iPin-DRC221, iPin-DRC222

Miniature iTOF Laser Distance Sensor

Description

iPin-DRC221/222 series are miniaturized, long range, precise, easy to use, single point laser distance sensors. It utilizes i-TOF laser light phase shift detection technology for obtaining the distance, which is featured in long distance accurate measurement.

Specially designed short focal length optics allows the sensor to have the thinnest structure as its kind. Visible red laser light is convenient for installing the sensor.

Features

1. Max range up to 20m
2. Max operable ambient light up to 3kLux
3. Sensor height less than 13mm
4. Typical accuracy tolerance ±3mm
5. Class II laser eye safety rating
6. UART+USB dual ports (iPin-DRC222)

Applications

1. Distance measurement
2. Robotics
3. Automation and control
4. Security surveillance
5. Displacement sensing

Technical Specifications

1. Absolute Maximum Ratings

Description	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply voltage UART	VDD	-0.3	5	5.5	V	
Supply voltage microUSB	VDDU	—	5	—	V	
Storage temperature range	T_{stor}	-25	—	60	°C	
Operating temperature range	T_{op}	-20	—	50	°C	a
Ambient light illumination	Ev	—	—	3000	Lux	

(a) Operating the product outside the max rated ambient temperature range may compromise its reliability.

2. Recommended Operating Conditions

Description	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply voltage UART	VDD	3.8	5	5.5	V	
Supply voltage microUSB	VDDU	—	5	—	V	
Storage temperature range	T_{stor}	-20	—	50	°C	
Operating temperature range	T_{op}	0	25	40	°C	
Ambient light illumination	Ev	—	—	500	Lux	
Target remission	Rm	18	90	—	%	

3. Electrical and Optical Characteristics (T_c = 25°C)

Description	Symbol	Min.	Typ.	Max.	Unit	Notes
Peak current consumption	I_{VDDp}	—	—	300	mA	a
Standby current consumption	I_{VDDs}	—	16	—	mA	b
Laser emission wavelength	λ	650	655	660	nm	
Measurement range	d_m	0.05	—	20	m	c
Distance resolution	d_{res}	—	1	—	mm	
Distance tolerance	Δd	—	3	—	mm	d
Measurement time	t_m	—	1.5	—	sec	

(a) Peak current occurs in the measurement period.

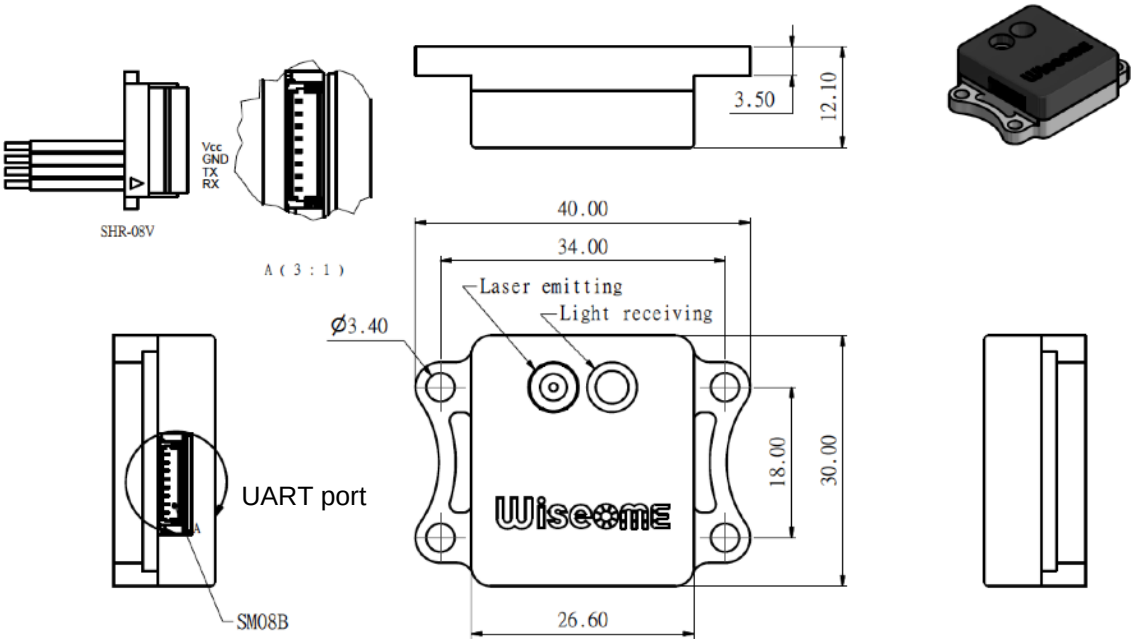
(b) Laser is off in standby status.

(c) Under typical recommended operating conditions.

(d) This is a 95% confidence level (2σ) tolerance at a distance less than 5m. For distance over 5m, the extra 0.25mm/m deterioration need to be added on the typical value, assuming under the typical recommended operating conditions.

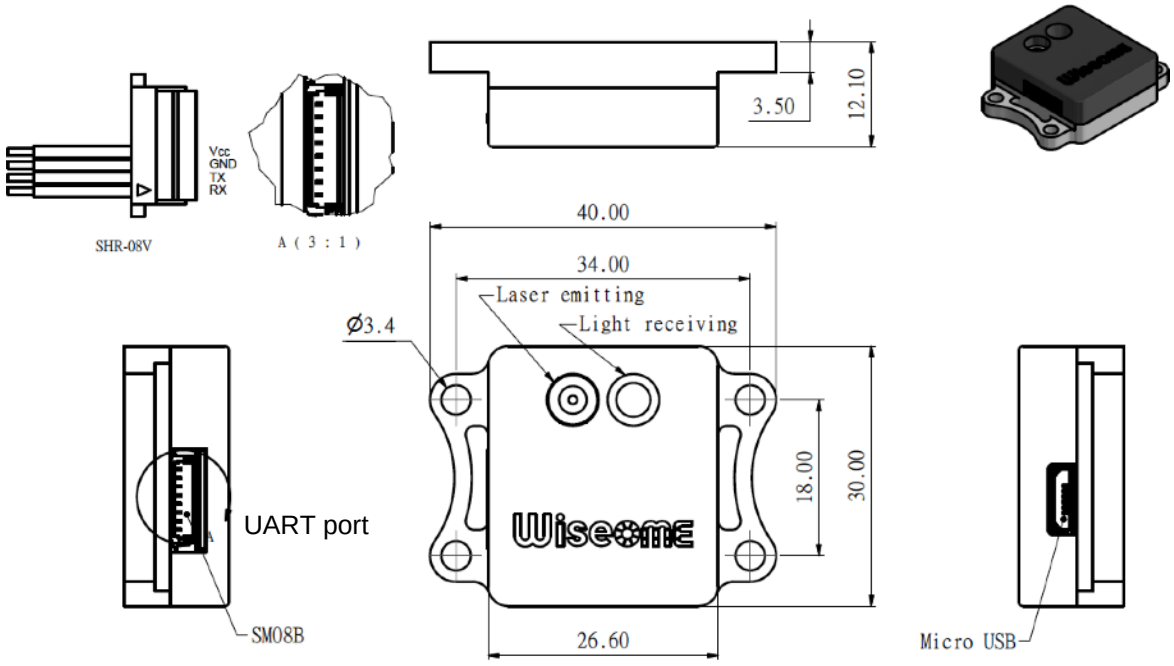
4. Outline Drawing

4.1. iPin-DRC221 (UART only)



* SHR-08V connecter wire is included in this product.

4.2. iPin-DRC222 (UART / microUSB dual interface ports)



* SHR-08V connecter wire is included in this product.

5. Serial Port Communication Protocols

5.1. Data Communication Protocol

Model	iPin-DRC221	iPin-DRC222
Interface(s)	UART only	UART & microUSB
Default baud rate	115200	115200
Data bit	8	8
Stop bit	1	1
Parity check	None	None

5.2. Default Command Sending Formats (to the sensor)

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Send Format 1	0xCD	0x01	0xPP	Cksum		
Send Format 2	0xCD	0x03	0xPP	0xZZ	0xYY	Cksum
Explanation	Frame header	0x01: without parameter 0x03: with 2-byte parameters	**Command code** (see table below)	New zero position = 0xYYZZ (mm) * **** Signed Integrer***		Sum of Byte 1~5

Send Format	Byte 2 Cmd codes	Definitions
1	0x02	Request firmware version
	0x03	Turn on laser (ready to measure)
	0x04	Turn off laser
	0x05	Measurement mode A (Single-shot): Start measurement—> get distance—> turn off laser
	0x06	Measurement mode B (Retained): Start measurement—> get distance—> ready for next command (laser stays on)
	0x07	Request current zero position
2	0x00	User defines a new zero position

5.3. Command Sending (to module) and Data Receiving (from module) in the Normal Condition

5.3.1. Request firmware version

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Send	0xCD	0x01	**0x02**	0x03						
Receive	0xFA	0x00	0x07	0xPP	0xQQ	0xRR	0xXX	0xYY	0xZZ	Cksum
Note	Header	Data length from Byte 3~ Cksum		Firmware Version: PP. QQ. RR(ASCII) Release Date: XX(Year) / YY (Month)/ZZ (Date)						Sum of Byte1~9

5.3.2. Turn on laser

	Byte 0	Byte 1	Byte 2	Byte 3
Send	0xCD	0x01	**0x03**	0x04
Receive	0xFA	0x00	0x01	0x01

5.3.3. Turn off laser

	Byte 0	Byte 1	Byte 2	Byte 3
Send	0xCD	0x01	**0x04**	0x05
Receive	0xFA	0x00	0x01	0x01

5.3.4. Measurement mode A (Single-shot)

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Send	0xCD	0x01	**0x05**	0x06				
Receive	0xFA	0x00	0x05	0xDD	0xCC	0xBB	0xAA	Cksum
Note	Header	Data length from Byte 3~ Cksum		Measurement result = 0xAABBCCDD (mm)				Sum of Byte1~6

5.3.5. Measurement mode B (Retained)

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Send	0xCD	0x01	**0x06**	0x07				
Receive	0xFA	0x00	0x05	0xDD	0xCC	0xBB	0xAA	Cksum
Note	Header	Data length from Byte 3~ Cksum		Measurement result = 0xAABBCCDD (mm)				Sum of Byte1~6

5.3.6. Request current zero position

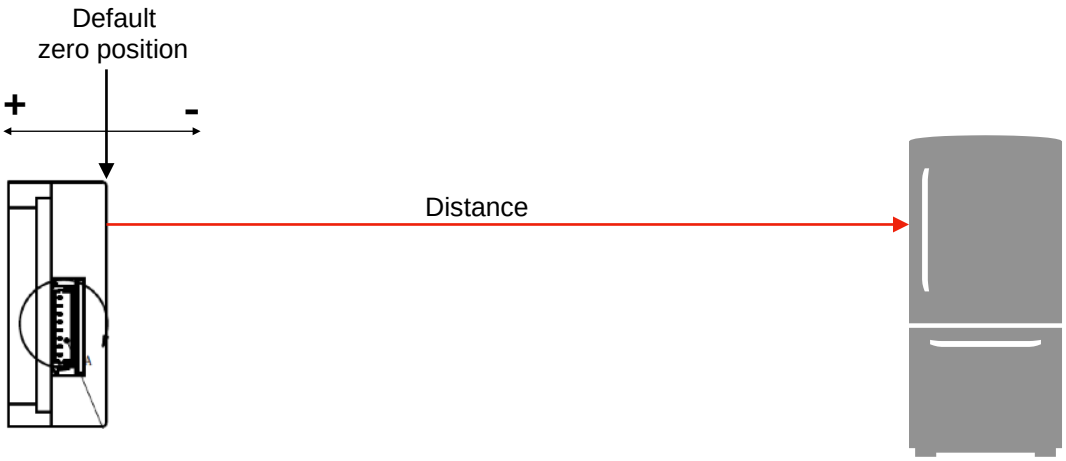
	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Send	0xCD	0x01	**0x07**	0x08		
Receive	0xFA	0x00	0x03	0xZZ	0xYY	Cksum
Note		Data length from Byte 3~ Cksum		Current zero position = 0xYYZZ (mm) * **** Signed Integrer***		Sum of Byte1~5

5.3.7. User defines a new zero position

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Send	0xCD	**0x03**	**0x00**	0xZZ	0xYY	Cksum
Note				New zero position = 0xYYZZ (mm) * **** Signed Integrer***		Sum of Byte1~5
Receive	0xFA	0x00	0x01	0x01		

Note:

The zero position values either readout from or set to the sensor are relative to the “Default zero position”. Positive (+) values indicate the zero position away from the target; negative (-) values indicate the zero position closer to the target. Refer to the explanation in following figure.

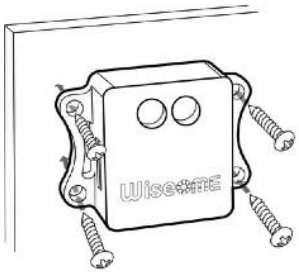


5.4. Error Codes Received From the Sensor in Abnormal Conditions

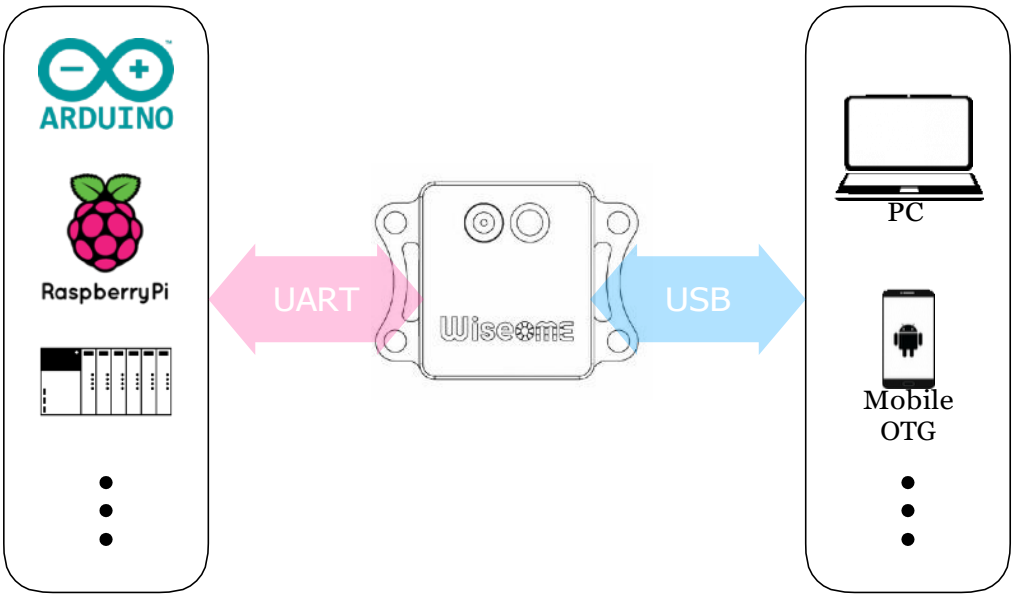
Format	Byte 0	Byte 1	Definitions
Explanation	**0x0E** Header	0x81	Checksum error
		0x82	Command not found
		0x83	The measured distance is out of max range.
		0x85	Laser not turned on before measurement.
		0x89	Low SNR

Install the Sensor

1. Fix the sensor to a firm surface.



2. Connecting the interface wires to either UART port or microUSB port (iPin-DRC222 only).
3. OTG USB is required if connected to an Android mobile device's USB port.

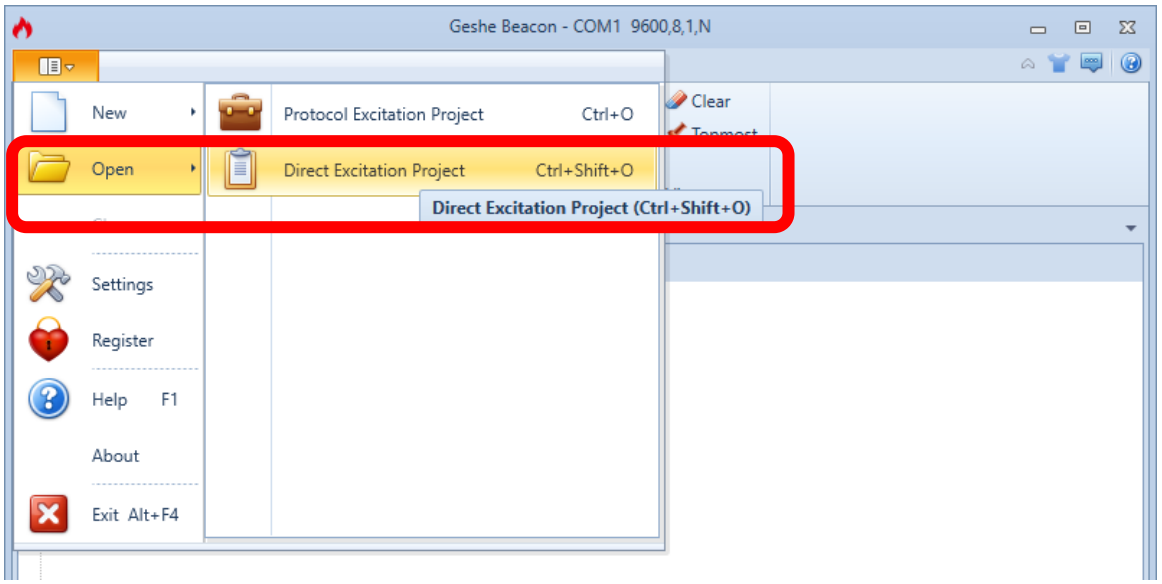


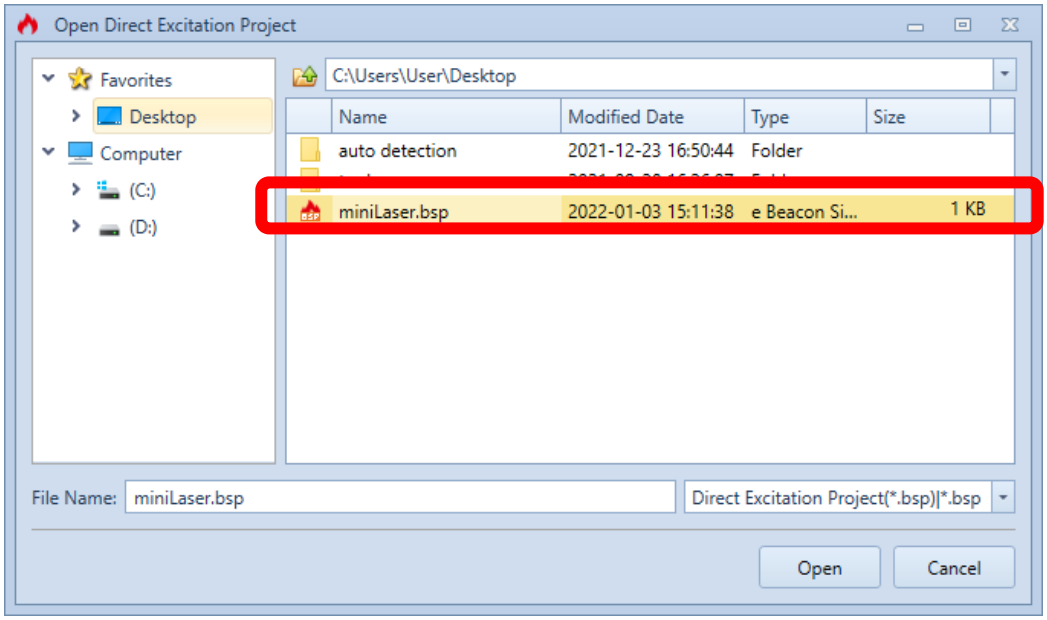
6.Serial Port Test Software

Before starting the test software, we need to:

1. Plug & Install CH341 USB2TTL converter driver on your computer.
2. Download & install the test software(GBeacon-2.6-Fx.exe): http://product.wiseomeinc.com/MiniLaser/Test/Mini_Laser_Test_Software.zip
3. Start the software and follow the steps:

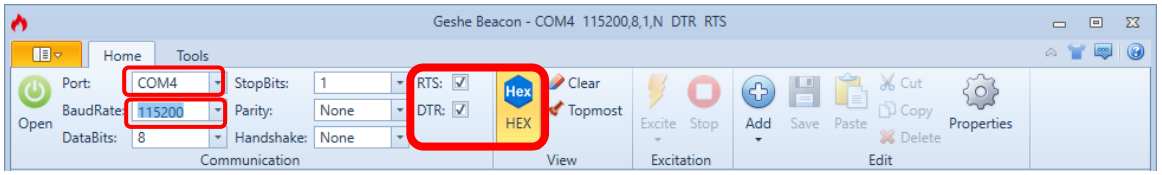
3.1 In order to load direct excitation file, click open -> Direct Excitation project, and chose to open miniLaser.bsp, it will automatically import laser command.



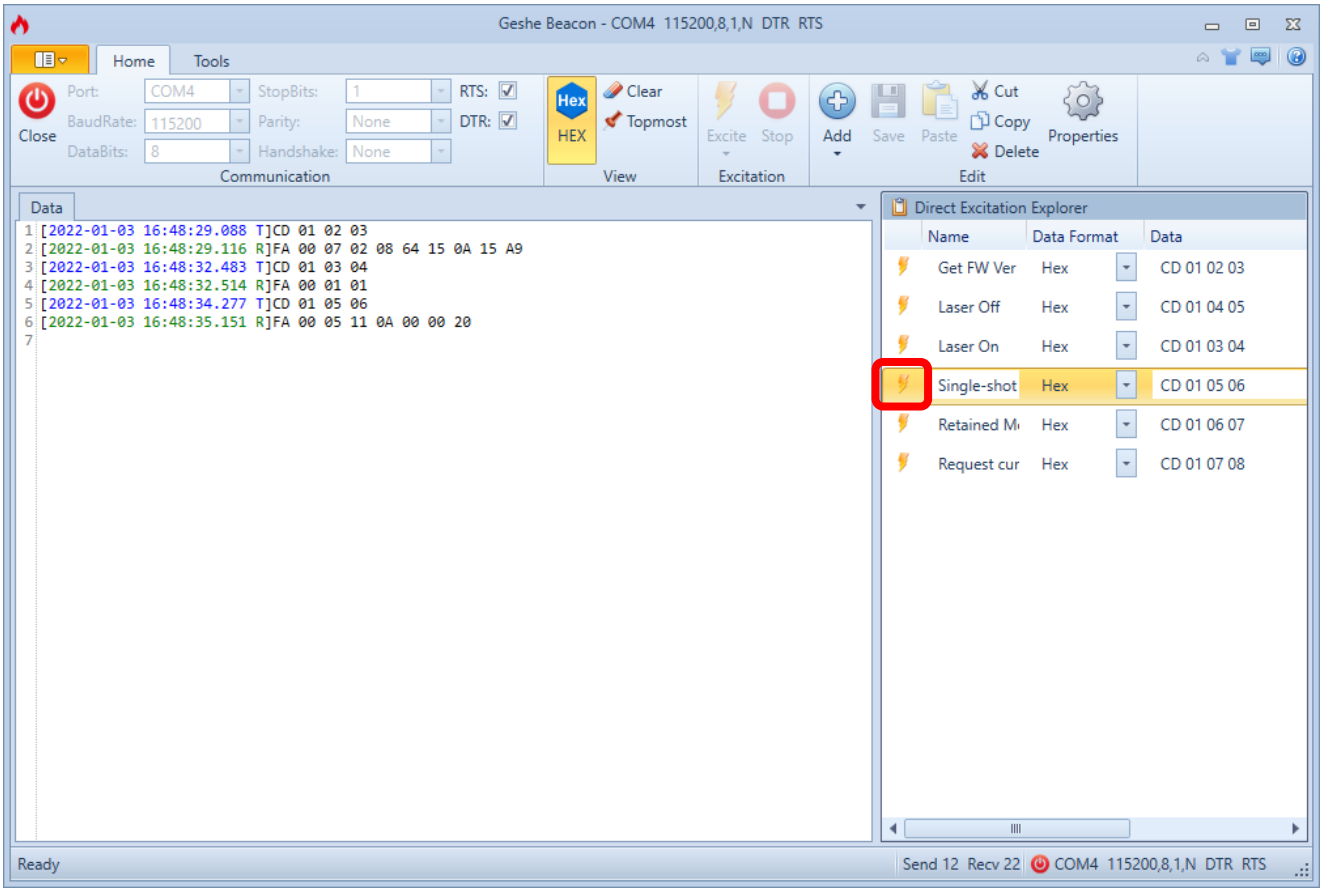


3.2 After loaded direct excitation file, it needs to setup below before open the terminal:

- COM port number
- Baud Rate to 115200
- Select RTS and DRT
- View Hex Data



3.3 After open the terminal, click (Excite icon) it will auto send command.



Precautions

1. Do not stare directly into the laser beam by human eye since it may cause eye damage.
2. The transparent cover on laser measure is an optical element. Do not contaminate the optical cover by soil, oil or chemicals.
3. Avoid any mechanical impact to prevent from malfunction or measurement deviations.

Revision History

No.	Date	Changes	Page	FW ver.
1	Dec. 31, 2021	Original version v.1.0		FW-v2
2	Jan. 4, 2022	Update to ver. 1.1 Add test software user guide	7-9	FW-v2
3	Jan. 5, 2022	Update to ver. 1.1.x 1. Fix wrong command receive formats at get FW version and measure mode. 2. Fix wrong page number.	5	FW-v2
4				

* Wiseome reserves the right to make the document change without prior notice.