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# AC Power Meter

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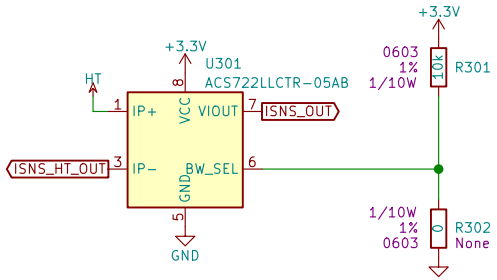
| | | |
|---|---|---|
| Sheet: / | | |
| File: AC_Power_Meter.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 1/17 |

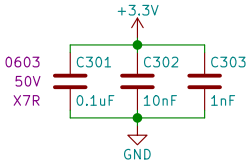
# AC Input Connections

| | | |
|---|---|---|
| Sheet: /AC Input/<br>File: AC_Input.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 2/17 |

# AC Current Sensor

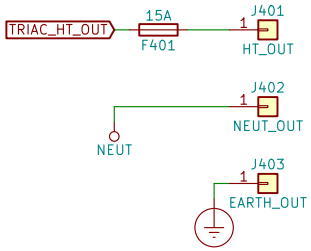



3.787 Peak Amps Max to support full output swing of conditioning stages

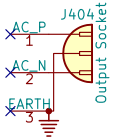



| | | |
|---|---|---|
| Sheet: /AC Current Sensor/<br>File: AC_Current_Sensor.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 3/17 |

# AC Output Connections

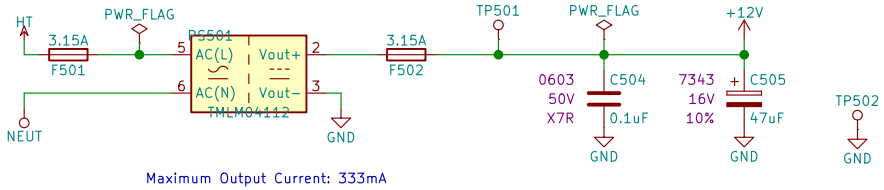



-> To Panel AC Output Socket

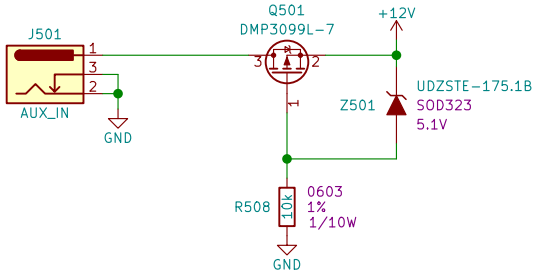


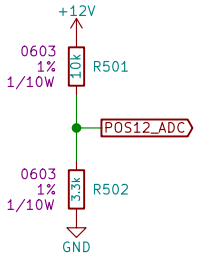

| | | |
|---|---|---|
| Sheet: /AC Output/<br>File: AC_Output.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 4/17 |

# +12V 4W Isolated AC/DC Converter, +12V PGOOD Window Comparator



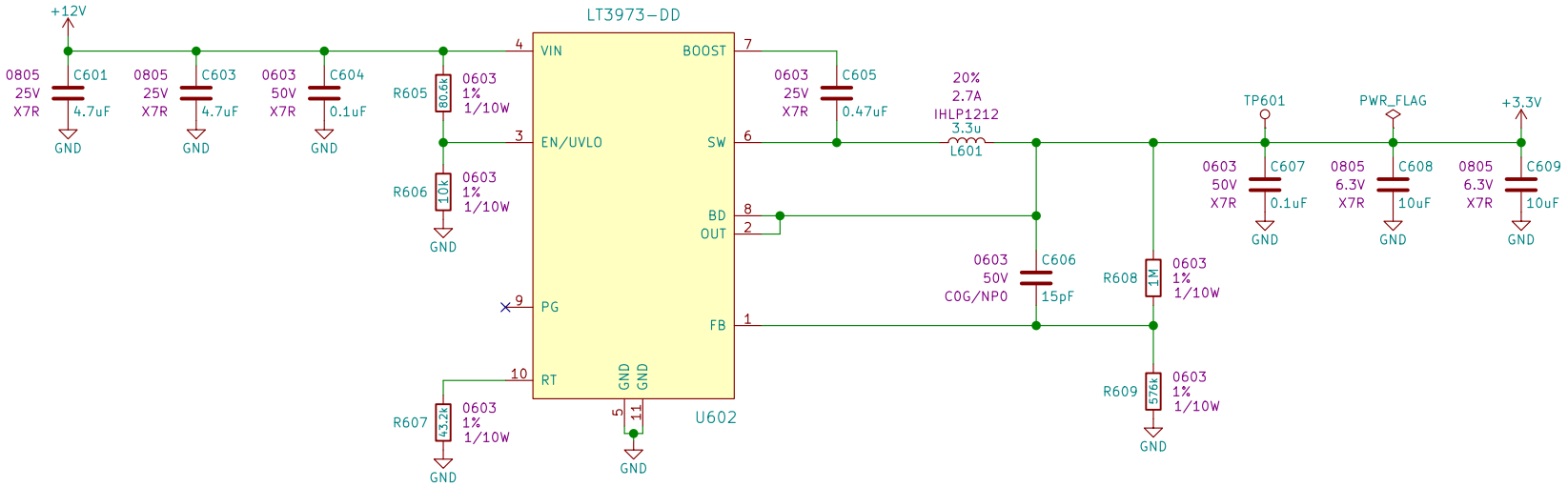

Maximum Output Current: 333mA

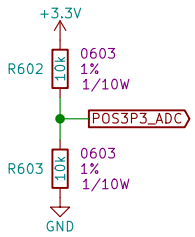



| | | |
|---|---|---|
| Sheet: /POS12 Power Supply/ | | |
| File: POS12_Power_Supply.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 5/17 |

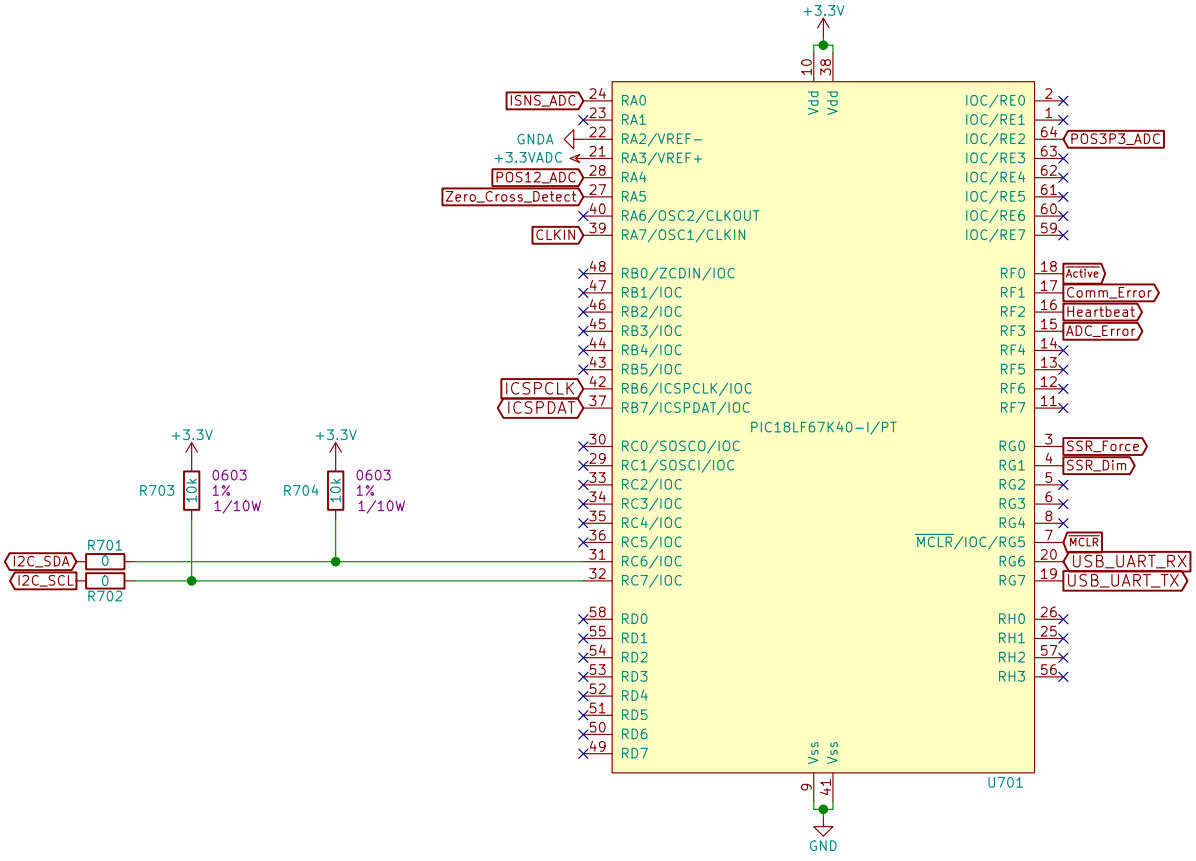
# +3.3V, 750mA, 2MHz Buck Converter



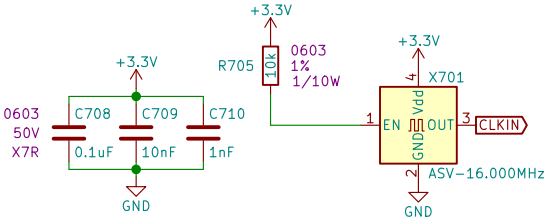

| | | |
|---|---|---|
| Sheet: /POS3P3 Power Supply/ | | |
| File: POS3P3_Power_Supply.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 6/17 |

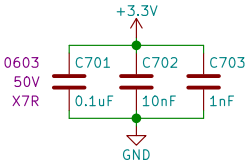
# 8 bit High Performance Enhanced Flash PIC Microcontroller

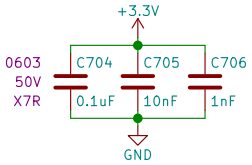








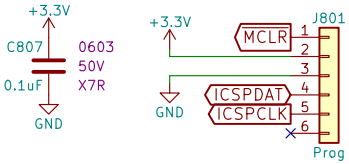



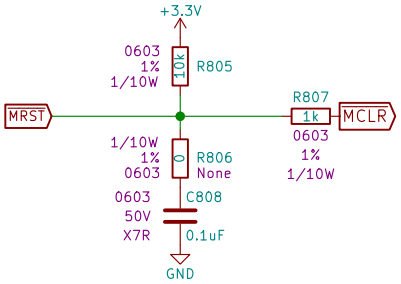

Sheet: /Microcontroller/
File: Microcontroller.sch

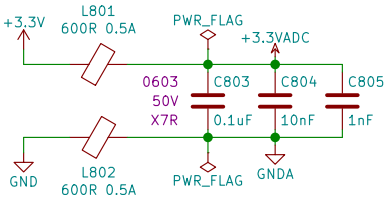
**Title:**

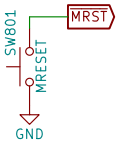
| Size: A | Date: 2018−10−01 | **Rev: A** |
|---|---|---|
| KiCad E.D.A. kicad (5.0.1)−3 | | Id: 7/17 |

# Programming Header, $\overline{\text{MCLR}}$ Reset Filter, ICSP Detection



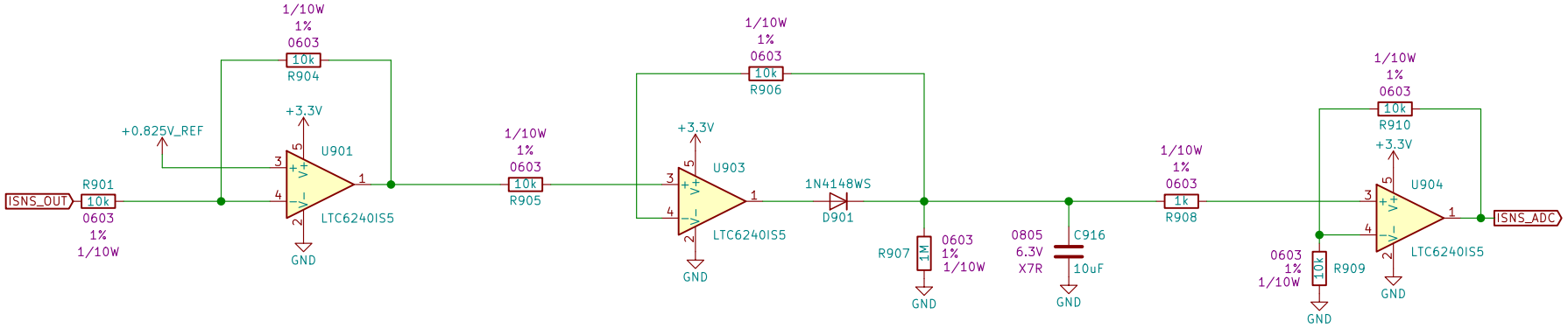



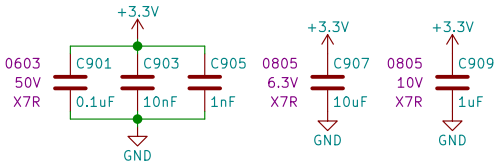

Sheet: /Microcontroller Programming/
File: Microcontroller_Programming.sch

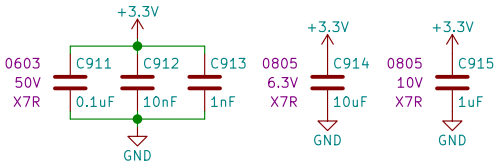
**Title:**

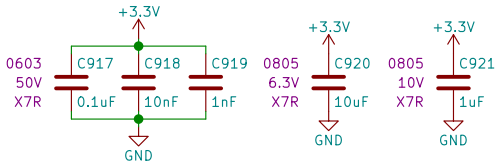
| Size: A | Date: | **Rev:** |
|---|---|---|
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 8/17 |

# Offset Removal, Active Peak Detector, 2V/V Gain Stage

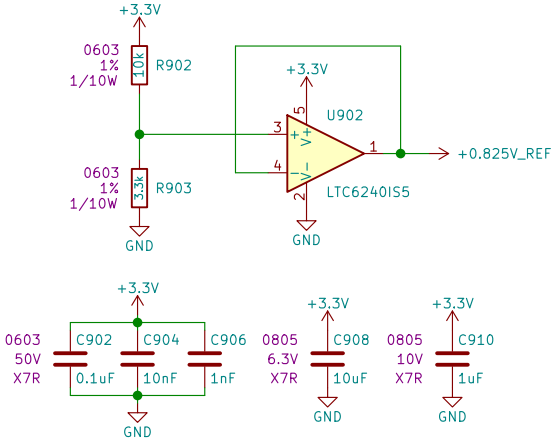


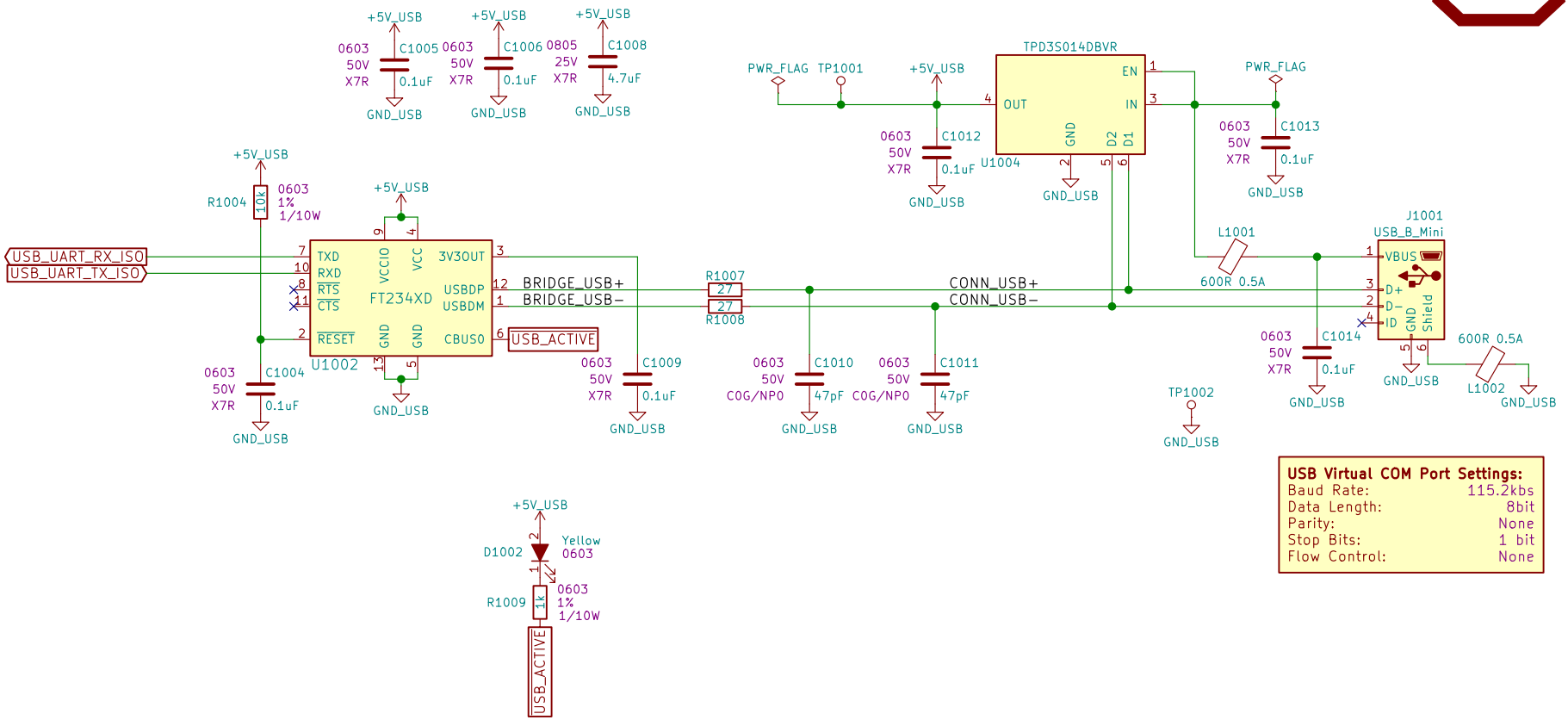




ISNS_ADC Scaling: 3.787Apk/2V




| | | |
|---|---|---|
| Sheet: /Sensor Signal Conditioning/ | | |
| File: Sensor_Signal_Conditioning.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 9/17 |

# UART to USB Bridge, +5V USB Window Comparator




**USB Virtual COM Port Settings:**

| | |
|---|---|
| Baud Rate: | 115.2kbs |
| Data Length: | 8bit |
| Parity: | None |
| Stop Bits: | 1 bit |
| Flow Control: | None |

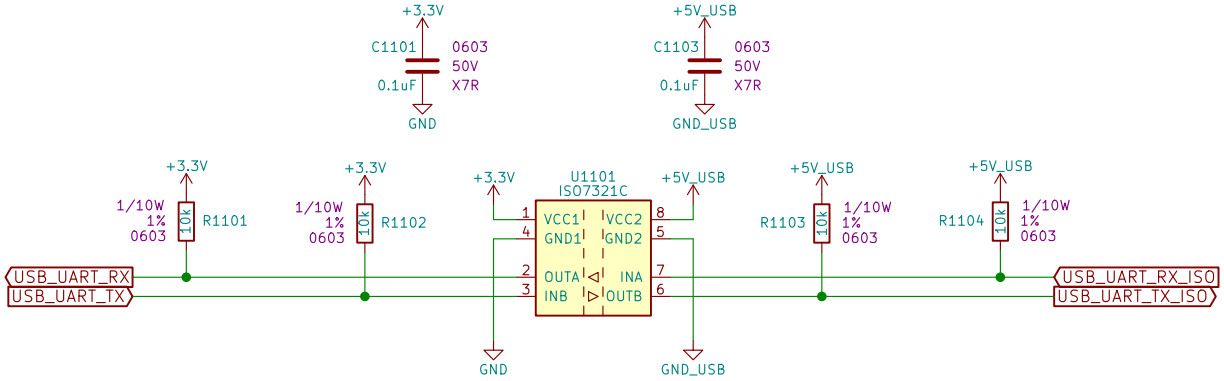
Sheet: /USB UART Bridge/
File: USB_UART_Bridge.sch

**Title:**

Size: A | Date: | **Rev:**

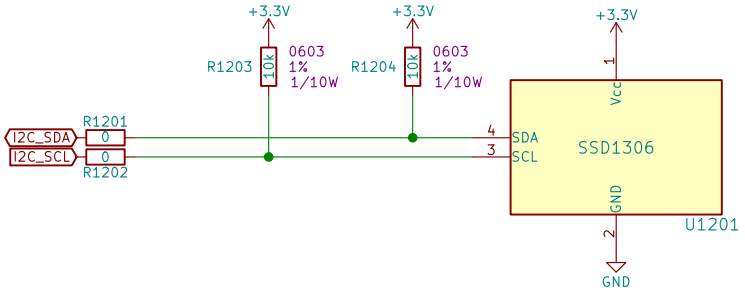
KiCad E.D.A. kicad (5.0.1)-3 | Id: 10/17

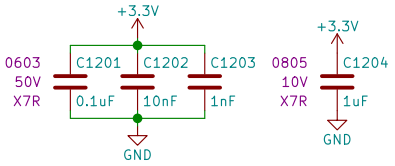
# USB UART Isolation




| | | |
|---|---|---|
| Sheet: /USB UART Isolation/<br>File: USB_UART_Isolation.sch | | |
| **Title:** | | |
| Size: A | Date: | **Rev:** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 11/17 |

# OLED Display




| | | |
|---|---|---|
| Sheet: /OLED Display/<br>File: OLED_Display.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 12/17 |

# Mounting Holes and Mechanical Components

MH1301
MountingHole

MH1303
MountingHole

MH1305
MountingHole

MH1307
MountingHole

MH1302
MountingHole

MH1306
MountingHole

MH1308
MountingHole

4-40 Screw
MK1303

4-40 Screw
MK1307

4-40 Screw
MK1311

4-40 Screw
MK1315

4-40 Screw
MK1304

4-40 Screw
MK1312

4-40 Screw
MK1316

4-40 Standoff
MK1305

4-40 Standoff
MK1309

4-40 Standoff
MK1313

4-40 Standoff
MK1317

4-40 Standoff
MK1306

4-40 Standoff
MK1314

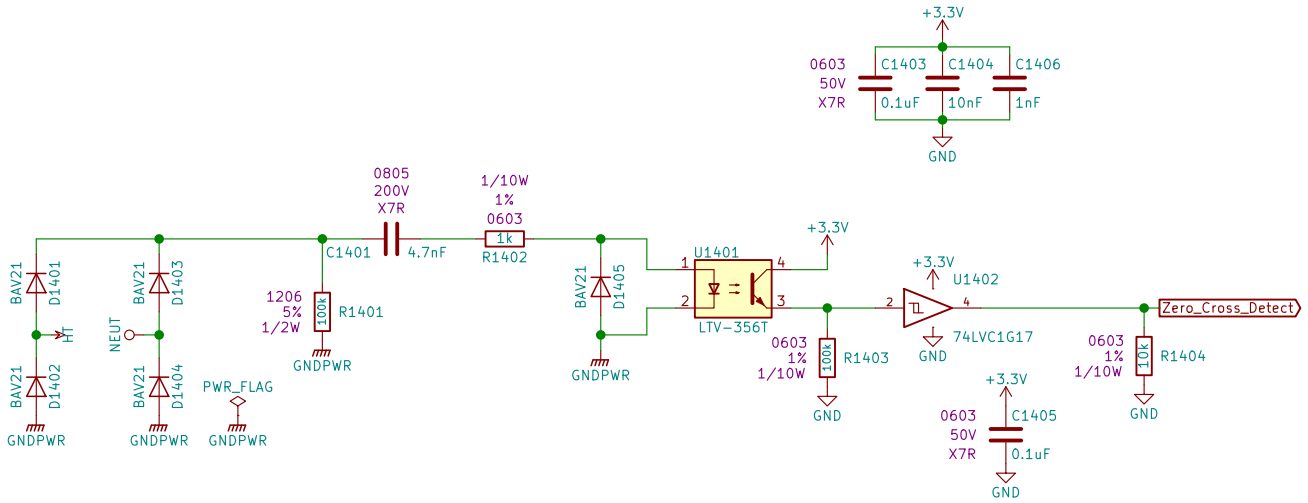
4-40 Standoff
MK1318

MK1301
Housing

MK1302
Lid

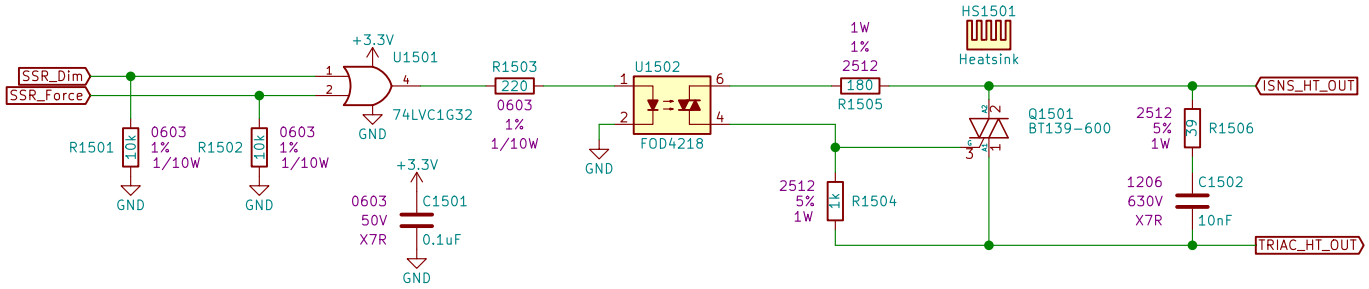
| | | |
|---|---|---|
| Sheet: /Mechanical/<br>File: Mechanical.sch | | |
| **Title:** | | |
| Size: A | Date: 2018-10-01 | **Rev: A** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 13/17 |

# Input AC Zero-Cross Detection



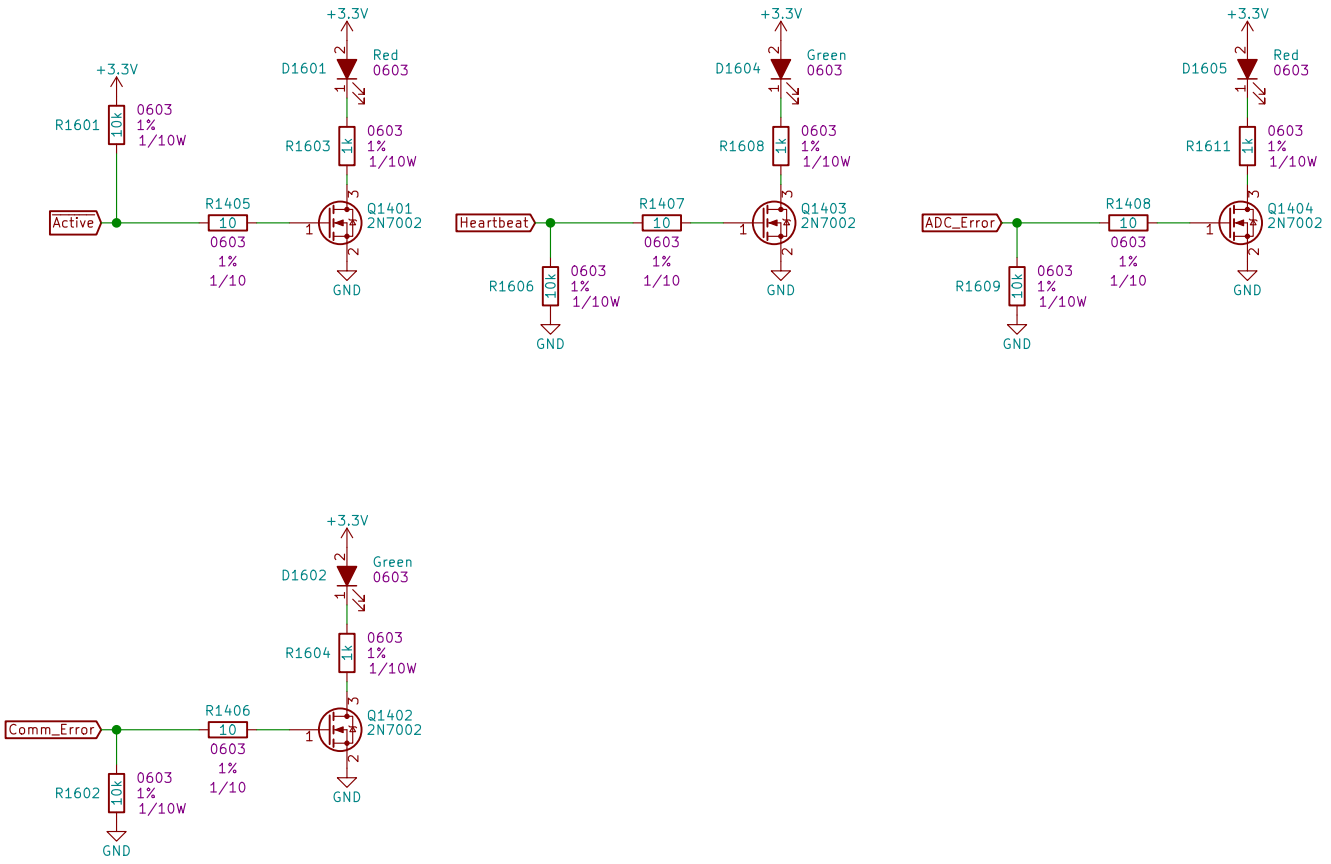

| | | |
|---|---|---|
| Sheet: /Zero Cross Detect/<br>File: Zero_Cross_Detect.sch | | |
| **Title:** | | |
| Size: A | Date: | **Rev:** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 14/17 |

# Output AC Solid State Switch, Random Phase




| | | |
|---|---|---|
| Sheet: /Output Switch/ | | |
| File: Output_Switch.sch | | |
| **Title:** | | |
| Size: A | Date: | **Rev:** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 15/17 |

# Status LEDs




| | | |
|---|---|---|
| Sheet: /Status LEDs/ | | |
| File: Status_LEDs.sch | | |
| **Title:** | | |
| Size: A | Date: | **Rev:** |
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 16/17 |

# Firmware Notes

* Configure RA0 as both an ADC input and the inverting input into an internal comparator
* Comparator will be used with internal DAC to set a current limit
* Configure ADC clock as FRC, external +/-VREF
* Configure clocking structure to use ECM clock mode, 16MHz clock input, 4xPLL = 64MHz SYSCLK
* Configure RA4 as an ADC input
* Configure RA5 as EXTINT0 for ZCD
* Configure RB0 as EXTINT1 for output switching
* Configure RB6:7 as MSSP1 I2C IO
* Configure RC2 and RC3 as interrupt on change inputs
* Configure RE2 as an ADC input
* Configure RF0 as open drain output, force low after booting
* Configure RF1:3 as push pull outputs, start low
* Configure RG6 as EUSART2 RX and RG7 as EUSART2 TX
* Configure the ADC to use digital filtering with lowest crossover frequency
* Use Timer7 to gather ADC data on all channels and run calculations on it at a fixed time base
* Use Timer5 as the time base for output dimming
* Use Timer6 as hearthbeat time base

Sheet: /Firmware Notes/
File: Firmware_Notes.sch

**Title:**

| Size: A | Date: | **Rev:** |
|---|---|---|
| KiCad E.D.A. kicad (5.0.1)-3 | | Id: 17/17 |