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April 1st, 2010
Renesas Electronics Corporation

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M16C/62P Group

Operation of Timer A (2-Phase Pulse Signal Process in Event Counter, Free-Running, Multiply-by-4, and Z-Phase Selected Mode)

1. Abstract

In this mode, timer A3 counter can be set to "0" by selecting Z-phase input. Figure 1 shows the operation timing and Figure 2 shows the set-up procedure. A sample program is an example which is based on the setting procedure of Figure 2, using INT2 interrupt.

2. Introduction

The explanation of this issue is applied to the following condition:

Applicable MCU: M16C/62P Group

The program on this application note can also be used when operating other microcomputers within the M16C Family, provided they have the same SFR (Special Function Registers) as the M16C/62P Group. However, some functions may have been modified. Refer to each device's hardware manual for details. Use functions covered in this application note only after careful evaluation.

3. Settings

The Z-phase input function can be used only when the timer A3 event counter mode, 2-phase pulse signal process, free-running, and multiply-by-4 mode are selected. The Z-phase is input from a ZP pin.

4. Operation

- A) When the count start flag is set to "1", the counter starts counting valid edges of the count source.
- B) If the counter underflows, the content of the reload register is not reloaded but the counter continues counting. At this time, the IR bit in the TA3IC register is set to "1".
- C) If the counter overflows, the content of the reload register is not reloaded but the counter continues counting. At this time, the IR bit is set to "1".
- D) When a rising edge is input to Z-phase (ZP pin (INT2 input)), the timer count value is set to "1" and the IR bit is set to "1" simultaneously.

Notes:

- The Z-phase is input when the INT2 input edge is detected. The edge polarity is selected by the POL bit in the INT2IC register.
- The Z-phase must have a pulse width greater than 1 cycle of the timer A3 count source.
- Set the direction register for TA3IN and TA3OUT pins to "0".
- Note that a timer A3 interrupt request occurs successively two times when a timer A3 underflows and an INT2 input reloads at the same timing. Do not use the timer A3 interrupt request when this function is used.

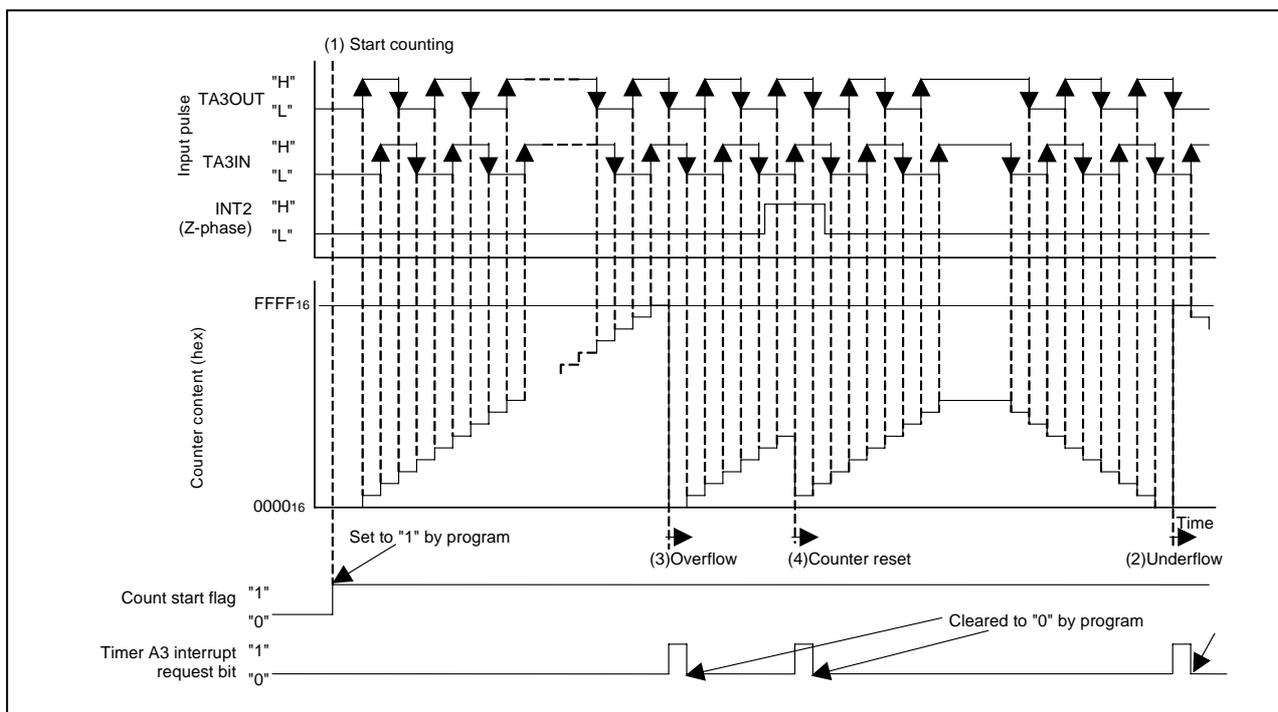
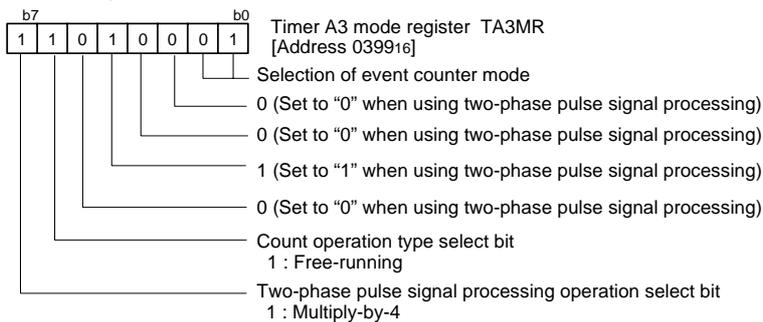
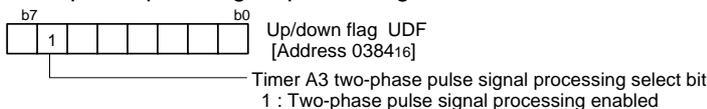


Figure 1. Operation timing of 2-phase pulse single process in event counter mode, multiply-by-4 mode, and Z-phase input selected

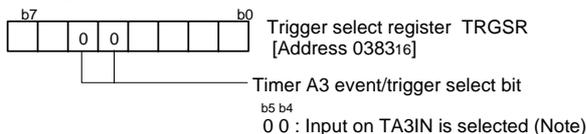
Selecting event counter mode and functions



Two-phase pulse signal processing select bit

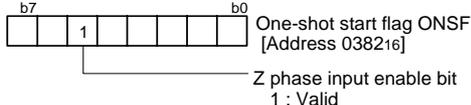


Setting trigger select register

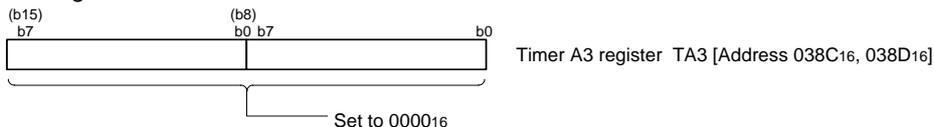


Note: Set the corresponding port direction register to "0".

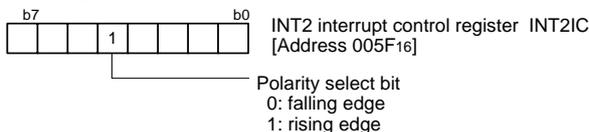
Setting one-shot start flag



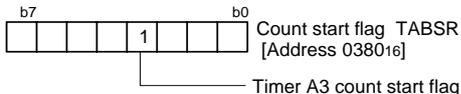
Setting counter value



Setting Z-phase (INT2) input polarity



Setting count start flag



Start count

Figure 2. Set-up procedure of 2-phase pulse single process in event counter mode, multiply-by-4 mode, and Z-phase input selected

5. Reference Program

Please find the reference program from the Renesas Technology Web site.
Click Application Note in the left menu of the M16C/60 Series top page.

6. Reference Documents

Hardware manual

M16C/62P Group (M16C/62P, M16C/62PT) Hardware Manual

(Use the most recent version of the document on the Renesas Technology Web site.)

Technical news/Technical update

(Use the most recent version of the document on the Renesas Technology Web site.)

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Revision

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