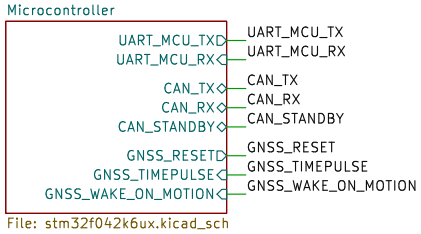
Requirements:
- 25 Hz GPS module
- external connector for GPS antenna
- Status LEDs for GPS Lock status
- Handle automotive voltage spikes on power and input
- Single CAN bus no termination
- Automotive enviornment

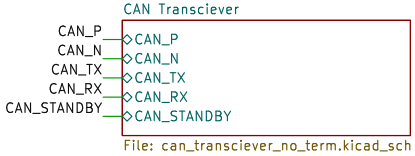
PCB Stackup Requirement: 4 layer JLC04161H-7628

H1 MountingHole
H2 MountingHole
H3 MountingHole
H4 MountingHole

Microcontroller



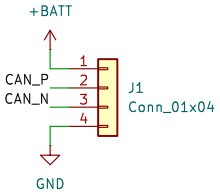
CAN Bus



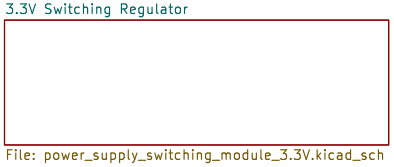
Connector

PCB Header: ATPF13-4P-BM13
- Deutsch DTM, Amphenol ATP compatible
- 4 position, right angle

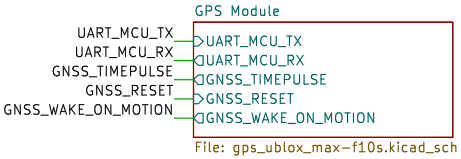
Mating Part: DTM06-4P, ATP06-4P



Power Supply



GPS Module



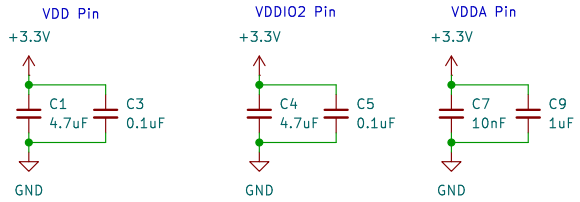
Brian Glen

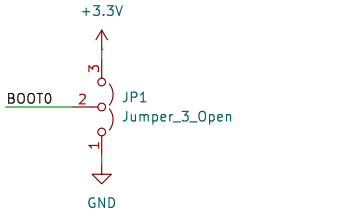
Sheet: /
File: can_gps_device.kicad_sch

Title: CAN GPS Device

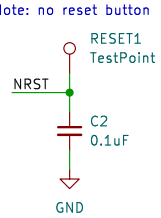
Size: A4	Date: 2025-08-19	**Rev: 1**
KiCad E.D.A. 9.0.1		Id: 1/5

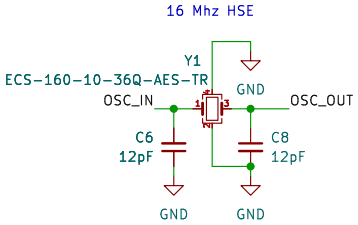
- power supply de-coupling
- TC2030 programing
- boot select switch
- 16 Mhz HSE oscillator
- status LEDs



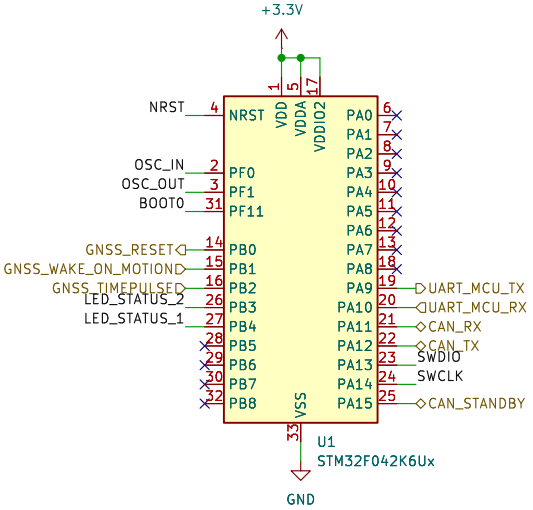


BOOT0 -> 3.3V: Boot to system memory
BOOT0 -> GND: Boot to flash memory (normal)

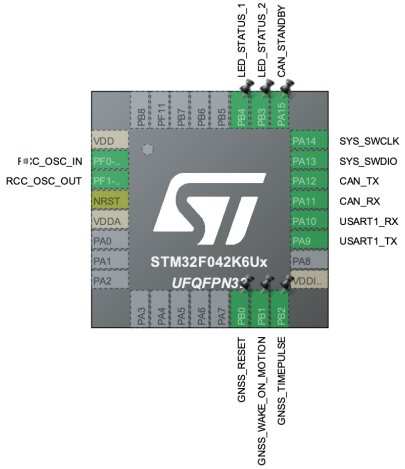




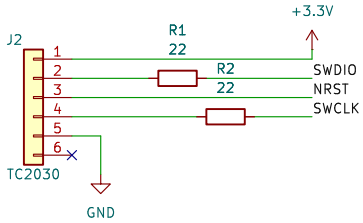
Microcontroller



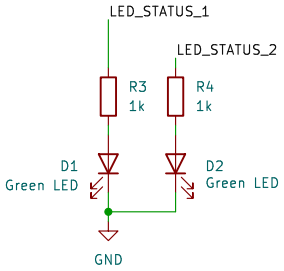
CubeMX Setup



TC2030-NL Programming



Status LEDs



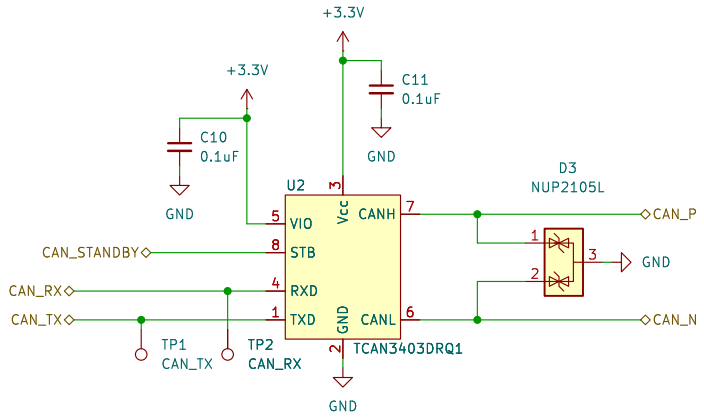
Sheet: /Microcontroller/
File: stm32f042k6ux.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.1		Id: 2/5

CAN Bus Tranciever

- no termination
- non-isolated
- TCAN3403 is pin compatible with other TI transievers
- TVS Diode Protection



Sheet: /CAN Transciever/
File: can_transciever_no_term.kicad_sch

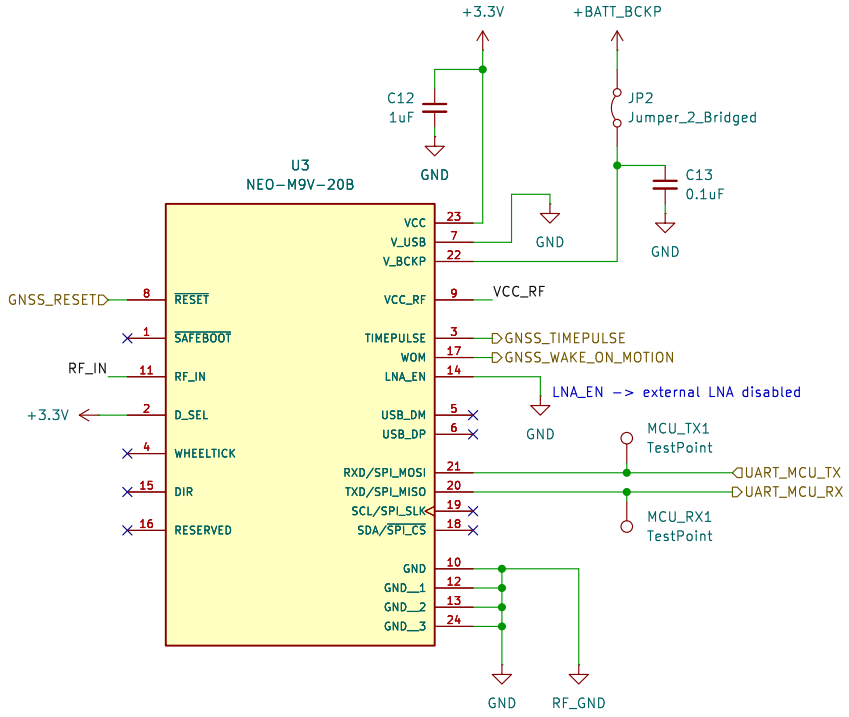
Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.1		Id: 4/5

GNSS + IMU Dead Reckoning Module

Note:
- Generally, use software reset over the UART. RESET_N triggers the RAM to clear and the firmware reloaded from flash
- RF_IN: 50 ohm characteristic impedance on transmission line
- Battery backup is needed for hot start

Interface:
- D_SEL to VCC or open: UART or I2C. D_SEL -> GND: SPI
- UART 9600 baudrate
- 8 bit no parit, 1 stop

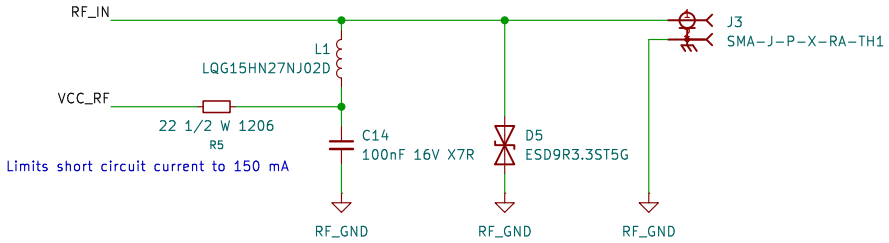


Keep digital return currents away from RF ground.

RF Circuit

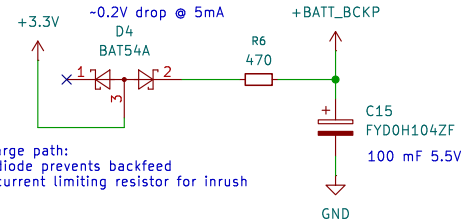
Layout notes:
- RF_IN must have 50 ohm characteristic impedance
- use GND via wall around microstrip
- no stubs

ANN-MB5 has SMA (plug) connector



Supercap backup supply

Backup operating voltage: 1.65 – 3.6 V
Backup current: 45 uA typical
Target backup operating time: 30 min (1800 s)



Charge path:
- diode prevents backfeed
- current limiting resistor for inrush

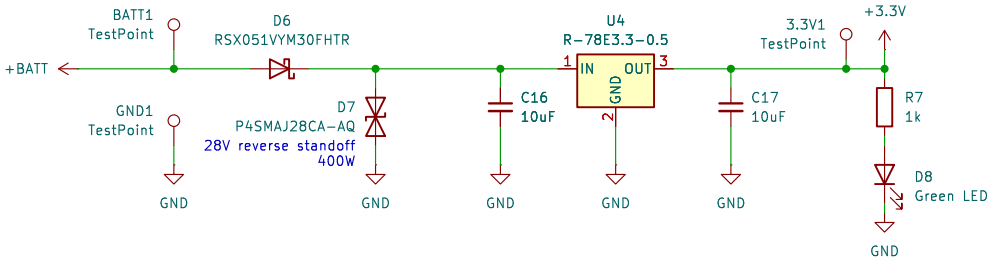
I = Q / t
C = Q1 / V_low
C = Q2 / V_high
Q = Q2 – Q1
t = (Q2 – Q1) / I
t = C * (V_high – V_low) / I
C = t * I / (V_high_V_low)

1.5 safety factor
(1800 * 1.5) * 45E-6 / (3.3 – 0.2 – 1.65) = 84 mF minimum

Expected supercap lifetime:
LS = Lr * 2X * 2Y
X = (Tm-Ta)/10
Y = (Vr-Va)/0.2
LS = 2000 * 2*(70 – 50)/10 *(5.5-3.3)/0.2
LS = 88,000 hours

Sheet: /GPS Module/		
File: gps_ublox_max-f10s.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.1		Id: 5/5

Input: 6–28 VDC
Output: 3.3V Fixed 500 mA
Protection:
– short circuit
– reverse polarity
– ESD



Sheet: /3.3V Switching Regulator/
File: power_supply_switching_module_3.3V.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.1		Id: 7/5