
DSP Processor Control Protocol

Rev 4

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Introduction

External control programming supports UDP and RS232 transmission, covering all control parameters of the processor, including parameter control, parameter retrieval, and preset calling.

When using UDP control, the default port is 50000, which can be set in the "Device Settings" of the DSP Controller software.

When using RS232 control, the default baud rate is 115200, with 8 data bits, 1 stop bit, and no parity bit. This can also be configured in the "Device Settings".

For RS232 transmission, **the interval between messages must be at least 200 milliseconds.**

If bidirectional communication is required, enable the communication reply switch in the "Device Settings" of the DSP Controller software.

The control protocol exists in two versions: V1 and V2. V1 uses fixed-length message packets, while V2 uses variable-length message packets.

Note: This document is only applicable to DSP fixed architecture and is not compatible with our company's open software architecture products. This document will be updated with product updates. Please check with sales support for the latest version.

V1 Version Control Protocol

Software Encoding Rules (12 bytes total)

byte1	byte2	byte3	byte4	byte5~12
0xb3	Message Type	0x00	0x00	Data

The byte3 value when retrieved by PC software may not be 0x00, as the PC software may not be updated to the latest control protocol. However, this does not affect usage; byte3 is a reserved field in the V1 version.

byte4 serves as a return code identifier, indicating whether the command is a reply. For V1, commands sent from devices are 0x00, and replies are 0xe0.

Message Type (byte2): 0x21 (Parameter Control)、0x22 (Parameter Retrieval)、0x13 (Scene Switching)

For message types 0x21 and 0x22, the data area format is as follows:

byte5-6	Module ID (see Appendix A)
byte7-8	Parameter type (see Appendix B)
byte9-10	Parameter value 1
byte11-12	Parameter value 2

Most modules have only one valid parameter. For example, to control the compressor on input channel 1 with a threshold of -40 dB: [B32100000100020060F00000](#)

To set a delay of 500 ms on output channel 3: [B3210000E9000200F4010000](#)

Modules with two parameters include input modules, output modules, equalizer modules, and automatic mixing modules.

For **input/output modules**, parameter value 1 specifies the input channel number (starting from 0), and parameter value 2 specifies the parameter value (e.g., mute: 1 for mute, 0 for unmute).

To set the gain step of +2 dB on input channel 1: [B32100002B010A000000C800](#)

To set the gain to -36 dB on input channel 1: [B32100002B0101000000F0F1](#)

For **equalizer modules**, parameter value 1 specifies the sub-segment number (starting from 0), and parameter value 2 specifies gain, Q value, frequency, etc.

For automatic mixing modules, two parameters are used for sub-channel settings, with parameter 1 specifying the channel number and parameter 2 specifying specific values such as priority, gain, mute, etc.

To set the frequency of 450 Hz for EQ sub-segment 3 on input channel 1: [B3210000610003000200C201](#)

To toggle mute on sub-channel 5 of automatic mixing: [B3210000A100060004000100](#)

Matrix routing involves three parameters: the first is the input channel number, the second is the output channel number, and the third is the routing switch. For example, to open the switch from input 3 to output 4 on the mixing module: [B3210000A600010002030100](#)

For message type 0x13 (scene switching), byte5-6 specifies the scene number, with 16 scenes available (0-15).

To switch to preset 10: [B3130000090000000000000000](#)

For floating-point values, multiply by 100 to convert to a 16-bit integer before transmission. For example, 12.15 becomes 1215 (hexadecimal 0x04BF), and -4.9 becomes -490 (hexadecimal 0xFE16).

V2 Version Control Protocol

Software Encoding Rules (variable length)

byte1	byte2	byte3	byte4	byte5~132
0xb3	Message Type	Length	0x01	Data

byte4 serves as a return code identifier, indicating whether the command is a reply. For V2, commands sent from devices are 0x01, and replies are 0xe1.

Message Types:

Message Type	Length	Data format	Description
0x21 (Parameter Control)	Variable length	byte5	0x1- Output 0x2- Input 0x3-Reserved 0x4-Feedback suppression 0x5-Automatic gain 0x6-Voice tracking
		byte6	Starting channel number (0-indexed)
		byte7	Ending channel number (0-indexed)
		byte8	Parameter type (see Appendix B)
		byte9-72	Parameter values, with each channel occupying two bytes in sequential order. Supports up to 32 channels. If all channels have the same parameter value, only one entry is required.
Example: Mute channels 2-6 on input: b3210a010201050201000100010001000100			
0x22 (Parameter Retrieval)	Variable length	byte5	0x1-Output 0x2-Input 0x3-Reserved 0x4-Feedback suppression 0x5-Automatic gain 0x6-Voice tracking
		byte6	Starting channel number (0-indexed)
		byte7	Ending channel number (0-indexed)
		byte8	Parameter type (see Appendix B)
		byte9-72	Parameter values, with each channel occupying two bytes in sequential order. Supports up to 32 channels.
Example: Retrieve levels for channels 2-6 on input: b3220a010201050c00000000000000000000 Response: B3220A010201050C40ED5AF179EC96ECEEEC			

Message Type	Length	Data format	Description
0x74 (External Control)	Variable length	byte5	Control type: 0x1 - GPIO control 0x2 - RS232 transmission code 0x3 - RS485 transmission code 0x4 - Enable central control reply 0x5 - Get device channel count 0x6 - Reset current preset (without saving) 0x7 - Set RS485 direction 0x8 - UDP forwarding code 0x9 - Enable system debug switch
		byte6	Data length (length of byte9-132)
		Byte7-8	0x0000
		byte9-132	Depending on byte5 control type (see External Control Description).
0x6e (Dante Routing)	36	byte5	Local Dante channel number (starting from 1)
		byte6	1 - Subscribe, 2 - Unsubscribe
		byte7-8	0x00
		byte9-24	Audio send channel name
		byte25-40	Audio send device name
			Example: Subscribe Dante send channel 1 of device "DSP-88D-0e8ae" to receive on Dante receive channel 3, labeled as "OUT9": b36e2401030100004f555431000000000000000000000000000000004453502d3838442d3065386165000000

External Control Description

Control Type	Data format	Description
0x1 (GPIO control)	byte9	GPIO direction (0-input, 1-output)
	byte10	start GPIO number (0-indexed)
	byte11	end GPIO number (0-indexed)
	byte12	value (bitwise representation, up to 8 bits for 8 GPIOs)
设置 GPIO 1-8 输出高电平: b374080101000000010007ff 读取 GPIO 1-8 电平值: b37408010100000000000000 返回值为: b37408010100000000000007ff		
0x2 (RS232 transmission code)	byte6	length of RS232 code
	byte9-132	RS232 output code
	From RS232 output the string "Hello, DSP." B37410010200000048656c6c6fa3ac4453502e00	
0x3 (RS485 transmission code)	byte6	length of RS485 code
	byte9-132	RS485 output code
	From RS485 output the string "Hello, DSP." B37410010300000048656c6c6fa3ac4453502e00 RS485 must be set to transmit mode first.	

Control Type	Data format	Description
0x4 (Enable central control reply)	byte9-12	reply switch: 0 - off, 1 - on. Enable Central Control Response: b37408010400000001000000 Disable Central Control Response: b37408010400000000000000
0x5 (Get device channel count)	byte9-24	device name
	byte25	analog audio input channel count
	byte26	analog audio output channel count
	byte27	Dante audio input channel count
	byte28	Dante audio output channel count
		Example: Get device channel count for device "DSP-88D-1370ae", with 8 analog and Dante audio input and output channels: b374140105000 Response: B3741401050000004453502D3838442D31333730616500008080808
0x6 (Reset current preset, non-saving)	Command: b374040106000000	
Control Type	Data Format	Description
0x7 (Set RS485 direction)	byte9-12	direction: 1 - input, 0 - output
	Example: Set RS485 to output mode: b3740801070000000000000000	
0x8 (UDP forwarding code)	byte9-12	IP address
	Byte13-14	port
	Byte15-16	length of forwarded data
	Byte17-132	forwarded data
	Example: Forward "Hello, DSP." to IP address 192.168.1.165 on port 3001: b374180108000000c0a801a5b90b0c0048656c6c6fa3ac4453502e00	
0x9 (Enable system debug switch)	byte9-12	1 - enable debug, 0 - disable debug
	Example: Enable debug: b37408010900000001000000 This feature is solely for debugging, and the system will output runtime logs to the serial port.	

Appendix A: Module ID Assignment

Module Name	ID	Module Name	ID
Input Source	299	Output Channels 1-32 High/Low Pass Filters	167~198
Input Channel 1-32 Expander	1~32	Output Channels 1-32 Equalizers	199~230
Input Channel 1-32 Compressor	33~64	Output Channels 1-32 Delays	231~262
Input Channel 1-32 AutomaticGain	65~95	Output Channels 1-32 Limiters	263~294
Input Channel 1-32 Equalizer	97~128		
Input Channel 1-32 Feedback Suppressor	129~160		
Automatic Mixer	161	Echo Canceler Selector	162
Echo Canceler	163	Noise Suppressor Selector	164
Noise Suppressor	165		
Mixer	166		
Output	295		
System Control	296		

Appendix B: Module Parameter Types

Module Name	Parameter Type	Description	Module Name	Parameter Type	Description	
Input Source	0x1	Gain	Output	0x1	Gain	
	0x2	Mute		0x2	Mute	
	0x3	Sensitivity		0x3	Channel name	
	0x4	Phantom power switch		0x4	Phase inversion	
	0x5	Signal generator type		0x5	Sensitivity	
	0x6	Signal generator frequency		0x6	Gain step	
	0x7	Sine wave gain		0x7	Link	
	0x8	Channel name		0x8	Channel level	
	0x9	Invert				
	0xa	Gain Step				
	0xb	Link				
	0xc	Channel Level		Expander	0x1	Switch
Delay	0x1	Bypass switch	0x2		Threshold	
	0x2	Milliseconds	0x3		Ratio	
	0x3	Microseconds	0x4		Attack time	
Equalizer	0x1	Equalizer master switch	0x5		Release time	
	0x2	Sub-section switch	Compressor		0x1	Compressor switch
	0x3	Frequency			0x2	Threshold
	0x4	Gain			0x3	Ratio
	0x5	Q value			0x4	Attack time
	0x6	Type			0x5	Release time
		0x6			Gain compensation	
Feedback Suppressor	0x1	Bypass switch (0-off/1-on)	Automatic Gain		0x1	Bypass switch (0-off/1-on)
	0x7	Clear all		0x2	Threshold	
	0x8	Panic threshold		0x3	Target threshold	
	0x9	Feedback depth		0x4	Ratio	
	0xa	Feedback threshold		0x5	Attack time	
				0x6	Release time	
Voice Tracking	0x1	Tracking Threshold		0x2	Default Mic	
	0x3	Response Time		0x4	Switch Default Mic Time	
	0x5	Round Robin Interval		0x6	Round Robin Count	
	0x7	Enable Tracking		0x8	Mic Priority	
	0x9	Serial Port Type		0xa	Camera Address	
	0xb	Protocol		0xc	Preset Point	
	0xd	Enable Mic Settings		0xe	Command Type	
	0xf	Command String		0x10	Send	
	0x11	Enable Command		0x12	Save	

Document History

Revision	Description
<i>Rev 1 - 2018-8-10</i>	Initial version release.
<i>Rev 2 - 2018-8-17</i>	Modification of V1 version explanation.
<i>Rev 3 - 2019-7-23</i>	Added return code recognition, corrected V2 version forwarding codes.
<i>Rev 4 - 2022-3-28</i>	Added control codes for feedback suppression, automatic gain, and reference control codes for voice tracking.