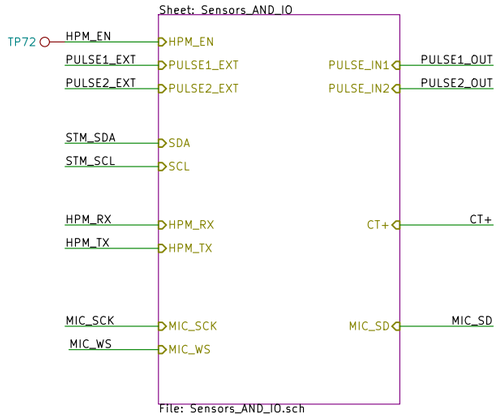
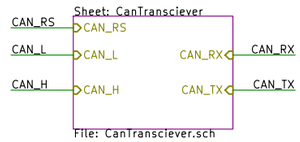
STM

Sensors and IO



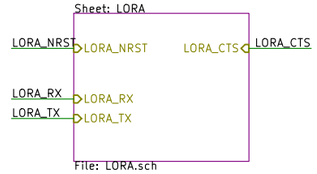
Communication

CAN Transciever

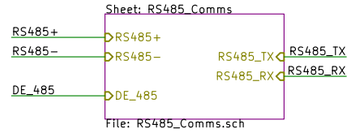


Note: Low power mode selected through RS

LORA

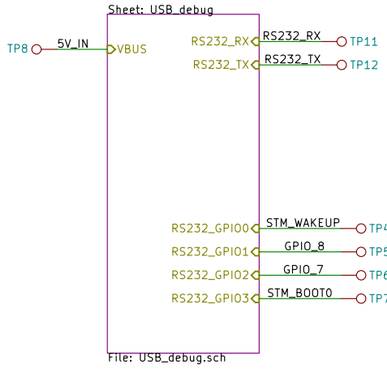


RS485 Transciever



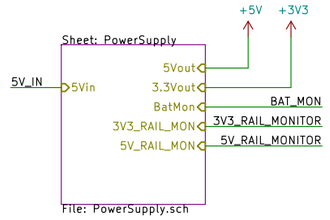
Note: Low power mode selected through DE along with RE

USB Debug

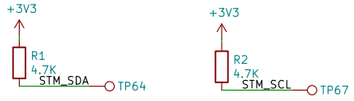


Easy access gnd pins for debug

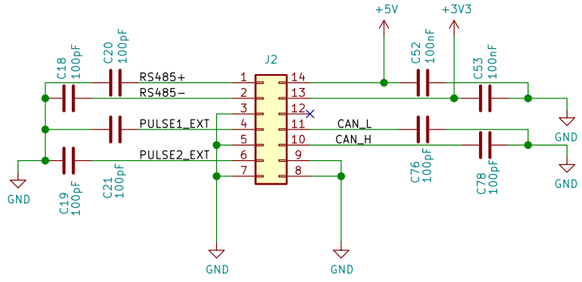
Power Supply and Battery



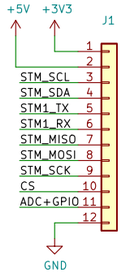
STM I2C Pullup



External Connector



Optional module



Fiducials

Parts to add:
- Fiducial
- Fix particulate in rush issue
- lora rst not routed and rst through hardware

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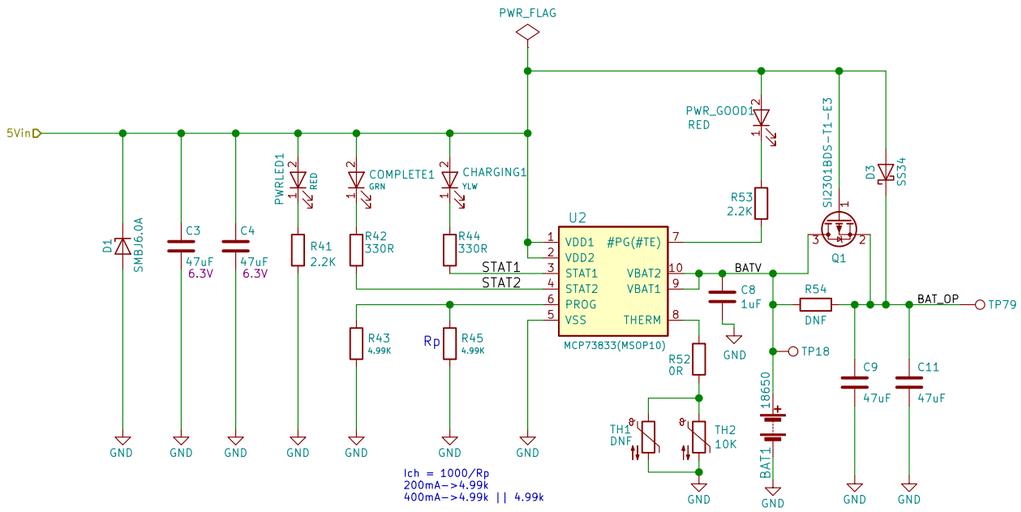
Sheet: /
File: OSM_env01.sch

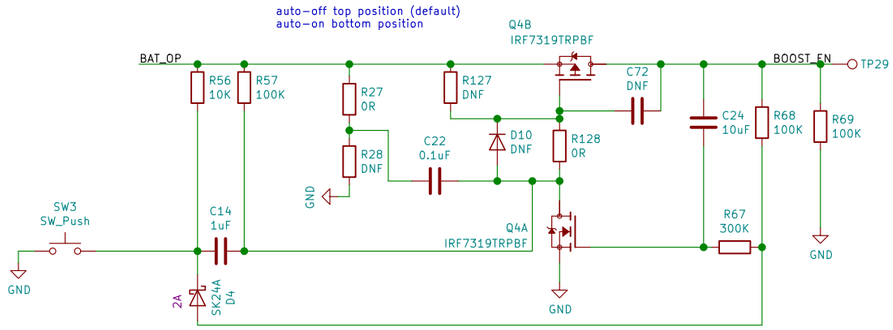
Title: Open Smart Monitor

Size: A3	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 1/9

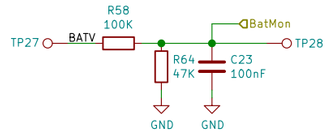
Li_Ion Battery Charge Controller



Latched powerbutton Circuit

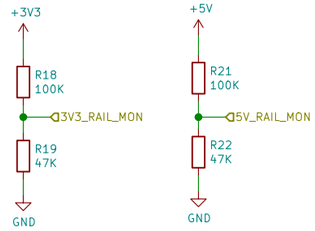


Battery Voltage Monitor

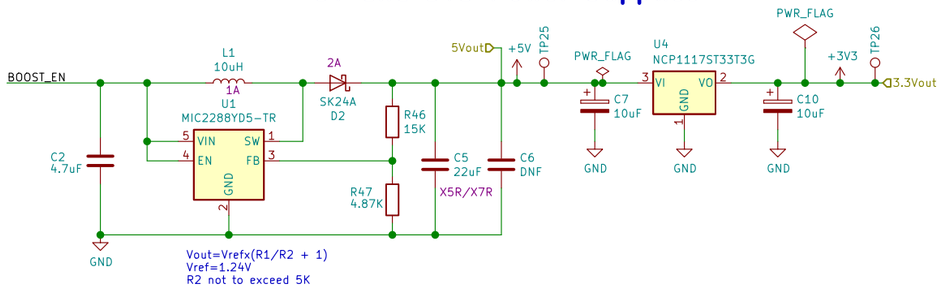


divider ratio=47/147=31.97
5/1024=1adc=4.88mm
(4.2/4.88m)*0.3197=275.15adc=fully charged and above

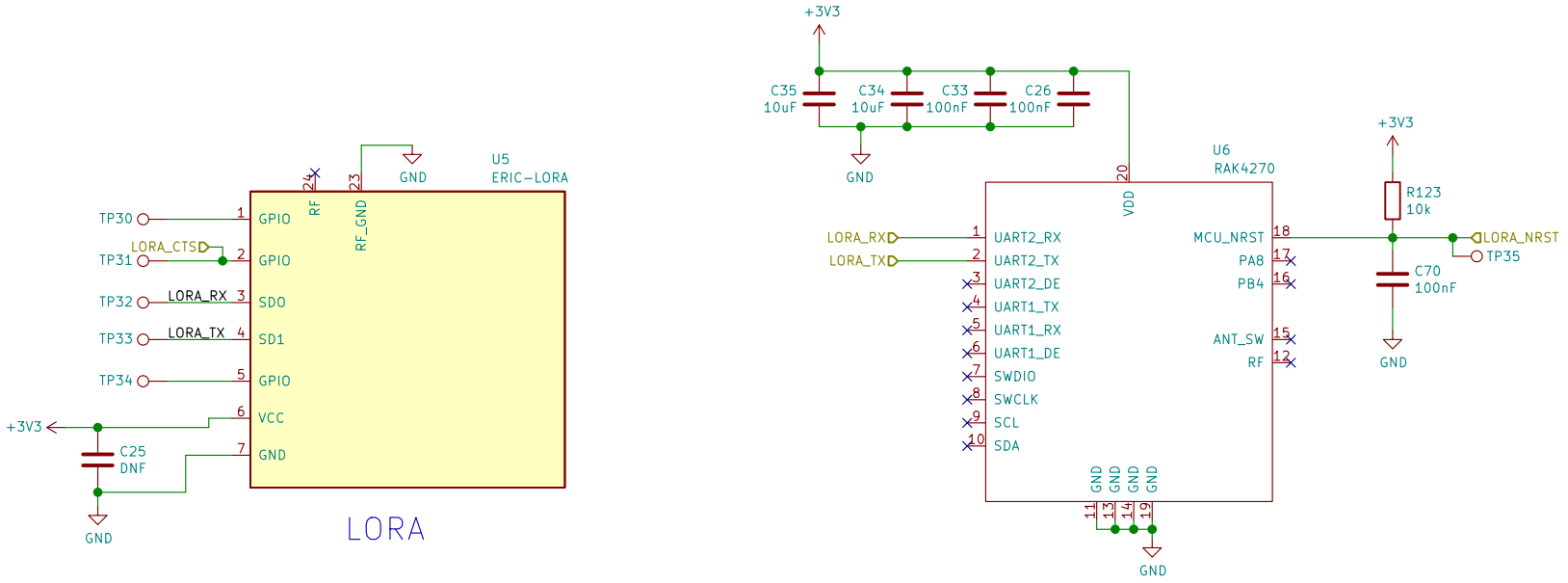
Voltage Rail Monitor



5V and 3V3 Power Supplies



Note: If MIC2250 used R1 should be as large as poosible ideally around 100k



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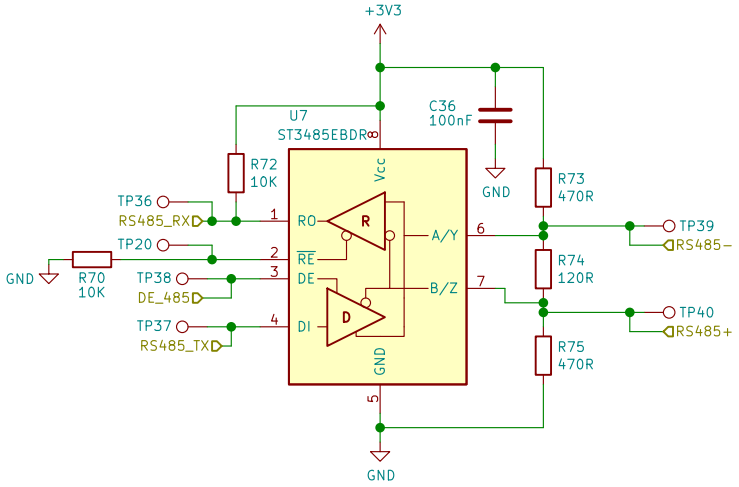
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 3/9



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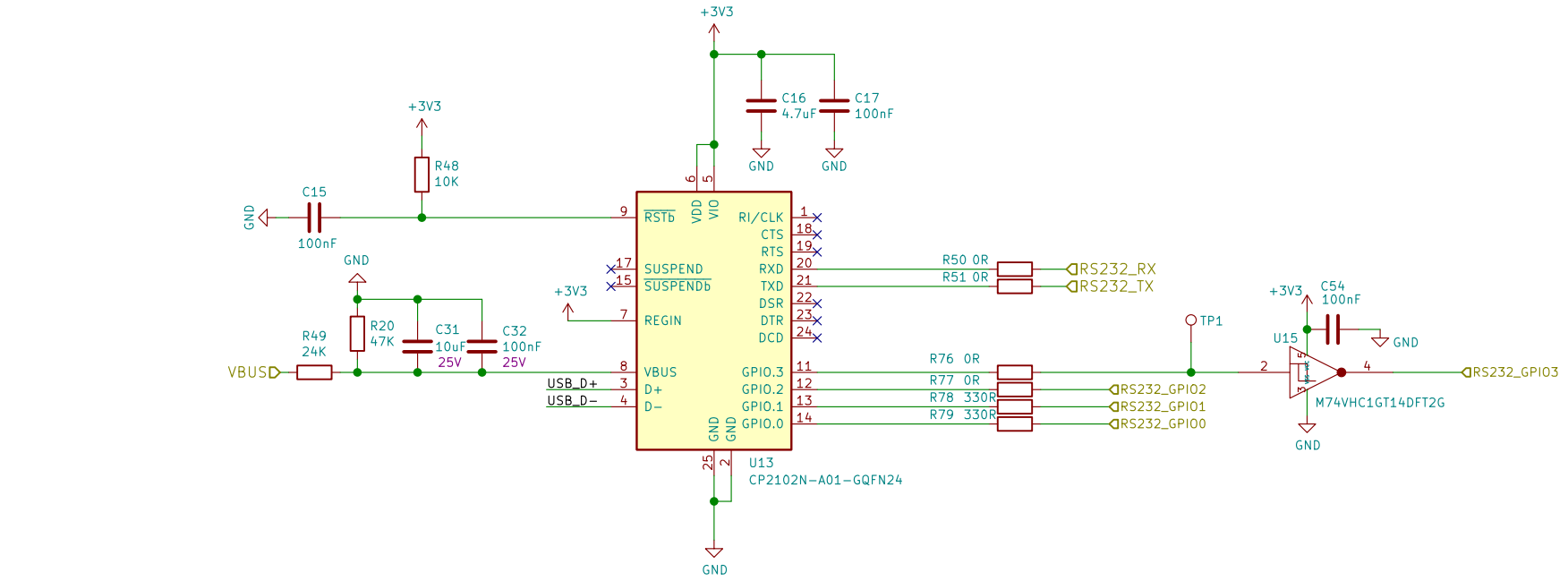
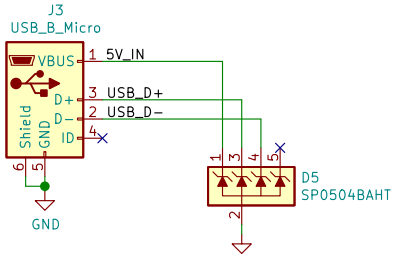
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 4/9





notes: use SP0504BAHTG, and SP0504BAJTG instead

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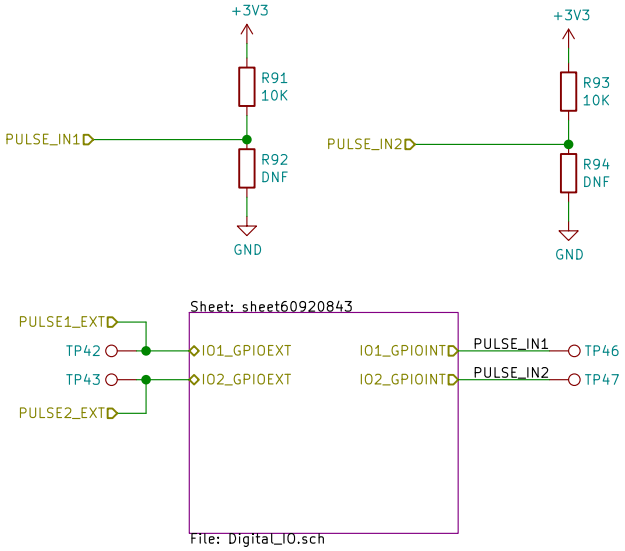
Sheet: /USB_debug/

File: USB_debug.sch

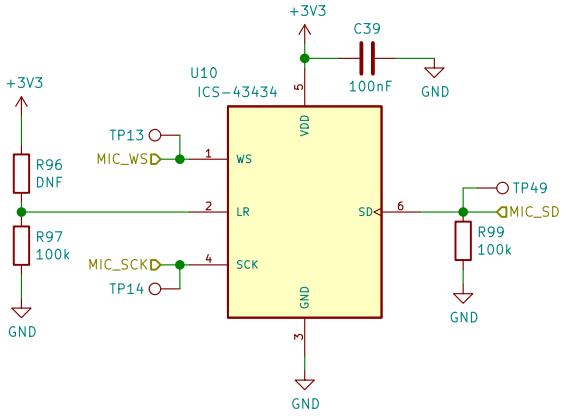
Title: Open Smart Monitor

Size: A4	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 5/9

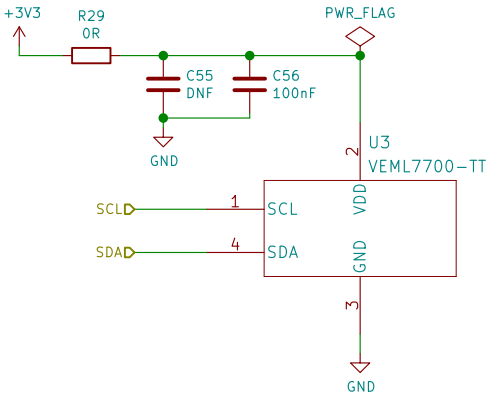
Pulse Inputs



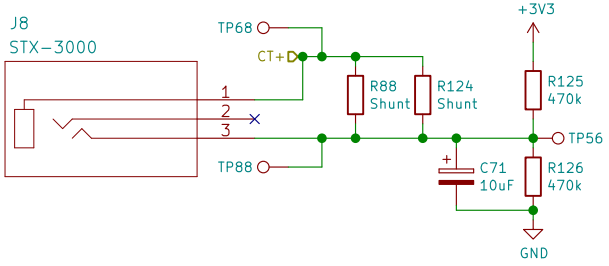
Microphone module



Light Sensor

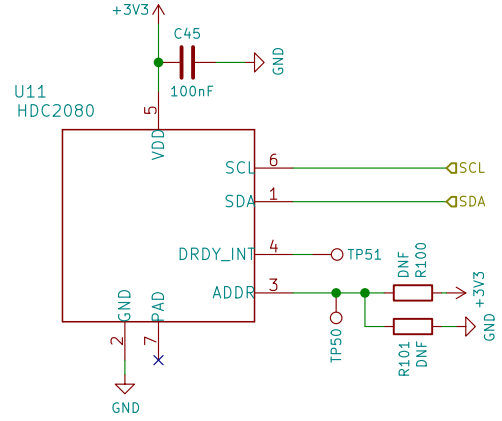


CT Clamp



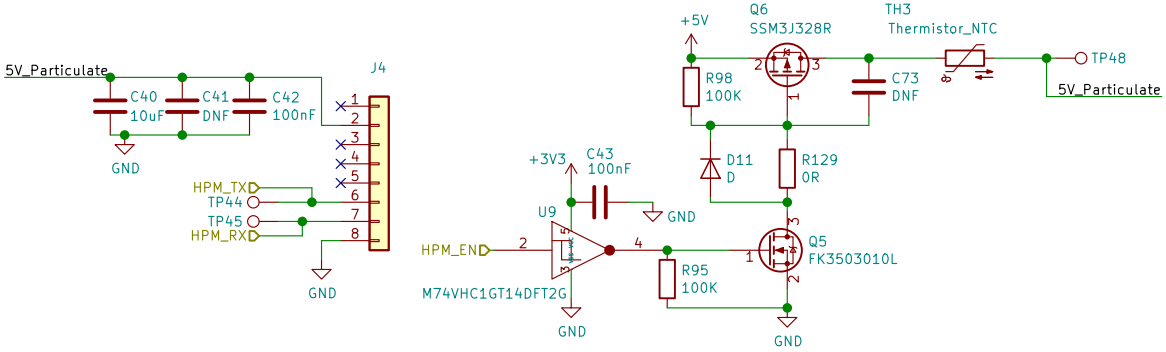
bypass capacitor few hundred ohms
https://learn.openenergymonitor.org/electricity-monitoring/ct-sensors/interface-with-arduino

Temp and Humidity



Note: Can use HDC1080/2080. For HTU21D leave pad 3,4 and ep unconnected

Particulate Sensor



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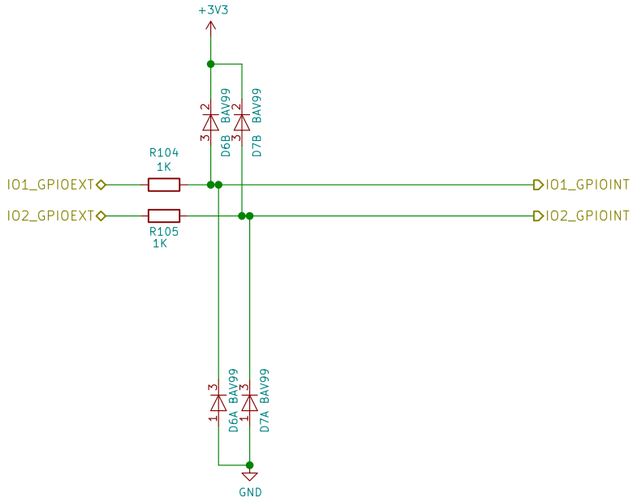
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 6/9

3V3 BI-DIRECTIONAL IO (5V TOLERANT)

Max 3mA per GPIO



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Sheet: /Sensors_AND_IO/sheet60920843/

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Title: Open Smart Monitor

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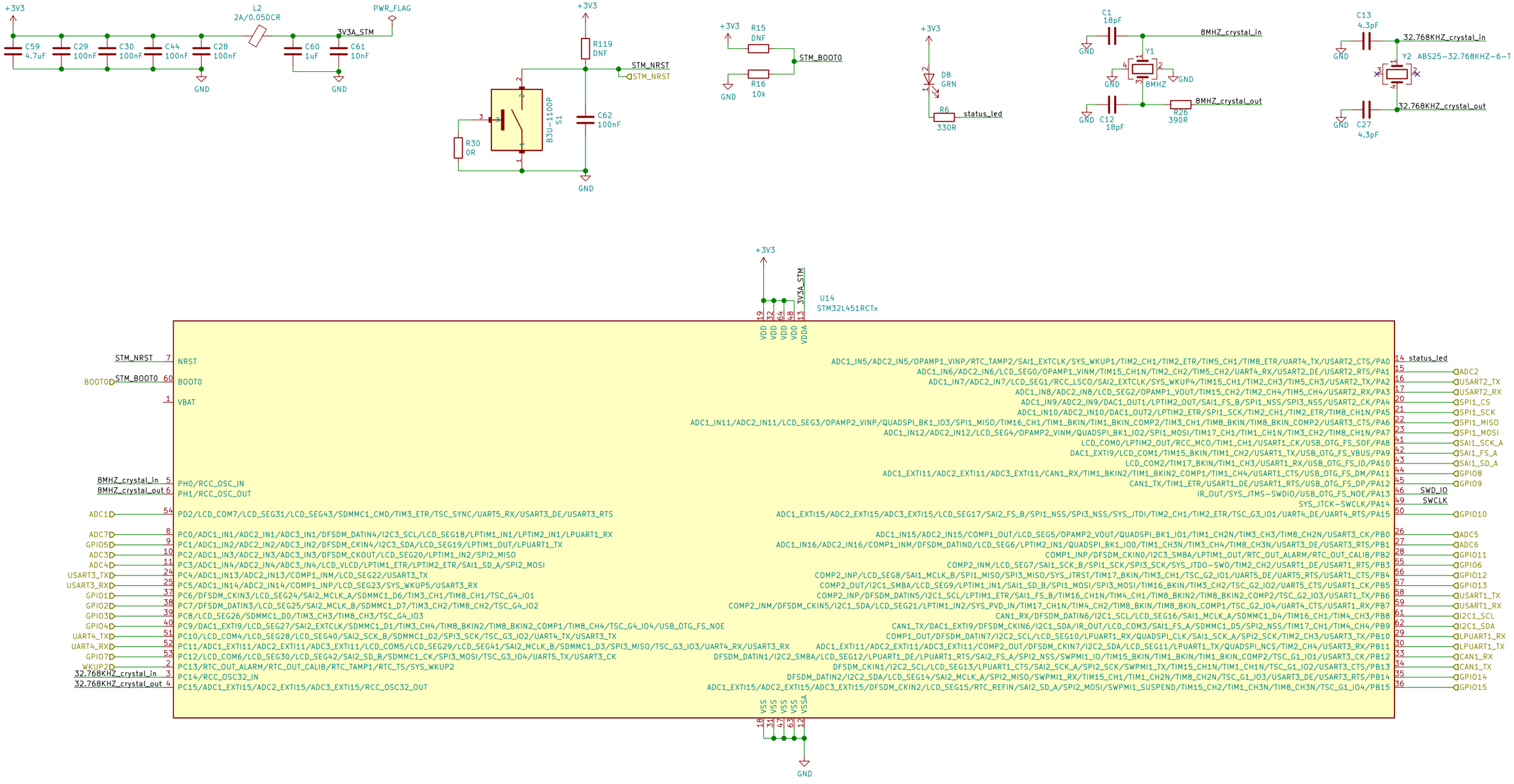
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 7/9


+3V3
L2
2A/0.05DCR
PWR_FLAG
3V3A_STM
C59 4.7uF
C29 100nF
C30 100nF
C44 100nF
C28 100nF
C60 1uF
C61 10nF
GND
R119 DNF
STM_NRST
B3U-1100P S1
R30 0R
C62 100nF
R15 DNF
R16 10k
STM_BOOT0
D8 GRN
R6 330R
status_led
C1 18pF
C12 18pF
Y1 8MHZ
R26 390R
8MHZ_crystal_in
8MHZ_crystal_out
C13 4.3pF
C27 4.3pF
Y2 ABS25-32.768KHZ-6-T
32.768KHZ_crystal_in
32.768KHZ_crystal_out
U14
STM32L451RCTx
VDD
VDDA
VSS
VSSA
NRST
BOOT0
VBAT
PH0/RCC_OSC_IN
PH1/RCC_OSC_OUT
PD2/LCD_COM7/LCD_SEG31/LCD_SEG43/SDMMC1_CMD/TIM3_ETR/TSC_SYNC/UART5_RX/USART3_DE/USART3_RTS
PC0/ADC1_IN1/ADC2_IN1/ADC3_IN1/DFSDM_DATIN4/I2C3_SCL/LCD_SEG18/LPTIM1_IN1/LPTIM2_IN1/LPUART1_RX
PC1/ADC1_IN2/ADC2_IN2/ADC3_IN2/DFSDM_CKIN4/I2C3_SDA/LCD_SEG19/LPTIM1_OUT/LPUART1_TX
PC2/ADC1_IN3/ADC2_IN3/ADC3_IN3/DFSDM_CKOUT/LCD_SEG20/LPTIM1_IN2/SPI2_MISO
PC3/ADC1_IN4/ADC2_IN4/ADC3_IN4/LCD_VLCD/LPTIM1_ETR/LPTIM2_ETR/SAI1_SD_A/SPI2_MOSI
PC4/ADC1_IN13/ADC2_IN13/COMP1_INM/LCD_SEG22/USART3_TX
PC5/ADC1_IN14/ADC2_IN14/COMP1_INP/LCD_SEG23/SYS_WKUP5/USART3_RX
PC6/DFSDM_CKIN3/LCD_SEG24/SAI2_MCLK_A/SDMMC1_D6/TIM3_CH1/TIM8_CH1/TSC_G4_IO1
PC7/DFSDM_DATIN3/LCD_SEG25/SAI2_MCLK_B/SDMMC1_D7/TIM3_CH2/TIM8_CH2/TSC_G4_IO2
PC8/LCD_SEG26/SDMMC1_D0/TIM3_CH3/TIM8_CH3/TSC_G4_IO3
PC9/DAC1_EXTI9/LCD_SEG27/SAI2_EXTCLK/SDMMC1_D1/TIM3_CH4/TIM8_BKIN2/TIM8_BKIN2_COMP1/TIM8_CH4/TSC_G4_IO4/USB_OTG_FS_NOE
PC10/LCD_COM4/LCD_SEG28/LCD_SEG40/SAI2_SCK_B/SDMMC1_D2/SPI3_SCK/TSC_G3_IO2/UART4_TX/USART3_TX
PC11/ADC1_EXTI11/ADC2_EXTI11/ADC3_EXTI11/LCD_COM5/LCD_SEG29/LCD_SEG41/SAI2_MCLK_B/SDMMC1_D3/SPI3_MISO/TSC_G3_IO3/UART4_RX/USART3_RX
PC12/LCD_COM6/LCD_SEG30/LCD_SEG42/SAI2_SD_B/SDMMC1_CK/SPI3_MOSI/TSC_G3_IO4/UART5_TX/USART3_CK
PC13/RTC_OUT_ALARM/RTC_OUT_CALIB/RTC_TAMP1/RTC_TS/SYS_WKUP2
PC14/RCC_OSC32_IN
PC15/ADC1_EXTI15/ADC2_EXTI15/ADC3_EXTI15/RCC_OSC32_OUT
ADC1_IN5/ADC2_IN5/OPAMP1_VINP/RTC_TAMP2/SAI1_EXTCLK/SYS_WKUP1/TIM2_CH1/TIM2_ETR/TIM5_CH1/TIM8_ETR/UART4_TX/USART2_CTS/PA0
ADC1_IN6/ADC2_IN6/LCD_SEG0/OPAMP1_VINM/TIM15_CH1N/TIM2_CH2/TIM5_CH2/UART4_RX/USART2_DE/USART2_RTS/PA1
ADC1_IN7/ADC2_IN7/LCD_SEG1/RCC_LSCO/SAI2_EXTCLK/SYS_WKUP4/TIM15_CH1/TIM2_CH3/TIM5_CH3/USART2_TX/PA2
ADC1_IN8/ADC2_IN8/LCD_SEG2/OPAMP1_VOUT/TIM15_CH2/TIM2_CH4/TIM5_CH4/USART2_RX/PA3
ADC1_IN9/ADC2_IN9/DAC1_OUT1/LPTIM2_OUT/SAI1_FS_B/SPI1_NSS/SPI3_NSS/USART2_CK/PA4
ADC1_IN10/ADC2_IN10/DAC1_OUT2/LPTIM2_ETR/SPI1_SCK/TIM2_CH1/TIM2_ETR/TIM8_CH1N/PA5
ADC1_IN11/ADC2_IN11/LCD_SEG3/OPAMP2_VINP/QUADSPI_BK1_IO3/SPI1_MISO/TIM16_CH1/TIM1_BKIN/TIM1_BKIN_COMP2/TIM3_CH1/TIM8_BKIN/TIM8_BKIN_COMP2/USART3_CTS/PA6
ADC1_IN12/ADC2_IN12/LCD_SEG4/OPAMP2_VINM/QUADSPI_BK1_IO2/SPI1_MOSI/TIM17_CH1/TIM1_CH1N/TIM3_CH2/TIM8_CH1N/PA7
LCD_COM0/LPTIM2_OUT/RCC_MCO/TIM1_CH1/USART1_CK/USB_OTG_FS_SOF/PA8
DAC1_EXTI9/LCD_COM1/TIM15_BKIN/TIM1_CH2/USART1_TX/USB_OTG_FS_VBUS/PA9
LCD_COM2/TIM17_BKIN/TIM1_CH3/USART1_RX/USB_OTG_FS_ID/PA10
ADC1_EXTI11/ADC2_EXTI11/ADC3_EXTI11/CAN1_RX/TIM1_BKIN2/TIM1_BKIN2_COMP1/TIM1_CH4/USART1_CTS/USB_OTG_FS_DM/PA11
CAN1_TX/TIM1_ETR/USART1_DE/USART1_RTS/USB_OTG_FS_DP/PA12
IR_OUT/SYS_JTMS-SWDIO/USB_OTG_FS_NOE/PA13
SYS_JTCK-SWCLK/PA14
ADC1_EXTI15/ADC2_EXTI15/ADC3_EXTI15/LCD_SEG17/SAI2_FS_B/SPI1_NSS/SPI3_NSS/SYS_JTDI/TIM2_CH1/TIM2_ETR/TSC_G3_IO1/UART4_DE/UART4_RTS/PA15
ADC1_IN15/ADC2_IN15/COMP1_OUT/LCD_SEG5/OPAMP2_VOUT/QUADSPI_BK1_IO1/TIM1_CH2N/TIM3_CH3/TIM8_CH2N/USART3_CK/PB0
ADC1_IN16/ADC2_IN16/COMP1_INM/DFSDM_DATIN0/LCD_SEG6/LPTIM2_IN1/QUADSPI_BK1_IO0/TIM1_CH3N/TIM3_CH4/TIM8_CH3N/USART3_DE/USART3_RTS/PB1
COMP1_INP/DFSDM_CKIN0/I2C3_SMBA/LPTIM1_OUT/RTC_OUT_ALARM/RTC_OUT_CALIB/PB2
COMP2_INM/LCD_SEG7/SAI1_SCK_B/SPI1_SCK/SPI3_SCK/SYS_JTDO-SWO/TIM2_CH2/USART1_DE/USART1_RTS/PB3
COMP2_INP/LCD_SEG8/SAI1_MCLK_B/SPI1_MISO/SPI3_MISO/SYS_JTRST/TIM17_BKIN/TIM3_CH1/TSC_G2_IO1/UART5_DE/UART5_RTS/USART1_CTS/PB4
COMP2_OUT/I2C1_SMBA/LCD_SEG9/LPTIM1_IN1/SAI1_SD_B/SPI1_MOSI/SPI3_MOSI/TIM16_BKIN/TIM3_CH2/TSC_G2_IO2/UART5_CTS/USART1_CK/PB5
COMP2_INP/DFSDM_DATIN5/I2C1_SCL/LPTIM1_ETR/SAI1_FS_B/TIM16_CH1N/TIM4_CH1/TIM8_BKIN2/TIM8_BKIN2_COMP2/TSC_G2_IO3/USART1_TX/PB6
COMP2_INM/DFSDM_CKIN5/I2C1_SDA/LCD_SEG21/LPTIM1_IN2/SYS_PVD_IN/TIM17_CH1N/TIM4_CH2/TIM8_BKIN/TIM8_BKIN_COMP1/TSC_G2_IO4/UART4_CTS/USART1_RX/PB7
CAN1_RX/DFSDM_DATIN6/I2C1_SCL/LCD_SEG16/SAI1_MCLK_A/SDMMC1_D4/TIM16_CH1/TIM4_CH3/PB8
CAN1_TX/DAC1_EXTI9/DFSDM_CKIN6/I2C1_SDA/IR_OUT/LCD_COM3/SAI1_FS_A/SDMMC1_D5/SPI2_NSS/TIM17_CH1/TIM4_CH4/PB9
COMP1_OUT/DFSDM_DATIN7/I2C2_SCL/LCD_SEG10/LPUART1_RX/QUADSPI_CLK/SAI1_SCK_A/SPI2_SCK/TIM2_CH3/USART3_TX/PB10
ADC1_EXTI11/ADC2_EXTI11/ADC3_EXTI11/COMP2_OUT/DFSDM_CKIN7/I2C2_SDA/LCD_SEG11/LPUART1_TX/QUADSPI_NCS/TIM2_CH4/USART3_RX/PB11
DFSDM_DATIN1/I2C2_SMBA/LCD_SEG12/LPUART1_DE/LPUART1_RTS/SAI2_FS_A/SPI2_NSS/SWPMI1_IO/TIM15_BKIN/TIM1_BKIN/TIM1_BKIN_COMP2/TSC_G1_IO1/USART3_CK/PB12
DFSDM_CKIN1/I2C2_SCL/LCD_SEG13/LPUART1_CTS/SAI2_SCK_A/SPI2_SCK/SWPMI1_TX/TIM15_CH1N/TIM1_CH1N/TSC_G1_IO2/USART3_CTS/PB13
DFSDM_DATIN2/I2C2_SDA/LCD_SEG14/SAI2_MCLK_A/SPI2_MISO/SWPMI1_RX/TIM15_CH1/TIM1_CH2N/TIM8_CH2N/TSC_G1_IO3/USART3_DE/USART3_RTS/PB14
ADC1_EXTI15/ADC2_EXTI15/ADC3_EXTI15/DFSDM_CKIN2/LCD_SEG15/RTC_REFIN/SAI2_SD_A/SPI2_MOSI/SWPMI1_SUSPEND/TIM15_CH2/TIM1_CH3N/TIM8_CH3N/TSC_G1_IO4/PB15
STM_NRST
STM_BOOT0
8MHZ_crystal_in
8MHZ_crystal_out
ADC1
ADC7
GPIO5
ADC3
ADC4
USART3_TX
USART3_RX
GPIO1
GPIO2
GPIO3
GPIO4
UART4_TX
UART4_RX
GPIO7
WKUP2
32.768KHZ_crystal_in
32.768KHZ_crystal_out
status_led
ADC2
USART2_TX
USART2_RX
SPI1_CS
SPI1_SCK
SPI1_MISO
SPI1_MOSI
SAI1_SCK_A
SAI1_FS_A
SAI1_SD_A
GPIO8
GPIO9
SWD_IO
SWCLK
GPIO10
ADC5
ADC6
GPIO11
GPIO6
GPIO12
GPIO13
USART1_TX
USART1_RX
I2C1_SCL
I2C1_SDA
LPUART1_RX
LPUART1_TX
CAN1_RX
CAN1_TX
GPIO14
GPIO15
Note: For comfirmation of pin functions refer to datasheet. Symbol may not be correct
– wkup pins 2,14,16,25
–pa13, pa15, pb4 avoid as after reset internal pull up and pull down activated
SWD Programming Header
J5
Conn_01x06
Sheet: /STM32L4/
File: STM32L4.sch
Title:
Size: A3
Date:
Rev:
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2
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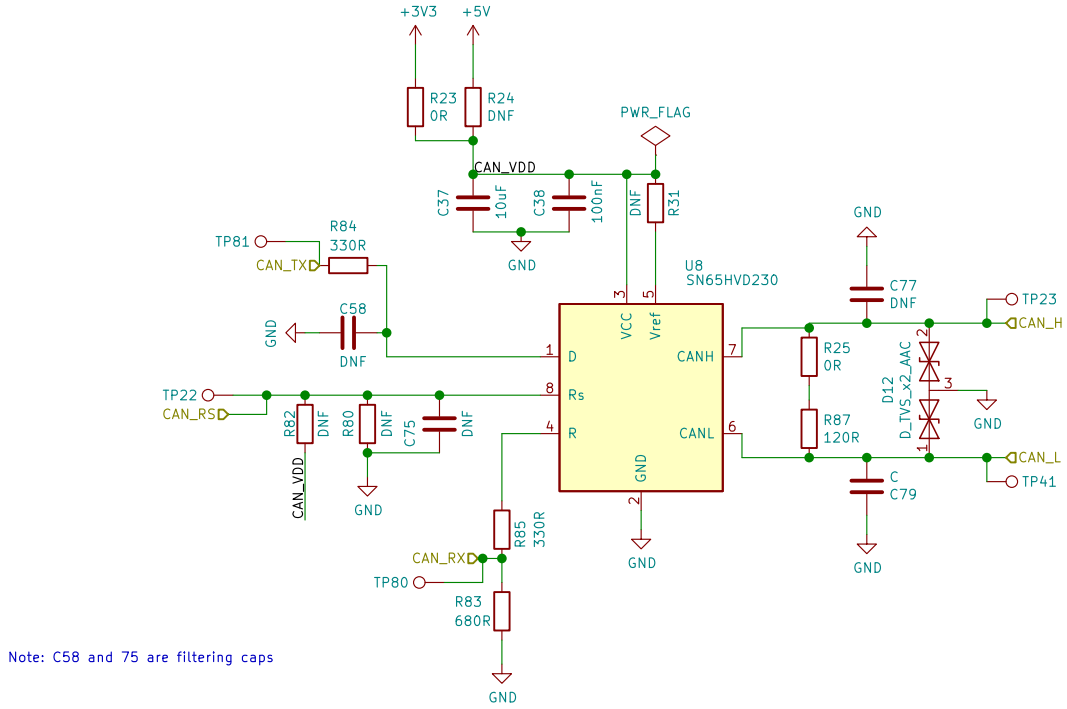

Note: C58 and 75 are filtering caps

Sheet: /CanTransciever/		
File: CanTransciever.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.5+dfsg1-2build2		Id: 9/9