All issues are not critical. However, overlapping matching circuit components, missing pull-up resistors, ground plane underneath the antenna, and uncentered footprints for pick-and-place are the most critical. Since I²C is not a high-speed communication protocol, the other issues are less likely to cause critical problems.

# Schematic Issues

1. **Missing Pull-up Resistors:**

The I²C lines (SCL and SDA) lack pull-up resistors, which are essential for reliable communication. According to RAK3172 datasheet, SDA or SCL pins are not mentioned as pulled up. Hence pull up resistors are needed here.

**Modification:** A 10kΩ resistor should be used to pull SCL to VCC and another 10kΩ resistor should be used to pull SDA to VCC.

A diagram of a microcontroller

Description automatically generated

1. **Improper Antenna Pi Network Design:**

The current antenna Pi network does not align with recommended guidelines. Linx and industry standards suggest implementing a minimum 3-element surface-mount Pi matching network. Even, the configuration does not match with any T network.

**Modification:** Two parallel capacitors (Cp1, Cp2) with one end of each capacitor grounded, and a series inductor (Ls) connecting the other ends of Cp1 and Cp2. Or pi combination using Lp1, Lp2, Cs. This configuration ensures proper impedance matching and optimal RF performance. It should first be fixed in the schematic.

A diagram of a circuit

Description automatically generatedA diagram of a circuit

Description automatically generated

1. **Floating Pins:**

PA0, PA1, UART2\_RX, and UART2\_TX are left floating without termination or defined logic states, which may result in unpredictable behavior.

# SHTC3 Issues:

1. **Missing Pull-up Resistors:** The SCL and SDA lines for the sensor lack pull-up resistors. **[Schematic]**

Modification: Add 10kΩ resistors to pull SCL and SDA to VCC for proper I²C communication.

1. **Routing of SDA and SCL:** Although SDA and SCL are not on the same plane.

Modification: Route SDA and SCL should be on same plane.

1. **Sensor Placement:** The sensor is currently placed far from MCU1, and the traces could be minimized.

**Modification:** Rotate the MCU 90 degrees clockwise to route the traces outward, and place the sensor closer to MCU1 to reduce trace length and improve performance.

# Antenna Issues:

1. **Overlapping Components:** L1 with L3 and C3 with C4 overlap.

Modification: The components should be separated **according to the corrected schematic.**

1. **Component Placement:** Antenna components are far from the RF pin.

Modification: They should be placed closer to the RF pin.

1. **Ground Plane Under Antenna:** Ground plane is underneath the antenna.

Modification: There should be no ground plane under the antenna.

1. **Ground Plane Size:** Linx recommends a minimum 38 mm x 84 mm or larger ground plane [not underneath].

Modification: The ground plane should meet the recommended size.

# Others:

1. U1 (MCU) and P1 (power connector) are not properly positioned/centered for pick and place.
2. Silkscreen overlapping.
3. DRC also says about footprints that I have not ponder about.