

[Notes]

R20TS0468EJ0100

Rev.1.00

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**C/C++ Compiler Package for SuperH Family**

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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:  $\pm 1.373400766945016$  is returned instead of an expected value of  $\pm 1.570796326794897$ .

**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)<sup>(Note)</sup>. If condition (3) is met, set  $\pm 1.570796326794897$  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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