LoRa - OreSat payload integration design

This schematic associated with this design (*see LoRaOreSatSchematic.pdf in #lora-oresat*) attempts to integrate the LoRa payload with the OreSat protocard. The theory is that with LoRa being ultra compatible relative to other radio modules, we may be able to just integrate the payload with the OreSat protocard without making fundamental design changes to the proto card itself.

STM32 Microcontroller Unit (STM32F091CCT6)

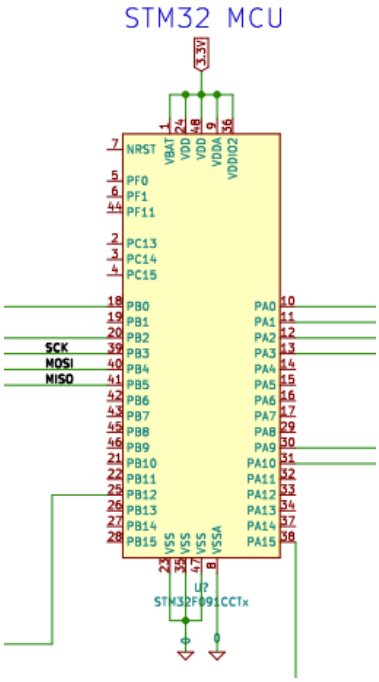

Figure 1:STM32 MCU symbol, as shown in the LoRa OreSat Schematic

This is the STM32F091CCT6 microcontroller unit (MCU), as used in the OreSat protocard. It is essentially the gateway between LoRa and OreSat.

LoRa Transceiver (RFM98PW)

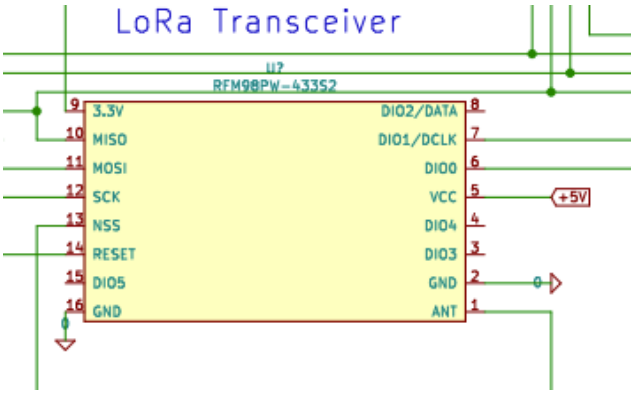

Figure 2: LoRa Transceiver symbol, as shown in the LoRa OreSat Schematic

This is the RFM98PW LoRa Transceiver Module intended to transmit/receive the RF signals from the radio module (coming from Max Holliday's SX1280 breakout board - see below). It receives UART signals from the SX1280 radio (can set to SPI also) and communicates with the microcontroller through SPI.

Radio module (SX1280IMLTRT)

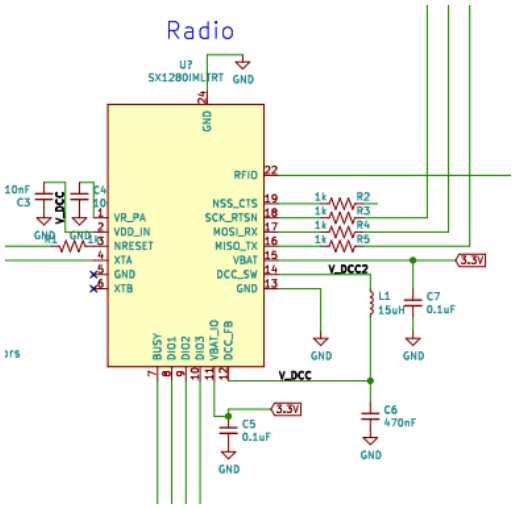

Figure 3:SX1280 Radio symbol, as shown in the LoRa OreSat Schematic

This is the SX1280 radio used in Max Holliday's SX1280 breakout board, communicating in the 2.4GHz standard ISM band. It communicates with the RFM through UART and an SPI interface to the microcontroller.

TCXO (XLH536025 - 52MHz)

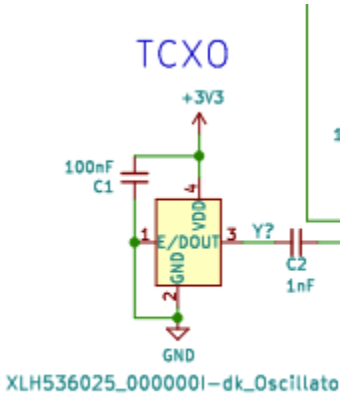

Figure 4:TCXO symbol, as shown in the LoRa OreSat Schematic

The TCXO is also from Max Holliday's SX1280 breakout board. TCXO is a temperature compensated crystal oscillator. From my understanding, TCXO's help stabilize the oscillator frequency in environments with noticeable temperature variation. In our case, it helps calibrate the SX1280's RC timer so that we get higher accuracy. Without using an external oscillator the RC timer averages 25% accuracy, but with the TCXO that accuracy rises to 1%.

Note: Michael had told me previously that we should try to keep the components identical with the LoRa-artemis payload (aside from the SX1280 breakout board, if I'm not mistaken). The identical components with LoRa Artemis are the RFM98PW and the Adafruit SD card breakout.