[Notes]

C/C++ Compiler Package for RX Family

R20TS0473EJ0100
Rev.1.00
Sep. 01, 2019

Outline

When using the C/C++ compiler package for RX family CC-RX, note the following point.

1. Mathematical library function atan (No.53)

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

1. Mathematical Library Function atan (No.53)

1.1 Applicable Products

CC-RX V1.00.00 to V3.01.00

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

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 is generated by using the -fpu option.

(3) The -dbl_size=8 option is specified.

1.4 Examples

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

[C source]

```
1:  #include <math.h>
2:  volatile double x, y;
3:  void func(void) {
4:      x = 3.59540e+307;       // Condition(1)
5:      y = atan(x);
6:  }
```

Line 4:

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

Line 5:

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 ±π/2 when the absolute value of the argument exceeds approximately 10^{17}. Therefore, ±1e+307 is used as the decision value for the argument in the example below.

[C source]

```
1:  #include <math.h>
2:  volatile double x, y;
3:  void func(void) {
4:      if ( x > 1e+307 )               // Check if x is larger than 1e+307.
5:          1.570796326794897:
6:      else if ( x < -1e+307 )         // Check if x is smaller than -1e+307
7:          -1.570796326794897:
8:      else
9:          y = atan(x);
10: }
```

1.6 Schedule for fixing the problem

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

Revision History

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

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