Device: DSP-0401B

This document Version: 1.0

Date: 6 June 2011

Description: 4 digit 16 segment Alpha-numeric display with 1 inch digits

Matches module hardware version: [3 May 11 v4]

Table of Contents

Introduction

The DSP-0401B is a 4 digit, sixteen segment display module powered by four TLC5926 serial LED driver chips.

Features

The DSP-0401B is a non-multiplexed display; each individual LED segment (aside from the dot LEDs) is lit and addressable. Unlike multiplexed displays that light only one digit at a time, the DSP-0401B allows all digits to be lit simultaneously resulting in a significantly brighter display. The brightness (and hence current consumption) of the entire display can be controlled in 256 steps via the TCL5926 configuration register, for analogue control, or by using PWM on the BLK pin, for digital control.

Construction

It's all done for you! In the future we may offer display boards and LEDs separately, please let us know on support@embeddedadventures.com

Connections

The DSP-0801B has five connection jumpers.

JP1 - Input

GND	Ground (Vss) connection
CLK	Clock
SIN	Serial In
BLK	Blank
LAT	Latch
VCC	Positive supply for driver chips

JP2 - Input

LED_SUP	Positive supply for LED displays
GND	Ground (Vss) connection

JP3

Jumper this connection if you want to use the same supply for both driver chips and LED displays. Leave it disconnected if you want to power the LED displays from different supplies.

JP4 - Output

LED_SUP	Positive supply for LED displays
GND	Ground (Vss) connection

JP5 - Output

GND	Ground (Vss) connection
CLK	Clock
SOUT	Serial Out
BLK	Blank
LAT	Latch
VCC	Positive supply for driver chips

Power

The DSP-0401B has two power connections. There is one supply for the driver chips, and another for the LED displays themselves.

The driver chips can be powered from 3.3V – 5V.

The board has been designed to handle a variety of different alphanumeric display colours. In the 1 inch versions of these displays use *two* LEDs for some of the segments (the longer ones). That means that the maximum voltage drop across these segments, for red LEDs is going to be about 1.9V x 2 = 3.8V, which is too high for a 3.3V supply. For blue LEDs, 2.8V x 2 = 5.6V, which is too high even for a 5V supply.

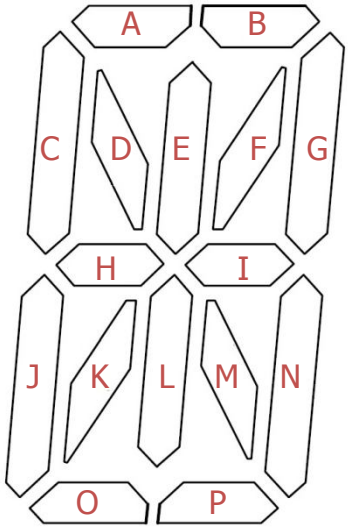
Having the LED supply and driver chips on separate supplies allows your control circuit to run at 3.3V or 5V, communicating with the driver chips without a level converter, while giving the LED displays whatever they need. Of course, you can run red or yellow LED displays with the same 5v supply for both the LEDs and the logic supplies. To do that without having to wire everything twice, simply connect jumper JP3.

So, the LED driver chips need 3.3v or 5v, and the LED Supply needs at least 3.8v for red LEDs, 4.3v for yellow LEDs, or 6.6v for blue LEDs. The display is not particularly

sensitive to the LED_SUP supply voltage, so long as the minimum voltage requirements are met. So a 5v supply will work for red and yellow LED displays, but you'll need about 7v for blue displays. The TLC5926 chips will supply the right amount of current regardless of the input voltage and adjust automatically for the fact that 1 inch displays use segments that have a variable number of LEDs in each segment. Keep in mind that the higher the voltage above what is required, the hotter the chips will run! Also be aware that lots of LEDs happily eat lots of current.

Usage

Each segment of each LED digit is individually addressable.



For each digit, shift in 16 bits by setting the SIN line correctly, and pulsing the CLK line high.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
P	M	N	I	G	B	F	E	A	D	C	H	J	O	K	L

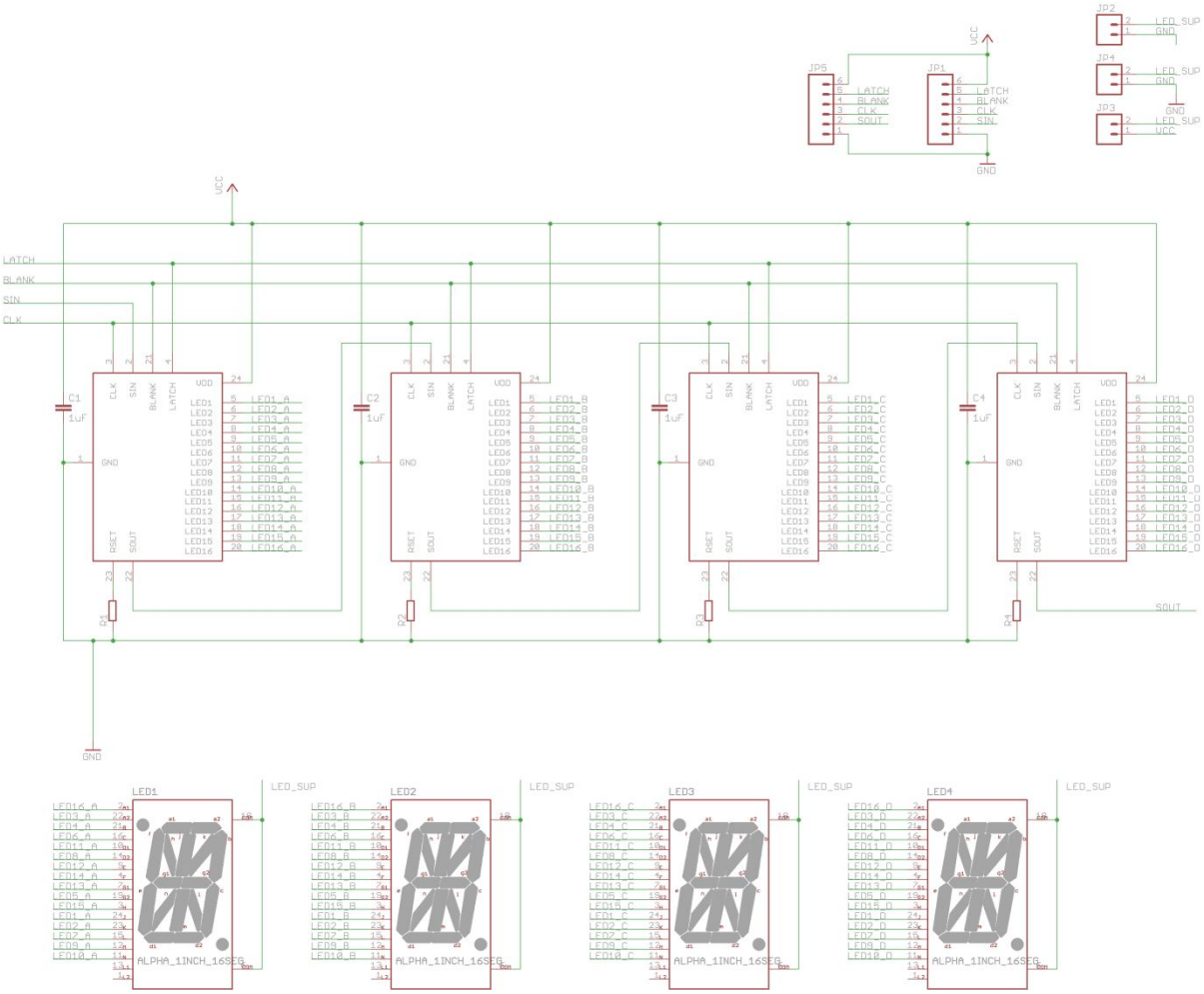
So to shift in the letter A, shift in 0011110010111000. This will light segments N, I, G, B, A, C, H and J, which is a pretty good letter A. For each bit, set the SIN line to either high (1) or low (0) and pulse the CLK line high.

Once you have shifted in all digits, pulse the LAT line high, which will change all digits at the same time. If you have several boards chained together, you can shift in the digits for all boards, then pulse the LAT line to change all at once.

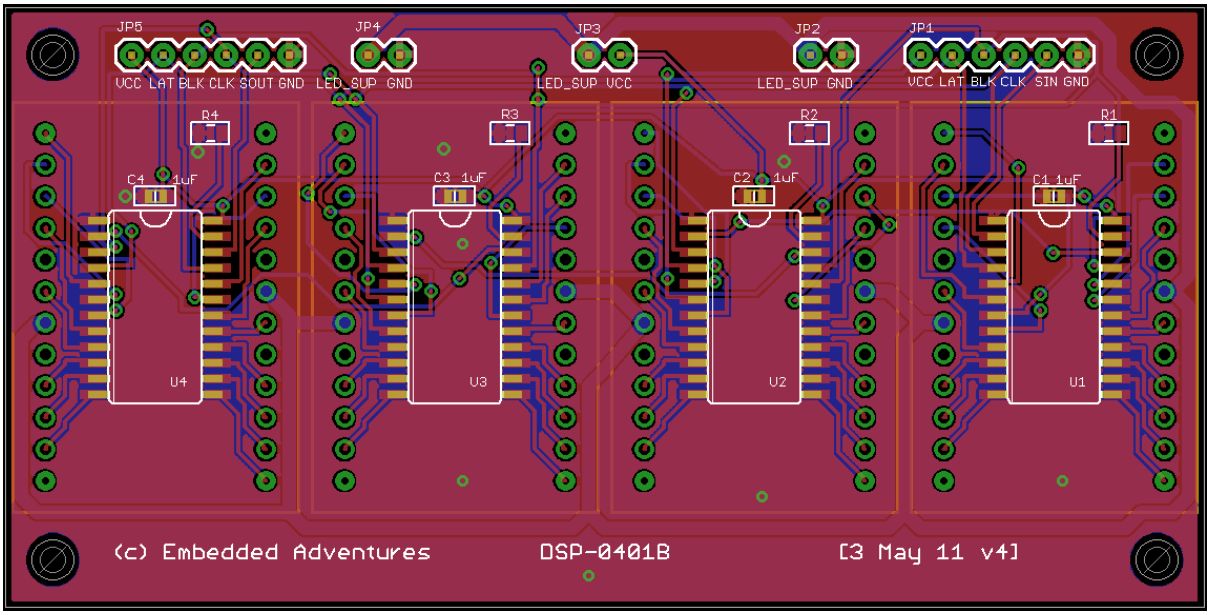
You will need to pull the BLK (Blank) line low, otherwise no digits will light. You can use PWM on the BLK line for more finely controlled brightness levels, although the TCL5926 has the ability to set the current used by each chip.

For more details, refer to the TLC5926 datasheet.

Schematic



PCB



Versions

Version	Date	Comments
Version 1.0	6 June 2011	Initial Version for board [3 May 11 v4]