

Sure Electronics

40-Segment 2.54 pitch LED Bar Display Board User's Guide

Product Name : 40-segment 2.54mm pitch

LED Bar Display Board

Product ID : DE-DP011

Product Version : Ver 1.0

Document Version: Ver 1.0

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Chapter 1. Overview and Main Feature

LED Bar Display Boards are manufactured by Sure Electronics. This series includes 3 different size panels, such as 40-Segment 2.54mm, 40-Segment 1mm, and 100-Segment 1mm. All those panels are driven by SPI like interface and all work in full static mode. They are easy to be interfaced to any Microcontrollers. They could be widely used in panel meter, big clocks and any other information display usage.

Sure Electronics provides series of such LED Bar Display Boards which are supposed to reduce your development time and make them standard. In this series, most boards assembled 4*10 segment LED Bars. If customer needs any special digits and special size ones, you could contact us with the contact information at the end of this document.

This document is used to describe how to use 40-segment 2.54mm pitch LED Bar Display Boards.

1-1. Overview

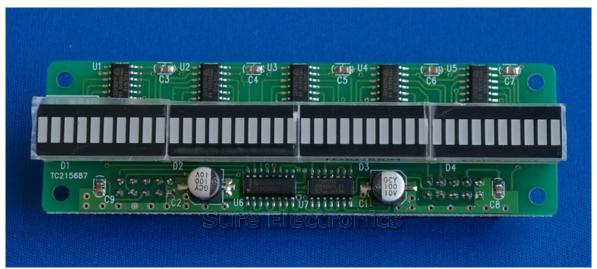


Figure 1

1-2. Part Layout

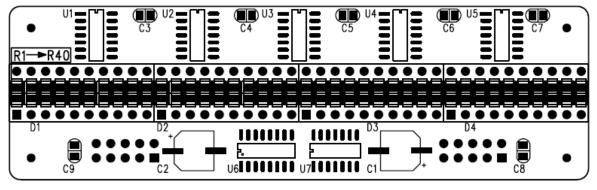


Figure 2 Top Part Layout



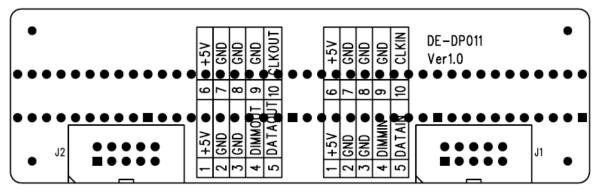


Figure 3 Bottom Part Layout

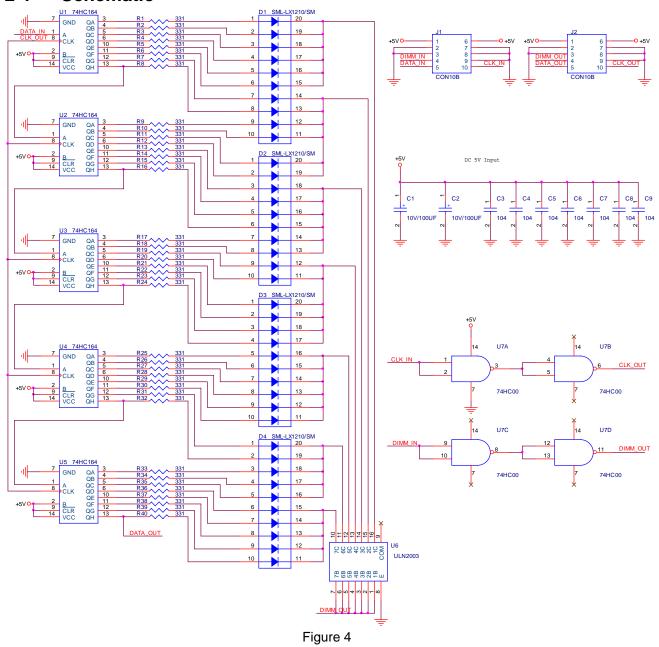
1-3. Main Feature

- **1-3-1.** 4*10 segment LED Bars are installed on this panel.
- **1-3-2.** 2*10pin interface for power serializing and data transferring, data inputs from J1 and flows out from J2.
- 1-3-3. A 74HC00 Nand chip is used to buffer CLK_IN and DIMM_IN control signal.
- **1-3-4.** LED Bar driver chips are composed of 4pcs 74HC164 and 1pcs of ULN2003, they are serialized to each other, the first chip receives data from Microcontroller or the board ahead, the final chip shifts data to next boards. Data should be clocked in from CLK_IN and DATA_IN in J1, and DIMM_IN pin should be pulled down to enable display. ULN2003 is used to drive the cathode of those led segments.



Chapter 2. Hardware Detail

2-1 Schematic



Note: Because of the LED's voltage drop difference, the resistance may vary from the value marked in the schematic.



2-2 Physical Dimension

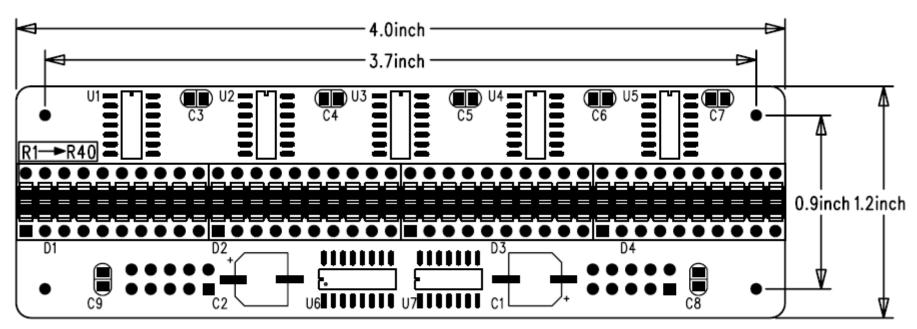


Figure 5

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2-3 Circuit Diagram

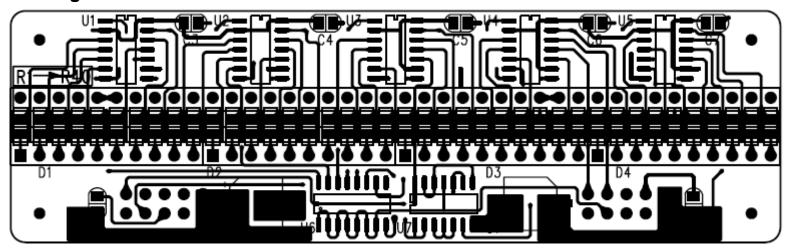


Figure 6

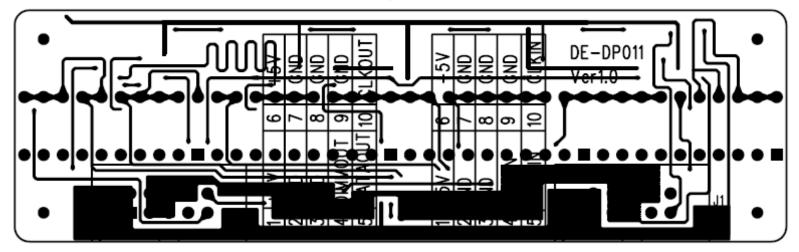


Figure 7

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2-4 Electric Characters

- Power Supply: DC4V-5.5V 0.8A/pcs (Maximum), for each additional panel, add another 0.8A, if voltage is less than 4V, the brightness would not be enough.
- Not more than 4 series panels, otherwise the 10pin communication port could not carry so much current.
- Maximum clock freq: 10MHz, 4 boards serialized
- If the communication speed is too high, it may cause communication problems.
- Suggested Refresh Rate: Less than 10Hz if DIMM is not used. Less than 50Hz if DIMM is used.
- Drive Current/segment: 10mA +3mA/-2mA, this value may be changed based on the production batch.
- Drive Method: Fully static.
- Connection Method: 74HC164 in series, SPI like interface.
- Maximum Cascade Level: 4 boards in series, clock less than 10MHz.
- 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.

2-5 Port Definition

2-5-1. LED Bar Display and Shift Register Data Driver



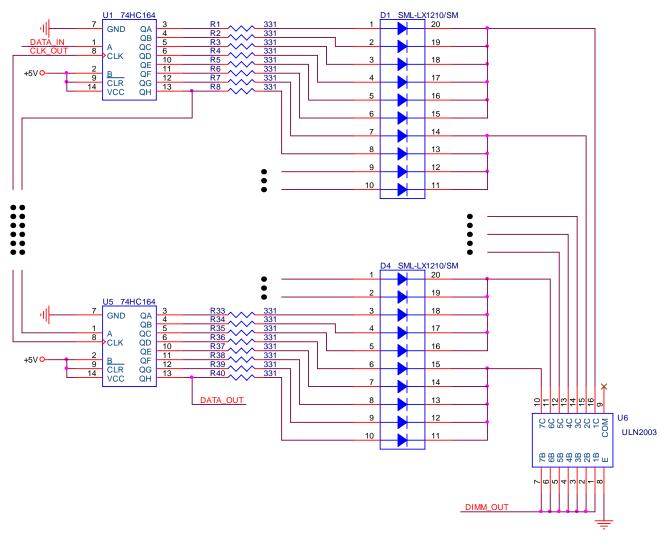
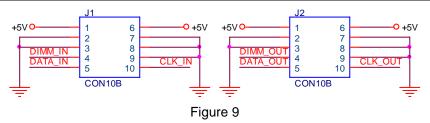


Figure 8

High brightness red 40-segment LED Bars are installed on this board. They are marked as D1-D4. DIMM_OUT signal is for brightness control usage, you could add simple on/off or PWM signal on this signal, when this signal is set to high, all segments will light on if valid data is shifted out from the 74HC164 chip. If you are changing the data in the 74HC164 driven chip, set this pin to low then the hash signal will not affect the display. Of course if you want to adjust the brightness of those LED Bars, PWM signal could be applied on the DIMM_IN pin. It is buffered with a 74HC00, and DIMM_OUT signal will drive this board and next. 74HC164 is used as shift register in this board. They are U1-U5, and connected to D1-D4. CLK_OUT is driven by a buffered output from CLK_IN with 74HC00. DATA_IN is data input pin of the first 74HC164, then all 74HC164 of cascaded boards will be serialized. All those pins accept only CMOS signals. Once you clock in correct data through these 2 pins, and ensure that PWM signal or ON/OFF signal is applied correctly on the DIMM_IN pin, the board will begin display.

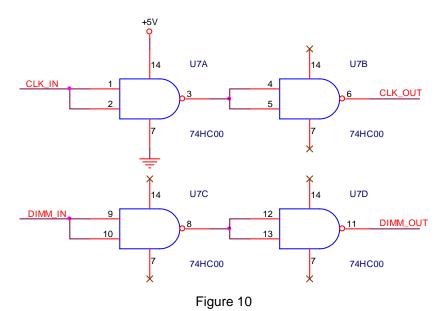
2-5-2. Data Ports Definition





2 IDC sockets are located on the board. They are data input and output interface, marked as J1 and J2. The definition is shown in Figure 9. When the board is working separately, connect J1 to the Microcontroller board and leave J2 open. If lots of same boards are in series, connect next board's input to previous one's output. Then you could connect up to 20 boards in series.

2-5-3. Data Buffer

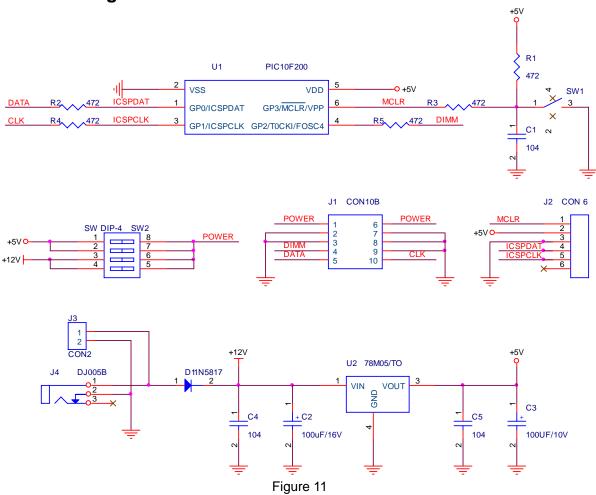


74HC00 chip is used to buffer Clock and DIMM signal in this board. A CMOS chip is not able to drive over 10pcs CMOS input if the cable is so long, here 74HC00 is used as NOT gate, and 2 gates in series is a buffer.



Chapter 3. Sample Codes

3-1. LED Segment Drive Demo Board's Schematic



3-2. How to Connect Load

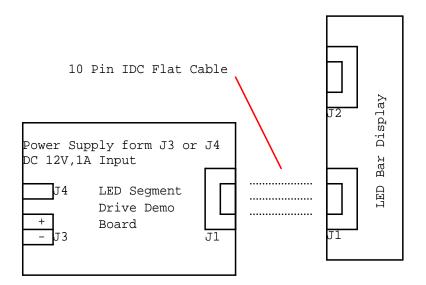




Figure 12

Output Voltage	Encoder Position Setting(1)(2)	
5V	4 3 2 1 +5V	ON
12V	4 3 2 1 +12V	OFF
0V	4 3 2 1 0V	

Notice:

- (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.

3-3. How to display data with PIC10F200 and PICC8.05 environment

Source code is shown below,

#include <pic.h>

#define Fuc_key

__CONFIG(UNPROTECT&MCLRDIS&WDTDIS);//Configure Word

GP3

void SEG_Shift1(void)



```
unsigned char i;
    position++;
    if(position>40)position=0;
    for(i = 0; i < 40; i++)
         if(i==position) DATA=0;
         else DATA = 1;
         CLK = 0;
         CLK = 1;
void SEG_Shift2(void)
    unsigned char i;
    position++;
    for(i = 0; i < position; i++)
         DATA = 1;
         CLK = 0;
         CLK = 1;
    for(i = 0; i < (40-position); i++)
         DATA = 0;
         CLK = 0;
         CLK = 1;
    if(position>40)position=0;
}
void SEG_Shift3(void)
{
    unsigned char i;
    position++;
    for(i = 0; i < (40-position); i++)
         DATA = 1;
         CLK = 0;
         CLK = 1;
    for(i = 0; i < position; i++)
         DATA = 0;
         CLK = 0;
         CLK = 1;
    if(position>40)position=0;
}
void change(void)
    key_pressed=Fuc_key;
    if((key_pressed==0)&(last_key_pressed==1))
         if(key_pressed==0)
         {
```



```
time++;
            if(time>3)time=1;
    last_key_pressed=key_pressed;
}
void main(void)
    OSCCAL=0;
    TRIS = 0b11111000;
    OPTION=0b10011111;
    while(1)
    {
        change();
        if(time==1)SEG_Shift1();
        if(time==2)SEG_Shift2();
        if(time==3)SEG_Shift3();
        delay_20ms();
    }
}
```



Chapter 4. Contact US

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