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: $\pm1.373400766945016$ is returned instead of an expected value of $\pm1.570796326794897$.

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^{37}. 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

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