

[Notes]

R20TS0469EJ0100

Rev.1.00

C Compiler Package for RH850 Family

Sep. 01, 2019

Outline

When using the C compiler package for RH850 family CC-RH, note the following point.

1. Mathematical library function `atan` (No.26)

* The number after the note is the note's identification number.

1. Mathematical Library Function `atan` (No.26)**1.1 Applicable Products**

CC-RH V1.00.00 to V2.01.00

1.2 Details

If the absolute value of the argument of the math library function `atan` is larger than $3.59539e+307$, the return value becomes invalid: ± 1.373400766945016 is returned instead of an expected value of ± 1.570796326794897 .

1.3 Conditions

- For CC-RH V1.02.00 to V2.01.00

The return value becomes invalid when all the following conditions (1) through (3) are met.

- (1) The absolute value of argument of `atan` is larger than $3.59539e+307$.
- (2) A library that uses the FPU^(Note) is linked.
- (3) The `-Xdbl_size=8` option is specified.

- For CC-RH V1.00.00 to V1.01.00

The return value will be invalid when both of the following conditions (1) and (2) are met.

- (1) The absolute value of argument of `atan` is larger than $3.59539e+307$.
- (2) A library that uses the FPU^(Note) is linked.

Note: The following are the applicable libraries (located directly under `<Installation path>\CS+CC\CC-RH\<Version number>\lib\v850e3v5\`).

- `libm.lib`
- `rhf8n.lib`
- `rhf8z.lib`

Note that this does not apply to `libm.lib`, which is located under `<Installation path>\CS+CC\CC-RH\<Version number>\lib\v850e3v5\softfloat\`.

1.4 Examples

Below is an example of the error. The parts corresponding to the error conditions are shown in red.

[C source]

1:	volatile double x, y;
2:	void func(void) {
3:	x = 3.59540e+307; // Condition (1)
4:	y = atan(x);
5:	}

Line 3:

Condition (1) is met because a value larger than 3.59539e+307 is specified as the variable for the argument of *atan*.

Line 4:

The *atan*'s return value is 1.373400766945016, which is invalid.

1.5 Workaround

As shown in the example below, check if the argument of *atan* meets condition (1)^(Note). If condition (1) is met, set ± 1.570796326794897 as the return value instead of the return value of *atan*.

Note: The return value of the *atan* function that handles 8-byte floating-point type converges to $\pm\pi/2$ when the absolute value of the argument exceeds approximately 10^{17} . Therefore, $\pm 1e+307$ is used as the decision value for the argument in the example below.

[C source]

1:	volatile double x, y;
2:	void func(void) {
3:	if (x > 1e+307) // Check if x is larger than 1e+307.
4:	y = 1.570796326794897;
5:	else if (x < -1e+307) // Check if x is smaller than -1e+307.
6:	y = -1.570796326794897;
7:	else
8:	y = atan(x);
9:	}

1.6 Schedule for Fixing the Problem

This problem will be fixed in the next version. The release date has not yet been determined.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Sep.01.19	-	First edition issued

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