
<tr>
<td></td>
<td>V850/SV1 (176-pin LQFP)</td>
<td>FA-176GM-UEU</td>
<td>Flash program adapter for 176-pin LQFP (176GM-UEU)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SA2 (100-pin TQFP)</td>
<td>FA-100GC-YEU-A</td>
<td>Flash program adapter for 100-pin TQFP (100GC-YEU)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SA3 (121-pin FBGA)</td>
<td>FA-121F1-EA6-A</td>
<td>121-pin FBGA (121F1-EA6) program adapter with connector for single-power-supply flash memory</td>
</tr>
<tr>
<td></td>
<td>V850/ES/KF1, V850/E/IA3 (80-pin QFP)</td>
<td>FA-80GC-BBT-A</td>
<td>Flash program adapter for 80-pin QFP (80GC-BBT)</td>
</tr>
<tr>
<td></td>
<td>V850/ES/KF1, V850/ES/KF1+, V850/ES/FF2 (80-pin TQFP)</td>
<td>FA-80GK-9EU-A</td>
<td>Flash program adapter for 80-pin TQFP (80GK-9EU)</td>
</tr>
<tr>
<td></td>
<td>V850/E/KJ1 (144-pin LQFP)</td>
<td>FA-144GJ-UEN-A</td>
<td>Flash program adapter for 144-pin LQFP (144GJ-UEN)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SV2 (257-pin FBGA)</td>
<td>FA-257F1-FA5-A</td>
<td>Flash program adapter for 257-pin FBGA (257F1-FA5)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SV1 (257-pin FBGA)</td>
<td>FA-257F1-FA5-A</td>
<td>Flash program adapter for 257-pin FBGA (257F1-FA5)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SV1 (257-pin FBGA)</td>
<td>FA-64GB-8EU-A</td>
<td>Flash program adapter for 64-pin QFP (64GB-8EU, 64GB-YEU)</td>
</tr>
<tr>
<td></td>
<td>V850/E/SV1 (257-pin FBGA)</td>
<td>FA-64GK-9ET-A</td>
<td>Flash program adapter for 64-pin TQFP (64GK-9ET)</td>
</tr>
</tbody>
</table>

Manufactured by Naito Densei Machida Mfg. Co., Ltd.
Inquiries to: Naito Densei Machida Mfg. Co., Ltd. (Tel: 81-45-475-4191)
HARDWARE TOOLS (COMMON INTERFACE)

**Desktop PC**

- **Interface module**
  - IE-70000-PCI-IF-A: For IBM PC/AT-compatible PCI bus (including PC98-NX series)

- **Software tools**
  - Real-time OS: SXX17RX703000, SXX17RX703100
  - Software package: SXX17SP850

The interface cable is included with the in-circuit emulator.

Refer to the device-dependent section.

**Notebook PC**

- **Interface module**
  - IE-70000-CD-IF-A: For PCMCIA socket

- **Software tools**
  - Real-time OS: SXX17RX703000, SXX17RX703100
  - Software package: SXX17SP850

The interface cable is included with the module.

Refer to the device-dependent section.
PARTNERS

NEC Electronics works together with partners who provide various types of development tools for the V850 Series to support our customers' system building requirements. By passing on to these partners the hardware and software information we develop, they can tailor product development to our customers' needs.

<table>
<thead>
<tr>
<th>PARTNERS</th>
</tr>
</thead>
</table>
| **Nucleus Plus**  
**[Manufacturer/Marketer]** Accelerated Technology Mentor Graphics Division of Mentor Graphics Japan Co., Ltd.  
**[Features]**  
- A real-time operating system with a proven track record throughout the world. Includes source code, making royalties unnecessary.  
- Scalable: From 4 KB to 45 KB depending on which functions are required  
- Descriptions in ANSI C  
- Short interrupt latency  
- Expandable: New service calls can be prepared by combining existing service calls  
- Configurable: Unused service calls can easily be excluded  
- Dynamic creation of all Nucleus PLUS resources  
- Intertask communication: Mailboxes, queues, pipes, task synchronization, counting semaphores, events, UNIX-like signal handler  
- One-shot timer and multiple-shot timer  
- Memory management: Support of fixed length and variable length (malloc)  
- Nucleus PLUS components can be allocated to any memory area  
- Advanced Interrupt Management Mechanism (AIMM) |
| **ThreadX/ThreadX µITRON**  
**[Manufacturer]** Express Logic, Inc.  
**[Marketer]** Grape Systems Inc.  
**[Features]**  
- Supplies ANSI C source code without royalties  
- Compact code size (4 KB min.)  
- Usable as OS conforming to µITRON  
- Easy integration and development with Green Hills MULTI (kernel-aware debug function)  
- High-speed response (2.9 µs, context switch@33 MHz)  
- Easy-to-understand API and flexible memory configuration  
- Quick technical support in Japanese  
- Wealth of middleware (such as FileX, NetX, and PegX)  
- NetX is supplied with high-end protocol of TCP/IP (such as DHCP, FTP, HTTP, PPP, Telnet, SNMP v1/v2/v3, TFTP, DNS, IGMP, and ICMP) |
| **TOPPERS-Pro**  
**[Manufacturer]** Al Corporation  
**[Features]**  
- Conforms to µITRON V4.  
- Dynamic loading of remote link loader method  
- TCP/IP protocol stack and file system integrated |
| **NORTi Professional**  
**[Manufacturer/Marketer]** MiSPO Co., Ltd.  
**[Features]**  
- Compiles with both µITRON 4.0 and 3.0 specifications, enables mixing of new and old system calls  
- Full-fledged TCP/IP protocol stack is a standard-equipped feature  
- Simple, royalty-free licensing similar to compiler  
- Provides various protocols, file systems, and wireless LAN drivers |
| **ProtoBuilder**  
**[Manufacturer/Marketer]** GAIO TECHNOLOGY CO., LTD.  
**[Features]**  
- Easy-to-operate product specification creation tool that does not require programming skill  
- Smooths communication between specification creator and software developer, so that "going back" of development because of insufficient specification can be eliminated  
- Automatically creates specification based on status transition from a prototype model created.  
- Read-only tool that can be distributed to other departments, cooperative companies, and foreign branch offices |
**Prototype Model Design Tools, Test Tools (2/2)**

**TestRT**  
*Manufacturer/Marketer* IBM Japan, Ltd.  
*Features*  
- Integrated dynamic test tool  
  ◆ This is an optimum test tool for customers with strict test requirements such as in the aerospace, military, and automotive fields.  
  ◆ Supports all test processes from unit testing to system testing, displaying application execution results as sequence diagrams that include time stamps. Also simultaneously displays test-related information including high-level coverage/memory error/bottleneck measuring and detection.  
  ◆ Realizes linkage with IBM's configuration/fault management tools and other companies' products (MATLAB, Simulink, CodeComposerStudio).  
  ◆ A dedicated editor for easy customization of target and compilation environments is included as standard.

**Compilers, Assemblers, Integrated Development Environments (1/2)**

<table>
<thead>
<tr>
<th>IAR Embedded Workbench (EW)</th>
<th>code</th>
<th>lab Debug</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Manufacturer</em></td>
<td>IAR Systems AB</td>
<td>Accelerated Technology</td>
</tr>
<tr>
<td><em>Marketer</em></td>
<td>IAR Systems Company</td>
<td></td>
</tr>
<tr>
<td><em>Features</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 1 in Europe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industry’s top-level compiler that generates compact code</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Many include files that can be used immediately, various templates, and sample files supplied as standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supports various RTOSs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XASS-V Series</th>
<th>code</th>
<th>lab EDE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Manufacturer/Marketer</em></td>
<td>GAIO TECHNOLOGY CO., LTD.</td>
<td>Accelerated Technology</td>
</tr>
<tr>
<td><em>Features</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplies seamless integrated development environment</td>
<td>Complete embedded development environment that speeds up development, compilation, building, and debugging</td>
</tr>
<tr>
<td></td>
<td>Easy modifying and building program and starting debugger with editor, compiler, and assembler under management of integrated development environment</td>
<td>Microsoft® Visual Studio™</td>
</tr>
<tr>
<td></td>
<td>Low-cost monthly rental available</td>
<td>System construction possible using any commercially available tools</td>
</tr>
<tr>
<td></td>
<td>Supports in-circuit emulators and RTOSs of many manufacturers</td>
<td>Error display in window for quick editing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZIPC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Manufacturer/Marketer</em></td>
<td>Cats, Inc.</td>
</tr>
<tr>
<td><em>Features</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Japan’s first CASE tool for embedded system development, using status transition table designing technique</td>
</tr>
<tr>
<td></td>
<td>Designing with status transition table and dynamic verification at design (model) level. Improves productivity and product quality by early discovery and solution of problems in upstream process</td>
</tr>
<tr>
<td></td>
<td>Dynamic verification at design (model) level including operation of RX850</td>
</tr>
<tr>
<td></td>
<td>Automatic generation of ANSI C codes that can operate in accordance with design (model) that was proved to be &quot;correct&quot; by dynamic verification</td>
</tr>
<tr>
<td></td>
<td>Debugging while checking both the target code and design (model) through coordination with ID850 and SM850</td>
</tr>
<tr>
<td></td>
<td>Model-based dynamic verification log can be used as a test script of automatic verification system &quot;XO850&quot;.</td>
</tr>
</tbody>
</table>
Compilers, Assemblers, Integrated Development Environments (2/2)

IDE MULTI

TimeMachine

C++/EC++/C cross compiler

[Marketer] Advanced Data Controls Corporation

[Features]

MULTI

◆ Based on integrated GUI, GHS’s MULTI provides a high-performance, easy-to-use integrated development environment. It provides total support from programming to debugging and maintaining, helping shorten the development period and improve the performance and quality of the application program.

TimeMachine

◆ By reversely executing a program based on trace data, complicated problems of real-time interferences with the application are made clear.

◆ Realizes execution analysis, such as profile, without extra codes for measurement.

Compiler

◆ Conforms to ANSI/ISO9899.

◆ Also supports Japanese Automotive C and MISRA-C.

◆ Optimization can be set in function units, such as loop optimization and in-line optimization, as well as specification by purpose, such as emphasizing speed and size.

◆ Can generate more efficient codes by expanding the bit manipulation instructions of the V850.

exeGCC

[Manufacturer] Kyoto Microcomputer Corporation
[Target devices] V850E1 core, V850E2 core, NU85E core, V850ES/ST2

[Features]

◆ Supports GNU C version 3.0.

◆ Supports C++.

Also supplies EC++ library suitable for embedding.

◆ Porting optimized for Windows environment

By optimizing and porting GNU C/C++ that runs in UNIX environment to Win32 of Windows, short compile time is realized and environment setting by GUI is provided.

◆ Original embedded library

Develops new total library including a library conforming to ANSI C and a floating-point emulator library and supplies high operation performances.

◆ Supports Japanese.

Comments and character strings in Japanese can be used.

GNUPro™

[Manufacturer] Red Hat, Inc.
[Marketer] Red Hat, Inc.

[Features]

◆ Package including GNU assembler (gas), C/C++ compiler (gcc/g++), debugger (gdb), simulator and other utilities

◆ GNUPro is provided in accordance with the GNU General Public License (GPL).

◆ Supports available for GNU Pro for remuneration

Middleware (1/6)

IAR visualSTATE (graphical design tool)

[Manufacturer] Sweden IAR Systems AB
[Marketer] IAR Systems Company
[Target devices] All devices (no device dependency)

[Features]

Development tool that dramatically improves productivity, reliability, and maintainability of embedded software with the following functions

◆ Graphical design tool

◆ Prototyping tool

◆ Automatic/manual test tool

◆ C/C++ code generation

◆ Graphical debugging with actual target

◆ Automatic document creation
Middleware (2/6)

NetFront™, Compact NetFront®, JV-Lite®2
[Manufacturer/Marketer] ACCESS Co., Ltd.
[Features]
NetFront
◆ Internet module set including embedded web browsers such as for
TVs and PDAs, Internet mail, TCP/IP modules, and a variety of drivers
◆ The browser includes a 300 KB kernel, complies with HTML 3.2, and
provides support for frames. Parts of HTML 4.0 are also supported
◆ TCP/IP protocol stack AVE-TCPv6.0 for IPv6 is included as standard.
Compact NetFront
◆ HTML browser optimized for mobile devices with small monochrome
liquid crystal displays such as cellular phones, PHS, PDAs, and pagers
◆ HTML 4.0 subset functions are available with 150 KB of RAM and 300
KB of ROM
JV-Lite2
◆ Java VM (Virtual Machine) for embedded systems. Entirely compatible
with Embedded Java™, Personal Java™ and J2ME CLDC1.0 + Profiles
◆ The virtual machine and class library are ROMable and available with
500 KB of ROM and 500 KB of RAM
◆ Can be provided as a plug-in of the Net Front browser or as a discrete
JV-Lite2 unit

Nucleus WebServ
[Manufacturer/Marketer] Accelerated Technology
Mentor Graphics Division of Mentor Graphics Japan Co., Ltd.
[Features]
◆ Fully functional server in a tiny package
◆ HTTP 1.0/1.1 Support
◆ Dynamic Web page content (Allows Monitoring)
◆ Forms support (Allows Configuration)
◆ Content Independent (Supports Java Applets, Images, etc.)
◆ CGI (plug-in) support
◆ Server side include support (SSI)
◆ File upload (online document update)
◆ Flexible page storage (in memory or on disk)
◆ Supports multiple concurrent requests
◆ Basic authentication
◆ DES authentication
◆ Document compression

JAVA platform for embedded computing JBlend™
[Manufacturer/Marketer] Aplix Corporation
eSol Co., Ltd.
[Features]
◆ Java execution environment optimized for embedded application
◆ Practical performance with fewer resources
◆ Supports Java specifications (profile/extension) based on JavaME.
◆ Quickly supports new Java specification and manufacturer’s original
specification by sophisticated modularization and standardization.
◆ Existing software resources can be used as is, so that mounting on the
OS/CPU you use is possible.
◆ Plans to participate in “platformOVIA” partner program (as of July 2005).

Nucleus FILE
[Manufacturer/Marketer] Accelerated Technology
Mentor Graphics Division of Mentor Graphics Japan Co., Ltd.
[Features]
◆ FAT12/16/32 support including long file name handling
◆ Royalties unnecessary as C source code is included
◆ Reentrant file access
◆ ROM programming supported
◆ Support of multiple floppy discs and fixed discs
◆ File system format functions provided
◆ RAM disc driver provided free of charge
◆ Transparent CPU byte allocation
◆ Simple device driver interface
◆ Nucleus PLUS integration complete

Nucleus NET
[Manufacturer/Marketer] Accelerated Technology
Mentor Graphics Division of Mentor Graphics Japan Co., Ltd.
[Features]
◆ Fully functional TCP/IP protocol stack
◆ Source code provided, no royalties
◆ Optimized for real-time applications
◆ Full integration with Nucleus PLUS for optimal performance
◆ Scalable configurations: IP, IP+UDP, IP+UDP+TCP
◆ Sockets API
◆ Compact (small footprint)
◆ RAW IP, IP Multicasting, IP Forwarding
◆ Ethernet drivers and serial driver templates
◆ PPP available
◆ Reentrant and ROMable
◆ Multiple protocols supported over same network device
◆ First class support and training

Mobile PictDirect (MoPiD™)
[Manufacturer/Marketer] Aplix Corporation
eSol Co., Ltd.
[Features]
◆ Realizes image printing by directly connecting a cellular phone and a
printer.
◆ Conforms to PictBridge standard that has become widespread in the
field of direct printing.
◆ Printer supporting PictBridge can be used regardless of the manufac-
turer and model.
◆ Can also be used from applications for printing.
◆ Requests for porting and customization can also be supported. The
number of development processes can be decreased.
## Embedded software products

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Features</th>
</tr>
</thead>
</table>
| Datalight    |◆ Driver for sector emulation with flash memory as disc drive  
              |◆ File system supporting power failure |
| EBSnet, Inc. |◆ File system compatible with MS-Windows/power failure (Fail-safe function) support function  
              |UPnP SDK  
              |◆ Conforms to UPnP Device Architecture version 1.0. |
| Extended Systems |XTNDAccess Blue SDK  
                |◆ Bluetooth protocol stack/Supporting CAN CCAP for automobile/Supporting many new protocols  
                |XTNDAccess Data Sync SDK  
                |◆ Data synchronization/Conforming to OMA standard |
| Interpeak    |IPNET/IPLITE/IPSec  
              |◆ IPv4/IPv6 dual stack |
| Mimer Information Technology AB |Mimer SQL Mobile  
                                ◆ SQL database engine for embedded system |
| Swell Software, Inc. |PEG  
                        ◆ GUI library for embedded system and GUI development environment |
| AIX Corporation |ImageStar QR/e  
                    ◆ Image processing & decoding of QR code (model 2) symbol |
| AIX Corporation |Resizeable  
                    ◆ Scalable font engine for embedded system/Japanese Rodan (gothic) supplied  
                    ◆ Control driver of SD memory card and SDIO card having SD expansion function  
                    ◆ Control driver of various flash media |
| AIX Corporation |ImageStar QR/e  
                    ◆ Image processing & decoding of QR code (model 2) symbol |

## Cantata++

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Features</th>
</tr>
</thead>
</table>
| Information Processing Ltd., England |Cantata++ is a standalone, combined test support tool.  
                                         ◆ Standalone, combined test: Supporting host environment and target environment  
                                         ◆ Test coverage analysis: Statement, branch, MC/DC, entry point, call return metric  
                                         ◆ GUI: Graphical analysis of test result and test creation with wizard  
                                         ◆ Wrap, stub function: Simulating and controlling behavior of external functions |

## Grousenet UPnP

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Features</th>
</tr>
</thead>
</table>
| SEC Corporation |Conforming to UPnP Device Architecture Version 1.0  
                    ◆ Addressing, discovery, description, control, event, and presentation functions  
                    ◆ Supports µTRON as OS.  
                    ◆ Debug function  
                    ◆ Sample application also in package  
                    ◆ Source code supplied |

## KASAGO TCP/IP (IPv4)-based development kit

<table>
<thead>
<tr>
<th>Manufacturer/Marketer</th>
<th>Features</th>
</tr>
</thead>
</table>
| Elmic Wescom, Inc. |High-speed TCP/IP protocol stack dedicated to embedded applications  
                        ◆ Support of ZERO Copy function  
                        ◆ Compact code size of about 100 KB  
                        ◆ Independent of CPU, OS, and compiler  
                        ◆ Supplied in source code conforming to ANSI C  
                        ◆ BSD4.4.socket I/F supported  
                        ◆ Wealth of optional software products such as PPP, SNMP, HTTPD, POP3&SMTP, and SIP |

## KASAGO IPv6 (IPv4/IPv6 Dual)-based development kit

<table>
<thead>
<tr>
<th>Manufacturer/Marketer</th>
<th>Features</th>
</tr>
</thead>
</table>
| Elmic Wescom, Inc. |High-speed TCP/IP protocol stack supporting IPv6 and dedicated to embedded applications  
                        ◆ IPv6 Ready Logo Phase-2 approved  
                        ◆ Support of ZERO Copy function  
                        ◆ Compact code size of about 150 KB (IPv4/IPv6 Dual)  
                        ◆ Independent of CPU, OS, and compiler  
                        ◆ Supplied in source code conforming to ANSI C  
                        ◆ Many optional software products such as IPsec, SNMP, HTTPD, POP3&SMTP, and SIP |
Middleware (4/6)

Coverage master winAMS
[Manufacturer/Marketer] GAIO TECHNOLOGY CO., LTD.
[Features]
◆ Environment automating single module (function) test of software
◆ Comprehensively executes single test to improve module quality.
◆ Automatically executes and judges I/O test of any module.
◆ Automatic coverage test for obtaining quantitative data of coverage rate of module test

CasePlayer2
[Manufacturer/Marketer] GAIO TECHNOLOGY CO., LTD.
[Features]
◆ Analyzes source code in C and assembler to automatically create various documents such as flowcharts and variable lists.
◆ Visualizes information of source code to accurately analyze existing software resources in a short time.
◆ Can also clarify source code review in a short time.

Middleware series for embedded application (GRAPEWARE)
[Manufacturer/Marketer] Grape Systems Inc.
[Features]
GR-USB series
◆ USB protocol stack for embedded applications
◆ Supplies royalty-free ANSI C source code.
◆ Supporting various real-time OSs, such as µTRON, NORTI, and ThreadX
◆ GR-USB/HOST, GR-USB/HOST II (host protocol stack)
◆ GR-USB/OTG (On-The-Go specification protocol stack)
◆ GR-USB/DEVICE (device protocol stack)
◆ GR-USB/FILE (USB mass storage integrated kit)
◆ Many class drivers
◆ New porting and development upon request possible

GR-FILE
◆ FAT file system for embedded application (supporting FAT 12/16/32)
◆ Supplies royalty-free ANSI C source code.
◆ Supplies standard I/O interface in C compatible with POSIX.
◆ Consecutive direct I/O or cache method can be selected in accordance with file characteristics
◆ Designing independent of OS
◆ Function to set format/partition of file system
◆ Supplies sample format code dedicated to SD cards
◆ Supporting long file names and Shift JIS file names
◆ Supporting simultaneous multi-task accesses
◆ Supporting illegal plugging in and out of media
### Cente middleware series

**[Manufacturer/Marketer]** Data Technology Co., Ltd.  
**[Features]**  
- Middleware package for µTRON kernel  
- Supplies 100% source code without project license and royalties.  
- Flexible technical service (porting customization)  
- Common modules available (ckernel, shell, zlib, crypto, Cente)  
- CenteIPv6  
- IPv4/IPv6 dual stack  
- Expands API of ITRON TCP/IP specification to IPv6.  
- CenteIPSec  
- USable in both IPv4/IPv6 environments  
- Encryption algorithm: NULL, DES-CBC, 3DES-CBC, AES (RIJNDAEL)  
- Authentication algorithm: MD5, SHA-1  
- CenteTCP/IPv4  
- API of ITRON TCP/IP specification and original DD (DeviceDriverInterface)  
- Cente HTTPd/c  
- Both WEB server and client available  
- Conforms to HTTP 1.0/1.1 (supported method: GET/HEAD/POST)  
- Cente PPP  
- Supporting authentication of PAP/CHAP/MS-CHAPv2  
- Supporting IP address setting with IPCP  
- Cente SNMP  
- MIB, MIB-II provided as standard  
- Original MIB can be defined.  
- Cente SSL  
- SSL library usable with CenteTCP/IPv4, CenteIPv6  
- Cente 802.11g PRISM  
- Supporting PRISM chip set  
- Cente 802.11b PRISM  
- Supporting PRISM2.0/2.5/3.0 chip set  
- Cente USB 1.1 Device  
- Transfer method: Control transfer/bulk transfer supported  
- USB device driver sample for Windows supplied  
- Cente Filesystem  
- Protects recording data from power failure as much as possible.  
- Supporting FAT12/16/32, VFAT, and hierarchical directory  
- Cente SD Card Driver  
- Can organize/read/write FAT file system to SD memory card via SD memory card controller LSI.  
- Fully supports SD memory card control commands.  
- Cente SmartMedia Driver  
- Conforms to SSFDC forum specifications and can organize/read/write FAT file system to commercially available SmartMedia.  
- Supports SmartMedia standard control function commands.  
- Cente NANDFLASH Driver  
- Can organize/read/write FAT file system to on-board NANDEEPROM.  

### matrixQUEST series

**[Manufacturer/Marketer]** TEPCO UQUEST, LTD.  
**[Features]**  
- matrixUSB (USB host driver)  
- Supports high-speed operation and OTG  
- Supports various controllers and classes  
- matrixDPS (PicBridge software)  
- Provided for printers and digital cameras respectively  
- Tested for logo recognition via supplied sample application  
- Emulation function enables development of applications without actual devices  
- matrixNET (TCP/IP dual stack)  
- Full scratch IPv4/IPv6 dual stack  
- IPv4/IPv6/ICMP/ICMPv6 is provided as standard  
- matrixWLAN (wireless LAN driver)  
- Supports Conexant’s PRISM2/3 and Atheros’s AR500x chips  
- Supports WPA  
- Can be provided with matrixNET  
- matrixFS (various file systems)  
- Products that supports FAT12/16/32, VFAT, ISO9660, and UDF file systems are provided  
- Supports Japanese file names  
- Provides cache library common to various file systems  
- Supports Japanese file names  
- Provides cache library common to various file systems  
- matrixXML/XHTML Browser  
- Compact browser for viewing XHTML Basic content  
- Lightweight and fast by using SAX Parser and minimum required CSS Parser (Level 1 subset)  
- Can be combined with matrixNET and matrixFS  

### EmbeddedWare series

**[Manufacturer/Marketer]** Nissin Systems, Co., Ltd.  
**[Manufacturer]** Pocket Soft, Inc.  
**[Marketer]** MONET  
**[Features]**  
- USNetPlus (super small embedded TCP/IP stack)  
- USFilesPlus (super small embedded FAT file system)  
- EW-SSL (super small embedded SSL)  
- EW-SSH (super small embedded SSH)  
- EW-RTPatch (differential upgrading)  

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**PARTNERS**
### Middleware (6/6)

**CANopen Master source code**  
**CANopen Slave source code**  
**[Marketer]** Vector Informatik GmbH  
Vector Japan Co., Ltd.  
**[Target devices]** V850ES  
**[Features]**  
◆ Protocol stack widely employed in Europe, especially in Germany where CANopen was originated  
◆ Embedded source code for developing CANopen Master or slave device  
◆ Operation confirmed, including driver for on-chip CAN controller of V850  
◆ Can be customized by user in accordance with user device specifications.  
◆ Development efficiency can be further enhanced by also using development support tools such as CANerator and CANoe.

**SYSTEM COMPONENT for ECHONET**  
**[Manufacturer/Marketer]** YASUKAWA INFORMATION SYSTEMS Corporation  
**[Features]**  
◆ Easily realizes Echonet (home network) system development.  
◆ Can freely combine various components of Echonet middleware layer.  
◆ Lightweight suitable for embedded system  
◆ Can also support application development for various Echonet systems.

### Flash Memory Programmer (1/2)

**Stick Writer SW-850SX2**  
**[Manufacturer/Marketer]** Application Corporation  
**[Target devices]** V850/SG2  
**[Features]**  
◆ Compact size directly connectable to USB connector  
◆ No external power supply needed  
◆ Operable with only target power supply  
◆ Operable with USB bus power  
◆ Operable in standalone mode  
◆ Easy operation guided by Japanese messages  
◆ Error log storage function helping you to analyze write errors

**Flash Gang Forward FL-G01**  
**[Manufacturer]** Hong Kong Forward Electric Co., Ltd.  
**[Marketer]** Application Corporation  
**[Target devices]** V850/SA1, V850/SB1, V850/SF1, V850E/MA1, V850E/MA3, V850ES/KG1  
**[Features]**  
◆ USB (V1.1) supported as host machine interface  
◆ Can also operate in standalone mode by using compact flash.  
◆ Up to eight programs can be written simultaneously (eight optional adapter boards are necessary).  
◆ Low price

**Programming system Y1000-8**  
**[Manufacturer/Marketer]** Wave Technology Co., Ltd.  
**[Target devices]** V850E/MA1, V850/SA1, V850/SB1 (70F3032A, 70F3033A), V850/SB2 (70F3035A, 70F3037A), V850E/IA1 (70F3116)  
**[Features]**  
◆ Gang programmer enabling simultaneous programming and verification of up to 8 devices  
◆ Enables reading of master data directly from floppy disk to internal memory  
◆ Data dump display and editing functions  
◆ Master data storable on internal hard disk  
◆ Emphasizes simple and effortless operation via touch panel and workability via PASS/FAIL display, checksum display, and task count display supporting sockets
Flash Memory Programmer (2/2)

FlashPRO IV FL-PR4
[Features]
◆ Supports programming of all NEC Electronics microcontrollers with on-chip flash memory
◆ USB support via host machine interface
◆ LCD panel allows checking of programmer setting information, error messages, checksum values, etc., even when used as a standalone unit.
◆ Device-specific information required for programming can be freely set using parameter files.
◆ On-board programming and programming via a program adapter are possible.
◆ Portable A5 size
◆ Easily operable both as a standalone unit or on Windows 95/98/Me/2000/XP and Windows NT 4.0 by using dedicated application (FlashPro4)

NET IMPRESS series
[Manufacturer/Marketer] Yokogawa Digital Computer Corporation
[Target devices] V850E/IA1 (μPD70F3116), V850/SB1 (μPD70F3030B, μPD70F3032A, μPD70F3032B, μPD70F3033, μPD70F3033A, μPD70F3033B), V850/SB2 (μPD70F3037A), V850/SA1 (μPD70F3017A), V850/SC3 (μPD70F3038Y), V853 (μPD70F3003A, μPD70F3025A), V850ES/M1 (μPD70F3102A), V850ES/MA1 (μPD70F3107), V850ES/IA2 (μPD70F3114), V850ES/KF1 (μPD70F3210), V850ES/SA2 (μPD70F3201), V850ES/SA3 (μPD70F3204), V850ES/SG2 (μPD70F3263, μPD70F3271, μPD70F3273, μPD70F3281, μPD70F3283), V850ES/SJ2 (μPD70F3264, μPD70F3266, μPD70F3274, μPD70F3276, μPD70F3284, μPD70F3286, μPD70F3288), V850ES/FE2 (μPD70F3231), V850ES/FF2 (μPD70F3232, μPD70F3233), V850ES/FG2 (μPD70F3234, μPD70F3235, μPD70F3236), V850ES/FJ2 (μPD70F3237, μPD70F3238, μPD70F3239)
[Features]
◆ Enables programming with various manufacturers’ microcontrollers (various programming specifications) with on-chip flash memory solder-mounted onto the user system
◆ General-purpose keys on one control module
Supports parameter changes for microcontrollers in same series
Supports licensing of definitions from microcontrollers in different series
◆ Able to operate via a host machine or as a stand-alone device
◆ Full lineup of software available as free downloads
◆ Flash programming using CAN interface, widely employed in automobiles, is possible (CarNETIMPRESS).

Emulators (1/5)

TimeMachine, SuperTrece Probe
[Marketer] Advanced Data Controls Corporation
[Target devices] V850E, V850ES
[Features]
TimeMachine
◆ Clarifies complicated problems of real-time interference with applications by reversely executing programs based on trace data.
◆ Realizes execution analysis, such as profiles, without extra codes for measurement.
SuperTrece Probe
◆ Trace buffer of up to 1 GB that can completely collect data with a clock exceeding 300 MHz (however, up to 160 MHz if IECUBE is used)
◆ Can easily realize execution analysis of program subject to several 100 millions or more of trace frames when used with TimeMachine.
* TimeMachine and SuperTrece Probe in V850 environment requires IECUBE supporting options.
### Emulators (2/5)

**PARTNER-Jet**

**[Manufacturer]** Kyoto Microcomputer Corporation  
**[Marketer]** Kyoto Microcomputer Corporation  
Naito Densei Machida Mfg. Co., Ltd.  
Application Corporation  
NEC Micro Systems, Ltd.  

**[Target devices]** V850E/MA1, V850E/MA2,  
NU8SE core (may be added at any time)  

**[Features]**  
- Super high-speed download  
  Via JTAG: With V850E/ME2 connected: 2.8 MB/s, JTCK = 51.344 MHz  
  With ROM emulation probe: 10 MB/s  
- Host interface of all models supports USB 2.0/1.1. Model30 also supports LAN (100Base-TX/10Base-T)  
- High-capacity trace memory (up to 18 Mb, Model30)  
- Supporting high-speed trace clock (200 MHz)  
- Option supporting high-capacity emulation memory (Model20/30)  
  High capacity (4 MB to 64 MB), high access speed: 30 ns  
- Low price  
  From 198,000 yen (207,900 yen, including consumption tax)

**PARTNER-ET II**

**[Manufacturer]** Kyoto Microcomputer Corporation  
**[Marketer]** Kyoto Microcomputer Corporation  
Naito Densei Machida Mfg. Co., Ltd.  
Application Corporation  
NEC Micro Systems, Ltd.  

**[Target devices]** V850 core, processor incorporating V850E core  

**[Features]**  
- Debug tool of ROM in-circuit type enabling debugging with microcontroller without N-Wire function  
- Tracing program executed on emulation memory  
- Super high downloading speed of 4 MB/s  
- Supporting network interface of 100Base-TX/10Base-T  
- Hardware break and profile functions provided  
- Available option of on-chip debugging by N-Wire connection

**UniSTAC II**

**[Manufacturer/Marketer]** Sophia Systems Co., Ltd.  

**[Features]**  
- Supporting N-Wire interface  
- Downloading to flash memory  
- Hardware break settable  
- Software break (without limit) settable  
- Branch trace function (256K steps)  
- Debugger WATCHPOINT supporting C/C++ language supplied as standard  
- Host connection with USB/LAN

**ND-V850ES Series**

**[Manufacturer/Marketer]** Naito Densei Machida Mfg. Co., Ltd.  

**[Target devices]** V850ES/KF1, V850ES/KG1, V850ES/KJ1,  
V850ES/SG2 (under development),  
V850ES/SJ2 (under development)

**[Features]**  
- Low price (sold as a set of hardware + debugger)  
- Simple-connection USB interface  
- High-performance debugger supporting NEC Electronics development environment  
- Realizes manipulatability equivalent to NEC Electronics ID debugger  
- High device equivalence by using NEC Electronics dedicated in-circuit-emulator chipset  
- Provides real-time trace/real-time RAM monitor function  
- Supports NEC Electronics compiler/project manager  
- Space-saving type that can be used lying down or standing up  
- Lineup of low-price, high-flexibility dedicated probes (NP-CX Series: Sold separately)
ND-V850 Series, ND-V850E Series

[Target devices] V850/SB1, V850/SB2, V850/SA1, V850/MA1, V850E/MA1
[Features]
◆ Low price (sold as a set of hardware + debugger)
◆ On-chip host interface (LPT port)
◆ High-performance debugger supporting NEC Electronics development environment
◆ Realizes manipulatability equivalent to NEC Electronics ID debugger
◆ High device equivalence by using NEC Electronics dedicated in-circuit-emulator chipset
◆ Provides real-time trace/real-time RAM monitor function
◆ Supports NEC Electronics compiler/project manager
◆ Space-saving type which can be used lying down or standing up

RTE Series

[Manufacturer] Midas Lab, Co., Ltd.
CORE Corporation
[Features]
RTE-V850x-IE series
Full ICE series of in-circuit type emphasizing reduction in size and weight as dedicated emulator
◆ GHS’s “MULTI” and Midas Lab’s “Partner” can be used as debuggers.
◆ Releases all resources of processor and supports all operation modes.
◆ Provided with emulation memory as standard
◆ Real-time execution and trace
RTE-2000-TP series
New model of ICE of JTAG method that has units of function modules and realizes a high degree of freedom and expandability of component configuration
◆ Equipped with high-speed JTAG circuit (66 MHz min.)
◆ Supporting high-speed N-Trace (333 MHz to 400 MHz)
◆ High-capacity trace memories (36 Mb to 144 Mb)
◆ Many options
  • High-capacity, high-speed emulation memory (35 ns, 64 bits, 128 MB)
  • Emulation memory supporting high-speed synchronous flash
  • Probe supporting 48-bit width N-Trace
  • External bus trace unit (various I/Fs)
  • High-speed download probe (bus connection type)
◆ Low voltage (1.2 V min.)
◆ LAN/USB-IF equipped as standard (100 Mbps/480 Mbps)
◆ Many debuggers usable
  • GHS’s “MULTI”
  • NEC Electronics’ “ID850NW”
  • Midas Lab’s (KMC license) “Partner”
  • Functions supporting MULTI core
### Emulators (4/5)

#### Code Debugger for V850
**Manufacturer/Marketer** BITRAN CORPORATION  
**Target devices** V850E/ME2, V850ES/SG2, V850E/MA3, Nx85ET  
**Features**  
- Low-cost emulator that supports N-Wire interface  
- Enables support using only one code debugger in a CPU or Nx85ET core equipped with the V850E1 or V850ES DCU (Debug Control Unit)  
- Complies with LAN and USB2.0 host interfaces as standard  
- Supports NEC Electronics compilers as well as various compilers made by other manufacturers  
- Supports programming to internal or external flash memory (over 800 models)

#### EMUSE-G II
**Manufacturer** CATS, Inc.  
**Marketer** Midoriya Electric Co., Ltd.  
**Features**  
- Address/data bus monitoring with ROMprobe alone  
- Also usable as logic analyzer  
- High-capacity emulation memory (8 MB)  
- High-speed downloading (about 75 times that of vsEMUSE, 1 MB/5 s)  
- Supporting GHS’s MULTI

#### advicePOCKET
**Manufacturer/Marketer** Yokogawa Digital Computer Corporation  
**Target devices** V850E/ME2, V850E/MA3, V850E2/ME3  
**Features**  
- Easy connection supporting N-Wire interface  
- Power supply-less operation supporting USB Vbus (JTAG model)  
- Branch PC trace/data trace by N-Wire  
- Maximum frequency: 100 MHz (trace model)  
  * Support depends on MPU.  
- Can write external flash memory.  
- Can write on-chip flash memory (V850E/MA3)  
- Debugger: microVIEW-PLUS dedicated to advicePOCKET supplied as standard

#### advice PLUS
**Manufacturer/Marketer** Yokogawa Digital Computer Corporation  
**Target devices** V850ES/KF1, V850ES/KG1, V850ES/KJ1; (Full-ICE)  
NU85ET, NB85ET, NA85E2, V850E/ME2, V850E2/ME3; (OCD tool)  
**Features**  
- Option module support enables selection of only necessary functions  
- Supports large-capacity emulation memory  
- Supports trace analysis function of up to 32K samples  
- Supports a range of measuring functions  
  - Profile measuring, two-point execution time measuring, coverage measuring  
  * Option module used depending on device.  
- Enables writing to external flash memory (OCD tool)  
- Supports N-Wire Interface (OCD tool)  
- Debugger: Supports microVIEW-PLUS
Emulators (5/5)

MJX330, MJX440, SSX850

[Manufacturer/Marketer] ZAX Division, Lightwell Co., Ltd.

[Target devices] V850/SA1, V850/SB1, V850/MA1, V850/MA2, V850/IA1, V850/IA2, V850/ME2, NB85E

[Features]
MJX330 for NB85E
- Card-type JTAG interface debugger
- Lightweight and compact JTAG emulator of PC card type with excellent portability
- JTAG emulator with high cost effectiveness, reducing cost while supporting JTAG debug function
- Supports integrated development environment MULTI of Green Hills Software.
- Writing to external general-purpose flash is supported.
- High-speed downloading (440 KB/s max.)

MJX440 for V850/ME2
- High-performance JTAG interface debugger
- Supported devices: V850/ME2, NB85E
- High-speed download: 440 KB/s
- Conforms to GHS integrated development environment MULTI
- ROM emulation function
- Real-time trace function
- Supports PC operating on Windows 98/ME, Windows NT 4.0/2000, and Windows XP

SSX850 Series
- Low-cost V850 in-circuit emulator
- Supported devices: V850/SA1, V850/SB1, V850/MA1, V850/MA2, V850/IA1, V850/IA2
- Conforms to GHS integrated development environment MULTI
- Real-time trace function
- On-chip flash memory programmer
- Supports PC operating on Windows 98/ME, Windows NT 4.0/2000, and Windows XP

Evaluation Board, Evaluation Kits (1/3)

TK-850 Series
[Manufacturer/Marketer] Application Corporation
[Target devices] V850ES/SG2, V850/KJ1+

[Features]
- Various software products necessary for development also supplied
- Low price
- Easy-to-use, as tutorial and sample programs available
- Compact, name card-size

TK-850/SG2+NET
[Manufacturer/Marketer] Application Corporation
[Target devices] V850/SG2

[Features]
- TCP/IP stack that can operate only with internal memory of V850
- Necessary items (AC adapter, serial cable, and Ethernet cross cable) in package
- Not only TCP/IP but also HTTP protocol, mail protocol (POP3, SMTP), and sampling application using these are stored in ROM.
- C compiler, debugger, and flash programmer are also packed as development environments.
### Evaluation Board, Evaluation Kits (2/3)

**CEB-V8xx**

**[Manufacturer/Marketer]** Cosmo Co., Ltd.

**[Target devices]** V850E/MA1, V850E/MA3, V850E/IA1, V850/SA1, V850/SB1, V850ES/SJ2, V850ES/FJ2

**[Features]**
- V850E/MA1, V850/SA1, and V850/SB1 include evaluation board, PARTNER monitor-debugger, and GNU compiler exeGCC evaluation versions in a single low-price package.
- RISC chip performance can be experienced by a simple serial PC connection.
- Compact board design measuring just 137 × 86 mm (V850E/MA1, V850/SA1, V850/SB1), 140 × 85 mm (V850E/MA3), φ150 mm (V850E/IA1), 150 × 125 mm (V850ES/SJ2, V850ES/FJ2).
- External fetchability of CPU signals facilitates expansion.
- Includes connector for writing to CPU's on-chip flash memory.

**KBCR-CB2**

**[Manufacturer]** Shikino High-Tech Co., Ltd.

**[Marketer]** Shikino High-Tech Co., Ltd., ZENIC, Inc.

**[Target devices]** V850E/MA1, V850E/ME2

**[Features]**
- The KBCR-CB2 image processing evaluation kit is a reference board that includes full-motion capture, sensing, and compression processing functions as well as multiple communication ports. This product not only facilitates the development of various surveillance camera systems but is also a useful evaluation kit for developing image processing system algorithms.
- Various image processing functions such as object sensing and color sensing for sensing functions, and JPEG for image compression functions (ZENIC’s ZENS001F image processing LSI for sensor cameras is used for image processing).
- Camera inputs include CMOS digital and NTSC inputs, enabling up to 4 channels of multi image control.
- Uses Ethernet (or optional wireless LAN) as network interface, and also includes serial communication port and extended bus.
- Real-time OS complies with µTRON 4.0 specification and TCP/IP is implemented (uses MSPO’s NORTi).

**µT-Engine/V850E-MA3 development kit**

**[Manufacturer/Marketer]** Personal Media Corporation

**[Target devices]** V850E/MA3

**[Features]**
- Kit based on µT-Engine specification promoted by T-Engine project.
- All software necessary for program development, such as driver, sample application, and development environment, as well as real-time OS “PMC T-Kernel” that makes the best use of 20 years of experience of Tron project, are supplied. Some source codes are also supplied.
- Detailed technical information related to hardware and circuit diagrams also attached.

**RTE Series**

**[Manufacturer]** Midas Lab, Co., Ltd

**[Marketer]** Naito Densei Machida Mfg. Co., Ltd. CORE Corporation

**[Target devices]** V853, V850E/MS1, V850E/MA1, V850E/ME2, V850E2/ME3, V850ES/SA3

**[Features]**
- Monitor support for MULTI from GHS and NEC Electronics’ PARTNER.
- High-speed program transfer via PC bus connection (except CB series).
- Connectable via serial communication (RS-232-C).
Giraffe
[Manufacturer/Marketer] Mikasa Shoji Co., Ltd
[Target devices] V850E/ME2
[Features]
◆ Supports LAN, compact flash memory card, and USB based on the high-speed (operating frequency: higher than 100 MHz) RISC microcontroller (V850E/ME2), and realizes a very adaptable platform.
◆ Optional 5.5 inch color LCD board selectable
◆ Enables development specialized for audio/visual functions which features A/V I/O connecting NTSC video encoder/decoder and audio ADC/DAC.

GT200 series
[Manufacturer/Marketer] Yokogawa Digital Computer Corporation
[Target devices] V850E/IA1
[Features]
◆ Starter kit evaluating FlexRay next-generation automobile LAN mounting V850E/IA1
◆ Robert Bosch GmbH’s IP (FPGA version) as FlexRay controller
◆ Philips’ FlexRay driver mounted on physical layer
◆ Enables establishing an appropriate environment for FlexRay system introduction instruction and waveform monitoring of communication operation and output signals.
# Partner Contact Information - Support in Japan (1/2)

<table>
<thead>
<tr>
<th>Contact</th>
<th>TEL</th>
<th>FAX</th>
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<tbody>
<tr>
<td>IAR Systems Company</td>
<td>81-3-5298-4800</td>
<td>81-3-5298-4801</td>
</tr>
<tr>
<td>ACCESS Co., Ltd.</td>
<td>81-3-3233-0200</td>
<td>81-3-3233-0222</td>
</tr>
<tr>
<td>Advanced Data Controls Corporation</td>
<td>81-3-3576-5351</td>
<td>81-3-3576-1772</td>
</tr>
<tr>
<td>Application Corporation</td>
<td>81-42-732-1377</td>
<td>81-42-732-1378</td>
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<tr>
<td>Aplix Corporation</td>
<td>81-3-3207-6575</td>
<td>81-3-3204-6450</td>
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<tr>
<td>Wave Technology Co., Ltd.</td>
<td>81-3-5304-1885</td>
<td>81-3-5304-1886</td>
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<td>AI Corporation</td>
<td>81-3-3493-7981</td>
<td>81-3-3493-7993</td>
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<tr>
<td>NEC Micro Systems, Ltd.</td>
<td>81-44-722-8194</td>
<td>81-44-733-9054</td>
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<tr>
<td>NEC Engineering, Ltd.</td>
<td>81-4-7185-7707</td>
<td>81-4-7185-7881</td>
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## Partner Contact Information - Support Outside of Japan (1/3)

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### Partner Contact Information - Support Outside of Japan (3/3)

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<td>Vector CANtech</td>
<td>1-248-449-9290</td>
<td>1-248-449-9704</td>
</tr>
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<td></td>
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<td><a href="mailto:sales@vector-cantech.com">sales@vector-cantech.com</a></td>
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<td><a href="http://www.vector-cantech.com">http://www.vector-cantech.com</a></td>
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<tr>
<td>Japan</td>
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<td>Vector Japan</td>
<td>81-3-5769-6980</td>
<td>81-3-5769-6975</td>
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<tr>
<td></td>
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<td><a href="mailto:sales@vector-japan.co.jp">sales@vector-japan.co.jp</a></td>
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<tr>
<td>France</td>
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<td>Vector France</td>
<td>33-1-4231-4000</td>
<td>33-1-4231-4009</td>
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<td><a href="mailto:information@vector-france.com">information@vector-france.com</a></td>
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<td><a href="http://www.vector-france.com">http://www.vector-france.com</a></td>
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<td>Sweden</td>
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<td>Vector Scandinavia</td>
<td>46-31-83-40-80</td>
<td>46-31-83-40-99</td>
</tr>
<tr>
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<td><a href="mailto:sales@vecscan.com">sales@vecscan.com</a></td>
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<td><a href="http://www.vecscan.com">http://www.vecscan.com</a></td>
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<tr>
<td>Wave Technology Co., Ltd.</td>
<td>Worldwide</td>
<td><a href="http://www.y1000.com/en/">http://www.y1000.com/en/</a></td>
<td>81-3-5304-1885</td>
<td>81-3-5304-1886</td>
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<tr>
<td>YASKAWA INFORMATION SYSTEMS Corporation</td>
<td>Worldwide</td>
<td><a href="mailto:echonet@ysknet.co.jp">echonet@ysknet.co.jp</a></td>
<td>81-44-952-8918</td>
<td>81-44-952-8921</td>
</tr>
<tr>
<td>Yokogawa Digital Computer Corporation</td>
<td>U.S.A.</td>
<td>Yokogawa Corporation of America</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>[Pacific Time Zone] <a href="mailto:shotaro.saito@us.yokogawa.com">shotaro.saito@us.yokogawa.com</a></td>
<td>1-408-392-1364</td>
<td>1-408-392-0541</td>
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<tr>
<td></td>
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<td>[Eastern Time Zone] <a href="mailto:bob.timms@us.yokogawa.com">bob.timms@us.yokogawa.com</a></td>
<td>1-770-594-0399, Ext. 5126</td>
<td>1-770-594-0336</td>
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<td><a href="http://www.advice-PLUS.com/">http://www.advice-PLUS.com/</a></td>
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<tr>
<td></td>
<td>Germany</td>
<td>Hitex Development Tools GmbH</td>
<td>49-721-9628-0</td>
<td>49-721-9628-149</td>
</tr>
<tr>
<td></td>
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<td><a href="mailto:info@hitex.de">info@hitex.de</a></td>
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<td><a href="http://www.hitex.de/">http://www.hitex.de/</a></td>
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<td>Europe</td>
<td>Ashling Microsystems Limited</td>
<td>44-1256-811998</td>
<td>44-1256-811761</td>
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<td>Korea</td>
<td>KM Data Inc.</td>
<td>82-2-3281-0333</td>
<td>82-2-3281-3117</td>
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<td>China</td>
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<td>86-10-6588-3555</td>
<td>86-10-6588-7025</td>
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<tr>
<td></td>
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<td>65-6569-3611</td>
<td>65-6566-9271</td>
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<td></td>
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<td><a href="mailto:sales@unidux.com.sg">sales@unidux.com.sg</a></td>
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<tr>
<td></td>
<td>Other countries</td>
<td>Yokogawa Digital Computer Corporation <a href="mailto:info-ovs@yokogawa-digital.com">info-ovs@yokogawa-digital.com</a></td>
<td>81-42-333-6222</td>
<td>81-42-333-6107</td>
</tr>
</tbody>
</table>

### Rental Companies

The above tools (hardware only) are leased out by the following companies. Please contact these companies for further details.

<table>
<thead>
<tr>
<th>Contact</th>
<th>URL</th>
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<tr>
<td>Orix Rentec</td>
<td><a href="http://www.orixrentec.co.jp">http://www.orixrentec.co.jp</a></td>
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<tr>
<td>Showa High-Tec Rent</td>
<td><a href="http://www.shiret.co.jp">http://www.shiret.co.jp</a></td>
</tr>
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</table>
SUPPORT SYSTEM

Purchasing Products
Please contact an NEC Electronics distributor or sales representative regarding the purchase of NEC Electronics products. Customers will receive shipment of products after the distributor or NEC Electronics sales office has submitted their order form.

Note that a precontract is required for real-time OS and middleware (RX-NET, RX-FS, GOFAST) products to be embedded in the customer's system. The procedure for purchasing NEC Electronics products is outlined below.

Purchasing procedure for products requiring precontract

<table>
<thead>
<tr>
<th>Preparation of purchase order form</th>
<th>A precontract is required when purchasing real-time OS products. Customers are therefore requested to fill out a purchase order form and submit it to an NEC Electronics sales representative.</th>
</tr>
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<tbody>
<tr>
<td>About 1 week</td>
<td></td>
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<tr>
<td>Signing of contract</td>
<td>A contract will be ready for signing about 1 week following submission of the order form. Please confirm that the contents are correct before signing the contract.</td>
</tr>
<tr>
<td>Submission of order</td>
<td>After the contract has been signed, the NEC Electronics sales division will submit the order form.</td>
</tr>
<tr>
<td>About 2 weeks</td>
<td></td>
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<tr>
<td>Product shipment</td>
<td>NEC Electronics operates on a production-on-demand system, so customers should expect shipment about 2 weeks after their order is received.</td>
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</table>

Supply format
Software from NEC Electronics includes only those objects necessary for operation. In the case of real-time OS and middleware products, however, due to the nature of the software, source code is supplied along with the execution objects.

After-sales support

Free upgrades
Provided the customer has completed and returned the User Registration Card included with the product’s guarantee card, free upgrades are available online for the period of one-year following purchase. Once this period expires, an upgrade fee will be required.

Inquiries regarding product usage and bugs
Please direct any inquiries to an NEC Electronics distributor, sales division, or use the technical hotline.

Range of support
NEC Electronics provides support for all products that have been used in accordance with the stated methods. Note that real-time OS source code products fall outside NEC Electronics’ support range.

Seminars
NEC Electronics provides a wide variety of forums for exploring the V850 Series development environment, ranging from seminars to introduce potential new customers to NEC Electronics products, to training sessions for those customers seeking to improve their knowledge and technical skills. All those interested are warmly invited to attend.

The following seminars have been organized to assist customers in understanding and using the V850 Series development environment.

<table>
<thead>
<tr>
<th>Seminar Name</th>
<th>Length</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>V800 Series C Compiler Basics and Application</td>
<td>2 days</td>
<td>A seminar that combines lecturing and hands-on training (using the V800 Series) to give customers an understanding of the basic coding techniques used in software development.</td>
</tr>
<tr>
<td>Real-Time OS for V850 Series Basics</td>
<td>2 days</td>
<td>A seminar to give customers detailed descriptions of and hands-on experience in using the functions of a real-time OS (RX850 Pro). Aim: To master RX850 Pro functions, operations, and system call usage.</td>
</tr>
<tr>
<td>Real-Time OS for V850 Series Application</td>
<td>2 days</td>
<td>A seminar to give an understanding and practical knowledge of development using the V850E and an evaluation board (SolutionGear) through hands-on practice.</td>
</tr>
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</table>

To find out more about these seminars, please refer to the separate introductory pamphlet. Those interested in NEC Electronics’ “on-site seminars” held at the customer’s location are requested to contact an NEC Electronics for details such as date and content.
DEVELOPMENT TOOLS DOWNLOAD SERVICE (ODS)

Service Outline
1. Development tool software for the V850 Series can be downloaded.

2. Technical information (version, technical documentation, etc.) pertaining to development tool software for the V850 Series can be viewed.

3. Version upgrade information is distributed by e-mail to registered users.

For more information, see [http://www.necel.com/micro/ods/eng/ods_readme_e.pdf](http://www.necel.com/micro/ods/eng/ods_readme_e.pdf)

The ODS top screen can be jumped to from the NEC Electronics Microcomputer website (http://www.necel.com/micro/index_e.html) by clicking [Development Tools Download]. (Refer to above figure.)

The sought after development tool can be looked for by device series or by development tool.

Screen when C Compiler has been selected

Technical information such as the development tool software version, release date, size, and attached documents can be viewed. (Example: CA703000).
NEC Electronics Microcomputer website: http://www.necel.com/micro/index_e.html

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ITRON is an abbreviation of Industrial TRON.
μITRON is an abbreviation of "Micro Industrial TRON".
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"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

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"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)

(1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.

(2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).
For further information, please contact:

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Stuttgart Office
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Tel: 0 711 99 01 0-0

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http://www.cn.necel.com/

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http://www.cn.necel.com/

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http://www.hk.necel.com/

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Taipei, Taiwan, R. O. C.
Tel: 02-2719-2377

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