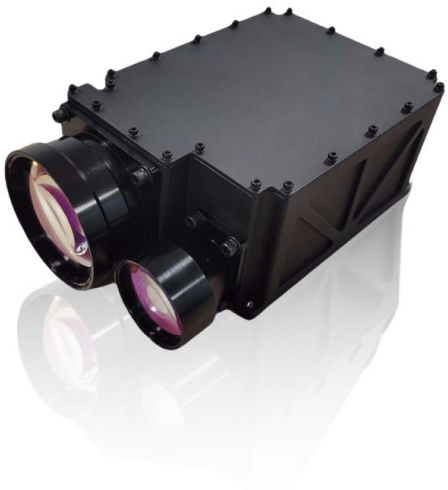
LSP-LRS-2020

20KM Laser Range Finder

(Drones Detection 4.5KM)

Technical Specification



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1. Scope

This plan discusses the development scheme for the laser rangefinder system. It is applicable to the development of the laser rangefinder system.

2. Development Basis

"LSP-LR-2020-01 Laser Rangefinder Technical Protocol", version number: CETC53-202403.

3. Symbols and Abbreviations

Laser Rangefinder — LSP-LRS-2020-01 Laser Rangefinder;

BIT — Built-In Test;

RMS — Root Mean Square;

LRU — Line Replaceable Unit;

MTBF — Mean Time Between Failures;

MTTR — Mean Time To Repair.

4. Mission Task

Receive commands from the entire system, complete the ranging function, and return information to the system as required.

5. Main Functional and Performance Requirements

5.1 Main Functions

(1) Capable of self-diagnosis and response;

(2) Capable of fault location and fault mode feedback;

(3) Capable of serial port communication.

5.2 Main Performance Indicators

(1) Laser wavelength: 1.57μm±0.005μm;

(2) Repetition rate: Adjustable at 1, 5, 10, 20Hz;

(3) Maximum ranging distance: Under conditions of atmospheric visibility

≥23.5km, atmospheric turbulence Cn2 ≤ 10^-16, wind speed ≤ 3m/s, and line-of-sight conditions:

Maximum ranging distance ≥ 4km (for small rotorcraft drones, axle distance 0.4～1.8m);

(4) Minimum ranging distance: ≤200m;

(5) Ranging accuracy: ±5m (RMS);

(6) Beam divergence angle: 1±0.1mard;

(7) Non-parallelism of the optical axis to the mounting base plane: ≤2mrad (design assurance).

(8) Weight: ≤2.5kg;

(9) Dimensions: ≤216mm×126mm×84mm (excluding aviation plug, lens cap).

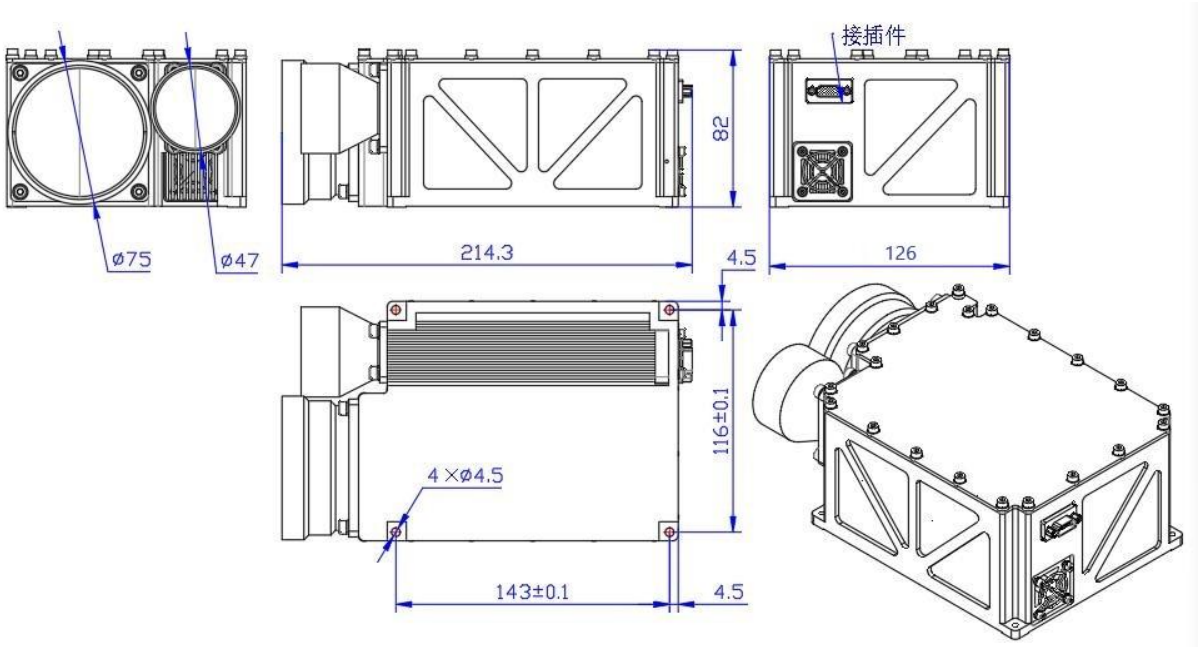

Figure 1: Structural Outline of the Laser Rangefinder

5.3 Main Usage Requirements

5.3.1 Power Supply Requirements

(1) Power supply: DC28V±10%;

(2) Power consumption: Peak power ≤150W, average power ≤100W;

5.3.2 Reliability Requirements

(1) The device complies with the provisions of GJB 450A-2004 "General

Requirements for Equipment Reliability Work";

(2) MTBF: ≥4000h.

5.3.3 Maintainability Requirements

(1) The device complies with the provisions of GJB 368B-2009 "General Requirements for Equipment Maintainability Work";

(2) MTTR: ≤30min.

5.3.4 Supportability Requirements

The system should be equipped with spare parts, accessories, tools, and technical materials required for the replacement of on-site replaceable units of mission equipment, enabling rapid on-site fault diagnosis and component replacement.

5.3.5 Testability Requirements

Features a self-test function, including monitoring of system operational status and fault alarms, and a self-diagnosis function for system failures.

5.3.6 Safety Requirements

Parts that may endanger personal safety should have safety protection measures and conspicuous signs.

5.3.7 Environmental Adaptability Requirements

5.3.7.1 High Temperature Operation

55°C;

5.3.7.2 Low Temperature Operation

-40°C;

5.3.7.3 High Temperature Storage

65°C;

5.3.7.4 Low Temperature Storage

-50°C;

5.3.7.5 Damp Heat

Constant damp heat environment, temperature 40°C, relative humidity 95±3%, test duration 72 hours, power off;

5.3.7.6 Shock

Shock pulse waveform is half-sine wave, peak acceleration is 200m/s², pulse width is 11ms, vertical axis direction 3 times;

5.3.7.7 Vibration

Sine sweep 5Hz～200Hz, among which 5～5.5Hz is double amplitude 25.4mm, 5.5～200Hz is acceleration 15m/s², test duration 60min, scan time 12min, vibration axis direction: vertical axis direction;

5.3.7.8 Rain

(1) In the deployed state, under the following conditions, there should be no water seepage or leakage:

(2) Rain intensity: 5mm/min~7 mm/min;

(3) Rain angle: top 45°～90°, side top 45°;

(4) Rain duration: 60min;

5.3.7.9 Vehicle Test

(1) Total mileage for road test: 500km;

(2) Dirt and gravel roads, speed 20km/h～30km/h, 200km;

(3) Asphalt and concrete roads, speed 30km/h～40km/h, 100km;

(4) Power off, system certification inspection carried out with the whole vehicle.

5.3.8 Electromagnetic Compatibility Requirements

Refer to GJB1389A-2005 for electromagnetic compatibility design, ensuring the system operates without self-interference or mutual interference and works normally.

5.3.9 Autonomous and Controllable Requirements

Strictly implement the relevant regulations of autonomous and controllable. Imported products shall not be selected if domestic products can meet the system requirements. For electronic components, strictly follow the rigid requirement of 100% use of domestic electronic components in equipment development and construction, with exceptions subject to negative list special approval, based on the "Catalogue of Domestic Military Electronic Component Products" for self-examination. For computers, storage devices,

network devices, peripherals, and supporting core chips, as well as key software and hardware products, selection is based on the "Military Key Software and Hardware Autonomous and Controllable List", strictly adhering to the principle of prioritizing the selection of autonomous and controllable products.

6. Electrical Interface Design

The model of the interface connector is J30JM-15ZKP29. The interface definition is shown in Table 1.

Table 1: Electrical Interface Definition

Cable Number	Definition	Remarks
1,2,3,4	DC Power	+28V DC
5,6,7,8	DC Power Ground	+28V Ground
9	Serial Port T+ (Rangefinder Transmit to Platform +)	
10	Serial Port R- (Platform Transmit to Rangefinder -)	RS422
11	Serial Port T- (Rangefinder Transmit to Platform -)	
12	Serial Port R+ (Platform Transmit to Rangefinder +)	
13	RS422 Communication GND (Optional)	
14	SYN+	RS422 Differential External Clock, width > 10μs