# CS+ RH850 Compiler CC-RH V2.02.00 Release Note

R20UT4647EJ0100
Rev.1.00
Dec.01.19

Thank you for using the CS+ integrated development environment.

This document describes the restrictions and points for caution. Read this document before using the product.

## Contents

# Chapter 1. Target Devices

The target devices supported by the CC-RH compiler are listed on the Web site.

Please see the URL below.

CS+ Product Page:

http://www.renesas.com/cs+

# Chapter 2. User's Manuals

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

| Name | Document Number |
|---|---|
| CC-RH Compiler User's Manual | R20UT3516EJ0107 |
| CS+ Integrated Development Environment User's Manual:<br>CC-RH Build Tool Operation | R20UT3283EJ0108 |

# 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 [CS+ CC-RH V2.02.00] from [Apps & features] from [Settings] of Windows or from [Programs and Features] of the control panel.

# Chapter 4. Changes

This chapter describes changes to the CC-RH compiler from V2.01.00 to V2.02.00.

Note that the features and changes that are only available to users holding a registered license for the Professional edition are indicated as [Professional edition].

## 4.1 Extensions to the checking of source code against MISRA-C:2012 rules [Professional edition]

The following rule numbers have been added as arguments of the -Xmisra2012 option for checking source code against MISRA-C:2012 rules.

Required rules: **14.2** and **14.3**

Advisory rule: **8.13**

The following shows the number of MISRA-C:2012 rules which can be checked by each revision.

| *Classification of Rules: Number of Rules* | *V2.01.00* | ***V2.02.00*** |
|---|---|---|
| Mandatory rules: 16 | 7 | 7 |
| Required rules: 108 | 88 | **90** |
| Advisory rules: 32 | 26 | **27** |
| Total: 156 | 121 | **124** |

## 4.2 Writing the #pragma section directive within functions

The #pragma section directive can be written within functions.

The section to which each of the following objects are allocated is individually specifiable.

- Static variables within functions
- String literals within functions

## 4.3 Generation of code to produce approximate results

The -approximate option has been added for generating code which produces approximate results for floating-point calculations. Specifying this option leads to the generation of more efficient code to handle calculations but the results of operations will be less precise.

```
<Example of source code>
float func1(float a) {
   return a/0.3f;
}
```

```
<With this option not specified>
_func1:
      mov 0x3E99999A, r2        ; 0.3f
      divf.s r2, r6, r10
      jmp [r31]
```

```
<With this option specified>
_func1:
      mov 0x40555555, r2        ; 3.333....(≈ 1.0f/0.3f)
      mulf.s r2, r6, r10
      jmp [r31]
```

## 4.4 Improvement to code generated for loop processing

Code has been improved so that calculations which satisfy all the following conditions and need not be executed in a loop are executed outside the loop.

- Integer division is in a loop.
- The dividend and divisor for the integer division in the loop have fixed values.
- The divisor is a non-0 constant.

<Example of source code>

```
void update(unsigned int* array, unsigned n, unsigned value) {
  unsigned i;
  for (i = 0; i < n; ++i) {
    array[i] = value / 3;
  }
}
```

<Code output by CC-RH V2.01>

```
  _update:
        mov 0x00000000, r2
        mov 0x00000003, r5
  .BB.LABEL.1_1:  ; bb7
        cmp r7, r2
        bz9 .BB.LABEL.1_3
  .BB.LABEL.1_2:  ; bb
        mov r8, r9
        divhu r5, r9, r0
        st.w r9, 0x00000000[r6]
        add 0x00000004, r6
        add 0x00000001, r2
        br9 .BB.LABEL.1_1
  .BB.LABEL.1_3:  ; return
        jmp [r31]
```

<Code output by CC-RH V2.02>

```
  _update:
        mov 0x00000003, r2
        divhu r2, r8, r0
        mov 0x00000000, r2
  .BB.LABEL.1_1:  ; bb7
        cmp r7, r2
        bz9 .BB.LABEL.1_3
  .BB.LABEL.1_2:  ; bb
        st.w r8, 0x00000000[r6]
        add 0x00000004, r6
        add 0x00000001, r2
        br9 .BB.LABEL.1_1
  .BB.LABEL.1_3:  ; return
        jmp [r31]
```

## 4.5 Improvement of code for calculating absolute values

Code has been improved so that instructions for simply calculating the absolute value are generated in the compiled result of the ternary expression ((f >= 0.0f) ? f : -f) when the -relaxed_math option is specified.

<Example of source code>

```
float absolute(float value) {
   return ((value >= 0.0f) ? value : (-value));
}
```

<Code output by CC-RH V2.01>

```
_absolute:
    mov 0x00000000, r2
    cmpf.s 0x00000004, r6, r2
    trfsr 0
    bz9 .BB.LABEL.1_2
.BB.LABEL.1_1:
    mov r6, r10
    jmp [r31]
.BB.LABEL.1_2:
    negf.s r6, r10
    jmp [r31]
```

<Code output by CC-RH V2.02>

```
_absolute:
    absf.s r6, r10
    jmp [r31]
```

## 4.6 Allowing the specification of the same module names during the generation of a library

The -allow_duplicate_module_name option has been added.

Specifying this option allows the specification of the same module names during the generation of a library.

## 4.7 Rectified points for caution

The following four points for caution no longer apply. For details, refer to Tool News.

- Comparison expressions in a loop (No. 25)
- Mathematical library function atan (No. 26)
- #pragma block_interrupt directive (No. 27)
- Using the -Xalias=ansi option (No.28)

## 4.8 Other changes and improvements

Other major changes and improvements are described below.

(a) Elimination of the output of messages on the results of MISRA-C checking to the standard header
Specifying the -Xmisra2012 option so that source code was checked against the MISRA-C:2012 rules sometimes led to messages on the results of checking being output to the standard header. This has been corrected so that the messages are not output.

(b) Elimination of the output of messages on the results of checking due to the -Xcheck option to the standard header
Specifying the -Xcheck option so that source code was checked for compatibility sometimes led to messages on the results of checking being output to the standard header. This has been corrected so that the messages are not output.

(c) Correction of internal errors
Internal errors sometimes occurred in the build process in previous revisions. These errors have been corrected.

# Chapter 5. Point for Caution

This section states a point for caution regarding CC-RH.

## 5.1 Note on specifying path names

Absolute paths that include drive letters or relative paths can be used as the path names for specifying input/output files or folders.

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