



CONFIDENTIAL

DSE Mode Evaluation Environment **Manual**

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1 Introduction

In this kit, “Sound effect evaluation environment” and “Sound tuning environment” for DSE mode (DSE mode is one of the firmware mode which work on DD-2SP/SPR-2.) are included. Use the sound effect evaluation environment to evaluate sample effects of firmware functions. Meanwhile, use the sound tuning environment to tune effects of firmware functions.

This manual describes the method of the sound effect evaluation and the sound tuning.

1.1 Sound effect evaluation / Sound Tuning

In this sound effect evaluation or this sound tuning, use the evaluation board control tool “DD-2CTL” and relational data bundled with this kit. And use “EVB-DD2SP/EVB- SPR2”. EVB-DD2SP/EVB-SPR2 is the evaluation board bundled with DD-2SP/SPR-2 standard evaluation kit “DMB-DD2SP/ DMB-SPR2”.

By the above environment, each sample effect of DSE mode function can be evaluated. And, the following function of DSE mode can be tuned: loudness, crossover, power limit, soft clipping and SDSP 10-band PEQ. The coefficients of loudness, crossover, power limit, soft clipping and 10-band PEQ can be output as the result of the sound tuning.

[Notes]

- For usage of DD-2CTL, refer also to “EVB-DD2SP/EVB-SPR2 Control Tool DD-2CTL Manual”. In this manual, only contents which specialized in the sound effect evaluation method and the sound tuning method for DSE mode are described.
- When using DD-2CTL bundled with DMB-DD2SP/DMB-SPR2, the sound effect evaluation and the sound tuning for DSE mode can not be performed.
- When using DD-2STT bundled with DMB-DD2SP/DMB-SPR2, the sound tuning for DSE mode can not be performed.

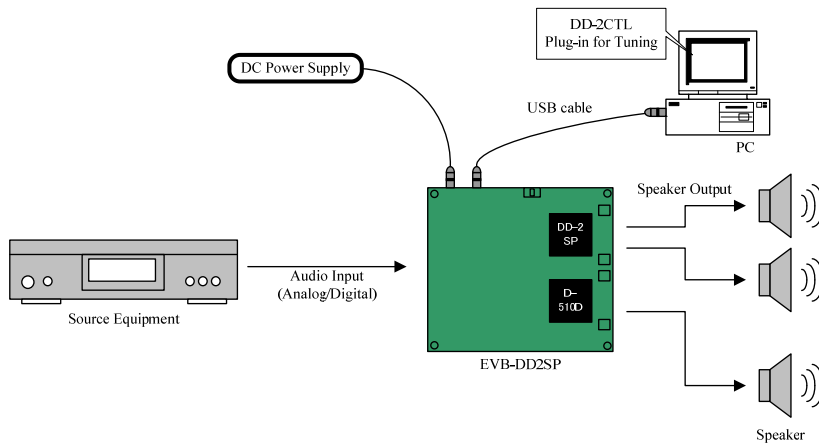
2 Preparation

2.1 System Constitution

When evaluating and tuning the sound effect for DSE mode, connect the evaluation board with the peripherals.
Here shows the connection examples.

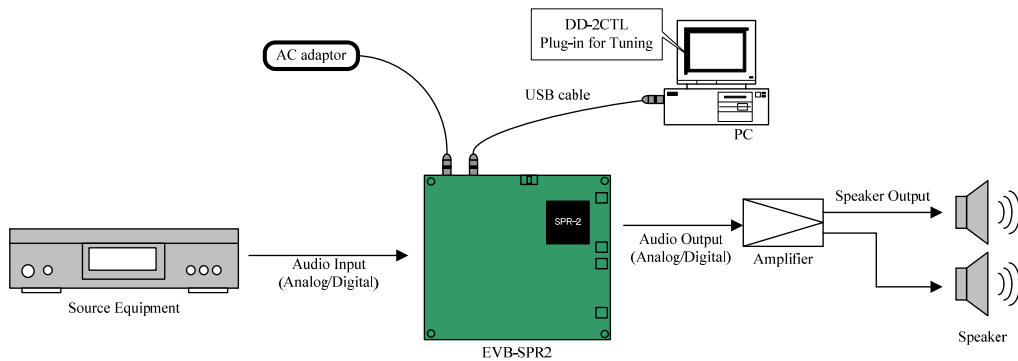
2.1.1 EVB-DD2SP

Here shows a connection example between the evaluation board “EVB-DD2SP” and the peripherals.



2.1.2 EVB-SPR2

Here shows a connection example between the evaluation board “EVB-SPR2” and the peripherals.



2.2 Evaluation Tool

When evaluating and tuning the sound effect for DSE mode, use the software bundled with this kit.

2.2.1 Recommended Operating Environment

OS: Windows XP SP3 32bit Japanese, English Versions.
Windows 7 32bit/64bit Japanese, English Versions.

USB Port: One USB 1.1 port is required.

2.2.2 Install and Uninstall

2.2.2-1 Install Method

When using EVB-DD2SP, copy “EVB-DD2SP” folder onto an appropriate location. Meanwhile, when using EVB-SPR2, copy “EVB-SPR2” folder onto an appropriate location.

The figure below shows the file tree of the installed tool:

EVB-DD2SP or EVB-SPR2		
├── DD-2CTL		
	DD-2CTL.exe	: DD-2CTL executable file
	DD-2CTL.ini	: DD-2CTL initialization file
	DD-2CTL.log	: DD-2CTL log file
	DD-2SP.rgn or SPR-2.rgn	: Register name information file
	DD-2SP.pit or SPR-2.pit	: Preset pattern information file
	└── Plug-ins	: Folder which plug-ins for sound tuning are stored in
	DD2CF8	
	:	
├── Firmware		
	├── Sample	: Folder which sample command files are stored in
		DSEInit.ebc
		:
	└── Instruction	: DSE mode firmware executable code
	DD-2inst_DSE.mdspcfg	
	:	
└── Tune		
	└── Sample	: Folder which sample VST configuration setting files are stored in
		1way.vstcfg
		:

[Notes]

- Windows Registry is not used, the file extension association, etc. are not performed.
- The USB driver for EVB-DD2SP/EVB-SPR2 needs to be installed in order to use DD-2CTL. For how to install the driver, see “EVB-DD2SP/EVB-SPR2 USB Driver Installation Manual”. This manual is bundled with DD-2SP/SPR-2 standard evaluation kit “DMB-DD2SP/DMB-SPR2”.
- Sample command files are stored in “Firmware\Sample” folder. For sample command files, see “4 Sample Command File”.
- VST configuration setting file (*.vstcfg) is file where sound tuning parameter are saved. Samples of sound tuning parameter are stored by VST configuration setting file format in “Tune\Sample” folder. For sample VST configuration setting files, see “5.2 Sample VST Configuration Setting File”.

2.2.2-2 Uninstall Method

Delete EVB-DD2SP or EVB-SPR2 folder.



3 Evaluation procedure

3.1 Sound Effect Evaluation


Here shows the procedure for evaluating sound effect for DSE mode. For this evaluation, DD-2CTL and the evaluation board are used.

- (1) Connect the evaluation board with the peripherals.
- (2) Turn on the evaluation board.

Perform the following step (3)~(7) with DD-2CTL.

- (3) Double-click “DD-2CTL.exe”. DD-2CTL main screen will open.
- (4) Click  on the main screen to connect between DD-2CTL and evaluation board.
- (5) Initialize and start up DD-2SP/SPR-2 to click “1:Initialize (DSE Mode)” button on the command file execution area. With this button clicked, the firmware mode is set to DSE mode. After this operation, if the audio signal is input into the evaluation board from the source equipment, the sound is output.
- (6) Execute the sample command file, and check the firmware function’s effect.
- (7) If finishing evaluation, click  on the main screen. After this operation, turn off the evaluation board.

[Notes]


- When using a digital input on the evaluation board, select optical input (Optical) or coaxial input (Coaxial) on [Board I/O Setting] dialog box. Click  on the main screen to open this dialog box.
- When using a line input on the evaluation board, click “4:Analog Line Input” button in the above step (6). After this operation, select line input (Line) on [Board I/O Setting] dialog box.
- For the effect when each sample command is executed, see “4 Sample Command File”.

3.2 Sound Tuning



Here shows the procedure for tuning sound effect for DSE mode. For this tuning, DD-2CTL and the evaluation board are used.

- (1) Connect the evaluation board with the peripherals.
- (2) Turn on the evaluation board.

Perform the following step (3)~(12) with DD-2CTL.

- (3) Double-click “DD-2CTL.exe”. DD-2CTL main screen will open.
- (4) Click  on the main screen to connect between DD-2CTL and evaluation board.
- (5) Initialize and start up DD-2SP/SPR-2 to click “1:Initialize (DSE Mode)” button on the command file execution area. With this button clicked, the firmware mode is set to DSE mode. After this operation, if the audio signal is input into the evaluation board from the source equipment, the sound is output.

[Notes]

- When using a digital input on the evaluation board, select optical input (Optical) or coaxial input (Coaxial) on [Board I/O Setting] dialog box. Click  on the main screen to open this dialog box.
 - When using a line input on the evaluation board, click “4:Analog Line Input” button in the above step (6). After this operation, select line input (Line) on [Board I/O Setting] dialog box.
- (6) As necessary, read sound tuning parameters from VST configuration setting file. The following operations should be performed for reading VST plug-in configuration file: When clicking  on main screen or selecting [All Plug-ins] on [File]-[Load .vstcfg] submenu, file selection screen opens. And VST plug-in configuration file should be specified on the screen. It is also possible to drop VST plug-in configuration file in main screen.






When reading sound tuning parameters is completed, the following log message is displayed on the log display area. If error occurs, error message is displayed on message dialog box. See “5.3 Error and Warning Messages” for the detail.

```
The following plug-in parameter loaded completely.
DD2CF8
DD2LMT8
DD2PEQ8
DD2VLE8
```

[Notes]


- The following operations should be performed in order to read only sound tuning parameters for specific sound tuning dialog box from VST configuration setting file: When selecting sound tuning dialog box name on [File]-[Load .vstcfg] submenu, file selection screen opens. And VST plug-in configuration file should be specified on the screen. It is also possible to drop VST plug-in configuration file in sound tuning dialog box.
- When reading sound tuning parameters is completed, the following log message is displayed on the log display area. If error occurs, error message is displayed on message dialog box. See “5.3 Error and Warning Messages” for the detail.

```
DD2CF8 plug-in parameter loaded completely.
```


- For sample VST configuration setting files, see “5.2 Sample VST Configuration Setting File”.
- (7) Click , , , ,  on main screen, or selecting sound tuning dialog box name on [Plug-ins] menu. Sound tuning dialog box will open.

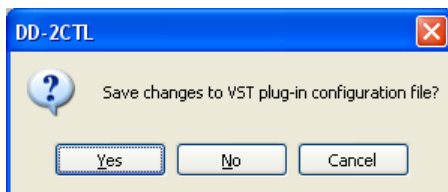
(8) Tune sound effect to control sound tuning dialog box.

[Notes]

- For sound tuning dialog box control method, see “5.1 Operation Method”.
 - As necessary, apply surround effect, harmonics enhancer effect, or acoustic compensation effect to click buttons on command file execution area. For the above effect, see “4.2.1 Surround Effect”, “4.2.2 Band Extension Effect” or “4.2.3 Acoustic Compensation Effect”.
- (9) When clicking  on each sound tuning dialog box, file save screen opens. And, save tuning result (coefficients) in MDSP/SDSP configuration file format.
- (10) If finishing sound tuning, save sound tuning parameters in VST plug-in configuration file (*.vstcfg) to select [Save .vstcfg As] on [File] menu.

[Notes]

- It is also possible to overwrite sound tuning parameters to VST plug-in configuration setting file read by (6) by the following operation: Clicking  on main screen or selecting [Save .vstcfg] on [File] menu.
- VST plug-in configuration file is changed, after DD-2CTL is finished, the following message box is displayed.



(11) Click  on DD-2CTL main screen. After this operation, turn off the evaluation board.

4 Sample Command File

Here describes the sample command files which are useful for evaluating DSE mode on the evaluation board. Those command files are stored in “Firmware\Sample” folder and registered in DD-2CTL’s command file execution area.

[Notes]

- For details of processes executed with command files, refer to description in command files.
- For command in sample command file, refer to “5.2 Command List” of “EVb-DD2SP/EVB-SPR2 Control Tool DD-2CTL Manual”.
- For preset patterns or firmware coefficients in command files, see “DD-2SP/SPR-2 Firmware DSE Mode Manual”. Also, for FM synthesizer contents, see “YDA174 Application Manual” or “YSS952 Application Manual”.

The sample command files are registered in the command file execution area as shown in the following table.

Reg. No.		Registration Name	Name of Sample Command File	Board Supported	
				EVb-DD2SP	EVb-SPR2
1		Initialize (DSE Mode)	DSEInit.ebc	✓	✓
2	(1)	Mute	Mute.ebc	✓	✓
	(2)	Mute Release	MuteRelease.ebc	✓	✓
3		Digital Input	DigitalInput.ebc	✓	✓
4		Analog Line Input	LineInput.ebc	✓	✓
5		FM Sequential Play	FMSeqPlay.ebc	✓	✓
6		1Way	1Way.ebc	✓	✓
7		1Way (2band)	1Way2band.ebc	✓	✓
8		2Way	2Way.ebc	✓	
9		2.1 Channel	2.1Channel.ebc	✓	
10		(unregistered)	(unregistered)		
11		S3D Natural	S3DNatural.ebc	✓	✓
12		S3D Stadium	S3DStadium.ebc	✓	✓
13		S3D Hall	S3DHall.ebc	✓	✓
14		S3D Wide 1	S3DWide1.ebc	✓	✓
15		S3D Wide 2	S3DWide2.ebc	✓	✓
16		S3D Off	S3DOff.ebc	✓	✓
17-20		(unregistered)	(unregistered)		
21		HXT Bass 1	HXTBass1.ebc	✓	✓
22		HXT Bass 2	HXTBass2.ebc	✓	✓
23		HXT High 1	HXTHigh1.ebc	✓	✓
24		HXT High 2	HXTHigh2.ebc	✓	✓
25		HXT Bass1 + High1	HXTBass1+High1.ebc	✓	✓
26		HXT Bass2 + High2	HXTBass2+High2.ebc	✓	✓
27		HXT Off	HXTOff.ebc	✓	✓
28-30		(unregistered)	(unregistered)		
31	(1)	AEQ On	AEQOn.ebc	✓	✓
	(2)	AEQ Off	AEQOff.ebc	✓	✓
32	(1)	Volume Linked EQ On	VolumeLinkedEQOn.ebc	✓	✓
	(2)	Volume Linked EQ Off	VolumeLinkedEQOff.ebc	✓	✓
33		Power Limit 1	PowerLimit1.ebc	✓	✓
34		Power Limit 2	PowerLimit2.ebc	✓	✓

Reg. No.	Registration Name	Name of Sample Command File	Board Supported	
			EVB-DD2SP	EVB-SPR2
35	Power Limit 1 + Soft Clip	PowerLimit1+SoftClip.ebc	✓	✓
36	Power Limit 2 + Soft Clip	PowerLimit2+SoftClip.ebc	✓	✓
37	Power Limit Off	PowerLimitOff.ebc	✓	✓
38	(1) Small Signal Detection On	ILDOn.ebc	✓	✓
	(2) Small Signal Detection Off	ILDOff.ebc	✓	✓
39-100	(unregistered)	(unregistered)		

[Notes]

- The labels on the “Reg. No.” and “Registration Name” columns are displayed on DD-2CTL’s command file execution buttons.
- Only the command file registered as the Reg. No. (1) can be executed when the evaluation is starting up for the first time.
- The following two command files are registered in the same command file execution button: 2-(1) and 2-(2), 31-(1) and 31-(2), 32-(1) and 32-(2), 38-(1) and 38-(2). And the two command files toggle every time the corresponding command file execution button is pressed.
- Hereafter, the name of the sample command file is expressed as in “{Reg. No.}:{ Registration Name }”.

4.1 Basic Control

4.1.1 Initialization

When “1:Initialize (DSE Mode)” command file is executed after the evaluation board is powered up or after the reset button is pressed, the input signal is sent to DD-2SP/SPR-2 through the digital input pin on the board, allowing the processed results to be output from the amplifier output pin and digital/analog pins. Following the end of the initialization, FM synthesizer content [Power_On_Short_06] is played back automatically. With this command file, the firmware and its related functions are set as shown below:

- AIF mode is 0.
- The firmware mode is set to DSE mode.
- 8-bit headroom is secured.
- FM synthesizer output is routed to mixer.
- SDSP 10-band PEQ output path is selected. (Its equalizer characteristics is flat.)
- When using EVB-DD2SP, the master volume is set to -30.0dB. When using EVB-SPR2, the master volume is set to -12dB.
- The master volume change smoothly.
- MDSP2 and SDSP will run and the mute state will be released.

[Note]

- Select either optical or coaxial digital input from [Board I/O Setting] dialog box of DD-2CTL.

4.1.2 Selection of Input Signals

Execute “3:Digital Input” command file to select a digital input pin as the audio signal input port. And, execute “4:Analog Line Input” command file to select a line input pin.

[Note]

- To use a digital input pin, select Optical or Coaxial from [Board I/O Setting] dialog box of DD-2CTL. To use a line input pin, select Line on the same dialog box.

4.1.3 Mute

Execute “2:(1) Mute” command file to mute the amplifier output and digital/analog output. With this command file, Mute is specified as a target master volume value. This application sleeps while the master volume transitions to Mute state smoothly. It sleeps for 20ms. After the master volume has muted, MDSP2 and SDSP are muted. (MDSPMUTEN=SDSPMUTEN=0 in DD-2SP/SPR-2 register 0x10 MUTE). Execute “2:(2) Mute Release” command file to release this Mute state. As with “2:(1) Mute”, the master volume is restored after the mute state of MDSP2 and SDSP is released (MDSPMUTEN=SDSPMUTEN=1).

4.1.4 Playback of FM Synthesizer

Executing “5:FM Sequential Play” command file allows the FM synthesizer contents (ROM block numbers from 32 to 89) on the on-chip ROM (DD-2SP/SPR-2) to be played back in this order.

4.1.5 Crossover Network Configurations

Execute “8:2Way” command file to use the evaluation board in 2 way configuration. The cross-over frequency is 2kHz.

And, execute “9:2.1 Channel” command file to use the 2.1 channel configuration. The cross-over frequency is 280Hz.

Execute “7:1Way (2band)” command file to achieve two-band limiter and two-band dynamic range compression for 1 way speakers.

When this command file and either of the following command files are executed, audio signal is divided (The cross-over frequency is 280Hz), output level of each divided signal is limited, and signal is output after being combined: “33:Power Limit 1” to “36:Power Limit 2 + Soft Clip” command file. Also, when “35:Power Limit 1 + Soft Clip”, “36:Power Limit 2 + Soft Clip” command files are executed, waveform of low frequency singnal is clipped smoothly.

To return from the above configurations to 1 way configuration, execute “6:1Way” command file.

[Notes]

- This command file can be executed only when EVB-DD2SP is used.
- For EVB-DD2SP with 2 way support, use “6:1Way”, “7:1Way (2band)” and “8:2Way” command files.
- For EVB-DD2SP with 2.1 channel support, use “6:1Way”, “7:1Way (2band)” and “9:2.1 Channel” command files.

4.2 Effect Control

4.2.1 Surround Effect

When “11:S3D Natural” command file is executed, the following effect is applied: The dialog articulation does not change. But the surround component is scaled up. When “12:S3D Stadium” command file is executed, the following effect is applied: This effect realizes such the feverish realistic sensation as the game or the performance in the stadium. When “13:S3D Hall” command file is executed, the following effect is applied: This effect realizes rich sound and space of a large concert hall.

Or, when “15:S3D Wide2” command file is executed, the wide stereo effect is applied. When “14:S3D Wide1” command file is executed, the wide stereo effect is applied weakly.

Execute “16:S3D Off” command file to disable this effect.

4.2.2 Band Extension Effect

When “21:HXT Bass 1” command file is executed, the bass enhancement effect is applied. This effect is for mini-component stereo sets. When “22:HXT Bass 2” command file is executed, the bass enhancement effect is applied. This effect is for TV sets.

When “23:HXT High 1” command file is executed, the bandwidth extension effect is applied. When “24:HXT High 2” command file is executed, the bandwidth extension effect is applied strongly.

When “25:HXT Bass1 + High1” command file is executed, “HXT Bass 1” and “HXT High 1” are applied. When “26:HXT Bass2 + High2” command file is executed, “HXT Bass 2” and “HXT High 2” are applied.

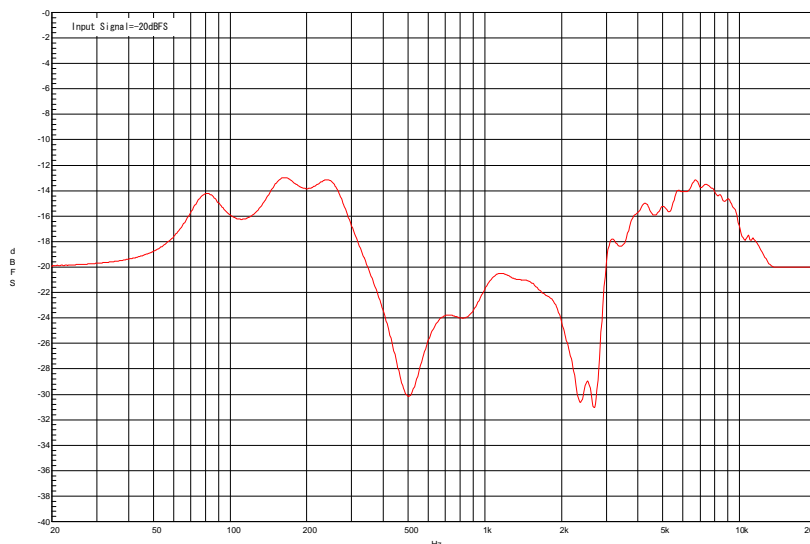
Execute “27:HXT Off” command file to disable these effects.

4.2.3 Acoustic Compensation Effect

When “31:(1)AEQ On” command file is executed, the acoustic compensation effect prepared as sample is applied. Execute “31:(2)AEQ Off” command file to disable this effect.

[Notes]

- When “31:(1)AEQ On” command file is executed, the following frequency response is realized.



- The acoustic compensation must tune a effect every cabinet. This sample is a effect for a specified speaker cabinet. It is not an appropriate effect for every speaker cabinet.

4.2.4 Volume Linked Equalizer Effect

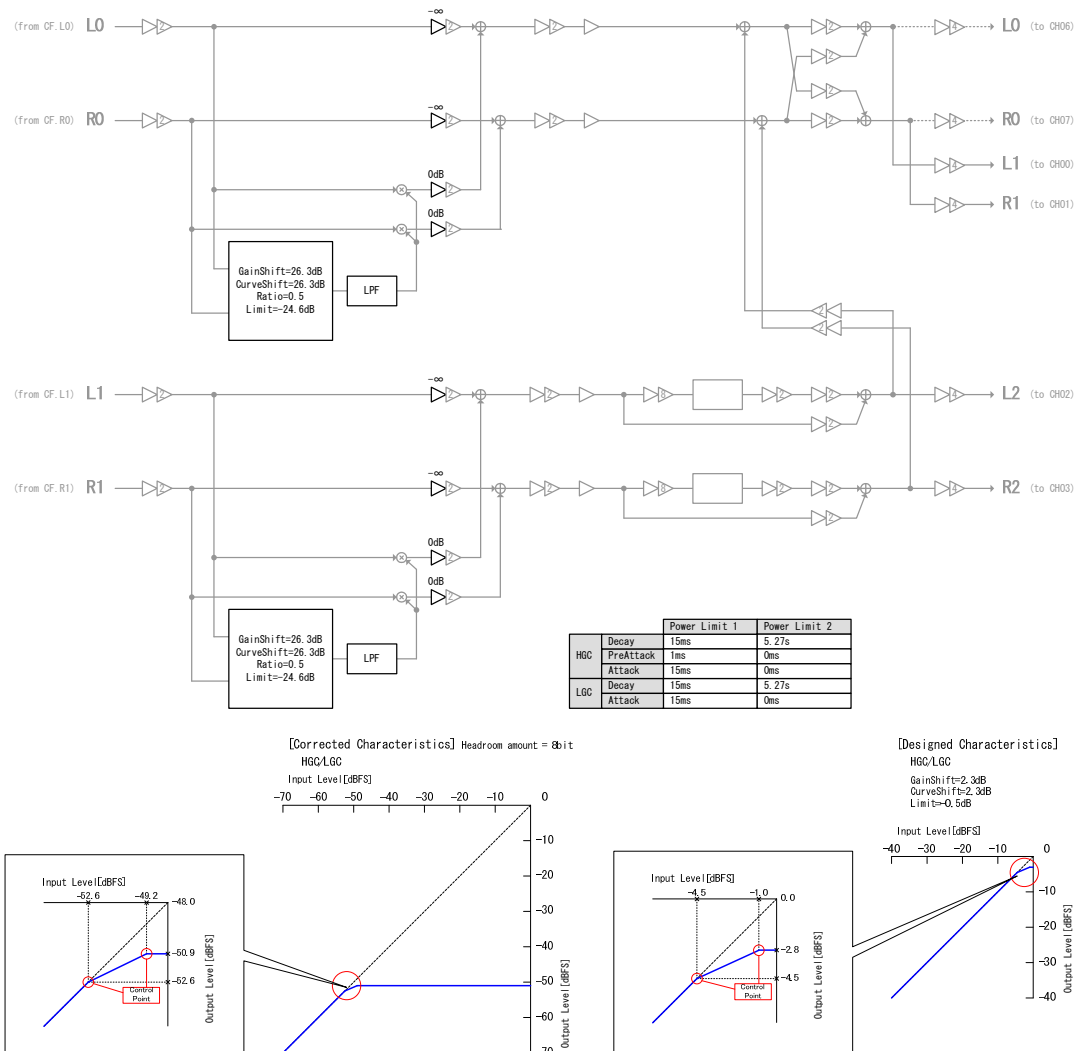
When executing “32:(1) Volume Linked EQ On” command file, the volume linked equalizer effect is applied. Execute “32:(2) Volume Linked EQ Off” command file to disable the equalizer effect. See the coefficient set [SV Ln DEQ0 High] described in “DD-2SP/SPR-2 Firmware DSE Mode Manual” for the detail of the equalizer characteristics.

4.2.5 Limitation of Output Power

When “33:Power Limit 1” command file is executed, the output power of the amplifiers on EVB-DD2SP (the on-chip amplifier (DD-2SP and D-510D)) and external connected amplifier is limited. When connecting 8Ω speaker to each amplifiers, the 0% distortion output power is nearly 10W limited. When “34:Power Limit 2” command file is executed, the auditory distortion and the max. sound pressure level is decreased. The above two effects are assumed with the power limit value for the on-chip amplifier (DD-2SP) is set to 0dBFS (0x2D-0x2E PLIMIT[10:0]=0x7FFF). Execute “37:Power Limit Off” command file to disable this effect.

[Notes]

- When “33:Power Limit 1” and “34:Power Limit 2” command file are executed, the Limiter firmware coefficients are set as follows. In this case, I/O characteristics is corrected on the premise that 8bit headroom is secured in the former firmware.



- “33:Power Limit 1” and “34:Power Limit 2” command file also clips waveform of low frequency range signal smoothly.

4.2.6 Soft Clipping

Execute “35:Power Limit 1 + Soft Clip”, “36:Power Limit 2 + Soft Clip” command file to clip waveform of low frequency range signal smoothly. When “35:Power Limit 1 + Soft Clip” command file is executed, soft clipping effect and “Power Limit 1” effect are applied. Meanwhile, when “36:Power Limit 2 + Soft Clip” command file is executed, soft clipping effect and “Power Limit 2” effect are applied.

[Notes]

- It premises using the soft clipping effect simultaneously with the power limit effect of “33:Power Limit 1” or “34:Power Limit 2”.
- Execute “33:Power Limit 1”, “34:Power Limit 2” command file to disable soft clipping effect.

4.2.7 Detection of Small Signal

Execute “38:(1) Small Signal Detection On” command file to detect the small signal. If the signal less than -60dBFS is continuously input for more than 500ms after executing this command file, the detection notice register will be set valid values (0x16 MIDAT[7:0]=0x01). Others, the detection notice register will be set invalid value (0x00). Execute “38:(2) Small Signal Detection Off” command file to disable the detective function.

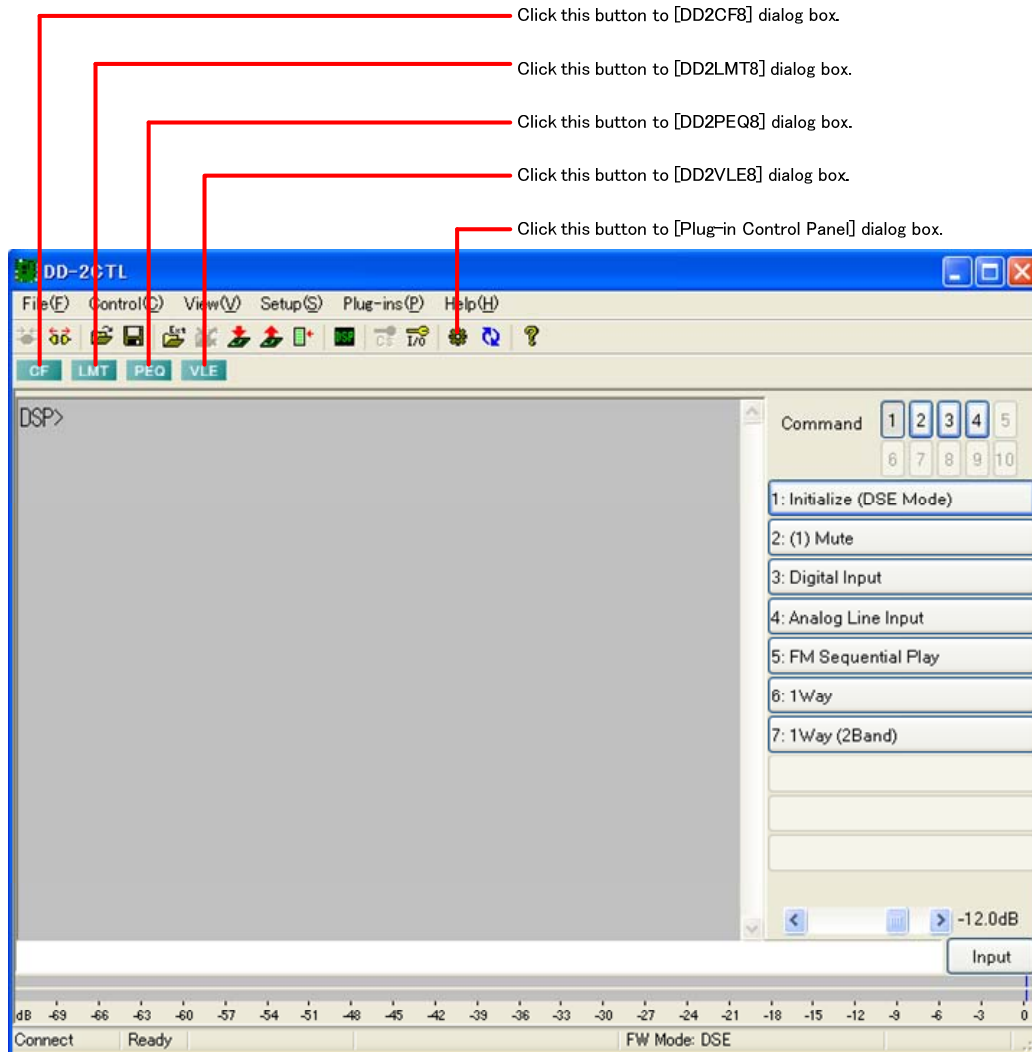
[Note]

- For DD-2SP/SPR-2 register access, see “4.5 Register Access” in “EVB-DD2SP/EVB-SPR2 Control Tool DD-2CTL Manual”.

5 Sound Tuning Dialog Box


Here describes the explanation of sound tuning dialog box.

Click the following buttons on DD-2CTL main screen. Each sound tuning dialog box will open.



The description below shows the operation method of each sound tuning dialog box.

[Note]

-  will be for extension in the future.

5.1 Operation Method



5.1.1 Common

Here describes common operation of the following dialog box: DD2CF8, DD2LMT8, DD2PEQ8, DD2VLE8.



① Effect On / Off

Enable / disable sound tuning effect.

-  (Turn on) : Enable effect.
-  (Turn off) : Disable effect.

② Undo

The last operation is canceled and undone.

③ Redo

The operation canceled by [Undo] is redone.

④ Make Coefficient File

When clicking this button, file save screen will open. And, result of sound tuning (coefficients) can be saved in MDSP/SDSP configuration file format.

⑤ Snapshot

Sound tuning dialog box screen is copied to clipboard.

⑥ Version

Version information of VST plug-in is displayed.

5.1.2 DD2CF8

By this dialog box, crossover can be tuned.

By [HPF] tab of this dialog box, frequency characteristic of high-frequency band signal can be tuned. Meanwhile, By [LPF] tab, frequency characteristic of low-frequency band signal can be tuned. Here explains only [LPF] tab. However, [HGC] tab has same function as [LPF] tab.

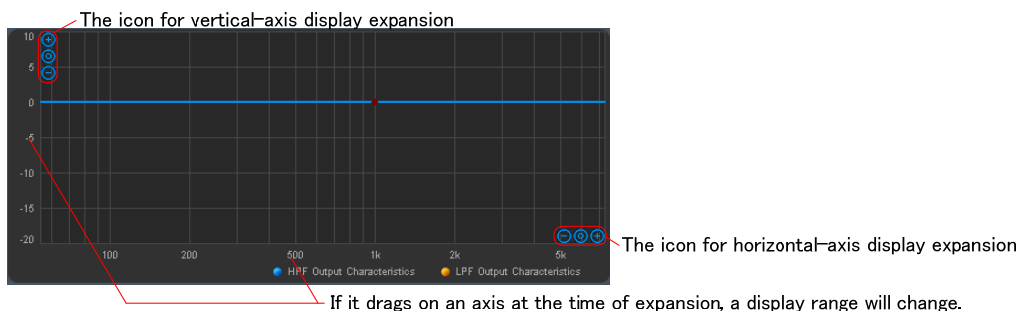


① Frequency Characteristic Graph

Display frequency characteristic graph of crossover filter.

[Note]

- If cursor is united with lower right or upper left of graph, icon for display expansion will appear. Click to expand display of graph. Click to reduce display of graph. Click to return magnification of the graph to 1 time.



② HPF Output Characteristics

Display frequency characteristic graph in high- frequency band in blue.

- (Turn on) : Graph is displayed.
- (Turn off) : Graph is not displayed.

③ LPF Output Characteristics

Display frequency characteristic graph in low- frequency band in orange.

- (Turn on) : Graph is displayed.
- (Turn off) : Graph is not displayed.

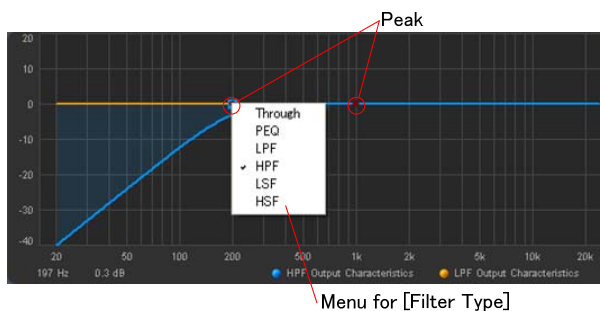
④ Biquad* Filter Type (*=0/1)

Select filter type for every biquad.

- Through : Through
- PEQ : Peak/Dip
- LPF : Low pass
- HPF : High pass
- LSF : Low shelving
- HSF : High shelving

[Note]

- Menu will be displayed if by left-double-clicking the peak. It is also possible to select [Filter Type] with this menu. And, [F] and [G] can be changed by left-clicking and dragging the peak, and [Q] can be also changed by right-clicking and dragging it.



⑤ Biquad* F (*=0/1)

Set frequency of filter for every biquad (Setting range: 20 to 20,000[Hz]).

⑥ Biquad* G (*=0/1)

Set gain of filter for every biquad (Setting range: -20.0 to 10.0[dB]).

⑦ Biquad* Q (*=0/1)

Set Q value of filter for every biquad (Setting range: 0.1000 to 10.0000).

⑧ HPF/LPF Output INV

Invert phase of high/low-frequency band side.

- ☒ INV (Turn on) : Phase is inverted.
- ☐ INV (Turn off) : Phase is not inverted.

[Note]

- When this button is ☒ INV (Turn on), frequency characteristic graph is displayed as dashed line.

⑨ LPF Output MONO

Transform low-frequency band signal into monaural signal.

- ☒ MONO (Turn on) : Low-frequency band signal is not transformed into monaural signal.
- ☐ MONO (Turn off) : Low-frequency band signal is not transformed into monaural signal.

[Note]

- When this button is ☒ MONO (Turn on), frequency characteristic graph is displayed as heavy line.
- This button is function of only [LPF] tab.

⑩ HPF/LPF Output INV

Set output gain of high/low-frequency band side signal (Setting range: -96.0 to 0.0[dB]).

When this button is ☐ (Turn off), output of high/low-frequency band side signal is muted.

5.1.3 DD2LMT8

5.1.3-1 [HGC/LGC] Tab

By [HGC] tab of this dialog box, input/output characteristic (output power limit and dynamic range compression) of high-frequency band signal can be tuned. Meanwhile, By [LGC] tab, input/output characteristic of low-frequency band signal can be tuned. Here explains only [HGC] tab. However, [LGC] tab has same function as [HGC] tab.

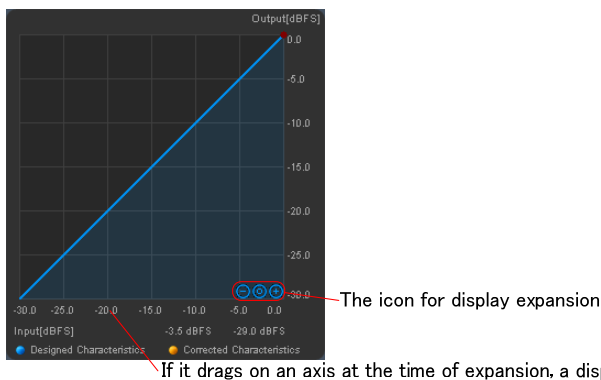


① I/O Characteristics Graph

Display designed input/output characteristic graph and corrected input/output characteristic graph.

[Note]

- If cursor is united with lower right of graph, icon for display expansion will appear. Click to expand display of graph. Click to reduce display of graph. Click to return magnification of graph to 1 time.



② Designed Characteristics

Display designed input/output characteristic graph in blue.

- (Turn on) : Graph is displayed.
- (Turn off) : Graph is not displayed.

③ Corrected Characteristics

Display designed input/output characteristic graph in orange.

- (Turn on) : Graph is displayed.
- (Turn off) : Graph is not displayed.

④ Headroom

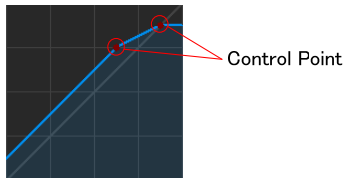
Set headroom value secured for signal to input to Limiter firmware. Usually, set 48.16[dB].

⑤ Threshold

Set input level to start compression (Setting range: -90.0 to 0.0[dB]). (The lower limit of range varies depending on [Headroom] or [Ratio] setting value.)

[Notes]

- [Threshold], [Ratio], [Output Gain] and [Output Limit] can be changed by left-clicking and dragging the control point (red point in the following figure).





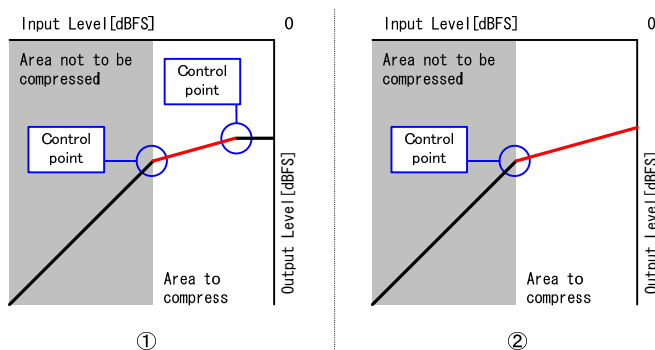
Control point can move only in area decided by [Threshold], [Ratio], [Output Gain] and [Output Limit]. (When moving control point to unmovable area, frame of parameter edit box of factor which can not move changes red.)



⑥ Ratio

Set output/input ratio (compression ratio) of the following (Setting range: 0.0000 to 1.0000).


- When [Output Limit] is  (Turn on).
To second control point from first control point of input signal compression area (Red line in the figure ① below).
- When [Output Limit] is  (Turn off).
Input signal compression area (Red line in the figure ② below).

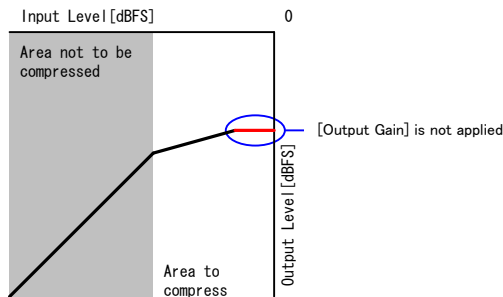


⑦ Output Gain

Set output signal gain (Setting range: -74.7 to 18.0[dB]). (The lower limit of range varies depending on [Headroom], [Threshold] or [Ratio] setting value.)


[Note]

- When [Output Limit] is  (Turn on), this parameter is not applied to right side from second control point of input signal compression area (Red line in the figure below).




⑧ Output Limit

Set level that output is limited (Setting range: -76.3 to 0.0[dBFS]). (The lower limit of range varies depending on [Headroom] or [Ratio] setting value.)

When this button is  (Turn off), this function is disabled.

⑨ Pre Attack Time

Set pre attack time (Setting range: 0 to 20[ms]).


When this button is  (Turn off), pre attack time is 0[ms].

[Note]

- This function is only [HGC] tab.

⑩ Release Time

Set release Time (Setting range: 0 to 15,812[ms]).


When this button is  (Turn off), release time is 0[ms].

[Note]

- Release time is corrected the nearest value to be able to convert. For example, when setting release time to 5,000 ms, its time is corrected to 5,270 ms (the nearest value to be able to convert to coefficient "0x0003").

⑪ Attack Time

Set attack time (Setting range: 0 to 100[ms]).

When this button is  (Turn off), attack time is 0[ms].

⑫ Gain Shift

Display the amount of Gain Shift in Gain controller in dB.

⑬ Curve Shift

Display the amount of Curve Shift in Gain controller in dB.

⑭ Ratio

Display output/input ratio (compression ratio) in Gain controller in decimal format.

⑮ Limit

Display the amount of limit level in Gain controller in dB.

5.1.3-2 [SC] Tab

By [SC] tab, soft clipping function for low frequency range signal can be tuned.



[SC] tab

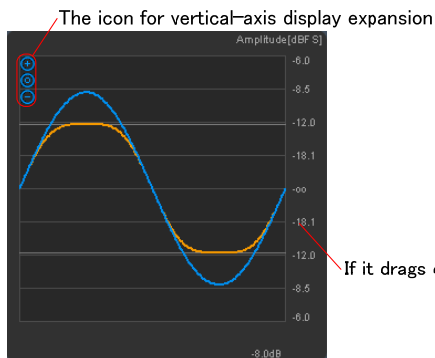
① I/O Waveform Graph

Display the following waveform for input (0 dBFS sine wave).

- Blue line : Soft clipping process input signal.
- Orange line : Soft clipping process output signal.

[Note]

- If cursor is united with upper left of graph, icon for display expansion will appear. Click to expand display of graph. Click to reduce display of graph. Click to return magnification of graph to 1 time.



If it drags on an axis at the time of expansion, a display range will change.

② Headroom

Set the amount of headrooms which was not cancelled by LMT.LoLevAdj[3:0] coefficient. Use 6.02[dB] for usual applications.

③ Limit Level

Set the signal level limited by Low Gain controller (Setting range: -18.00 to 0.00[dB]).


④ PreLev

Adjust the input signal level in soft clipping processing (Setting range: 0.00 to 18.06[dB]).

When this button is (Turn on), PreLev parameter is calculated automatically so that the amplitude of soft clipper input signal will be 0 dBFS.

⑤ PostLev

Adjust the output signal level of soft clipping processing (Setting range: -18.06 to 0.00[dB]).



When this button is  (Turn on), PostLev parameter is set to “-1 * PreLev” automatically.

⑥ Compression

Set the compression level for the 0 dBFS signal in soft clipping processing (Setting range: 0.0 to 3.5[dB]).



⑦ Soft Clipped

Enable the effect of soft clipping.

-  (Turn on) : Soft clipping enabled.
-  (Turn off) : Soft clipping disabled.


⑧ LoMix INV

Invert phase of low frequency range signal when mixing to high frequency range signal.

-  (Turn on) : Phase is inverted.
-  (Turn off) : Phase is not inverted.

⑨ LoMix

Set gain of low frequency range signal when mixing to high frequency range signal.

When this button is  (Turn on), low frequency range signal is not mixed to high frequency range signal.

5.1.4 DD2PEQ8

By this dialog box, SDSP 10-band PEQ equalizer can be tuned.



① Read Measurement Correction Result File

Read measurement correction result file (extension is .afc). When clicking this icon, file selection screen opens and it can specify measurement compensation result file.

[Notes]

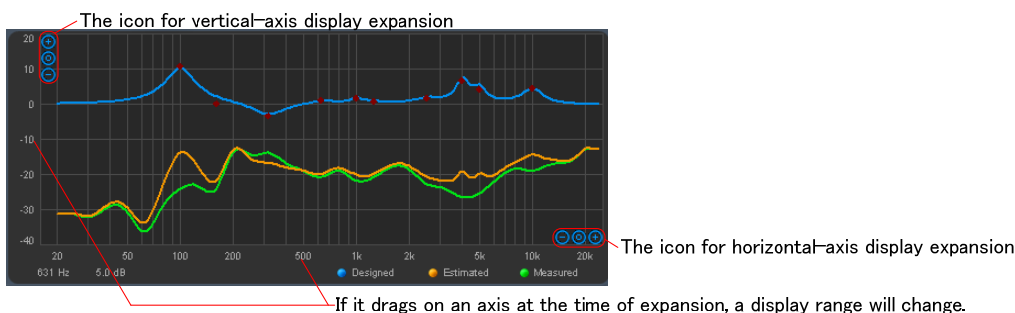
- Measurement compensation result file can be created with DD-2SP/SPR-2 Cabinet Calibration Evaluation Tool “DAP1AFC+”. DAP1AFC+ is included in DD-2 SP/SPR-2 cabinet measurement kit “KT-DD2 SP/SPR2-AFC”. For creation method of measurement compensation result file, see "DD-2SP/SPR-2 Cabinet Calibration Evaluation Tool “DAP1AFC+ Manual” included the above kit.
- When it does not tune equalizer of 10-band PEQ using measurement compensation result file, this icon operation is unnecessary.

② Frequency Characteristic Graph

Displays the following frequency characteristics: frequency characteristic of 10-band PEQ, frequency characteristic of cabinet before/after compensation.

[Note]

- If cursor is united with lower right or upper left of graph, icon for display expansion will appear. Click to expand display of graph. Click to reduce display of graph. Click to return magnification of graph to 1 time.





③ Designed

Display frequency characteristic graph of 10-band PEQ in blue.


- (Turn on) : Graph is displayed.
- (Turn off) : Graph is not displayed.

④ Estimated

Display frequency characteristic graph of cabinet after compensation in orange. This characteristic is the characteristic that 10-band PEQ is applied to frequency characteristic of cabinet ([Measured] graph).



-  (Turn on) : Graph is displayed.
-  (Turn off) : Graph is not displayed.

[Note]


- When it does not tune equalizer of 10-band PEQ using measurement compensation result file, this button should be used as  (Turn off).

⑤ Measured

Display frequency characteristic of cabinet measured in DAP1AFC+ in green.

-  (Turn on) : Graph is displayed.
-  (Turn off) : Graph is not displayed.

[Note]

- When it does not tune equalizer of 10-band PEQ using measurement compensation result file, this button should be used as  (Turn off).

⑥ Sort

Sort the Band* equalizers so that the frequency of these equalizers becomes the ascending order.

⑦ Measurement file

Measurement compensation result file name read by (1) is displayed.

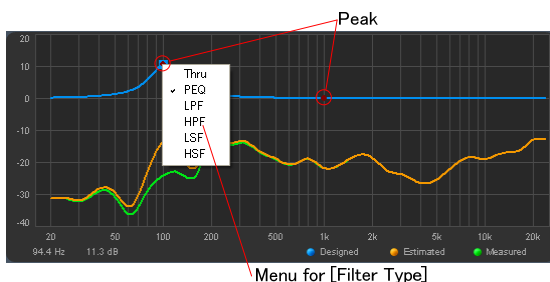
⑧ Band* Filter Type (*=0/1/.../8/9)

Select equalizer type.

- Through : Through
- PEQ : Peak/Dip
- LPF : Low pass
- HPF : High pass
- LSF : Low shelving
- HSF : High shelving

[Note]

- Menu will be displayed if by left-double-clicking the peak. It is also possible to select [Filter Type] with this menu. And, [F] and [G] can be changed by left-clicking and dragging the peak, and [Q] can be also changed by right-clicking and dragging it.



- In order of Band9 to Band0 on DD2PEQ8 dialog box, coefficient of each Band is output to SDSP configuration file.

⑨ Band* F (*=0/1/.../8/9)

Set frequency of equalizer (Setting range: 20 to 20,000[Hz]).

⑩ Band* G (*=0/1/.../8/9)

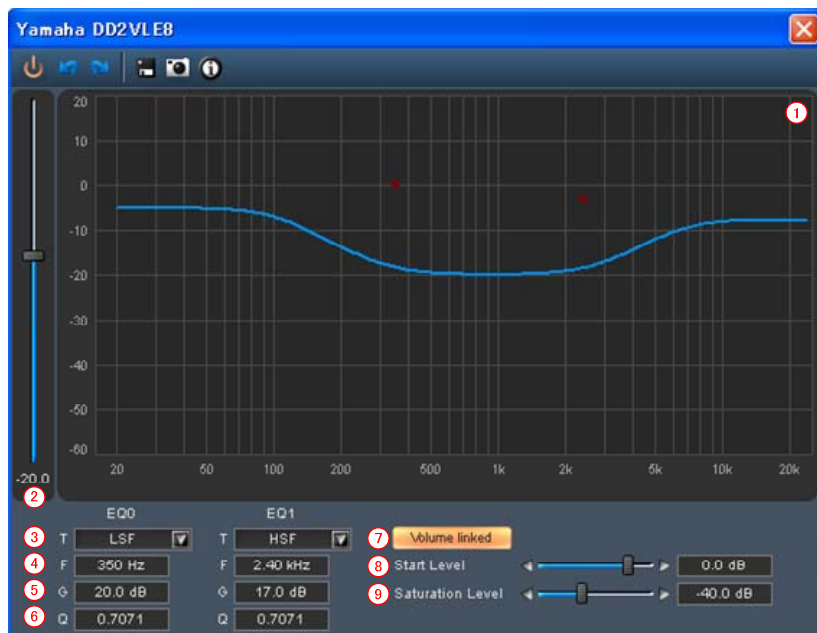
Set gain of equalizer (Setting range: -12.0 to 12.0[dB]).

⑪ Band* Q (*=0/1/.../8/9)

Set Q value of equalizer (Setting range: 0.1000 to 10.0000).

5.1.5 DD2VLE8

By this dialog box, volume linked equalizer can be tuned.

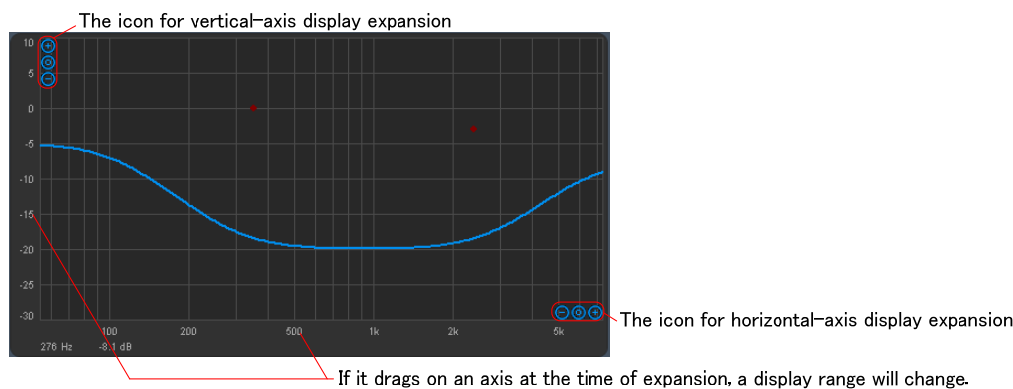


① Frequency Characteristic Graph

Simulation of frequency characteristic of equalizer according to [simulation volume] value is executed, and it is displayed on graph.

[Note]

- If cursor is united with lower right or upper left of graph, icon for display expansion will appear. Click to expand display of graph. Click to reduce display of graph. Click to return magnification of graph to 1 time.



② Simulation Volume

Set simulation volume value. This is used to check variation of equalizer characteristics with control of volume value.

[Notes]

- Actual master volume value does not vary even if this parameter is changed.
- When ⑦ is (Turn off), this function is disabled.

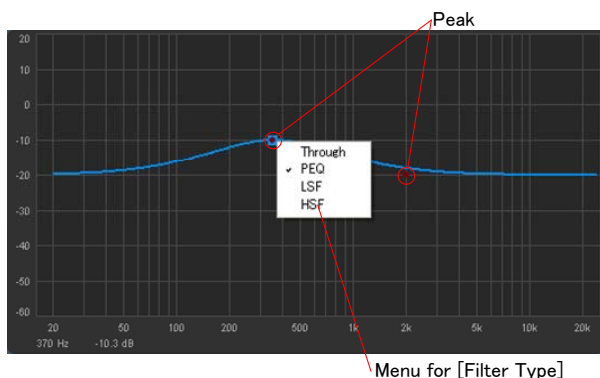
③ EQ* Filter Type (*=0/1)

Select equalizer type.

- Through : Through
- PEQ : Peak/Dip
- LSF : Low shelving
- HSF : High shelving

[Note]

- Menu will be displayed if by left-double-clicking the peak. It is also possible to select [Filter Type] with this menu. And, [F] and [G] can be changed by left-clicking and dragging the peak, and [Q] can be also changed by right-clicking and dragging it.



④ EQ* F (*=0/1)

Set frequency of equalizer (Setting range: 20 to 20,000[Hz]).

⑤ EQ* G (*=0/1)

Set gain of equalizer (Setting range: -20.0 to 20.0[dB]).

⑥ EQ* Q (*=0/1)

Set Q value of equalizer (Setting range: 0.1000 to 10.0000).

⑦ Volume Linked

Select whether to link equalizer with the volume.

- ☒ Volume linked (Turn on) : Equalizer is linked with the volume.
- ☐ Volume linked (Turn off) : Equalizer is not linked with the volume.

(Characteristic of equalizer is always characteristic designed by [F], [G] and [Q].)

⑧ Start Level

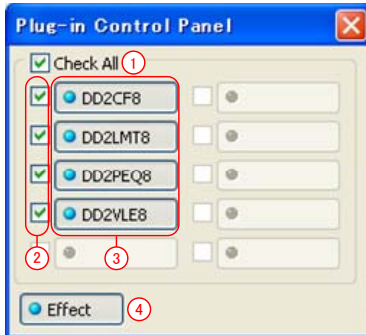
Set volume value at which volume linked equalizer effect starts (Setting range: [Saturation Level] value+13 to 18.0[dB]).

⑨ Saturation Level

Set volume value at which volume linked equalizer effect is saturated (Setting range: -72.0 to [Start Level] value-13[dB]).

5.1.6 Plug-in Control Panel

In this dialog box, effect of DD2CF8, DD2LMT8, DD2PEQ8, and DD2VLE8 can be turned on and off.



① Check Collectively



When this box is checked, all of [linked check] box (②) is checked. Meanwhile, when this box is unchecked, all of [linked check] box will be unchecked.

② Linked Check

Effect of sound tuning dialog box which attached check is simultaneously turned on and off with [Turned On/Off Effect Collectively] button (④).



③ Turned On/Off Effect

Turned on and off effect of each sound tuning dialog box.

-  (Turn on) : Turned on effect.
-  (Turn off) : Turned off effect.

④ Turned On/Off Effect Collectively

Effect of sound tuning dialog box by which [Linked Check] box (②) is checked is turned on and off collectively.

-  (Turn on) : Turned on effect collectively.
-  (Turn on) : Turned off effect collectively.

5.2 Sample VST Configuration Setting File

Here describes VST configuration setting files which are useful for sound tuning DSE mode. VST configuration setting files which are realize the following are stored in “DD-2STT\User” folder.

Parameter File Name	Dialog Box to Be Set Parameter	Description	Board Supported	
			EVB-DD2SP	EVB-SPR2
1Way.vstcfg	CF, LMT	Configure network of the evaluation board. These is the same effects as set by executing the following by using DD-2CTL: - 1Way.vstcfg : “6:1Way” - 1Way(2Band).stt : “7:1Way (2band)” - 2Way.vstcfg : “8:2Way” - 2.1ch.vstcfg : “9:2.1 Channel” For detail of these effects, see “4.1.5 Crossover Network Configurations”.	✓	✓
1Way(2Band).vstcfg			✓	✓
2Way.vstcfg			✓	
2.1ch.vstcfg			✓	
PowerLimit1.vstcfg	LMT	Output powers of amplifier on EVB-DD2SP (on-chip amplifier (DD-2SP)) and external connected amplifier are limited. These is the same effects as set by executing the following by using DD-2CTL: - PowerLimit1.vstcfg : “33:Power Limit 1” - PowerLimit2.vstcfg : “34:Power Limit 2” For detail of these effects, see “4.2.5 Limitation of Output Power”.	✓	✓
PowerLimit2.vstcfg			✓	✓
PowerLimit1+SoftClip.vstcfg		Output powers of amplifier on EVB-DD2SP (on-chip amplifier (DD-2SP)) and external connected amplifier are limited. And, waveform of low frequency range signal is clipped smoothly. These is the same effects as set by executing the following by using DD-2CTL: - PowerLimit1+SoftClip.vstcfg : “35:Power Limit 1 + Soft Clip” - PowerLimit2+SoftClip.vstcfg : “36:Power Limit 2 + Soft Clip” For detail of these effects, see “4.2.6 Soft Clipping”.	✓	✓
PowerLimit2+SoftClip.vstcfg			✓	✓
VolumeLinkedEQ.vstcfg	SV	Apply volume linked equalizer effect. This is the same effect as set by executing “32:(1)Volume Linked EQ On” by using DD-2CTL. For detail of this effect, see “4.2.4 Volume Linked Equalizer Effect”.	✓	✓

[Note]

- “2.1ch.vstcfg”, “2Way.vstcfg” and “1Way.vstcfg” can be read only when EVB-DD2SP is used.
 - For EVB-DD2SP with 2 way support, use “2Way.vstcfg”, “1Way.vstcfg” and “1Way(2Band).vstcfg” parameter files.
 - For EVB-DD2SP with 2.1 channel support, use “2.1ch.vstcfg”, “1Way.vstcfg” and “1Way(2Band).vstcfg” parameter files.

5.3 Error and Warning Messages

Here explains errors and warnings to occur in sound tuning dialog box operation.

5.3.1 Error Messages

5.3.1-1 DD-2CTL

Message	Meaning and Action to Take	
No VST plug-in installed.	Meaning	Sound tuning plug-in is not installed.
	Action	Install sound effect evaluation and sound tuning environment according to "2.2.2-1 Install Method".
{file name}:Not suitable for installed plug-in.	Meaning	Specified VST plug-in configuration file is not for sound tuning dialog box for DSE mode.
	Action	VST plug-in configuration file should be checked in for sound tuning plug-in for DSE mode.

5.3.1-2 Common (for Sound Tuning Dialog Box)

Message	Meaning and Action to Take	
{file name}:Not suitable for {sound tuning dialog box name}.	Meaning	Specified VST plug-in configuration file is not for sound tuning dialog box.
	Action	VST plug-in configuration file should be checked in for sound tuning plug-in.

5.3.1-3 DD2CF8

Message	Meaning and Action to Take	
Coefficient overflowed.: {filter name}	Meaning	An overflow occurred when calculating HPF/LPF filter coefficients.
	Action	Enter a value that leads to an appropriate calculation result.

5.3.1-4 DD2PEQ8

Message	Meaning and Action to Take	
Coefficient overflowed.:Plug-in {equalizer name}	Meaning	An overflow occurred when calculating Band* equalizer coefficients.
	Action	Enter a value that leads to an appropriate calculation result.

5.3.1-5 DD2VLE8

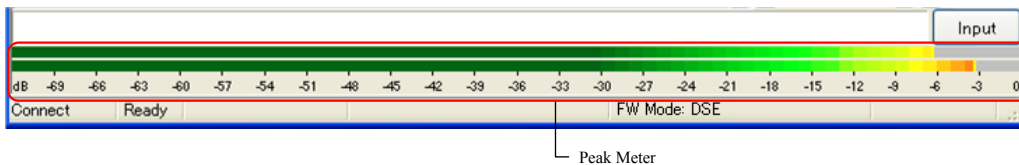
Message	Meaning and Action to Take	
Coefficient overflowed.:Plug-in {equalizer name}	Meaning	An overflow occurred when calculating EQ0/EQ1 equalizer coefficients.
	Action	Enter a value that leads to an appropriate calculation result.

6 Supplementary Note

Here describe notes about operation of DD-2CTL.

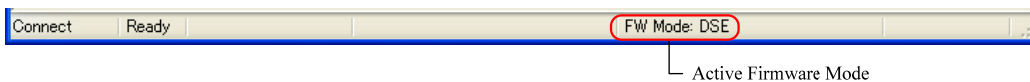
6.1 Peak Meter

When evaluating the sound effect for DSE mode, a peak meter is displayed on the main screen. On the peak meter, the peak level of audio signal output to SDO0 path (GPIO9 pin) is displayed.



6.2 Active Firmware Mode Display

When evaluating the sound effect for DSE mode, “FW Mode:DSE” is always displayed in [Active Firmware Mode] on the main screen.



6.3 Preset Pattern Execution

Only the preset patterns that can be used with DSE mode can be executed from [Preset Pattern Setting] dialog box.

[Note]

- For [Preset Pattern Setting] dialog box's operation, see “4.6 Calling Preset Pattern” in “EVB-DD2SP/EVB-SPR2 Control Tool DD-2CTL Manual”.

6.4 Command File Registration

When registering the command file created originally in [Command Setting Edit] dialog box, check “DSE” in [Permission] on this dialog box.

[Note]

- For command file registration operation, see “4.7 Command File Registration” in “EVB-DD2SP/EVB-SPR2 Control Tool DD-2CTL Manual”.