

SONY

Powered Line-Array Speaker

SLS-1A

Technical Solution Guide



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Product Specifications

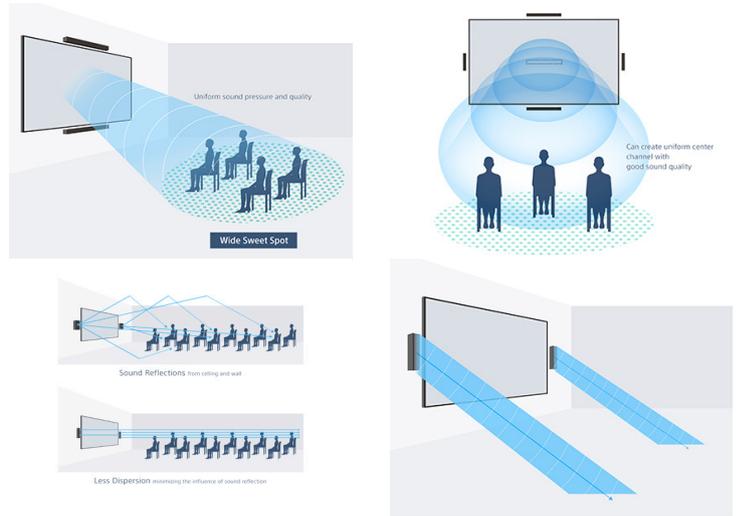
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New solution for sound system design

Compact powered line-array speaker
Fine beam control with FIR filter/96kHz
Dante® Network and analog inputs

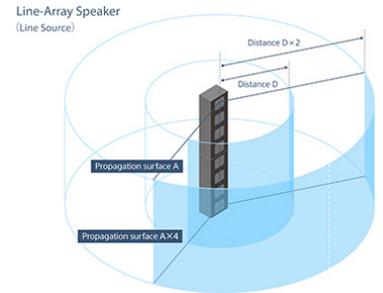
The SLS-1A is the ultimate speaker solution for PA system design, solving some of the toughest challenges faced by modern sound system designers. Typical challenges include

- **Creation of a large listening area that is suitable for a large display**
- **On screen sound localization**
- **Maintenance of speech intelligibility in reverberant space**
- **Flexible installation**
- **Networking**



The SLS-1A is a line array speaker developed with the ideal line source in mind. A flat and square diaphragm provides extremely good directivity and uniform quality over long distances despite its compact size.

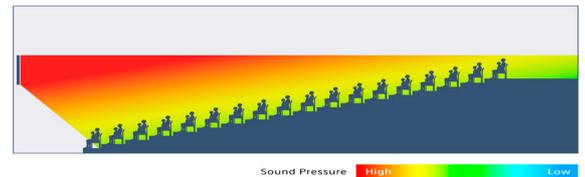
To optimize the audio for each unique installation environment the SLS-1A has an on-board DSP that operates at up to 96kHz sample rate. This powerful DSP enables it to be configured with a FIR filter with an impulse response of 1024 taps for each of the eight speakers. This results in precise control of the beam that can be customized for each environment.



It also supports Dante networks, replacing traditional high-impedance connections with IP networks.

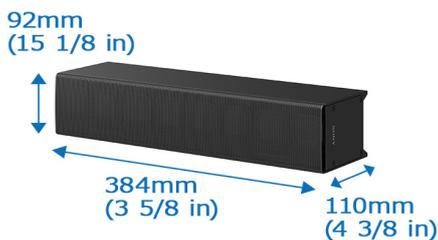
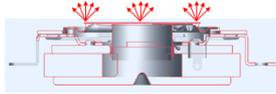
The SLS-1A series offers the best solutions in a variety of applications, including

- **Corporate Meeting Rooms**
- **Education**
- **Auditorium**
- **Corporate Entrance, show room and hotel lobby**
- **Retail Store**
- **Transportation**



Technologies for advanced Beam control

Flat and Square diaphragm



In addition, the flat and square unit allows for extremely precise control of the directivity of SLS-1A down to the low frequencies, compared to typical small size line-array speaker.

The graph on the right is a frequency directivity graph called Isobar.

The upper graph shows the directivity control down to about 600 Hz for a single module. The lower graph is for 6 modules and shows that directivity is controlled down to about 125 Hz.

The speaker unit newly developed for the SLS-1A is a flat and square diaphragm. By arranging that unit in an array, it approaches an ideal linear sound source. In addition, the spider(damper) that supports the voice coil has been removed and a "magnetic fluid suspension structure" is used instead, which greatly reduces sound distortion.

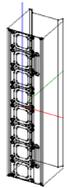
Compared with a normal circular diaphragm a square diaphragm make equalize the distance between sound sources. Thereby, it allows fine beam control while interference distortion between units is reduced. Moreover, a larger diaphragm area can be taken with the same array length.

As a result, the transmission loss of individual units is reduced, and the efficiency of the entire array is improved.

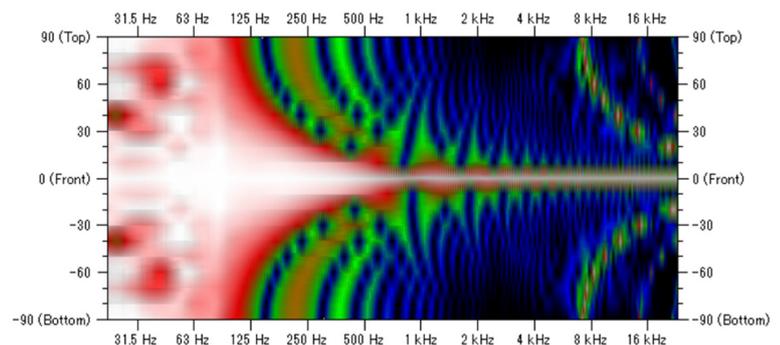
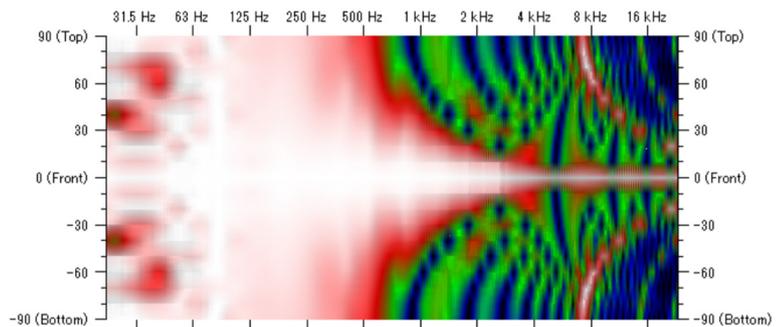
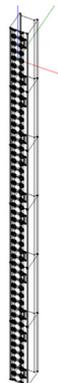
The SLS-1A is equipped with eight speaker units, and up to six modules can be linked together. It can also be easily installed vertically and horizontally.

Thanks to the use of flat units, the extremely compact size of the line array speaker allows for flexible installation in a variety of environments.

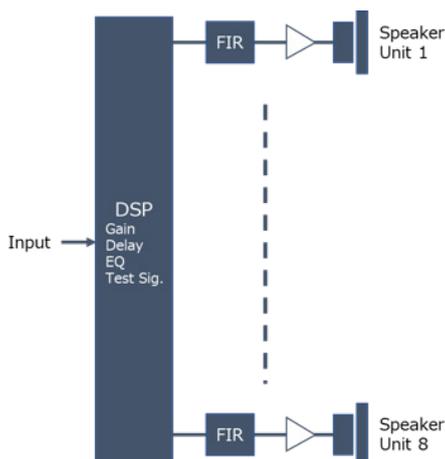
1 Module



6 Modules



96kHz sampling rate DSP



The DSP in the SLS-1A uses a 96 kHz sampling rate instead of the 48 kHz rate commonly used in installation equipment. As a result, fine beam control is achieved.

The DSP is divided into two parts: a DSP that performs global processing (delay, equalization, test tone generation, etc.) for the entire loudspeaker system, and FIR filter placed separately for each speaker unit.

The FIR filter can provide fine control of sound radiation between each unit from low to high frequencies, including phase. Furthermore, in conjunction with AFMG's FIRmaker[®] 3D (line array optimization algorithm), the SLS-1A's beam performance can be dramatically controlled.

*FIR=Finite Impulse Response.

SLS-1A Sound System Design Workflow

Three approaches according setting style

The most flexible and powerful acoustic characterization method is fine beam control using AFMG's FIRmaker® 3D algorithm. This method always requires some work, such as drawing the auditorium on AFMG's EASE Focus simulation and placing the SLS-1A in the appropriate position. It also requires knowledge and experience in operating EASE Focus and FIRmaker® 3D. However, we promise you that the results will be well worth the effort.

A method that is both fully effective and easy to work with is to use Sony's Line Array Speaker Manager. This software has two parameters, "Beam Steering(Beam Angle)" and "Beam Spread(Beam Width)" that allow you to set the beam settings for each SLS-1A. EASE Focus also allows you to see in advance what beam settings will work best for your project. SLS-1As placed on EASE Focus have the same beaming setting capabilities as the Sony's Line-Array Speaker Manager. Therefore, the EASE Focus acts as an acoustic monitor to know the results of the beaming settings.

The last method is the easiest and does not require a PC. Simply operate the DIP switch on the rear panel of the product to select one of the six preset beaming patterns.



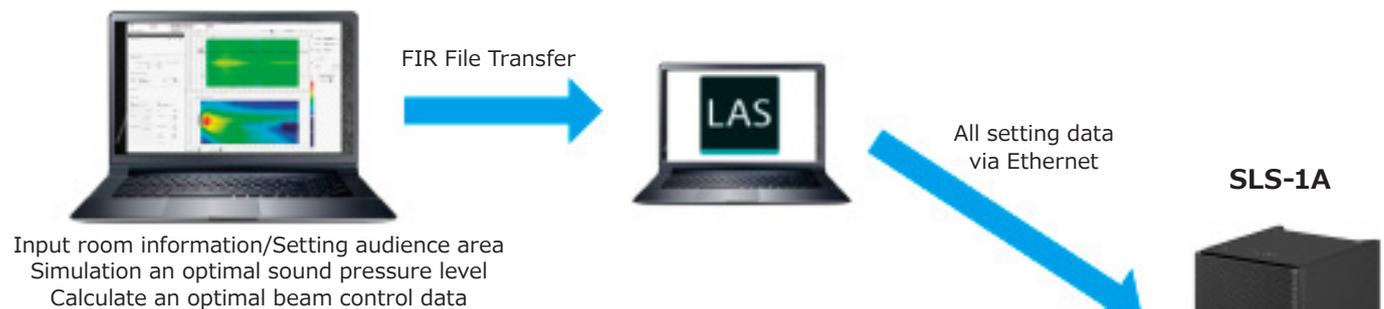
Sony's Line-Array Speaker Manager



AFMG® EASE Focus including FIRmaker® 3D

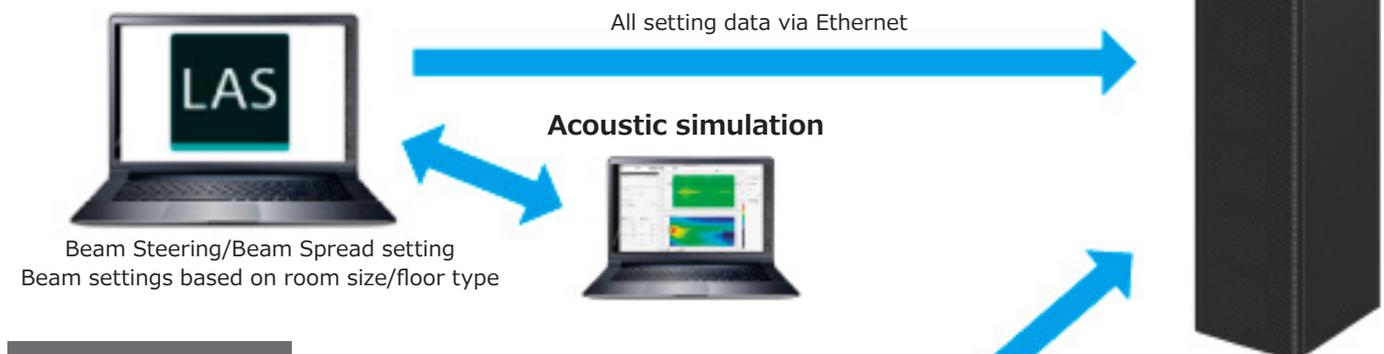
(A) FIRmaker® 3D in EASE Focus

Optimized sound design based on room information by fine beam control



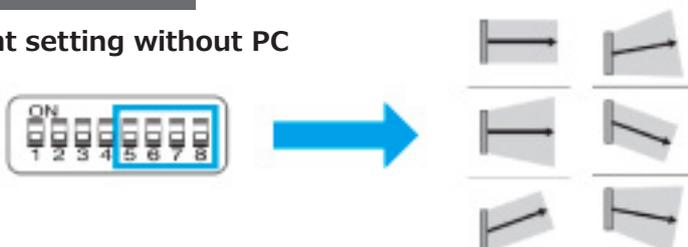
(B) Sony's Line-Array Speaker Manager

Beam Steering/Beam Spread/EQ settings while checking the sound on-site



(C) DIP switch

Instant setting without PC

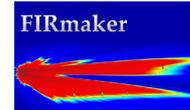


Optimized Beam control

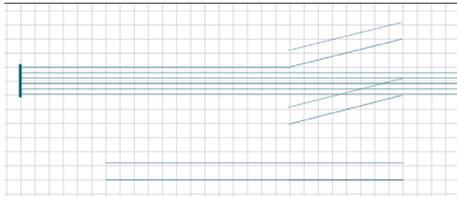
EASE Focus and FIRmaker® 3D can be used to create arbitrary beams of sound tailored to the seating area; FIRmaker® 3D automatically calculates the FIR filter coefficients needed for beaming. The sound system designer uploads them to the SLS-1A's DSP module via Sony's Line-Array Speaker Manager and converts them to actual sound.



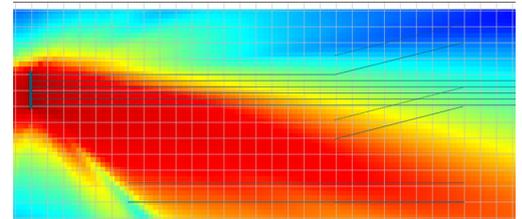
EASE Focus



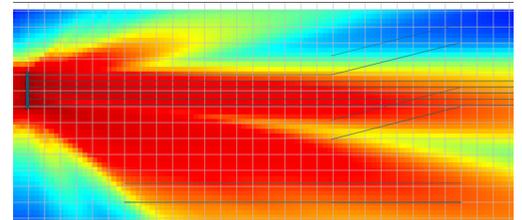
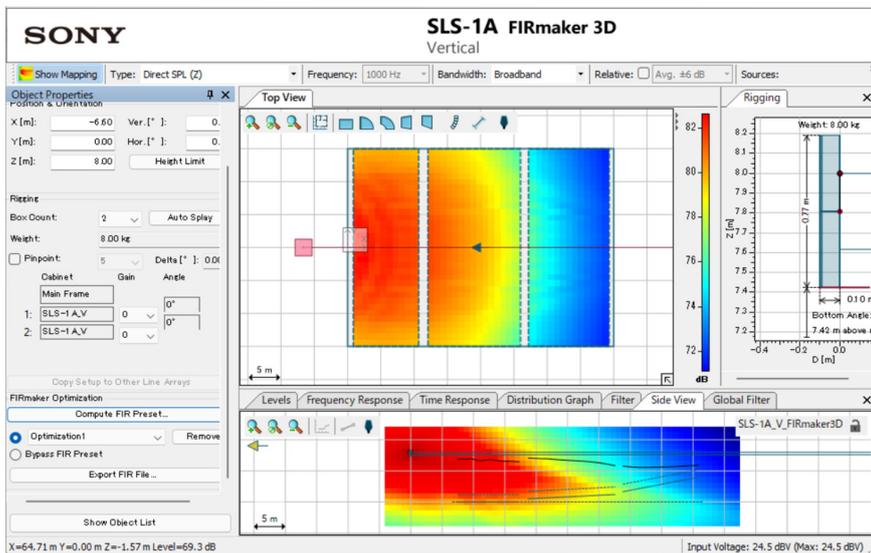
FIRmaker® 3D



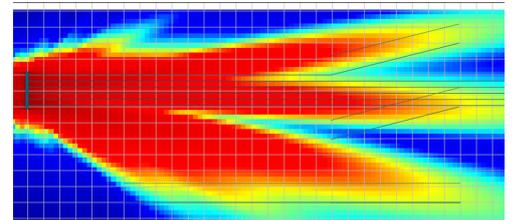
3 floors Auditorium (side view)



Optimized for 1F



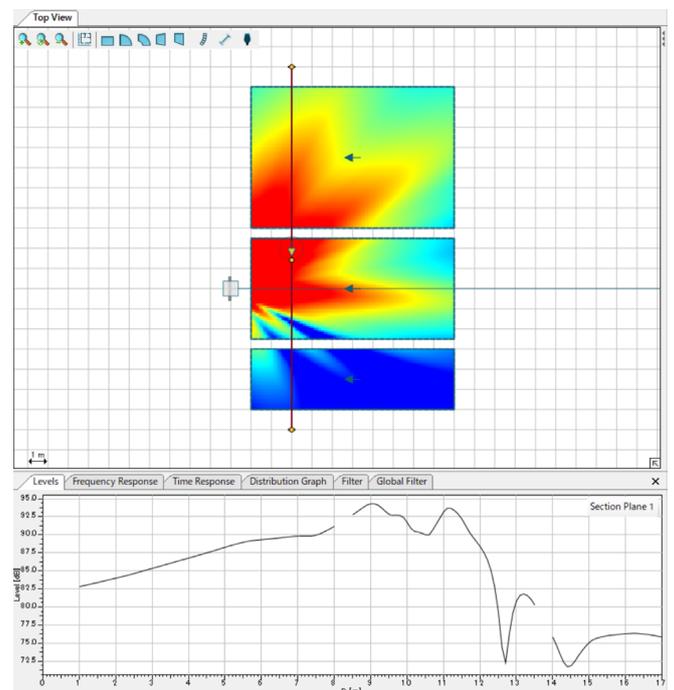
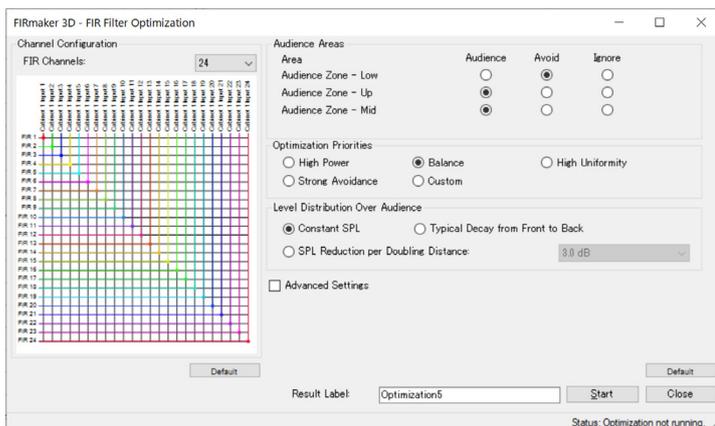
Optimized for 1F & 2F

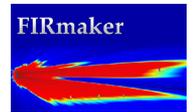


Optimized for all floors

One of the greatest features is that the combination of the SLS-1A and FIRmaker® 3D can also control horizontal directivity, whereas conventional line arrays can only provide vertical directivity.

Top view of one floor with three audience areas and SPL level of the section plane.



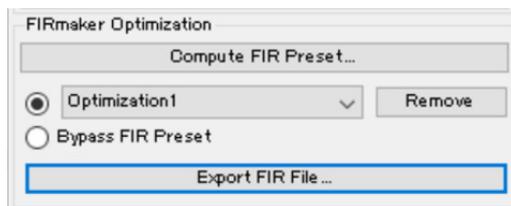


SLS-1A Speaker data(GLL) for FIRmaker® 3D

FIRmaker® 3D gives the SLS-1A beaming a revolutionary feature (optimal 3D sound radiation to the audience area). Draw audience areas in the top and side views of EASE Focus and place the corresponding SLS-1A GLL data(with FIRmaker® 3D at the end of the data name). The data is divided into vertical and horizontal placement, and the number of modules can be changed on EASE Focus for vertical placement.

- Sony_SLS-1A_Horizontal_1module_FIRmaker3D_v1.gll
- Sony_SLS-1A_Horizontal_2modules_FIRmaker3D_v1.gll
- Sony_SLS-1A_Horizontal_3modules_FIRmaker3D_v1.gll
- Sony_SLS-1A_Horizontal_4modules_FIRmaker3D_v1.gll
- Sony_SLS-1A_Horizontal_5modules_FIRmaker3D_v1.gll
- Sony_SLS-1A_Horizontal_6modules_FIRmaker3D_v1.gll
- Sony_SLS-1A_Vertical_FIRmaker3D_v1.gll

Next, select the placed speaker and the following window will appear in the properties screen: Click on Compute FIR Filter to open the optimization condition setting window.



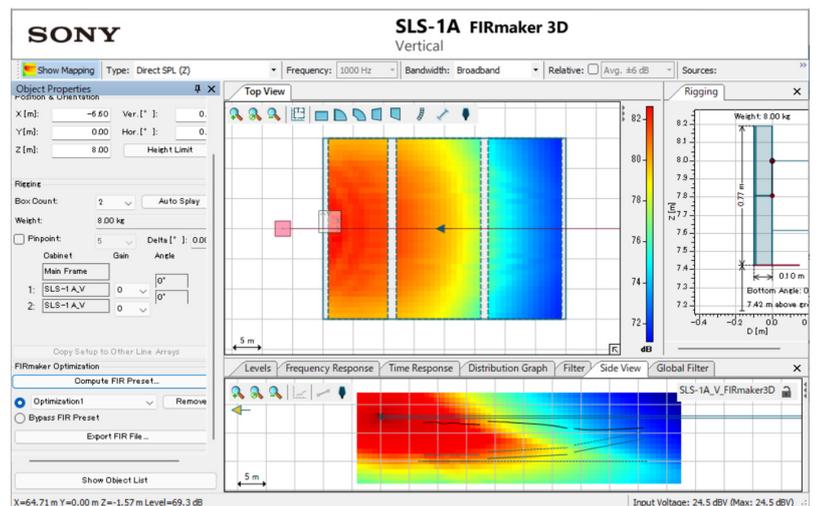
Optimization condition

The most important setting is the selection of the audience area to be optimized. In addition to setting audience area criteria, there are a variety of other configuration parameters. For more information, please refer to the EASE Focus manual (F1 key or Help menu).

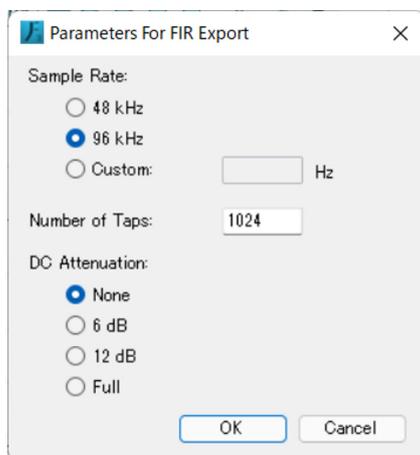
For each Audience Areas, set Audience(Optimize), Avoid(Suppress), and Ignore.

Audience Areas	Audience	Avoid	Ignore
Audience Zone - Audience Area 1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audience Zone - Audience Area 2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audience Zone - Audience Area 3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

As soon as the parameter settings are completed, the optimization calculation starts. When the calculation is finished, the Show Mapping button, the sound pressure level distribution will be plotted.



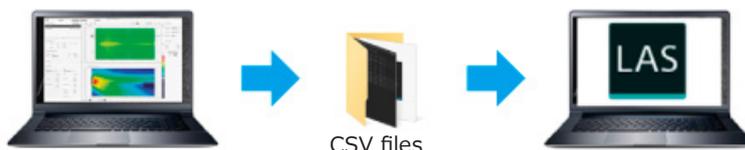
Export FIR data to Line-Array Speaker Manager



When you click [Export FIR File] button, you will be asked for the sampling rate and the number of taps in the impulse response, so set them to 96 kHz/1024 taps to match the DSP hardware of the SLS-1A. You can also choose to attenuate the DC component of the impulse response. However, if you selected [Flat Response with Roll-Off] and [Maximum Filter Gain] when setting the target in FIRmaker®, the DC component of the impulse response will not appear originally, so you can leave it at [None].

The FIR Filter File is a CSV file, which is generated as many as the number of FIR Filters, but it can be easily read by Sony' Line-Array Speaker Manager.

Export FIR coefficients data calculated by FIRmaker® 3D.



Import data and then transfer them to SLS-1A.

Beam control with Sony's Line-Array Speaker Manager

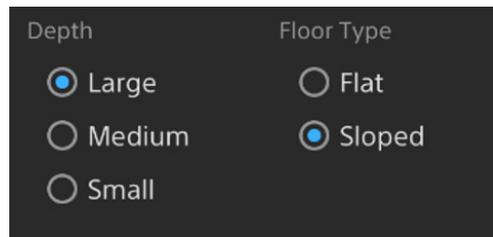
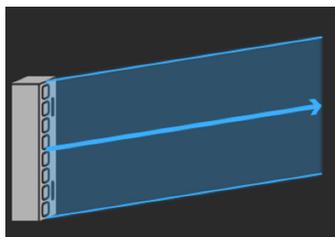
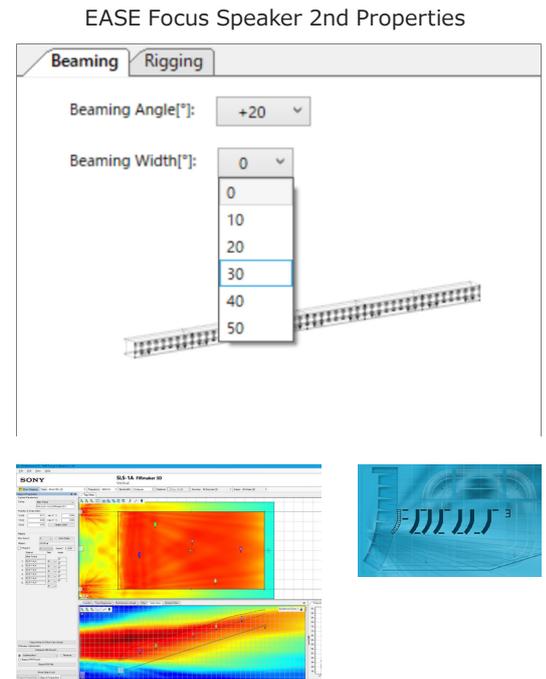
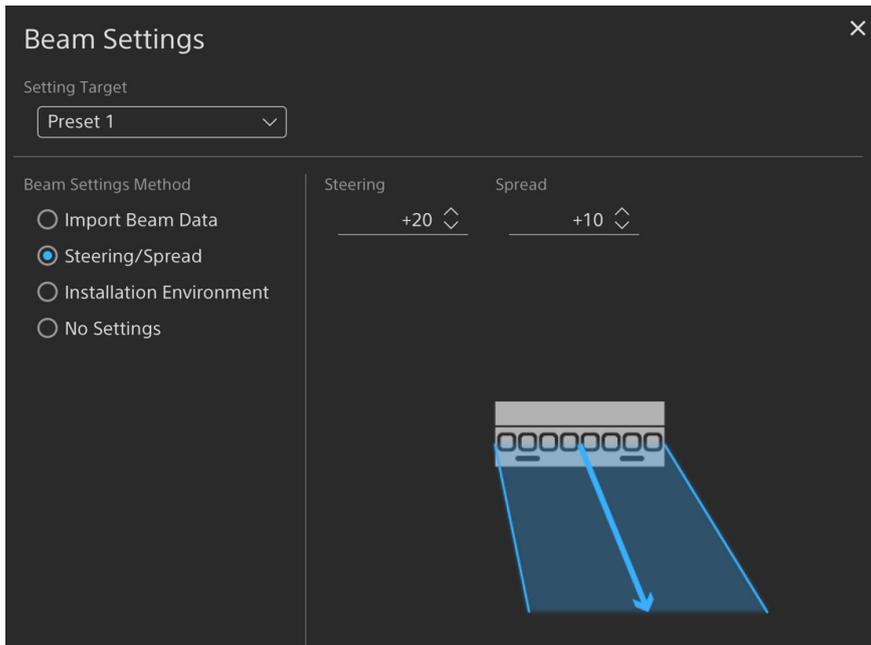


Sony

Line-Array Speaker Manager

Sony's Line Array Speaker Manager has a simple and intuitive beaming configuration feature. Users simply select from a library of predefined beam control configuration(Beam Steering[Beaming angle] and Beam Spread[Beaming Width]). *See p.18 Appendix "3.Sony' s Line-Array Speaker Manager Beam control patter".

Also, the exact same beam control conditions can be selected in the Sony's Beaming(2nd properties)(refer page 8) window in EASE Focus, allowing the sound system designer to predict the sound pressure level distribution and frequency response of the audience. See the next page for details.



You can create beam control data to meet depth of room and floor type. *Vertical style only. See p.17 Appendix "2.Room Size in Line-Array Speaker Manager "Installation Environment".

The preset mode can also be changed to select from three custom presets that can be stored in the software, or six product-loaded presets that can be selected with the product's DIP switch.

Sony's Line-Array Speaker Manager includes not only Beam control, but also horizontal and vertical placement settings, input source routing, EQ and Delay settings, Dante networking settings, and many other features.

Placement	Routing	Beam	Sound	Network	Device
Speaker setting - Vertical/Horizontal - Grouping(Connection)	Input source setting - Sampling rate - Unicast/Multicast	Beam control setting - Ease Focus date export - Steering/Spread	Sound setting - Equalizer - Delay/Analog Gain	Network setting - IP/MAC address check - Network setting	Device setting - Reboot/Update - LED display/Power control

Dante Networking

The SLS-1A is a Dante-enabled device. Dante audio network replaces the point-to-point connections with a standard IP network.



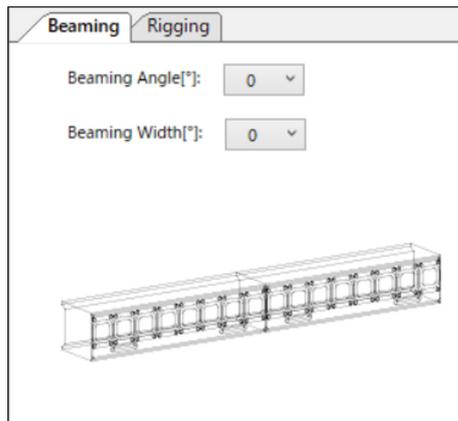


SLS-1A Speaker Data(GLL) for EASE Focus

EASE Focus provides strong support for beaming setup with Sony Line-Array Speaker Manager. Draw audience areas in the top and side views of EASE Focus and place the corresponding SLS-1A GLL data (note that there is no FIRmaker® 3D at the end of the data name). The data is divided into vertical and horizontal placement, and the number of modules can be changed on EASE Focus for vertical placement. See p.17. Appendix "1.GLL data".

- Sony_SLS-1A_Horizontal_1module_v1.gll
- Sony_SLS-1A_Horizontal_2modules_v1.gll
- Sony_SLS-1A_Horizontal_3modules_v1.gll
- Sony_SLS-1A_Horizontal_4modules_v1.gll
- Sony_SLS-1A_Horizontal_5modules_v1.gll
- Sony_SLS-1A_Horizontal_6modules_v1.gll
- Sony_SLS-1A_Vertical_v1.gll

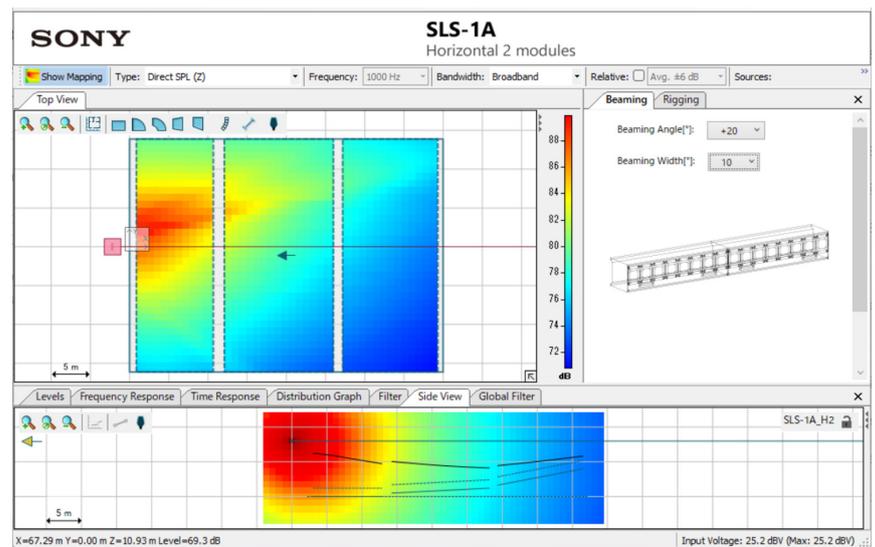
Next, select the placed speaker and the following window will appear on the Secondary Properties screen (Beaming tab).



Beaming setting

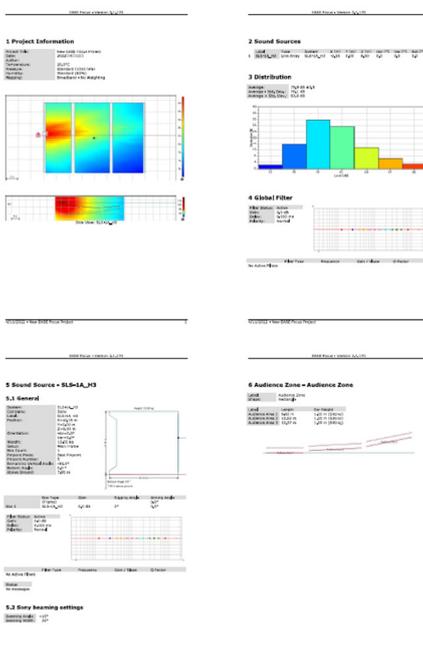
Beaming settings, both vertical and horizontal, depend on the number of modules. The more modules there are, the more types of beaming are available. For example, for horizontal-1 module, Beam Angle(Beam Steering) is +20 to -20 degrees and Beam Width(Beam Spread) is 0 to 40 degrees, while for 3 modules, Beaming Angle is +30 to -30 degrees and Beaming Width is 0 to 60 degrees. Note that Beaming Angle and Width are interrelated.

As soon as the parameter settings are completed, the beaming calculation starts. When the calculation is finished, the Show Mapping button, the sound pressure level distribution will be plotted.



Determination of Beam Settings

EASE Focus simulation report



EASE Focus allows detailed analysis of the distribution of sound pressure levels within an audience area through frequency weighting and bandwidth modification. You can also specify a specific location and check its frequency response.

Typically, the Beaming parameter is set so that the sound pressure level within the audience area is more uniform. If higher sound pressure levels are required, increase the number of SLS-1A modules. Of course, it is also useful to change the speaker placement.

Once the number of modules, placement, and beaming parameters are determined, the beaming is set in Sony Line-Array Speaker Manager based on that information. The beaming settings and simulation results can be saved as a PDF file using the EASE Focus report function.

5.2 Sony beaming settings

Beaming Angle: +10°
Beaming Width: 20°

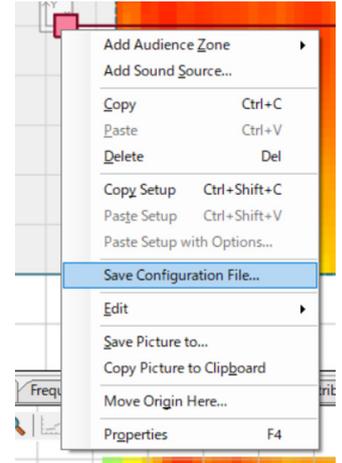


Room Simulation with EASE®

Export GLL configuration file from EASE Focus to EASE®

If the SLS-1A is installed in a room and you want to predict acoustics, including room effects such as reverberation and reflected sound, use AFMG's EASE® acoustic simulation software. EASE® can predict reverberation time and speech intelligibility (STI), calculate impulse response, and make binaural audible.

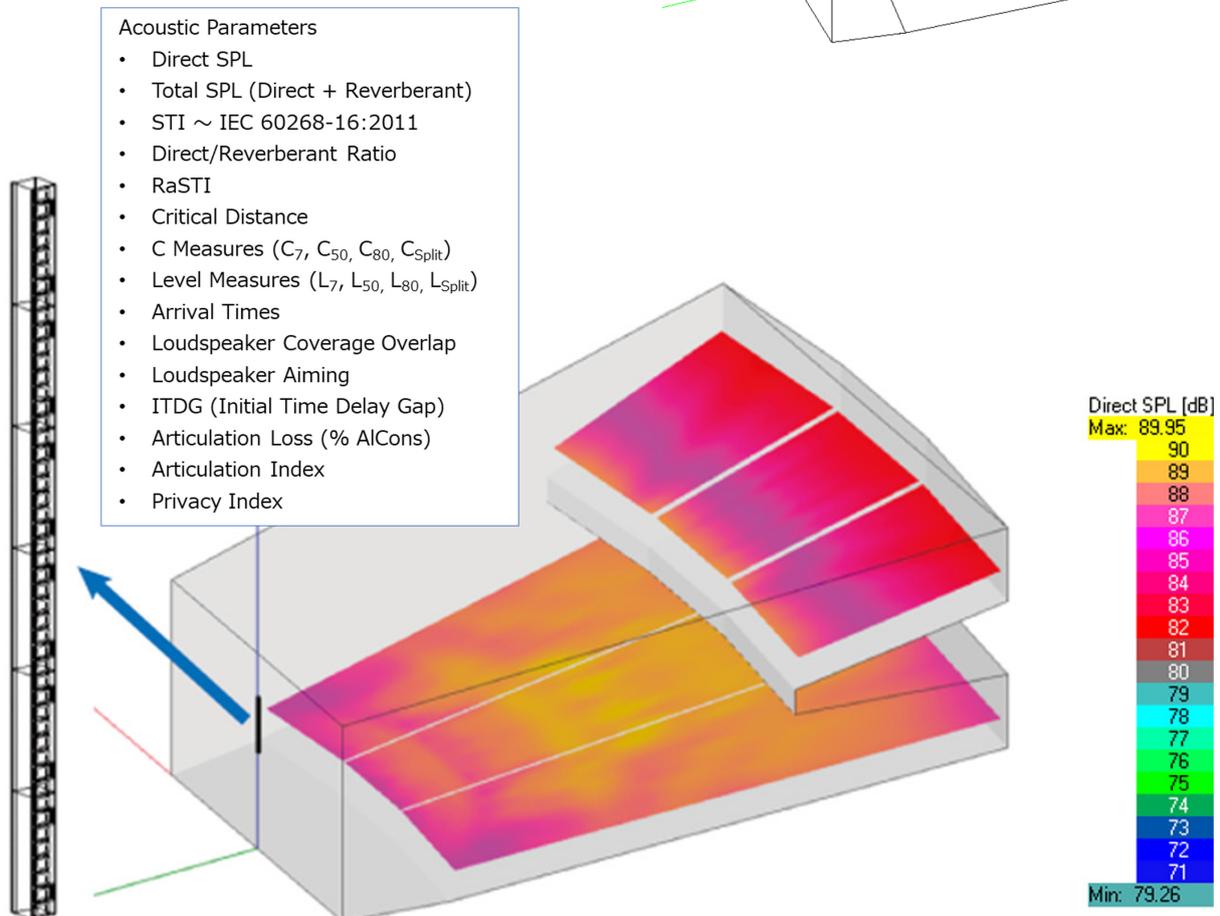
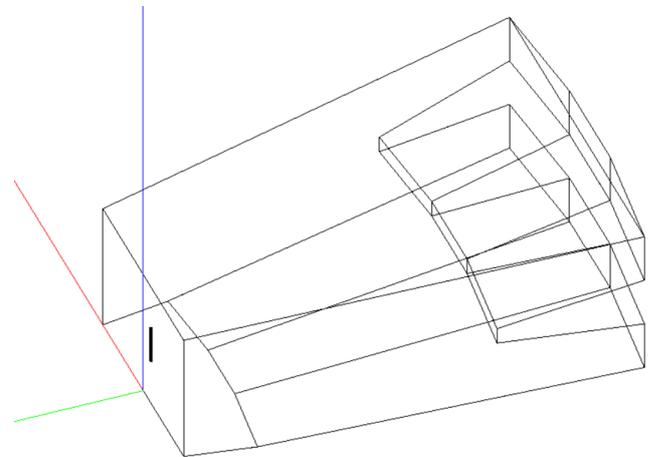
Information from an SLS-1A beaming with Sony Line-Array Speaker Manager or FIRmaker® 3D can be exported to EASE® via EASE Focus using the following steps. Select a speaker, open the menu with the right mouse button, and click Save Configuration File.... and save it as a GLL Configuration file (*.xglc). In EASE®, click Import in the GLL Configuration window under Speaker Properties to load the GLL Configuration File.



EASE® simulation

While EASE Focus was a direct sound only simulation, EASE® allows for room modeling. After the room is drawn in 3D, acoustic materials are applied to the walls, floor, and ceiling. As a result, reverberation and reflections can be taken into account in the simulation.

The acoustic properties of SLS-1A are reflected in EASE®, along with beaming and optimization results, and EASE® can predict various acoustic parameters, including speech intelligibility, as well as overall sound pressure level.



Corporate Meeting Rooms

In a company, communication and collaboration among members is essential for an active and productive team, and a sound system using the SLS-1A can create higher quality voice calls whether in remote or face-to-face meetings. Beam steering technology reduces reflections from walls, ceilings, and other boundary surfaces, focusing sound specifically on remote team members for maximum speech intelligibility.

Proper beaming settings can be made only by selecting presets using the DIP switch on the SLS-1A. Note that the DIP switch presets are valid only when the modules are not connected.

*See p.19 Appendix "4.SDIP switch Beam setting pattern".

Example

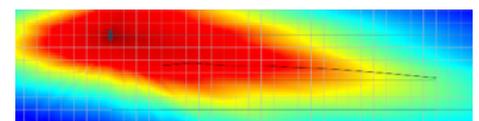
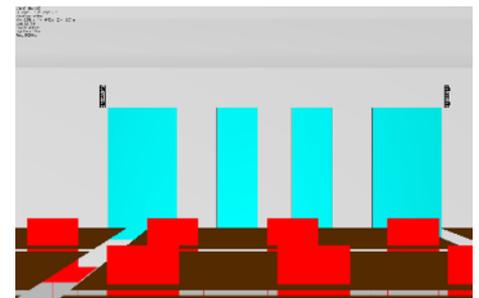
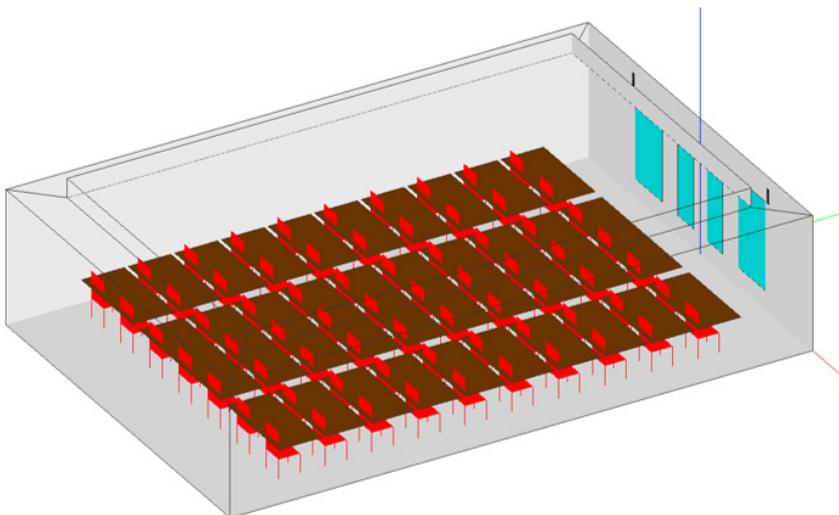
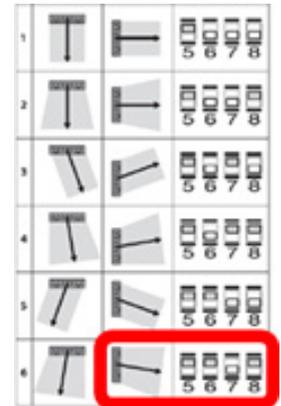
Purpose : Speech PA for face-to-face and remote conference

Acoustic environment : Dead

Size : 15m(D), 10m(W), 3.5m(H), flat floor

Beaming : Using LA1 on-board preset

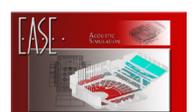
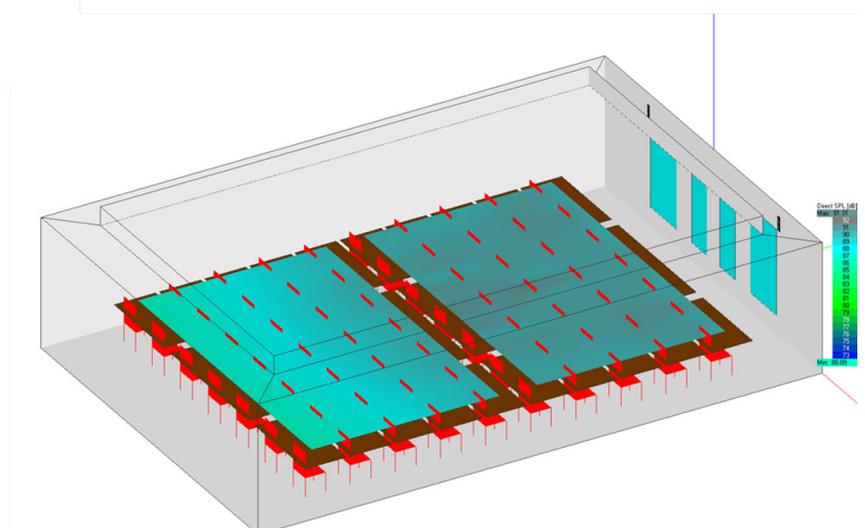
Installation: LR vertical alignment along the wall, 3m(H)



EASE Focus side view mapping

Direct sound SPL distribution after beaming (preset 6)

The difference in sound pressure levels between all locations in the conference room is within about 4 dB.



Education

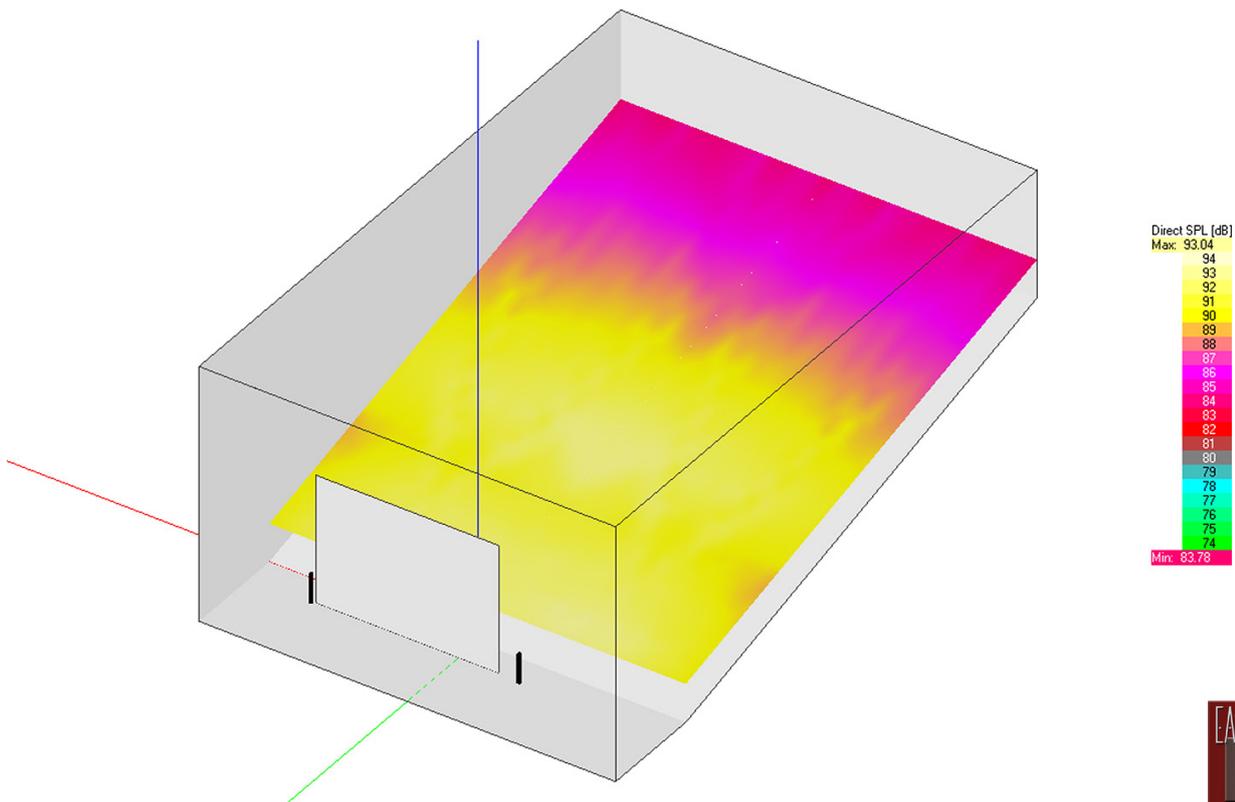
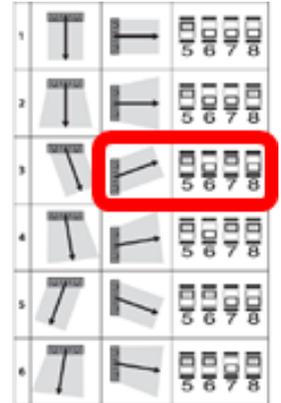
The SLS-1A's superior acoustic performance provides a PA system that ensures lectures can be heard and understood. Advanced Beam Steering technology reduces the effect of reflected sound from walls and other boundary surfaces, allowing the sound to be directed precisely to the students. Whether in a classroom, lecture hall, or gymnasium, the SLS-1A provides high-quality sound for students and staff.

For most cases, proper beaming settings can be made only by selecting presets using the DIP switch on the SLS-1A. Of course, more detailed beaming design is also possible using Sony's Line-Array Speaker Manager or EASE Focus.

*See p.19 Appendix "4.SDIP switch Beam setting pattern".

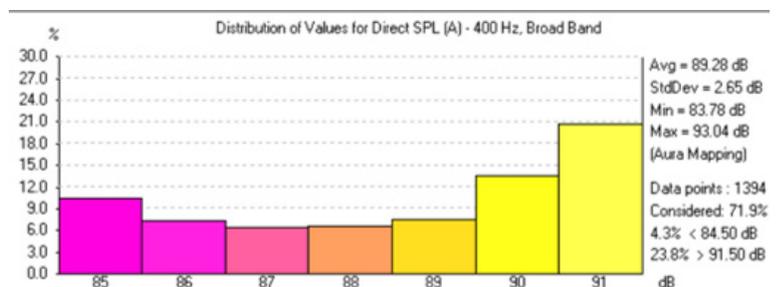
Example

- Purpose : Lecture audio PA or content audio PA**
- Acoustic environment : Slightly dead**
- Size : Audience area 20m(D), 16m(W), with slope**
- Beaming : Using SLS-1A on-board preset**
- Installation : LR vertical alignment along the wall, 3m(H)**



Direct sound SPL distribution after beaming (preset 3)

The difference in direct sound pressure level between the frontmost and last seats is reduced to approximately 6 dB.

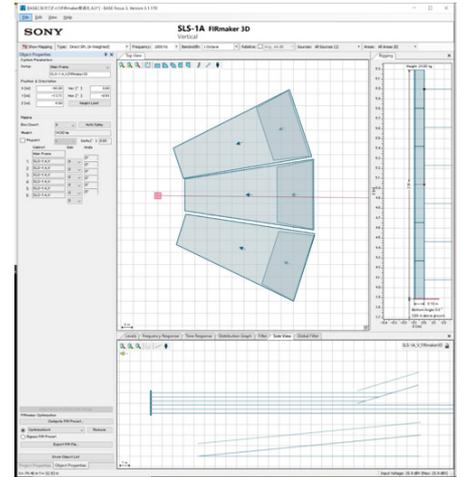
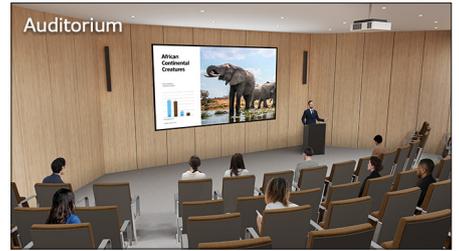


Auditorium

Thanks to its superior acoustic performance, the SLS-1A makes a significant contribution to holding the audience's attention in the auditorium space. In a versatile space designed not only for lectures but also for music concerts, the room's acoustic environment may be full of reflections and reverberations.

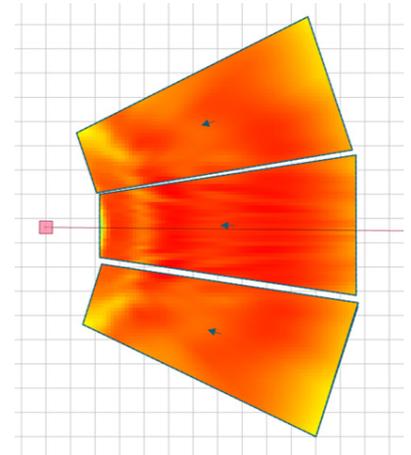
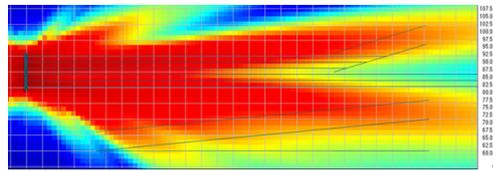
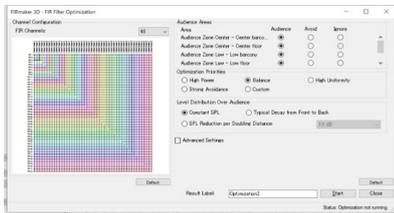
Even in such acoustically challenging cases, the SLS-1A's advanced beaming technology improves speech intelligibility by reducing reflected sound from walls, ceilings, and other boundary surfaces and delivering more sound directly to the audience. In addition, multiple modules can be used to increase the length of the line array, resulting in more broadband reproduction and greater area coverage.

Using FIRmaker[®] 3D on EASE Focus, the distribution of sound pressure levels can be optimized for any given audience area. This also contributes greatly to the economics of the sound system.



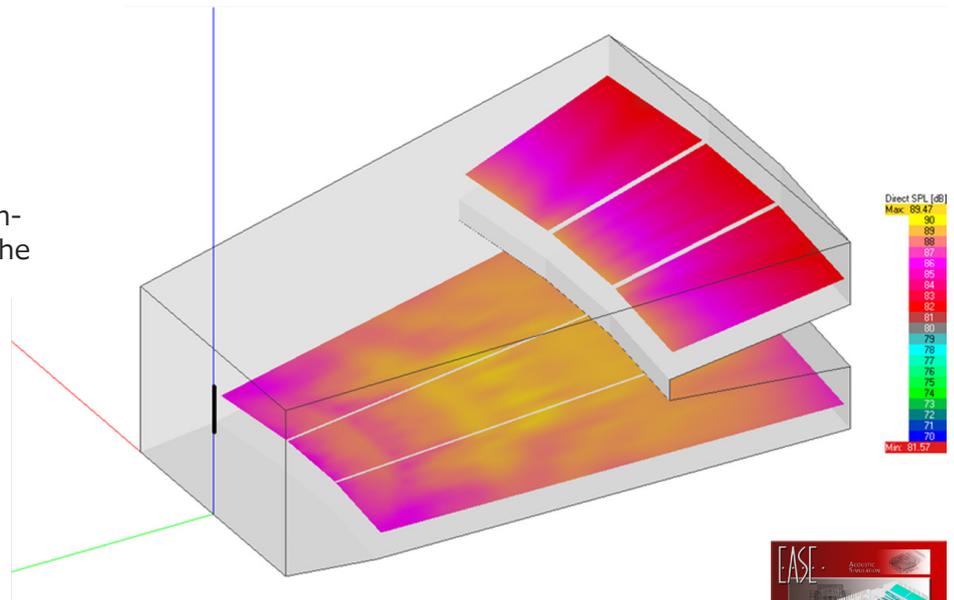
Example

- Purpose : Lecture PA and Announce PA**
- Acoustic environment : Slightly live**
- Size : Audience area 25m(D), 15-20m(W), 2 floors**
- Beaming : EASE Focus FIRmaker[®] 3D**
- Installation : Vertical 6-modules in the center**



Direct sound SPL distribution after FIRmaker[®] 3D beaming

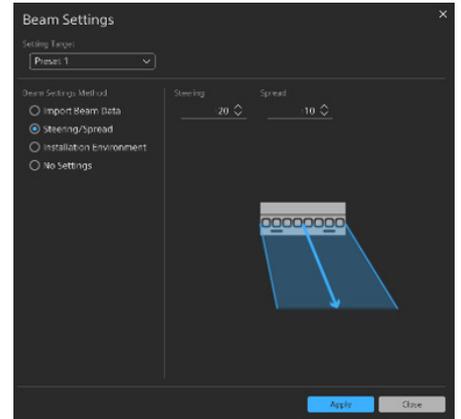
This example shows how one set of 6 modules vertically connected SLS-1A in a medium-sized auditorium covers both the first and second floor seats.



Corporate Entrance

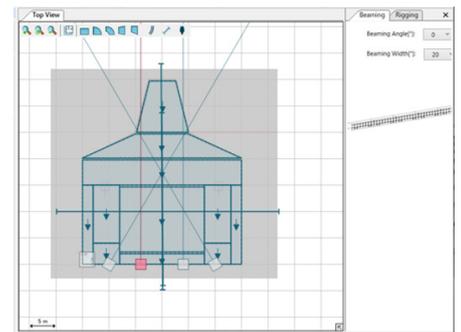
The SLS-1A creates an attractive acoustic atmosphere in corporate entrances, showrooms, and hotel lobbies. The SLS-1A can be positioned horizontally as well as vertically to localize the sound of content to the screen and create a wider sweet spot. On the other hand, for areas where sound is not desired, appropriate beaming can provide a lower sound pressure level.

Beam control is easily accomplished by selecting the beam control angle and spread angle using the Sony Line-Array Speaker Manager. EASE Focus can also be used to draw the audience area and position the speakers to pre-simulate and confirm the sound pressure level distribution after the beam control effect. If there are severe limitations on speaker placement, or if the environment is highly reverberant, FIRmaker® 3D can be used with EASE Focus to optimize beaming.



Example

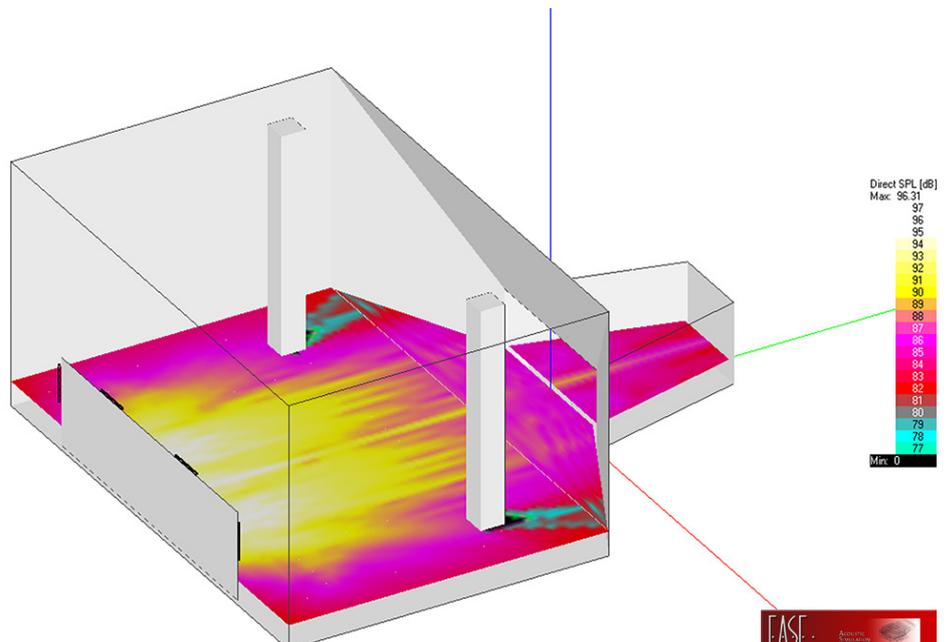
- Purpose :** PA for large display and announce
- Acoustic environment :** Live
- Size :** Audience area 20m(D), 30m(W)
- Beaming :** Sony Line-Array Speaker Manager
- Installation :** Vertical and Horizontal multi-modules



Direct sound SPL distribution after Line-Array Speaker Manager beaming

By placing the SLS-1A around the large display and applying Line-Array Speaker Manager beaming appropriately, the sound can be focused on targeted areas.

In particular, PA playback of screen content can be performed with high intelligibility even in entrance spaces where there is a lot of reverberation and reflection.



*In this example, each module is placed at intervals to deliver a sound of uniform sound pressure over as wide area as possible. Depending on the situation and purpose, it may be better to place them connect and place in the center.



Transportation

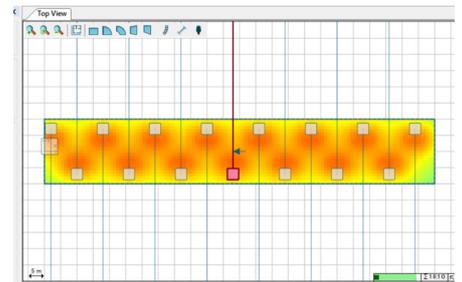
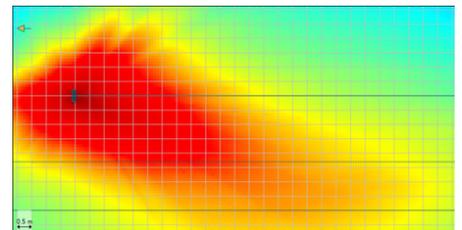
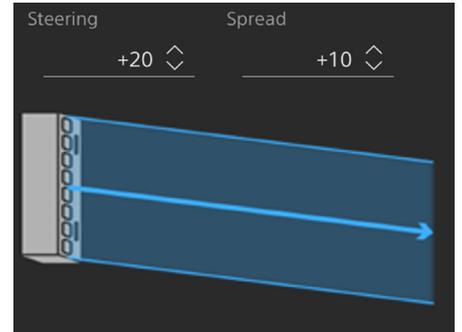
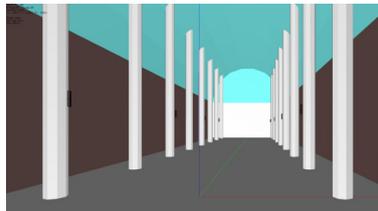
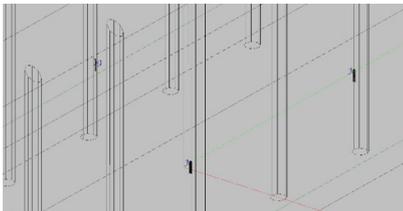
Acoustic environments such as train stations and airports are extremely challenging applications for sound systems due to the high level of background noise in addition to reverberation and reflected sound. Furthermore, announcements such as traffic information and its updates, which are important to visitors, are required to have a certain level of speech intelligibility. On the other hand, there are many restrictions on speaker mounting locations and methods.

Thanks to its compact size and excellent beam control performance, the SLS-1A can provide accurate and intelligible sound at train stations, bus centers, airports, etc., to help guests understand important, time-sensitive and specific traffic information.

Beam control is easily accomplished by selecting the beaming angle and spread angle using the Sony Line-Array Speaker Manager. In addition, EASE Focus can be used to pre-simulate and confirm the sound pressure level distribution after the beam control effect. If STI (Speech Transmission Index) is specified, it can be predicted in advance by EASE®.

Example

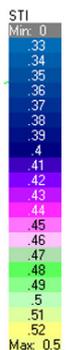
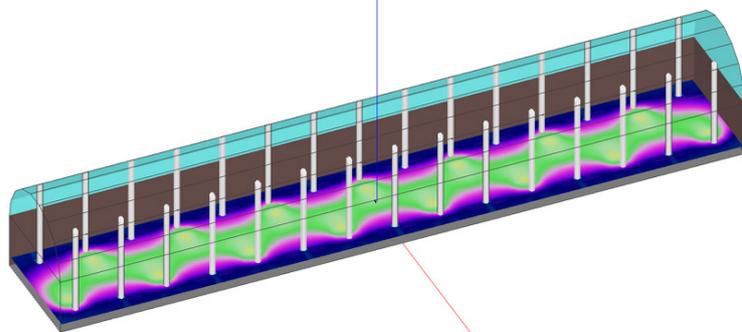
- Purpose : Announce PA**
- Acoustic environment : Extremely Live**
- Size : Audience area 120m(D), 20m(W)**
- Beaming : Sony Line-Array Speaker Manager**
- Installation : Vertical placement on columns, 4m(H)**



STI distribution after Line-Array Speaker Manager beaming

Despite the extremely long reverberant space, the main aisle has an STI of 0.5 (FAIR) or better.

If a typical point source speaker with the same performance as the SLS-1A were aimed at the main aisle, the STI would be 0.3 (POOR) in all areas of the main aisle.



STI Value	Rating
0.75 – 1	excellent
0.6 – 0.75	good
0.45 – 0.6	fair
0.3 – 0.45	poor
0 – 0.3	bad



Selecting your best SLS-1A and Simulation

Which module configuration?

Which arrangement?

Which method of beaming?

EASE Focus or need EASE®?

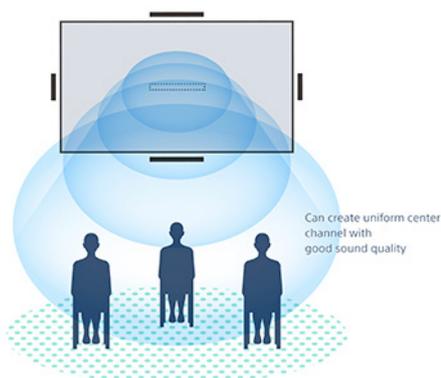
The SLS-1A is a line array speaker with eight Flat & Square speaker units. Up to 6 units can be connected in a modular configuration. Vertical and horizontal placement is possible. Beaming can be done in three different ways. Acoustic simulation software (EASE Focus and EASE®) can also be used.

Module and Size

This table shows the approximate distances at which PA speech intelligibility can be maintained in a room. In terms of sound pressure levels, longer distances can be used.

Increase the number of modules when a higher sound pressure level is required, or when you want more dynamic beaming control.

Distance	Numbers of module	Length	
4m	1 module	384mm	=====
8m	2 modules	768mm	=====
12m	3 modules	1,152mm	=====
16m	4 modules	1,536mm	=====
20m	5 modules	1,920mm	=====
25m	6 modules	2,304mm	=====



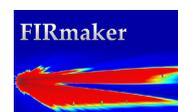
Vertical or Horizontal?

If you want to aim downward from a high position, or vice versa, use vertical placement. In addition, vertical placement will result in fewer reflections from the ceiling and floor. If you want to beaming horizontally, use horizontal placement. Horizontal placement will reduce reflections from the side walls.

When playing content on a large screen display, it is recommended to use both vertical and horizontal placement to surround the screen.

FIRmaker® 3D or Line-Array Speaker Manager beam control?

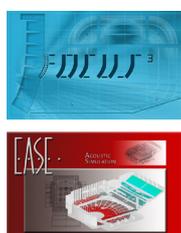
FIRmaker® 3D is effective when multiple beaming is required, when there is a mix of areas where sound is to be delivered and areas where it is not, or when there are restrictions on speaker mounting positions.



Beaming with Sony Line-Array Speaker Manager is useful when design time is limited, when field adjustments are required, and when past performance indicates a high likelihood of good results. If design time is available, we recommend simulating with EASE Focus.



The easiest way to set beaming is to use the Dip switch on the product itself; no PC is required, and 6 typical beaming patterns can be selected only by the SW setting.



EASE Focus or EASE®?

For general facility sound system design, EASE Focus is sufficient for direct sound prediction. On the other hand, if you want to ensure speech intelligibility in an acoustically challenging environment with high reverberation and reflections, we recommend EASE®. After simulation with EASE Focus, the GLL configuration data is exported to EASE® and evaluate the STI (Speech Transmission Index).

Appendix

1. SLS-1A Speaker Data(GLL)

There are two main sets of SLS-1A GLL data available for EASE Focus and EASE®, one for Sony's Line-Array Speaker Manager and one for FIRmaker® 3D.

Each has a horizontal and vertical placement. The GLL data for horizontal placement is a separate GLL data depending on the number of modules. There is only one type of GLL data for vertical placement.

For Sony' s Line-Array Speaker Manager

 Sony_SLS-1A_Horizontal_1module_v1.gll

 Sony_SLS-1A_Horizontal_2modules_v1.gll

 Sony_SLS-1A_Horizontal_3modules_v1.gll

 Sony_SLS-1A_Horizontal_4modules_v1.gll

 Sony_SLS-1A_Horizontal_5modules_v1.gll

 Sony_SLS-1A_Horizontal_6modules_v1.gll

 Sony_SLS-1A_Vertical_v1.gll

For FIRmaker® 3D

 Sony_SLS-1A_Horizontal_1module_FIRmaker3D_v1.gll

 Sony_SLS-1A_Horizontal_2modules_FIRmaker3D_v1.gll

 Sony_SLS-1A_Horizontal_3modules_FIRmaker3D_v1.gll

 Sony_SLS-1A_Horizontal_4modules_FIRmaker3D_v1.gll

 Sony_SLS-1A_Horizontal_5modules_FIRmaker3D_v1.gll

 Sony_SLS-1A_Horizontal_6modules_FIRmaker3D_v1.gll

 Sony_SLS-1A_Vertical_FIRmaker3D_v1.gll

2. Room Size in Line-Array Speaker Manager "Installation Environment"

Below table is a guide of room size in beam setting by "Installation Environment" in Line-Array Speaker Manager (Vertical style).

Unit : m

Product	Small				Medium				Large			
	Room Size			Speaker Height	Room Size			Speaker Height	Room Size			Speaker Height
No. of modules	W	D	H	Top point	W	D	H	Top point	W	D	H	Top point
1module	3	3	2.7	1.6	3	5	2.7	1.8	4	7	2.7	2
2module	3	6	2.7	2.1	4	10	2.7	2.5	9	14	2.7	2.7
3module	4	9	2.7	2.5	10	15	2.7	2.7	13	21	3.8	3.5
4module	8	12	3	2.9	13	20	3.6	3.3	19	28	5	3.5
5module	10	15	3.5	3.4	17	25	4.5	4.2	23	35	6.3	6
6module	12	18	3.8	3.7	20	30	5.4	5.2	28	42	7.6	7.2

Appendix

3. Sony' s Line-Array Speaker Manager Beam control pattern

1module		Steering				
		-20	-10	0	10	20
Spread	0	✓	✓	✓	✓	✓
	10		✓	✓	✓	
	20		✓	✓	✓	
	30			✓		
	40			✓		

5module		Steering								
		-40	-30	-20	-10	0	10	20	30	40
Spread	0	✓	✓	✓	✓	✓	✓	✓	✓	✓
	10		✓	✓	✓	✓	✓	✓	✓	
	20		✓	✓	✓	✓	✓	✓	✓	
	30			✓	✓	✓	✓	✓		
	40			✓	✓	✓	✓	✓		
	50				✓	✓	✓			
	60				✓	✓	✓			
	70					✓				
	80					✓				

2module		Steering				
		-20	-10	0	10	20
Spread	0	✓	✓	✓	✓	✓
	10	✓	✓	✓	✓	✓
	20		✓	✓	✓	
	30		✓	✓	✓	
	40			✓		
	50			✓		

6module		Steering								
		-40	-30	-20	-10	0	10	20	30	40
Spread	0	✓	✓	✓	✓	✓	✓	✓	✓	✓
	10	✓	✓	✓	✓	✓	✓	✓	✓	✓
	20		✓	✓	✓	✓	✓	✓	✓	
	30		✓	✓	✓	✓	✓	✓	✓	
	40			✓	✓	✓	✓	✓		
	50			✓	✓	✓	✓	✓		
	60				✓	✓	✓			
	70				✓	✓	✓			
	80					✓				
	90					✓				

3module		Steering						
		-30	-20	-10	0	10	20	30
Spread	0	✓	✓	✓	✓	✓	✓	✓
	10		✓	✓	✓	✓	✓	
	20		✓	✓	✓	✓	✓	
	30			✓	✓	✓		
	40			✓	✓	✓		
	50				✓			
	60				✓			

4module		Steering						
		-30	-20	-10	0	10	20	30
Spread	0	✓	✓	✓	✓	✓	✓	✓
	10	✓	✓	✓	✓	✓	✓	✓
	20		✓	✓	✓	✓	✓	
	30		✓	✓	✓	✓	✓	
	40			✓	✓	✓		
	50			✓	✓	✓		
	60				✓			
	70				✓			

Appendix

4. DIP switch Beam setting pattern

Instead of the Line-Array Speaker Manager, you use the DIP switch on the rear of the speaker to make beam control setup of the speaker. (One module setting only)

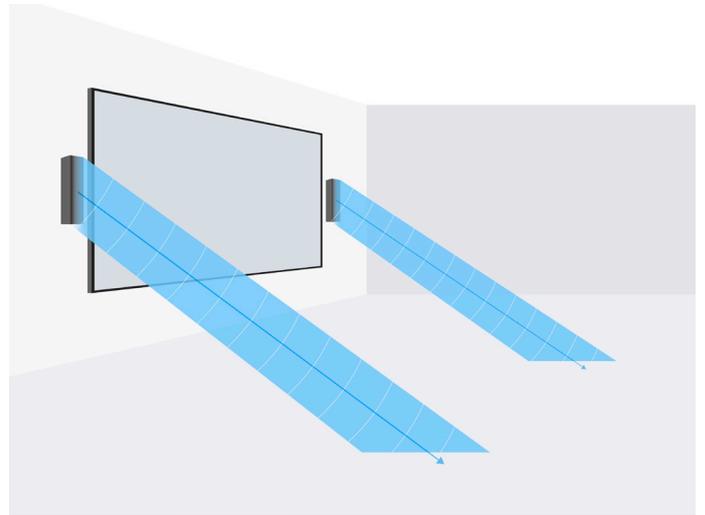


DIP switch



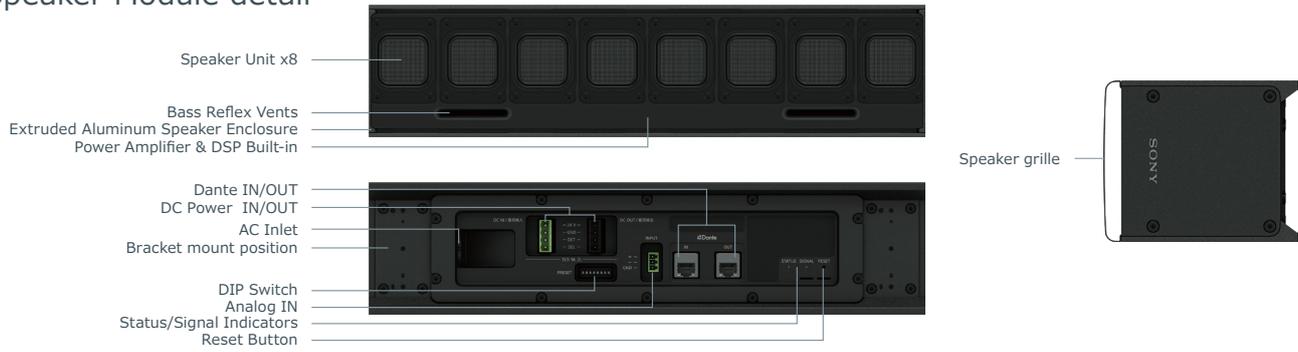
Using the 4 sliders to the right of the DIP switch, you can select one of the 6 preset beam control settings.

Preset	For horizontal placement	For vertical placement	DIP switch configuration
1			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
2			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
3			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
4			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
5			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
6			<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8



Product Specifications

Speaker Module detail



Powered Line-Array Speaker		SLS-1A					
(System)	Module	(1module)	(2module)	(3module)	(4module)	(5module)	(6module)
	Frequency Range *Frequency characteristic measured at anechoic chamber	80Hz-20kHz					
	Horizontal Dispersion *1 -4k average, -6dB *At Vertical style (Vertical Dispersion at Horizontal style)	200degrees					
	Vertical Opening Angles *At Vertical style (Vertical Opening Angles at Horizontal style)	Software Adjustable: Max 40degrees	Software Adjustable: Max 50degrees	Software Adjustable: Max 60degrees	Software Adjustable: Max 70degrees	Software Adjustable: Max 80degrees	Software Adjustable: Max 90degrees
	Vertical Beam Steering Angles *At Vertical style (Horizontal Beam Steering at Horizontal style)	20degrees	20degrees	30degrees	30degrees	40degrees	40degrees
	Maximum SPL (1m) *Max SPL calculated based on free-field sensitivity, and without beam steering, spreading applied.	105dB (peak 112dB)	111dB (peak 118dB)	115dB (peak 122dB)	117dB (peak 124dB)	119dB (peak 126dB)	121dB (peak 128dB)
	Peak SPL (30m) *Assumption signal loss at 30m and 15dB	97dB	103dB	107dB	109dB	111dB	113dB
	Typical Usable Throw Distance *Typical Maximum Usable Throw Distance includes considerations for reverberation and speech intelligibility.	4m	8m	12m	16m	20m	25m
	Low-frequency Beam Control Limit	1.25kHz	630Hz	400Hz	315Hz	250Hz	200Hz
	Enclosure type	Bass reflex type					
	Driver	Flat and Square speaker unit, 35mm x 35mm (1 7/16 in x 1 7/16 in) Full range x 8					
	Magnetic shielding	No					
	Dust and water resistant	No					
(System)	Amplifier Channels / Rated Power	Power Output (rated) 10W x 8channels (at 6ohms, 1kHz, 1% THD)					
	Amplifier type	Class-D					
	Protection circuit	Speaker Processing: Clipping limit Amplifier: Terminal shutdown/Overheat protection/Over voltage protection/Under voltage lock out/DC protection Power: Overload protection/Overheat protection					
(Electric performance)	Power (AC) Voltage	Universal AC 100V - 240V, 50Hz/60Hz					
	Power (AC) Connector	IEC60320-C7					
	Power Consumption	87W/Standby 7W (Dante IN or Dante OUT: 1port), 8W (Dante IN and Dante OUT: 2ports)					
(Input/Output)	Analog Audio Input	Euro type terminal block (Pitch 3.81mm, 3-pin, Green)					
	Analog Audio Maximum Input Level (4stages)	Balance connection: +8.2dBu (2Vrms) / +12dBu/+18dBu/+24dBu Unbalance connection:+8.2dBu(2Vrms)/+12dBu/+18dBu					
	Input Sensitivity (4stages)	Balance connection: +8.2dBu (2Vrms) / +12dBu/+18dBu/+24dBu Unbalance connection:+8.2dBu(2Vrms)/+12dBu/+18dBu					
	Input Impedance	Balance connection: 94k Ω / Unbalance connection: 47k Ω					
	Digital Audio Inputs	1-channel of Dante digital audio network (RJ-45) * 8-channel of Dante digital audio network (RJ-45) is possible					
	Digital Audio Outputs	1-channel of Dante digital audio network (RJ-45) * 8-channel of Dante digital audio network (RJ-45) is possible					
	Power (DC) Input/Output	Euro type terminal block (Pitch 5.08mm, 4-pin, Black/Green)					
	DIP Switch	Select preset beam setting and Dante® input channel (1ch/8ch)					
(Integrated DSP)	A/D and D/A Converters	24-bit, 96kHz					
	FIR Filter Support	1024tap @ 96kHz					
	Audio Latency	13mS					
(Physical specification)	Enclosure	Cabinet: Extruded aluminum (powder coated) Side/Back panel: Plastic					
	Grille	Punching metal steel plate (Painted)					
	Indicators	Status, Signal, LAN					
	Operating Temperature Range (Ambient)	0°C -40°C					
	Cooling System	Cooling is passive only					
	Environmental	Indoor only					
	Install	Integrated speaker brackets; allows horizontal yaw to 0-degree or 10-degree direction					
	Dimensions (w x h x d) (approx.)	384mm x 92mm x 100mm (15 1/8in x 3 5/8in x 4in) (without speaker grille) 384mm x 92mm x 110mm (15 1/8in x 3 5/8in x 4 3/8in) (with speaker grille)					
	Mass (approx.)	4kg (8lb 14 oz) (with speaker grille)					
	Power (DC) Input/Output	Euro type terminal block (Pitch 5.08mm, 4-pin, Black/Green)					
	Included Accessories	Speaker grille (attached to the speaker) (1), Power cord (1), Power cascade cable (Euro type terminal block) (1), Ethernet cable for audio signal cascade (RJ-45) (1), 3-pin Euro type terminal block header (1), Speaker bracket(no slant) (2), Speaker bracket (10-degree slant) (2), Speaker joint bracket (no slant) (1), Speaker joint bracket (10-degree slant) (1), Wall mounting bracket (1), Metal joint fitting for wall mounting brackets (1), Detachment stopper (2), Metal joint fitting for attaching a safety wire (2), Cable clamp (2), Spacer pad A (2), Spacer pad B (1), 4 x 10 screw with washer (9), Shoulder screw (2), Operating Instructions (this manual) (1), Reference Guide (1), Warranty card (1)					

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