01. Table of Contents

Electronic Display Logic Board

Marguette University Senior Design 2018, Group E44 Drew Maatman, Kevin Etta, Logan Wedel, Caroline Gilger, Tuoxuan Ren

1		7
	M	
	_	4 [
	C	

02. Power Input	02.	Power I	Input
-----------------	-----	---------	-------

03. +3.3V Power Supply

04. +5V Power Supply

05. Microcontroller Programming

06. Microcontroller Power

07. Microcontroller IO Bank 1

08. Microcontroller IO Bank 2

09. WiFi Module

10. USB UART Digital Isolation

11. USB UART Bridge

12. Status LEDs Bank 1

13. Status LEDs Bank 2

14. Pushbuttons

15. Internal Rail Monitoring

16. LED Power Supply Monitoring

Power Input Power_Input.sch POS3P3 Power Supply POS3P3_Power_Supply.sch POS5 Power Supply

POS5_Power_Supply.sch Microcontroller Programming

Microcontroller_Programming.sch

Microcontroller Power

Microcontroller_Power.sch

Microcontroller 1

Microcontroller 1.sch Microcontroller 2

Microcontroller_2.sch WiFi Module

Wi_Fi_Module.sch

USB UART Isolation

USB UART Isolation.sch

USB UART Bridge

USB_UART_Bridge.sch Status LEDs 1

Status_LEDs_1.sch

Status LEDs 2

Status LEDs 2.sch

Pushbuttons

Pushbuttons.sch

Internal Rail Monitoring

Internal_Rail_Monitoring.sch LED POSS Monitoring

LED_POS5_Monitoring.sch

17. External SRAM

18. External FLASH 1

19. External FLASH 2

20. External FLASH 3

21. External FLASH 4

22. External FLASH 5

23. External FLASH 6

24. External FLASH 7

25. External FLASH 8

26. Panel Data Level Shifters 1

27. Panel Data Level Shifters 2

28. Panel Data Level Shifters 3

29. Panel Data Connectors

30. Test Points

31. Mechanical

External SRAM

External SRAM.sch

External Flash 1

External_Flash_1.sch

External Flash 2

External_Flash_2.sch

External Flash 3

External Flash 3.sch

External Flash 4

External_Flash_4.sch

External Flash 5 External Flash 5.sch

External Flash 6

External Flash 6.sch

External Flash 7

External_Flash_7.sch

External Flash 8

External Flash 8.sch

Panel Data Level Shifters 1

Panel_Data_Level_Shifters_1.sch Panel Data Level Shifters 2

Panel_Data_Level_Shifters_2.sch

Panel Data Level Shifters 3

Panel_Data_Level_Shifters_3.sch Panel Data Connectors

Panel_Data_Connectors.sch

Test Points

Test_Points.sch

Mechanical

Mechanical.sch

* Draw custom footprints (SRAM, power supply ICs, etc)
* Assign footprints

* Assign Digi-Key Partnumbers * Run ERC, resolve errors

* Generate netlist

* Generate BOM

* Layout PCB

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

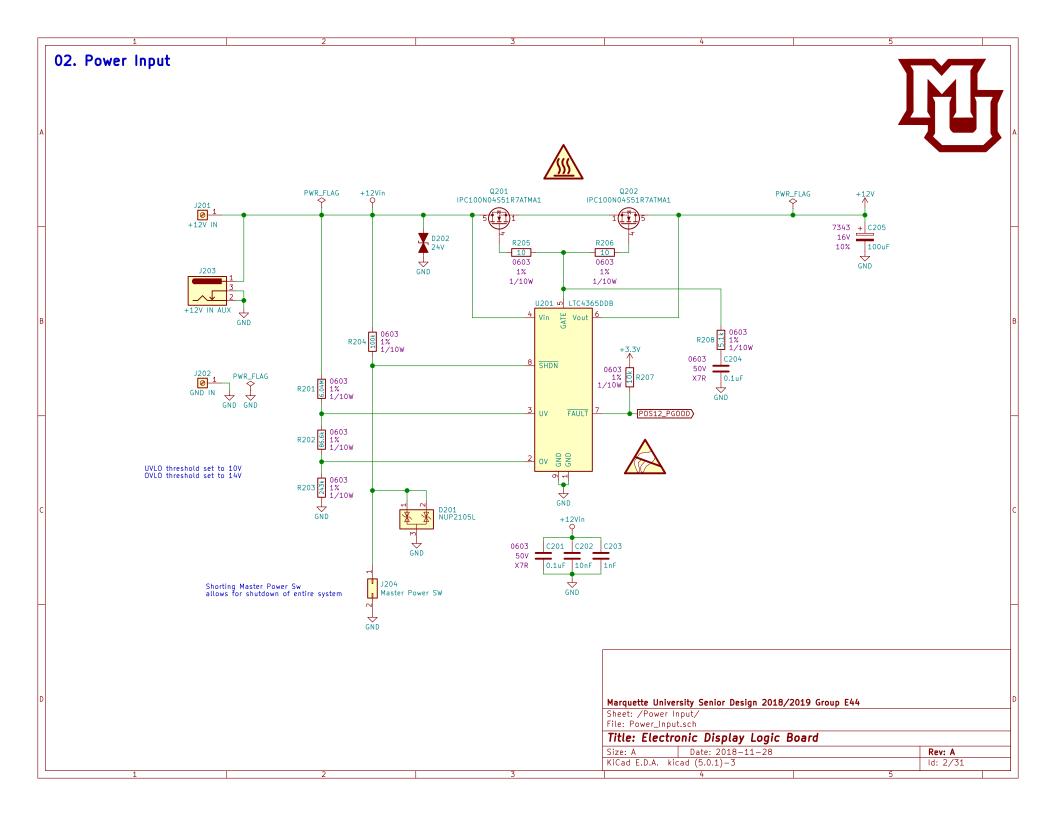
Sheet: /

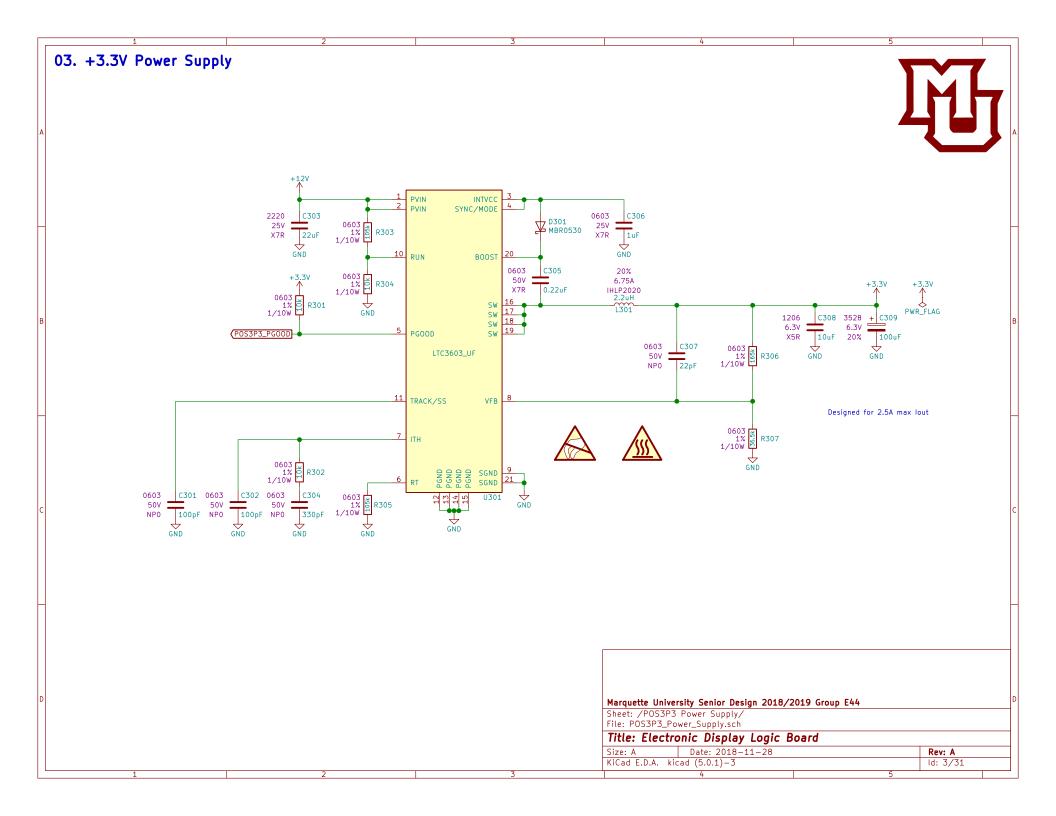
File: LED_Display_Controller.sch

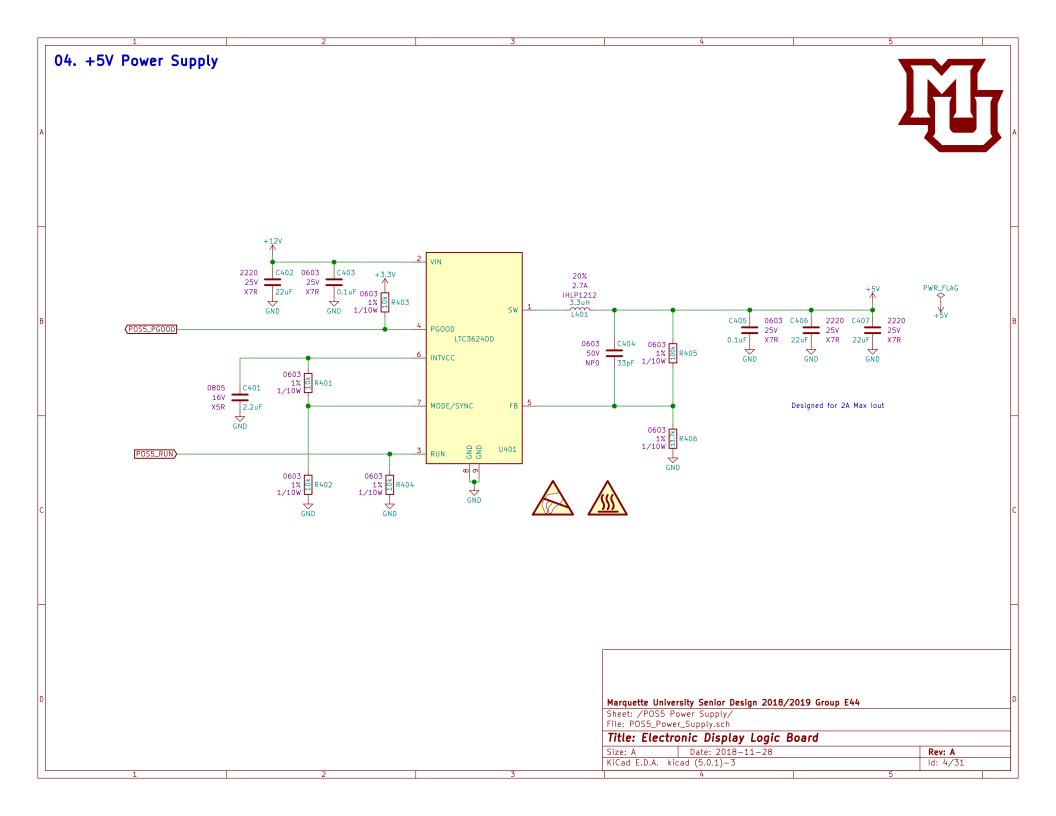
Title: Electronic Display Logic Board

Date: 2018-11-28 Size: A Rev: A ld: 1/31

KiCad E.D.A. kicad (5.0.1)-3



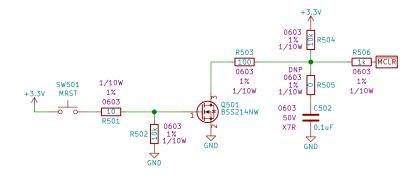




05. Microcontroller Programming



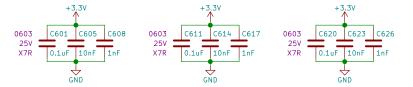


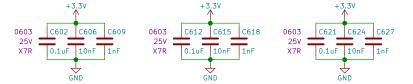


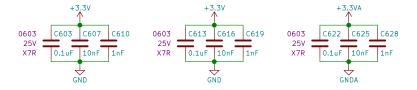
Marquette University Senior Design 2018/2019 Group E44
Sheet: /Microcontroller Programming/
File: Microcontroller_Programming.sch

Size: A	Date: 2018-11-28	Rev: A	
KiCad E.D.A. kid	cad (5.0.1)-3	ld: 5/31	

06. Microcontroller Power



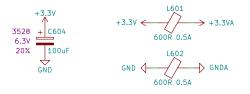












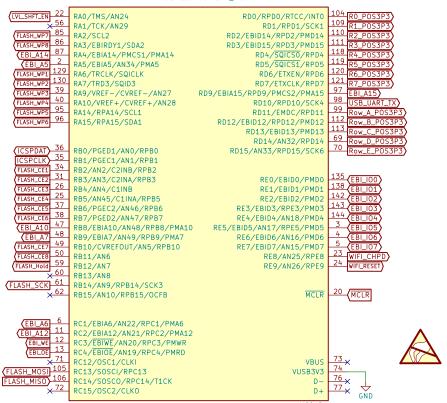


|--|

Sheet: /Microcontroller Power/ File: Microcontroller_Power.sch

Size: A	Date: 2018-11-28		Rev: A	
KiCad E.D.A. kicad (5.0.1)-3			ld: 6/31	
T .	In .	5	•	

07. Microcontroller IO Bank 1 PIC32MZ2048EFH144_IPL



Marquette University Senior Design 2018/2019 Group E44

Sheet: /Microcontroller 1/ File: Microcontroller_1.sch

Title: Electronic Display Logic Board

 Size: A
 Date: 2018-11-28
 Rev: A

 KiCad E.D.A. kicad (5.0.1)-3
 Id: 7/31

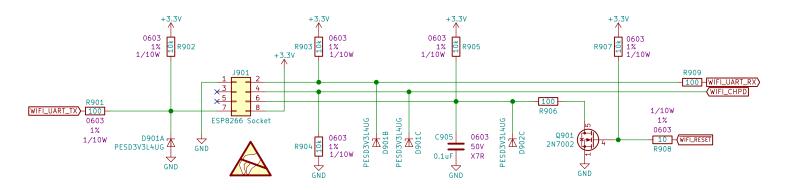
Row A is Least Significant Bit

2

08. Microcontroller IO Bank 2 PIC32MZ2048EFH144_IPL USB_UART_RX) 124 RF0/EBID11/RPF0/PMD11 114 Panel_CLK_POS3P3 RJ0/ETXERR ×125 RF1/EBID10/RPF1/PMD10 115 Panel_LAT_POS3P3 RJ1/EMDIO POS5_RUN 79 RF2/SDA3/RPF2 116 Panel_OE_POS3P3 RJ2/EBIRDY3 POS5_PGOOD) 78 RF3/RPF3/USBID RJ3/EBIA22 RJ4/EBICSO 132 G0_P0S3P3 RJ5/EBICS1 RJ6/EBICS2 RJ7/EBICS3 G2_POS3P3 POS5P_RUN 57 RF13/TDI/AN30/RPF13/SCK5 RJ8/AN35/ETXD0 8 RJ9/AN36/ETXD1 10 G5_P0S3P3 RJ10/EBIBS1 27 G6_P0S3P3 Panel_Dim_PWM 128 RGO/EBID8/RPGO/PMD8 RJ11/AN37/ERXCLK/EREFCLK EBI_Error_LED 127 RG1/EBID9/RPG1/PMD9 9 <u>G7_P0S3P</u> RJ12/EBIBSO SPI_Error_LED 14 RG6/AN14/C1IND/RPG6/SCK2 RJ13/EBIA13/PMA13 28 EBI_A13 WIFI_UART_TX 15 RG7/AN13/C1INC/RPG7/SDA4 RJ14/EBIA11/PMA11 29 EBI_A11 WIFI_UART_RX 16 RG8/AN12/C2IND/RPG8/SCL4 RJ15/EBIAO/PMAO 30 EBI_AO EBI_A2 21 RG9/EBIA2/AN11/C2INC/RPG9/PMA2 Panel_Enable_LED 140 RG12/TRD1/SQID1 WIFLError_LED 141 RG13/TRD0/SQID0 RKO/EBIA16 19 EBI_A16 USB_Error_LED 139 RG14/TRD2/SQID2 ACTIVE_LED 1 RG15/AN23 53 EBI_A17 RK3/EBIA17 92 Display_Enable RK4/EBIA18 POS3P3_ADC) 43 RHO/AN38/ETXD2 RK5/EBIA19 93 ENCODER_STEP OS12_ADC 44 RH1/AN39/ETXD3 94 ENCODER_DIR RK6/EBIA20 X 45 RH1/AN39/ X 45 RH2/EBIRP X 46 RH3 RK7/EBIA21 POS5P5_ADC) 65 RH4/AN40/ERXERR POS5_ADC 66 RH5/AN41/ERXD1 POS5_ADC 67 RH6/AN42/ERXD2 (EBLA4 68 BD_POS3P3 81 RH8/ERXD0 B1_P0S3P3 82 RH9/ERXD3 B2_P0S3P3 83 RH10/ECOL B3_P0S3P3 84 RH11/EBIRDY2 B4 POS3P3 100 RH12/ECRS B5_POS3P3 101 RH13/ERXDV/ECRSDV B6_P0S3P3 102 RH14 B7_P0S3P3 103 RH15/EBIA23 U601C Marquette University Senior Design 2018/2019 Group E44 Sheet: /Microcontroller 2/ File: Microcontroller_2.sch Title: Electronic Display Logic Board Date: 2018-11-28 Size: A Rev: A KiCad E.D.A. kicad (5.0.1)-3ld: 8/31

09. WiFi Module





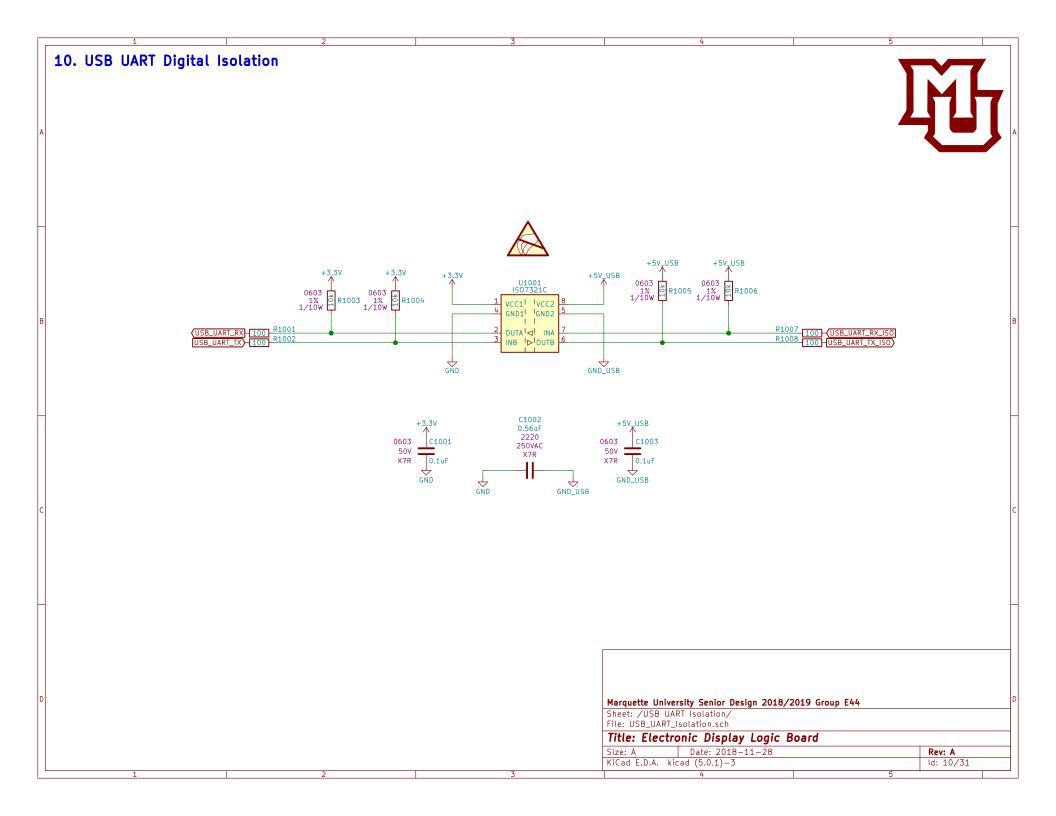
 $\ensuremath{\mathsf{ESP8266}}$ Pinout does not match default KiCad pin socket footprint. Use a custom footprint

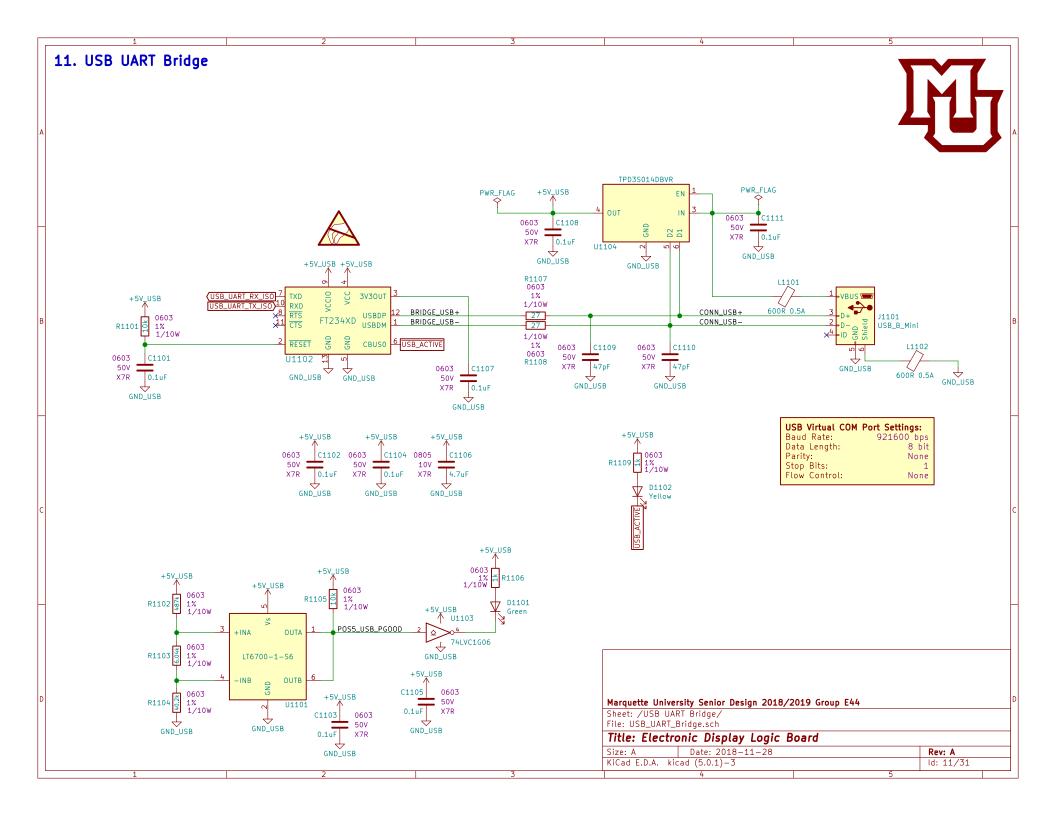


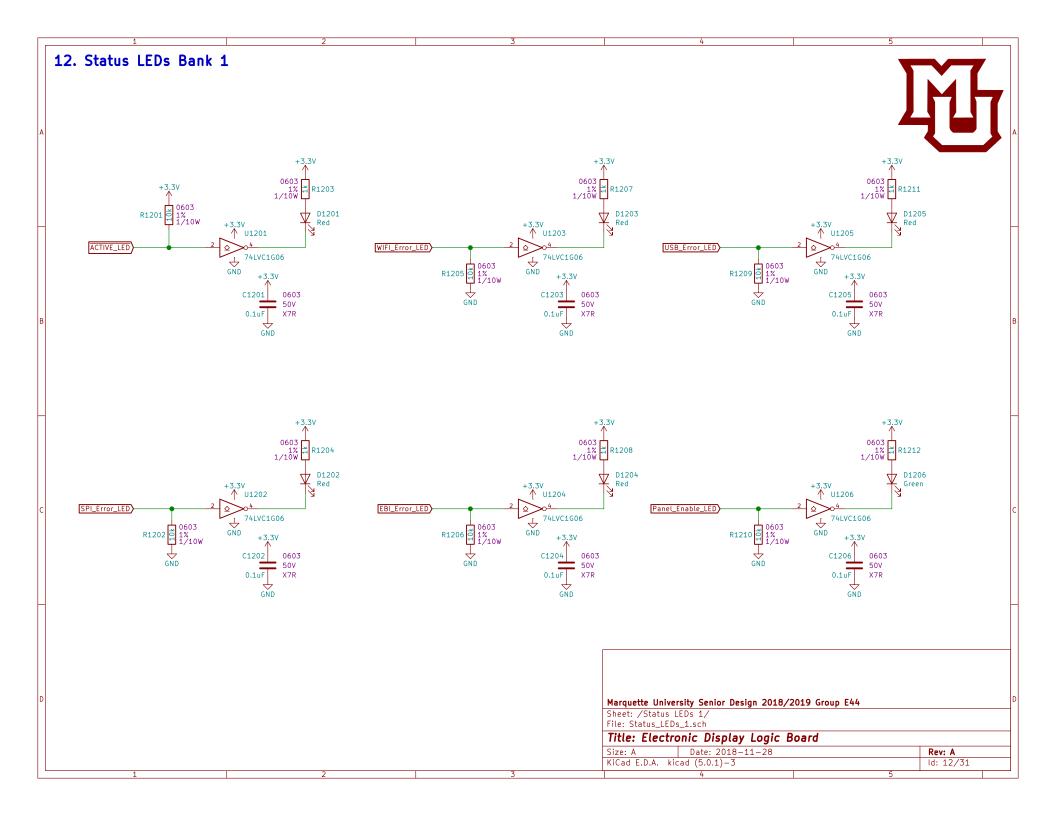
Marquette	University	Senior	Design	2018	/2019	Group F	44
maiuuelle	UIIIVEISILV	Selliol	Desiuii	2010/	2013	GIUUD D	

Sheet: /WiFi Module/ File: Wi_Fi_Module.sch

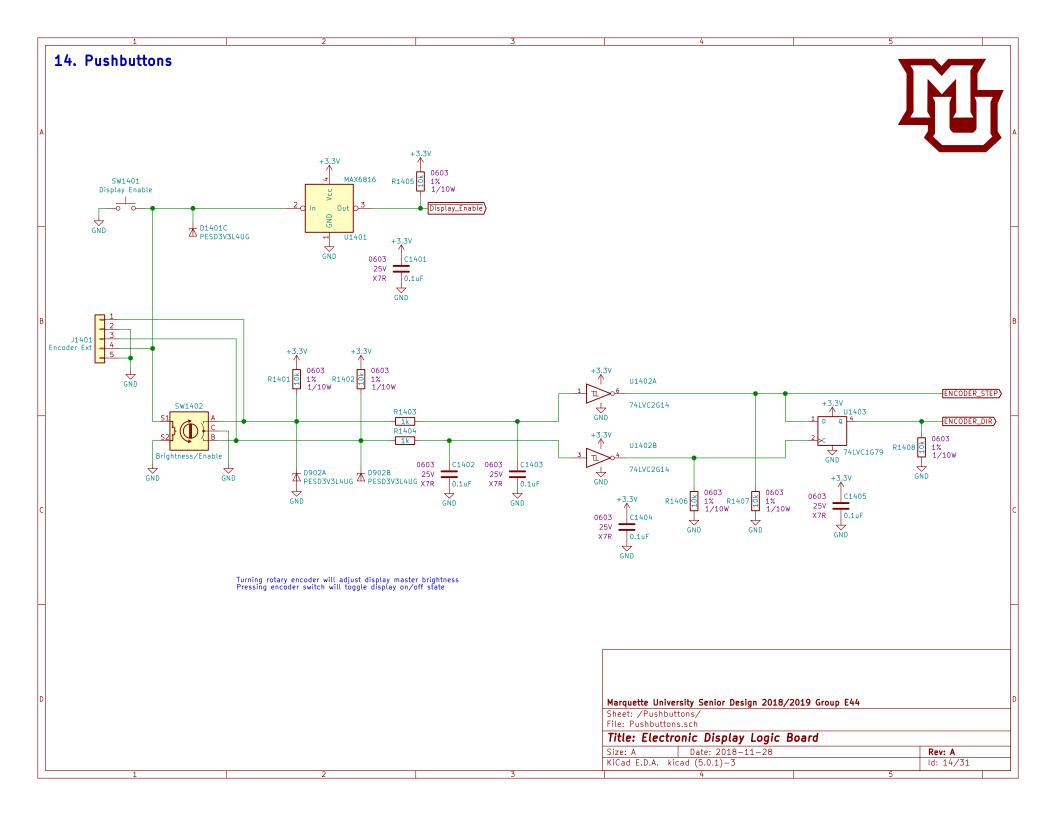
Size: A	Date: 2018-11-28	Rev: A
KiCad E.D.A. ki	cad $(5.0.1)-3$	ld: 9/31





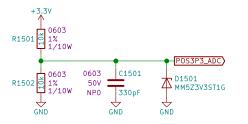


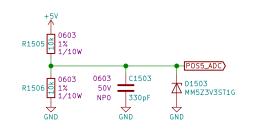
13. Status LEDs Bank 2 D1303 Green D1301 D1302 Green D1304 Green +3.3V ↑ U1301 +3.3V ↑ U1304 Green +3.3V ↑ U1302 +3.3V ↑ U1303 74LVC1G06 74LVC1G06 74LVC1G06 74LVC1G06 GND +3.3V +3.3V 0.1uF 0.1uF 0.1uF 0.1uF 0603 50V 0603 0603 50V 500 50V X7R GND GND GND GND Marquette University Senior Design 2018/2019 Group E44 Sheet: /Status LEDs 2/ File: Status_LEDs_2.sch Title: Electronic Display Logic Board Size: A Date: 2018-11-28 Rev: A KiCad E.D.A. kicad (5.0.1)-3 ld: 13/31

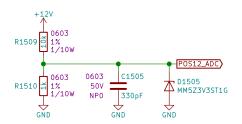


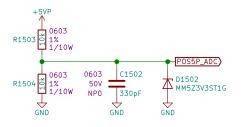
15. Internal Rail Monitoring

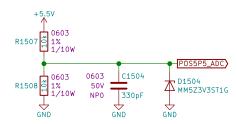








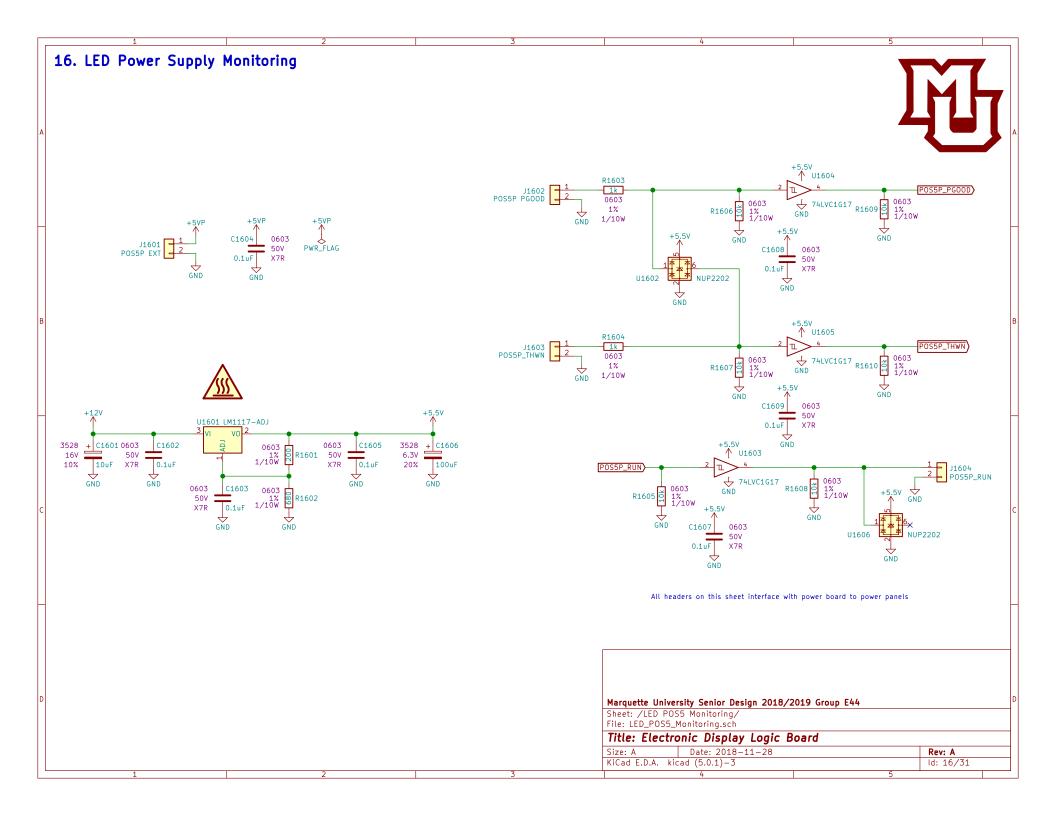


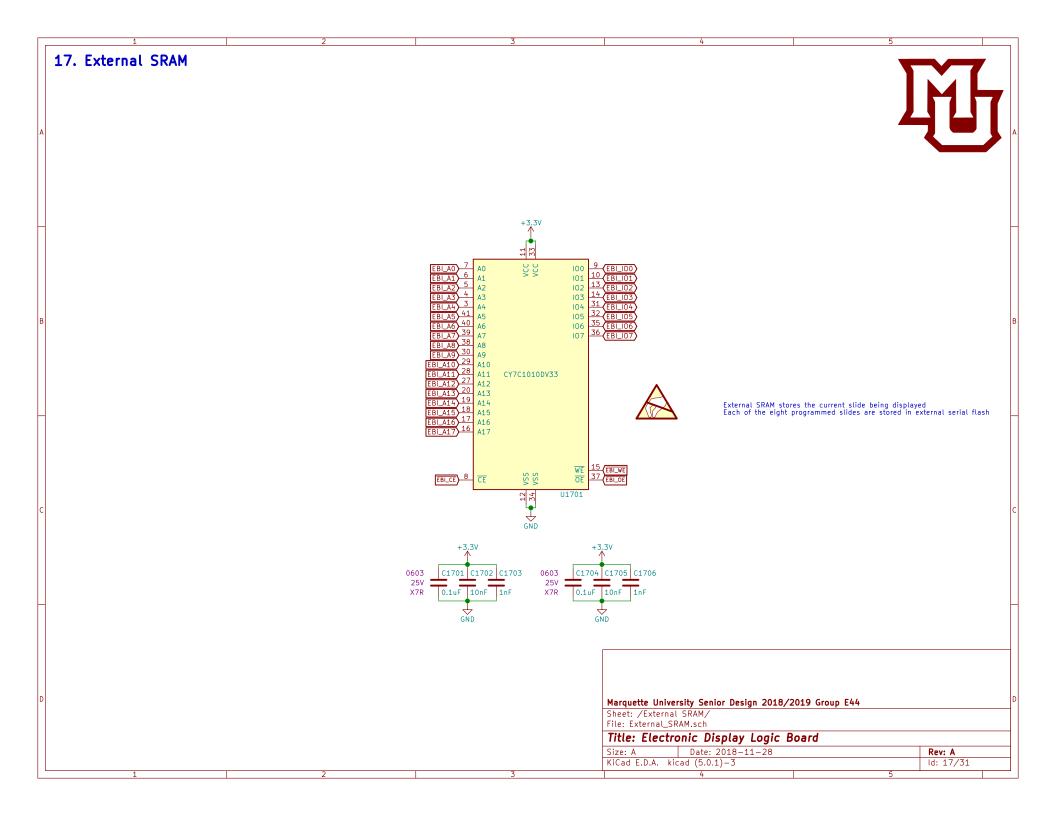


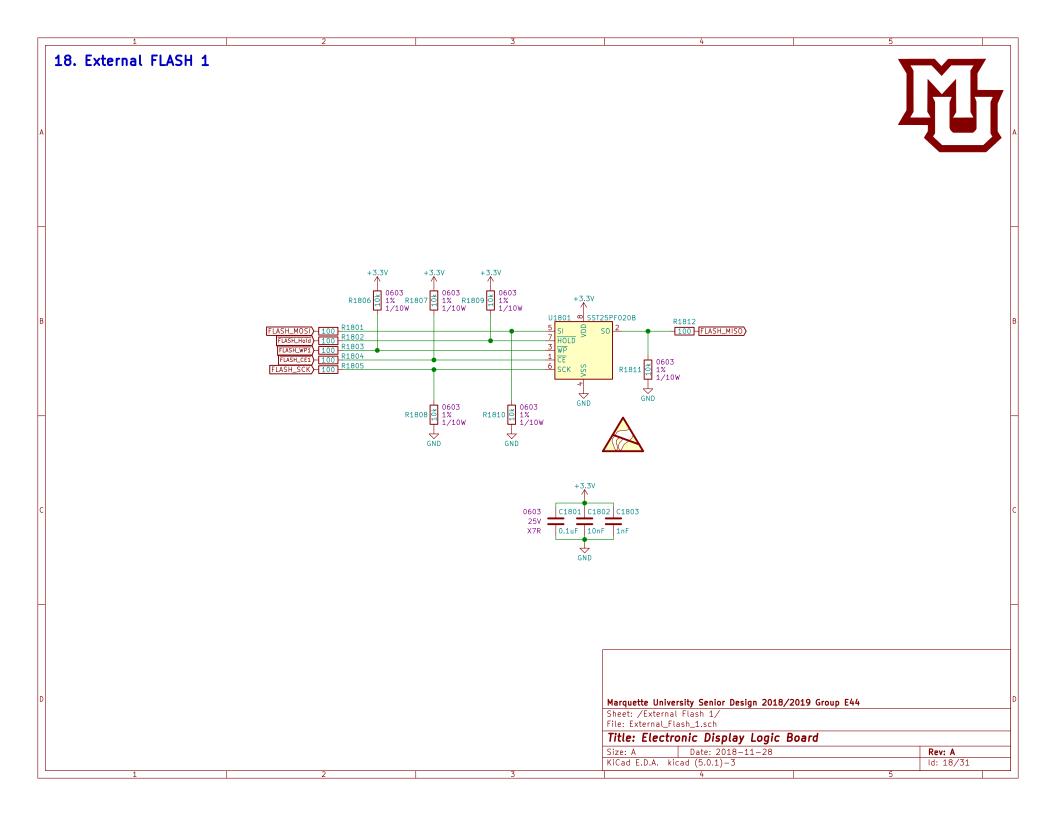
Marquette University Senior Design 2018/2019 Group E44

Sheet: /Internal Rail Monitoring/ File: Internal_Rail_Monitoring.sch

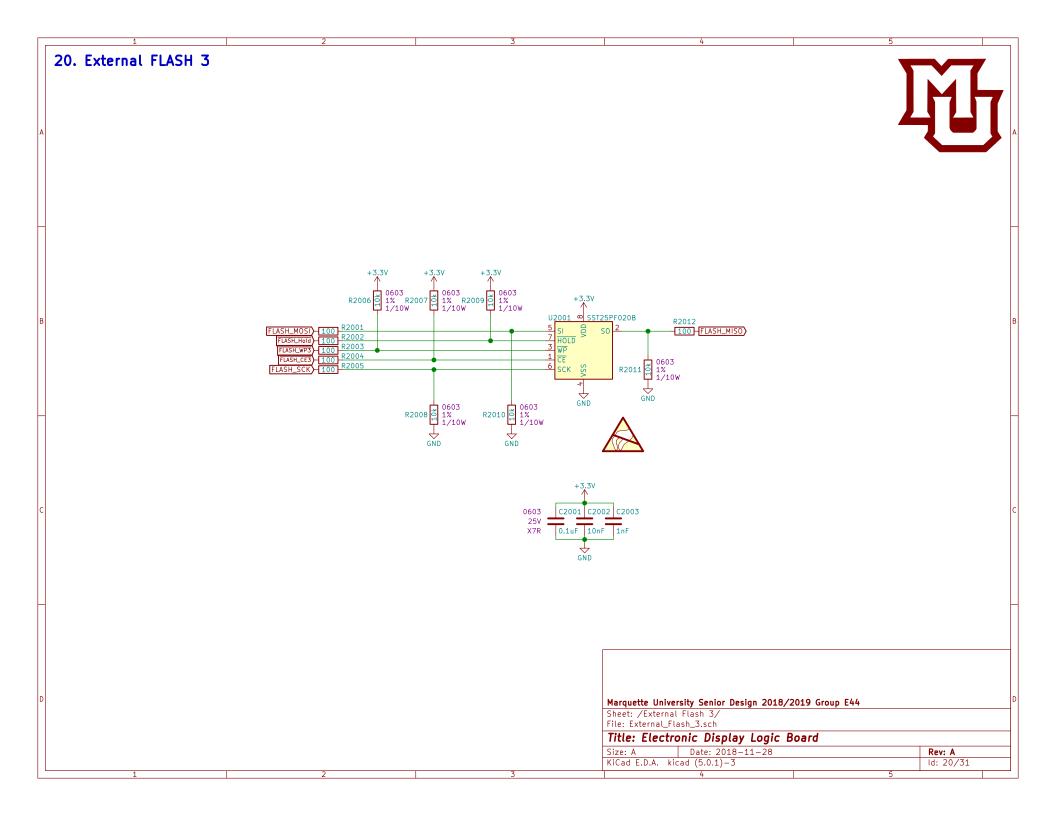
Size: A	Date: 2018-11-28	Rev: A	
KiCad E.D.A. kid	cad (5.0.1)-3	ld: 15/31	
	I.		

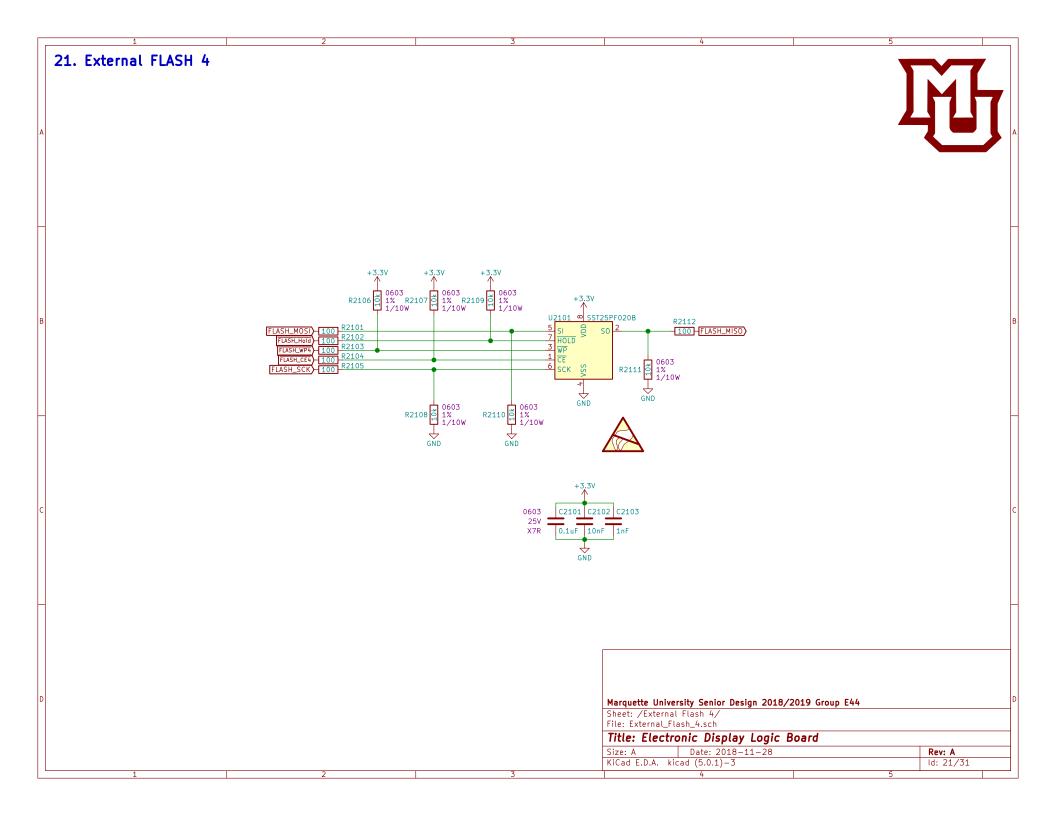


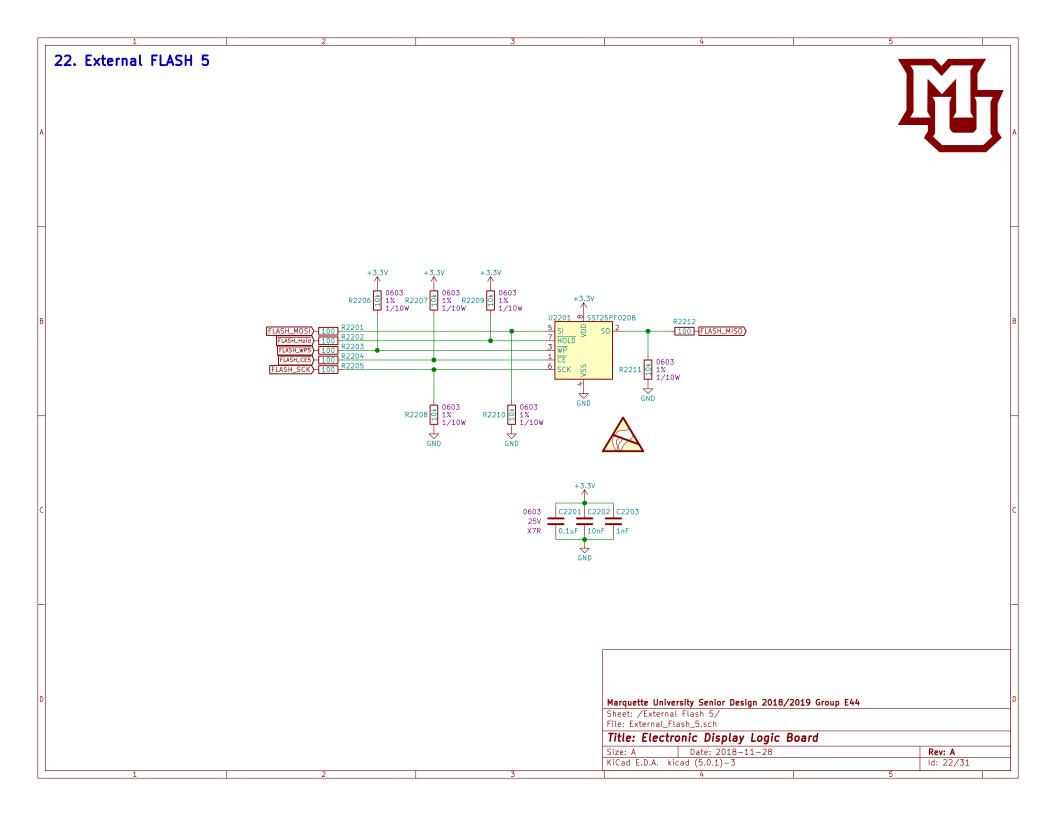


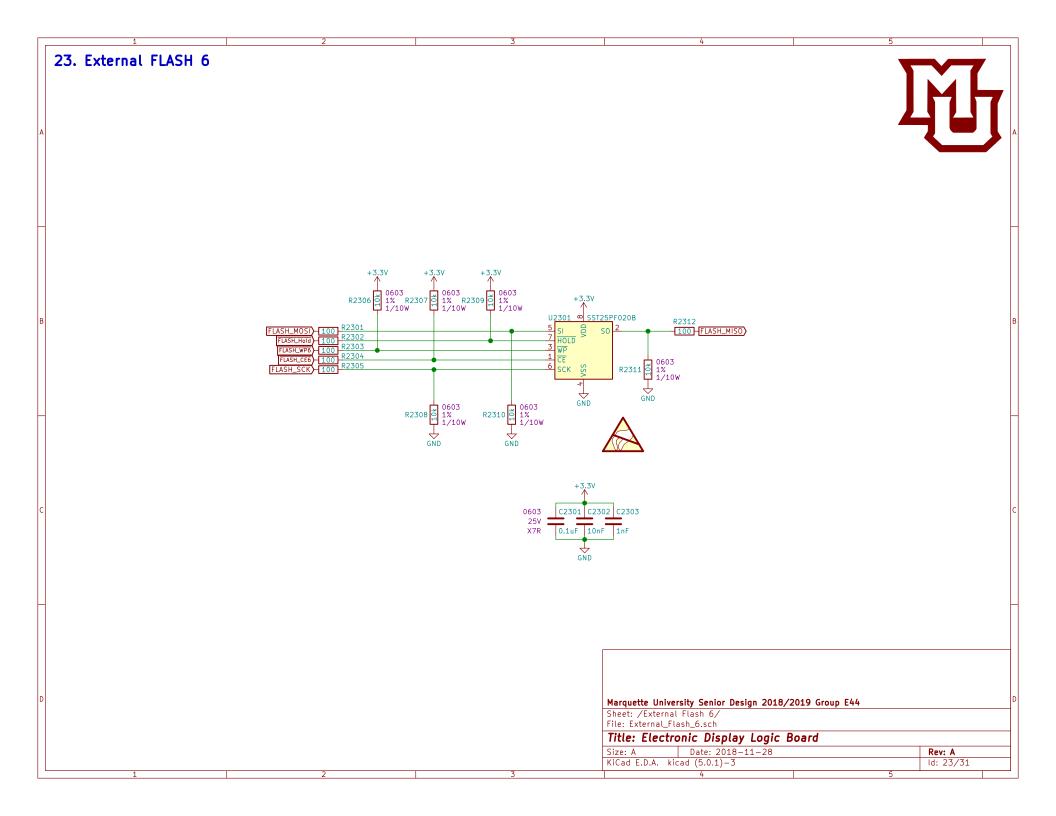


19. External FLASH 2 GND Marquette University Senior Design 2018/2019 Group E44 Sheet: /External Flash 2/ File: External_Flash_2.sch Title: Electronic Display Logic Board Date: 2018-11-28 Size: A Rev: A KiCad E.D.A. kicad (5.0.1)-3 ld: 19/31

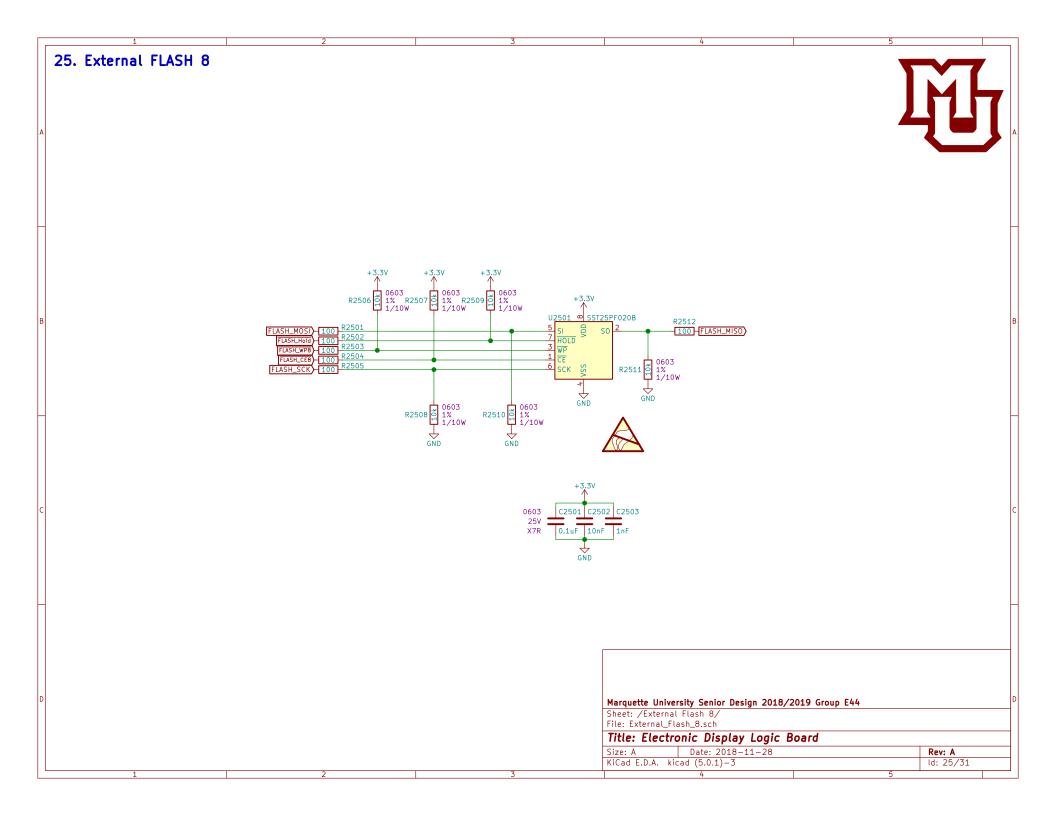


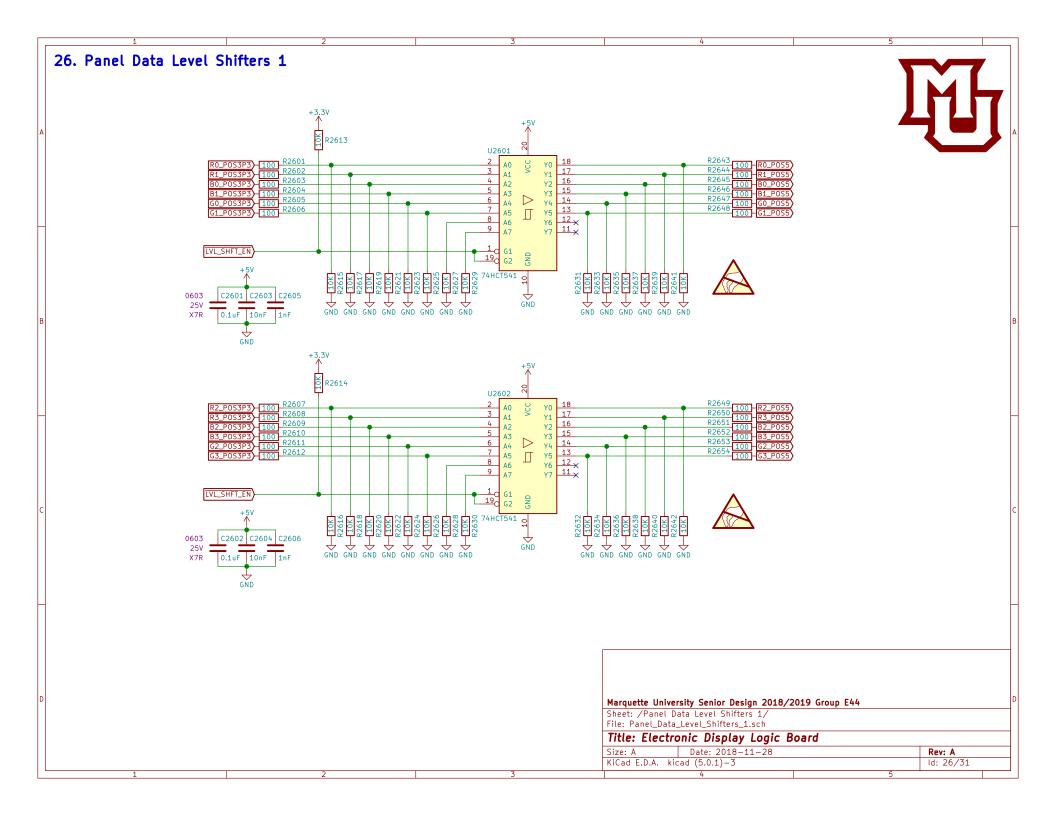


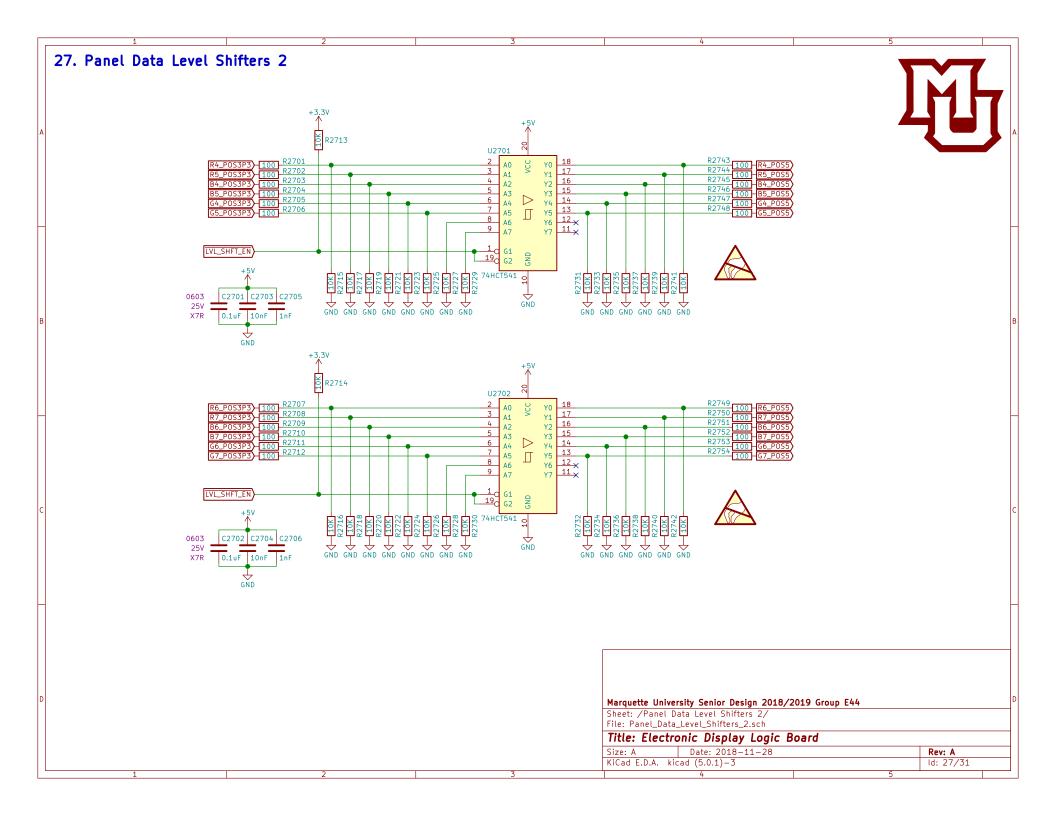




24. External FLASH 7 R2412 —100 FLASH_MISO Marquette University Senior Design 2018/2019 Group E44 Sheet: /External Flash 7/ File: External_Flash_7.sch Title: Electronic Display Logic Board Date: 2018-11-28 Size: A Rev: A KiCad E.D.A. kicad (5.0.1)-3 ld: 24/31







28. Panel Data Level Shifters 3 R2813 0603 25V X7R 17 16 15 14 13 Y1 Y2 Y3 Y4 Y5 Y6 R2832 R2803 0603 1% 1/10W R2808 R283 R2834 +3.3V Panel_CLK_P0S3P3 Panel_LAT_P0S3P3 R2835 R2810 R2836 R2837 R2804 1/10W LVL_SHFT_EN G2 74HCT541 C2802 C2803 C2804 GND 0603 25V X7R GND 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

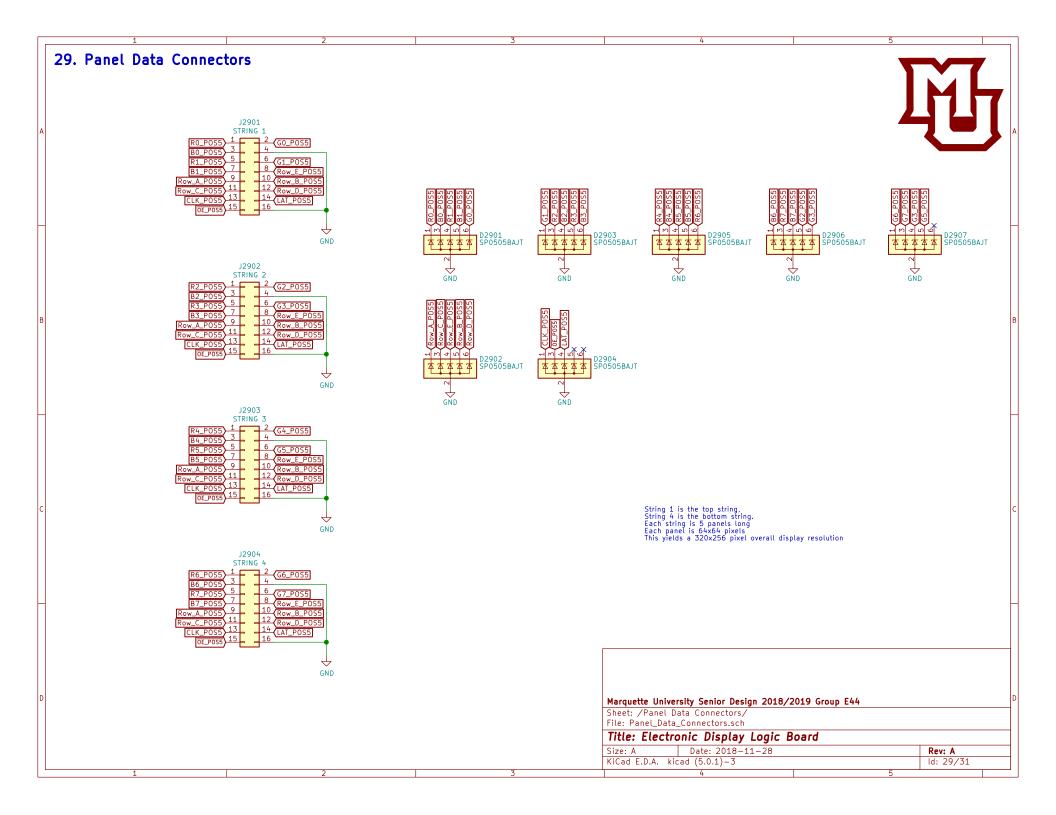
Date: 2018-11-28

Rev: A

ld: 28/31

Size: A

KiCad E.D.A. kicad (5.0.1)-3



30. Test Points J3003 FLASH SPI USB UART WIFI UART GND GND 32 Panel_LAT_POS5 GND TP3001 GND +12Vin +3.3V +5V +5.5V TP3004 TP3005 TP3006 TP3008 TP3003 +5V_USB GND_USB Marquette University Senior Design 2018/2019 Group E44 Sheet: /Test Points/ File: Test_Points.sch Title: Electronic Display Logic Board Date: 2018-11-28

Size: A

KiCad E.D.A. kicad (5.0.1)-3

Rev: A

ld: 30/31

31. Mechanical 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff MK3101 MK3105 MK3109 MK3113 MK3117 MK3121 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff 4-40 Standoff MK3102 MK3106 MK3110 MK3114 MK3118 MK3122 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw MK3103 MK3107 MK3111 MK3115 MK3119 MK3123 1 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw 4-40 Screw MK3108 MK3112 MK3116 MK3120 MK3124 MK3104 1 H3111 3mm Mounting Hole H3103 H3105 H3109 3mm Mounting Hole H3104 3mm Mounting Hole H3110 3mm Mounting Hole H3102 3mm Mounting Hole H3106 3mm Mounting Hole H3108 3mm Mounting Hole H3112 3mm Mounting Hole Marquette University Senior Design 2018/2019 Group E44 Sheet: /Mechanical/ File: Mechanical.sch Title: Electronic Display Logic Board Date: 2018-11-28 Size: A Rev: A ld: 31/31 KiCad E.D.A. kicad (5.0.1)-3