

LRF1200A1

SOURCE-PRESERVING ENGINEERING REFERENCE



LRF1200A1 / SOURCE-PRESERVING USER MANUAL

SECTION 01

Document Control and Source Boundary

Model LRF1200A1. This customer-facing transcription is bound to the supplied model-specific DOCX and its six source tables and seven embedded media files.

Technical values, source conflicts, protocol rows, and source images remain source-stated. Listed standards and certifications are not independently verified by this document.



Brand wordmark embedded in the supplied source document.

SECTION 02

Product Overview

The LRF1200A1 is a 905nm Class 1 eye-safe laser rangefinder module that measures 5–1200 m on building targets with $\pm 1 \text{ m} / \pm(1+L \times 0.4\%) \text{ m}$ accuracy, 0.1 m resolution and 1–3 Hz operation. Powered from 3.3 V with $\leq 400 \text{ mW}$ standby and $\leq 1.5 \text{ W}$ operating power in a $\Phi 23 \times 40 \text{ mm}$, 18 g cylindrical housing and using a UART-TTL interface with low-power enable control, it is ideal for handheld rangefinders, sport optics, mobile devices and compact industrial instruments.

SOURCE BOUNDARY — The overview is source-stated. The Technical Specifications table and Source Discrepancy section control where source values conflict.

SECTION 03

Technical Specifications

All rows below are transcribed from the supplied technical table. CE/FCC, RoHS, IP, ESD, and Class entries are source-stated references, not independent certification claims.

SOURCE PARAMETER	SOURCE-STATED VALUE
Laser Wavelength	905nm
Eye Safety	Class 1
Launch Lens Diameter	$\Phi 6.6\text{mm}$
Receiver Lens Diameter	$\Phi 18\text{mm}$
Measuring Range building)	$\geq 5\text{--}1200\text{m}$
Ranging Accuracy	$5 \leq L \leq 100\text{m}: \pm 1\text{m}$ $L > 100\text{m}: \pm(1+L \times 0.4\%)\text{m}$

SOURCE PARAMETER	SOURCE-STATED VALUE
Display Accuracy	0.1m
Ranging Frequency	1~3Hz
Precision Rate	≥98%
False Alarm Rate	≤1%
Data Interface	UART TTL_3.3V
Supply Voltage	DC3.3+/-0.1V
Standby Power Consumption	≤400mW
Operating Power Consumption	≤1.5W
Weight	18g
Dimension (L×W×H)	Φ23mm40mm
Operation Temperature	-20~ 60℃
Storage Temperature	-55~ 65℃
Impact Resistance	1200 g 1 ms
Anti-vibration	5 50 5 Hz 1 Octave range /min 2.5 g
Dependability	MTBF≥1500 h
Activation Time	≤500ms
Waterproof rating	Lens IP67
ESD Class	(Lens position) Contact discharge 6kV Air discharge 8kV
Electromagnetic Compatibility (EMC)	CE/FCC Certification
Eco-friendly	RoHS2.0

SOURCE LOW-POWER NOTE — In this mode, the device consumes minimal power. The MCU is in an off state and does not respond to any commands.

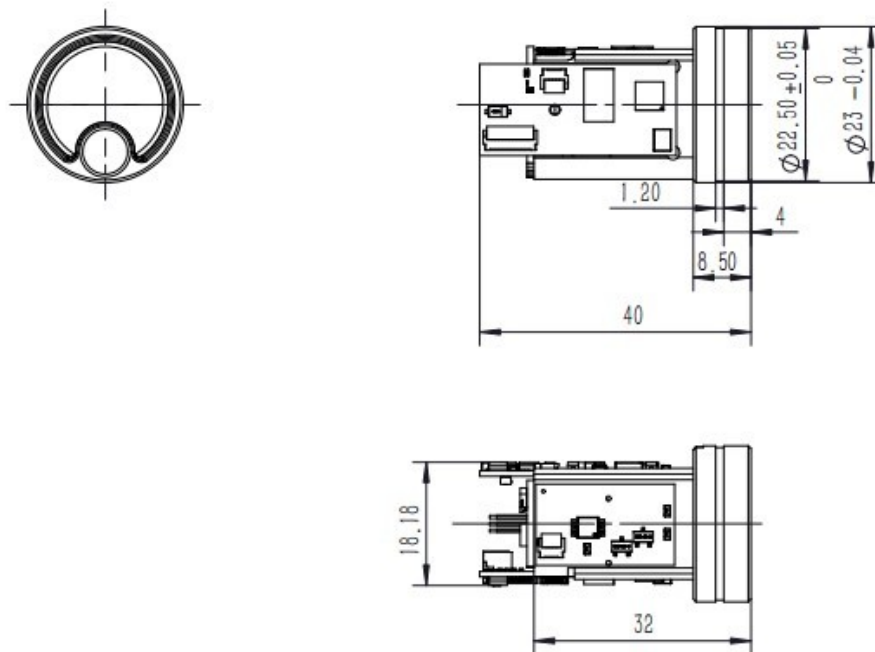
When a measurement is needed, pull the enable pin low to switch the device into normal working mode and automatically perform one measurement.

After the measurement is complete, pull the enable pin high to return the device to low-power mode, with power consumption below 3mW.

SECTION 04

Mechanical Dimensions

The supplied source drawing is retained as a customer reference. Dimensions and tolerances must not be inferred beyond the visible source callouts; the drawing is not a manufacturing release.



Supplied LRF1200A1 mechanical source drawing — customer reference only; not for manufacturing.

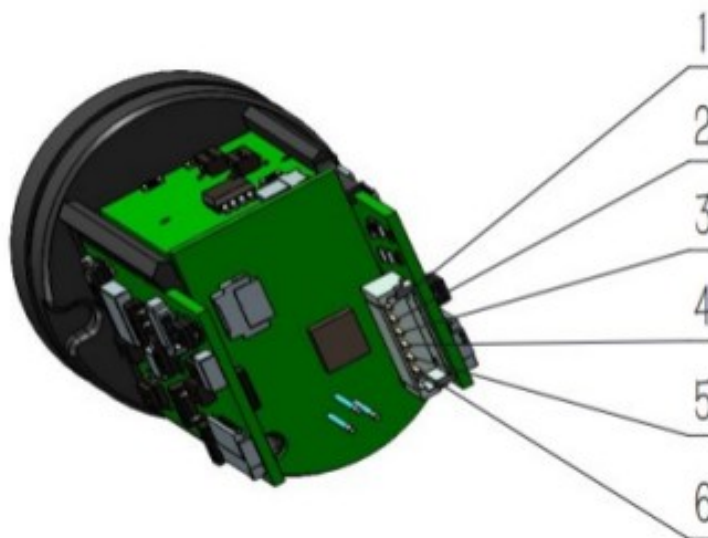
SECTION 05

Electrical Interface and Pin Definition

Source interface: UART (TTL_3.3V). Source connector reference: FWF08002-S06B13W5M. The image shows source pin callouts 1 through 6; it does not establish a production-harness mating orientation beyond the supplied figure.

PIN	SOURCE DEFINITION	SOURCE DESCRIPTION
1	GND	Earth (wire)
2	Power supply	3.3V DC power supply

PIN	SOURCE DEFINITION	SOURCE DESCRIPTION
3	NC	Empty pin
4	TTL_TXD	Serial transmitter, TTL level 3.3V
5	TTL_RXD	Serial Receiver, TTL Level 3.3V
6	Enable Pin	low level power on



Supplied connector and pin-callout source figure — callouts 1 through 6 retained.

SECTION 06

Source Communication Protocol Transcription

Communication mode: using serial communication mode

Baud rate: 115200 (default)

Data Bits: 8 Bits

Length of a frame: 8 bytes

Secondary low- power mode

In this mode, the device's power consumption is reduced, and the MCU is in standby mode, capable of responding to other commands.

Send the "External Circuit Disabled" command to switch the device into secondary low-power mode.

When a measurement is needed, simply send a "Measurement" related command to automatically switch the device into normal working mode for measurement.

Alternatively, send the "External Circuit Enabled" command to switch the device into normal working mode independently.

The verification content for sending and receiving may differ, so please pay attention to discrimination.

The checksum is the lower eight bits of the sum of the bytes requiring verification.

All data is transmitted and received in hexadecimal.

The source-stated continuous-ranging request uses function 0x89 while its recorded reply uses 0x88. This document preserves both and does not authorize continuous operation or a response parser.

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T2/R0	Data protocol
T2/R1	Frame header H Frame header L Function word D1 D2 D3 D4 Calibration
T2/R2	Send 55 AA SUM(function word +DATA1+...+DATA4)
T2/R3	Reply 55 AA SUM(frame header H + frame header L + ...+DATA4)
T3/R0	Measurement instruction
T3/R1	Single ranging Send 55 AA 88 FF SUM[3 7]
T3/R2	Single ranging Send 55 AA 88 FF FF FF FF 84
T3/R3	Single ranging Reply 55 AA 88 STA FF DIS_H DIS_L SUM[1 7]
T3/R4	Single ranging Reply STA = 0 measurement failure; STA = 1: The measurement was successful DIS_H: high bytes of the measured result; DIS_L: The lower bytes of the measurement result Data returns are returned in hexadecimal, and all data results are output by multiplying the real data by 10
T3/R5	Continuous ranging send 55 AA 89 FF SUM[3 7]

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T3/R6	Continuous ranging send 55 AA 89 FF FF FF FF 85
T3/R7	Continuous ranging Reply 55 AA 88 STA FF DIS_H DIS_L SUM[1 7]
T3/R8	Continuous ranging Reply STA = 0 measurement failure; STA = 1: The measurement was successful DIS_H: high bytes of the measured result; DIS_L: The lower bytes of the measurement result Data returns are returned in hexadecimal, and all data results are output by multiplying the real data by 10
T3/R9	Stop ranging send 55 AA 8E FF SUM[3 7]
T3/R10	Stop ranging send 55 AA 8E FF FF FF FF 8A
T3/R11	Stop ranging Reply 55 AA 8E STA FF SUM[1 7]
T3/R12	Stop ranging Reply STA= 0 closes multiple measurement failures; STA = 1 closes multiple measurements successfully
T3/R13	Angular measurement send 55 AA 8A FF SUM[3 7]
T3/R14	Angular measurement send 55 AA 8A FF FF FF FF 86

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T3/R15	Angular measurement Reply 55 AA 8A STA FF ANG_H ANG_L SUM[1 7]

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T3/R16	Angular measurement Reply STA= 0 Measurement failure; STA= 1: Measurement success ANG_H: Measurement result high byte; ANG_L: Measurement result low byte, data return to hexadecimal return, all data results will be the real data multiplied by 10 output, only in the movement with an angle sensor effective
T4/R0	Power-on self-test
T4/R1	Self-test information Reply 55 AA 80 STA 00 ErrCode SUM[1 7]
T4/R2	Self-test information Reply STA= 0 Boot initialization failed, ErrCode is the error code; STA= 1 Boot initialization success. By default, initialization success does not reply to such messages.
T5/R0	Setting up the system
T5/R1	Baud rate Send 55 AA TYPE FF SUM[3 7]
T5/R2	Baud rate Send TYPE = 01 sets the baud rate to 9600 bps TYPE = 02 Set the baud rate to 14400 bps TYPE = 03 Set the baud rate to 19200 bps TYPE = 04 Set the baud rate to 38400bps TYPE = 05 Set the baud rate to 56000 BPS TYPE = 06 Set the baud rate to 57600bps TYPE = 07 Set the baud rate to 115200bps TYPE = 08 Set the baud rate to 128000bps TYPE = 09 Set the baud rate to 230400bps The baud rate does not change immediately after it is set and only takes effect after a restart
T5/R3	Baud rate Reply 55 AA TYPE STA FF SUM[1 7]
T5/R4	Baud rate Reply STA = 0 setting failure; STA = 1 is set successfully
T5/R5	External circuit enable Send 55 AA 70 AB CD 00 SUM[3 7]

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T5/R6	External circuit enable Send 55 AA 70 AB CD 00 00 E8
T5/R7	External circuit enable Reply 55 AA 70 STA 00 SUM[1 7]
T5/R8	External circuit enable Reply STA = 0, enable failure; STA = 1, enabling success
T5/R9	55 AA 71 AB CD 00 SUM[3 7]
T5/R10	55 AA 71 AB CD 00 00 E9

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T5/R11	55 AA 71 STA 00 SUM[1 7]
T5/R12	STA = 0, disable failure; If STA = 1, it is disabled successfully
T5/R13	ErrCode
T5/R14	Error code Description Remarks
T5/R15	0x00 No echo signal was received

SOURCE LOCATION	VISIBLE SOURCE TRANSCRIPTION
T5/R16	0x16 Out of range: below the minimum range
T5/R17	0x18 No echo signal was received
T5/R18	0x00~0x07 Hardware error

PROTOCOL HOLD Continuous ranging remains an engineering-confirmation item because the source request and reply function bytes differ.

SECTION 07

Legacy Source Software Reference

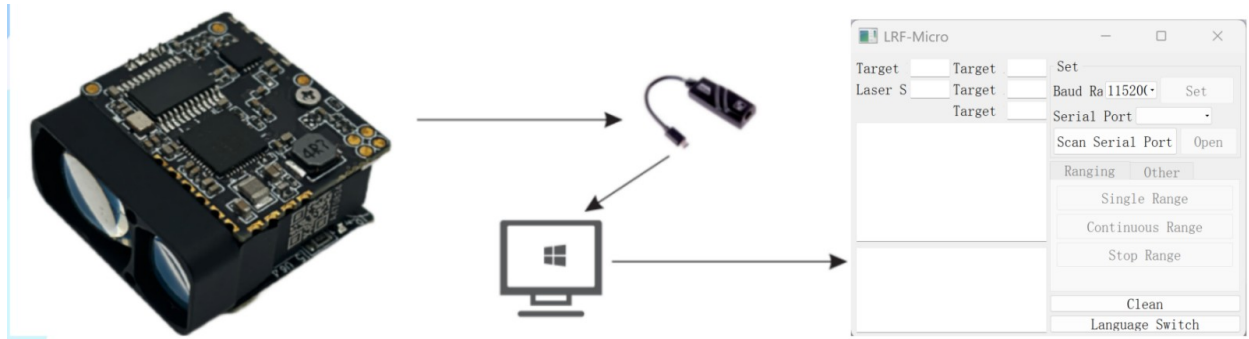
Step 1: Insert the data cable into the ranging module, which can supply power to the module and output the measurement data at the same time. (Note: Do not insert the plug in the wrong direction, and strictly control the power supply voltage range between 3.3V and 5V.)

Step 2: Install the Serial Port Genius software and connect to a computer or other control devices through an adapter interface.

Step 3: After the software is installed, open the display interface.

The adjacent source package contains an unverified source executable. The retained screenshot and procedure do not establish compatibility testing, firmware support, or a validated live connection.

The source screenshot also contains a device illustration that is not used as model-specific product evidence.



Supplied legacy source software and connection reference — procedure reference only; compatibility unverified.

SECTION 08

Source Operating Notes and Safety Precautions

The following operating, environment, target, warranty, and troubleshooting statements are retained from the supplied source and are not independent certification or performance guarantees.

When using this module, do not look directly into the laser beam.

Do not use a lens barrel or other additional optical devices to operate this module to avoid increasing the risk of eye damage.

Do not disassemble the module. Disassembling the product will result in the loss of the right to repair.

When transporting, please add sufficient cushioning materials to the packaging box to avoid damage to the module.

Do not place the module on an unstable high place to prevent it from falling and being damaged.

Do not place the module in a harsh environment or near a heat source to prevent uncontrollable impacts on the module.

When there is a sharp change in temperature, there will be condensation fog on the surface of the main lens of the module. Do not use the module at this time.

If the exposed lens is dirty, gently wipe it clean with a lens cleaning cloth. Do not use other items to wipe it to avoid damaging the coating layer on the surface of the lens.

This module comes with a one-year quality guarantee and lifetime maintenance. In case of quality problems of its own, it can be replaced free of charge. For problems caused by human factors, repair and replacement of parts will be charged according to the actual situation of the product.

The factors that affect the ranging ability, ranging response speed, and speed measurement accuracy include:

Target reflectivity: Generally, the higher the target reflectivity, the better the ranging ability and the faster the ranging response speed. For example, for a target with medium reflectivity, a distance of 1500 meters can be measured, for a target with high reflectivity, a distance of not less than 1800 meters can be measured, and for a target with low reflectivity, it may only be possible to measure a distance of 600 meters. (Targets that are difficult to form diffuse reflection, such as the water surface, may not be measurable.)

Target shape: When the area of the reflective surface of the measured target is too small or uneven, the ranging ability and ranging response speed will be correspondingly reduced.

- **Measurement angle:** When the laser angle is vertically incident on the reflective surface of the measured target, the ranging ability is better and the ranging response speed is faster. Conversely, the ranging ability and ranging response speed will decrease. Using it at extreme measurement angles cannot ensure that the ranging ability and ranging response speed specified in this manual can be achieved.

Measurement environment: The factors affecting the ranging ability and ranging response speed also include the intensity of sunlight, the concentration of water vapor and suspended particulate matter in the air, the angle of deviation from the sunlight irradiation, etc. (For example, in rainy, foggy, snowy, or hazy weather conditions, the measuring range will be reduced.)

The measuring range of this series of ranging telescopes is defined under the following conditions:

- 1) The measured target has a medium reflectivity, such as the wall surface of a building.
- 2) The reflective surface of the measured target is perpendicular to the direction of laser emission.
- 3) The measuring weather is sunny but not under direct sunlight.

Suggestion: When measuring distant targets, please fix this module with a tripod to reduce the shaking of the module during the measurement process, so as to obtain better measurement results.

I. The factors that affect the ranging ability and ranging response speed include:

Target reflectivity: Generally, the higher the target reflectivity, the better the ranging ability and the faster the ranging response speed. For example, for a target with medium reflectivity, a distance of 600 meters can be measured; for a target with high reflectivity, a distance of not less than 800 meters can be measured; and for a target with low reflectivity, it may only be possible to measure a distance of 300 meters. (For targets that are difficult to form diffuse reflection, such as the water surface, it may not be possible to measure the distance.)

Target shape: When the reflective surface of the measured target is too small or uneven, the ranging ability and ranging response speed will be correspondingly reduced.

Measurement angle: When the laser angle is vertically incident on the reflective surface of the measured target, the ranging ability is better and the ranging response speed is faster. Conversely, the ranging ability and ranging response speed will decrease. Using it at extreme measurement angles cannot ensure that the ranging ability and ranging response speed specified in this manual can be achieved.

Measurement environment: The factors affecting the ranging ability and ranging response speed also include the intensity of sunlight, the concentration of water vapor and suspended particulate matter in the air, the angle of deviation from the sunlight irradiation, etc. (For example, in rainy, foggy, snowy, or hazy weather conditions, the measuring range will be reduced.)

II. Suitable Targets for Measurement This product can measure targets with high reflectivity (such as highway road signs), targets with medium reflectivity (such as the walls of buildings), and targets with low reflectivity (such as trees, golf flagsticks, animals, etc.). When the reflectivity drops to a certain level, the measuring range will be correspondingly reduced.

Highway road sign	The wall surface of a building	Trees	Animal
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The measuring range of this module is defined under the following conditions:

- 1) The measured target has a medium reflectivity, such as the wall surface of a building.
- 2) The reflective surface of the measured target is perpendicular to the direction of laser emission.
- 3) The measuring weather is sunny but not under direct sunlight.

Remarks:

It is recommended that when you measure distant targets, you fix this module with a tripod to reduce the shaking of the module during the measurement process, so as to obtain better measurement results.

Safety Precautions

8.1 Measured distance result does not match the actual distance

If tests are carried out in conditions such as heavy smog or water-mist weather with high humidity, it is easy to measure back water droplets or particles in the air. It is recommended to choose a good test environment.

Under extreme low-temperature conditions, within 20 m there is a risk that the ranging accuracy exceeds the tolerance.

8.2 Ranging performance is reduced, target at theoretical range cannot be measured

Very low target reflectivity will affect the returned laser energy and thus affect the ranging performance. When the ranging target is a low-reflectivity object such as a lake surface, wet road surface in rainy weather, or glass, the actual performance of the product cannot reach the theoretical range.

The ranging module does not irradiate the target point vertically but forms a certain angle. In an oblique-measurement state, the returned laser energy will attenuate, resulting in reduced ranging performance.

Under extreme low-temperature conditions, the ranging performance may decrease slightly.

8.3 Using our complete communication cable to communicate with the PC, no command response

Check whether the communication cable is broken (the 6-pin communication cable is thin and easy to break).

8.4 Using self-prepared cable for communication, no command response

Check whether the external wiring sequence of the module is correct, whether the communication cable is short-circuited, open-circuited or has poor contact, and check whether the serial-port TX and RX wire order is reversed.

SECTION 09

Source Application Reference

The supplied application silhouette is retained with English-only label overlays. The overlay changes labels only and does not infer performance for any depicted target.



Highway Traffic Sign



Building Wall



Trees



Animal

Supplied application silhouette — English terminology overlay only.

SECTION 10

Source Warning Graphic Boundary

The supplied warning graphic visibly contains both Class 1 and Class 3R panels. It is retained as source media only and must not be used to select or claim the delivered product classification. Confirm the production label and applicable classification before release.



Supplied warning graphic — conflicting Class 1 and Class 3R panels retained for engineering confirmation.

SECTION 11

Source Discrepancy — Engineering Confirmation Required

The following source discrepancies are retained neutrally and are not resolved or overwritten in this transcription.

1. Keep the formal 5–1200 m table value separate from source narrative examples of 1500/1800 m and 600/800/300 m.
2. Keep the 3.3 V $\pm$ 0.1 V table entry separate from the source operating-step 3.3–5 V statement.
3. Show the source-stated 0x89 continuous request and 0x88 reply without authorizing continuous operation or a reply parser.