十速科技股份有限公司
tenx technology inc.

Advance Information

4-Bit Micro-Controller

SZ077

How to make bonding option for TM87/89 series MCU?

Application Note

Tenx reserves the right to change or discontinue this product without notice.

tenx technology inc.

INDEX

PRODUCT NAME

SZ077

TITLE

How to make bonding option for TM87/89 series MCU?

APPLICATION NOTE

I. Introduction

When making bonding option, the simplest method is to connect the input pin to High (1) or Low (0) directly. In doing so, there are two states for each input pin and if there are enough input pins, all the bonding options can be completed in this method. In most cases, there are not enough input pins. However, there might be leftover output pins (for example, the COMMON pin) due to the fact that the TM87/89 series share the input pins with SEGMENT or other special pins. Therefore, the output pins need to match up with the input pins. There are three states for each input pin: High, Low, and Connection. The actual number of Connection will be determined by the number of output pins.

II. Use I/O for bonding option

The TM87/89 series MCUs excel in low power consumption and the majority of the developed products are also low power consumption. Therefore, the biggest challenge for making the bonding option is not to increase the power consumption of the product. The specifics of how to avoid such mistakes will be discussed as follows:

The input pins of the TM87/89 series MCUs all come with one pull down resistor. This resistor can be disabled in program. When using the input pins without the pull down resistor for bonding option, the program will be simpler. There is no need to read and restore its state after power on reset; it is fine to read when needed. Please pay attention to the following point when using this method: the input pin must be connected to the High or Low during manufacturing. If it is matched up with an output pin, the output pin must also have definitive High or Low state (High impedance state can not be allowed.) The main purpose of doing so is to be able to read the correct states and, at the same time, to avoid the large current generated when the input pin is in Floating state.

The disadvantage for making the bonding option as mentioned above is that customers will need to specify all the bonding out for the input pins. Here is another way to allow customers to avoid such kind of trouble: that is, to use input pins with pull down resistor. The advantage of this method is that those input pins in Low state will not need to be bonded out. The disadvantage is that there are some processes needed to avoid unnecessary current in the bonding point.

The specifics of the program is as follows(use PortA as an example)：

```
。 。 。
SPA     10000B    ; Set PortA to be the input pin with pull down resistor
IPA     OPTION    ; Read the bonding option and store in variable OPTION
OPA     OPTION    ; Send the content of variable OPTION to output buffer
SPA     1111B     ; Set PortA to be output pin
。 。 。
```

The function of Instructions 1 and 2 is to read and store the bonding option. When the program needs to use the bonding option, it only needs to access the variable OPTION. Therefore, the above program needs to be executed only once after power on reset. The function of Instruction 3 and 4 is to equalize the output state of all the pins in PortA to the bond option state; that is, all the bond options connected to VCC will output high state and all the bond options connected to GND or floating will output low state to make sure that there is no current consumption in each bond option. Note: The sequence of Instructions 3 and 4 can not be changed.

III. Use the INT pin for bonding option

In many cases, all the input pins are used for other functions. You can check the external interrupt pin INT in these cases. If this pin is not used for other function, it can be used as an input pin for the bonding option.

The specific of the program is as follows：

Assume the INT pin is set to internal pull-down, triggered by rising edge in the Mask Option and assume the definition of SEG1 output pin is “1, 0, 1f, a” in the CFG document(the second item “0” sets SEG1 to be COMS output pin).

```
1.      。 。 。
2.  plc         1100B       ; Clear the Halt release Request flag of 0.5
                              second and the external interrupt pin INT
3.  she         1100B       ; Enable the Halt release from 0.5 second and
                              the external interrupt pin INT
4.  lds         Temp,00h    ;
5.  lcp         01fh,Temp   ; SEG1 output low state
6.  Nop                     ; Delay
7.  lds         Temp,0fh
8.  lcp         01fh,Temp   ; SEG1 Output high state
9.  Nop                     ; Delay
10. lds         Temp,00h
11. lcp         01fh,Temp   ; SEG1 Output low state
12. halt
13. msc         Option      ; Store SCF4 (INT pin outputs HaltRelease signal)
                              to variable Option
14. lds         Temp,0001B  ;
```

```
15.   And      Option    ; Set bit0 of variable Option to be the signal of the
                           bonding option
                         ; Option.1=1 means there is a connection
                           between SEG1 and INT pin
                         ; Option.1=0 means there is no connection
                           between SEG1 and INT pin
16.   plc      1100B     ; Clear the Halt release Request flag of 0.5
                           second and the external interrupt pin INT
```

The set up of Instructions 2 and 3 allows 0.5 second and INT pin Halt release. When there are no input signals on the INT pin, the 0.5 second signal will free the MCU from the Halt mode. The function of instruction 4 and 5 is to output low state on SEG1. The reason to do it this way is due to the fact that if customer sets LCD display in reset cycle to be ON in Mask Option, the outputting SEG1 will be set to high state after RESET. Therefore, it needs to be set to low state first (to produce rising edge). If customer sets it to OFF, these two instructions can be omitted. Instruction 7 and 8 sets the SEG1 to output high state to generate a rising edge on the INT pin(INT pin is set as triggered by rising edge in Mask Option). Instruction 10 and 11 sets SEG1 to output low state so that there is no voltage difference between SEG1 and INT (INT is set to with pull-down resistor in Mask Option). Instructions 12, 13, and 15 read and store bonding option.

The above mentioned method requires an output pin and the INT pin to form a bonding option.

If all the output pins are used, you can consider reuse. Buzzer is frequently used. The specifics are basically the same as mentioned above.

The specific of the program is as follows：

```
plc       1100B       ; Clear the Halt release Request flag of 0.5 second and
                        the external interrupt pin
she       1100B       ; Allow 0.5 second and the Halt release in the external
                        interrupt pin INT
alm       011000000B  ; BZ/BZB output square wave to INT pint
call      delay       ; Delay
alm       00h         ; BZ/BZB output low state
halt
msc       Option      ; Store SCF4(Halt release signal from INT pin) to
                        variable Option
lds       Temp,0001B  ;

And       *Option     ; Set bit0 of variable Option to be the signal of the
                        bonding option
```

```
                                ; Option.1=1 means there is a connection between
                                  BZ/BZB and INT pin
                                ; Option.1=0 means there is no connection between
                                  BZ/BZB and INT pin
    Plc         1100B           ; Clear the Halt release Request flag of 0.5 second and
                                  the external interrupt pin
```

The delay time in the above program should be adjusted based on the requirement of application. The basic principle is to ensure the generation of rising edges. The main considering factor is the frequency of the system clock.

IV. Miscellaneous notes

Also, if the SEGMENT line is time shared and re-used to do keyscan, it can be re-used to make bonding option. The details will be divulged in the AP Note.

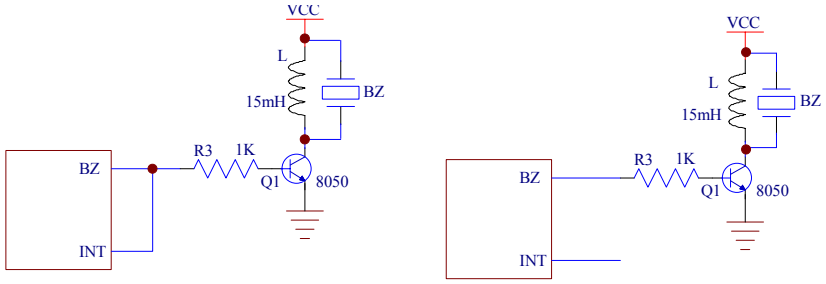
V. Application Circuit

Fig.1 Use the input pins without the pull down resistor for bonding option

Fig. 2 Use the input pins with the pull down resistor for bonding option

Fig. 3 Use external pin INT and output pin with SEG wire for bonding option

Fig. 4 Use external pin INT and pin BZ for bonding option



tenx	Title: SZ077		
	size B	number:	Revision:
	Data: Aug. 30, 2002		sheet of
	File: sz077.ddb		Drawnby: