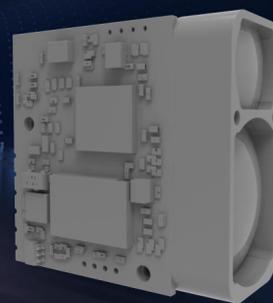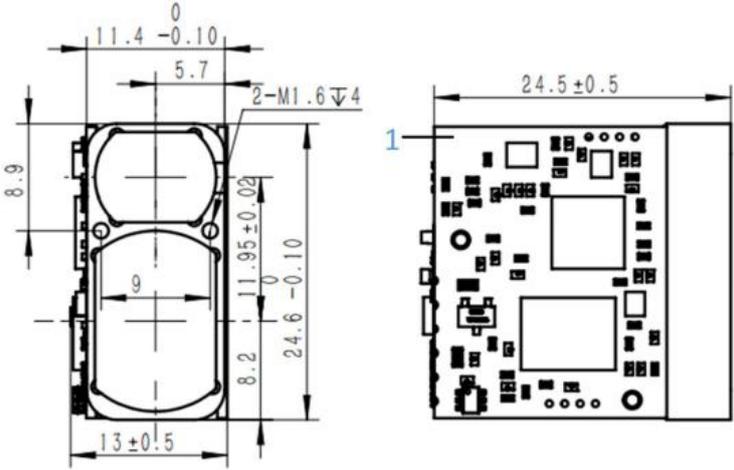# Sentiacu SPL1K5

Datasheet

The SPL1K5 long range laser rangefinder module is a compact sensor based on a 905nm semiconductor laser. It features a small size, lightweight design, and long measurement range. Typical applications include handheld rangefinders, mini drones, and rangefinding scopes. The module is equipped with a UART (TTL 3.3V) data interface and comes with PC software and a communication protocol command set to support secondary development by users.

Technical Specifications

| Performance Parameters	
Model	SPL1K5
Ranging capability[①]	0.5 ~ 1500 m (Low-frequency mode) 0.5 ~ 1300 m (High-frequency mode)
Precision	± 0.5m(≤ 80m)，± 1.0m (> 80m)
Distance resolution	1 cm
Default frame rate	1 ~ 4Hz (Low-frequency mode, adaptive) 60 ~ 800Hz (Low-frequency mode, adaptive)
Beam divergence	~ 6 mrad
False detection rate	≤ 1%
Target discrimination	≤ 30m
Central wavelength	905± 5 nm
Mechanical and Electrical Parameters	
Size （L×W×H)	≤ 25 mm × 26 mm × 13 mm
Weight	11± 0.5 g
Operating temperature	−20 ~ +60 ℃
Storage temperature	−45 ~ + 70 ℃
Supply voltage	DC 3.0 ~ 5.0 V
Shock resistance	1000 g, 20 ms
Vibration resistance	5 to 50 to 5 Hz, 1 oct/min, 2.5 g
Operating power consumption	≤ 1.8W

Standby Power Consumption	≤ 0.8W
Communication Protocol	
Communication Interface	UART (TTL_3.3V)
Baud rate	500000 bps
Dimensions (Unit: mm)	

Notes:

① Under test conditions: visibility not less than 10 km, relative humidity ≤ 70%, and large target refers to a target whose dimensions exceed the laser spot size.

Interface

Pin sequence description: The pins of the interface terminal are numbered 1~6 from top to bottom.
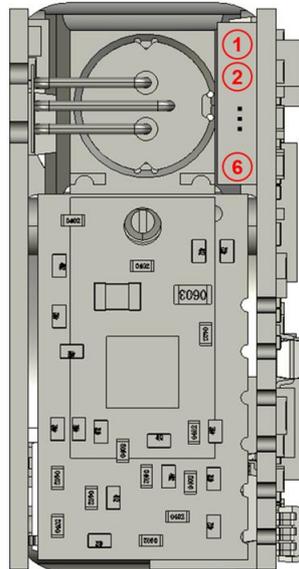
Electrical Interface: The interface model is FWF08002-S06B13W5M. The interface definition is detailed in the table below.

Pin Number	Definition	Notes
1	GND	Vin-/TTL GND
2	Vin+	VCC+ DC 3 ~ 5V
3	UART_Tx	TTL serial port transmitter, **high-frequency** output pin
4	UART_Tx	TTL serial port transmitter, **low-frequency** output pin
5	UART_Rx	TTL serial port receiver, 3.3V voltage level
6	Power_EN	Module power supply enable, TTL_3.3V level; Module is activated (>2.5V or floating), Module is turned off (<0.3V);

Attention: This product supports both high-frequency ranging mode and standard ranging mode, the parameters and protocol instructions may differ between the two modes. Please refer to the communication protocol below for specific information. Please switch the distance measurement mode through the command and read the distance measurement value from the corresponding Pin (3 or 4).

Protocol

High-frequency mode:

Output definition

- Communication format: default baud rate of 500000bps;

- Data format: 8-bit data, one start bit, one stop bit, no parity check, data from the beginning

- Byte, command part, data length, parameter part, and checksum byte.

- Communication method: The master control and rangefinder adopt a master-slave communication method, and the master control sends control commands to the rangefinder. The rangefinder receives and executes instructions. The measurement data is counted through the high-frequency output port.

The high-frequency ranging start command is as follows:

Byte	1	2	3	4	5	6	7	8
Value	0x55	0xAA	0xCB	0xCC	0xCC	0xCC	0xCC	0xFB

The high-frequency ranging shutdown command is as follows:

Byte	1	2	3	4	5	6	7	8
Value	0x55	0xAA	0xCC	0xCC	0xCC	0xCC	0xCC	0xFC

After sending "high-frequency ranging shutdown command", TFA1500 will be set to low-frequency mode, please switch to correct Pin to get data.

Attention: When using high-frequency working mode, the baud rate should not be lower than 500000bps, and the upper range limit is 1300m.

Output data format

Example: 5C D1 00 00 2E

- 5C: Fixed frame header

- D1 00 00: Three bytes represent measurement distance of 209cm, little-endian (i.e. 0000D1), range: 0-130000cm.

- 2E: From 02 to 03, perform a sum check and reverse, one byte
- Note: If the converted distance measurement value is 3FFFFF (4194303cm), it is an invalid number, indicating that the target has not been tested.

Low-frequency mode:

The baud rate should not be lower than 115200bps, and the upper range limit is removed.

The master controller and the range finder use a master-slave communication method, where the master controller sends control commands to the range finder, which receives and executes the instructions. In the ranging state, the range finder periodically sends data and status back to the host computer.The communication format and command content are shown in Table A.

The format of command message to LiDAR is as follows:

STX0	CMD	LEN	DATAH	DATAL	CHK

The data message format of the LiDAR is as follows:

STX0	CMD_JG	LEN	DATAn	DATA0	CHK

Table A Description of sending message format

Index	Send message	Receive message	Code	Description
1	STX0	STX0	55（H）	Message Start Flag
2	CMD	CMD_JG	See table A/B	Command
3	LEN	LEN	Length of the parameter	Data length
4	DATAH	DATA n	See table B	/
5	DATAL	DATA 0		
6	CHK	CHK	All bytes except for the checksum byte are XOR	XOR Check

Table A Command word description

Index	Command	Function	Downlink Data	Demonstration
1	0x00	Standby (Continuous ranging stopped)	00 00	55 00 02 00 00 57
2	0x01	Single ranging	20 00	55 01 02 20 00 76

3	0x02	Continuous ranging	20 00	55 02 02 20 00 75
4	0x03	Self-check	00 00	55 03 02 00 00 54
5	0x07	High voltage reference setting	DATAH=XX(H) DATAL=YY(L)	55 07 02 05 AA FF (Voltage value1450)
6	0xE8	Check version number	00 00	55 CB 02 00 00 9C

Table B Command word description

Index	Command	Function	Uplink Data Bytes	Description
1	0x00	Standby (Continuous ranging stopped)	00 00 (6 bytes)	/
2	0x01	Single ranging	D6-D0 (11 bytes)	D6 Flag Byte; D5-D3 Target Distance (the parsed distance value is divided by 10, unit: 0.1m); D1 APD High Voltage Value (V); D0 APD Temperature (°C).
3	0x02	Continuous ranging	D3-D0 (11 bytes)	D6 Flag Byte; D5-D3 Target Distance (the parsed distance value is divided by 10, unit: 0.1m); D1 APD High Voltage Value (V); D0 APD Temperature (°C).
4	0x03	Self-check	D7-D0 (12 bytes)	D6 APD High Voltage Reference Value (V); D5-D4 Blind Zone Value (V); D3 Temperature Compensated APD High Voltage Value (V); D2 APD Temperature (°C).
5	0x07	High voltage reference setting	D1 D0 (6 bytes)	D1 High Byte of Temperature Compensated APD High Voltage Value; D0 Low Byte of Temperature Compensated APD High Voltage Value.
6	0xE8	Check version number	/	/

Precautions for use

- This rangefinder module emits a 905 nm laser classified as eye-safe. However, despite being within the eye-safe wavelength range, direct eye exposure is not recommended.

- The front window of the rangefinder module should be coated with an anti-reflection film (905 ± 20 nm, transmittance > 95%). As the module is not hermetically sealed, please ensure that it is operated in an environment with a relative humidity below 80% and that cleanliness is maintained to avoid potential damage to the laser.

- The rangefinder performance of the module is influenced by atmospheric visibility and target characteristics. Adverse conditions such as fog, rain, or sandstorms may significantly reduce the effective range. Targets with high reflectivity—such as green foliage, white walls, or exposed limestone—can help extend the measurement distance. However, an increased angle between the laser beam and the target surface will lead to reduced rangefinder performance.

- Strictly prohibit plugging or unplugging cables while the device is powered on. Ensure correct power supply polarity at all times; incorrect connection may result in permanent damage to the device.

- High-voltage and heat-generating components are present on the circuit board after power-on. Do not touch the board during operation to avoid risk of injury.