

## LDK Model 2 series

### Introduction

The newest generation of Laser distance measurement modules offers measuring ranges from 30 up to 100 meters. The LDK Model 2 series are compact units with small dimensions: only 37.5 x 45.3 x 19.2 mm. They are designed for users to easily connect the Laser measurement unit to a PC or an MCU through RS232 communication (UART TTL). A Bluetooth option is also available, please refer to the Egismos Laser Distance measuring BT-series. The unit has a 1mm resolution and an accuracy of  $\pm 3.0\text{mm}$  along with a high sampling rate (up to 10 samples / second)

The typical UART output uses a serial RS232 with standard communication transmission protocol, which is the most common configuration for PC serial communications today. The common line speed has a Baud Rate of 9600.

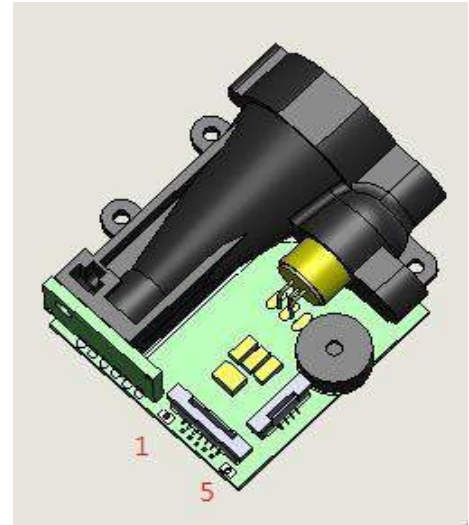


Fig. 1

### Features

- \* Distance measuring capacity.
- \* RS-232 serial port connectivity.
- \* Compact dimensions: 37.5 x 45.3 x 19.2 mm.
- \* option Bluetooth module for wireless applications

### Product Code of Product

Product	Model Number	Distance Measuring Range	Communication mode
LDK : Laser Distance Measuring Kit	1M : Model 1	30 : 30 meters	RS: RS-232
LDM : Laser Distance Measuring Module	2M : Model 2	60 : 60 meters 100: 100 meters	BT: Bluetooth
<b>Example: LDK-2M-60-RS</b>			

## Specifications [T=25°C]

Model Name	LDK-2M-30-RS	LDK-2M-60-RS	LDK-2M-100-RS
Measuring Range	0.06 ~ 30 meters	0.06 ~ 60 meters	0.06 ~ 100 meters
Measure Accuracy	± 3.0 mm @ 25°C		
Measure Rate	1 ~ 10 Hz		
Mechanical Dimension	37.5 x 45.3 x 19.2 mm		
Distance Resolution	1 mm		
Starting Current	Min. 300mA, Typ. 500mA		
Operating Current	<200 mA		
Operating Voltage(DC)	2.5 ~ 3.0 V		
Transmission Mode	RS-232 TTL (UART)		
Transmission Interfaces	Female USB "B" connector		
Baud Rate	9600		
Operating Temperature	0 ~ 50 °C		
Storage Temperature	-20 ~ 70 °C		
Buzzer Sound	70 ± 10 dB		
Laser Beam Size	2.5 x 5 mm @ 3 meter (FWHM)		
Laser Wavelength	635 ± 5nm		
Laser Safety	<1 mW (Class 2)		
Pin Assignment	<ol style="list-style-type: none"> <li>1. Vin : Vcc</li> <li>2. Vur : UART Rx, TTL level</li> <li>3. Vut : UART Tx, TTL level</li> <li>4. Vpe : Power Enable, used for system ON (High) and OFF(Low) or can be used as Reset pin</li> <li>5. GND : Ground</li> </ol>		

※See notice for details.

Electrical Characteristics

Value	Symbol	Min	Typical	Max	Unit
Voltage Input	Vin	2.5	3.0	3.1	V
Current Input	Iin	300	500	-	mA
UART Rx Logic 1	Vuth	3.0	3.3	3.4	V
UART Rx Logic 0	Vutl	-0.3	0	0.8	V
UART Tx Logic 1	Vurh	3.0	3.3	3.4	V
UART Tx Logic 0	Vurl	-0.3	0	0.3	V
Power Enable Logic 1	Vpeh	3.0	3.3	Vin+0.3	V
Power Enable Logic 0	Vpel	-0.3	0	0.1	V

System compliance

Dos, OS/2, Unix, Xenix, Linux, Windows and Netware

Connection

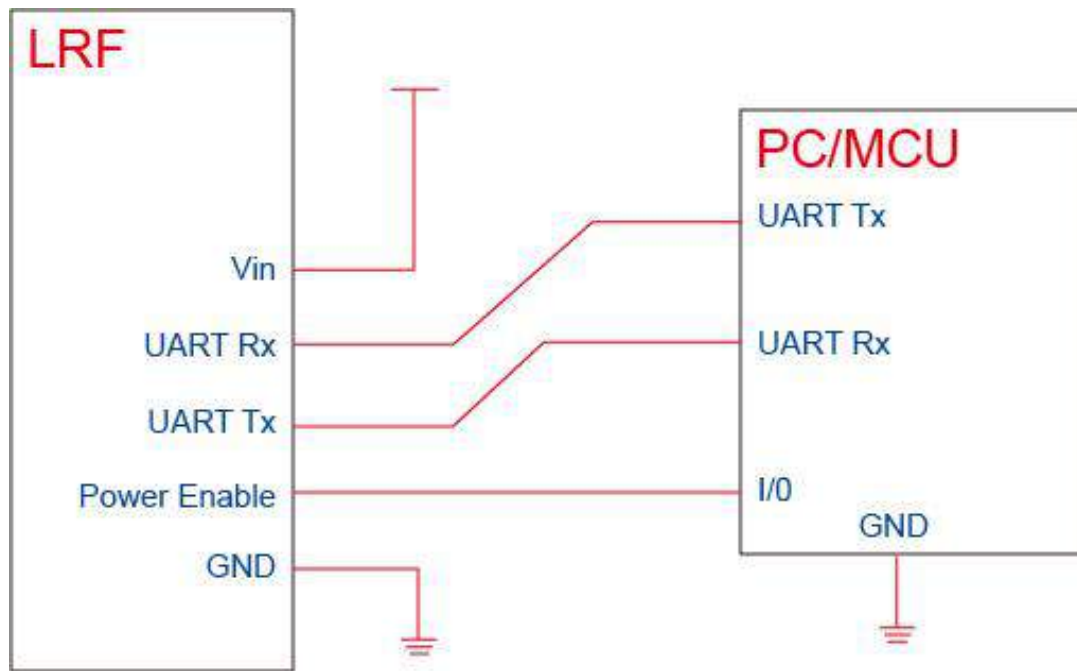


Fig. 2

Note

Users should check their OS version (Operating System) to confirm that RS232 data transmission is available.

Communication Format

Master (PC/MCU) Read/Write							
Initiate	Address	Command	Data 1	.....	Data N	Check Sum	End
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
Slave (Laser Distance Measuring Kit)							
Initiate	Address	Command	Data 1	.....	Data N	Check Sum	End
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte

Initiate: 0xAA

End: 0xA8

Address: 0 is the master, 1-127 are the slave/devices on the Bus.

The master can communicate with all the slave devices on the Bus

Data: Some commands may have no response

Checksum: Only Bit 7 to avoid conflict with Initiate or End. The highest level is set at 0.

Checksum = ( Address+Command+Data 1+...+Data n ) & 0x7F.

Commands

	Remark
0x01	Read Software version
0x02	Read Device Type
0x04	Read slave address
0x41	Set Slave address
0x08	Read device error code
0x42	Laser ON
0x43	Laser OFF
0x44	Single measurement
0x45	Continuous measurement
0x46	Stop continuous measurement

Read SW version						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x00</b>	<b>0x01</b>	<b>0x01</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	Data 2	Data 3
	<b>0xAA</b>	<b>0x01</b>	<b>0x01</b>	<b>0x28</b>	<b>0x48</b>	<b>0x4D</b>
	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
	<b>0x53</b>	<b>0x44</b>	<b>0x33</b>	<b>0x30</b>	<b>0x2D</b>	<b>0x33</b>
	Data 10	Data 11	CheckSum	End		
	<b>0x30</b>	<b>0x29</b>	<b>0x72</b>	<b>0xA8</b>		

※Slave response Version hex display (HMSD30-30),The corresponding model is LDK-2M-30-RS.

Read SW version						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x00</b>	<b>0x01</b>	<b>0x01</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	Data 2	Data 3
	<b>0xAA</b>	<b>0x01</b>	<b>0x01</b>	<b>0x28</b>	<b>0x48</b>	<b>0x4D</b>
	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
	<b>0x53</b>	<b>0x44</b>	<b>0x36</b>	<b>0x30</b>	<b>0x2D</b>	<b>0x33</b>
	Data 10	Data 11	CheckSum	End		
	<b>0x30</b>	<b>0x29</b>	<b>0x75</b>	<b>0xA8</b>		

※Slave response Version hex display (HMSD60-30), The corresponding model is LDK-2M-60-RS.

Read SW version						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x00</b>	<b>0x01</b>	<b>0x01</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	Data 2	Data 3
	<b>0xAA</b>	<b>0x01</b>	<b>0x01</b>	<b>0x28</b>	<b>0x48</b>	<b>0x4D</b>
	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
	<b>0x53</b>	<b>0x44</b>	<b>0x31</b>	<b>0x30</b>	<b>0x30</b>	<b>0x2D</b>
	Data 10	Data 11	Data 12	CheckSum	End	
	<b>0x33</b>	<b>0x30</b>	<b>0x29</b>	<b>0x20</b>	<b>0xA8</b>	

※Slave response Version hex display (HMSD100-30), The corresponding model is LDK-2M-100-RS.

Read Device Type						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x01</b>	<b>0x02</b>	<b>0x03</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x02</b>	<b>0x01</b>	<b>0x04</b>	<b>0xA8</b>

※Slave response: Device type is LFR

Read Device status						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x01</b>	<b>0x08</b>	<b>0x09</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x08</b>	<b>0x00</b>	<b>0x09</b>	<b>0xA8</b>

※Slave response: 0x00 as Not ready yet; 0x01 as Standby; 0x31 as Error.

When an error message is displayed, we suggest to the user to reset the system by following the procedure below: set the Power Enable pin level low for 200ms and then back high, and check if the system works.

If not, please contact Egismos for further service.

Read Slave Address						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x00</b>	<b>0x04</b>	<b>0x04</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x04</b>	<b>0x01</b>	<b>0x06</b>	<b>0xA8</b>

※Slave response: Address is 0x01

Set Slave Address						
Master	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x00</b>	<b>0x041</b>	<b>0x02</b>	<b>0x43</b>	<b>0xA8</b>
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x02</b>	<b>0x041</b>	<b>0x01</b>	<b>0x44</b>	<b>0xA8</b>

※Master command: Set slave Address as 0x02; Slave response: 1-Success, 0-Failed

Laser ON						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x01</b>	<b>0x42</b>	<b>0x43</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x42</b>	<b>0x01</b>	<b>0x44</b>	<b>0xA8</b>

※This Command is for user to easily aim at the target, but is not a necessary procedure for the measurement

※Slave response: 1-Success, 0-failed

Laser OFF						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x01</b>	<b>0x43</b>	<b>0x44</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x43</b>	<b>0x01</b>	<b>0x45</b>	<b>0xA8</b>

※Slave response: 1-Success, 0-failed

Single measurement											
Master	Initiate	Address	Command	CheckSum	End						
	<b>0xAA</b>	<b>0x01</b>	<b>0x44</b>	<b>0x45</b>	<b>0xA8</b>						
Slave	Initiate	Address	Command	Data1	Data2	Data3	Data4	Data5	Data6	Check Sum	End
Cond.1	<b>0xAA</b>	<b>0x01</b>	<b>0x44</b>	<b>0x30'0'</b>	<b>0x32'2'</b>	<b>0x33'3'</b>	<b>0x34'4'</b>	<b>0x35'5'</b>	<b>0x36'6'</b>	<b>0x79</b>	<b>0xA8</b>
Cond.2	<b>0xAA</b>	<b>0x01</b>	<b>0x44</b>	<b>0x45'E'</b>	<b>0x52'R'</b>	<b>0x52'R'</b>	<b>0x32'2'</b>	<b>0x35'5'</b>	<b>0x35'5'</b>	<b>0x74</b>	<b>0xA8</b>

※1. Slave response: Data Byte coding with ASCII.

Continuous Measurement											
Master	Initiate	Address	Command	CheckSum	End						
	<b>0xAA</b>	<b>0x01</b>	<b>0x45</b>	<b>0x46</b>	<b>0xA8</b>						
Slave	Initiate	Address	Command	Data 1	Data2	Data3	Data4	Data5	Data6	Check Sum	End
Cond.1	<b>0xAA</b>	<b>0x01</b>	<b>0x45</b>	<b>0x30'0'</b>	<b>0x32'2'</b>	<b>0x33'3'</b>	<b>0x34'4'</b>	<b>0x35'5'</b>	<b>0x36'6'</b>	<b>0x7A</b>	<b>0xA8</b>
Cond.2	<b>0xAA</b>	<b>0x01</b>	<b>0x45</b>	<b>0x45'E'</b>	<b>0x52'R'</b>	<b>0x52'R'</b>	<b>0x32'2'</b>	<b>0x35'5'</b>	<b>0x35'5'</b>	<b>0x75</b>	<b>0xA8</b>

※The Continuous measurement command allows the Laser Distance Measuring kit to feedback measurement data continuously.

There are 2 ways to stop the continuous mode: 1. STOP Continuous measurement command, and 2: Level Low the supply power, such as system OFF.

※The slave response is shown above.

**For example: If the measuring distance is 23.456mm, Data will be shown as above Cond.1; but if the system fails, the error code will be 255, the response data will be shown as Cond. 2, other error codes will display “ERRxxx”.**

Error code	Problem	Description
ERR204	calculate error	The Target moved too fast
ERR255	Weak signal reception	Use a reflective film on the target, or find a more adapted measurement point on the target
ERR256	Strong signal reception	Use a reflective film on the target, or move the target away from any light source.

STOP Continuous Measurement						
Master	Initiate	Address	Command	CheckSum	End	
	<b>0xAA</b>	<b>0x01</b>	<b>0x46</b>	<b>0x47</b>	<b>0xA8</b>	
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x46</b>	<b>0x01</b>	<b>0x48</b>	<b>0xA8</b>

※Slave response: 1-Success, 0-failed

ON/OFF Buzzer						
Master	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x47</b>	<b>0x01</b>	<b>0x49</b>	<b>0xA8</b>
Slave	Initiate	Address	Command	Data 1	CheckSum	End
	<b>0xAA</b>	<b>0x01</b>	<b>0x47</b>	<b>0x01</b>	<b>0x49</b>	<b>0xA8</b>

※Users can use this command to turn ON or OFF the Buzzer on the Laser Distance measuring kit by sending 0 for OFF or 1 for ON . The example above shows a command to turn the Buzzer ON, and Slave response is: 1-Success, 0-failed.



### Notice

1. User should always remember to turn OFF the power of the Laser Distance Measuring Kit when the measurement is complete, as keeping the power on might reduce the life-time of the Laser and of the light receiving element inside the Laser Distance Measuring Kit.
2. Resistors of a few hundred Ohm are preferentially added between the pins UART Rx, UART Tx and the user's MCU in order to limit the voltage discrepancy between the two systems that would lead to current loss.
3. Measure Accuracy  $\pm 3.0$  mm @ 25°C, room environment.  
The outdoor measurement accuracy can be roughly calculated using the following formula.  
Accuracy reference ( mm) = (L-20) x C x 0.3 +2  
L: measure distance ( M), C: constant=1
4. The measure rate changes automatically based on reflectance and environmental conditions.
5. Continuous testing at low temperatures(0°C) should not exceed 30 minutes.
6. Measurement targets should avoid direct light exposure.

### Dimensions

