

A Note on Using the C/C++ Compiler Package V.9 for the SuperH RISC engine Family of MCUs

Please take note of the following problem in using the C/C++ compiler package V.9 for the SuperH RISC engine family of MCUs:

- With multiplying a variable of type unsigned short and that of unsigned char (SHC-0072)

1. Product and Version Concerned

The C/C++ compiler package for the SuperH RISC engine family
V.9.01 Release 00

2. Description

Multiplying a variable of type unsigned short and that of unsigned char may bring an incorrect result.

Conditions:

This problem may occur if the following conditions are all satisfied:

- (1) The optimization level is set to 1 (optimize=1) by an optimizing option.
- (2) Any of the CPU options except cpu=sh1 is selected.
- (3) A multiplication between a variable of type unsigned short and that of unsigned char is performed.

Example :

```
-----  
unsigned char a = 0xff;  
unsigned short b = 1;  
int c;  
main(){  
    c = a * b; // Condition (3)  
}
```

```
-----  
MOV.B    @R5,R5    ; a One-byte-length zero extension  
          not performed for R5  
MOV.W    @R1,R1    ; b  
MULU.W   R5,R1  
-----
```

Workarounds:

Avoid this problem by using any of the following ways:

- (1) Set the optimization level to 0 (optimize=0) or debug_only (optimize=debug_only).
- (2) Use sh1 (cpu=sh1) as a cpu option.
- (3) Zero-extend the variable of type unsigned char by one byte explicitly.

In the above example, for instance, modify the expression satisfying Condition (3) as follows:

Original: $c = a * b;$

Modified: $c = (\text{unsigned short})(a\&0xff) * b;$

3. Schedule of Fixing the Problem

We plan to fix this problem in the next release of the product, V.9.01 Release 01.

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