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Liancheng Electronics JC02-1 Series

JC02-1 Series Laser Distance Measuring Module User Manual

Compact Laser Distance Measuring Module for High-Precision Ranging

1. PRODUCT OVERVIEW

The JC02-1 Series Laser Distance Measuring Module is a high-precision, long-range sensor designed for rapid and stable distance measurements. Utilizing a 905nm semiconductor laser, it offers excellent accuracy and a fast response time, making it suitable for a wide array of applications from industrial inspection to outdoor sports and drone integration.



Figure 1: JC02-1 Laser Ranging Sensor Module with key features.

This module is characterized by its compact size, low power consumption, and robust design, including an IPX7 waterproof lens rating, making it ideal for integration into various systems.

Applicable to various scenarios

Jc02-1 laser ranging sensor is widely used, mainly used in aviation, railway, electric power, water conservancy, outdoor sports, agriculture, etc.

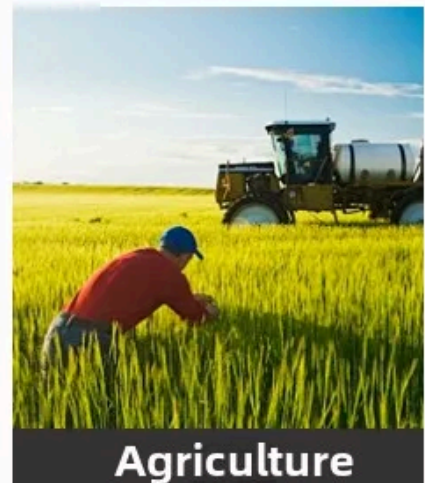
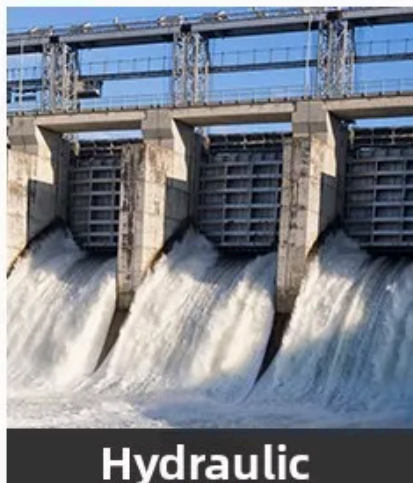
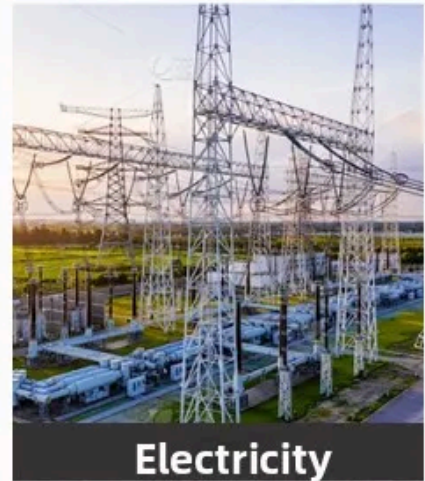


Figure 2: Applicable scenarios for the JC02-1 laser ranging sensor, including aviation, railway, electricity, hydraulic, outdoor sports, and agriculture.

2. SAFETY PRECAUTIONS

- **Laser Safety:** Do not look directly at the laser beam when using this module. Avoid using the module with the lens barrel or any other optical accessories that could cause eye injury.
- **Power Supply:** Strictly control the power supply voltage within the range of 3.3V ~ 3.8V. Connecting incorrect voltage or reversed polarity will damage the module.
- **Handling:** Do not remove the module casing; removal is not covered by warranty. When handling, avoid dropping or impacting the module. Ensure sufficient cushioning if transporting.
- **Environmental Conditions:** Avoid direct sunlight, harsh environments, and extreme temperature changes. If the module experiences fogging due to sudden temperature changes, do not use it.
- **Cleaning:** If the lens is dirty, gently wipe it with a clean, soft cloth. Do not use abrasive materials or solvents that could scratch the lens surface.
- **California Proposition 65 Warning:** This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

3. SETUP

3.1 Package Contents

- 1x JC02-1 Laser Rangefinder Module
- 1x Data/Power Cable

3.2 Physical Dimensions

Product size chart

Product Dimension Drawing

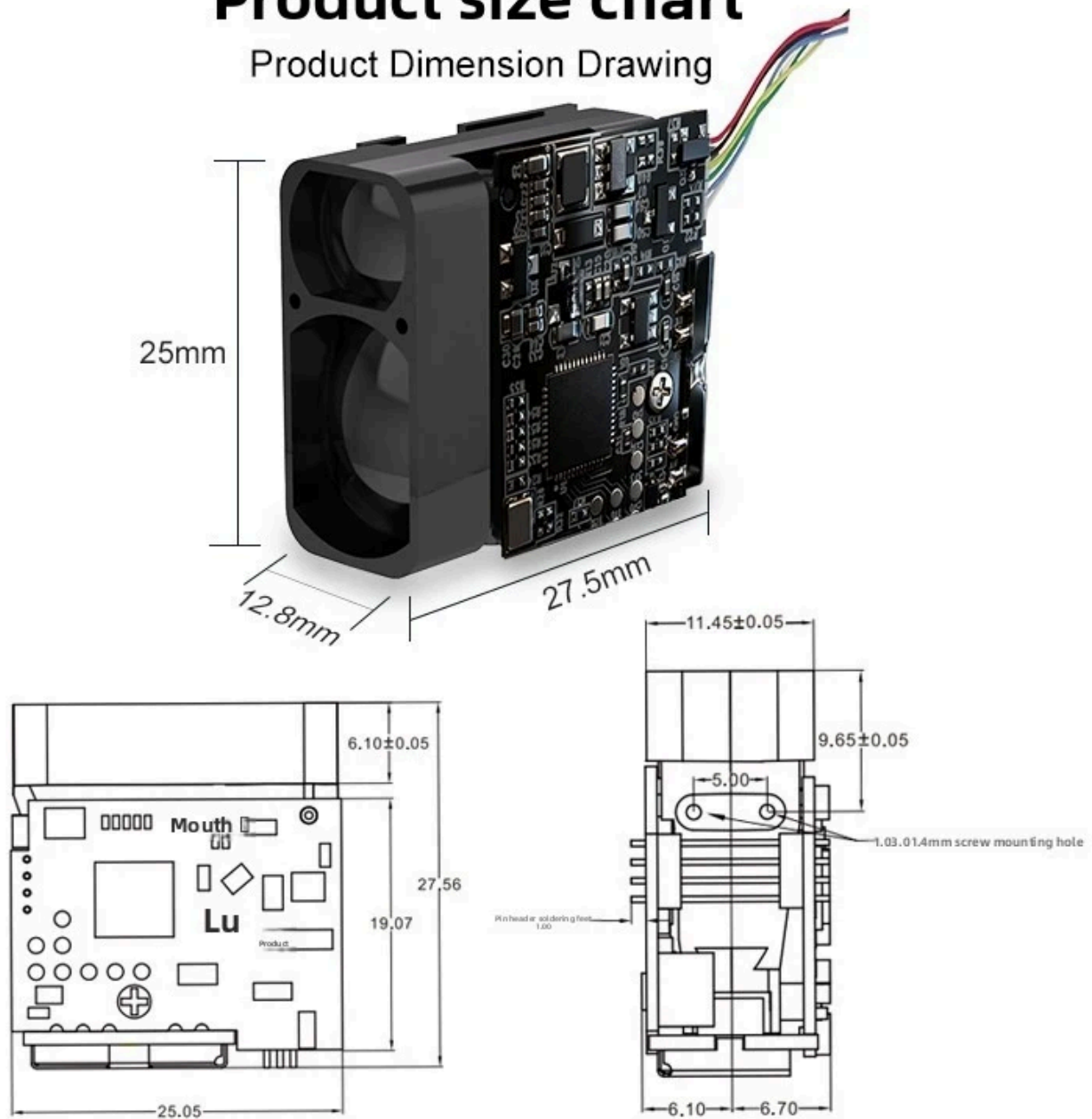


Figure 3: Product dimension drawing of the JC02-1 module.

The module has overall dimensions of 27.5mm * 25mm * 12.8mm and weighs approximately 10.5g.

3.3 Pin Function and Wiring

The module connects via a multi-colored wire harness. Ensure correct pin connections to avoid damage.

Technical parameters

Technical parameters

Technical indicators	Performance parameters
	Functional technical indicators
Application areas	Single barrel/double barrel/thermal sight/night vision sight
Emission aperture	Φ 06
Receiving aperture	13*8
Ranging range (buildings)	600, 800, 1000, 1200, 2000m
Ranging accuracy (building)	<200m±0.6m, 200m or more, ±0.5%
Maximum measuring time	≤ 0.9S
Laser divergence angle	3mrad
Laser type	905nm (laser)
Pulse energy (nj)	Single pulse 1800nj
Power supply voltage	+3.3V~+3.8V
Communication interface	Uart (ttl level)
Static power consumption	100mW@3.3V
Howling sound (db)	< 60db
Module weight	About 10.5g
Lens waterproof rating	IPX7
Impact resistance level	1000G
Overall dimensions	27.5*25*12.8mm
Working temperature	0°C~50°C
Storage temperature	0°C~60°C
Baud rate	115200bps/9600bps (default 9600bps)

Figure 4: Pin function and wiring diagram for the JC02-1 module.

Table 1: Pin Color and Function

Pin No.	Wire Color	Function
1	White	GND (Ground)
2	Light Blue	VCC (Power Supply, +3.3V ~ +3.8V)
3	Green	NC (No Connection)
4	Yellow	UART Tx (Transmit Data)
5	Black	UART Rx (Receive Data)
6	Red	Power ON (High level enables module)

3.4 Initial Connection Steps

1. Insert the data cable into the distance measurement module.
2. Connect the module to a computer or other control device (e.g., microcontroller, FPV flight controller) via an appropriate adapter (e.g., USB-to-UART converter).
3. Ensure the power supply voltage is within 3.3V ~ 3.8V. Do not reverse the plug.
4. Install any necessary distance measurement software or drivers on your computer/control device.
5. Open the software interface and select the corresponding serial port number for communication.

4. OPERATING PROCEDURES

4.1 Communication Protocol (UART TTL)

The module communicates using a UART (TTL level) serial interface. Configure your control device's serial port with the following parameters:

- **Baud Rate:** 115200bps / 9600bps (default: 9600bps)
- **Data Bits:** 8 bits
- **Stop Bit:** 1 bit
- **Parity Bit:** None
- **Flow Control:** None

4.2 Control Commands and Responses

The module responds to specific hexadecimal commands for various operations. All byte content is in hexadecimal.

4.2.1 Reset Command

Command: AE A7 05 00 0B 00 10 BC BE

Table 2: Reset Command Format

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comman d word (1 byte)	Data field (1 byte)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	05	00	0B	00	10	BC	BE

Response: No response packet is sent after a successful reset command. Wait 500ms for reinitialization.

4.2.2 Single Measurement Control

Initiates a single distance measurement. The module performs one measurement and returns the data.

Command: AE A7 04 00 05 09 BC BE

Table 3: Single Measurement Initiation Command

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comma nd word (1 byte)	Data field (0 bytes)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	04	00	05		09	BC	BE

Response: AE A7 17 00 85 MMSG* BC BE (where MMSG* is the returned measurement result).

Table 4: Single Measurement Response Format

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comma nd word (1 byte)	Data field (19 bytes)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	17	00	85	MMSG*		BC	BE

The MMSG (Measurement Message) contains the measured value as a signed short type with the high 8 bits first and the low 8 bits last. Units: Angle: 0.1 degrees; Speed: 0.1 km/h; Distance: 0.1 meters (01 byte), 0.1 yards (02 byte), 0.1 feet (03 byte). Note: The device supports only one linear distance measurement. Other fields (Elevation, Sine Height, Azimuth, Span, Velocity, Parallax) are reserved for future updates and currently return 0.

4.2.3 Continuous Measurement Control

Initiates continuous distance measurements.

Command: AE A7 04 00 0E 12 BC BE

Table 5: Continuous Measurement Control Command

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comma nd word (1 byte)	Data field (0 bytes)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	04	00	0E		12	BC	BE

Response: AE A7 04 00 0E 12 BC BE (upon receiving the command, respond with this to initiate continuous measurement and respond upon successful measurement).

Table 6: Continuous Measurement Response Format

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comma nd word (1 byte)	Data field (19 bytes)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	17	00	85	MMSG*		BC	BE

4.2.4 Stop Continuous Ranging Control Command

Stops continuous distance measurements.

Command: AE A7 04 00 0F 13 BC BE

Table 7: Stop Continuous Ranging Control Command

BaoTo u 1 (1 byte)	BaoTo u 2 (1 byte)	Data length (1 byte)	Addres s code (1 byte)	Comma nd word (1 byte)	Data field (0 bytes)	Check sum (1 byte)	Wrap 1 (1 byte)	Wrap 2 (1 byte)
AE	A7	04	00	0F		13	BC	BE

Response: AE A7 04 00 0F 93 BC BE

5. MAINTENANCE

5.1 Cleaning

Gently wipe the lens and module body with a clean, soft, dry cloth. Avoid using harsh chemicals or abrasive materials that could damage the lens or casing.

5.2 Environmental Considerations

The module has an IPX7 lens waterproof rating, preventing water intrusion when submerged. However, prolonged exposure to extreme conditions should be avoided. Store the module within the specified temperature range (0°C ~ 60°C) and operate within 0°C ~ 50°C.

5.3 Handling and Storage

Add sufficient cushioning material in the packaging box during transportation to prevent damage to the module. Keep the module out of reach of children and avoid placing it on unstable high places to prevent accidental damage.

6. TROUBLESHOOTING (FAQ)

Q1: Is it a malfunction if the module has no response after sending the reset command?

Answer: No, it's not a malfunction. The JC02-1 reset command is designed to execute silently (no response packet after receiving the command). To verify if the reset works:

1. Send the reset command.
2. Wait 500ms for the module to reinitialize.

3. Send the "Single Measurement command".
4. If you receive the measurement response packet from the module, the reset is successful.

Q2: How to switch the module's baud rate from default 9600bps to 115200bps?

Answer: Follow these steps:

1. Ensure the module is currently communicating at 9600bps.
2. Send the baud rate configuration command (hex): AE A7 05 00 0C 01 02 BC BE (where 02 corresponds to 115200bps).
3. Immediately reconfigure your serial tool/MCU to 115200bps after sending the command to continue communication.

Q3: Are the MMSG fields (Elevation, Sine Height, etc.) showing 0 due to incorrect settings?

Answer: No, it's not incorrect settings. The MMSG fields (Elevation, Sine Height, Azimuth, etc.) of JC02-1 are reserved for future firmware updates/higher-end models. Only the "Crowfly distance" field is active (non-zero) in the current version, and other fields return 0 by default. We recommend keeping the code logic for these fields—they can be used directly after firmware updates or model switching.

Q4: Can I change the module's distance unit (meters/yards/feet)?

Answer: No. The distance unit of JC02-1 is factory-calibrated to "meters (unit code 1)" as a fixed parameter, and unit switching via commands is not supported.

Q5: Can the Power ON pin be connected directly to VCC? How to control the module's ON/OFF?

Answer:

1. The Power ON pin can be connected directly to 3.3V VCC (the pin is designed to accept 3.3V high-level input); you can also pull it up to VCC via a 10kΩ resistor

(more stable, recommended for long-term use).

2. It is recommended to use the Power ON pin to control the module (low level = OFF, high level = ON). Do not switch the VCC line directly (voltage spikes may damage the module).

Q6: How to connect the JC02-1-10 module to FPV (VCC, Power ON) and which communication protocol to choose for the flight controller?

Answer:

1. Wiring for VCC and Power ON (FPV Compatibility)

The JC02-1-10 operates on **3.3V~3.8V (TTL levels)**—ensure stable power and compatibility with your FPV flight controller (FC):

- **VCC (Power Supply):**
 - If your FC has a 3.3V BEC output: Connect the module's VCC (light blue wire) directly to the FC's 3.3V pin.
 - If your FC only has 5V: Use an **AMS1117-3.3V voltage regulator** (convert 5V from FC to 3.3V) to power the module (never connect 5V directly—this will damage the module!).
- **Power ON (Module Activation):**
 - For automatic startup with FC power: Connect Power ON (red wire) to the FC's 3.3V pin (permanent high level).
 - For remote control via FC: Connect Power ON to a free digital IO pin of the FC (set the IO to high level in FC software to activate the module).
- **GND (Ground):** Mandatorily connect the module's GND (white wire) to the FC/FPV system's common ground (no common ground = communication failure!).

2. Communication Protocol with FPV Flight Controller

Recommended protocol: **UART (TTL levels)**—the standard, most compatible protocol for FPV FCs.

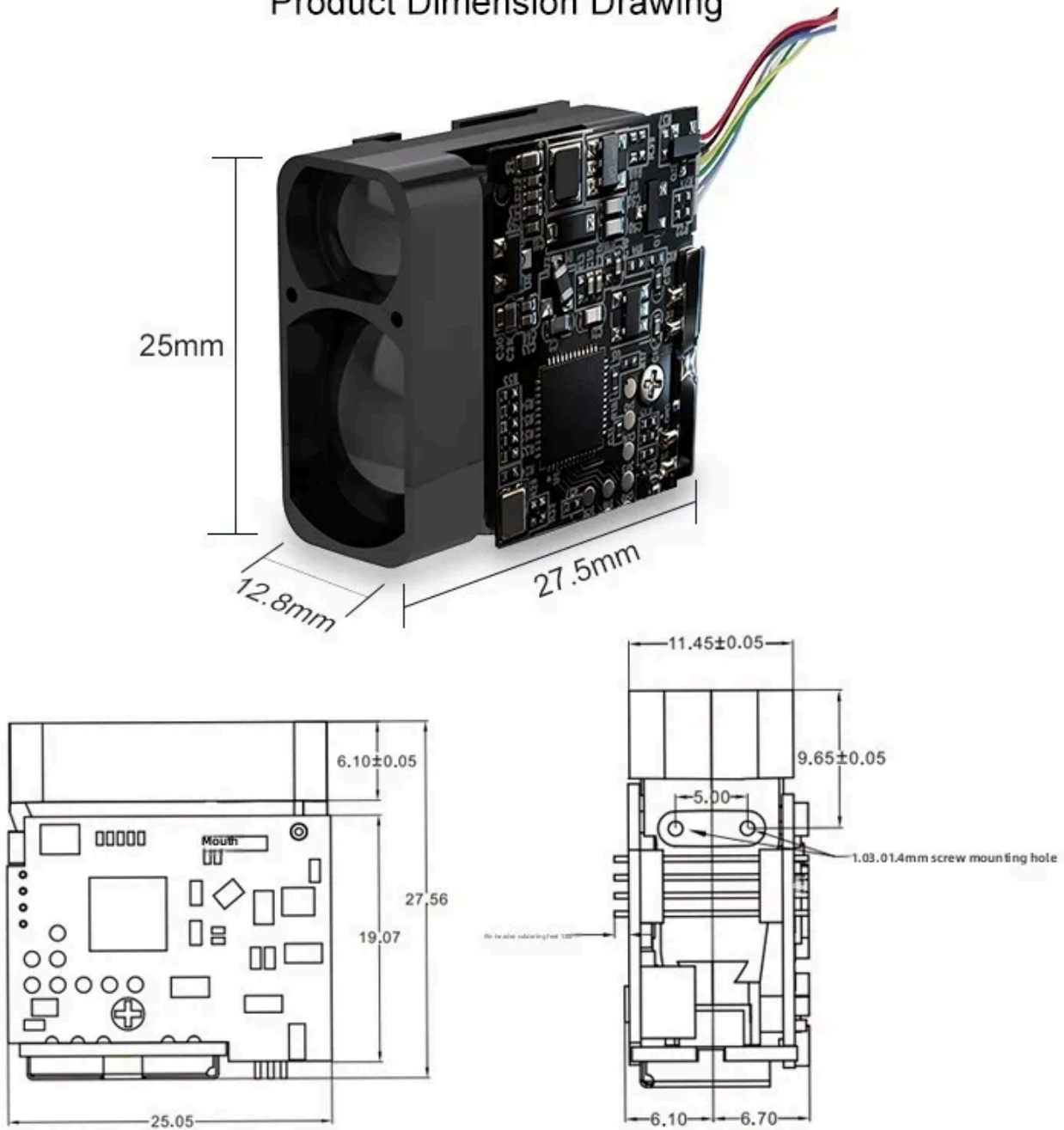
- **UART Configuration Parameters (Default):**
 - Baudrate: 9600 bps (can switch to 115200 bps via command if needed)
 - Data Bits: 8
 - Stop Bit: 1
 - Parity: None
 - Flow Control: None
- **FC Setup Steps:**
 1. Select a free UART port on the FC (e.g., UART2/UART3—avoid UART1, typically used for GPS/telemetry).
 2. In FC configuration software (e.g., Betaflight Configurator, INAV Configurator):
 - Enable the selected UART port.
 - Choose protocol: **Serial Passthrough** or **Custom Serial** (the module uses a proprietary binary protocol; passthrough mode allows the FC to receive raw data for parsing via LUA scripts or FC code).
 3. UART Wiring:
 - Module's Uart Tx (yellow wire) → FC UART port's Rx
 - Module's Uart Rx (black wire) → FC UART port's Tx

Factors Affecting Range Measurement Capability

The accuracy and maximum range can be affected by several factors:

Product size chart

Product Dimension Drawing



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Figure 5: Environmental and target factors influencing measurement accuracy.

- **Target Reflectivity:** Generally, higher target reflectivity indicates better ranging capability and faster response. For instance, medium reflectivity targets can be

measured up to 900 meters, while low reflectivity targets may only measure 600 meters.

- **Target Shape:** When the measured target's effective reflective surface area is too small or uneven, the ranging capability and ranging response speed will be correspondingly reduced.
- **Measurement Angle:** When the laser beam is vertically incident on the target, the ranging capability and response speed are optimized. Conversely, both performance metrics will degrade under oblique angles.
- **Measurement Environment:** Factors such as solar radiation intensity, atmospheric visibility, temperature, humidity, and air pressure can affect ranging capability and measurement results.
- **Measurement may be inaccurate or fail under the following conditions:** Snow, rain, or fog; Small or slender target; Target is black or dark; Target is moving or vibrating; When measuring the water surface; Target measured through glass; Target is glass or mirror; Incidence of the laser on the target surface is oblique; Sunlight incidence angle $\geq 30^\circ$; Visibility ≤ 10 km.

7. SPECIFICATIONS

The following table details the technical parameters of the JC02-1 Series Laser Distance Measuring Module:

Product showcase

product display

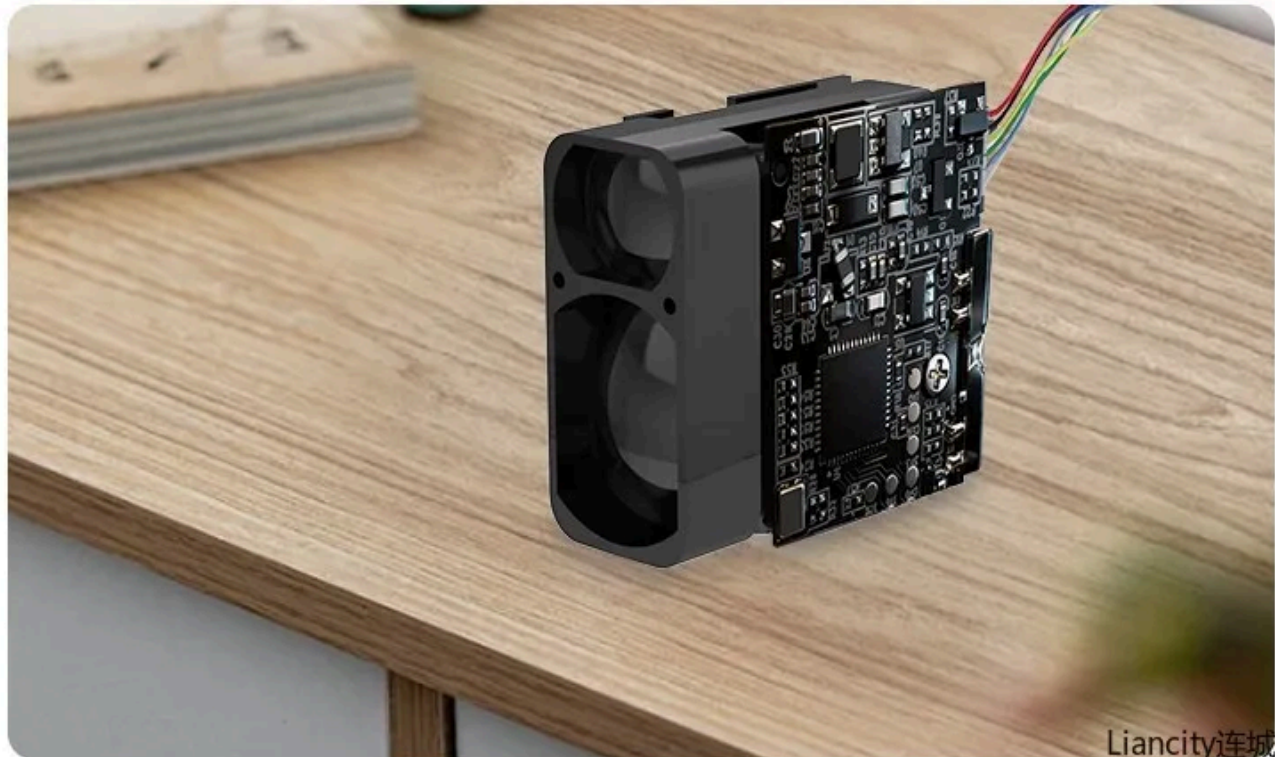


Figure 6: Detailed technical parameters of the JC02-1 module.

Table 8: Technical Parameters

Technical Indicator	Functional Technical Indicator
Application areas	Single barrel/double barrel/thermal sight/night vision sight
Emission aperture	Φ 06
Receiving aperture	13*8
Ranging range (buildings)	600, 800, 1000, 1200, 2000m
Ranging accuracy (building)	<200m±0.6m, over 200m, ±0.5%
Maximum measuring time	≤ 0.9S
Laser divergence angle	3mrad
Laser type	905nm (laser)
Pulse energy (nJ)	Single pulse 1800nJ
Power supply voltage	+3.3V~+3.8V
Communication interface	Uart (TTL level)
Static power consumption	100mW@3.3V
Howling sound (db)	< 60db
Module weight	About 10.5g
Lens waterproof rating	IPX7
Impact resistance level	1000G
Overall dimensions	27.5*25*12.8mm
Working temperature	0°C~50°C

Technical Indicator	Functional Technical Indicator
Storage temperature	0°C~60°C
Baud rate	115200bps/9600bps (default 9600bps)

8. USER TIPS

- For stable operation, consider pulling up the Power ON pin to VCC via a 10kΩ resistor.
- When integrating with FPV flight controllers, always ensure a common ground connection between the module and the FC to prevent communication issues.
- If your flight controller or power source provides 5V, use a voltage regulator (e.g., AMS1117-3.3V) to step down the voltage to the module's required 3.3V-3.8V range. Directly connecting 5V will damage the module.
- Remember that only the "Crowfly distance" field in the MMSG response is currently active; other fields are reserved for future updates.

9. WARRANTY AND SUPPORT

This product comes with a one-year warranty and lifetime support. For quality-related issues, replacement is free. For further technical assistance or support, please contact Liancheng Electronics (Shenzhen) Co., Ltd. Store directly through your purchase platform.

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Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question

Answered questions about this manual

Which type of male connector should I use to connect the Liancheng Electronics JC02-1-08 laser distance measuring module?

The Liancheng Electronics JC02-1 Series (including the JC02-1-08) typically comes with a 6-pin data/power cable (wire harness) included in the package. While the manual does not explicitly name a specific industry-standard connector part number...

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