2.3" 2 Digit 7-Segment Red Display Board

User's Guide

2.3" 2 DIGIT 7-SEGMENT RED DISPLAY BOARD USER'S GUIDE

Table of Contents

2.3" 2 Digit 7-Segment Red Display Board

NOTES:

Product Version : Ver 1.0

Document Version : Ver 1.0

2.3" 2 DIGIT 7-SEGMENT RED DISPLAY BOARD USER'S GUIDE

Chapter 1. Overview

1.1 Overview

Thanks for using 7-segment information board series by Sure Electronics. This series includes 5 different size panels, they are 1.5inches, 1.8inches, 2.3inches, and 4inches, 7inches (character height). All those panels are driven by SPI like interface and all work in full static mode. They are easy to be interfaced to any Microcontroller. They could be widely used in panel meters, big clocks and any other information display usage.

Sure Electronics providing series of such information boards is to reduce your development time and make them standard. In this series, most boards are 4 digits and static, if customer need any special digits and special size ones, could contact us with the contact information at the end of this document.

This document is used to describe how to use 2.3 inches character height panels.

FIGURE 1-1 OVERVIEW

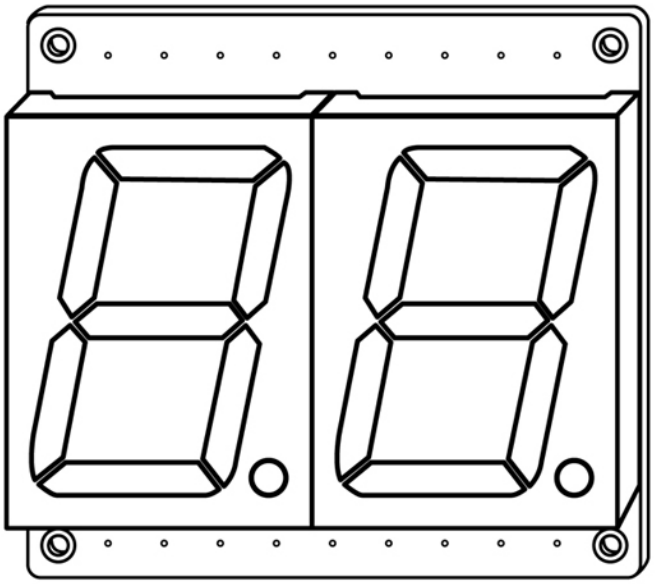
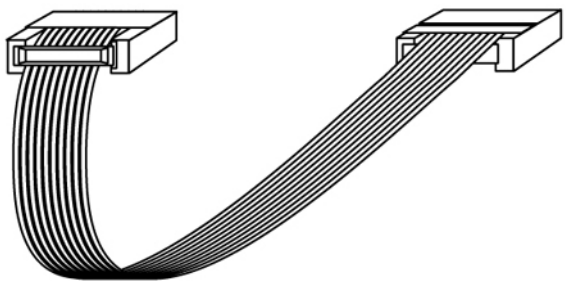


FIGURE 1-2 ACCESSORY



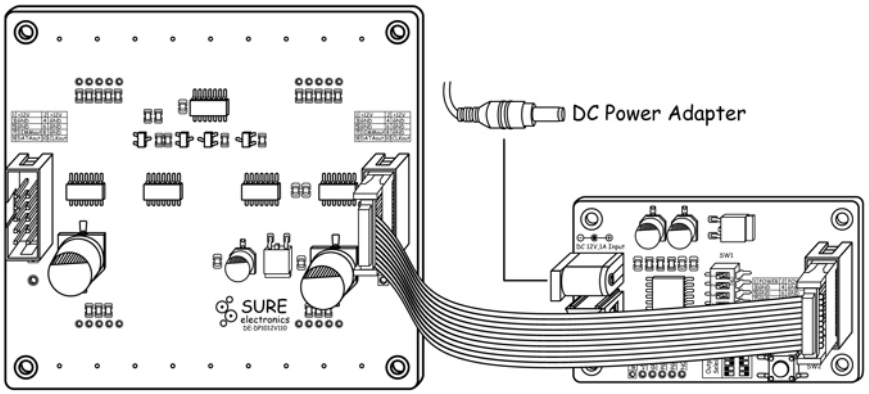
Note: All the diagrams in this manual are for reference only.

2.3" 2 Digit 7-Segment Red Display Board

1.2 Quick Start

Please connect the info boards and the driver board as follows.

FIGURE 1-3 CONNECTION SCHEMATIC



Note:

1. Pay attention to the connection of Input and Output.
2. Connect the info boards and the demo board before power on.

Chapter 2. Hardware Detail

2.1 7-segment LED

2.3" 2 digits 7-segment LEDs are installed on the board. All the segments are common-anode. The four digits are respectively marked as U3, U4 on the schematics. LEDs are driven by DIMM_NOT signal from DIMM_IN pin via 74HC00 NAND. Of course you can also drive the LED and adjust the brightness by applying PWM signal on the DIMM_IN pin. When the valid data is shifted from 74HC164 and DIMM_NOT signal is set to high (DIMM_IN signal low), all the corresponding segments will be illuminated. Before change the data displayed by segments, turn off the display first and then write new data into 74HC164 chip.

FIGURE 2-1 7-SEGMENT LEDS

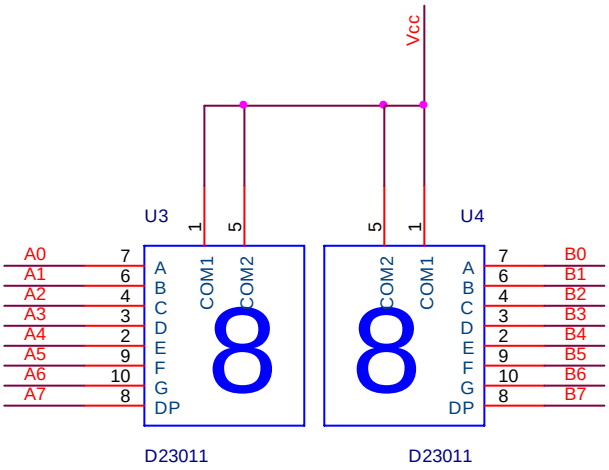


FIGURE 2-2 DIMM_NOT

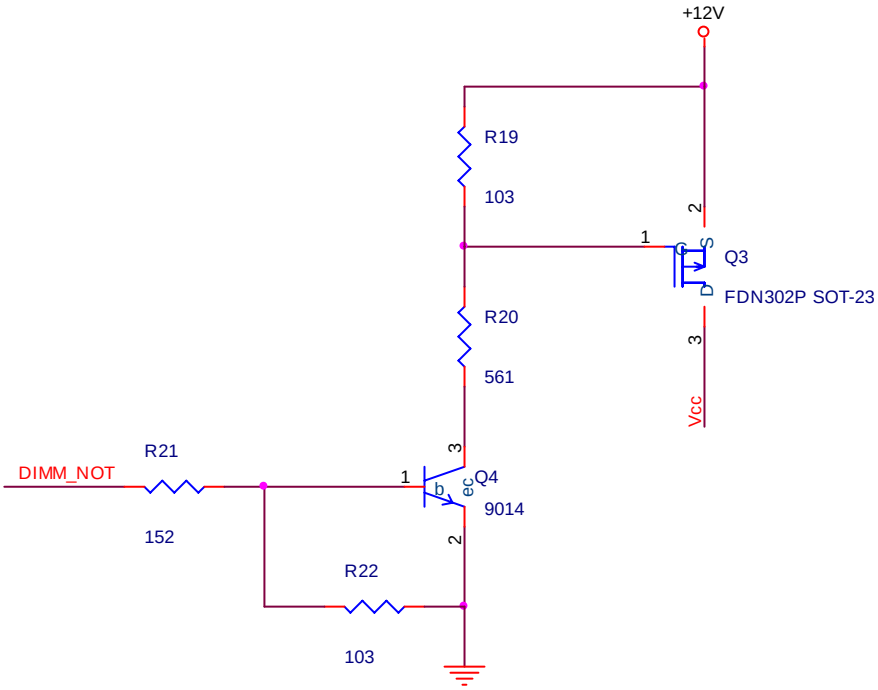
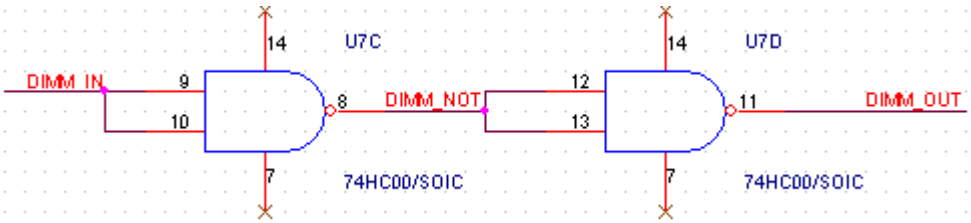
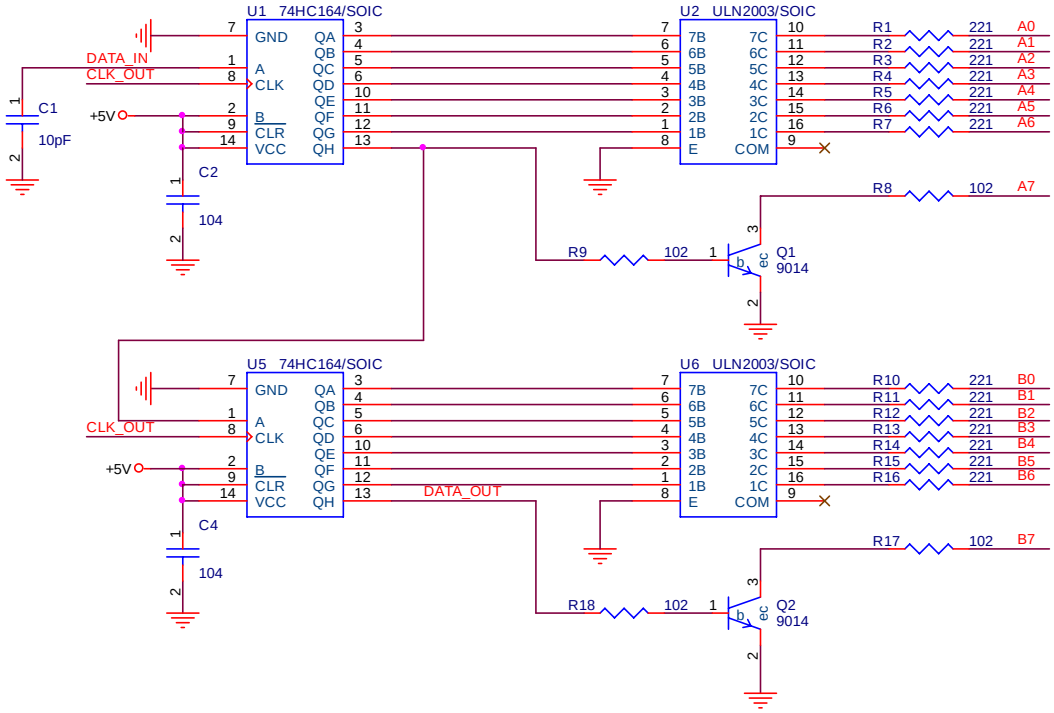


FIGURE 2-3 DIMM_IN AND DIMM_NOT



2.2 Shift Register Data Driver

FIGURE 2-4 SHIFT REGISTER DATA DRIVER



74HC164 chips are used as shift registers, marked as U1, U5, and segments are driven by ULN2003 and 9014. ULN2003 chips, Darlington Driver IC, are directly connected with LED segments and are marked as U2, U6. All 74HC164 on the board are connected in series. Only CMOS signals are received by these pins. All the segments will start to work when clock line, data line and correct signal from DIMM_IN are correct.

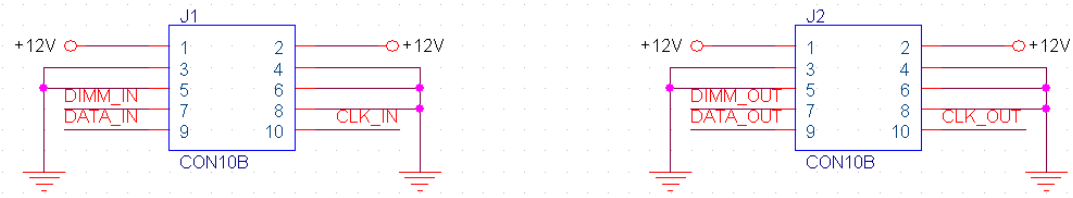
Characters displayed and their corresponding codes are shown in the following table.

TABLE 2-1 CHARACTERS DISPLAYED AND THE CORRESPONDIGN CODES

Segment								
Code	0x01	0x02	0x04	0x08	0x10	0x20	0x40	0x80

2.3 Data Ports Definition

FIGURE 2-5 DATA PORTS DEFINITION

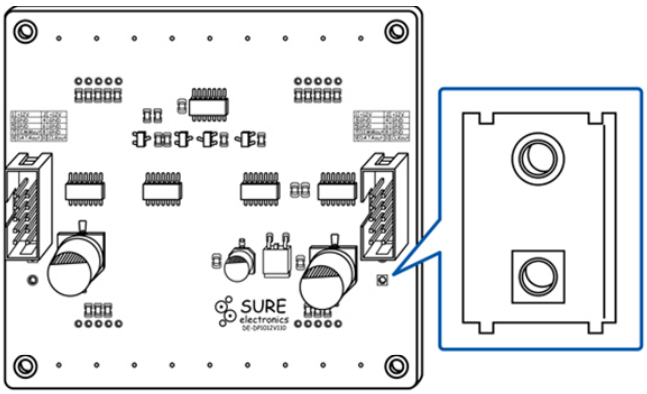


There're two IDC sockets which are respectively marked as J1 and J2. J1 is the data input interface and J2 data output interface. An info board can work separately when its J1 is connected with J1 of the demo board and J2 is left open. When more boards are in series, connect J1 of the next board with J2 of the previous board and all the boards can work. Up to 4 boards are recommended to be connected in series. When over 4 boards are connected in series, you must add auxiliary power to provide more current ensuring normal working.

2.4 Auxiliary Power Interface

There're two auxiliary power interfaces on this board. If the power supply used can output higher enough current, 10-pin IDC cable is enough. If the power supply used output low current and many boards are connected in series, it's suggested to use wires to connect the info boards and the driver board via auxiliary power interfaces, or the current is not enough to drive these boards. Just feed the boards with +12V power supply via auxiliary power interfaces. Make sure the polarity is correct.

FIGURE 2-6 AUXILIARY POWER INTERFACE

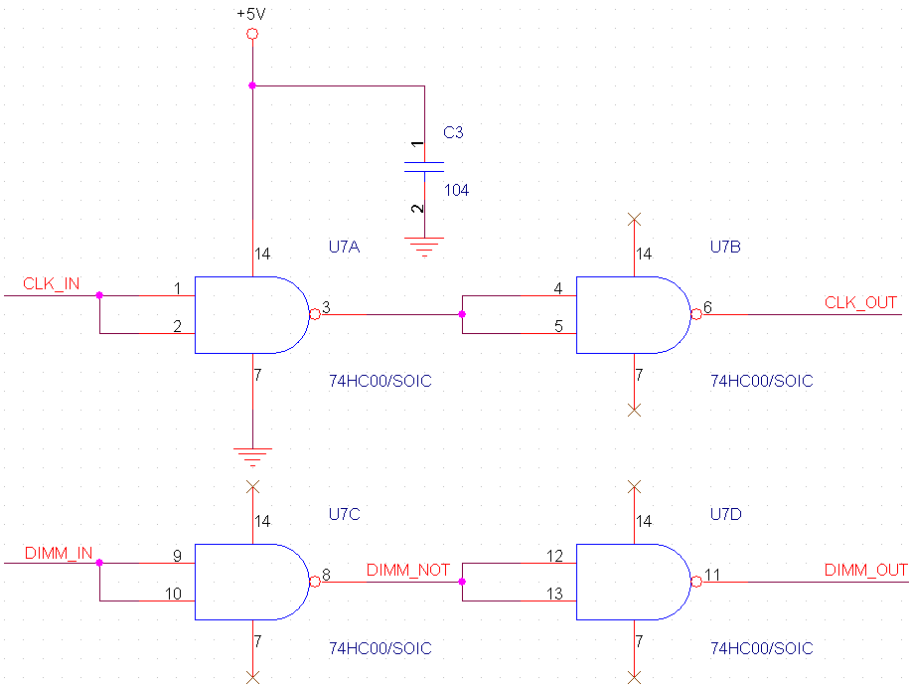


2.5 Data Buffer

74HC00 chip is used to buffer the clock and DIMM_IN signals since CMOS output signal cannot drive multiple CMOS chips if the cable is too long.

FIGURE 2-7 DATA BUFFER

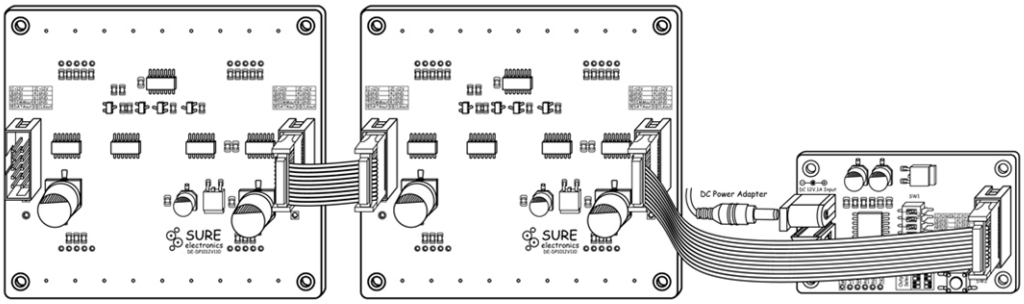
2.3" 2 Digit 7-Segment Red Display Board



2.6 Connection in Series

To cascade our signal enhancing board, please refer to the specific connection diagram as follows:

FIGURE 2-7 CONNECTION IN SERIES



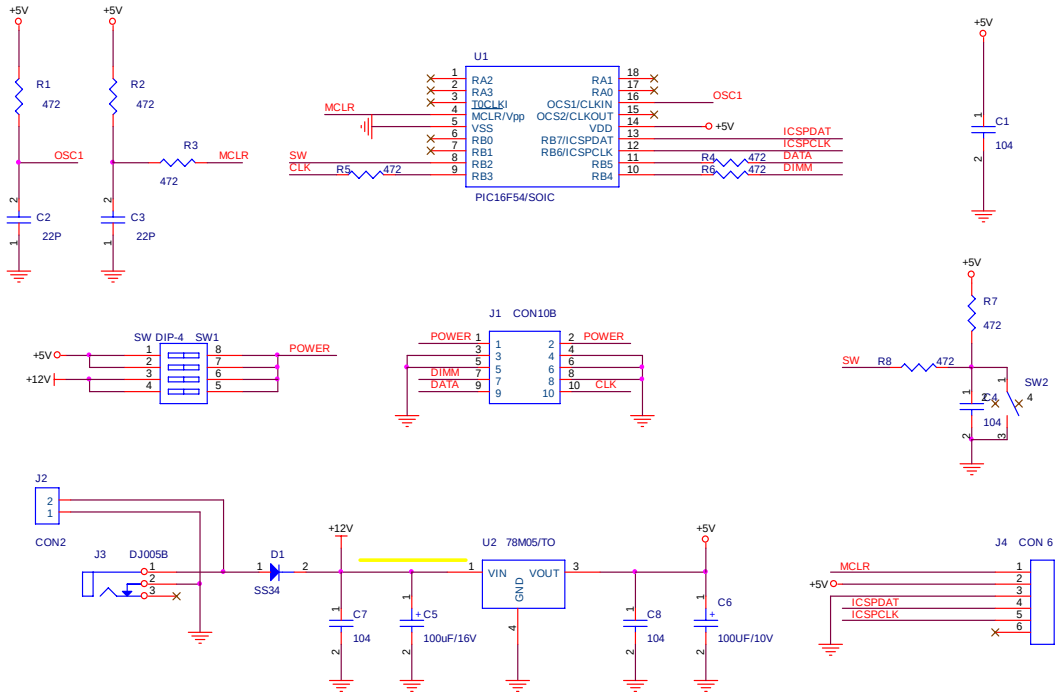
Chapter 3. Electrical Characteristics

- Power supply recommended:
  Input: AC100 to AC200 1A 50 to 60HZ
  Output: DC 12V 3.25A
- For over 4 panels, user must add auxiliary power on the auxiliary power ports, or the 10pin communication port could not carry so much current.
- Maximum clock frequency: 1MHz, 4 boards connected in series
- Suggested Refresh Rate: less than 10Hz
- Drive Current/segment: 18mA +3mA/-5mA, this value may be changed based on the production batch, and the dot uses different current: 7mA +1mA/2mA
- Drive Method: Fully static.
- Connection Method: 74HC164 in series, SPI like interface.
- Up to 4 boards are suggested to be connected in series.
- Interface Voltage Level: VDD*0.8-VDD+0.5V, standard CMOS level. If you need TTL/CMOS compatible interface in batch, please contact us but the quantity should be no less than 100pcs.

Chapter 4. Sample Codes

4.1 LED Segment Drive Demo Board's Schematic

FIGURE 4-1 LED SEGMENT DRIVE DEMO BOARD'S SCHEMATIC



4.2 How to Connect Load

FIGURE 4-2 CONNECT LOAD

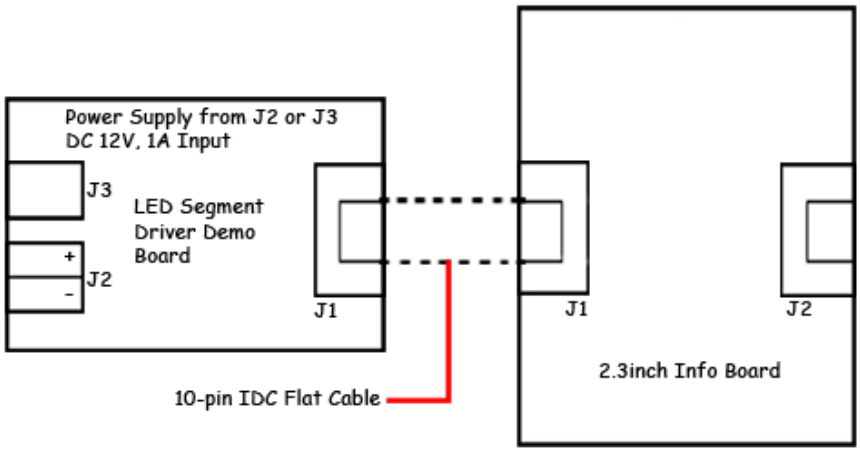
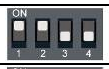
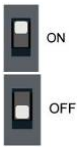


TABLE 4-1 ENCODER POSITION SETTING

Output Voltage	DIP Switch Settings	
5V	 +5V	
12V	 +12V	
0V	 +0V	

Note:

1. DIP switch only has the 3 ways as shown above to work; any other switching ways are prohibited.
2. Users shouldn't change the voltage while LED Segment Drive Demo Board is working. It is only allowed to change it before applying the current.

4.3 How to Display Data with PIC16F54 and PICC9.60 Compiler

Source code is shown below.

TABLE 4-2 SOURCE CODE

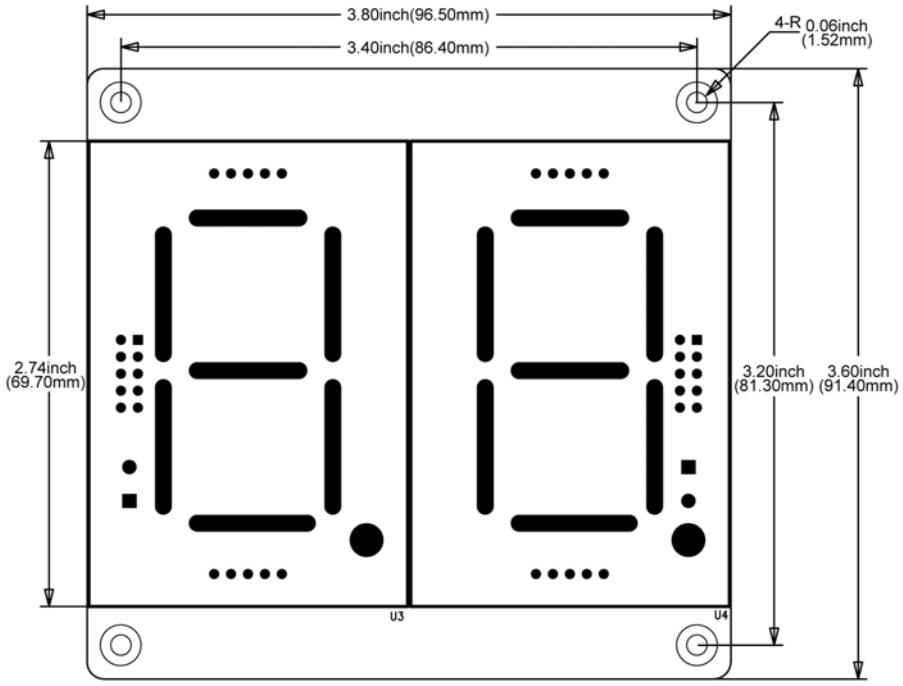
C code:

```
#include<pic.h>

__CONFIG(RC & WDTEN & UNPROTECT);

#define uchar unsigned char
#define uint unsigned int
#define DATA RB5
#define CLK    RB3
#define EN     RB4
#define keydown RB2

const uchar
TAB[19]={0x06,0x5b,0x4f,0x66,0x6d,0x7d,0x07,0x7f,0x6f,0x3f,0x01,0x02,0x04,0x08,0x
10,0x20,0x40,0xff,0x00};
//character library
uchar n;
uchar flag_g;
void delayus(uchar i)
{
      while(i--);
}

void init(void)
{
       TRISA=0;
       RA2=1;
       TRISB=0B00000100;
       CLK=0;
       OPTION=0B11000111;

       n=0;
       flag_g=0;
}

void sent_data(uchar sdata)
{
       uchar i;

       EN=1; //turn off the display, write data to be displayed
```

```
      for(i=0;i<8;i++)
      {
            CLK=0;
            delayus(5);
            if((sdata&0x80)==0x80) DATA=1;
           else DATA=0;
           sdata=(sdata<<1);
           CLK=1;
           delayus(5);
      }
            CLK=0;
      EN=0; //turn on the display
}

void delaytime(uchar i)
{
    uint j;
      for(;i>0;i--)
           for(j=0;j<400;j++)asm("clrwdt");
}


void scankey(void)
{
      uchar i,j;
      if(keydown==0)
      {
           delaytime(25);
           if(keydown==0)
          {
           while(keydown!=1) asm("clrwdt");
                 n++;
                 n=n%18;
                 for(i=0;i<19;i++)
                       {
                       for(j=0;j<16;j++)
                             {
                              sent_data(TAB[i]);
                             }
                             delaytime(200);
                       }
           }
       }
}

void main()
{
      init();
      while(1)
       {
           asm("clrwdt");
           scankey();
       }

}
```

Chapter 5. Mechanical Drawing

FIGURE 5-1 MECHANICAL DRAWING



Chapter 6. Contact Us

Sure Electronics Co., Ltd.
East zone, 3F, Building 6
Jingang Technology Innovation Center
No.108 Ganjiabian Rd (ZIP: 210000)
Qixia District
Nanjing
P.R.China
Tel: +86-25-68154800-860
Fax: +86-25-68154891-832
Website: www.sure-electronics.com
Email: customerservice@sure-electronics.com