



78K0R/Kx3 Microcontroller Sample Program Operation Manual (Interval Timer/Square Wave Output (Timer Array Unit), ASM Source)

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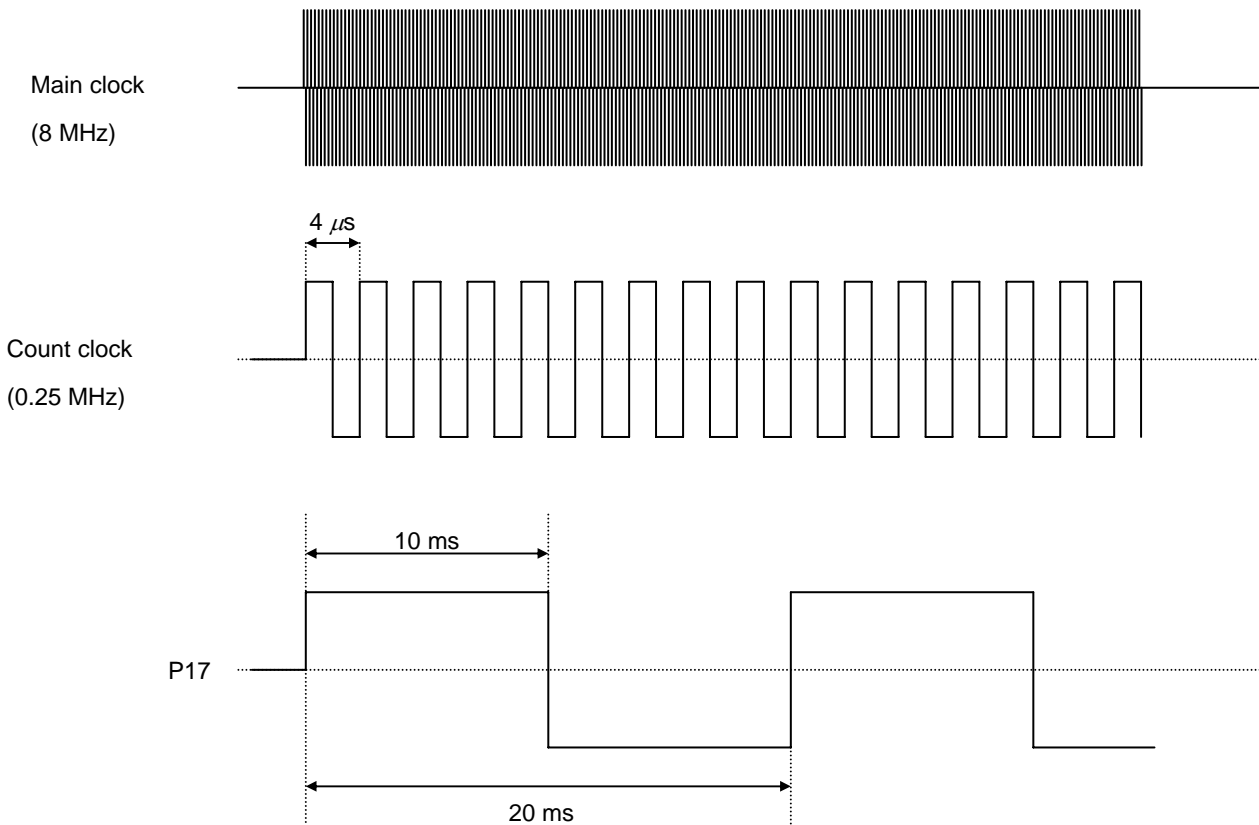
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1. OVERVIEW

This manual explains sample program functions of the interval timer/square wave output for the 78K0R/Kx3.

In this sample program, an interrupt is generated at intervals of 10 ms (every 2,500 counts) by using a count clock whose frequency is $1/2^5$ of that of the main clock (8 MHz).

A toggle operation is performed by using output pin P17 to output a square wave with a cycle of 20 ms and a duty factor of 50% when the interrupt is generated.



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 ($1/2^5$), 0.25 MHz (4 μ s)
	Timer mode register 02 (TMR02)	Operation clock: CK01, 8 MHz (0.125 μ s)
	Timer data register 02 (TDR02)	Interval cycle: 10 ms (4 μ s \times 2500)
	Timer output mode register 0 (TOM0)	Channel 2 toggle operation mode
	Timer output level register 0 (TOL0)	Channel 2 positive logic output (active high)
	Timer output register 0 (TO0)	Channel 2 timer output value is "0".
	Timer output enable register 0 (TOE0)	Channel 2 timer output enable (valid when square wave is output)
	Timer channel start register 0 (TS0)	
	Timer channel stop register 0 (TTO)	
	Port mode register (PM1)	
	Port register (P1)	
I/O	Output: TO02 (P17)	
Interrupt	Timer channel 2	
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	Interval timer/square wave 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 interval timer/square wave output. After timer channel 2 interrupt request flag is set to ON, clears it.
Remark	–

[File name]

K0R_sfr_set.asm

Functions

Function Name	Processing Outline	Argument	Return Value
STM_IINI	Initializes interval timer/square wave output.	None	None
STM_ISTT	Starts interval timer/square wave output operation.	None	None
STM_ISTP	Stops interval timer/square wave output operation.	None	None

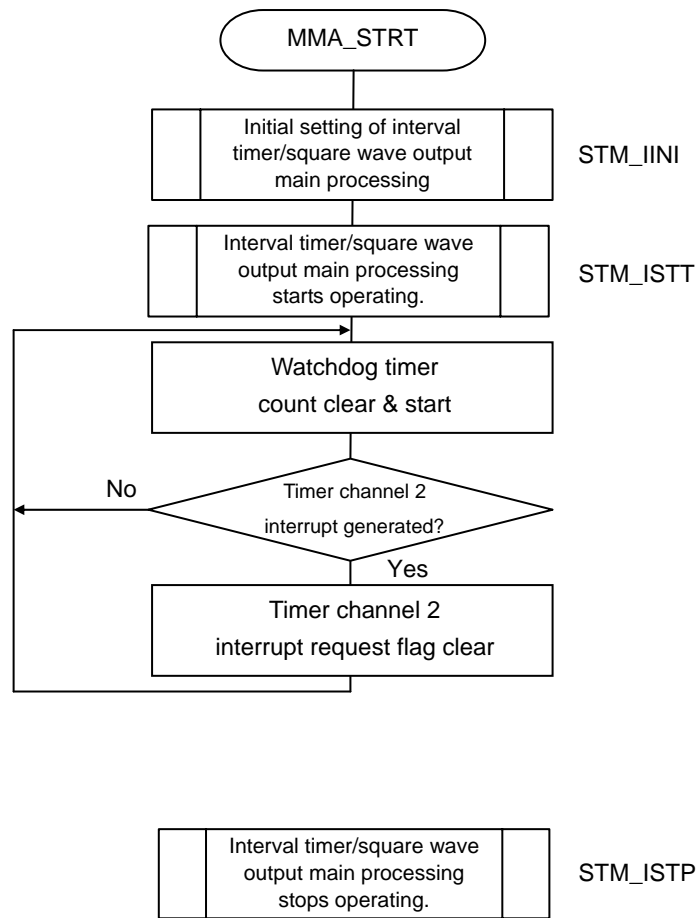
Function explanations

Function name	STM_IINI
Processing	Initializes interval timer/square wave output.
Argument	–
Return value	–
Description	<p>Initializes the timer array unit.</p> <ul style="list-style-type: none"> • Supplies a timer array unit input clock. • Sets the clock frequency of CK01 to 4 μs. <p>Initializes timer channel 2.</p> <ul style="list-style-type: none"> • Uses operation clock CK01 and sets the interval timer mode. • Sets the generation cycle to 10 ms. • Enables output.
Remark	–

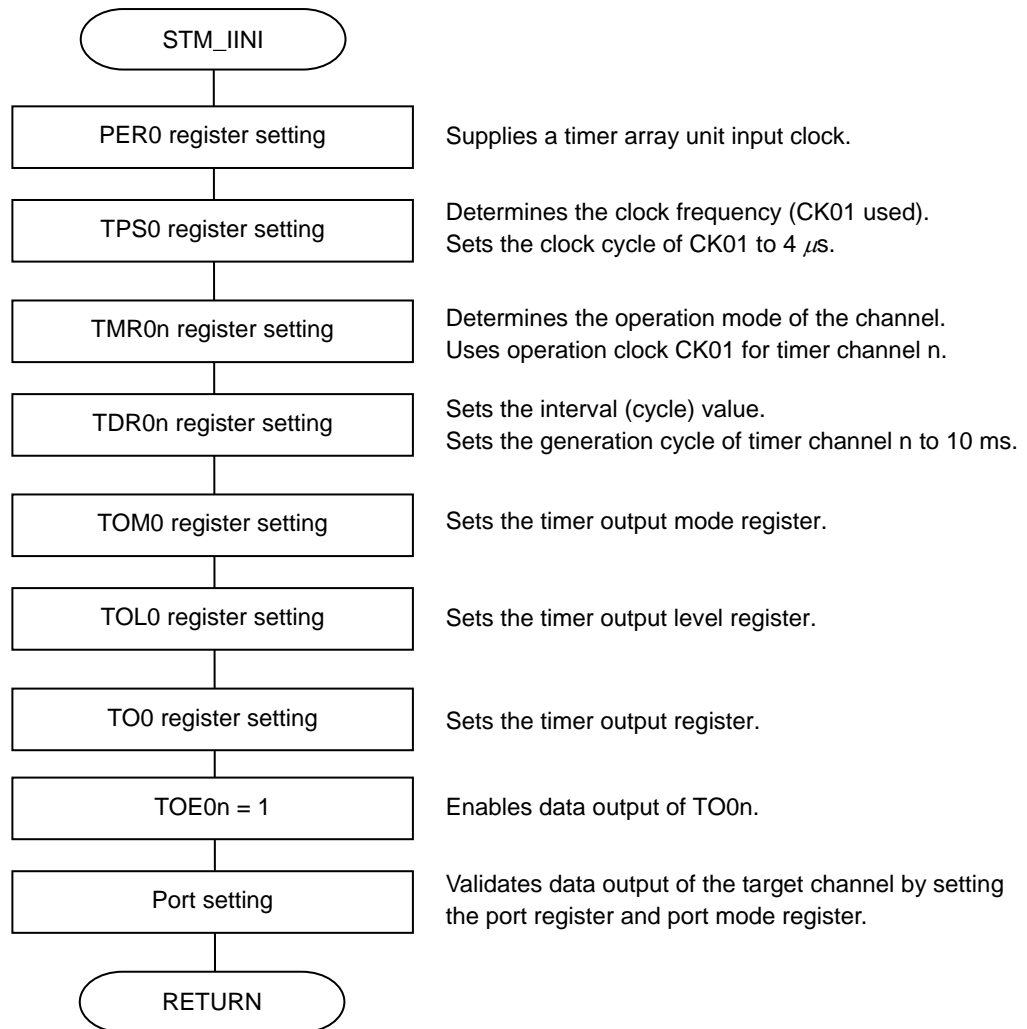
Function name	STM_ISTT
Processing	Starts interval timer/square wave output operation.
Argument	–
Return value	–
Description	<p>Starts timer channel 2 operation.</p> <ul style="list-style-type: none"> • Enables output. • Starts operation. • Clears interrupt request flag. • Enables interrupts.
Remark	–

Function name	STM_ISTP
Processing	Stops interval timer/square wave output operation.
Argument	–
Return value	–
Description	<p>Stops timer channel 2 operation.</p> <ul style="list-style-type: none"> • Stops operation. • Disables output.
Remark	–

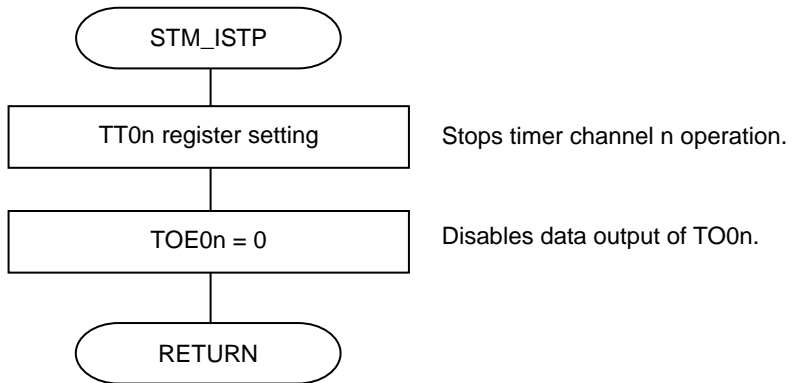
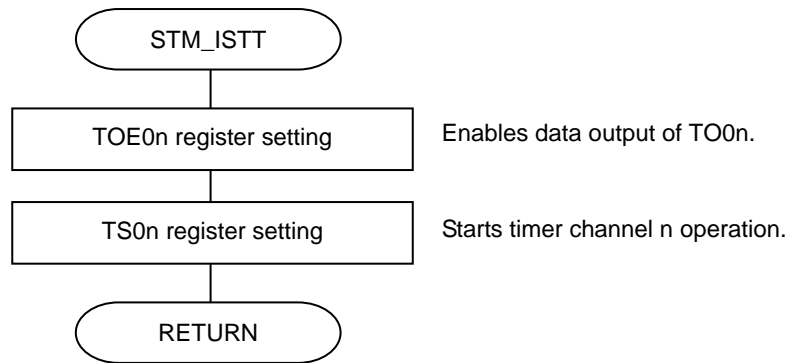
5. FLOWCHARTS



Remark n = 0 to 7 can be set.
 n = 2 for this sample program.



Remark n = 0 to 7 can be set.
n = 2 for this sample program.



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n = 2 for this sample program.