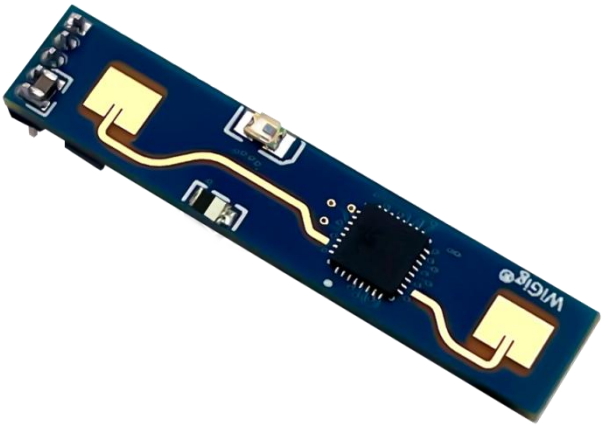
Shenzhen Hi-Link Electronic Co., Ltd.

HLK-LD2410B
Human presence sensing module
Serial communication protocol



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1. Introduction to communication interfaces

1.1 Pin definition

Figure 1 Module pin definition diagram

Pin	Symbol	Name	Function
1	OUT	Target status output	Human presence detected: output high level No human presence: output low level
2	UART_Tx	Serial Tx	Serial Tx pin
3	UART_Rx	Serial Rx	Serial Rx pin
4	GND	Power ground	Power ground
5	VCC	Power input	Power input 5V

Table 1 Pin Definition Table

1.2 Use and configuration

1.2.1 Typical application circuit

The LD2410B module directly outputs the detected target state through an IO pin (someone is high, no one is low), and it can also output the detection result data through the serial port according to the specified protocol. The serial port output data includes: Target status and distance auxiliary information, etc., users can use it flexibly according to specific application scenarios.

The power supply voltage of the module is 5V, and the power supply capacity of the input power supply is required to be greater than 200mA.

The module IO output level is 3.3V. The default baud rate of the serial port is 256000, 1 stop bit, and no parity bit.

1.2.2 The role of configuration parameters

The user can modify the configuration parameters of the module through the serial port of the LD2410B to adapt to different application requirements.

The configurable radar detection parameters include the following:

- **farthest detection distance**

Set the farthest detectable distance, only human targets that appear within this farthest distance will be detected and output results.

Set in units of distance gates, with a maximum of 8 distance gates and configurable distance resolution (0.2m or 0.75m per distance gate).

Including the farthest distance door for motion detection and the farthest distance door for stationary detection, the range can be set from 1 to 8. For example, if the farthest distance door is set to 2 and the distance resolution is 0.75m, only the presence of a human body within 1.5m will be effectively detected and the result output.

- **Sensitivity**

Only when the detected target energy value (range 0~100) is greater than the sensitivity value will it be determined that the target exists, otherwise it will be ignored.

The sensitivity value can be set from 0 to 100. The sensitivity of each range gate can be independently set, so that the detection in different distance ranges can be precisely adjusted, local accurate detection or filtering of interference sources in specific areas.

In addition, if the sensitivity of a certain distance gate is set to 100, the effect of not recognizing the target under the distance gate can be achieved. For example, if the sensitivity of distance gate 3 and distance gate 4 is set to 20, and the sensitivity of other distance gates is set to 100, it is possible to detect only the human body within the range of 2.25-3.75m from the distance module.

- **no-one duration**

When the radar outputs the result from man to no man, it will report man for a period of time. If there is no man in the radar test range during this time period, the radar will report no man; if the radar detects man during this time period, it will be refreshed again. This time, in seconds. It is equivalent to the unmanned delay time. After the person leaves, the output state will be unmanned only after the person has left the system for more than this duration.

1.2.3 Visual configuration tool description

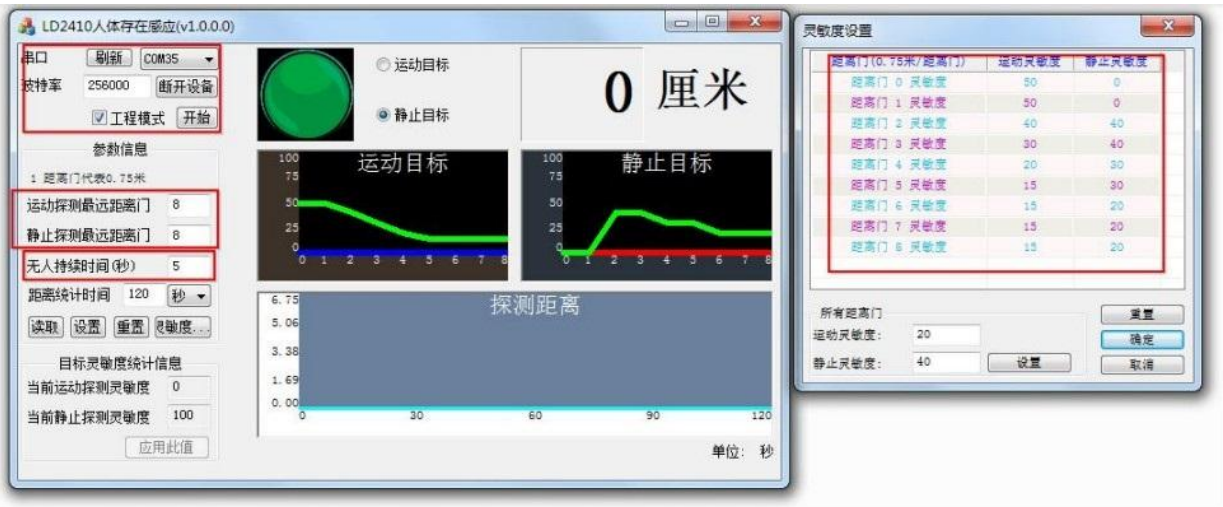
In order to facilitate the user to test and configure the module quickly and efficiently, a PC configuration tool is provided. The user can use this tool software to connect the serial port of the module, read and configure the parameters of the module, and receive the detection results reported by the module. Data, and real-time visual display, which greatly facilitates the use of users.

How to use the host computer tool:

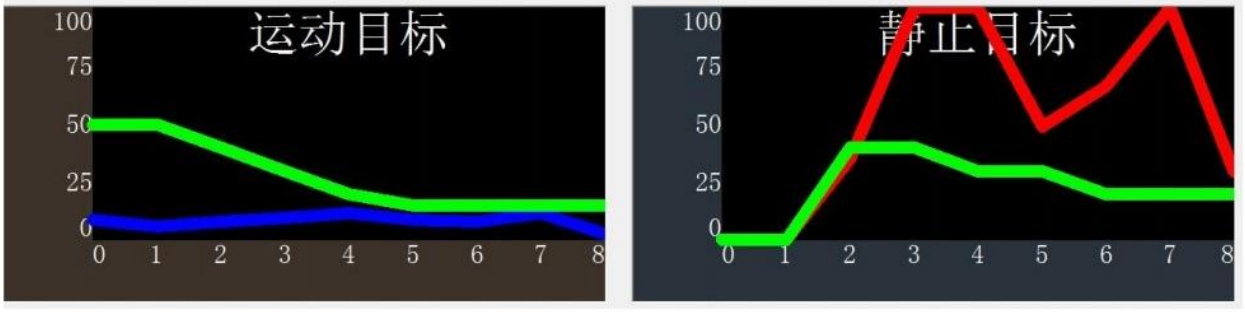
- Use the USB to serial port tool to connect the module serial port correctly;
- Select the corresponding serial port number in the host computer tool, set the baud rate to 256000, select the engineering mode, and click to connect the device;
- After the connection is successful, click the Start button, and the graphical interface on the right will display the test results and data;
- After connecting, when the start button is not clicked, or click stop after starting, the mode parameter information can be read or set;

Note: The parameters cannot be read and configured after clicking start, and configuration can only be performed after stopping.

The interface and common functions of the host computer tool are as follows:



The ball is the target status output indication: red means there is a moving target; purple means there is a stationary target; green means no one.



Green line: the set sensitivity

Blue line: moving target energy value on each distance gate

Red line: static target energy value on each range gate

2. Communication protocol

This communication protocol is mainly used by users who need to do secondary development without visual tools. LD2410B communicates with the outside world through the serial port (TTL level). The data output and parameter configuration commands of the radar are all carried out under this protocol. The default baud rate of the radar serial port is 256000, 1 stop bit, and no parity bit.

2.1 Protocol format

2.1.1 Protocol data format

The serial data communication of LD2410B uses little-endian format, and all data in the following table are in hexadecimal.

2.1.2 Command protocol frame format

The radar configuration command and ACK command format defined by the protocol are shown in Table 1 to Table 4.

Table 2 Send command protocol frame format

Frame header	Intra-frame data length	Intra-frame data	End of frame
FD FC FB FA	2 bytes	See Table 3	04 03 02 01

Table 3 Send intra-frame data format

Command word (2 bytes)	Command value (N bytes)

Table 4 ACK command protocol frame format

Frame header	Intra-frame data length	Intra-frame data	End of frame
FD FC FB FA	2 bytes	See Table 5	04 03 02 01

Table 5 ACK intra-frame data format

Send command word | 0x0100 (2 bytes)	Return value (N bytes)

2.2 Send command with ACK

2.2.1 Enable configuration command

Any other command issued to the radar must be executed after this command is issued, otherwise it will be invalid.

Command word: 0x00FF

Command value: 0x0001

Return value: 2 bytes ACK status (0 success, 1 failure) + 2 bytes protocol version (0x0001) + 2 bytes buffer size (0x0040)

Send data:

FD FC FB FA	**04 00**	**FF 00**	**01 00**	**04 03 02 01**

Radar ACK (success):

FD FC FB FA	**08 00**	**FF 01**	**00 00**	**01 00**	**40 00**	**04 03 02 01**

2.2.2 End configuration command

End configuration command, Radar resumes working mode after execution. If you need to issue other commands again, you need to send the enable configuration command first.

Command word: 0x00FE

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure)

Send data:

FD FC FB FA	**02 00**	**FE 00**	**04 03 02 01**

Radar ACK (success):

FD FC FB FA	**04 00**	**FE 01**	**00 00**	**04 03 02 01**

2.2.3 Maximum distance gate and unmanned duration parameter configuration command

This command sets the radar's maximum detection range gate (moving & stationary) (configuration range 2~8), and the parameter of unmanned duration (configuration range 0~65535 seconds). For specific parameters, please refer to Table 5- 5. This configuration value is not lost when power off.

Command word: 0x0060

Command value: 2 bytes maximum moving distance door word + 4 bytes maximum moving distance door parameter + 2 bytes maximum dead distance door word + 4 bytes maximum dead distance door parameter + 2 bytes no-go duration word + 4 bytes no-go Duration parameter

Return value: 2 bytes ACK status (0 success, 1 failure)

0x0060 Protocol parameter word

Parameter name	Parameter word
Maximum moving distance gate	0x0000
Maximum resting distance door	0x0001
No-one duration time	0x0002

Send data: maximum distance gate 8 (movement & stillness), unmanned duration 5 seconds

FD FC FB FA	**14 00**	**60 00**	**00 00**	**08 00 00 00**	**01 00**	**08 00 00 00**	**02 00**	**05 00 00 00**	**04 03 02 01**

Radar ACK (success):

FD FC FB FA	**04 00**	**60 01**	**00 00**	**04 03 02 01**

2.2.4 Read parameter command

This command can read the current configuration parameters of the radar.

Command word: 0x0061

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure) + header (0xAA) + maximum distance gate N (0x08) + configure maximum moving distance gate + configure maximum static distance gate + distance gate 0 motion sensitivity (1 byte) + ... + Distance Gate N Motion Sensitivity (1 byte) + Distance Gate 0 Rest Sensitivity 1 byte) + ... + Distance Gate N Rest Sensitivity (1 byte) + No Time Duration (2 bytes)

Send data:

FD FC FB FA	**02 00**	**61 00**	**04 03 02 01**

Radar ACK: (success, max range gate 8, configure motion range gate 8, static range gate 8, 0~8 motion sensitivity 20, 0~8 static sensitivity 25, unmanned duration 5 seconds)

Byte 1~4		Byte 5, 6	Byte 7, 8	Byte 9, 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18
FD FC FB FA		1C 00	61 01	00 00	AA	08	08	08	14	14	14	14
Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	
14	14	14	14	14	19	19	19	19	19	19	19	
Byte 31	Byte 32	Byte 33, 34	Byte 35~38									
19	19	05 00	04 03 02 01									

2.2.5 Enable engineering mode command

This command turns on radar engineering mode. After the engineering mode is turned on, the energy value of each range gate will be added to the data reported by the radar. For the detailed format, please refer to 2.3.2 Target Data Composition. After the module is powered on, the engineering mode is disabled by default, and this configuration value is lost when the power is turned off.

Command word: 0x0062

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure)

Send data:

FD FC FB FA	**02 00**	**62 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**62 01**	**00 00**	**04 03 02 01**

2.2.6 Close engineering mode command

This command turns off radar engineering mode. After it is turned off, please refer to 2.3.2 Target Data Composition for the data format reported by the radar.

Command word: 0x0062

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure)

Send data:

FD FC FB FA	**02 00**	**63 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**63 01**	**00 00**	**04 03 02 01**

2.2.7 Range Gate Sensitivity Configuration Commands

This command configures the sensitivity of the distance gate, and the configuration value will not be lost after power failure. It supports not only the individual configuration of each distance gate, but also the simultaneous configuration of all distance gates to a unified value. If you set the sensitivity of all distance gates to the same value at the same time, you need to set the distance gate value to 0xFFFF.

Command word: 0x0064

Command value: 2 bytes distance gate word + 4 bytes distance gate value +2 bytes motion sensitivity word + 4 bytes motion sensitivity value + 2 bytes rest sensitivity word + 4 bytes rest sensitivity value

Return value: 2 bytes ACK status (0 success, 1 failure)

0x0064 Protocol parameter word

Parameter name	Parameter word
Distance gate	0x0000
Motion sensitivity word	0x0001
Static sensitivity word	0x0002

Send data: configure the motion sensitivity of distance gate 3 to 40, and the static sensitivity of 40

FD FC FB FA	**14 00**	**64 00**	**00 00**	**03 00 00 00**	**01 00**	**28 00 00 00**	**02 00**	**28 00 00 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**64 01**	**00 00**	**04 03 02 01**

Send data: configure the motion sensitivity of all distance gates to 40, and the static sensitivity to 40

FD FC FB FA	**14 00**	**64 00**	**00 00**	**FF FF 00 00**	**01 00**	**28 00 00 00**	**02 00**	**28 00 00 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**64 01**	**00 00**	**04 03 02 01**

2.2.8 Read firmware version command

This command reads radar firmware version information.

Command word: 0x00A0

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure) + 2 bytes firmware type (0x0000) + 2 bytes major version number + 4 bytes minor version number

Send data:

FD FC FB FA	**02 00**	**A0 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**0C 00**	**A0 01**	**00 00**	**00 00**	**02 01**	**16 24 06 22**	**04 03 02 01**

The corresponding version number is V1.02.22062416

2.2.9 Set serial port baud rate

This command is used to set the baud rate of the serial port of the module. The configuration value will not be lost after power failure. The configuration value will take effect after restarting the module.

Command word: 0x00A1

Command value: 2-byte baud rate selection index

Return value: 2 bytes ACK status (0 success, 1 failure)

Table 6 Serial port baud rate selection

Baud rate selection index value	Baud rate
0x0001	9600
0x0002	19200
0x0003	38400
0x0004	57600
0x0005	115200
0x0006	230400
0x0007	256000
0x0008	460800

The factory default value is 0x0007, which is 256000

Send data:

FD FC FB FA	**04 00**	**A1 00**	**07 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A1 01**	**00 00**	**04 03 02 01**

2.2.10 Reset

This command is used to restore all configuration values to their original values, and the configuration values will take effect after restarting the module.

Command word: 0x00A2

Command value: none

Return value: 2 bytes ACK status (0 success, 1 failure)

Send data:

FD FC FB FA	**02 00**	**A2 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A2 01**	**00 00**	**04 03 02 01**

The factory default configuration values are as follows:

Table 7 Factory Default Configuration Values

Configuration item	Defaults
Maximum moving distance gate	8
Maximum resting distance door	8
No-one duration	5
Serial port baud rate	256000
Distance resolution	0.75m

Configuration item	Defaults	Configuration item	Defaults
Motion Sensitivity for Distance Gate 0	50	Rest Sensitivity for Distance Gate 0	-(cannot be set)
Motion Sensitivity for Distance Gate 1	50	Rest Sensitivity for Distance Gate 1	-(cannot be set)
Motion Sensitivity for Distance Gate 2	40	Rest Sensitivity for Distance Gate 2	40
Motion Sensitivity for Distance Gate 3	30	Rest Sensitivity for Distance Gate 3	40
Motion Sensitivity for Distance Gate 4	20	Rest Sensitivity for Distance Gate 4	30
Motion Sensitivity for Distance Gate 5	15	Rest Sensitivity for Distance Gate 5	30
Motion Sensitivity for Distance Gate 6	15	Rest Sensitivity for Distance Gate 6	20
Motion Sensitivity for Distance Gate 7	15	Rest Sensitivity for Distance Gate 7	20
Motion Sensitivity for Distance Gate 8	15	Rest Sensitivity for Distance Gate 8	20

2.2.11 Restart the module

When the module receives this command, it will automatically restart after the response is sent.
Command word: 0x00A3
Command value: none
Return value: 2 bytes ACK status (0 success, 1 failure)
Send data:

FD FC FB FA	**02 00**	**A3 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A3 01**	**00 00**	**04 03 02 01**

2.2.12 Bluetooth settings

This command is used to control bluetooth on or off, the module's bluetooth function is enabled by default. After receiving this command, the function will take effect after restarting.

Command word: 0x00A4

Command value: 0x0100 Turn on bluetooth 0x0000 Turn off bluetooth

Return value: 2 bytes ACK status (0 success, 1 failure)

Send data: (Turn on bluetooth)

FD FC FB FA	**04 00**	**A4 00**	**01 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A4 01**	**00 00**	**04 03 02 01**

2.2.13 Get mac address

This command is used to query the MAC address

Command word: 0x00A5

Command value: 0x0001

Return value: 2 bytes ACK status (0 success, 1 failure) + 1 byte fixed type (0x00) + 3 bytes MAC address (address is big endian)

Send data: // FD FC FB FA 04 00 A5 00 01 00 04 03 02 01

FD FC FB FA	**04 00**	**A5 00**	**01 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**0A 00**	**A5 01**	**00 00**	**8F 27**	**2E B8**	**0F 65**	**04 03 02 01**

The mac address queried is: 8F 27 2E B8 0F 65

2.2.14 Get Bluetooth access

This command is used to obtain bluetooth permission. After successful acquisition, you can use the APP to obtain device information and debugging parameters through bluetooth.

Command word: 0x00A8

Command value: 6-byte password value (every 2 bytes in small endian order)

Return value: 2-byte ACK status (0 successful, 1 failed)

The default password is "HiLink", and the corresponding value is 0x4869 (Hi) 0x4c69 (Li) 0x6e6b (nk)

Send data:

FD FC FB FA	**08 00**	**A8 00**	**48 69**	**4c 69**	**6e 6b**	**48 69**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A8 01**	**00 00**	**04 03 02 01**

Note: This response only responds to bluetooth, not the serial port

2.2.15 Set Bluetooth Password

This command is used to set the bluetooth control password. The configuration value is not lost after a power failure. The configuration value takes effect after the module is restarted.

Command word: 0x00A9

Command value: 6-byte password value (Each byte is in small endian order)

Return value: 2-byte ACK status (0 successful, 1 failed)

Send data:

FD FC FB FA	**08 00**	**A9 00**	**48 69**	**4c 69**	**6e 6b**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**A9 01**	**00 00**	**04 03 02 01**

2.2.16 Range resolution setting

You can set the distance resolution of a module, that is, how far each distance gate represents. The value does not lose after a power failure. The value takes effect after the module is restarted. Each distance gate can be configured as 0.75m or 0.2m, and the maximum number of distance gates supported is 8.

Command word: 0x00AA

Command value: 2-byte range resolution selection index

Return value: 2-byte ACK status (0 successful, 1 failed)

Table 8 Range resolution selection

Range resolution select index value	Distance resolution (distance represented by each distance gate)
0x0000	0.75m
0x0001	0.2m

The factory default value is 0x0001, or 0.75m

Send data:

FD FC FB FA	**04 00**	**AA 00**	**01 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**04 00**	**AA 01**	**00 00**	**04 03 02 01**

2.2.17 Query range resolution settings

Queries the current range resolution setting of the module, i.e. how far each range gate represents.
Command word: 0x00AB
Command value: None
Return value: 2-byte ACK status (0 successful, 1 failed) + 2 byte distance resolution select index
Return values defined as Table 8 range resolution selection

Send data:

FD FC FB FA	**02 00**	**AB 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**06 00**	**AB 01**	**00 00**	**01 00**	**04 03 02 01**

Indicates that the currently set range resolution is 0.2m

2.2.18 Auxiliary control function settings

This module comes with a photodiode, which can be used to detect the output light sensitivity value(Please refer to Table 15 Object data composition of engineering model), users can also configure the light sensing auxiliary control function;
Turn on the light sensing auxiliary control function, and the output of the OUT foot is also affected by the radar detection result and the light sensing control logic:

The output of the OUT foot changes from no one to someone, which needs to meet the following requirements: the radar detects someone and the light-sensing auxiliary control logic conditions are met;

OUT foot output from human to unmanned, need to meet: radar detection of unmanned;

The optical sensing control logic can choose to detect that the optical sensing value is less than the set optical sensing threshold or that the optical sensing value is greater than the set optical sensing threshold;
The default output level of the OUT pin can also be configured;

Command word: 0x00AD
Command value: the configuration value is 4 bytes
Return value: 2-byte ACK status (0 successful, 1 failed)

Table 9 Command value set by the auxiliary control function

First byte	Description
0x00	Turn off the light sensing auxiliary control function, and the output of the OUT foot is not affected by light sensing
0x01	Enable the optical sensing auxiliary control function. When the optical sensing value is lower than the threshold, the auxiliary control condition is met; The second byte is the light threshold to be set (range 0x00 to 0xFF).

0x02	Enable the optical sensing auxiliary control function. When the optical sensing value is greater than the set threshold, the auxiliary control condition is met; The second byte is the light threshold to be set (range 0x00 to 0xFF).

The factory default value is 0x00, that is, the optical auxiliary control function is disabled.

Second byte	Description
0x00 ~ 0xFF	The optical sensing threshold (0 to 255) to be set. The default value is 0x80.

OUT pin default level configuration

Configuration value of the third byte	Description
0x00	The OUT pin is low by default and outputs low level when there is no target trigger and high level when there is a target trigger
0x01	The OUT pin is high by default and outputs high when there is no target trigger and low when there is a target trigger

The default value is 0x00, that is, the OUT pin defaults to low.

Send data:

FD FC FB FA	**06 00**	**AD 00**	**01 60 00 00**	**04 03 02 01**

Indicates that when the detection light sensing value is less than the set threshold, the auxiliary control condition is met. The light sensing threshold is set to 0x060. The default level of OUT is low.

Radar ACK(success):

FD FC FB FA	**04 00**	**AD 01**	**00 00**	**04 03 02 01**

2.2.19 Querying the Configuration of Auxiliary Control

Querying the current auxiliary control configuration values of the module.

Command word: 0x00AE

Command value: None

Return value: 2-byte ACK status (0 successful, 1 failed) + 4-byte configuration value

The configuration values are defined as the same (Table 9 command values set by the auxiliary control function).

Send data:

FD FC FB FA	**02 00**	**AE 00**	**04 03 02 01**

Radar ACK(success):

FD FC FB FA	**08 00**	**AE 01**	**00 00**	**01 60 01 00**	**04 03 02 01**

Indicates that the current setting is that when the detection light sensing value is less than the set threshold, the auxiliary control condition is met. The light sensing threshold is set to 0x060. The default level of OUT is high.

2.2.20 Start performing bottom noise detection and automatic sensitivity configuration

After receiving this command, the module will enter the bottom noise detection mode and start detection after 10 seconds. It is required that everyone leave the detection range of the module within 10 seconds and ensure that there is no one within the detection range of the module during the detection process. The module will automatically calculate and record the energy value on each distance door under unmanned conditions, which is the background noise value. After the detection is completed, the sensitivity value of each distance door will be automatically configured based on the detected background noise value.

During the process of performing bottom noise detection, there will be corresponding outputs for the target state values in the reported data frames to indicate the current state. Please refer to <Table 14 for details on target state values>.

Command word: 0x000B
Command value: Two byte detection duration value, in seconds
Return value: 2-byte ACK status (0 successful, 1 failed)
Data sending:

FD FC FB FA	04 00	0B 00	0A 00	04 03 02 01

Radar ACK(success):

FD FC FB FA	04 00	0B 01	00 00	04 03 02 01

2.2.21 Query the execution status of bottom noise detection

This command is used to query the status value of background noise detection
Command word: 0x001B
Command value: None
Return value: 2-byte ACK status (0 successful, 1 failed)+2-byte status value
Status value: 0x0000 not in progress, 0x0001 in progress, 0x0002 detection completed

Data sending:

FD FC FB FA	02 00	1B 00	04 03 02 01

Radar ACK(success):

FD FC FB FA	06 00	1B 01	00 00	01 00	04 03 02 01

2.3 Radar Data Output Protocol

The LD2410B outputs the radar detection results through the serial port, and outputs the basic information of the target by default, including the target state, motion energy value, static energy value, motion distance, static distance and other information. If the radar is configured in engineering mode, the radar will additionally output the energy value of each range gate (moving & stationary). Radar data is output in the specified frame format.

2.3.1 Reporting data frame format

The format of the radar report message frame defined by the protocol is shown in Table 8 and Table 9.n the normal working mode and engineering mode, the definition of the reported data type value is shown in Table 10.

Table 10 Reporting data frame format

Frame header	Intra-frame data length	Intra frame data	End of frame
F4 F3 F2 F1	2 bytes	See Table 11	F8 F7 F6 F5

Table 11 Intra-frame data frame format

Data Type	Head	Target data	End	Check
1 bytes(See Table 12)	0xAA	See Table 13, Table 15	0x55	0x00

Table 12 Data type description

Data type value	Description
0x01	Engineering mode data
0x02	Target basic information

2.3.2 Target data composition

The content of the target data reported by the radar will change according to the working mode of the radar. In the normal working mode, the radar outputs the basic information data of the target by default; when configured in the engineering mode, the radar will add the energy value information of each range gate after the basic information data of the target. Therefore, the basic information of the target will always be output in the data reported by the radar, and the energy value information of the range gate will only be output after the command is enabled.

In the normal working mode, the composition of the target data reported by the radar is shown in Table 13, and the definition of the target state value is shown in Table 14. The composition of the target data frame in the engineering mode is shown in Table 15, and some data are added on the basis of the data reported in the normal working mode.

Table 13 Target basic information data composition

Target state	Movement target distance (cm)	Exercise target energy value	Stationary target distance (cm)	Stationary target energy value	Detection distance (cm)
1 byte (see Table 12)	2 bytes	1 byte	2 bytes	1 byte	2 bytes

Table 14 Target Status Value Description

Target state value	Description
0x00	No target
0x01	Movement target

0x02	Stationary target
0x03	Movement&Stationary target
0x04	Under background noise detection, only valid when performing background noise detection function
0x05	Bottom noise detection successful, only valid when performing the bottom noise detection function
0x06	Bottom noise detection failed, only valid when performing the bottom noise detection function

Table 15 Project Mode Target Data Composition

Add the following data after the target basic information data in Table 11

...	Maximum moving distance gate N	Maximum static distance gate N	Movement distance gate 0 energy value	...	Movement distance gate N energy value	Static distance gate 0 energy value	...	Static distance gate N energy value	Photosensitive detection value	Output status of the OUT pin
...	1 byte	1 byte	1 byte	...	1 byte	1 byte	...	1 byte	1 byte	1 byte

Photosensitive detection value range: 0 ~ 255, OUT pin output status: 0 unmanned, 1 occupied

Example of reporting data:

Report data in normal working mode:

Frame header	Intra-frame data length	Intra-frame data	End of frame
F4 F3 F2 F1	0D 00	02 AA 02 51 00 00 00 00 3B 00 00 55 00	F8 F7 F6 F5

Data reported in engineering mode:

Frame header	Intra-frame data length	Intra-frame data	End of frame
F4 F3 F2 F1	23 00	01 AA 03 1E 00 3C 00 00 39 00 00 08 08 3C 22 05 03 03 04 03 06 05 00 00 39 10 13 06 06 08 04 60 01 55 00	F8 F7 F6 F5

Example analysis:

F4 F3 F2 F1 Frame Head 23 00 Frame Data Length 01 Engineering Mode

AA frame data header 03 target state value 1E 00 moving target distance 3C moving target energy value

00 00 Static target distance 39 Static target energy value 00 00 Detection distance

08 08 Maximum Motion Distance Door Maximum Static Distance Door

3C 22 05 03 03 04 06 05 Motion distance door energy value (9)

00 00 39 10 13 06 08 04 Static distance door energy values (9)

60 photosensitive 01 out status 55 00 tail verification

F8 F7 F6 F5 End of frame

2.4 Radar command configuration mode

2.4.1 Radar Command Configuration Steps

The process of executing a configuration command by the LD2410B radar includes two links: "send command" by the host computer and "reply command ACK" by the radar. If the radar has no ACK reply or fails to reply ACK, it means that the radar fails to execute the configuration command.

As mentioned before, before sending any other commands to the radar, the developer needs to send the "enable configuration" command first, and then send the configuration command within the specified time. After the command configuration is completed, send the "end configuration" command to inform the radar configuration has ended.

For example, to read the radar configuration parameters, first the host computer sends the "enable configuration" command; after receiving the radar ACK successfully, it sends the "read parameters" command; after receiving the radar ACK successfully, it finally sends the "end" command. "Configure" command; after the radar ACK is successful, it indicates that the complete reading of parameters is over.

The radar command configuration process is shown in the figure below.

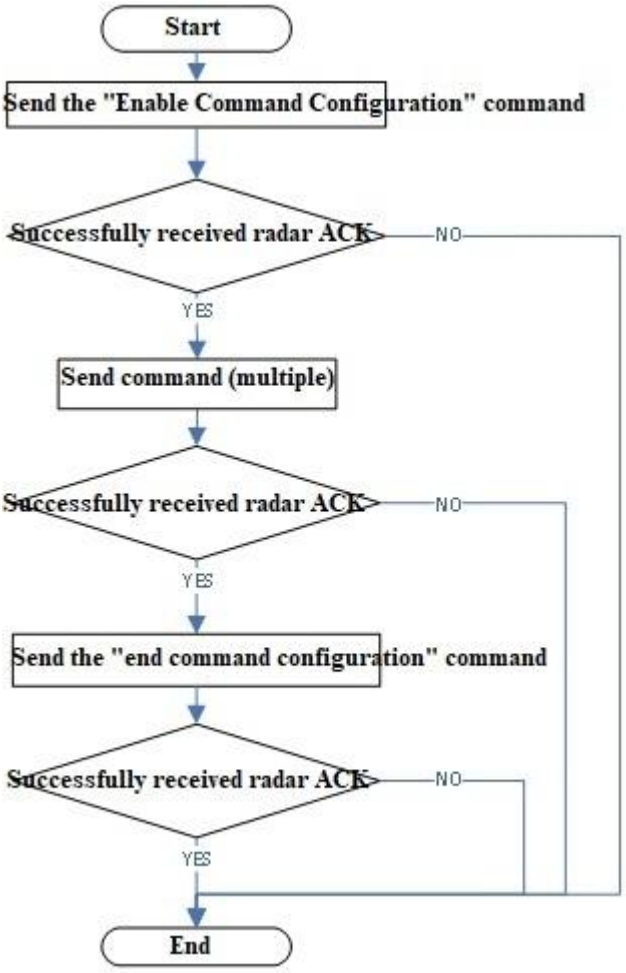


Figure 2 Radar command configuration process.

3. Revision records

Data	Version	Modify the content
2022-6-24	1.01	Initial version
2022-7-1	1.02	Fixed some error descriptions, added restart and factory reset commands
2022-7-19	1.03	Correct the length value of some command instances
2022-8-26	1.04	Added the description of the range resolution configuration command
2022-9-20	1.05	Added the protocol of bluetooth part
2023-2-21	1.06	Added the output description of optical sensing value, added the auxiliary control function setting command
2024-08-05	1.07	Command instructions for adding background noise detection and sensitivity automatic configuration related functions
2024-11-22	1.08	Modify some instruction reply errors and add engineering mode data parsing

4. Technical support and contact

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