100m Indoor-Outdoor
Laser Range Finder Module

Key Properties

- Measurement Range: 0.03~100m @ Indoor
  0.03~50m @ Outdoor
- Measurement Frequency: 1~3 Hz
- Measurement Accuracy: ±3mm @ 25˚C
- Wavelength: 650 nm
- Laser Safety: Class 2
- Communication Interface: TTL (UART)

Application

Industrial Manufacturing / Automation Equipment / Automatic Classification
Rangefinder / Service Robot Positioning / Industrial & Livestock Stock Inspection
Container capacity detection / Security camera triggering / Parking space detection

Product Code

Product	Measure Range	Frequency	Type	Communication Interface
LRF: Laser Range Finder	100M: 100 meter	3: 3Hz	PS: Phase-shift Method Standard	Default: TTL (UART) Option: USB (converter)
Example: LRF100M3PS				

Introduction

LRF100M3PS is a phase shift based laser rangefinder module with better accuracy than the pulse method. LRF100M3PS uses standard TTL serial communication to make it easy for users to develop their own measurement applications, we also provide USB cable for evaluation.

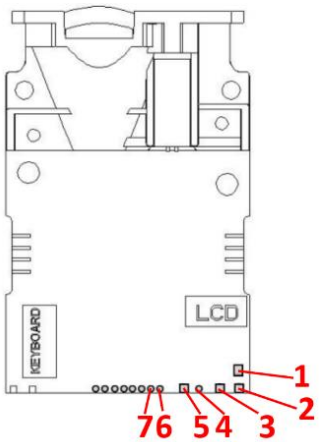
LRF100M3PS is an ideal laser rangefinder module for measuring distance applications. The compact, eye safe and highly integrated laser rangefinder module is utilized in various applications from versatile systems to handheld devices. The module is delivered without enclosure enabling OEM-users to embed the module into their own system or device.

1. Specifications

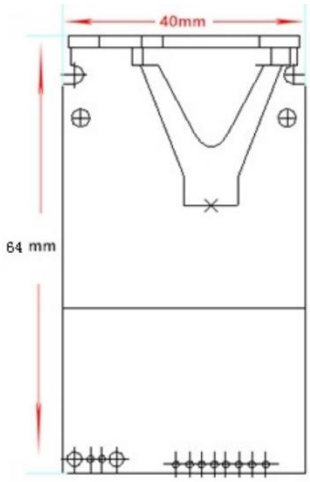
Technical specifications	
Model Name	LRF100M3PS
Measurement Range	0.03~100m @ Indoor 0.03~50m @ Outdoor
Measurement Frequency	1~3Hz
Measurement Accuracy	±2mm
Wavelength	650nm
Laser Safety	Class 2 (<1mW)
Measurement Method	Phase-shift
Electrical	
Input Voltage	3.3V DC
Operating Current	90mA
Communication	
Communication Interface	3.3V TTL (UART)
Data Resolution	1mm
Baud Rate	19200 bps
Mechanical	
Dimensions	64 x 40 x 18mm
Weight	13g
Environmental	
Storage Temperature	0°C~40°C

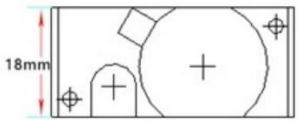
2. Pin Assignment

1	GND	Ground
2	GND	(Conduction with Pin 1)
3	PWREN	High for enable
4	VCC	DC 2.5~3.3V, 90mA
5	VCC	(Conduction with Pin 4)
6	RXD	UART Receive RX
7	TXD	UART Transmitter TX



3. Dimensions





4. Communication

4.1 Communication frame format:

Head (1 byte)	Address (2 byte)	Command (2 byte)	Data Length (2 byte)	Data (N byte)	Checksum (1 byte)
0xAA					

*Head: Fixed as 0xAA.

* Address: Address only use bit0~6 and range is 0x00 to 0x7F.
The bit7 means R/W, 0 is write and 1 is read.
0x00 is default address, 0x7F is broadcast reservation address.

*Command: Function identification, please refer to Chapter 5.1 Command List.

*Data Length: Command identification characters, please refer to Chapter 5.1 Command List.

*Data: Data content, number of byte varies by command.

*Checksum: Address + Command + Data Length + Data (Ignore byte overflow).

4.2 UART configuration parameters:

8N1 with default 19200 baud rate, byte data are expressed in ASCII.

Data bits: 8

Parity bits: None

Stop bits: 1

5. Command

5.1 Command List

Command code	Description
0x0000	Read Device Status
0x0006	Read Device Voltage
0x000A	Read Device HW Version
0x000C	Read Device SW Version
0x000E	Read Device Serial Number
0x0010	Setting Device Address
0x0012	Set Measurement Offset
0x0020	Measurement start
0x0022	Read Measurement Results
0x01BE	Laser ON/OFF

5.2 Command Detail

5.2.1 Read Device Status

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x00	0x80

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x80	0x00	0x00	0x00	0x01	*DATA	*DATA	*SUM
* DATA: The status code of device, please refer to chapter 5.5 status code list.								

5.2.2 Read Device Voltage

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x06	0x86

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x80	0x00	0x06	0x00	0x01	*DATA	*DATA	*SUM
* Assume the DATA is 0x32 0x19, it means the voltage is 3219mV.								

5.2.3 Read Device HW Version

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x0A	0x8A

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x80	0x00	0x0A	0x00	0x01	*DATA	*DATA	*SUM
* Assume the DATA is 0xA1 0x23, it means the HW version is A123.								

5.2.4 Read Device SW Version

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x0C	0x8C

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x80	0x00	0x0C	0x00	0x01	*DATA	*DATA	*SUM
* Assume the DATA is 0xA1 0x23, it means the SW version is A123.								

5.2.5 Read Device Serial Number

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x0E	0x8E

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x80	0x00	0x0E	0x00	0x01	*DATA	*DATA	*SUM
* Assume the DATA is 0xA1 0x23, it means the serial number is A123.								

5.2.6 Setting Device Address

Master Sends

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x00	0x10	0x00	0x01	0x00	*DATA	*SUM
* Assume the DATA is 0x13, it means set device address to 0x13. Note: Address only use bit0~6 and range is 0x00 to 0x7F. 0x00 is default address, 0x7F is broadcast reservation address.								

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x00	0x10	0x00	0x01	0x00	*DATA	*SUM
* The address will not be lost after the module is powered off.								

5.2.7 Set Measurement Offset

Master Sends

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x00	0x12	0x00	0x01	*DATA	*DATA	*SUM

* Assume the DATA is 0x00 0x7B, it means set offset +123, the measurement results will add 123.

* Assume the DATA is 0xFF 0x85, it means set offset -123, the measurement results will minus 123.

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x00	0x12	0x00	0x01	*DATA	*DATA	*SUM

5.2.8 Measurement Start

Master Sends

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x00	0x20	0x00	0x01	0x00	*DATA	*SUM

* DATA for sets the measurement mode:

  0x00 as single auto measurement

  0x01 as single slow measurement

  0x02 as single fast measurement

  0x04 as continuous auto measurement

  0x05 as continuous slow measurement

  0x06 as continuous fast measurement

* Example:

  single auto measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x00, 0x21

  single slow measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x01, 0x22

  single fast measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x02, 0x23

  continuous auto measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x04, 0x25

  continuous slow measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x05, 0x26

  continuous fast measurement 0xAA, 0x00, 0x00, 0x20, 0x00, 0x01, 0x00, 0x06, 0x27

* Please refer to chapter 5.2.10 for stop continuous measurement command.

* Please refer to chapter 5.4 for the description of the measurement mode.

Slave Responses

Head	Address	Command		Data Length		Data	Checksum
0xAA	0x00	0x00	0x22	0x00	0x03	*DATA x6	*SUM

* Data have 6 bytes, byte0~3 for distance, byte4~5 for measuring quality.

* Assume the DATA is 0x00 0x01 0x23 0x45 0x01 0x23, it means measure distance is 74565mm, and measuring quality is 291. (The lower value means the better quality of measurement.)

5.2.9 Read Measurement Results

Master Sends

Head	Address	Command		Checksum
0xAA	0x80	0x00	0x22	0xA2

Slave Responses

* Please refer to chapter 5.2.8 for slave responses.

5.2.10 Stop Continuous Measurement

Transmission of one byte 0x58(uppercase character ' X ') to stops continuous measurement.

5.2.11 Slave Responses Error

If an error occurs during the measurement phase, the device will respond with the following information:

Head	Address	Command		Data Length		Data		Checksum
0xEE	0x00	0x00	0x00	0x00	0x01	0x00	0x0F	0x10
*Head is 0xEE in case of error response. * Please refer to chapter 5.5 status code list for 0x0F.								

5.2.12 Laser ON/OFF

Master Sends

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x01	0xBE	0x00	0x01	0x00	*DATA	*SUM
* Assume the DATA is 0x01 means laser ON. * Assume the DATA is 0x00 means laser OFF.								

Slave Responses

Head	Address	Command		Data Length		Data		Checksum
0xAA	0x00	0x01	0xBE	0x00	0x01	0x00	*DATA	*SUM

5.4 Measure Mode

1. There are two measurement methods, single measurement and continuous measurement.
2. Single measurement gives only one measurement result for each command.
3. Continuous measurement up to 255 consecutive cycles, if sending byte 0x58 can interrupt the continuous measurement.
4. Each measurement method has three modes, automatic, slow and fast
   4.1 Automatic: The device returns the measurement result and the quality of the measurement, the smaller the quality value means the more reliable the measurement result, this mode adjusts the reading speed according to the laser reflection.
   4.2 Slow: High precision, long measuring distance.
   4.3 Fast: Low precision, short measurement distance.

Mode\Method	Auto	Slow	Fast
Single	Single Auto	Single Slow	Single Fast
Continuous	Continuous Auto	Continuous Slow	Continuous Fast
Speed	Auto	Slow	Fast
Accuracy	Auto	High	Low

5.5 Status code list

Status code	Description
0x0000	No error
0x0001	Input power is too low, power voltage should be >= 2.2V
0x0002	Internal error, can be ignored
0x0003	Module temperature too low
0x0004	Module temperature too high
0x0005	Target out of range
0x0006	Invalid measurement results
0x0007	Background light is too strong
0x0008	Laser signal is too weak
0x0009	Laser signal is too strong
0x000A	Hardware failure 1
0x000B	Hardware failure 2
0x000C	Hardware failure 3
0x000D	Hardware failure 4
0x000E	Hardware failure 5
0x000F	Unstable laser signal
0x0010	Hardware failure 6
0x0011	Hardware failure 7
0x0081	Invalid