

7Semi

Air Quality Sensor

Version 1.0



Table of Contents

1.Introduction.....	2
1.1 Features	2
2.Technical specification.....	3
2.1 Block Diagram	3
2.2 General Characteristics	4
2.3 Measured Parameters	4
2.4 Electrical Specifications.....	4
3. Hardware setup	6
3.1 Pinouts	6
3.2 Hardware connection	7
4. Output	8
5.Mechanical specification	9

1.Introduction



Breathe smarter with the 7Semi Air Quality Sensor — a compact, intelligent device designed to keep your environment healthy and safe. Packed with advanced sensing technology, it continuously measures dust particles (PM1, PM2.5, PM4, PM10), temperature, humidity, air pressure, CO₂ levels, VOCs, NO_x gases, and even surrounding light and colour. Every reading is captured with high precision to give you a complete picture of your indoor environment.

With real-time data and clear, easy-to-understand results, the 7Semi Air Quality Sensor gives you instant awareness of the air you breathe. Whether used in homes, offices, schools, or industrial spaces, it empowers you to make smarter decisions for cleaner air, improved comfort, and a healthier lifestyle.

1.1 Features

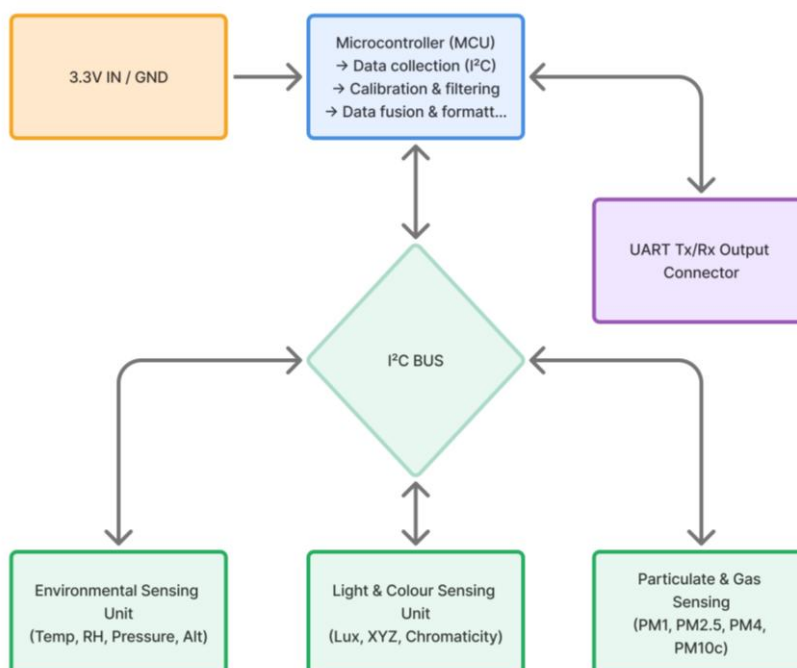
- Measures PM1, PM2.5, PM10, temperature, humidity, CO₂, VOC, NO_x, and air pressure in one compact unit.
- Provides high-precision readings using industrial-grade sensor technology.
- Updates air-quality data every second for real-time monitoring.
- Includes ambient light and colour detection through the 7Semi Air Quality sensor.
- Delivers clear, user-friendly output for dashboards and IoT systems.

2. Technical specification

The 7Semi Air Quality Sensor integrates multiple high-accuracy sensing modules, including a particulate matter sensor (PM1, PM2.5, PM4, PM10), environmental sensor for temperature and humidity, pressure sensor, a CO₂ and gas index sensor (VOC/NO_x), and an advanced light and colour detector. Each sensor is calibrated for precise, stable measurements, delivering reliable data across a wide operating range suitable for indoor and industrial air-monitoring applications.

Built on robust Microcontroller technology, the system communicates via I²C and UART, supports real-time updates, and is designed for 24/7 continuous operation. The device offers high sampling accuracy, low power consumption, fast response time, and strong noise immunity, making it ideal for smart home systems, IoT platforms, HVAC automation, and high-performance environmental monitoring setups.

2.1 Block Diagram



2.2 General Characteristics

Parameter	Specification
Product Type	Multi-parameter 7Semi Air Quality Monitoring Module
Operating Mode	24/7 continuous monitoring
Communication Interface	UART (Output), I ² C (Sensor communication)
Supply Voltage	3.3V (typical)
Form Factor	Compact embedded module

2.3 Measured Parameters

Parameter	Measurement Range	Accuracy / Resolution
PM1 / PM2.5 / PM4 / PM10	0–1000 µg/m ³	±(10 µg/m ³ + 10%)
Temperature	–10°C to +60°C	±0.2°C
Humidity	0–100% RH	±1.5% RH
VOC Index	0–500	Algorithm-based index
NOx Index	0–500	Algorithm-based index
CO ₂ (approximation)	400–5000 ppm	Typical ±50 ppm (algorithmic)
Barometric Pressure	300–1250 hPa	±0.12 hPa
Altitude	–500 to +9000 m	±1–3 m (typical)
Ambient Light (Lux)	0–100,000+ lux	±5% (range dependent)
Colour Detection	RGB/XYZ/xy chromaticity	High-precision chroma calculation

2.4 Electrical Specifications

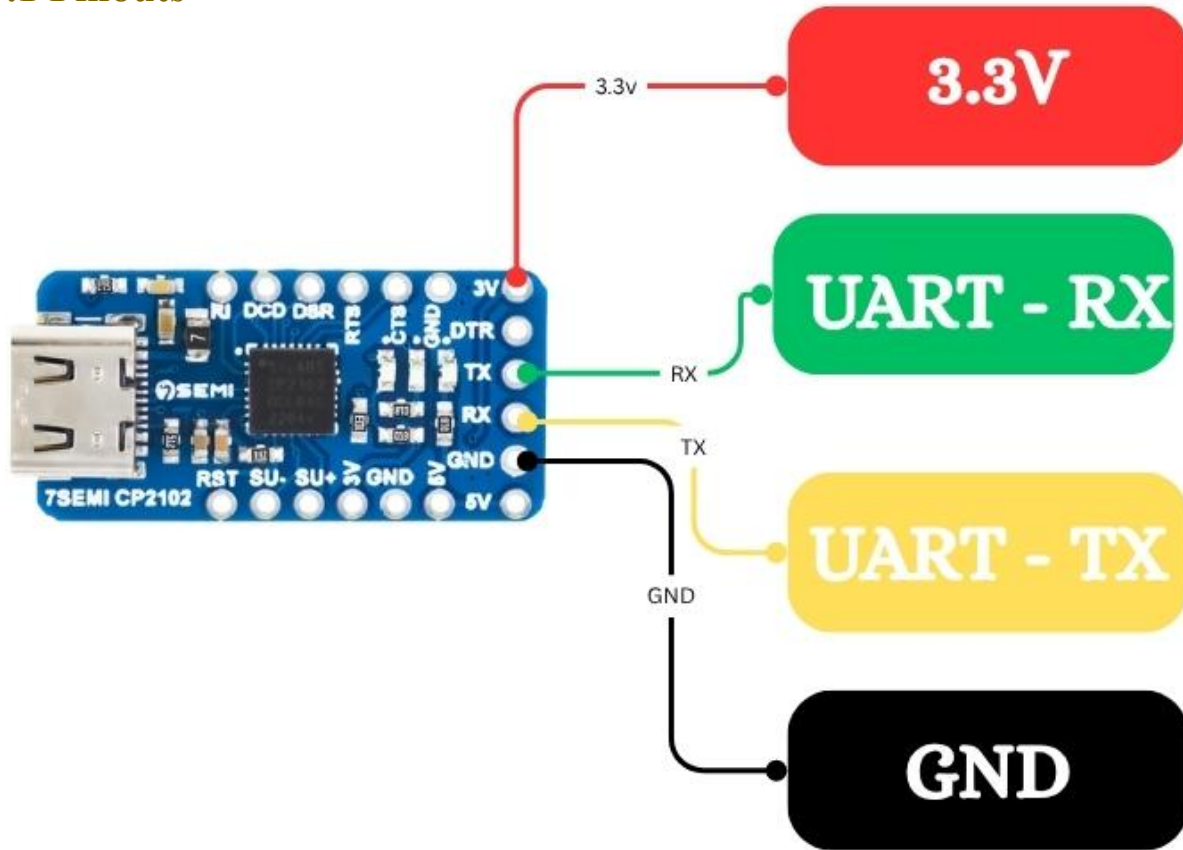
Parameter	Value
Power Consumption	<120 mA peak (sensor active)
UART Output Baud Rate	115200 bps
I ² C Bus Frequency	100 kHz / 400 kHz

Applications

- Indoor air-quality monitoring for homes, apartments, and smart living spaces
- Offices, corporate buildings, and shared work environments
- Schools, universities, and educational facilities
- Hospitals, clinics, laboratories, and medical environments
- HVAC systems for ventilation control and air-purification automation
- Industrial workspaces, warehouses, and production floors
- Smart city infrastructure and environmental monitoring stations
- IoT-based analytics platforms and cloud-connected devices

3. Hardware setup

3.1 Pinouts

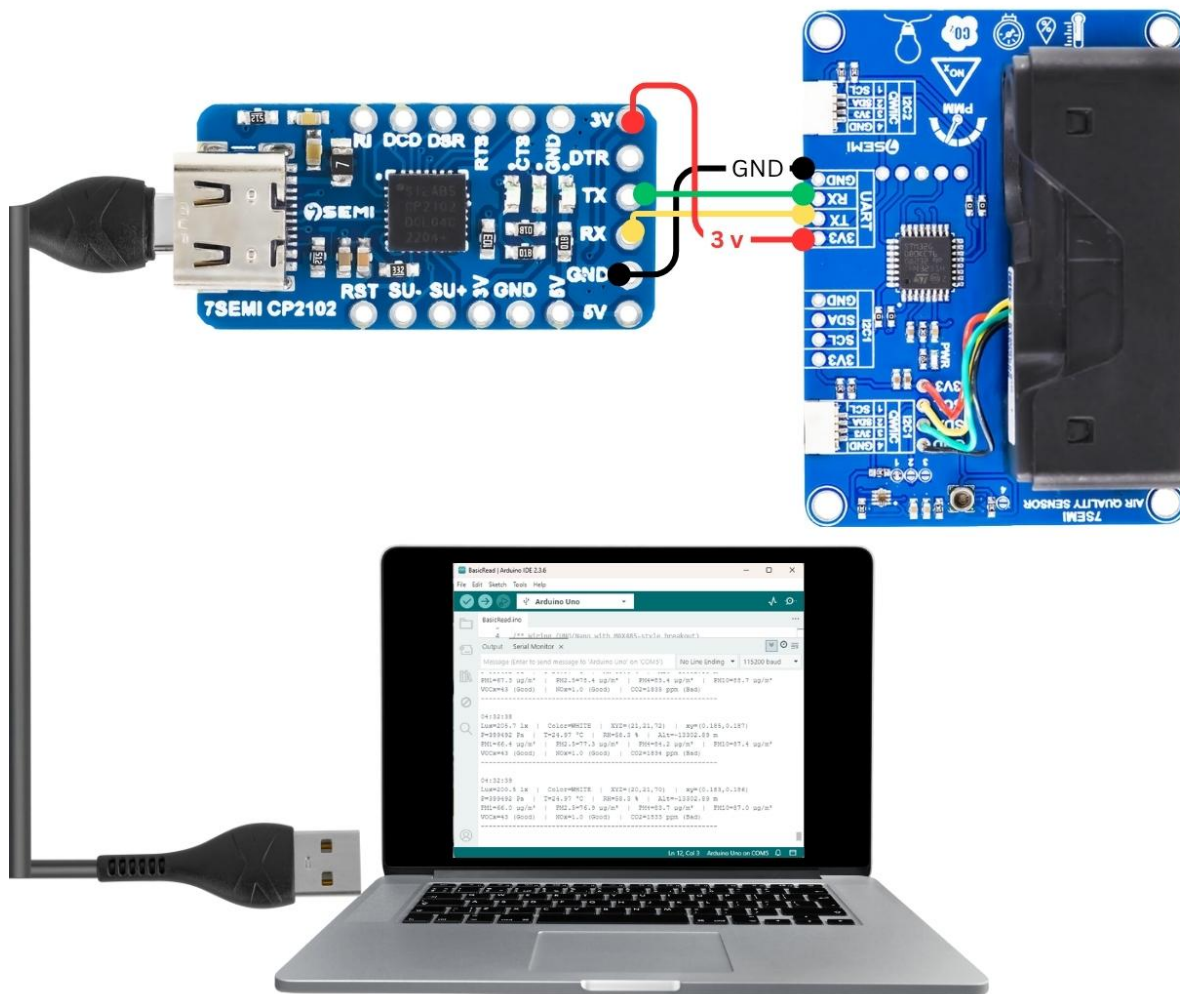


7Semi Air Quality Sensor (UART)	USB To TTL
3.3v	3.3v
TX	RX
RX	TX
GND	GND

Connection Guidelines

- Connect the wire from the 7Semi Air Quality Sensor (UART) to (USB To TTL) as shown above table under hardware setup/pinout
- And another end of (USB To TTL) breakout USB-C Type connect to Host (Laptop)

3.2 Hardware connection



4. Output

Steps to see output in Arduino IDE :-

1. **Install the Arduino IDE** on your computer.
2. Once installed, **open the Arduino IDE**.
3. Go to **Tools** → **Port** → **Select Com Port** (According to your com port like **COM5** etc.)
4. After selecting Com Port → **Click On Serial Monitor**.
5. Set the **baud rate to 115200** in the Serial Monitor.
6. You should now **see the output** displayed on the Serial Monitor.

Sample output image:-

```
Lux=193.2 lx | Color=WHITE | XYZ=(20,20,66) | xy=(0.191,0.189)
P=998.7 hPa | T=25.33 °C | RH=62.2 % | Alt=61.19 m
PM1=33.5 µg/m³ | PM2.5=47.9 µg/m³ | PM4=58.6 µg/m³ | PM10=63.8 µg/m³
VOCx=95 (Good) | NOx=1.0 (Good) | CO2=1732 ppm (Bad)
-----
```

```
Lux=193.2 lx | Color=WHITE | XYZ=(20,20,67) | xy=(0.187,0.187)
P=998.7 hPa | T=25.33 °C | RH=62.2 % | Alt=61.19 m
PM1=33.6 µg/m³ | PM2.5=47.9 µg/m³ | PM4=58.6 µg/m³ | PM10=63.8 µg/m³
VOCx=95 (Good) | NOx=1.0 (Good) | CO2=1732 ppm (Bad)
-----
```

```
Lux=186.3 lx | Color=WHITE | XYZ=(20,20,58) | xy=(0.206,0.202)
P=998.7 hPa | T=25.33 °C | RH=62.2 % | Alt=61.18 m
PM1=33.7 µg/m³ | PM2.5=48.1 µg/m³ | PM4=58.8 µg/m³ | PM10=64.0 µg/m³
VOCx=95 (Good) | NOx=1.0 (Good) | CO2=1732 ppm (Bad)
-----
```

```
Lux=195.8 lx | Color=WHITE | XYZ=(20,20,68) | xy=(0.188,0.188)
P=998.7 hPa | T=25.33 °C | RH=62.2 % | Alt=61.19 m
PM1=34.0 µg/m³ | PM2.5=48.4 µg/m³ | PM4=59.2 µg/m³ | PM10=64.4 µg/m³
VOCx=95 (Good) | NOx=1.0 (Good) | CO2=1732 ppm (Bad)
-----
```

5. Mechanical specification

