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April 1st, 2010
Renesas Electronics Corporation

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78K0R/Kx3 Microcontroller

Sample Program

Operation Manual

(PWM Output (Timer Array Unit),

ASM Source)

This software is for reference only and NEC Electronics does not guarantee its operation.
Thoroughly evaluate this software on your set prior to use.

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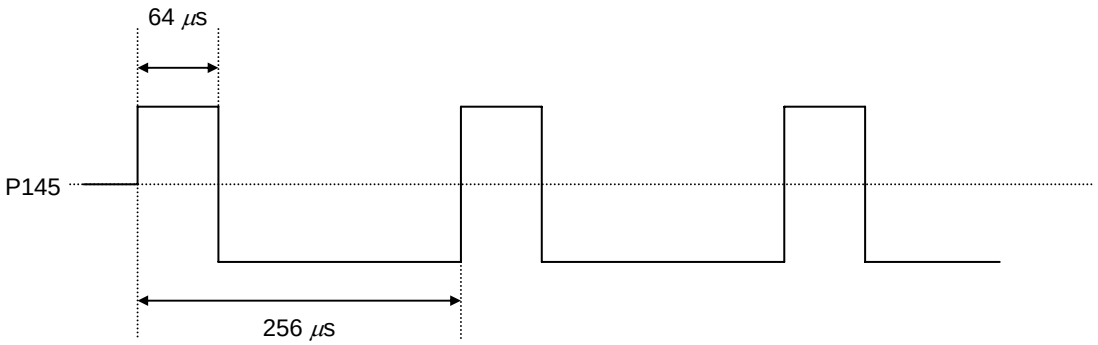
1st Product Solution Group, Multipurpose Microcomputer Systems Division,
Microcomputer Operations Unit
NEC Electronics Corporation

CONTENTS

1. OVERVIEW

This manual explains the sample program functions of PWM output for the 78K0R/Kx3 microcontroller.

In this sample program, timer channel 6 is used as the master and timer channel 7 is used as the slave, and a signal with a pulse cycle of 256 μs and a duty factor of 25% is output from output pin P145.



2. RESOURCES USED

Resource	Description	Remark
Main clock specification	Internal high-speed oscillator used (8 MHz (TYP.))	Supplied to CPU and peripheral hardware
	High-speed system clock used (20 MHz)	Oscillated by initial processing
Subclock	XT1 (32.768 kHz)	Oscillated by initial processing
Related hardware	Peripheral enable register 0 (PER0)	Controls the input clock of the timer array unit.
	Timer clock select register 0 (TPS0)	Operation clock: CK01 (1/2), 4 MHz (0.25 μs)
	Timer mode register 06 (TMR06)	Operation clock: CK01, 8 MHz Master channel
	Timer mode register 07 (TMR07)	Operation clock: CK01, 8 MHz Slave channel
	Timer data register 06 (TDR06)	Pulse cycle: 256 μs
	Timer data register 07 (TDR07)	Duty factor: 25%
	Timer output mode register 0 (TOM0)	Channel 6: Toggle mode Channel 7: Combination operation mode with channel 6
	Timer output level register 0 (TOL0)	Channel 0 positive logic output (active high)
	Timer output register 0 (TO0)	Channel 0 timer output value is “0”.
	Timer output enable register 0 (TOE0)	Enables TO07 operation by counting operation.
	Timer channel start register 0 (TS00)	
	Timer channel stop register 0 (TT0)	
	Port mode register (PM14)	
	Port register (P14)	
I/O	Output: TO07 (P145)	
Interrupt	Timer channels 6, 7	
Others	Not used	

3. SOFTWARE CONFIGURATION

Files

File Name	Processing Outline
K0R_vct.asm	Vector processing
K0R_init.asm	Initialization processing
K0R_main.asm	Main processing
K0R_sfr_set.asm	PWM output

4. FUNCTION EXPLANATIONS

[File name]

K0R_main.asm

Function

Function Name	Processing Outline	Argument	Return Value
MMA_STRT	Main routine	None	None

Function explanations

Function name	MMA_STRT
Processing	Main routine
Argument	–
Return value	–
Description	Executes initialization processing and then starts PWM output main processing.
Remark	–

[File name]

K0R_sfr_set.asm

Functions

Function Name	Processing Outline	Argument	Return Value
STM_PINI	Initializes PWM output.	None	None
STM_PSTT	Starts PWM output operation.	None	None
STM_PSTP	Stops PWM output operation.	None	None

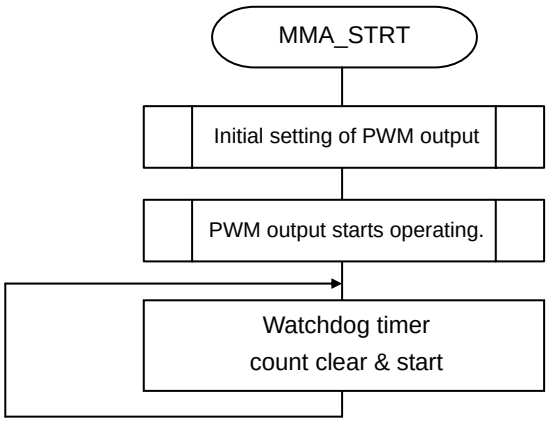
Function explanations

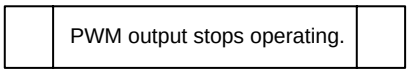
Function name	STM_PINI
Processing	Initializes PWM output.
Argument	–
Return value	–
Description	Initializes the timer array unit. • Supplies a timer array unit input clock. • Sets the clock frequency to 0.25 μs. Initializes timer channel 6 (master). • Operation mode: Operation clock CK01, master channel, interval timer mode • Output mode: Toggle operation mode • Sets the pulse cycle to 256 μs (0.25 μs × 1,024). Initializes timer channel 7 (slave). • Operation mode: Operation clock CK01, slave channel, one-count mode • Output mode: Combination operation mode • Sets the duty factor to 25% ((256/1,024) × 100). • Enables output. Sets P145 to the output mode.
Remark	This function is called after reset.

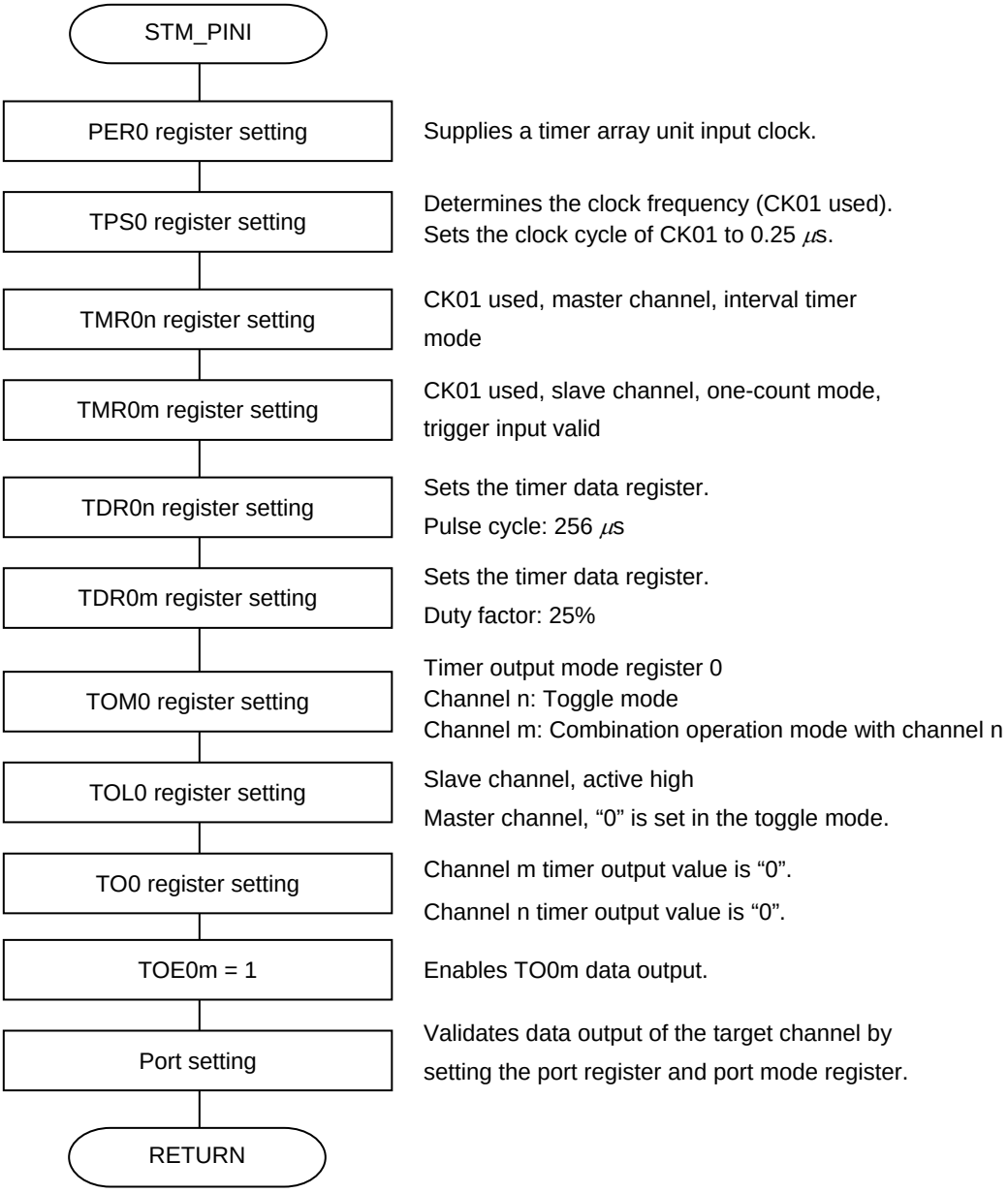
Function name	STM_PSTT
Processing	Starts PWM output operation.
Argument	–
Return value	–
Description	Enables the output operation of timer channel 7 (slave). Starts operation of timer channels 6 and 7.
Remark	–

Function name	STM_PSTP
Processing	Stops PWM output operation.
Argument	–
Return value	–
Description	Stops operation of timer channels 6 and 7. Disables the output operation of timer channel 7 (slave).
Remark	–

5. FLOWCHARTS

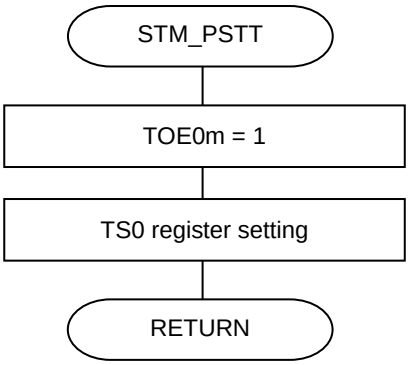






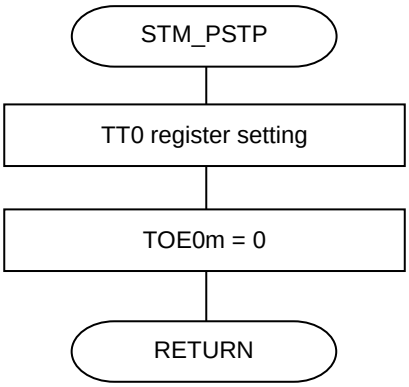
Remark n = 0, 2, 4, 6 can be set. m = n + 1

n = 6, m = 7 for this sample program.



Enables TO0m output operation (slave).

Enables timer channel m operation.
Enables timer channel n operation.



Stops timer channel m operation.
Stops timer channel n operation.

Disables TO0m output operation (slave).

Remark n = 0, 2, 4, 6 can be set.

m = n + 1

n = 6, m = 7 for this sample program.