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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),
C 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.

ZUD-CC-07-0082-E
January, 2008

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

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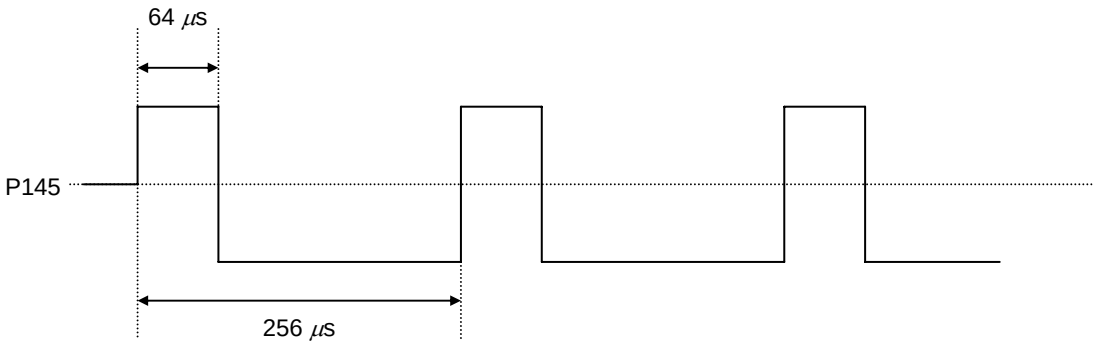
M8E 02. 11-1

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_def.h	Definition file
K0R_init.c	Initialization processing
K0R_ext.h	External declaration
K0R_main.c	Main processing
K0R_sfr_set.c	PWM output

4. FUNCTION EXPLANATIONS

[File name]

K0R_main.c

Function

Function Name	Processing Outline	Argument	Return Value
main	PWM output main processing	None	None

Function explanations

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

[File name]

K0R_sfr_set.c

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

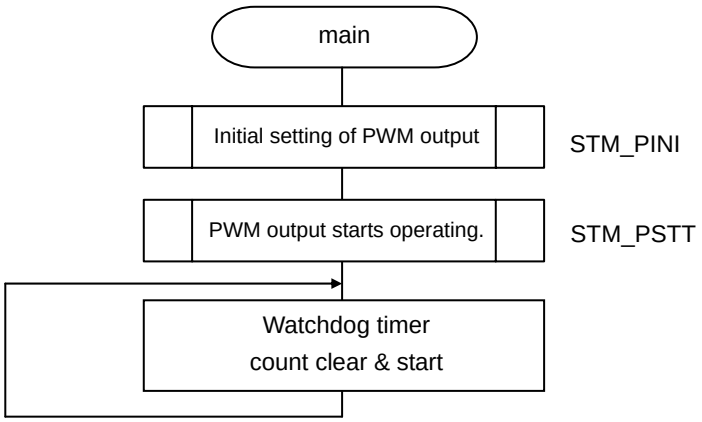
Function explanations

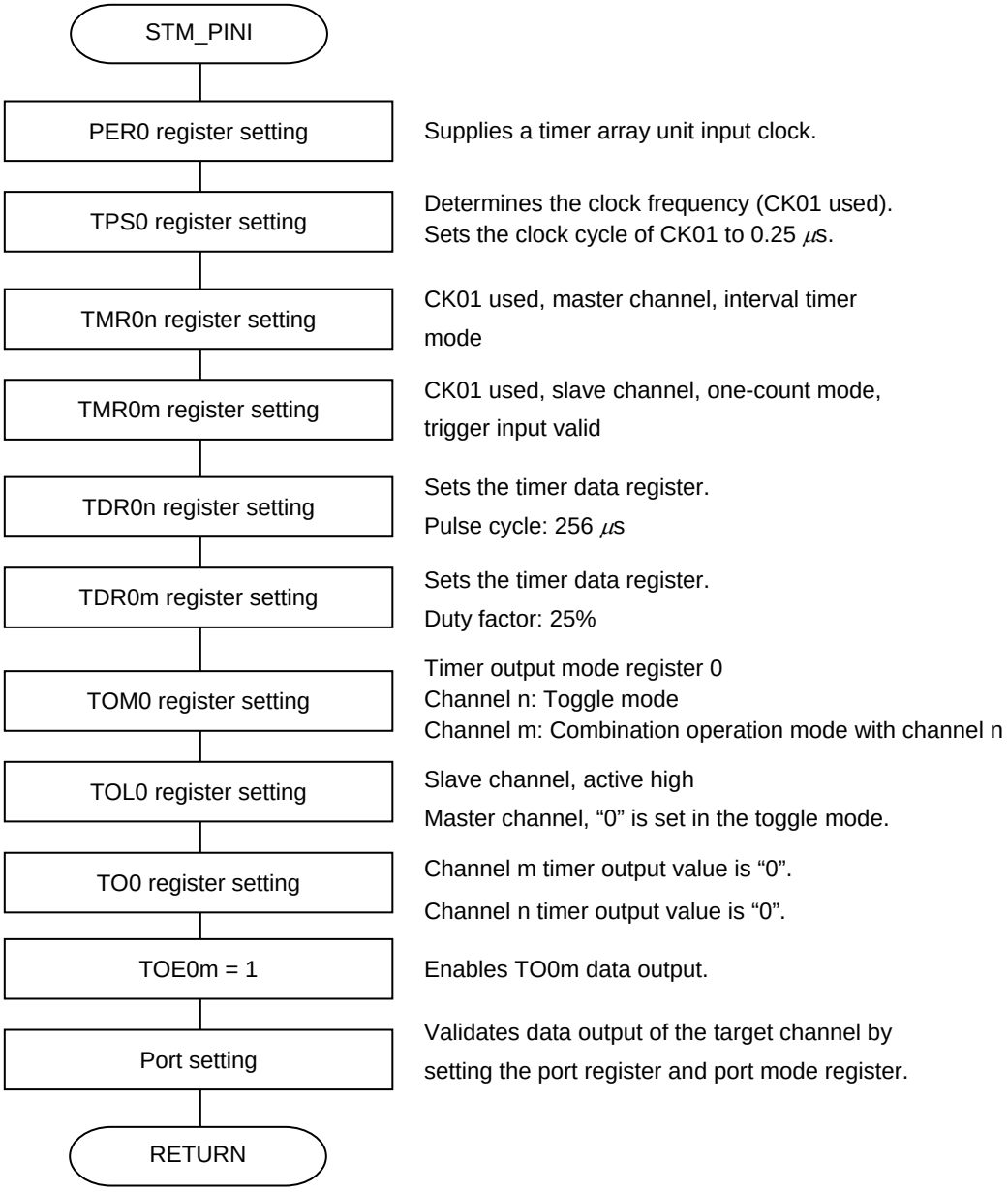
Function name	STM_PINI
Processing	Initializes PWM output.
Argument	–
Return value	–
Description	Initializes the timer array unit. • Supplies a timer array unit input clock. • Sets the clock frequency to 0.25 μs. Initializes timer channel 6 (master). • Operation mode: Operation clock CK01, master channel, 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	–

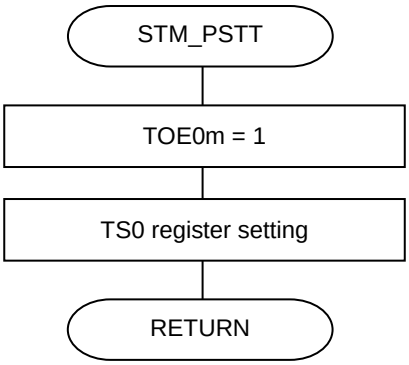
5. FLOWCHARTS





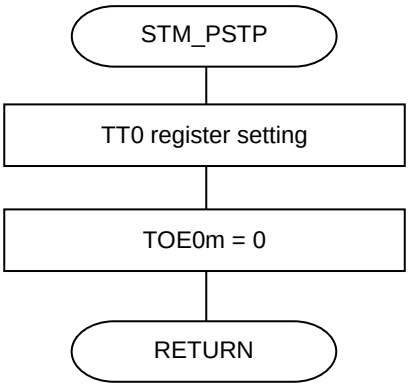
Remark n = 0, 2, 4, 6 can be set. m = n + 1

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.