

[Notes]

R20TS0468EJ0100

Rev.1.00

C/C++ Compiler Package for SuperH Family

Sep. 01, 2019

Outline

When using the C/C++ compiler package for SuperH family, note the following point.

1. Mathematical library function `atan` (No.100)

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

1. Mathematical Library Function `atan` (No.100)

1.1 Applicable Products

C/C++ Compiler Package for SuperH family V9.00 Release 00 to V.9.04 Release 03

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

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

- (1) One of the following options is specified.
 - `-cpu=sh2afpu`
 - `-cpu=sh4`
 - `-cpu=sh4a`
- (2) The `-fpu=single` option is not specified.
- (3) The absolute value of argument of `atan` is larger than $3.59539e+307$.

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 (3)
4:     y = atan(x);
5: }
```

Line 3:

Condition (3) 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 (3)^(Note). If condition (3) 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

There is no schedule for fixing this problem.

Revision History

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

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