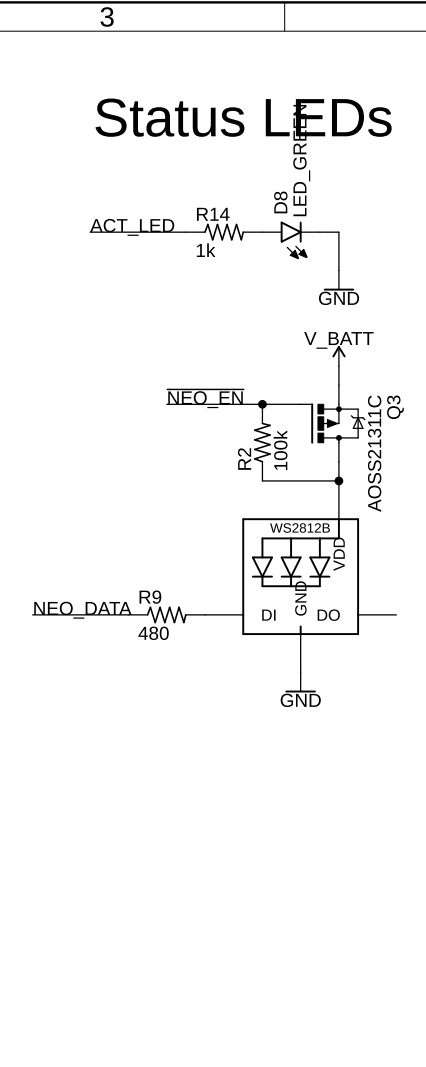


[illegible]

4
5

User Inputs

Application note:
LOG_EN should be tied to a flag to enable/disable logging. This can be done by using an interrupt in the firmware.

Input buttons with low-pass DC filters.
The RC circuit debounces the button press, making interrupts more accurate.
The debounce time is determined by $t = R \cdot C$
For this case, $t = 10000 \cdot 0.000001 = 10 \text{ ms}$

Operation Mode Selectors
Position 1+2: Dual versus Redundant CANbus
Position 3: CAN0 termination
Position 4: CAN1 termination
Position 5: External power

SW1

Position	Signal	Pin	Component	Signal
1	CAN1_H	10		CAN0_H
2	CAN1_L	9		CAN0_L
3	CAN0_H	8	R6 120	CAN0_L
4	CAN1_H	7	R23 120	CAN1_L
5		6		EXT_PWR_EN

219-5MST

GND

Peripherals

The schematic diagram illustrates the peripheral components and their connections to the main PCB layout. The components and their connections are as follows:

- 6DOF IMU (U4):** An LSM6DSO32TR sensor. It is connected to a 3.3V supply (pin 8) and GND (pin 6). The INT1/INT pin (pin 4) is connected to a 0.1 uF capacitor (C16) to GND. The AP_CS pin (pin 12) is connected to a 10k pull-up resistor (R26) to 3.3V. The SCL (pin 13) and SDA (pin 14) pins are connected to the I2C bus. The AP_SDO/AP_ADO pin (pin 1) is connected to GND.
- 3DOF Mag (U1):** A LIS3MDLTR sensor. It is connected to a 3.3V supply (pin 5) and GND (pin 3). The CS pin (pin 10) is connected to a 10k pull-up resistor (R25) to 3.3V. The SCL/SPC pin (pin 1) is connected to the I2C bus. The SDA/SDI/SDO pin (pin 11) is connected to the I2C bus. The SDO/SA1 pin (pin 9) is connected to GND. The RSVD1 pin (pin 2) is connected to GND. The RSVD2 pin (pin 12) is connected to GND. A 0.1 uF capacitor (C20) is connected to GND. A 0.1 uF capacitor (C24) is connected to GND.
- SMT SD Card (U7):** An SD card. It is connected to a 3.3V supply (pin 8) and GND (pin 2). The SCK pin (pin 3) is connected to the SPI bus. The MOSI pin (pin 5) is connected to the SPI bus. The MISO pin (pin 6) is connected to the SPI bus. The VTD pin (pin 2) is connected to GND. A 0.1 uF capacitor (C11) is connected to GND.
- CAN 1 (U11):** An MCP2151-I/SO CAN controller. It is connected to a 3.3V supply (pin 18) and GND (pin 9). The CS pin (pin 16) is connected to the CAN_CS signal. The RESET pin (pin 17) is connected to the CAN_RST signal. The TX0RTS pin (pin 4) is connected to the TX0RTS signal. The TX1RTS pin (pin 5) is connected to the TX1RTS signal. The TX2RTS pin (pin 6) is connected to the TX2RTS signal. The OSC1 pin (pin 8) is connected to the OSC1 signal. The RXCAN pin (pin 2) is connected to the CAN1_RXD signal. The SCK pin (pin 13) is connected to the CAN_SCK signal. The SI pin (pin 14) is connected to the CAN_MOSI signal. The INT pin (pin 12) is connected to the CAN_INT signal. The RX0BF pin (pin 11) is connected to the RX0BF signal. The RX1BF pin (pin 10) is connected to the RX1BF signal. The CLKOUT pin (pin 7) is connected to the CLKOUT signal. The OSC2 pin (pin 15) is connected to the OSC2 signal. The SO pin (pin 1) is connected to the CAN1_TXD signal. The TXCAN pin (pin 1) is connected to the TXCAN signal. A 0.1 uF capacitor (C23) is connected to GND. A 22 pF capacitor (C6) is connected to GND. A 22 pF capacitor (C7) is connected to GND. A 16 MHz crystal (Y1) is connected to the OSC1 and OSC2 pins.
- CAN 0 (U3):** A MAX3051EKA CAN controller. It is connected to a 3.3V supply (pin 3) and GND (pin 2). The VCC pin (pin 3) is connected to the 3.3V supply. The RXD pin (pin 4) is connected to the CAN0_TXD signal. The CANH pin (pin 7) is connected to the CAN0_H signal. The CANL pin (pin 6) is connected to the CAN0_L signal. The RS pin (pin 8) is connected to the CAN_EN signal. The SHDN pin (pin 5) is connected to the CAN0_RXD signal. The TXD pin (pin 1) is connected to the TXD signal. A 0.1 uF capacitor (C22) is connected to GND.
- CAN 1 (U8):** A CAN controller. It is connected to a 3.3V supply (pin 3) and GND (pin 2). The VCC pin (pin 3) is connected to the 3.3V supply. The RXD pin (pin 4) is connected to the CAN0_TXD signal. The CANH pin (pin 7) is connected to the CAN0_H signal. The CANL pin (pin 6) is connected to the CAN0_L signal. The RS pin (pin 8) is connected to the CAN_EN signal. The SHDN pin (pin 5) is connected to the CAN0_RXD signal. The TXD pin (pin 1) is connected to the TXD signal. A 0.1 uF capacitor (C22) is connected to GND.

Pullups and Filtering

5V Regulator

The diagram illustrates a 5V regulator circuit. The input voltage V_{IN} is connected to the gate of an AOSS2131C MOSFET. The MOSFET's source is connected to ground, and its drain is connected to the V_{IN} pin of the AP7380 regulator (U10) through a 100k resistor (R24). The AP7380 regulator's GND pin is connected to ground, and its VOUT pin is connected to the USB V+ line. The NC and NC_2 pins of the regulator are connected to pins 5 and 4 of a connector, respectively. The output of the regulator is labeled USB.

External Conns

External connections for various modules:

- CAN0:** VIN (1), CAN0_L (2), CAN0_H (3), GND (4)
- CAN1:** VIN (1), CAN1_L (2), CAN1_H (3), GND (4)
- USB:** V_USB (1), USB_DP (2), USB_DN (3), GND (4)
- UART:** V_USB (1), ESP_TX0 (2), ESP_RX0 (3), GND (4)

3V3 Regulator

3V3 Regulator

Dynamic VIN selection: VBUS (USB) will override VBAT (LiPo) via D4 when both are present. When USB is present, Q1 is closed, cutting battery power. S1 controls Q2's output which allows both power sources into U2

USB-C Connector

Passive detection circuit for USB plug in. This can be tied to a flag to enable debugging or USB MSC when a USB cable is plugged in

The diagram shows a USB4105-GF-A IC connected to a USB-C connector (J1). The IC has pins for CC1, DP1, DN1, SBU1, CC2, DP2, DN2, SBU2, GND, and SHELL_GND. The connector pins are labeled A4, B9*2, A5, USB_DPA6, USB_DNA7, A8, B5, CC2, B6, USB_DP, B7, USB_DN, B8, A1, B12*2, and S1*4. The circuit includes a 5k1 resistor (R7) connected to GND, a 100k resistor (R11) connected to V_USB, a 200k resistor (R17) connected to USB_MON, a 5k1 resistor (R8) connected to GND, and two capacitors (C2 = 10 uF, C1 = 10 uF) connected to GND. The IC is labeled USB4105-GF-A.

LiPoly Charger

10K = 100mA
5.0K = 200mA
2.0K = 500mA
1.0K = 1000mA

V_USB

4

VDD VBAT

3 V_BATT

PROG

5 R5

2k

2

C5

10 uF

GND

1

D5

LED_GREEN

STAT VSS

MCP73831/2

The schematic diagram illustrates the electrical connections for the Thetis RevG2 SCH v1 PCB. It features two primary components: a MAX3051EKA CAN transceiver and a GPS Radio module.

MAX3051EKA Component:

- Pin 3 (VCC):** Connected to the CAN1_TXD pin of the CAN1 module.
- Pin 4 (CAN1_TXD):** Connected to the CAN1_TXD pin of the CAN1 module.
- Pin 2 (GND):** Connected to a common ground point.
- Pin 1 (CAN1_RXD):** Connected to the CAN1_RXD pin of the CAN1 module.
- Pin 5 (SHDN):** Connected to the CAN1_EN pin of the CAN1 module.
- Pin 6 (CAN1_L):** Connected to the CAN1_L pin of the CAN1 module.
- Pin 7 (CAN1_H):** Connected to the CAN1_H pin of the CAN1 module.

GPS Radio Component (U6):

- Pin 1 (VCC):** Connected to the 3.3V supply.
- Pin 2 (NRESET):** Connected to the GPS_RST pin.
- Pin 3 (GND):** Connected to a common ground point.
- Pin 4 (VBACKUP):** Connected to the 3.3V supply.
- Pin 5 (3D-FIX):** Connected to the GPS_FIX pin.
- Pin 6 (NC):** Not connected.
- Pin 7 (NC):** Not connected.
- Pin 8 (GND):** Connected to a common ground point.
- Pin 9 (RTCM):** Connected to the ESP_RX1 pin.
- Pin 10 (1PPS):** Connected to the ESP_TX1 pin.
- Pin 11 (TX):** Connected to the TX pin of the ESP module.
- Pin 12 (EX_ANT):** Connected to the antenna (X1).
- Pin 13 (VCC):** Connected to the 3.0-4.3V supply.
- Pin 14 (VBACKUP):** Connected to the 2.0-4.3V supply.
- Pin 15 (P\$11):** Connected to the antenna (X1).
- Pin 16 (P\$12):** Connected to the antenna (X1).
- Pin 17 (P\$13):** Connected to the antenna (X1).
- Pin 18 (P\$14):** Connected to the antenna (X1).
- Pin 19 (P\$15):** Connected to the antenna (X1).
- Pin 20 (P\$16):** Connected to the antenna (X1).
- Pin 21 (P\$17):** Connected to the antenna (X1).
- Pin 22 (P\$18):** Connected to the antenna (X1).
- Pin 23 (P\$19):** Connected to the antenna (X1).
- Pin 24 (P\$20):** Connected to the antenna (X1).

Other Components and Connections:

- LED_YELLOW:** Connected to the GPS_FIX pin (P\$5) via a resistor (R20) and a diode (D7).
- GPS_RST:** Connected to the NRESET pin (P\$2) of the GPS Radio.
- GPS_FIX:** Connected to the 3D-FIX pin (P\$5) of the GPS Radio.
- ESP_RX1:** Connected to the RTCM pin (P\$9) of the GPS Radio.
- ESP_TX1:** Connected to the 1PPS pin (P\$10) of the GPS Radio.
- TX:** Connected to the TX pin (P\$11) of the GPS Radio.
- EX_ANT:** Connected to the EX_ANT pin (P\$12) of the GPS Radio.
- Antenna (X1):** Connected to the EX_ANT pin (P\$12) and the antenna pins (P\$11, P\$12, P\$13, P\$14, P\$15, P\$16, P\$17, P\$18, P\$19, P\$20) of the GPS Radio.