ALAMSCN DHT21 AM2301

DHT21 AM2301 Digital Temperature and Humidity Sensor Module User Manual

1. Introduction

The ALAMSCN DHT21 AM2301 is a high-precision capacitive digital temperature and humidity sensor module designed for various applications requiring accurate environmental monitoring. This sensor provides calibrated digital signal output, ensuring long-term stability and reliability. It is commonly used with microcontrollers like Arduino for data acquisition.

Figure 1: Front view of the DHT21 AM2301 sensor module.

2. Product Features

- High precision capacitive digital output for temperature and humidity.
- Standard digital single bus output for easy integration.
- Long-term stability and high reliability.
- Low energy consumption and fast response time.
- Long transmission distance capability.
- Automatic calibration and strong anti-interference ability.
- Suitable for test and inspection equipment, medical devices, automobiles, automatic controls, home appliances, and humidity regulators.

3. Specifications

Operating Voltage	DC 3.3V ~ 5.2V
Humidity Range	0% ~ 99.9% RH
Temperature Range	-40℃ ~ 80℃
Humidity Measurement Precision	±3% RH
Temperature Measurement Precision	±0.5℃
Output Type	Digital Single Bus
Dimensions	Approx. 58mm (length) x 26mm (width) x 15mm (height)
Cable Length	Approx. 240mm / 9.44in

Figure 2: DHT21 AM2301 sensor module with approximate dimensions.

Figure 3: Back view of the sensor module, displaying printed specifications including power, humidity, temperature, precision, and output type.

4. Setup and Wiring

The DHT21 AM2301 sensor module typically comes with three wires for connection. Proper wiring is crucial for correct operation. Refer to the diagram below for standard pin assignments.

Figure 4: The DHT21 AM2301 sensor module showing its three connection wires.

4.1 Pinout Description

- **Red Wire:** VCC (Power Supply, DC 3.3V - 5.2V)
- **Black Wire:** GND (Ground)
- **Yellow/White Wire:** Data (Digital Signal Output)

4.2 Connection to Microcontroller (e.g., Arduino)

1. Connect the **Red Wire (VCC)** of the sensor to the 5V or 3.3V pin on your Arduino board.
2. Connect the **Black Wire (GND)** of the sensor to a GND pin on your Arduino board.
3. Connect the **Yellow/White Wire (Data)** of the sensor to any digital pin on your Arduino board (e.g., Pin 2).
4. A 10K Ohm pull-up resistor is often recommended between the Data pin and VCC for stable communication, especially over longer wire lengths.

5. Operating Instructions

Once the sensor is correctly wired to your microcontroller, you can begin reading temperature and humidity data. This sensor uses a single-wire digital interface, requiring specific libraries for communication.

5.1 Software Setup (Arduino Example)

1. **Install DHT Library:** Open your Arduino IDE. Go to *Sketch > Include Library > Manage Libraries...* Search for "DHT sensor library" by Adafruit and install it. You may also need the "Adafruit Unified Sensor" library.
2. **Example Code:** Use the example sketches provided with the library (e.g., "DHTtester") as a starting point. Modify the pin number to match your connection.
3. **Upload Sketch:** Upload the modified sketch to your Arduino board.
4. **Monitor Output:** Open the Serial Monitor in the Arduino IDE (set baud rate to 9600 or as specified in the code) to view the temperature and humidity readings.

5.2 Data Reading Interval

It is recommended to read data from the DHT21 AM2301 sensor at intervals of at least 2 seconds to ensure stable and accurate readings. Reading too frequently may result in erroneous data.

6. Maintenance

The DHT21 AM2301 sensor module is designed for long-term stability and typically requires minimal maintenance. Follow these guidelines to ensure optimal performance:

- **Keep Clean:** Ensure the sensor's perforated casing is free from dust, dirt, or debris, which can obstruct airflow and affect readings.
- **Avoid Contaminants:** Do not expose the sensor to corrosive gases, high concentrations of solvents, or direct water immersion, as this can damage the sensing element.
- **Stable Environment:** While the sensor has a wide operating range, prolonged exposure to extreme temperatures or humidity levels outside its specified range may affect its lifespan and accuracy.
- **Physical Protection:** Handle the module carefully to avoid physical damage to the casing or internal components.

7. Troubleshooting

If you encounter issues with your DHT21 AM2301 sensor, consider the following troubleshooting steps:

- **No Readings or "Failed to read from DHT sensor!":**
  - Verify all wiring connections (VCC, GND, Data) are secure and correct.
  - Ensure the sensor is receiving adequate power (3.3V to 5.2V).
  - Check if the correct digital pin is specified in your code.
  - Confirm that the DHT library is correctly installed and included in your sketch.
  - Try adding a 10K Ohm pull-up resistor between the Data pin and VCC.
  - Ensure you are not reading the sensor too frequently (minimum 2 seconds between readings).
- **Inaccurate Readings:**
  - Ensure the sensor is placed in an area with good air circulation and away from direct heat sources or strong drafts.
  - Allow the sensor sufficient time to stabilize after power-up or environmental changes.
  - Verify that the correct sensor type (DHT21 or AM2301) is specified in your code if the library supports multiple types.
- **Intermittent Readings:**

- Check for loose connections or damaged wires.
- Ensure the power supply is stable and free from voltage fluctuations.
- Consider using shielded cables if operating in an electromagnetically noisy environment.