Datasheets
Temperature/Humidity (HDC1080):
https://www.ti.com/lit/ds/symlink/hdc1080.pdf?ts=1738555810034&ref_url=https%253A%252F%252Fwww.ti.com%252Fproduct%252FHDC1080

CO2 (SCD41) :
https://download.mikroe.com/documents/datasheets/SCD41%20Datasheet.pdf

Ammonia (MQ-137):
https://www.sparkfun.com/ammonia-gas-sensor-mq-137.html

Methane (MQ-4):
https://www.sparkfun.com/methane-cng-gas-sensor-mq-4.html

Hydrogen Sulfide (MQ-136):
https://www.sparkfun.com/hydrogen-sulfide-gas-sensor-mq-136.html

AD7718:
https://www.analog.com/media/en/technical-documentation/data-sheets/ad7708_7718.pdf

Microcontroller pins:
I2C:
SCL - IO4
SDA - IO6

SPI:
MOSI - IO21
MISO - IO19
CLK - IO18
CS* - IO5
RESET - IO7
RDY - IO9

Sensor IDs:
Temperature and Humidity Sensor:
0x40

CO2 Sensor:
0x62

Formula:
SPI:
adc_value = 2*(((adc_code / pow(2,23) -1)*2.5) + .0278177268);

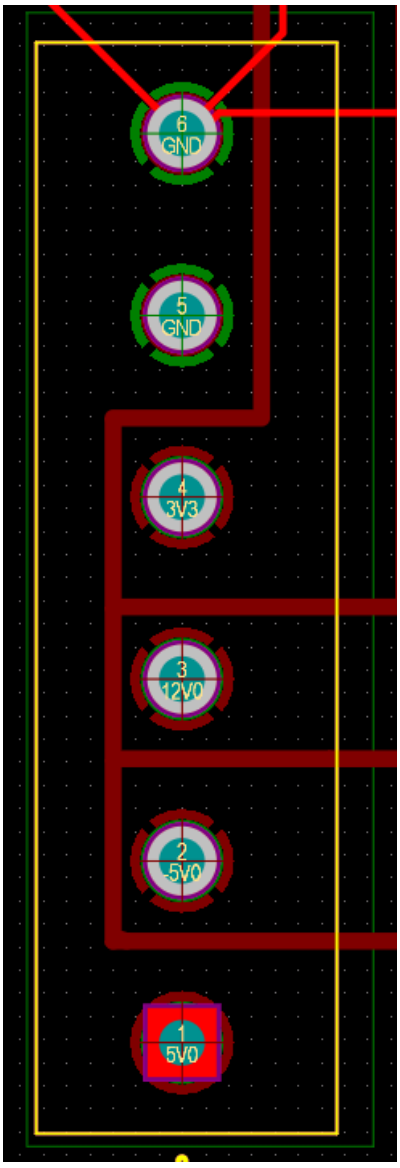
Using I2C for digital sensors, I need to write a function that can access both (HDC1080 and SCD41) of the sensors from the SCL - IO4 and SDA - IO6.

Using SPI to interface with the AD7718 to read the 3 analog sensor values as shown below:

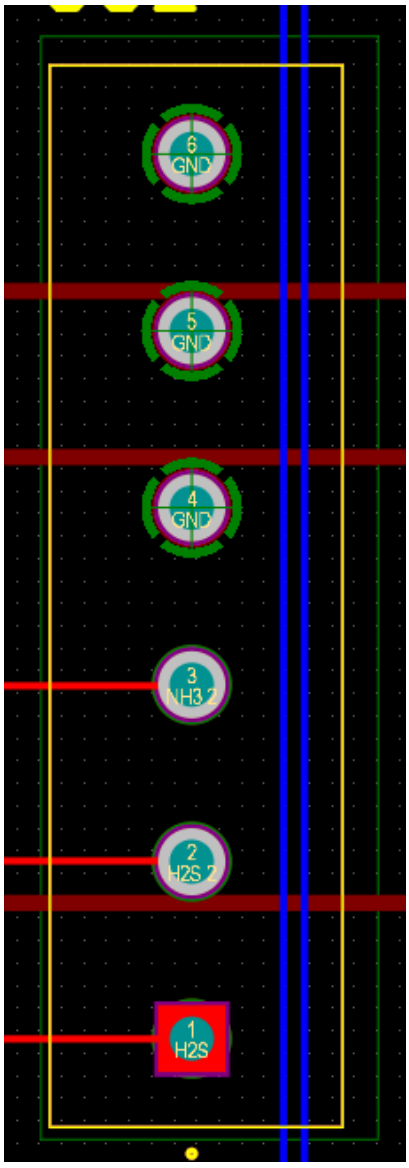
- **I2C Sensors (Temperature & CO2)**
  - **HDC1080 (Temperature & Humidity) @ 0x40**
  - **SCD41 (CO2 Sensor) @ 0x62**
  - **I2C Pins on ESP32-S3:**
    - **SCL → GPIO 4**
    - **SDA → GPIO 6**
- **Analog Sensors (Interfaced via SPI ADC)**
  - **MQ-137 (Ammonia)**
  - **MQ-4 (Methane)**
  - **MQ-136 (H2S)**
  - **SPI ADC (AD7718)**
    - **MOSI → GPIO 21**
    - **MISO → GPIO 19**
    - **CLK → GPIO 18**
    - **CS → GPIO 5**
    - **RESET → GPIO 7**
    - **RDY → GPIO 9**

Header Connections and Buttons:

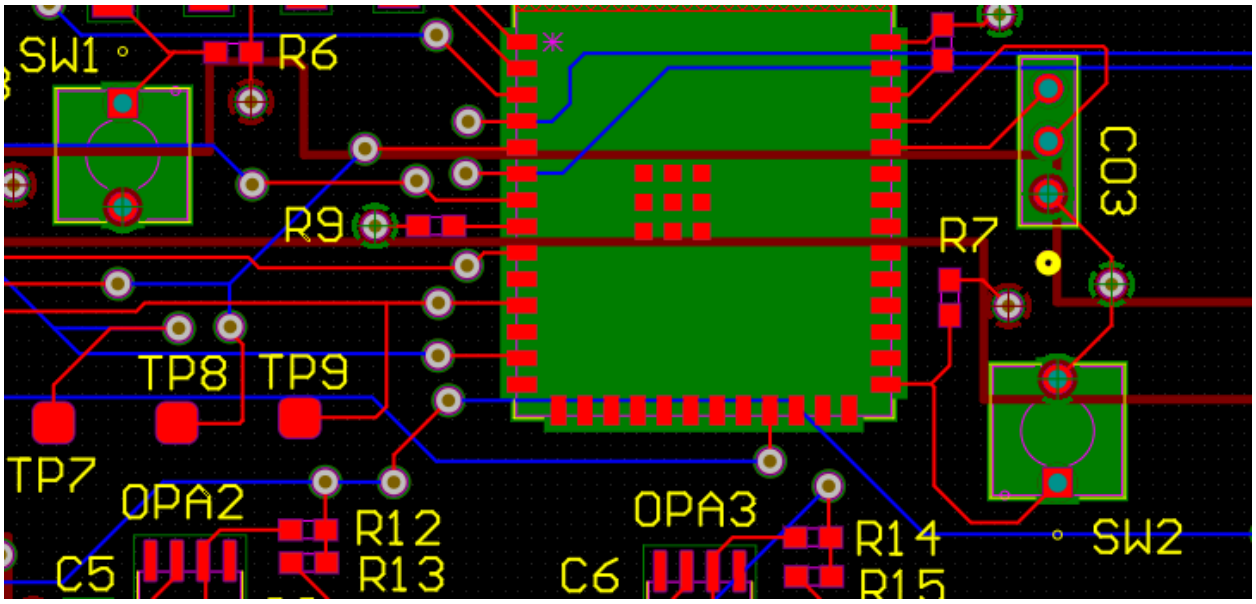
Connector on the left:



Connector on the right:



Left side is power. Right side is the test voltages. H2S 2 sends voltage directly to ADC analog input 1. NH3 2 sends to ADC analog input 2.



SW1 is the reset button. SW2 is the boot button.

I2C Test:

Power 3.3V. No test voltage needed.

SPI/ADC Test:

Power 5V and 3.3V. Test voltage H2S 2 needed. Use NH3 2 if you want to test chip select.