[Notes]

C Compiler Package for RL78 Family

Outline

When using the C compiler package CC-RH for RL78 family, note the following point.

1. Mathematical library function atan (CCRL#024)
   * The number after the note is the note's identification number.

1. Mathematical Library Function atan (CCRL#024)

1.1 Applicable Products

   CC-RL V1.01.00 to V1.08.00

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 both of the following conditions (1) and (2) are met.
   (1) The -dbl_size=8 option is specified.
   (2) 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] (when the -dbl_size=8 option is specified.)

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

   Line 3:

   Condition (2) 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 \( \text{atan} \) meets condition (2)\(^{(\text{Note})}\). If condition (2) is met, set \( \pm1.570796326794897 \) as the return value instead of the return value of \( \text{atan} \).

Note: The return value of the \( \text{atan} \) 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, \( \pm1e+307 \) is used as the decision value for the argument in the example below.

[C source] (when the \(-\text{dbl}\_\text{size}=8\) option is specified.)

```c
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 is scheduled to be fixed in CC-RL V1.09.00.
# Revision History

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