

To our customers,

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## H8S/2200 Series

### Output of Count-specified Pulses

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#### Introduction

Outputs as many 50% duty pulses as required (1 to 256).

#### Target Device

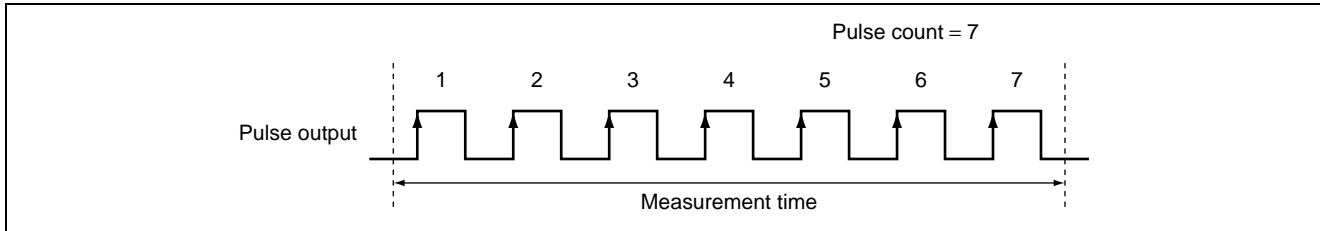
H8S/2215

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### 1. Specifications

1. As shown in figure 1, this sample task outputs as many 50% duty pulses as required.
2. The pulse cycle can be set to 1.5  $\mu\text{s}$  to 127.5  $\mu\text{s}$  in increments of 0.5  $\mu\text{s}$  in 16-MHz operation.  
The number of pulses to be output can set from 1 to 256.



**Figure 1 Pulse Output Timing**

## 2. Description of Functions

1. The block diagram of the 8-bit timer to be used by this sample task is shown in figure 2. This sample task uses the following functions:
    - A. Function that cascade connects the 2-channel 8-bit timer and counts channel-0 compare match according to the channel-1 timer (compare match count mode)
    - B. Function that generates an interrupt to the set count.
- This sample task uses the functions as shown in figure 2 to count pulse rising edges.

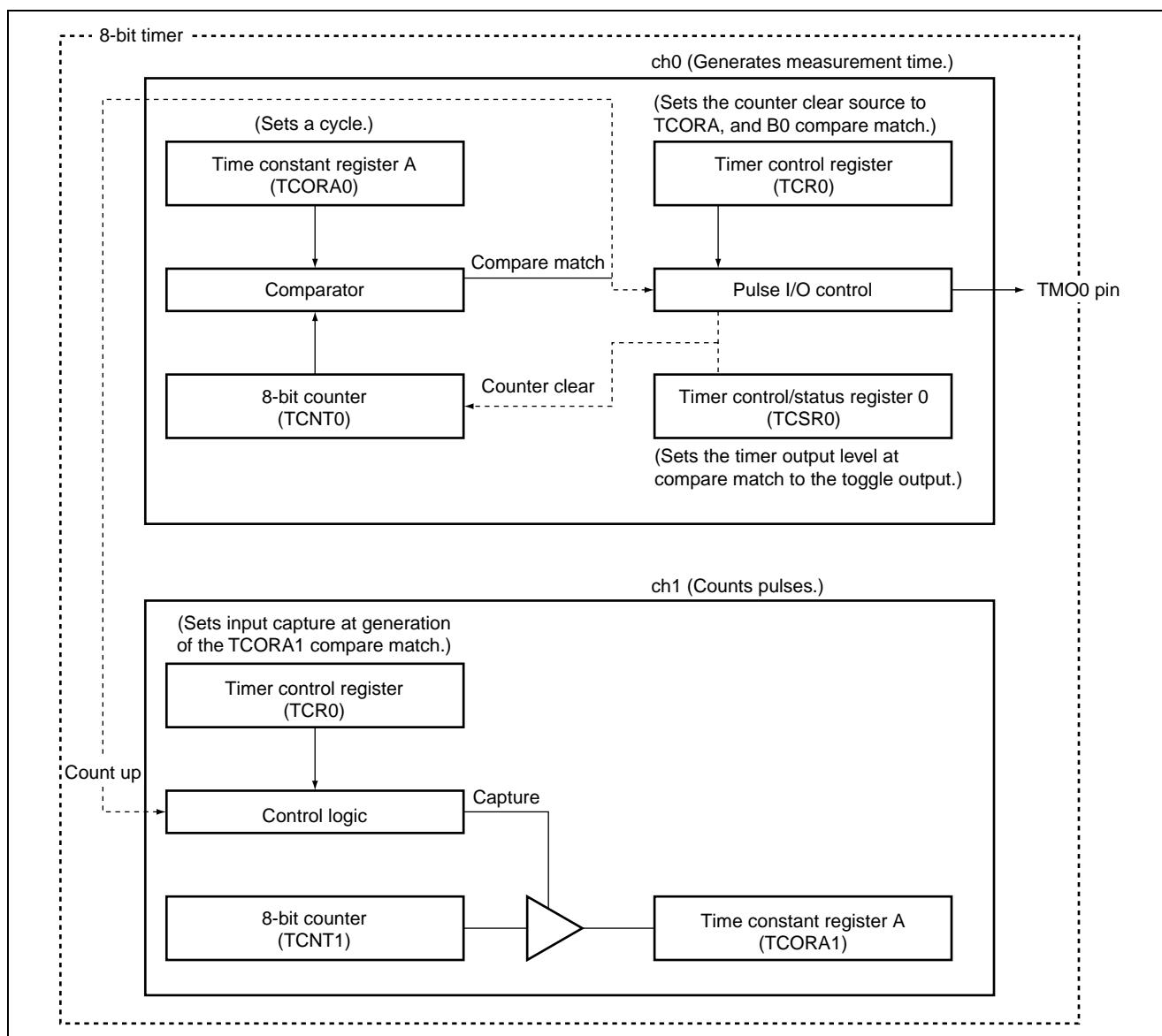


Figure 2 Output Pulse Count Block Diagram

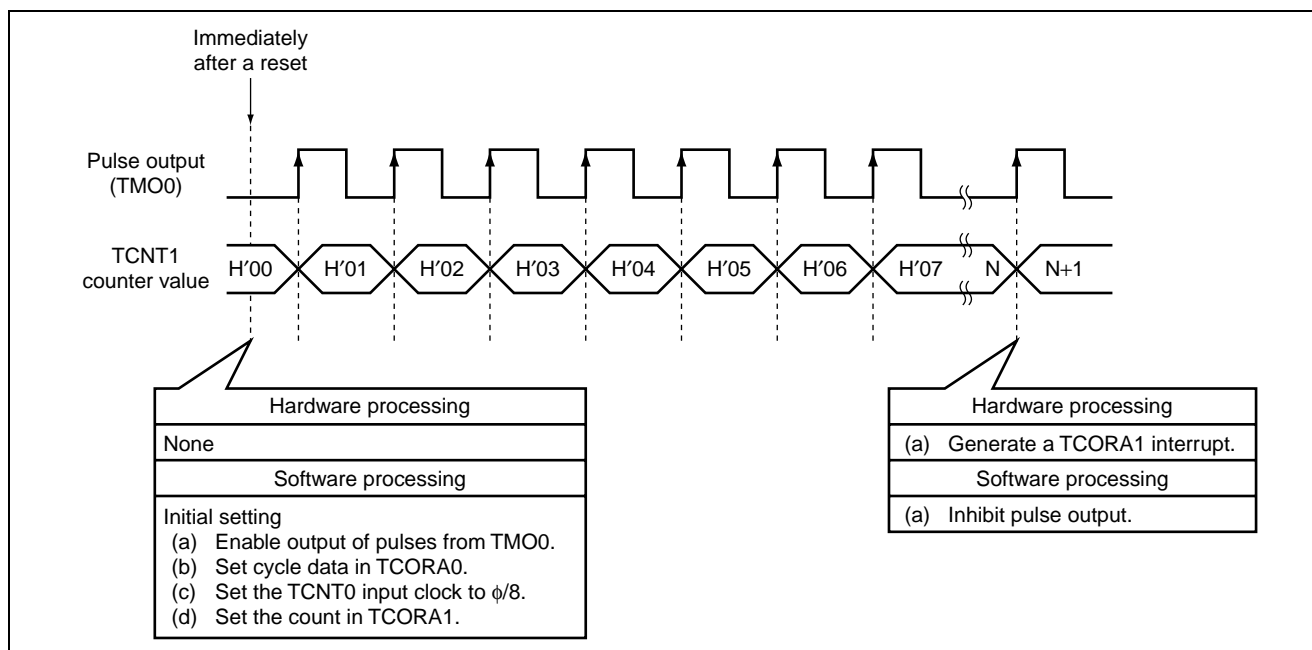
2. Function allocation of this sample task is shown in table 1. This sample task allocates the H8S/2215 functions as shown in table 1 to measure the number of pulses.

**Table 1 Assignment of Functions**

Elements	Description
TCNT0	Generates compare match A/B
TCORA0	Generates compare match A.
TCORB0	Generates compare match B.
TCSR0	Outputs 1 for each compare match A and outputs 0 for each compare match B.
TMO0	Timer output pin (compare match output)
TCR0	Clears the counter at compare match A and selects the input clock ( $\phi/8$ )
TCNT1	Counts generation of compare match A of channel 0.
TCORA1	Generates compare match A.
TCR1	Clears the counter at compare match A and enables compare match (A) interrupt.

### 3. Principles of Operation

The principles of operations used are shown in figure 3. This sample task performs H8S/2215 hardware processing and software processing as shown in figure 3 to measure the number of pulses.



**Figure 3 Principles of Operations Used for Measurement of the Number of Pulses**

## 4. Description of Software

### 1. Description of Modules

Module Name	Label Name	Function
Main routine	pulsemn	Performs initial setting for the 8-bit timer.
Pulse output stop	pulend	Starts up by a TCORA1 interrupt and sets the number of pulses set in TCNT1 for an output argument.

### 2. Description of Arguments

Elements	Function	Data Length	Used in	I/O
pulse_cycle	Sets a pulse cycle.	1 byte	Main routine	Input
pulse_count	Sets the number of counted pulses.	1 byte	Main routine	Input

### 3. Description of Internal Registers Used

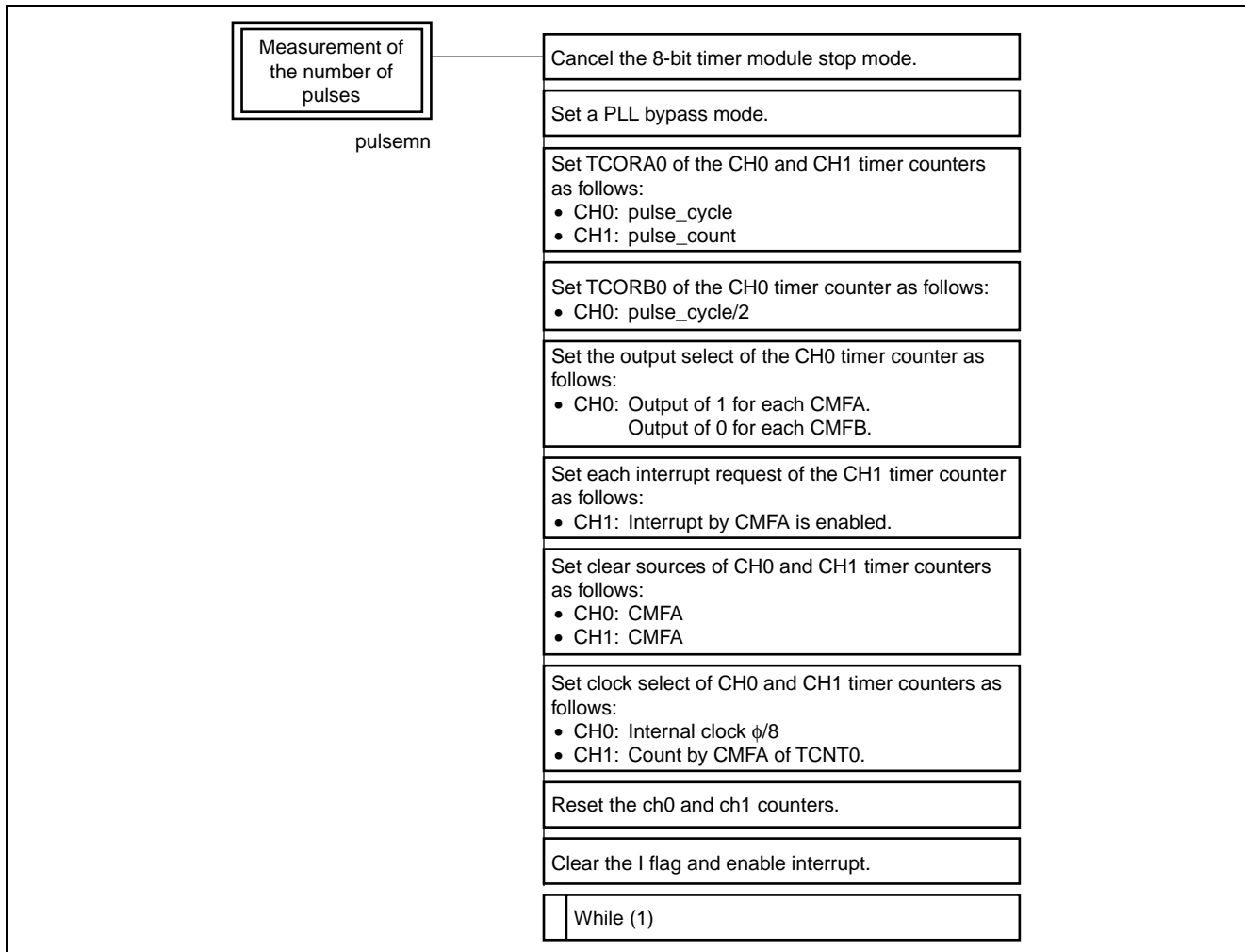
Register Name	Function	Used in
TCORA0	Generates compare match A.	Main routine
TCORB0	Generates compare match B.	Main routine
TCSR0	Outputs 1 for each compare match A and outputs 0 for each compare match B.	Main routine
TCR0	Clears the counter at compare match A. Selects the input clock ( $\phi/8$ ).	Main routine
TCR1	Counts generation of the compare match A of channel 0. Clears the counter at compare match A. Enables a compare match (A) interrupt.	Main routine
TCORA1	Generates compare match A.	Main routine, measurement end
MSTPCR	Cancel the 8-bit timer module stop mode.	Main routine

### 4. RAM Usage

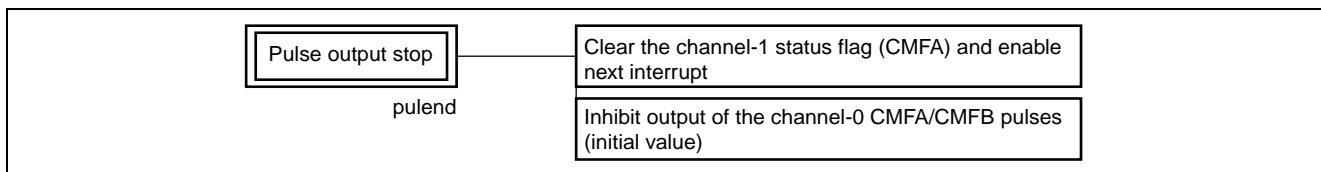
This sample task uses only arguments.

### 5. PAD

#### 1. Main Routine



#### 2. Pulse Output Stop





### Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Mar.16.04	—	First edition issued

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