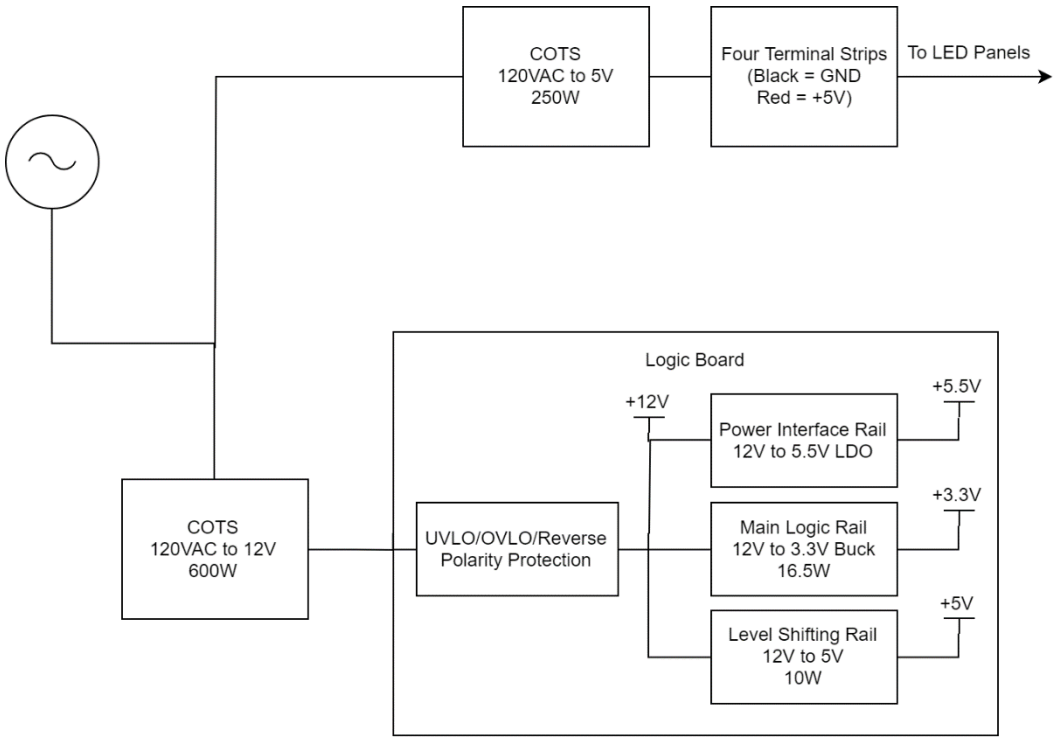
MU-MatriX

Repair Guide

Caroline Gilger, Logan Wedel, Drew Maatman, Kevin Etta, Tuoxuan Ren

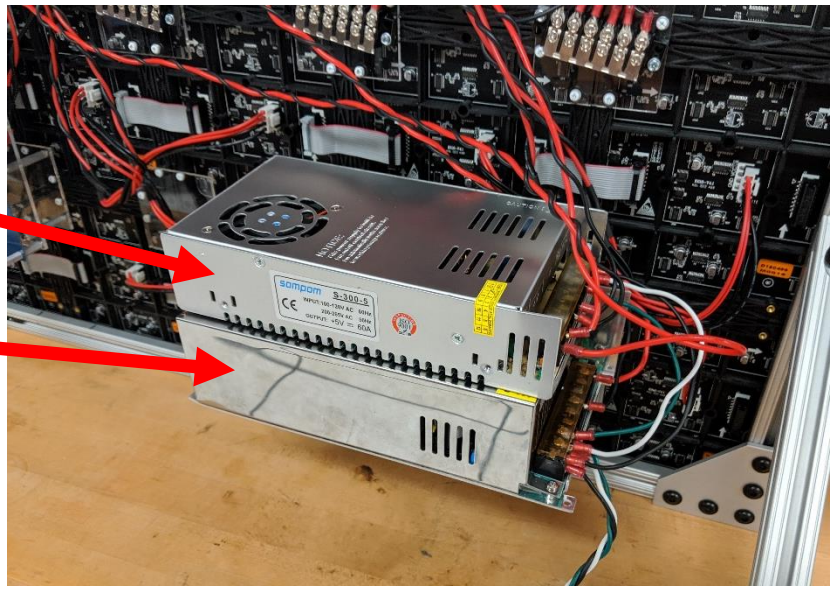
Power Distribution Wiring:



The power tree above graphically describes the different voltages used in the device. A single wall voltage inlet powers both the COTS 120VAC to 12V and COTS 120VAC to 5V chassis power supplies. The 120VAC input voltage is wired using black, white and green wires for live, neutral and earth connections. The wired connections are insulated with hot glue at the input terminals for the COTS converters. This was done to protect a user from touching high voltage connections with their fingers. The COTS power supplies are shown below:

120VAC to 5V 250W
COTS power supply

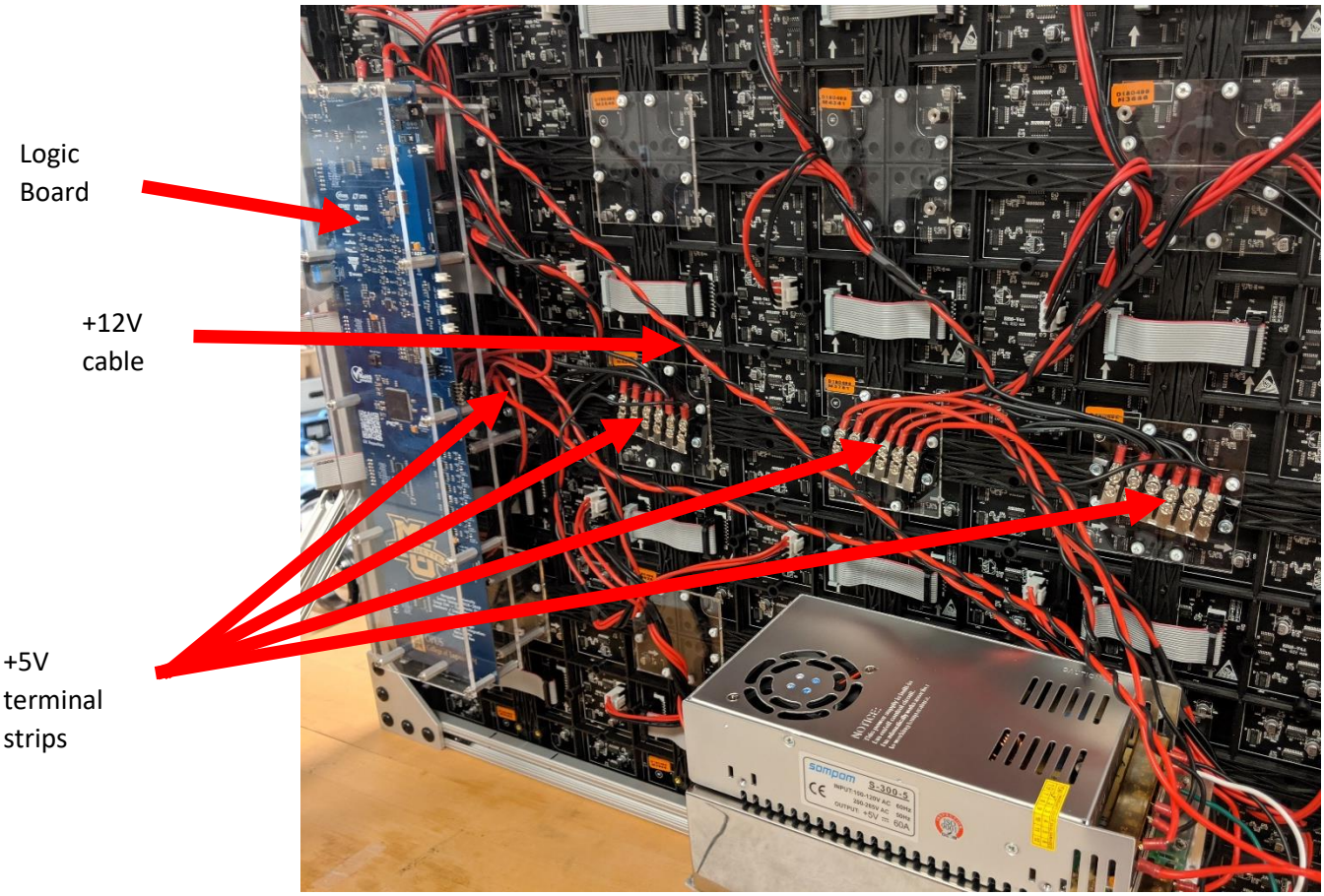
120VAC to 12V 600W
COTS power supply



Each COTS power supply has various pairs of output wires running from the output terminals of the converters to the respective load terminals. The 12V COTS converter only powers the logic board.

The 12V COTS converter is dramatically oversized and over rated for this application, since the project originally had a different power configuration. If the 12V COTs power supply fails, it can be replaced with a much smaller power supply. The 5V COTS converter attached above it, however, needs to be at a 250W power rating, or more. Replacing the installed converter with a higher output power rated converter could be beneficial in the future, but 250W seems to be great right now. The 12V COTS power supply is mechanically attached to the project using #4-40 screws and standoffs, which attach the frame of the power supply to the acrylic brackets which hold the corners of the LED panels together. The 5V COTS power supply is attached mechanically to the top of the 12V COTs power supply using poster mounting putty. At the time, this seemed like a strong enough solution.

The output terminals of the 5V COTS converter is wired to four 6-circuit terminal strips, two of which distribute the 5V output wires to all of the LED panels, and the other two terminal strips which distribute the ground connections to all of the LED panels. The 5V terminal strips have all red wires leading into and out of them, while the ground terminal strips have all black wires leading into and out of them. All red and black wires that distribute 5V connections, 12V connections, and ground connections are terminated with red ring terminals, which allow the wire connections to be screwed into the terminal strips and onto the blue logic board which controls the project. All power distribution wiring is 14 gauge wire. Only use this gauge wire or thicker for minimum resistivity of electrical connections. This is especially critical for the 5V connections. The output wiring of the COTS power supplies is shown below:



Wires are connected to the terminal strips and COTS power supplies using phillips screws. Wires are connected to the blue logic board using Metric 4 nuts. Wires are connected to the LED panels using

the LED panel connectors, which are available on ebay, amazon, and Alibaba (HUB75 LED Panel Power Cable). The connector housing and power cable for the LED panels are included in one wiring harness assembly when purchased online.

Logic Board Hardware Repair:

Logic board components should not fail, but if they do, the most likely components to fail are the ceramic capacitors, which will most likely fail short. Most passive components on the logic board are 0603 case size, 1% resistor tolerance, 1/10W resistor power rating, 50V capacitor voltage rating, X7R capacitor dielectric. The logic board hardware schematic included as an appendix shows components parameters for most components, and if parameters for certain components are not shown, assume these parts have the parameters listed above. The hardware schematic is included as an appendix in PDF form, as well as a bill of materials, but the actual design files can be accessed from the project Git repository at https://github.com/drewsum/Electronic_Display. Contact Drew Maatman at drewmaatman@gmail.com if these files cannot be accessed. All hardware design files are opened with KiCad 5.1.0, and are located within the project repo in hdw/Logic_Board/LED_Display_Controller. Custom schematic symbols and PCB footprint libraries must be added to the KiCad path to be able to open the schematics and PCB layouts. These libraries are located in the project Git repo at hdw/lib.

Only integrated circuits on the logic board have their reference designators printed in PCB silkscreen (parts with Uxxxx reference designators). This is done to keep more space on the PCB to allow parts to be placed more densely, since so much circuitry had to be crammed onto the board. In order to locate a particular component on the circuit board using a component reference designator from either the schematic or bill of materials, use the KiCad PCB editor and the find tool (Ctrl+F) to search for that component by reference designator on the PCB. KiCad will highlight this component on the PCB, which allows someone to locate the component on the physical hardware. PCB footprints within the KiCad board layout can be clicked to see what the reference designator of the component is, as well as value. This accomplishes the opposite of finding a part by reference designator with Ctrl+F. When a component is selected in the PCB layout in KiCad, the schematic symbol will be pointed to in the KiCad schematic, and vice versa.

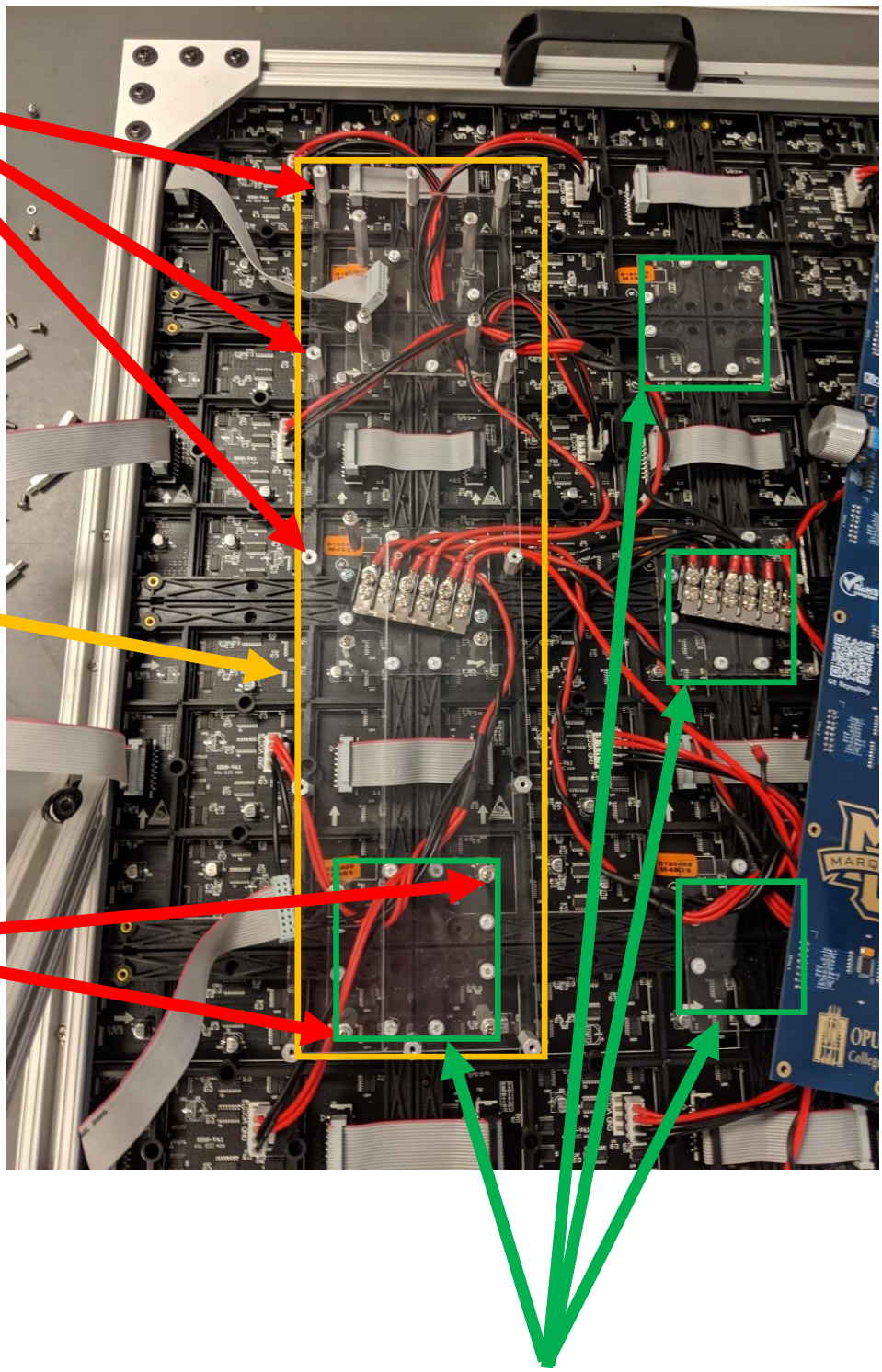
The logic board is powered by 12V cables from the 120VAC to 12V COTS power supply, described above. Output data from the logic board is transferred into the LED panels (and across LED panels in a serial fashion) with 16 circuit IDC connectors and ribbon cables. These are the grey cables running across the LED panels and from the logic board into the LED panels. These ribbon cables and IDC connectors can be removed, and they can only be installed in the correct way, since the connectors are keyed.

Logic Board Mechanical Installation:

The logic board has acrylic cover plates on both the top and bottom. These protect the logic board from being damaged. Both acrylic covers are attached to the logic board with #4-40 machine screws and standoffs. These screw into four mounting holes that span the perimeter of the logic board. The lower acrylic protective plate has other holes drilled into it to allow mounting to the acrylic panel corner brackets, which fix the logic board into position on the back of the LED panels. The machine screws and taller standoffs which attach the logic board to the corner brackets are also #4-40. Varias washers protect the acrylic from too much direct clamping force. These standoff connections are shown below:

Shorter standoffs which connect lower acrylic protective plate to logic board

#4-40 fasteners



Lower acrylic protective plate (Custom laser cut acrylic)

#4-40 fasteners

Taller standoff connections which mount lower protective plate to corner brackets

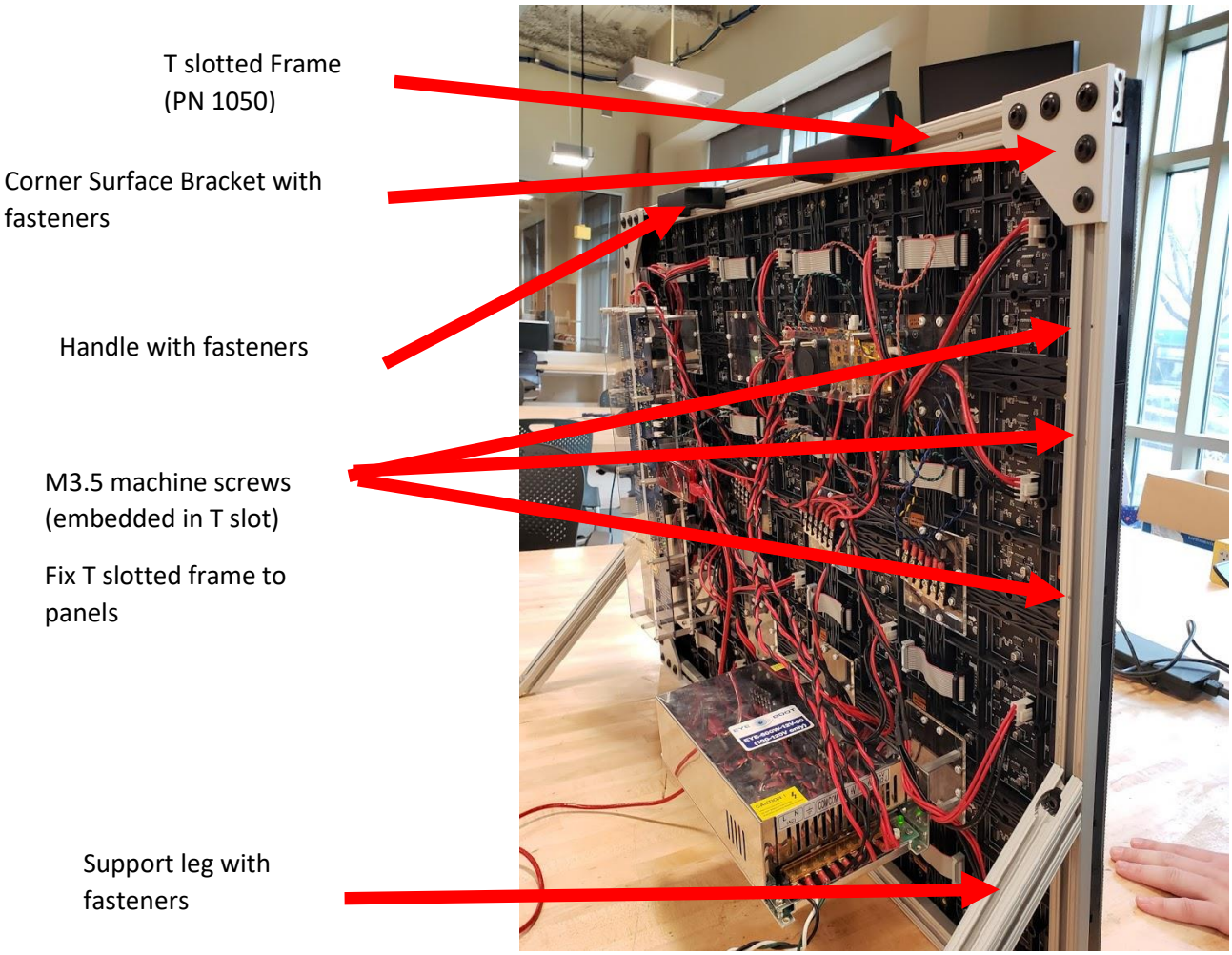
#4-40 fasteners

Corner brackets (Custom laser cut acrylic)

M3.5 fasteners

T-slotted Frame:

The entire project is held together with extruded aluminum T-slotted framing. The exact 80/20 part number used is 1050. The T slotted framing is 1" wide by 0.5" tall, and two bars of 3 foot lengths were cut to custom lengths to run the perimeter of the display. The T slotted framing is fixed to the LED panels using counterbore metric 3.5 phillips machine screws. These screw through T slotted framing into brass inserts in the LED panels. The four corners of the frame are held together with corner surface brackets, available from McMaster-Carr with PN 47065T267. The included fasteners are used to fix the corner brackets into the T slotted frame. These fasteners have a torx head, T27 or T30. In addition to the corner surface brackets, handles are included for easy handling on the top bar of the T slotted frame. These are McMaster-Carr PN 47065T164, and also include fasteners. The support legs added to the sides of the T slotted frame are McMaster-Carr PN 47065T186. These also include fasteners. The complete T slotted frame is shown below:



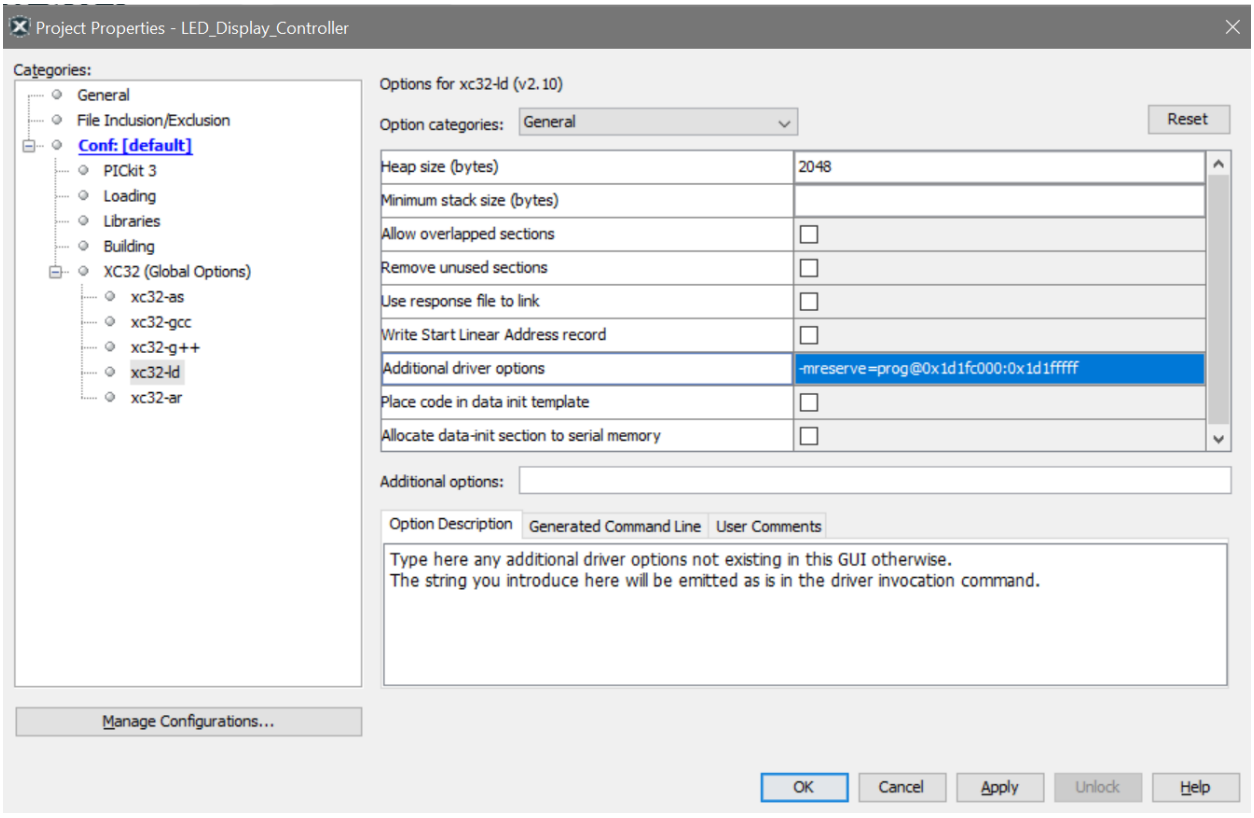
Acrylic Panel Corner Brackets:

Custom cut acrylic corner brackets hold the interior corners of the LED panels together. They are fixed to the LED panels with M3.5 Screws, which thread through the acrylic brackets into the same brass inserts in the LED panels which the T slotted frame is fixed to.

Logic Board Microcontroller Firmware:

The microcontroller on the logic board was programmed using a PIC KIT 3 programmer from Microchip. PIC KIT 4 may work as well, but has not been tested. The project Git repository (including hardware design files and app and embedded software) is located at this URL at the time of writing: https://github.com/drewsum/Electronic_Display. Contact Drew Maatman at drewmaatman@gmail.com should any issues arise accessing the project Git repository. The microcontroller on the logic board is programmed with firmware located in the project repository at /sfw/embedded_firmware/U601_firmware/. The microcontroller firmware was complied with Microchip's XC32 compiler, version 2.10, using the MPLAB X IDE, version 5.15. The microcontroller firmware was compiled at **optimization level two**. The command line argument -O2 must be added to the XC32 command line driver arguments section of the project settings. Failure to do so will result in screen flickering. Optimization level two may or may not require a Microchip XC32 Pro compiler license. We purchased the Pro license for $30 for a one month subscription when building the project. **Reprogram the microcontroller on the logic board at your own risk. This should be a last-ditch troubleshooting/repair attempt. A microcontroller firmware failure is very rare.**

In addition to **optimization level 2,** the compiler must also be configured to have a **heap size of 2048 bytes,** and have **additional driver options set to -mreserve=prog@0x1d1fc000:0x1d1fffff under the XC32 linker options.** These additional compiler settings are shown below:



Appendix: Logic Board Hardware Schematic and Bill of Materials:

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Marquette Universiy Senior Design 2018, Group E44

Drew Maatman, Kevin Etta, Logan Wedel, Caroline Gilger, Tuoxuan Ren

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04. +5V Power Supply — POS5 Power Supply — POS5_Power_Supply.sch

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06. Microcontroller Power — Microcontroller Power — Microcontroller_Power.sch

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Note: If component footprints, tolerances, and power ratings are hidden, components are:
0603 case size, 1% tolerance, 1/10W power rating

Marquette University Senior Design 2018/2019 Group E44		
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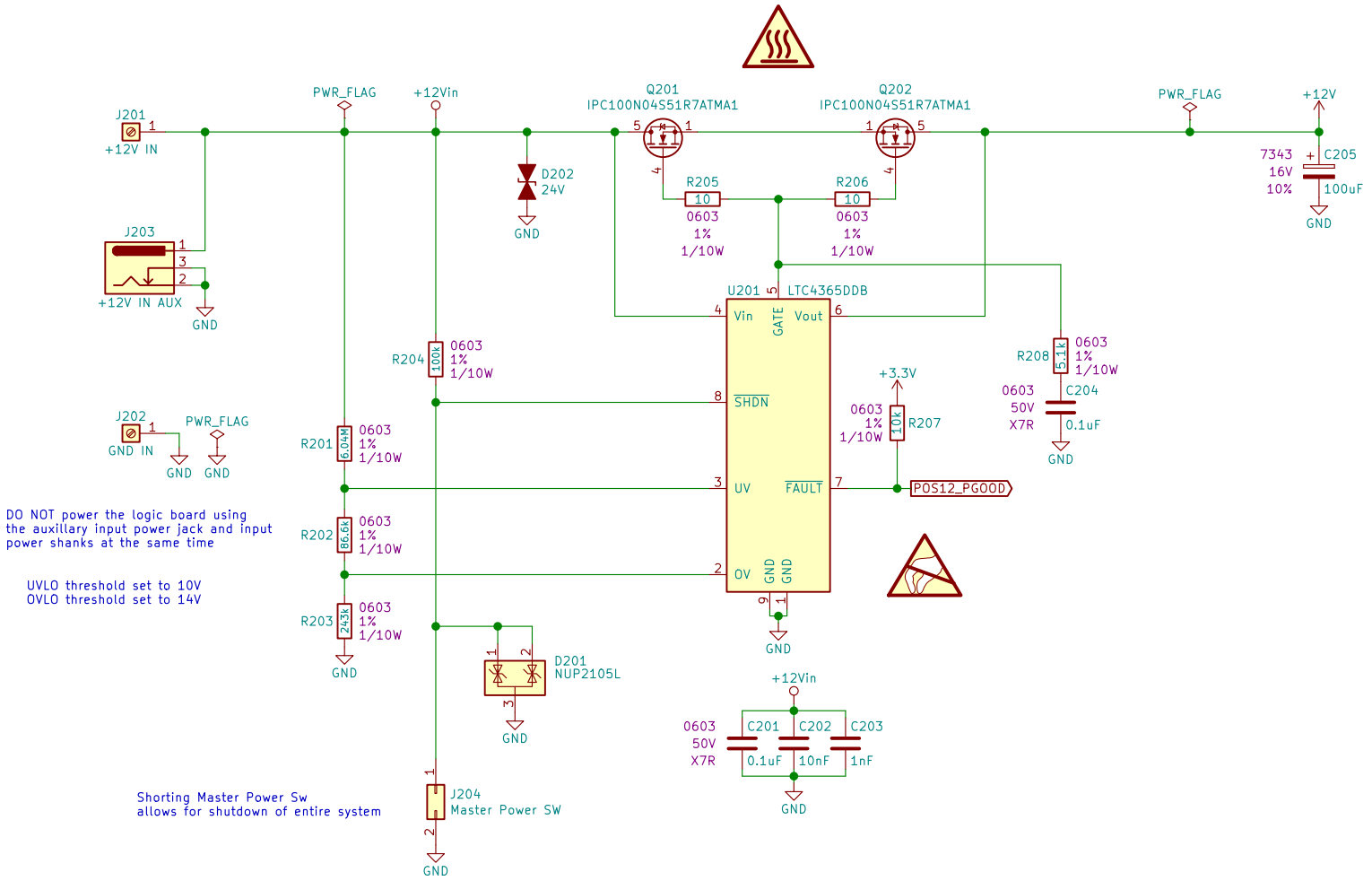
KiCad E.D.A. kicad (5.1.2)-1		Id: 1/32

02. Power Input



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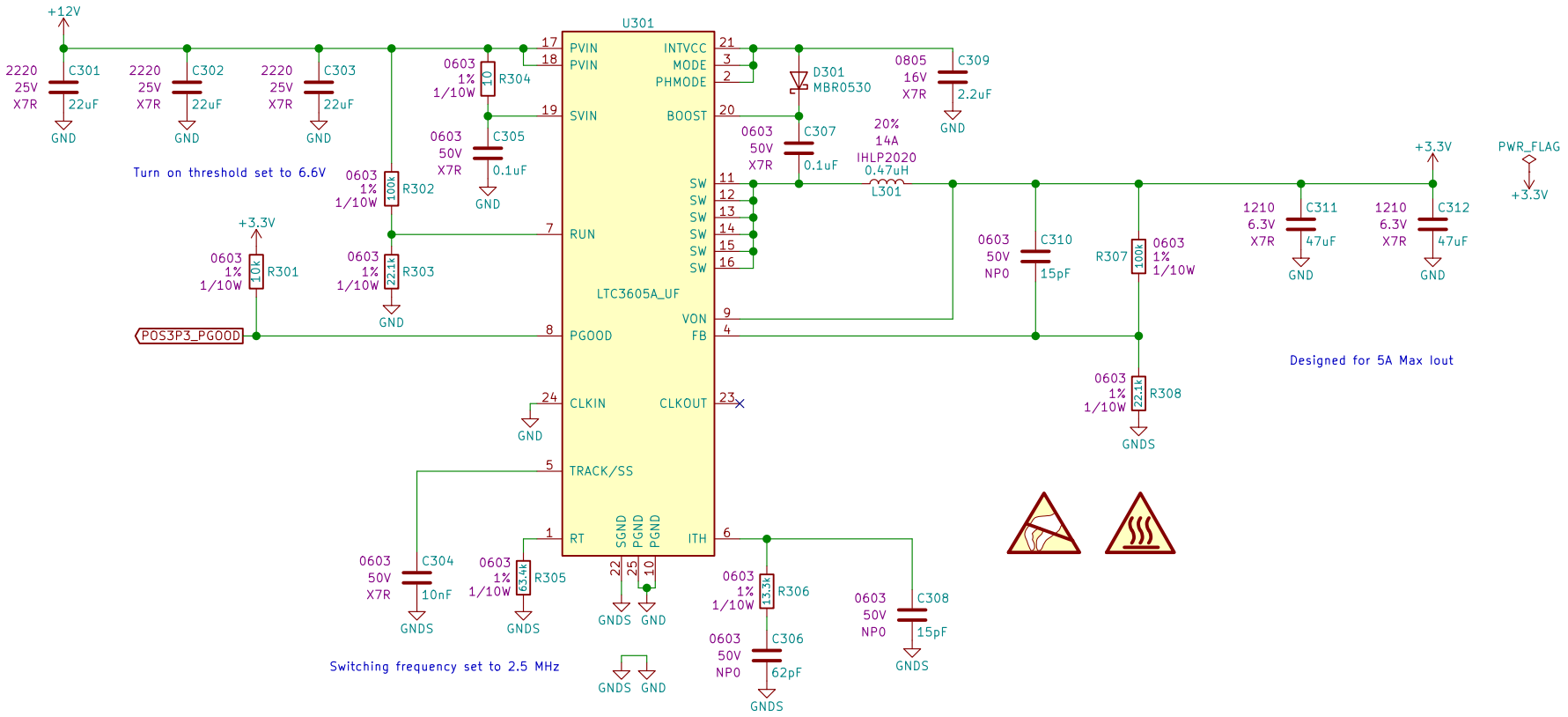
03. +3.3V Power Supply



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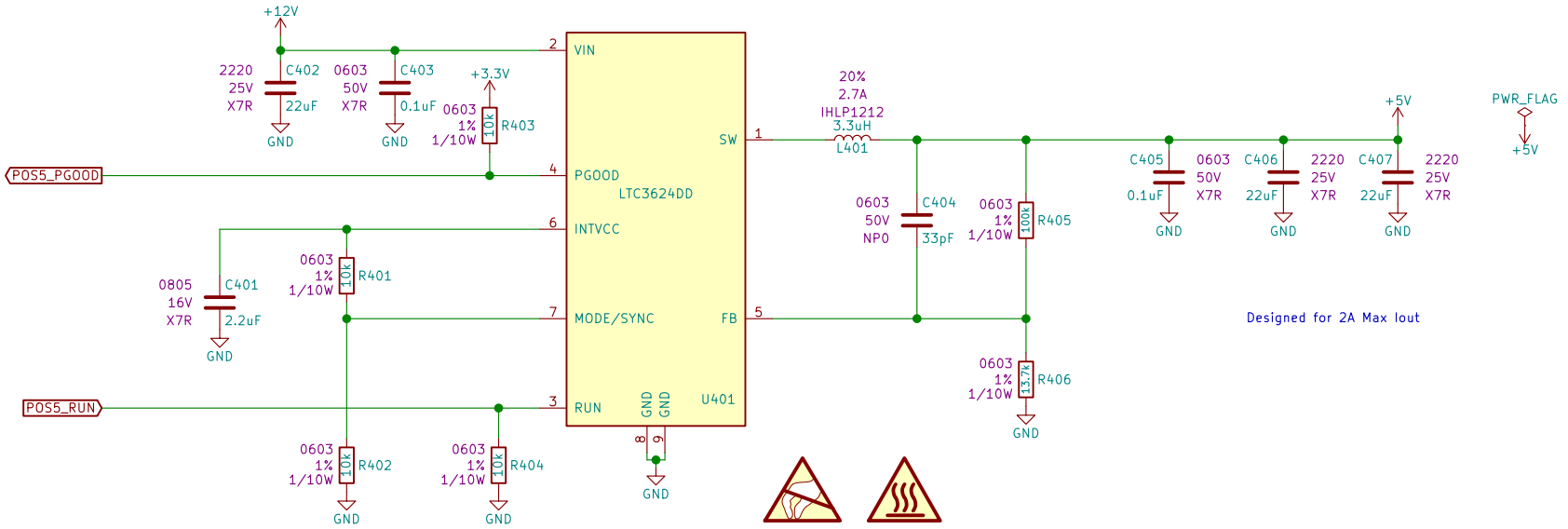
04. +5V Power Supply



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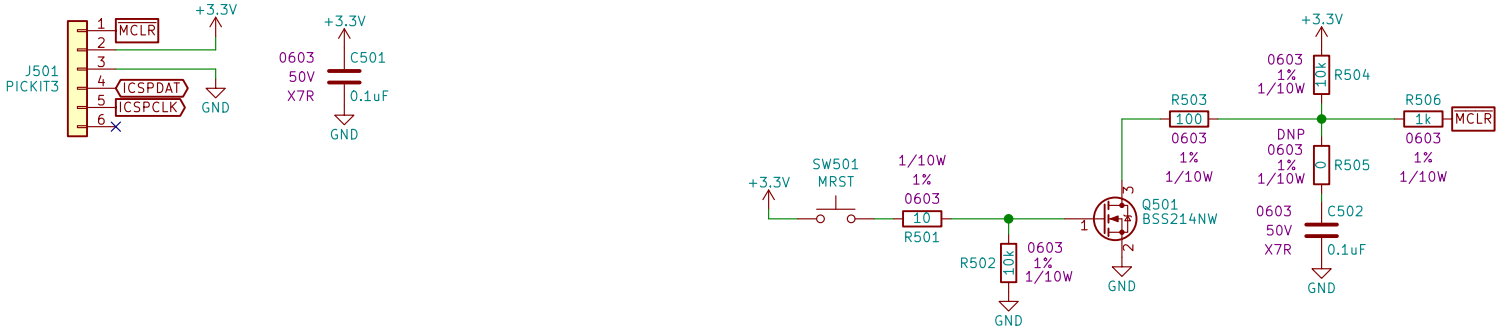
05. Microcontroller Programming



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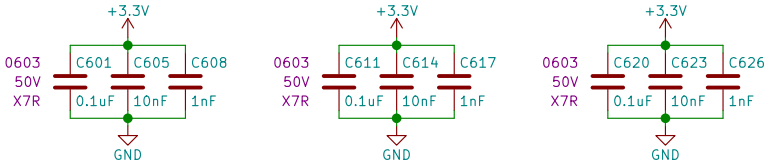
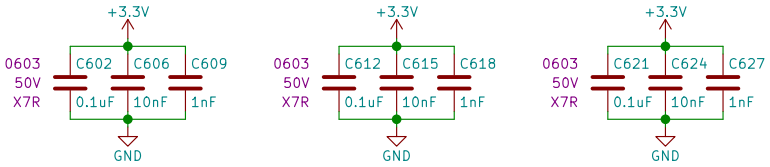
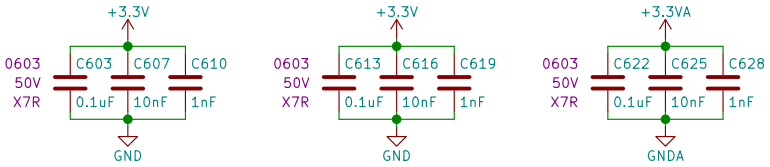
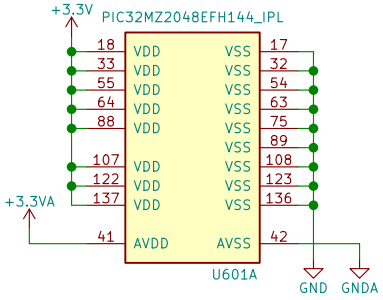
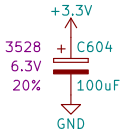
06. Microcontroller Power

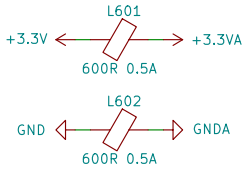












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Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
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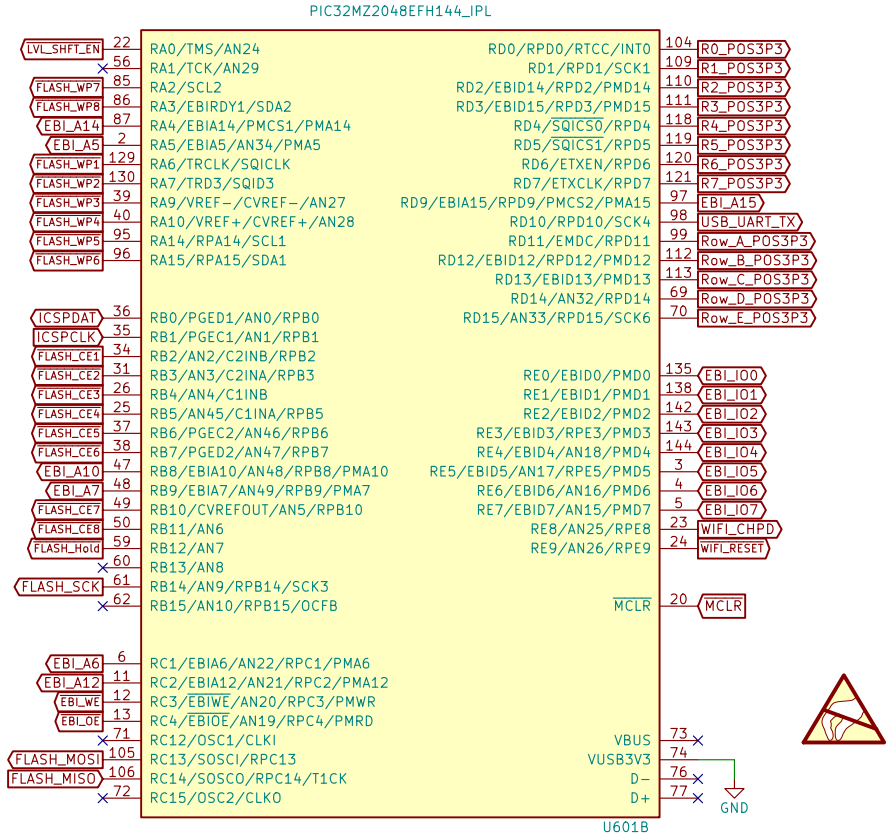
07. Microcontroller IO Bank 1



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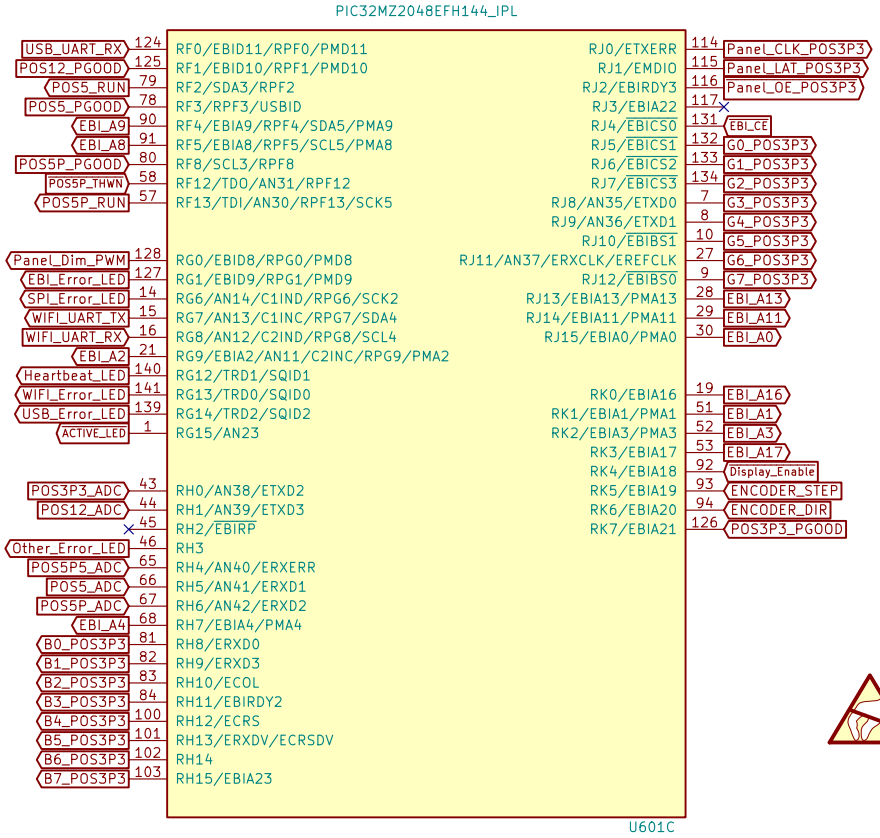
08. Microcontroller IO Bank 2



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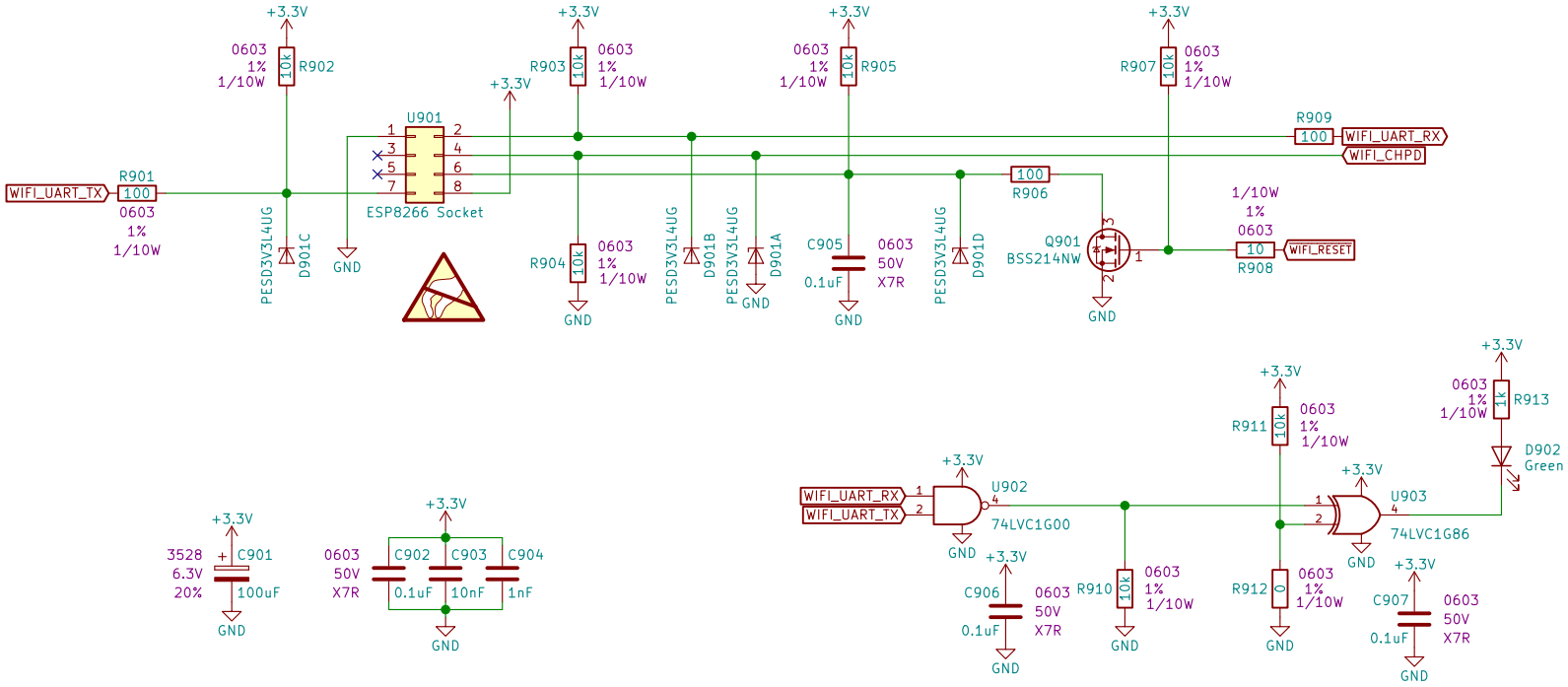
09. WiFi Module



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Sheet: /WiFi Module/

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Title: Electronic Display Logic Board

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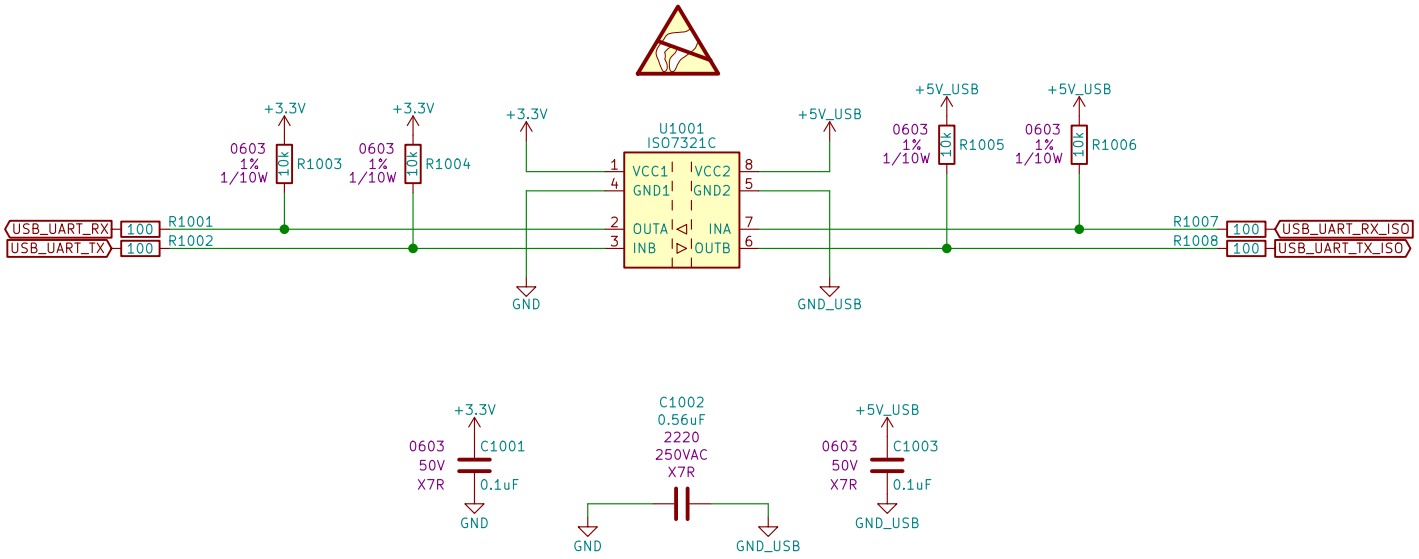
10. USB UART Digital Isolation



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Sheet: /USB UART Isolation/

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Title: Electronic Display Logic Board

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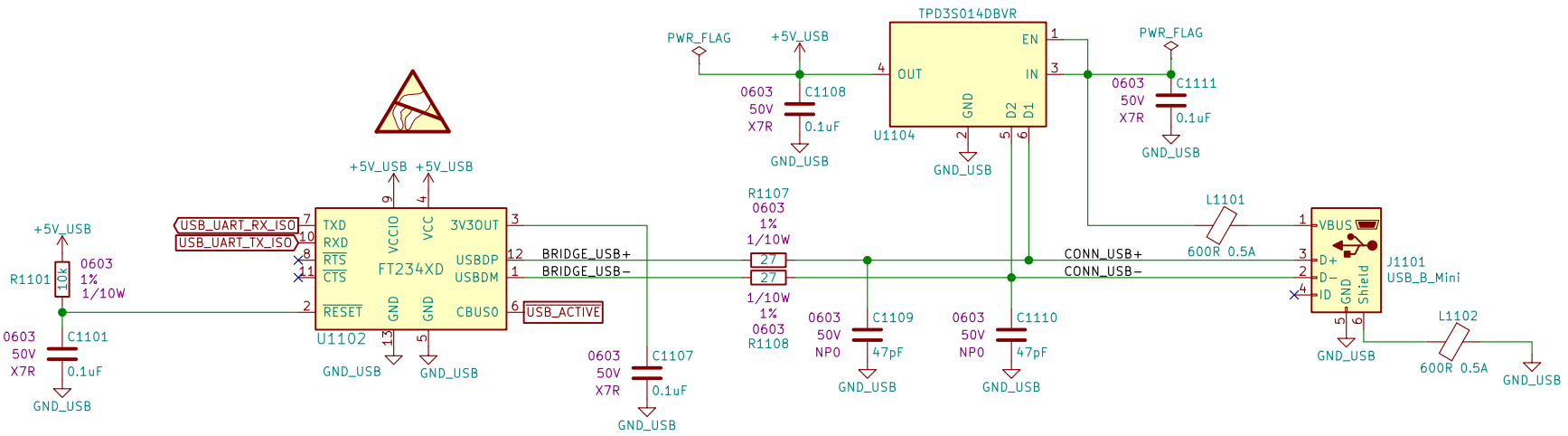
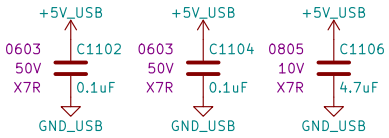
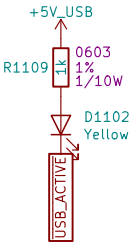
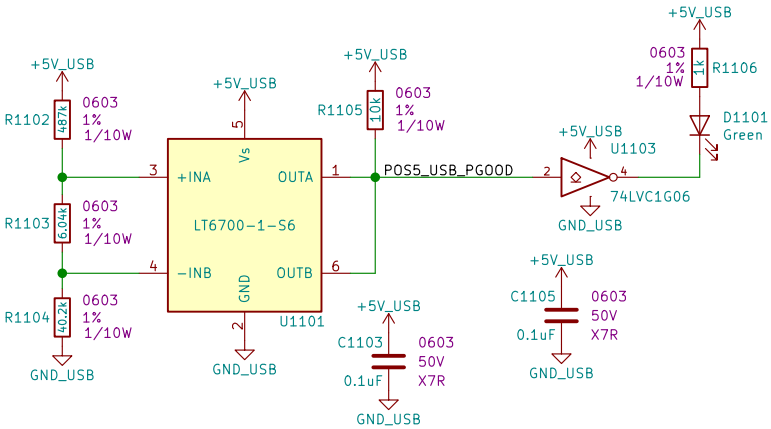
11. USB UART Bridge









USB Virtual COM Port Settings:

Baud Rate:	921600 bps
Data Length:	8 bit
Parity:	None
Stop Bits:	1
Flow Control:	None

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Sheet: /USB UART Bridge/
File: USB_UART_Bridge.sch

Title: Electronic Display Logic Board

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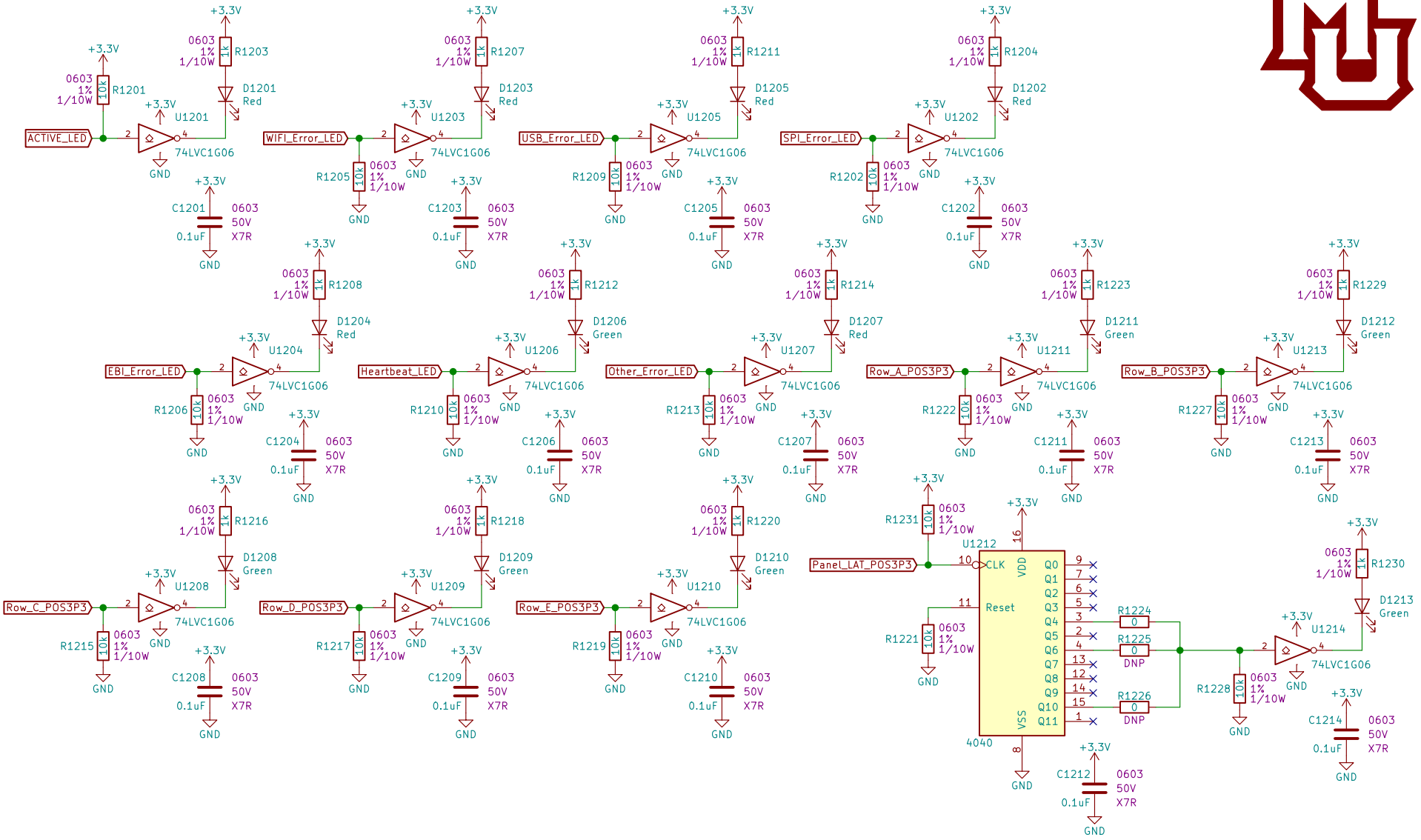
12. Status LEDs Bank 1



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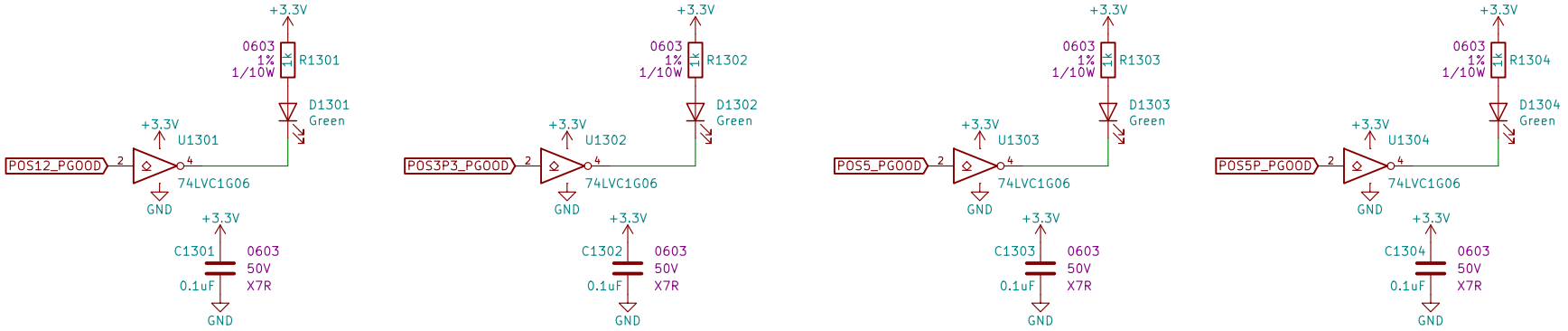
13. Status LEDs Bank 2



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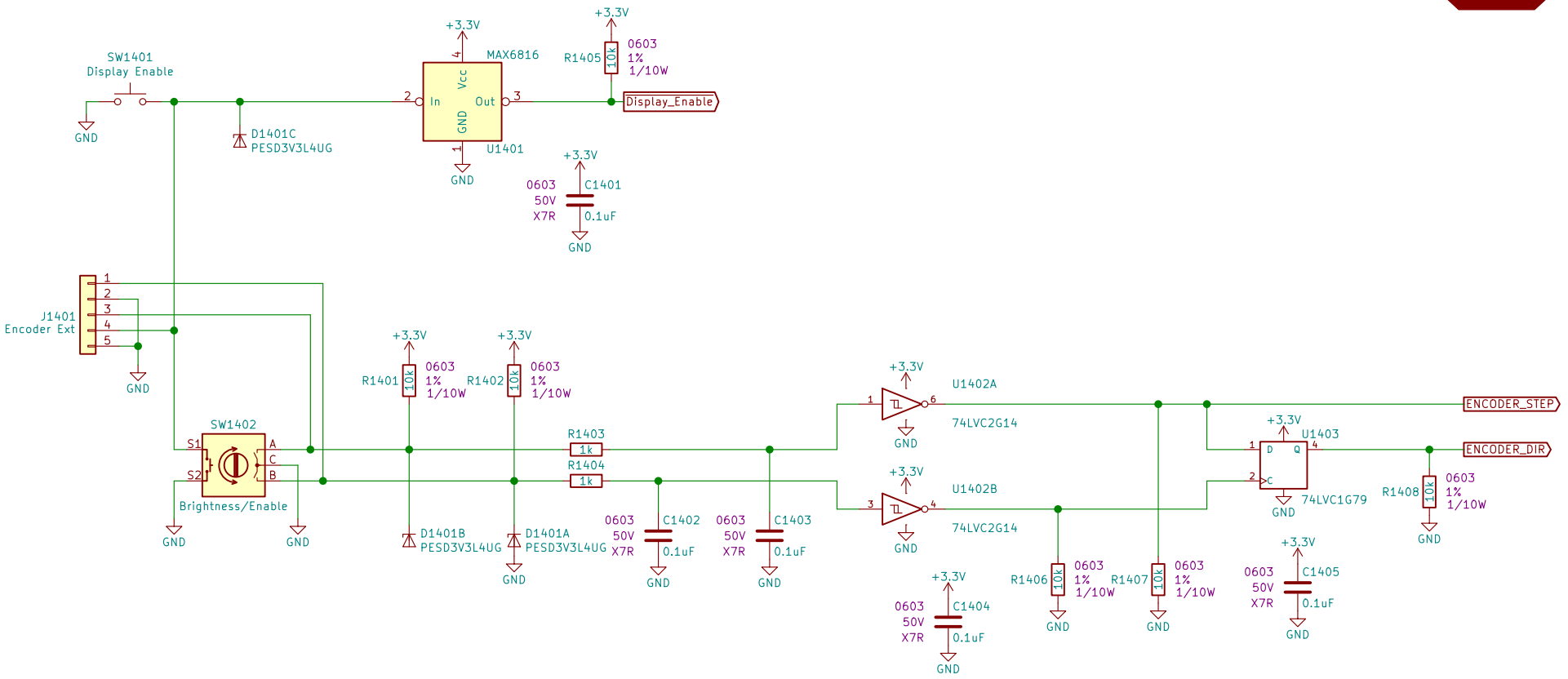
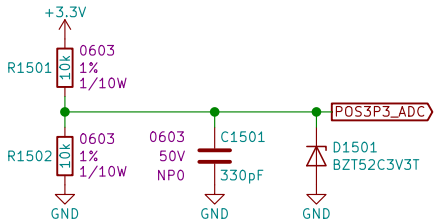
14. Pushbuttons

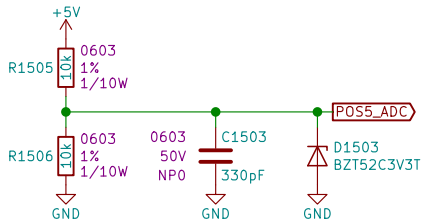


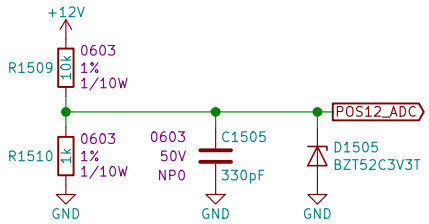
Turning rotary encoder will adjust display master brightness
Pressing encoder switch will toggle display on/off state

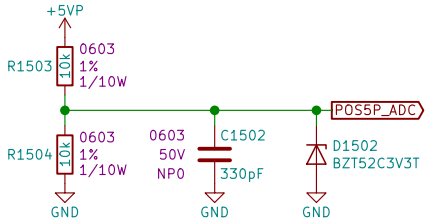
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Pushbuttons/		
File: Pushbuttons.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 14/32

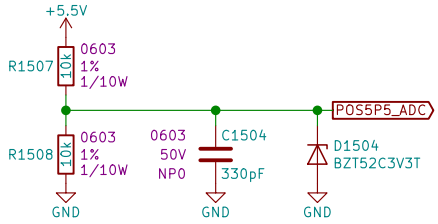
15. Internal Rail Monitoring











Marquette University Senior Design 2018/2019 Group E44

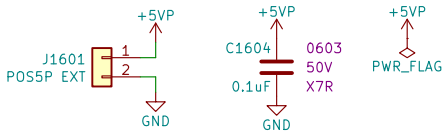
Sheet: /Internal Rail Monitoring/

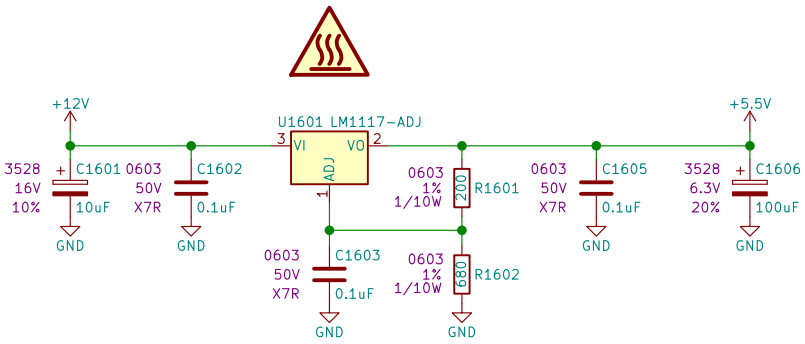
File: Internal_Rail_Monitoring.sch

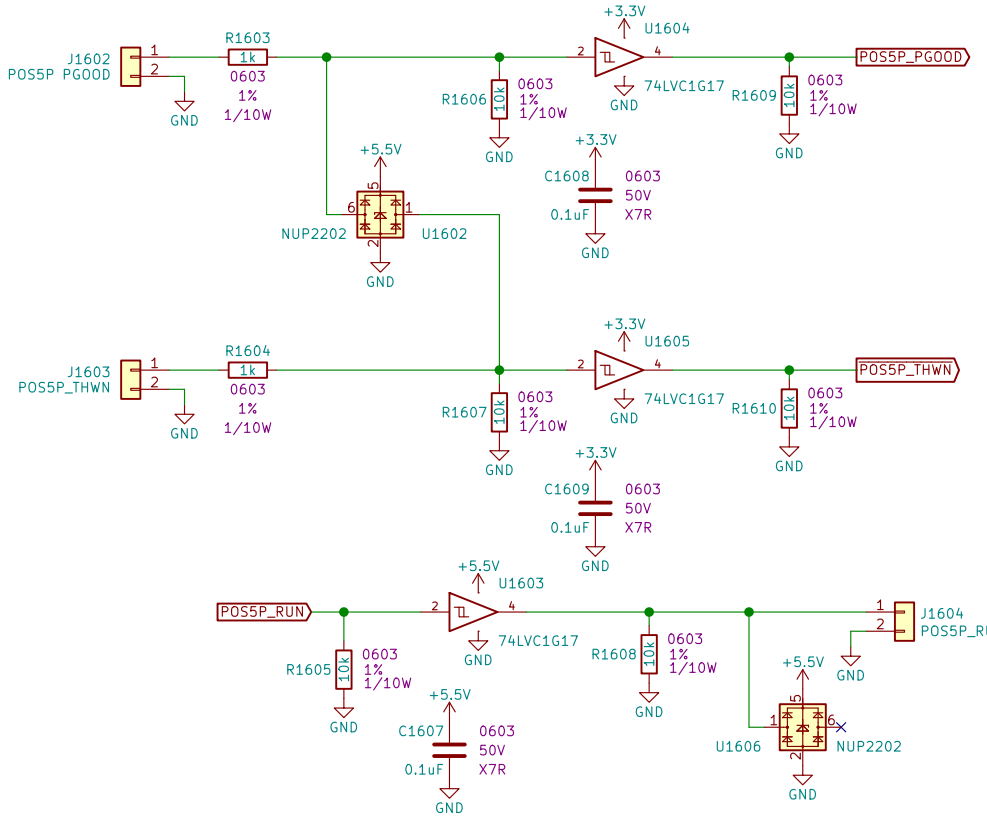
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 15/32

16. LED Power Supply Monitoring







All headers on this sheet interface with power board to power panels

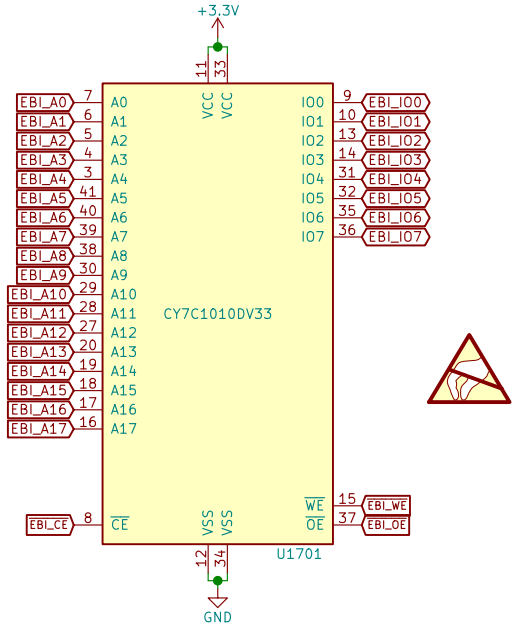
Marquette University Senior Design 2018/2019 Group E44

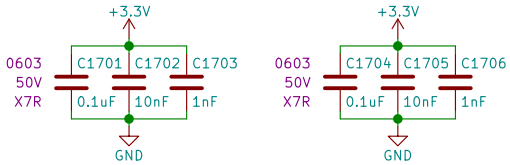
Sheet: /LED POS5 Monitoring/
File: LED_POS5_Monitoring.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 16/32

17. External SRAM





External SRAM stores the current slide being displayed
Each of the eight programmed slides are stored in external serial flash

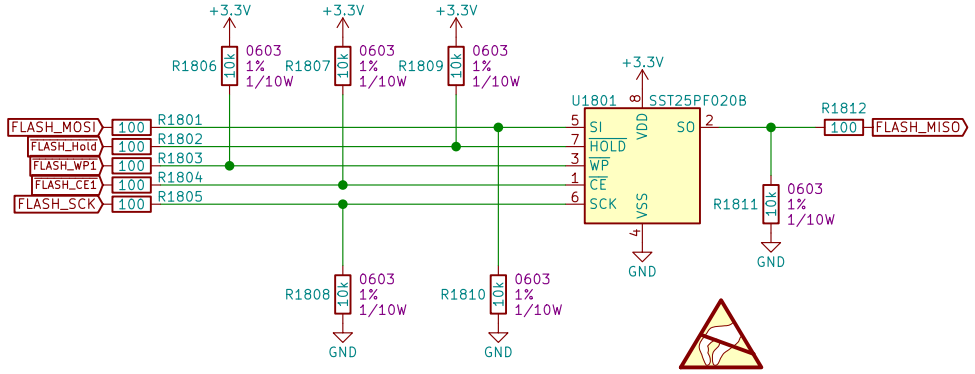
Marquette University Senior Design 2018/2019 Group E44

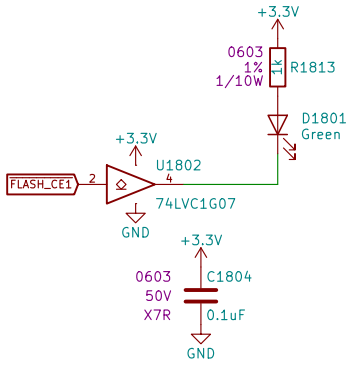
Sheet: /External SRAM/
File: External_SRAM.sch

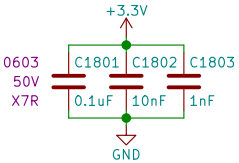
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 17/32

18. External FLASH 1







Marquette University Senior Design 2018/2019 Group E44

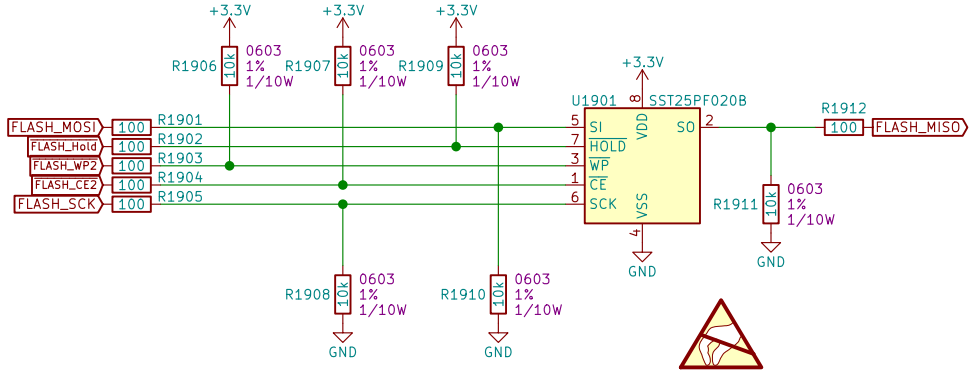
Sheet: /External Flash 1/

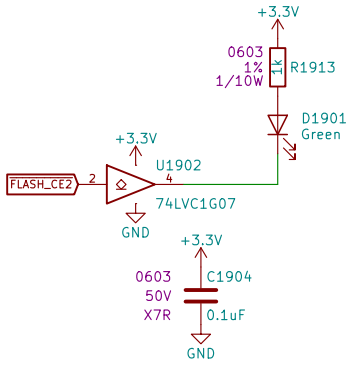
File: External_Flash_1.sch

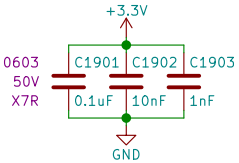
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 18/32

19. External FLASH 2







Marquette University Senior Design 2018/2019 Group E44

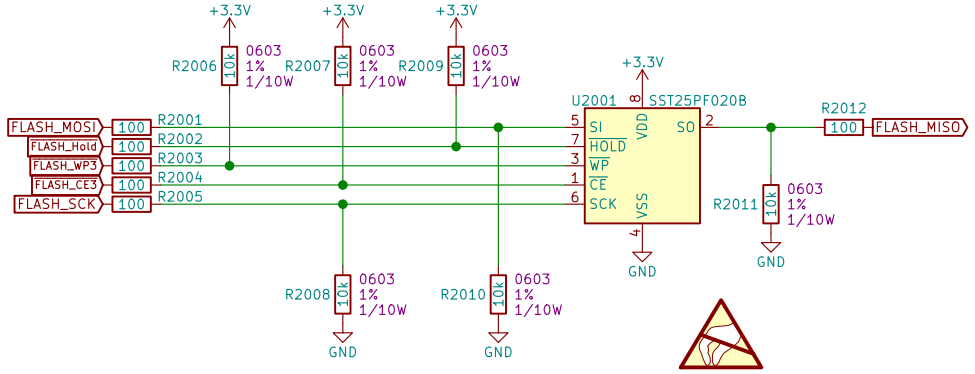
Sheet: /External Flash 2/

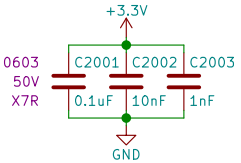
File: External_Flash_2.sch

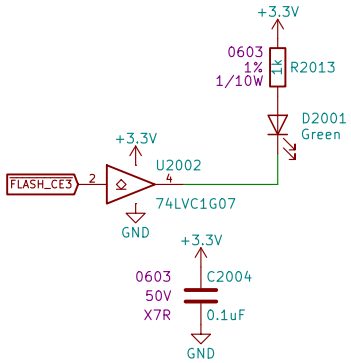
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 19/32

20. External FLASH 3







Marquette University Senior Design 2018/2019 Group E44

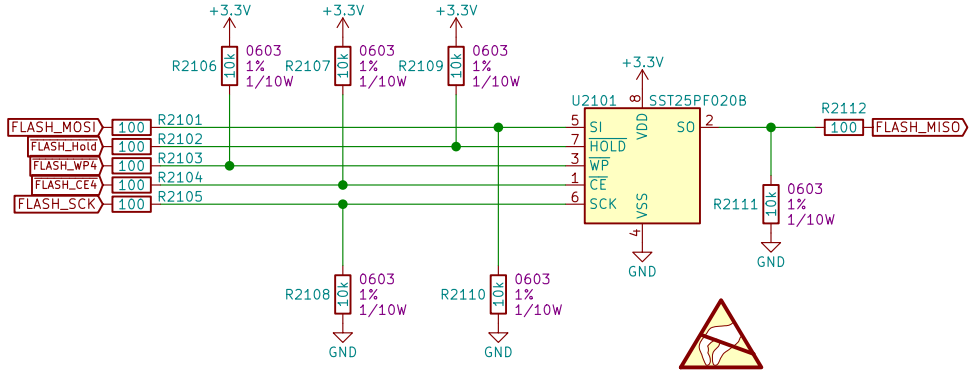
Sheet: /External Flash 3/

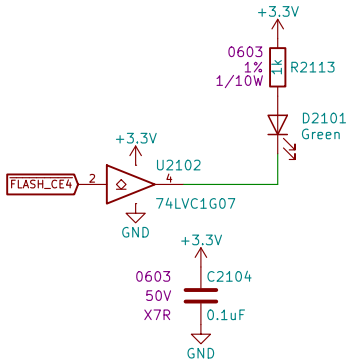
File: External_Flash_3.sch

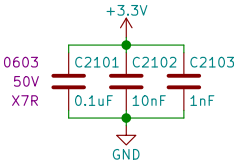
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 20/32

21. External FLASH 4







Marquette University Senior Design 2018/2019 Group E44

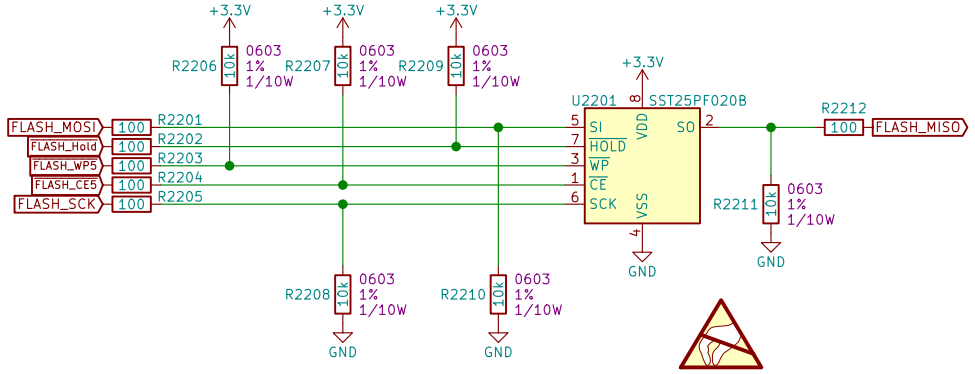
Sheet: /External Flash 4/

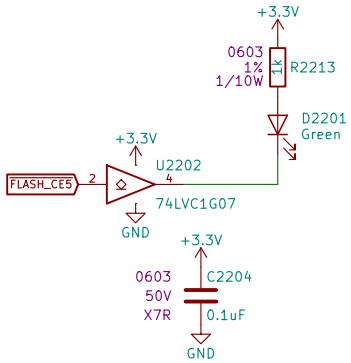
File: External_Flash_4.sch

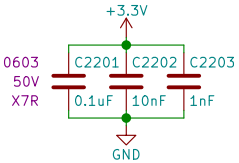
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 21/32

22. External FLASH 5







Marquette University Senior Design 2018/2019 Group E44

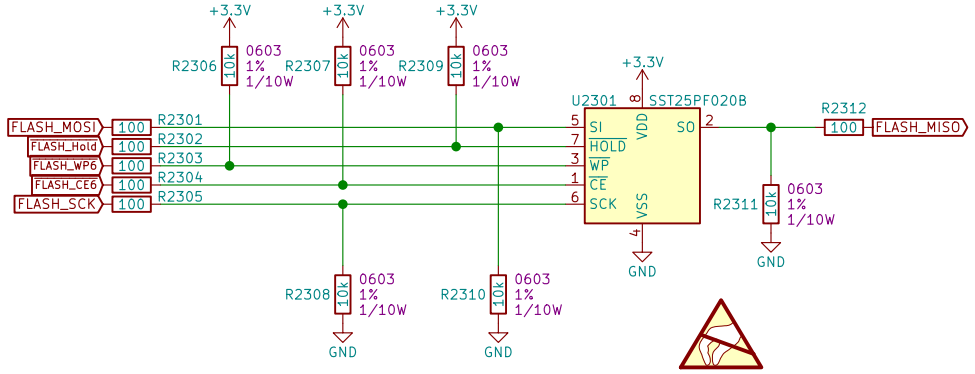
Sheet: /External Flash 5/

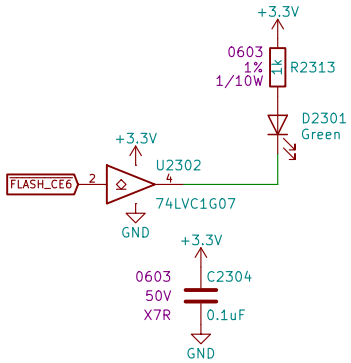
File: External_Flash_5.sch

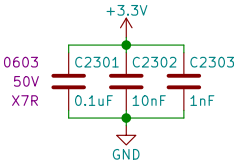
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 22/32

23. External FLASH 6







Marquette University Senior Design 2018/2019 Group E44

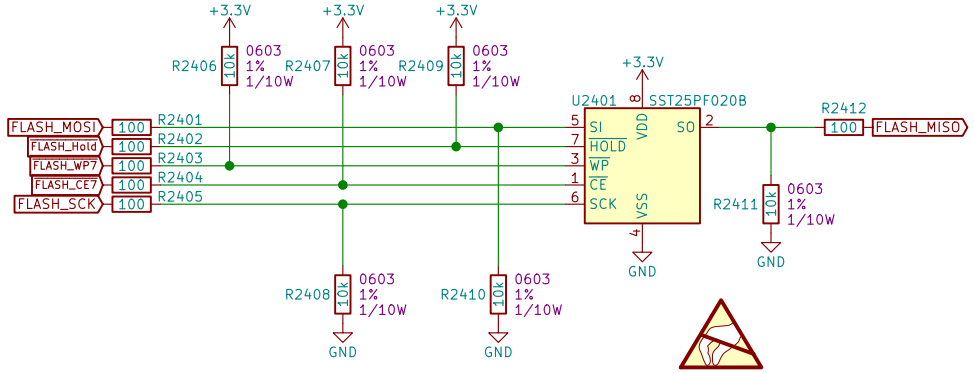
Sheet: /External Flash 6/

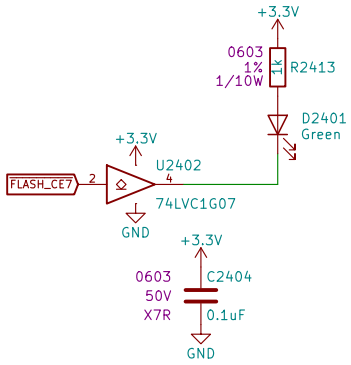
File: External_Flash_6.sch

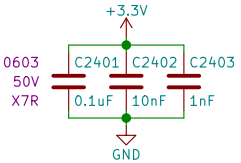
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 23/32

24. External FLASH 7







Marquette University Senior Design 2018/2019 Group E44

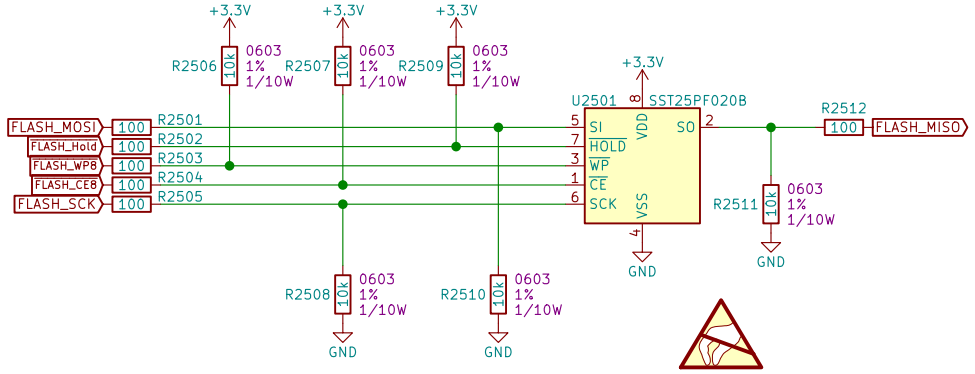
Sheet: /External Flash 7/

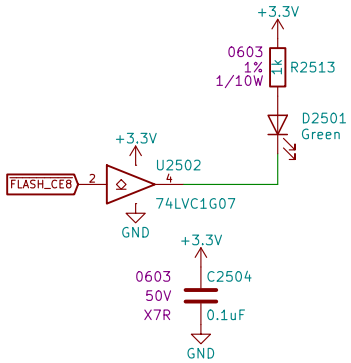
File: External_Flash_7.sch

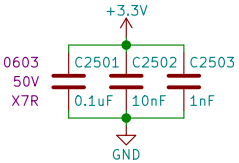
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 24/32

25. External FLASH 8







Marquette University Senior Design 2018/2019 Group E44

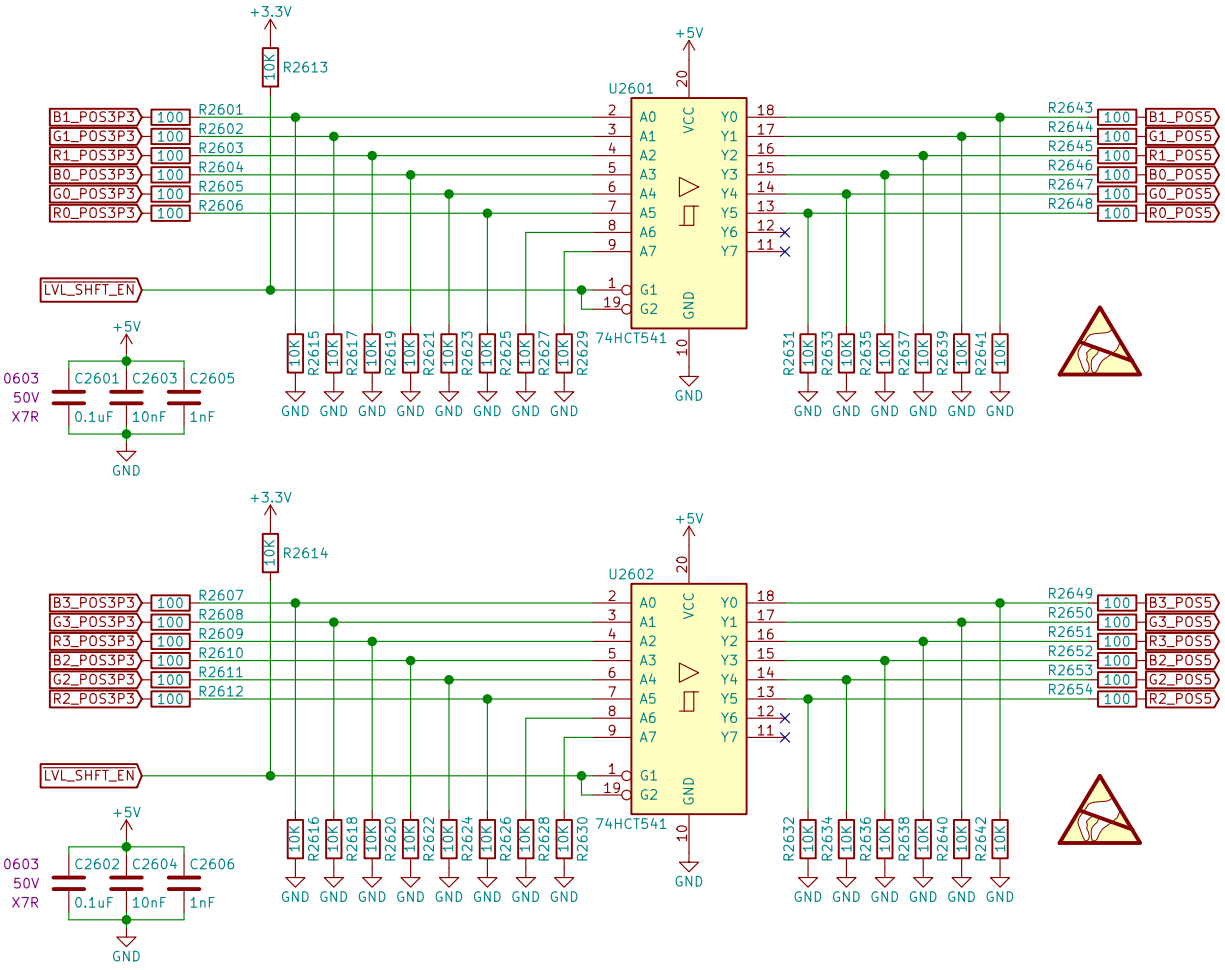
Sheet: /External Flash 8/

File: External_Flash_8.sch

Title: Electronic Display Logic Board

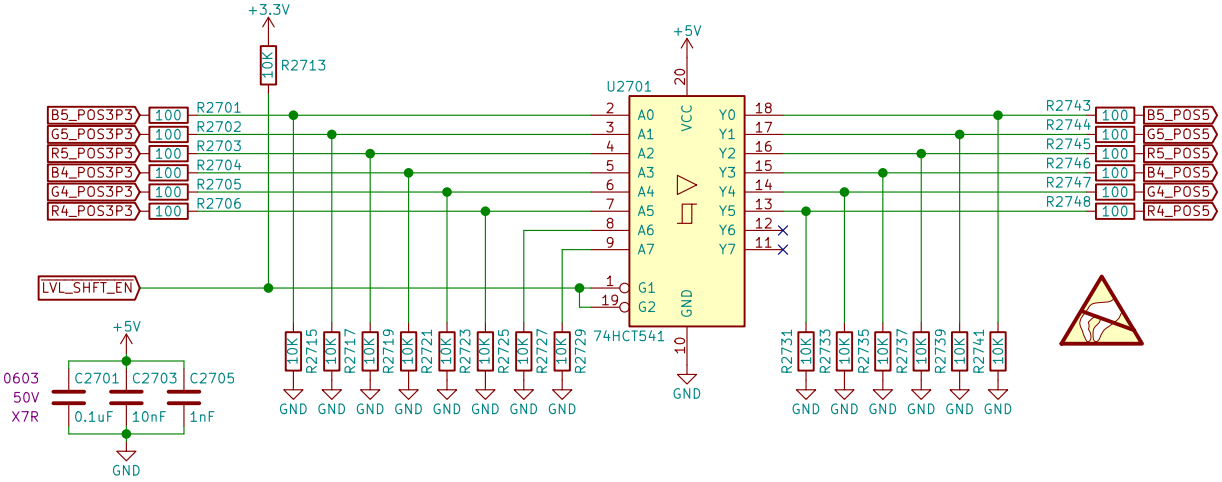
Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 25/32

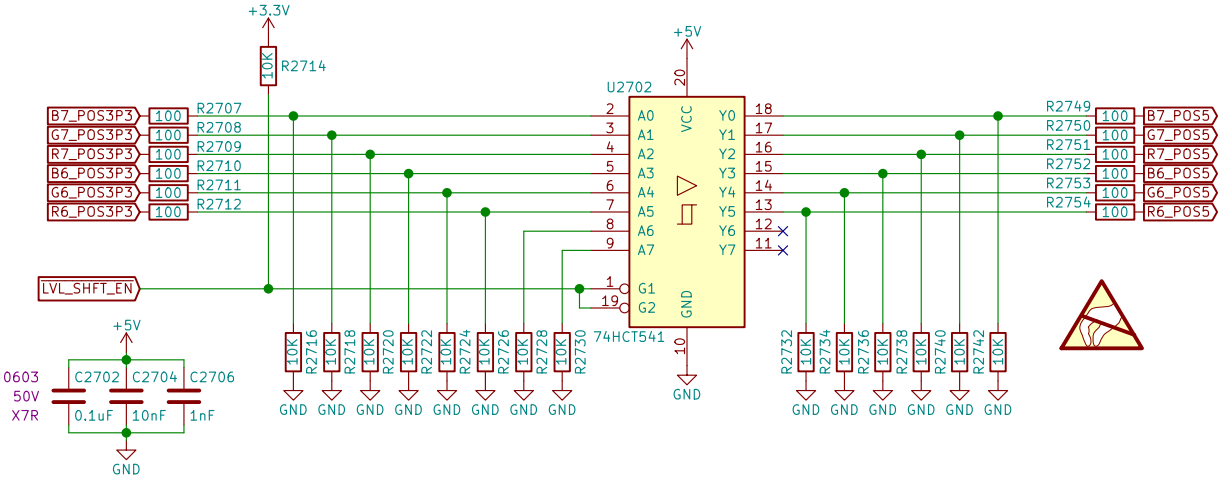
26. Panel Data Level Shifters 1



Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Panel Data Level Shifters 1/		
File: Panel_Data_Level_Shifters_1.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 26/32

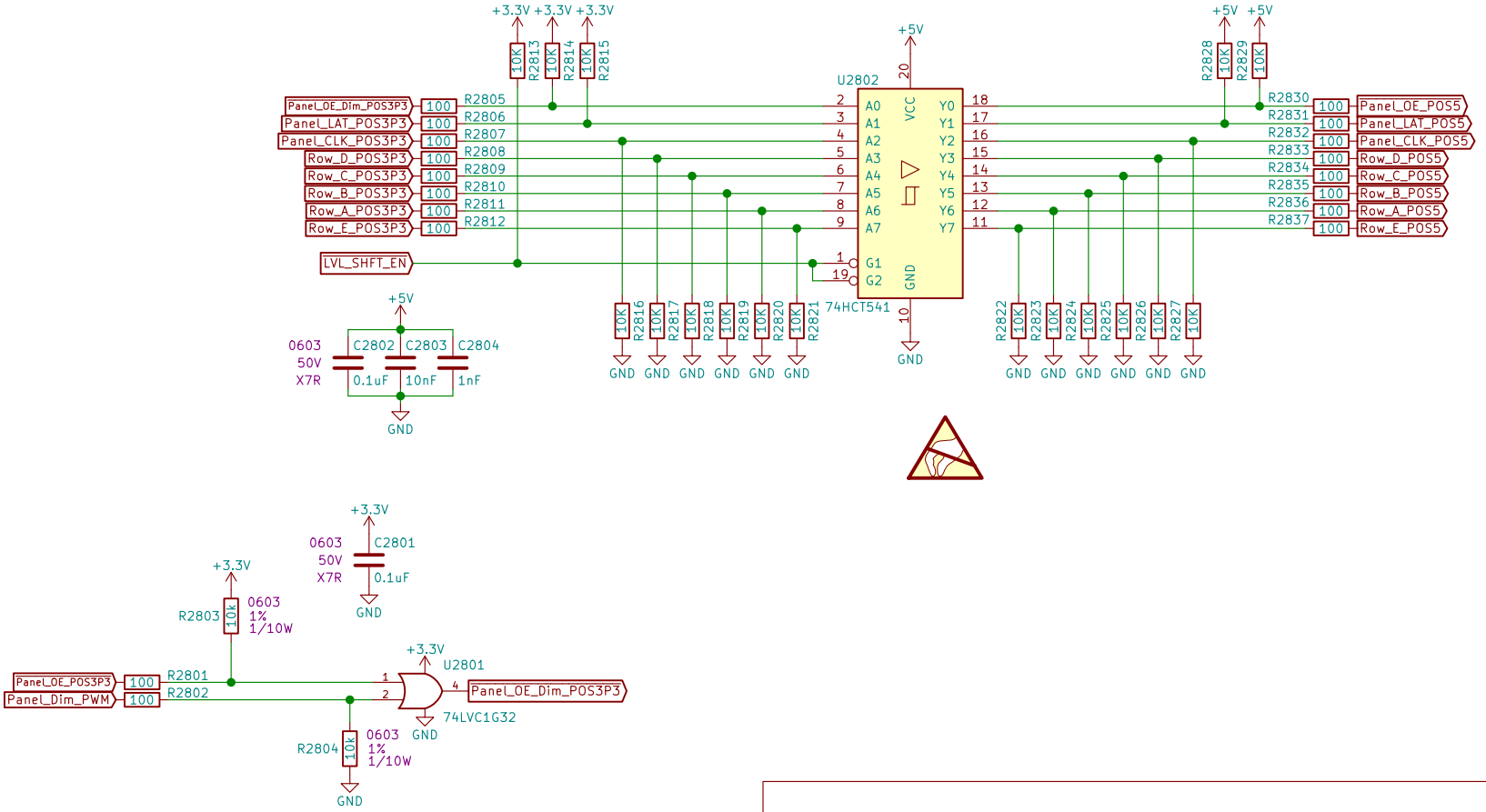
27. Panel Data Level Shifters 2





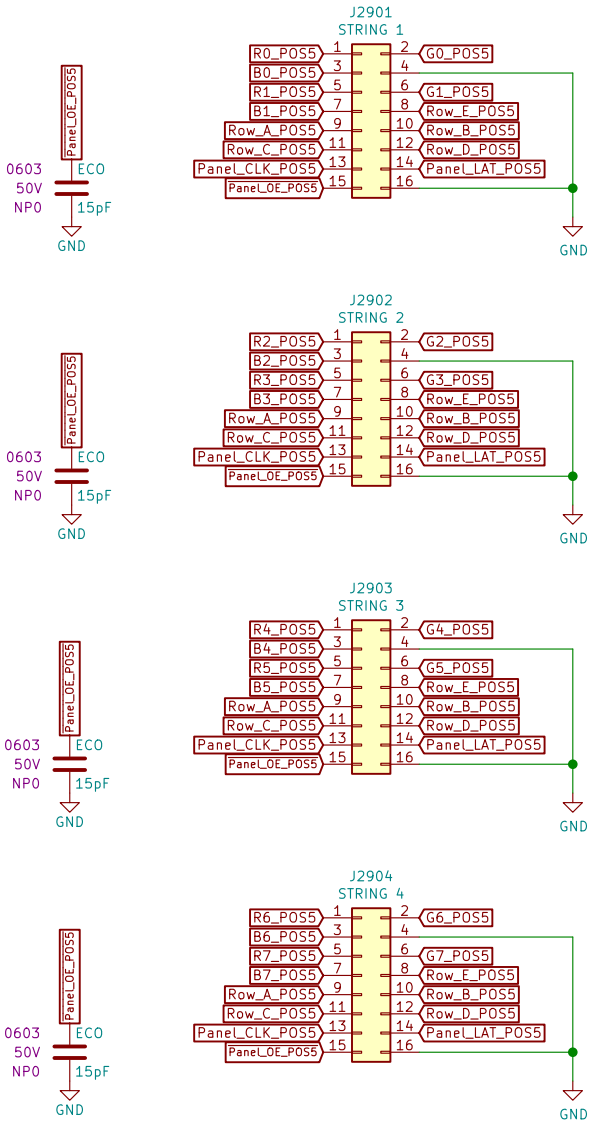
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Panel Data Level Shifters 2/		
File: Panel_Data_Level_Shifters_2.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.1.2)-1		Id: 27/32

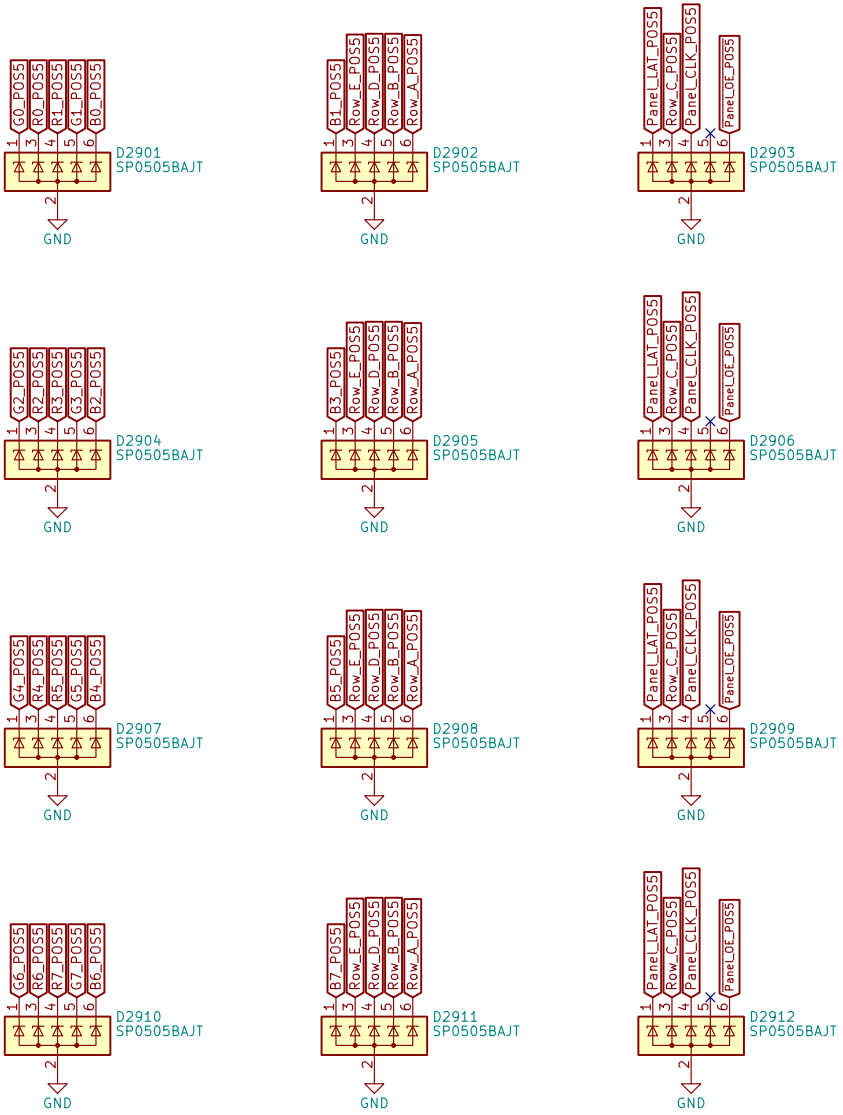
28. Panel Data Level Shifters 3



Marquette University Senior Design 2018/2019 Group E44	
Sheet: /Panel Data Level Shifters 3/	
File: Panel_Data_Level_Shifters_3.sch	
Title: Electronic Display Logic Board	
Size: A	Date: 2018-12-15
KiCad E.D.A. kicad (5.1.2)-1	Id: 28/32
	Rev: A

29. Panel Data Connectors





ECO 15pF caps added to slow down $\overline{OE}$ rising edge

String 1 is the top string.
String 4 is the bottom string.
Each string is 5 panels long
Each panel is 64x64 pixels
This yields an overall 320x256 pixel display resolution

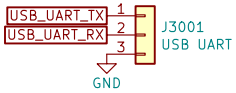
Marquette University Senior Design 2018/2019 Group E44

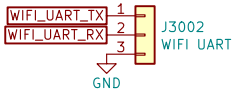
Sheet: /Panel Data Connectors/
File: Panel_Data_Connectors.sch

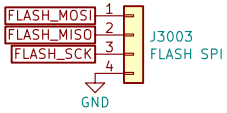
Title: Electronic Display Logic Board

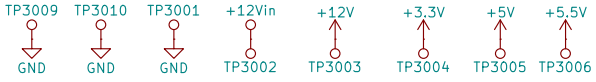
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 29/32

30. Test Points









Marquette University Senior Design 2018/2019 Group E44

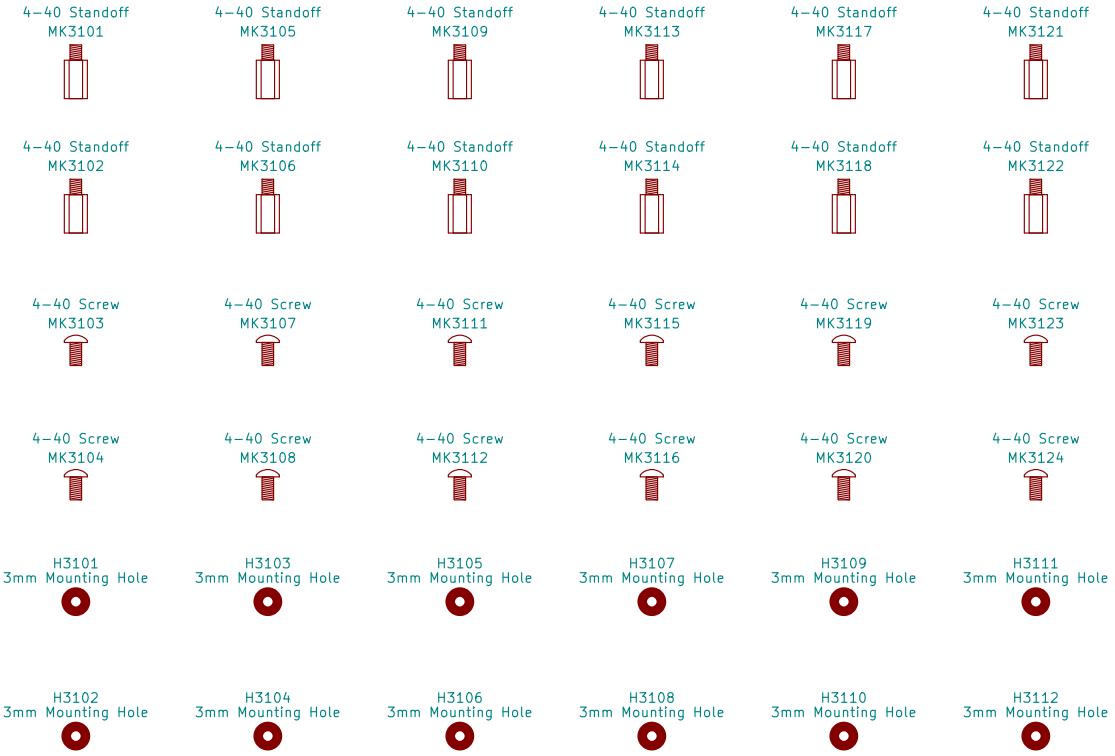
Sheet: /Test Points/

File: Test_Points.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 30/32

31. Mechanical



Marquette University Senior Design 2018/2019 Group E44

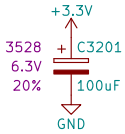
Sheet: /Mechanical/
File: Mechanical.sch

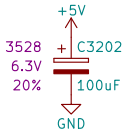
Title: Electronic Display Logic Board

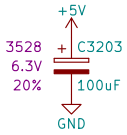
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 31/32

32. Additional Capacitance

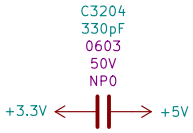
Bulk Capacitors

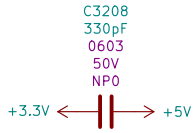


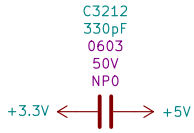


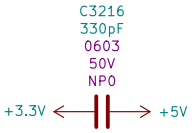


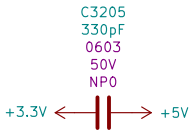
Stitching Capacitors

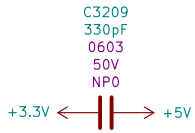


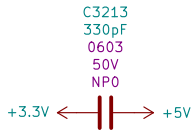


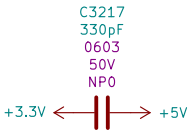


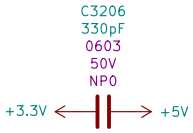


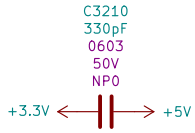


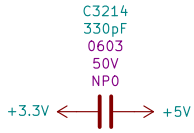


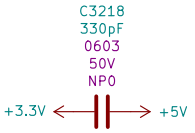


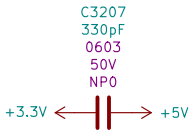


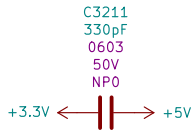


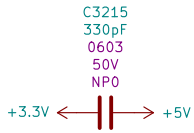


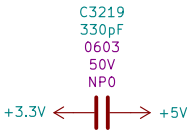












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Sheet: /Additional Capacitance/
File: Additional_Capacitance.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.1.2)-1		Id: 32/32

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C201	0.1uF	X7R	311-1344-1-ND		50V	0603
C202	10nF	X7R	1276-1921-1-ND		50V	0603
C203	1nF	X7R	1276-1018-1-ND		50V	0603
C204	0.1uF	X7R	311-1344-1-ND		50V	0603
C205	100uF		718-1102-1-ND	10%	16V	7343
C301	22uF	X7R	445-1453-1-ND		25V	2220
C302	22uF	X7R	445-1453-1-ND		25V	2220
C303	22uF	X7R	445-1453-1-ND		25V	2220
C304	10nF	X7R	1276-1921-1-ND		50V	0603
C305	0.1uF	X7R	311-1344-1-ND		50V	0603
C306	62pF	NP0	1276-2320-1-ND		50V	0603
C307	0.1uF	X7R	311-1344-1-ND		50V	0603
C308	15pF	NP0	478-10289-1-ND		50V	0603
C309	2.2uF	X7R	445-5691-1-ND		16V	0805
C310	15pF	NP0	478-10289-1-ND		50V	0603
C311	47uF	X7R	490-4844-1-ND		6.3V	1210
C312	47uF	X7R	490-4844-1-ND		6.3V	1210
C401	2.2uF	X7R	445-5691-1-ND		16V	0805
C402	22uF	X7R	445-1453-1-ND		25V	2220
C403	0.1uF	X7R	311-1344-1-ND		50V	0603
C404	33pF	NP0	399-1055-1-ND		50V	0603
C405	0.1uF	X7R	311-1344-1-ND		50V	0603
C406	22uF	X7R	445-1453-1-ND		25V	2220
C407	22uF	X7R	445-1453-1-ND		25V	2220
C501	0.1uF	X7R	311-1344-1-ND		50V	0603
C502	0.1uF	X7R	311-1344-1-ND		50V	0603
C601	0.1uF	X7R	311-1344-1-ND		50V	0603
C602	0.1uF	X7R	311-1344-1-ND		50V	0603
C603	0.1uF	X7R	311-1344-1-ND		50V	0603
C604	100uF		478-3130-1-ND	20%	6.3V	3528
C605	10nF	X7R	1276-1921-1-ND		50V	0603
C606	10nF	X7R	1276-1921-1-ND		50V	0603
C607	10nF	X7R	1276-1921-1-ND		50V	0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C608	1nF	X7R	1276-1018-1-ND		50V	0603
C609	1nF	X7R	1276-1018-1-ND		50V	0603
C610	1nF	X7R	1276-1018-1-ND		50V	0603
C611	0.1uF	X7R	311-1344-1-ND		50V	0603
C612	0.1uF	X7R	311-1344-1-ND		50V	0603
C613	0.1uF	X7R	311-1344-1-ND		50V	0603
C614	10nF	X7R	1276-1921-1-ND		50V	0603
C615	10nF	X7R	1276-1921-1-ND		50V	0603
C616	10nF	X7R	1276-1921-1-ND		50V	0603
C617	1nF	X7R	1276-1018-1-ND		50V	0603
C618	1nF	X7R	1276-1018-1-ND		50V	0603
C619	1nF	X7R	1276-1018-1-ND		50V	0603
C620	0.1uF	X7R	311-1344-1-ND		50V	0603
C621	0.1uF	X7R	311-1344-1-ND		50V	0603
C622	0.1uF	X7R	311-1344-1-ND		50V	0603
C623	10nF	X7R	1276-1921-1-ND		50V	0603
C624	10nF	X7R	1276-1921-1-ND		50V	0603
C625	10nF	X7R	1276-1921-1-ND		50V	0603
C626	1nF	X7R	1276-1018-1-ND		50V	0603
C627	1nF	X7R	1276-1018-1-ND		50V	0603
C628	1nF	X7R	1276-1018-1-ND		50V	0603
C901	100uF		478-3130-1-ND	20%	6.3V	3528
C902	0.1uF	X7R	311-1344-1-ND		50V	0603
C903	10nF	X7R	1276-1921-1-ND		50V	0603
C904	1nF	X7R	1276-1018-1-ND		50V	0603
C905	0.1uF	X7R	311-1344-1-ND		50V	0603
C906	0.1uF	X7R	311-1344-1-ND		50V	0603
C907	0.1uF	X7R	311-1344-1-ND		50V	0603
C1001	0.1uF	X7R	311-1344-1-ND		50V	0603
C1002	0.56uF	X7R	565-4707-1-ND		250VAC	2220
C1003	0.1uF	X7R	311-1344-1-ND		50V	0603
C1101	0.1uF	X7R	311-1344-1-ND		50V	0603
C1102	0.1uF	X7R	311-1344-1-ND		50V	0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C1103	0.1uF	X7R	311-1344-1-ND		50V	0603
C1104	0.1uF	X7R	311-1344-1-ND		50V	0603
C1105	0.1uF	X7R	311-1344-1-ND		50V	0603
C1106	4.7uF	X7R	1276-2972-1-ND		10V	0805
C1107	0.1uF	X7R	311-1344-1-ND		50V	0603
C1108	0.1uF	X7R	311-1344-1-ND		50V	0603
C1109	47pF	NP0	478-1171-1-ND		50V	0603
C1110	47pF	NP0	478-1171-1-ND		50V	0603
C1111	0.1uF	X7R	311-1344-1-ND		50V	0603
C1201	0.1uF	X7R	311-1344-1-ND		50V	0603
C1202	0.1uF	X7R	311-1344-1-ND		50V	0603
C1203	0.1uF	X7R	311-1344-1-ND		50V	0603
C1204	0.1uF	X7R	311-1344-1-ND		50V	0603
C1205	0.1uF	X7R	311-1344-1-ND		50V	0603
C1206	0.1uF	X7R	311-1344-1-ND		50V	0603
C1207	0.1uF	X7R	311-1344-1-ND		50V	0603
C1208	0.1uF	X7R	311-1344-1-ND		50V	0603
C1209	0.1uF	X7R	311-1344-1-ND		50V	0603
C1210	0.1uF	X7R	311-1344-1-ND		50V	0603
C1211	0.1uF	X7R	311-1344-1-ND		50V	0603
C1212	0.1uF	X7R	311-1344-1-ND		50V	0603
C1213	0.1uF	X7R	311-1344-1-ND		50V	0603
C1214	0.1uF	X7R	311-1344-1-ND		50V	0603
C1301	0.1uF	X7R	311-1344-1-ND		50V	0603
C1302	0.1uF	X7R	311-1344-1-ND		50V	0603
C1303	0.1uF	X7R	311-1344-1-ND		50V	0603
C1304	0.1uF	X7R	311-1344-1-ND		50V	0603
C1401	0.1uF	X7R	311-1344-1-ND		50V	0603
C1402	0.1uF	X7R	311-1344-1-ND		50V	0603
C1403	0.1uF	X7R	311-1344-1-ND		50V	0603
C1404	0.1uF	X7R	311-1344-1-ND		50V	0603
C1405	0.1uF	X7R	311-1344-1-ND		50V	0603
C1501	330pF	NP0	399-6880-1-ND		50V	0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C1502	330pF	NP0	399-6880-1-ND		50V	0603
C1503	330pF	NP0	399-6880-1-ND		50V	0603
C1504	330pF	NP0	399-6880-1-ND		50V	0603
C1505	330pF	NP0	399-6880-1-ND		50V	0603
C1601	10uF		478-8236-1-ND	10%	16V	3528
C1602	0.1uF	X7R	311-1344-1-ND		50V	0603
C1603	0.1uF	X7R	311-1344-1-ND		50V	0603
C1604	0.1uF	X7R	311-1344-1-ND		50V	0603
C1605	0.1uF	X7R	311-1344-1-ND		50V	0603
C1606	100uF		478-3130-1-ND	20%	6.3V	3528
C1607	0.1uF	X7R	311-1344-1-ND		50V	0603
C1608	0.1uF	X7R	311-1344-1-ND		50V	0603
C1609	0.1uF	X7R	311-1344-1-ND		50V	0603
C1701	0.1uF	X7R	311-1344-1-ND		50V	0603
C1702	10nF	X7R	1276-1921-1-ND		50V	0603
C1703	1nF	X7R	1276-1018-1-ND		50V	0603
C1704	0.1uF	X7R	311-1344-1-ND		50V	0603
C1705	10nF	X7R	1276-1921-1-ND		50V	0603
C1706	1nF	X7R	1276-1018-1-ND		50V	0603
C1801	0.1uF	X7R	311-1344-1-ND		50V	0603
C1802	10nF	X7R	1276-1921-1-ND		50V	0603
C1803	1nF	X7R	1276-1018-1-ND		50V	0603
C1804	0.1uF	X7R	311-1344-1-ND		50V	0603
C1901	0.1uF	X7R	311-1344-1-ND		50V	0603
C1902	10nF	X7R	1276-1921-1-ND		50V	0603
C1903	1nF	X7R	1276-1018-1-ND		50V	0603
C1904	0.1uF	X7R	311-1344-1-ND		50V	0603
C2001	0.1uF	X7R	311-1344-1-ND		50V	0603
C2002	10nF	X7R	1276-1921-1-ND		50V	0603
C2003	1nF	X7R	1276-1018-1-ND		50V	0603
C2004	0.1uF	X7R	311-1344-1-ND		50V	0603
C2101	0.1uF	X7R	311-1344-1-ND		50V	0603
C2102	10nF	X7R	1276-1921-1-ND		50V	0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C2103	1nF	X7R	1276-1018-1-ND		50V	0603
C2104	0.1uF	X7R	311-1344-1-ND		50V	0603
C2201	0.1uF	X7R	311-1344-1-ND		50V	0603
C2202	10nF	X7R	1276-1921-1-ND		50V	0603
C2203	1nF	X7R	1276-1018-1-ND		50V	0603
C2204	0.1uF	X7R	311-1344-1-ND		50V	0603
C2301	0.1uF	X7R	311-1344-1-ND		50V	0603
C2302	10nF	X7R	1276-1921-1-ND		50V	0603
C2303	1nF	X7R	1276-1018-1-ND		50V	0603
C2304	0.1uF	X7R	311-1344-1-ND		50V	0603
C2401	0.1uF	X7R	311-1344-1-ND		50V	0603
C2402	10nF	X7R	1276-1921-1-ND		50V	0603
C2403	1nF	X7R	1276-1018-1-ND		50V	0603
C2404	0.1uF	X7R	311-1344-1-ND		50V	0603
C2501	0.1uF	X7R	311-1344-1-ND		50V	0603
C2502	10nF	X7R	1276-1921-1-ND		50V	0603
C2503	1nF	X7R	1276-1018-1-ND		50V	0603
C2504	0.1uF	X7R	311-1344-1-ND		50V	0603
C2601	0.1uF	X7R	311-1344-1-ND		50V	0603
C2602	0.1uF	X7R	311-1344-1-ND		50V	0603
C2603	10nF	X7R	1276-1921-1-ND		50V	0603
C2604	10nF	X7R	1276-1921-1-ND		50V	0603
C2605	1nF	X7R	1276-1018-1-ND		50V	0603
C2606	1nF	X7R	1276-1018-1-ND		50V	0603
C2701	0.1uF	X7R	311-1344-1-ND		50V	0603
C2702	0.1uF	X7R	311-1344-1-ND		50V	0603
C2703	10nF	X7R	1276-1921-1-ND		50V	0603
C2704	10nF	X7R	1276-1921-1-ND		50V	0603
C2705	1nF	X7R	1276-1018-1-ND		50V	0603
C2706	1nF	X7R	1276-1018-1-ND		50V	0603
C2801	0.1uF	X7R	311-1344-1-ND		50V	0603
C2802	0.1uF	X7R	311-1344-1-ND		50V	0603
C2803	10nF	X7R	1276-1921-1-ND		50V	0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
C2804	1nF	X7R	1276-1018-1-ND		50V	0603
C3201	100uF		478-3130-1-ND	20%	6.3V	3528
C3202	100uF		478-3130-1-ND	20%	6.3V	3528
C3203	100uF		478-3130-1-ND	20%	6.3V	3528
C3204	330pF	NP0	399-6880-1-ND		50V	0603
C3205	330pF	NP0	399-6880-1-ND		50V	0603
C3206	330pF	NP0	399-6880-1-ND		50V	0603
C3207	330pF	NP0	399-6880-1-ND		50V	0603
C3208	330pF	NP0	399-6880-1-ND		50V	0603
C3209	330pF	NP0	399-6880-1-ND		50V	0603
C3210	330pF	NP0	399-6880-1-ND		50V	0603
C3211	330pF	NP0	399-6880-1-ND		50V	0603
C3212	330pF	NP0	399-6880-1-ND		50V	0603
C3213	330pF	NP0	399-6880-1-ND		50V	0603
C3214	330pF	NP0	399-6880-1-ND		50V	0603
C3215	330pF	NP0	399-6880-1-ND		50V	0603
C3216	330pF	NP0	399-6880-1-ND		50V	0603
C3217	330pF	NP0	399-6880-1-ND		50V	0603
C3218	330pF	NP0	399-6880-1-ND		50V	0603
C3219	330pF	NP0	399-6880-1-ND		50V	0603
D201	NUP2105L		NUP2105LT1GOSCT-ND			
D202	24V		SMAJ24CALFCT-ND			
D301	MBR0530		MBR0530T1GOSCT-ND			
D901	PESD3V3L4UG		1727-3827-1-ND			
D902	Green		160-1446-1-ND			
D1101	Green		160-1446-1-ND			
D1102	Yellow		160-1448-1-ND			
D1201	Red		160-1447-1-ND			
D1202	Red		160-1447-1-ND			
D1203	Red		160-1447-1-ND			
D1204	Red		160-1447-1-ND			
D1205	Red		160-1447-1-ND			
D1206	Green		160-1446-1-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
D1207	Red		160-1447-1-ND			
D1208	Green		160-1446-1-ND			
D1209	Green		160-1446-1-ND			
D1210	Green		160-1446-1-ND			
D1211	Green		160-1446-1-ND			
D1212	Green		160-1446-1-ND			
D1213	Green		160-1446-1-ND			
D1301	Green		160-1446-1-ND			
D1302	Green		160-1446-1-ND			
D1303	Green		160-1446-1-ND			
D1304	Green		160-1446-1-ND			
D1401	PESD3V3L4UG		1727-3827-1-ND			
D1501	BZT52C3V3T		BZT52C3V3T-TPMSCT-ND			
D1502	BZT52C3V3T		BZT52C3V3T-TPMSCT-ND			
D1503	BZT52C3V3T		BZT52C3V3T-TPMSCT-ND			
D1504	BZT52C3V3T		BZT52C3V3T-TPMSCT-ND			
D1505	BZT52C3V3T		BZT52C3V3T-TPMSCT-ND			
D1801	Green		160-1446-1-ND			
D1901	Green		160-1446-1-ND			
D2001	Green		160-1446-1-ND			
D2101	Green		160-1446-1-ND			
D2201	Green		160-1446-1-ND			
D2301	Green		160-1446-1-ND			
D2401	Green		160-1446-1-ND			
D2501	Green		160-1446-1-ND			
D2901	SP0505BAJT		F3160CT-ND			
D2902	SP0505BAJT		F3160CT-ND			
D2903	SP0505BAJT		F3160CT-ND			
D2904	SP0505BAJT		F3160CT-ND			
D2905	SP0505BAJT		F3160CT-ND			
D2906	SP0505BAJT		F3160CT-ND			
D2907	SP0505BAJT		F3160CT-ND			
D2908	SP0505BAJT		F3160CT-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
D2909	SP0505BAJT		F3160CT-ND			
D2910	SP0505BAJT		F3160CT-ND			
D2911	SP0505BAJT		F3160CT-ND			
D2912	SP0505BAJT		F3160CT-ND			
DOC1101	COM_Port_Settings					
ECO2901	15pF	NP0	478-10289-1-ND		50V	0603
ECO2902	15pF	NP0	478-10289-1-ND		50V	0603
ECO2903	15pF	NP0	478-10289-1-ND		50V	0603
ECO2904	15pF	NP0	478-10289-1-ND		50V	0603
H3101	3mm Mounting Hole					
H3102	3mm Mounting Hole					
H3103	3mm Mounting Hole					
H3104	3mm Mounting Hole					
H3105	3mm Mounting Hole					
H3106	3mm Mounting Hole					
H3107	3mm Mounting Hole					
H3108	3mm Mounting Hole					
H3109	3mm Mounting Hole					
H3110	3mm Mounting Hole					
H3111	3mm Mounting Hole					
H3112	3mm Mounting Hole					
J201	+12V IN		732-3214-ND			
J202	GND IN		732-3214-ND			
J203	+12V IN AUX		CP-202BH-ND			
J204	Master Power SW					
J501	PICKIT3					
J1101	USB_B_Mini		732-2109-1-ND			
J1401	Encoder Ext					
J1601	POS5P EXT					
J1602	POS5P PGOOD					
J1603	POS5P_THWN					
J1604	POS5P_RUN					
J2901	STRING 1		ED10523-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
J2902	STRING 2		ED10523-ND			
J2903	STRING 3		ED10523-ND			
J2904	STRING 4		ED10523-ND			
J3001	USB UART					
J3002	WIFI UART					
J3003	FLASH SPI					
L301	0.47uH		541-1231-1-ND	20%		IHLP2020
L401	3.3uH		541-2567-1-ND	20%		IHLP1212
L601	600R 0.5A		732-2389-1-ND			
L602	600R 0.5A		732-2389-1-ND			
L1101	600R 0.5A		732-2389-1-ND			
L1102	600R 0.5A		732-2389-1-ND			
MK3101	4-40 Standoff		36-2204-ND			
MK3102	4-40 Standoff		36-2204-ND			
MK3103	4-40 Screw		36-9900-ND			
MK3104	4-40 Screw		36-9900-ND			
MK3105	4-40 Standoff		36-2204-ND			
MK3106	4-40 Standoff		36-2204-ND			
MK3107	4-40 Screw		36-9900-ND			
MK3108	4-40 Screw		36-9900-ND			
MK3109	4-40 Standoff		36-2204-ND			
MK3110	4-40 Standoff		36-2204-ND			
MK3111	4-40 Screw		36-9900-ND			
MK3112	4-40 Screw		36-9900-ND			
MK3113	4-40 Standoff		36-2204-ND			
MK3114	4-40 Standoff		36-2204-ND			
MK3115	4-40 Screw		36-9900-ND			
MK3116	4-40 Screw		36-9900-ND			
MK3117	4-40 Standoff		36-2204-ND			
MK3118	4-40 Standoff		36-2204-ND			
MK3119	4-40 Screw		36-9900-ND			
MK3120	4-40 Screw		36-9900-ND			
MK3121	4-40 Standoff		36-2204-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
MK3122	4-40 Standoff		36-2204-ND			
MK3123	4-40 Screw		36-9900-ND			
MK3124	4-40 Screw		36-9900-ND			
Q201	IPC100N04S51R7ATMA1		IPC100N04S51R7ATMA1CT-ND			
Q202	IPC100N04S51R7ATMA1		IPC100N04S51R7ATMA1CT-ND			
Q501	BSS214NW		BSS214NWH6327XTSA1CT-ND			
Q901	BSS214NW		BSS214NWH6327XTSA1CT-ND			
R201	6.04M		541-6.04MHCT-ND	1%		0603
R202	86.6k		311-86.6KHRCT-ND	1%		0603
R203	243k		311-243KHRCT-ND	1%		0603
R204	100k		A106046CT-ND	1%		0603
R205	10		YAG3351CT-ND	1%		0603
R206	10		YAG3351CT-ND	1%		0603
R207	10k		RMCF0603FT10K0CT-ND	1%		0603
R208	5.1k		YAG3621CT-ND	1%		0603
R301	10k		RMCF0603FT10K0CT-ND	1%		0603
R302	100k		A106046CT-ND	1%		0603
R303	22.1k		P22.1KHCT-ND	1%		0603
R304	10		YAG3351CT-ND	1%		0603
R305	63.4k		541-63.4KHCT-ND	1%		0603
R306	13.3k		P13.3KHCT-ND	1%		0603
R307	100k		A106046CT-ND	1%		0603
R308	22.1k		P22.1KHCT-ND	1%		0603
R401	10k		RMCF0603FT10K0CT-ND	1%		0603
R402	10k		RMCF0603FT10K0CT-ND	1%		0603
R403	10k		RMCF0603FT10K0CT-ND	1%		0603
R404	10k		RMCF0603FT10K0CT-ND	1%		0603
R405	100k		A106046CT-ND	1%		0603
R406	13.7k		P13.7KHCT-ND	1%		0603
R501	10		YAG3351CT-ND	1%		0603
R502	10k		RMCF0603FT10K0CT-ND	1%		0603
R503	100		A106047CT-ND	1%		0603
R504	10k		RMCF0603FT10K0CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R505	0		311-0.0GRCT-ND	1%		0603
R506	1k		RMCF0603FT1K00CT-ND	1%		0603
R901	100		A106047CT-ND	1%		0603
R902	10k		RMCF0603FT10K0CT-ND	1%		0603
R903	10k		RMCF0603FT10K0CT-ND	1%		0603
R904	10k		RMCF0603FT10K0CT-ND	1%		0603
R905	10k		RMCF0603FT10K0CT-ND	1%		0603
R906	100		A106047CT-ND	1%		0603
R907	10k		RMCF0603FT10K0CT-ND	1%		0603
R908	10		YAG3351CT-ND	1%		0603
R909	100		A106047CT-ND	1%		0603
R910	10k		RMCF0603FT10K0CT-ND	1%		0603
R911	10k		RMCF0603FT10K0CT-ND	1%		0603
R912	0		311-0.0GRCT-ND	1%		0603
R913	1k		RMCF0603FT1K00CT-ND	1%		0603
R1001	100		A106047CT-ND	1%		0603
R1002	100		A106047CT-ND	1%		0603
R1003	10k		RMCF0603FT10K0CT-ND	1%		0603
R1004	10k		RMCF0603FT10K0CT-ND	1%		0603
R1005	10k		RMCF0603FT10K0CT-ND	1%		0603
R1006	10k		RMCF0603FT10K0CT-ND	1%		0603
R1007	100		A106047CT-ND	1%		0603
R1008	100		A106047CT-ND	1%		0603
R1101	10k		RMCF0603FT10K0CT-ND	1%		0603
R1102	487k		311-487KHRCT-ND	1%		0603
R1103	6.04k		RMCF0603FT6K04CT-ND	1%		0603
R1104	40.2k		311-40.2KHRCT-ND	1%		0603
R1105	10k		RMCF0603FT10K0CT-ND	1%		0603
R1106	1k		RMCF0603FT1K00CT-ND	1%		0603
R1107	27		RMCF0603FT27R0CT-ND	1%		0603
R1108	27		RMCF0603FT27R0CT-ND	1%		0603
R1109	1k		RMCF0603FT1K00CT-ND	1%		0603
R1201	10k		RMCF0603FT10K0CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R1202	10k		RMCF0603FT10K0CT-ND	1%		0603
R1203	1k		RMCF0603FT1K00CT-ND	1%		0603
R1204	1k		RMCF0603FT1K00CT-ND	1%		0603
R1205	10k		RMCF0603FT10K0CT-ND	1%		0603
R1206	10k		RMCF0603FT10K0CT-ND	1%		0603
R1207	1k		RMCF0603FT1K00CT-ND	1%		0603
R1208	1k		RMCF0603FT1K00CT-ND	1%		0603
R1209	10k		RMCF0603FT10K0CT-ND	1%		0603
R1210	10k		RMCF0603FT10K0CT-ND	1%		0603
R1211	1k		RMCF0603FT1K00CT-ND	1%		0603
R1212	1k		RMCF0603FT1K00CT-ND	1%		0603
R1213	10k		RMCF0603FT10K0CT-ND	1%		0603
R1214	1k		RMCF0603FT1K00CT-ND	1%		0603
R1215	10k		RMCF0603FT10K0CT-ND	1%		0603
R1216	1k		RMCF0603FT1K00CT-ND	1%		0603
R1217	10k		RMCF0603FT10K0CT-ND	1%		0603
R1218	1k		RMCF0603FT1K00CT-ND	1%		0603
R1219	10k		RMCF0603FT10K0CT-ND	1%		0603
R1220	1k		RMCF0603FT1K00CT-ND	1%		0603
R1221	10k		RMCF0603FT10K0CT-ND	1%		0603
R1222	10k		RMCF0603FT10K0CT-ND	1%		0603
R1223	1k		RMCF0603FT1K00CT-ND	1%		0603
R1224	0		311-0.0GRCT-ND	1%		0603
R1225	0		311-0.0GRCT-ND	1%		0603
R1226	0		311-0.0GRCT-ND	1%		0603
R1227	10k		RMCF0603FT10K0CT-ND	1%		0603
R1228	10k		RMCF0603FT10K0CT-ND	1%		0603
R1229	1k		RMCF0603FT1K00CT-ND	1%		0603
R1230	1k		RMCF0603FT1K00CT-ND	1%		0603
R1231	10k		RMCF0603FT10K0CT-ND	1%		0603
R1301	1k		RMCF0603FT1K00CT-ND	1%		0603
R1302	1k		RMCF0603FT1K00CT-ND	1%		0603
R1303	1k		RMCF0603FT1K00CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R1304	1k		RMCF0603FT1K00CT-ND	1%		0603
R1401	10k		RMCF0603FT10K0CT-ND	1%		0603
R1402	10k		RMCF0603FT10K0CT-ND	1%		0603
R1403	1k		RMCF0603FT1K00CT-ND	1%		0603
R1404	1k		RMCF0603FT1K00CT-ND	1%		0603
R1405	10k		RMCF0603FT10K0CT-ND	1%		0603
R1406	10k		RMCF0603FT10K0CT-ND	1%		0603
R1407	10k		RMCF0603FT10K0CT-ND	1%		0603
R1408	10k		RMCF0603FT10K0CT-ND	1%		0603
R1501	10k		RMCF0603FT10K0CT-ND	1%		0603
R1502	10k		RMCF0603FT10K0CT-ND	1%		0603
R1503	10k		RMCF0603FT10K0CT-ND	1%		0603
R1504	10k		RMCF0603FT10K0CT-ND	1%		0603
R1505	10k		RMCF0603FT10K0CT-ND	1%		0603
R1506	10k		RMCF0603FT10K0CT-ND	1%		0603
R1507	10k		RMCF0603FT10K0CT-ND	1%		0603
R1508	10k		RMCF0603FT10K0CT-ND	1%		0603
R1509	10k		RMCF0603FT10K0CT-ND	1%		0603
R1510	1k		RMCF0603FT1K00CT-ND	1%		0603
R1601	200		P200HCT-ND	1%		0603
R1602	680		P680HCT-ND	1%		0603
R1603	1k		RMCF0603FT1K00CT-ND	1%		0603
R1604	1k		RMCF0603FT1K00CT-ND	1%		0603
R1605	10k		RMCF0603FT10K0CT-ND	1%		0603
R1606	10k		RMCF0603FT10K0CT-ND	1%		0603
R1607	10k		RMCF0603FT10K0CT-ND	1%		0603
R1608	10k		RMCF0603FT10K0CT-ND	1%		0603
R1609	10k		RMCF0603FT10K0CT-ND	1%		0603
R1610	10k		RMCF0603FT10K0CT-ND	1%		0603
R1801	100		A106047CT-ND	1%		0603
R1802	100		A106047CT-ND	1%		0603
R1803	100		A106047CT-ND	1%		0603
R1804	100		A106047CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R1805	100		A106047CT-ND	1%		0603
R1806	10k		RMCF0603FT10K0CT-ND	1%		0603
R1807	10k		RMCF0603FT10K0CT-ND	1%		0603
R1808	10k		RMCF0603FT10K0CT-ND	1%		0603
R1809	10k		RMCF0603FT10K0CT-ND	1%		0603
R1810	10k		RMCF0603FT10K0CT-ND	1%		0603
R1811	10k		RMCF0603FT10K0CT-ND	1%		0603
R1812	100		A106047CT-ND	1%		0603
R1813	1k		RMCF0603FT1K00CT-ND	1%		0603
R1901	100		A106047CT-ND	1%		0603
R1902	100		A106047CT-ND	1%		0603
R1903	100		A106047CT-ND	1%		0603
R1904	100		A106047CT-ND	1%		0603
R1905	100		A106047CT-ND	1%		0603
R1906	10k		RMCF0603FT10K0CT-ND	1%		0603
R1907	10k		RMCF0603FT10K0CT-ND	1%		0603
R1908	10k		RMCF0603FT10K0CT-ND	1%		0603
R1909	10k		RMCF0603FT10K0CT-ND	1%		0603
R1910	10k		RMCF0603FT10K0CT-ND	1%		0603
R1911	10k		RMCF0603FT10K0CT-ND	1%		0603
R1912	100		A106047CT-ND	1%		0603
R1913	1k		RMCF0603FT1K00CT-ND	1%		0603
R2001	100		A106047CT-ND	1%		0603
R2002	100		A106047CT-ND	1%		0603
R2003	100		A106047CT-ND	1%		0603
R2004	100		A106047CT-ND	1%		0603
R2005	100		A106047CT-ND	1%		0603
R2006	10k		RMCF0603FT10K0CT-ND	1%		0603
R2007	10k		RMCF0603FT10K0CT-ND	1%		0603
R2008	10k		RMCF0603FT10K0CT-ND	1%		0603
R2009	10k		RMCF0603FT10K0CT-ND	1%		0603
R2010	10k		RMCF0603FT10K0CT-ND	1%		0603
R2011	10k		RMCF0603FT10K0CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2012	100		A106047CT-ND	1%		0603
R2013	1k		RMCF0603FT1K00CT-ND	1%		0603
R2101	100		A106047CT-ND	1%		0603
R2102	100		A106047CT-ND	1%		0603
R2103	100		A106047CT-ND	1%		0603
R2104	100		A106047CT-ND	1%		0603
R2105	100		A106047CT-ND	1%		0603
R2106	10k		RMCF0603FT10K0CT-ND	1%		0603
R2107	10k		RMCF0603FT10K0CT-ND	1%		0603
R2108	10k		RMCF0603FT10K0CT-ND	1%		0603
R2109	10k		RMCF0603FT10K0CT-ND	1%		0603
R2110	10k		RMCF0603FT10K0CT-ND	1%		0603
R2111	10k		RMCF0603FT10K0CT-ND	1%		0603
R2112	100		A106047CT-ND	1%		0603
R2113	1k		RMCF0603FT1K00CT-ND	1%		0603
R2201	100		A106047CT-ND	1%		0603
R2202	100		A106047CT-ND	1%		0603
R2203	100		A106047CT-ND	1%		0603
R2204	100		A106047CT-ND	1%		0603
R2205	100		A106047CT-ND	1%		0603
R2206	10k		RMCF0603FT10K0CT-ND	1%		0603
R2207	10k		RMCF0603FT10K0CT-ND	1%		0603
R2208	10k		RMCF0603FT10K0CT-ND	1%		0603
R2209	10k		RMCF0603FT10K0CT-ND	1%		0603
R2210	10k		RMCF0603FT10K0CT-ND	1%		0603
R2211	10k		RMCF0603FT10K0CT-ND	1%		0603
R2212	100		A106047CT-ND	1%		0603
R2213	1k		RMCF0603FT1K00CT-ND	1%		0603
R2301	100		A106047CT-ND	1%		0603
R2302	100		A106047CT-ND	1%		0603
R2303	100		A106047CT-ND	1%		0603
R2304	100		A106047CT-ND	1%		0603
R2305	100		A106047CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2306	10k		RMCF0603FT10K0CT-ND	1%		0603
R2307	10k		RMCF0603FT10K0CT-ND	1%		0603
R2308	10k		RMCF0603FT10K0CT-ND	1%		0603
R2309	10k		RMCF0603FT10K0CT-ND	1%		0603
R2310	10k		RMCF0603FT10K0CT-ND	1%		0603
R2311	10k		RMCF0603FT10K0CT-ND	1%		0603
R2312	100		A106047CT-ND	1%		0603
R2313	1k		RMCF0603FT1K00CT-ND	1%		0603
R2401	100		A106047CT-ND	1%		0603
R2402	100		A106047CT-ND	1%		0603
R2403	100		A106047CT-ND	1%		0603
R2404	100		A106047CT-ND	1%		0603
R2405	100		A106047CT-ND	1%		0603
R2406	10k		RMCF0603FT10K0CT-ND	1%		0603
R2407	10k		RMCF0603FT10K0CT-ND	1%		0603
R2408	10k		RMCF0603FT10K0CT-ND	1%		0603
R2409	10k		RMCF0603FT10K0CT-ND	1%		0603
R2410	10k		RMCF0603FT10K0CT-ND	1%		0603
R2411	10k		RMCF0603FT10K0CT-ND	1%		0603
R2412	100		A106047CT-ND	1%		0603
R2413	1k		RMCF0603FT1K00CT-ND	1%		0603
R2501	100		A106047CT-ND	1%		0603
R2502	100		A106047CT-ND	1%		0603
R2503	100		A106047CT-ND	1%		0603
R2504	100		A106047CT-ND	1%		0603
R2505	100		A106047CT-ND	1%		0603
R2506	10k		RMCF0603FT10K0CT-ND	1%		0603
R2507	10k		RMCF0603FT10K0CT-ND	1%		0603
R2508	10k		RMCF0603FT10K0CT-ND	1%		0603
R2509	10k		RMCF0603FT10K0CT-ND	1%		0603
R2510	10k		RMCF0603FT10K0CT-ND	1%		0603
R2511	10k		RMCF0603FT10K0CT-ND	1%		0603
R2512	100		A106047CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2513	1k		RMCF0603FT1K00CT-ND	1%		0603
R2601	100		A106047CT-ND	1%		0603
R2602	100		A106047CT-ND	1%		0603
R2603	100		A106047CT-ND	1%		0603
R2604	100		A106047CT-ND	1%		0603
R2605	100		A106047CT-ND	1%		0603
R2606	100		A106047CT-ND	1%		0603
R2607	100		A106047CT-ND	1%		0603
R2608	100		A106047CT-ND	1%		0603
R2609	100		A106047CT-ND	1%		0603
R2610	100		A106047CT-ND	1%		0603
R2611	100		A106047CT-ND	1%		0603
R2612	100		A106047CT-ND	1%		0603
R2613	10K		RMCF0603FT10K0CT-ND	1%		0603
R2614	10K		RMCF0603FT10K0CT-ND	1%		0603
R2615	10K		RMCF0603FT10K0CT-ND	1%		0603
R2616	10K		RMCF0603FT10K0CT-ND	1%		0603
R2617	10K		RMCF0603FT10K0CT-ND	1%		0603
R2618	10K		RMCF0603FT10K0CT-ND	1%		0603
R2619	10K		RMCF0603FT10K0CT-ND	1%		0603
R2620	10K		RMCF0603FT10K0CT-ND	1%		0603
R2621	10K		RMCF0603FT10K0CT-ND	1%		0603
R2622	10K		RMCF0603FT10K0CT-ND	1%		0603
R2623	10K		RMCF0603FT10K0CT-ND	1%		0603
R2624	10K		RMCF0603FT10K0CT-ND	1%		0603
R2625	10K		RMCF0603FT10K0CT-ND	1%		0603
R2626	10K		RMCF0603FT10K0CT-ND	1%		0603
R2627	10K		RMCF0603FT10K0CT-ND	1%		0603
R2628	10K		RMCF0603FT10K0CT-ND	1%		0603
R2629	10K		RMCF0603FT10K0CT-ND	1%		0603
R2630	10K		RMCF0603FT10K0CT-ND	1%		0603
R2631	10K		RMCF0603FT10K0CT-ND	1%		0603
R2632	10K		RMCF0603FT10K0CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2633	10K		RMCF0603FT10K0CT-ND	1%		0603
R2634	10K		RMCF0603FT10K0CT-ND	1%		0603
R2635	10K		RMCF0603FT10K0CT-ND	1%		0603
R2636	10K		RMCF0603FT10K0CT-ND	1%		0603
R2637	10K		RMCF0603FT10K0CT-ND	1%		0603
R2638	10K		RMCF0603FT10K0CT-ND	1%		0603
R2639	10K		RMCF0603FT10K0CT-ND	1%		0603
R2640	10K		RMCF0603FT10K0CT-ND	1%		0603
R2641	10K		RMCF0603FT10K0CT-ND	1%		0603
R2642	10K		RMCF0603FT10K0CT-ND	1%		0603
R2643	100		A106047CT-ND	1%		0603
R2644	100		A106047CT-ND	1%		0603
R2645	100		A106047CT-ND	1%		0603
R2646	100		A106047CT-ND	1%		0603
R2647	100		A106047CT-ND	1%		0603
R2648	100		A106047CT-ND	1%		0603
R2649	100		A106047CT-ND	1%		0603
R2650	100		A106047CT-ND	1%		0603
R2651	100		A106047CT-ND	1%		0603
R2652	100		A106047CT-ND	1%		0603
R2653	100		A106047CT-ND	1%		0603
R2654	100		A106047CT-ND	1%		0603
R2701	100		A106047CT-ND	1%		0603
R2702	100		A106047CT-ND	1%		0603
R2703	100		A106047CT-ND	1%		0603
R2704	100		A106047CT-ND	1%		0603
R2705	100		A106047CT-ND	1%		0603
R2706	100		A106047CT-ND	1%		0603
R2707	100		A106047CT-ND	1%		0603
R2708	100		A106047CT-ND	1%		0603
R2709	100		A106047CT-ND	1%		0603
R2710	100		A106047CT-ND	1%		0603
R2711	100		A106047CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2712	100		A106047CT-ND	1%		0603
R2713	10K		RMCF0603FT10K0CT-ND	1%		0603
R2714	10K		RMCF0603FT10K0CT-ND	1%		0603
R2715	10K		RMCF0603FT10K0CT-ND	1%		0603
R2716	10K		RMCF0603FT10K0CT-ND	1%		0603
R2717	10K		RMCF0603FT10K0CT-ND	1%		0603
R2718	10K		RMCF0603FT10K0CT-ND	1%		0603
R2719	10K		RMCF0603FT10K0CT-ND	1%		0603
R2720	10K		RMCF0603FT10K0CT-ND	1%		0603
R2721	10K		RMCF0603FT10K0CT-ND	1%		0603
R2722	10K		RMCF0603FT10K0CT-ND	1%		0603
R2723	10K		RMCF0603FT10K0CT-ND	1%		0603
R2724	10K		RMCF0603FT10K0CT-ND	1%		0603
R2725	10K		RMCF0603FT10K0CT-ND	1%		0603
R2726	10K		RMCF0603FT10K0CT-ND	1%		0603
R2727	10K		RMCF0603FT10K0CT-ND	1%		0603
R2728	10K		RMCF0603FT10K0CT-ND	1%		0603
R2729	10K		RMCF0603FT10K0CT-ND	1%		0603
R2730	10K		RMCF0603FT10K0CT-ND	1%		0603
R2731	10K		RMCF0603FT10K0CT-ND	1%		0603
R2732	10K		RMCF0603FT10K0CT-ND	1%		0603
R2733	10K		RMCF0603FT10K0CT-ND	1%		0603
R2734	10K		RMCF0603FT10K0CT-ND	1%		0603
R2735	10K		RMCF0603FT10K0CT-ND	1%		0603
R2736	10K		RMCF0603FT10K0CT-ND	1%		0603
R2737	10K		RMCF0603FT10K0CT-ND	1%		0603
R2738	10K		RMCF0603FT10K0CT-ND	1%		0603
R2739	10K		RMCF0603FT10K0CT-ND	1%		0603
R2740	10K		RMCF0603FT10K0CT-ND	1%		0603
R2741	10K		RMCF0603FT10K0CT-ND	1%		0603
R2742	10K		RMCF0603FT10K0CT-ND	1%		0603
R2743	100		A106047CT-ND	1%		0603
R2744	100		A106047CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2745	100		A106047CT-ND	1%		0603
R2746	100		A106047CT-ND	1%		0603
R2747	100		A106047CT-ND	1%		0603
R2748	100		A106047CT-ND	1%		0603
R2749	100		A106047CT-ND	1%		0603
R2750	100		A106047CT-ND	1%		0603
R2751	100		A106047CT-ND	1%		0603
R2752	100		A106047CT-ND	1%		0603
R2753	100		A106047CT-ND	1%		0603
R2754	100		A106047CT-ND	1%		0603
R2801	100		A106047CT-ND	1%		0603
R2802	100		A106047CT-ND	1%		0603
R2803	10k		RMCF0603FT10K0CT-ND	1%		0603
R2804	10k		RMCF0603FT10K0CT-ND	1%		0603
R2805	100		A106047CT-ND	1%		0603
R2806	100		A106047CT-ND	1%		0603
R2807	100		A106047CT-ND	1%		0603
R2808	100		A106047CT-ND	1%		0603
R2809	100		A106047CT-ND	1%		0603
R2810	100		A106047CT-ND	1%		0603
R2811	100		A106047CT-ND	1%		0603
R2812	100		A106047CT-ND	1%		0603
R2813	10K		RMCF0603FT10K0CT-ND	1%		0603
R2814	10K		RMCF0603FT10K0CT-ND	1%		0603
R2815	10K		RMCF0603FT10K0CT-ND	1%		0603
R2816	10K		RMCF0603FT10K0CT-ND	1%		0603
R2817	10K		RMCF0603FT10K0CT-ND	1%		0603
R2818	10K		RMCF0603FT10K0CT-ND	1%		0603
R2819	10K		RMCF0603FT10K0CT-ND	1%		0603
R2820	10K		RMCF0603FT10K0CT-ND	1%		0603
R2821	10K		RMCF0603FT10K0CT-ND	1%		0603
R2822	10K		RMCF0603FT10K0CT-ND	1%		0603
R2823	10K		RMCF0603FT10K0CT-ND	1%		0603

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
R2824	10K		RMCF0603FT10K0CT-ND	1%		0603
R2825	10K		RMCF0603FT10K0CT-ND	1%		0603
R2826	10K		RMCF0603FT10K0CT-ND	1%		0603
R2827	10K		RMCF0603FT10K0CT-ND	1%		0603
R2828	10K		RMCF0603FT10K0CT-ND	1%		0603
R2829	10K		RMCF0603FT10K0CT-ND	1%		0603
R2830	100		A106047CT-ND	1%		0603
R2831	100		A106047CT-ND	1%		0603
R2832	100		A106047CT-ND	1%		0603
R2833	100		A106047CT-ND	1%		0603
R2834	100		A106047CT-ND	1%		0603
R2835	100		A106047CT-ND	1%		0603
R2836	100		A106047CT-ND	1%		0603
R2837	100		A106047CT-ND	1%		0603
SW501	MRST					
SW1401	Display Enable					
SW1402	Brightness/Enable		102-1753-ND			
U201	LTC4365DDB		LTC4365IDDB#TRMPBFCT-ND			
U301	LTC3605A_UF		LTC3605AIUF#TRPBFCT-ND			
U401	LTC3624DD		LTC3624IDD#PBF-ND			
U601	PIC32MZ2048EFH144_IPL		PIC32MZ2048EFH144-I/PL-ND			
U901	ESP8266 Socket					
U902	74LVC1G00		296-9846-1-ND			
U903	74LVC1G86		296-9854-1-ND			
U1001	ISO7321C		296-42102-1-ND			
U1101	LT6700-1-S6		LT6700CS6-1#TRMPBFCT-ND			
U1102	FT234XD		768-1178-1-ND			
U1103	74LVC1G06		296-8484-1-ND			
U1104	TPD3S014DBVR		296-38835-1-ND			
U1201	74LVC1G06		296-8484-1-ND			
U1202	74LVC1G06		296-8484-1-ND			
U1203	74LVC1G06		296-8484-1-ND			
U1204	74LVC1G06		296-8484-1-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
U1205	74LVC1G06		296-8484-1-ND			
U1206	74LVC1G06		296-8484-1-ND			
U1207	74LVC1G06		296-8484-1-ND			
U1208	74LVC1G06		296-8484-1-ND			
U1209	74LVC1G06		296-8484-1-ND			
U1210	74LVC1G06		296-8484-1-ND			
U1211	74LVC1G06		296-8484-1-ND			
U1212	4040		296-12761-1-ND			
U1213	74LVC1G06		296-8484-1-ND			
U1214	74LVC1G06		296-8484-1-ND			
U1301	74LVC1G06		296-8484-1-ND			
U1302	74LVC1G06		296-8484-1-ND			
U1303	74LVC1G06		296-8484-1-ND			
U1304	74LVC1G06		296-8484-1-ND			
U1401	MAX6816		MAX6816EUS+TCT-ND			
U1402	74LVC2G14		296-13011-1-ND			
U1403	74LVC1G79		296-9850-1-ND			
U1601	LM1117-ADJ		LM1117IMPX-ADJ/NOPBCT-ND			
U1602	NUP2202		NUP2202W1T2GOSCT-ND			
U1603	74LVC1G17		296-11934-1-ND			
U1604	74LVC1G17		296-11934-1-ND			
U1605	74LVC1G17		296-11934-1-ND			
U1606	NUP2202		NUP2202W1T2GOSCT-ND			
U1701	CY7C1010DV33		428-1960-ND			
U1801	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U1802	74LVC1G07		296-8486-1-ND			
U1901	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U1902	74LVC1G07		296-8486-1-ND			
U2001	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U2002	74LVC1G07		296-8486-1-ND			
U2101	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U2102	74LVC1G07		296-8486-1-ND			
U2201	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			

Reference	Value	Dielectric	Digi-Key PN	Tolerance	Voltage	Footprint
U2202	74LVC1G07		296-8486-1-ND			
U2301	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U2302	74LVC1G07		296-8486-1-ND			
U2401	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U2402	74LVC1G07		296-8486-1-ND			
U2501	SST25PF020B		SST25PF020B-80-4C-SAE-TCT-ND			
U2502	74LVC1G07		296-8486-1-ND			
U2601	74HCT541		296-26499-1-ND			
U2602	74HCT541		296-26499-1-ND			
U2701	74HCT541		296-26499-1-ND			
U2702	74HCT541		296-26499-1-ND			
U2801	74LVC1G32		296-9848-1-ND			
U2802	74HCT541		296-26499-1-ND			