千问办公

PRODUCT SPECIFICATION

SM-10 Laser Ranging Sensor Module

3-Axis Sensing + iToF Laser Ranging · UART Digital Output · V1.0

Hejiarun Electronic Technology Co., Ltd. September 2026

本规格书由 铄泓科技 SH-MEMS 提供 · 联系人:李生 13632956297 · shop.sh-mems.com

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Yellow-Highlight Notice

Amber-highlighted text in this document indicates reference values pre-filled based on typical industry practice. They have not been verified by measurement and must be confirmed and replaced with actual test data before formal release or external delivery.

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1. Product Overview

1.1 Introduction

The SM-10 is a compact laser ranging sensor module from Hejiarun Electronic Technology Co., Ltd. It integrates an **iToF (indirect Time-of-Flight) laser ranging sensor** and a **3-axis sensor** on board, simultaneously outputting target distance and attitude/angle data. The module communicates with a host MCU via UART (TXD/RXD) and is powered from a single 3.3 V supply.

The laser ranging covers 2 m to 5 m with sub-millimeter accuracy (maximum error ⩽ ±1 mm over the full range). Combined with the 3-axis sensor, horizontal angle measurement is supported. The module is well suited to smart furniture, robot vacuums, security surveillance, industrial positioning, and liquid/bulk level detection, and is easy to integrate into smart hardware and IoT devices.

1.2 Positioning

- **Target markets**: Smart home, service robots, security surveillance, industrial positioning, IoT devices
- **Target customers**: OEMs, solution providers, system integrators
- **Core value**: Millimeter-class ranging plus angle sensing — compact size, plug-and-play serial interface, easy SMT integration

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1.3 Highlights

Feature	Description
iToF laser ranging	Range 2 – 5 m, sub-millimeter accuracy, max error ⩽ ±1 mm over full range
3-axis sensing	On-board 3-axis sensor supporting horizontal angle measurement (see Section 5.3)
Ultra-compact	Only 10.474 mm × 13.078 mm, saves enclosure space
Standard serial	UART (TXD/RXD), 3.3 V level, easy to connect
Single supply	3.3 V power, no multiple rails required
High integration	On-board MCU and RC filtering; only power and serial lines required externally
Mounting holes	Corner mounting holes for screws or SMT assembly

2. Mechanical and Structural Specifications

2.1 Product Photo

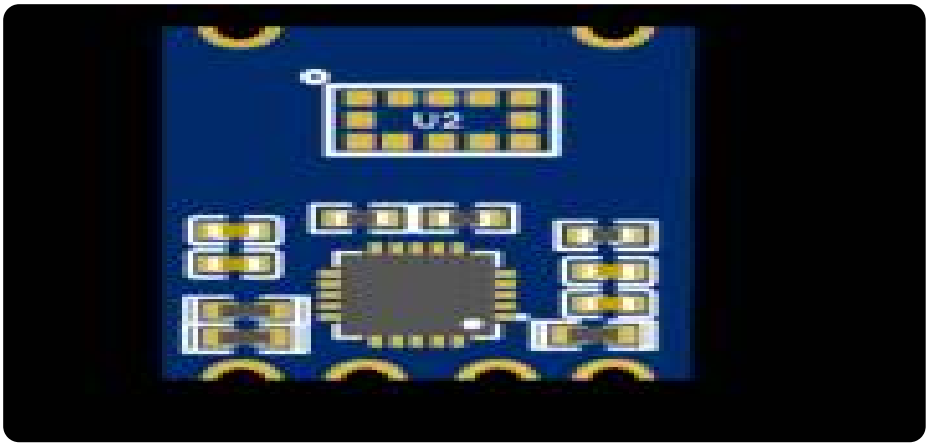


Figure 2-1 SM-10 module photo (top side)

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2.2 PCB Layout

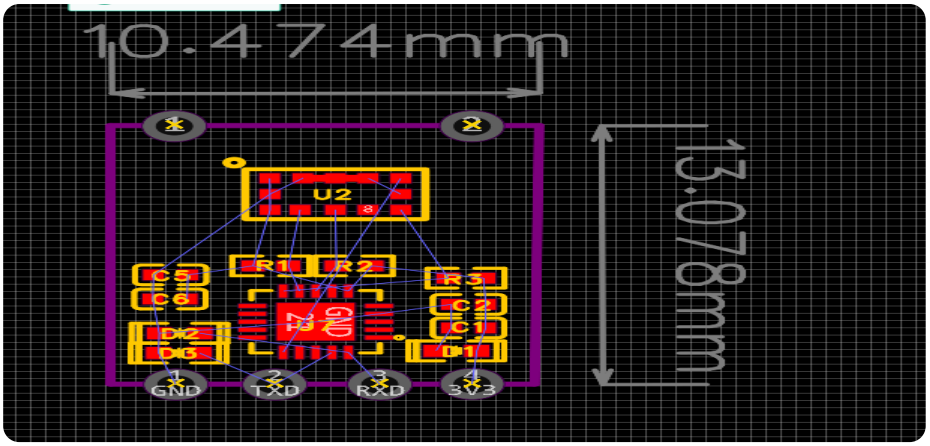


Figure 2-2 SM-10 PCB component layout (EDA export)

2.3 Mechanical Parameters

Item	Specification
PCB dimensions	10.474 mm × 13.078 mm
Board thickness	1.0 mm
PCB material	FR-4 (TG130 or above)
Mounting holes	2 corner holes (cross-marked positions)
Surface finish	ENIG (immersion gold)
Weight	approx. 1.5 g

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2.4 Component Layout

RefDes	Package / Type	Function
U1	QFN leadless package	iToF laser ranging sensor IC
U2	8-pin connector	Board-to-board connection (pins 1–8)
U3	LGA package	3-axis accelerometer
U4	QFN package	Host MCU
R1, R2	0402 resistor	Pull-up / divider
R3	0402 resistor	Current limiting / impedance matching
C1, C2, C5, C6	0402 capacitor	Power filtering / decoupling
D2, D6	Diode	VCSEL emitter / PD receiver (integrated ranging solution)

3. Interface Definition

3.1 External Pads (Bottom)

Pin	Name	Type	Description
1	GND	P	Power ground
2	TXD	O	UART transmit (module → host), 3.3 V level
3	RXD	I	UART receive (host → module), 3.3 V level
4	3V3	P	Power input, 3.3 V

Note: P = power, I = input, O = output. Pin order follows Figure 2-2 left to right; refer to the actual silkscreen.

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3.2 U2 Connector Pins

U2 is an 8-pin board-to-board connector. Pin definitions (assumed values, refer to actual unit):

Pin	Name	Function
1	3V3	Power
2	GND	Ground
3	TXD	UART transmit
4	RXD	UART receive
5	INT	Data-ready interrupt (open-drain)
6	EN	Enable / sleep control
7	NC	Reserved
8	GND	Ground

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4. Functional Specifications

No.	Function	Description
F-01	Laser ranging	iToF ranging, 2 – 5 m, sub-millimeter accuracy (⩽ ±1 mm over full range)
F-02	3-axis attitude sensing	On-board 3-axis sensor, outputs 3-axis data, supports horizontal angle measurement
F-03	Serial output	UART digital output, default 115200 bps (9600 – 921600 bps configurable)
F-04	Autonomous reporting	Auto-report at configured rate in continuous mode, 10 Hz – 1/60 Hz
F-05	Command response	Single shot, continuous ranging, parameter setup, sleep/wake-up, version query, factory reset
F-06	Low-power mode	Sleep supported, sleep current < 10 μA (via EN pin or command)
F-07	Calibration	Factory calibrated; user-side offset calibration command supported

5. Technical Specifications

5.1 Electrical Characteristics

Item	Specification
Supply voltage	3.3 V (recommended 3.0 – 3.6 V)
Operating current	Typ. 40 mA (continuous ranging); average decreases with lower rate
Peak current	⩽ 100 mA (laser emission)
Sleep current	< 10 μA
I/O level	3.3 V (5 V tolerance requires external level shifting)
ESD protection	±2 kV contact / ±4 kV air (HBM)

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5.2 Laser Ranging Performance

Item	Specification
Ranging principle	iToF (indirect Time-of-Flight)
Ranging range	2 m – 5 m
Ranging accuracy	Sub-millimeter (max error ⩽ ±1 mm over full range)
Ranging resolution	0.1 mm
Measurement rate	10 – 50 Hz (configurable)
Laser wavelength	850 nm (near-infrared)
Laser class	Class 1 (IEC 60825-1, eye-safe)
Field of view (FoV)	±25° (customizable)
Target reflectivity	10 % – 90 % (grey-scale targets; white wall is best-case)

5.3 3-Axis Sensor Performance

Item	Specification
Sensing axes	3-axis (X / Y / Z), 3-axis accelerometer (±2 g / ±4 g / ±8 g selectable)
Horizontal angle range	Within 2 – 5 m distance ±90° (pitch/roll, computed from 3-axis data)
Angle accuracy	±1° (static conditions)
Resolution	0.1°
Zero-offset drift	< 0.05°/°C (temperature drift)
Sampling rate	100 Hz (12.5 – 800 Hz configurable)

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5.4 Environmental Conditions

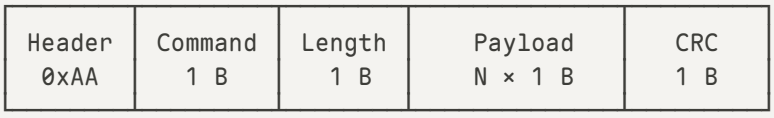
Item	Specification
Operating temperature	-20 °C to +70 °C
Storage temperature	-40 °C to +85 °C
Operating humidity	5 – 95 %RH (non-condensing)
Ambient light immunity	⩽ 5 klux (indoor strong light OK; degrades under direct sunlight)

5.5 UART Communication Parameters

Item	Specification
Interface	UART, 3.3 V level
Baud rate	Default 115200 bps (9600 – 921600 bps configurable)
Data format	8N1 (8 data bits, no parity, 1 stop bit)
Protocol	Binary frame protocol, see Section 6

6. Communication Protocol

6.1 Data Frame Format (Example)



> **Protocol Note**
> The frame format above is a generic example. Actual header, command set, byte order, and checksum algorithm (sum / CRC-8 / CRC-16) are defined by the production firmware.

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6.2 Typical Communication Flow

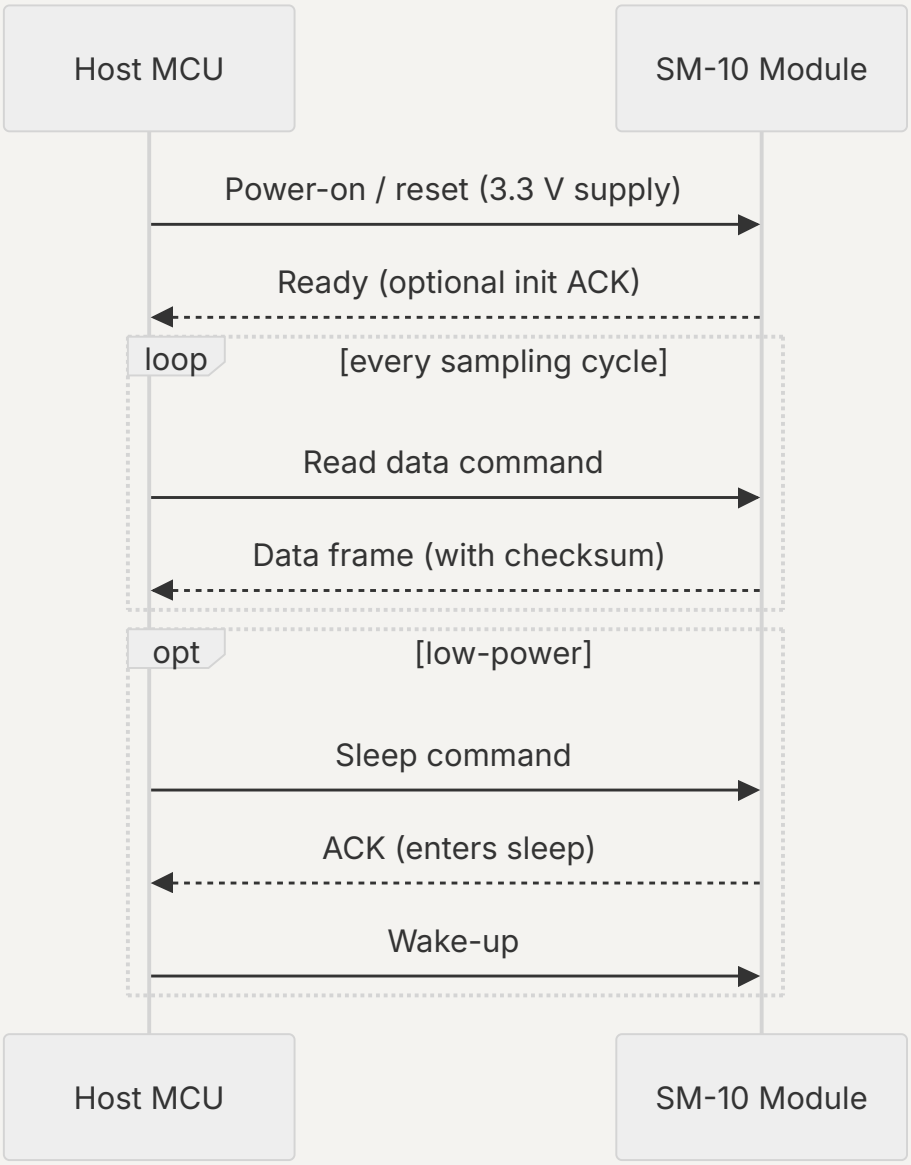


Figure 6-1 Typical communication flow between host MCU and SM-10

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7. Reliability and Testing

Test Item	Standard	Result
High/low temperature operation	-20 °C / +70 °C, 48 h each	Pass (pre-filled, to be verified)
Damp heat, steady state	40 °C / 95 %RH, 48 h	Pass (to be verified)
Reflow soldering resistance	Peak 260 °C, 10 s, J-STD-020	Pass (to be verified)
Vibration	10 – 55 Hz, 1.5 mm double amplitude, 2 h/axis	Pass (to be verified)
Electrical safety	ESD / surge per GB/T 17626 series	Pass (to be verified)

8. Safety and Certifications

Item	Description
Safety	IEC 62368-1 / GB 4943.1
RoHS	EU RoHS 2.0 (2015/863, ten substances)
EMC	EN 55032 Class B / EN 55035
Laser safety	IEC 60825-1 Class 1 (eye-safe)

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9. Packaging and Delivery

Item	Specification
Packaging	Anti-static tray (tape & reel optional, by order volume)
Minimum order quantity	100 pcs
Label information	Model, lot number, quantity
Storage conditions	MSL 3 (assemble within 168 h after opening, or bake as required)
Warranty	12 months from delivery

10. Appendix

Appendix A: Terms and Abbreviations

Term	Description
iToF	Indirect Time-of-Flight ranging technology
UART	Universal Asynchronous Receiver-Transmitter
QFN	Quad Flat No-leads package
FoV	Field of View
ENIG	Electroless Nickel Immersion Gold
MSL	Moisture Sensitivity Level
SMT	Surface Mount Technology

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Appendix B: Contact

Item	Content
Company	Hejiarun Electronic Technology Co., Ltd.
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