Device: LCD-7S04

This document Version: 1

Matches module hardware version: 1

Date: 31 March 2013

Description: Low power four digit, seven segment LCD display

Contents

Introduction

The LCD-7S04 is a super low power seven segment liquid crystal display, with decimal points and colon.

Features

With a very straightforward synchronous (ie, clocked) serial input, this display is easy to get up and running. It has a wide viewing angle and has an optional backlight that aids viewing in darkness.

It's perfect for making clocks and temperature sensors. Pair it with the MOD-1001 RTC/Temp sensor and you have a great combination!

Construction

It's all pre-built! Just add female or male header pins, or solder directly to the board, and away you go.

Connections

The LCD-7S04 has one connection port.

VDD	Positive supply (2.7V to 5.5V)
DI	Data In
VSS	Ground connection
CLK	Clock
BLA	Backlight LED anode
BLK	Backlight LED cathode

Technical details

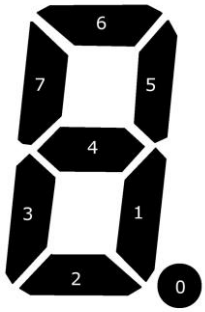
The LCD-7S04 can be powered from 2.7V to 5.5V. At 3V it consumes 20µA. At 5V it consumes 300 µA. This is a great display to experiment with lower power designs.

With a couple of AA batteries, this display will last practically forever, so the challenge becomes convincing your microcontroller to consume as little power as possible.

To communicate with the display, simply "shift in" five bytes, MSB first. The Clock signal is active low, meaning that you need to change the value on the data line

while the clock is high, and then pulse the clock low to shift the data in. The data bits are also active low, meaning that a segment will be "lit" if the bit value is 0.

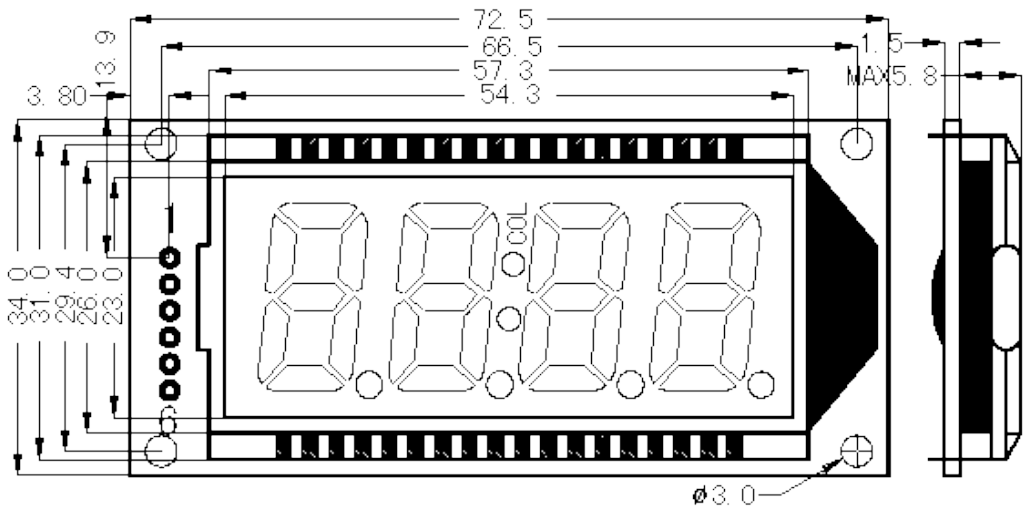
The first byte determines if the colon should be lit. Following that, digits 4, 3, 2 and 1 are shifted in, where digit 4 is the left-most digit. The following picture shows which bit lights up which segment:



The following code shows one byte being clocked into the LCD. Note that the nop() instruction gives the display a chance to catch its breath.

```
void ea_lcd7s04_write_data_byte(uns8 data) {

    for( uns8 count = 0 ; count < 8 ; count++ ) {
        change_pin(lcd_di_port, lcd_di_pin, data.7);
        data = data << 1;
        clear_pin(lcd_clk_port, lcd_clk_pin);
        nop(); nop(); nop(); nop();
        set_pin(lcd_clk_port, lcd_clk_pin);
    }
}

void ea_lcd7s04_update_display(void) {

     if (colon) {
          ea_lcd7s04_write_data_byte(0x00);
     } else {
          ea_lcd7s04_write_data_byte(0xff);
     }

     ea_lcd7s04_write_data_byte(~(display[0] | dots[0]));
     ea_lcd7s04_write_data_byte(~(display[1] | dots[1]));
     ea_lcd7s04_write_data_byte(~(display[2] | dots[2]));
     ea_lcd7s04_write_data_byte(~(display[3] | dots[3]));

}
```

Dimensions



Versions

Doc Version	HW Version	Date	Comments
1	1	31 March 2013	Initial Version for board v1