Module13.2 QRCode

Recognition Reading Protocol

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1. Introduction

The protocol programming is used by the host computer to implement function configuration, information reading, control and other operations on the reader module. The protocol can realize the interaction between the host computer and the reader module through RS-232, USB virtual serial port and other interfaces.

This document contains the protocol format specification and protocol instruction table.

1.1 Protocol Format

The command sent by the host consists of 4 parts:

Command Type	Property Identifier (PID)	Functional Identifier (FID)	Value
1 byte	1 byte	1 byte	Indefinite length

Description of each part:

Fields	Length	Value
Command type (TYPE)	1 byte	The type of command sent by the host or identification module
Property Identifier (PID)	1 byte	Contains a set of numbers for specific functions
Functional Identifier (FID)	1 byte	Function number is the specific sub-function under the attribute. The upper two bits (7th and 6th) of FID are used as the description of the number of parameter bytes: 7bit 6bit Number of parameter bytes 0 0 None 0 1 1 byte 1 0 2 bytes 1 1 Greater than 2 bytes
Value (PARAM)	Indefinite length	The parameter length is determined by the two higher bits of the FID. If it is greater than two bytes, the first two bytes of the parameter part determine the number of remaining bytes of the parameter.

1.2 Protocol Package Type

Communication programming protocols include several protocol types:

Configuration commands, control commands, status commands, image commands

Each protocol command class contains a variety of specific communication commands, which are used by the host to send requests and the identification module to

respond to the host requests.

1.2.1 Configuration Commands

Set and read the reading module configuration function parameter information.

Configuration Write	twenty one	The host requests to modify the value of one or more configuration parameters When the configuration is written successfully, the command parameters will be saved directly to the storage medium.
Configuring write replies	twenty two	The identification module sends the host response configuration result
Configuration Read	twenty three	The host requests the value of one or more configuration parameters
Configuring Read Replies	twenty four	The identification module sends the configuration Values requested by the host

1.2.2 Control Commands

The host controls the identification module to complete an action.

Control instructions	32	The host sends one or more control instructions for the identification module to execute
Control Reply	33	Identify the module's response to control commands

1.2.3 Status Query

Get the status information of the reading device, such as version number, serial number , etc.

Status Read	43	The host requests to obtain the identification module status information
Status Reply	44	The identification module sends status information in response to host requests .

1.2.4 Image Commands

Set and read the reading module configuration function parameter information .

Image Reading	60	Host requests to obtain image data
Image Reply	61	The recognition module sends image data to the host and responds to the host's request .

2. Protocol Command Description

2.1 Configuration Commands

These commands are used to configure the identification module or receive the setting information of the identification module.

2.1.1 Configuration Write (0x21)

The configuration write command is sent by the host to send the setting command to the identification module.

The command Value will be applied to the corresponding function of the current reading module and saved to the storage medium.

- Protocol format : **<21> <PID> <FID> <PARAM>**

2.1.2 Configure Write Reply (0x22)

Sent by the identification module to the host as a response to the configuration write command to illustrate the configuration write execution result.

Supported configuration write commands will be executed correctly, and illegal commands will return error results.

- Protocol format : **<22> <PID> <FID> <PAR> <RID>**
- The format is as follows:

PID/FID	Configuration write contains flags
PAR	When the configuration write is a 1-byte Value, fill in the original Value When the configuration write is 2 or more bytes of Value, fill in 00
RID	Configuration write result 0x00 Configuration successful 0x01 Illegal PID/FID

- Example 1: Configure the reading mode to key trigger mode

  Host: 21 61 41 00
  Module: 22 61 41 00 00

- Example 2: Configuring the suffix /r/n

  Host: 21 51 C2 00 02 0D 0A
  Module: 22 51 C2 00 00

2.1.3 Configuration Read (0x23)

The configuration read command is sent by the host to receive the configuration information Value of the identification module.

- Protocol format : **<23> <PID> <FID>**

2.1.4 Configuration Read Reply (0x24)

Sent by the identification module to the host as a response to a configuration read command. Used to send the configuration Value requested by the host.

If an unsupported configuration parameter is requested, no error is generated. Unsupported PID/FID are ignored.

- Protocol format : **<24> <PID> <FID> <PARAM>**

The Identification Module ignores unsupported set parameter requests without generating an error.

- Example: Read module reading mode

  Host: 23 61 41
  Module: 24 61 41 05

2.2 Control Commands

The control command is used to operate the identification module to complete corresponding operations, such as starting decoding, restoring to factory settings, etc.

2.2.1 Control Instruction (0x32)

The control command is sent by the host to control the identification module to complete a certain operation.

- Protocol format : **<32> <PID> <FID> <PARAM>**

2.2.2 Control Reply (0x33)

The identification module is used to respond to the control command (0x32) sent by the host.

When the control command is executed correctly, the identification module sends a "result command" as a response. Some control commands are not returned. If the control command contains illegal commands, the illegal commands will be included in the result command and returned to the host.

- Protocol format : **<33> <PID> <FID> <PAR> <RID>**
- The format is as follows:

PID/FID	The PID and FID contained in the control command
PAR	When the control command is a 1-byte Value, fill in the original Value the control command has no parameters or 2 or more byte Values, fill in 00
RID	Control command results 0x00 The command succeeded . 0x01 PID / FID , parameters are incorrect

- Example 1: Send a start decoding command

  Host: 32 75 01
  Module: Null

- Example 2: Send a stop decoding command

  Host: 32 75 02
  Module: 33 75 02 00 00

2.3 Status Query Command

This part of the commands is used to send and receive status parameter information. Status query includes reading module software version, firmware version, serial number, etc.

2.3.1 Status Read (0x43)

The status read command is sent by the host to receive certain status parameter information of the identification module.

- Protocol format : **<43> <PID> <FID>**

2.3.2 Status Reply (0x44)

Sent by the identification module to the host as a response to a status read, used to send the status Value requested by the host.

Unsupported or illegal status query commands are ignored and no error is generated. If all queries are unsupported, an empty status reply is returned.

- Protocol format : **<44> <PID> <FID> <PARAM>**

Unsupported or illegal status query commands are ignored and no error is generated. If all queries are unsupported, an empty status reply is returned: < 44 > < 00 > .

- Example: Get the firmware version of the reader module:

  The host sends a status read:

Command Type	PID/FID
43	02C1
Status Read	Firmware version

  Identify module status reply:

Command Type	PID/FID	parameter
43	02C1	00 09 42 46 35 33 31 5F 31 2E 30
Status Reply	Firmware version	Length BF351_1.0

2.4 Image Commands

This part of commands is used to transmit image data.

2.4.1 Image Read (0x60)

The image read command is sent by the host to request the recognition module to send the current (last) acquired image data.

- Protocol format : **< 60 > < Request Image Header >**

The <Request Image Header> contains the image condition information, such as image size, format, etc., and is defined as follows:

Name	Byte	Illustration
width	2	Image width (MSB first) The width can be smaller than the supported image size width, in which case the image will be scaled.
high	2	Image height (MSB first) If the maximum image height supported is smaller than the maximum image height, the image will be scaled
Image Type	1	When Bit [7:4] Bit [3:0] = 3, it is Jpeg format Compression rate percentage: 01 - 0A 10%-100%, default 00 is 50% Bit [3:0] 0 - Raw data 3 - Jepg format
reserve	1	Reserved for use

- Identify module response :

When the recognition module correctly receives the image data read command, it will send an "image reply" command as a response.

If the host request contains illegal Values, the recognition module returns an empty "image reply".

2.4.2 Image Reply (0x61)

The image reply is sent by the recognition module to the host in response to the image read command.

- Protocol format : **< 61 > < Reply Image Header > < Image Data >**

The definition of <Reply Image Header> is as follows:

Name	Byte	Illustrate
width	2	Image width (MSB first) The width can be smaller than the supported image size width, in which case the image will be scaled.
high	2	Image height (MSB first) If the maximum image height supported is smaller than the maximum image height, the image will be scaled
Image Type	1	When Bit [7:4] Bit [3:0] = 3, it is Jpeg format Compression rate percentage: 01 - 0A 10%-100%, default 50% Bit [3:0] 0 Original data 3 Jepg format
reserve	1	Reserved for use
Image data length	4	Total number of bytes in the image data area (MSB first)

If the image read command contains illegal parameters, the reply will return empty data : < 61 > < 00 >

- Example:

The host requests the recognition module to upload an image with a size of 640×480 and original data, and the recognition module returns the current captured image.

The host sends an image data read command:

Command Type	Request image header
60	0280 01 E0 00 00
Image Reading	Width and height original data retained

The identification module sends a reply command:

Command Type	Reply Image Header	Image data
60	0280 01 E0 00 00 00 1C 20 00	7A 76 7B 7A 7C 76 76 76 79 79 78 79 76 …
Image read reply	Width Height Original Data Retain Image Data Length	Image data

3. Protocol Command Table

3.1 Configuration Parameter Table

This list describes the definition of the PID/FID and Values of each configuration function of the reader module.

To complete the corresponding configuration function parameter writing or reading function, refer to the " Configuration Commands " section.

3.1.1 Communication Interface

Description	PID/FID	Value
RS232 (serial port)	42 40	00
USB keyboard emulation		01
USB virtual serial port		02
USB HID POS		03
RS485		04

3.1.2 RS232 Parameters

Description		PID/FID	Value
Baud rate	1200	41 41	04
	2400		05
	4800		06
	9600		07
	19200		08
	38400		09
	57600		0A
	115200		0B
	128000		0C
Data bits	7 bits	41 42	00
	8 bits		01
Check digit	None	41 43	00
	Even		01
	Odd		02
Stop bits	1	41 44	00
	2		01

3.1.3 USB Keyboard

Description		PID/FID	Value
Keyboard Country Type	US	43 40	00
	Spain		01
	Germany		02
	France251		03
	France189		04
	Italy		05
	Sweden153		06
	Swenden285		07
	UK166		08
	UK168		09
	Brazil		0A
	Latin America		0B

Description		PID/FID	Value
	India		0C
	Korea		0D
	Russia		0E
	Turkey Q		0F
	Turkey F		10
	Hungary		11
	Croatia		12
Barcode encoding type	ASCII	43 41	00
	GBK		01
	UTF-8		02
Input speed mode	Default Speed	43 42	00
	Fast		01

3.1.4 Reading Parameters

Description		PID/FID	Value
Trigger Mode	Button	61 41	00
	Continuous		01
	Automatic		02
	Pulse		04
	Motion Sensing		05
Pulse trigger timeout	Stop decoding timeout (unit: 1ms) XXYY = hex value 00 to FFFF	61 82	XXYY
Sensing Mode Sensitivity	1		
	2		
	3		
	4		
	5		
Sensing mode continuous decoding	Close	61 4B	00
	Open		01
Same code interval	Close	64 82	0000
	Interval duration (unit: 1ms) XXYY = hex value 00 to FFFF		XXYY
Same code, no delay	Close	64 43	00
	No delay		01

3.1.5 Fill Light

Description		PID/FID	Value
Working Mode	Decoding is always on	62 41	02
	Constantly extinct		00
	Always on after power on		03

Description		PID/FID	Value
Working brightness	Percentage 0 to 100 XX = hex value 0 to 64	62 48	XX
Induction detection enable	Close	62 44	00
	Always on		01
Sensor detection brightness	Percentage 0 to 100 XX = hex value 0 to 64	62 4C	XX

3.1.6 Positioning Light

Description		PID/FID	Value
Working Mode	Flash	62 42	01
	Always on		02
	Constantly extinct		00
Induction detection enable	Close	62 45	00
	Always on		01

3.1.7 Buzzer

Description		PID/FID	Value
Successful recognition prompt	Open	63 46	01
	Close		00
Number of successful identifications	0	63 42	00
	1		01
	2		02
Identify success types	Default	63 41	01
	Short		00
	Long Tone		02
Startup reminder tone	4 sounds	63 45	01
	2 sounds		02
	Close		00

3.1.8 Language Settings

Description		PID/FID	Value
Enable settings	Close	65 40	00
	Open		01
Read successfully	Close	65 42	00
	Combined broadcast		01
	Play only the default voice		02
	Allow WeChat and Alipay voice		03
	Allow WeChat and Alipay		04
volume	0 to 100 XX = hex value 0 to 64	61 4B	XX

3.1.9 Data Editing

Description		PID/FID	Value
Suffix Enable	Open	51 4C	01
	Close		00
Barcode suffix content	Data length 0 to 40 bytes LD = length (2 bytes) + data (0-40 bytes)	51 C2	LD
Prefix Enable	Open	51 CB	01
	Close		00
Barcode prefix content	Data length 0 to 40 bytes LD = length (2 bytes) + data (0-40 bytes)	51 C1	LD
Protocol Format	Close	51 43	00
	Format 1		01
	Format 2		02
	Format 3		03
Case conversion	Close	51 48	00
	Capitalize		01
	Lowercase		02

3.1.10 One - dimensional Code Setting

Description		PID/FID	Value
Code 39			
Code 39	Prohibited from reading	23 40	00
	Allow reading		01
Verification method	No verification	23 41	00
	Code 32 Checksum		01
	Mod 43 Checksum		02
Full ASCII	Prohibit	23 42	00
	Allow		01
Output start and end characters	Prohibit	23 43	00
	Allow		01
Output Verification	Prohibit	23 33	00
	Allow		01
Code 93			
Code 93	Prohibited from reading	22 40	00
	Allow reading		01
Full ASCII	Prohibit	22 41	00
	Allow		01
Code 128			
Code 128	Prohibited from reading	21 40	00
	Allow reading		01

Description		PID/FID	Value
UPC-A			
UPC-A	Prohibited from reading	24 41	00
	Allow reading		01
Output Verification	Prohibit	24 51	00
	Allow		01
UPC-E			
UPC-A	Prohibited from reading	24 42	00
	Allow reading		01
Output Verification	Prohibit	24 52	00
	Allow		01
EAN 13			
EAN 13	Prohibited from reading	24 43	00
	Allow reading		01
Output Verification	Prohibit	24 53	00
	Allow		01
EAN 8			
EAN 8	Prohibited from reading	24 44	00
	Allow reading		01
Output Verification	Prohibit	24 54	00
	Allow		01
Codabar			
Codabar	Prohibited from reading	25 40	00
	Allow reading		01
Verification method	No verification	25 41	00
	check		01
Output Verification	Prohibit	25 42	00
	Allow		01
Output start and end characters	Prohibit	25 43	00
	Output start and end characters ABCD		01
	Output start and end characters abcd		02
Standard 2 of 5			
Standard 2 of 5	Prohibited from reading	26 40	00
	Allow reading		01
Verification method	No verification	26 41	00
	Find remainder 10 Check		01
Output Verification	Prohibit	26 42	00
	Allow		01
Martix 2 of 5			
Martix 2 of 5	Prohibited from reading	27 40	00
	Allow reading		01
Verification method	No verification	27 41	00
	Find remainder 10 Check		01

Description		PID/FID	Value
Output Verification	Prohibit	27 42	00
	Allow		01
Interleaved 2 of 5			
Interleaved 2 of 5	Prohibited from reading	28 40	00
	Allow reading		01
Verification method	No verification	28 41	00
	Find remainder 10 Check		01
Output Verification	Prohibit	28 42	00
	Allow		01
MSI			
MSI	Prohibited from reading	2A 40	00
	Allow reading		01
Verification method	No verification	2A 41	00
	Find remainder 10 Check		01
	Find remainder 11 Check		02
	2 times modulo 10 check		03
	Remainder 11/Remainder 10 Check		04
Output Verification	Prohibit	2A 42	00
	Allow		01
Code 11			
Code 11	Prohibited from reading	2940	00
	Allow reading		01
Verification method	No verification	29 41	00
	1 check		01
	2 checks		02
	Automatic verification		03
Output Verification	Prohibit	29 42	00
	Allow		01
GS1 Databar (Omnidirectional)			
GS1 Databar (Omnidirectional)	Prohibited from reading	2B 40	00
	Allow reading		01
GS1 Databar (Limited)			
GS1 Databar (Limited)	Prohibited from reading	2B 41	00
	Allow reading		01
GS1 Databar (Expanded)			
GS1 Databar (Expanded)	Prohibited from reading	2B 42	00
	Allow reading		01
China Post			
China Post	Prohibited from reading	2D 40	00
	Allow reading		01

Description		PID/FID	Value
Plessey			
Plessey	Prohibited from reading	2C 40	00
	Allow reading		01
Output Verification	Prohibit	2C 41	00
	Allow		01
Telepen			
Telepen	Prohibited from reading	2E 40	00
	Allow reading		01
Encoding Type	ASCII	2E 41	00
	Numeric		01

3.1.11 QR Code Settings

Description		PID/FID	Value
QR Code			
QR Code	Prohibited from reading	10 40	01
	Allow reading		00
Mirror Image Reading	Close	10 42	01
	Open		00
Micro QR			
Micro QR	Prohibited from reading	15 40	00
	Allow reading		01
PDF417			
PDF417	Prohibited from reading	11 40	00
	Allow reading		01
Chinese Xin Code			
Chinese Xin Code	Prohibited from reading	12 40	00
	Allow reading		01
Data Matrix			
Data Matrix	Prohibited from reading	13 40	00
	Allow reading		01
Aztec			
Aztec	Prohibited from reading	14 40	00
	Allow reading		01
Micro PDF417			
Micro PDF417	Prohibited from reading	16 40	00
	Allow reading		01
Grid Matrix			
Grid Matrix	Prohibited from reading	17 40	00
	Allow reading		01

3.2 Control Command Table

To complete the corresponding control command function, it is necessary to compose a complete protocol command according to the "Control Command" section.

Description		PID/FID	Value
Decoding commands	Start decoding	75 01	none
	Stop decoding	75 02	
	Start delayed decoding	75 04	
Setting Commands	Factory Reset	76 01	
Code reading settings	Close All	76 42	00
	Only Allow reading of all 1D codes		01
	Only Allow reading of all QR codes		02
	Allow all barcodes		0 3

3.3 Status Query Command Table

To complete the corresponding status information query function, it is necessary to form a complete protocol command according to the "Status Command" section.

Description		PID/FID	Value
Version	Reading software version	02 C2	none
	Firmware version	02 C1	
Product Information	Serial Number	02 C5	
	Production Date	02 C6	
	Hardware Model (Device Type)	02 C7	
	Hardware specifications	02 C8	
	Hardware version	02 C4	