UMLIFE AS5600

UMLIFE AS5600 Magnetic Encoder Module User Manual

High Precision 12-bit Non-Contact Angle Measurement Sensor

1. Introduction

This manual provides detailed instructions for the setup, operation, and maintenance of the UMLIFE AS5600 Magnetic Encoder Module. The AS5600 is a high-precision 12-bit non-contact rotary magnetic encoder designed for accurate angle measurement. It offers multiple output modes including I2C, PWM, and analog voltage, making it versatile for various embedded applications.
Please read this manual thoroughly before using the module to ensure correct installation and optimal performance.

2. Product Overview

The AS5600 module utilizes a magnetic field to determine angular position without physical contact, reducing wear and increasing longevity. It is suitable for applications requiring precise angular feedback.

2.1 Module Components

The module consists of the AS5600 sensor IC, passive components, and pin headers for connectivity. A separate magnet (included) is required for operation.

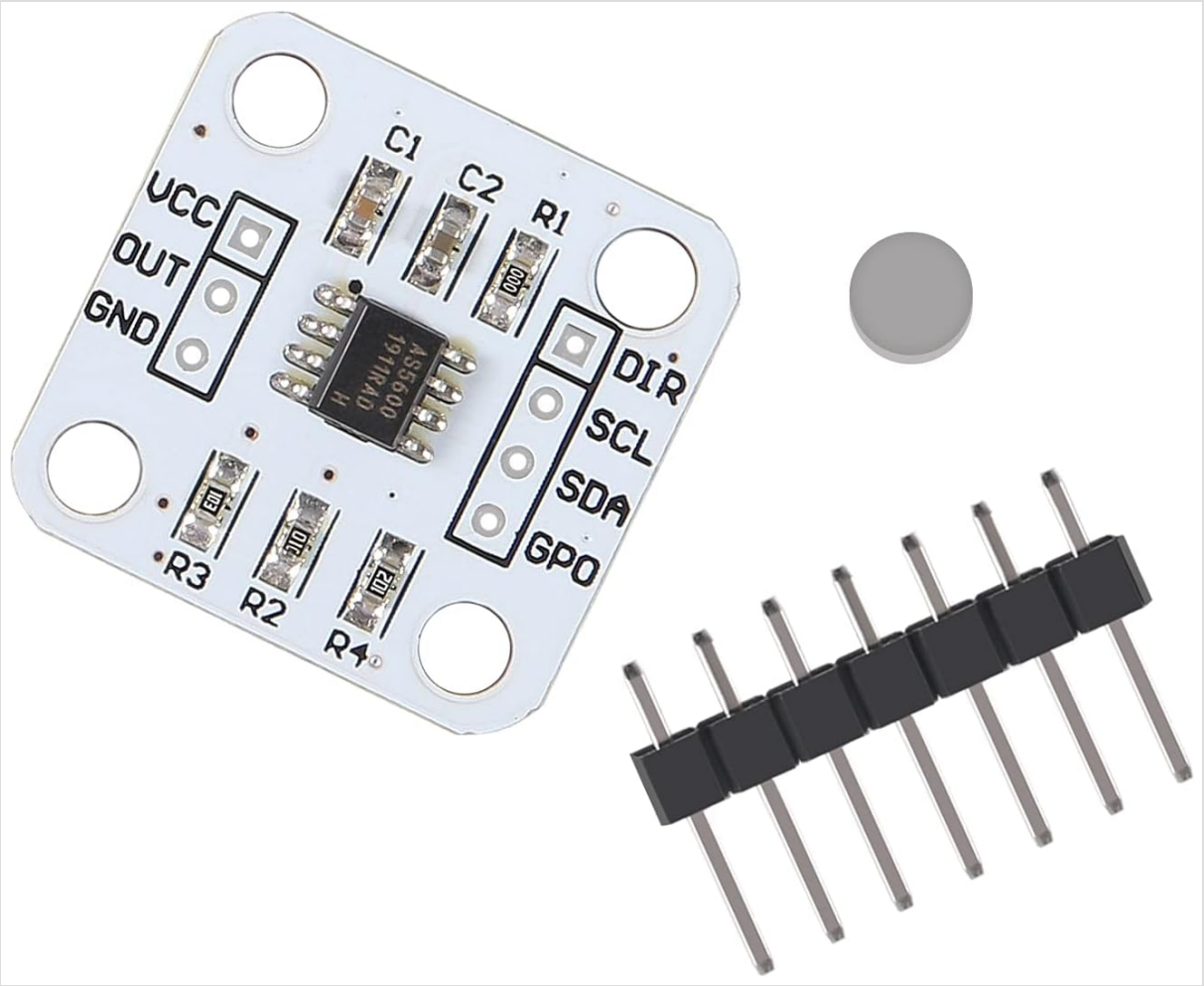

Image 2.1: A single UMLIFE AS5600 Magnetic Encoder Module shown with its accompanying pin headers and a small circular magnet. The module features clearly labeled pins for VCC, OUT, GND, DIR, SCL, SDA, and GPO.

2.2 Pinout Description

The AS5600 module features several pins for power, ground, and data communication:

- **VCC:** Power supply input (typically 3.3V or 5V).
- **GND:** Ground connection.
- **OUT:** Analog voltage output or PWM output.
- **DIR:** Direction pin (can be used for I2C address selection or direction control).
- **SCL:** I2C Clock line.
- **SDA:** I2C Data line.
- **GPO:** General Purpose Output (can be configured for various functions).

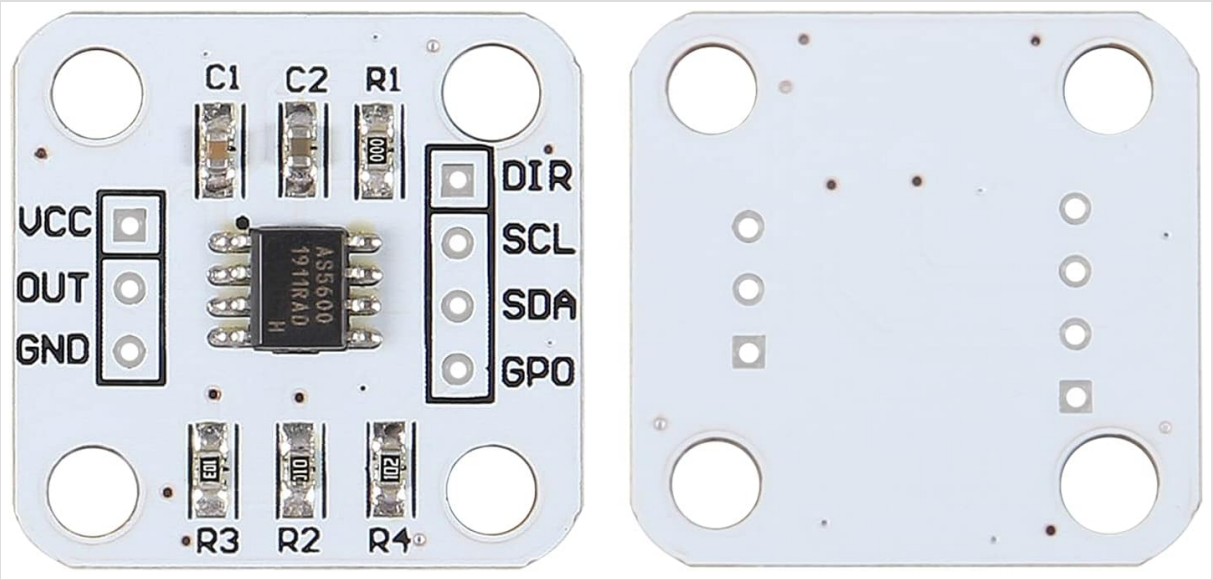

Image 2.2: Front and back views of the AS5600 module. The front shows the AS5600 IC and labeled pins, while the back shows solder pads and mounting holes.

3. Setup

3.1 Unpacking and Inspection

Upon receiving your AS5600 modules, carefully unpack them and inspect for any visible damage. Ensure all components, including the pin headers and magnets, are present.

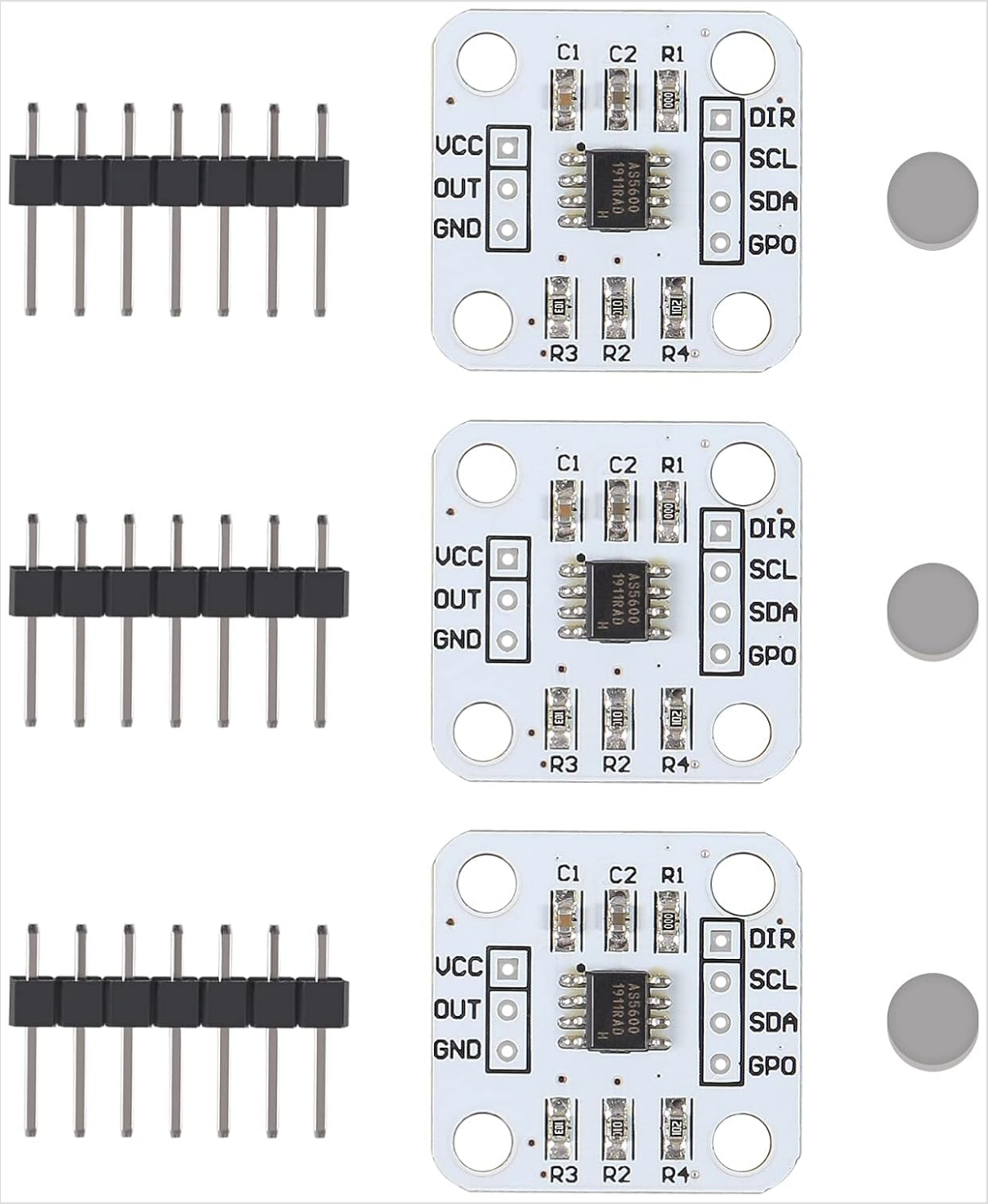

Image 3.1: Three AS5600 Magnetic Encoder Modules, each accompanied by a set of pin headers and a small circular magnet, laid out for inspection.

3.2 Electrical Connections

Connect the AS5600 module to your microcontroller or development board according to the following guidelines:

- Connect **VCC** to your power supply (3.3V or 5V).
- Connect **GND** to the ground of your system.
- For I2C communication, connect **SCL** and **SDA** to the corresponding I2C pins on your microcontroller.
- For PWM or Analog Voltage output, connect the **OUT** pin to an appropriate input on your microcontroller (e.g., an analog-to-digital converter pin for voltage output, or a digital input for PWM).
- The **DIR** and **GPO** pins can be configured via I2C for specific functionalities. Refer to the AS5600

datasheet for advanced configurations.

3.3 Magnet Placement

Proper placement of the magnet is crucial for accurate readings. The magnet should be centered directly above the AS5600 sensor IC, with a small air gap (typically 0.5mm to 3mm). The magnetic field strength and orientation are critical; use the provided diametrically magnetized magnet.

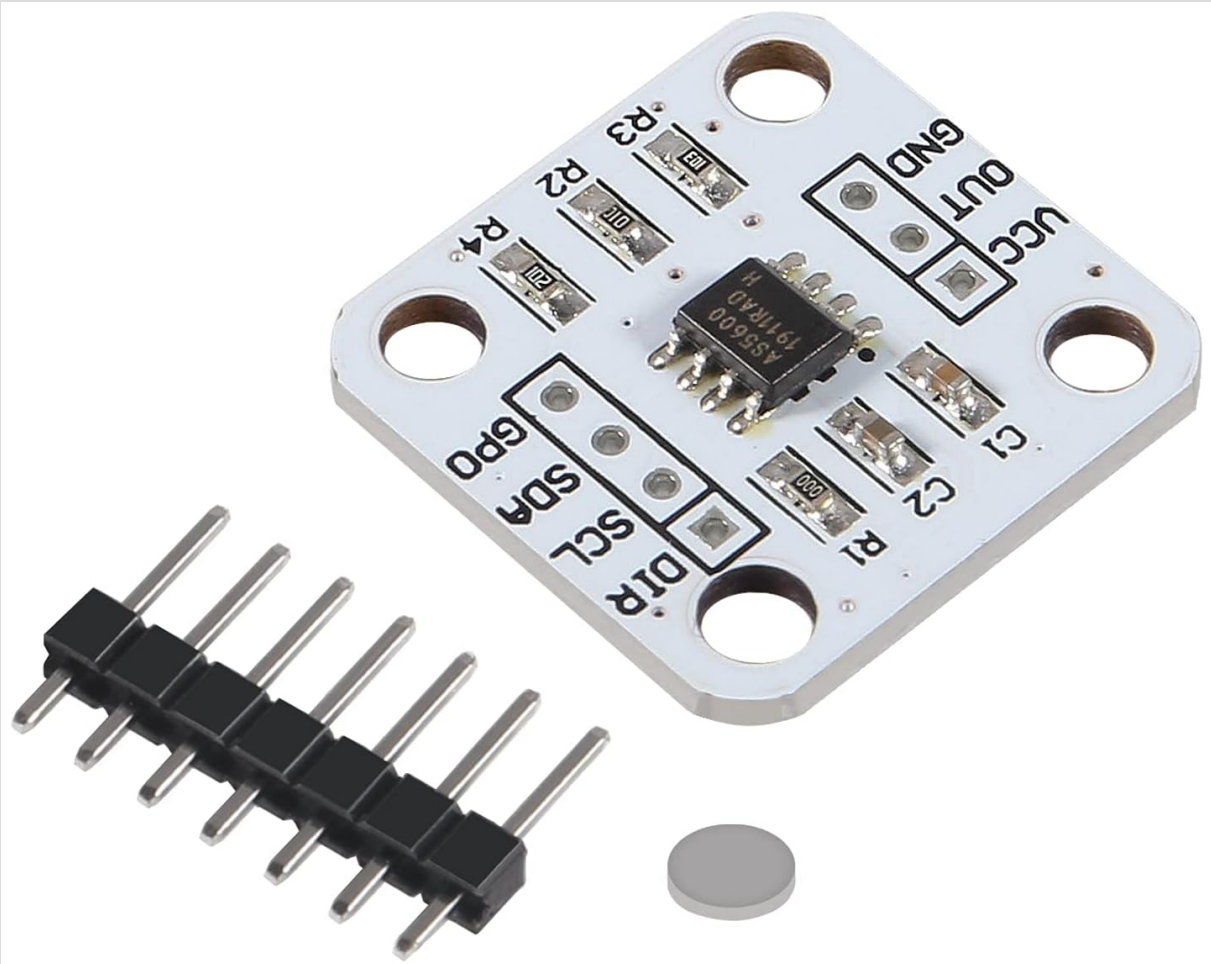

Image 3.2: An angled view of the AS5600 module, showing the pin headers inserted and the small circular magnet positioned nearby, illustrating the components involved in setup.

4. Operating Modes

The AS5600 supports three primary output modes for angle measurement:

4.1 I2C (Inter-Integrated Circuit) Mode

In I2C mode, the AS5600 acts as a slave device. Your microcontroller can read the 12-bit angle data directly from the sensor's registers. This mode allows for configuration of various parameters such as start/end angle, hysteresis, and output scaling.

- **I2C Address:** The default I2C address is 0x36.
- **Data Format:** Angle data is typically read from specific registers (e.g., 0x0E and 0x0F for raw angle).
- **Configuration:** Use I2C commands to write to configuration registers for advanced settings.

4.2 PWM (Pulse Width Modulation) Mode

In PWM mode, the AS5600 outputs a pulse-width modulated signal where the duty cycle is proportional to the measured angle. Your microcontroller can measure the pulse width to determine the angle.

- **Output Pin:** The OUT pin provides the PWM signal.
- **Frequency:** The PWM frequency can be configured via I2C.
- **Measurement:** Use a timer/counter on your microcontroller to measure the high pulse duration and total period.

4.3 Analog Voltage Output Mode

In analog voltage mode, the AS5600 outputs a voltage on the OUT pin that is proportional to the measured angle. This voltage can be read by an Analog-to-Digital Converter (ADC) on your microcontroller.

- **Output Range:** The voltage range typically scales from 0V to VCC.
- **Resolution:** The effective resolution depends on the ADC of your microcontroller.

5. Calibration

For optimal accuracy, it is recommended to calibrate the AS5600 module after initial setup. Calibration typically involves setting the zero position and, if desired, the maximum angle position. This can be done by writing to specific registers via I2C. Refer to the AS5600 datasheet for detailed calibration procedures.

6. Maintenance

The AS5600 module is a robust electronic component. Minimal maintenance is required:

- **Environmental Conditions:** Operate the module within its specified temperature and humidity ranges.
- **Magnetic Interference:** Avoid placing strong magnetic fields near the sensor, as this can affect readings.
- **Cleaning:** If necessary, gently clean the module with a dry, soft cloth. Avoid using liquids or abrasive materials.

7. Troubleshooting

If you encounter issues with your AS5600 module, consider the following troubleshooting steps:

- **No Output/Incorrect Readings:**
  - Verify power supply (VCC and GND) connections are correct and stable.
  - Check magnet placement and distance from the sensor. Ensure the magnet is centered and diametrically magnetized.
  - Confirm the correct output mode is selected and configured (I2C, PWM, or Analog).
  - For I2C, check SCL/SDA connections and ensure the correct I2C address is used.
- **Communication Errors (I2C):**
  - Ensure pull-up resistors are present on SCL and SDA lines (typically 4.7kΩ).
  - Check for bus conflicts with other I2C devices.
- **Inconsistent Readings:**
  - Ensure the magnet is securely fixed and not wobbling.
  - Minimize external magnetic interference.

8. Specifications

Key technical specifications for the UMLIFE AS5600 Magnetic Encoder Module:

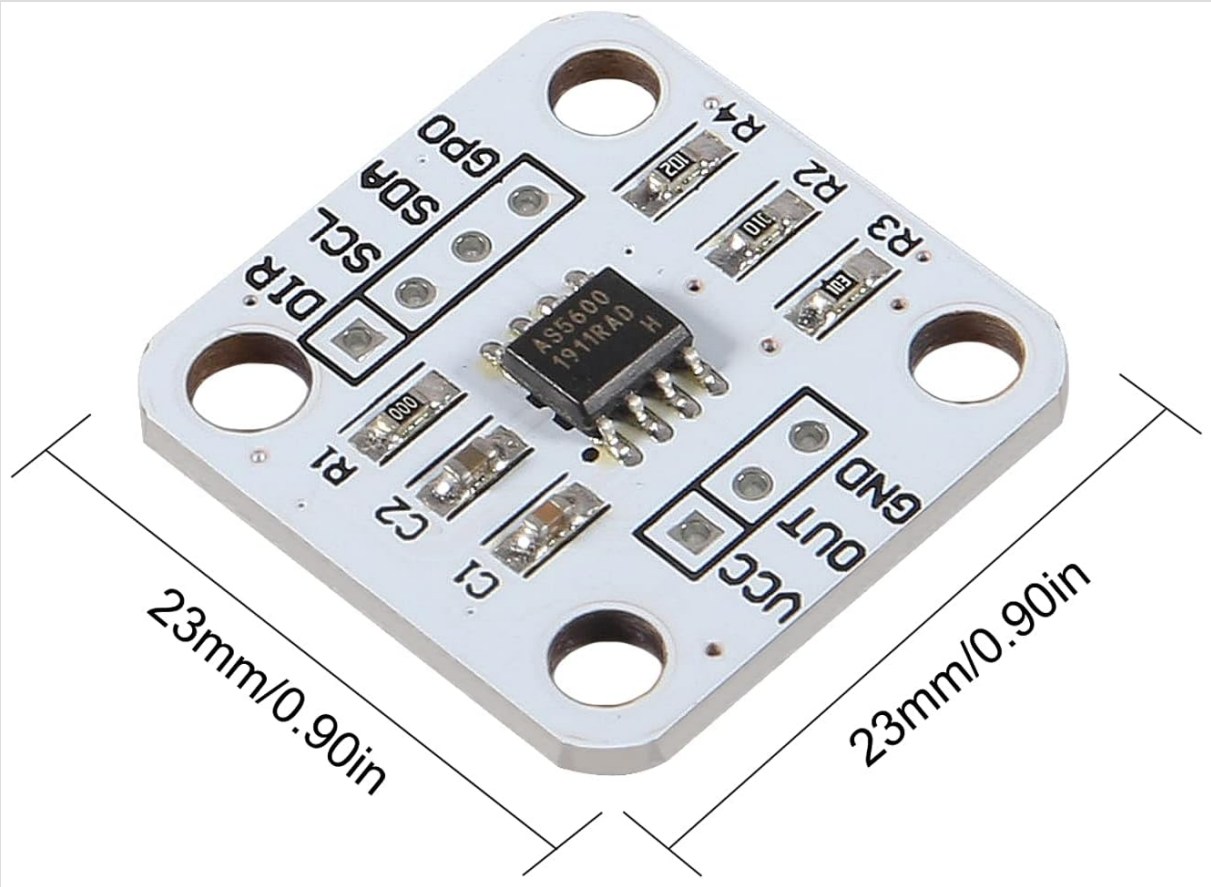

Image 8.1: The AS5600 module with clear dimension markings, indicating its compact size of 23mm by 23mm.

Feature	Description
Brand	UMLIFE
Model Name	AS5600 Magnetic Encoder
Measurement Type	Non-contact magnetic induction
Resolution	12-bit
Output Modes	I2C, PWM, Analog Voltage
Connectivity Technology	I2C
Operating System Compatibility	Linux (for development environments)
Dimensions	Approx. 23mm x 23mm (0.91in x 0.91in)
Included Components	Magnetic Encoder Module, Pin Headers, Magnet

9. Warranty and Support

The UMLIFE AS5600 Magnetic Encoder Module comes with a standard manufacturer's warranty. For specific warranty details, please refer to the product packaging or contact your retailer.
For technical support, inquiries, or further assistance, please contact UMLIFE customer service through the official channels provided at the point of purchase or on the UMLIFE brand store page.