V850 Real-time OS RI850V4 V1.01.00
Release Note

R20UT3092EJ0100
Rev.1.00
2014.07.31

Contents

1. Packaged Tools

Agreement type and contents are different according to the product.

Product Name	Agreement Type	Contents
R0R08500TCW011	Evaluation License, Limited 1 host	A
R0R08500TCW01A	Evaluation License, Unlimited hosts	A
R0R08500TCW01K	Mass-production License, 3000 copies	A
R0R08500TCW01U	Mass-production License, Unlimited copies	A
R0R08500TCW01Z	Mass-production License, Unlimited copies, With source code	B

The following tools are provided.

Contents		Name	Version
B	A	Realtime OS RI850MP Kernel Object	V1.00.02
		Command-line Configurator “CF850MP”	V1.01.00.01
		Plug-ins for CS+ for CACX	
		Realtime OS Build Tool Plug-in (Common)	V3.00.00.03
		Realtime OS Build Tool Plug-in (RI850V4)	V3.00.00.02
		Realtime OS Analysis Control Plug-in (Common)	V3.00.00.03
		Realtime OS Analysis Control Plug-in (µITRON4)	V3.00.00.02
		Realtime OS Analysis Control Plug-in (RI850V4)	V3.00.00.03
		Realtime OS Resource Information Displaying Plug-in (Common)	V3.00.00.06
		Realtime OS Resource Information Displaying Plug-in (µITRON4)	V3.00.00.06
		System Performance Analyzer AZ850V4	V4.10
		Realtime OS RI850MP Kernel Source Code	V1.00.02

2. User's Manual

The following user's manuals are included with this version. Please read these manuals together with this document.

Manual Name	Document Number
RI Series Real-Time Operating System User's Manual: Start	R20UT0751JJ0102
RI850V4 Real-Time Operating System User's Manual: Coding	R20UT0511JJ0101
RI850V4 Real-Time Operating System User's Manual: Debug	R20UT0753JJ0101
RI850V4 Real-Time Operating System User's Manual: Analysis	R20UT0513JJ0100
RI Series Real-Time Operating System User's Manual: Message	R20UT0756JJ0102

These PDF files are provided by this package or Renesas Electronics Home page.

3. Target Devices

The following devices are supported by the product.

- V850ES core
- V850E1 core
- V850E2 core
- V850E2M core
- V850E2S core

4. Operating Environment

Below is described the operating environment for using the product.

4.1. Hardware Environment

(1) Integrated development environment “CS+”

- Processor：At least 1 GHz (support for hyper threading/multicore CPU)
- Main memory：At least 512 MB (1 GB or higher recommended)
  (64-bit Windows® 7, Windows® 8, Windows® 8.1 requires 2 GB or more)
- Display：Resolution at least 1,204 x 768; at least 65,536 colors

(2) Integrated development environment “MULTI”

- Processor：At least 1 GHz (support for hyper threading/multicore CPU)
- Main memory：At least 512 MB (1 GB or higher recommended)
- Display：Resolution at least 1,204 x 768; at least 65,536 colors

4.2. Software Environment

The following software environments are supported.

- Windows 7（32bit, 64bit）
- Windows 8（32bit, 64bit）
- Windows 8.1（32bit, 64bit）
- Windows Vista（32bit, 64bit）
- .NET Framework 4
- Runtime library of Microsoft Visual C++ 2010 SP1
- Internet Explorer 6.0 or later

Remark: For any of these, we recommend having the latest service pack installed.

4.3. Supported Tools

The following tools are supported.

Tool Name	Manufacturer	Version
Integrated development environment CS+ for CACX	Renesas Electronics	V3.00.00 or later
C Compiler CA850	Renesas Electronics	V3.50 or later
C Compiler CX	Renesas Electronics	V1.31 or later
Integrated development environment MULTI	Green Hills Software, Inc.	Ver5.1.6 Rel 8.1.1 or later

5. Installation Cautions

This section provides cautions for installation and uninstallation

5.1. Cautions for Installation

5.1.1. Cautions for administrator privileges

Windows® administrator privileges are required to install the software.

5.1.2. Cautions for execution environment

The .NET Framework and the Visual C++ runtime libraries are required to run the installer.

5.1.3. Cautions for network drives

The software cannot be installed from a network drive.

It also cannot be installed to a network drive.

5.1.4. Cautions for installation folder name

The available characters for specifying the installation folder are the same as for Windows®.

The 11 characters / * : < > ? | " \ ; , cannot be used. Folder names also cannot start or end with a space.

Specify folders as absolute paths. Do not use relative paths.

Use the backspace character (\) as the path separator for the installation folder. Do not use the forward slash (/).

5.1.5. Cautions for modifying and repairing functions

To modify or repair the function of a tool that has already been installed, have the tool's installer package on hand, and run the installation program. The program maintenance program will start; select Modify or Repair.

Uninstall or change a program dialog boxes will cause an error.

5.1.6. Cautions for required files after installation

The following folder is created after installation. Do not delete it, because it contains files that are necessary for the tools to run.

- If Windows® is 32bit and the installation drive is C:
  C:\Program Files\Common Files\Renesas Electronics CS+\
- If Windows® is 64bit and the installation drive is C:
  C:\Program Files (x86)\Common Files\Renesas Electronics CS+\

5.1.7. Cautions for version of installed tools

If the newer version tool is already installed, the older version tool may not be installed.

5.1.8. Cautions for staring installer

If the installer is started on a non-Japanese version of Windows®, then if the path contains multi-byte characters it will cause an error, and the installer will not start.

5.1.9. Enable Plug-ins

Plug-ins of this product may be disabled immediately after installation of this product. Please enable Plug-ins of this product. For details, refer to “7.3 Enable Plug-ins”.

5.2. Cautions for Uninstallation

5.2.1. Cautions for administrator privileges

Windows® administrator privileges are required to uninstall the software.

5.2.2. Cautions for uninstallation folder name

Depending on the order in which tools are uninstalled, the folders may not be completely deleted. If this happens, remove any remaining folders via Explorer or the like.

5.2.3. Cautions for adding/repairing via other than the installer

If you added or modified files to the folders in which tools and manuals were installed using other means than the installers, they cannot be deleted during uninstallation.

5.2.4. Key Word for Uninstallation

There are two ways to uninstall this product.

- Use the integrated uninstaller (uninstalls CS+ for CACX)
- Use separate uninstaller (uninstalls this product only)

To use the separate uninstaller, select the following from the Control Panel:

- Programs and Features

After the applet appears, delete from the following.

- CS+ Realtime OS Common Plugins
- CS+ Realtime OS RI850V4 Plugins
- CS+ Realtime OS RI850V4 Object Release, or CS+ Realtime OS RI850V4 Source Release

6. Changes from Previous Version

6.1. Kernel

The “CS+ for CACX” tools are supported

6.2. Configurator

The V850E2S core is supported. The application for V850E2S core can be created.

6.3. Realtime OS Build Tool Plug-in

(3) The “CS+ for CACX” tools are supported

The “CS+ for CACX” tools are supported. In addition, this plug-in of this version does not operate on the “CubeSuite+”.

(4) The help can be opened from [RI78V4] tab and [System Configuration File Related Information] tab

6.4. Realtime OS Analysis Control Plug-in

(1) The “CS+ for CACX” tools are supported

The “CS+ for CACX” tools are supported. In addition, this plug-in of this version does not operate on the “CubeSuite+”.

(2) The function to issue service call is improved

The function to issue service call is improved. For example, jump to C-source program after issuing the service call.

6.5. Realtime OS Resource Information Displaying Plug-in

(1) The “CS+ for CACX” tools are supported

The “CS+ for CACX” tools are supported. In addition, this plug-in of this version does not operate on the “CubeSuite+”.

(2) The waiting factor which are showed by the “ID” are changed to “name”

The waiting factor which are showed by the “ID” are changed to “name”. It became intelligible the waiting factor.

(3) It became intelligible the tabs

The tab selection area is divided into two columns, and adds the icon to each tabs.

(4) A part of messages is improved

A part of messages, for example error message, is improved.

(5) The following restriction is canceled.

The resource information panel does not get focus even if a display menu or a display button on toolbar is selected.

7. Cautions

7.1. Kernel

7.1.1. When using Green Hills Software, Inc. compiler

(1) register r2

When performing development using the RI850V4 with a Green Hills Software, Inc. compiler, be sure to use the compiler option *-reserve_r2*. When using the MULTI 2000 builder, click Project on the menu bar, then "CPU Options for *Selected File*", and then select "Reserve r2 for the User" in the opened window. When using the MULTI v4.0 builder, click Edit on the menu bar, "Set Options" > "All options" > "Target", and then select "Reserve for User" for "Register r2" in the opened window.

The Green Hills Software, Inc. compiler outputs code using the r2 register by default. However, this register is used by the RI850V4. It is therefore required to generate codes that do not use register r2.

(2) When using multiple TDA functions

When using multiple TDA functions, the task/handler of the RI850V4 cannot be coded as "named-TDA function". If coded as such, the operation of the RI850V4 cannot be guaranteed. Code them as "no-TDA function" or "export-TDA function"

The task/handler indicates the following: a task, task exception processing routine, interrupt handler, direct activation interrupt handler, CPU exception handler, cyclic handler, idle routine, initialization routine, and extended service call routine.

(3) About TDA option

When performing development using the RI850V4 with a Green Hills Software, Inc. compiler, be sure to use the same TDA compiler option (-notda / -single_tda / -mtda) about all C language files.

If there are the C language files which different TDA compiler option, the following service call operation cannot be guaranteed

dis_int / ena_int / loc_cpu / iloc_cpu / unl_cpu / iunl_cpu / chg_ims / ichg_ims / get_ims / iget_ims

7.2. Build Tool

7.2.1. Removing configuration file deletes include path

If the output folder of the system information header file and the build tool's include path are set to the same path, then removing the system configuration file from the project will cause the build tool's include path to be deleted.

7.2.2. C compiler CX / caution on using common register mode

If you build files after having set the register mode setting, CX compiler output warning message that "register mode is different ". Please ignore this warning message that there is not the problem with kernel behavior.

7.2.3. Caution about the mount setting of the Real-time OS Build Tool plug-in

When using the Real-time OS Build Tool plug-in, make setting to mount the following three plug-in by the plug-in manager of CubeSuite+. When either "CA850 plug-in" or "CX plug-in" is not make setting to mount, "Real-time OS Build Tool plug-in" is not mounted.

“CA850 plug-in”, “CX plug-in”, “Real-time OS Build Tool plug-in”

When using the plug-in manager of CubeSuite+, click Edit on the menu bar, “Tool” > “plug-in manager” ,and then select each plug-in.

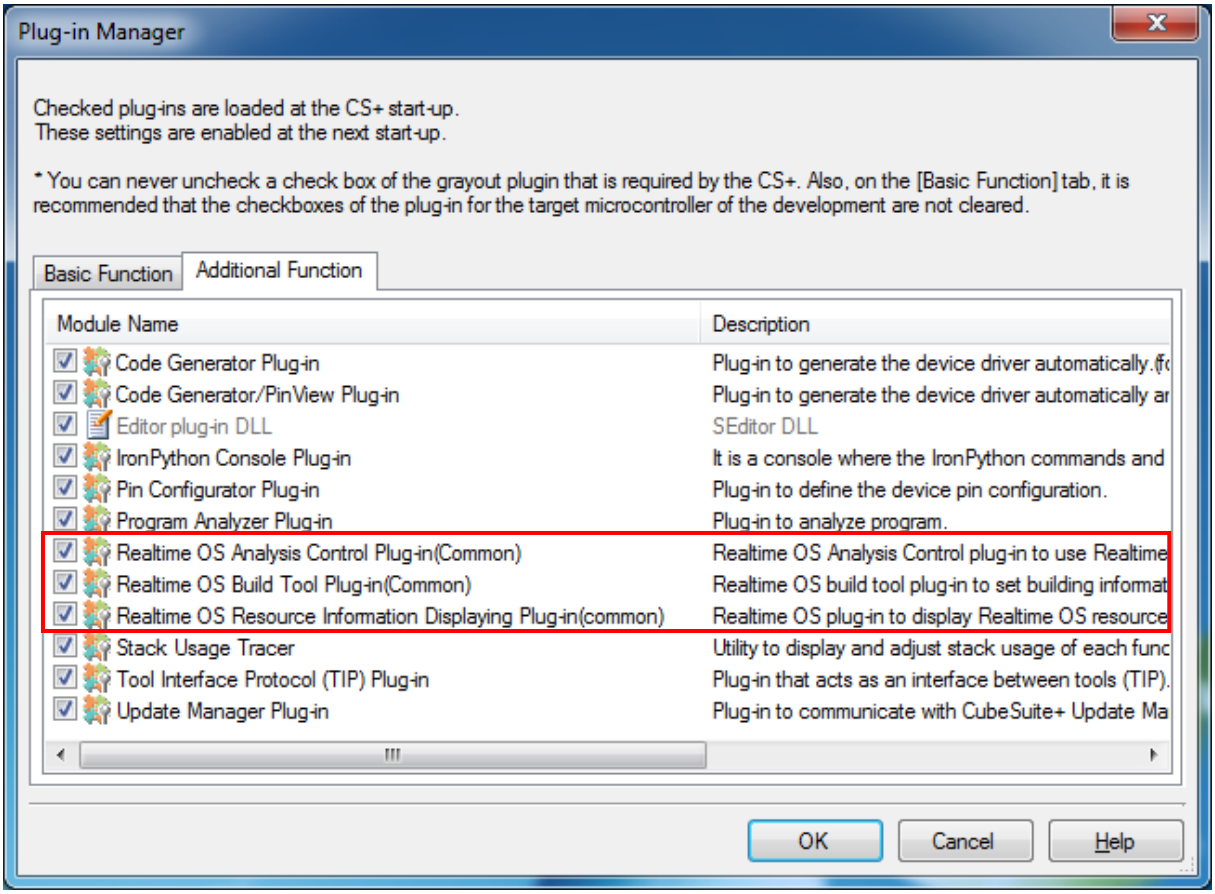
7.3. Enable Plug-ins

Plug-ins of this product may be disabled immediately after installation of this product. If plug-ins are disabled, the problem of being unable to build arises.

Please enable following Plug-ins by [Additional Function] tab in [Plug-in Manager] dialog box of the CS+ for CACX

- Realtime OS Analysis Control Plug-in(Common)
- Realtime OS Build Tool Plug-in(Common)
- Realtime OS Resource Information Displaying Plug-in(common)

figure 7-1 Plug-in Manager



7.4. Cautions for Realtime OS Resource Information Panel

7.4.1. View after real-time OS is initialized

View the Realtime OS Resource Information Panel after the real-time OS has been initialized. Before the real-time OS has been initialized, the information in the Realtime OS Resource Information Panel is undefined.

7.4.2. Use programs with debug information generated

When using the Realtime OS Resource Information Panel, download a program for which debug information has been generated. Downloading a program without debug information and viewing it in the Realtime OS Resource Information Panel will cause an error.

To generate debug information, under Build Tool, under the Link Options properties, set "Generate debug information" to "Yes".

7.5. Cautions for System Performance Analyzer AZ850V4

7.5.1. Do not use qualify tracing and AZ850V4 together

Do not use qualify tracing and AZ850V4 together. If tracing is enabled in AZ850V4 while qualify tracing is being used, the qualify tracing conditions will be added to the AZ850V4 conditions. In addition, if the AZ850V4 tracing is then disabled in this state, the qualify tracing conditions including conditions configured by the user will be deleted.

7.5.2. Cautions for combination with debugger

The hardware trace mode is not supported when using the AZ850V4 in the following debugging environment of Green Hills Software, Inc.

- MULTI2000 + rteserv
- MULTIv4 + rteserv

When using the above combinations, the hardware trace mode is not supported even if hardware trace is selectable in the AZ Option dialog box. Therefore, use the software trace mode for this combination.

7.5.3. Initialization when using software trace function

When using the software trace function, use the AzInit function to initialize the monitor. This function must be called, when the RI850V4 is traced, after initialization of the RI850V4 itself has been completed. Therefore, call this function via an initialization handler. If the function is called by boot processing, initialization will not be correctly executed.

7.5.4. Allocation of AZ monitor when using software trace function

When linking the AZ monitor, it is recommended to allocate the .azmon_b section to the internal RAM. When it is allocated to the external RAM, the external RAM must be referenced correctly (e. g. the peripheral I/O registers are set correctly).

7.5.5. Case where elapsed time cannot be measured correctly

When executing a hardware trace using an in-circuit emulator, if the operating speed of the CPU is 33 MHz or faster, the elapsed time may not be measured between events due to problems with the resolution because the tracer timer is a 16-bit timer. In such a case, the following phenomena occur.

- It seems that time does not elapse at the entry and exit of a service call
- It seems that time does not elapse at the entry and exit of an interrupt

The AZ850V4 calculates the processing time of the specified section by adding the elapsed time between events. Therefore, if multiple events occur in the specified section, the errors described above are accumulated. Consequently, a time shorter than the actual processing time will be displayed (the number of errors is linear to the number events that occurred in the specified section).

7.5.6. Case where correct information is not acquire

When uploading the AZ trace data by clicking the Upload button, correct information on the RI850V4 may not be acquired if the program is stopped during RI850V4 internal processing. The following functions will be affected when the above situation occurs.

- The function that sorts tasks in the priority order in the Analyze window and Object Select dialog box.
- The function to display the task names and resource names in the Analyze window. (“Tsk [task ID] is displayed when task names cannot be acquired.)

7.5.7. Cautions for display

- If the window is vertically expanded in the Object Select dialog box and then reduced, the displayed data may be disordered.
- If a task name cannot be acquired and a system call that waits for resources is issued from an object displayed as “Tsk (????)” in the Analyze Window, a blue horizontal line indicating the resource waiting status is drawn until the end of trace even after the resource waiting status has been cleared.
- The Analyze Window and the transition diagram of the object may not be correctly displayed while the load module subject to AZ trace has more than 1000 objects.
- If an interrupt occurs during Idle and Idle is restored from the interrupt, the frame of IntRet is not displayed in the Trace View Window.
- When the pull-down menu of the scale modify button is displayed in the Analyze Window (task level) in the Windows Me environment, the numbers may be dimmed. However, the operation itself can be performed normally.

7.5.8. About V850E2S core support

AZ850V4 is not supported to analyze application on V850E2S core.

7.6. Cautions for Code Generator

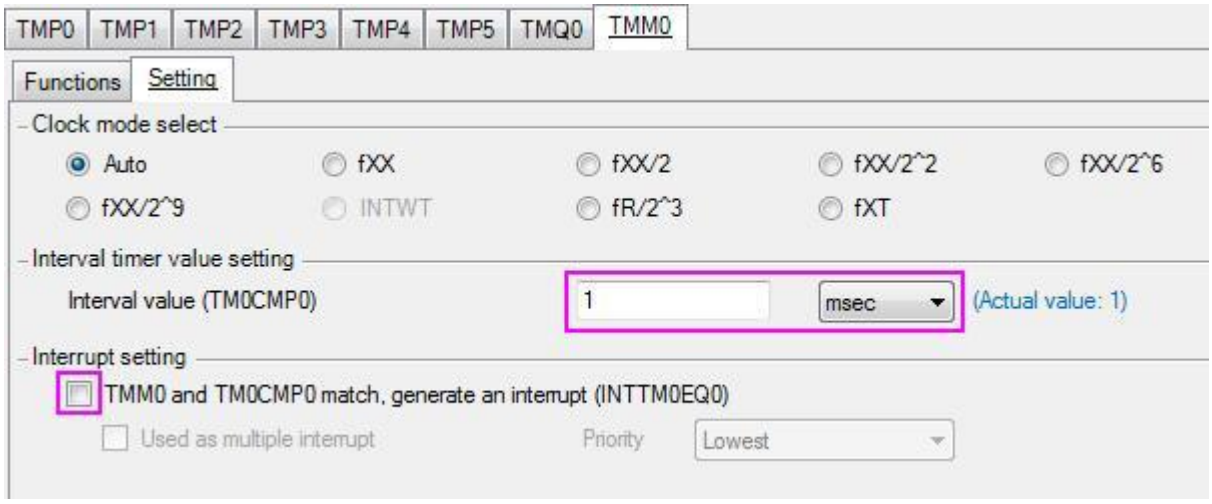
This section describes cautions for the CS+ code generator relating to RI850V4.

7.6.1. Procedures for performing basic operations

With RI850V4 projects, it is not possible to run a program created using only generated code as a real-time OS program. The following changes must be made in order to perform basic operations.

(1) Set the interval of the timer used for the RI850V4 basic-clock timer on the code generation panel. Clear the checkbox under Interrupt Settings.
The next section describes the timer being used as the 16-bit interval timer M (TMM).

figure 7-2 Timer Setting



(2) After making the settings in step 1, perform code generation, and then modify the output code.

- Task “maintask” (File name: CG_main.c)

  Add code to authorize the operation of the timer to use.

```
void maintask(VP_INT exinf)
{
  /* Start user code. Do not edit comment generated here */
  TMM0_Start();    /* Add code */
  while (1U)
  {
     ;
  }
  /* End user code. Do not edit comment generated here */
}
```

- Function to enable timer operation TMM0_Strat (File name: CG_timer.c)

  Add code to clear the timer interrupt request signal and enable timer-interrupt processing.

```
void TMM0_Start(void)
{
    TM0EQIF0 = 0U; /* clear INTTM0EQ0 interrupt flag */  /* Add code */
    TM0EQMK0 = 0U; /* enable INTTM0EQ0 interrupt */      /* Add code */
    TM0CE = 1U;            /* enable TMM0 operation */
}
```

Note: Running code generation again will erase these additions.

(3) Edit the file coding the interrupt/exception handlers (inttab.s)

Comment out the interrupt entry for the timer used as the base clock.

```
                :
      .section "INTTP5CC1", text   --INTTP5CC1
        reti
--      .section "INTTM0EQ0", text --INTTM0EQ0       -- Comment out
--      reti                                         -- Comment out
        .section "INTCB0R", text   --INTCB0R/INTIIC1
        reti
        .section "INTCB0T", text   --INTCB0T
                :
```

Note: Running code generation again will erase these edits and revert the file to the original.

(4) The code generator does not output a system configuration file (.cfg). You must prepare one yourself.

Make the following three additions/edits to the prepared system configuration file.

- Base clock information

  Write the base clock timer cycle and interrupt trigger name for the RI850V4 to match the settings made in 1.

```
/* system information */
RI_SERIES(RI850V4, V100);
CPU_TYPE(V850E1);
REG_MODE(r32);
DEF_TIM(1);              /* Base clock interval */
CLK_INTNO(INTTM0EQ0);    /* Clock timer exception code */
STK_CHK(TA_ON);
SYS_STK(0x800);
MAX_PRI(12);
MAX_INT(4);
```

- Task information

  The code generation outputs one task. Add the task information for this task to the system configuration file.

  - Task output by code generator

    File name : CG_main.c

    Task name : maintask

  - Sample task information code

    Set the task startup address to "maintask".

```
/* task information */
CRE_TSK(ID_TASK1, {
    TA_HLNG | TA_ACT | TA_ENAINT,
    0,
    maintask,
    1,
    0x100,
    NULL
});
```

- Boot information

  The code generation outputs a boot process. Add the branch process to this boot process to the system configuration file, as interrupt information.

  - Boot process

    File name : inttab.s

    Task name : _start

  - Sample interrupt information code

    Make _start the start address after the CPU is reset.

```
  -- reset handler routine

     .section "RESET"
```

7.6.2. Changing the interrupt type

The hardware-interrupt process output by the code generator is a directly activated interrupt handler. Make the following additions and deletions in order to use an indirectly activated interrupt handler managed by the RI850V4. The section below describes the external interrupt pin input edge detection INTP0 as the interrupt used.

(1) Change the interrupt-handler code. Delete the #pragma statement and change the handler type.

- Sample interrupt handler code

File name : CG_int_user.c

Handler name : MD_INTP0

Code output by code generator

```
#pragma interrupt INTP0 MD_INTP0

__interrupt void MD_INTP0(void)
{
        /* Start user code. Do not edit comment generated here */
        /* End user code. Do not edit comment generated here */
}
```

After changes

```
void MD_INTP0(void)
{
    /* Start user code. Do not edit comment generated here */
    /* End user code. Do not edit comment generated here */
}
```

(2) Add the interrupt handler information to the system configuration file.

```
/* interrupt handler information */
DEF_INH(INTP0, {
        TA_HLNG,
        MD_INTP0
});
```

7.7. Cautions for RX850V4 users

RI850V4 is newly version of RX850V4. This section explains the changes from RX850V4 package V4.43 (kernel V4.31) to RI850V4 V1.01.00.

7.7.1. The Changes from RX850V4 to RI850V4

- The product name changes from “RX850V4” to “RI850V4”
- The version number of digit changes from “3” to “5”
- The supported uITRON version changes from “V4.03.01” to “V4.03.03”
- The maker code for uITRON specification Changes from “0x0017(NEC Electronics)” to “0x011b (Renesas Electronics”
- The Identification number of kernel for uITRON specification Changes from “0x2230” to “0x0000”
- The name of kernel library changes from “librxc.a” to “libri.a”
- The folder structure changes. Please refer to “help” or “User’s Manual RI Series Start”
- The conditional compile macro changes from “__nec__” to “__rel__”
- The sections of kernel changes as follows
  - rx_text → kernel_system
  - rx_info → kernel_const
  - rx_control → kernel_data
  - rx_memory → kernel_work
- The function of restructed task is removed
- The configurator option changes from “-t NECEL “ to “-t REL”
- The keyword of configuration file changes from “RX_SERIES“ to “RI_SERIES”
- The configurator error number of digit changes from “4” to “7”
- Supports CubeSuite+ / CS+
- Remove to support CubeSuite and PM+
- Add function that the CubeSuite/PM+ projects convert CubeSuite+ / CS+projects
- The function of kernel version select ion is removed
- Supports E1/E20 emulatores

8. Restrictions

8.1. Restrictions of CS+ for CACX

8.1.1. Realtime OS Build Tool Plug-in

(1) Display of temporary file names in the output pane of the IDE when the preprocessor is started up

The configuration file registered with a project is input to the preprocessor of the compiler. If any macro definition in this configuration file has a syntax error, an error message is output with the name of a temporary file (cf850***.c) created by the configurator (instead of the name of the configuration file). Since the temporary file is deleted immediately after use, jumping from the output pane to the line that has the syntax error is not possible.

(2) Multiple build modes

Do not use multiple build modes for the following reasons.

- The configurator options are common to all build modes. Even if multiple build modes are used, the same configurator options are applied.
- Every time the build mode is changed, the path to the kernel_id.h file is added to [Additional include paths] of the build tool. Although the build-setting plug-in sets the correct path in [System include paths], the IDE adds the old path prior to the change of the build mode to [Additional include paths]. In the process of building, the build tool refers to the old path set by the IDE. This means that editing the configuration file to change the build mode before editing kernel_id.h, for example, will not be reflected in building.

(3) Utilizing existing projects

If you choose to recycle as the basis of a new project an existing project that does not contain any files such as sit.s which are generated by the configurator, and you select copy processing for the files you will be reusing, the missing files such as sit.s that are supposed to be grayed out in the project tree will be deleted from the project tree.

8.1.2. Realtime OS Analysis Control Plug-in

No resutruction.

8.1.3. Realtime OS Resource Information Displaying Plug-in

(1) Effect of resetting the display of waiting tasks (child nodes) on the display of the [Task] tabbed page

Resetting the display of waiting tasks also resets the display of other tasks in the [Task] tabbed page. However, the information being displayed will be correct.

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