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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MSC TECHNICAL NEWS

No.M16C-01-9607

Note on using the shift instructions of the M16C/60 series (Rev.B)

Note on using the shift instructions are shown as follows:

1. Related devices

M16C/60 series

2. Symptom

When executing the shift instruction by shifting left using an immediate, a right shift may occur. This happens only when executing the shift instruction (1) as shown and R1H is "0016", and then executing the shift instruction (2) as shown:

(1) R1H indicates the number of bits to shift. (See 4-1.)

(2) An immediate indicates the number of bits to shift (only when shifting to the left). (See 4-2.)

3. Example

When executing this program, the 1st shift instruction shifts R0 by the contents of R1H. The 2nd shift instruction shifts R2 by 3 bits to the left. However, if executing the 1st shift instruction with R1H equal "0016", the 2nd shift instruction shifts R2 by 3 bits to the right.

SHL.W R1H,R0 The 1st shift instruction

SHL.W #3,R2 The 2nd shift instruction

4. Related shift instructions

4-1. The following instructions are intended for the 1st shift instructions:

SHA.size R1H,dest

SHL.size R1H,dest

ROT.size R1H,dest

4-2. The following instructions are intended for the 2nd shift instructions (only when shifting to the left):

SHA.size #IMM,dest

SHL.size #IMM,dest

ROT.size #IMM,dest

5. Solution

Inserting an instruction (e.g. NOP) between the 1st shift instruction and the 2nd shift instruction eliminates the problem.