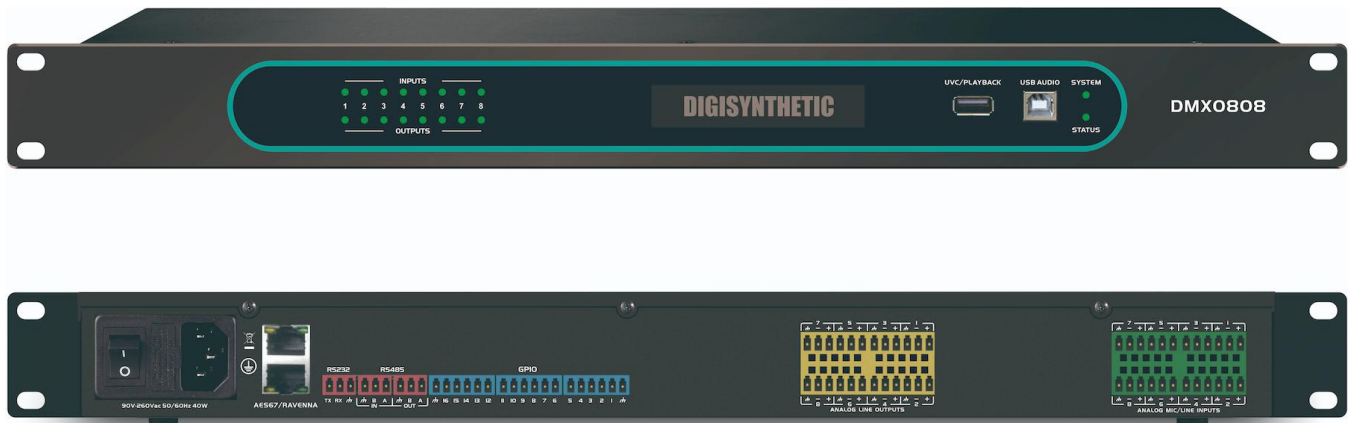


8-Channel Network Audio Matrix Manual



Safety Instructions

(Directives regarding fire, electric shock, or personal injury)

WARNING - When using this electrical product, basic precautions should always be followed:

1. To reduce the risk of injury, close supervision is necessary when the product is used near children.
2. Do not use this apparatus near water, for example, near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool or lake.
3. This product may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
4. The product should be located in a place with good ventilation.
5. The product should be located away from heat sources such as radiators, heat registers, or other products that produce heat.
6. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product. Ensure that the external adapter provides good power quality to avoid interference with the machine's operation.
7. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings. The apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the apparatus.
8. Refer servicing to qualified service personnel under the following conditions:
 1. Objects have fallen, or liquid has been spilled into the product;
 2. The product has been exposed to rain;
 3. The product does not appear to operate normally or exhibits a marked change in performance;
 4. The product has been dropped, or the enclosure damaged.
9. Do not attempt to service the product beyond what is described in the user-maintenance instructions. All other servicing should be referred to qualified service personnel.

1. Product Introduction

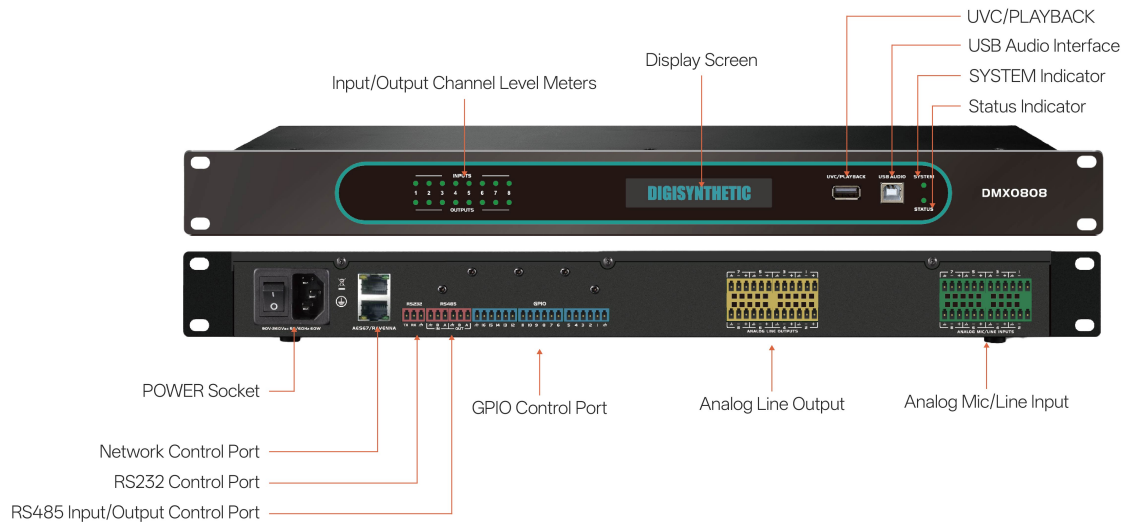
Thank you for purchasing this network audio matrix. This device features high integration, high performance, easy scalability, and flexible control.

1.1 Functional Features

- **Sampling Rate:** 48 kHz.
- **High-Performance AD/DA:** Low distortion, large dynamic range, and pure sound quality.
- **Intuitive Control:** Network-connected, offering efficient, concise, and engineering-friendly GUI software for real-time control of all functions and monitoring of device status.
- **USB Interfaces:** Supports UAC and USB AUDIO interfaces (2 x UAC, 2 x USB AUDIO channels).
- **Rich I/O Interfaces:** 8 MIC/LINE inputs, 8 balanced outputs.
- **Network Audio:** 8 AES67 network inputs, 8 AES67 network outputs.
- **Auto-Mixing & AEC:** 3 auto-mixing channels; 1 AEC (Acoustic Echo Cancellation) channel.
- **Matrix Routing:** Supports up to 24 internal matrix routing mixing channels (8 Analog + 8 Network + 2 USB AUDIO + 2 UAC + 3 Auto-Mix + 1 AEC).
- **Robust Networking:** 2 Gigabit Ethernet ports, each supporting simultaneous transmission of control data and audio data.

- **GPIO:** 16 GPIO interfaces with customizable input/output direction.
- **RS485:** 2 RS485 interfaces for daisy-chain control (RS485 IN for input, RS485 OUT connected to another unit's RS485 IN).
- **RS232:** 1 RS232 interface.
- **Flexible Gain Control:** Adjustable hardware gain for each input (0dB / 15dB / 20dB / 24dB), with independent 48V phantom power control.
- **Precise Level Adjustment:** Independent volume control for input and output audio signals, range: Mute to +12dB.
- **DSP Functions:** Input/Output channels provide Signal Generator, Noise Gate, Feedback Suppressor, EQ, High Pass, Low Pass, Delay, Expander, Compressor, Limiter, Ducker, FIR, and other optional DSP functions.

1.2 Panel Functions



1.2.1 Front Panel Functions

- **INPUTS:** Input channel level indicators (IN1 ~ 8). The indicator lights up when the input signal reaches a certain amplitude.
- **OUTPUTS:** Output channel level indicators (OUT1 ~ 8). The indicator lights up when the output signal reaches a certain amplitude.
- **USB AUDIO:** Core interface for audio communication between computer and device, allowing the device to function as an external sound card.
- **UAC:** For connecting UAC device.
- **SYSTEM:** System status indicator (solid green). Normally flashes once per second; does not flash if abnormal.
- **STATUS:** Abnormal status indicator (solid red). Normally off. Lights up when an abnormality occurs (Solid on: Network abnormality; Flashes once every 1 second: Device overheating; Flashes once every 2 seconds: High CPU usage).

1.2.2 Rear Panel Functions

- **90V-260Vac 50/60Hz 40W:** Power input interface.
- **AES67/RAVENNA:** Two Gigabit network interfaces for control and network audio transmission.
- **RS232:** Serial control interface.
- **RS485:** Serial control interface (RS485 IN for input, RS485 OUT to connect to another unit's RS485 IN for simultaneous control).
- **GPIO:** General Purpose Input/Output interface, supporting customizable input/output direction.
- **ANALOG LINE INPUTS:** Analog audio input channels, supporting microphone and line inputs, balanced or unbalanced.
- **ANALOG LINE OUTPUTS:** Analog audio output channels, balanced or unbalanced.

1.2.3 USB Interface Functions



- **A:** USB AUDIO interface. Core interface for audio communication between computer and device, allowing the device to

function as an external sound card.

- **B:** UAC / PLAYBACK interface. For connecting UAC device.

2. Functional Description

2.1 Power On

- After powering on, the front panel screen lights up.
- The device begins to boot up the system, which takes about 20 seconds.
- Upon completion, the SYSTEM indicator flashes, indicating normal operation.

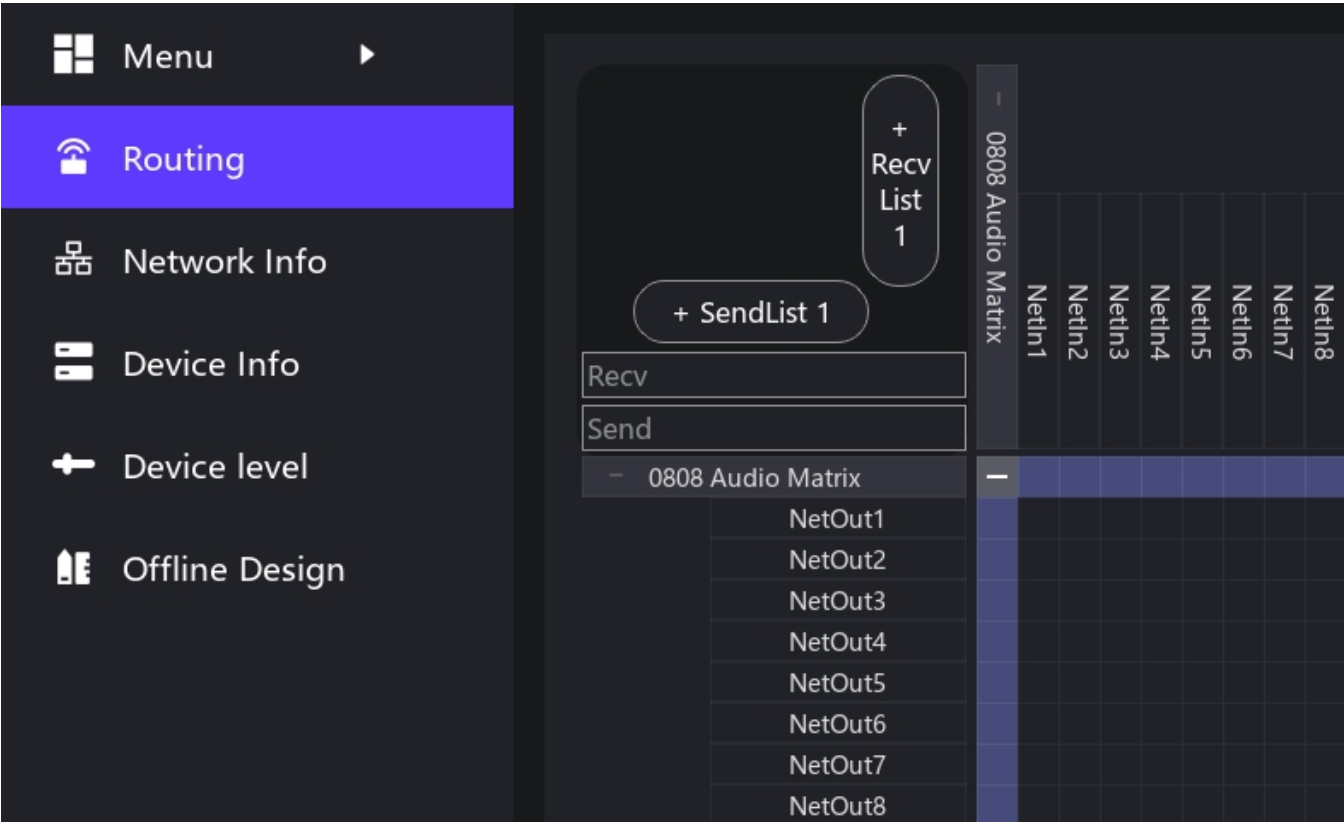
2.2 Microphone Phantom Power Switch

- **Select Microphone Channel:** This device supports up to 8 microphone input channels. Phantom power for each channel can be independently controlled via the GUI.
- **Toggle Phantom Power:** In the GUI, enter the device's detail page, go to the "Channel Volume" interface, and select whether to enable phantom power for the corresponding input channel.

3. PC Software Communication & Control

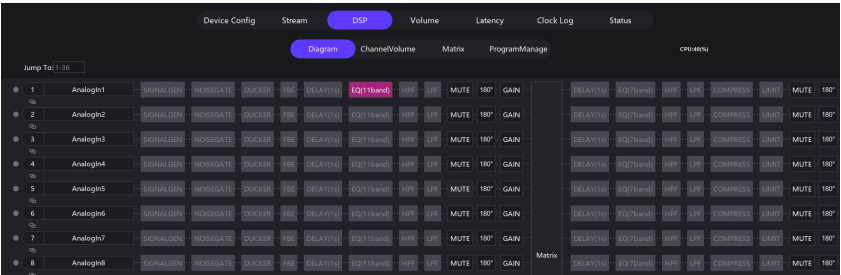
3.1 Device Connection

- The computer running the GUI must be connected to the same local area network (LAN) as the device and be able to communicate with it.
- After the software starts, it will automatically search for devices in the LAN. Once a device is found, you can configure parameters, manage routing, and view device status.



3.2 DSP Function Usage Instructions

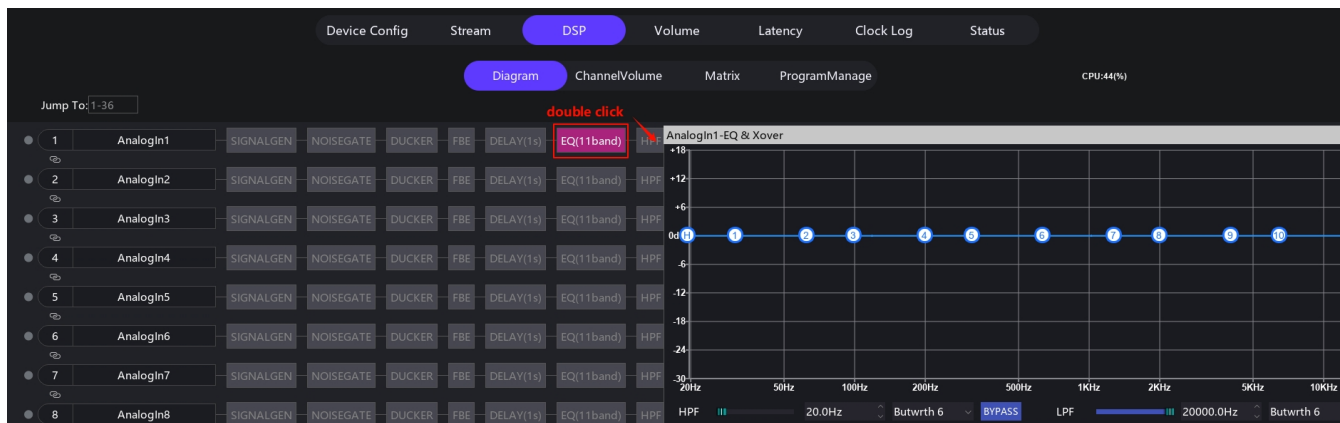
3.2.1 DSP Function Description



- **Channel Selection:** The top bar indicates the currently displayed channel. *AnalogIn* for analog inputs, *NetIn* for network

inputs, **AnalogOut** for analog outputs, and **NetOut** for network outputs. Click to switch channels and set parameters for different channels.

- **CPU Usage:** The top right corner displays CPU usage with two values separated by "-". Each value has a maximum of 100. If both values are high (recommended not to exceed 85%), it indicates high CPU usage, and resource limitations should be considered.
- **EQ Settings:** Each channel supports multi-band PEQ. For each band, you can set Gain, Type (P/HS/LS), Frequency, Bandwidth, and Bypass. Double-click the "EQ" button to expand and view the EQ curve:



- **Volume Gain:** Set the volume gain value for the corresponding channel and toggle Mute.
- **Level Display:** View the real-time dynamic level of the corresponding channel.
- **High/Low Pass:** Set HighPass/LowPass parameters, including Frequency and Type. "Flat" means no effect. Double-click the "HighPass / LowPass" button to view the curve.
- **Delay:** Configures channel delay from 0ms to 1000ms.
- **Feedback Suppression (Fbe):** Configures feedback suppression level for mic inputs (OFF, 1-3). Higher levels provide stronger suppression but affect sound quality more. Default is OFF.
- **Noise Gate:** Configure Noise Gate parameters: Threshold, Attack Time, and Release Time.
- **Limiter:** Limits the maximum level to a set value. Set Trigger Threshold and Limit Threshold. When the level exceeds the trigger threshold, the function activates to keep the level below the limit threshold. This may cause distortion and is generally used for protection.
- **Compressor:** Set Threshold, Attack Time, Release Time, Ratio, etc.
- **FIR:** Set FIR Type, Window Type, and FIR Taps.
- **Matrix:** Flexibly configure the correspondence between input and output channels.

3.2.2 DSP Configuration Management

The screenshot shows the DSP Configuration Management interface. At the top, there are tabs: Device Config, Stream, DSP (selected), Volume, Latency, Clock Log, and Status. Below these are sub-tabs: Diagram, ChannelVolume, Matrix, and ProgramManage (selected). The CPU usage is shown as 12-23%. A table lists 20 programs (No. 0 to 20) with their Program Names. The first row is 'SystemDefault'. To the right of the table, there are buttons for 'SaveProgram', 'LoadProgram', 'DeleteProgram', 'ExportToPC', 'ImportFromPC', 'ExportAllToPC', and 'ImportAllFromPC'. The 'Last Load' status is shown as '0 SystemDefault'.

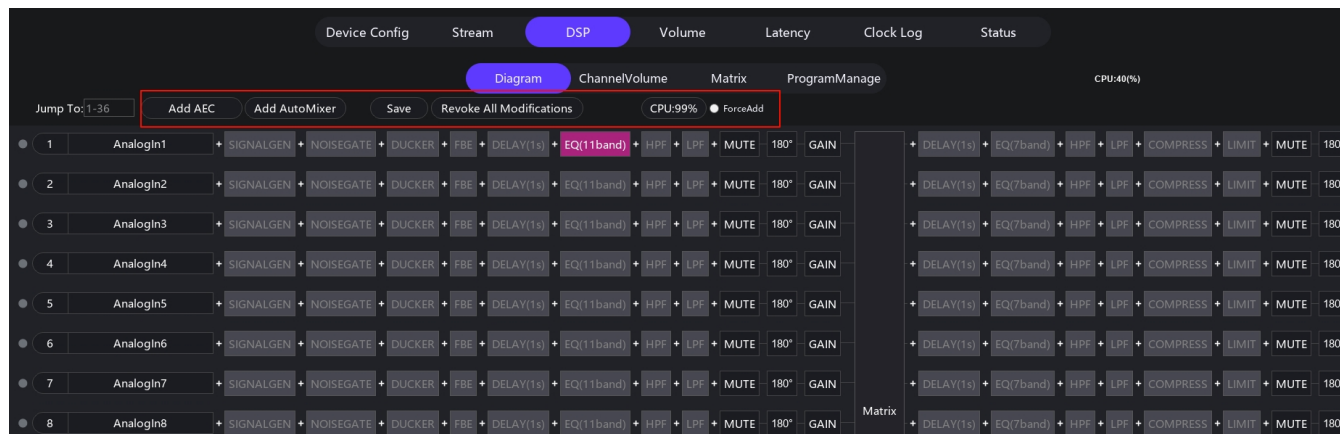
No	Program Name
0	SystemDefault
1	aaa
2	123
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

- **Open Config Interface:** Click the Program Management button on the DSP page to open the configuration page.

- **Last Loaded:** Displays the last manually loaded program configuration.
- **Save Config:** Parameters are auto-saved after modification. To save as a specific configuration file, select the name in the Config List and click Save.
- **Load Config:** Select a configuration name in the list and click Load.
- **Delete Config:** Select a configuration name in the list and click Delete Program.
- **Import Config:** Click Import to select an external file and import it to the device. Manually click Save/Load to apply.
- **Export Config:** Select a configuration name in the list and click Export to save it to the computer.

3.2.3 DIY DSP Functions

In the "Flow Chart" page, press **ctrl + 8**, then enter the control code **6689**. A "Custom" button will appear. Click it to enter the Custom DSP page.



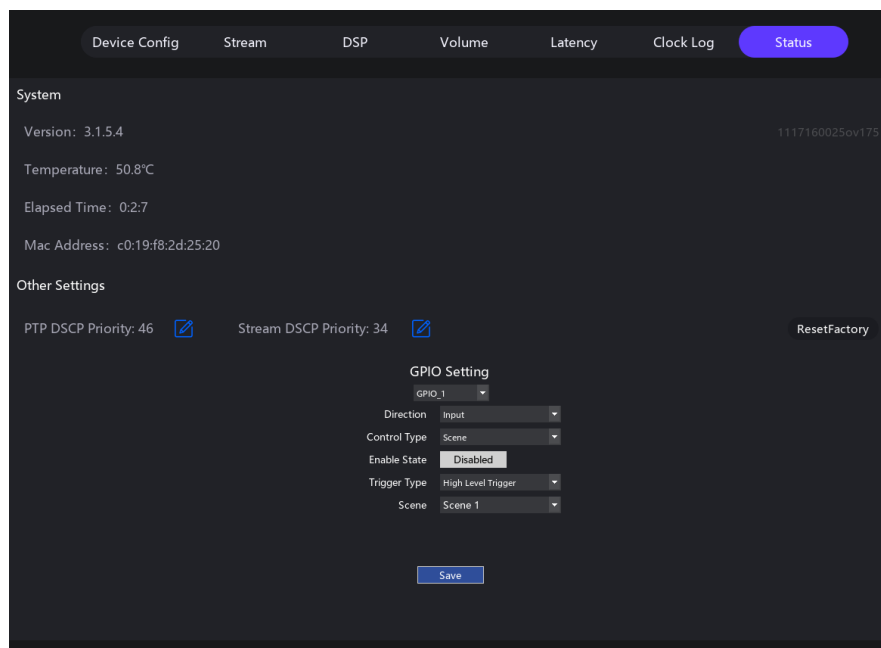
In DIY mode, you can add "Auto Mix Channel" & "AEC Channel".

Click the "+" sign to add a function from the pop-up window. To remove a function, click its button again and select "Empty".

- **COPY FROM:** To copy an entire channel's configuration, select the target channel, click "COPY FROM", and select the source channel.
- **CPU Resource Evaluation:**
 1. DIY functions allow free configuration, but resources are limited. Configure only necessary functions for required channels.
 2. Monitor CPU usage when configuring (estimate only; actual performance may vary).
- **Exit DIY:** After finishing DIY configuration, click Exit Diy to return to the DSP page.

4. GPIO Usage Instructions

- The GPIO ports on this product can be used to control DSP functions. The function of each GPIO interface can be controlled in the "Other" interface of the GUI.
- *Note: All GPIO settings are applied to the device only after clicking "Save".*



General Settings Parameters

In this interface, the key settings are defined as follows:

- **Direction**

- **Input:** The port receives external signals. When a trigger level is detected, the device executes a preset DSP function (e.g., switch scene, mute channel).
- **Output:** The port sends signals outward. Based on internal DSP status changes (e.g., scene switched, channel muted), the port outputs a corresponding level signal to an external device (e.g., LED indicator).

- **Control Type:** Select the specific function module the GPIO port will control or feedback (including: Program, Route, Gain, Mute, Command).

- **Active Status:** Enables or disables the port function.

- **Active:** Enables current settings; port works normally.
- **Inactive:** Disables current settings; port performs no action and outputs no signal.

- **Trigger Type**

- **High Level Trigger:** In input mode, a change from low to high level is considered a trigger; in output mode, output changes from low to high level when active.
- **Low Level Trigger:** In input mode, a change from high to low level is considered a trigger; in output mode, output changes from high to low level when active.

The GPIO ports support 5 control types, summarized below:

Control Type	Supported Direction	Description
Program	Input / Output	Call scene configuration (Input) or feedback current scene status (Output).
Route	Input / Output	Control matrix routing connection (Input) or feedback routing status (Output).
Gain	Input / Output	Adjust volume to a specified value (Input) or feedback if current volume matches specified value (Output).
Mute	Input / Output	Control channel mute (Input) or feedback channel mute status (Output).
Command	Input Only	Send preset DSP control code when triggered.

Note: The following descriptions use "High Level Trigger/Output" as an example. Logic levels are reversed for Low Level Trigger/Output, but functional logic remains the same.

4.1 Control Type - Program

Device Config
Stream
DSP
Volume
Latency
Clock Log
Status

System

Version: 3.1.5.4
1117160025ov175

Temperature: 49.5°C

Elapsed Time: 1:9:16

Mac Address: c0:19:f8:2d:25:20

Other Settings

PTP DSCP Priority: 46
Stream DSCP Priority: 34
ResetFactory

GPIO Setting

GPIO_1

Direction: Output

Control Type: Scene

Enable State: Enabled

Trigger Type: High Level Trigger

Scene: Scene 1

Save

Used for device preset scene (configuration) management and status feedback.

- **Output Direction:** When the specified program (e.g., "Program 1") is loaded in the DSP Program Manager, the GPIO port (e.g., GPIO 1) outputs a high level. Otherwise, it outputs a low level.
- **Input Direction:** When the GPIO port detects an input trigger signal (e.g., high level), the device automatically loads the specified program selected in the GPIO settings.
- **Active Status:** The "Active/Inactive" button enables or disables the current settings for the GPIO port.

4.2 Control Type - Route

The screenshot shows the Digisynthetic web interface with the 'Status' tab selected. The 'System' section displays: Version: 3.1.5.4, Temperature: 50°C, Elapsed Time: 1:10:16, and Mac Address: c0:19:f8:2d:25:20. The 'Other Settings' section shows PTP DSCP Priority: 46 and Stream DSCP Priority: 34, both with edit icons. A 'ResetFactory' button is present. The 'GPIO Setting' modal is open for 'GPIO_1', showing: Direction: Output, Control Type: Route, Enable State: Enabled, Trigger Type: High Level Trigger, Input: 1, and Output: 1. A 'Save' button is at the bottom of the modal.

Used to control or monitor the routing relationship between input and output channels in the matrix.

- **Output Direction:** When the specified "Input Channel" is routed to the specified "Output Channel" in the DSP matrix (e.g., Input 1 routed to Output 1), the GPIO port outputs a high level. If the route is disconnected, it outputs a low level.
- **Input Direction:** When the GPIO port detects an input trigger signal (e.g., high level), the device automatically routes the preset "Input Channel" to the "Output Channel". When the level changes back, the corresponding route is cancelled.

4.3 Control Type - Gain

The screenshot shows the Digisynthetic web interface with the 'Status' tab selected. The 'System' section displays: Version: 3.1.5.4, Temperature: 49.1°C, Elapsed Time: 1:11:51, and Mac Address: c0:19:f8:2d:25:20. The 'Other Settings' section shows PTP DSCP Priority: 46 and Stream DSCP Priority: 34, both with edit icons. A 'ResetFactory' button is present. The 'GPIO Setting' modal is open for 'GPIO_1', showing: Direction: Output, Control Type: Gain, Enable State: Enabled, Trigger Type: High Level Trigger, Channel: Input 1, and Gain: 0.0dB. A 'Save' button is at the bottom of the modal.

Used for precise control or monitoring of a specified channel's gain value.

- **Output Direction:** When the current gain value of the specified channel equals the value set in "Gain" (target gain), the GPIO port outputs a high level (otherwise low).
- **Input Direction:** When the GPIO port detects an input trigger signal (e.g., high level), the device automatically adjusts the specified channel's gain to the value set in "Gain" (e.g., sets directly to 0.1dB, not increases by 0.1dB). When the level changes back, the channel gain resets to 0dB.

4.4 Control Type - Mute

The screenshot shows the 'Status' tab of the DIGISYNTHETIC web interface. The 'GPIO Setting' section is expanded, displaying the following configuration for GPIO_1:

- Direction: Output
- Control Type: Mute
- Enable State: Enabled
- Trigger Type: High Level Trigger
- Channel: Input 1

A 'Save' button is located at the bottom of the settings panel. Other settings visible include PTP DSCP Priority: 46, Stream DSCP Priority: 34, PTP Domain: 0, and a 'ResetFactory' button.

Used to control or monitor channel mute status.

- **Output Direction:** When the specified channel in the DSP is in "Mute" state, the GPIO port outputs a high level. It outputs a low level when not muted.
- **Input Direction:** When the GPIO port detects an input trigger signal (e.g., high level), the device mutes the specified channel. When the level changes back, the mute status is cancelled.

4.5 Control Type - Command

The screenshot shows the 'Status' tab of the DIGISYNTHETIC web interface. The 'GPIO Setting' section is expanded, displaying the following configuration for GPIO_1:

- Direction: Input
- Control Type: Command
- Enable State: Enabled
- Trigger Type: High Level Trigger
- Command: (Empty text input field)

A 'Save' button is located at the bottom of the settings panel. Other settings visible include PTP DSCP Priority: 46, Stream DSCP Priority: 34, PTP Domain: 0, and a 'ResetFactory' button.

This type supports **Input** direction only, used to send custom control commands via GPIO trigger.

- **Input Direction:** When the GPIO port detects an input trigger signal (e.g., high level), the device sends out the pre-filled command code.
- **Command Support:** Supports filling in any DSP command compliant with the protocol. Refer to official documentation for the instruction set.

5. RS232 & RS485 Central Control Protocol

5.1 RS485 Control Port Interface

RS485 serves as the control port, supporting both IN and OUT ports, which can be used for daisy-chain control. You can connect the OUT port of one device to the IN port of another device. When the controller sends a command to one device, both devices can be controlled simultaneously.

Communication Format:

- **Baud Rate:** 115200
- **Data Bits:** 8
- **Stop Bits:** 1
- **Parity:** NONE

Response Strategy: The slave device does not respond after receiving the command.

5.2 RS232 Control Port Interface

Communication Format:

- **Baud Rate:** 115200
- **Data Bits:** 8
- **Stop Bits:** 1
- **Parity:** NONE

Response Strategy: The slave device returns the received content after receiving the command.

5.3 Command Protocol Structure

The host (computer or central control system) sends commands in Hexadecimal format.

Example Command: FE EF 05 01 00 00 00 01 07

Byte Sequence	Value	Description
Start Identifier	FE EF	Fixed header
Length	05	Length of Command (1 byte) + Data (0~n bytes)
Command Code	01	Command function code (0~127)
Data	00...	Data content (variable length)
Checksum	07	Sum of (Length + Command + Data), take the lower 2 bytes

5.4 Function Control Codes

The following table details the communication codes for various functions:

Function	Length	Cmd Code	Data Bytes	Data Description
Gain Increase (Max +12dB)	0x05	0x01	4	- Byte 1: I/O Type (0-Input, 1-Output) - Byte 2: Channel Num High - Byte 3: Channel Num Low - Byte 4: Increase Value (0-100 corresponds to 0dB-10dB, min 0.1dB step)
Gain Decrease (Min -60dB)	0x05	0x02	4	- Byte 1: I/O Type (0-Input, 1-Output) - Byte 2: Channel Num High - Byte 3: Channel Num Low - Byte 4: Decrease Value (0-100 corresponds to 0dB-10dB, min 0.1dB step)
Mute	0x04	0x03	3	- Byte 1: I/O Type (0-Input, 1-Output) - Byte 2: Channel Num High - Byte 3: Channel Num Low
Unmute	0x04	0x04	3	- Byte 1: I/O Type (0-Input, 1-Output) - Byte 2: Channel Num High - Byte 3: Channel Num Low
Set Mixing	0x05	0x05	4	- Byte 1: Input Channel High - Byte 2: Input Channel Low - Byte 3: Output Channel High - Byte 4: Output Channel Low

Cancel Mixing	0x05	0x06	4	- Byte 1: Input Channel High - Byte 2: Input Channel Low - Byte 3: Output Channel High - Byte 4: Output Channel Low
Load Preset	0x02	0x10	1	- Byte 1: Preset Number (0 is System Default, Range 0-20)

5.5 RS232 / RS485 Protocol Conversion Tool

- https://files.digisynthetic.cn/Tools/RS232_RS485_Converter.html

6. Necessary Online Control Tips

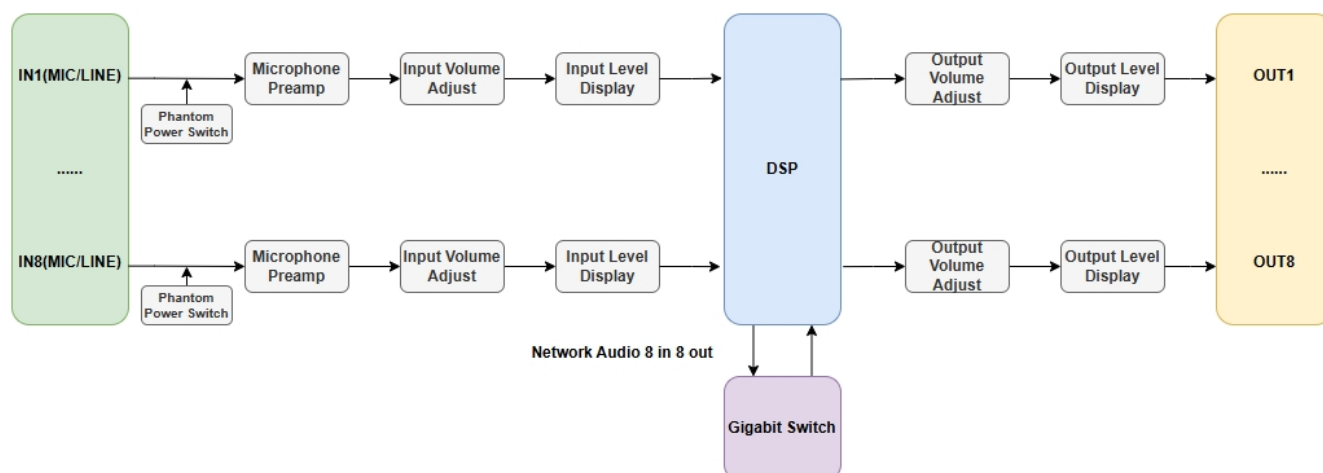
Users must read the following precautions before performing online control operations:

1. Use the power cord provided with the machine. If using a third-party cord, ensure the adapter output meets the machine's allowable range.
2. Avoid online control operations in environments with strong signal interference.
3. Perform online operations under good network conditions.
4. Ensure the computer's firewall or antivirus software does not block the GUI's network functions.
5. Ensure the machine's IP address and the computer running the GUI are on the same network segment (e.g., Machine IP: 192.168.10.123, PC IP: [192.168.10.xxx](#)), and avoid IP conflicts with other devices on the network.

7. Common Troubleshooting Guide

Symptom	Solution
Power LED is off	1. Check if power cord is connected. 2. Check if power adapter output meets specifications. 3. Check power wiring correctness.
Cannot connect to PC software	1. Check network cable connection. 2. Check software and machine version compatibility. 3. Check IP subnet consistency.
Device visible but uncontrollable	1. Confirm IP is in the same segment. 2. Check network transmission quality. 3. Check switch/router status.
IPs not in same segment	1. Confirm connection to same switch/router. 2. Check fixed IP settings. 3. Check DHCP function.
No audio output	1. Confirm input is normal. 2. Check output lines. 3. Check mute/volume settings. 4. Verify matrix routing configuration.

8. Signal Flow Chart



9. Product Specifications

	Parameter	Specification
Audio Specs	Analog Audio Channels	8 In / 8 Out

	Network Audio Channels	8 In / 8 Out
	Sampling Rate	48k
	SNR	99dB @ re+4dB A-weighted
	THD + N	≤ 0.003% @ re+4dB A-weighted
	Channel Isolation	90dB @ re+4dB A-weighted
	Frequency Response	20-20kHz ±0.3dB
	Max Input Level	14dBu 1kHz THD+N<1%
	Max Output Level	14dBu 1kHz THD+N<1%
	Dynamic Range	109dB Re Max Output Level A-weighted
Power		90~260VAC 50/60Hz
Interfaces		Phoenix Input * 8
		Phoenix Output * 8
		GPIO * 16
		RS232 * 1
		RS485 IN * 1, OUT * 1
		RJ45 Port * 2 (Switching, Gigabit)
		USB Audio * 1 (Connect to PC)
		UAC / PLAYBACK * 1 (Connect to UAC devices)
Consumption		< 36W

Specifications subject to change without notice.