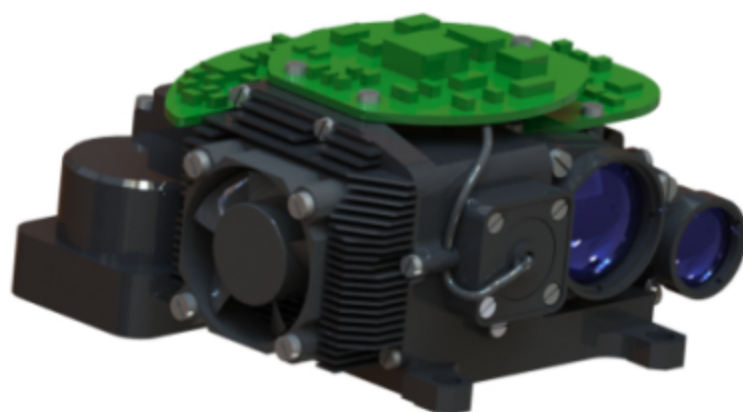


40mJ Laser Target Designator

Product Specification

SUK:LDR1064-40



1. TECHNICAL SPECIFICATIONS

Operating mode	Ranging, Illumination		
Operating wavelength	1.064 μ m		
Pulse energy	≥ 40 mJ		
Pulse energy fluctuation	Within one illumination cycle, the fluctuation of a single pulse energy does not exceed 10% of the average energy (counted after emitting light for 2 seconds)		
Beam divergence angle	≤ 0.5 mrad		
Pulse width	15ns \pm 5ns		
Laser beam axis stability	≤ 0.05 mrad (laser beam stability at room temperature of 25°C \pm 5°C)		
Laser beam axis zero-position drift	≤ 0.15 mrad (laser beam stability at high and low temperatures)		
Alignment error between the optical axis and installation benchmark	Azimuth ≤ 0.5 mrad, Pitch ≤ 0.25 mrad		
Ranging performance	Ranging frequency and maximum continuous measurement time	Ranging frequency	1Hz/5Hz, single shot
		The continuous ranging time of 1Hz is not less than 5 minutes, with 1-minute rest	
		The continuous ranging time of 5Hz is not less than 1 minute, with 1-minute rest	
	Minimum ranging distance	not greater than 300m	
	Maximum ranging distance	not less than 5000m	
	Ranging accuracy	± 2 m	
	Target acquisition rate	not less than 98%	
	Ranging logic	Initial and final target logic, and final target reporting	
Illumination performance	Illumination distance	≥ 3.5 km	

	Illumination frequency	Fundamental frequency 20Hz	
	Coding method	Accurate frequency code	
		supporting user-defined accurate frequency	
	Coding accuracy	±2.5μs	
Irradiation Capability	The duration of each target irradiation is not less than 20 seconds, and the interval between successive irradiations is no more than 30 seconds. The device is capable of continuous irradiation for 10 cycles, and after continuous operation, the interval between successive irradiations must be at least 30 minutes before restarting the continuous irradiation		
	The duration of each target irradiation is not less than 47 seconds, and the interval between successive irradiations is no more than 30 seconds. The device is capable of continuous irradiation for 2 cycles, and after continuous operation, the interval between successive irradiations must be at least 30 minutes before restarting the continuous irradiation		
Service Life	Not less than 1 million times		
Weight	The overall weight of the laser rangefinder/illuminator		≤500g
Power Supply Voltage	Voltage		18V~32V
Power Consumption	Standby power consumption		≤4W
	Average power consumption		≤60W
	Peak power consumption		≤120W
Environmental Adaptability	Operating temperature		-40°C~55°C
	Storage temperature		-55°C~70°C

2.CONTROL FUNCTION

The laser rangefinder/illuminator can achieve the following functions through the serial communication interface:

- 2.1 Respond to laser ranging instructions and can stop ranging at any time according to the stop command;
- 2.2 During ranging, distance data and status information are output once for each pulse;
- 2.3 After starting continuous ranging at 1Hz, if no stop command is received, it will automatically stop after 5 minutes;
- 2.4 After starting continuous ranging at 5Hz, if no stop command is received, it will automatically stop after 1 minute;
- 2.5 It has a single ranging function;
- 2.6 It can set the illumination mode and encoding, and can output the selected settings;
- 2.7 Respond to laser illumination command, illuminate according to the set mode and encoding, and can stop illumination at any time according to the stop command;
- 2.8 If no stop command is received after starting the illumination, it will automatically stop after one illumination cycle;
- 2.9 During laser illumination, distance values and status information are output once for each pulse;
- 2.10 It can report the cumulative number of laser pulses emitted (not lost in case of power failure);
- 2.11 It can report the cumulative number of laser pulses emitted (not lost in case of power failure);
- 2.12 The information reported during ranging and laser illumination work includes pulse counting numbers;
- 2.13 Self-test and output fault codes:
 - 2.13.1 Power-on self-test, including
 - 2.13.1.1 RS422 serial port communication status;
 - 2.13.1.2 High temperature alarm.

2.13.2 Start and cycle self-test, including:

2.13.2.1 RS422 serial port communication status;

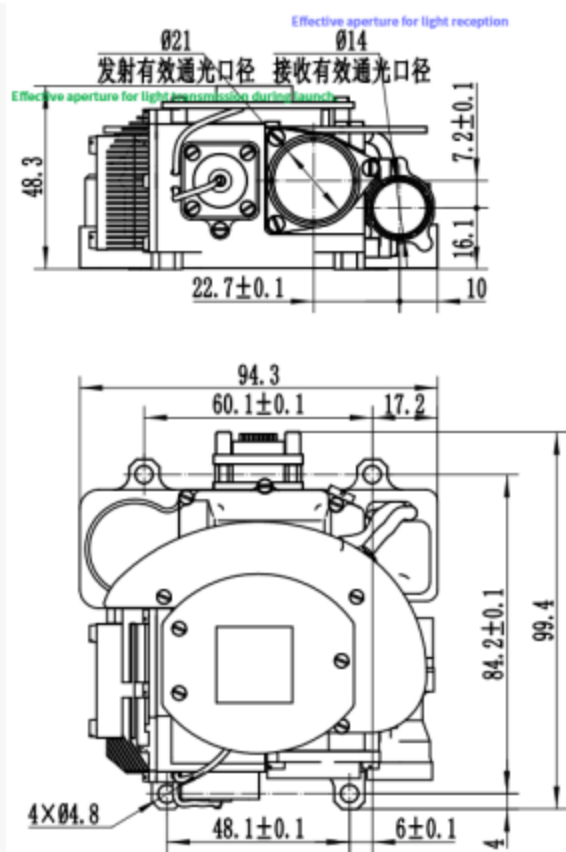
2.13.2.2 High temperature alarm;

2.13.2.3 High temperature alarm.

Note: Laser rangefinders/illuminators can only detect charging/discharging and laser emission/non-emission faults when emitting laser beams. Therefore, the power-on self-test does not require detection of the above two types of faults. During startup self-test and periodic self-test, the laser rangefinder/illuminator reports the detection results from the last illumination or ranging.

2.2 Temperature warning output, expected performance during illumination or ranging.

3. MECHANICAL INTERFACE



Interface schematic diagram

4.COMMUNICATION PROTOCOL

4.1 Serial Port Parameters Asynchronous serial communication standard: RS-422;

Baud rate: 115200bps;

Transmission format: 8 data bits, 1 start bit, 1 stop bit, no parity bit;

For each byte of information, the least significant bit (lsb) is transmitted first. If it is a multi-byte message, the low byte is transmitted first.

4.2 Message Format

The communication message format is as follows:

Header (1 byte)
Subsystem ID number
Message body
Footer (1 byte, i.e., checksum)

The message body in the above table is described in section 2 "Data Protocol". The header, subsystem ID number, and footer are described in tables 1, 2, and 3, respectively.

Table 1 Description of information header

Byte name	Data type	Byte length	Value/range of values	Comments
Message start code	Unsigned bytes	1	0xCC	Constant

Table 2 Description of subsystem ID numbers

Byte names	Data type	Byte length	Value/range of values	comment
Subsystem ID number	Unsigned bytes	1	0x08	Constant

Table 3 Information Tail (checksum) description

Name of each byte	Data type	Byte length	Value/range of values	Comments
Checksum	Unsigned bytes	1	0-255.	The sum of each byte of the message body part modulo 256.

The first byte of the 'header' is 0xCC, which is the synchronization code, indicating the beginning of a frame of information; The subsystem ID number is the identification number assigned by the system to the laser rangefinder/illuminator for the system to identify the monomer. The subsystem ID number is 0x08; The message tail is the checksum, which is modulo 256 after summing all the bytes of the message body.

Data Protocol

4.3 Output Information

Output information refers to the command sent by the system to the laser rangefinder/irradiator. The command information packet is in 6-byte fixed-length format, and the information body is 3-byte. The specific definition is shown in Table 4.

Table 4 Output command information body data format

Command content	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Start self-test	0x01	N/A	N/A	N/A	N/A	N/A
Continuous ranging 5Hz(1min)	0x02	N/A	N/A	N/A	N/A	N/A
Laser irradiation	0x03	Exposure time (27s ~ 60s)	Code 1 to 8	N/A	N/A	N/A

Laser stop	0x05	N/A	N/A	N/A	N/A	N/A
Pulse times reported	0x0A	N/A	N/A	N/A	N/A	N/A
Product identification reporting	0x10	N/A	N/A	N/A	N/A	N/A
Laser-coded parameter storage	0x13	Code 1 to 8	Encoding parameter, UINT32 type, the lowest part is first, 43 to 53ms, resolution 0.01ms			
The laser coding storage parameter is confirmed	0x14	N/A	N/A	N/A	N/A	N/A
Laser coding parameter query	0x15	Code 1 to 8	N/A	N/A	N/A	N/A
Single ranging	0x0B	N/A	N/A	N/A	N/A	N/A
Continuous ranging 1Hz(5min)	0x0C	N/A	N/A	N/A	N/A	N/A
Temperature read	0x06	N/A	N/A	N/A	N/A	N/A

Note 1: Laser ranging/irradiator in ranging state, can respond to the illumination command;

Note 2: Laser ranging/irradiator in irradiation, only respond to laser stop command;

Note 3: N/A The default value is 0x00.

4.3 Entering Information

Input information refers to the status information received by the system from the laser rangefinder/illuminator. The status message packet is in 9-byte fixed-length format, and the message body is 6-byte, as defined in Table 5.

Table 5 Status message body

Status content	Byte 1	Byte 2	Byte 3	Bytes 4 to 5	Pulse count number
Power-on self-test response	0x00	Power-on self-test result: 0x00: Normal 0x01: Fault	When "Power-on self test complete" : Failure code (Note 1)	N/A	N/A
Start the self-test response	0x01	Startup self-test result: 0x00: Normal 0x01: Fault	When "Boot Self-test complete" : Failure code (Note 1)	N/A	N/A
Continuous ranging 5Hz(1min)	0x02	Fault or not: 0x00: Normal 0x01: Fault	Laser or not: Failure code (Note 1)	Laser distance value (Note 2)	0 to 255
Being irradiated	0x03	Fault or not: 0x00: Normal 0x01: Fault	Laser or not: Failure code (Note 1)	Laser distance value (Note 2)	0 to 255
Laser stop	0x05	N/A	N/A	N/A	N/A
Return pulse report	0x0A	N/A	N/A	Laser pulse count (Note 3)	N/A
Product identification reporting	0x10	Identification number 1 (Note 4)	Identification number 2 (Remark 4)	N/A	N/A
Laser-coded parameter storage	0x13	Code 1 to 8	Encoding parameter, UINT32 type, the lowest part is first, 43 to 53ms, resolution is 0.01ms, simultaneous transmission		

The laser encoding storage parameter is confirmed	0x14	N/A	N/A	N/A	N/A
Laser coding parameter query	0x15	Code 1 to 8	Encoding parameter, UINT32 type, the lowest part is first, 43 to 53ms, resolution 0.01ms		
Single ranging	0x0B	Fault or not: 0x00: Normal 0x01: Fault	Laser or not: Failure code (Note 1)	Laser distance value (Note 3)	N/A
Continuous ranging 1Hz(5min)	0x0C	Fault or not: 0x00: Normal 0x01: Fault	Laser or not: Failure code (Note 1)	Laser distance value (Note 2)	0 to 255
Temperature report	0x06	N/A	Temperature value (Note 5)	N/A	N/A

Note 1: Fault codes are judged by bits. 0: Pass 1:fail Bit0 to bit7 represent each SRUs. For details, see Table 6.

Note 2: bit4 and bit5 respectively represent the low and high distance values (distance range: 0 ~ 65535, if the ranging is invalid, set the value to 0);

Note 3: Actual laser pulse number = laser pulse count × 100 (Scale=100). (65535*100=6553500 times);

Note 4: The product identification code consists of 2 bytes, byte 2 represents the product ID number of the laser ranging/irradiator (constant 0x05), byte 3 represents the software version number of the laser ranging/irradiator, in which the high four digits represent one digit and the low four digits represent one decimal;

Note 5: Byte 3 is the temperature value, representing the ambient temperature (temperature range -55°C ~ +125°C);

Note 6: The default value of N/A is 0x00.

Table 6 List of SRU fault codes

Fault bits (Bits)	SRU name
0	Spare
1	Spare
2	Spare
3	Spare
4	Laser not out
5	Temperature sensor overtemperature
6	Spare
7	Spare

5.CONTROL THE FLOW

5.1 Message Response

The laser range finder/irradiator is powered on and self-checked. After the completion of the self-test, report the self-test result of power-on and enter the standby state.

After working normally, the system sends a control command to the laser rangefinder/irradiator. After receiving the command, the laser rangefinder/irradiator starts to execute the command and report the status information to the system. The main control process is as follows:

When the system sends the "start self-test" command to the laser rangefinder/illuminator, the laser rangefinder/illuminator actively reports the detailed start self-test result information to the system after the start self-test is completed.

When the system sends the "ranging" command to the laser rangefinder/illuminator, the laser rangefinder/illuminator starts

ranging and reports the ranging status and distance value.

When the system sends the "Shine" command to the laser rangefinder/illuminator, the laser rangefinder/illuminator starts to shine and reports the shine status and range value.

When the system sends the "laser stop" command to the laser rangefinder/illuminator, the laser rangefinder/Illuminator stops the laser emission in progress.

When the system sends the "Read Product ID" command to the laser rangefinder/Illuminator, the laser rangefinder/Illuminator replies "Product ID" within the reply timeout.

- Passive response timeout: 600ms.
- Active reply timeout (only when answering "start self check complete") : 1000ms.

The laser irradiation command has the highest priority, and the laser rangefinder/illuminator should be able to respond to the irradiation command during the ranging process. The laser irradiation process only responds to the stop command, or automatically stops in accordance with the firing time.

5.2 Appendix III Electrical Interface

Electrical connector model: J30J pin 15 core (socket: J30JZLN15ZKWA000, plug: J30JZ/XN15TJCAL01); The corresponding plugs and cables shall be provided by Party B. The interface definition is shown in Table 7:

Table 7 Interface definitions

Pin number	Label number	Remarks
P-1	VIN+	
P-2	VIN+	
P-3	NC	
P-4	VDD	Burn writing
P-5	GND	Burn writing
P-6	ARM_SWCLK	Burn for writing
P-7	ARM_SWDAT	Burn writing
P-8	NC	
P-9	GND	
P-10	GND	
P-11	RS422_TX+	
P-12	RS422_TX-	
P-13	RS422_RX-	
P-14	RS422_RX+	
P-15	GND	

Note: Laser ranging/irradiation appliances have power backconnect protection.