CISSCA User's Manual

V3.1: December 2022

About CISSCA

Commercial Installation Solutions Speaker Calculator (CISSCA) is a simulation software application into which conditions including the size and application of the room in which speakers are to be situated, and the type and arrangement of speakers are input, enabling rapid estimation of the optimal numbers of speakers and confirmation of the virtual sound pressure values in the estimated results.

If you wish to specify conditions in more detail, please use Yamaha's Y-S3 audio simulation software.

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This agreement shall be governed by and construed in accordance with the laws of Japan. All disputes that may arise between you and Yamaha concerning this License Agreement shall be settled under the jurisdiction of the Tokyo District Court.

Version information

V3.1

·Supported speakers added
  Ceiling speaker: VXC2F, VC4, VC6, VC8, VC4N, VC6N, VC8N
  Subwoofer: VXC8S
·Subwoofer arrangement available locations increased from 2 to 9.
·Screen layout revised

·Supported speakers
  Ceiling speaker: VXC4, VXC6, VXC8, VXC2F, VXC3F, VXC5F, S5*, NS-IC400, NS-IC600, NS-IC800, VC4, VC6, VC8, VC4N, VC6N, VC8N
  Surface mount speaker: VXS5, VXS8, VXS3F, VXS3FT, VXS1ML, VS4, VS6, S15, S55, NS-AW392, NS-AW592, NS-AW992
  Subwoofer: VXS10S, VXS10ST, VXS3S, VXC8S

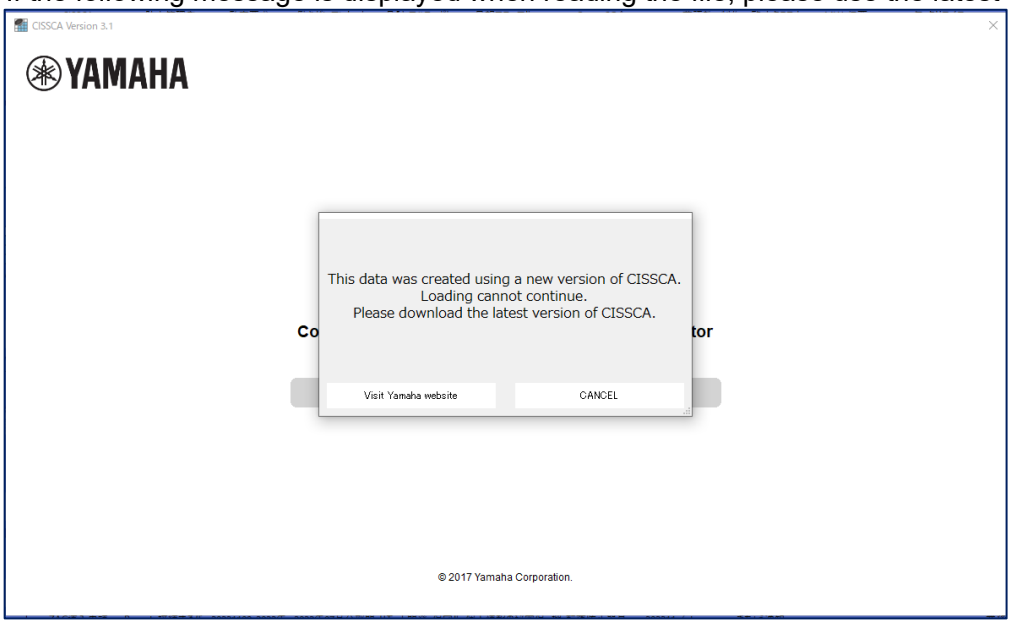
File compatibility with previous versions

Version 2.1: No compatibility

Version 3.0: Reading and sound pressure calculations for files created in Version 3.0 available.
Files created with Version 3.1 are not compatible with Version 3.0.
Sound pressure cannot be calculated for files that use added speaker data.
The impedance setting is unified with the setting of the ceiling speaker.

File compatibility with future versions

It is not compatible with newer versions that will ship in the future.
If the following message is displayed when reading the file, please use the latest version of CISSCA.



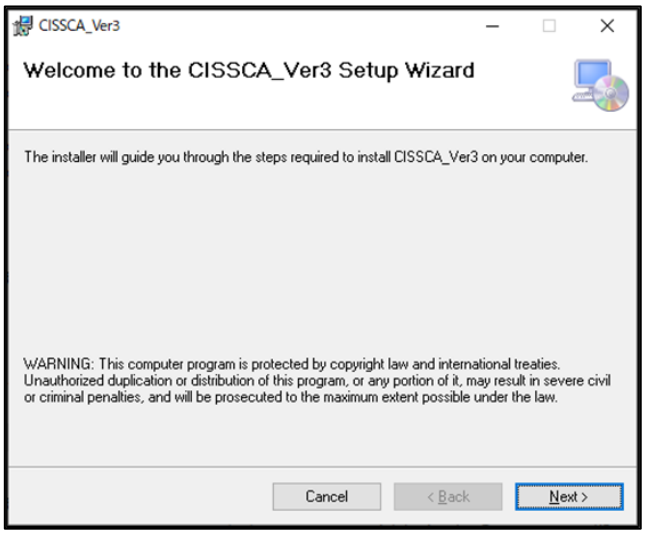
PC System Requirements

OS	Windows 7 / 8 / 8.1 / 10 / 11 (Framework 4.5 or above)
CPU	32 or 64-bit processor, 1 GHz or above
Memory	2 GB RAM (32 bit) or 4 GB RAM (64 bit)
Hard disk	250 MB or more free space
Display	1024×768 pixels, 256 colors or more

Install the Software

1. Double-click the "CISSCA" folder.
2. Double-click the installer file named CISSCA.

3. The CISSCA setup dialog box appears.



4. Follow the instructions on the screen to install the program.
5. During installation, a folder named "CISSCA" is created on the PC (in "Program Files(x86)\YAMAHA\CISSCA_Ver3" by default).
6. Shortcuts are added to the Start menu and desktop.

Uninstall the Software

1. Click "Start" > "Settings" > "Control Panel" > "Add or Remove Programs".
2. The "Add or Remove Programs" dialog box appears.
3. Click the "Remove" button for CISSCA.
4. A dialog box will appear. Follow the instructions on the screen to uninstall the program.

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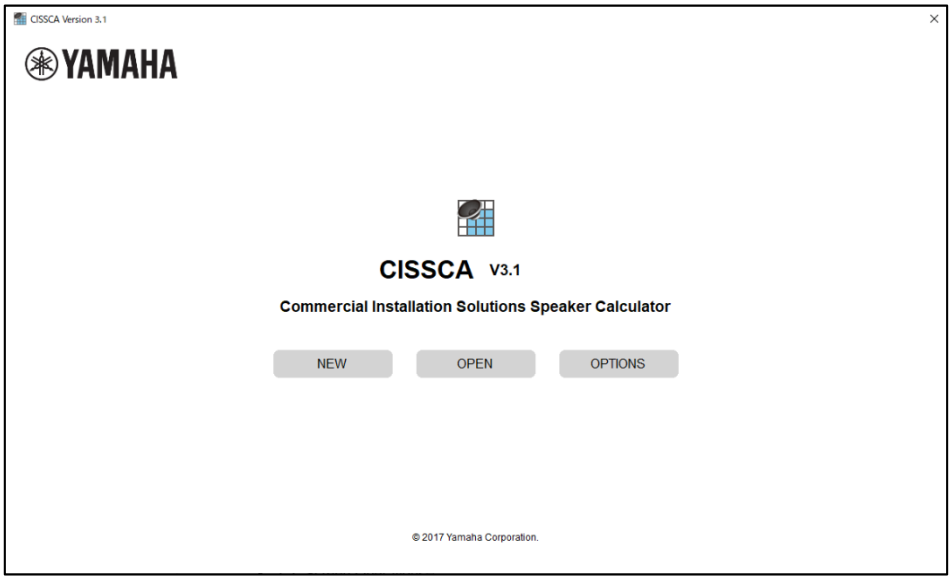
1. Starting CISSCA

To start the program, double-click the CISSCA icon on the desktop, or click "Programs" > "YAMAHA" > "CISSCA_Ver3" from the Start menu. When the program starts, the initial screen (HOME screen) appears.



HOME screen

CISSCA is designed in a wizard format. From the HOME screen, you can simply enter conditions to specify the number of speakers and other design parameters. A design for a single room is referred to as a "project", and can be managed like a file.

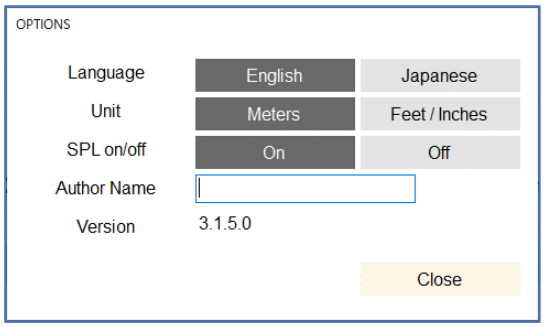
1-1. Screen Operations

CISSCA can be used to perform the following operations from the initial screen.

- **Create a New Project: NEW**
  Creates a new project.

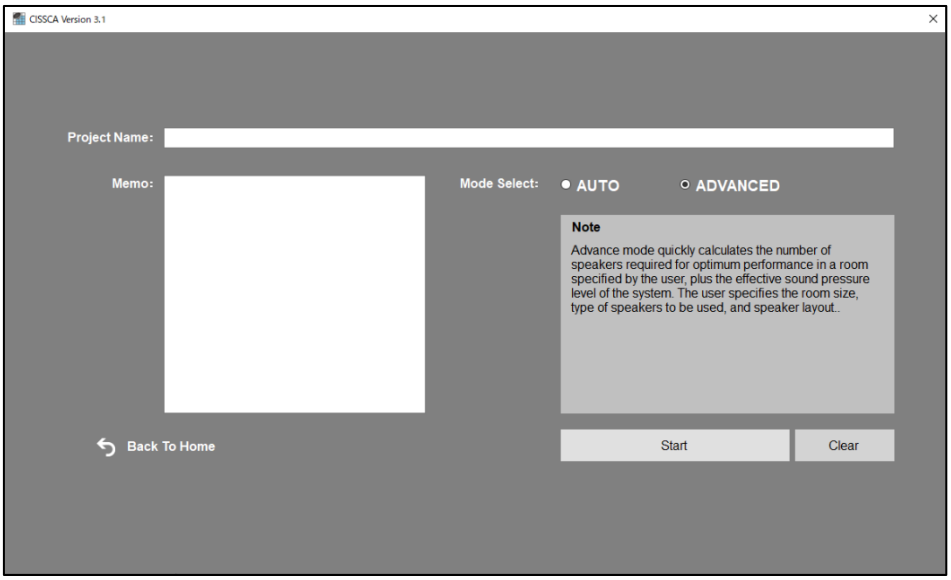
- **Open an Existing Project: OPEN**
  Opens a project that has been created in the past. You can also use this function to create a new project based on a past project.

- **Configure settings: OPTION**
  You can set various CISSCA options.



- Language: Select the language to use in the CISSCA screens. You can select English or Japanese.
- Unit: Set the unit of measure. You can select meters or inches.
- SPL on/off: Select whether to show or hide the sound pressure color map on page 4.
- Author Name: Set the name of the author that is indicated in reports.
- Version: The CISSCA version number.

1-2. Creating a Project
Select "New" on the initial screen (HOME screen) to open the Project Settings screen.



Project Settings screen

Enter the name, memo, and the configuration method for the new project. Enter the conditions (as shown below) and then run the simulation.

[AUTO configuration method]
- 2.1: Enter room conditions
- 2.2: Configure speaker density
- 2.4: Configure the application
- 2.6: View settings
- 2.7: View results
- 2.8: Generate report

[ADVANCED configuration method]
- 2.1: Enter room conditions
- 2.3: Select the speaker
- 2.4: Configure the application
- 2.5: Adjust speaker output
- 2.6: View settings
- 2.7: View results
- 2.8: Generate report

On each condition entry screen, pressing the NEXT button will advance to the next step (screen). Pressing the BACK button will return to the previous step (screen). You can go back to previous screens to change the values that have been entered.

1-3. Editing a Project
Select "OPEN" on the initial screen (HOME screen) to open the Select Previous Project File screen.

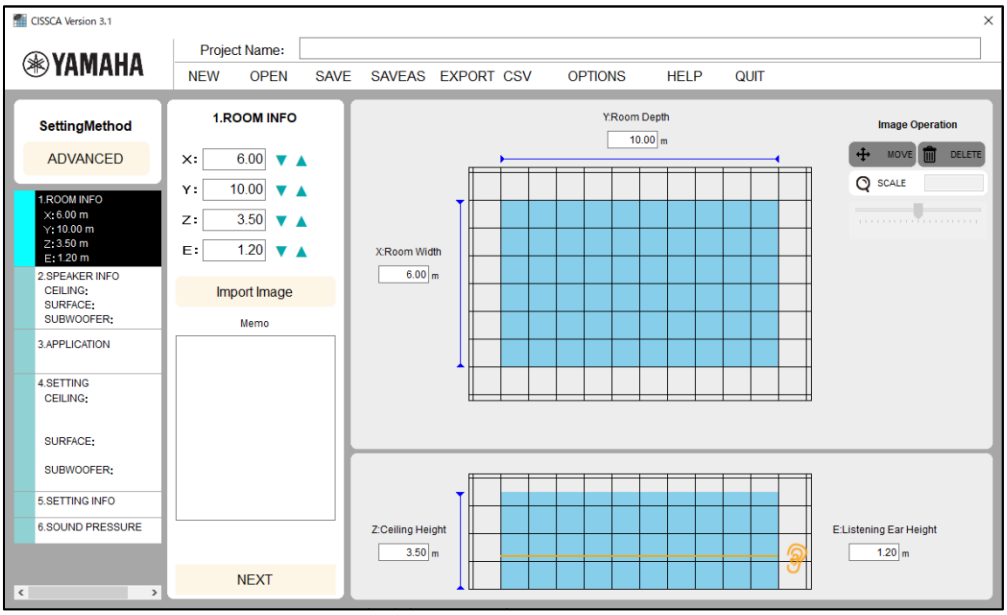
1-4. Common Features
After a project is created, you can save it at any time (SAVE). Other common features are as follows:

- NEW: Creates a new project.
- OPEN: Opens an existing project.
- SAVE: Saves the project.
- SAVE AS: Saves the current project with another name.
- Export CSV: Saves the project content to a CSV (comma-separated text) file.
- OPTIONS: Set various CISSCA options.
- Help: Opens the PDF manual.
- Quit: Closes the application.

2. Data Entry

2-1. Entering Room Conditions

Click "OK" on the Project Settings screen to start a new project. If you click "OPEN" on the HOME screen and select an existing project, the screen that was displayed when the project was saved appears.



Room information settings

On this screen, enter the environmental information of the target room

- Project name
  Enter a name for managing this design information.

  (e.g.) Yamaha Corporation, meeting room, acoustic design

➢ ROOM INFO
- Width (X): Enter the width of the room.
- Depth (Y): Enter the depth of the room.
- Ceiling Height (Z): Enter the height of the room.
- Listening Ear Height: Enter the measurement height. In most cases, this will be the height of the listener's ears.
- Image: The room plan or another image can be imported into the diagram on the right side of the screen. Imported images may be moved or resized.

➢ MEMO
Enter a memo. The memo is also printed in reports. Enter information about the room or any other relevant information.

When you enter these values, they are reflected in the diagram on the right side of the screen so you can get a general idea of the room dimensions.

Note: Values are entered here in meters. You can also switch to inches. This can be changed in the Options screen.

Note: Please use a period as a decimal point when entering numbers. Commas will be ignored.

You can also import blueprints or another image to more easily visualize the room.
Imported images may be moved or resized as follows.

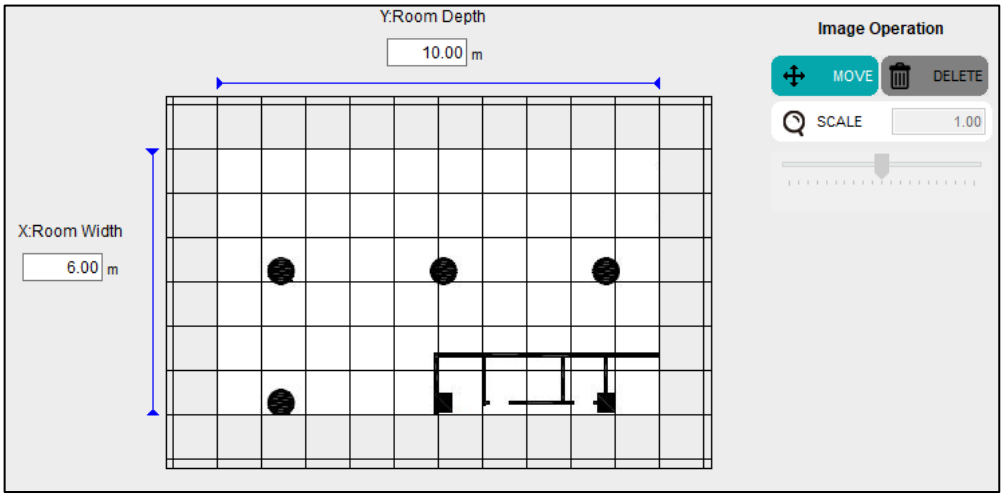
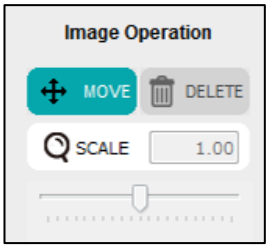


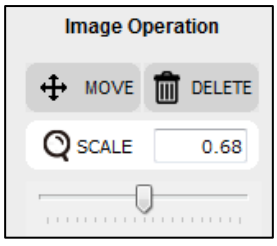
Image operations

- Move: Press the Move button to use the mouse to move an imported image.



The button will appear as shown in the figure to the left when the image can be moved.

- Scale: The image can be resized by entering a scale value or by dragging the scale slider.



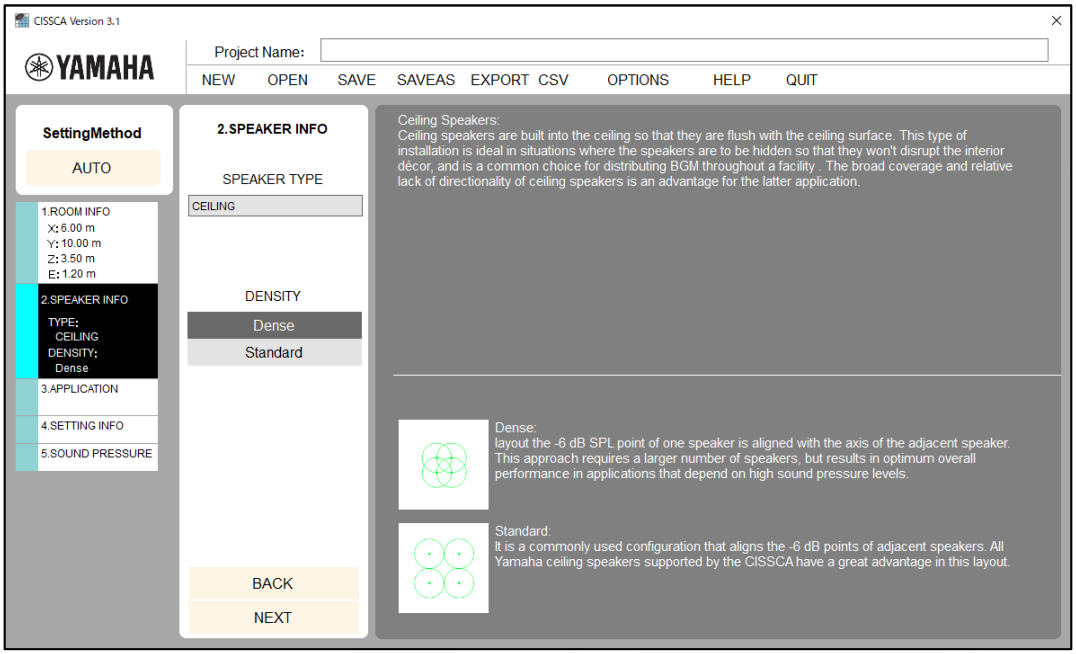
A scale value of 1 represents the original size of the image.
It can be set to a value of 0.01 or greater.
Moving the slider to the left shrinks the image.
Moving it to the right expands it.
An image may be expanded up to twice its size at once.
Once the scale has been set, the slider resets to the center.
To further expand the image, move the slider again.

- Delete: Deletes the imported image.

After you enter the values, press the NEXT button to move to the next step.

Note: Please use a period as a decimal point when entering numbers. Commas will be ignored.

2-2. Configuring Speaker Density
On this screen, configure the speaker density.
Note: AUTO mode only (the speaker type is set to ceiling speaker and cannot be changed).



Speaker density settings

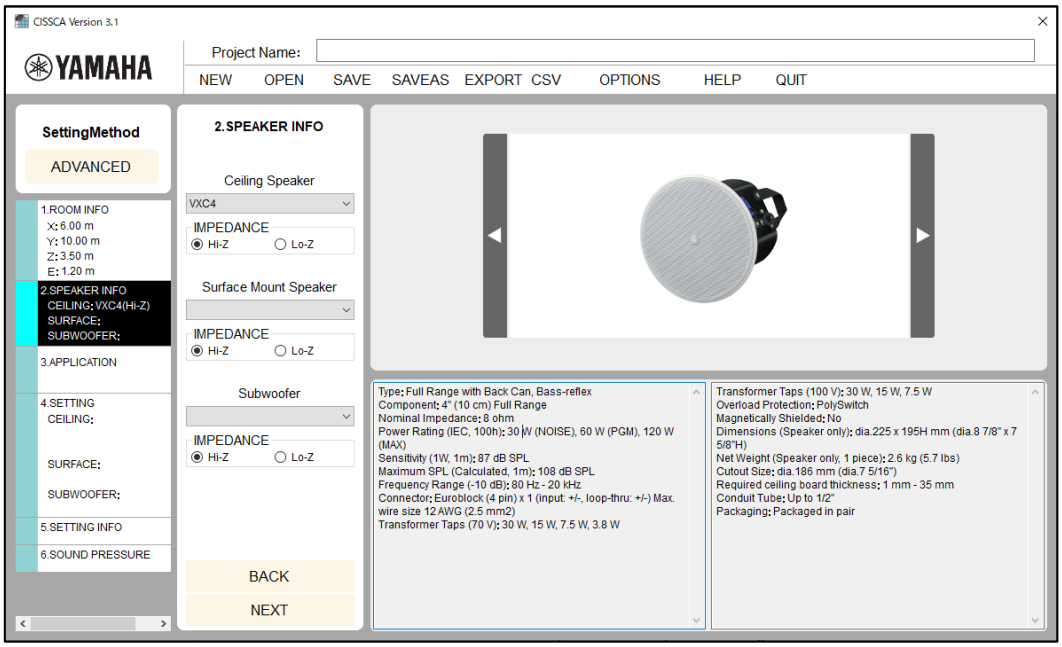
- Density: Configure the number of speakers (layout density).
  * Explanations for each setting are shown in the Settings screen.

After you configure the speaker density, press the NEXT button to move to the next step.

2-3. Selecting the Speaker

On this screen, configure the impedance and the speaker to use.

Note: ADVANCED mode only.



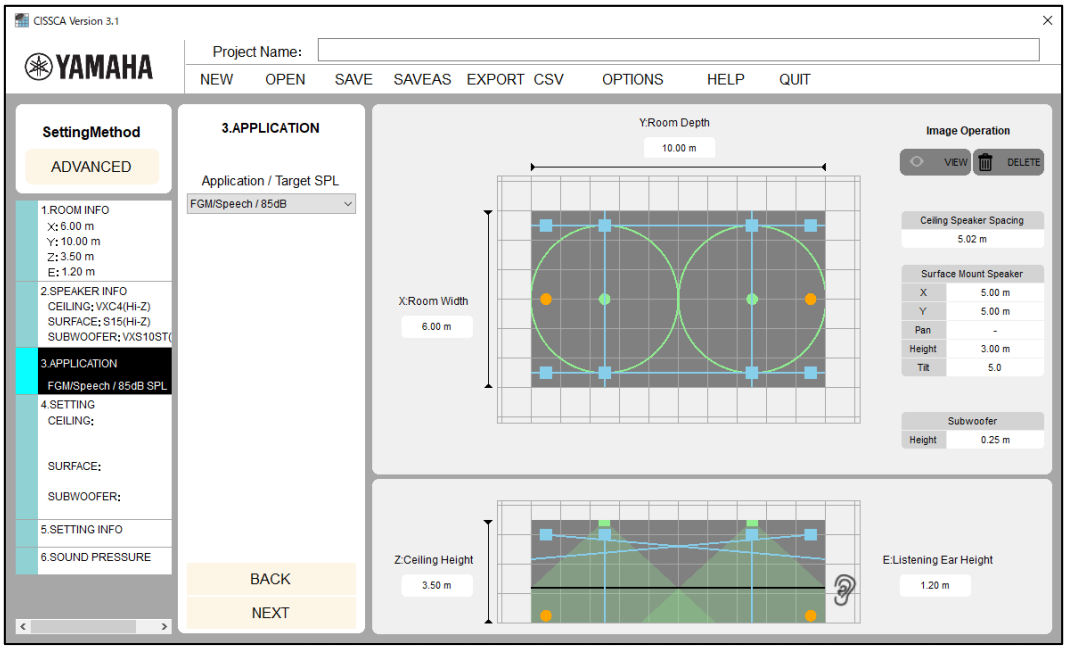
Impedance and speaker settings

- Impedance: Select the speaker connection method (high-impedance connection or low-impedance connection).

- Speaker: Select the speaker to use. When you select a speaker, its photo and usage information are displayed on the right side of the screen. Some speakers may not be available to select, depending on the connection method.

After you configure the speaker, press the NEXT button to move to the next step.

2-4. Configuring the Application
On this screen, set the required sound pressure target (target SPL).



Application settings
(ADVANCED mode is shown here)

- Application: Consider your application and set the maximum SPL that is necessary at the sound receiving point.

- Application/maximum sound pressure: Consider your application and set the maximum SPL that is necessary at the sound receiving point. Specific examples are provided, so select a setting that is closest to your target (e.g. High BGM/79 dB). In actuality, there will be some margin on the maximum SPL depending on the number of speakers that are laid out (layout density).

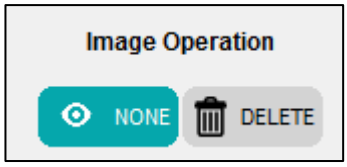
Note: The applications that are available to select are different for AUTO mode and ADVANCED mode.

Application examples:

Name	Maximum sound pressure	Application example
Quiet BGM	70 dB	BGM (quiet)
Low BGM	73 dB	
Mid BGM	76 dB	BGM (medium)
High BGM	79 dB	
Low FGM/Speech	82 dB	BGM (loud), announcement
FGM/Speech	85 dB	Aggressive BGM
High FGM	88 dB	
Low Ent. Music	91 dB	Music for an event (low)
Low Ent. Music	94 dB	
Mid Ent. Music	97 dB	Music for an event (medium)
Mid Ent. Music	100 dB	
High Ent. Music	103 dB	Music for an event (high)
High Ent. Music	106 dB	

Speakers are automatically arranged in the room based on the room information and speaker density that were specified in the previous steps. Ceiling speakers are displayed as dots, and the coverage areas (the area that starts from immediately below the speaker and extends outward horizontally until the sound pressure decreases by 6 dB) are displayed as circles.
Coverage areas are calculated from the conditions that were entered. They will be slightly different from the nominal values indicated in catalogs and other related documents.
The spacing between the arranged ceiling speakers is displayed on the right side of the screen.

Room images can be shown/hidden or deleted.



- Show: Press the SHOW/HIDE button to show or hide the imported image.
- Delete: Deletes the imported image.

After you configure the application, press the NEXT button to move to the next step.

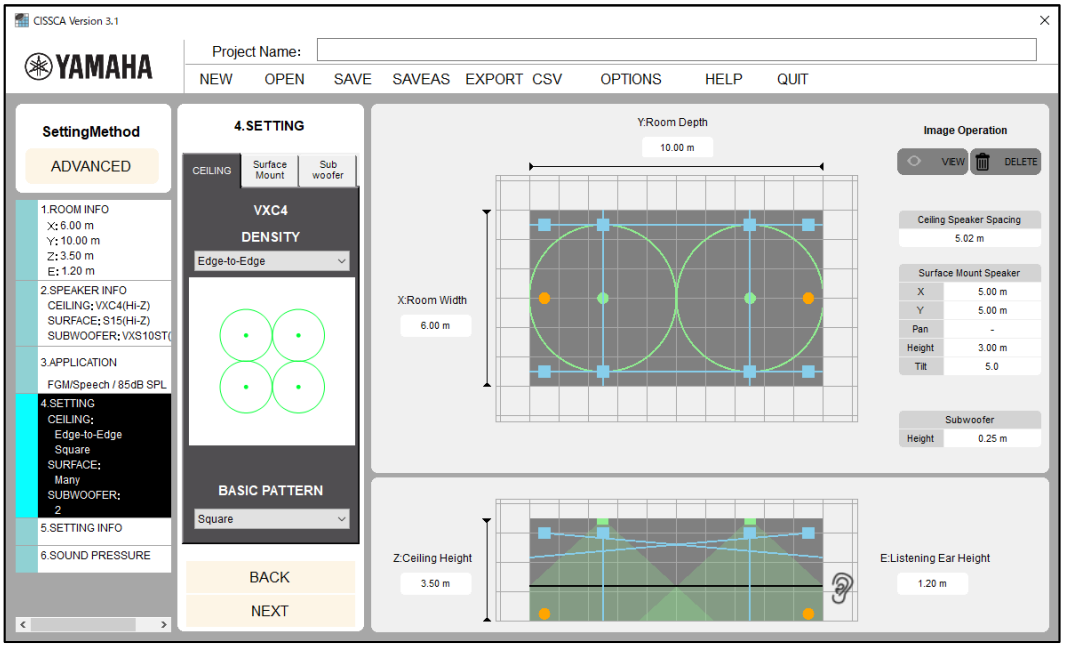
2-5. Adjusting Speaker Output

On this screen, configure the following items.

- Ceiling speaker density (quantity) and layout type
- Surface mount speaker quantity, installation spacing, height and angles (tilt and pan)
- Subwoofer quantity and installation location

Note: ADVANCED mode only.

2-5-1. Ceiling speakers



Adjusting ceiling speaker output

Density (speaker layout density): Adjust the amount of overlap of the coverage areas, which indicates the boundaries where the sound pressure is 6 dB lower than at the sound receiving point immediately below the speaker (on the axis). By default, this is set to Edge-to-Edge.

There are five adjustment levels that you can choose from.

High density

Maximum Overlap
Minimum Overlap
Edge-to-Edge
1.4 x Edge-to-Edge
2.0 x Edge-to-Edge

Low density

When you select a certain density, the software starts calculating and redraws the recalculated coverage areas.

- **Layout type:** By default, speakers are arranged in a square pattern. You can also choose a hexagonal pattern.

- **Speaker spacing:** Shows the spacing between speakers.

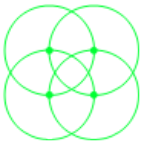
Note: Speaker spacing is displayed even if only one speaker has been configured. Consider this to be an indicator of what the spacing would be if there were a second speaker.

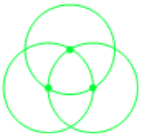
If the number of speakers could exceed 128, an error message will be displayed.
If this happens, select a layout pattern with a lower density.

- **Speaker layout patterns**

  - Maximum Overlap

In this approach, the -6 dB SPL point of one speaker is aligned with the axis of the adjacent speakers. This approach requires a larger number of speakers, and is therefore suited for



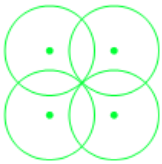


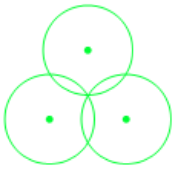
applications requiring a high sound pressure.

Square Hexagonal

  - Minimum Overlap

Edge-to-edge speaker layouts can result in gaps in the coverage area. Minimum overlap is used to eliminate these gaps.

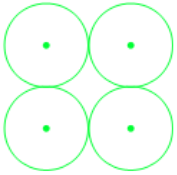


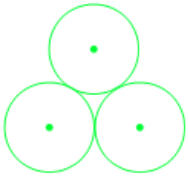


Square Hexagonal

  - Edge-to-Edge

This approach aligns the -6 dB SPL points of the coverage areas of adjacent speakers. This is one of the most standard layouts recommended by Yamaha. It can maximize the performance of Yamaha speakers supported by CISSCA.

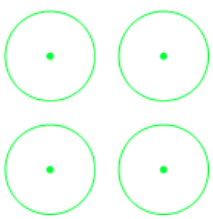




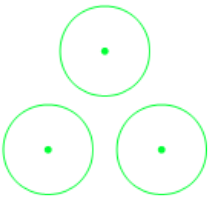
Square Hexagonal

・ 1.4 x Edge-to-Edge

In this approach, speakers are spaced 1.4 times further apart than in Edge-to-Edge. As one of the layouts recommended by Yamaha, this approach reduces the number of required speakers, resulting in a more economical system than even Edge-to-Edge.



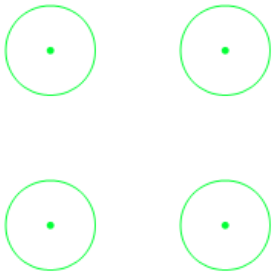
Square



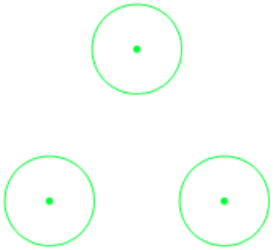
Hexagonal

・ 2.0 x Edge-to-Edge

In this approach, speakers are spaced 2 times further apart than in Edge-to-Edge. This is the most economical approach, but it is not recommended by Yamaha because it can more easily result in an uneven sound pressure.

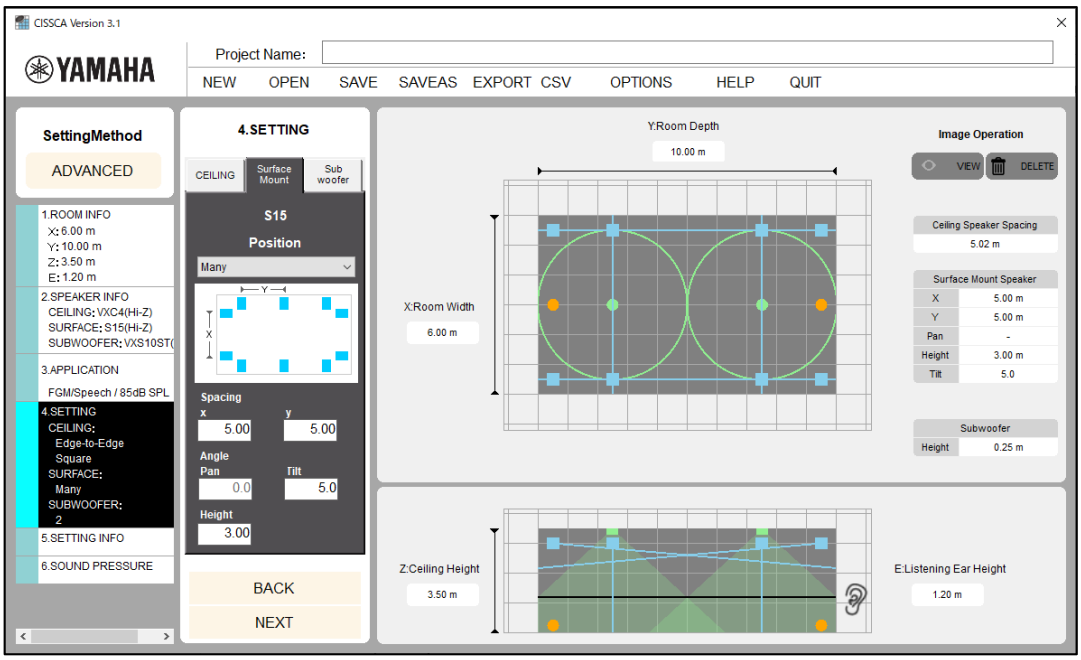


Square



Hexagonal

2-5-2. Surface mount speakers



Adjusting surface mount speaker output

Click the Surface Mount Speaker tab to specify settings for arranging surface mount speakers. The following settings are available.

- Installation location: Specify the speaker arrangement pattern.
  - None: None.
  - Two: Arranges two speakers in front.
  - Four: Arranges two speakers in front and two speakers in back.
  - Many: Arranges speakers around the room at the specified spacing.

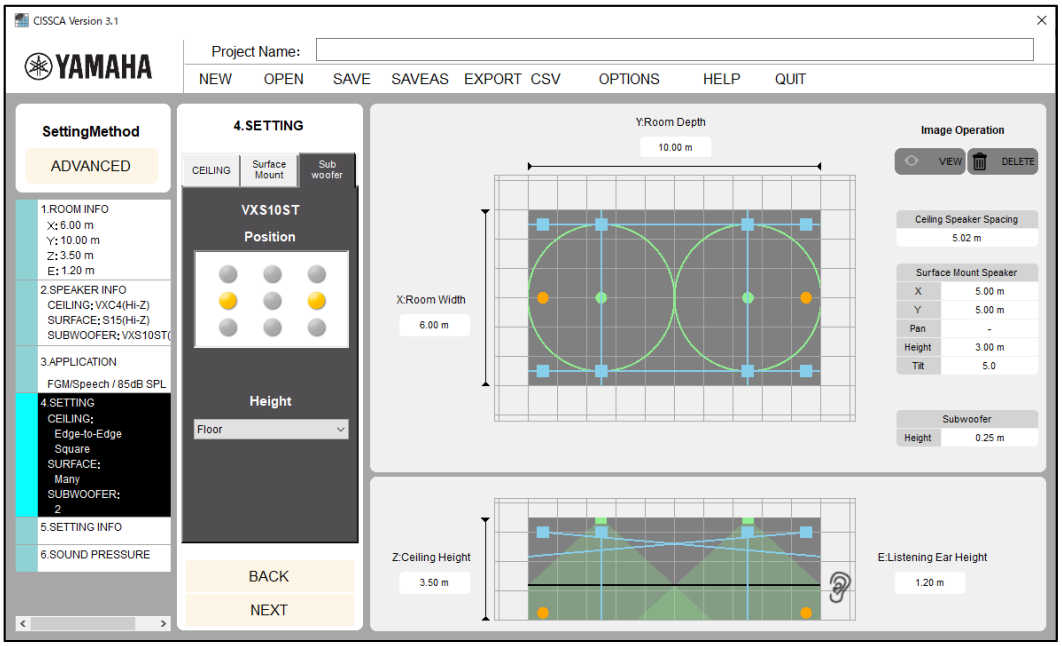
- Spacing:
  - X: Set the speaker spacing for across the room widthwise.
  - Y: Set the speaker spacing for along the room lengthwise.
    This is not available when the layout pattern is set to "Two".

- Angle:
  - Pan: Set the speaker horizontal angle (pan).
  - Tilt: Set the speaker vertical angle (tilt).

- Height: Set the speaker installation height.

Note: Please use a period as a decimal point when entering numbers. Commas will be ignored.

2-5-3. Subwoofers



Adjusting subwoofer output

Click the Subwoofer tab to specify settings for arranging subwoofers.
The following settings are available.

- Installation location: Select the installation location from the nine available choices (corners or near the center of the room).
  You can install up to nine subwoofers.

- Height: Set the height of the installation location. Select "Ceiling" or "Floor".
  Some subwoofers may not be selected for "Floor" installation.

After you configure the output, press the NEXT button to move to the next step.

2-6. Viewing Settings

This screen shows information on the speakers that were automatically arranged based upon the room information, speaker density, and application that were specified in the previous steps.

View settings

Speakers that were automatically arranged can be moved and deleted.

- Speakers: Selects the speaker to manipulate.
- Move or delete: Selects how to manipulate the speaker.

- [Move]
  Use the mouse to move the applicable speaker (dot).

- [Delete]
  Use the mouse to click the applicable speaker (dot).

You can also "UNDO" a moved/deleted speaker, or "REVERT" the layout.

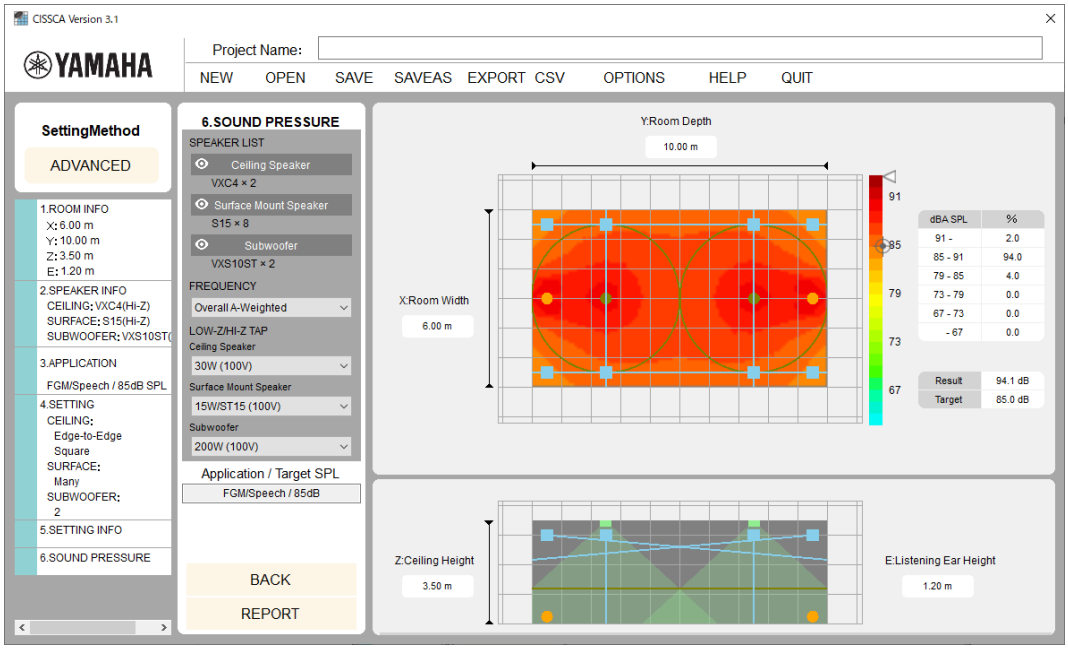
- UNDO: Undo the previous operation.
- REVERT: Return the speaker arrangement to the initial state.

After confirming and adjusting the settings, press the View Sound Pressure Calculation Results button to move to the next step.

2-7. Viewing Results

On this screen, you can view a sound pressure distribution map created based upon the specified conditions.

You can update the map by changing measurement conditions such as the speaker output settings and the measurement frequency.



View results

The sound pressure (intensity) is represented using different colors on the color bar shown on the right of the map. You can see that it is highest near the speaker, and decreases as you move away from it. This is the sound pressure when the wattage selected in the currently selected speaker output settings (Lo-Z/Hi-Z Tap) is output.

The color bar indicates how the colors are mapped to sound pressure. The target mark shown on the right side of the bar indicates the target sound pressure set in the application. The arrow indicates the maximum sound pressure in the current speaker output settings. These are also shown numerically next to Result (calculated result) and Target (target sound pressure) on the right side of the screen.

The measurement frequency is usually based on the Overall+A weighted (overall bandwidth with A characteristic curve correction) setting, but you can also change this. If you select a different frequency, the Result and Target numeric displays will not be shown.

If SPL on/off (sound pressure map display option) is set to ON, the sound pressure colors and values that are used in the map are indicated on the right side of the screen. The specified target sound pressure is also indicated.

The table on the right side of the screen (dBA SPL or dB SPL) indicates the sound pressure distribution ratios in the room at 6 dB intervals.

- Speaker List: A list of speakers used in the calculation.
  You can temporarily exclude speakers from the sound pressure calculation by clicking the eye icon shown on the left of each speaker name. This is also reflected in reports.

- Frequency: The frequency band used for the sound pressure calculation can be selected. The default setting is overall bandwidth with A curve weighting (Overall A-Weighted). Other available settings are overall bandwidth (Overall Flat), Low (125-500 Hz), Mid (500 Hz-2 kHz), and High (2 kHz-8 kHz). If you change a parameter, the software recalculates and redraws the map.

- Lo-Z/HI-Z Tap: Selects the tap.
  The software recalculates the sound pressure distribution based upon the selected values.

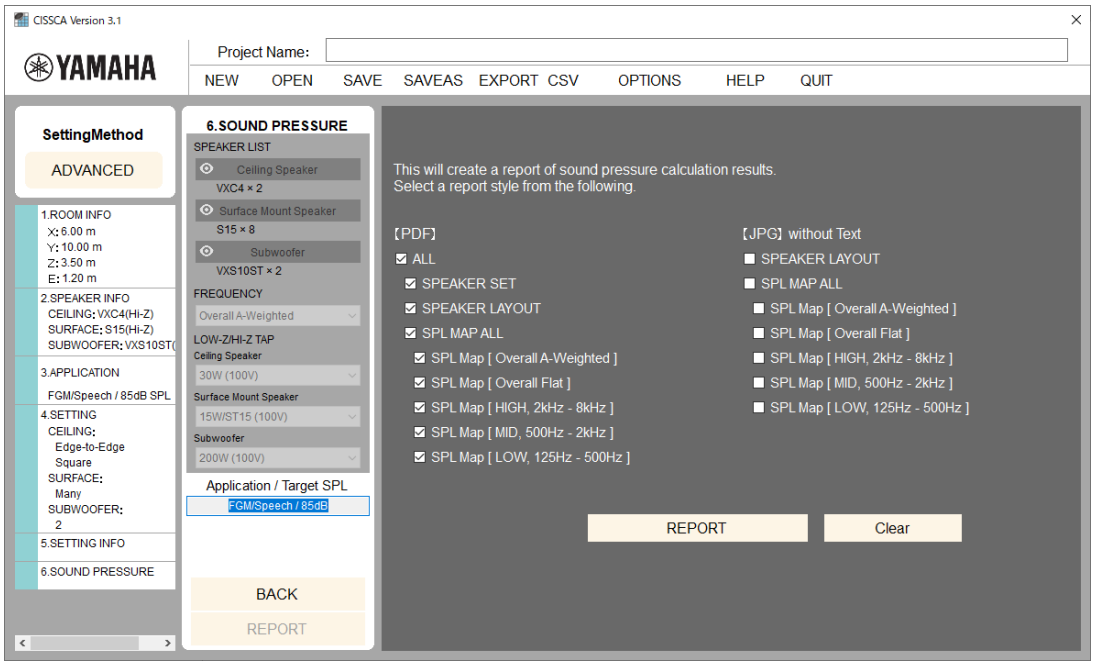
- REPORT: The software generates a PDF report that can be printed on an A4 paper based upon the completed design information. You can open the PDF file in Adobe Reader (recommended) or a similar application, print it, and provide it as design information.

Note: Overlapping speaker coverage areas creates an acoustic space that allows for great flexibility. However, at the same time remember that the required number of speakers will increase. To adjust the number of speakers, go back to the speaker density settings and adjust the speaker density.

Press the REPORT button to move to the next step.

2-8. Generating Reports

Press the REPORT button on the View Results screen to open the Report Output screen (as shown below).



Generate report

When you press the REPORT button on the right side of the screen, a dialog box will appear asking you to enter the storage location and file name of the PDF file. Enter the information, and save the file.

The following items may be specified for PDF output.

Item	Output
[PDF] ALL	Outputs all information to a PDF file.
[PDF] SPEAKERSET	Outputs project information and speaker information to a PDF file.
[PDF] SPEAKERLAYOUT	Outputs project information and the speaker layout to a PDF file.
[PDF] SPL MAP ALL	Outputs project information and the sound pressure map for the entire frequency to a PDF file.
[PDF] SPL MAP [Overall A-Weighted]	Outputs project information and the sound pressure map of the measurement frequency [Overall A-Weighted] to a PDF file.
[PDF] SPL MAP [Overall Flat]	Outputs project information and the sound pressure map of the measurement frequency [Overall Flat] to a PDF file.
[PDF] SPL MAP [HIGH, 2 kHz-8 kHz]	Outputs project information and the sound pressure map of the measurement frequency [HIGH, 2 kHz-8 kHz] to a PDF file.
[PDF] SPL MAP [MID, 500 Hz-2 kHz]	Outputs project information and the sound pressure map of the measurement frequency [MID, 500 Hz-2 kHz] to a PDF file.
[PDF] SPL MAP [LOW, 125 Hz-500 Hz]	Outputs project information and the sound pressure map of the measurement frequency [LOW, 125 Hz-500 Hz] to a PDF file.

The following items may be specified for JPG output.

Item	Output
[JPG] SPEAKERLAYOUT	Outputs the speaker layout diagrams from the report (top view, side view) to a JPEG image.
[JPG] SPL MAP ALL	Outputs all sound pressure map diagrams to a JPEG image.
[JPG] SPL MAP [Overall A-Weighted]	Outputs the sound pressure map of the measurement frequency [Overall A-Weighted] to a JPEG image.
[JPG] SPL MAP [Overall Flat]	Outputs the sound pressure map of the measurement frequency [Overall Flat] to a JPEG image.
[JPG] SPL MAP [HIGH, 2 kHz-8 kHz]	Outputs the sound pressure map of the measurement frequency [HIGH, 2 kHz-8 kHz] to a JPEG image.
[JPG] SPL MAP [MID, 500 Hz-2 kHz]	Outputs the sound pressure map of the measurement frequency [MID, 500 Hz-2 kHz] to a JPEG image.
[JPG] SPL MAP [LOW, 125 Hz-500 Hz]	Outputs the sound pressure map of the measurement frequency [LOW, 125 Hz-500 Hz] to a JPEG image.

Note: If SPL on/off (sound pressure map display option) is set to OFF, the SPL MAP cannot be specified for output. If this is required, set SPL on/off (sound pressure map display option) to ON.

Note: An image of the room is displayed in the "SPEAKER LAYOUT" section of output reports. If this is not required, set the image to "hidden" using the image adjustment settings, and then output the report.

Report example (page 1)

YAMAHA

PROJECT NAME: Yamaha Corporation

AUTHOR NAME:

APPLICATION TARGET : FGM/Speech / 85dB

Ceiling Speaker : VXC4 x 2 (30W (100V))
Density: Edge-to-Edge
Basic Pattern: Square
Speaker Spacing: 5.02 m

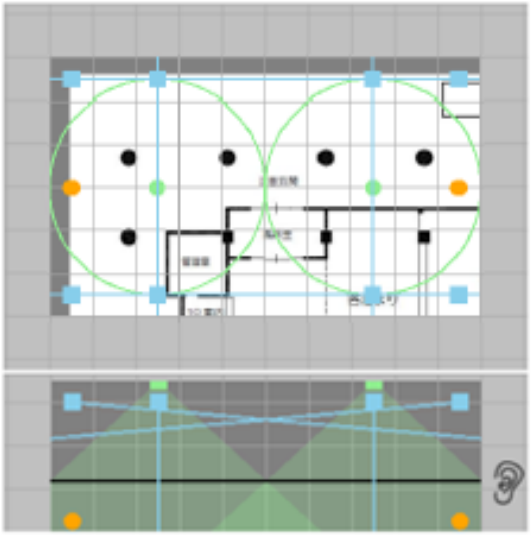
Surface Mount Speaker : S15 x 8 (15W/ST15 (100V))
Sp Pattern: Many
Spacing: X : 5.00 m
Spacing: Y : 5.00 m
Angle: Tilt : 5.0
Height: 3.00 m

Subwoofer : VXS10ST x 2 (200W (100V))
Height: Floor

SPEAKER LAYOUT

Room Depth : 10.00 m

Room Width
6.00 m



Ceiling Height
3.50 m

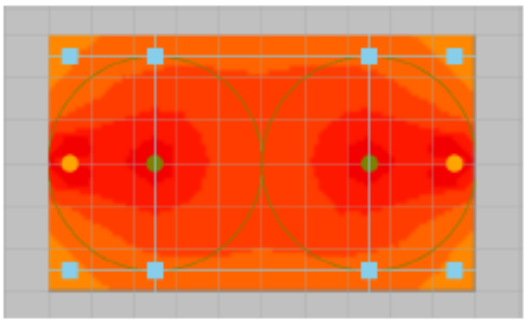
Listening Height
1.20 m

Memo

SPL Map[Overall A-Weighted]

Room Depth : 10.00 m

Room Width
6.00 m



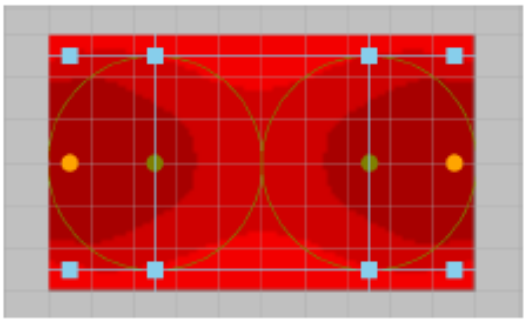
dBA SPL	%
91.0 -	2.0%
85.0 - 91.0	94.0%
79.0 - 85.0	4.0%
73.0 - 79.0	0.0%
67.0 - 73.0	0.0%
- 67.0	0.0%

Result : 94.1 dB
Target : 85.0 dB

SPL Map[Overall Flat]

Room Depth : 10.00 m

Room Width
6.00 m



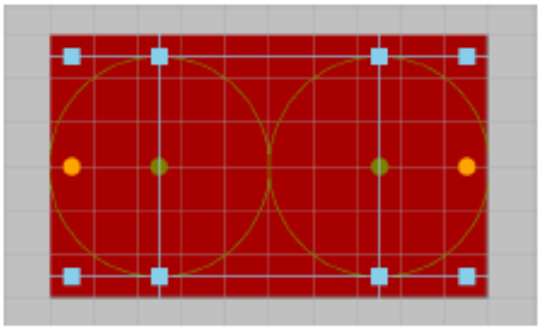
dBA SPL	%
91.0 -	2.0%
85.0 - 91.0	94.0%
79.0 - 85.0	4.0%
73.0 - 79.0	0.0%
67.0 - 73.0	0.0%
- 67.0	0.0%

Report example (page 3)

SPL Map[LOW, 125Hz - 500Hz]

Room Depth : 10.00 m

Room Width
6.00 m

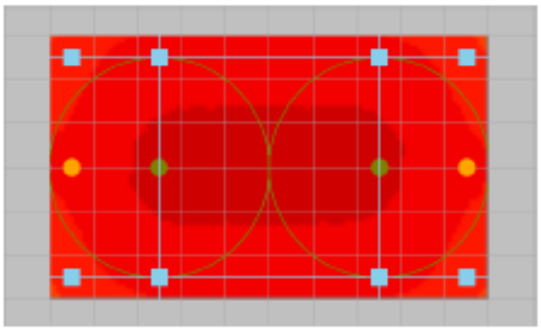


dBA SPL	%
91.0 -	2.0%
85.0 - 91.0	94.0%
79.0 - 85.0	4.0%
73.0 - 79.0	0.0%
67.0 - 73.0	0.0%
- 67.0	0.0%

SPL Map[MID, 500Hz - 2kHz]

Room Depth : 10.00 m

Room Width
6.00 m

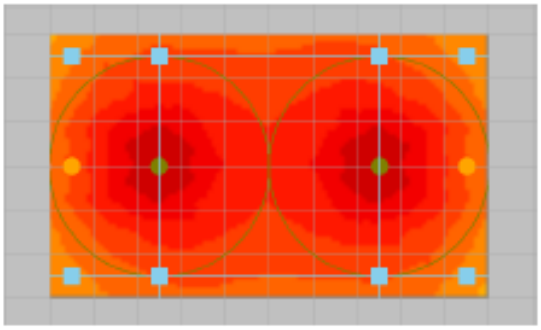


dBA SPL	%
91.0 -	2.0%
85.0 - 91.0	94.0%
79.0 - 85.0	4.0%
73.0 - 79.0	0.0%
67.0 - 73.0	0.0%
- 67.0	0.0%

SPL Map[HIGH, 2kHz - 8kHz]

Room Depth : 10.00 m

Room Width
6.00 m



dBA SPL	%
91.0 -	2.0%
85.0 - 91.0	94.0%
79.0 - 85.0	4.0%
73.0 - 79.0	0.0%
67.0 - 73.0	0.0%
- 67.0	0.0%