To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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Renesas Electronics Corporation

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RENESAS TECHNICAL UPDATE

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Product Category	MPU&MCU		Document No.	TN-32R-A071A/E	Rev.	1.00
Title	Timer TIO, TOD, TOM, TOU: About reload update timing in PWM output mode		Information Category	Technical Notification		
Applicable Product	32170/32174 Group, 32171 Group, 32172/32173 Group, 32176 Group 32180 Group, 32182 Group, 32186 Group, 32192/32196 Group	Lot No. --	Reference Document	Hardware Manual		

When using Timer TIO, TOD, TOM, TOU in PWM output mode, the cautions about reload update timing of Reload 0 Register value and Reload 1 Register value is shown below.

[[Contents]]

When write in Reload 0 Register and Reload 1 Register more than twice during PWM output mode operation in PWM period, it is possible to be outputted PWM waveform in Reload 0 Register value written before and Reload 1 Register value written last time. And from next PWM period it is operated by Reload 0 Register value and Reload 1 Register value last time.

[[Occurrence Conditions]]

When it is met the conditions below, PWM waveform is outputted in Reload 0 Register value written before and Reload 1 Register value written last time.

Condition 1: After capturing PWM output period of Reload 0 Register in the old PWM output period, write Reload 0 Register.

Condition 2: Rewrite Reload 1 Register before capturing PWM period of the new PWM output period, write Reload 0 Register after capturing PWM period.

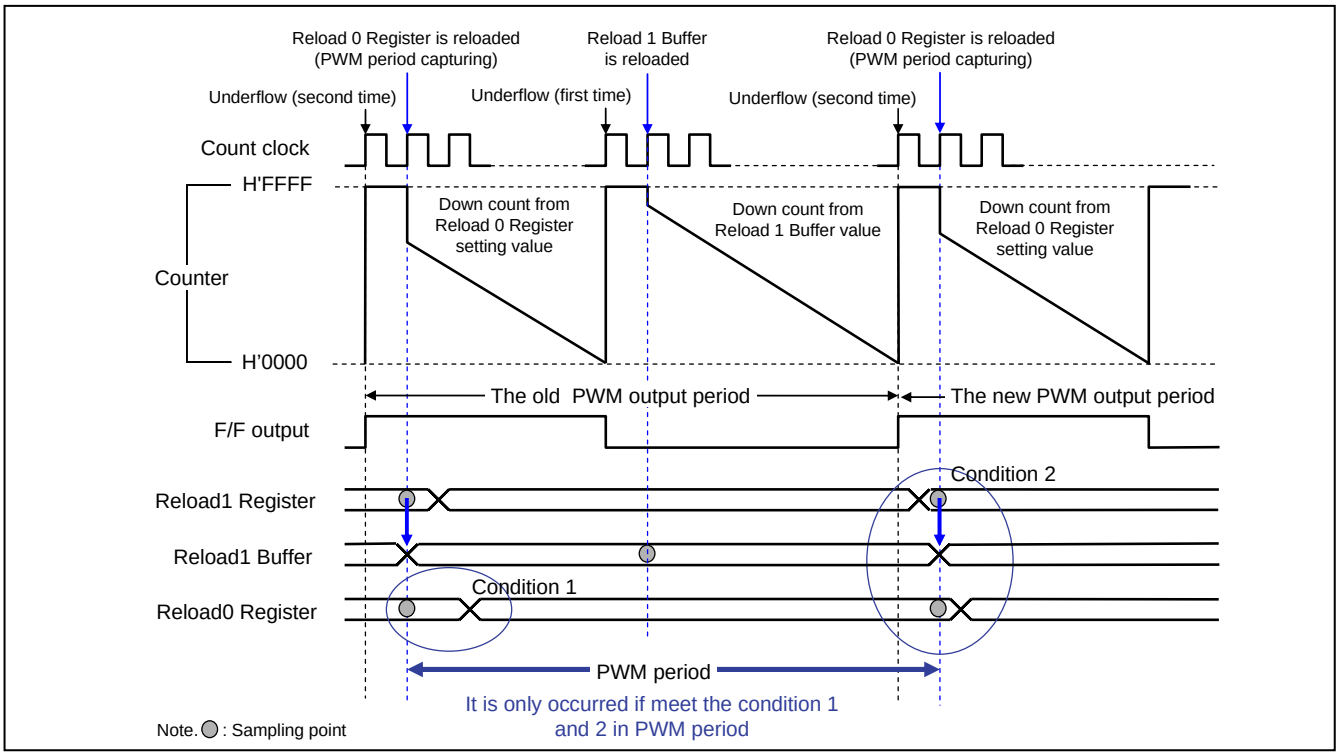


Figure1. Update timing of PWM period

[[Solutions]]

On period from Underflow (second time) to reloading Reload 0 Register in Figure1 (status counter value is H'FFFF), Solutions by modified software should be done to avoid writing to Reload 1 Register and Reload 0 Register.

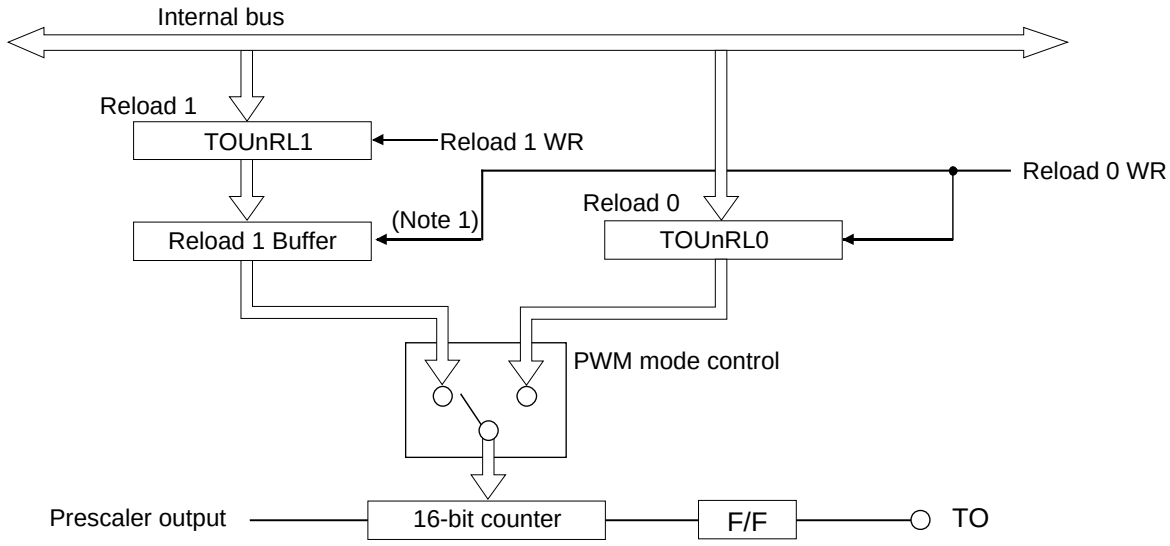
Solution 1: By reading counter value when write to Reload 1 Register and Reload 0 Register, distinguish finishing timing for PWM period, and write to Reload 1 Register and Reload 0 Register not to cross over PWM period.

Solution 2: When writing to Reload 1 Register and Reload 0 Register by using interrupt, set prescaler value of counter as small as possible. By setting prescaler value of counter as small as possible, write to Reload 1 Register and Reload 0 Register after status of H'FFFF on counter value in PWM period.

Solution 3: Writing to Reload 1 Register and Reload 0 Register should be less than once in one PWM period. (Make rewrite period of Reload Register longer for PWM period)

[[Reference]]

PWM circuit diagram is shown in Figure2; Timer list corresponding to PWM output mode for each type of products is shown in Table1.



Note1. It is transferd from Reload 1 Register to Reload 1 Buffer when Reload 0 Register is reloaded after updating Reload 0 Register during counter operation.

Figure2. PWM circuit diagram

Table1. Timer list corresponding to PWM output mode for each type of products

Products type	Timer corresponding to PWM output mode
32170/32174	TIO, TOD, TOM
32171	TIO
32172/32173	TOM
32176	TIO
32180	TIO, TOU
32182	TIO
32192	TIO, TOU
32196	TIO, TOU
32186	TIO, TOU