[Featured Tool]

Reduce the Program Data Size with Ease!

Introducing Half-Precision Floating-Point Feature in Renesas Compiler Professional Edition

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Overview

Here we introduce one of the additional functions of Renesas compiler professional edition: half-precision floating-point format. [Applicable compliers: C Compiler Package for RH850 Family (CC-RH) V1.05.00 or above]

By using half-precision floating-point format data, you can reduce data size in programs containing a lot of floating-point data.

1. Features

1.1 Reduction in Program Data Size

CC-RH supports 2-byte floating-point format (in addition to the typical 4- and 8-byte floating-point type formats). This data type is called half-precision floating-point, and can be defined as __fp16 type.

Using half-precision floating-point data can greatly reduce the data size of a program.

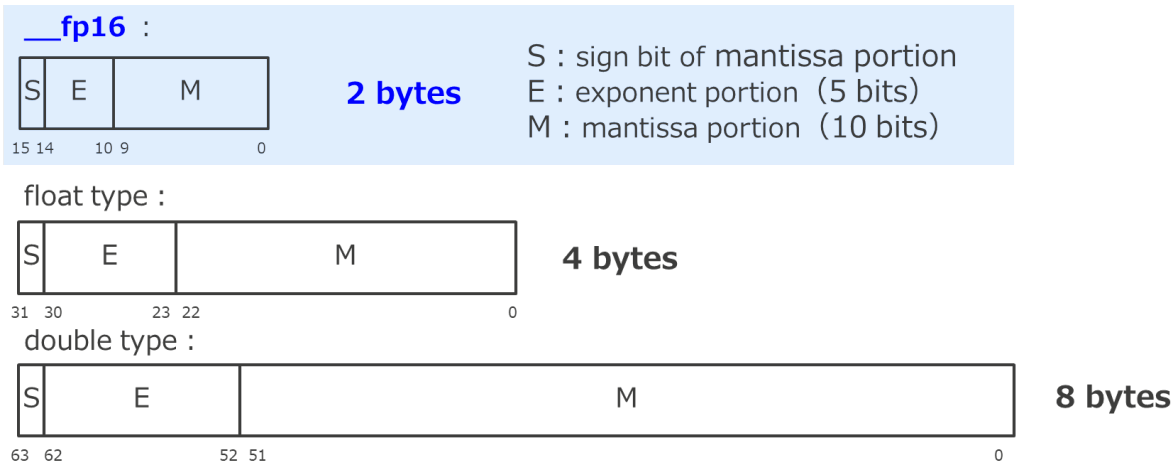


Figure 1. Data Size Comparison between __fp16, float, and double Types.

1.2 Ease of Use: Just Define Floating-point Type as __fp16 type

__fp16 type half-precision floating-point format uses FPU instructions to convert data from half-precision to single-precision to compute the data as single-precision floating-point data. It then uses FPU instructions again to convert the data back from single-precision to half-precision. These codes are automatically generated by CC-RH, so all you need to do to reduce the size of floating-point data is to replace float or double type in your C code with __fp16 type.

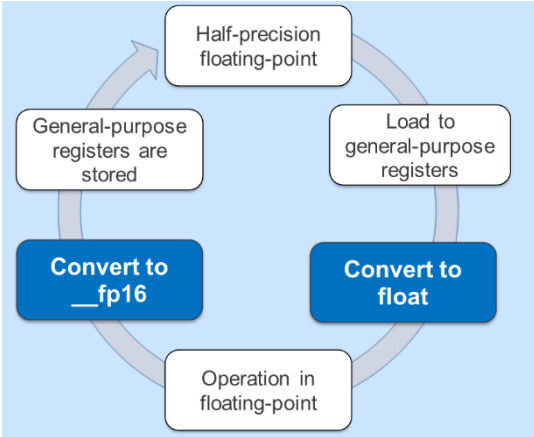


Figure 2. CC-RH Generated Code

2. How to Specify Options

If you are using the CS+ Integrated Development Environment, you can specify options on the GUI.

You can easily enable or disable the half-precision floating-point type from the following property:

[Compile Options] tab > [Output Code] category > [Enable half precision floating-point type] property.

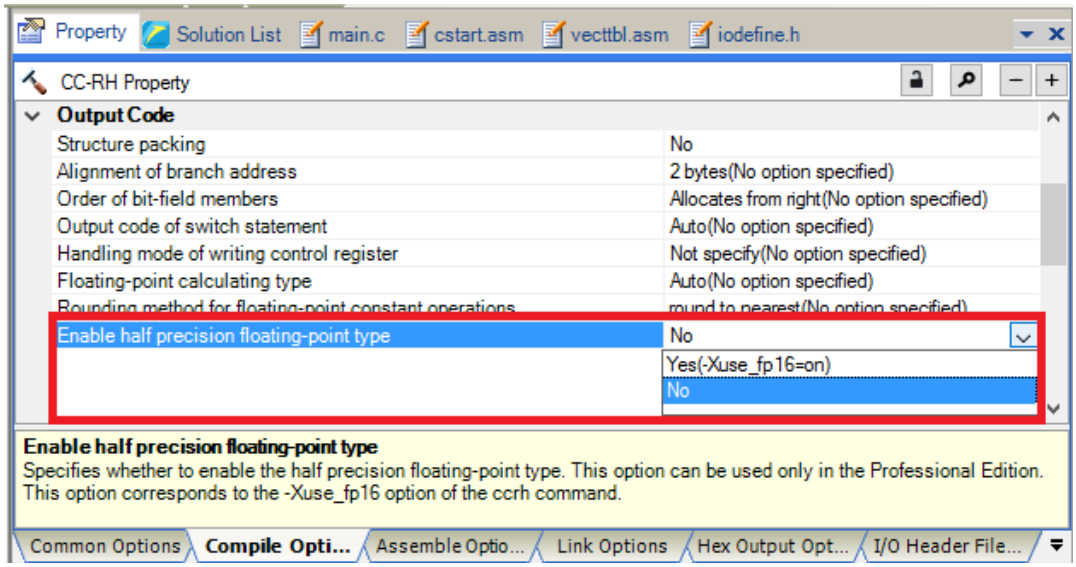


Figure 3. Specification in CS+

Note that Half-precision floating-point format cannot be specified in an MCU with a G3K core.

3. Other Functions of Professional Edition

The professional edition offers more additional features as below.

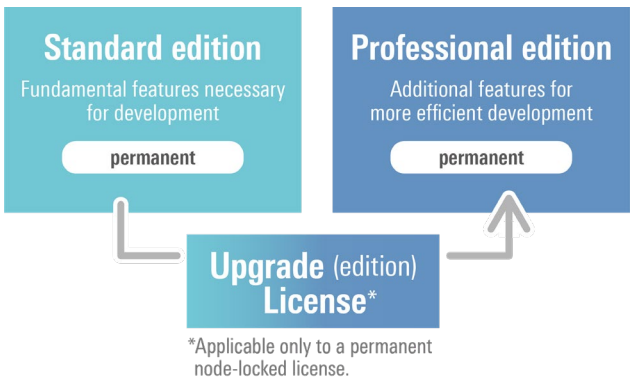
- Checking Source Code against MISRA-C:2004/2012 Rules
  The source code is checked against MISRA-C rules during compilation for efficient program development and quality improvement.
- Detection of Stack Smashing
  Stack overflow or security attack is prevented for safer program development.
- Enhancing the Safety of Dynamic Memory Management
  Double-freeing or overflow of a heap area is prevented for safer program development.
- Detection of Illegal Indirect Function Calls
  Indirect function calls to untrustworthy addresses are prevented for safer program development.
- Synchronization in the Updating of Control Registers
  Workload for determining if insertion of synchronization processing is required and for inserting it manually is reduced.

For details about the functions of the Renesas compiler professional edition, refer to the following application note. The application note describes the functions that enable better quality programs to be delivered to customers within shorter development periods. Example of C sources that you can immediately try by copying and pasting are also provided.
https://www.renesas.com/document/apn/renesas-compilers-application-note-professional-editions
Renesas compiler professional edition: Compiler

4. Purchasing the Product

For product ordering, contact your local Renesas Electronics marketing office or distributor.

Customers who have standard edition node-locked licenses can upgrade their compilers from Standard edition to Professional edition by additionally purchasing the upgrade (edition) license.



For product part names, refer to the web pages for the following complier packages.

CC-RL: https://www.renesas.com/rl78_c

CC-RX: https://www.renesas.com/rx_c

CC-RH: https://www.renesas.com/rh850_c

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Dec.01.20	-	First edition issued

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