# Thermal Camera

https://github.com/drewsum/Thermal_Camera


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28. Mechanical


| | |
|---|---|
| POS12_Input | |
| POS12 Telemetry | |
| POS3P0 Power Supply | |
| POS3P0 Telemetry | |
| POS1P8 Power Supply | |
| POS1P8 Telemetry | |
| POS2P8 Power Supply | |
| POS2P8 Telemetry | |
| POS1P2 Power Supply | |
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| LCD Backlight Power Supply | |
| LCD Backlight Telemetry | |
| Battery Management | |
| PIC32MZ DA Programming | |
| PIC32MZ DA Clocking | |
| PIC32MZ DA Power | |
| PIC32MZ DA 1 | |
| PIC32MZ DA 2 | |
| External Storage | |
| Graphic LCD | |
| USB UART | |
| Elapsed Time Counter | |
| FLIR Lepton Sensor | |
| USB Hub | |
| PGOOD LEDs | |
| Status LEDs | |
| Mechanical | |

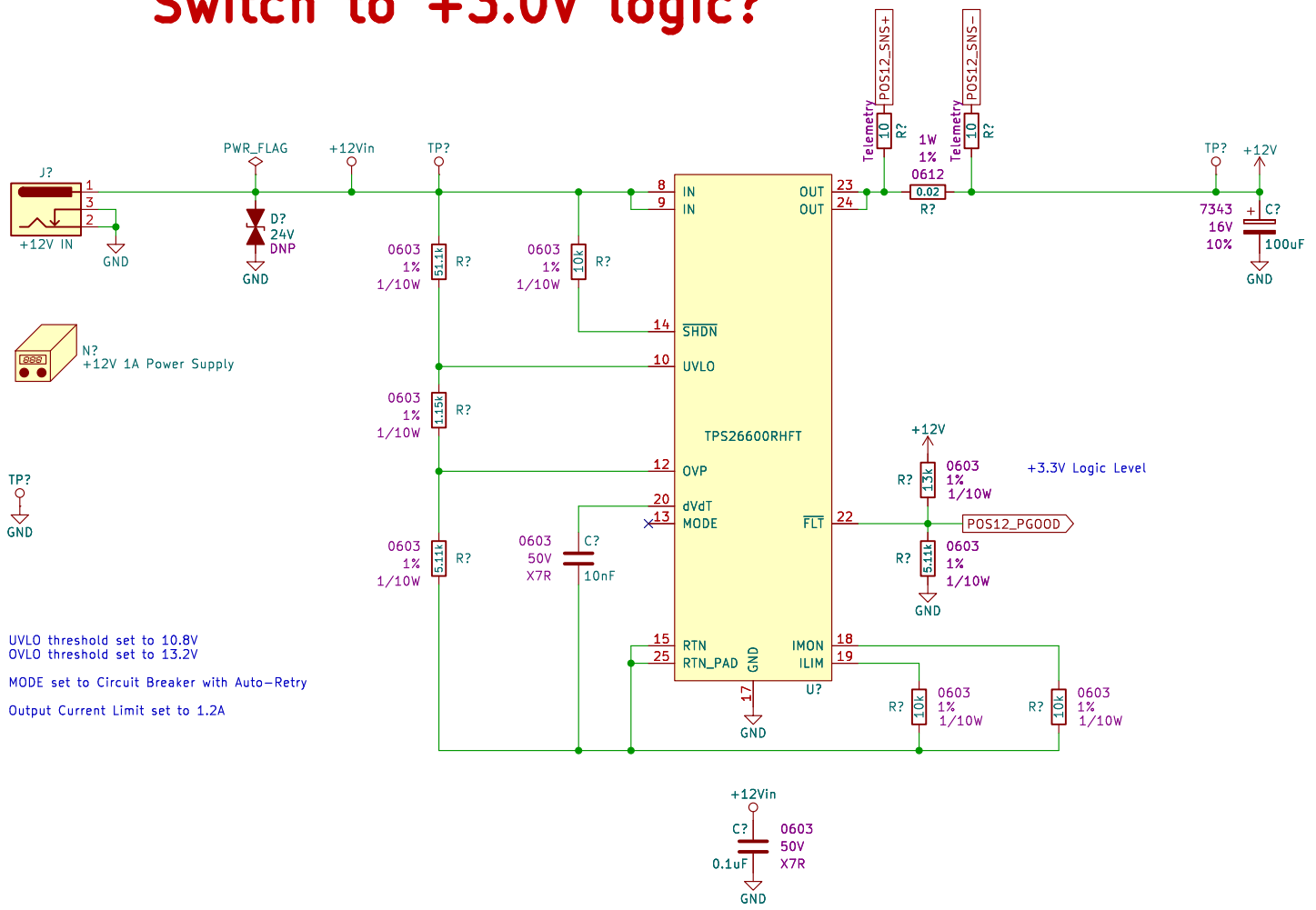

Drew Maatman and Michael Laffin


Sheet: /
File: Thermal_Camera.kicad_sch

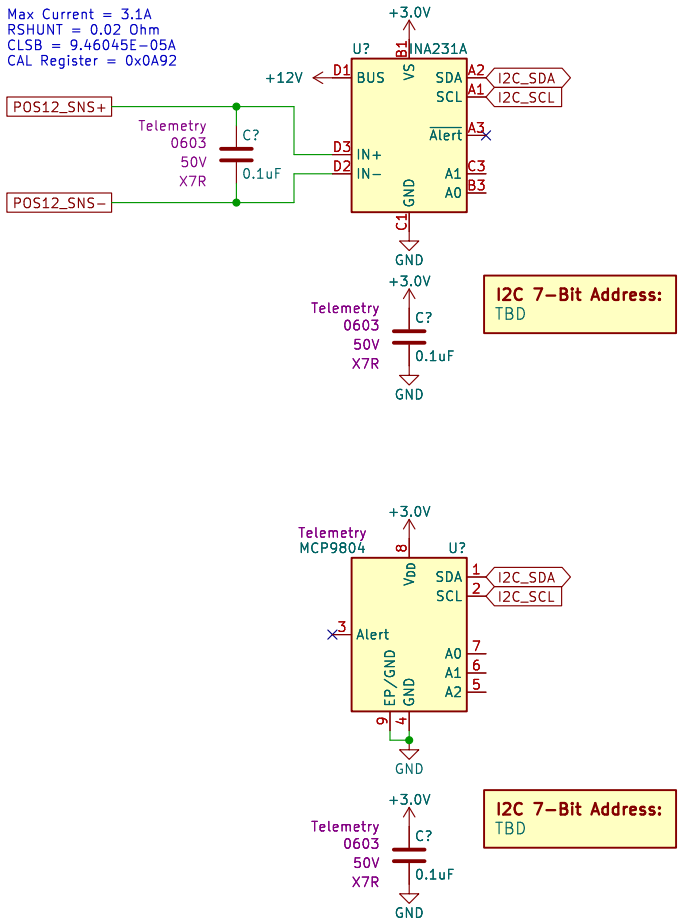
Title: Thermal Camera

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | Rev: PRELIM |
| KiCad E.D.A. kicad 7.0.9 | | Id: 1/28 |

# Switch to +3.0V logic?




| | | |
|---|---|---|
| **Drew Maatman and Michael Laffin** | | |
| Sheet: /POS12_Input/ | | |
| File: POS12_Input.kicad_sch | | |
| ***Title: Thermal Camera*** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 2/28 |

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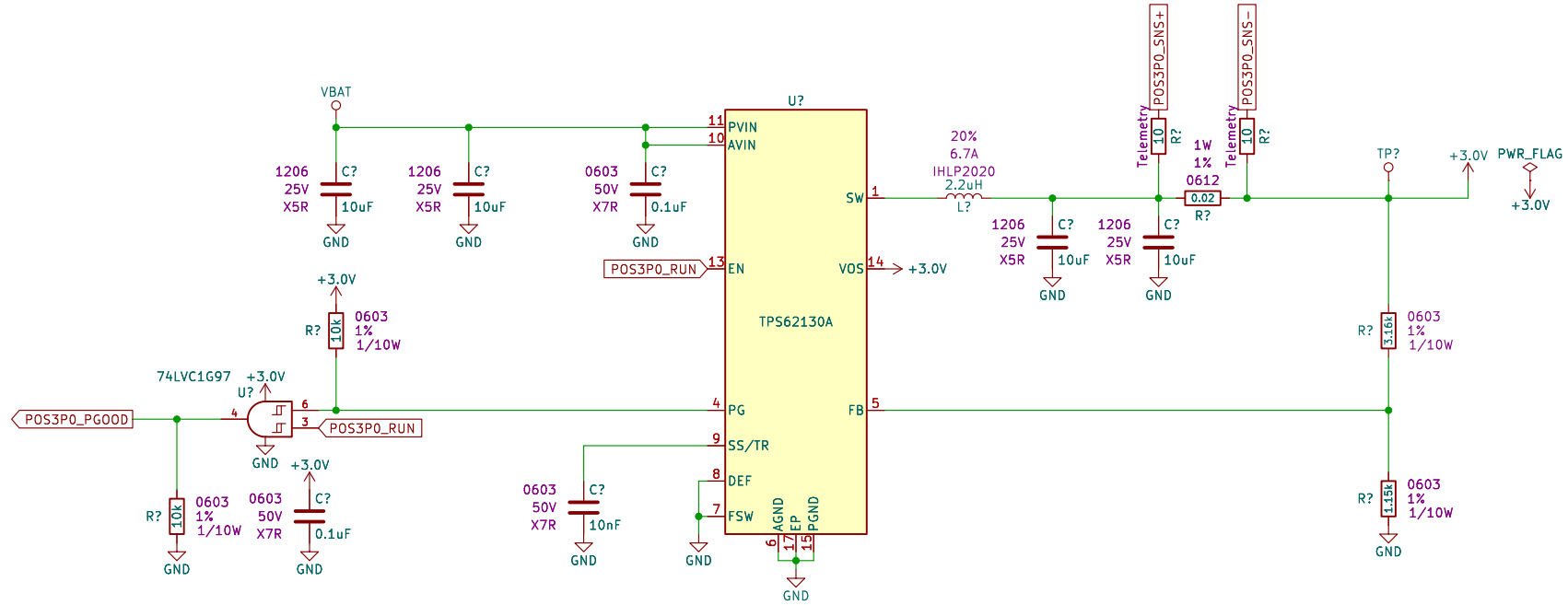
Sheet: /POS12 Telemetry/

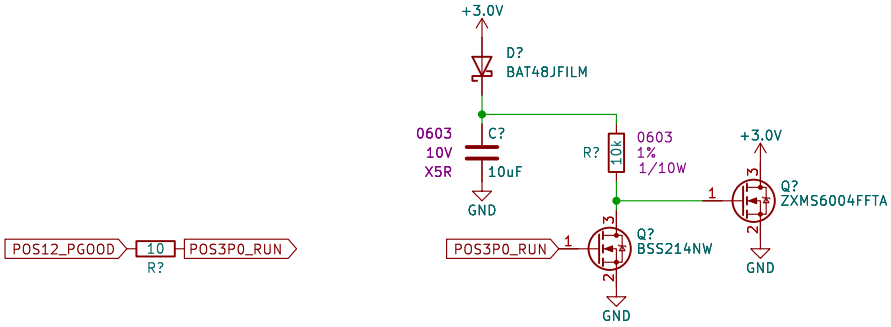
File: POS12_Telemetry.kicad_sch

**Title: Thermal Camera**

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 3/28 |

# figure out sequencing




| | |
|---|---|
| Drew Maatman and Michael Laffin | |
| Sheet: /POS3P0 Power Supply/ | |
| File: POS3P0_Power_Supply.kicad_sch | |
| **Title: Thermal Camera** | |
| Size: A | Date: 2023-11-13 |
| KiCad E.D.A. kicad 7.0.9 | Id: 4/28 |

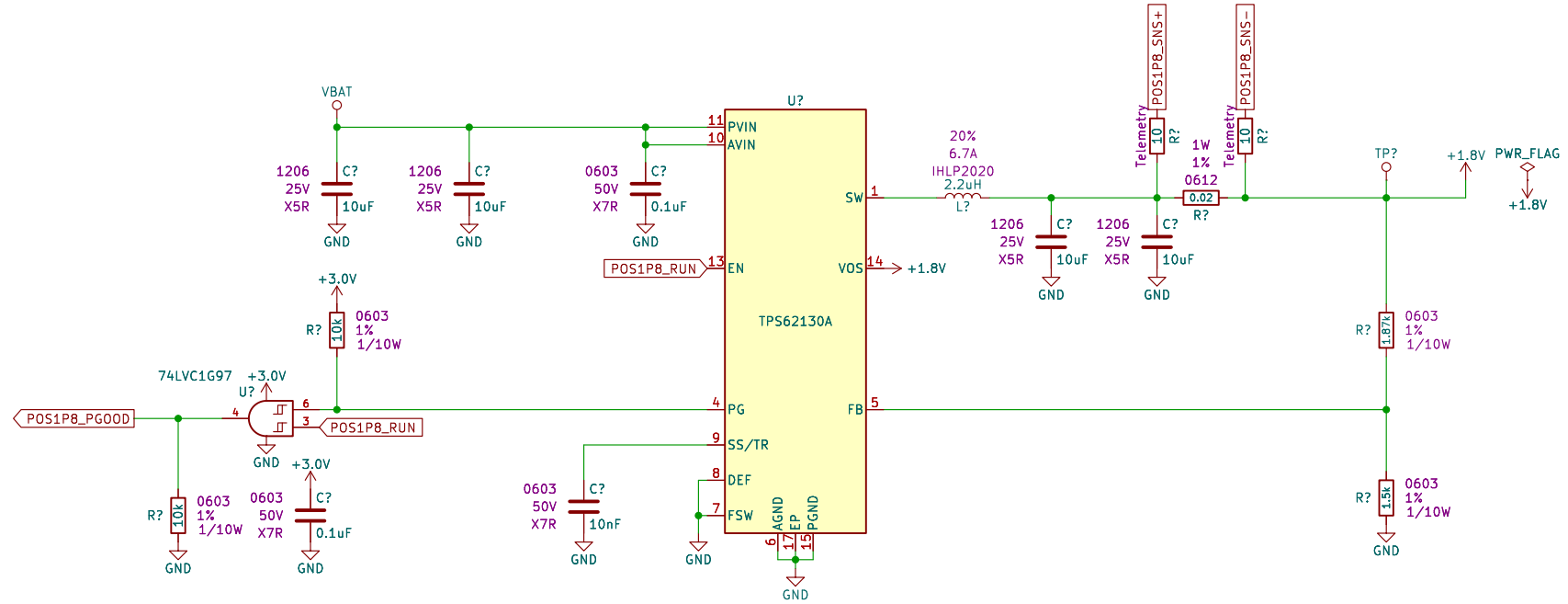
Drew Maatman and Michael Laffin

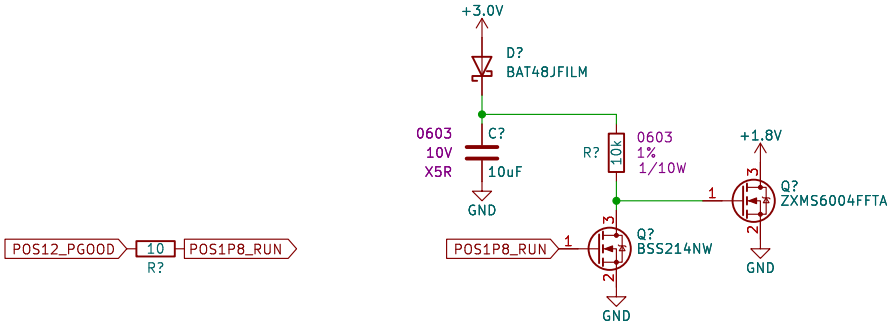
Sheet: /POS3P0 Telemetry/
File: POS3P0_Telemetry.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 5/28 |

# figure out sequencing




| | |
|---|---|
| **Drew Maatman and Michael Laffin** | |
| Sheet: /POS1P8 Power Supply/ | |
| File: POS1P8_Power_Supply.kicad_sch | |
| ***Title: Thermal Camera*** | |
| Size: A | Date: 2023-11-13 |
| KiCad E.D.A. kicad 7.0.9 | Id: 6/28 |
| | **Rev: PRELIM** |

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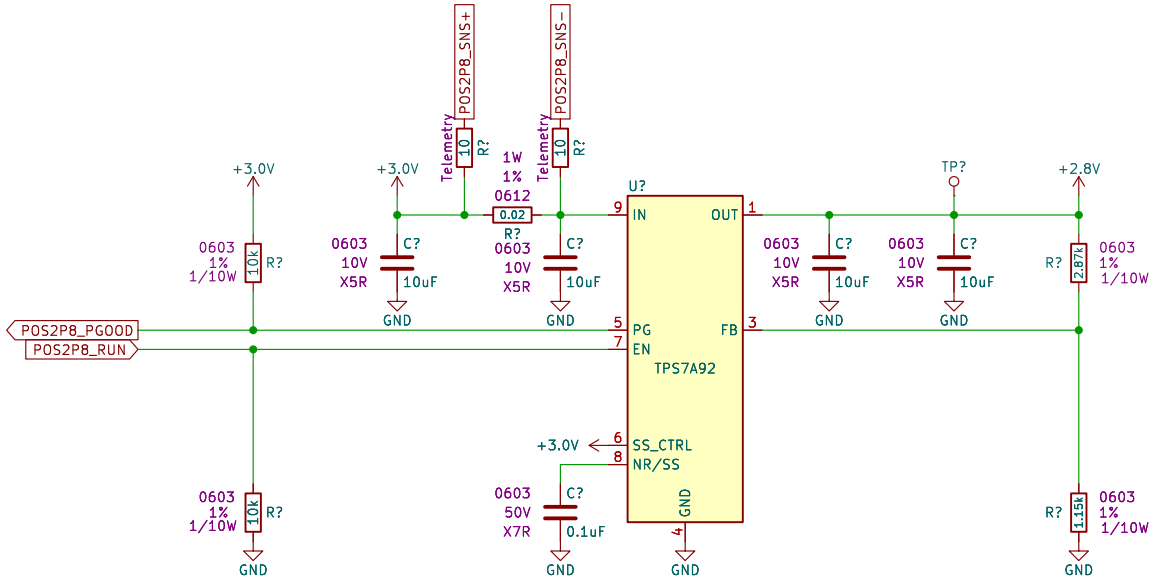
Sheet: /POS1P8 Telemetry/
File: POS1P8_Telemetry.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 7/28 |




| | | |
|---|---|---|
| **Drew Maatman and Michael Laffin** | | |
| Sheet: /POS2P8 Power Supply/ | | |
| File: POS2P8_Power_Supply.kicad_sch | | |
| ***Title: Thermal Camera*** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 8/28 |

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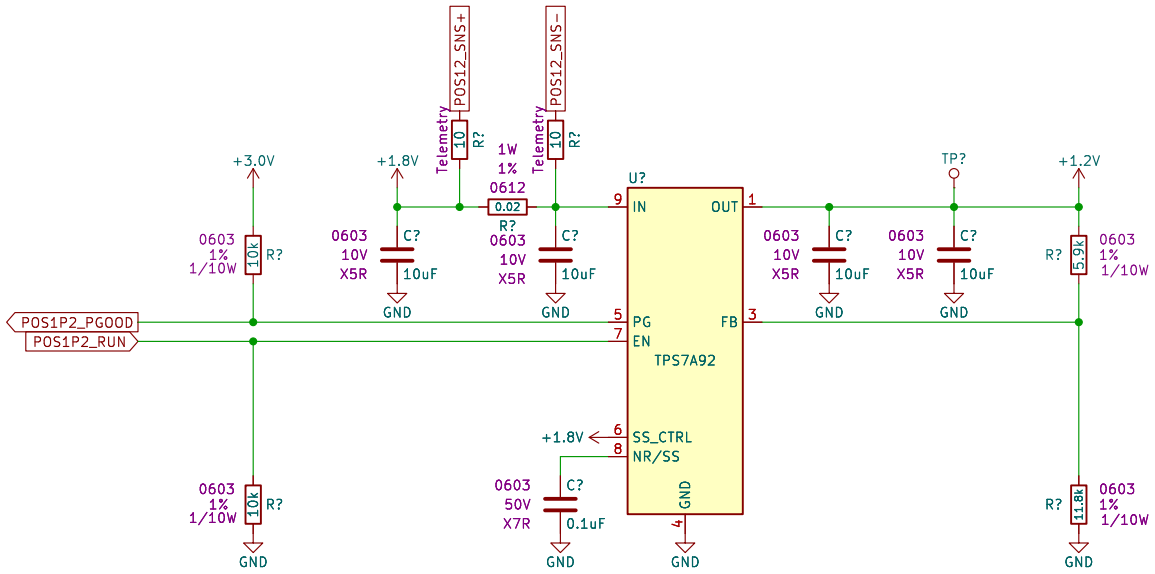
Sheet: /POS2P8 Telemetry/
File: POS2P8_Telemetry.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 9/28 |




| | | |
|---|---|---|
| **Drew Maatman and Michael Laffin** | | |
| Sheet: /POS1P2 Power Supply/ | | |
| File: POS1P2_Power_Supply.kicad_sch | | |
| ***Title: Thermal Camera*** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 10/28 |

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Sheet: /POS1P2 Telemetry/
File: POS1P2_Telemetry.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 11/28 |

Drew Maatman and Michael Laffin

Sheet: /LCD Backlight Power Supply/
File: LCD_Backlight_Power_Supply.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 12/28 |

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Sheet: /LCD Backlight Telemetry/
File: LCD_Backlight_Telemetry.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 13/28 |

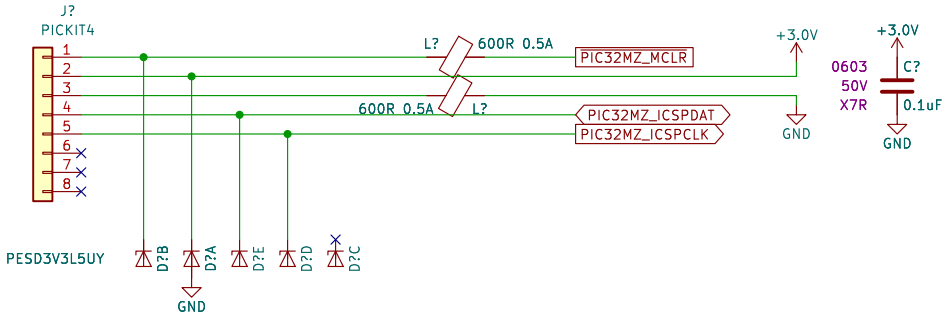
Drew Maatman and Michael Laffin

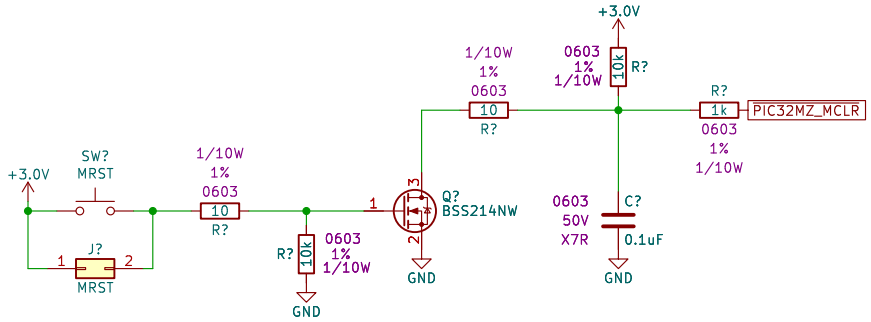
Sheet: /Battery Management/
File: Battery_Management.kicad_sch

**Title: Thermal Camera**

| | | |
|---|---|---|
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 14/28 |

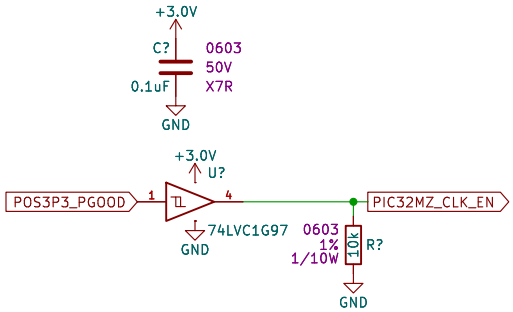
# COPIED FROM PIC32MZ EF
# FIX FOR PIC32MZ DA
# CONSIDER REMOVING BEADS

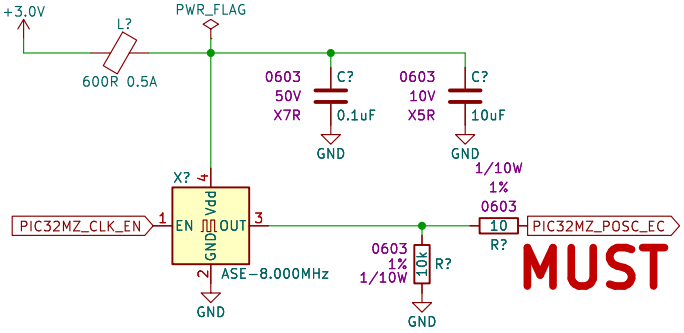


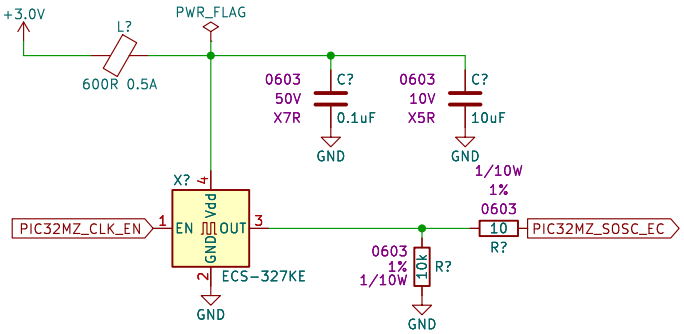

| | | |
|---|---|---|
| **Drew Maatman and Michael Laffin** | | |
| Sheet: /PIC32MZ DA Programming/ | | |
| File: PIC32MZ_DA_Programming.kicad_sch | | |
| ***Title: Thermal Camera*** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 15/28 |

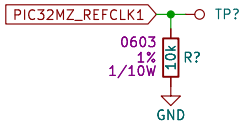
# COPIED FROM PIC32MZ EF
# FIX FOR PIC32MZ DA
# CHANGE TO +3.0V CLOCKS



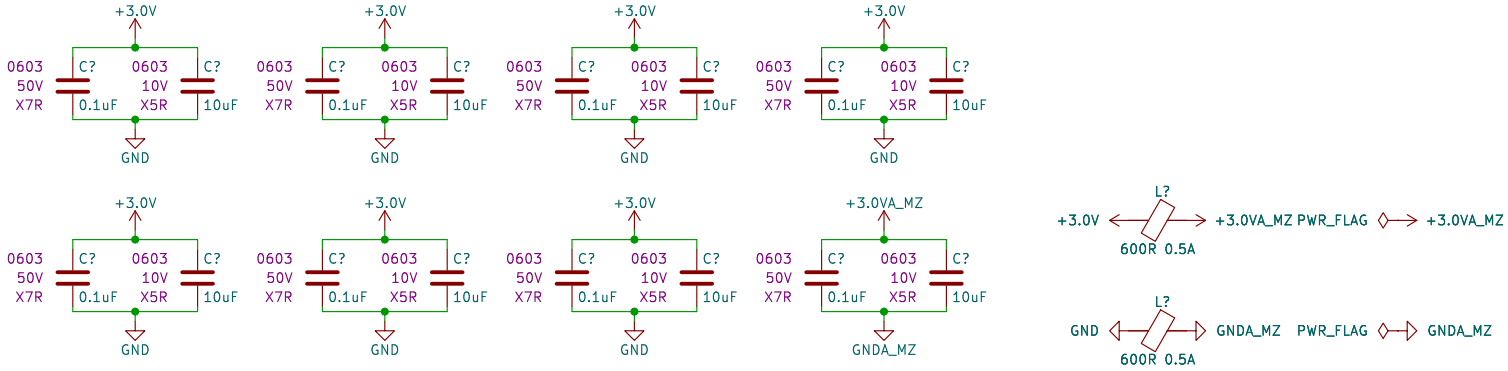




**MUST BE 24MHZ**



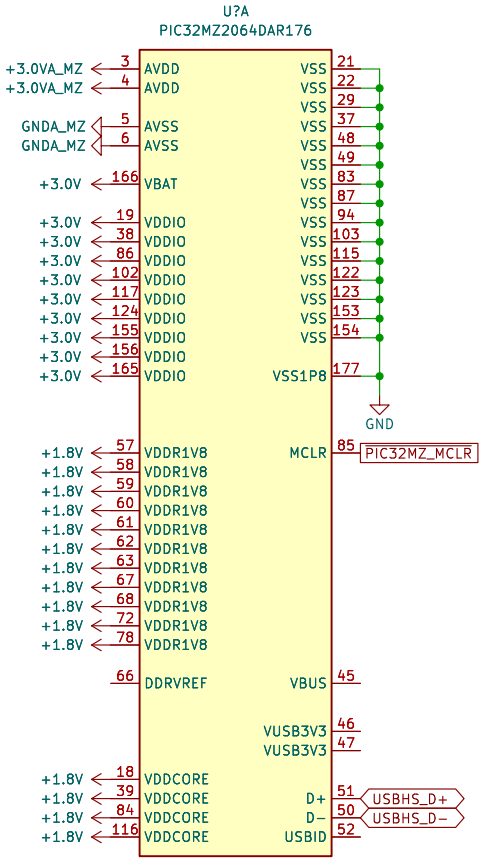




| | | |
|---|---|---|
| Drew Maatman and Michael Laffin | | |
| Sheet: /PIC32MZ DA Clocking/ | | |
| File: PIC32MZ_DA_Clocking.kicad_sch | | |
| ***Title: Thermal Camera*** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 16/28 |










COPIED FROM PIC32MZ EF
FIX FOR PIC32MZ DA
CHANGE TO +3.0V

FIGURE OUT HOW TO USE THIS

Drew Maatman and Michael Laffin

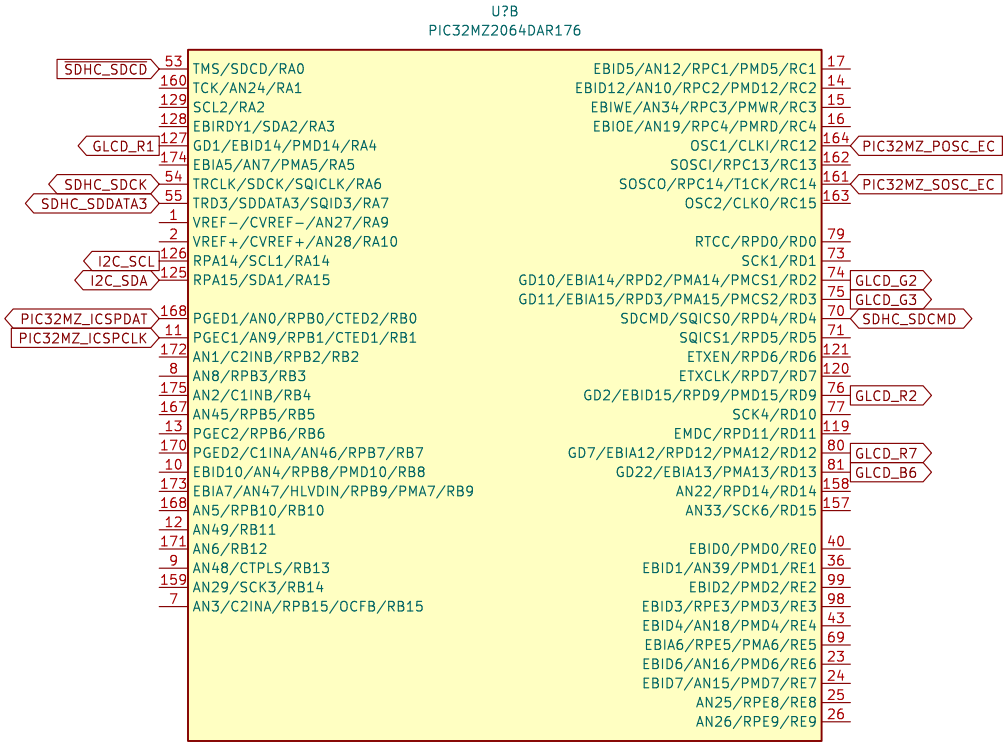
Sheet: /PIC32MZ DA Power/

File: PIC32MZ_DA_Power.kicad_sch

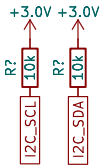
**Title: Thermal Camera**

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 17/28 |

See TABLE 36-1:RGB COLOR MAPPING for Graphic LCD Pin Mapping




DOUBLE CHECK SOSC PIN




Drew Maatman and Michael Laffin

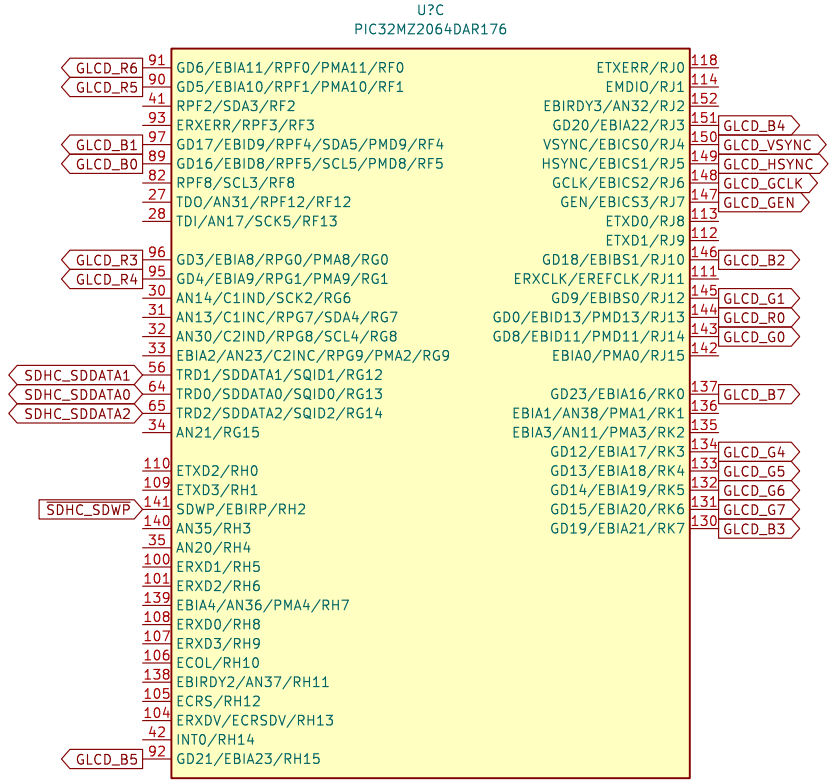
Sheet: /PIC32MZ DA 1/

File: PIC32MZ_DA_1.kicad_sch

Title: Thermal Camera

| Size: A | Date: 2023-11-13 | Rev: PRELIM |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 18/28 |

**See TABLE 36-1:RGB COLOR MAPPING for Graphic LCD Pin Mapping**

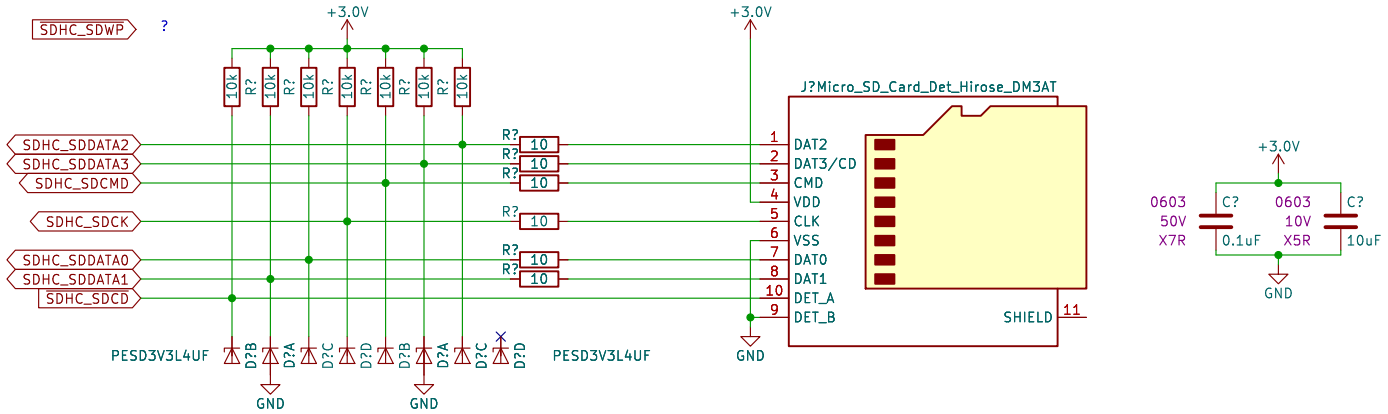



**Drew Maatman and Michael Laffin**

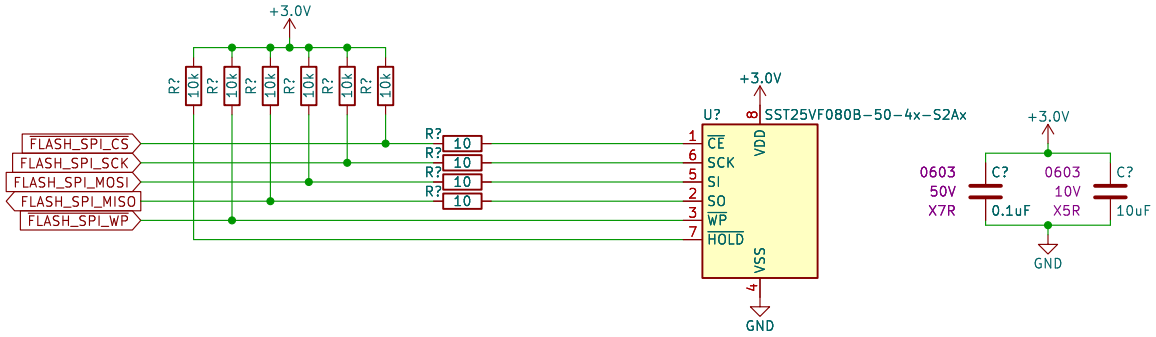
Sheet: /PIC32MZ DA 2/
File: PIC32MZ_DA_2.kicad_sch

***Title: Thermal Camera***

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 19/28 |




## Add SD card power switching?




## SD CARD, SPI FLASH

## BREAK OUT A SPI TO SD CARD AS INSURANCE

## BREAK OUT FLASH SPI TO A HEADER FOR PROGRAMMING

| | |
|---|---|
| Drew Maatman and Michael Lemin | |
| Sheet: /External Storage/ | |
| File: External_Storage.kicad_sch | |
| **Title: Thermal Camera** | |
| Size: A | Date: 2023-11-13 |
| KiCad E.D.A. kicad 7.0.9 | Id: 20/28 |
| | **Rev: PRELIM** |

GLCD_VSYNC
GLCD_HSYNC
GLCD_GCLK
GLCD_GEN

GLCD_R0
GLCD_R1
GLCD_R2
GLCD_R3
GLCD_R4
GLCD_R5
GLCD_R6
GLCD_R7

GLCD_G0
GLCD_G1
GLCD_G2
GLCD_G3
GLCD_G4
GLCD_G5
GLCD_G6
GLCD_G7

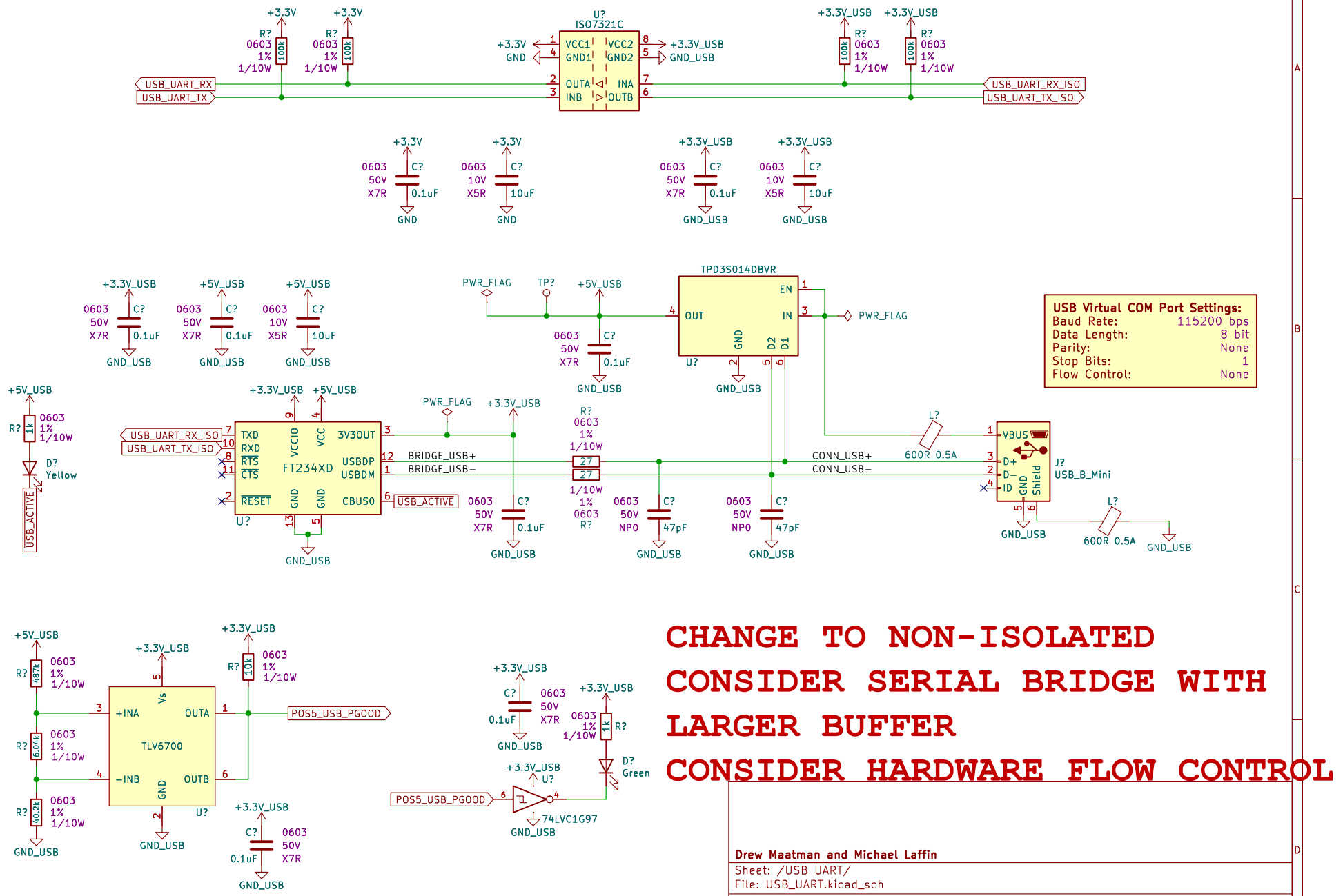
GLCD_B0
GLCD_B1
GLCD_B2
GLCD_B3
GLCD_B4
GLCD_B5
GLCD_B6
GLCD_B7

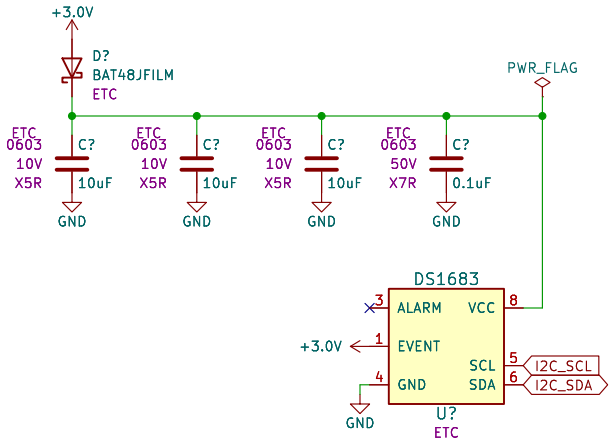
**Drew Maatman and Michael Laffin**

Sheet: /Graphic LCD/
File: Graphic_LCD.kicad_sch

***Title: Thermal Camera***

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 21/28 |


USB_UART_RX
USB_UART_TX
ISO7321C
USB_UART_RX_ISO
USB_UART_TX_ISO
TPD3S014DBVR
PWR_FLAG
USB Virtual COM Port Settings:
Baud Rate: 115200 bps
Data Length: 8 bit
Parity: None
Stop Bits: 1
Flow Control: None
FT234XD
USB_ACTIVE
BRIDGE_USB+
BRIDGE_USB−
CONN_USB+
CONN_USB−
USB_B_Mini
TLV6700
POS5_USB_PGOOD
74LVC1G97
CHANGE TO NON-ISOLATED
CONSIDER SERIAL BRIDGE WITH
LARGER BUFFER
CONSIDER HARDWARE FLOW CONTROL
Drew Maatman and Michael Laffin
Sheet: /USB UART/
File: USB_UART.kicad_sch
Title: Thermal Camera
Size: A
Date: 2023-11-13
Rev: PRELIM
KiCad E.D.A. kicad 7.0.9
Id: 22/28




**I2C 7-Bit Address:**
0x6B

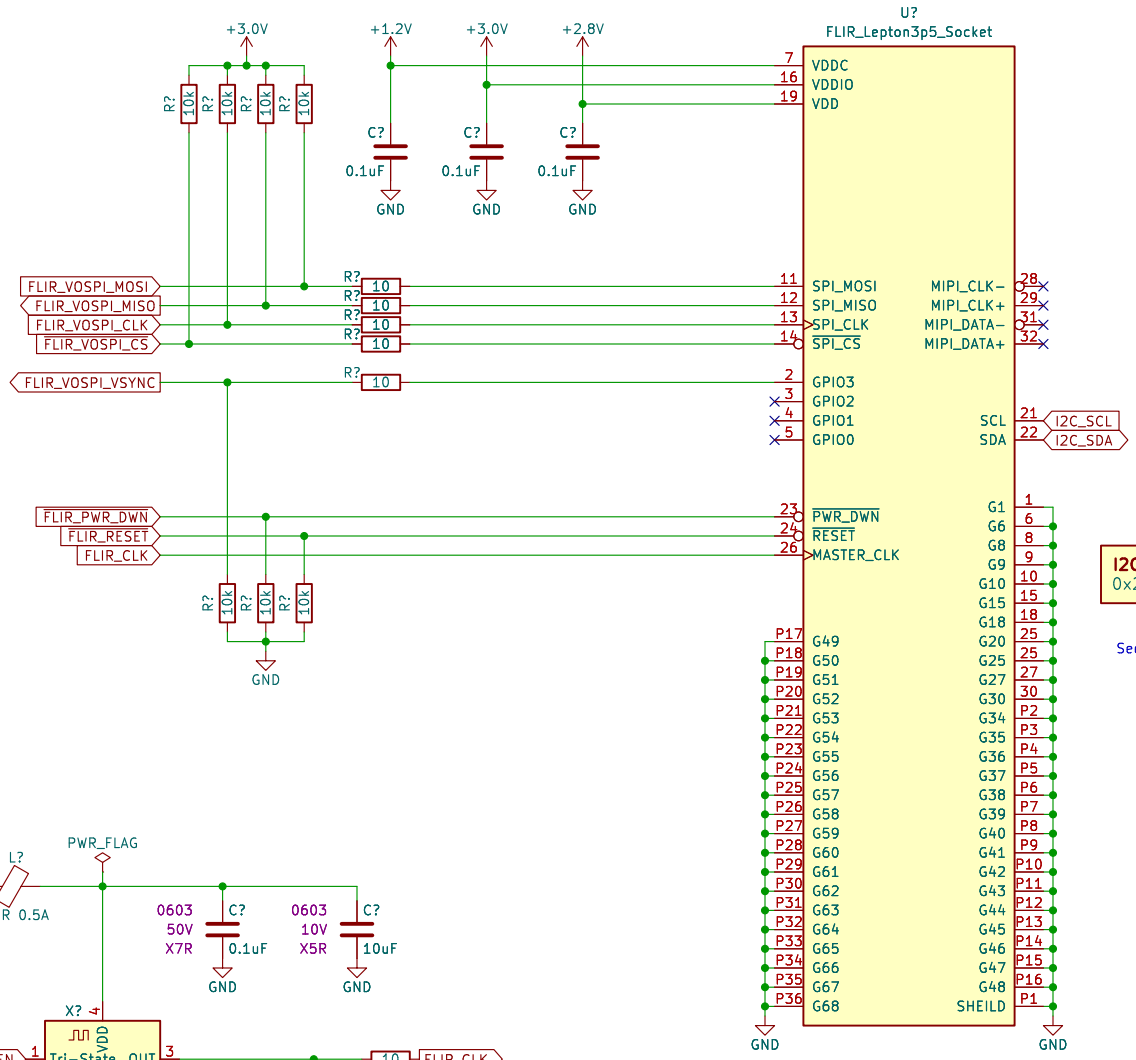
**Drew Maatman and Michael Laffin**

Sheet: /Elapsed Time Counter/
File: Elapsed_Time_Counter.kicad_sch

***Title: Thermal Camera***

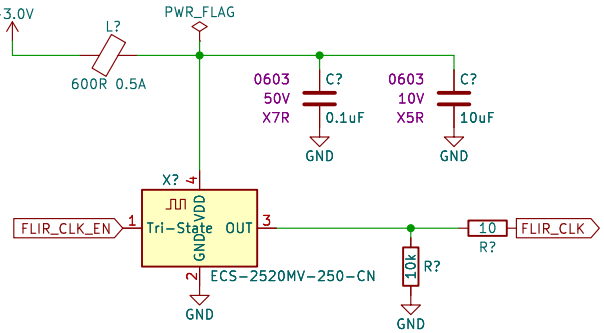
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 23/28 |

Power Supply Considerations:
VDDC: 1.20V (1.14V min, 1.26V max), 50mVpp max ripple, 110mA max draw
VDD: 2.80V (2.72V min, 2.88V max), 30mVpp max ripple, 16mA max draw
VDDIO: 2.8V min, 3.1V max, 50mVpp max ripple, 310mA max draw




**I2C 7−Bit Address:**
0x2A

See FLIR document #110−0144−04 for I2C register map

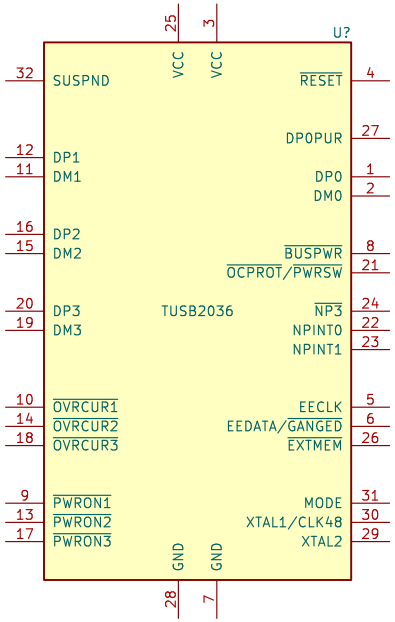



**Drew Maatman and Michael Laffin**

Sheet: /FLIR Lepton Sensor/
File: FLIR_Lepton_Sensor.kicad_sch

***Title: Thermal Camera***

| Size: A | Date: 2023−11−13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 24/28 |

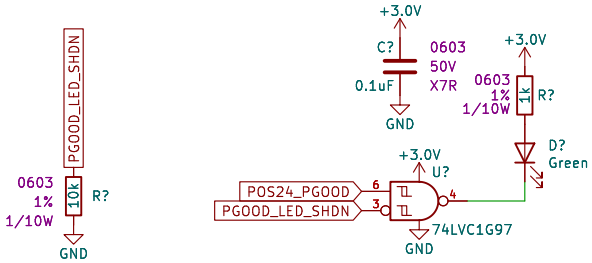



**Drew Maatman and Michael Laffin**

Sheet: /USB Hub/
File: USB_Hub.kicad_sch

***Title: Thermal Camera***

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 25/28 |



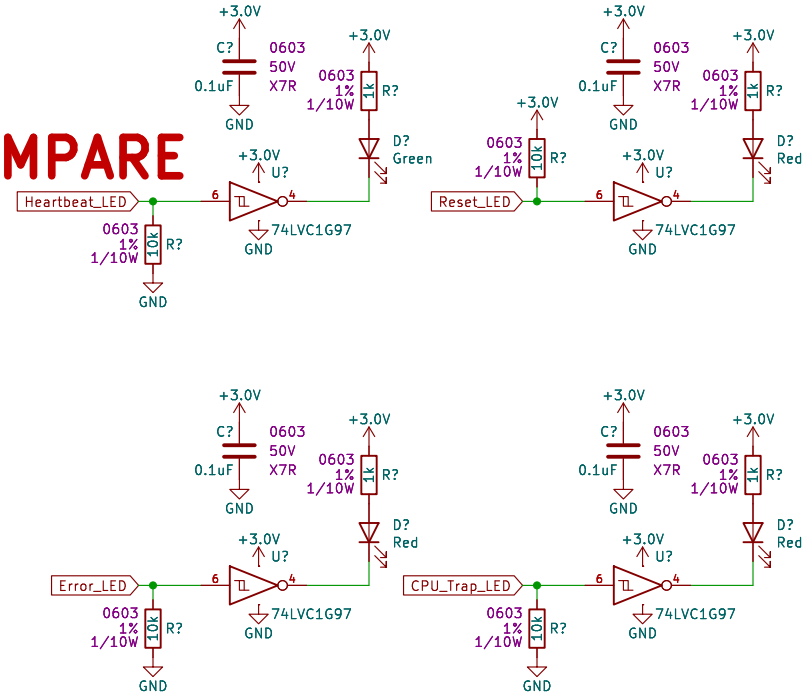

**Drew Maatman and Michael Laffin**

Sheet: /PGOOD LEDs/
File: PGOOD_LEDs.kicad_sch

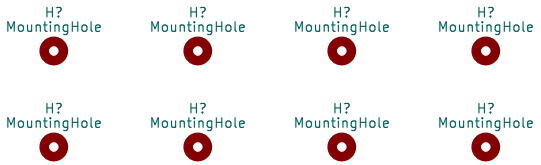
***Title: Thermal Camera***

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 26/28 |

MUST USE
OUTPUT COMPARE
PIN




| | | |
|---|---|---|
| Drew Maatman and Michael Laffin | | |
| Sheet: /Status LEDs/ | | |
| File: Status_LEDs.kicad_sch | | |
| **Title: Thermal Camera** | | |
| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
| KiCad E.D.A. kicad 7.0.9 | | Id: 27/28 |




**Drew Maatman and Michael Laffin**

Sheet: /Mechanical/
File: Mechanical.kicad_sch

***Title: Thermal Camera***

| Size: A | Date: 2023-11-13 | **Rev: PRELIM** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.9 | | Id: 28/28 |