

# Vacuum Fluorescent Display Clock

	Power Input		Analog Inputs
02.	PowerInput.sch	14.	AnalogInputs.sch
	Microcontroller		Firmware Notes
03.	Microcontroller.sch	15.	FirmwareNotes.sch
	+3.3V Power Supply		Programming
04.	POS3P3V_Power_Supply.sch	16.	Programming.sch
	VAN Power Supply		Backup Supply
05.	VAN_Power_Supply.sch	17.	BackupSupply.sch
	VFF Power Supply		Serial Number
06.	VFF_Power_Supply.sch	18.	SerialNumber.sch
	USB/UART Converter		Display
07.	USB_UART_Converter.sch	19.	Display.sch
	PGOOD Indicators		Ambient Light Sensor
08.	PGOOD_Indicators.sch	20.	Ambient_Light_Sensor.sch
	UART Isolation		Temperature Sensors
09.	UART_Isolation.sch	21.	Temperature_Sensors.sch
	Status Indicators		Tube Life Timer
10.	Status_Indicators.sch	22.	Tube_Life_Timer.sch
	Anode Drivers		Mechanical
11.	AnodeDrivers.sch	23.	Mechanical.sch
	Grid Drivers		
12.	GridDrivers.sch	24.	
	Pushbuttons		
13.	Pushbuttons.sch	25.	

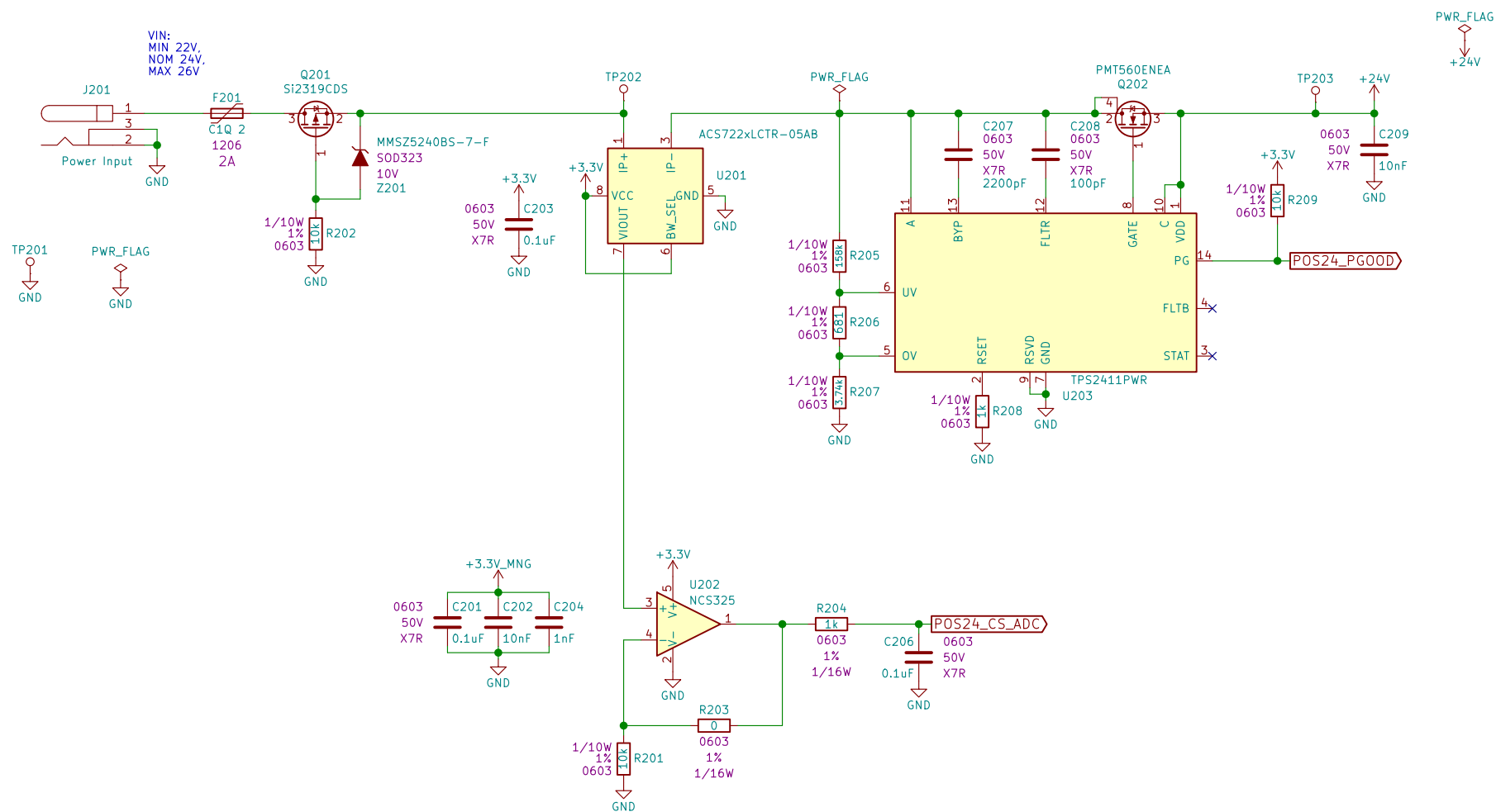
Sheet: /  
File: VFD\_Clock.sch

## Title:

Size: A      Date:  
KiCad E.D.A.    kicad (5.0.0)

Rev:  
Id: 1/23

## Input Overvoltage/Undervoltage/Reverse Polarity Lockout



**Drew Maatman**

Sheet: /Power Input/  
File: PowerInput.sch

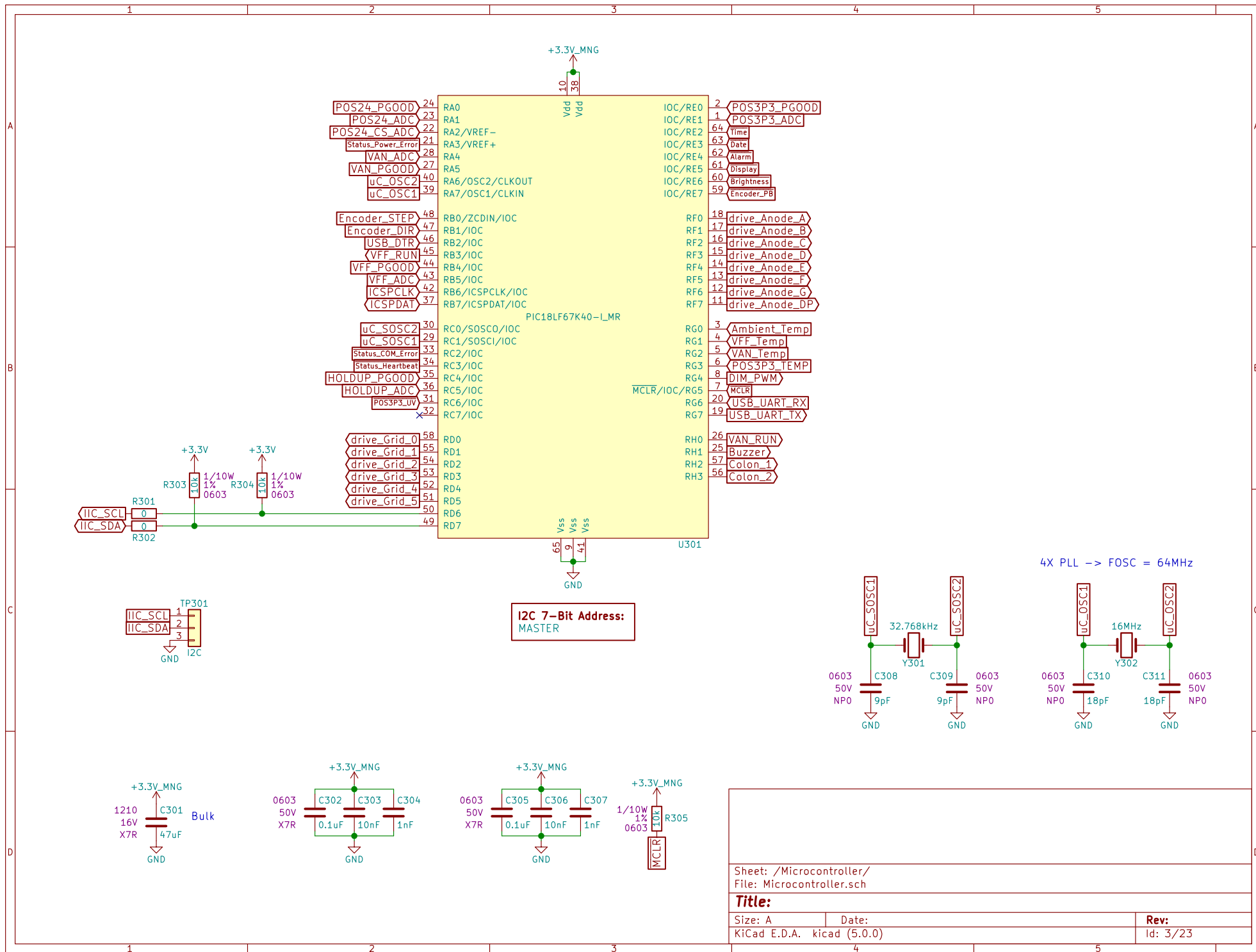
**Title: Power Input**

Size: A	Date: 2017-03-06
---------	------------------

KiCad E.D.A.	kiCad (5.0.0)
--------------	---------------

Rev: 2

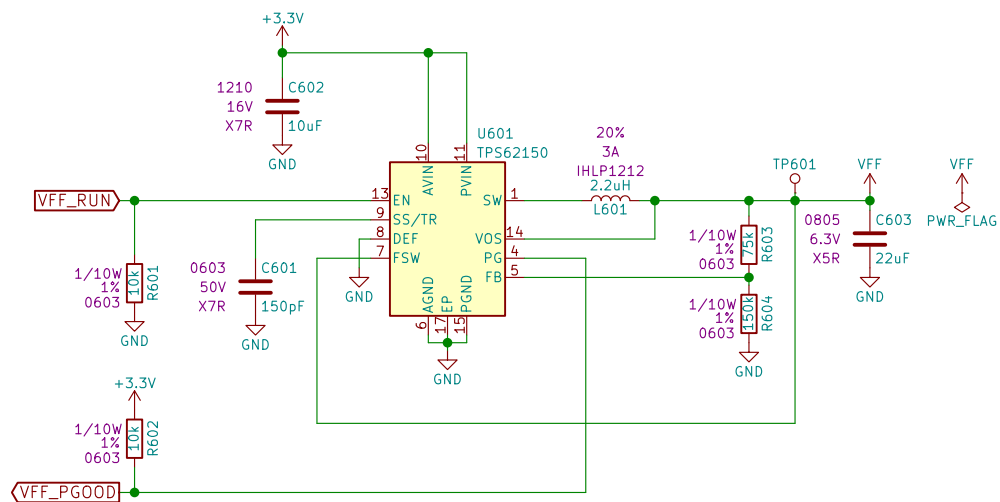
Id: 2/23



Rev:  
Id: 4/23



# +1.2V Filament Voltage Power Supply

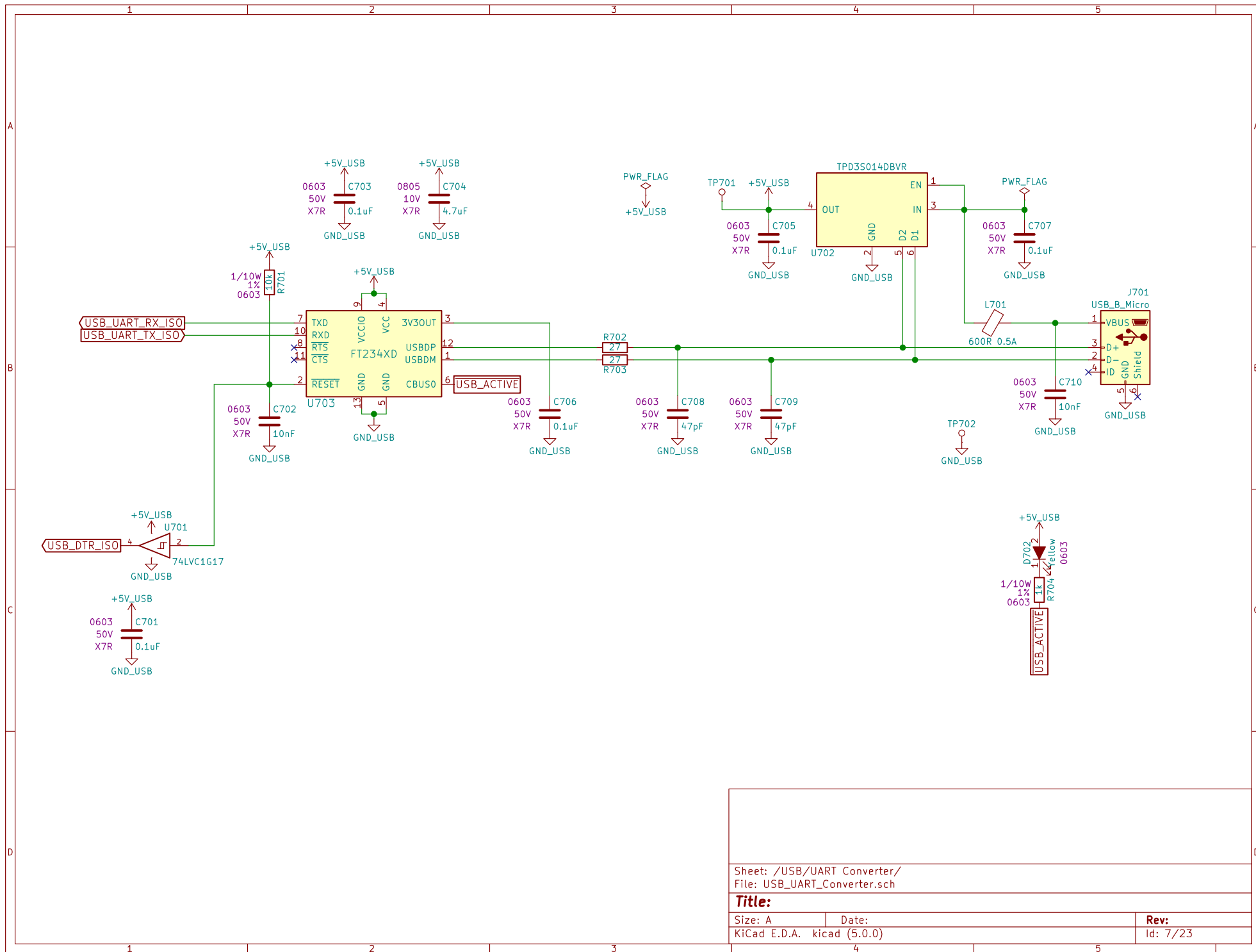


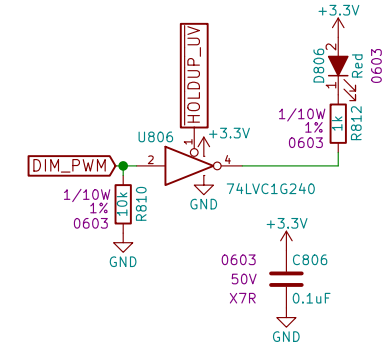
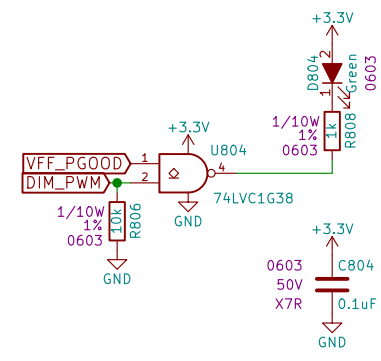
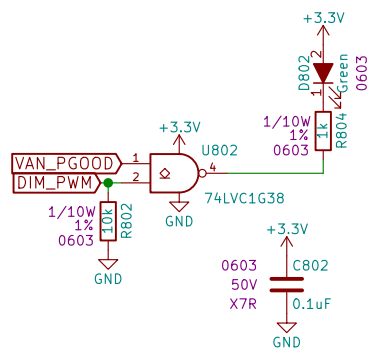
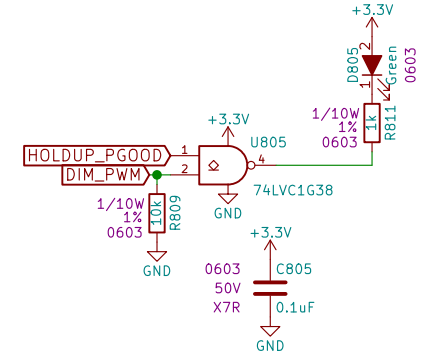
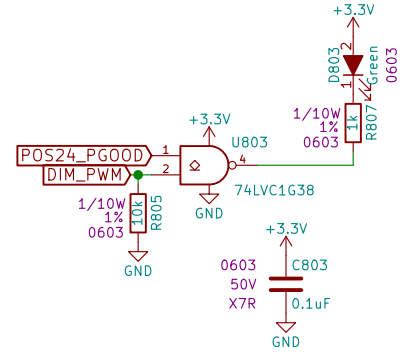
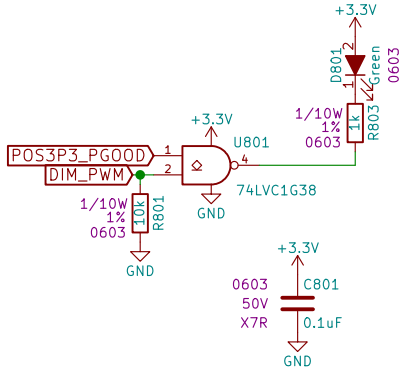
Sheet: /VFF Power Supply/  
File: VFF\_Power\_Supply.sch

## Title:

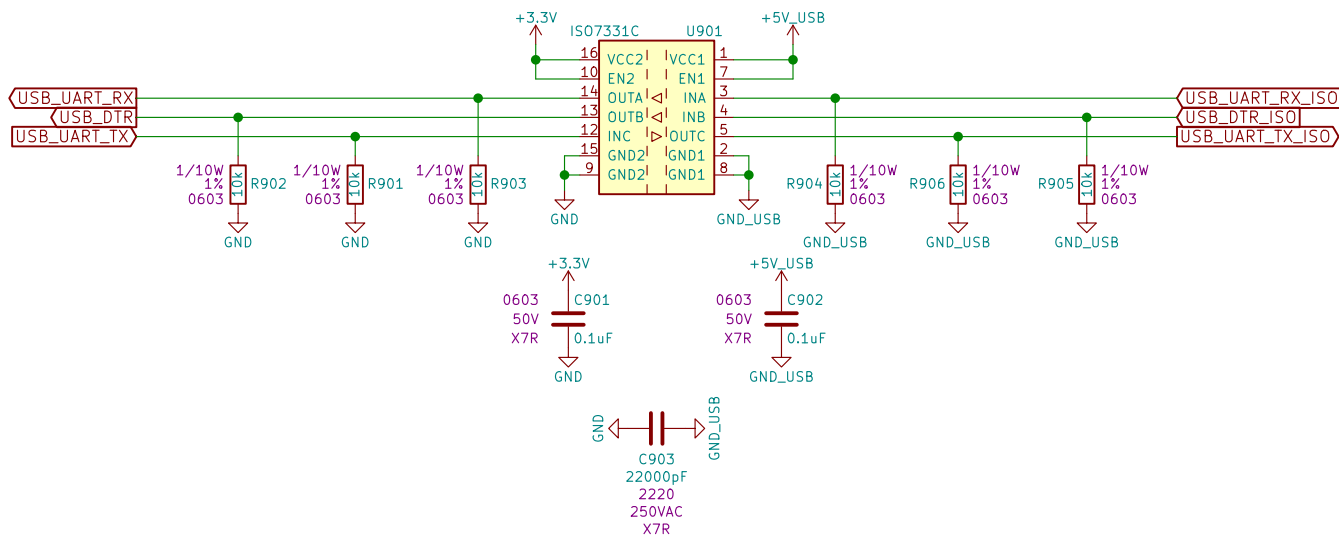
Size: A Date:  
KiCad E.D.A. kicad (5.0.0)

Rev:  
Id: 6/23

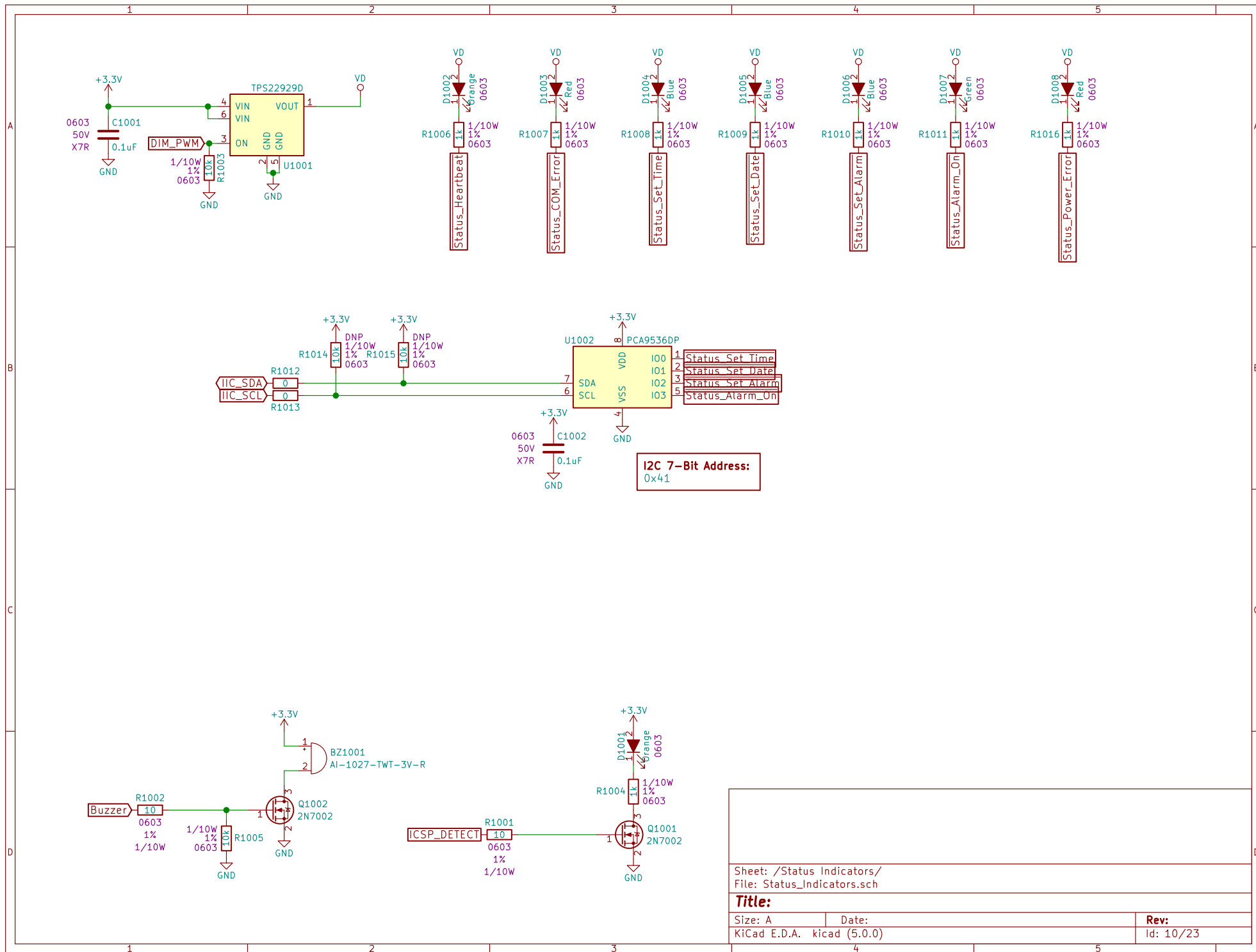


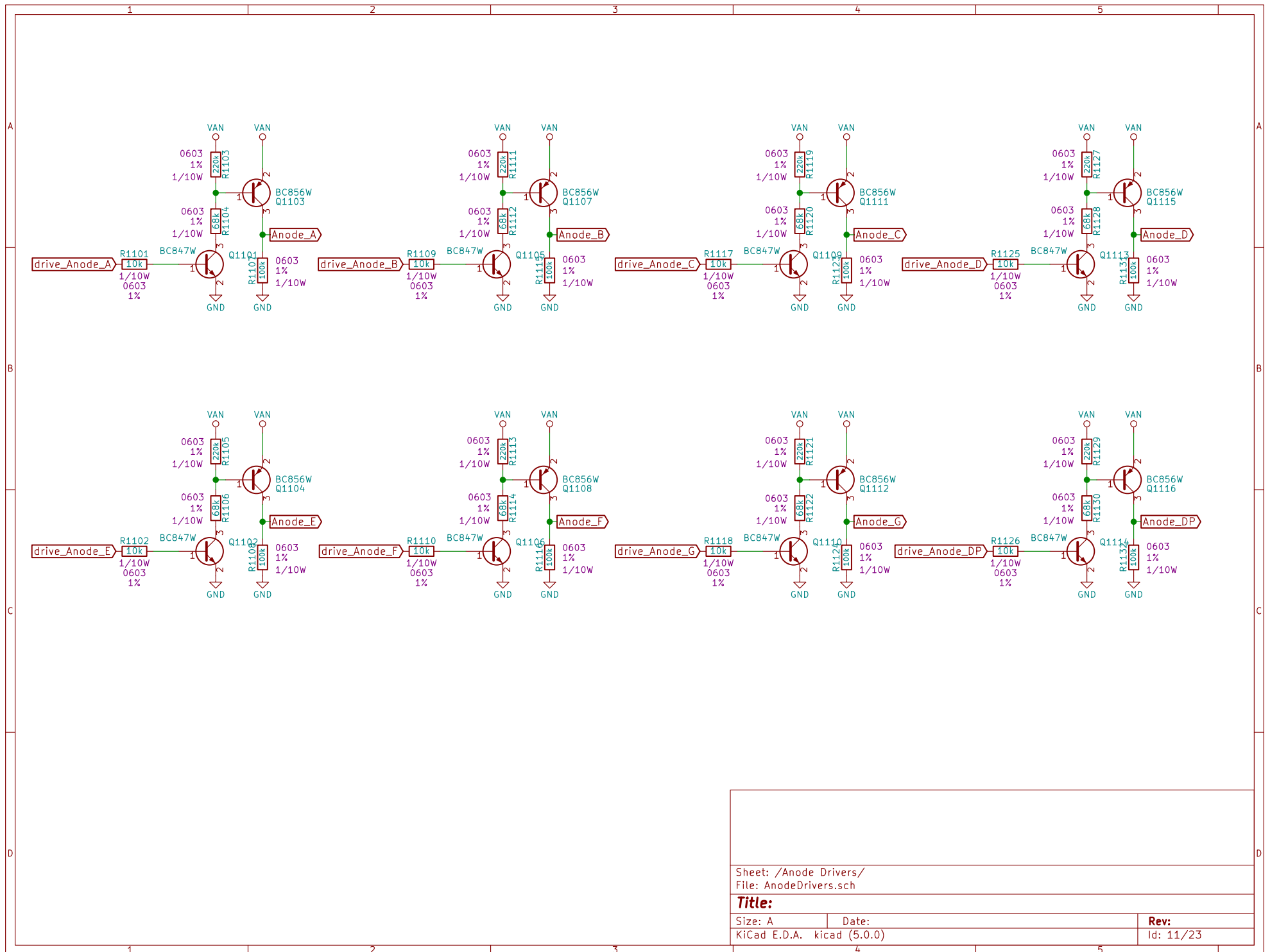


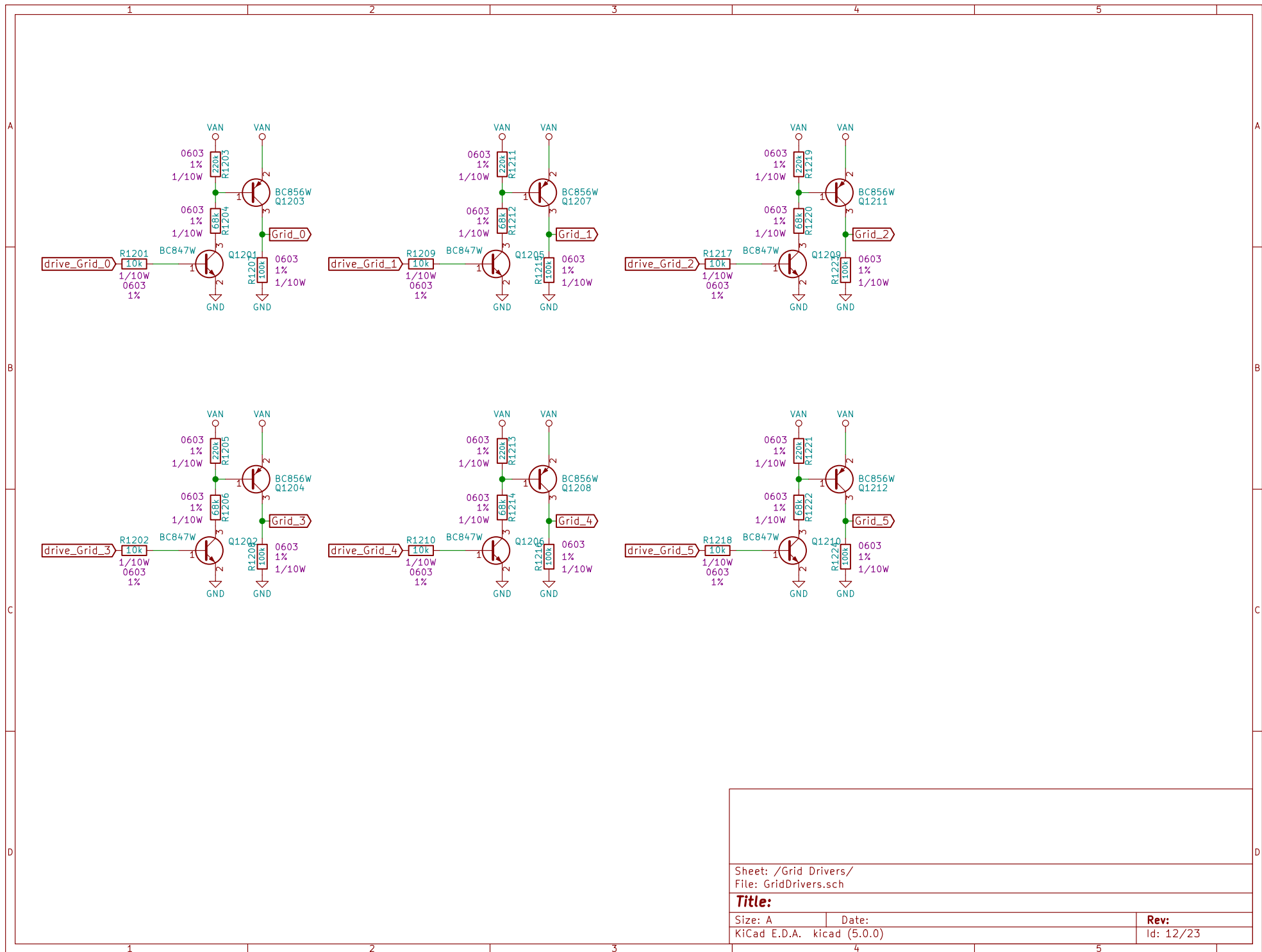


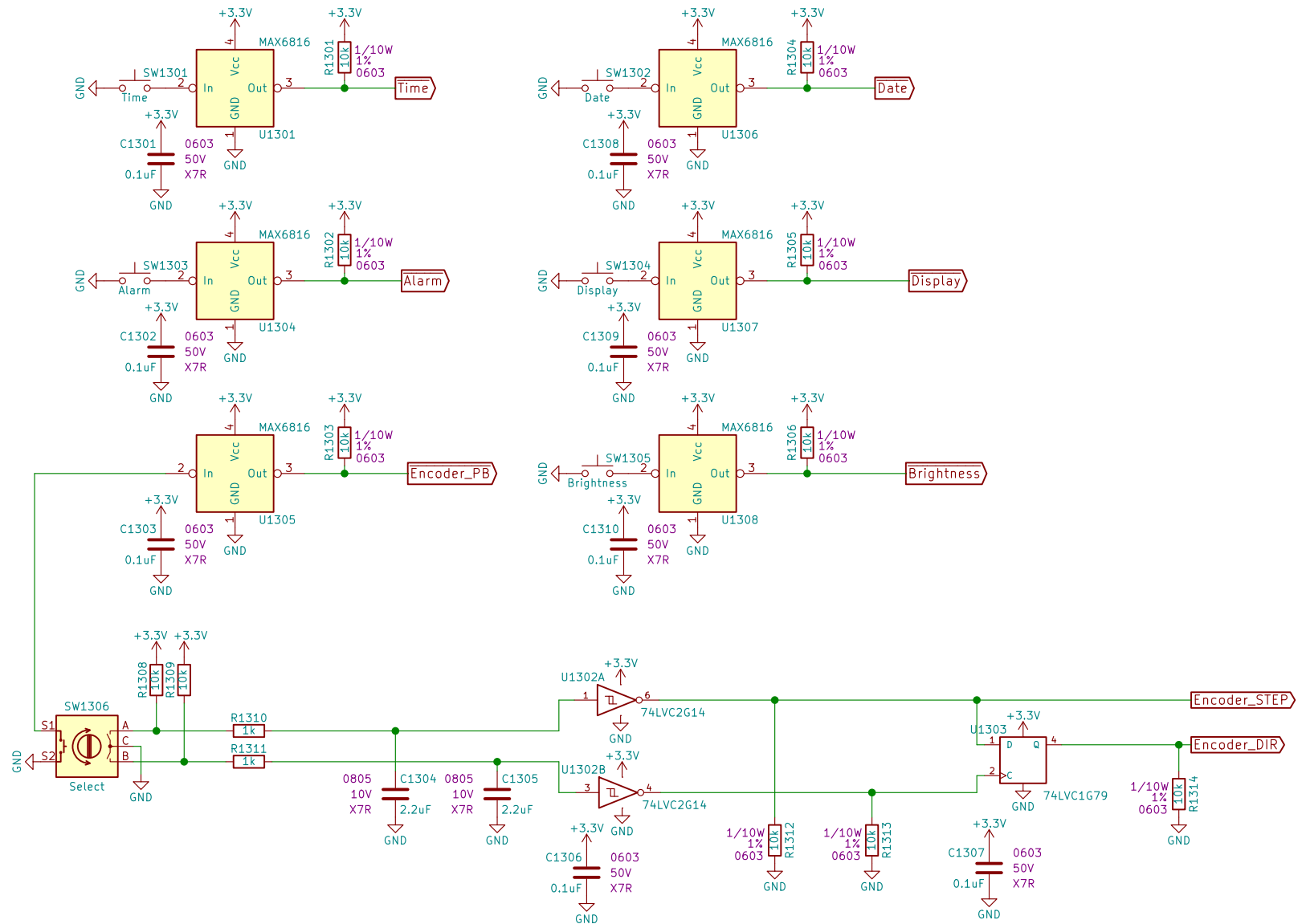


Sheet: /UART Isolation/ File: UART_Isolation.sch		
<b>Title:</b>		
Size: A	Date:	Rev:
KiCad E.D.A. kicad (5.0.0)		Id: 9/23







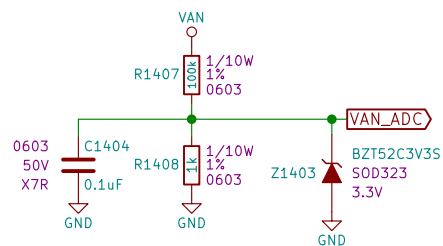
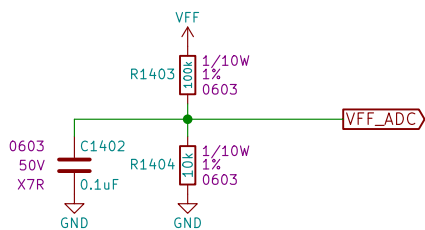
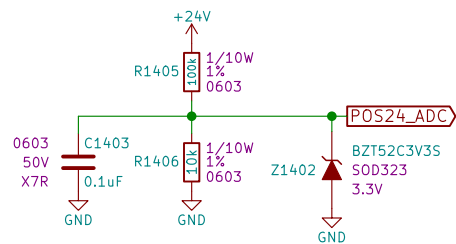
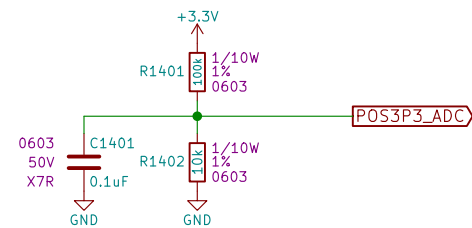


Sheet: /Pushbuttons/  
File: Pushbuttons.sch

**Title:**

Size: A      Date:  
KiCad E.D.A. kicad (5.0.0)

**Rev:**  
Id: 13/23



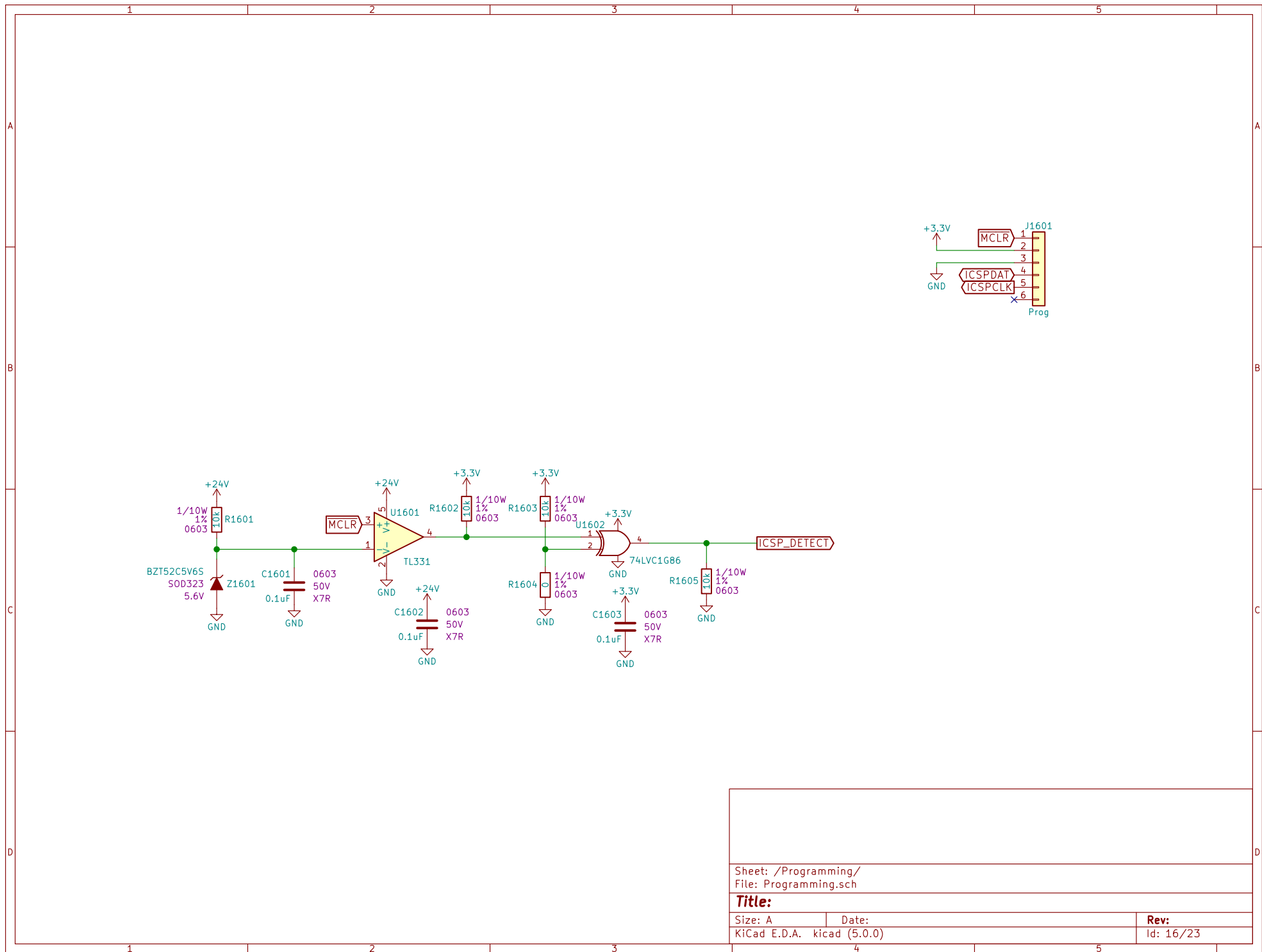
Sheet: /Analog Inputs/  
File: AnalogInputs.sch

**Title:**

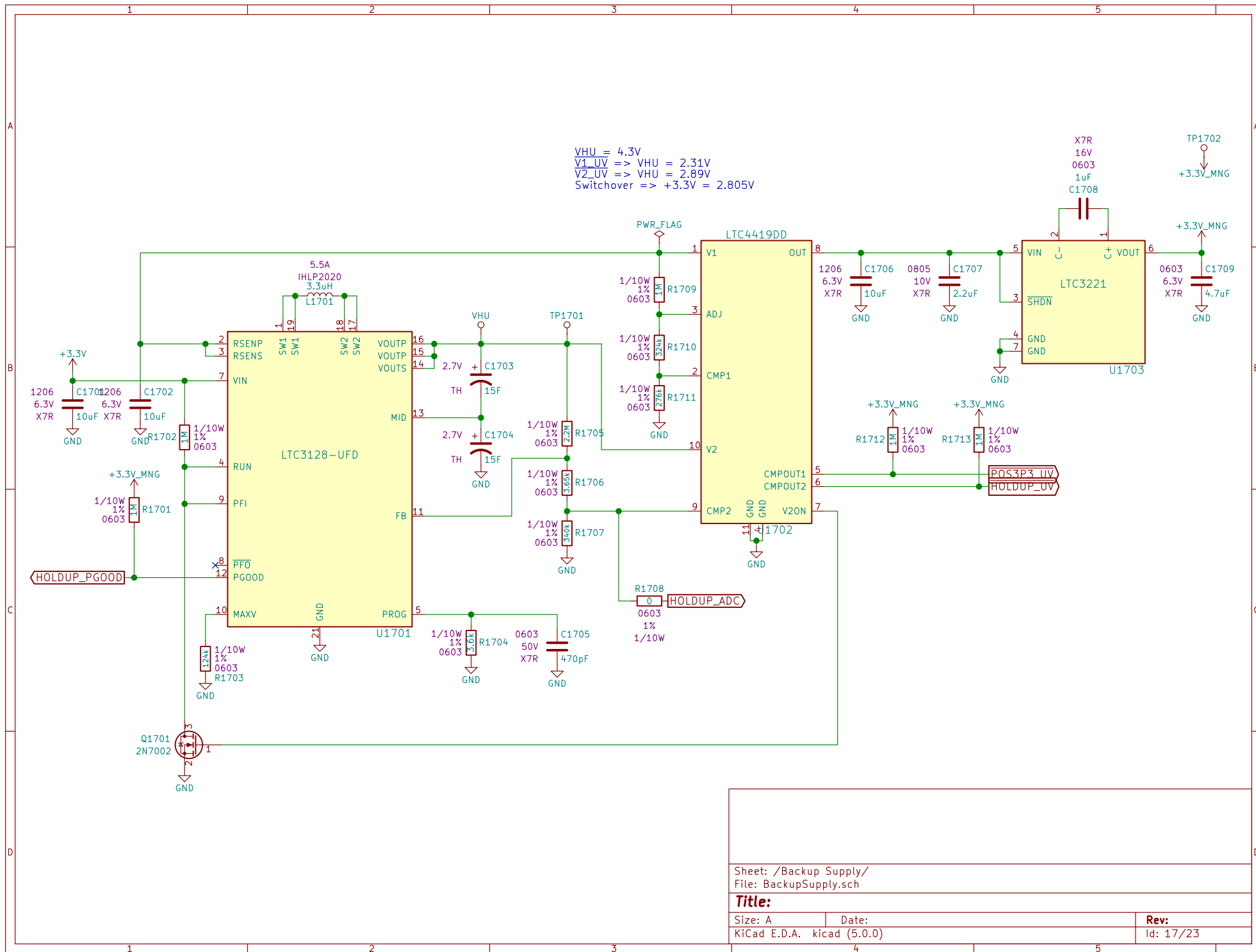
Size: A Date:  
KiCad E.D.A. kicad (5.0.0)

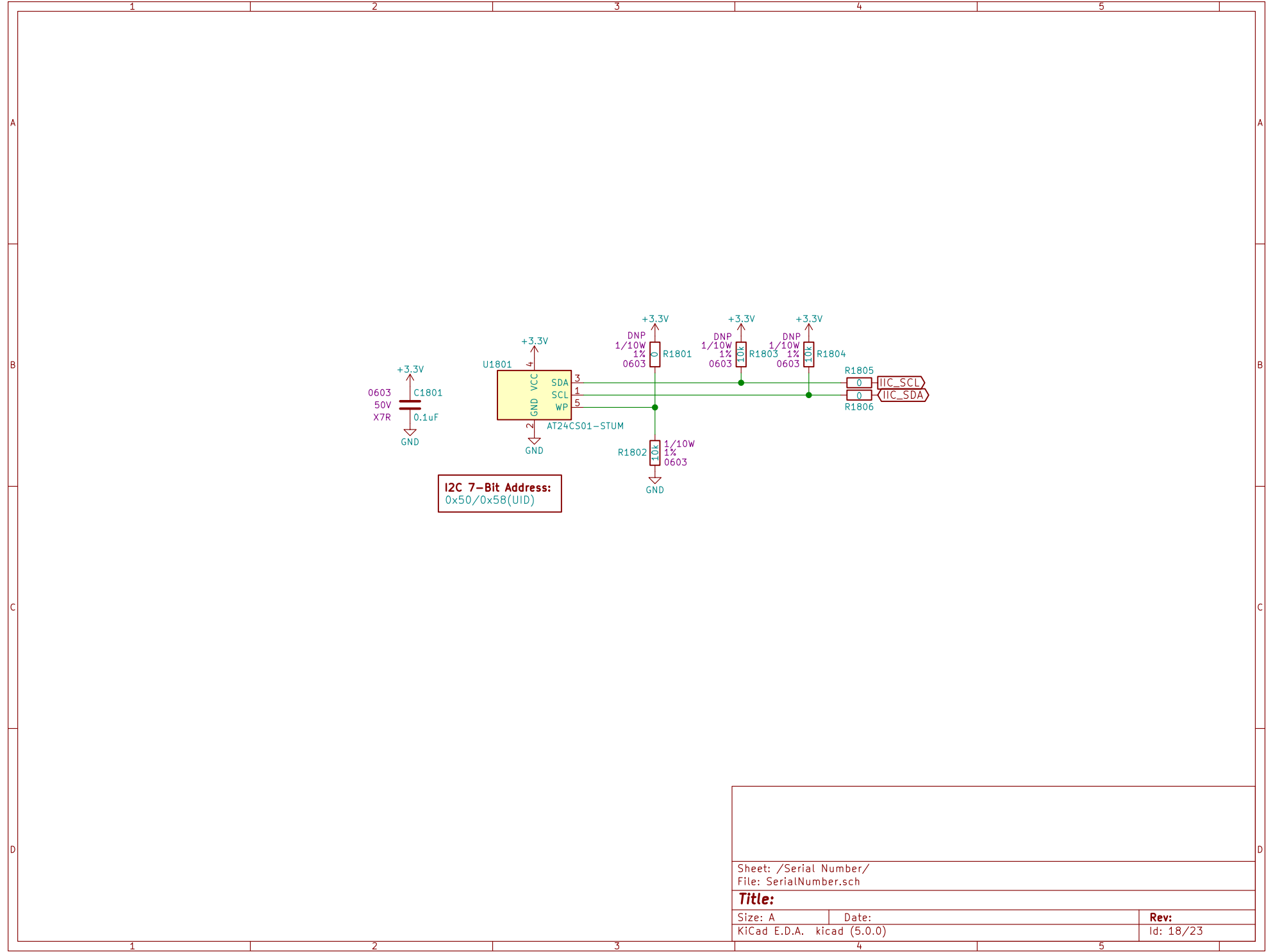
Rev:  
Id: 14/23

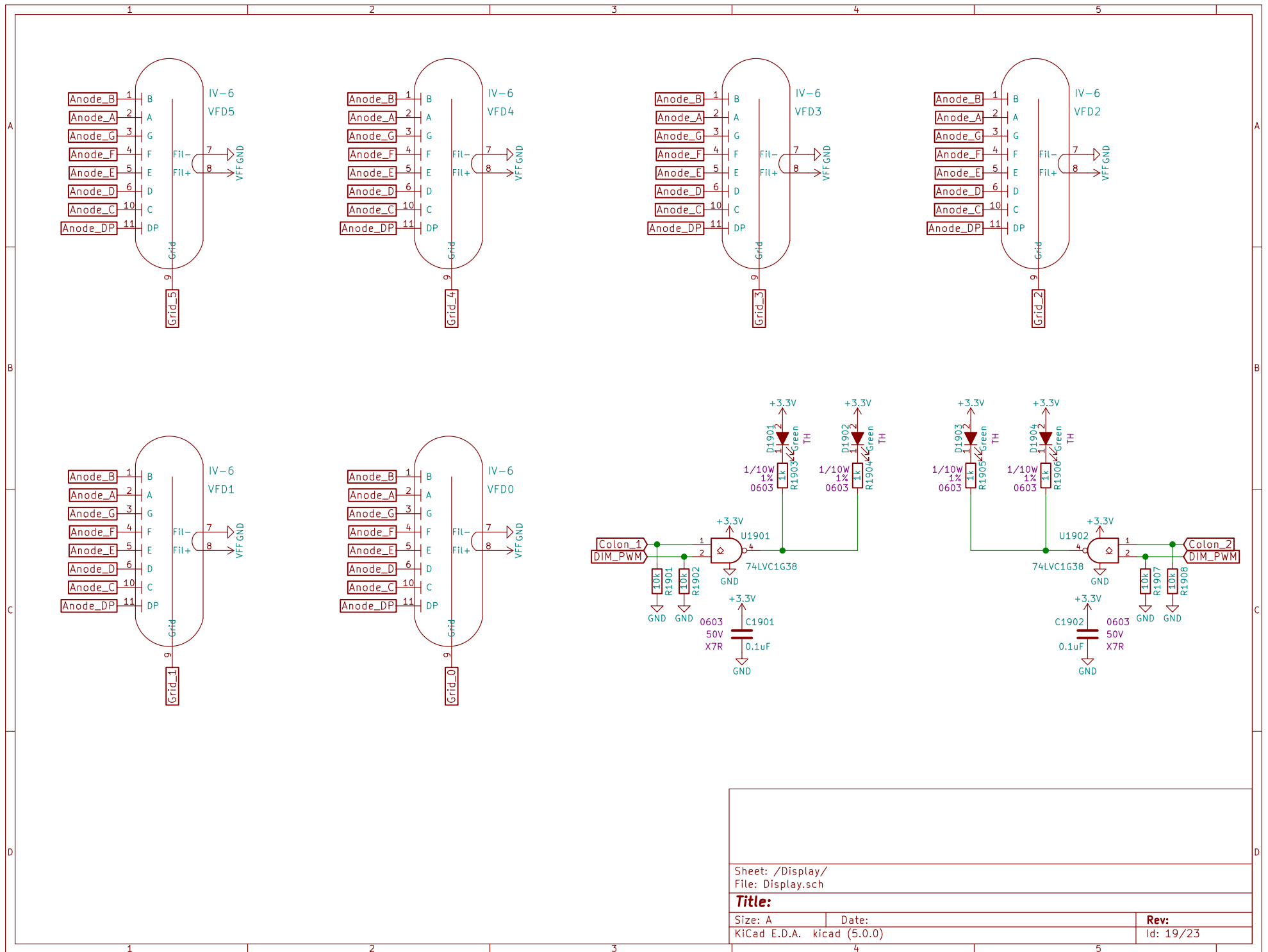
	1	2	3	4	5	
A	<div><ul style="list-style-type: none"><li>* All of PORTC should be configured as open drain outputs for sinking current from LEDs</li><li>* All of PORTA is used for ADC measurments/external oscillator</li><li>* Most of PORTD is used for driving grid switches, can be set up as a 6 bit structure located at the PORTC memory address</li><li>* All of PORTF is used for driving anode switches, so smae thing as above with 8 bits</li><li>* All of PORTE is used for measuring pushbuttons so all should be set as inputs with IOC's enabled</li><li>* Same with PORTB except with only 6 bits, and used for generic input logic signals</li><li>* RD0 and RD1 should be routed to SMT1 and SMT2 so that the signal measurement timers can be used to measure diplsay update rate and refresh rate</li><li>* RG3 should be configured as an output for a CCPx module to produce a PWM signal for dimming LEDs on the board. Display itself will be dimmed in software by adjusting the on time</li><li>* EUSART5 must be used for USB serial communication since only this module can be routed to PORTG</li><li>* RG0 and RG1 will be the inputs to CCPx modules to measure the switching frequency (maybe duty cycle as well) of VFF and VAN supplies</li><li>* RG4 should be set/cleared every other display refresh cycle, and the input snese ciruit queued when cleared, so that energy/charge per display cycle can be measured</li><li>* While operating, the external 16MHz clock with internal 4x PLL will yield an FOSC of 64MHz. While the display is off, FOSC should be switched to something slower internally to minimize power consumption</li></ul></div>					A
B						B
C						C
D	<div><div></div><div>Sheet: /Firmware Notes/ File: FirmwareNotes.sch</div><div><b>Title:</b></div><div><div>Size: ADate:</div><div>KiCad E.D.A. kicad (5.0.0)</div></div><div><div>Rev:</div><div>Id: 15/23</div></div></div>					D
	1	2	3	4	5	









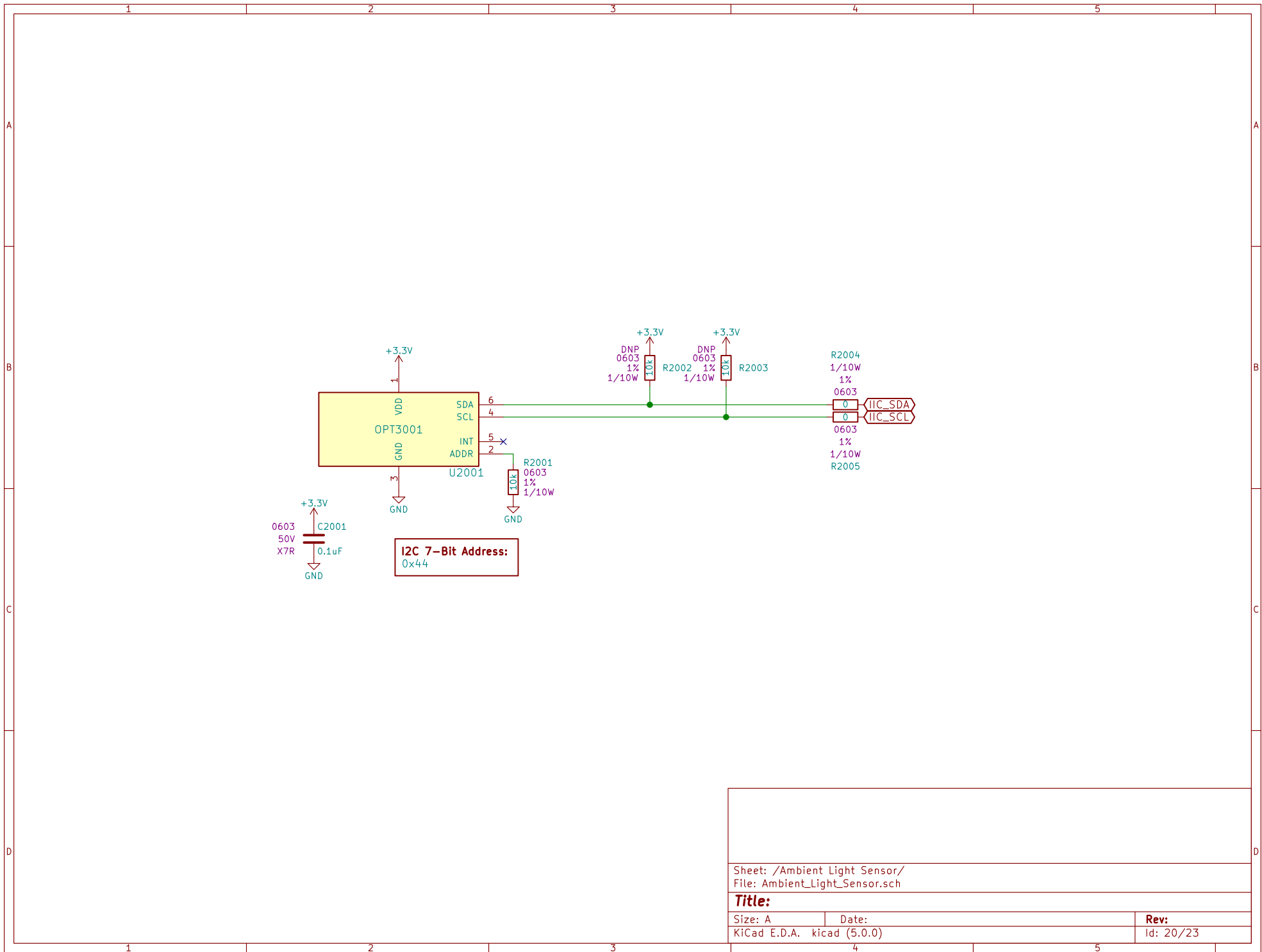


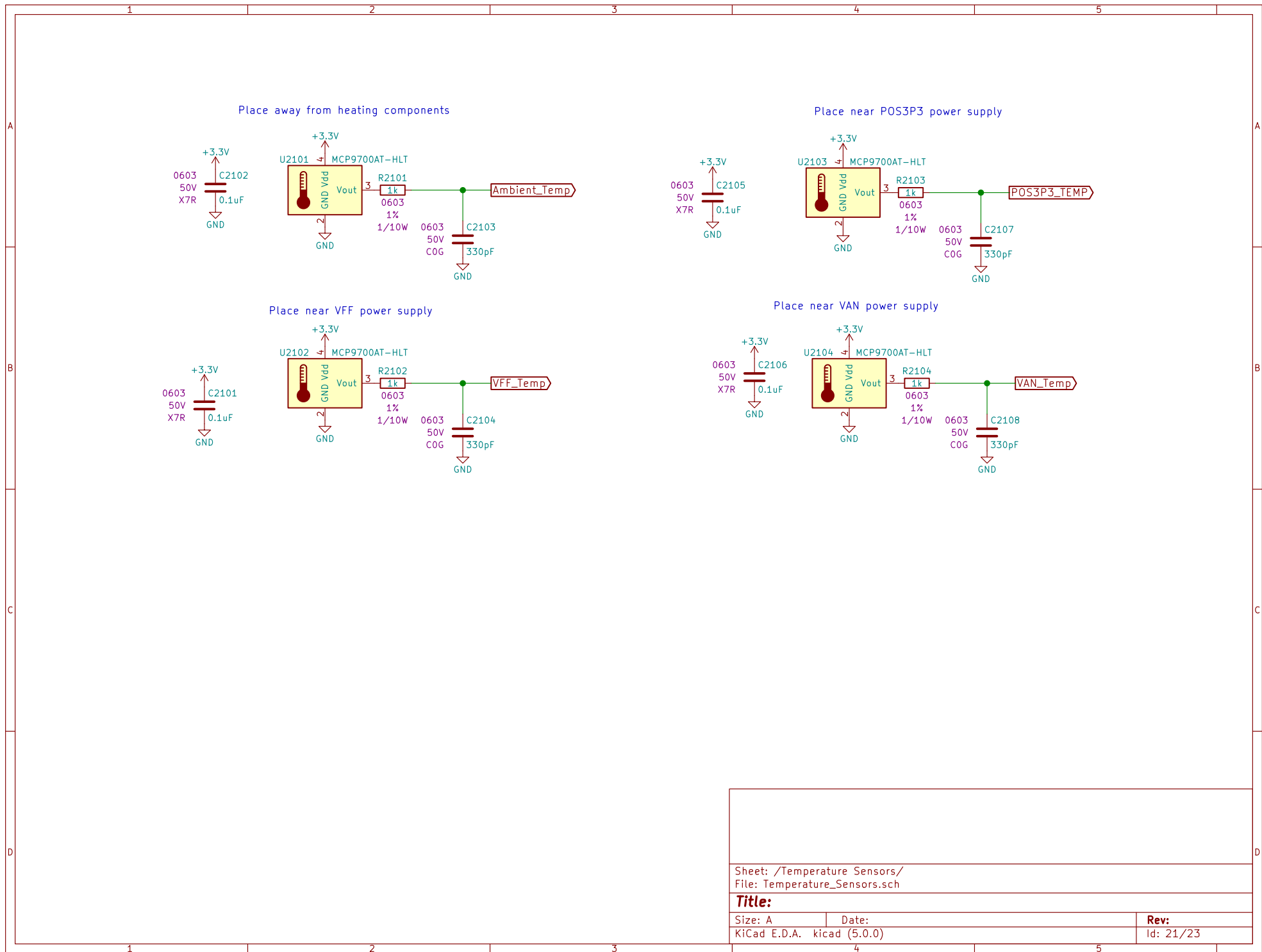
Sheet: /Display/  
File: Display.sch

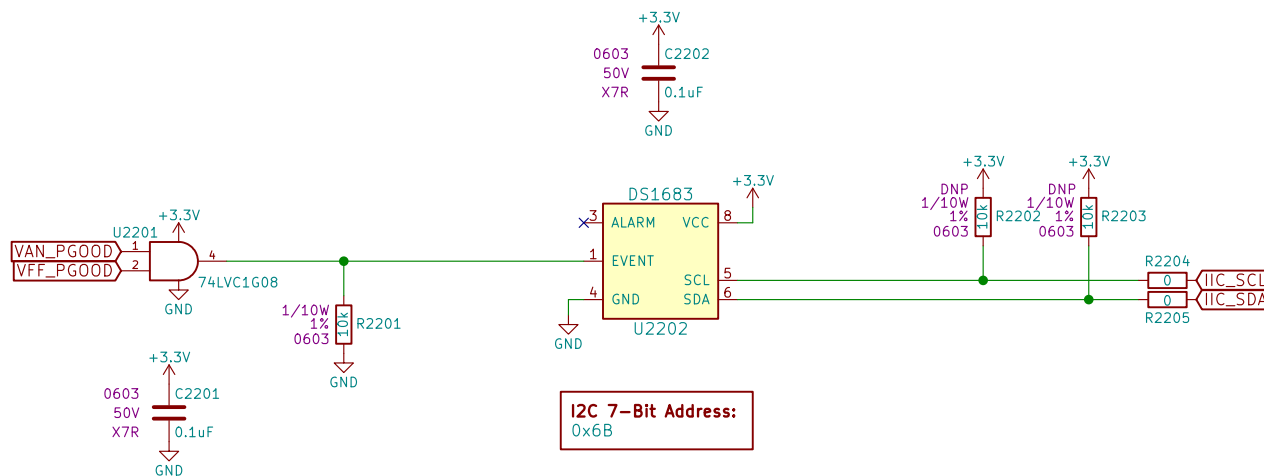
**Title:**

Size: A Date:  
KiCad E.D.A. kicad (5.0.0)

**Rev:**  
Id: 19/23







Sheet: /Tube Life Timer/  
File: Tube\_Life\_Timer.sch

**Title:**

Size: A Date:  
KiCad E.D.A. kicad (5.0.0)

**Rev:**  
Id: 22/23

