



PRODUCT NAME

TM87 series

TITLE

Notes in using TM87 series to design Infra-Red remote controller

APPLICATION NOTE

If TM87 series products are used to design Infra-Red remote controller, special attention needs to be given to a few items in programming design.

In this design, Timer1, Timer2 and frequency generator are used to generate the wave shape of the Infra-Red remote controller. This waveform comes out from the buzzer output end.

The following example is part of the program for generating wave shapes of 38KHz carrier. Example:

SHE	1	;Enable timer 1 halt release enable flag.
TMSX	3Fh	;Set value for timer 1 is 3Fh and the clock source is PH9.
SCC	40h	;Set the clock source of the frequency generator as BCLK.
FRQX	2, 3	;FREQ = BCLK / (4*2), setting value for the frequency generator is 3 and duty cycle is 1/2.
ALM	160h	;FREQ signal is outputted. ;This instruction must be executed after the FRQ ; related instructions.
HALT		;Wait for the halt release caused by timer .
.....		
		;Halt released.
ALM	0	;Stop the buzzer output.

This example uses a frequency generator to generate the needed carrier frequency and send this frequency to external circuit through BZ (BZB) pin. Timer1 controlled the time period of carrier that outputted from BZ (BZB) pin.

The clock source of the frequency generator in this example is set to be BCLK, and the instruction cycle time of TM87 is 4 clocks (BCLK). The output frequency of frequency generator cannot fast than the instruction cycle time. Otherwise, the program will not be able to accurately produce an intact carrier output wave shape on BZ (BZB) pin. Some of the format (for example, Philips), their command definitions for remote controller are determined by the number of carrier. Such a definition enables the program to generate an intact wave shape. If not, the IR receiver will not be able to identify the command that remote controller send out.

Therefore, when the program has set the clock source of frequency generator to be BCLK, the usage of FRQX instruction must be as below.

FRQX D,X D = 3 , X \geq 3
 D = 2 , X \geq 1
 D = 1 , X \geq 1
 D = 0 , X \geq 0

Nevertheless, please pay attention to the instruction cycle consumed in the loop of program. The setting of X value has to provide the program enough time to monitor the output wave shape is intact or not.

In addition, ALM instruction has to be executed right after the FRQ command. Doing so can reduce the time discrepancy in program control.