

# Vcan1935 Communication protocol sample document

## 1. Communication protocol content

### 1. Agreement object content (some examples):

#### Vcan1935 transmitter number list

parameter name	length	label	Read and write R/W	Remark
Transmit power (adjustable)	1	0x0107	R/W	Transmit power 1dB adjustable
System fault error code	4	0x0108	R	system error BIT0: FPGA fault BIT1: Data transmission failure BIT2: RF failure BIT3: Voice chip failure
Frequency point (string)	10	0x0200	R/W	String, such as "435.5"
Digital board temperature	5	0x0211	R	String, "56.8"
Channel connection status	1	0x0120	R	0: System failure 1: Communication interruption 2: Communication normal
Video channel 1 format setting	1	0x0130	R/W	0:AUTO 1:NTSC 2: PAL 3:720P_25 4:720P_30 5:720P_50 6:720P_60 7:1080P_25 8:1080P_30
Video channel 2 format setting	1	0x0131	R/W	Same as above
Video channel 3 format setting	1	0x0132	R/W	Same as above

Video channel 4 format setting	1	0x0133	R/W	Same as above
Channel 1 format	1	0x0138	R	0: Not connected 1:NTSC 2: PAL 3:720P_25 4:720P_30 5:720P_50 6:720P_60 7:1080P_25 8:1080P_30
Channel 2 format	1	0x0139	R	Same as above
Channel 3 format	1	0x013a	R	Same as above
Channel 4 format	1	0x013b	R	Same as above
Video channel selection	1	0x0140	R/W	0: Four pictures 1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4
FPGA video output format	1	0x0141	R/W	0:NTSC 1:PAL 2:720P 3:1080P
Adaptive video output mode	1	0x0142	R/W	0: off 1: open
Initial video channel selection	1	0x0143	R/W	0: Four channels 1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4
Video combining mode	1	0x0144	R/W	0:4 screen evenly divided 1:4 screen up and down mode 2:4 screen left and right mode 5:3 screen up and down mode 6:3 screen left and right mode 9:2 screen up and down mode 10:2 screen left and right mode
Channel 1 OSD	50	0x0145	R/W	Strings can be set with Chinese characters (UTF-8 format)
Channel 2 OSD	50	0x0146	R/W	string
Channel 3 OSD	50	0x0147	R/W	string
Channel 4 OSD	50	0x0148	R/W	string
Home screen settings	1	0x014A	R/W	1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4
<b>Data transmission parameters:</b>				
Digital transmission	1	0x0410	R	0:Master

working mode				1:Repeater 2:Slave
Data transmission wireless speed	1	0x0411	R/W	0:automatic 1:115200 2:172800 8:57600
Digital ID	4	0x0412	R/W	Values (0 - 4,294,967,295) 1234567890
Data transmission power	1	0x0415	R/W	3 options (30 27 20) 30:30dBm 27:27dBm 20:20dBm
configuration status	1	0x0416	R	0: To be effective 1: Configuration successful
Digital transmission receiving energy	1	0x0417	R	signed number
<b>BB:</b>				
Frequency point (receiving)	10	0x0210	R	String (receiver frequency point)
receiving status	1	0x0A30	R	0:UnLock 1:Lock
Received power	10	0x0A31	R	string
BER	4	0x0A35	R	
total packets received	4	0x0A37	R	
Error packet received	4	0x0A39	R	
ARM version number query	20	0x0A01	R	string form
FPGA software version	20	0x0A02	R	string form
RF2081 status	1	0x0A1D	R	0:unlock 1:lock
modulation mode	1	0x0A19	R/W	0 = QPSK 1 = 16QAM 2 = 64QAM
CC method	1	0x0A1A	R	0 = 1/2CC 1 = 2/3CC 2 = 3/4CC 3 = 5/6BC 4 = 6/7CC
Bandwidth query	1	0x0A1B	R	02:2M 0x25:2.5M 04:4M 06:6M 07:7M 08:8M
Channel information-guard interval	1	0x0A26	R	0:1/32 1:1/16 2:1/8 3:1/4
Voice switch	1	0x0EA0	R/W	0: off 1: on
Audio encoding settings	1	0x0EBA	R/W	0:PCM 3:OPUS

Bandwidth settings	1	0x0EA1	R/W	2::2.5M 3:8M 6:4M
Local IP settings	16	0x0E07	R/W	String—"192.168.1.22"
Serial port baud rate setting	1	0x0EA5	R/W	Baud rate setting: 0:115200 1:38400 2:9600 3:19200
Video quality	1	0x0EAA	R/W	0: Screen priority 1: Latency priority
Audio IO control switch	1	0x0ED0	R/W	0: full duplex 1: Half duplex
Audio noise reduction switch	1	0x0ED1	R/W	0: OFF 1:ON
Noise reduction mode	1	0x0ED2	R/W	Noise reduction level 0~3
echo cancellation switch	1	0x0ED3	R/W	0: OFF 1:ON
audio gain switch	1	0x0ED4	R/W	0: OFF 1:ON
Echo Cancellation Match Time	1	0x0ED5	R/W	silence time
Audio IO level status	1	0x0ED6	R	0: low level 1: high level
MIC volume	1	0x0ED7	R/W	0~100
Spker audio	1	0x0ED8	R/W	0~100
Silent switch	1	0x0ED9	R/W	0: OFF 1:ON

## Vcan1935 receiver parameter list

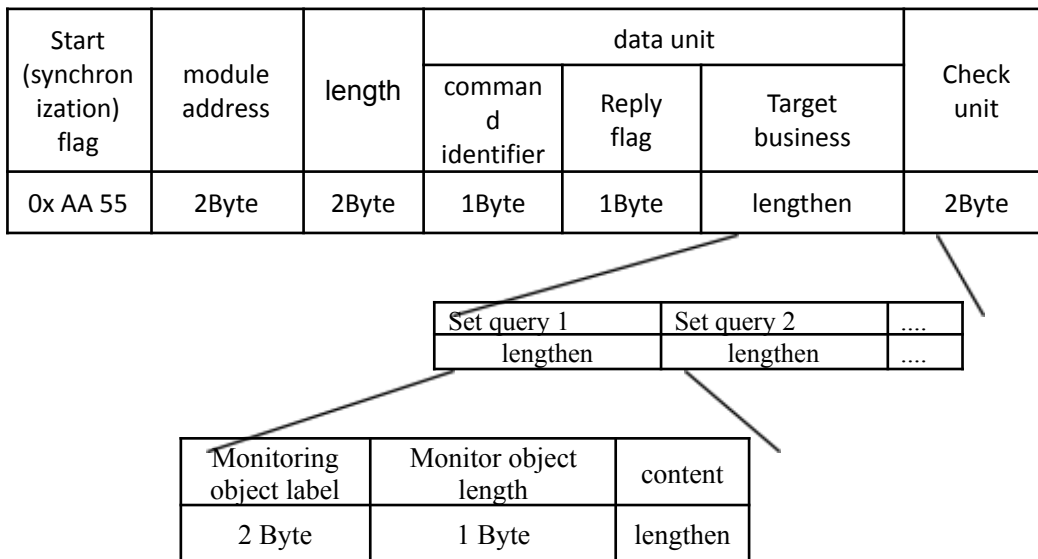
parameter name	length	label	Read and write R/W	Remark
Transmit power (adjustable)	1	0x0107	R/W	Adjust transmitter power
System fault error code	4	0x0108	R	system error BIT0: FPGA fault BIT1: Data transmission failure BIT2: RF failure BIT3: Voice chip failure BIT4: Demodulation failure
slave module address	2	0x0109	R	slave module address
Frequency point (string)	10	0x0200	R/W	string
Digital board temperature	5	0x0211	R	String, "56.8"
Channel connection status	1	0x0120	R	0: System failure 1: Communication interruption 2: Communication normal
<b>Video settings:</b>				
Video channel selection	1	0x0140	R/W	0: Four pictures

				1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4
Home screen settings	1	0x014A	R/W	1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4
<b>Transmitter information:</b>				
Channel 1 format	1	0x0138	R	0: Not connected 1:NTSC 2: PAL 3:720P_25 4:720P_30 5:720P_50 6:720P_60 7:1080P_25 8:1080P_30
Channel 2 format	1	0x0139	R	Same as above
Channel 3 format	1	0x013a	R	Same as above
Channel 4 format	1	0x013b	R	Same as above
Video output format	1	0x0141	R	0:NTSC 1:PAL 2:720P 3:1080P
Frequency point (transmission)	10	0x0210	R	String (transmitter frequency point)
Real-time transmit power	1	0x0E06	R	
Transmitter digital board temperature	5	0x0EBE	R	String, "56.8"
<b>Data transmission parameters:</b>				
Digital transmission working mode	1	0x0410	R/W	0:Master 1:Repeater 2:Slave
Data transmission wireless speed	1	0x0411	R/W	0:automatic 1:115200 2:172800 8:57600
Digital ID	4	0x0412	R/W	Values (0 - 4,294,967,295) 1234567890
Data transmission power	1	0x0415	R/W	3 options (30 27 20) 30: 30dBm 27: 27dBm 20: 20dBm
configuration status	1	0x0416	R	0: To be effective 1: Configuration successful
Digital transmission receiving energy	1	0x0417	R	signed number

ARM version number query	20	0x0A01	R	string form
FPGA software version	20	0x0A02	R	string form
Clear packet count statistics	1	0x0A18	IN	1 Clear
RF status	1	0x0A1D	R	0:UnLock 1: Lock
receiving status	1	0x0A30	R	0:UnLock 1: Lock
Channel A receiving power	10	0x0A31	R	string
Channel B receive power	10	0x0A32	R	string
A channel antenna strength	4	0x0A33	R	
B channel antenna strength	4	0x0A34	R	
BER	4	0x0A35	R	
SNR	4	0x0A36	R	
Total packets received	4	0x0A37	R	
Correct packet received	4	0x0A38	R	
Error packet received	4	0x0A39	R	
Channel information FTT	1	0x0A3A	R	
Channel information-guard interval	1	0x0A3B	R	
VP292 bandwidth modulation mode	2	0x0A3C	R	
	1	0x0A3D	R	0 = QPSK 1 = 16QAM 2 = 64QAM
CC method	1	0x0A3E	R	1 = 1/2CC 2 = 2/3CC 3 = 3/4CC 5 = 5/6BC 6 = 6/7CC
Target IP settings	16	0x0E02	R/W	String—"192.168.1.21"
Local IP settings	16	0x0E07	R/W	String—"192.168.1.22"
Wired connection status	1	0x0E0F	R/W	0: Not connected 1: Connected
Voice switch	1	0x0EA0	R/W	0: off 1: on
Bandwidth settings	1	0x0EA1	R/W	0: automatic 2: 2.5M 3: 8M 6: 4M
Model special mode	1	0x0EA4	R/W	0: normal mode 1: Network mode (only output through the network port)
Serial port baud rate setting	1	0x0EA5	R/W	Baud rate setting: 0: 115200 1: 38400 2: 9600
Video playback smoothness	1	0x0EAA	R/W	0: standard 1: Process 2; fast
Audio IO control switch	1	0x0ED0	R/W	0: full duplex 1: Half duplex

Audio noise reduction switch	1	0x0ED1	R/W	0: OFF 1: ON
Noise reduction mode	1	0x0ED2	R/W	Noise reduction level 0~3
echo cancellation switch	1	0x0ED3	R/W	0: OFF 1: ON
audio gain switch	1	0x0ED4	R/W	0: OFF 1: ON
Echo Cancellation Match Time	1	0x0ED5	R/W	silence time
Audio IO level status	1	0x0ED6	R	0: low level 1: high level
MIC volume	1	0x0ED7	R/W	0~100
Spker audio	1	0x0ED8	R/W	0~100
Silent switch	1	0x0ED9	R/W	0: OFF 1: ON

## 2. Communication protocol details



Note: Multi-bytes are transmitted using little endian, that is, the low byte is sent first, for example: 0x1234 data is 0x34 0x12

- **Start (synchronization) flag:** 0x AA 55, used for synchronization, 2 bytes.
- **module address:** The address of the module, indicating the target module for communication, the broadcast address is 0xffff
- **length:** The length of the protocol data, starting from the "synchronization flag" to the last byte of the "check unit".

Note: Considering the efficiency of the serial port, the maximum serial port communication length is 255 bytes.

There is no limit on the length of network communications.

- **Data unit:**
  - **command identifier:** Module command list.

Parameter query	0x01	Module parameter query
parameter settings	0x02	Module parameter settings

- **Reply flag:** Reply flag list.

coding	meaning	Remark
0x00	success	
0x02	Wrong command number	Invalid command or illegal command
0x03	Wrong length	The actual length received does not match what is described in the packet (has incomplete parameters)
0x04	CRCwrong	
0xC0	No module number	
0xFF	initial value. filling	
other		System reserved

- **Target business:**

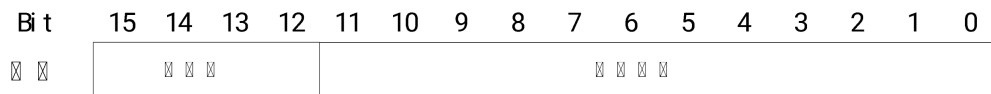
The object business is the main component of the protocol and the specific content of the data in the protocol package.

The setting and query data packet format consists of one or more query and setting monitoring object units.

The query setting object unit consists of: monitoring object label, monitoring object length and monitoring object content.

For details, see [[Agreement object content](#)].

When the module executes communication commands, there may be situations where some parameters cannot be processed. For this reason, bit15 to bit12 of the monitoring object label are given the function of "error indication". That is: when the module cannot correctly handle the monitoring object, it will modify bit15~bit12 of the monitoring object label to an error code with a specified meaning when returning to the main control board. In this way, the main control board can clearly know what went wrong.



Error codes and their meanings:

- 1: The monitoring object label cannot be identified.
- 2: The content of the monitoring object is out of range.
- 3: The monitoring object label and monitoring object content do not meet the requirements, for example: non-required ASCII code range.
- 4: The monitoring object label does not match the length of the monitoring object.
- 5: The content of the monitoring object is lower than the working range.
- 6: The content of the monitoring object is higher than the working scope.
- 7: Other errors not listed.
- 8~15: reserved by the system.

**Note: The error indication of bit15~bit12 in the monitoring object label is optional, that is, these functions do not need to be implemented in the software. Everything is based on the principle of software stability and simplicity.**



- Check unit:** Starting from the "synchronization flag" and counting to the last byte of the "data unit", The check unit uses CRC check, and the generated polynomial is 16 bits recommended by CCITT.  $x^{16}+x^{12}+x^5+1$  (0x11021) 。

## 4. Communication examples

In the following example, the sending end is a PC and the receiving end is an image transmission device.

**Example 1: Query the frequency point and find the frequency point 435: (The following content is in hexadecimal)**

Send: 55 aa ff ff 17 00 01 ff 00 02 0a 00 00 00 00 00 00 00 00 05 84

Receive: 55 aa ff ff 17 00 01 00 00 02 0a 34 33 35 2e 30 00 00 00 00 00 e9 9c

Response content analysis:

Start (sync) flag	module address	length	data unit			Check unit
			command identifier	Reply flag	Target business	
0x AA 55	2Byte	2Byte	1Byte	1Byte	lengthen	2Byte
55 aa	ff ff (broadcast address)	17 00	01 (Inquire)	00 (success)	See below	e9 9c

Monitoring object label	Monitor object length	content
2 Byte	1 Byte	lengthen
00 02 (0x0200 frequency setting)	0a (10 bytes)	"435.0"

**Example 2 sets the frequency point to 440.5MHz and the power to 25dBm:(The following content is in hexadecimal)**

Send: 55 aa ff ff 1b 00 02 ff 00 02 0a 34 34 30 2e 35 00 00 00 00 00 07 01 01 19 37 a7

Receive: 55 aa ff ff 1b 00 02 00 00 02 0a 34 34 30 2e 35 00 00 00 00 00 07 01 01 19 2d bd

Set sending content parsing:

Start (synchronization) flag	module address	length	data unit			Check unit
			command identifier	Reply flag	Target business	
0x AA 55	2Byte	2Byte	1Byte	1Byte	lengthen	2Byte
55 aa	ff ff (broadcast address)	1b 00	02 (set up)	ff (initial value)	See below	37 a7

Monitoring object label	Monitor object length	content
2 Byte	1 Byte	lengthen
00 02 (0x0200 frequency setting)	0a (10 bytes)	"440.5"

Monitoring object label	Monitor object length	content
2 Byte	1 Byte	lengthen
07 01 (0x0107 power setting)	01 (1 byte)	0x19 (25)

### Example 3: Switch video channel command

Send the command as follows:

Switch one channel: 55 aa ff ff 0e 00 02 ff 40 01 01 01 27 11

Switch the second channel: 55 aa ff ff 0e 00 02 ff 40 01 01 02 44 21

Switch three channels: 55 aa ff ff 0e 00 02 ff 40 01 01 03 65 31

Switch four channels: 55 aa ff ff 0e 00 02 ff 40 01 01 04 82 41

Switch four pictures: 55 aa ff ff 0e 00 02 ff 40 01 01 00 06 01

Query the current channel: 55 aa ff ff 0e 00 01 ff 40 01 01 00 e6 cf

## 4. CRC check code

Attached CRC check code:

```
const ushort Crc16Table[] = {
    0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50a5, 0x60c6, 0x70e7,
    0x8108, 0x9129, 0xa14a, 0xb16b, 0xc18c, 0xd1ad, 0xe1ce, 0xf1ef,
    0x1231, 0x0210, 0x3273, 0x2252, 0x52b5, 0x4294, 0x72f7, 0x62d6,
    0x9339, 0x8318, 0xb37b, 0xa35a, 0xd3bd, 0xc39c, 0xf3ff, 0xe3de,
    0x2462, 0x3443, 0x0420, 0x1401, 0x64e6, 0x74c7, 0x44a4, 0x5485,
    0xa56a, 0xb54b, 0x8528, 0x9509, 0xe5ee, 0xf5cf, 0xc5ac, 0xd58d,
    0x3653, 0x2672, 0x1611, 0x0630, 0x76d7, 0x66f6, 0x5695, 0x46b4,
    0xb75b, 0xa77a, 0x9719, 0x8738, 0xf7df, 0xe7fe, 0xd79d, 0xc7bc,
    0x48c4, 0x58e5, 0x6886, 0x78a7, 0x0840, 0x1861, 0x2802, 0x3823,
    0xc9cc, 0xd9ed, 0xe98e, 0xf9af, 0x8948, 0x9969, 0xa90a, 0xb92b,
    0x5af5, 0x4ad4, 0x7ab7, 0x6a96, 0x1a71, 0x0a50, 0x3a33, 0x2a12,
    0xdbfd, 0xcbdc, 0xfbbf, 0xeb9e, 0x9b79, 0x8b58, 0xbb3b, 0xab1a,
    0x6ca6, 0x7c87, 0x4ce4, 0x5cc5, 0x2c22, 0x3c03, 0x0c60, 0x1c41,
    0xedae, 0xfd8f, 0xcdec, 0xddcd, 0xad2a, 0xbd0b, 0x8d68, 0x9d49,
    0x7e97, 0x6eb6, 0x5ed5, 0x4ef4, 0x3e13, 0x2e32, 0x1e51, 0x0e70,
    0xff9f, 0xefbe, 0xdfdd, 0xcffc, 0xbf1b, 0xaf3a, 0x9f59, 0x8f78,
    0x9188, 0x81a9, 0xb1ca, 0xa1eb, 0xd10c, 0xc12d, 0xf14e, 0xe16f,
    0x1080, 0x00a1, 0x30c2, 0x20e3, 0x5004, 0x4025, 0x7046, 0x6067,
    0x83b9, 0x9398, 0xa3fb, 0xb3da, 0xc33d, 0xd31c, 0xe37f, 0xf35e,
    0x02b1, 0x1290, 0x22f3, 0x32d2, 0x4235, 0x5214, 0x6277, 0x7256,
    0xb5ea, 0xa5cb, 0x95a8, 0x8589, 0xf56e, 0xe54f, 0xd52c, 0xc50d,
    0x34e2, 0x24c3, 0x14a0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
```

```
0xa7db, 0xb7fa, 0x8799, 0x97b8, 0xe75f, 0xf77e, 0xc71d, 0xd73c,
0x26d3, 0x36f2, 0x0691, 0x16b0, 0x6657, 0x7676, 0x4615, 0x5634,
0xd94c, 0xc96d, 0xf90e, 0xe92f, 0x99c8, 0x89e9, 0xb98a, 0xa9ab,
0x5844, 0x4865, 0x7806, 0x6827, 0x18c0, 0x08e1, 0x3882, 0x28a3,
0xcb7d, 0xdb5c, 0xeb3f, 0xfb1e, 0x8bf9, 0x9bd8, 0xabbb, 0xbb9a,
0x4a75, 0x5a54, 0x6a37, 0x7a16, 0x0af1, 0x1ad0, 0x2ab3, 0x3a92,
0xfd2e, 0xed0f, 0xdd6c, 0xcd4d, 0xbdaa, 0xad8b, 0x9de8, 0x8dc9,
0x7c26, 0x6c07, 0x5c64, 0x4c45, 0x3ca2, 0x2c83, 0x1ce0, 0x0cc1,
0xef1f, 0xff3e, 0xcf5d, 0xdf7c, 0xaf9b, 0xbfba, 0x8fd9, 0x9ff8,
0x6e17, 0x7e36, 0x4e55, 0x5e74, 0x2e93, 0x3eb2, 0x0ed1, 0x1ef0
};

// crc: initial value
//Return value: CRC16 check
ushort CalCrc16(uchar *ptr, uint len)
{
    flying tempo;
    fly *p = ptr;
    uint p_len = len;
    ushort p_crc = 0;

    for( ; p_len--> p++)
    {
        temp = p_crc / 256;
        p_crc <<= 8; // Shift left by 8 bits
        p_crc ^= Crc16Table[temp ^ *p]; //Add the high 8 bits to the current byte and
then look up the table to find the CRC
    }

    return p_crc;
}
```