01. Table of Contents

Electronic Display Logic Board

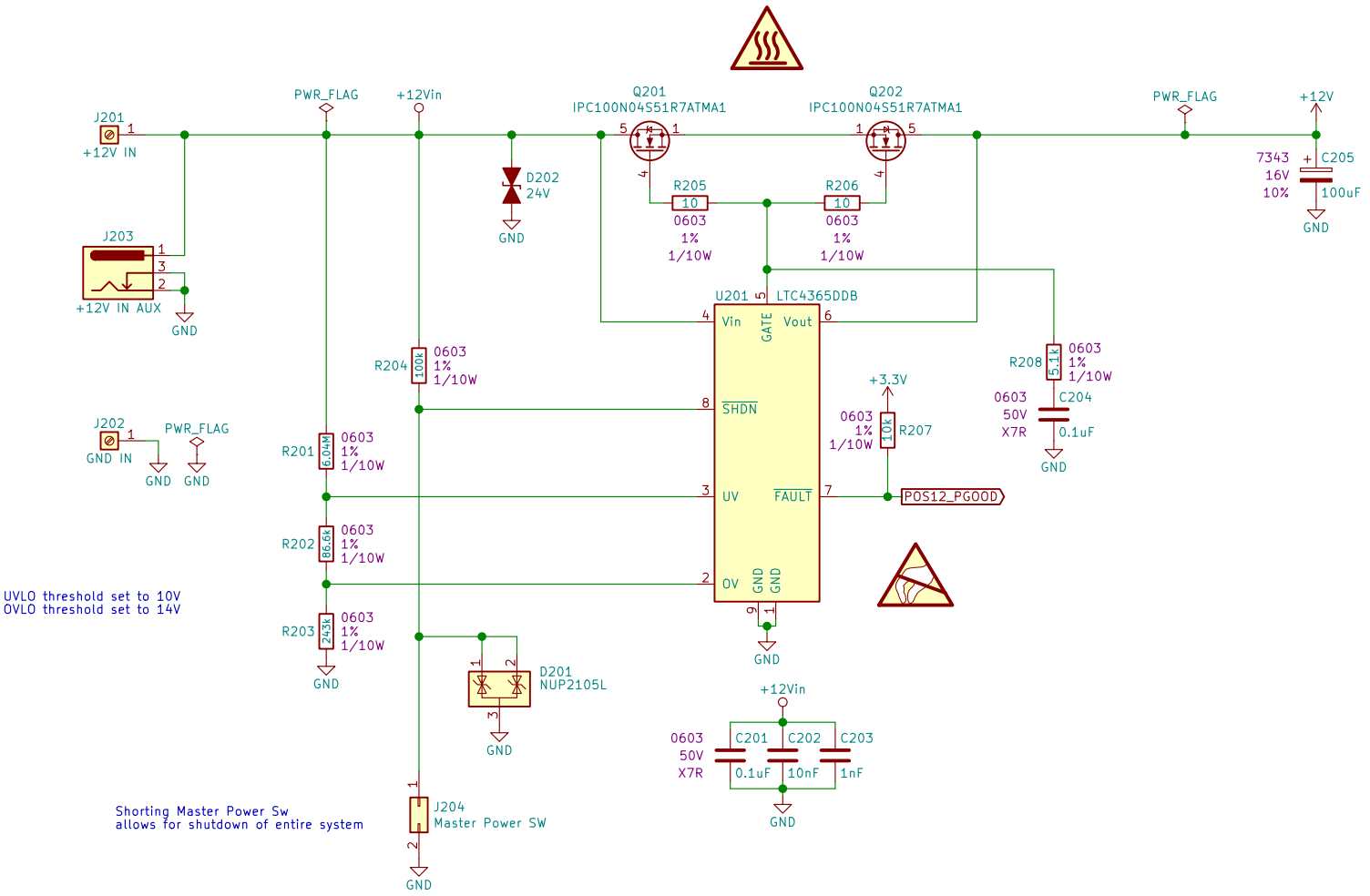
Marquette Universiy Senior Design 2018, Group E44

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

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		
Sheet: /		
File: LED_Display_Controller.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 1/32

02. Power Input



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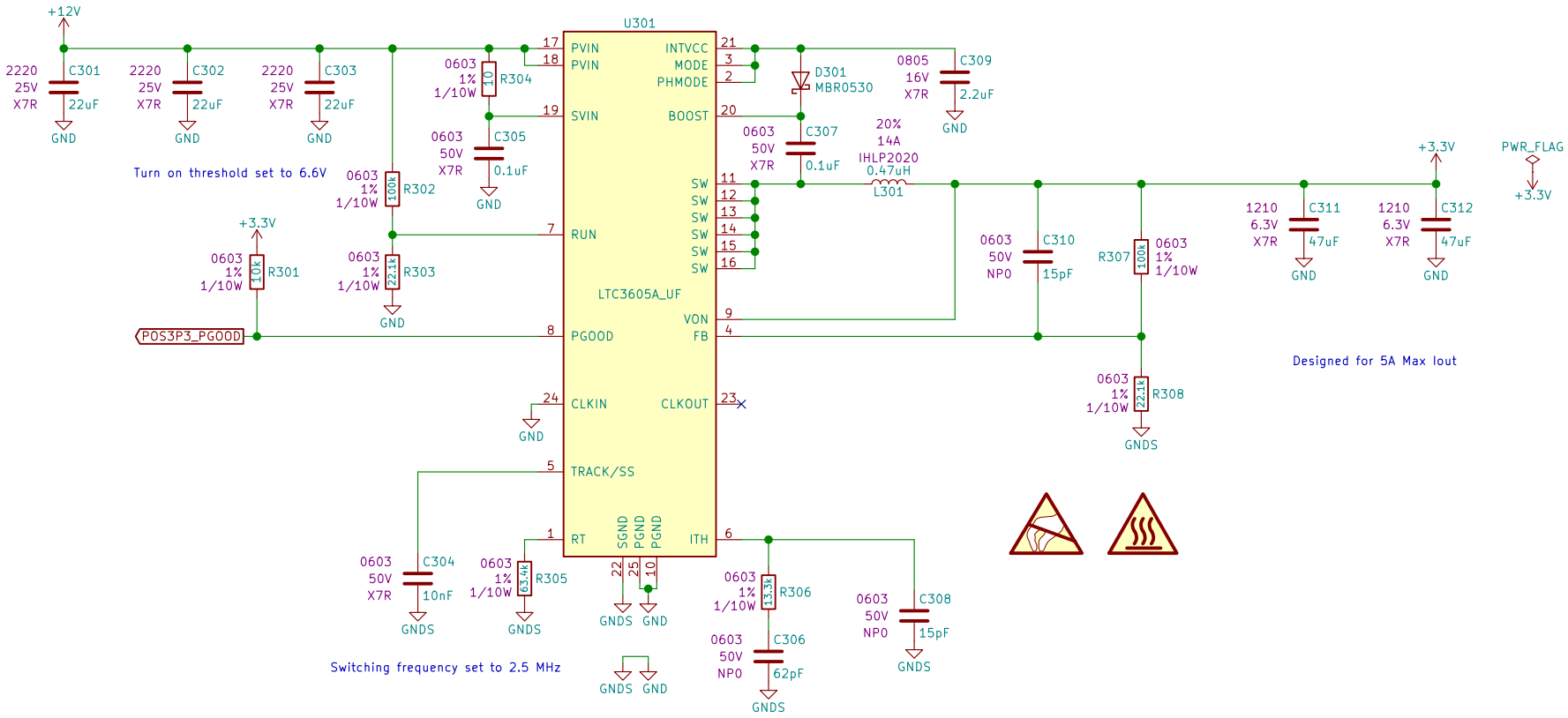
Sheet: /Power Input/

File: Power_Input.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 2/32

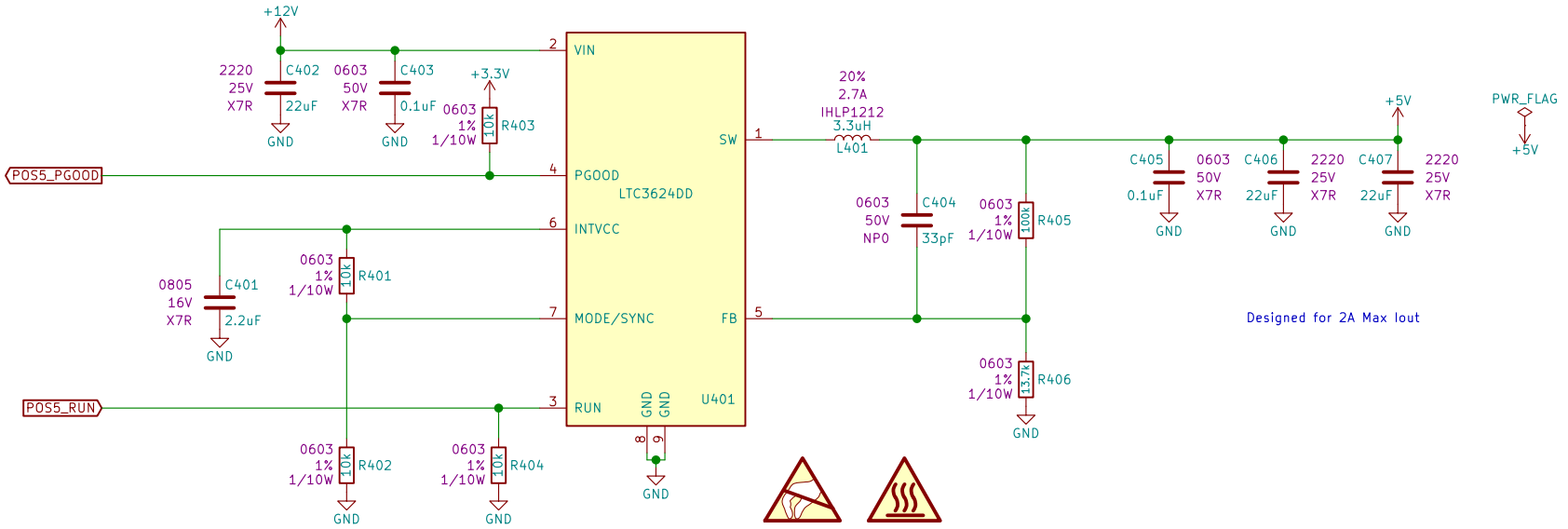
03. +3.3V Power Supply



Switching frequency set to 2.5 MHz

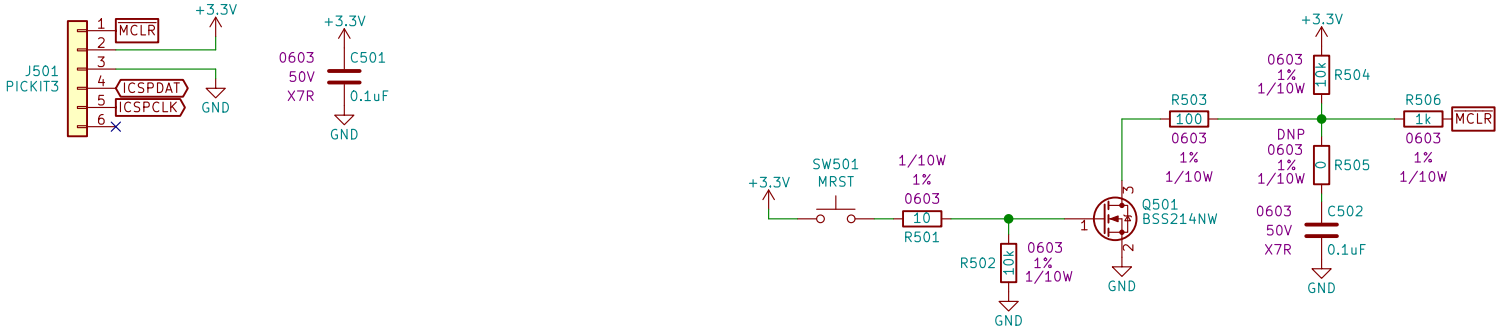
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /POS3P3 Power Supply/		
File: POS3P3_Power_Supply.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 3/32

04. +5V Power Supply



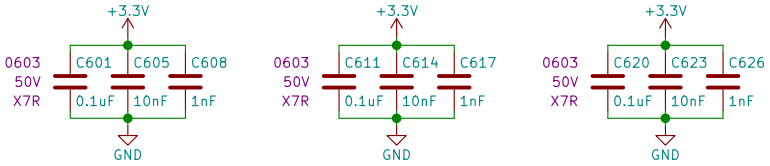
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /POS5 Power Supply/		
File: POS5_Power_Supply.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 4/32

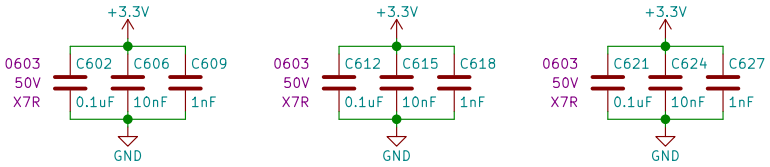
05. Microcontroller Programming

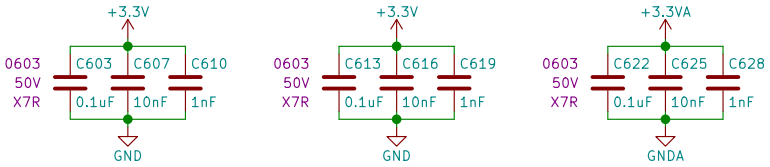


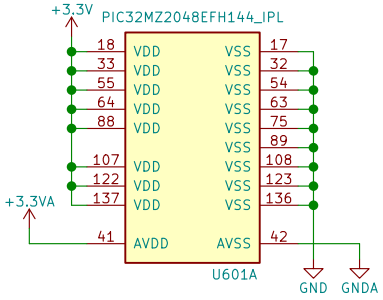
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Microcontroller Programming/		
File: Microcontroller_Programming.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 5/32

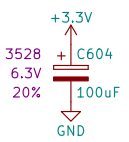
06. Microcontroller Power

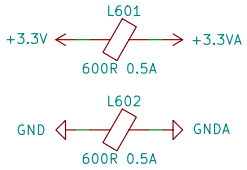












Marquette University Senior Design 2018/2019 Group E44

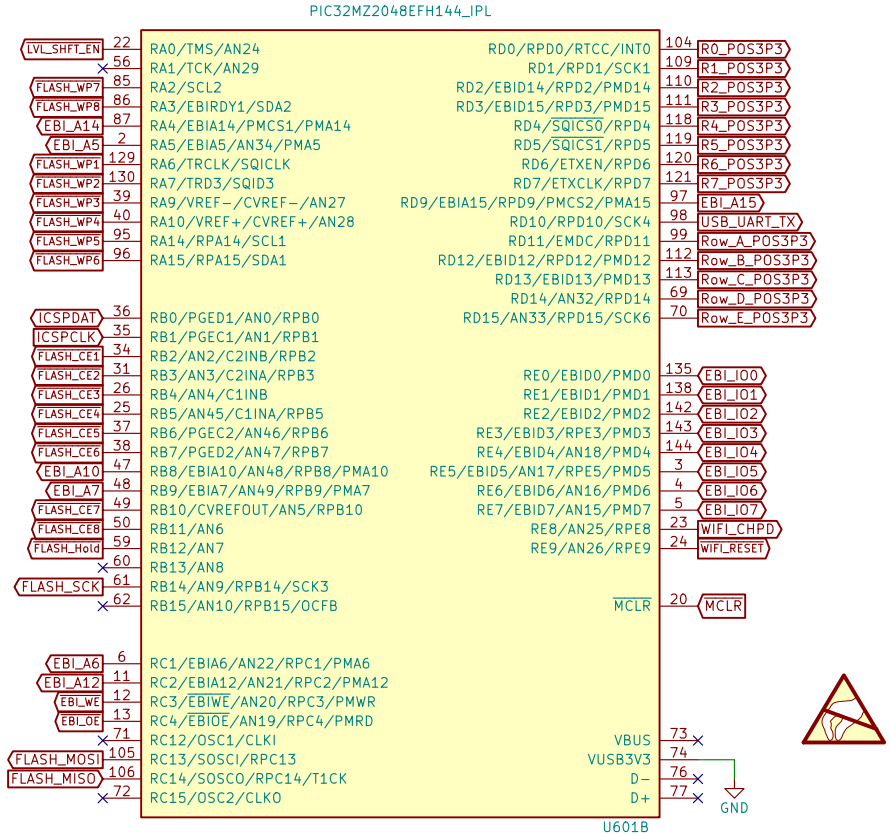
Sheet: /Microcontroller Power/

File: Microcontroller_Power.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 6/32

07. Microcontroller IO Bank 1



Row A is Least Significant Bit

Marquette University Senior Design 2018/2019 Group E44

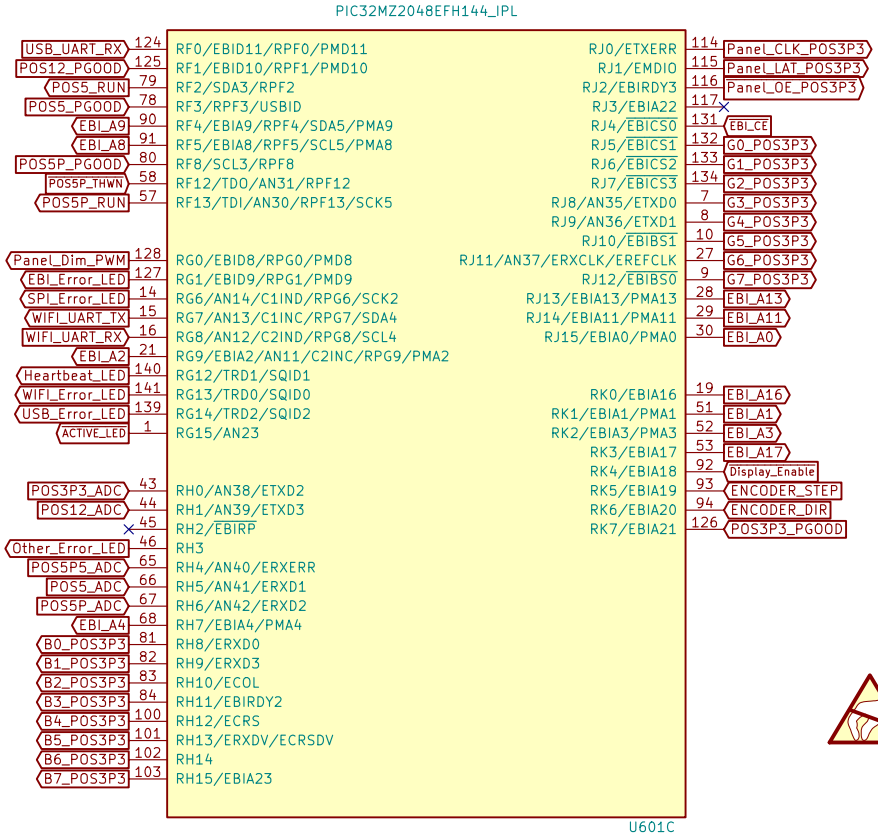
Sheet: /Microcontroller 1/

File: Microcontroller_1.sch

Title: Electronic Display Logic Board

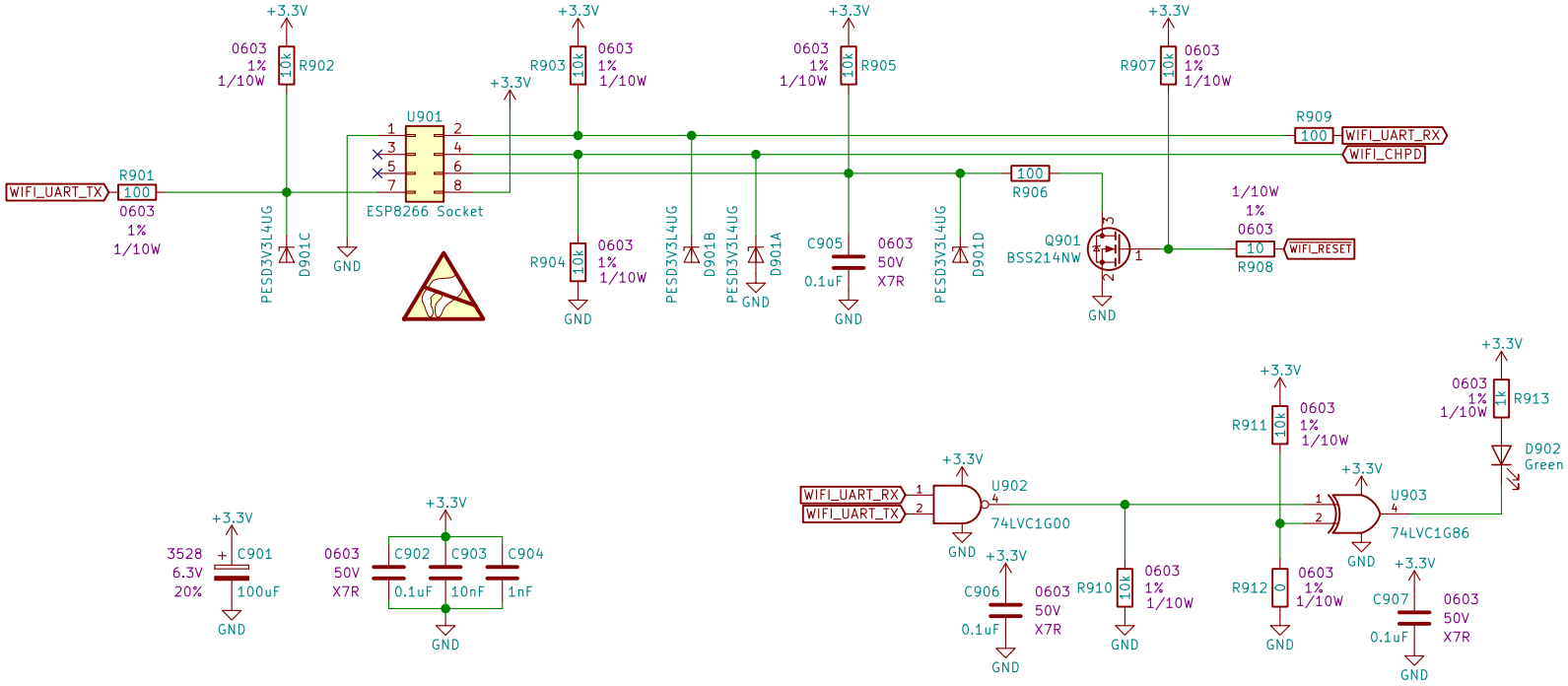
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 7/32

08. Microcontroller IO Bank 2



Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Microcontroller 2/		
File: Microcontroller_2.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 8/32

09. WiFi Module



Marquette University Senior Design 2018/2019 Group E44

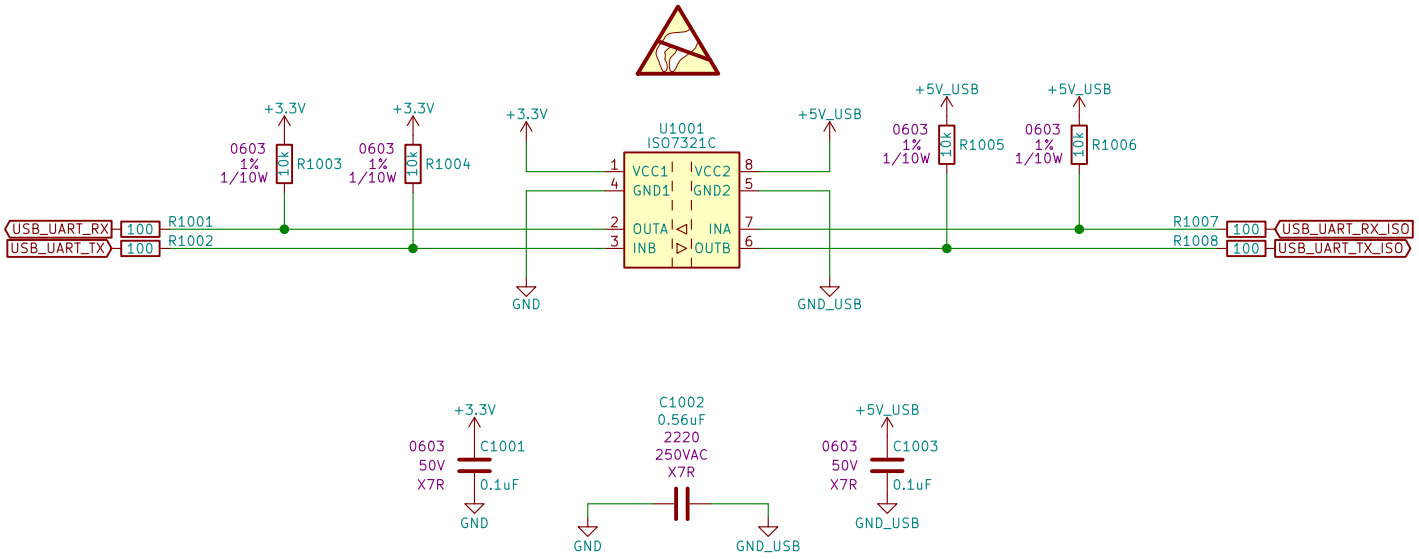
Sheet: /WiFi Module/

File: Wi_Fi_Module.sch

Title: Electronic Display Logic Board

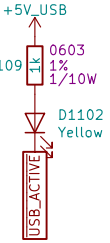
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 9/32

10. USB UART Digital Isolation



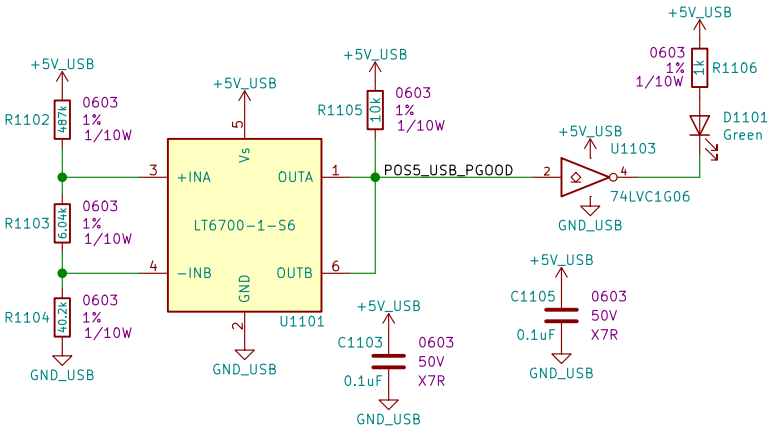
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /USB UART Isolation/		
File: USB_UART_Isolation.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 10/32

11. USB UART Bridge



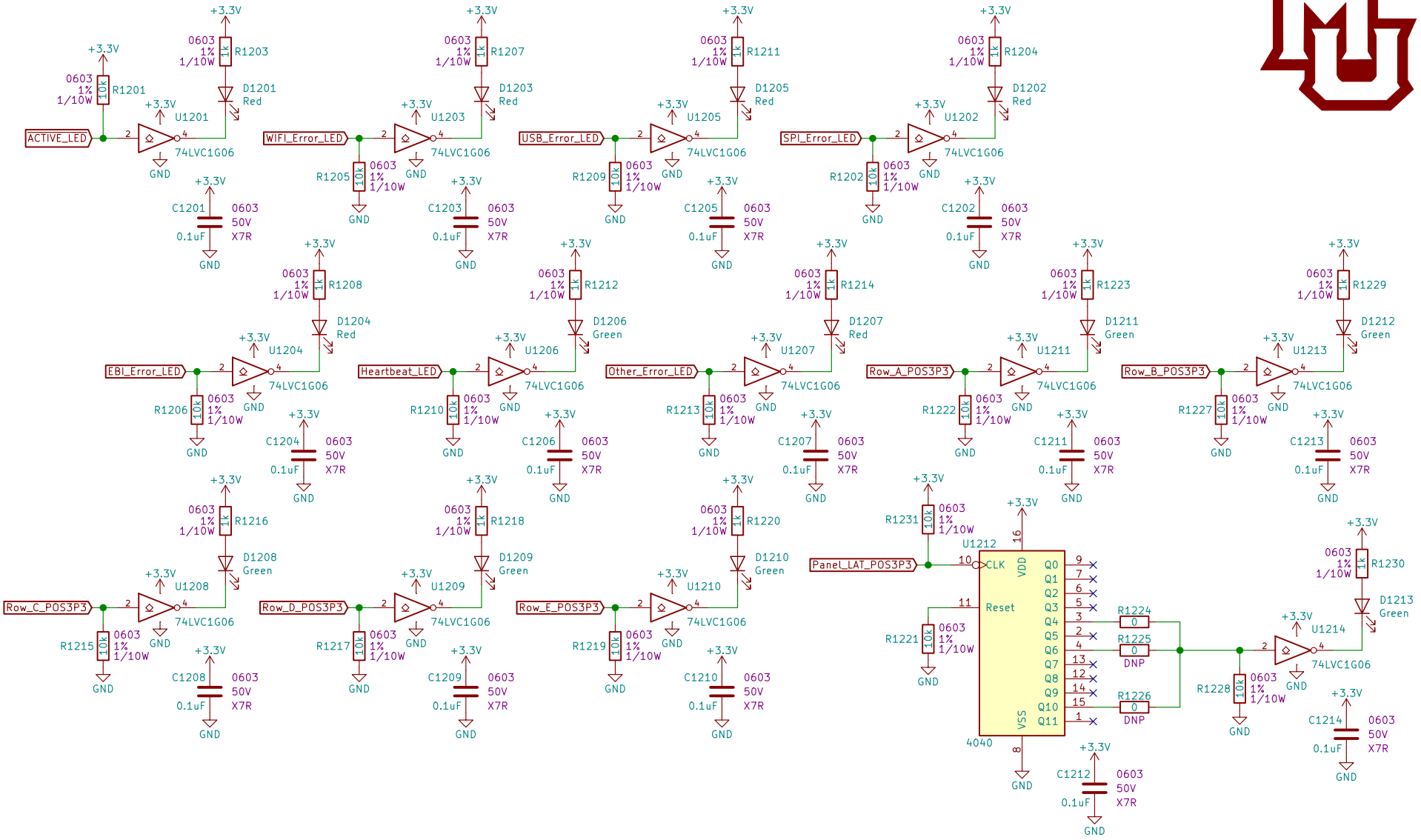
USB Virtual COM Port Settings:

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



Marquette University Senior Design 2018/2019 Group E44	
Sheet: /USB UART Bridge/	
File: USB_UART_Bridge.sch	
Title: Electronic Display Logic Board	
Size: A	Date: 2018-12-15
KiCad E.D.A. kicad (5.0.2)-1	Id: 11/32

12. Status LEDs Bank 1



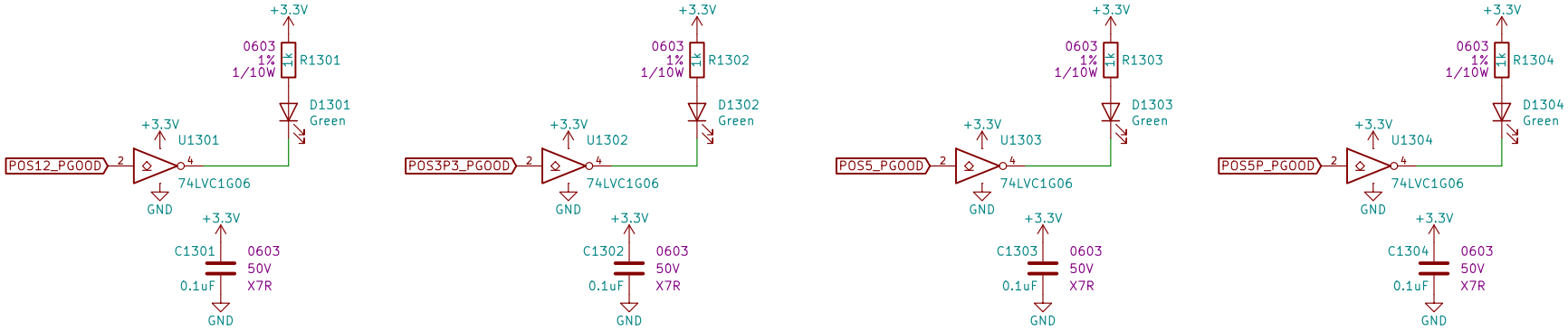
Marquette University Senior Design 2018/2019 Group E44

Sheet: /Status LEDs 1/
File: Status_LEDs_1.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 12/32

13. Status LEDs Bank 2



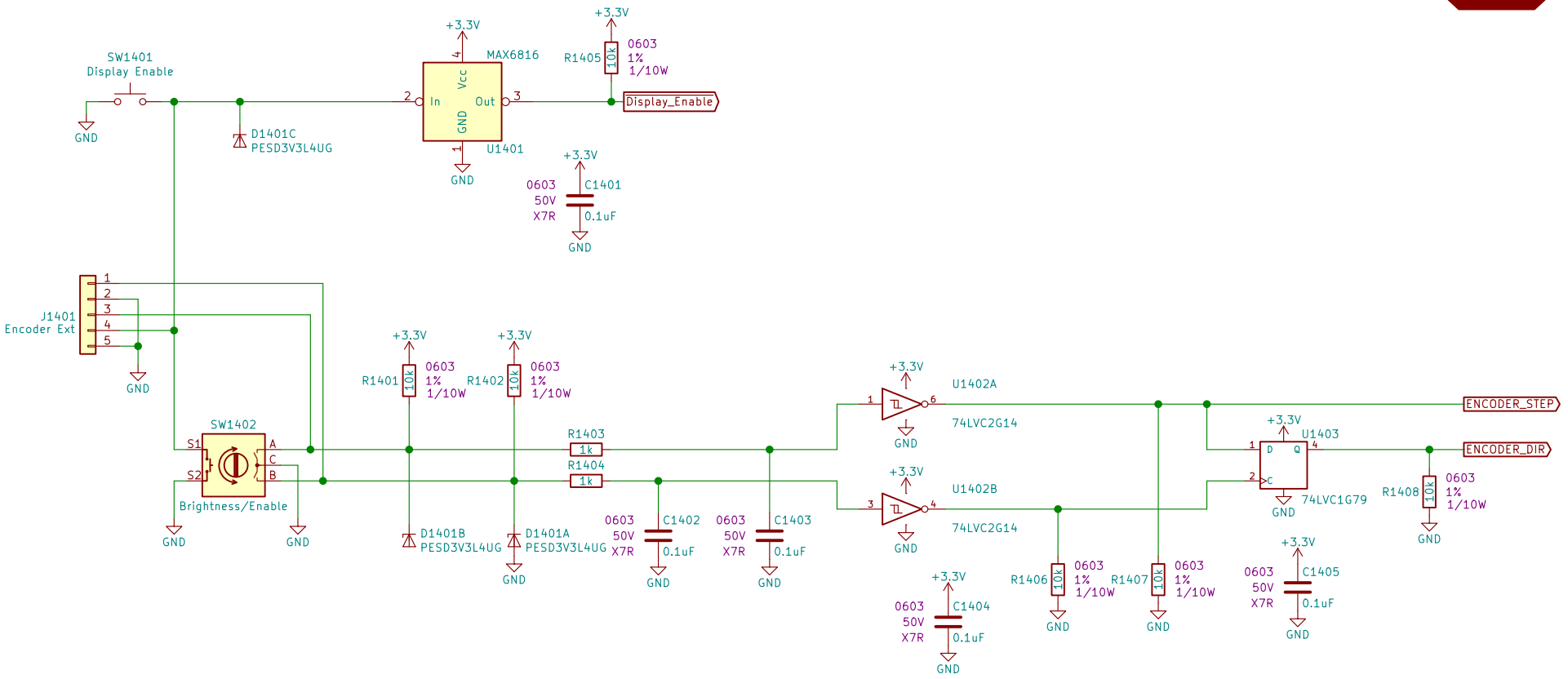
Marquette University Senior Design 2018/2019 Group E44

Sheet: /Status LEDs 2/
File: Status_LEDs_2.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 13/32

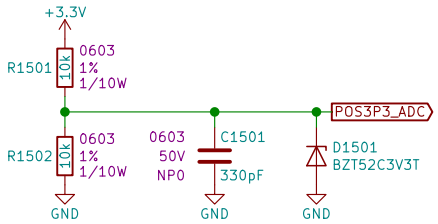
14. Pushbuttons

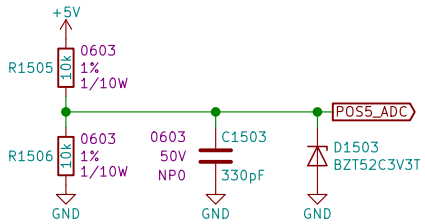


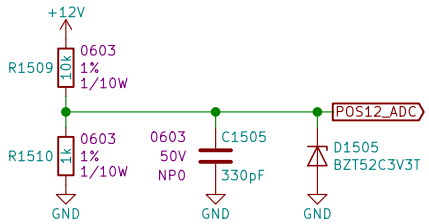
Turning rotary encoder will adjust display master brightness
Pressing encoder switch will toggle display on/off state

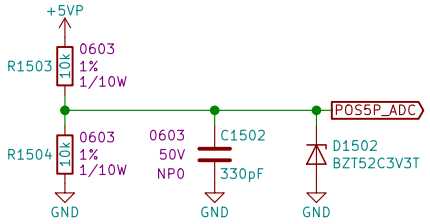
Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Pushbuttons/		
File: Pushbuttons.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 14/32

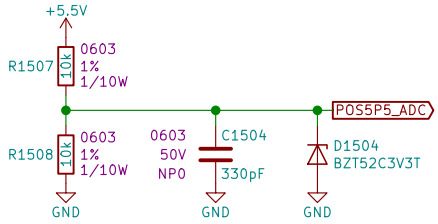
15. Internal Rail Monitoring











Marquette University Senior Design 2018/2019 Group E44

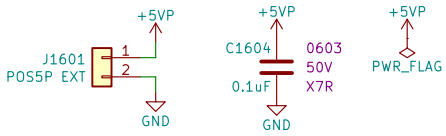
Sheet: /Internal Rail Monitoring/

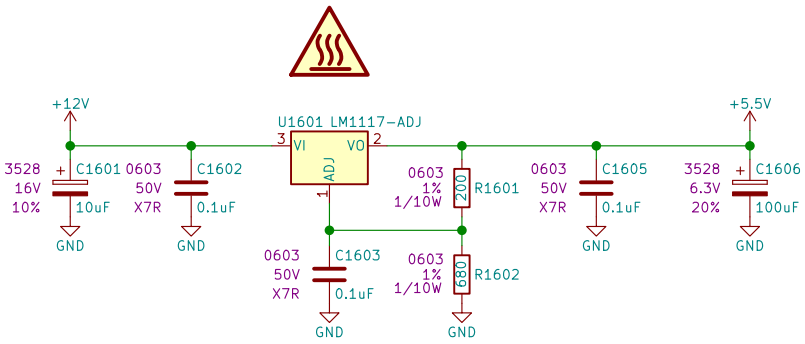
File: Internal_Rail_Monitoring.sch

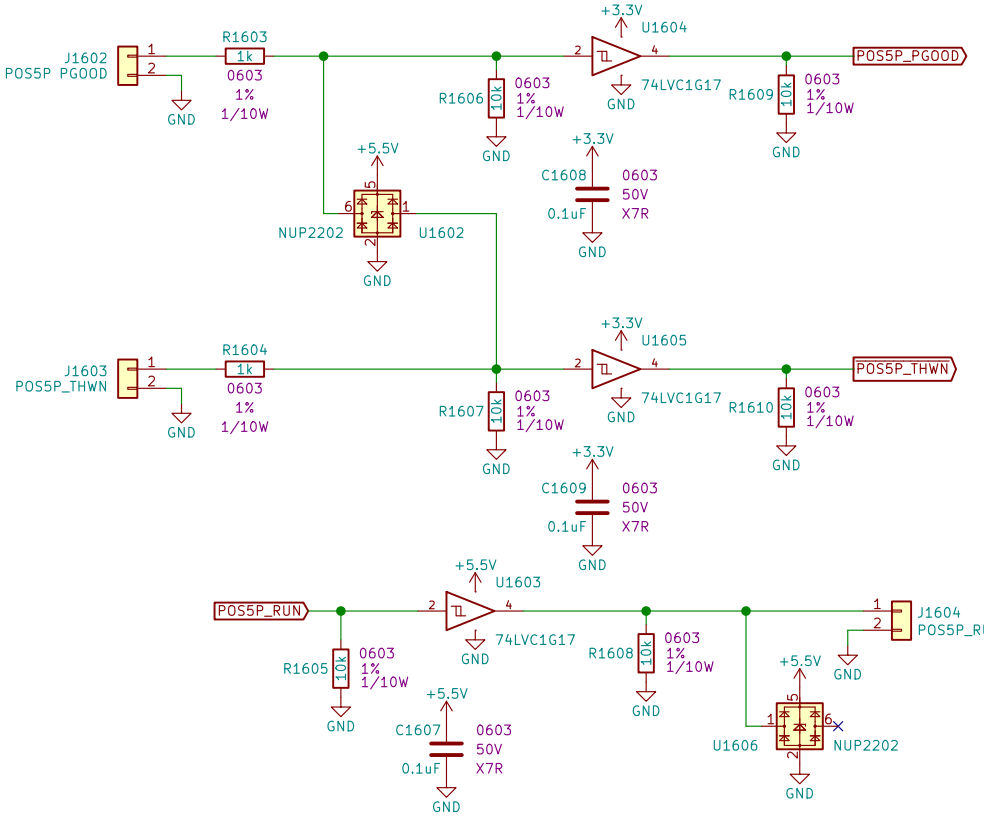
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 15/32

16. LED Power Supply Monitoring



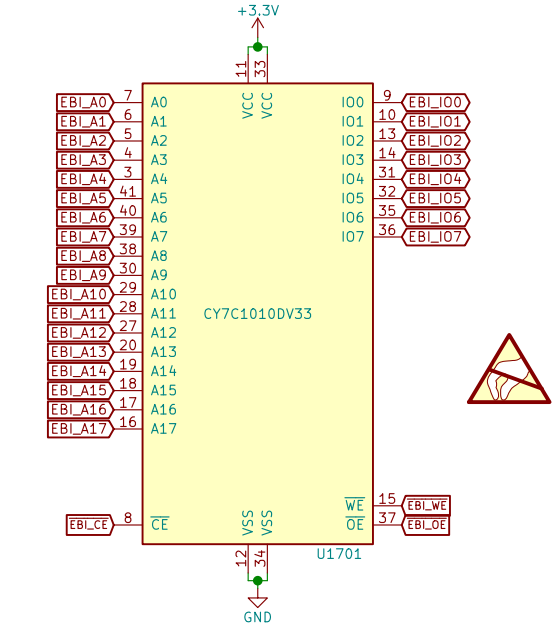




All headers on this sheet interface with power board to power panels

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 (5.0.2)-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

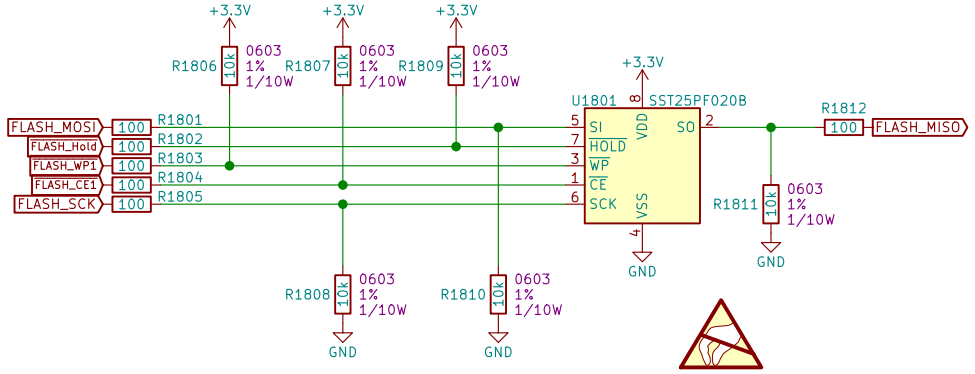
Marquette University Senior Design 2018/2019 Group E44

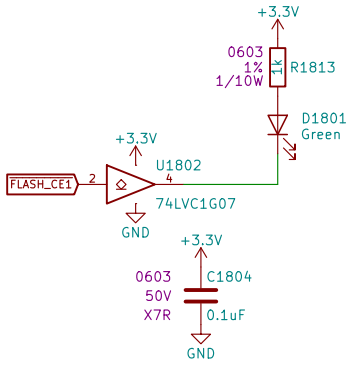
Sheet: /External SRAM/
File: External_SRAM.sch

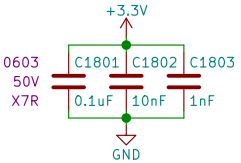
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 17/32

18. External FLASH 1







Marquette University Senior Design 2018/2019 Group E44

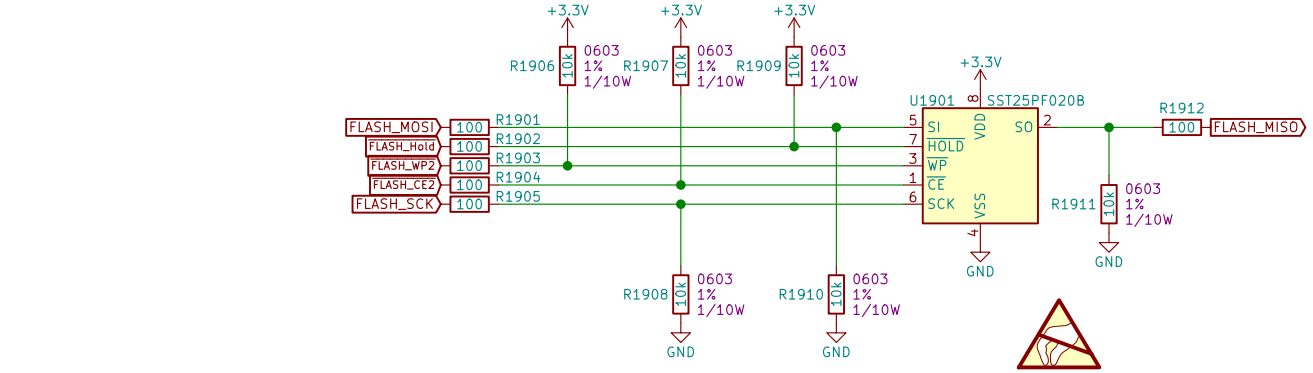
Sheet: /External Flash 1/

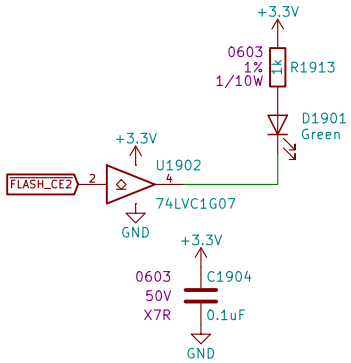
File: External_Flash_1.sch

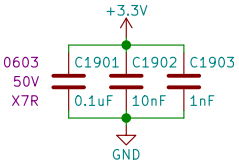
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 18/32

19. External FLASH 2







Marquette University Senior Design 2018/2019 Group E44

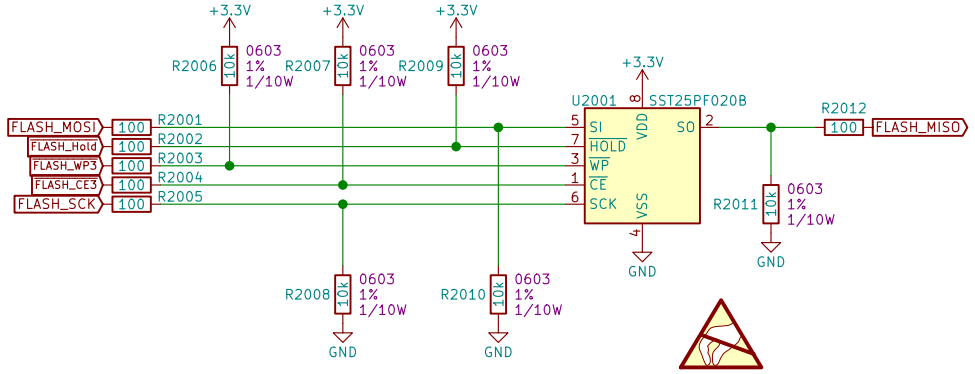
Sheet: /External Flash 2/

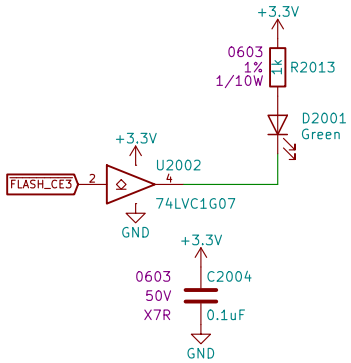
File: External_Flash_2.sch

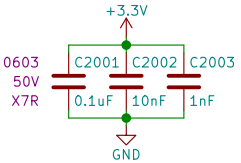
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 19/32

20. External FLASH 3







Marquette University Senior Design 2018/2019 Group E44

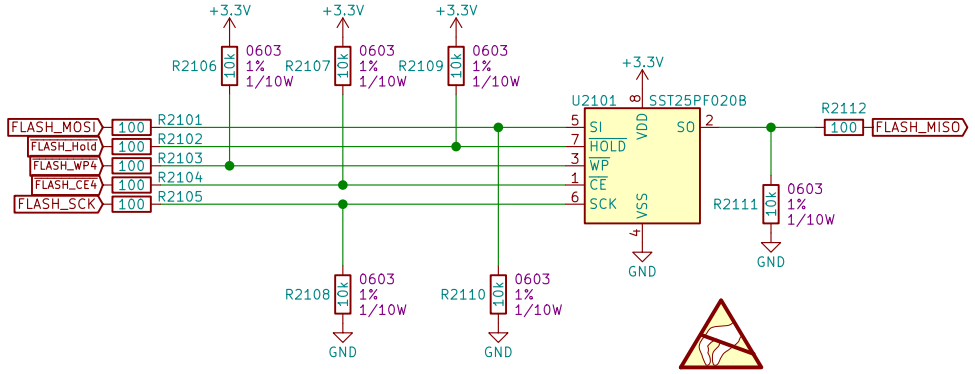
Sheet: /External Flash 3/

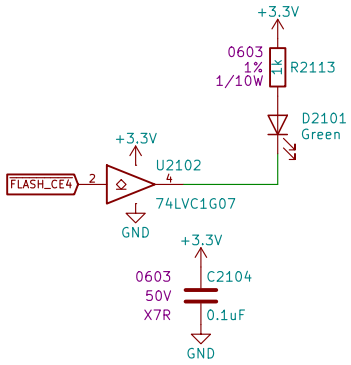
File: External_Flash_3.sch

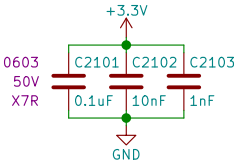
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 20/32

21. External FLASH 4







Marquette University Senior Design 2018/2019 Group E44

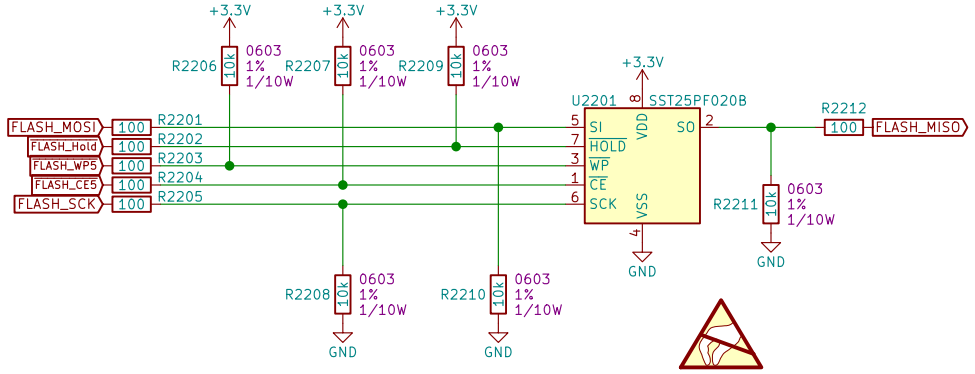
Sheet: /External Flash 4/

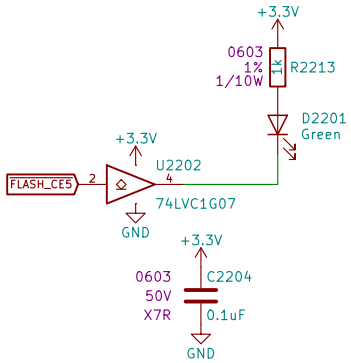
File: External_Flash_4.sch

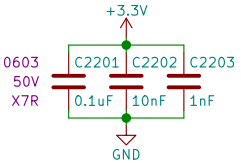
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 21/32

22. External FLASH 5







Marquette University Senior Design 2018/2019 Group E44

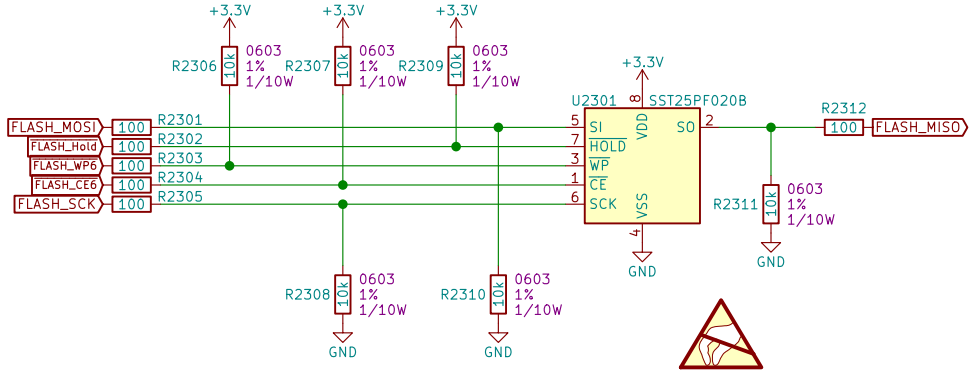
Sheet: /External Flash 5/

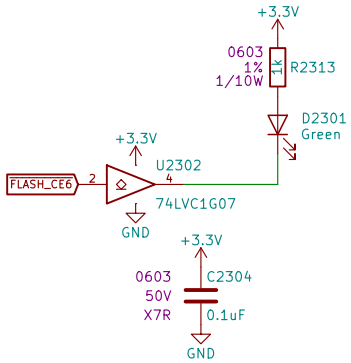
File: External_Flash_5.sch

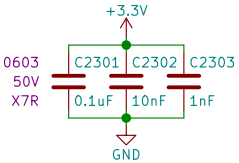
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 22/32

23. External FLASH 6







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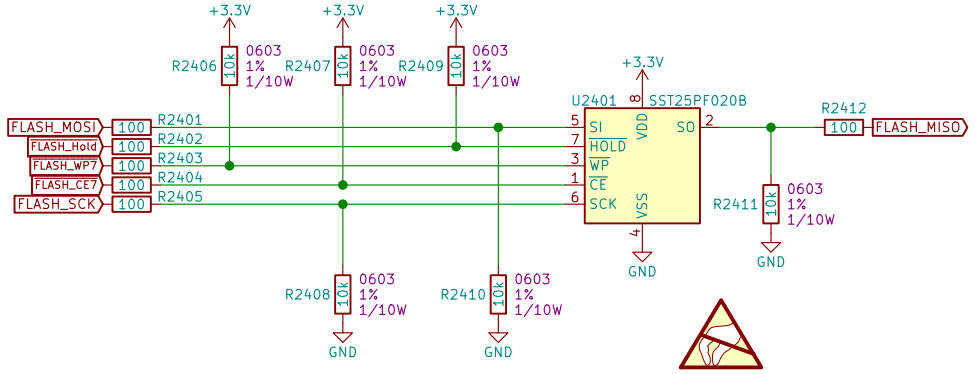
Sheet: /External Flash 6/

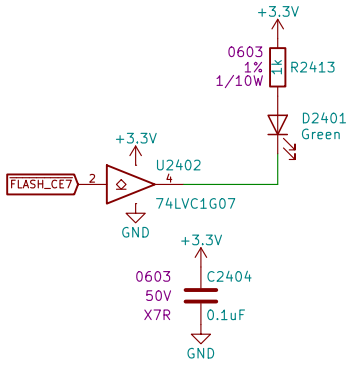
File: External_Flash_6.sch

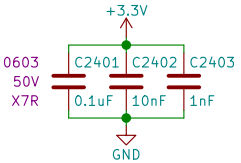
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 23/32

24. External FLASH 7







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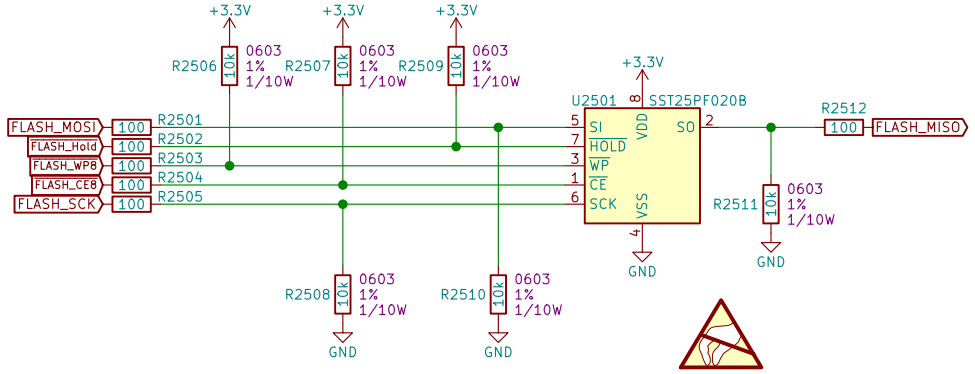
Sheet: /External Flash 7/

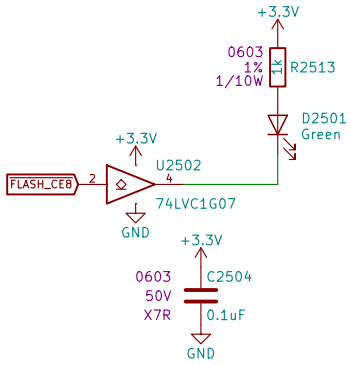
File: External_Flash_7.sch

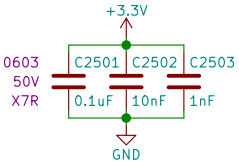
Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 24/32

25. External FLASH 8







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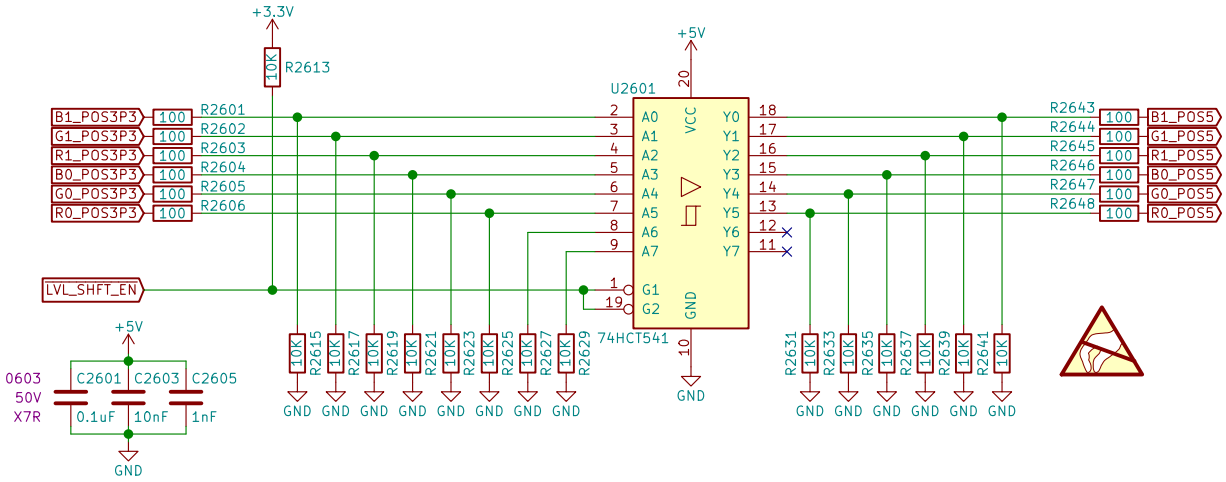
Sheet: /External Flash 8/

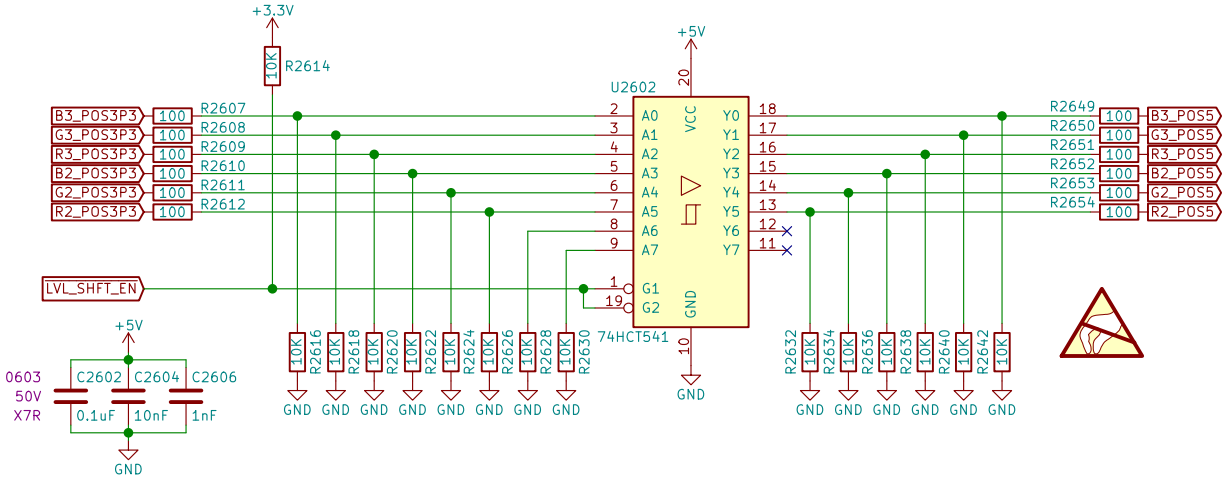
File: External_Flash_8.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 25/32

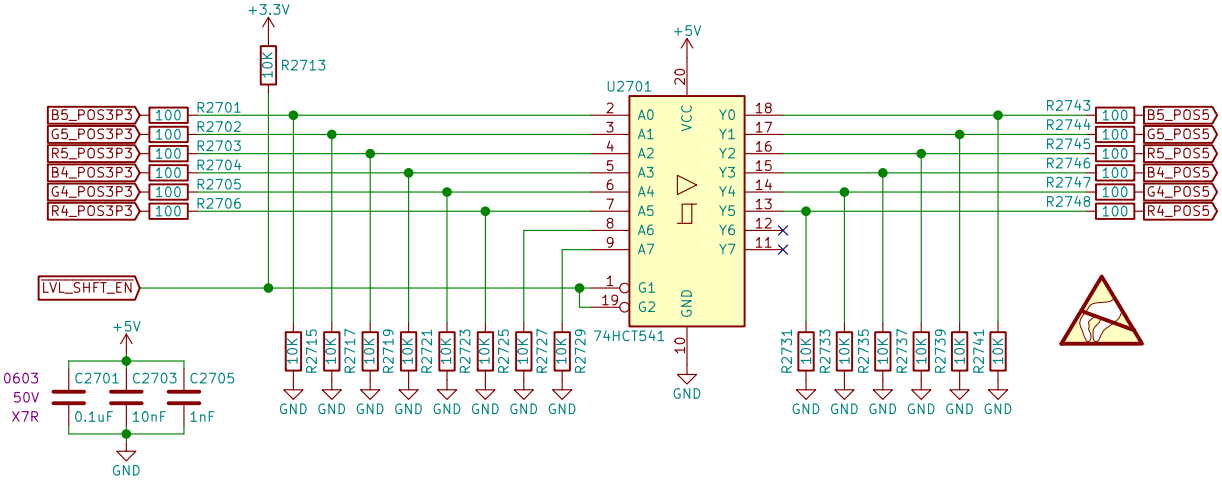
26. Panel Data Level Shifters 1

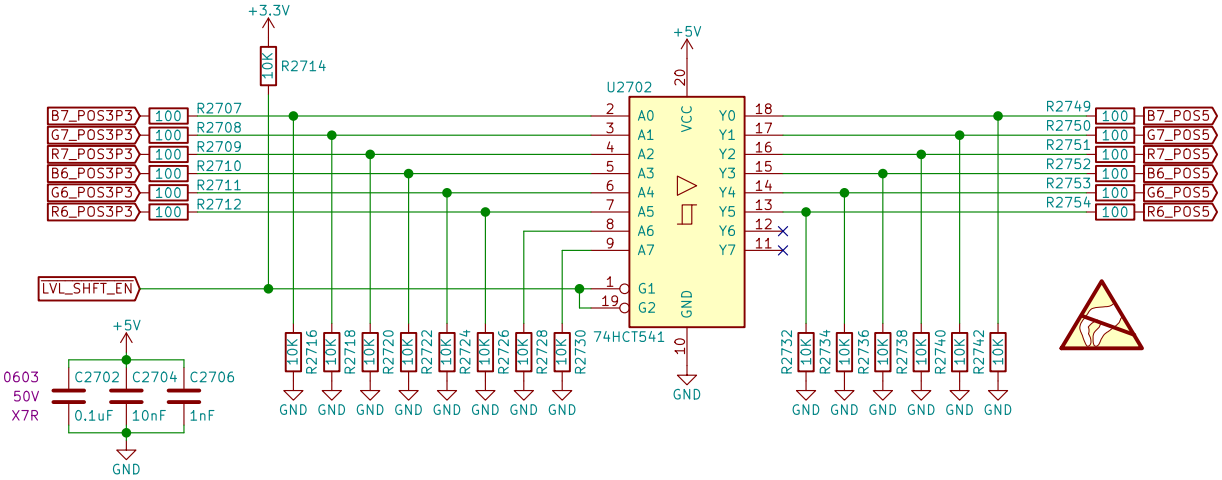




Marquette University Senior Design 2018/2019 Group E44		
Sheet: /Panel Data Level Shifters 1/		
File: Panel_Data_Level_Shifters_1.sch		
Title: Electronic Display Logic Board		
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 26/32

27. Panel Data Level Shifters 2





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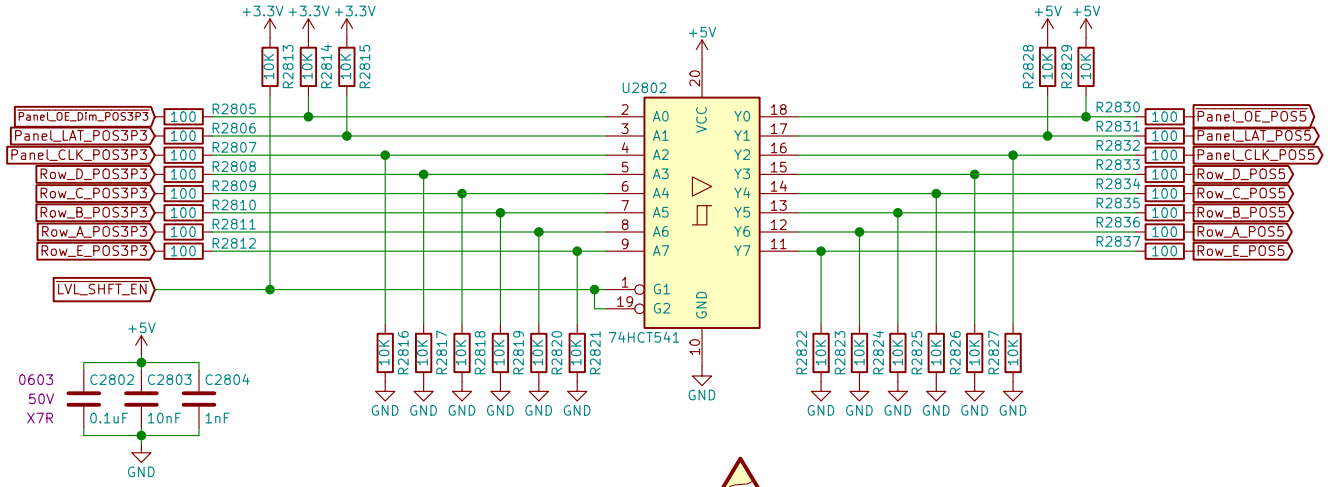
Sheet: /Panel Data Level Shifters 2/

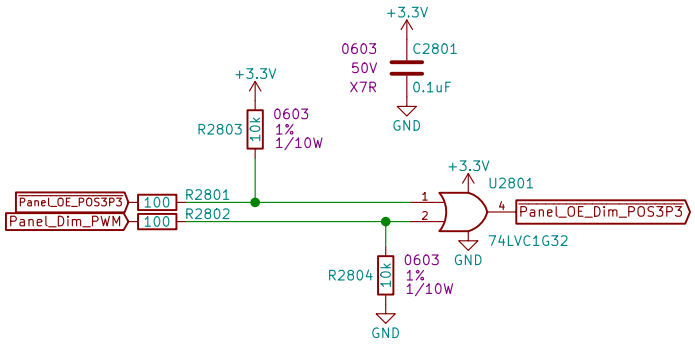
File: Panel_Data_Level_Shifters_2.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	Rev: A
KiCad E.D.A. kicad (5.0.2)-1		Id: 27/32

28. Panel Data Level Shifters 3





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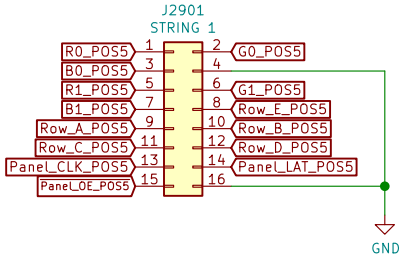
Sheet: /Panel Data Level Shifters 3/

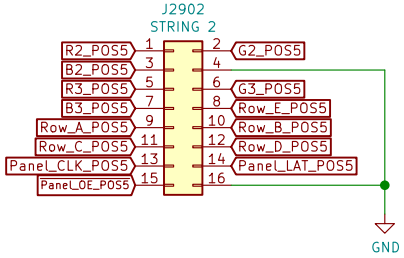
File: Panel_Data_Level_Shifters_3.sch

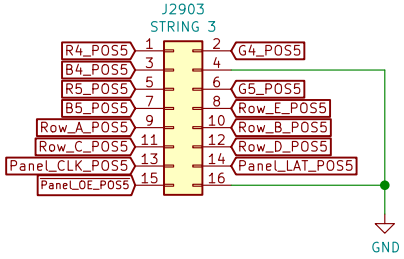
Title: Electronic Display Logic Board

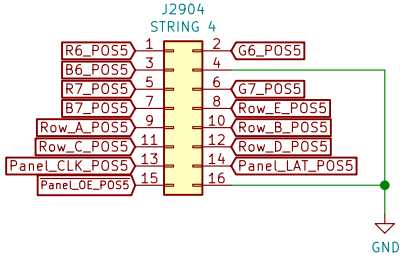
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 28/32

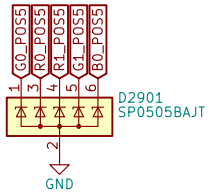
29. Panel Data Connectors

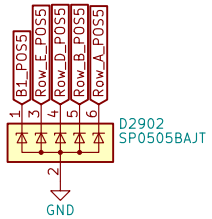


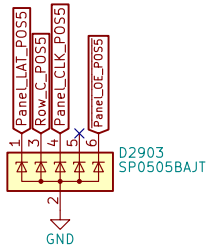


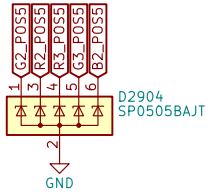


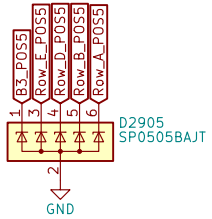


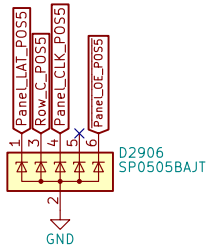


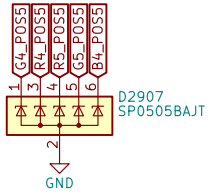


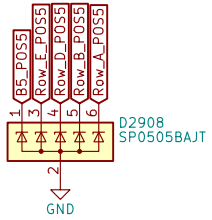


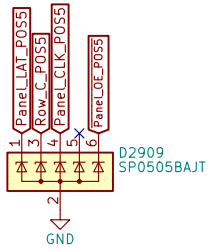


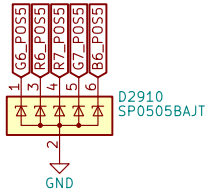


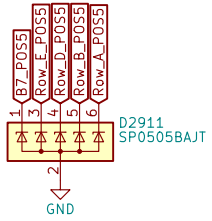


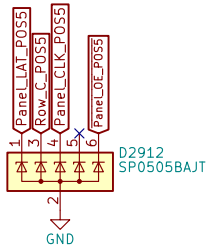












String 1 is the top string.
String 4 is the bottom string.
Each string is 5 panels long
Each panel is 64x64 pixels
This yields a 320x256 pixel overall display resolution

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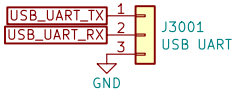
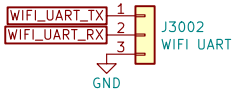
Sheet: /Panel Data Connectors/
File: Panel_Data_Connectors.sch

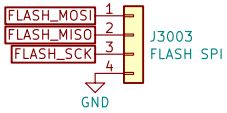
Title: Electronic Display Logic Board

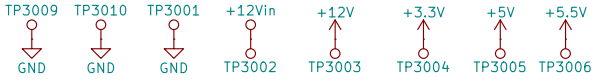
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 29/32

30. Test Points









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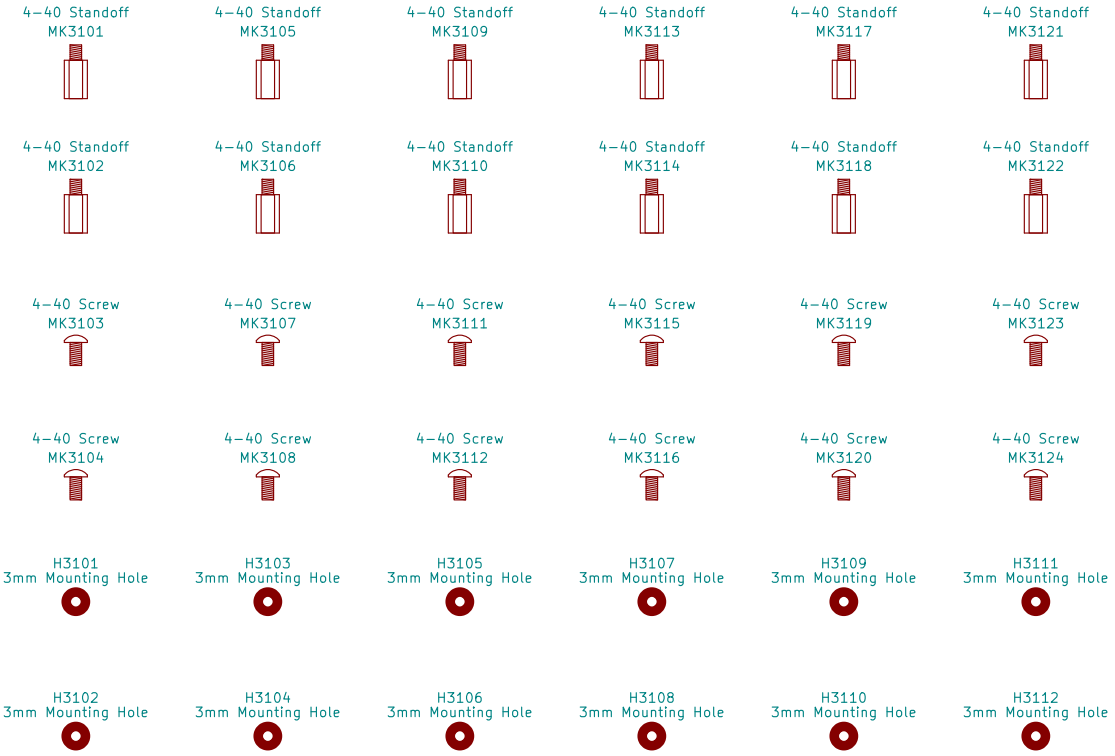
Sheet: /Test Points/

File: Test_Points.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 30/32

31. Mechanical



Marquette University Senior Design 2018/2019 Group E44

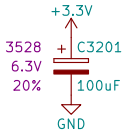
Sheet: /Mechanical/
File: Mechanical.sch

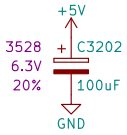
Title: Electronic Display Logic Board

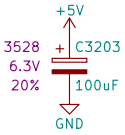
Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 31/32

32. Additional Capacitance

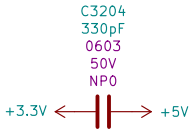
Bulk Capacitors

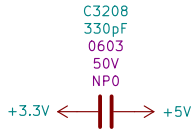


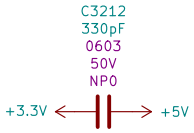


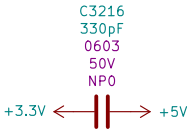


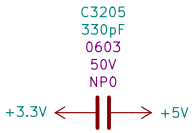
Stitching Capacitors

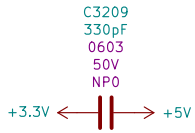


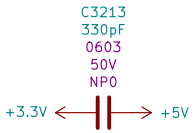


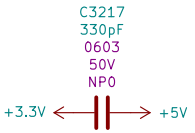


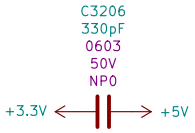


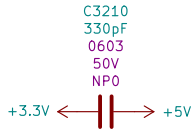


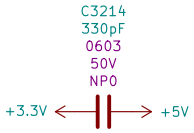


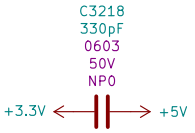


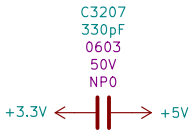


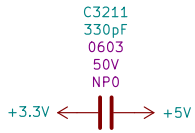


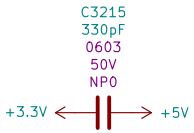


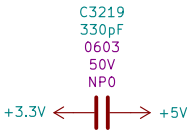












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Sheet: /Additional Capacitance/
File: Additional_Capacitance.sch

Title: Electronic Display Logic Board

Size: A	Date: 2018-12-15	**Rev: A**
KiCad E.D.A. kicad (5.0.2)-1		Id: 32/32