9km Laser Rangefinder Module for UAV Pod

Product Introduction

JIO-H0913X laser rangefinder module adopts self-developed 1535nm erbium glass laser component, which has the features of long range, low power consumption, small size and human eye safety.

Range performance: 9000m (2.3x2.3m Targets),13000m (Maximum range)
Ranging accuracy ± 1m
Measurement accuracy ≥ 98%
Weight ≤ 130g

Product performance index

Item	Index	
Model	JIO-H0913X	
Operating wavelength	1535nm ±10nm	
Eye-Safe	Class 1 (IEC 60825-1)	
Receiving Aperture	Φ33mm	
Ranging range	30-13000m	
Range performance	13000m	Maximum range
	11000m	Big target,Reflectivity: 60 %, observer visibility 25 km
	9000m	2.3 × 2.3 m target size,Reflectivity: 30 %, observer visibility 15 km
	4000m	1 × 1 m target size,Reflectivity: 10 %, observer visibility 10 km

Communication Interface	RS422
Humidity	≤ 80%
Ranging accuracy	±1m
Accuracy rate	≥98%
Divergence angle	≤0.5mrad
Ranging frequency	1~10hz
Continuous ranging time	≥30min
Non-parallelism of the laser optical axis to the mounting reference	<0.3mrad
Size	≤69mm×57mm×45mm
Voltage	5.6-8.4V
Power consumption	Average power consumption ≤3W, peak power consumption ≤6W
Working temperature	-40℃～+60℃
Storage temperature	-45℃～+70℃
Weight	≤130g

Note: All performance indicators and interfaces can be customized according to requirements

Applications for the JIO-H0915X Laser Rangefinder Module

Thermal imaging, night vision and other handheld mobile devices
Border observation and surveillance systems
Sensor kits for UAV pods and UGVs

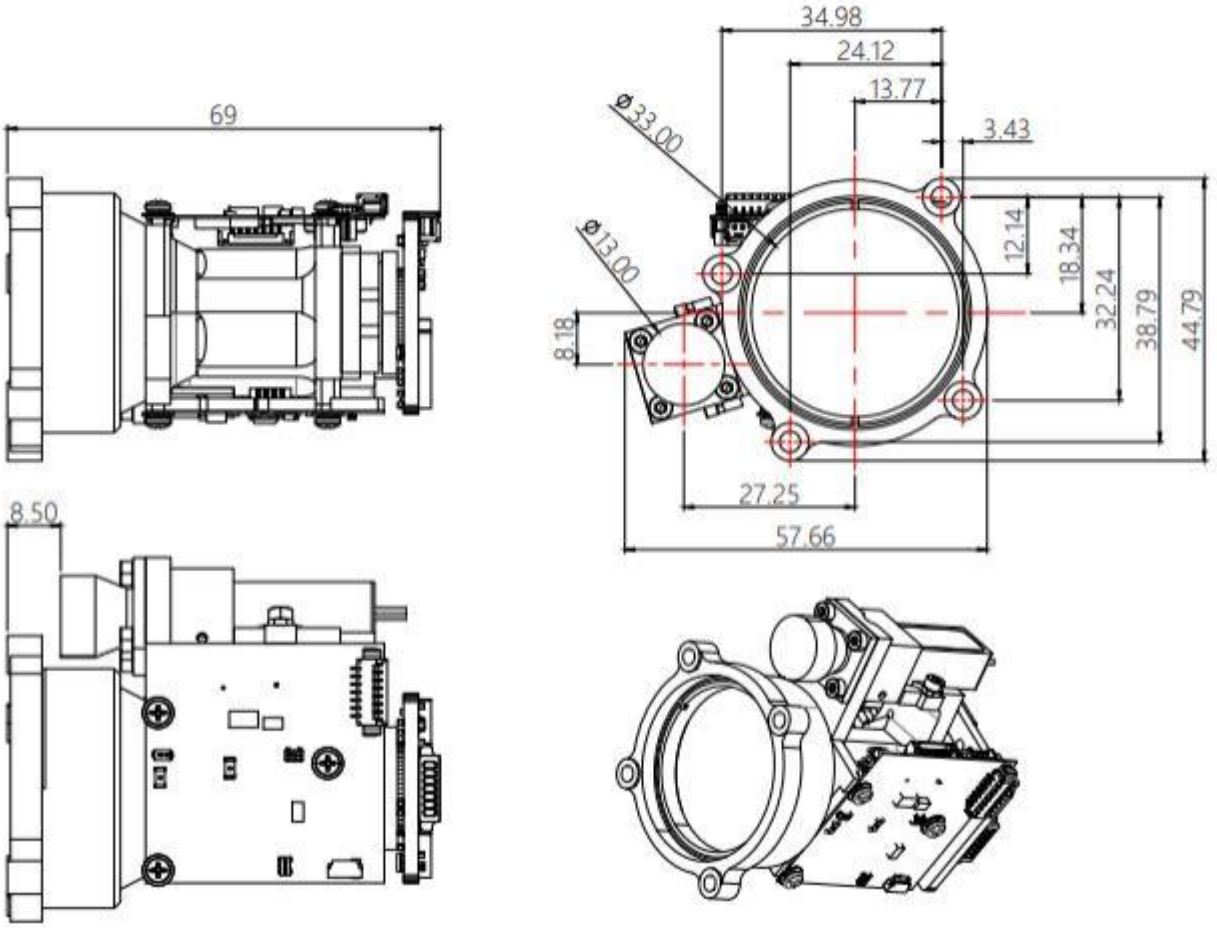
Product function

a) With single ranging and continuous ranging functions;
(b) With power-up/cycle/start-up self-test function;
(c) with the first and last target distance logic display function;
(d) With distance measurement times query function;
(e) Temperature alarm function;
(f) with over-current and over-voltage circuit protection function (design guarantee);
(g) with software remote upgrade function: directly upgrade the software through the communication interface.

Ranging mode and ranging time

a) Single maximum continuous ranging time: ≥35min;
b) The maximum interval time for continuous distance measurement again: ≤15s.
Laser optical axis stability ≤ 0.1mrad (full temperature range);
Verticality of the launching optical axis to the installation reference: ≤2mrad (design guarantee);

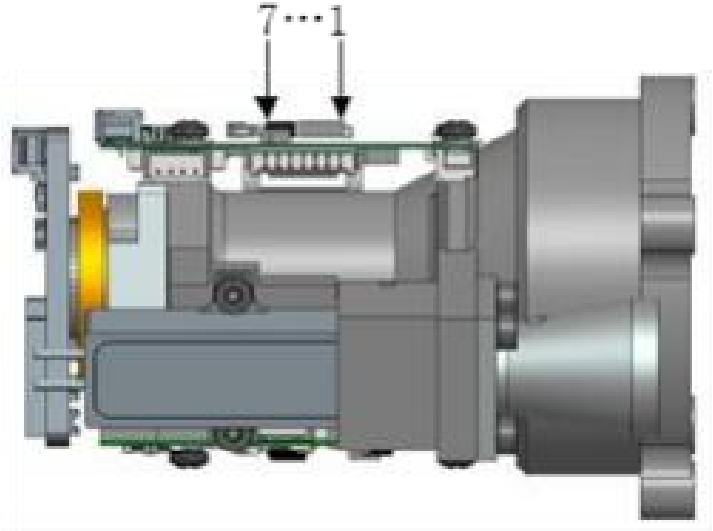
Structure installation interface



Electrical Interfaces

The laser rangefinder is connected externally with a CK connector (Model: A1257WR-S-7P).

Electrical Interface.



The laser rangefinder interface is defined below:

Terminal number	Serial No.	Connector Model	Signal Definition（RS422）	Other
X4	X4-1	A1257WR-S-7P	+12V	Laser rangefinder interface
	X4-2		GND	
	X4-3		RS422-A	
	X4-4		RS422-B	
	X4-5		RS422-Y	
	X4-6		RS422-Z	
	X4-7		RS422-GND	

Communication Protocol

1.Communication speed and format

Format standard	115200(out of factory)N, 8, 1， upper bits priority for multi-bytes data
Data type	Char one byte、int two byte、long four byte； Signed(default)、unsigned

2.Packet format

①start character		②data length	③data content	④sum check
0xEB	0x90	unsigned char	unsigned char[]	unsigned char
“④sum check”refers to summing up all content except for verification and taking the lower 8 bit				
Command data and response data are all within “③data content”				

3.Command data format

Target device code	Command code	Additional data of a certain length
unsigned char	unsigned char	unsigned char[]
Time interval between characters should be ≤20ms。		
Normal command code is forbidden to use 0XFF。		

4.Response data format

Self device code	Response code	Additional data of a certain length
unsigned char	unsigned char	unsigned char[]
Device should respond within in 1s and the time interval between characters should be≤20ms。		
All commands on bus serial port will respond.		

5.Device code

Device name	Device code
Laser rangefinder	0x03

6.Response code

type	Response code	Additional date	meaning	clarification
Normal response	Command code	See attached	Executed successfully	Command is handled normally. Additional data refers to device command.

7.1laser self-check

Sending to laser rangefinder:

byte	0	1	2	3	4	5
Description	0xEB	0x90	②data length（2）	0x03	0x01	Check_sum

Rangefinder sending back:

Byte	0	1	2	3	4	5	6	7	8	9
Description	0xEB	0x90	②data length（12）	0x03	0x01	Self-check	Stand by	Stand by	Stand by	Stand by
10		12	13	14	15					
Stand by	Stand by	Stand by	Stand by	Stand by	Check_sum					

Self-check definition

Bit	D7	D6	D5	D4	D3	D2	D1	D0
description	System status: 0: normal 1:abnormal					Temperature alarm: 0: normal 1:alarm	Bias voltage fault 0: normal 1:fault	Counter malfunction： 0: normal 1:fault

7.2 single measurement

Sending to laser rangefinder:

byte	0	1	2	3	4	5
Description	0xEB	0x90	②data length（2）	0x03	0x02	Check_sum

7.3 auto measurement

Sending to laser rangefinder:

byte	0	1	2	3	4	5
Description	0xEB	0x90	②data length（2）	0x03	0x03	Check_sum

7.4 stop ranging

Sending to laser rangefinder:

byte	0	1	2	3	4	5
Description	0xEB	0x90	②data length（2）	0x03	0x04	Check_sum

7.5 sending back distance data

Single measurement and auto measurement data will be sent back based ranging frequency.

byte	0	1	2	3	4	5	6	7	8	9
Description	0xEB	0x90	②data length（12）	0x03	Single measure: 0x02 Auto measure: 0x03 Standby:	status	First target measured value upper 8	First target lower 8 bits of	First target decimal bytes	End target upper 8 bits of integer

					0x00		bits of integer	integer		
10		12	13	14	15					
End target lower 8 bits of integer	End target decimal bytes	standby	standby	standby	Check_sum					

Note: range finder value with 2 decimal places

Status definition

bite	D7	D6	D5	D4	D3	D2	D1	D0
description	System status: 0: normal 1: abnormal	Front power switch: 0：off 1: on	LD power switch: 0：off 1: on	Bias voltage switch: 0：off 1: on	Working status: 0:off 1: working	Echo status: 0：no 1: yes	Main wave status: 0: no 1 yes	Temperature alarm: 0：no alarm 1: alarm

7.6 setting frequency

Sending to laser rangefinder:

byte	0	1	2	3	4	5	6
Description	0xEB	0x90	②data length（3）	0x03	0x05	1-5:1-5Hz	Check_sum

Setting parameters:

Laser rangefinder sending back

byte	0	1	2	3	4	5	6	7	8	9
description	0xEB	0x90	②data length（12）	0x03	0x05：set frequency 0x08:check setting value	standby	standby	standby	standby	standby
10	11	12	13	14	15	16	17	18	19	20
standby	Ranging frequency 1-5:1-5Hz	Main version no.	Minor version no.	Maintenance no.	Check_sum					

7.7 Check setting value

Sending to laser rangefinder:

Byte	0	1	2	3	4	5
Description	0xEB	0x90	②data length（2）	0x03	0x08	Check_sum

Rangefinder sending back:

Refers to setting parameter

7.8 Check laser emitting times:

Sending to laser rangefinder:

byte	0	1	2	3	4	5

Description	0xEB	0x90	②data length（2）	0x03	0x07	Check_sum

Laser rangefinder sending back:

Byte	0	1	2	3	4	5	6	7	8	9
Description	0xEB	0x90	②data length（12）	0x03	0x07	Cumulative counting D31-D24	Cumulative counting D23-D16	Cumulative counting D15-D8	Cumulative counting D7-D0	Standby
10	11	12	13	14	15	16	17	18	19	20
Standby	Standby	Standby	Standby	Standby	Check_sum					

When working, laser rangefinder autonomously sends back distance data and status to upper computer; When standby, rangefinder doesn't send back information.