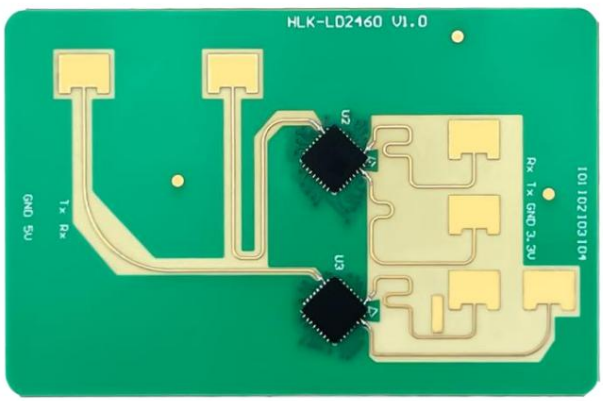
Shenzhen Hailingke Electronics Co., Ltd.

HLK-LD2460

Moving target detection and tracking module

Serial port protocol



1. Serial port protocol description

The LD2460 serial port protocol consists of a frame header, function code, data length, data content, and frame tail.

As shown in Table 1.

Table 1. Description of each part of the serial port protocol

Data item	illustrate
Frame	Fixed value
header	Divided by different functions
Function code	Total number of bytes of frame header + function code + data length + data content + frame tail
Data length Data	See below
content Frame end	Fixed value

2. Radar reporting protocol

After the radar detects a target, it actively reports the target information. The radar reporting protocol is shown in Table 2.

Table 2. Radar target information reporting protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xF4	Fixed value
	1byte	0xF3	
	1byte	0xF2	
	1byte	0xF1	
Function	1byte	0x04	
code data length	2byte	Total length of data	Target number*4(byte)+11(byte)
Data content	2byte	packet Target	X-axis position of target 1 (accuracy 0.1)
	2byte	1-X Target 1-Y	Y-axis position of target 1 (accuracy 0.1)
		…	
	2byte	Target NX	X-axis position of target N
	2byte	Target NY	Y-axis position of target N
Frame end	1byte	0xF8	Fixed value
	1byte	0xF7	
	1byte	0xF6	
	1byte	0xF5	

Data example: There is a target at the coordinates (1.5, 2.3) in the field, and the radar reports the following:

F4 F3 F2 F1 04 0F 00 0F 00 17 00 F8 F7 F6 F5

3. Radar on/off reporting function protocol

The host computer sends an on/off command to the radar to control the radar reporting function. The radar automatically reports by default when it is turned on.

After receiving the on/off command, the radar performs the corresponding operation and returns the operation result. The command protocol sent by the host computer is shown in Table 3

As shown, the radar receipt protocol is shown in Table 4.

Table 3. Open/Close reporting function command protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x06	
code data length	2byte	Total length of data packet	12
Data content	1byte	0/1	00: Disable radar reporting function 01: Enable radar reporting function
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The command to turn off the radar reporting function is as follows

FD FC FB FA 06 0C 00 00 04 03 02 01

Table 4. Radar on/off reporting function setting receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x06	
code data length	2byte	Total length of data packet	12
Data content	1byte	High 4 bits: operation result Lower 4 bits: Operation content	00: Failed to disable radar reporting function 10: Successfully closed the radar reporting function 01: Failed to enable radar reporting function 11: The radar reporting function is enabled successfully
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The receipt for successfully closing the radar reporting function is FD FC FB FA 06 0C 00 10 04 03 02 01

4. Set the installation height and installation angle agreement

The host computer sends a setting command to the radar to set the radar installation height and installation angle parameters. The parameters remain unchanged after the radar is powered off.

After receiving the setting parameters, the radar sets the parameters and returns the setting results after the setting is completed.

The command protocol is shown in Table 5, and the radar receipt protocol is shown in Table 6.

Note: This parameter can only be set when side-mounted.

Table 5. Protocol for setting radar installation parameters

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x07	
code data length	2byte	Total length of data	15
Data content	2byte	package Installation	Installation height (m)*100
	2byte	height Installation angle	Installation angle (°)*100
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: Set the radar installation height to 2.6 meters and the installation angle to 30 degrees. The host computer sends the following instructions:

FD FC FB FA 07 0F 00 04 01 B8 0B 04 03 02 01

Table 6. Set radar installation parameter receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x07	
code data length	2byte	Total length of data packet	12
Data content	1byte	Setting the result	00: Installation parameter setting failed 01: Installation parameters set successfully
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The instructions for setting radar installation parameters successfully are as follows

FD FC FB FA 07 0C 00 01 04 03 02 01

5. Check the installation height and installation angle agreement

The host computer sends a query command to the radar to query the current installation height and installation angle. The radar receives the query command.

Returns the current installation parameters. The installation parameter query command protocol is shown in Table 7, and the radar return installation parameter protocol is shown in Table 8.

Note: This parameter is only queried when side-mounted.

Table 7. Query installation parameter protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x08	
code data	2byte	Total length of data packet	12
length data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The host computer query installation parameter command is as follows

FD FC FB FA 08 0C 00 01 04 03 02 01

Table 8. Radar installation parameter receipt protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x08	
code data length	2byte	Total length of data	15
Data content	2byte	package Installation	Installation height (m)*100
	2byte	height Installation angle	Installation angle (°)*100
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The current installation height is 2.6 meters, the installation angle is 30 degrees, and the radar receipt information is as follows:

FD FC FB FA 08 0F 00 04 01 B8 0B 04 03 02 01

6. Set the installation mode

Send a setting command to the radar to set the radar installation mode (side mount/top mount). After receiving the setting command, the radar

The radar installation mode setting protocol is shown in Table 9, and the radar receipt protocol is shown in Table 10.

Table 9. Protocol for setting radar installation mode

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x09	
code data length	2byte	Total length of data packet	12
Data content	1byte	01/02	01: Side Mount 02: Top loading
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The host computer sets the installation mode to side installation command as follows

FD FC FB FA 09 0C 00 01 04 03 02 01

Table 10. Set Installation Mode Radar Receipt Protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x09	
code data length	2byte	Total length of data packet	12
Data content	1byte	High 4 bits: operation result Lower 4 bits: Setting content	01: Side-mount setting failed 11: Side-mounting is set successfully 02: Setting top installation failed 12: Top installation is set successfully
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Set the side installation success receipt command as follows: FD FC FB FA 09 0C 00 11 04 03 02 01

7. Query the installation mode protocol

The host computer sends a query command to the radar to query the current installation mode (side mount/top mount). The radar receives the query

The current mode information is returned after the command is issued. The command protocol for querying the radar installation mode is shown in Table 11. The radar returns the installation mode protocol.

The proposals are shown in Table 12.

Table 11. Protocol for querying radar installation mode

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0A	
code data	2byte	Total length of data packet	12
length data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The command to query the radar installation mode is as follows

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

Table 12. Radar installation mode receipt instructions

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0A	
code data length	2byte	Total length of data packet	12
Data content	1byte	01/02	01: Side Mount 02: Top loading
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The current installation mode is top installation, and the receipt instructions are as follows

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

8. Firmware version query protocol

The host computer sends a firmware version query command to the radar, and the radar returns the version of the currently running firmware after receiving the command.

The protocol for querying the firmware version number is shown in Table 13, and the protocol for receiving the radar version number is shown in Table 14.

Table 13. Protocol for querying firmware version number

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0B	
code data length	2byte	Total length of data packet	12
data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

The command to query the current firmware version number is: FD FC FB FA 0B 0C 00 01 04 03 02 01

Table 14. Radar version number receipt protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0B	
code data length	2byte	Total length of data pack	16
Data content	1byte	Installation mode	01: Side Mount / 02: Top Mount
	1byte	Year	
	1byte	moon	
	1byte	Major version number	
	1byte	Minor version number	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The current firmware version is V1.2, February 25, and the radar returns the following information:

FD FC FB FA 0B 10 00 02 19 02 01 02 04 03 02 01

9. Restart the radar command protocol

The host computer sends a restart command to the radar, and the radar restarts after receiving the command. The radar restart command protocol is shown in Table 15.

Table 15. Radar restart protocol

Data direction: host computer ÿ radar

Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0D	
code data	2byte	Total length of data packet	12
length data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The radar restart command is as follows

FD FC FB FA 0D 0C 00 01 04 03 02 01

10. Set the radar baud rate

The host computer sends a baud rate modification command to the radar. After receiving the command, the radar sets the baud rate and returns the setting result.

The instructions sent by the position machine are shown in Table 16, and the radar receipt protocol is shown in Table 17.

Table 16. Radar Modify Baud Rate Protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0E	
code data length	2byte	Total length of data packet	12
Data content	1byte	Baud rate serial number	0ÿ9600 1ÿ19200 2ÿ38400 3ÿ57600 4ÿ115200 5ÿ230400 6ÿ256000 7ÿ460800
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: To change the baud rate to 115200, the host computer sends the following command:

FD FC FB FA 0E 0C 00 04 04 03 02 01

Table 17. Radar Modify Baud Rate Receipt Protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x0E	
code data length	2byte	Total length of data packet	12
Data content	1byte	00/01	00: Baud rate setting failed 01: Baud rate setting successful
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

The radar replies that the baud rate has been modified successfully: FD FC FB FA 0E 0C 00 01 04 03 02 01

11. Restore factory settings

The host computer sends a command to restore the factory settings to the radar, and the radar sets the baud rate to the default value: 115200. Installation method

The settings are: side-mounted, the installation height is set to 2.6 meters, the installation angle is set to 30°, and the side-mounted detection range is set to 6 meters.

±60°, top-mounted detection range is set to 4 meters 0-360°. After the radar setting is completed, the setting result is returned. Restore factory settings

The protocol is shown in Table 18, and the radar factory reset receipt is shown in Table 19.

Table 18 Factory reset protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x10	
code data	2byte	Total length of data packet	12
length data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The host computer sends the factory setting command to the radar as follows

FD FC FB FA 10 0C 00 01 04 03 02 01

Table 19. Radar factory reset receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x10	
code data length	2byte	Total length of data packet	12
Data content	1byte	00/01	00: Factory reset failed 01: Factory reset successful
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Radar factory reset successful receipt: FD FC FB FA 10 0C 00 01 04 03 02 01

12. Detection range setting

The host computer sends a detection range setting command to the radar to set the radar detection distance and detection angle.

Maximum 6 meters, angle range ±60°; top-mounted detection distance maximum 4 meters, angle 0-360°. This setting only sets the current installation

The radar detection range setting protocol is shown in Table 20, and the radar receipt protocol is shown in Table 21.

Table 20. Radar detection range setting protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x11	
code data length	2byte	Total distance of	16
Data content	1byte	data	Distance*10 Unit (meter*10)
	2byte	packet Start	Angle*10 (°*10)
	2byte	angle End angle	Angle*10 (°*10)
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The radar is set to detect a distance of 6 meters and a detection angle of ±50°. The host computer instructions are as follows:

FD FC FB FA 11 10 00 3C 0C FE F4 01 04 03 02 01

Table 21. Radar setting detection range receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x11	
code data length	2byte	Total length of data packet	12
Data content	1byte	00/01	00: Detection range setting failed 01: Detection range is set successfully
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Radar detection range setting success receipt: FD FC FB FA 11 0C 00 01 04 03 02 01

13. Detection range query

The radar sends a query detection range command to the host computer, and the host computer returns information such as detection distance and angle.

Detection range in installation mode. The detection range query command is shown in Table 22, and the radar response is shown in Table 23.

Table 22. Query detection range protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x12	
code data length	2byte	Total length of data packet	12
data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Query detection range command: FD FC FB FA 12 0C 00 01 04 03 02 01

Table 23. Query detection range receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	

	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x12	
code data length	2byte	Total distance of	16
Data content	1byte	data	Distance*10 Unit (meter*10)
	2byte	packet Start	Angle*10 (°*10)
	2byte	angle End angle	Angle*10 (°*10)
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: If the current installation mode is side-mounted, the radar detection distance is 6 meters, and the detection angle is ±50°, the receipt is as follows

FD FC FB FA 12 10 00 3C 0C FE F4 01 04 03 02 01

14. Radar detection sensitivity setting

The host computer sends a sensitivity setting command to the radar, and the radar sets the sensitivity after receiving the command.

The sensitivity setting protocol is shown in Table 24, and the radar response is shown in Table 25.

Note: This protocol is a reserved protocol and specific functions are yet to be added.

Table 24. Radar sensitivity setting protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x13	
code data length	2byte	Total length of data packet	12
Data content	1byte	Sensitivity value	01: High sensitivity 02: Medium sensitivity 03: Low sensitivity
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Set high sensitivity command: FD FC FB FA 13 0C 00 01 04 03 02 01

Table 25. Sensitivity setting receipt

Data direction: radar ÿ host computer			
Data item data length		value	illustrate

Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x13	
code data length	2byte	Total length of data packet	12
Data content	1byte	00/01	00: Sensitivity setting failed 01: Sensitivity setting successful
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Sensitivity setting success receipt: FD FC FB FA 13 0C 00 01 04 03 02 01

15. Sensitivity query

The host computer sends a sensitivity query command to the radar, and the radar returns the current sensitivity value. The sensitivity query protocol is shown in Table 26

The radar response sensitivity protocol is shown in Table 27.

Table 26. Sensitivity query protocol

Data direction: host computer ÿ radar			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	
Function	1byte	0x14	
code data	2byte	Total length of data packet	12
length data content	1byte	01	
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The host computer sends the following sensitivity query command to the radar:

FD FC FB FA 14 0C 00 01 04 03 02 01

Table 27. Sensitivity Query Receipt Protocol

Data direction: radar ÿ host computer			
Data item data length		value	illustrate
Frame Header	1byte	0xFD	Fixed value
	1byte	0xFC	
	1byte	0xFB	
	1byte	0xFA	

Function	1byte	0x14	
code data length	2byte	Total length of data packet	12
Data content	1byte	Sensitivity value	01: High sensitivity 02: Medium sensitivity 03: Low sensitivity
Frame end	1byte	0x04	Fixed value
	1byte	0x03	
	1byte	0x02	
	1byte	0x01	

Data example: The radar returns that the current sensitivity is medium, and the receipt instruction is as follows

FD FC FB FA 14 0C 00 02 04 03 02 01