

# Renesas Compilers Professional Editions



Renesas provides standard and professional editions of the licenses for its CC-RL, CC-RX, and CC-RH compilers. In addition to the features of the standard editions, the professional editions provide additional features which help to improve the quality of your programs and shorten development periods. The set of features is to be continuously extended in the future.

Features of the Professional Edition	CC-RL	CC-RX	CC-RH
Checking of Source Code against MISRA-C:2004/2012 Rules	√	√	√
Detection of Stack Smashing	√	√	√
Detection of Illicit Indirect Function Calls	√	√	√
Enhanced Security for Dynamic Memory Management Functions	√	√	√
Half-precision Floating Point	—	—	√
Synchronization Features in the Updating of Control Registers	—	—	√

√ : Supported.  
 — : Support is not planned at present.

## ● Checking of Source Code against MISRA-C:2004/2012 Rules

The compiler checks C source code against large sets of MISRA-C:2004 or MISRA-C:2012 rules and outputs messages if the code violates the rules.

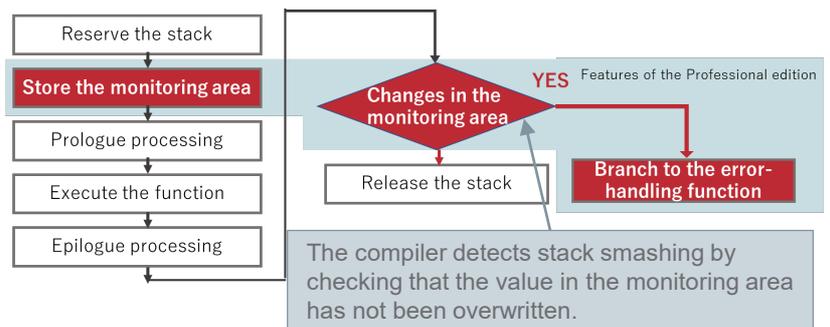
Checking against the rules during compilation enables efficient development and improved quality for programs.

Classification of Rules	MISRA-C:2004	MISRA-C:2012
Mandatory rules	—	7 (16)
Required rules	79 (121)	90 (108)
Advisory rules	13 (20)	27 (32)
<b>Total number of rules</b>	<b>92 (141)</b>	<b>124 (156)</b>

Number of supported rules  
 ( ): Total number of rules

## ● Detection of Stack Smashing

The compiler reserves a monitoring area where an arbitrary value is stored on the stack and checks that the value is still the same after the execution of a function. This method of preventing attacks on security allows the development of programs with improved safety.

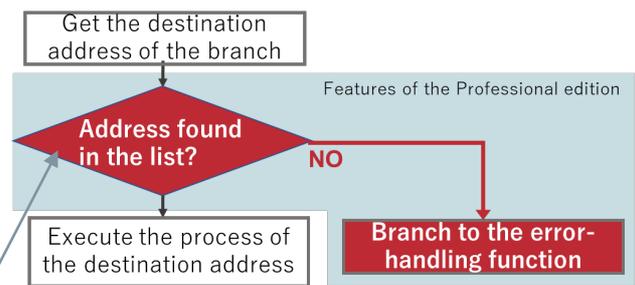


## ● Detection of Illicit Indirect Function Calls

The compiler extracts information on the addresses of functions that may be indirectly called and registers them in a list of such functions, and checks whether or not the information has been registered in the list immediately before a function is called.

Preventing indirect function calls to non-trusted addresses allows the development of programs with improved safety.

The compiler detects illicit indirect function calls by checking that the destination addresses of calls have been registered in the list of functions.

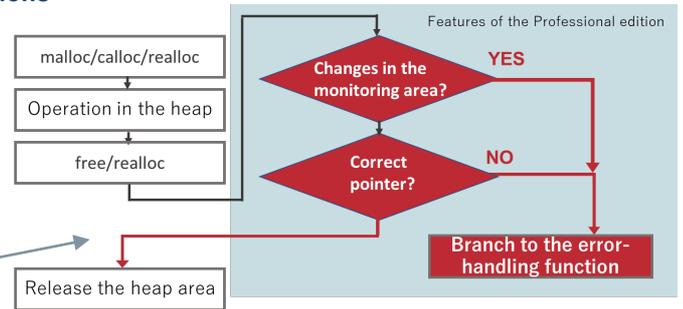


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### ● Enhanced Security for Dynamic Memory Management Functions

When part of the heap is reserved by a call of the calloc, malloc, or realloc function, monitoring areas in which arbitrary values are stored are set up before and after the given area of the heap, and the values are checked when that part of the heap is released. Preventing problems such as releasing memory twice or overflows in the heap in this way enables the development of programs with enhanced security.

Checking that the values stored in the monitoring area have not been overwritten enables detection of smashing in the heap.



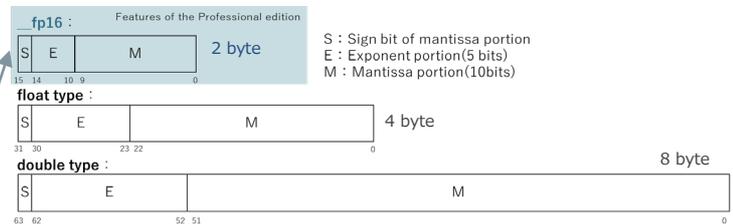
### ● Half-precision Floating Point



A 2-byte half-precision floating-point type is supported.

Where the use of this type is acceptable, this can allow the compiler to reduce the size of programs that contain large amounts of floating-point data.

The `__fp16` type is a 2-byte half-precision floating-point type.

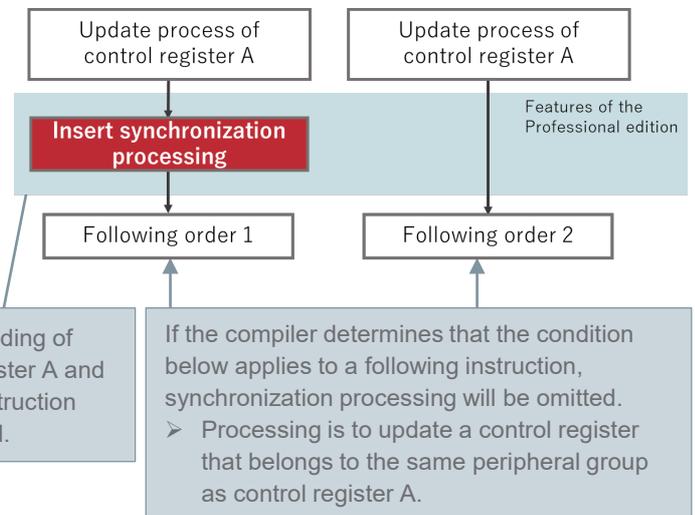


### ● Synchronization Features in the Updating of Control Registers



Synchronization processing is inserted when control registers are successively updated to make the order of updating match that in which the relevant instructions are written in the source file. This feature can reduce the load on users by relieving them of the need to determine the necessity of synchronization processing and its manual insertion.

You can use this feature by specifying the address ranges of peripheral groups with CC-RH language extension. If you are using an MCU which incorporates the G4MH core, the automatic generation of a file containing this language extension is available.



Dummy reading of control register A and a syncp instruction are inserted.

**Detailed information** We provide [an application note for the professional editions](#) (using R20UT4026 as a search keyword).  
This comes with examples of C source code that can be copied and pasted; and that demonstrate how you can make use of the various features of the professional edition.

**Edition Upgrade License**  
If you have a node-locked license for a standard edition, you can upgrade from the standard edition to a professional edition by additionally purchasing an **edition upgrade license**.  
Note that this form of upgrade (of the edition) is only for node-locked licenses; it does not apply to floating licenses and annual licenses.

### ● Part Numbers

For the part numbers, refer to the following web pages for the compiler packages.

CC-RL: [https://www.renesas.com/rl78\\_c](https://www.renesas.com/rl78_c)

CC-RX: [https://www.renesas.com/rx\\_c](https://www.renesas.com/rx_c)

CC-RH: [https://www.renesas.com/rh850\\_c](https://www.renesas.com/rh850_c)

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