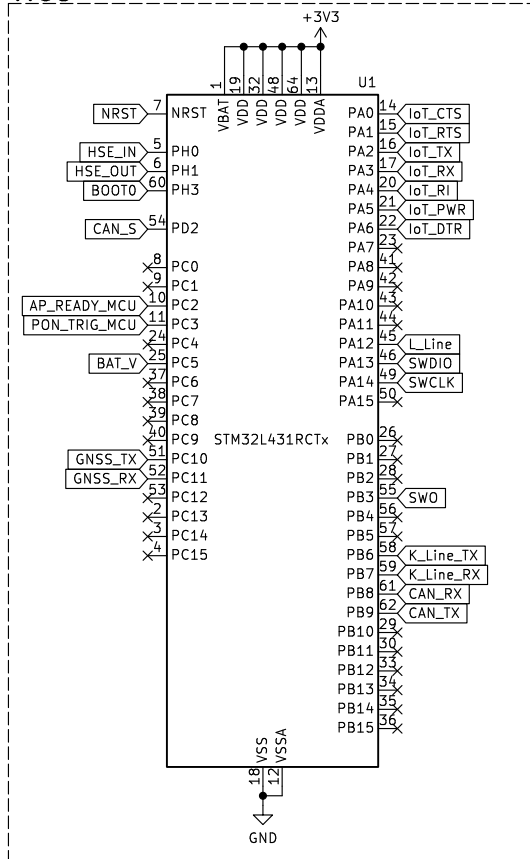
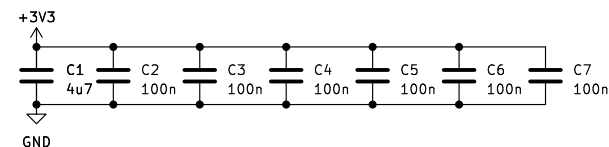


# MCU – STM32L431

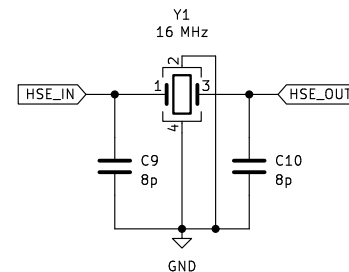
## MCU



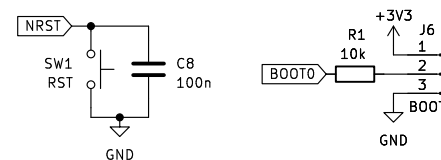
## Power



## Oscillator



## Reset & Boot



power\_supply  
File: pwr.kicad\_sch

iot\_module  
File: iot.kicad\_sch

car\_comm  
File: car.kicad\_sch

connectors  
File: connect.kicad\_sch

FEKT VUT

Sheet: /  
File: iot\_diagnostic\_tool.kicad\_sch

**Title: OBD Monitoring Device**

Size: A4 Date: 2023-02-27

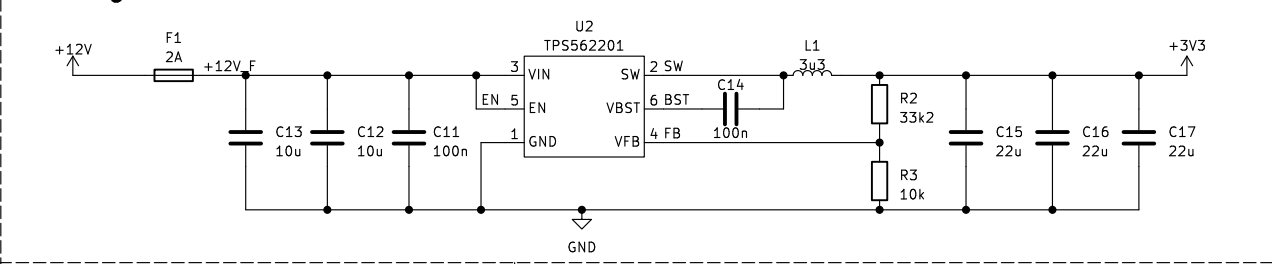
KiCad E.D.A. kicad (7.0.0)

**Rev: 1.0**

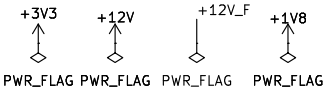
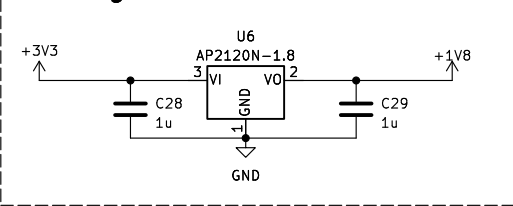
Id: 1/8

# Power supplies

## 3.3V Regulator



## 1.8V Regulator



FECT VUT

Sheet: /power\_supply/  
File: pwr.kicad\_sch

Title: OBD Monitoring Device

Size: A4 Date: 2023-02-27

KiCad E.D.A. kicad (7.0.0)

Rev:  
Id: 2/8

# IoT Module Quectel BG77

## PWRKEY & RESET

## PON Trigger

## AP READY

## STATUS INDICATOR

## Main module

U4 BG77LA-64-SGNS

Pin	Signal	Pin	Signal
46	PWRKEY	20	VBAT
45	RESET_N	21	VDD_EXT
41	W_DISABLE#	78	STATUS
77	AP_READY	79	NET_STATUS
72	PON_TRIG	83	GRFC1
17	ADC0	94	GRFC2
18	ADC1	42	USBPHY_3P3
32	ANT_GNSS	12	USB_VBUS
26	ANT_MAIN	87	USB_BOOT
37	I2C_SCL	10	USB_D-
5	I2C_SDA	11	USB_D+
3	PCM_CLK	64	USBPHY_3P3_EN
35	PCM_SYNC	16	SIM_VDD
2	PCM_DIN	44	SIM_DET
34	PCM_DOUT	15	SIM_RST
61	DBG_RXD	13	SIM_CLK
60	DBG_TXD	14	SIM_DATA
1	GPI01	65	USIM_GND
8	GPI02	36	GNSS_TXD
9	GPI03	4	GNSS_RXD
33	GPI04	62	MAIN_DTR
40	GPI05	6	MAIN_RXD
57	GPI06	7	MAIN_TXD
63	GPI07	39	MAIN_CTS
		38	MAIN_RTS
		90	MAIN_DCD
		76	MAIN_RI
			RSVD
			GND

## Power

## UART Level Shifter

## Component List

Ref	Value	Footprint
D10	ESD9L3.3	ESD9L3.3
Q2	BC817	BC817
Q3	BC817	BC817
Q6	RUM001L02T2CL	RUM001L02T2CL
Q5	BC817	BC817
Q8	NVT2010	NVT2010
D11	TPSMF4L5.0A	TPSMF4L5.0A
R14	4k7	0603
R15	47k	0603
R40	10k	0603
R41	10k	0603
R42	100k	0603
R43	100k	0603
R44	10k	0603
R45	10k	0603
R17	2k2	0603
R18	4k7	0603
R19	47k	0603
R16	200k	0603
R20	10k	0603
R21	10k	0603
R22	10k	0603
C21	10p	0603
C22	33p	0603
C23	100n	0603
C24	100u	0603
C27	100n	0603

## Simulation

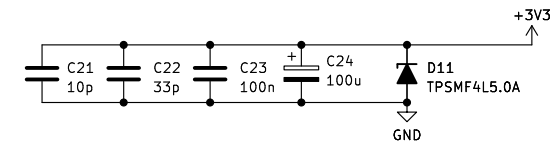
antenna sim usb

File: ant.kicad\_sch File: sim.kicad\_sch File: usb.kicad\_sch

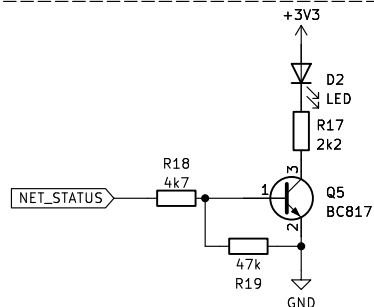
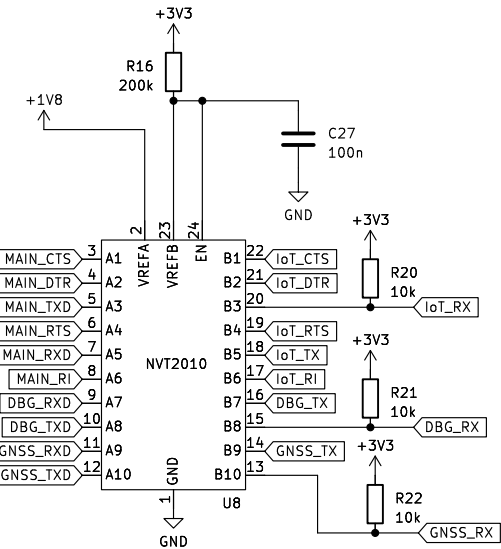
## Metadata

**Fekt VUT**  
 Sheet: /iot\_module/  
 File: iot.kicad\_sch  
**Title: OBD Monitoring Device**  
 Size: A4 Date: 2023-02-27  
 KiCad E.D.A. kicad (7.0.0) Rev: 3/8

## Power



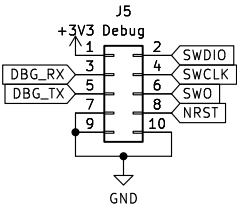
## UART Level Shifter



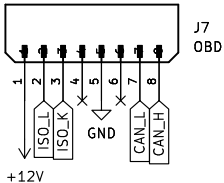
Rev:
Id: 3/8

# Connectors

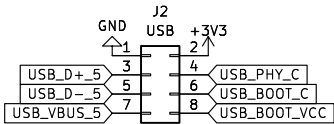
Debug



OBD



USB



FECT VUT

Sheet: /connectors/  
File: connect.kicad\_sch

**Title: OBD Monitoring Device**

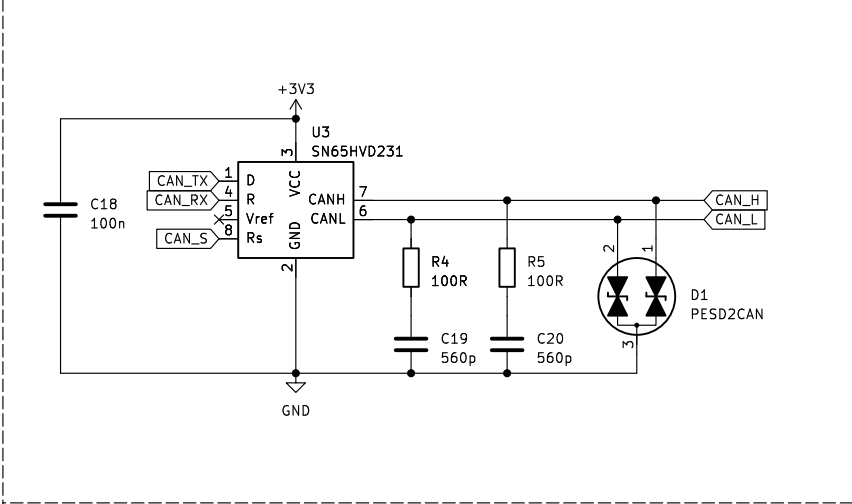
Size: A4 Date: 2023-02-27

KiCad E.D.A. kicad (7.0.0)

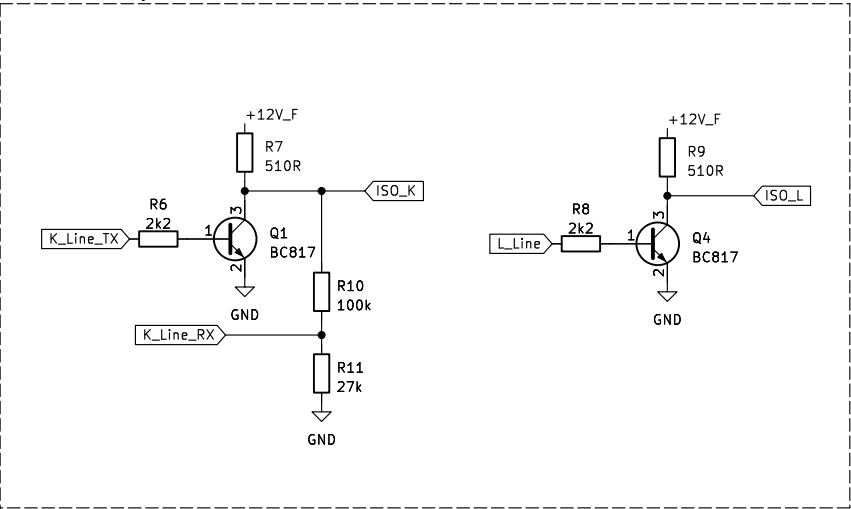
Rev:  
Id: 4/8

# Car communication circuitry

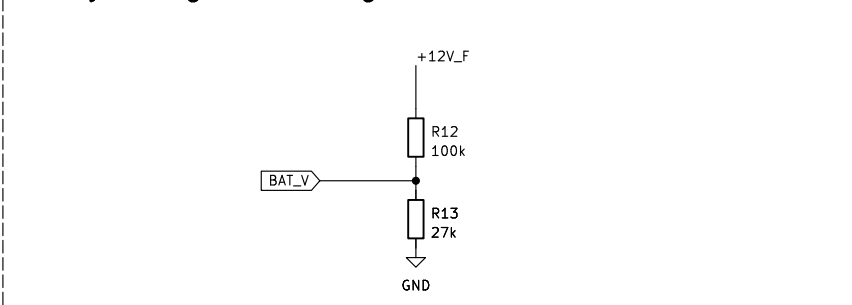
## CAN BUS Transceiver



## ISO 9141 / ISO 14230 Transceiver



## Battery Voltage Monitoring



FECT VUT

Sheet: /car\_comm/  
File: car.kicad\_sch

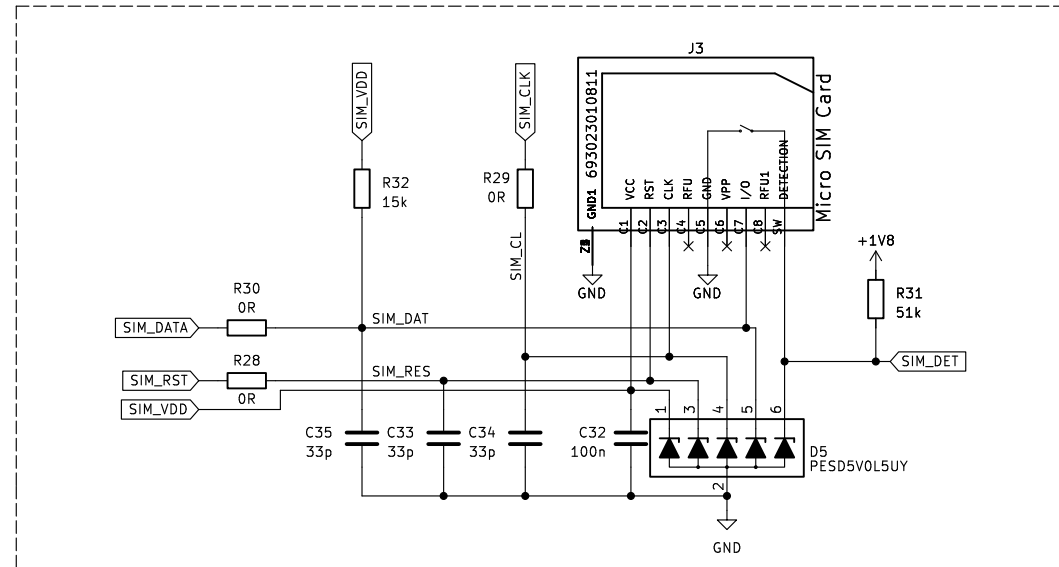
**Title: OBD Monitoring Device**

Size: A4 Date: 2023-02-27

KiCad E.D.A. kicad (7.0.0)

Rev:  
Id: 5/8

# SIM Card



FECT VUT

Sheet: /iot\_module/sim/

File: sim.kicad\_sch

**Title: OBD Monitoring Device**

Size: A4

Date: 2023-02-27

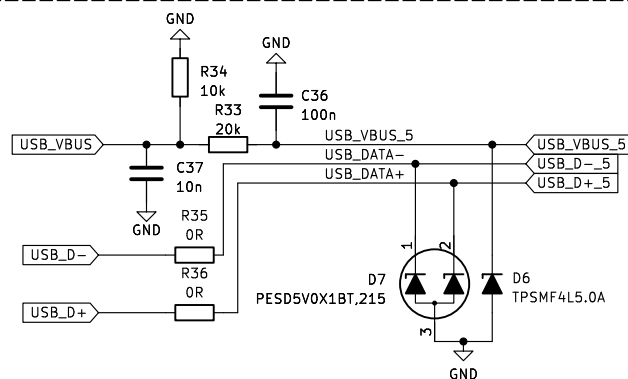
KiCad E.D.A. kicad (7.0.0)

Rev:

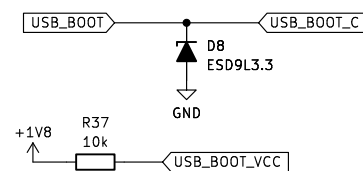
Id: 6/8

# USB

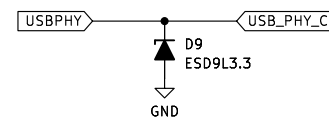
## Interface



## USB Boot



## USB Phy enable circuitry



FECT VUT

Sheet: /iot\_module/usb/

File: usb.kicad\_sch

**Title: OBD Monitoring Device**

Size: A4

Date: 2023-02-27

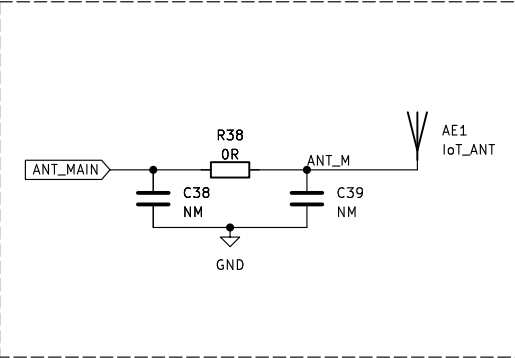
Rev:

KiCad E.D.A. kicad (7.0.0)

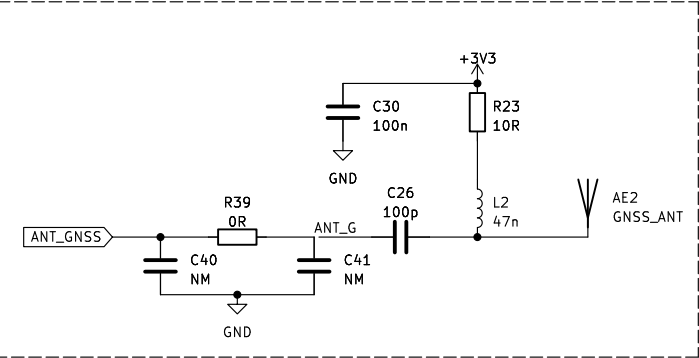
Id: 7/8

# Antennas

IoT Antenna



GNSS Antenna



FECT VUT

Sheet: /iot\_module/antenna/  
File: ant.kicad\_sch

**Title: OBD Monitoring Device**

Size: A4 Date: 2023-02-27

KiCad E.D.A. kicad (7.0.0)

Rev:  
Id: 8/8