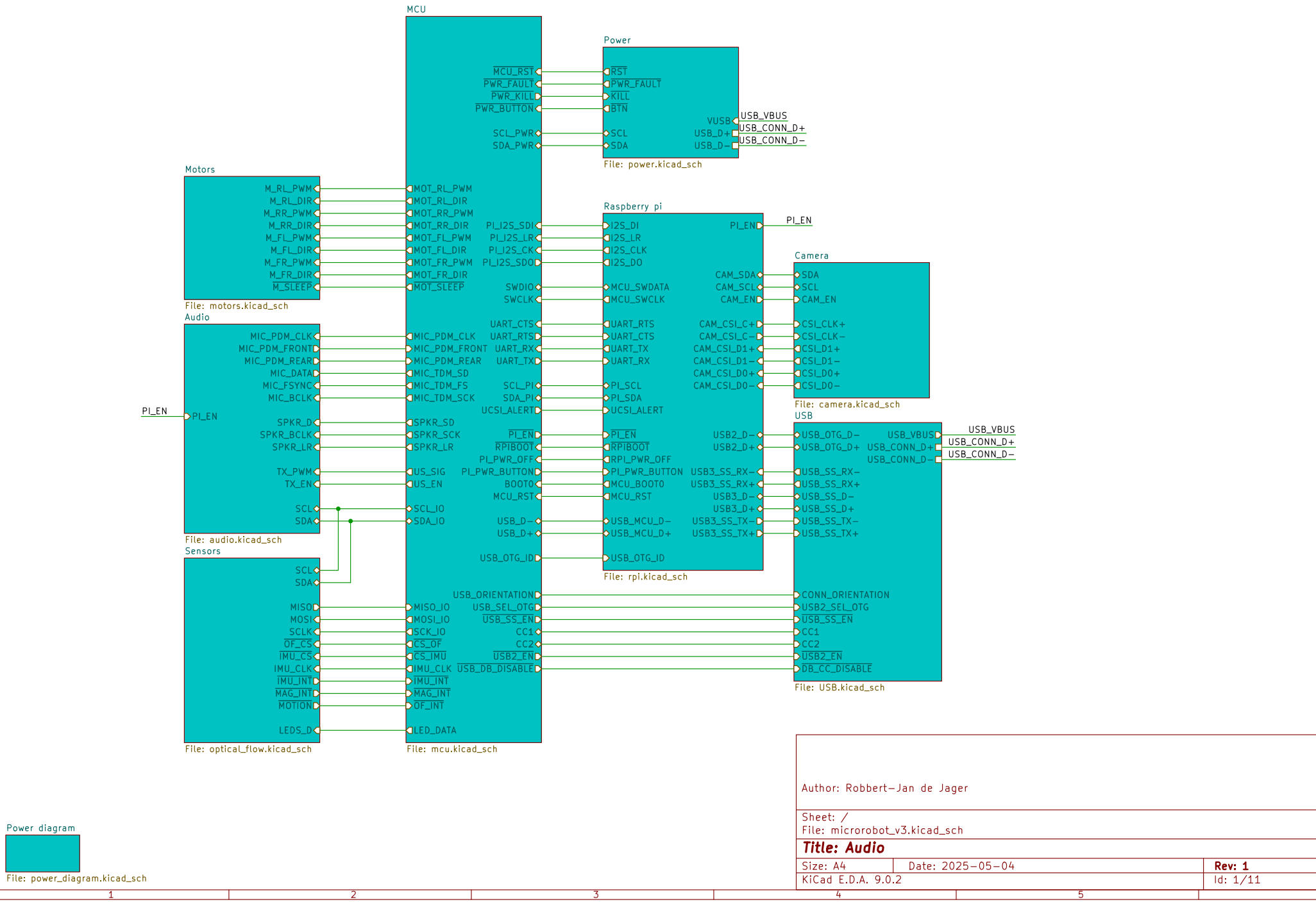
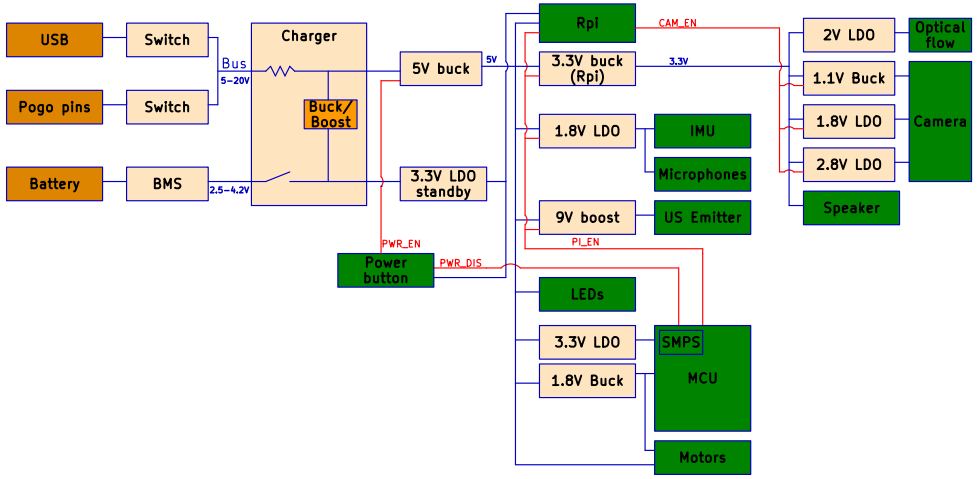

MCU
Power
MCU_RST
PWR_FAULT
PWR_KILL
PWR_BUTTON
SCL_PWR
SDA_PWR
RST
PWR_FAULT
KILL
BTN
SCL
SDA
VUSB
USB_D+
USB_D−
USB_VBUS
USB_CONN_D+
USB_CONN_D−
File: power.kicad_sch
Motors
M_RL_PWM
M_RL_DIR
M_RR_PWM
M_RR_DIR
M_FL_PWM
M_FL_DIR
M_FR_PWM
M_FR_DIR
M_SLEEP
MOT_RL_PWM
MOT_RL_DIR
MOT_RR_PWM
MOT_RR_DIR
MOT_FL_PWM
MOT_FL_DIR
MOT_FR_PWM
MOT_FR_DIR
MOT_SLEEP
File: motors.kicad_sch
Raspberry pi
PI_I2S_SDI
PI_I2S_LR
PI_I2S_CK
PI_I2S_SDO
SWDIO
SWCLK
I2S_DI
I2S_LR
I2S_CLK
I2S_DO
MCU_SWDATA
MCU_SWCLK
PI_EN
PI_EN
Camera
CAM_SDA
CAM_SCL
CAM_EN
SDA
SCL
CAM_EN
Audio
MIC_PDM_CLK
MIC_PDM_FRONT
MIC_PDM_REAR
MIC_DATA
MIC_FSYNC
MIC_BCLK
PI_EN
SPKR_D
SPKR_BCLK
SPKR_LR
TX_PWM
TX_EN
SCL
SDA
MIC_PDM_CLK
MIC_PDM_FRONT
MIC_PDM_REAR
MIC_TDM_SD
MIC_TDM_FS
MIC_TDM_SCK
SPKR_SD
SPKR_SCK
SPKR_LR
US_SIG
US_EN
SCL_IO
SDA_IO
File: audio.kicad_sch
UART_CTS
UART_RTS
UART_RX
UART_TX
SCL_PI
SDA_PI
UCSI_ALERT
PI_EN
RPIBOOT
PI_PWR_OFF
PI_PWR_BUTTON
BOOT0
MCU_RST
USB_D−
USB_D+
USB_OTG_ID
UART_RTS
UART_CTS
UART_TX
UART_RX
PI_SCL
PI_SDA
UCSI_ALERT
PI_EN
RPIBOOT
RPI_PWR_OFF
PI_PWR_BUTTON
MCU_BOOT0
MCU_RST
USB_MCU_D−
USB_MCU_D+
USB_OTG_ID
CAM_CSI_C+
CAM_CSI_C−
CAM_CSI_D1+
CAM_CSI_D1−
CAM_CSI_D0+
CAM_CSI_D0−
CSI_CLK+
CSI_CLK−
CSI_D1+
CSI_D1−
CSI_D0+
CSI_D0−
File: camera.kicad_sch
USB
USB2_D−
USB2_D+
USB3_SS_RX−
USB3_SS_RX+
USB3_D−
USB3_D+
USB3_SS_TX−
USB3_SS_TX+
USB_OTG_D−
USB_OTG_D+
USB_SS_RX−
USB_SS_RX+
USB_SS_D−
USB_SS_D+
USB_SS_TX−
USB_SS_TX+
USB_VBUS
USB_CONN_D+
USB_CONN_D−
USB_VBUS
USB_CONN_D+
USB_CONN_D−
Sensors
SCL
SDA
MISO
MOSI
SCLK
OF_CS
IMU_CS
IMU_CLK
IMU_INT
MAG_INT
MOTION
LEDS_D
MISO_IO
MOSI_IO
SCK_IO
CS_OF
CS_IMU
IMU_CLK
IMU_INT
MAG_INT
OF_INT
LED_DATA
File: optical_flow.kicad_sch
USB_ORIENTATION
USB_SEL_OTG
USB_SS_EN
CC1
CC2
USB2_EN
USB_DB_DISABLE
CONN_ORIENTATION
USB2_SEL_OTG
USB_SS_EN
CC1
CC2
USB2_EN
DB_CC_DISABLE
File: USB.kicad_sch
File: mcu.kicad_sch
Power diagram
File: power_diagram.kicad_sch
Author: Robbert−Jan de Jager
Sheet: /
File: microrobot_v3.kicad_sch
Title: Audio
Size: A4
Date: 2025−05−04
Rev: 1
KiCad E.D.A. 9.0.2
Id: 1/11



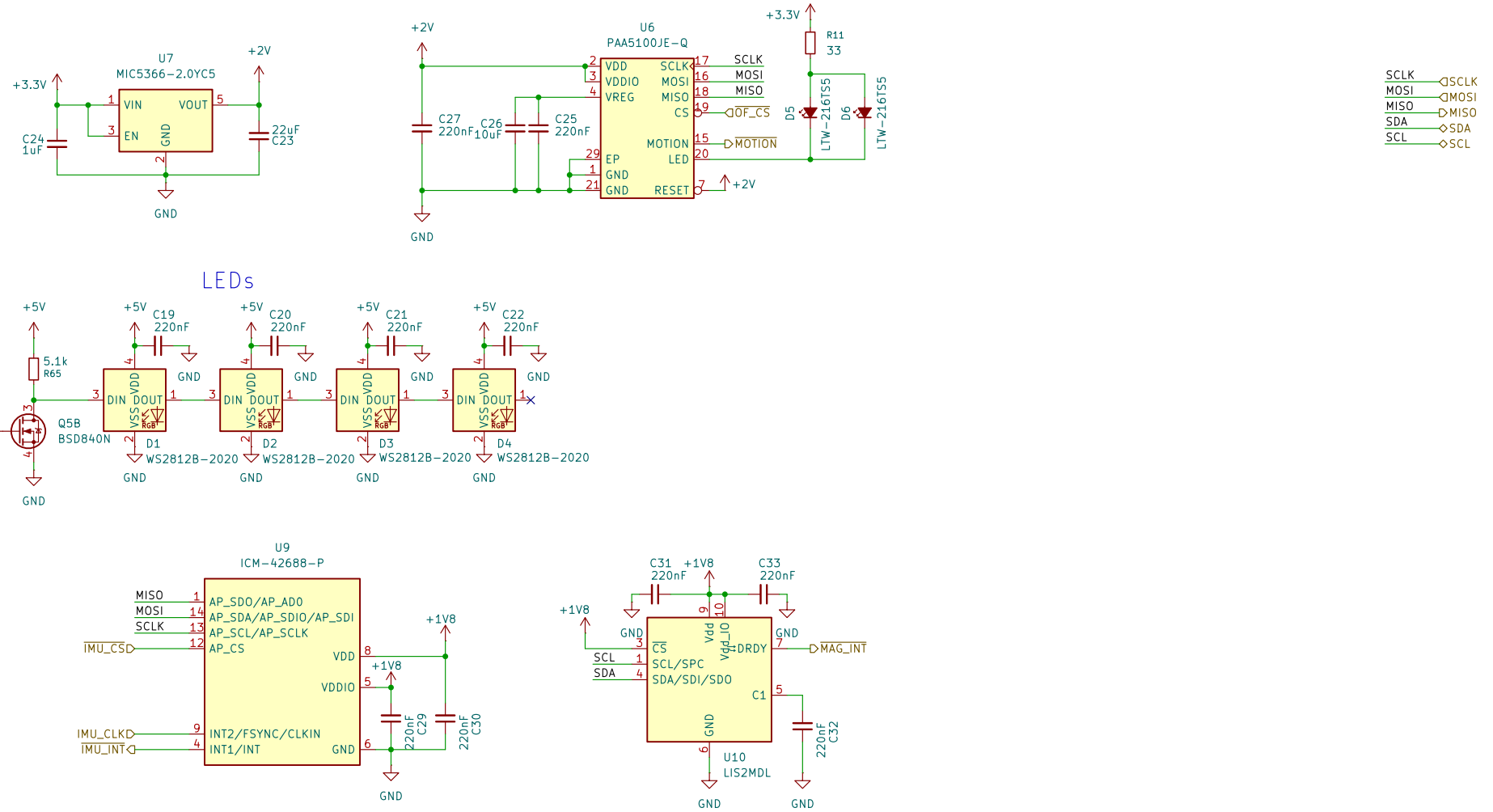
Bus	Address	Purpose
I2C-pi	0x40	UCSI PPM (Type-C)
I2C-pi	0x50	HAT Eeprom (EEPROM Emulation)
I2C-pi	0x0b	Smart Battery
sensors	0x1E	magnetometer
sensors	0x17	PDM to TDM converter
battery	0x6b	Battery charger
battery	0x55	Fuel guage
Camera	0x1a	Camera sensor
Camera	0x0c	Autofocus

Author: Robbert-Jan de Jager

Sheet: /Power diagram/
File: power_diagram.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.2		Id: 2/11

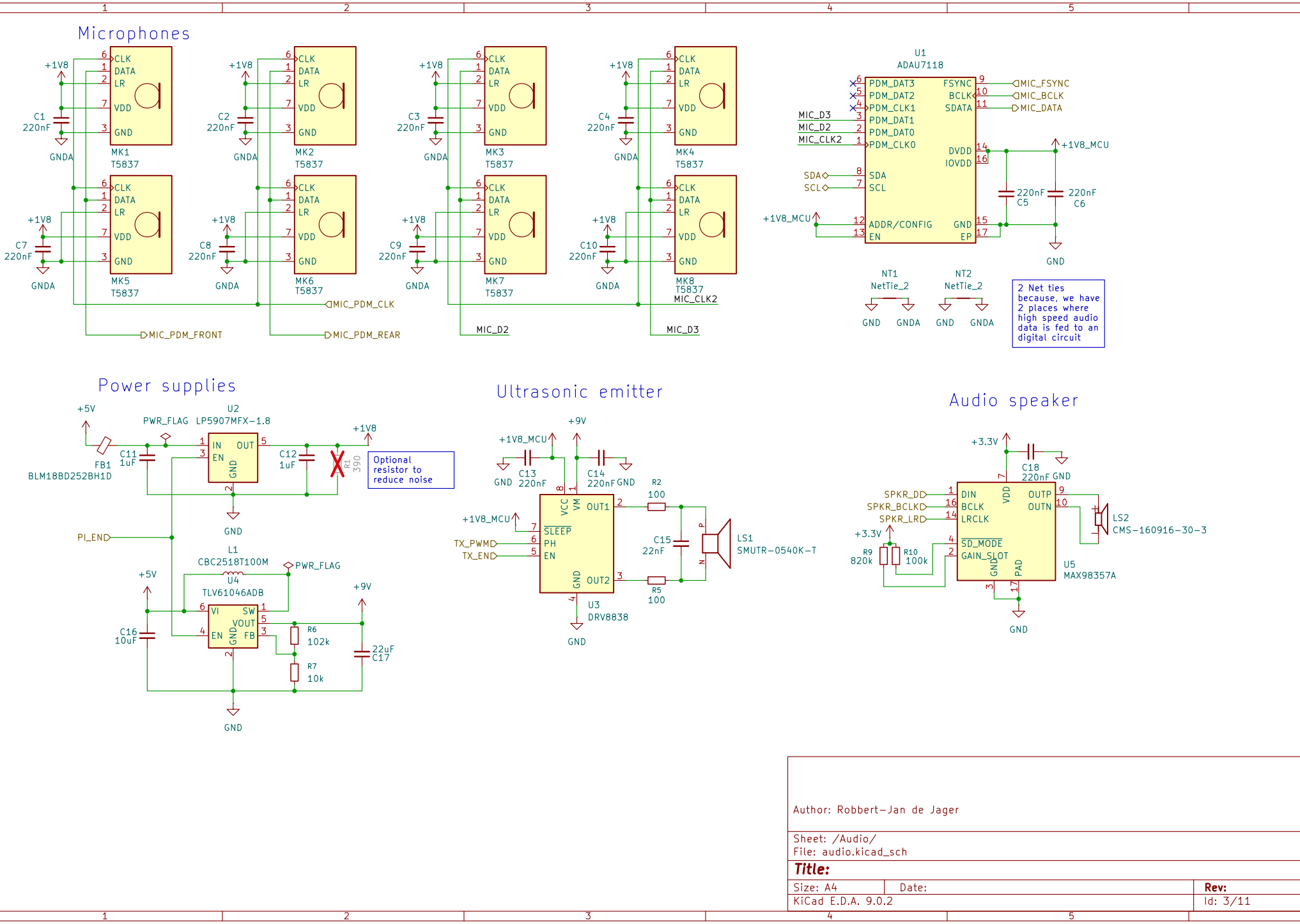


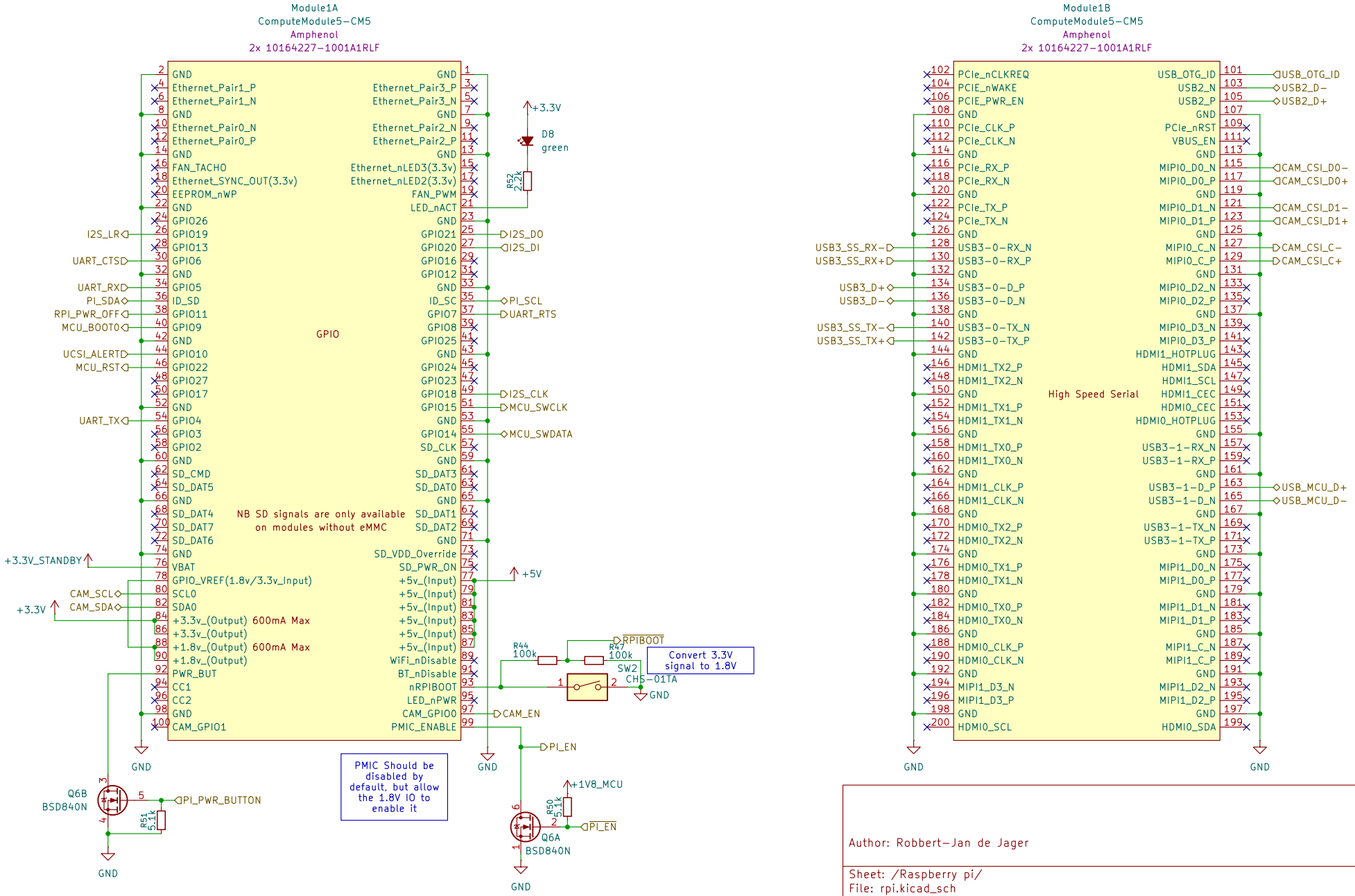
Author: Robbert-Jan de Jager

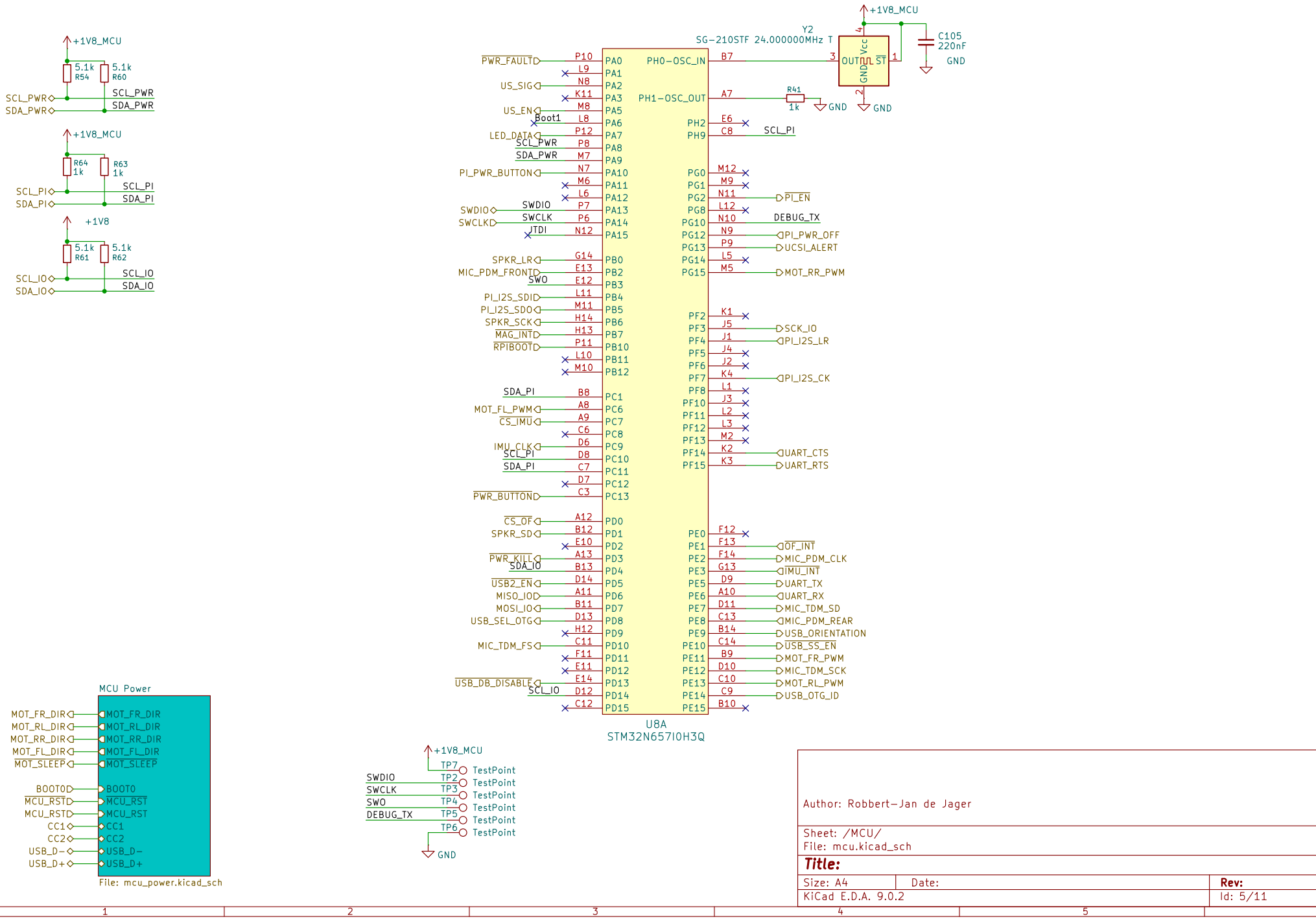
Sheet: /Sensors/
File: optical_flow.kicad_sch

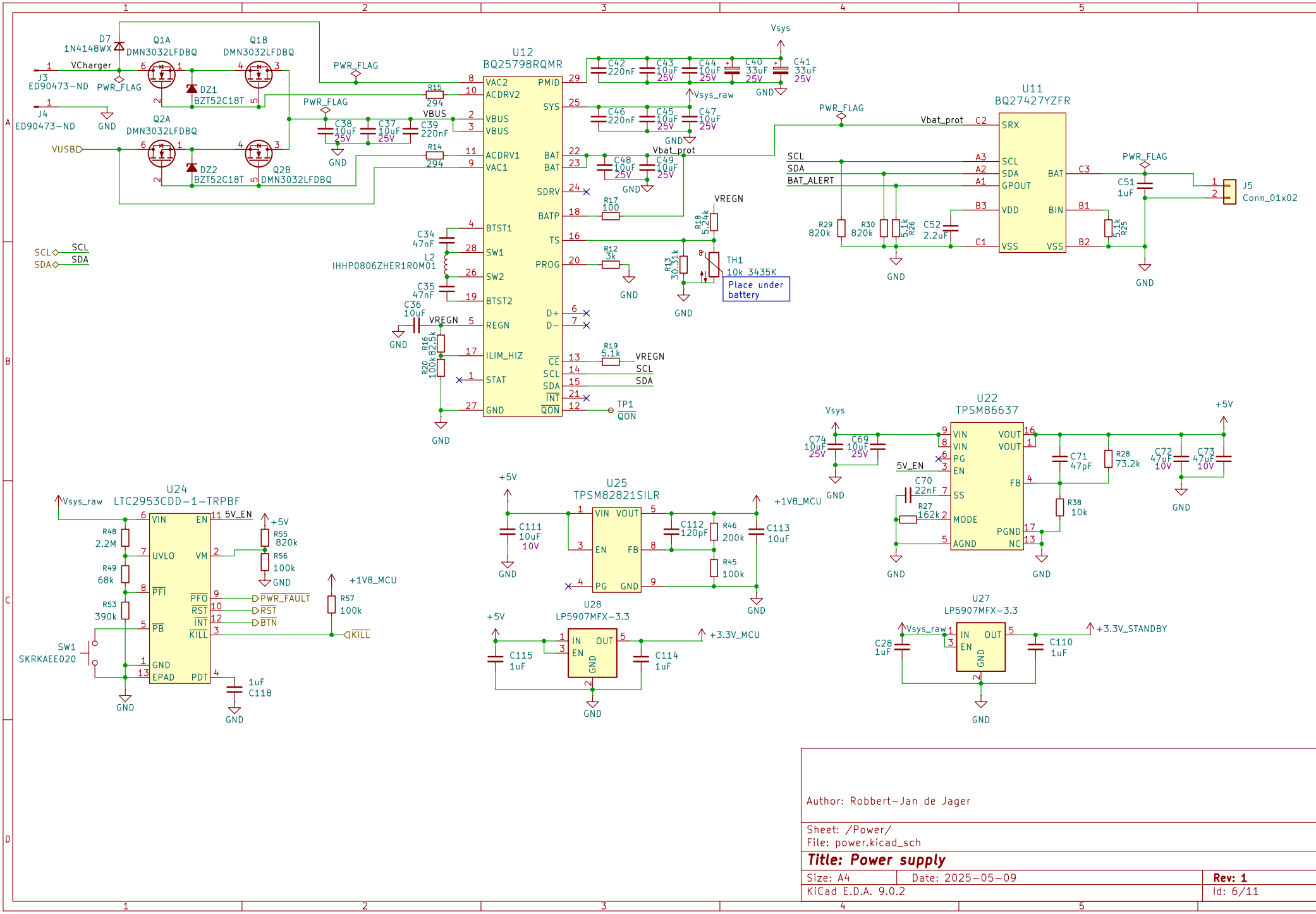
Title: Sensors

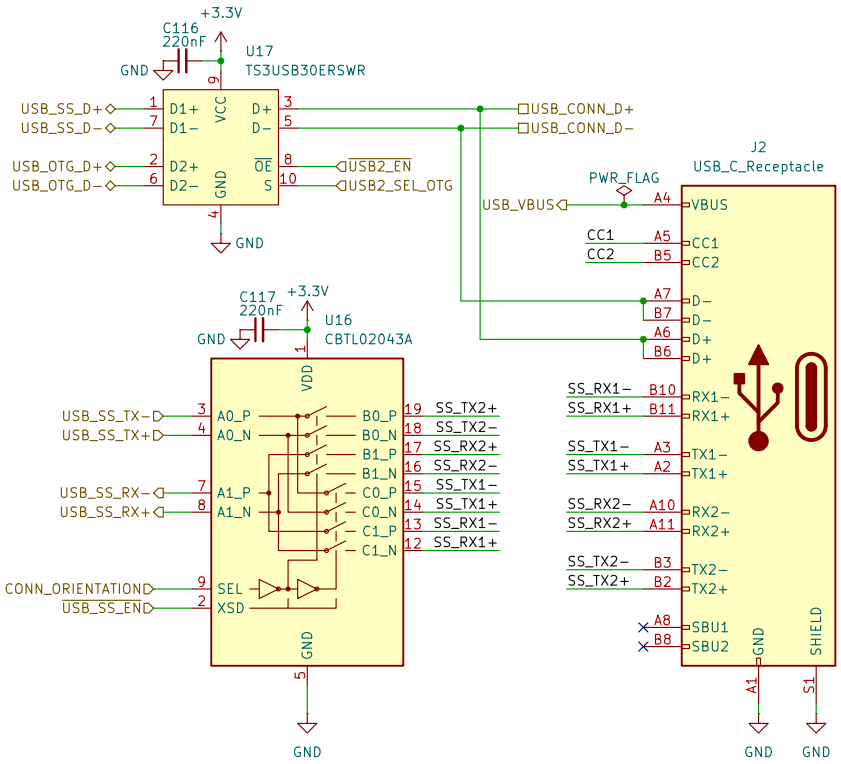
Size: A4	Date: 2025-05-05	**Rev: 1**
KiCad E.D.A. 9.0.2		Id: 2/11

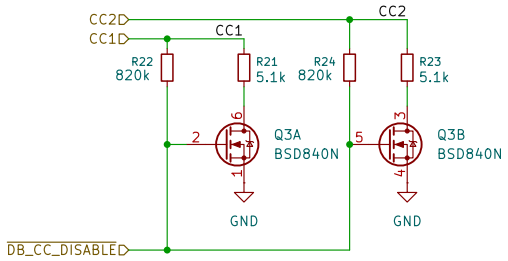

Microphones
+1V8
C1 220nF
GNDA
MK1 T5837
MK2 T5837
MK3 T5837
MK4 T5837
MK5 T5837
MK6 T5837
MK7 T5837
MK8 T5837
C2 220nF
C3 220nF
C4 220nF
C7 220nF
C8 220nF
C9 220nF
C10 220nF
CLK
DATA
LR
VDD
GND
MIC_PDM_CLK
MIC_PDM_FRONT
MIC_PDM_REAR
MIC_D2
MIC_D3
MIC_CLK2
U1
ADAU7118
PDM_DAT3
PDM_DAT2
PDM_CLK1
PDM_DAT1
PDM_DAT0
PDM_CLK0
FSYNC
BCLK
SDATA
DVDD
IOVDD
SDA
SCL
ADDR/CONFIG
EN
GND
EP
MIC_FSYNC
MIC_BCLK
MIC_DATA
+1V8_MCU
C5 220nF
C6 220nF
NT1
NetTie_2
NT2
NetTie_2
2 Net ties because, we have 2 places where high speed audio data is fed to an digital circuit
Power supplies
+5V
U2
PWR_FLAG
LP5907MFX-1.8
IN
OUT
EN
GND
FB1
BLM18BD252BH1D
C11 1uF
C12 1uF
R1 390
Optional resistor to reduce noise
PI_END
L1
CBC2518T100M
U4
TLV61046ADB
VI
SW
VOUT
EN
FB
C16 10uF
R6 102k
R7 10k
22uF C17
Ultrasonic emitter
+9V
C13 220nF
C14 220nF
VCC
VM
OUT1
OUT2
SLEEP
PH
EN
TX_PWM
TX_EN
R2 100
R5 100
C15 22nF
LS1
SMUTR-0540K-T
U3
DRV8838
Audio speaker
+3.3V
C18 220nF
DIN
BCLK
LRCLK
SD_MODE
GAIN_SLOT
VDD
OUTP
OUTN
GND
PAD
SPKR_DD
SPKR_BCLK
SPKR_LR
R9 820k
R10 100k
LS2
CMS-160916-30-3
U5
MAX98357A
Author: Robbert-Jan de Jager
Sheet: /Audio/
File: audio.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.2
Id: 3/11


Module1A
ComputeModule5-CM5
Amphenol
2x 10164227-1001A1RLF
GPIO
NB SD signals are only available on modules without eMMC
Module1B
ComputeModule5-CM5
Amphenol
2x 10164227-1001A1RLF
High Speed Serial
Convert 3.3V signal to 1.8V
PMIC Should be disabled by default, but allow the 1.8V IO to enable it
Author: Robbert-Jan de Jager
Sheet: /Raspberry pi/
File: rpi.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.2
Id: 4/11


+1V8_MCU
5.1k R54
5.1k R60
SCL_PWR
SDA_PWR
+1V8_MCU
R64 1k
R63 1k
SCL_PI
SDA_PI
+1V8
5.1k R61
5.1k R62
SCL_IO
SDA_IO
Y2
SG-210STF 24.000000MHz T
+1V8_MCU
C105 220nF
GND
R41 1k
PWR_FAULT
US_SIG
US_EN
Boot1
LED_DATA
SCL_PWR
SDA_PWR
PI_PWR_BUTTON
SWDIO
SWCLK
JTDI
SPKR_LR
MIC_PDM_FRONT
SWO
PI_I2S_SDI
PI_I2S_SDO
SPKR_SCK
MAG_INT
RPIBOOT
SDA_PI
MOT_FL_PWM
CS_IMU
IMU_CLK
SCL_PI
SDA_PI
PWR_BUTTON
CS_OF
SPKR_SD
PWR_KILL
SDA_IO
USB2_EN
MISO_IO
MOSI_IO
USB_SEL_OTG
MIC_TDM_FS
USB_DB_DISABLE
SCL_IO
PA0 PH0-OSC_IN
PA1
PA2
PA3 PH1-OSC_OUT
PA5
PA6
PA7
PA8
PA9
PA10
PA11
PA12
PA13
PA14
PA15
PB0
PB2
PB3
PB4
PB5
PB6
PB7
PB10
PB11
PB12
PC1
PC6
PC7
PC8
PC9
PC10
PC11
PC12
PC13
PD0
PD1
PD2
PD3
PD4
PD5
PD6
PD7
PD8
PD9
PD10
PD11
PD12
PD13
PD14
PD15
PH2
PH9
PG0
PG1
PG2
PG8
PG10
PG12
PG13
PG14
PG15
PF2
PF3
PF4
PF5
PF6
PF7
PF8
PF10
PF11
PF12
PF13
PF14
PF15
PE0
PE1
PE2
PE3
PE5
PE6
PE7
PE8
PE9
PE10
PE11
PE12
PE13
PE14
PE15
SCL_PI
DEBUG_TX
PI_PWR_OFF
UCSI_ALERT
MOT_RR_PWM
SCK_IO
PI_I2S_LR
PI_I2S_CK
UART_CTS
UART_RTS
OF_INT
MIC_PDM_CLK
IMU_INT
UART_TX
UART_RX
MIC_TDM_SD
MIC_PDM_REAR
USB_ORIENTATION
USB_SS_EN
MOT_FR_PWM
MIC_TDM_SCK
MOT_RL_PWM
USB_OTG_ID
U8A
STM32N657I0H3Q
MCU Power
MOT_FR_DIR
MOT_RL_DIR
MOT_RR_DIR
MOT_FL_DIR
MOT_SLEEP
BOOT0
MCU_RST
MCU_RST
CC1
CC2
USB_D-
USB_D+
File: mcu_power.kicad_sch
+1V8_MCU
SWDIO
SWCLK
SWO
DEBUG_TX
TP7 TestPoint
TP2 TestPoint
TP3 TestPoint
TP4 TestPoint
TP5 TestPoint
TP6 TestPoint
GND
Author: Robbert-Jan de Jager
Sheet: /MCU/
File: mcu.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.2
Id: 5/11


U12
BQ25798RQMR
U11
BQ27427YZFR
U22
TPSM86637
U24
LTC2953CDD-1-TRPBF
U25
TPSM82821SILR
U28
LP5907MFX-3.3
U27
LP5907MFX-3.3
D7
1N4148WX
Q1A
DMN3032LFDBQ
Q1B
DMN3032LFDBQ
Q2A
DMN3032LFDBQ
Q2B
DMN3032LFDBQ
DZ1
BZT52C18T
DZ2
BZT52C18T
J3
ED90473-ND
J4
ED90473-ND
VCharger
VUSB
PWR_FLAG
GND
VBUS
Vsys
Vsys_raw
Vbat_prot
VREGN
SCL
SDA
BAT_ALERT
L2
IHHP0806ZHER1R0M01
TH1
10k 3435K
Place under battery
J5
Conn_01x02
SW1
SKRKAEE020
5V_EN
PWR_FAULT
BTN
KILL
+5V
+1V8_MCU
+3.3V_MCU
+3.3V_STANDBY
Author: Robbert-Jan de Jager
Sheet: /Power/
File: power.kicad_sch
Title: Power supply
Size: A4
Date: 2025-05-09
Rev: 1
KiCad E.D.A. 9.0.2
Id: 6/11





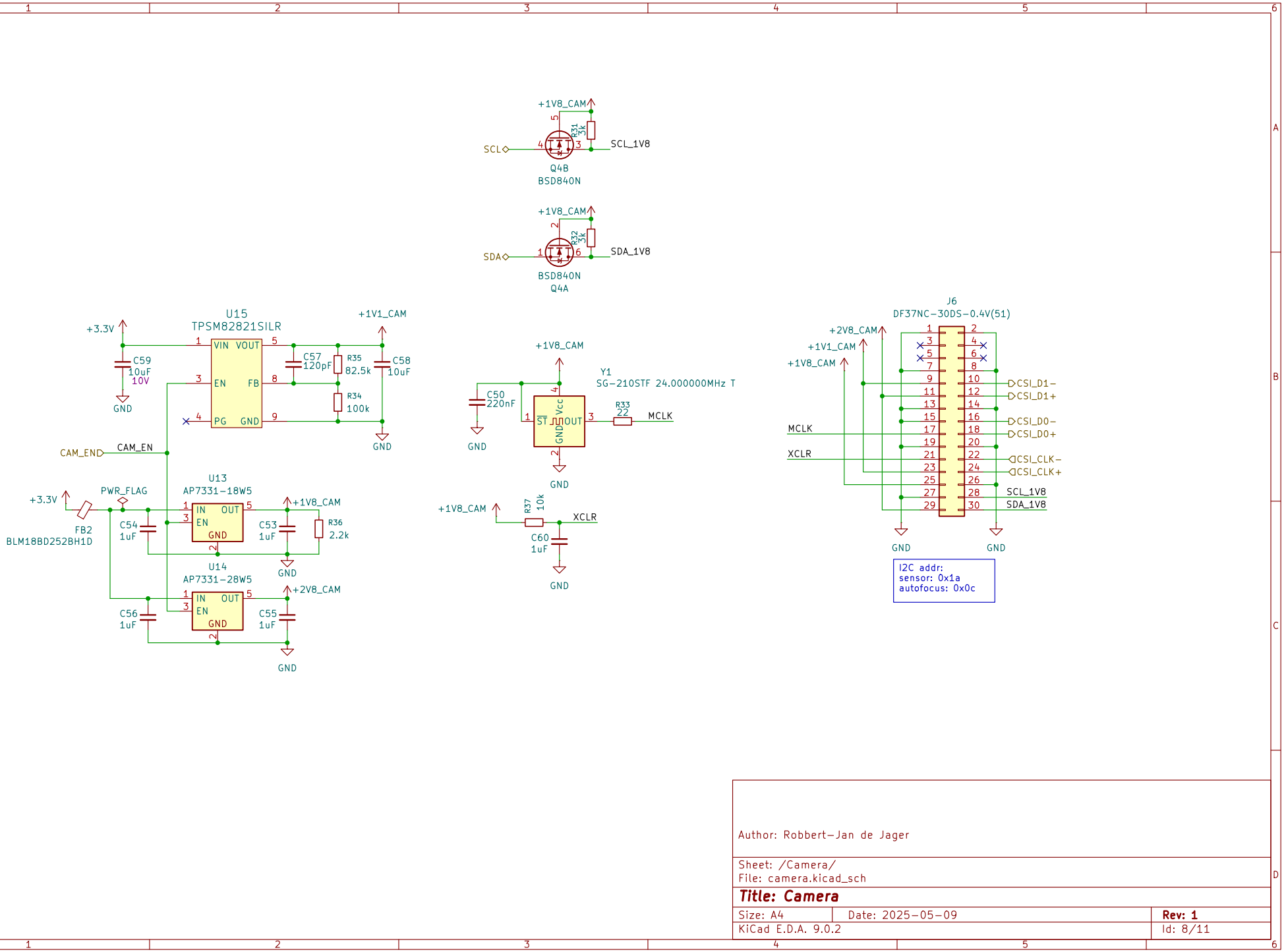
Workaround to get power to the system in dead-battery mode.
We should present 5.1k resistors on the CC lines when we don't have power.
But we should remove those when the MCU starts talking on the CC lines.
We may need to fine tune the resistors to get the aparant resistance correct, as we are operating the fets in the margins.

Author: Robbert-Jan de Jager

Sheet: /USB/
File: USB.kicad_sch

Title: USB

Size: A4	Date: 2025-05-09	**Rev: 1**
KiCad E.D.A. 9.0.2		Id: 7/11

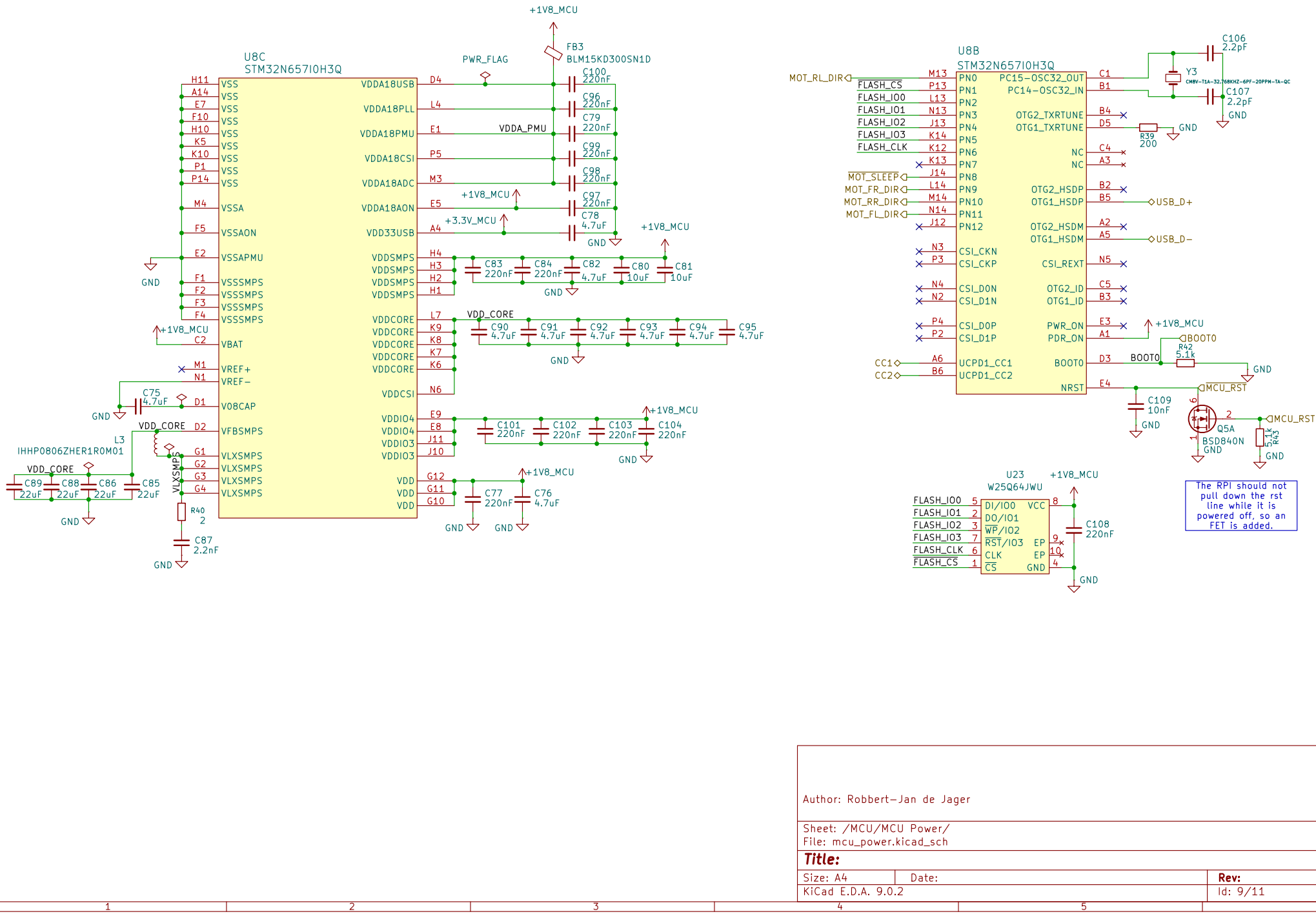


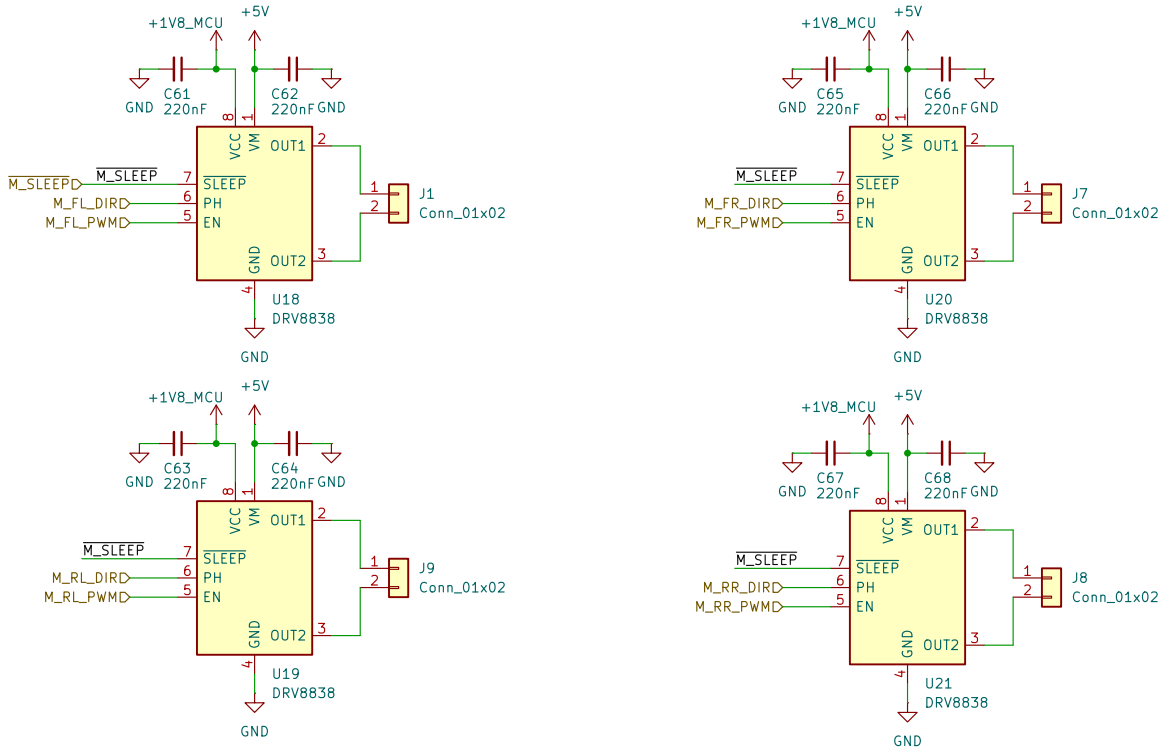
Author: Robbert-Jan de Jager

Sheet: /Camera/
File: camera.kicad_sch

Title: Camera

Size: A4	Date: 2025-05-09	**Rev: 1**
KiCad E.D.A. 9.0.2		Id: 8/11


U8C
STM32N657I0H3Q
U8B
STM32N657I0H3Q
U23
W25Q64JWU
+1V8_MCU
+3.3V_MCU
VDDA_PMU
VDD_CORE
PWR_FLAG
GND
FB3
BLM15KD300SN1D
L3
IHHP0806ZHER1R0M01
Y3
CM8V-T1A-32.768KHZ-6PF-20PPM-TA-QC
Q5A
BSD840N
R39 200
R40 2
R42 5.1k
R43 5.1k
C106 2.2pF
C107 2.2pF
C108 220nF
C109 10nF
C87 2.2nF
USB_D+
USB_D-
BOOT0
MCU_RST
MOT_RL_DIR
MOT_SLEEP
MOT_FR_DIR
MOT_RR_DIR
MOT_FL_DIR
CC1
CC2
FLASH_IO0
FLASH_IO1
FLASH_IO2
FLASH_IO3
FLASH_CLK
FLASH_CS
The RPI should not pull down the rst line while it is powered off, so an FET is added.
Author: Robbert-Jan de Jager
Sheet: /MCU/MCU Power/
File: mcu_power.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.2
Id: 9/11



Author: Robbert-Jan de Jager

Sheet: /Motors/
File: motors.kicad_sch

Title: Motors

Size: A4	Date: 2025-05-09	**Rev: 1**
KiCad E.D.A. 9.0.2		Id: 11/11