Peripherals

NOTE:
Isolated +5V and +3.3V.
Use GND as local gnd for all board electronic components.
Connect GNDPWR when using +12V.

Power Distribution
+5V
+3.3V
GND
File: PowerDist.kicad_sch

CAN
CAN_TX
CAN_RX
CAN1_TX
CAN1_RX
J1
CAN_LogicAnalyzer
File: CAN.kicad_sch

USB
UART_RX
UART_TX
USART3_TX
USART3_RX
File: USB.kicad_sch

IMU
Addr: 0x28
I2C_SCL
I2C_SDA
INT
RESET
I2C1_SCL
I2C1_SDA
PB4
PB5
J2
IMU_LogicAnalyzer
File: IMU.kicad_sch

GPS
UART_RX
UART_TX
FIX
1PPS
USART1_TX
USART1_RX
PA8
PA11
J3
GPS_LogicAnalyzer
File: GPS.kicad_sch

SD Card
SPI_CS
SPI_MOSI
SPI_CLK
SPI_MISO
DET
SPI5_CS
SPI5_MOSI
SPI5_CLK
SPI5_MISO
SD_DET
J5
SDCard_LogicAnalyzer
File: SDCard.kicad_sch

Ethernet
RMII_TX_EN
RMII_TXD0
RMII_TXD1
RMII_RXD0
RMII_RXD1
RMII_CRS_DV
RMII_MDC
RMII_MDIO
NRST
RMII_REF_CLK
File: Ethernet.kicad_sch

LEDs
PE[7..15]
File: LEDs.kicad_sch

STM32 Core

+BATT
+3.3V
NRST
PDR_ON
BOOT0
VREF+
C3 18p
C4 18p
Y1 8M
Load capacitance of ~19p
GND
U1
STM32F429ZITx
VBAT
VDD
VSS
VSSA
VCAP_1
VCAP_2
C1 0.1u
C2 0.1u
Use 0.1uF instead of 2.2u because
internal voltage regulator is not used.
R1 4.7k
R2 4.7k
RMII_TX_EN
RMII_TXD0
RMII_TXD1
RMII_MDC
RMII_RXD0
RMII_RXD1
RMII_CRS_DV
RMII_REF_CLK
RMII_MDIO
PB4
PB5
I2C1_SCL
I2C1_SDA
CAN1_RX
CAN1_TX
USART1_TX
USART1_RX
PA8
PA11
SWDIO
SWCLK
USART3_TX
USART3_RX
PE[0..5]
PE[7..15]
SPI5_CS
SPI5_CLK
SPI5_MISO
SPI5_MOSI
SD_DET
Y3 32.768k
C35 9p
C50 9p
Load capacitance of ~14.5p

STM32 Essentials

+3.3V
VDD/VSS
C5 0.1u
C7 0.1u
C11 0.1u
C12 0.1u
C13 0.1u
C14 0.1u
C15 0.1u
C16 0.1u
C17 0.1u
C18 0.1u
C19 0.1u
C20 4.7u
GND
One 0.1u cap per VDD pin. Place 4.7u near any VDD pin.

Dr. Hallock
UTSVT Logo

+3.3V
VDDA/VSSA
C6 0.1u
C8 1u
GND
Place near pin 33

NRST
C10 0.1u
SW1 Reset
GND
Place near pin 25

+BATT
C9 0.1u
GND
Place near pin 6

+BATT
R3 550
D2 RTCC_BattCheck
SW2 RTCC_BattCheck
BT1 CR1220
GND
Check levels of coin cell battery without having the led constantly consume power.

+3.3V
SWCLK
SWDIO
J4 SWD
GND
Flashing pins

H1 M3
H2 M3
H3 M3
H4 M3

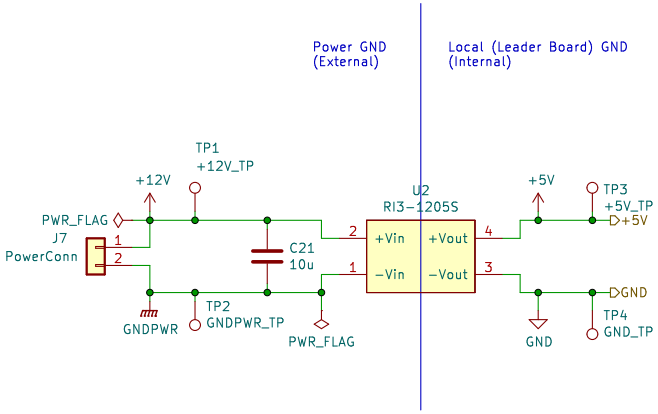
VERSION HISTORY

2.1 – Removes the external RTC.
There's no need to use an external RTC on the telemetry board. The microcontroller itself has an internal RTC that can be powered from the VBAT line and a 32.768kHz oscillator. Courtesy of Chase!

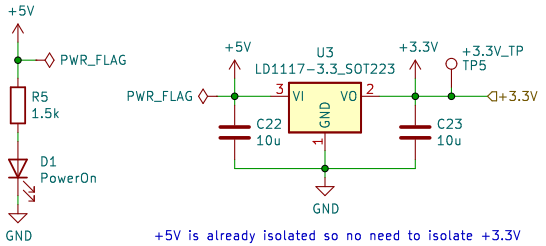
Future Changes
–Add keepout area around RTC clock (prevent noise)
–Add impedance matching resistor to Ethernet line
–PR Checklist

Sheet: /
File: Telemetry–Primary.kicad_sch
Title:
Size: A3 | Date: | Rev:
KiCad E.D.A. kicad 7.0.2 | Id: 1/9

ISOLATED



Isolated DC-DC Converter to step down +12V power to an isolated +5V. The input gnd (Power GND) is different from the output gnd (Local GND)

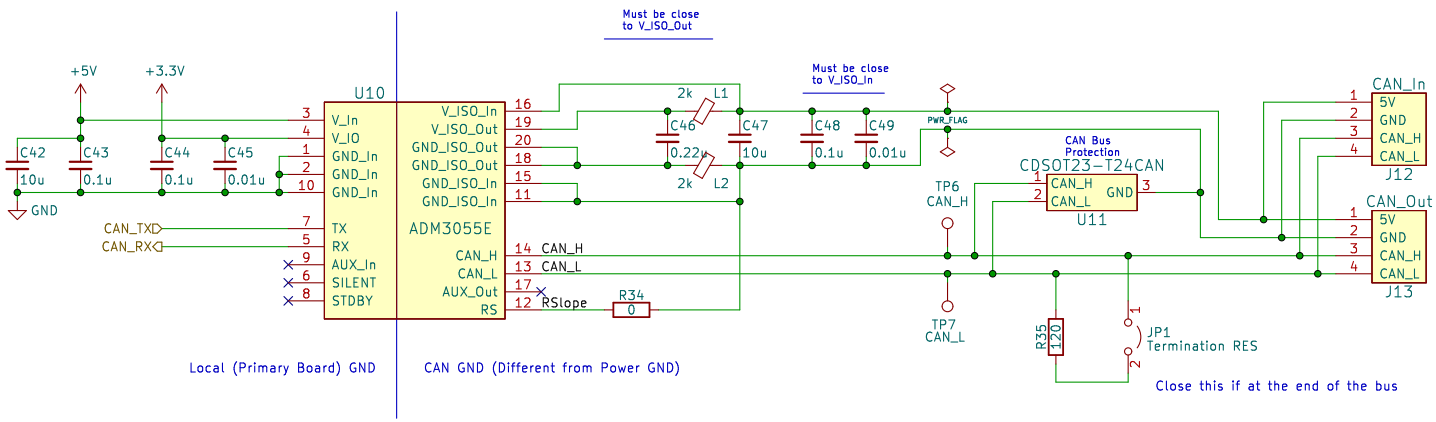


+5V is already isolated so no need to isolate +3.3V

Linear Regulator to step down +5V to +3.3V. An isolated converter was not used for the +3.3V line because of price and space. May need to change this to DC-DC converter if we really want to make the BPS more energy efficient.

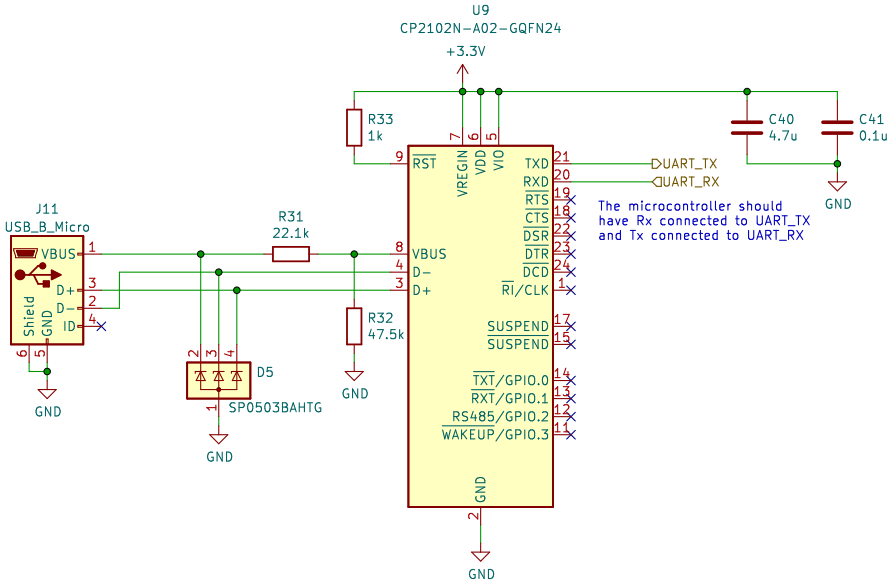
Sheet: /Power Distribution/		
File: PowerDist.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 2/9

ISOLATED



Isolated CAN transceiver. This connects to the main electrical system's CAN bus. Look in datasheet for more information about this page.

Sheet: /CAN/		
File: CAN.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 3/9



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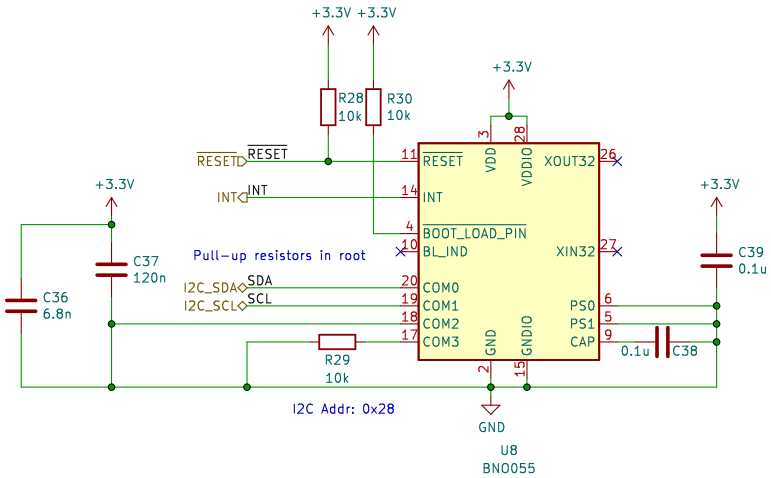
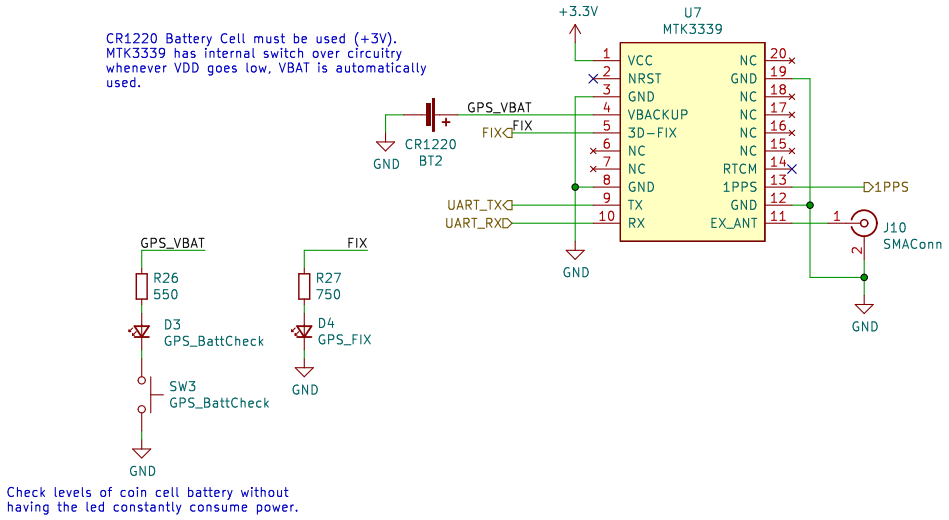
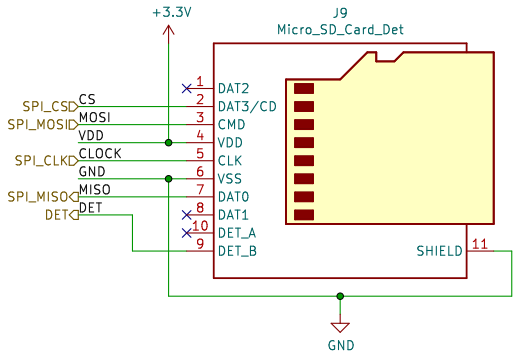
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 4/9



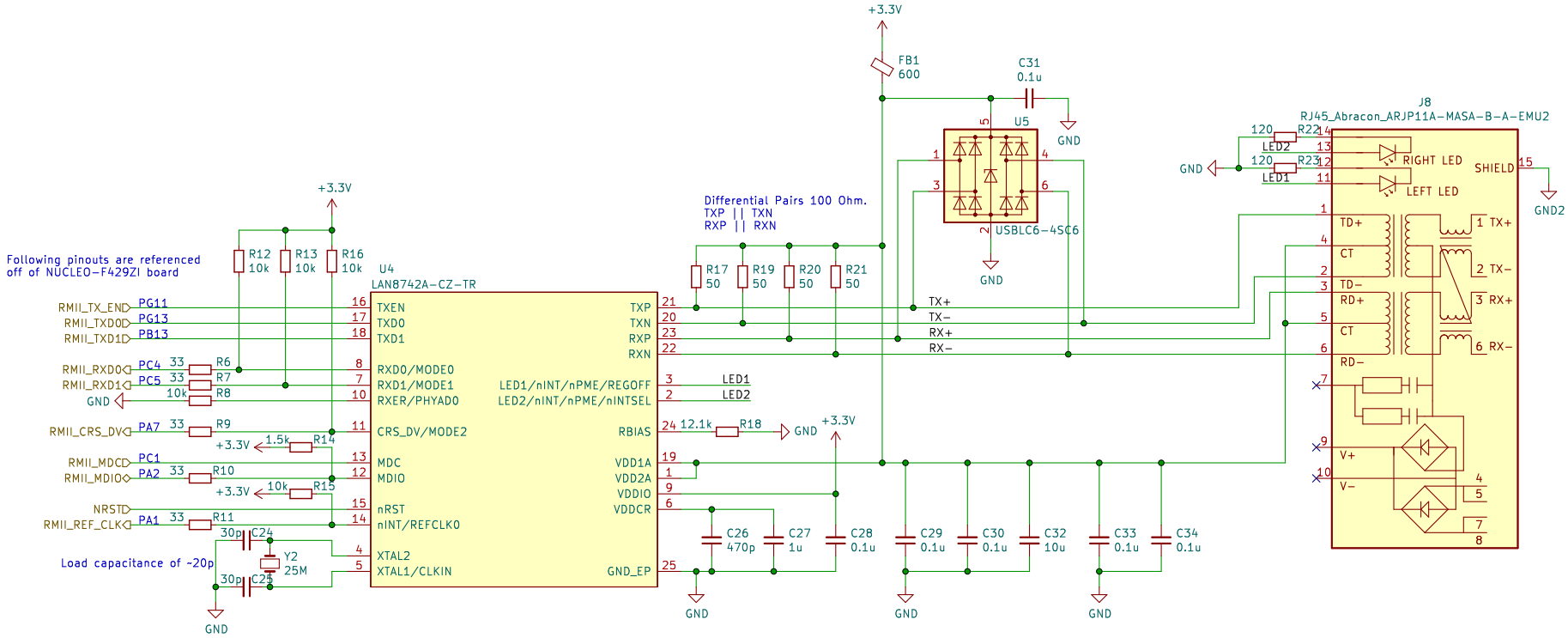
Sheet: /IMU/		
File: IMU.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 5/9



Sheet: /GPS/		
File: GPS.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 6/9



Sheet: /SD Card/		
File: SDCard.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 8/9

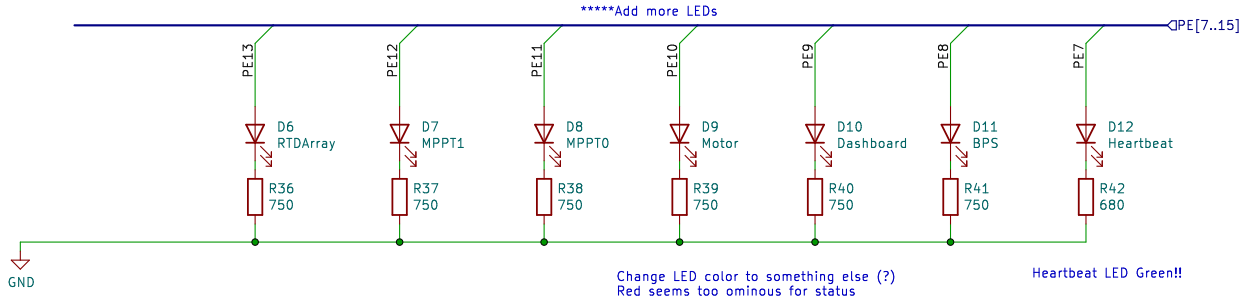


Sheet: /Ethernet/		
File: Ethernet.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 9/9

Status LEDs

Green LEDs good

Red LEDs fault



Sheet: /LEDs/		
File: LEDs.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.2		Id: 10/9