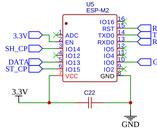
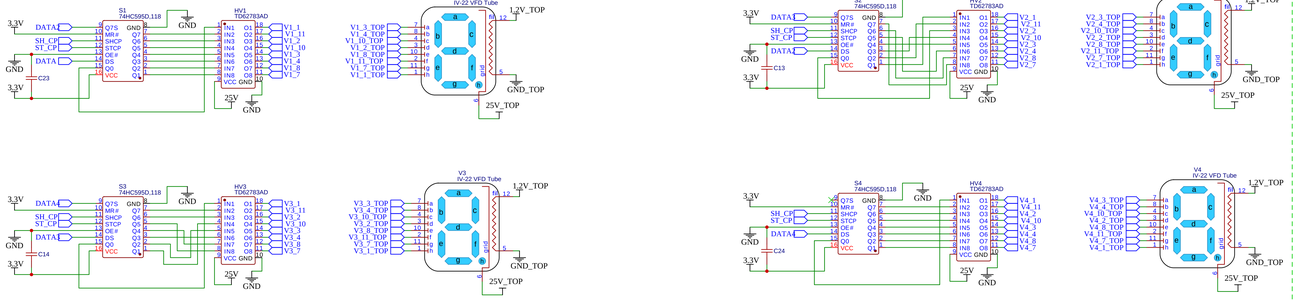


GPIO4, GPIO5 and GPIO12 are unused in the design and perfect for any use.

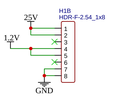
VFD + shift registers

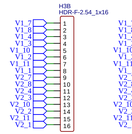


Decoupling capacitors should be placed as close to 74HC595 as possible

TBD62783AFG (C97745) is a modern pin-compatible replacement with lower power consumption, recommended! Cheap chinese 1:1 clone XL62783 also available (C556260)

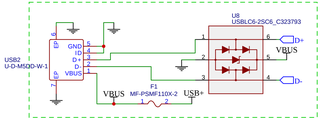
48x golden pin sockets are needed, you can get them on ebay, search for "IN-12 nixie pins" :)



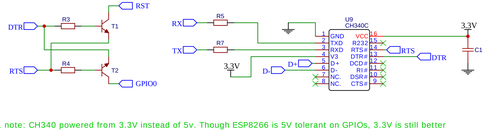


You will need 2x 16pin header + 2x 8pin header, both male and female

Micro USB + ESD protection

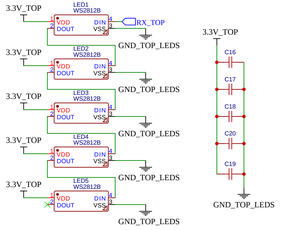


USB to SERIAL + auto-reset



v1.1 note: CH340 powered from 3.3V instead of 5v. Though ESP8266 is 5V tolerant on GPIOs, 3.3V is still better

Colon leds



Decoupling capacitors should be placed as close to LEDs as possible

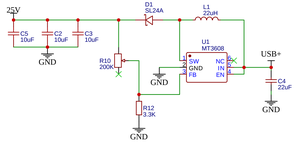
Powered from 3.3V for lower brightness + no level shifter required. Out of spec but tested on several different chips

Depending on exact chip used, you will have to adjust colors in the sketch

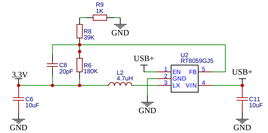
WS2812B are almost too bright. WS2812C (tcsc C114587) recommended for its lower max brightness.

3.3V, 25V, 1.2V voltages

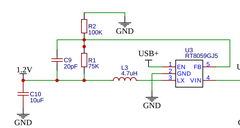
5V to 25V boost (grid+anodes)



5V to 3.3V step-down



5V to 1.0V step-down (filament)



100K R2 + 75K R1 = > 1.0V

100K R2 + 100K R1 = > 1.2V

Absolute max voltage is 28V but it's good to stay below 23V

18V+1.0V for power efficency or darker rooms, 21V+1.2V for high brightness

I personally had good results with 20V + 1.2V filament or 22V + 1.0V filament

Use 10-20uH inductors with rating of 2A or higher, C439002 or similar should also work well

SX1308 can also be used as it's 1:1 pin compatible

3x 10uF ceramic capacitors can be replaced with same size 2x 22uF (rated for 35V!)

Lower filament voltage saves power but also means that grid+anodes voltage needs to go higher which is less efficient.

Also when the duty cycle is low, most of the power goes to filament which is always powered. So there's no ideal balance.

In any case, the power consumed by the clock should be between 0.30A and 0.45A @ 5Vin all scenarios.

TITLE:	FLORA IV-22 VFD Clock	REV: 2.0
EasyEDA	Company:	Sheet: 1/1
	Date: 2021-03-09 Drawn By: NiceThings	