

Chapter 1. Target Devices.....	2
Chapter 2. User's Manuals	3
Chapter 3. Keywords When Uninstalling the Product	4
Chapter 4. Changes.....	5
Chapter 5. Points for Caution	9
Chapter 6. Restrictions	19

Chapter 1. Target Devices

The target devices supported by the CS+ are listed on the Website.
Please see this URL.
CS+ Product Page

<https://www.renesas.com/cs+>

Chapter 2. User's Manuals

Please read the following user's manuals along with this document.

Manual Name	Document Number
CS+ V3.00.00 Installer	R20UT3094EJ0100
CS+ V4.00.00 Editor	R20UT3625EJ0100
CS+ V4.01.00 Python Console	R20UT3830EJ0100
CS+ V3.00.00 Updater	R20UT3098EJ0100
CS+ V4.01.00 Message	R20UT3826EJ0100
CS+ V4.01.00 Project Operation	R20UT3819EJ0100
CS+ V3.02.00 Analysis Tool	R20UT3461EJ0100
CS+ V4.01.00 RH850 Debug Tool	R20UT3822EJ0100
CS+ V4.01.00 RX Debug Tool	R20UT3821EJ0100
CS+ V4.01.00 RL78 Debug Tool	R20UT3820EJ0100
CS+ V4.01.00 GHS CCRH850 Build Tool Operation	R20UT3829EJ0100

* GHS : Green Hills Software, Inc.

Chapter 3. Keywords When Uninstalling the Product

There are two ways to uninstall this product.

- Use the integrated uninstaller from Renesas (uninstalls all CS+ components)
- Use the Windows uninstaller (only uninstalls this product)

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

- Programs and Features

Then select [CS+ for CC].

Chapter 4. Changes

This chapter describes changes from V4.00.00 to V4.01.00.

4.1 Additions to CS+

4.1.1 Changes to the operating environment

Due to the change in system requirements for Windows10, we have modified the conditions for main memory of the host machine on which V4.01.00 or a later version of CS+ can be assumed to run smoothly.

Before	At least 1 Gbyte (or 2 Gbytes for any 64-bit version of Windows), 2 Gbytes or more recommended
Now	At least 1 Gbyte (or 2 Gbytes for Windows 10 and any 64-bit version of Windows), 2 Gbytes or more recommended

4.1.2 Changes to the supporting Internet Explorer

We have modified the conditions for supporting Internet Explorer.

Before	Internet Explorer 7 or higher
Now	Internet Explorer 9 or higher

4.1.3 Provision of new solutions

While retaining the basic features of the development environment, CS+ also provides useful solutions that will aid various aspects of development at a level closer to your applications.

The following features are available in V4.01.00 and are easily accessible from the [Solution List] panel.

- Smart browser
- Smart report

4.1.4 Addition of Smart Browser feature

You can use this feature to view required information, including the contents of user's manuals and sample code. The [Smart Browser] panel lists various documents (user's manuals, technical updates, application notes, and tool news) related to the device selected for the active project and allows downloading of sample code, if any, that comes with the applicable application notes.

4.1.5 Addition of Smart Report feature

You can use this feature to make settings for the collective output of quality-related information such as lists of source files, build option settings, information on functions and variables, and coverage rates. Select items that you wish to output and their formats. Information on the selected items will be saved in the corresponding files. The following items are selectable.

- Project tree
- Dependency information
- Quality report at building
- Contents of [Property] panel
- Result of memory mapping profiling
- Function list
- Variable list
- Analysis chart
- Call graph
- Functions and Variables Access Table

The report of Call graph may not be saved. In that case, select [Output Data for Quality Records Collectively] after displaying the graph on Call graph panel.

4.1.6 Support for the use of the C source code converter in creating projects [CC-RL]




This improvement reduces the amount of work required to convert projects created by using CA78K0R to projects for use with CC-RL. In creating projects, you can utilize the configuration of existing CA78K0R project files. Since this process converts the C source files to suit CC-RL, it means that this improvement reduces the amount of work required to changing Compiler from CA78K0R to CC-RL.

4.1.7 Enhanced facility for comparing performance in optimization

V4.01.00 supports measuring and comparing optimization for code size or speed of execution by the build tool in cases where either size or speed is given priority or optimization proceeds with the current build-mode options.

4.1.8 Enhanced control of checkboxes

V4.01.00 makes it easier to select multiple checkboxes. When the mouse cursor is placed over any of the checkboxes listed, you can select whether to control all checkboxes at a time.

	Selects all checkboxes.
	Deselects all checkboxes.
	Invert the states of all checkboxes.

4.1.9 Enhanced coloring

The settings for colors used in the panels of CS+ can be changed to suit your preference. V4.01.00 now has a facility to select desired colors for text and background in the Editor panel independently from other panels.

4.1.10 Enhanced help information

You can now view the latest help file. V4.01.00 allows you to select either [Online] or [Offline] for access to help information.

Online	View help information online in a Web browser
Offline	View the help file installed on the host PC (as before)

4.2 Additions to the build tool

4.2.1 Support for the build tool from Green Hills Software, Inc.

You can now also use the compiler from Green Hills Software, Inc. (the GHS compiler) in building, since V4.01.00 of CS+ supports the creation of projects based on existing GHS project files and the setting of GHS compiler options. Note that you need to separately purchase the GHS compiler from a sales office of Green Hills Software, Inc.

4.2.2 Removal of the note on using CC-RH

The following caution was raised.

- Using RH850 Compiler (CC-RH) V1.02.00 with CS+ V4.00.00 or V4.00.01

4.3 Additions to the debug tool

4.3.1 Addition of a facility to simulate current drawn by RL78/G13 products [RL78]

In addition to the simulation of peripheral modules in the RL78/G13, V4.01.00 supports the simulation of current drawn even when the actual MCU (on a board) is not connected. You can use a Python function to view the result of this simulation.

4.3.2 Checking for exclusive control in simulation [RH850]

V4.01.00 supports checking of whether any functions modify memory values from out of specified code (e.g. a range in which interrupts are enabled) even when the actual MCU (on a board) is not connected. That is, the facility of checking for exclusive control is now also applicable with the simulator.

4.3.3 Using an on-chip debugging emulator while the sub-system clock of certain RL78 family products is operating [RL78]

The following caution was raised.

After the setting "System" is made for [Monitor clock] in [Clock] on the [Connect Settings] tab of the property panel of the debugging tool, a communications error may arise between the emulator and MCU so that the debugging tool does not operate correctly when a program is stopped while the sub-system clock is operating.

4.3.4 Added of the version of the GHS compiler it becomes possible to download. [RH850]

The version of the GHS compiler it becomes possible to download in CS+ was added.

- Ver.2015.1.7
- Ver.2015.1.5
- Ver.2014.1.7

4.3.5 Changes to trace of E1/E20 emulator [RH850]

As it is written in a user's manual:hardware of the microcontroller, the microcomputer a trace memory mounts can acquire tracing, and the microcomputer on which a trace memory isn't mounted can't acquire tracing.

4.3.6 Added select of PiggyBack board of RH850/P1M group [RH850]

Available to select of PiggyBack board at the time of debugging of RH850/P1M group.

4.3.7 Removal of the note on setting of [Trace data type] when using an E1 or E20 emulator to debug RX71M series products. [RX]

The following caution was raised.

Only tracing of the "branch" type can be obtained, even if the debug tool is connected after selecting either of the below settings for debugging an RX71M series product in CS+.

- "Branch + Data access" or "Data access" from [Trace data type] of [Trace] in [Debug Tool Setting] in the property panel of the debug tool.

4.3.8 Addition of force reset function [RH850]

The force reset function which a reset or a break compulsorily from a debugger is added when a reset or forced break fails during execution of the user program.

4.4 Additions to the Python console

4.4.1 Addition of Python functions

The following Python functions are added.

Function Name	Functional Overview
debugger.CurrentConsumption.Clear	Clears data on current drawn that have been acquired. [RL78/G13] [Simulator]
debugger.CurrentConsumption.Disable	Disables the acquisition of data on current drawn. [RL78/G13] [Simulator]
debugger.CurrentConsumption.Enable	Enables the acquisition of data on current drawn. [RL78/G13] [Simulator]
debugger.CurrentConsumption.Get	Displays the maximum and average values of data on current drawn that have been acquired. [RL78/G13] [Simulator]
debugger.CurrentConsumption.Information	Displays data on current drawn that have been acquired. [RL78/G13] [Simulator]
debugger.PseudoError.Clear	Clears the states of errors created by pseudo errors. [RH850] [E1/E20/Full-spec emulator]

4.4.2 Addition of parameters for a Python function

The following parameters for a Python function have been added. [RH850]

Function Name	Newly Added Parameter	Description
project.Create	ProjectKind.GHSCCProject	Indicates that a CS+ project is based on an existing project file from the Green Hills Software, Inc.
	Compiler.GHSCC	Selects the compiler from Green Hills Software, Inc.

4.4.3 Addition of Python Classes

The following Python classes are added.

Class Name	Class Overview
CurrentConsumptionInfo	Holds data on current drawn that have been acquired. [RL78/G13] [Simulator]
ProcessorElement	Holds the current PE number when a multi-core MCU is in use. [RH850] [E1/E20/Full-spec. emulator]
debugger.Option.AccessDuringExecution	Selects whether to allow access to memory during execution. [RH850] [E1/E20/Full-spec. emulator]
debugger.Option.MainClockFrequency	Specifies the main clock frequency (numerical value) in units of kHz. [Other than with the RX simulator]
debugger.Option.TracePriority	Selects whether the acquisition of all data or real-time operation should have priority in the acquisition of trace data. [RH850] [E1/E20/Full-spec. emulator]
debugger.Option.TraceTarget	Selects the target of tracing. [RH850] [E1/E20/Full-spec. emulator]

Chapter 5. Points for Caution

This section describes points for caution regarding CS+.

5.1 Points for caution regarding CS+ (general)

5.1.1 File names

The following rules apply to folder and file names.

- Folder and file names
Do not use folder or file names that cannot be created from Windows Explorer.
- Source file names, load module file names, and project file names
File names consist of the characters a-z, A-Z, 0-9, the period (.), the underscore (_), plus sign (+), and minus sign (-).
File names cannot start or end with a period (.).
File names cannot start with a plus sign (+) or minus sign (-).
CS+ is not case-sensitive to file names.
File names may have up to 259 characters, including the path.
Do not use source files with the same file name. Even if they are on different paths, CS+ cannot classify them.
- File names other than the above
File names comply with Windows conventions.
Note that the following characters cannot be used in file names.
\\ : * ? " < > | ;
File names cannot start or end with a period (.) or space.
CS+ is not case-sensitive to file names.
File names may have up to 259 characters, including the path.
- Folder names
Folder names comply with Windows conventions.
Note that the characters below cannot be used in file names.
() , =

5.1.2 Panel display

If your hardware environment does not meet the recommended specifications for CS+, the [Property] panel may appear small and have scrambled contents.

If this happens, move the [Property] panel outside the split panel area.

- Enable [Dockable], and make it a docking panel
- Enable [Floating], and make it a floating panel

5.1.3 User Account Control (UAC) function (Windows Vista, Windows 7)

If the UAC function is disabled on Windows Vista or Windows 7, then if a user without administrator privileges creates a project, and no Device Dependence Information is installed, installation of the Device Dependence Information will begin, but the installation will fail. If the UAC function is disabled, create projects after logging in with administrator privileges.

5.1.4 Problem with a Windows update program

Your computer may suffer a "blue screen" error if you apply the KB2393802 patch published by Microsoft Corporation. If this error occurs, please apply the patch provided by your computer's manufacturer or another source.

5.1.5 Renesas Electronics real-time OS

If you use the real-time operating system for the RX family provided by Renesas Electronics, install CS+ in a folder and path where the names contain no parentheses. If you install it under the 64-bit version of Windows, it will be installed in the "Program Files (x86)" folder by default, and since the folder path includes parentheses, this will produce an error.

5.1.6 Changing microcontrollers

Note the following points for caution when changing the microcontroller.

- The microcontroller can only be changed to another within the same family, since this will correspond to the same build tool (RH850, RX and RL78).
- When changing the microcontroller, do so while the debugger is not connected.
- Save the project before changing the microcontroller.
- Information on pin layout (design tool), code generation (design tool), and debugging (except for watch registration information) are not carried over after the microcontroller has been changed.

5.1.7 Plug-in Manager function

We recommend that the checkbox for the plug-in for the microcontroller that is the target for development is not deselected on the [Basic Function] tabbed page of the [Plug-in Manager] dialog box.

Deselect the checkboxes for the build tool and debugging tool plug-ins that are for microcontrollers that are not the target for development. For example, if only the plug-in for the build tool is deselected, the file to be downloaded by the debugging tool will not be found and an error will occur.

5.1.8 [Editor] panel

- The [Page Setup] dialog box is not available.
- Although there is a [Copy] button on the [Print Preview] toolbar, it does not work.
- When a variable or label is selected and the Jump to Function feature is used from the context menu, execution does not jump to the variable or label.
- The Jump to Function feature will not jump to a static function defined in another file.
- The following notes apply to the editor, when source files with the same name but from different folders are registered with a main project and a sub project, and load modules from both the main project and sub project are downloaded.
 - The address of the main project is displayed on the file.
 - At jumping to a source file from disassembled code, the file registered with the main project is opened.
 - If the file is opened from either project, only one file will be opened.
- The smart edit function does not work correctly for a structure that does not have a name.
- If the arguments of a function include a function call, incorrect information will be displayed in the tooltip.
- Names of member variables and functions are not correctly supplemented by the smart edit function in arrays of classes and of pointers to classes.
- Supplementation does not produce appropriate strings even if a part of a member name is entered and 'ctrl + (space)' is also entered.
- Outlining (collapse/expand) only works with files that have been registered with the project. Any files that have not been registered with the project will not be outlined in the [Editor] panel of CS+.
- On Windows 8.1, the display may become unclear due to anti-aliasing.
- In mixed display mode, if a line number is specified for a jump, the disassembled code is inserted and displayed, so the specified line may not be displayed on the screen.
- If a structure is nested, the smart edit function does not work on the third and subsequent stages. In addition, information is not displayed in the tooltip.
- For the first line of code immediately after '#ifdef - #endif', the smart edit function does not show candidate members. In addition, no tooltip is displayed.
- For the first variable in '#ifdef - #endif', the smart edit function does not show candidate members for the code after '#endif'. In addition, no tooltip is displayed.
- When a file not included in a project is opened, a bookmark is set, the project is closed, the setting for the bookmark in the file is changed, the project is opened again, and the [Bookmarks] dialog box is opened, the dialog box will display the bookmark with the setting when the project was closed while the source window displays the bookmark with the new setting that was made after the project was closed. That is, different settings are displayed for the bookmark in the dialog box and source window. In such cases, close the file and then open it again. The display of the bookmark in the [Bookmarks] dialog box will then reflect the display in the source window.
- When the rectangular selection tool (obtained by holding the Alt key down and then using the mouse to select an area) is used and the selected area is pasted to add lines in and after the last line, the selected area is pasted from the beginning of the line after last regardless of the location specified for pasting. Insert spaces after pasting as required.
- When saving a file in the [Save As] dialog box, the extension listed at the top of the [Save as type] drop-down list is automatically added unless another extension is specified. Note however, that an extension is not added when a file name is input with an extension that is selected in the [Save as type] drop-down list or with an extension that is registered with Windows. When an automatically added extension is not as expected, modify the name of the file by using, for example, Explorer.
- When inputting to [file type] combo box of the [Find and Replace] dialog directly, input only a wildcard

of the file name.

(For example) *.c; *.inc; *.asm

CS+ searches or replaces for a specified character string as the file name.

(For example) Source files(*.c; *.inc; *.asm)

It is recognized as the file name including "Source files(".

- Printing the contents of the Editor panel is not possible in an environment with .NET Framework 4.6 installed. To do so in that case, use an editor other than that of CS+.

5.1.9 Conversion from PM+ to CS+ projects

CS+ cannot read CA850 projects made by PM+ V6.00/V6.10/V6.11 then the Build Mode has been newly added. Handling by CS+ is as follows.

- (1) When [Debug Build] or [Release Build] is specified, information on the added Build Mode cannot be read.
- (2) When the added Build Mode is specified, it leads to an error.

[Workaround]

Use V6.20 or a later version of PM+ to read the project, save it, then read the project into CS+.

5.1.10 Debugging tool settings during project appropriation

When you create a project by appropriate settings from another project, only the settings for the default debugging tool will be imported. In the RX family, however, internal processing is common to the emulator and simulator, so the settings are imported regardless of which debugging tool is selected.

5.1.11 Help

If you close the help while the Search tab is being displayed and you then open the help again and display the [Contents] tab, the Compiler and Build Tool Operation sections may disappear.

If this happens, close the help while the [Contents] tab is being displayed, and then open the online again.

5.1.12 Changing the target device during the process of converting a project

When the target device is changed in the [Project Convert Setting] dialog box while it is open for conversion of a project created by using the High-performance Embedded Workshop, PM+, or an earlier version of CubeSuite, the value chosen in [Kind of project] is returned to the default value (top type in the combo box).

For example:

The setting for [Kind of project] changes to the default type (for example, [Application]) when the device selection is changed.

5.1.13 Converting CA78K0R projects for use with CC-RL

In converting projects created by using CA78K0R to projects for use with CC-RL, conversion will not proceed if the destination folder already contains files with the same names as those of the files to be output. Check that there are no such files in the destination folder before using the converter.

And, in converting projects created by using CA78K0R to projects for use with CC-RL, conversion will not proceed if the folder name of Environment Variables 'TMP' on Windows includes Multi-byte Characters. Check that there are no such folder name in Environment Variables 'TMP' before using the converter.

5.1.14 Converting High-performance Embedded Workshop projects

Attempting to load a High-performance Embedded Workshop project into the CS+ under certain conditions may not be possible, or may lead to an error during conversion or building of the project.

- (1) Converting a High-performance Embedded Workshop project to make it compatible with the CS+ fails when any of the following conditions is satisfied.
 - No toolchain from Renesas Electronics Corp. is selected for the project.
 - The project contains no tps file for use in setting up the High-performance Embedded Workshop environment (the tps file is automatically created when the project is opened through the High-performance Embedded Workshop). To avoid this problem, you should open the project through the High-performance Embedded Workshop once before starting conversion.
 - The project contains multiple CFG files, each of which is used to set up a realtime OS from Renesas Electronics Corp.
- (2) Converting a High-performance Embedded Workshop project to make it compatible with the CS+

succeeds but building of the project leads to an error when any of the following conditions is satisfied.

- Placeholder \$(TCINSTALL) is used in the project.
(TCINSTALL) remains in the project even after conversion but the CS+ does not recognize \$(TCINSTALL). Placeholder \$(TCINSTALL) that has been used as a parameter for [Options] in the High-performance Embedded Workshop is simply passed to the CS+ and may cause an unintended result (e.g. an error) upon building of the project. For this reason, you should manually change \$(TCINSTALL) after converting the project.
- Placeholder \$(WORKSPDIR) is used in the project.
If you select a HEW project file (with extension hwp) in the CS+, this is automatically converted to "%ProjectDir%\.." (the directory above the project directory). An error may occur during building of the project if the workspace does not exist in the directory indicated by "%ProjectDir%\..". For this reason, you should manually change "%ProjectDir%\.." after converting the project.
- A custom build phase is used in the project.
Since all custom phases are deleted upon conversion, an error may occur during building of a project that involved a file output created for a custom build phase in the High-performance Embedded Workshop.
After converting the project, register the custom build-phase command with the CS+ as a command to be executed before or after each phase as required.
- A custom placeholder is used in the project.
Custom placeholders are not converted because the CS+ does not recognize them. Any custom placeholder that has been used as a parameter for [Options] in the High-performance Embedded Workshop is simply passed to the CS+ and may cause an unintended result (e.g. an error) upon building of the project. For this reason, you should manually change the custom placeholders after converting the project.

(3) Other

- (a) \$(FILEDIR) is converted to %FileDir%.
Leaving %FileDir% as it is when the pathname is edited in the [Path Edit] dialog box will lead to the following error: The specified path contains a non-existent folder. (W0205012)
Edit the pathnames and replace %FileDir% with another placeholder or directory name.
- (b) \$(WINDIR) is converted to %WinDir%.
- (c) The order in which folders are displayed in CS+ may differ from that in the High-performance Embedded Workshop.
- (d) If a High-performance Embedded Workshop project for which downloaded files have been specified is loaded into CS+, CS+ will show these files as the second and subsequent items in the list of downloaded files for each debugging tool.
- (e) The compiler option -output=src is converted to -output=obj (default).
- (f) If you load a library project that has been linked to the standard library into CS+, the linkage setting will be discarded (this is indicated in the log information that is output as a result of loading the project).
- (g) If [Use an existing library file] has been selected for the library generator in the High-performance Embedded Workshop, the setting is changed to [Do not add a library file] in CS+. For this reason, linking with the specified library will not proceed (this is indicated in the log information that is output as a result of loading the project).
- (h) Option settings that were made on the [Toolchain Option] tabbed page of the High-performance Embedded Workshop are not converted but discarded (i.e. they are not moved across to CS+).
- (i) If a sub-command file has been selected for the linkage editor in the High-performance Embedded Workshop, the [Use external subcommand file] setting is discarded when the project is loaded into CS+. The linkage editor options will have their default settings.
- (j) Any files specified with the -library, -input, or -binary option will not be listed in the [Link Order] dialog box. The result is that the order of linkage for these files will not be selectable.
- (k) RTOS configuration files will not be displayed under the [Configuration file] category node after the project is loaded into CS+.
- (l) RTOS option settings that were made in the High-performance Embedded Workshop are discarded. RTOS options will have their default settings in CS+.
- (m) The build mode for RTOS projects will be "DefaultBuild" after the project is loaded into CS+. You will need to change the build mode as required.
- (n) The order of linkage of the assembly output files (ritbl.obj) for an RTOS project will differ from that in the High-performance Embedded Workshop.

5.1.15 Creating new projects

Applies to: RX

If a new project is created by selecting [Empty Application[CC-RX]] under the environment for the RX, building the project may lead to the following errors.

- ** L2132 (E) Cannot find "D" specified in option "rom"
- ** L2132 (E) Cannot find "D_1" specified in option "rom"
- ** L2132 (E) Cannot find "D_2" specified in option "rom"

If you encounter these errors, change the setting of [ROM to RAM mapped section] on the [Link Options] sheet in CS+.

5.1.16 Microsoft IME

If you are using Microsoft Office IME 2010, which is included in Office 2010 from Microsoft Corporation, CubeSute+ may output error E2000006.

Since Microsoft Office IME 2010 may have caused this problem, replace it with Microsoft's standard IME or install the KB2687611 module provided by Microsoft Corporation to fix Microsoft Office IME 2010.

5.1.17 Tutorials

The Code Generator Plug-in, Pin Configurator Plug-in and Program Analyzer Plug-in are used in tutorials. Enable them through the [Plug-in Manager] dialog box.

5.1.18 Starting multiple instances of CS+

Two or more instances of CS+ can be started on the same host machine, but if you do so, take note of the points listed below.

- When two or more instances of CS+ are started, the most recent information to have been written is saved in the information file for each user's own PC.
- When two or more instances of CS+ are started, the most recent information to have been written is saved in the information file for the stack analysis tools (including CallWalker).
- When the same project file is used in two or more instances of CS+, the most recent information to have been written is saved.
- When the same project file is used in two or more instances of CS+, do not attempt building from more than one instance at the same time since the names of the output files will be identical.

5.1.19 Smart Browser

Applies to: RH850

When RH850 project is opened, Smart Browser doesn't display the contents of user's manuals and sample code in some cases.

5.1.20 Mentions of "R8C" in user's manuals and online help

"R8C" is mentioned in the user's manuals and online help, but CS+ does not support the R8C family.

5.2 Points for caution regarding build tools

5.2.1 Merging of error information into an error file and parallel build

When merging into an error file and parallel build are enabled at the same time, the error information is not correctly merged into the error file in some cases.

5.2.2 Error messages or warnings output for the last line of source code in a GHS CCRH850 project

When a GHS CCRH850 project is being built and an error message or warning is output for the last line of source code, building is terminated with an error message or warning but note that the display in CS+ will be incorrect on the following points.

(1)[Output] panel

The message is not colored to indicate that it is an error message or warning.

(2)[Error List] panel

The applicable error message or warning will not be displayed.

This note applies to error messages and warnings in the following format.

"<source file name>", At end of source: error #<error number>

"<source file name>", At end of source: warning #<warning number>

5.3 Points for caution regarding design tools

5.3.1 Changing packages

If you change the package name in the pin layout properties, the data input in the device top view and

device pin list will be cleared.

5.3.2 Saving projects

If you save a project that has sub-projects while the [Device Top View] or [Device Pin List] panel is open, then the device top view and device pin list of the last sub-project in the Project Tree will always appear.

5.4 Points for caution regarding debugging tools

The abbreviations listed below collectively denote the corresponding tools in this section.

OCD (serial): E1 Emulator (serial), E20 Emulator (serial)

OCD (JTAG): E1 Emulator (JTAG), E20 Emulator (JTAG)

5.4.1 Low-power consumption modes

Applies to: All debugging tools for RX

When a forced break occurs in a low-power consumption mode (e.g. sleep, stop, or standby) or an instruction that makes the CPU enter a low-power consumption mode is executed during stepped execution, the behavior of the simulator and the emulator will differ as follows.

- Emulator: The forced break leads to release of the CPU from the low-power consumption mode. Furthermore, the CPU will enter the low-power consumption mode during stepped execution.
- Simulator: Transitions to low-power consumption modes (e.g. by a register setting) are not supported. Executing a WAIT instruction causes a break, with the PC placed at the address of the next instruction. During stepped execution, the CPU does not enter the low-power consumption mode and the PC is placed at the address of the next instruction.

5.4.2 Traces over desired intervals

Applies to: Simulator for all devices

If you perform a trace from a trace start event until a trace end event, the simulator will not include the trace end event in the results of the trace. For this reason, if you are using a simulator, set the trace end event one line below the range for which you require display of the trace data.

5.4.3 Adding sub-projects

Applies to: Common to all debugging tools and devices

If you add a sub-project while a debugging tool is connected, downloading and so on may fail. Only add sub-projects while the debugging tool is disconnected.

5.4.4 Breakpoints and other settings becoming invalid

Applies to: Common to all debugging tools and devices

If you use leading underscores to differentiate function or variable names, the debugger may recognize them incorrectly and change the symbols or invalidate breakpoint settings.

This applies in cases such as when you have two functions, one named `_reset` and the other named `__reset`.

5.4.5 Two or more variables having the same name

Applies to: All debugging tools for RX

When two or more variables are defined with the same name in unnamed name spaces of different source files, the [Watch] panel only shows the information on the first variable to be found.

5.4.6 Member-variable pointers

Applies to: All debugging tools for RX

After the member-variable pointer "mp1" defined in the program below is registered with the [Watch] and [Local Variables] panels, the type of the pointer is indicated as "int **", not "int Foo::*".

```
class Foo {
    int m1;
};
int Foo::*mp1 = &Foo::m1;
```

5.4.7 Assigning unions to registers

Applies to: All debugging tools for RX

When a union is assigned to a register, it is assumed that the members of the union are assigned to the lower-order bytes of the register. For this reason, the values of the members will be incorrect when displayed as big endian.

5.4.8 Functions with the same name and char-type parameters

Applies to: All debugging tools for RX

When three functions with char-type parameters are defined as shown below, the address of "Func(signed char)" will not be displayed (i.e. the address of "Func(char)" will be displayed instead).

```
void Func(char);
void Func(signed char);
void Func(unsigned char);
```

5.4.9 Char-type one-dimensional arrays

Applies to: All debugging tools for RX

When a char-type one-dimensional array is assigned to multiple locations in registers or memory as shown below, no character string will be displayed in the value column of the [Watch] or [Local Variables] panel even after the array "array" has been registered with the panel.

```
char array[5] = "ABCD";
```

5.4.10 Changing the priority section among overlaid sections

Applies to: All debugging tools for RX

Changing the priority section among overlaid sections is not immediately reflected in debugger operations. To update the display of addresses in the editor, for example, you need to close the file and open it again. To update the display of variables in the [Watch] panel, execute a single step of the program.

5.4.11 Variables assigned to registers

Applies to: All debugging tools for RX

When the selection for [Scope] in the [Local Variables] panel is not [Current], the values of variables assigned to registers are not displayed correctly. Editing these values is also not possible.

5.4.12 Locations to which variables are assigned

Applies to: All debugging tools for RX

When a defined variable satisfies both of the conditions given below, the [Watch] and [Local Variables] panels indicate the location of the entire variable rather than the location of its member variables.

Conditions:

- (1) The variable is assigned to two or more addresses or registers (i.e. two or more addresses or registers are displayed in the address column).
- (2) A structure-, class-, array-, or union-type member is defined in the variable.

Example:

```
struct Mem {
    long m_base;
};
struct Sample {
    long m_a;
    struct Mem m_b;  <- Condition (2)
};
```

```
main () {
    struct Sample obj;
}
```

Display in the [Watch] and [Local Variables] panels:

"obj"	-	{ R1:REG, R2:REG }	(struct Sample)
L m_a	0x00000000	{ R1:REG }	(long)
L m_b	-	{ R1:REG, R2:REG }	(struct Base)
L m_base	0x00000000	{ R2:REG }	(long)

5.4.13 Casting variables

Applies to: All debugging tools for RX

When a variable is cast to another type in the [Watch] panel, casting of the variable is C-style.

For this reason, the result of casting a class using virtual inheritance to its base class is not the same as the result of the cast within the program

```
class AAA [
    int m_aaa;
} objA;
```

```

class BBB : public AAA { // BBB inherits AAA.
    int m_bbb;
} objB;
class CCC { // CCC does not inherit AAA.
    int m_ccc;
} objC

class AAA* pa = objA;
class BBB* pb = objB;
class CCC* pc = objC;

"(AAA*)pa"           Usable
"(BBB*)pb"           Usable
"(AAA*)pb"           Usable
"(CCC*)pc"           Usable
"(AAA*)pc"           Not usable because pc is considered to point to the top address of AAA.
Image of the cast in a program: (AAA*)((void*)pc)

```

5.4.14 PC entering the sleep state

Applies to: OCD (JTAG) and OCD (serial) for RX

When a PC running Windows Vista or Windows 7 enters the sleep state, debugging by CS+ cannot be continued after the PC reawakes.

Please set up the PC so that it does not enter the sleep state.

5.4.15 Stopping and restarting tracing during program execution

Applies to: All debugging tools for RX

When trace start events and end events have been set, stopping and restarting tracing during program execution is not possible.

5.4.16 Timestamps of trace information

Applies to: OCD (JTAG) and OCD (serial) for RX

The timestamps of trace information will not indicate the right times if the time between frames exceeds that corresponding to the trace counter (20 bits) or when trace output is lost.

5.4.17 Linkage options of CC-RX

Applies to: All debugging tools for RX

CC-RX does not support the '-sdebug' linkage option.

Please set [Outputs debugging information] in the [output] category of the [Link Options] tabbed page to '-debug'.

5.4.18 Return-out command execution

Applies to: All debugging tools for RX

Executing a return-out command from a recursive function may lead to execution stopping at the address of the return instruction in the called function instead of the correct line in the calling function.

5.4.19 Startup program protection

Applies to: OCD (serial) for RX100

Executing a CPU reset after one of the following operations during the execution of a user program will lead to a discrepancy between the contents of ROM as displayed by the debugger and the contents of the actual ROM of the MCU.

In this case, the contents will match after re-executing then stopping the user program.

Calling the R_FCL_ChangeSwapFlag function to immediately swap boot areas

Controlling the flash initial setting register (FISR) to immediately swap boot areas

5.4.20 Coverage measurement function

Applies to: E20 emulator (JTAG) for RX64M

(1) If you connect the emulator by using hot plug-in, the coverage measurement function is not available.

If you use hot plug-in to connect the emulator, please select [No] for [Use code coverage measurement function] in the [Coverage] category of the debugging tool properties.

(2) When the error message "The system was reset." is displayed during program execution, coverage from the start of the program to the system reset will not have been measured.

5.4.21 Breakpoints in for statements or inline-expanded functions

Applies to: All debugging tools for RX

If a line of C source code includes any of the functions or statements listed below, the instruction is placed at two or more addresses. However, the editor panel shows only one of the addresses.

In cases where a breakpoint is set on this line, the program stops only when the instruction at the address being displayed on the editor panel is executed.

1. Inline-expanded function (*)
 2. Template function
 3. First line of a for or do-while statement
- * Includes those inline-expanded by optimization

5.4.22 Trace setting for DMAC/DTC

Applies to: E20 emulator (JTSG) for RX64M

When [DTAC/DTC] is selected for [Bus Master of data access] in the [Trace] category on the [Debug Tool Settings] tabbed page of the Property panel, select [CPU execution] or [Do not output] for [External trace output] in the [Trace] category. If you select [Trace output] for [External trace output], the trace function may not work correctly.

5.4.23 Main clock source setting when PLL is selected as clock source

Applies to: OCD(JTAG),OCD(Serial),RX64M

Please set up the following, when PLL is selected as clock source.

Set the [Main clock source] of the [Clock] category of the [Connection settings] tab of a debug tool property as [EXTAL].

When EXTAL is selected as PLL clock source, set the frequency of EXTAL to [Main clock frequency].

When HOCO is selected as PLL clock source, set the frequency of HOCO to [Main clock frequency].

5.4.24 DMA display of trace panel

Applies to: IECUBE for RL78 and 78K0R

When there is access to SFR/ memory by DMA, character string of "DMA" is not displayed in the trace panel. ("Address" and "Data" of the access to SFR/memory by DMA are displayed correctly.)

5.4.25 Debug Tool Property panel

Applies to: All debugging tools for RH850

The [Use virtual machine and thread] from the [Connect Settings] tabbed page of the property panel, do not change it from "No."

5.4.26 Pseudo-error debugging

Applies to: All debugging tool excluding simulator for RH850

- To cause an RH850/P1x-series MCU to be internally reset by a pseudo-error, set up an ECM pseudo-error trigger register from the user program. A special instruction sequence is required for writing to this register since it is protected. For details, refer to the section of write-protected registers in User's Manual: Hardware for the MCU in use.
- Do not set a breakpoint at the current PC address in pseudo-error debugging. When it is set, interrupts and internal reset will not occur.
- If you wish to set another breakpoint via a source editor or the disassemble panel at the address where a breakpoint has been set for pseudo-error debugging, designate it as a hardware breakpoint. Setting a software breakpoint in this case will lead to an error when pseudo-error debugging is started.

5.5 Points for caution regarding analysis tools

5.5.1 [Analysis Chart] panel

- When the emulator does not support the time tags of the internal trace, the [Analysis Chart] panel cannot be used (E1/E20 for RX).
- When a simulator is specified as the debugging tool in a graph of transitions in values, realtime sampling of IORsis not supported.
- The results on an [Execution Time(Percentage) Chart] may not be exact. This is because the counter for time-lag measurement of the trace is small and may overflow. Please check whether it has overflowed by checking the timestamp of the [Trace] panel (E1/E20 for RX).

5.6 Points for caution regarding the Python Console

5.6.1 Japanese input

The Japanese input facility cannot be activated from the Python Console. To enter Japanese text, write it in an external editor etc., copy it, and paste it into the console.

5.6.2 Display of the prompt

The Python Console prompt ">>>" may be displayed more than once, as in ">>>>>>", results may be displayed after the ">>>", or the caret may appear without a preceding ">>>" prompt. Entering functions is still possible in these situations.

5.6.3 Paths to folders and files

IronPython recognizes the backslash character (\) as a control character. For example, if a folder or file name starts with a "t", then the sequence "\t" will be recognized as a tab character. Please use r + "path_name" to avoid this.

Example: r"c:\test\test.py"

A forward slash (/) can be used instead of a backslash (\).

5.6.4 Executing scripts for projects that do not have load modules

If a script is specified in the startup options for use with a project that does not have a load module file, or if project_file.py is placed in the same folder as the project file, then although the script would have been executed automatically after normal loading of the project, it will not be executed if there is no load module file.

5.6.5 Forced termination

The following actions while a script such as an infinite loop is running may lead to the results of function execution being in error because the actions forcibly terminate the execution of functions.

1. Forcible termination by selecting "Forcibly terminate" from the context menu or pressing Ctrl+D in the Python Console
2. Changing the active project in a project with multiple projects

5.6.6 Forced stopping

Executing "Abort" from the context menu will forcibly stop an executing script or function, but hook and callback functions that had not started at the time the "Abort" was executed will still be executed in order after that.

5.6.7 Executing Python commands during building

Do not issue Python commands while building is in progress.

5.7 Points for caution regarding licenses

5.7.1 Updating CC-RX V2.04.00 and CC-RH V1.03.00

The CC-RX V2.04.00 and CC-RH V1.03.00 compiler have the following two editions.

- standard edition
- professional edition

Start a License Manager to enable the license of "RX License Pack 2 Professional(CC-RX)" and "RH850 License Pack 1 Professional(CC-RH)" registered at present.

Chapter 6. Restrictions

This section describes restrictions on CS+.

6.1 Restrictions imposed by debugging tools

The abbreviations listed below collectively denote the corresponding tools in this section.

OCD (serial): E1 Emulator (serial), E20 Emulator (serial)

OCD (JTAG): E1 Emulator (JTAG), E20 Emulator (JTAG)

6.1.1 List of restrictions imposed by debugging tools

No.	Target tool	Target device	Description	Remarks
1	OCD (serial) OCD (JTAG)	RX64M	Restriction on ID code authentication due to an error	

6.1.2 Details of restrictions imposed by debugging tools

No.1 Condition leading to errors in ID code authentication

Applies to: OCD (serial) and OCD (JTAG) for RX64M

Description: When both of the following conditions are met, an error will occur in ID code authentication making it impossible to continue with debugging.

[Conditions]

1. A device having an ID code setting other than all FF is being debugged in user boot mode.
2. After downloading a program that includes data for the option-setting memory, the CPU is reset by a RESET command, RES# pin reset, or an internal reset.

Workaround: There is no workaround.

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