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# **Electronic Display Logic Board**

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

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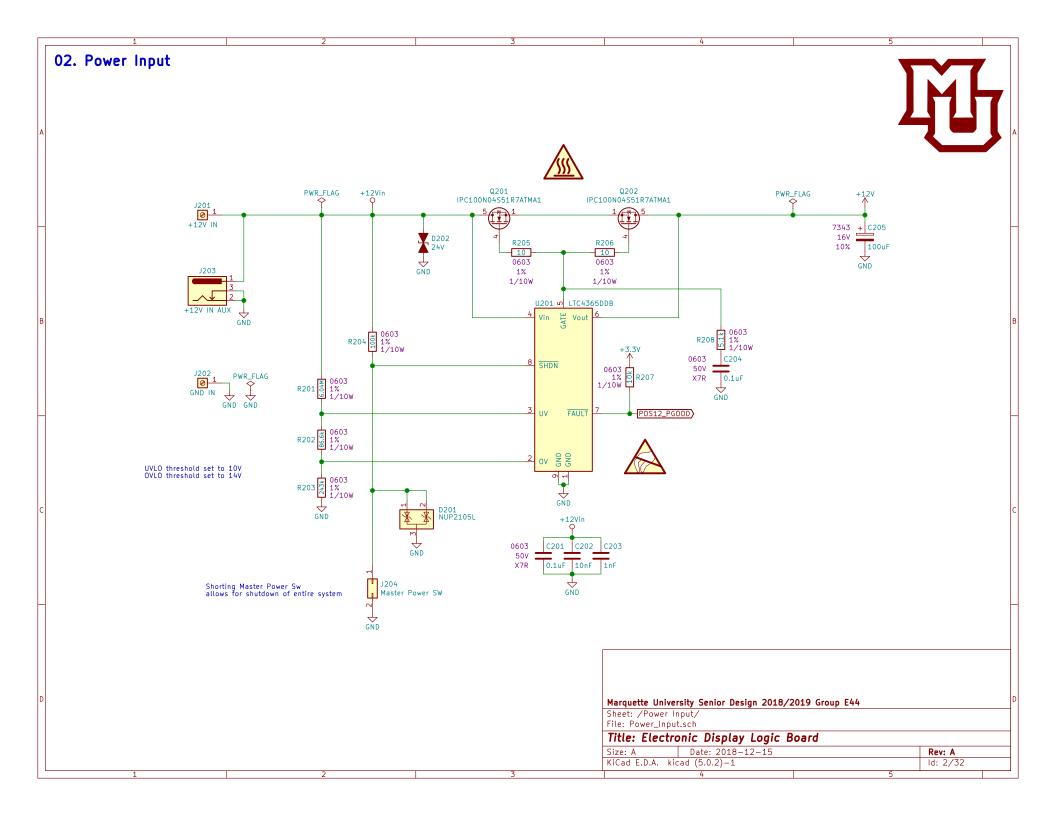
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File: LED\_Display\_Controller.sch

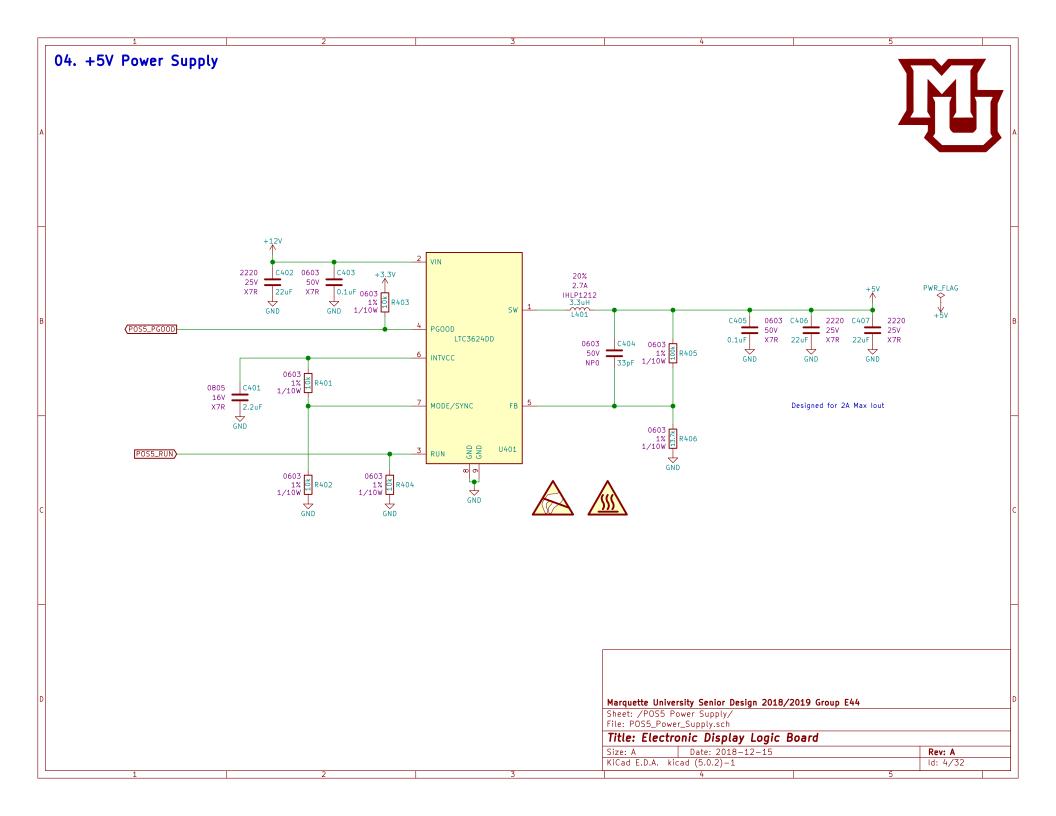
Title: Electronic Display Logic Board

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

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

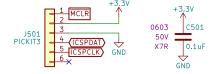


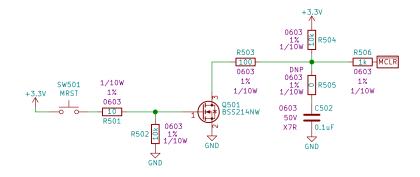
#### 03. +3.3V Power Supply INTVCC 18 C309 0805 MODE C301 2220 2220 C303 C302 2220 1% 1/10W D301 MBR0530 16V R304 PHMODE 25V X7R 25V X7R 25V X7R 2.2uF 22uF GND X7R 22uF 22uF GND BOOST GND GND 20% 0603 C307 0603 50V C305 14A PWR\_FLAG +3.3V 50V IHLP2020 0.47uH L301 0.1uF X7R X7R 0603 1% 1/10W Turn on threshold set to 6.6V SW SW SW SW +3.30 1210 C311 1210 C312 6.3V X7R 6.3٧ 47uF GND 47uF 0603 R307 | 0603 1% 1/10W X7R 50V NP0 0603 1% 1/10W 0603 GND SW 1% T R303 LTC3605A\_UF GND VON (POS3P3\_PGOOD FB PGOOD Designed for 5A Max lout GND 24 CLKOUT 23× CLKIN GNDS TRACK/SS 0603 1% 1/10W GNDS GND 0603 C304 50V X7R 0603 1% 1/10W 10nF 0603 C308 GNDS 50V GNDS 15pF NP0 0603 GNDS 50V GNDS GND 62pF Switching frequency set to 2.5 MHz NP0 GNDS Marquette University Senior Design 2018/2019 Group E44 Sheet: /POS3P3 Power Supply/ File: POS3P3\_Power\_Supply.sch Title: Electronic Display Logic Board Date: 2018-12-15 Size: A Rev: A KiCad E.D.A. kicad (5.0.2)-1 ld: 3/32



# 05. Microcontroller Programming





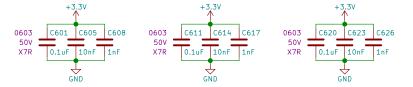


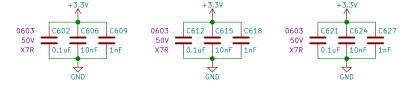
#### Marquette University Senior Design 2018/2019 Group E44

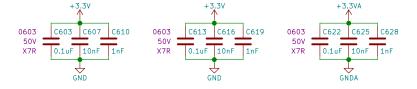
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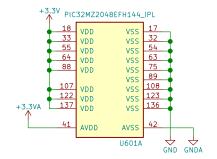
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## 06. Microcontroller Power





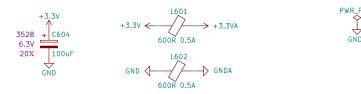












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PWR\_FLAG

Size: A	Date: 2018-12-15		Rev: A	
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#### 07. Microcontroller IO Bank 1 PIC32MZ2048EFH144\_IPL RAO/TMS/AN24 RDO/RPDO/RTCC/INTO 109 R1\_P0S3P3 X 56 RA1/TCK/AN29 RD1/RPD1/SCK1 FLASH\_WP7 85 RA2/SCL2 110 R2\_P0S3P3 RD2/EBID14/RPD2/PMD14 FLASH\_WP8 86 RA3/EBIRDY1/SDA2 RD3/EBID15/RPD3/PMD15 (EBI\_A14 87 RA4/EBIA14/PMCS1/PMA14 118 R4\_POS RD4/SQICSO/RPD4 119 R5\_P0S3P3 2 RA5/EBIA5/AN34/PMA5 RD5/SQICS1/RPD5 (EBI A5 FLASH\_WP1 129 RA6/TRCLK/SQICLK RD6/ETXEN/RPD6 120 R6\_POS3P FLASH\_WP2 130 RA7/TRD3/SQID3 RD7/ETXCLK/RPD7 121 R7\_POS3P FLASH\_WP3 39 RA9/VREF-/CVREF-/AN27 RD9/EBIA15/RPD9/PMCS2/PMA15 97 EBI\_A15) RD10/RPD10/SCK4 98 USB\_UART\_TX FLASH\_WP4 40 RA10/VREF+/CVREF+/AN28 FLASH\_WP5 95 RA14/RPA14/SCL1 RD11/EMDC/RPD11 99 Row\_A\_POS3P3 FLASH\_WP6 96 RA15/RPA15/SDA1 RD12/EBID12/RPD12/PMD12 Row A is Least Significant Bit RD13/EBID13/PMD13 113 Row\_C\_POS3P: RD14/AN32/RPD14 69 Row\_D\_POS3P3 (ICSPDAT) 36 RB0/PGED1/AN0/RPB0 RD15/AN33/RPD15/SCK6 70 Row\_E\_POS3P3 ICSPCLK) 35 RB1/PGEC1/AN1/RPB1 RB2/AN2/C2INB/RPB2 FLASH\_CE2 31 RB3/AN3/C2INA/RPB3 REO/EBIDO/PMDO 138 EBI\_IO1 FLASH\_CE3 26 RB4/AN4/C1INB RE1/EBID1/PMD1 142 (EBI\_I02 FLASH\_CE4 25 RB5/AN45/C1INA/RPB5 RE2/EBID2/PMD2 FLASH\_CE5 37 RB6/PGEC2/AN46/RPB6 RE3/EBID3/RPE3/PMD3 EBI 103 FLASH\_CE6 38 RB7/PGED2/AN47/RPB7 RE4/EBID4/AN18/PMD4 EBLA10 47 RB8/EBIA10/AN48/RPB8/PMA10 RB9/EBIA7/AN49/RPB9/PMA7 RE5/EBID5/AN17/RPE5/PMD5 EBI 105 RE6/EBID6/AN16/PMD6 **√**EBI\_106 FLASH\_CEF 50 RB10/CVREFOUT/AN5/RPB10 FLASH\_CEE 50 RB11/AN6 RE7/EBID7/AN15/PMD7 EBI\_107 RE8/AN25/RPE8 FLASH\_Hold 59 RB12/AN7 24 WIFI\_RESET RE9/AN26/RPE9 × 60 RB13/AN8

FLASH\_SCK 61 RB14/AN9/RPB14/SCK3 X 62 RB15/AN10/RPB15/OCFB

FLASH\_MISO 106

X 72 RC15/0SC2/CLK0

 EBLA6
 6
 RC1/EBIA6/AN22/RPC1/PMA6

 (EBLA12
 11
 RC2/EBIA12/AN21/RPC2/PMA12

 (EBLWE)
 12
 RC3/EBIWE/AN20/RPC3/PMWR

 (EBLOE)
 13
 RC4/EBIOE/AN19/RPC4/PMRD

 RC12/OSC1/CLKI

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Sheet: /Microcontroller 1/ File: Microcontroller\_1.sch

VBUS

D- 76 ×

VUSB3V3

Title: Electronic Display Logic Board

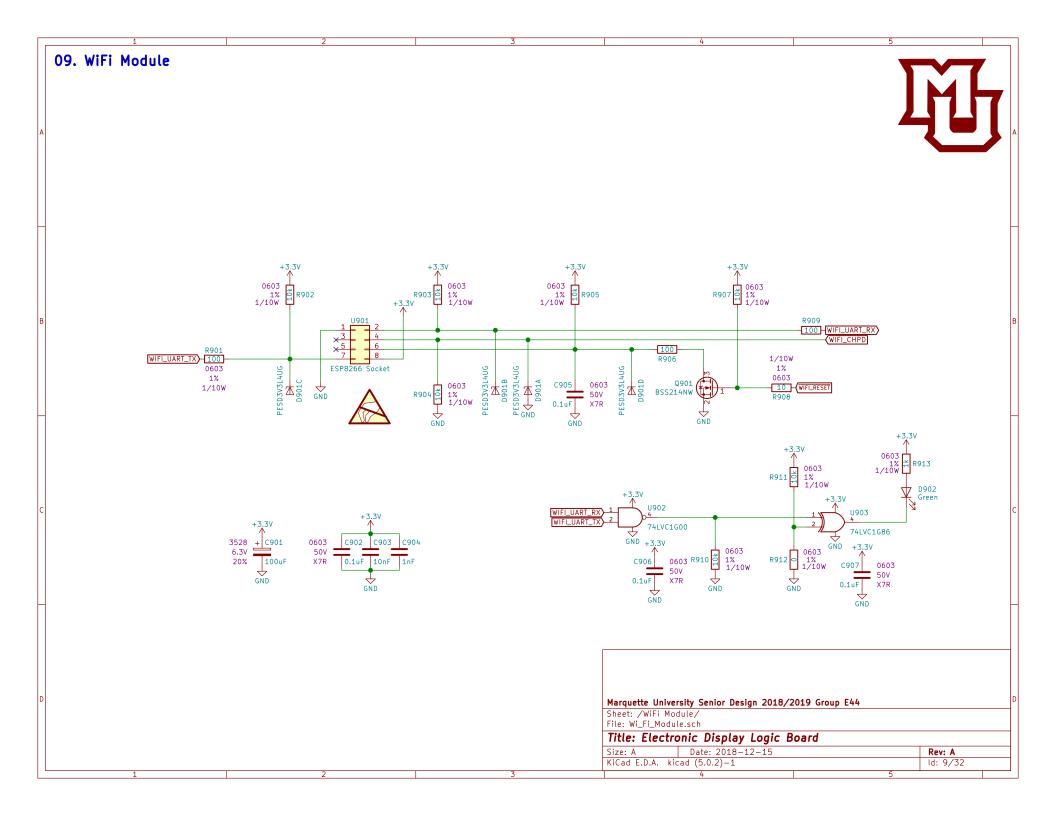
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 Rev: A

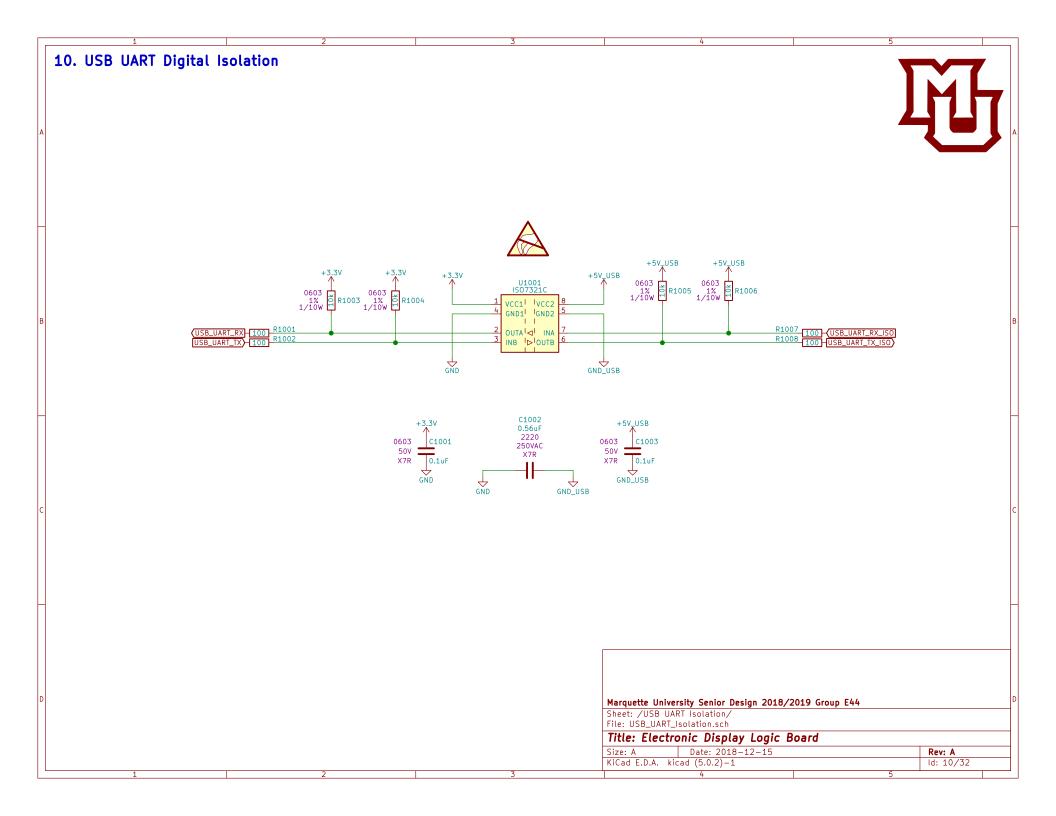
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 Id: 7/32

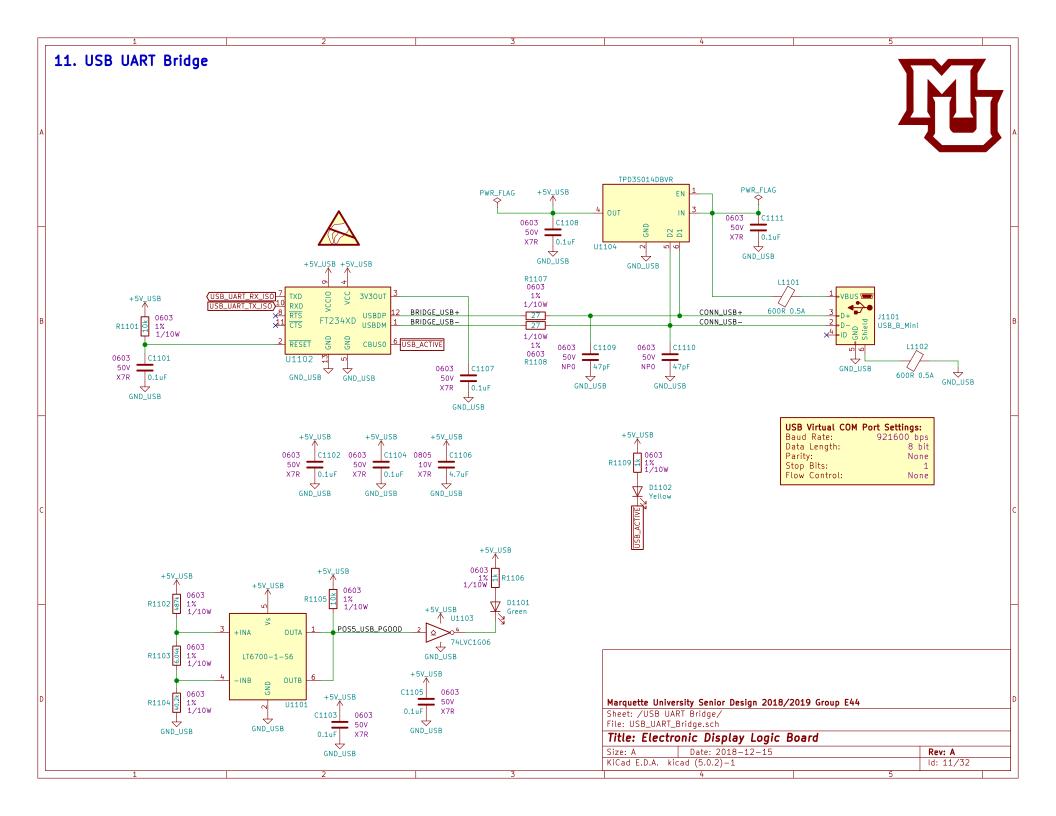
#### 08. Microcontroller IO Bank 2 PIC32MZ2048EFH144\_IPL USB\_UART\_RX) 124 RF0/EBID11/RPF0/PMD11 114 Panel\_CLK\_POS3P3 RJ0/ETXERR POS12\_PGOOD 125 RF1/EBID10/RPF1/PMD10 115 Panel\_LAT\_POS3P3 RJ1/EMDIO (POS5\_RUN 79 RF2/SDA3/RPF2 116 Panel\_OE\_POS3P3 RJ2/EBIRDY3 POS5\_PGOOD 78 RF3/RPF3/USBID RJ3/EBIA22 EBLA9 90 RF4/EBIA9/RPF4/SDA5/PMA9 RF5/EBIA8/RPF5/SCL5/PMA8 RJ4/EBICSO 132 G0\_P0S3P3 RJ5/EBICS1 POS5P\_FGOOD 80 RF8/SCL3/RPF8 RF12/TD0/AN31/RPF12 RJ6/EBICS2 RJ7/EBICS3 G2\_POS3P3 POS5P\_RUN 57 RF13/TDI/AN30/RPF13/SCK5 RJ8/AN35/ETXD0 8 G4\_P0S3P. 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 RJ12/EBIBSO 9 G7\_POS3P 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 EBLA2 21 RG9/EBIA2/AN11/C2INC/RPG9/PMA2 Heartbeat\_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 POS12\_ADC 44 RH1/AN39/ETXD3 94 ENCODER\_DIR RK6/EBIA20 RH2/EBIRP RK7/EBIA21 Other\_Error\_LED 46 RH3 POSSP5\_ADC 65 RH4/AN40/ERXERR POS5\_ADC 66 RH5/AN41/ERXD1 POS5\_ADC 67 RH6/AN42/ERXD2 (EBI\_A4 68 B0\_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: 2018-12-15 Size: A Rev: A

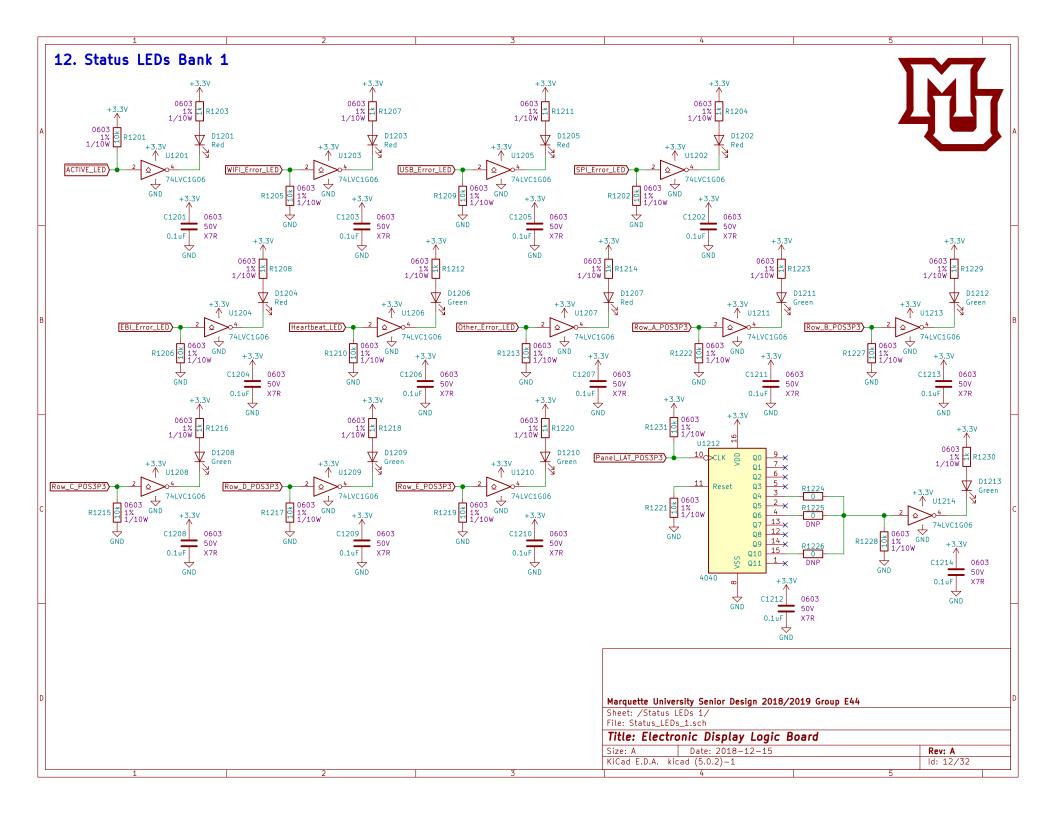
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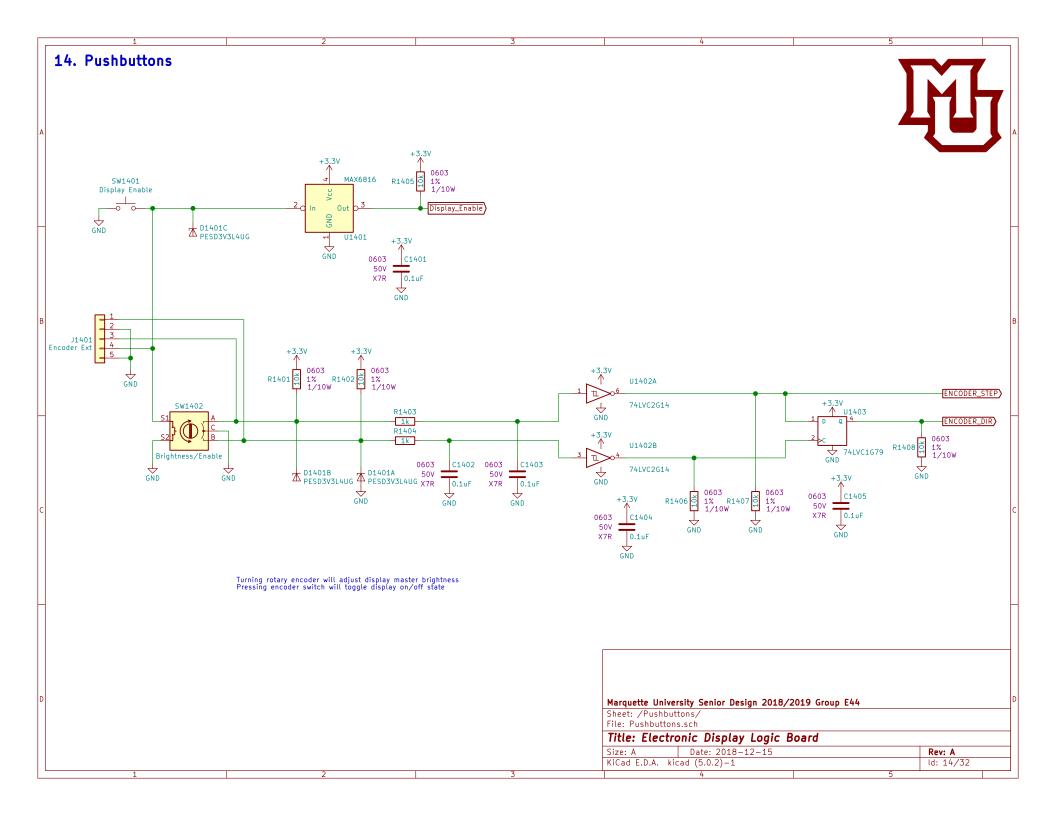






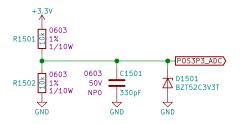


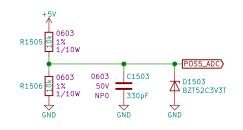
# 13. Status LEDs Bank 2 D1303 Green D1301 D1302 Green D1304 Green +3.3V ↑ U1301 +3.3V ↑ U1304 Green +3.3V ↑ U1302 +3.3V ↑ U1303 74LVC1G06 74LVC1G06 74LVC1G06 74LVC1G06 GND +3.3V +3.3V 0.1uF 0.1uF 0.1uF 0.1uF 0603 50V 0603 0603 50V 500 50V GND GND GND GND Marquette University Senior Design 2018/2019 Group E44 Sheet: /Status LEDs 2/ File: Status\_LEDs\_2.sch Title: Electronic Display Logic Board Size: A Date: 2018-12-15 Rev: A KiCad E.D.A. kicad (5.0.2)-1 ld: 13/32

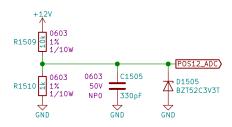


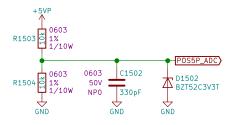
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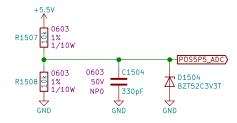








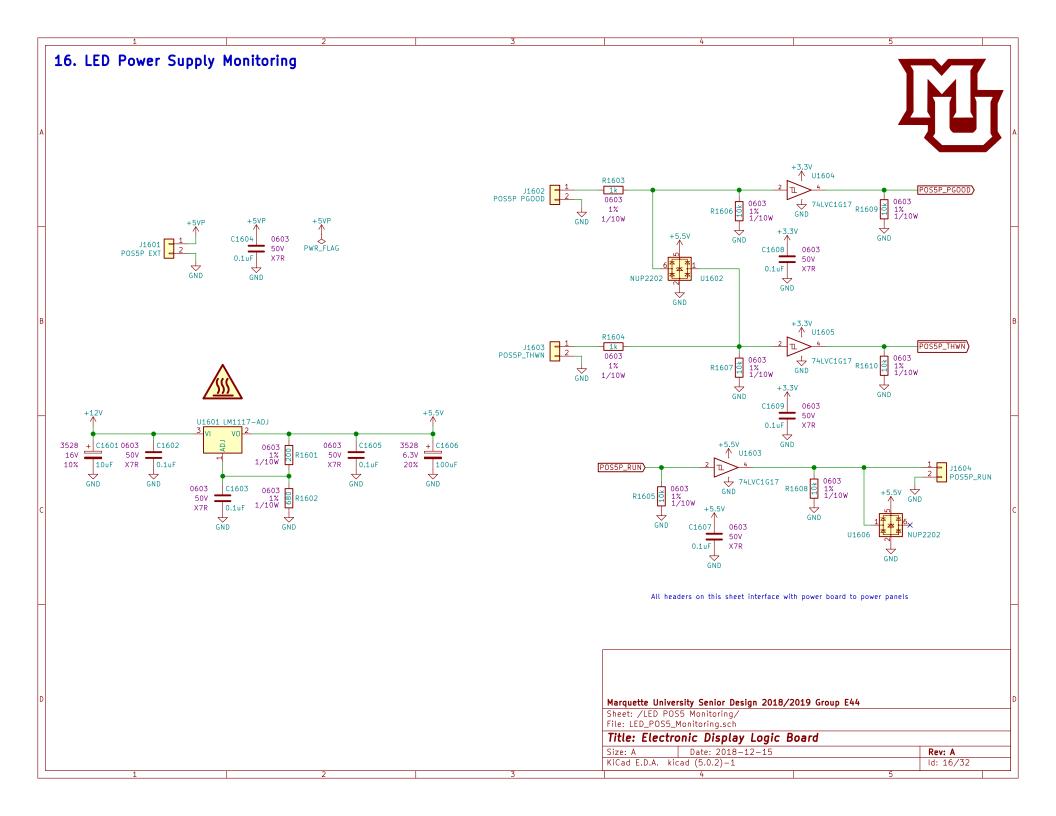


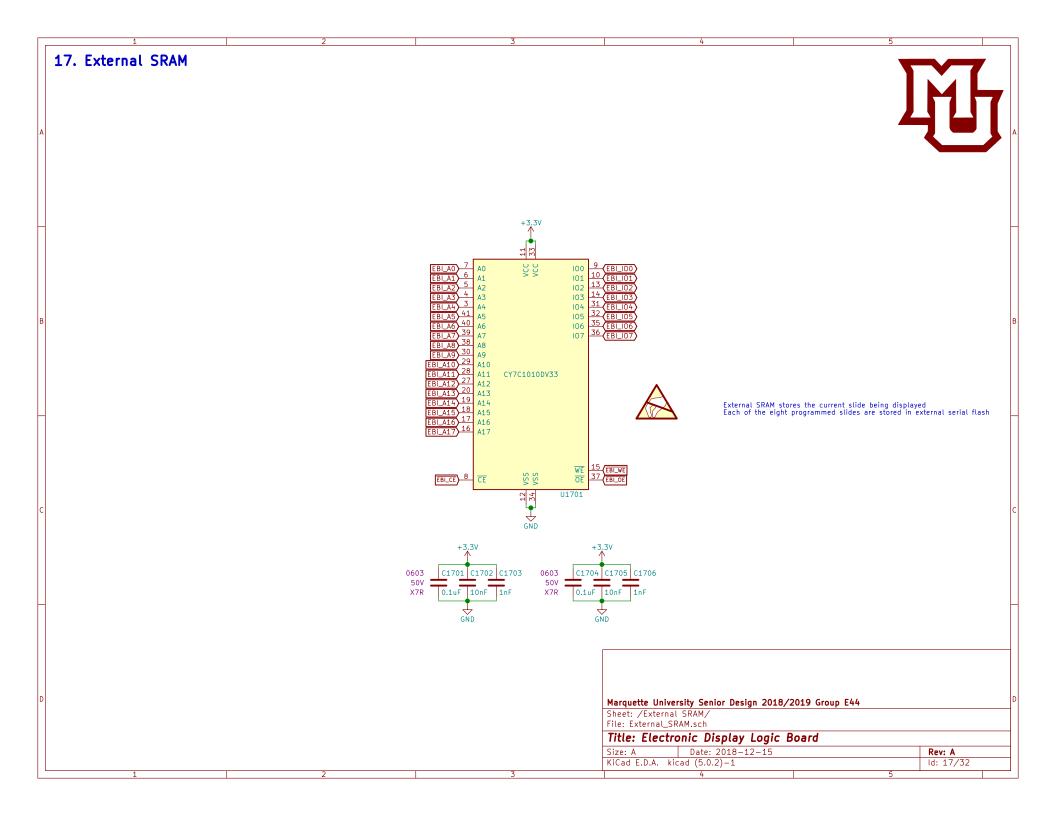


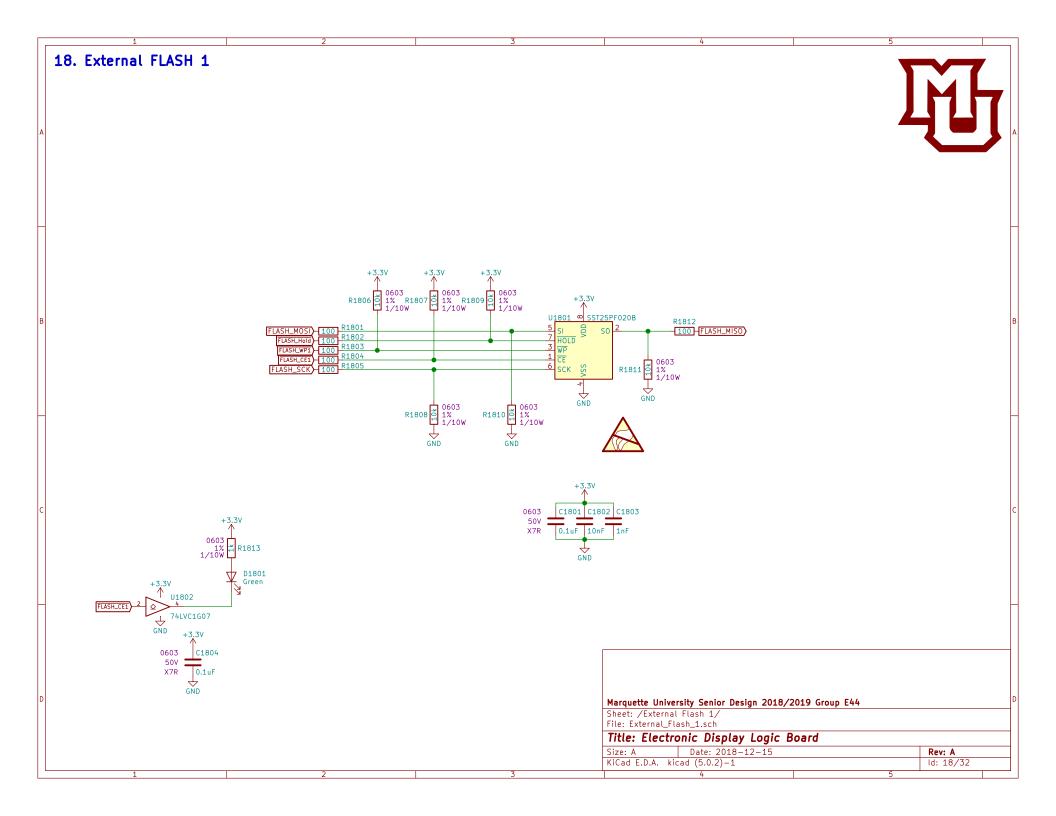
#### Marquette University Senior Design 2018/2019 Group E44

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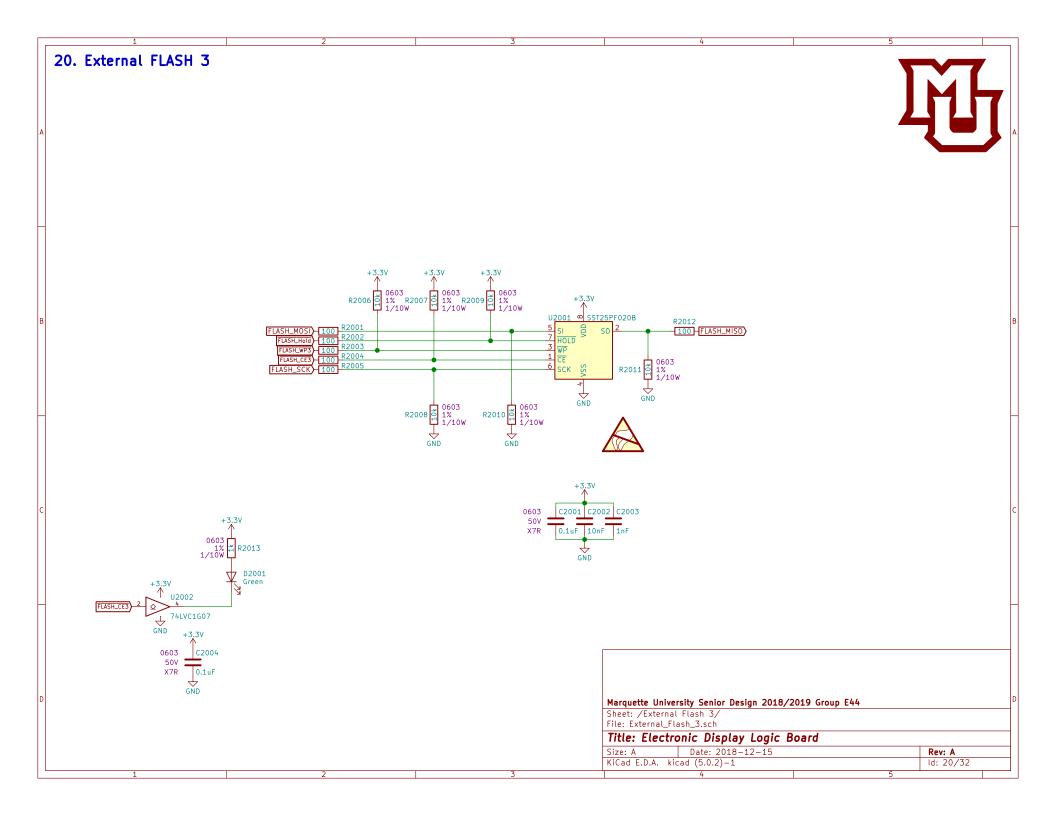
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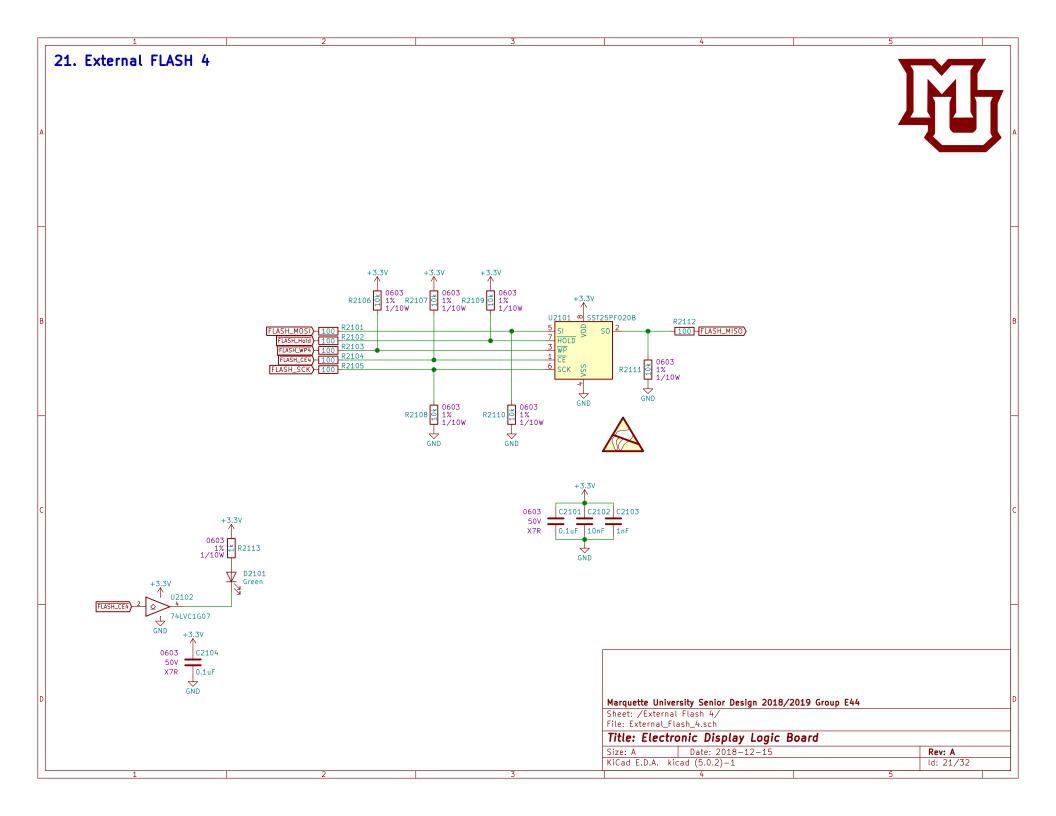


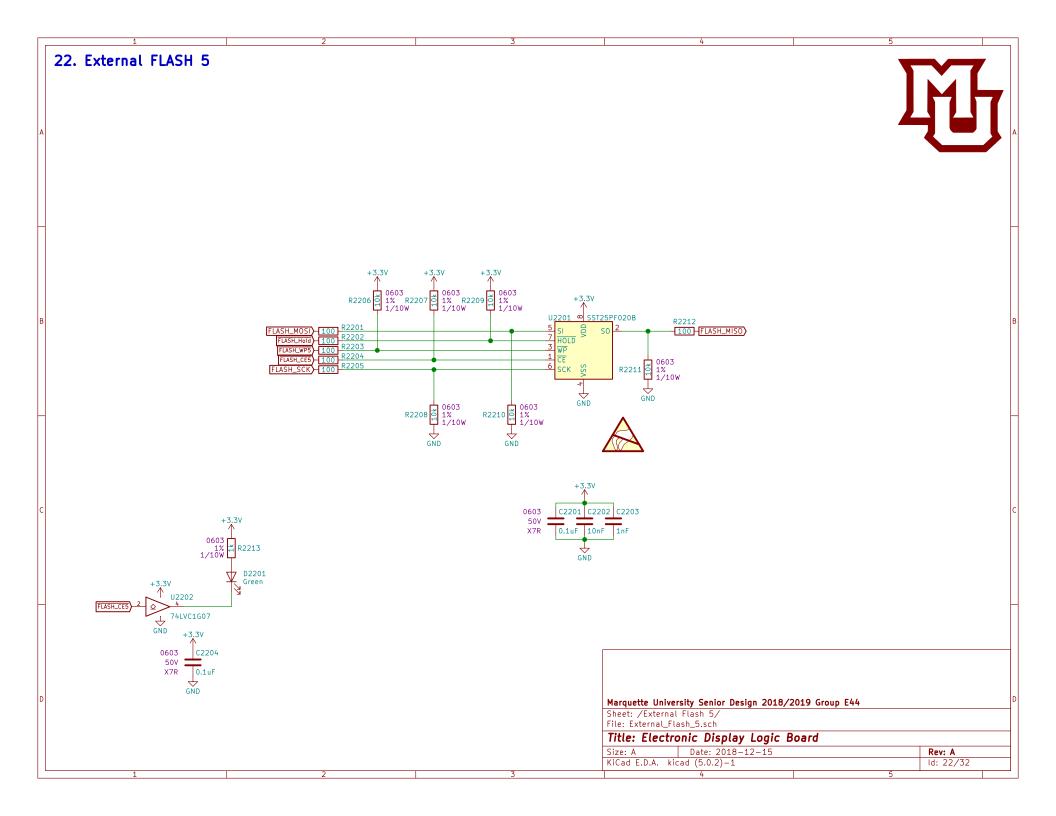


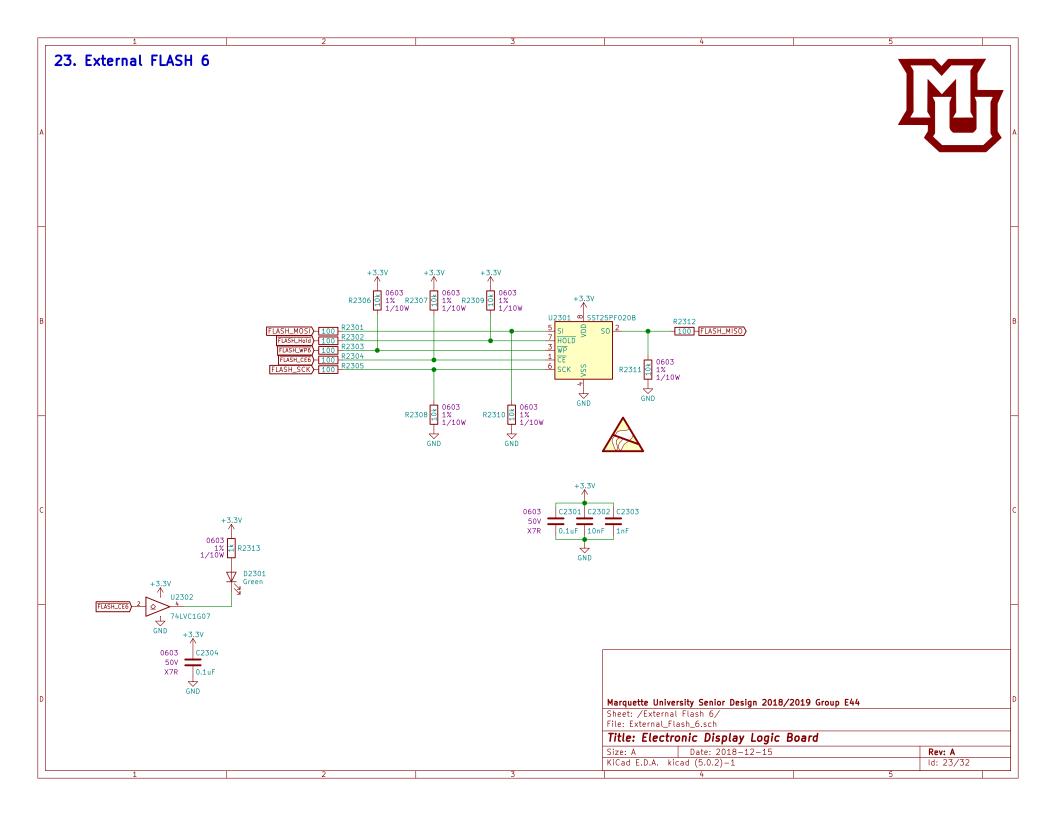


# 19. External FLASH 2 GND R1910 0603 1% 1/10W 50V X7R +3.3V 101902 74LVC1G07 +3.3V C1904 0603 50V X7R Marquette University Senior Design 2018/2019 Group E44 Sheet: /External Flash 2/ File: External\_Flash\_2.sch Title: Electronic Display Logic Board Size: A Date: 2018-12-15 Rev: A KiCad E.D.A. kicad (5.0.2)-1 ld: 19/32

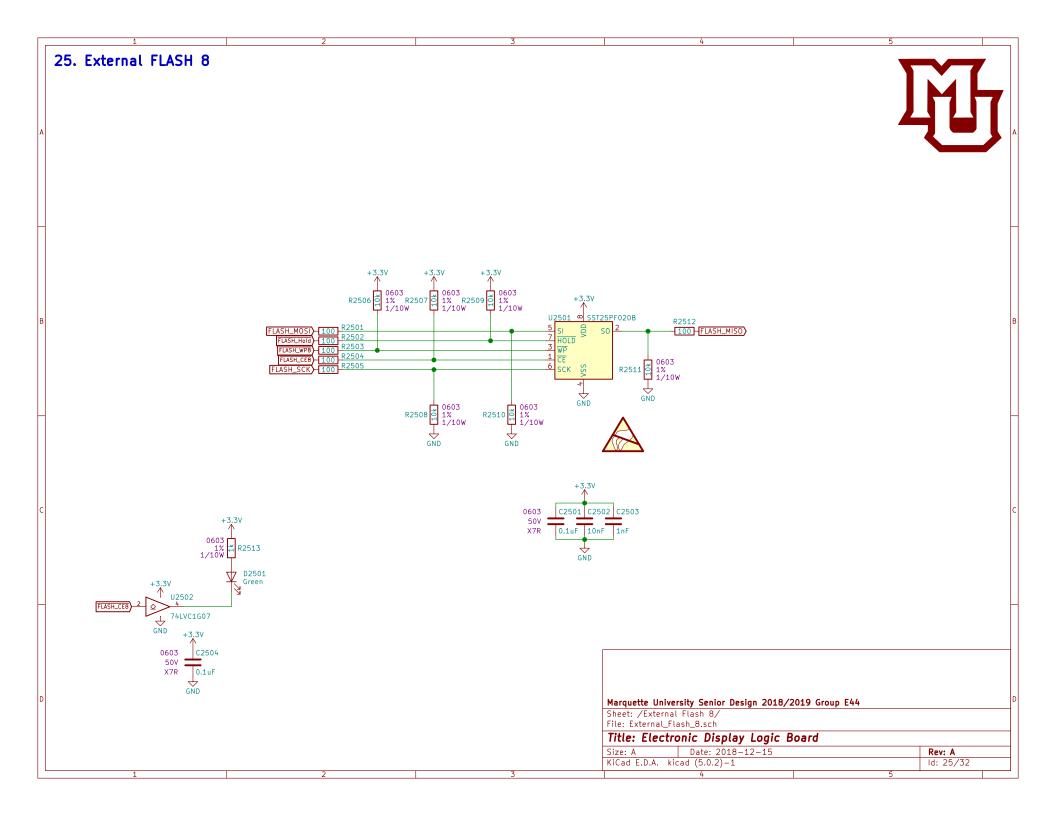


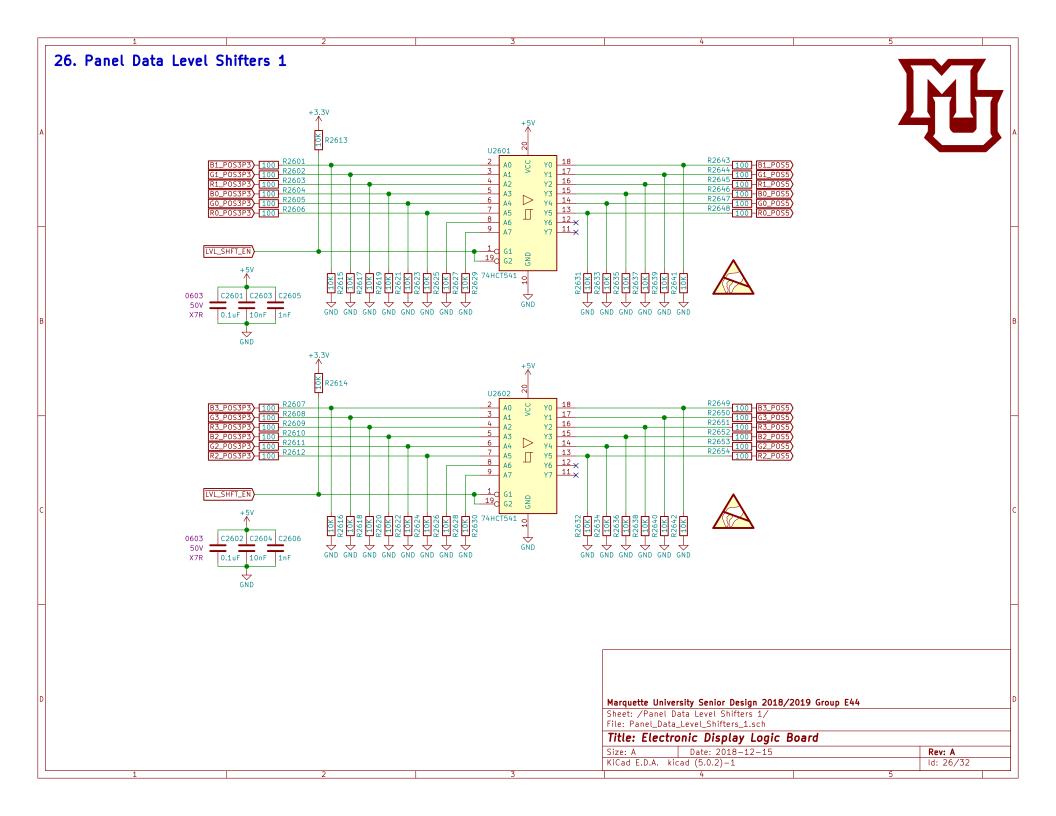


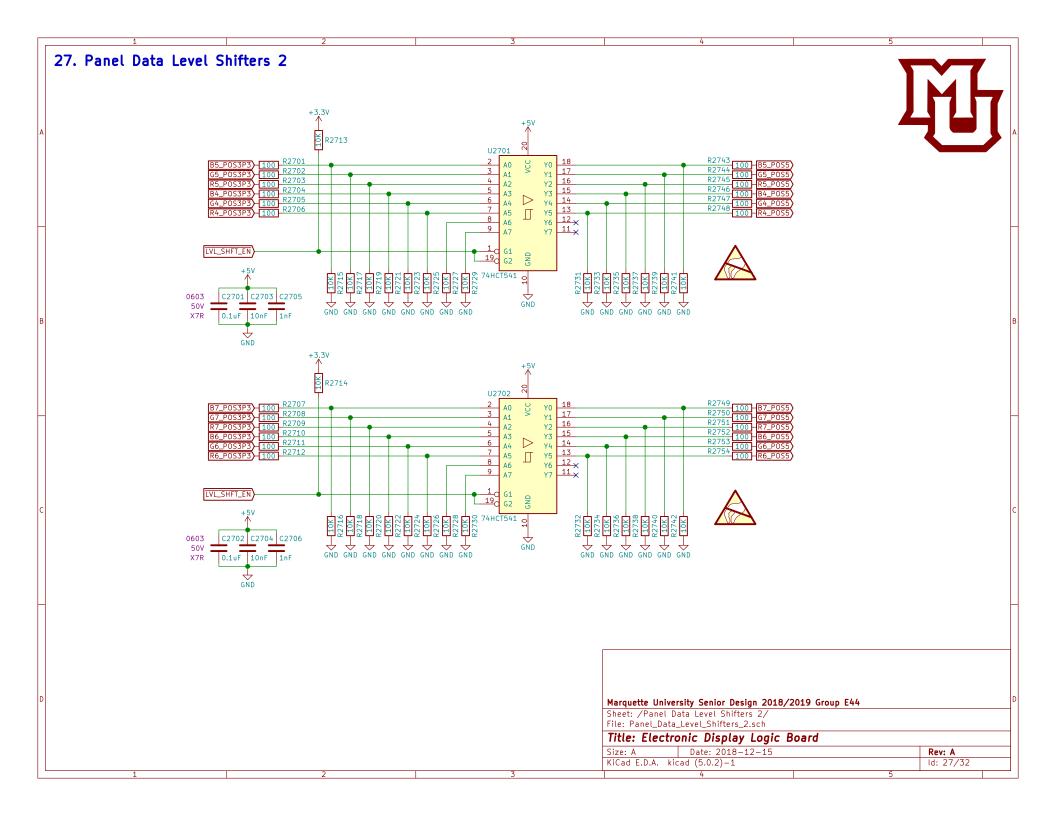


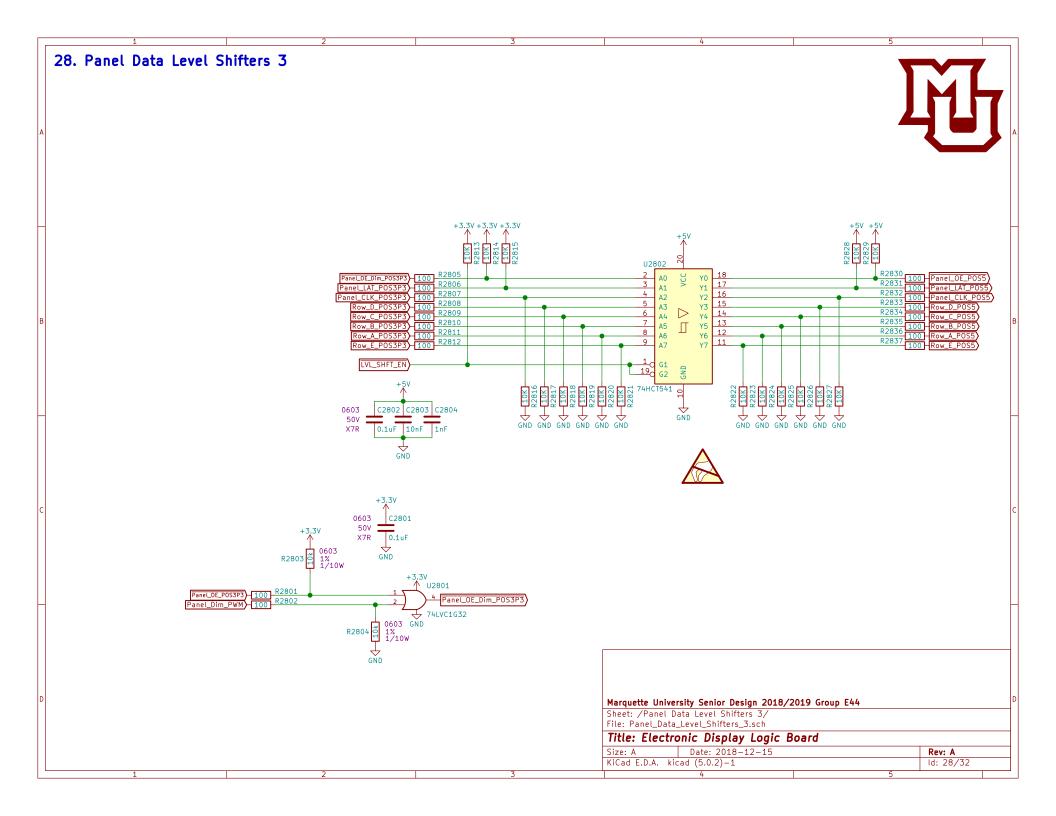


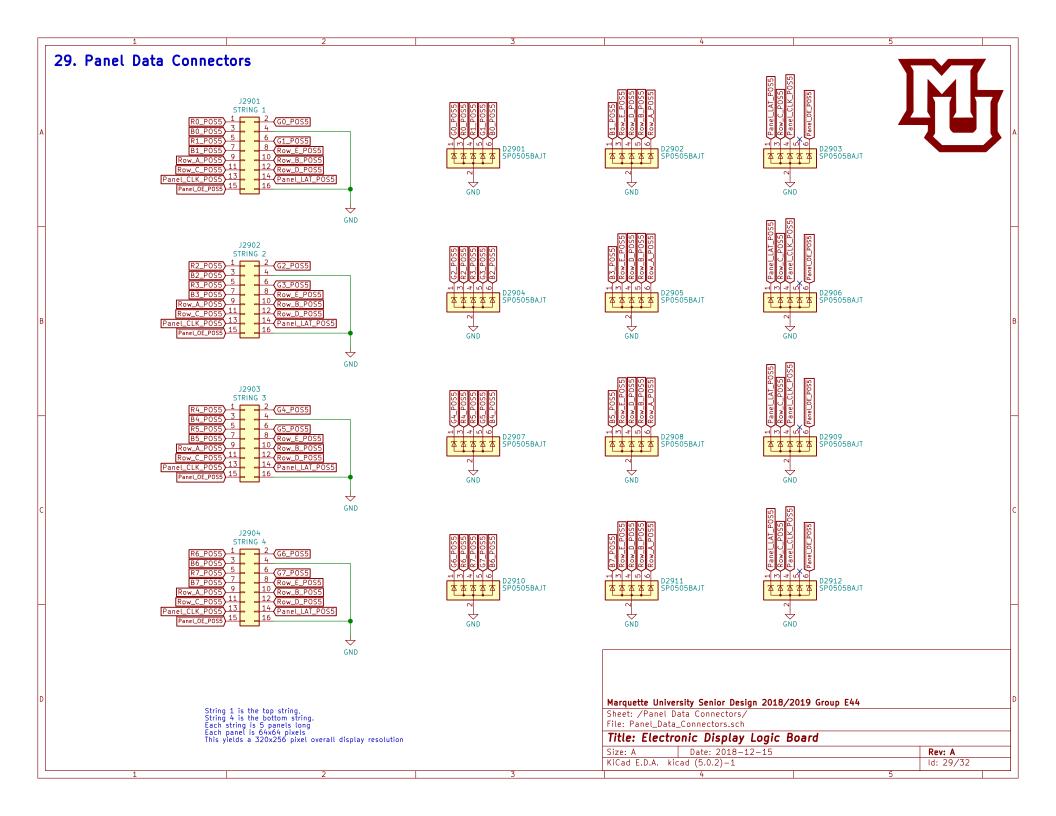
# 24. External FLASH 7 U<u>2401 <sup>∞</sup> SST25P</u>F020B R2412 —100 FLASH\_MISO GND 50V X7R 74LVC1G07 +3.3V 0603 50V X7R C2404 Marquette University Senior Design 2018/2019 Group E44 Sheet: /External Flash 7/ File: External\_Flash\_7.sch Title: Electronic Display Logic Board Size: A Date: 2018-12-15 Rev: A KiCad E.D.A. kicad (5.0.2)-1 ld: 24/32











# 30. Test Points J3003 FLASH SPI WIFI UART TP3008 GND\_USB +5V\_USB Marquette University Senior Design 2018/2019 Group E44 Sheet: /Test Points/ File: Test\_Points.sch Title: Electronic Display Logic Board

Date: 2018-12-15

Rev: A

ld: 30/32

Size: A

KiCad E.D.A. kicad (5.0.2)-1

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

# 32. Additional Capacitance





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