Demo Driver Test Board for HD44780 Character LCD Module User's Guide

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NOTES:

Product Version : Ver 2.0

Document Version : Ver 2.0

Chapter1.Overview

1.1 Welcome

Thanks for purchasing series product of LCD character panel display of Sure Electronics. The following table shows the types of LCD display.

Product Number	Types of LCD character panel display
DE-LM001	0802LCD（Green backlight, black character）
DE-LM003	1602LCD（Blue backlight, white character）
DE-LM004	2002 OLED LCD（No backlight, green character）
DE-LM005	2004LCD（Blue backlight, white character）
DE-LM006	2004LCD（Blue backlight, white character）
DE-LM008	1602LCD（No backlight, black character）
DE-LM009	2402LCD（No backlight, black character）
DE-LM010	2402LCD（Red backlight, white character）
DE-LM011	1602 OLED LCD（No backlight, green character）
DE-LM013	2002 LCD（No backlight, black character）

Note: The dimensions of DE-LM005 and DE-LM006 are different.
Demo board and related accessories are provided along with the product you purchased so that users can test the functions of LCD display.

1.2 Quick Start

First, secure the connection of LCD display and demo board with a pin header. When making connections, be sure that the front of LCD and demo board face upwardly and both of them are approaching to each other. Be sure to align pin 1 (GND) of LCD display with pin 1(square-headed, GND) of demo board. In the mean time, users can also refer to Fig 1.1 and 1.2 for the correct connection. Try to make the contact as good as possible.

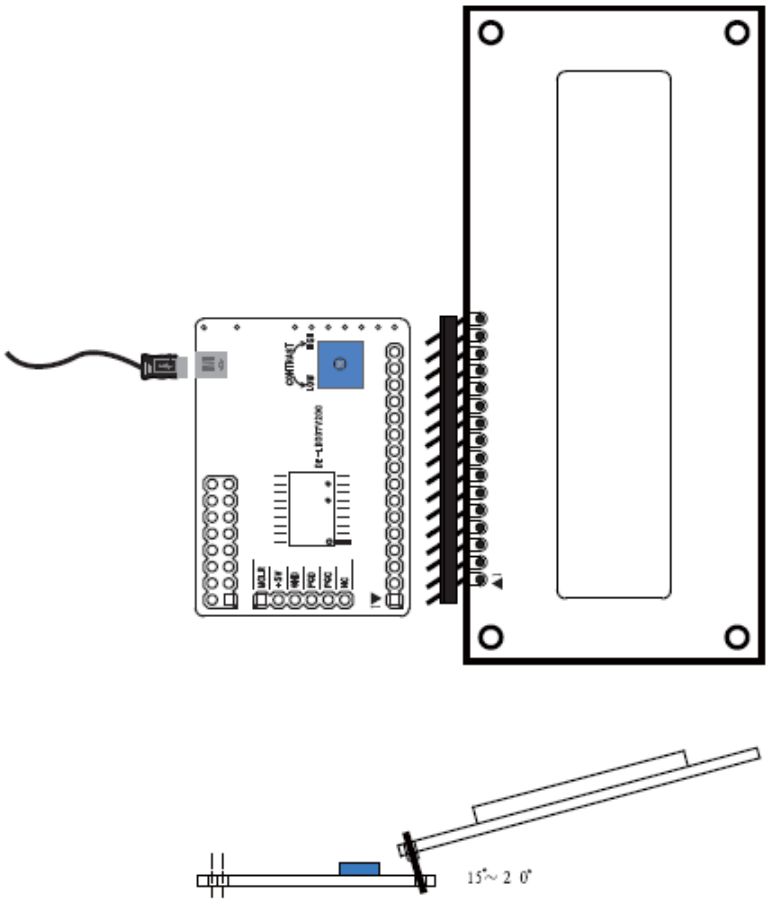


Fig 1.1 Connection schematic (with a single-row pin header)

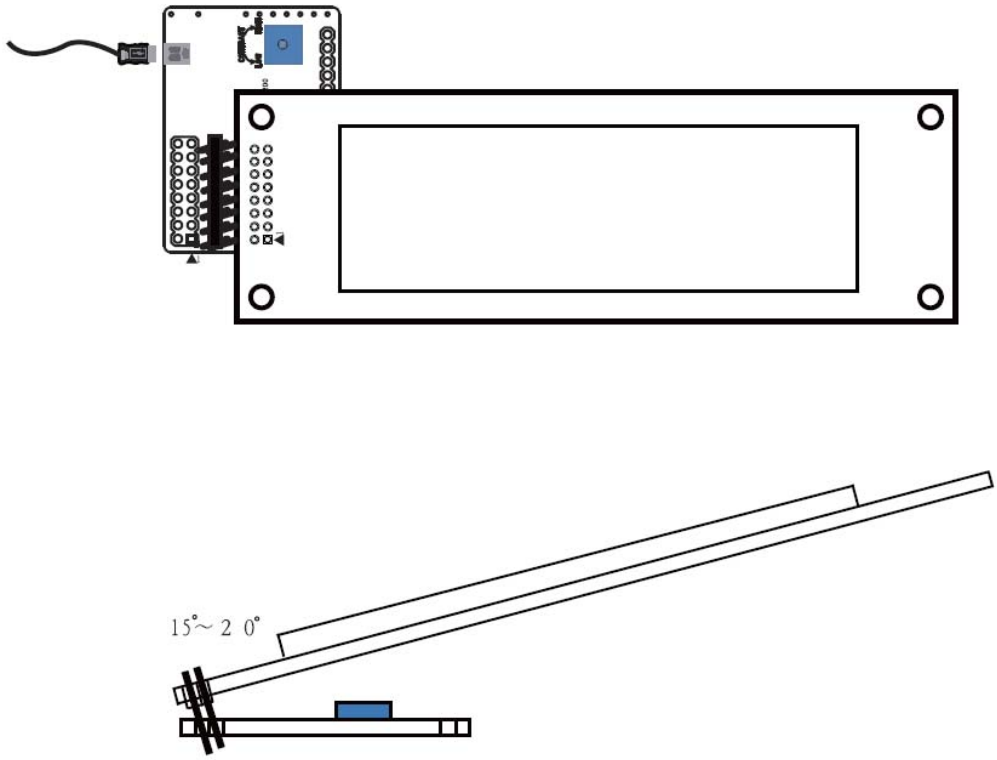


Fig 1.2 Connection schematic (Double-row pin header)

The following displaying schematics Fig 1.3, Fig 1.4, Fig 1.5, Fig 1.6 and Fig 1.7 shows the displaying contents of LCD display after powering by USB.

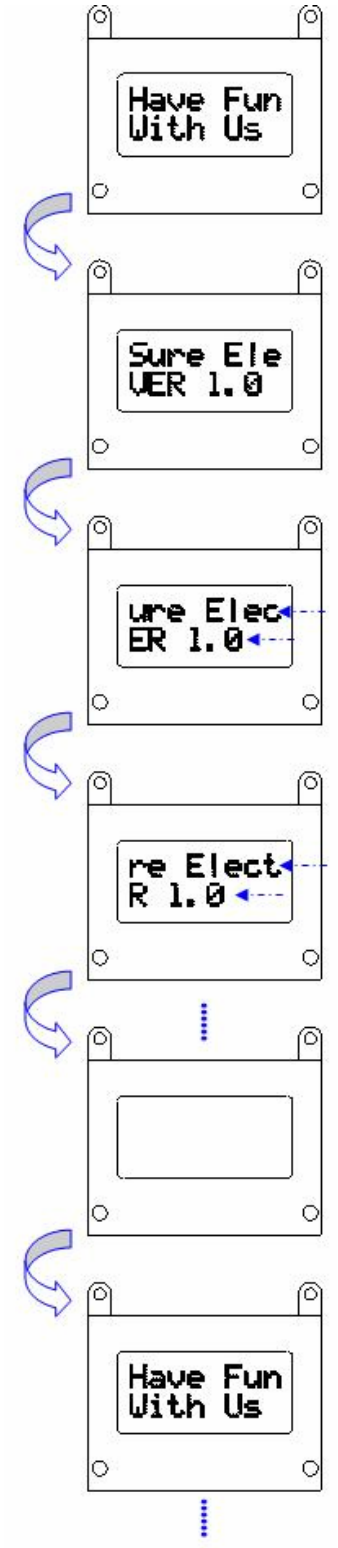


Fig 1.3 8*2LCD displaying schematic

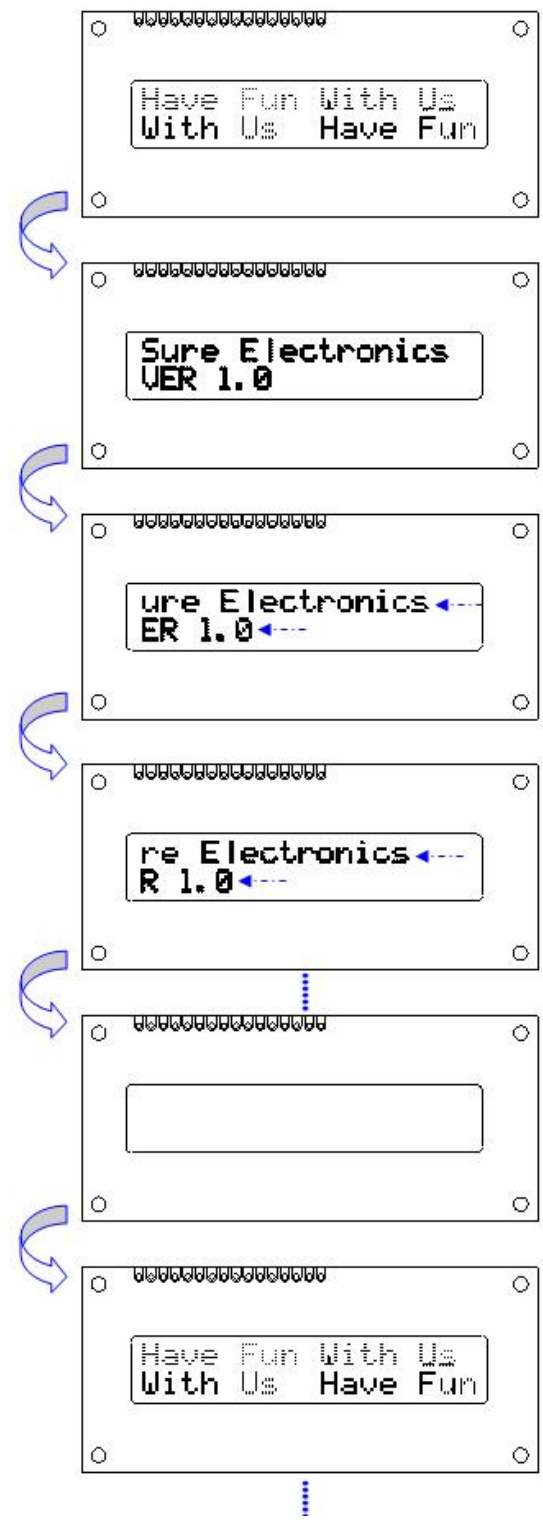


Fig 1.4 16*2 LCD displaying schematic

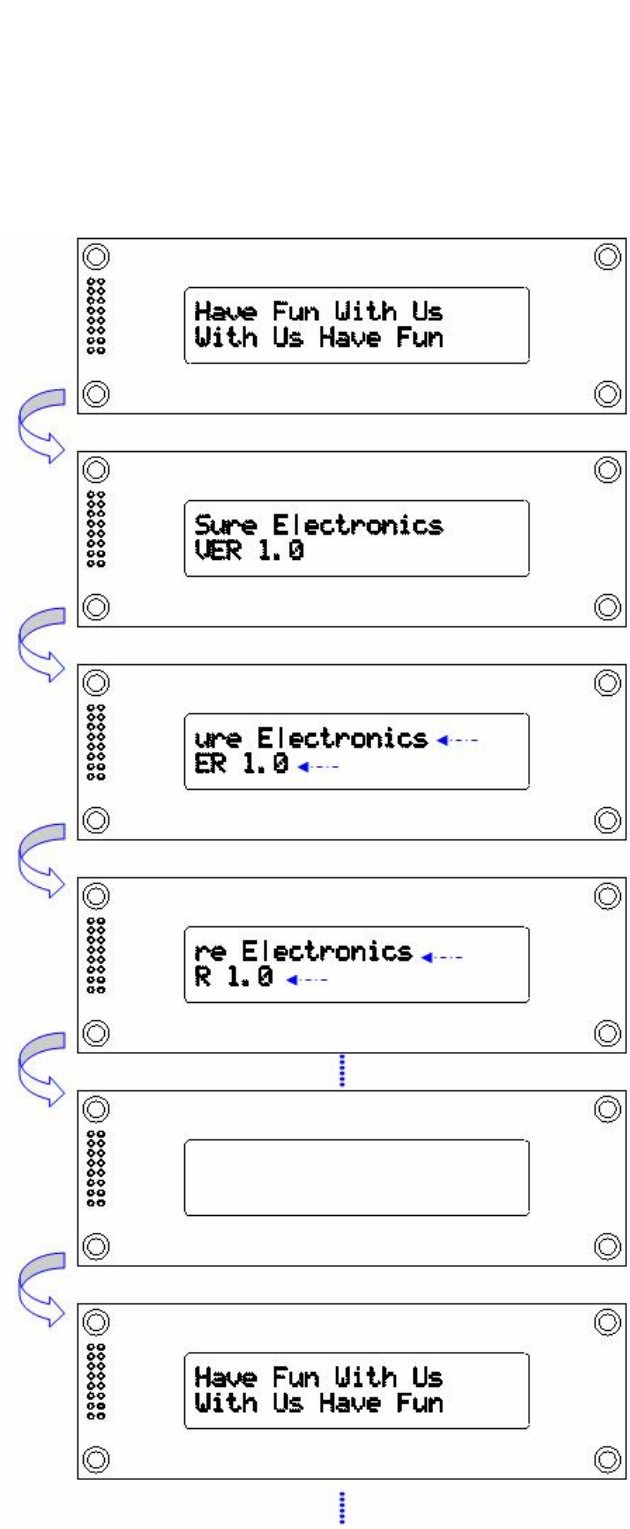


Fig 1.5 20*2 LCD displaying schematic

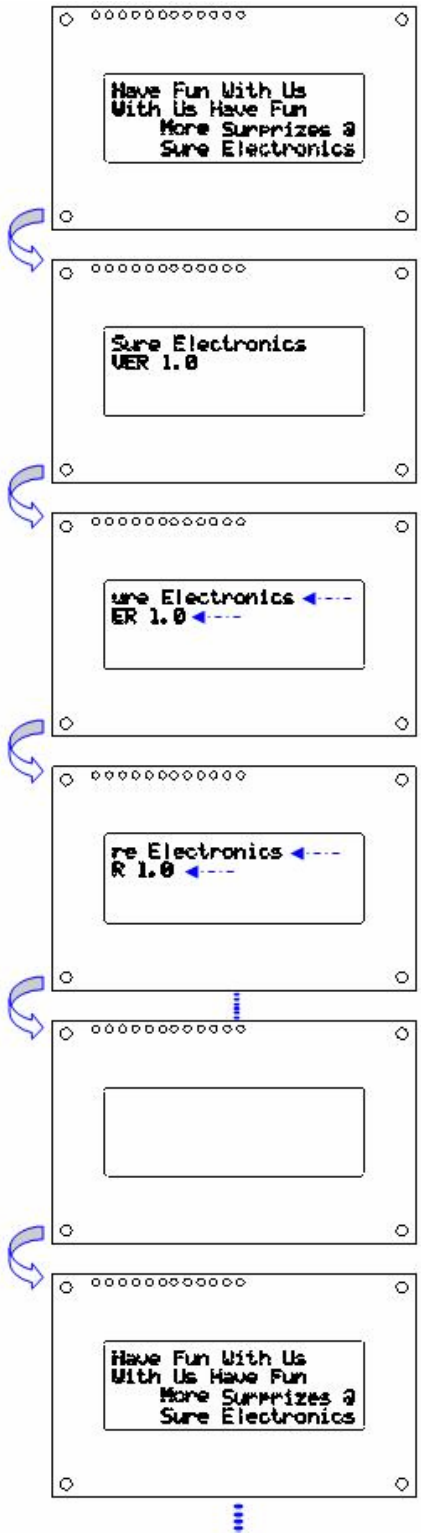


Fig 1.6 20*4 LCD displaying schematic

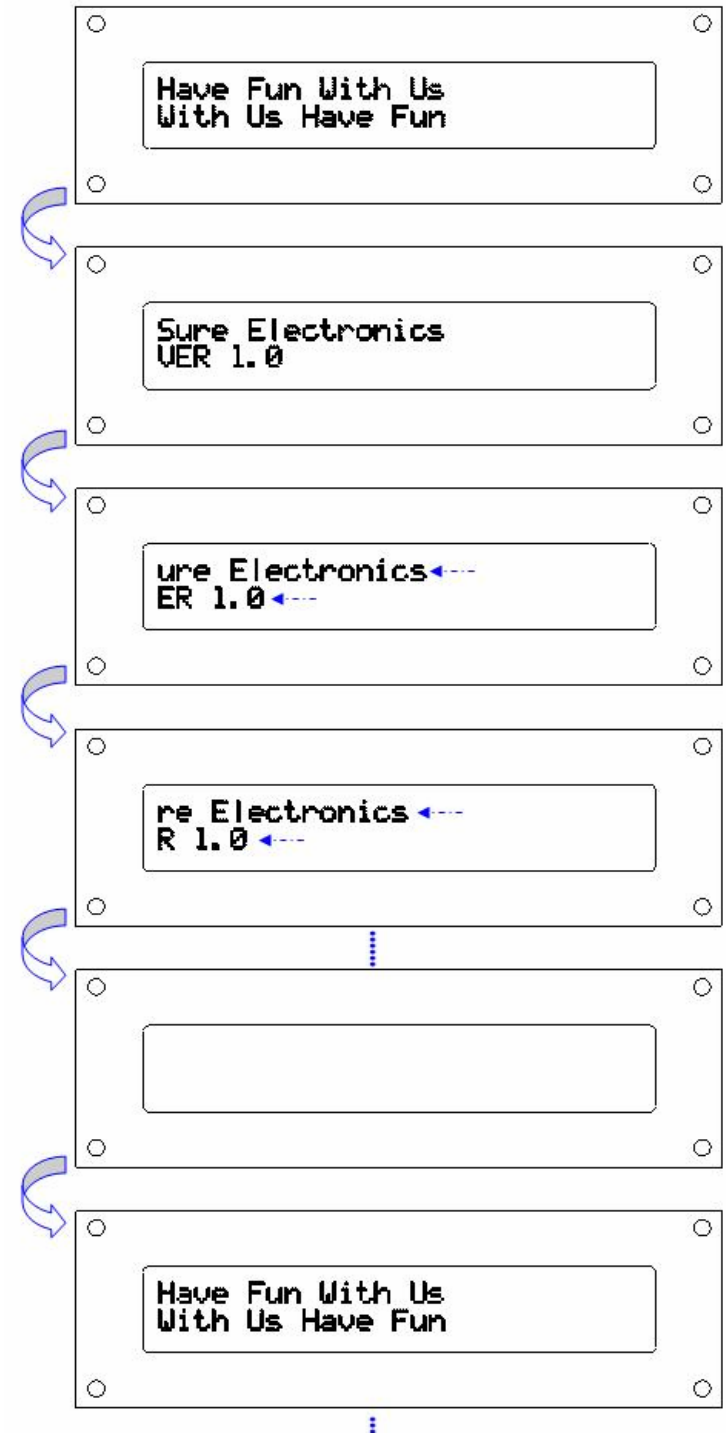


Fig1.7 24*2LCD displaying schematic

In case that the powering of demo board is finished before the connection of LCD display and demo board, LCD will start displaying from any random figure as shown in the above schematics as the first cycle. After the first cycle is finished, LCD will enter into the cycle display and start displaying from the first figure.

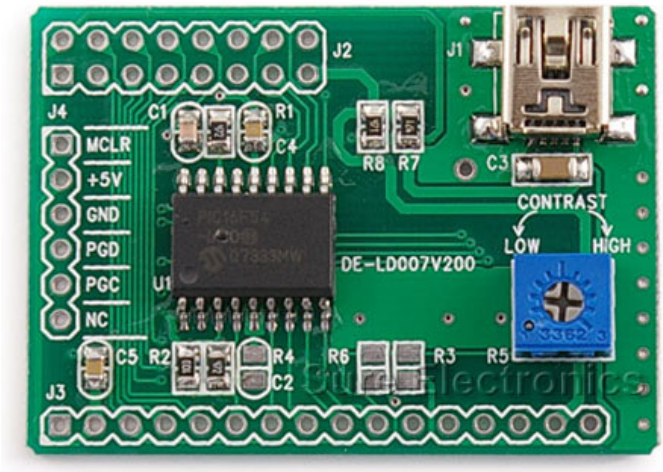


Fig 1.8 demo board

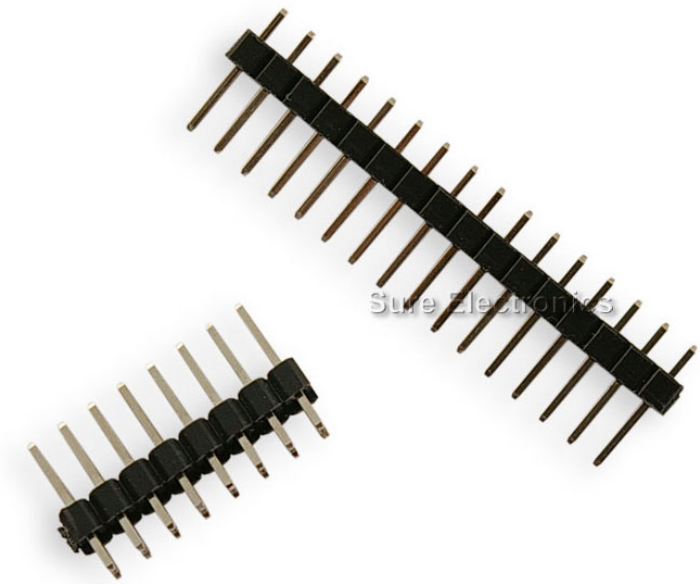


Fig 1.9 Single & double-row pin header

Chapter2.Hardware Introduction

2.1 Hardware details

（1）Controlling chip: PIC16F54, packaging: SOIC. A RC oscillator is connected as clock source.

（2）Backlight power input: pin A shall be connected with +5V power supply via shunt resistor if LCD supports backlighting, pin K shall be earthed. Otherwise, pin A and K are invalid.

（3）Interface between LCD and demo board: single/double-row 16pin holes.

（4）5pin mini USB B port can only be used as the interface of +5V power supply and cannot be used for UART, the maximum current shall not exceed 500mA.

(5) Contrast adjustment can be done via adjustable potentiometer R5.

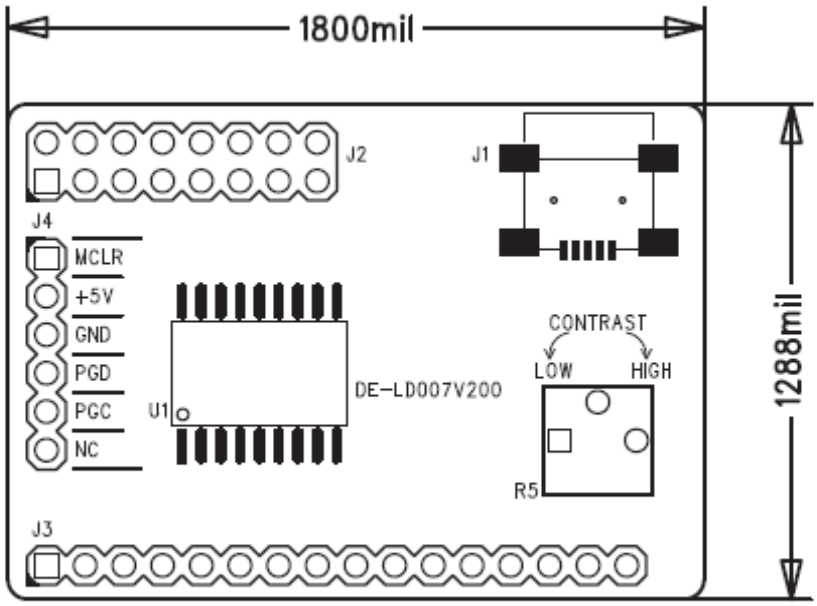
（6）Programming interface is reserved.

Note: the on-board contrast adjustment knob doesn't apply to 2002 OLED display since its brightness has already been set as well as its different rationale compared with other types of LEDs. The contrast of other types of display can be adjusted by R5.

2.2 Port Definition

No	Port name	Function
1	GND	For Grounding
2	＋5V	+5V power input
3	Vo	To adjust the contrast of LCD display
4	RS	Select shift register
5	RW	Reading& writing control
6	E	For enabling signal
7~14	DB0~DB7	Data bus
15，16	A ， K	Backlight power output, A is connected to +5V power supply, k is connected to earth.

2.3 Mechanical Drawing



Chapter3.Application Notes

3.1 25℃ is an appropriate ambient temperature for LCD testing with demo board.

3.2 It is highly recommended to secure the connection of display and demo board during testing. If the contact of LCD display and demo board becomes loose accidentally during testing which causes the displaying abnormal, users need to readjust and secure the connection to make it normal again.

3.3 Users are allowed to adjust the potentiometer if you think the characters on the LCD are not clearly displayed. It is highly recommended to adjust the viewing angle if you are still not satisfied with the displaying effect after adjustment.

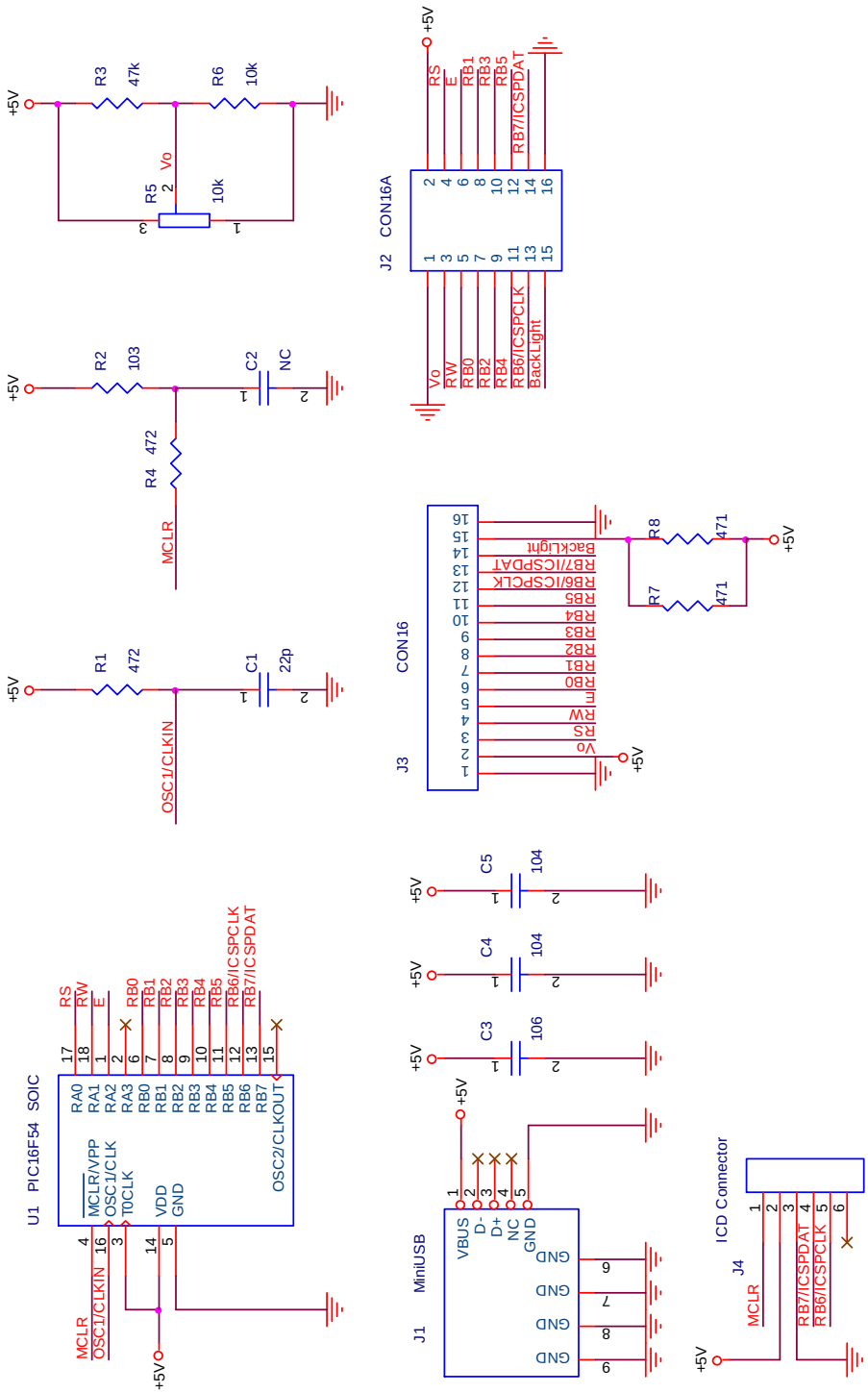
3.4 The service life of the adjustable potentiometer is 1000 times. If the potentiometer is found as incapable of performing its function, users may solder appropriate resistors in the pad area of R3, R6 or buy the same demo board.

3.5 Do not connect LCD display and demo board when programming the chip. Otherwise, failure will occur.

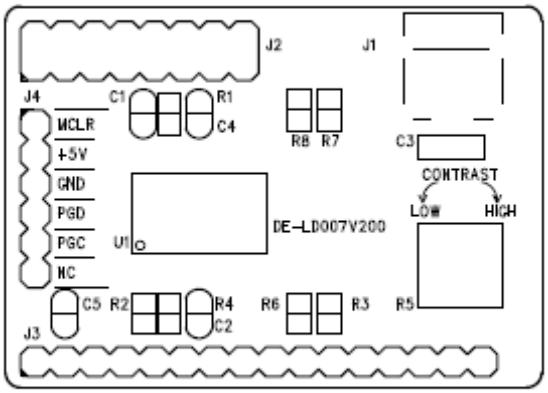
3.6 Do not test LCD display under intense light source. Otherwise, the character and backlight of LCD will be difficult to recognize.

3.7 Sure Electronics doesn't provide technical support for further development of this demo board

Appendix1:Schematics



Appendix2:PADS Layout



Appendix3:Sample Code

The sample code below is specifically designed for this demo board.

```
#include<pic.h>
__CONFIG(WDTDIS & RC & UNPROTECT);

//I/O port
#define RS_PIN       RA0
#define RW_PIN     RA1
#define E_PIN        RA2

#define DATA_PORT          PORTB
#define TRIS_DATA_PORT TRISB


void Delay_4ms(void)//Delay 4.1ms
{
      unsigned int t;
      for(t=0;t<820;t++)
      ;
}
```

```
//Write Command
void WriteCommand(unsigned char cmd)
{
        TRIS_DATA_PORT=0x00;
        RS_PIN=0;
        RW_PIN=0;

        E_PIN=1;
        DATA_PORT=cmd;
        E_PIN=0;
}
//Read busy flag
unsigned char BusyCheck(void)
{
      unsigned char BF;
      TRIS_DATA_PORT=0xff;
      RS_PIN=0;
      RW_PIN=1;

      E_PIN=1;
      BF=DATA_PORT;
      E_PIN=0;
      if(BF & 0x80)
            return 1;
      else
            return 0;
}
//Initial by instruction
void InitByInstru(void)
{

      Delay_4ms();
      WriteCommand(0b00111111);
      Delay_4ms();
      WriteCommand(0b00111111);
      Delay_4ms();
      WriteCommand(0b00111111);

      WriteCommand(0b00111011);          //8-bit mode,two lines,5*7 character
      while(BusyCheck());
```

```
    WriteCommand(0b00001100);       //Display on,cursor off,blink off
    while(BusyCheck());
    WriteCommand(0b00000001);       //Clear display
    while(BusyCheck());
    WriteCommand(0b00000011);       //Return home,AC=0
    while(BusyCheck());
    WriteCommand(0b00000110);       //Set entry mode,increment adress by 1
                                    // and shift cursor to the right at the
                                    // time of write to DD/CGRAM.Display
                                    // is not shifted
}
//Write Address
void WriteAddress(unsigned char adr)
{
    TRIS_DATA_PORT=0x00;
    RS_PIN=0;
    RW_PIN=0;

    E_PIN=1;
    DATA_PORT=(adr | 0x80);
    E_PIN=0;
}
//Write character
void WriteChar(unsigned char data)
{
    TRIS_DATA_PORT=0x00;
    RS_PIN=1;
    RW_PIN=0;

    E_PIN=1;
    DATA_PORT=data;
    E_PIN=0;
}
//Write strings
void WriteStr(const char *string,unsigned char cnt)
{
    while(cnt--)
    {
        while(BusyCheck());
            WriteChar(*string++);
```

```
    }
}

 void Delay_500ms(void)
{
    unsigned int k;
    for(k=0;k<120;k++)
        Delay_4ms();

}

void init(void)
{
    TRIS_DATA_PORT=0b00000000;
    TRISA=0b0000;
    E_PIN=0;
}

//Characters used to display
const char poweron[]="Have Fun With Us";
const char disp1[]="More Surprizes ";
const char disp2[]="Sure Electronics";
const char disp3[]="VER 1.0";
void main(void)
{
    unsigned char cnt;
    init();
    InitByInstru();

    while(BusyCheck());
    WriteAddress(0x00);                 //Set display address at 0x00
    WriteStr(poweron,16);
    while(BusyCheck());
    WriteAddress(0x18);                 //Set display address at 0x18
    WriteStr(disp1,15);
    while(BusyCheck());
    WriteChar(0b01000000) ;             //Write '@'

    while(BusyCheck());
    WriteAddress(0x40);                 //Set display address at 0x40
```

```
    WriteStr(poweron+9,7);
    while(BusyCheck());
    WriteChar(' ');
    WriteStr(poweron,8);
    while(BusyCheck());
    WriteAddress(0x58);                    //Set display address at 0x58
    WriteStr(disp2,16);
    Delay_500ms();                         //Delay some time to keep dispaly stable
    Delay_500ms();
    Delay_500ms();
    Delay_500ms();

    //Write different data array each time
    //Simulate shift-display
    for(cnt=0;cnt<16;cnt++)
    {
        InitByInstru();

        while(BusyCheck());
        WriteAddress(0x00);
        WriteStr(disp2+cnt,16-cnt);
        if(cnt<7)
        {
            while(BusyCheck());
            WriteAddress(0x40);
            WriteStr(disp3+cnt,7-cnt);
        }
        Delay_500ms();                     //Delay some time to keep display stable
    }
}
```

Chapter4. Contact Us

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