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Note on Using CS+ CA850 Compiler

When using CS+ CA850 Compiler (for V850E1 core and V850ES core), take note of the following problem:

- With using the .shword assembler directive (No. 113)
NOTE: The number at the end of the above item is for indexing the problems in this compiler.

Notification: The product name of CubeSuite+, an integrated development environment from Renesas, has been changed to "CS+."

1. Versions Concerned

CS+ CA850 Compiler V1.00 through V3.50

2. Description

When the .shword assembler directive (NOTE) is used to secure two bytes, the highest-order bit (the sign bit) may be truncated since its value does not fit into the two bytes. Nonetheless, assembly proceeds without the output of error or warning messages.

NOTE: The .shword is a directive that secures two bytes, and the value used in initialization is specified by the operand shifted rightwards by one bit.
It is used to set up the branch tables in the table jump format with the switch instruction.

When the value of the operand satisfies condition (a) or (b) below, the highest-order bit (the sign bit) is truncated since its value does not fit into the two bytes.

- (a) Between 10000H(65536) and 1FFFFH(131071)
- (b) Between FFFE0000H (-131072) and FFFEFFFH (-65537)

If the .shword satisfies the condition above and it is used to set up the branch tables in the table jump format with the switch instruction,

the branches are made to incorrect addresses with the switch instruction.

When a C source file satisfies the conditions below, code in the table jump format that uses the switch instruction and .shword directive is generated.

- The V850E/V850ES/V850E2 core is selected.
- In a source file exist a switch statement.
- In the switch statement exist four or more case labels.
- The difference between the maximum and minimum values of the case labels is less than 3 times of the number of the case labels.

If the .shword directive satisfies this problem, the branch table that is generated is incorrect and the branches are made to incorrect addresses by the switch instruction.

Example: assembly source

```
-----  
switch r10  
.L0:  
.shword .L1 - .L0  
.shword .L2 - .L0  
.shword .L3 - .L0  
/* Each line containing a .shword directive secures two bytes, */  
/* and the value obtained by shifting the value of operand */  
/* to the right by one bit is used in initialization. */  
/* At this time, if the highest-order bit (the sign bit) is */  
/* truncated, the branch table that is generated will be */  
/* incorrect. */  
  
.L1:  
Processing A  
.L2:  
Processing B  
.L3:  
Processing C  
-----
```

3. Workarounds

When the .shword directive is directly used in the assembly file, change the value of the operand so that it does not satisfy the condition for the restriction.

Specifically, where the .shword directive in an assembly file generated by compiling a C source file satisfies the condition, take either of

actions (1) or (2) below.

(1) Change the branch table from two bytes to four bytes

In CS+, specify "4 bytes (-Xword_switch)" from the [Compiler Options] tabbed page -> [Output Code] Category -> [Label size of switch table].

In PM+, select [Tool] menu -> [Compiler Options] dialog box -> [Output Code] tabbed page -> [Use Word Switch Table].

(2) Change the setting so that code in the table jump format is not generated for the switch statement

Specify ifelse or binary with the -Xcase option.

In CS+, specify either "if-else(-Xcase=ifelse)" or "Binary search (-Xcase=binary)" from the [Compile Options] tabbed page -> [Output Code] Category -> [Output code of switch statement].

In PM+, specify either "if-else[-Xcase=ifelse]" or "Binary search (-Xcase=binary)" from the [Tool] menu -> [Compiler Options] dialog box -> [Output Code] tabbed page -> [Output Code of switch statement].

4. Schedule for Fixing the Problem

This problem will be fixed in a later revision of the product.

(The next release date has not yet been determined.)

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