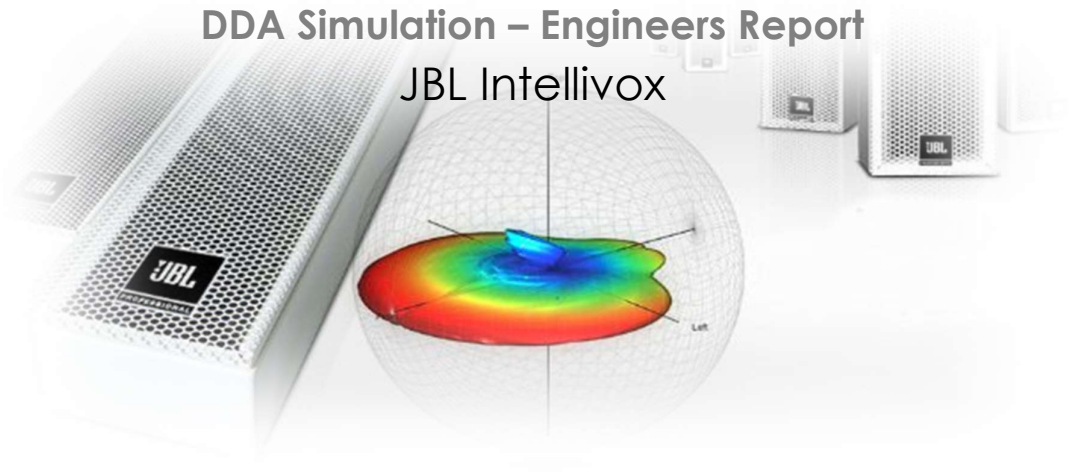
EASE

DDA Simulation – Engineers Report

JBL Intellivox



Prepared for:

Church of Nativity

Location Venue

Prepared by:

LOU GARCIA

Senior Systems Application Engineer

Electronics & Engineering Singapore

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Note:

All simulations are for reference purposes only and are based on the given data information at the time of plotting. AV / Project Engineer shall make all necessary provisions for any changes due to on-site constraints hereafter. All simulations are based on direct sound and total dBSPL and are subjected to change.

EASE SIMULATION and DDA ANALYSIS PLOTS REPORTED BY:

LOU GARCIA | Systems Applications
Electronics & Engineering Pte Ltd

Engineers Report

I. Executive Summary

This is an EASE simulation report with regards to the proposal of a JBL Intellivox System in a church submitted to CCW associates. The system will be of JBL Intellivox system that has a profile of DSX180's and DS115's. The system must have a high direct to reverberant sound ratio, maximizing the sound that arrives directly to the listeners ear, while reducing the sound energy from walls, ceilings and other acoustically reflective surfaces possibly to control the vertical directivity pattern and aim the sound where it is being required.

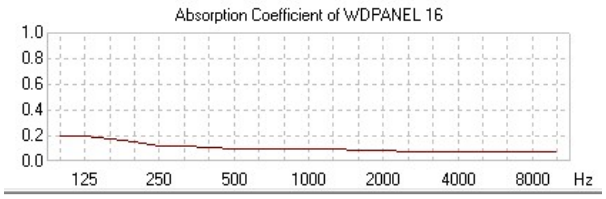
As given on this simulation, there are 2 units of JBL DXS180 as Main Front Left and Right and 2 Units of DS115 as Left-Wing Fill and Right-Wing Fill. Along with it as 1st group pair of delay speakers of 2 units of DS115 and 2nd group pair of delay speakers of 2 units of DS115. As data information and pertinent acoustic wall material made available on this simulation from a church environment are the following:

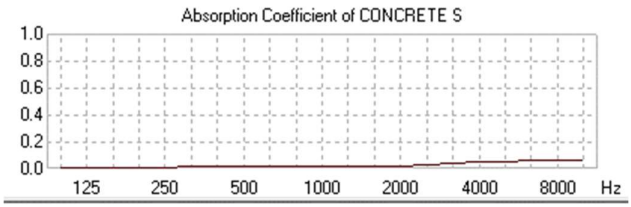
Concrete Smooth (Main Interior Walls)
Wood Panels and Grids (Windows, Ceiling)

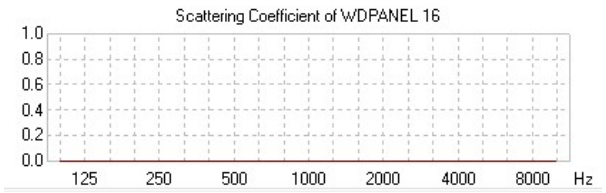
Please take note that there are pillars column available within the venue interior that will contribute or affect to the sound propagation. Hence it is critical for better speaker placement and focused directivity to achieve better STI. Other information given are ambient noise level of 60 dBA from 100Hz to 10000Hz, humid temperature of 27 degrees celsius. Internal reverberation time will be assumed between 2.5s to 3s for full to partial occupancy, transept areas will be up to 3.5s. Non-occupied area of 4.5s as declared to the simulation process.

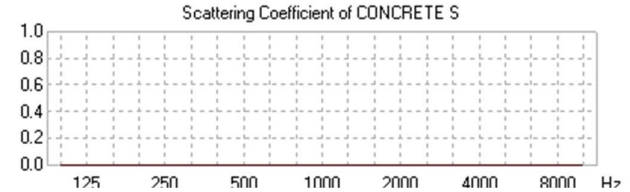
Absorption Coefficients of Wall Materials:

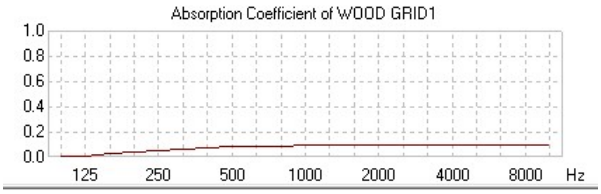
Figure 1

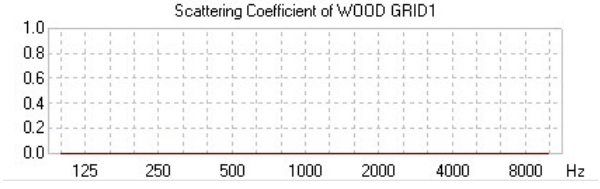












Venue dimension with a throw distance of 53 meters plotted on XY axis with a height of 14 meters. As targeted loudness distribution of 96.3 dBSPL with a +/- 6.8 dBSPL as average for modern catholic churches. As Speech Transmission Index of category F, Nominal Speech Intelligibility Index of 0.54.

Category	Nominal STI value	Type of message information	Examples of typical uses (for natural or reproduced voice)	Comment
A+	>0,76		Recording studios	Excellent intelligibility but rarely achievable in most environments
A	0,74	Complex messages, unfamiliar words	Theatres, speech auditoria, parliaments, courts, Assistive Hearing Systems (AHS)	High speech intelligibility
B	0,7	Complex messages, unfamiliar words		
C	0,66	Complex messages, unfamiliar words	Theatres, speech auditoria, teleconferencing, parliaments, courts	High speech intelligibility
D	0,62	Complex messages, familiar words	Lecture theatres, classrooms, concert halls	Good speech intelligibility
E	0,58	Complex messages, familiar context	Concert halls, modern churches	High quality PA systems
F	0,54	Complex messages, familiar context	PA systems in shopping malls, public buildings offices, VA systems, cathedrals	Good quality PA systems
G	0,5	Complex messages, familiar context	Shopping malls, public buildings offices, VA systems	Target value for VA systems
H	0,46	Simple messages, familiar words	VA and PA systems in difficult acoustic environments	Normal lower limit for VA systems
I	0,42	Simple messages, familiar context	VA and PA systems in very difficult spaces	
J	0,38		Not suitable for PA systems	
U	<0,36		Not suitable for PA systems	

NOTE 1 These values should be regarded as minimum target values.

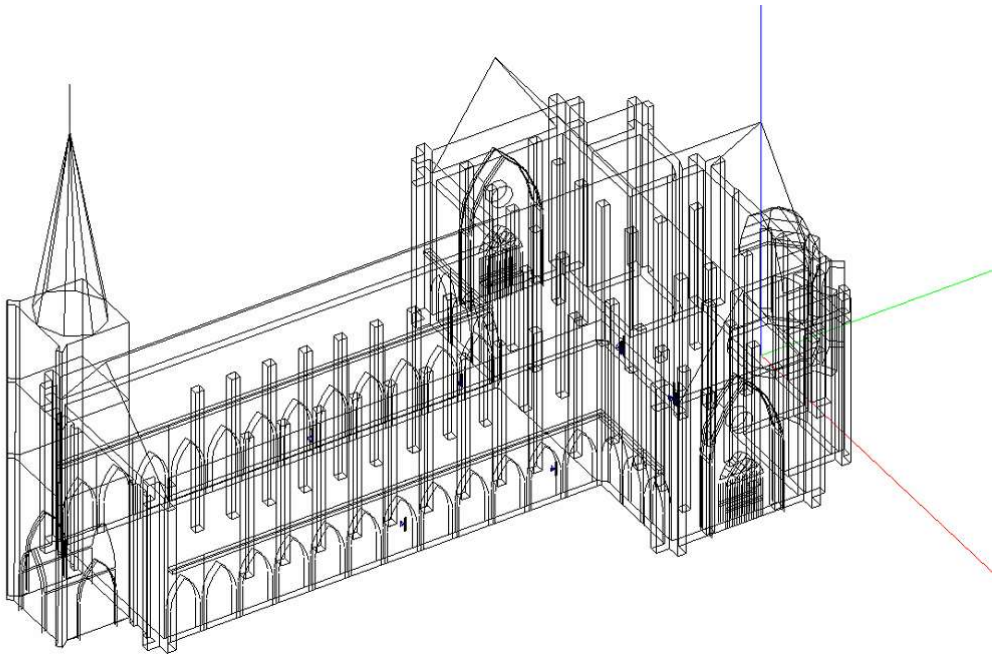
NOTE 2 Perceived intelligibility relating to each category will also depend on the frequency response at each listening position.

NOTE 3 The STI values refer to measured values in sample listening positions or as required by specific application standards.

(Reference: Wikipedia Speech Transmission Index)

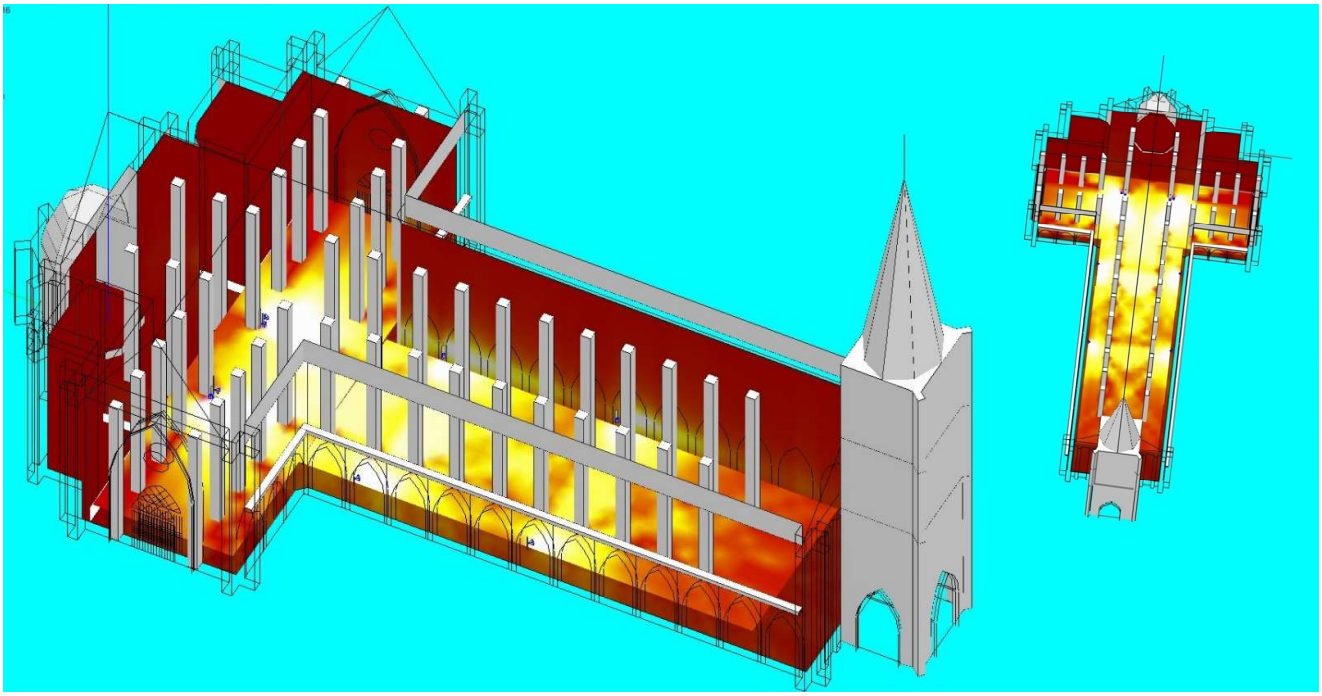
II. a. VENUE VEWS

3D OVERVIEW – FRAME



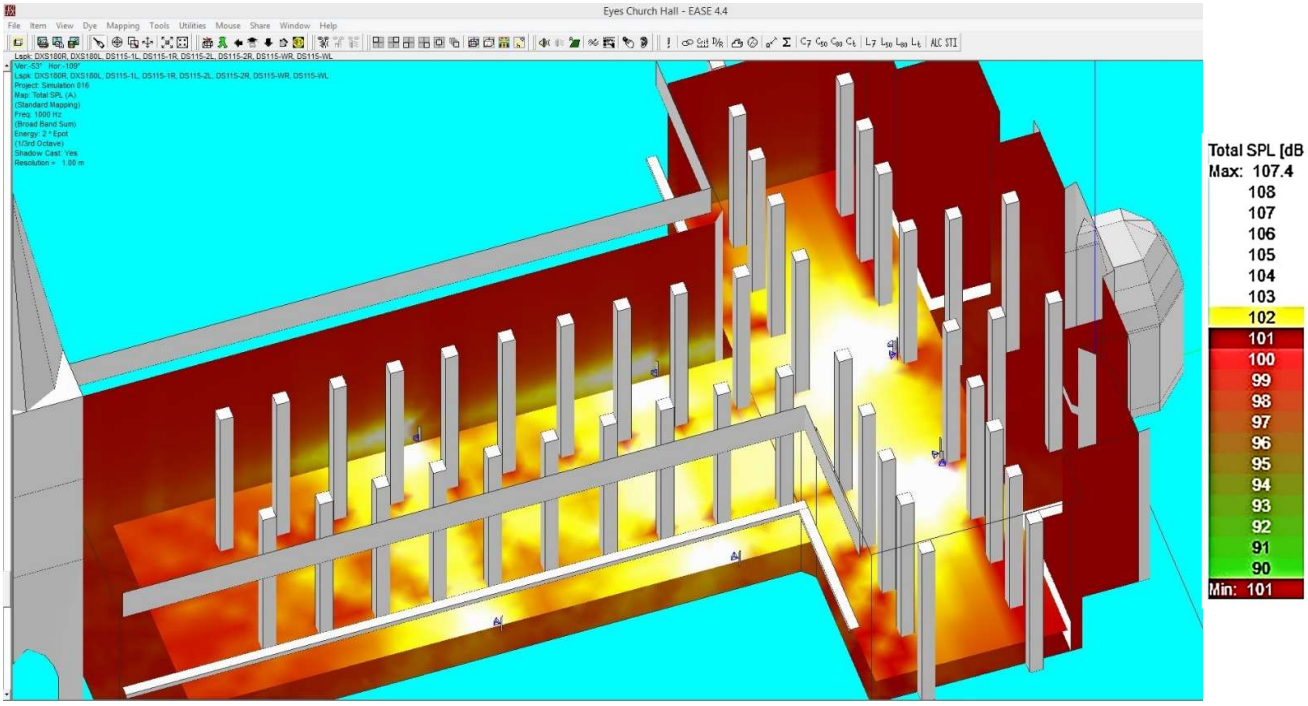
b. VENUE VEWS

3D OVERVIEW – SIMULATION



III. a.LOUDNESS DISTRIBUTION

3D TOTAL SPL – Simulation (Highlighted region is the Audience Area)
This simulation indicates that 101 dBSPL with +/- 3 dBSPL is all throughout the face.



IV. b. LOUDNESS DISTRIBUTION

Table Calculation: Total SPL
(Frequency 100Hz to 10kHz combined @ A-Weighted Broadband).

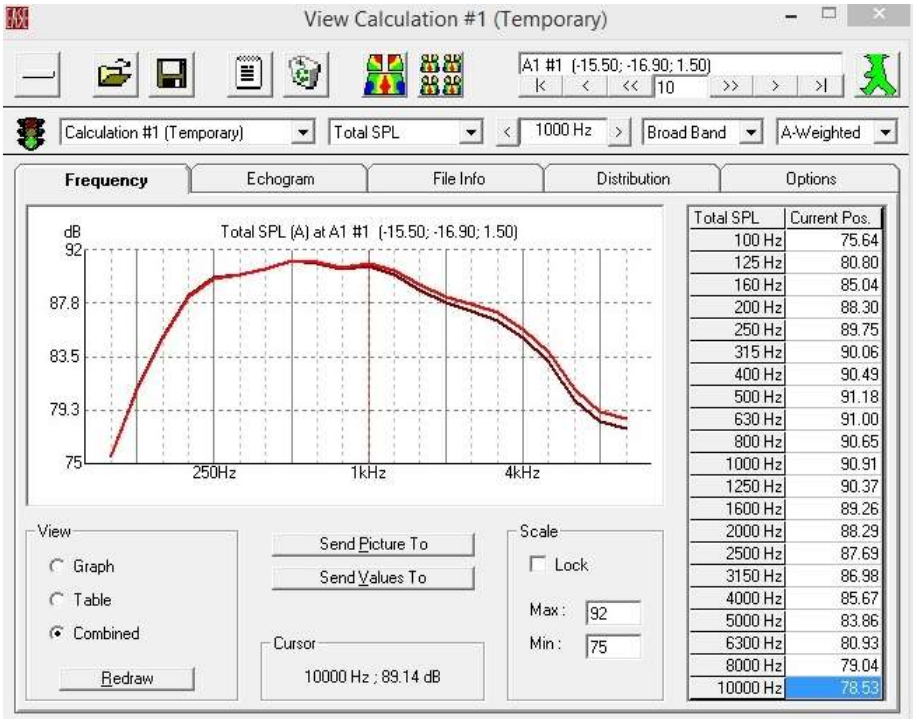
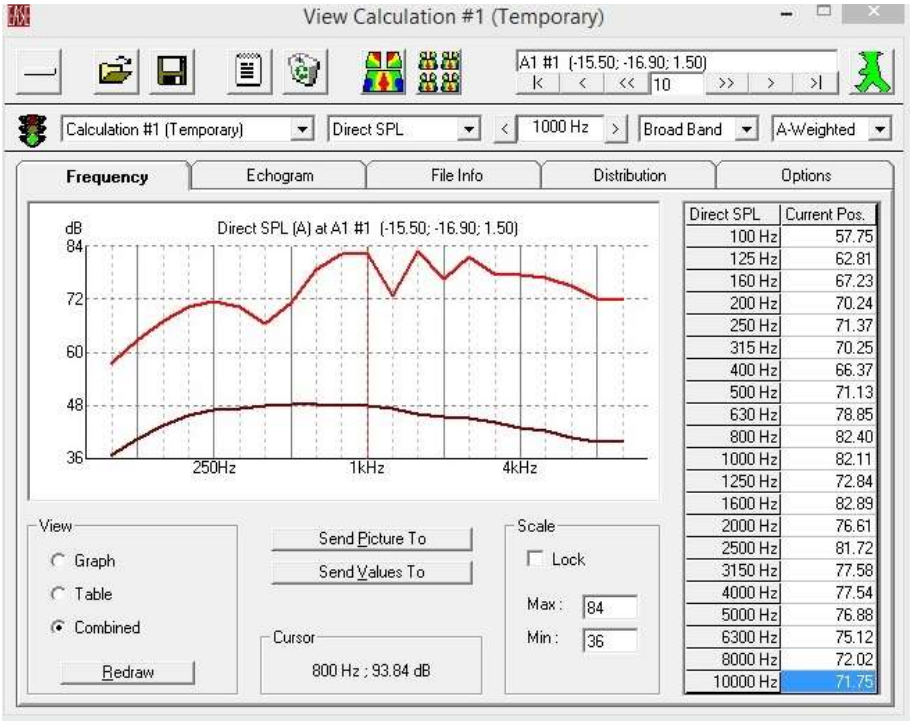


Table Calculation: Direct SPL
(Frequency 100Hz to 10kHz combined @ A-Weighted Broadband).

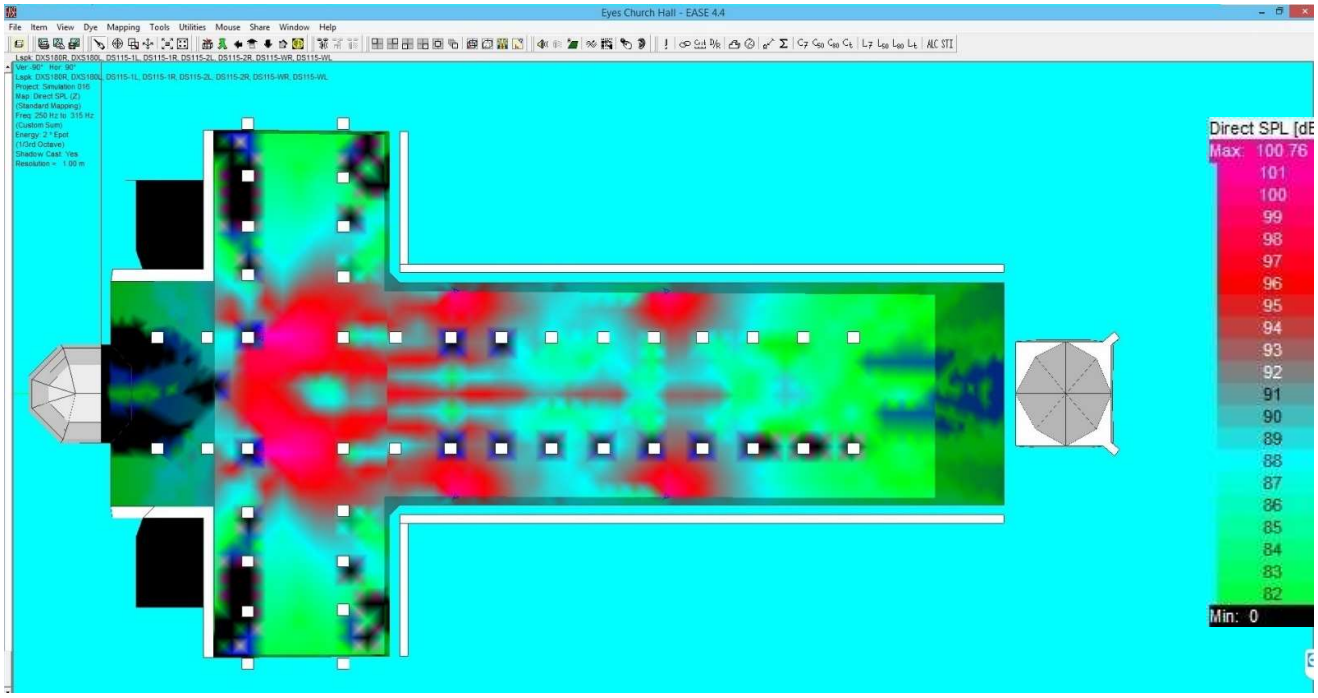


V. b. FREQUENCY (Standard Mapping)

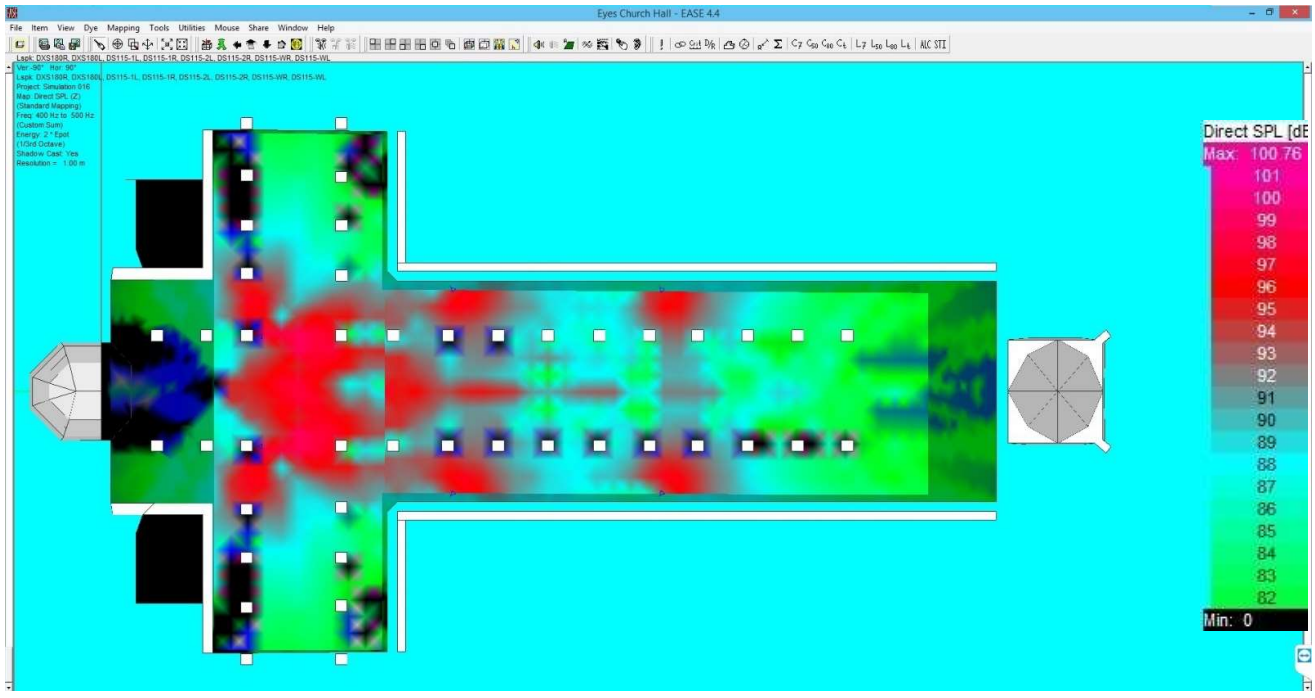
400 Hz to 10kHz

(Frequency @ Unweighted Broadband)

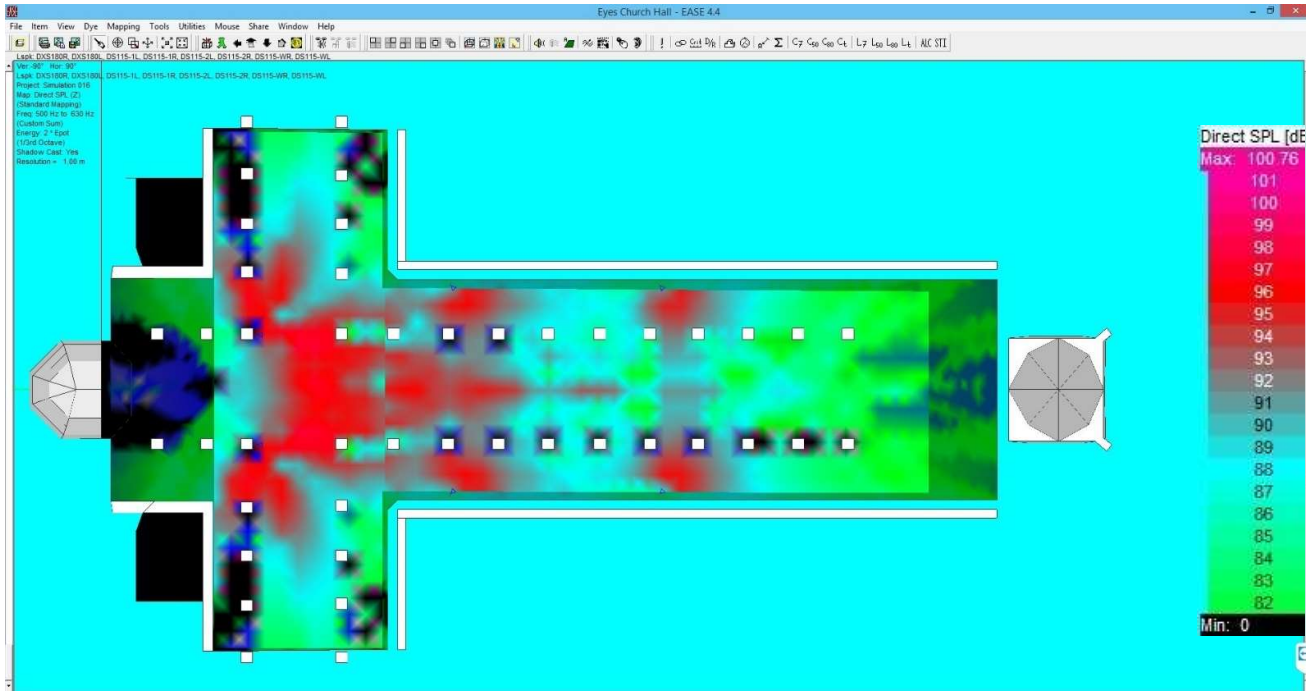
250 Hz to 315 Hz



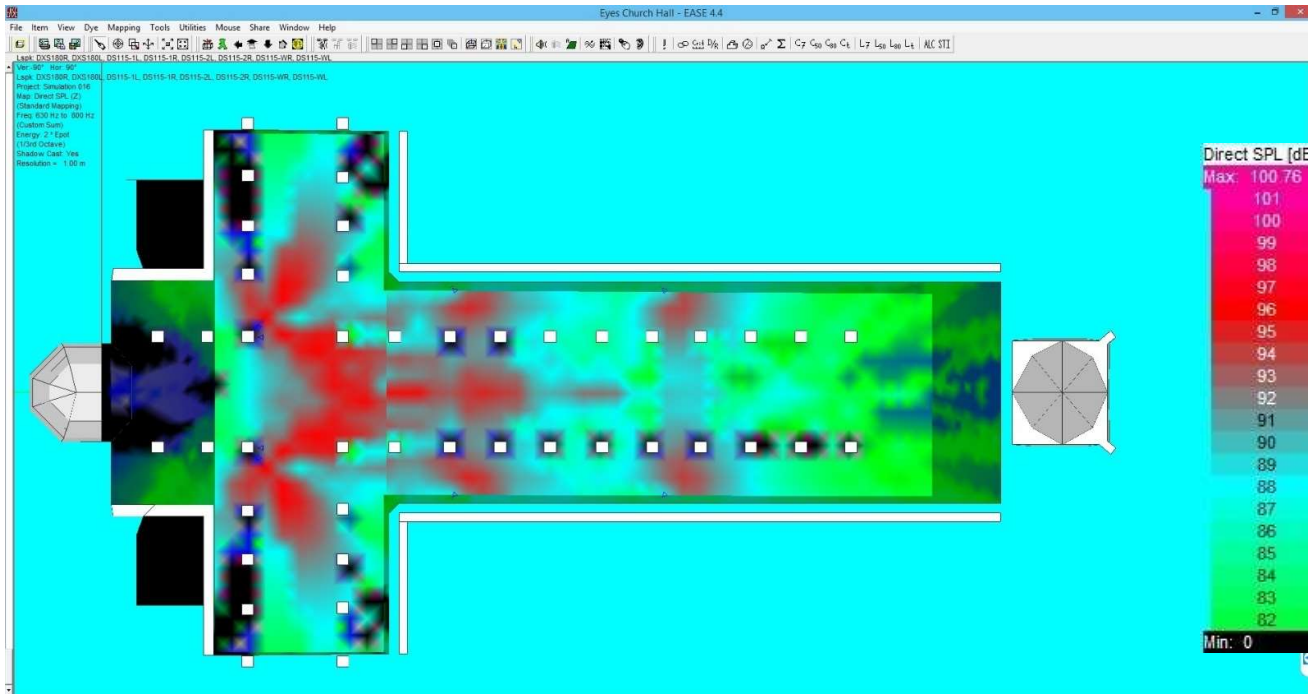
400 Hz to 500 Hz



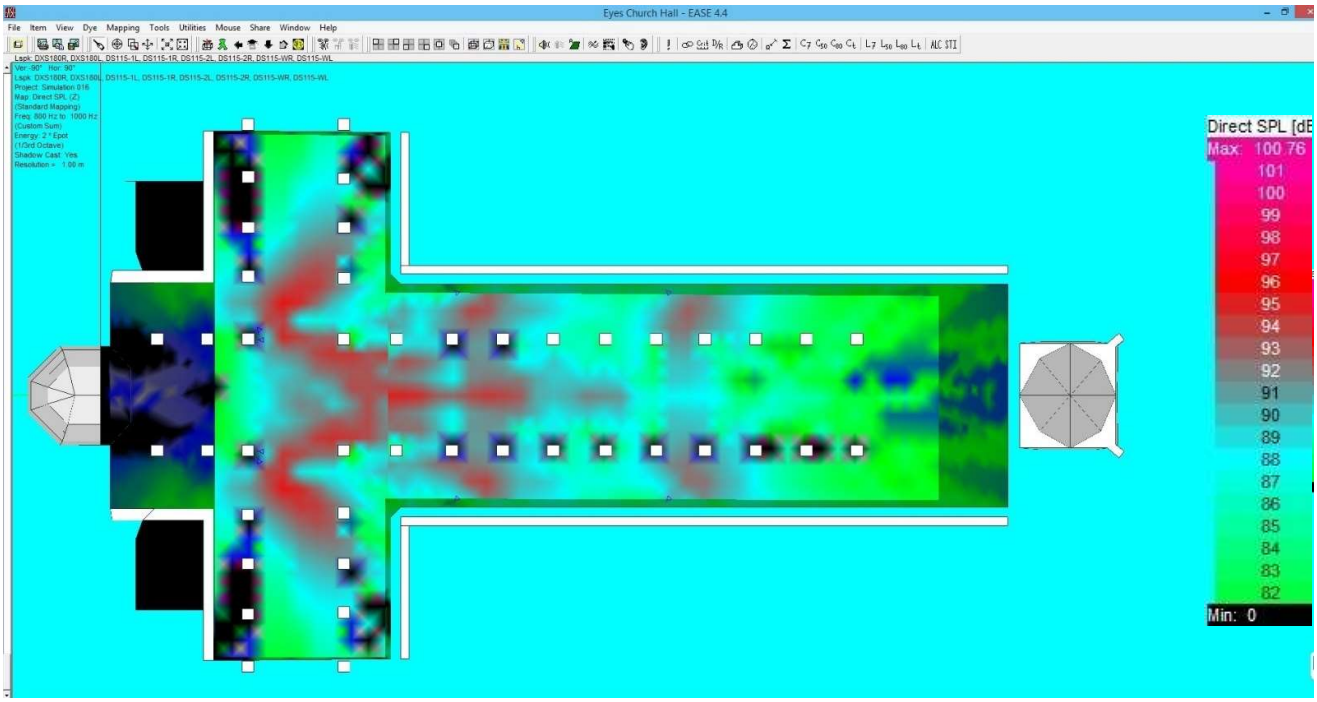
500 Hz to 630 Hz



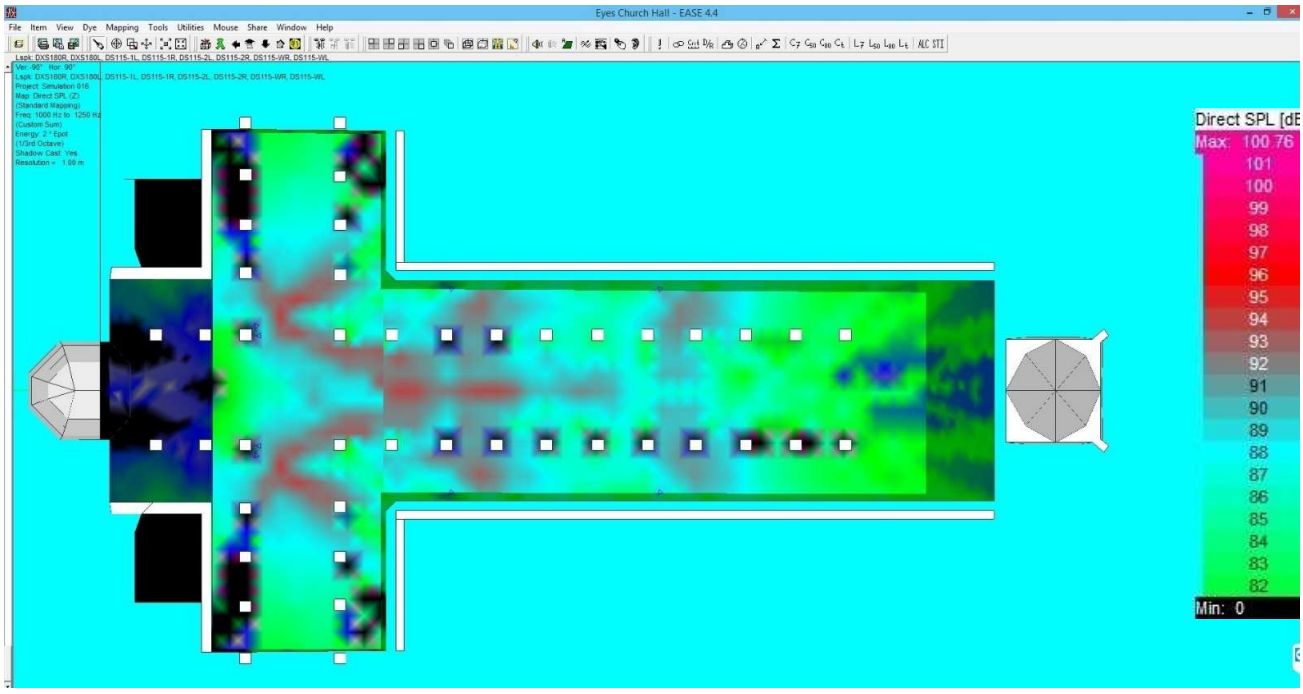
630 Hz to 800 Hz



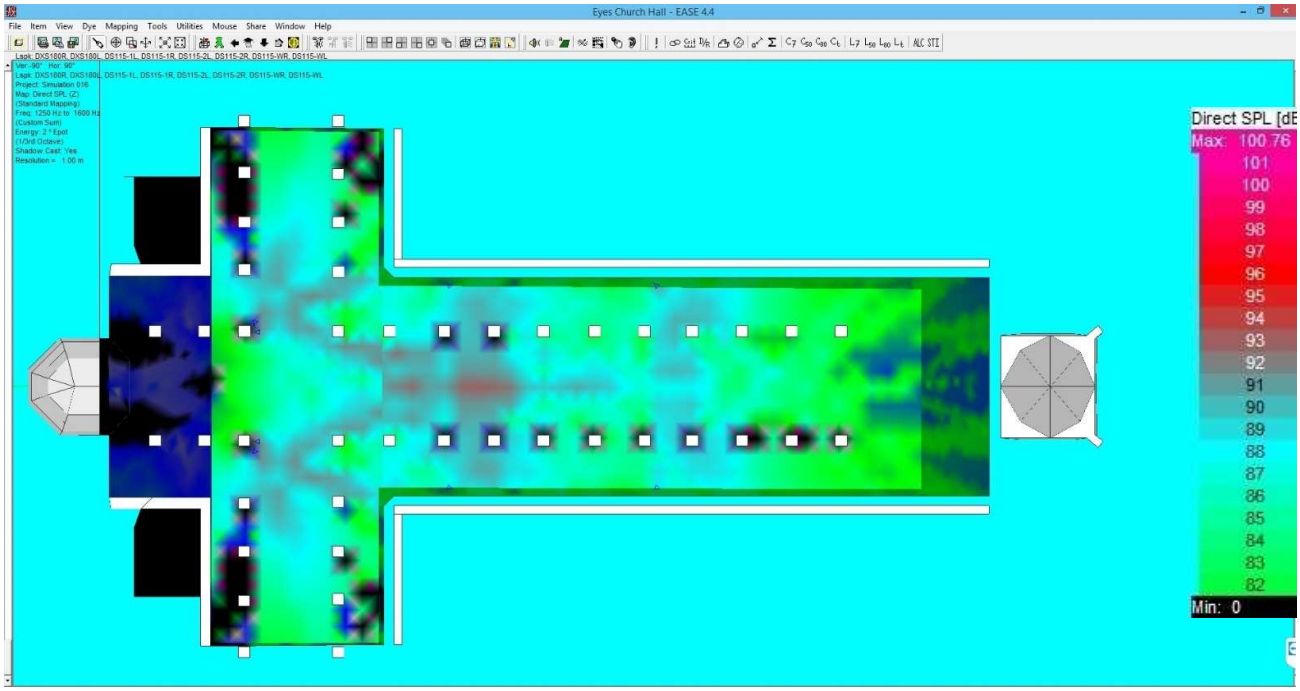
800 Hz to 1000 Hz



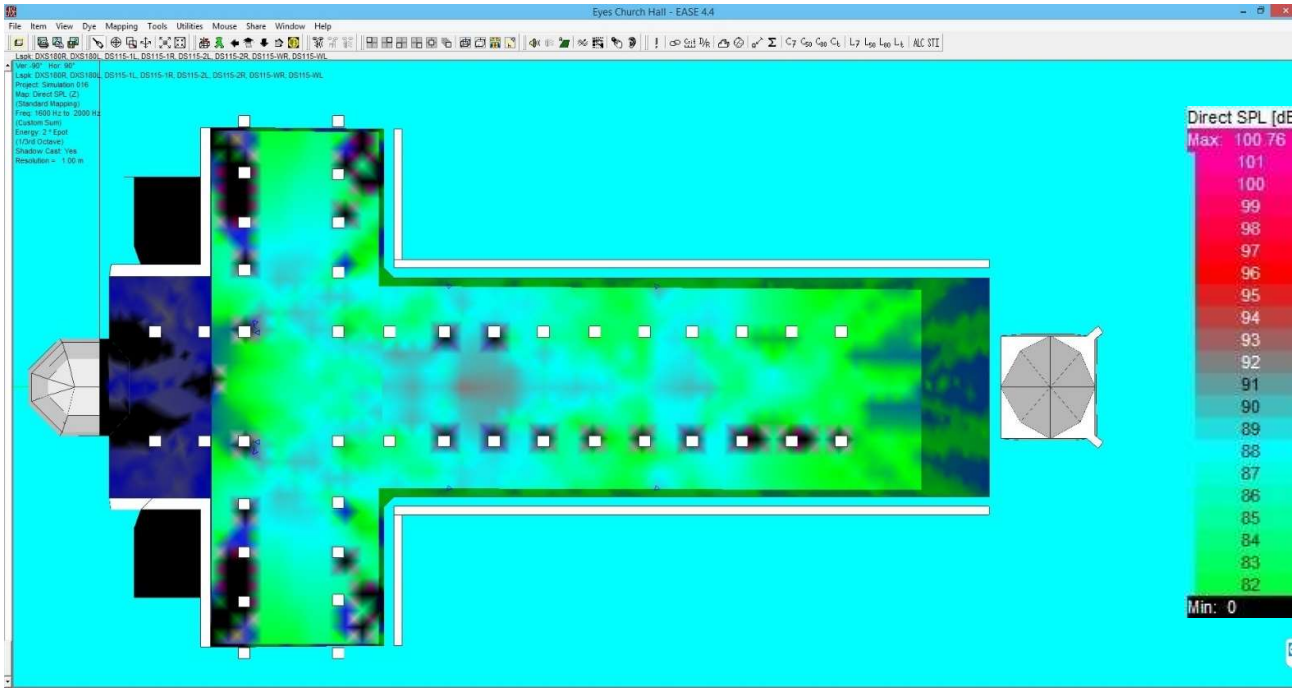
1000 Hz to 1250 Hz



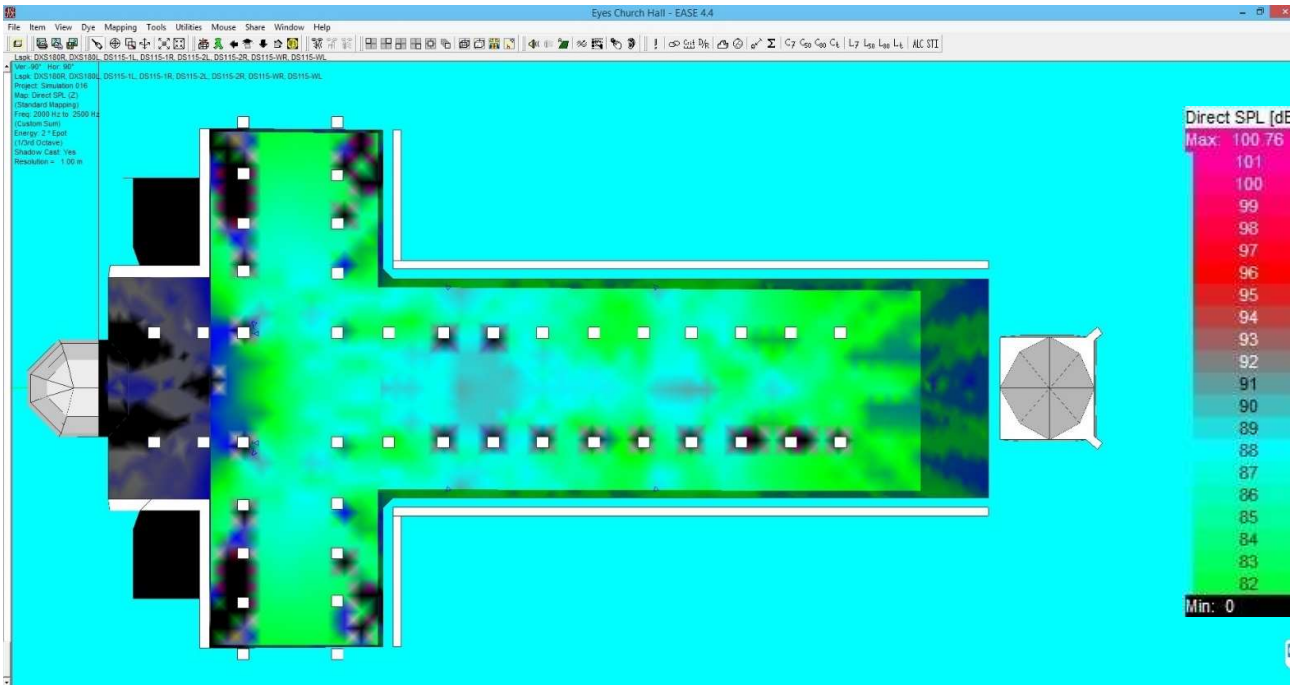
1250 Hz to 1600 Hz



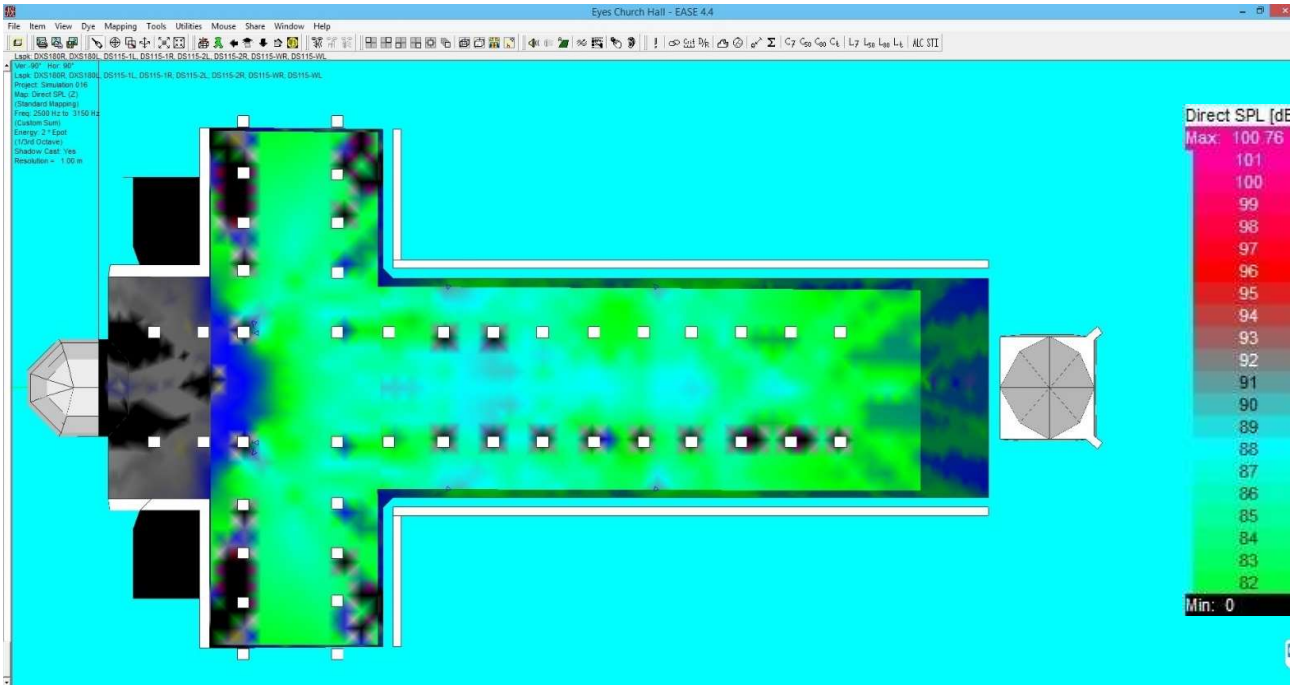
1600 Hz to 2000 Hz



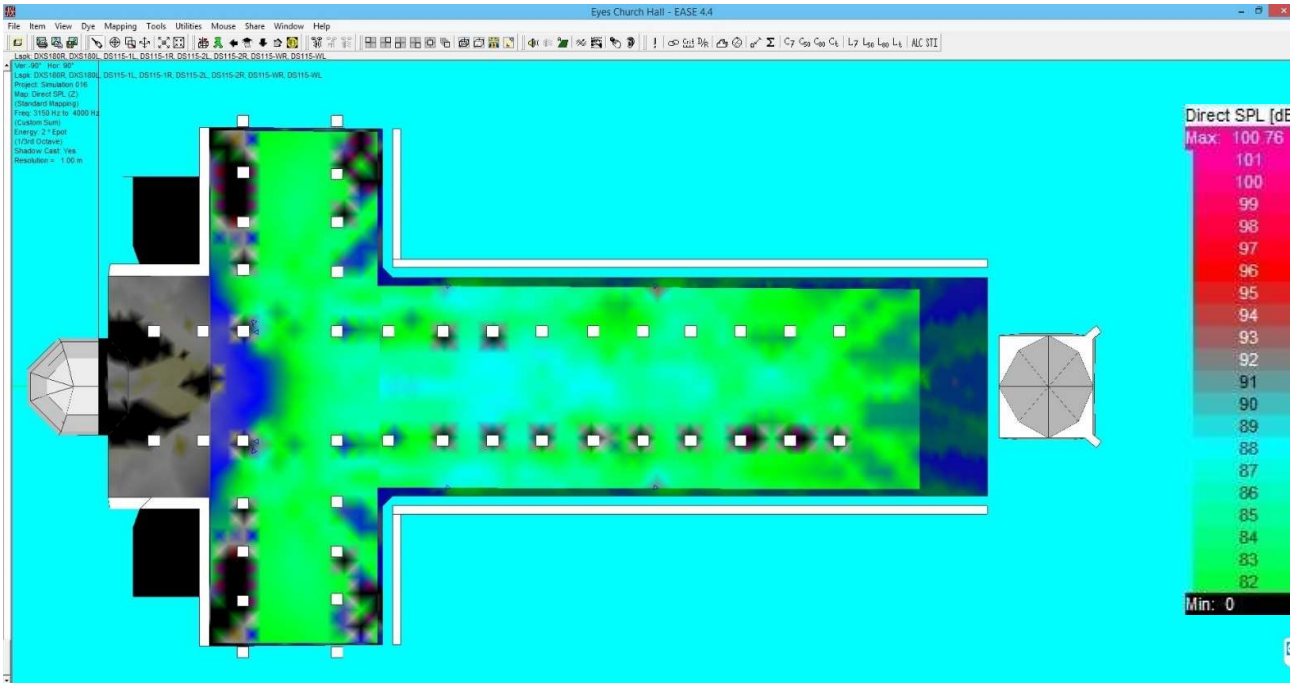
2000 Hz to 2500 Hz



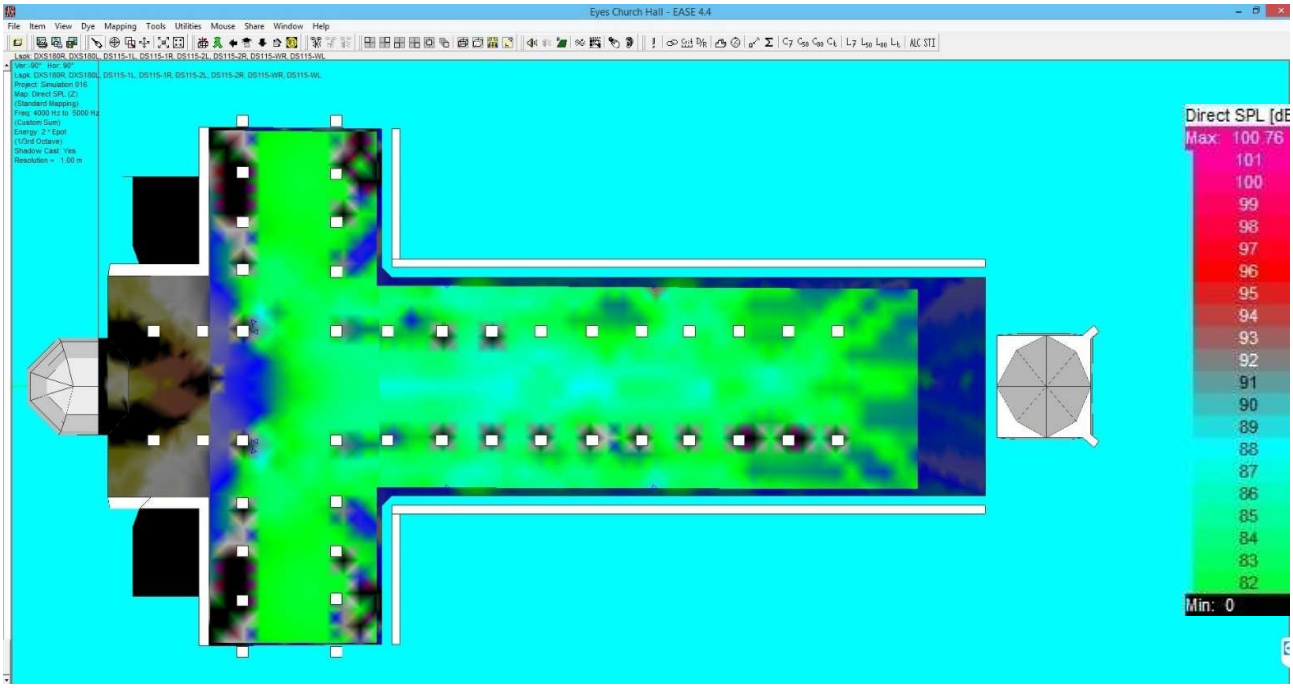
2500 Hz to 3150 Hz



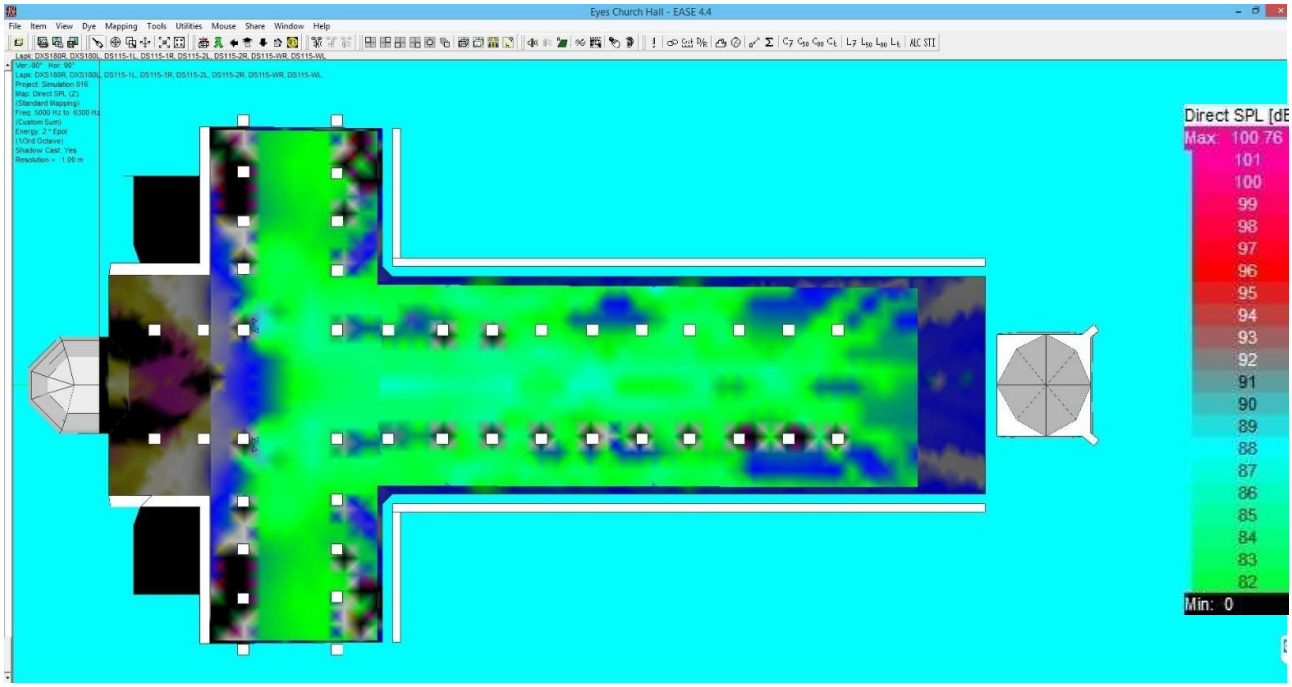
3150 Hz to 4000 Hz



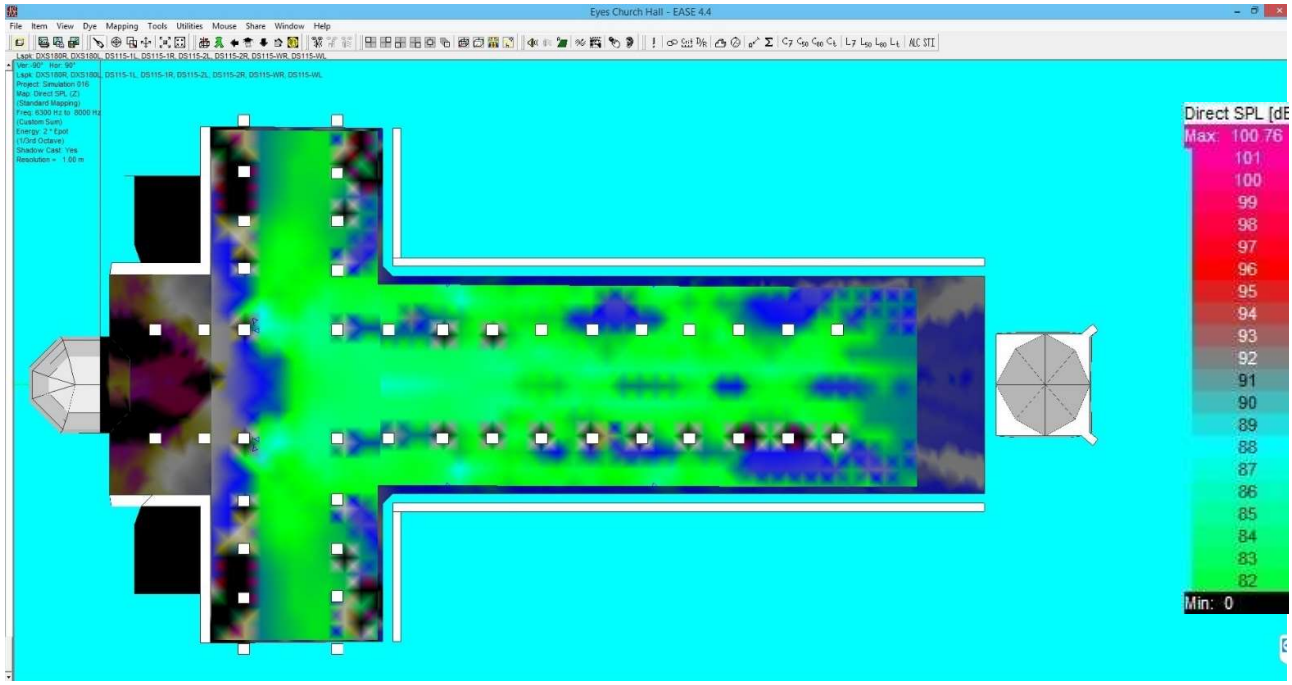
4000 Hz to 5000 Hz



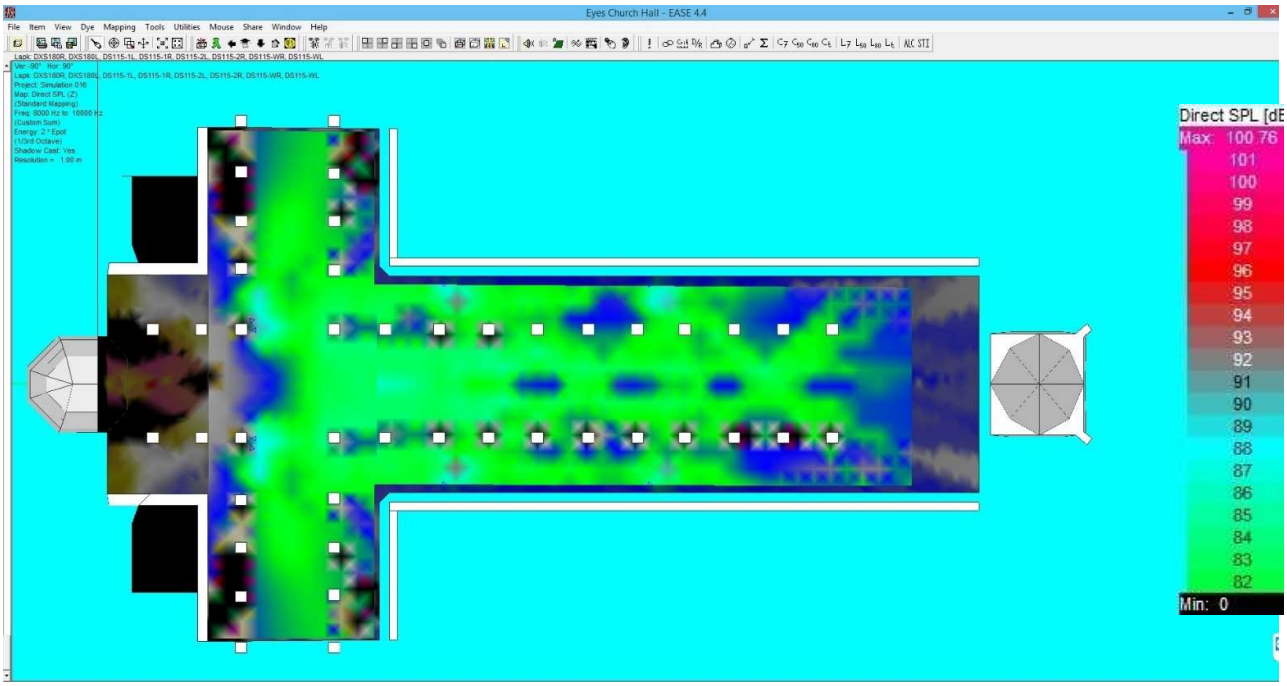
5000 Hz to 6300 Hz



6300 Hz to 8000 Hz



8000 Hz to 10000 Hz

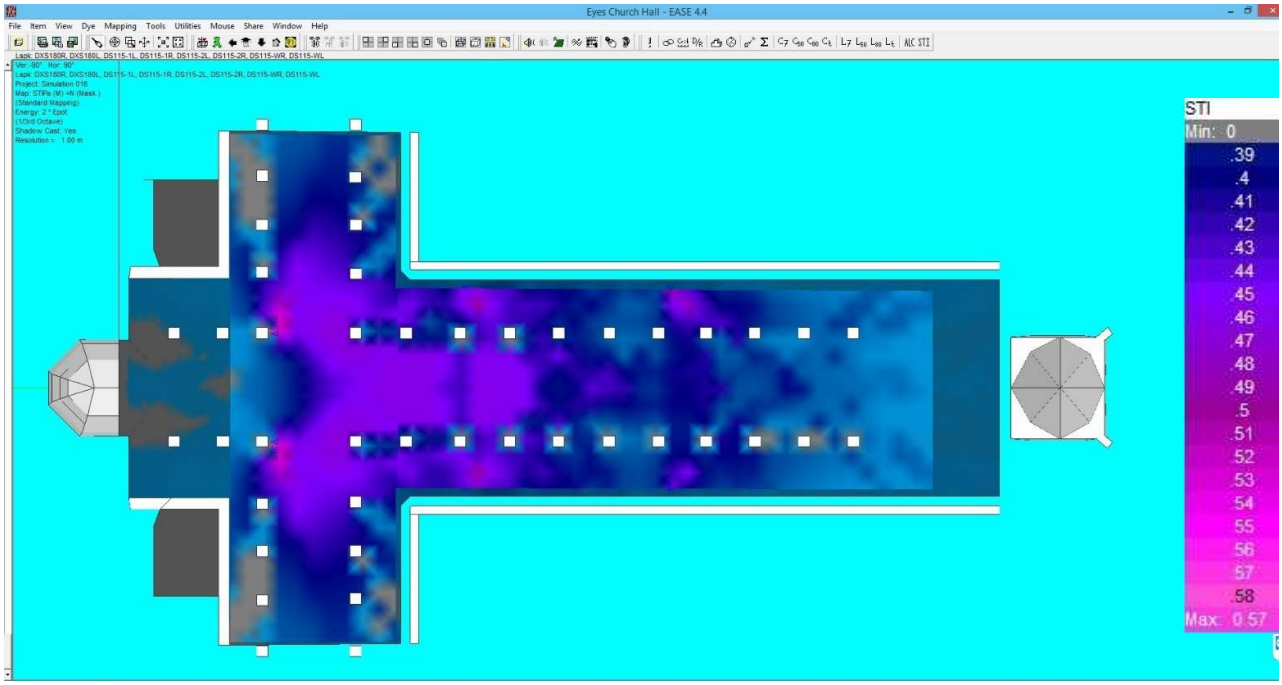


VI. SPEECH TRANSMISSION INDEX (Standard Mapping) (0.58 STI max)

400 Hz to 10kHz

(Frequency @ Unweighted Broadband)

STIPa (M)+n (Mask)Broadband Shadow Cast, Resolution 1.00 m



STIPa (M)+n (Mask)Broadband Shadow Cast, Resolution 1.00 m

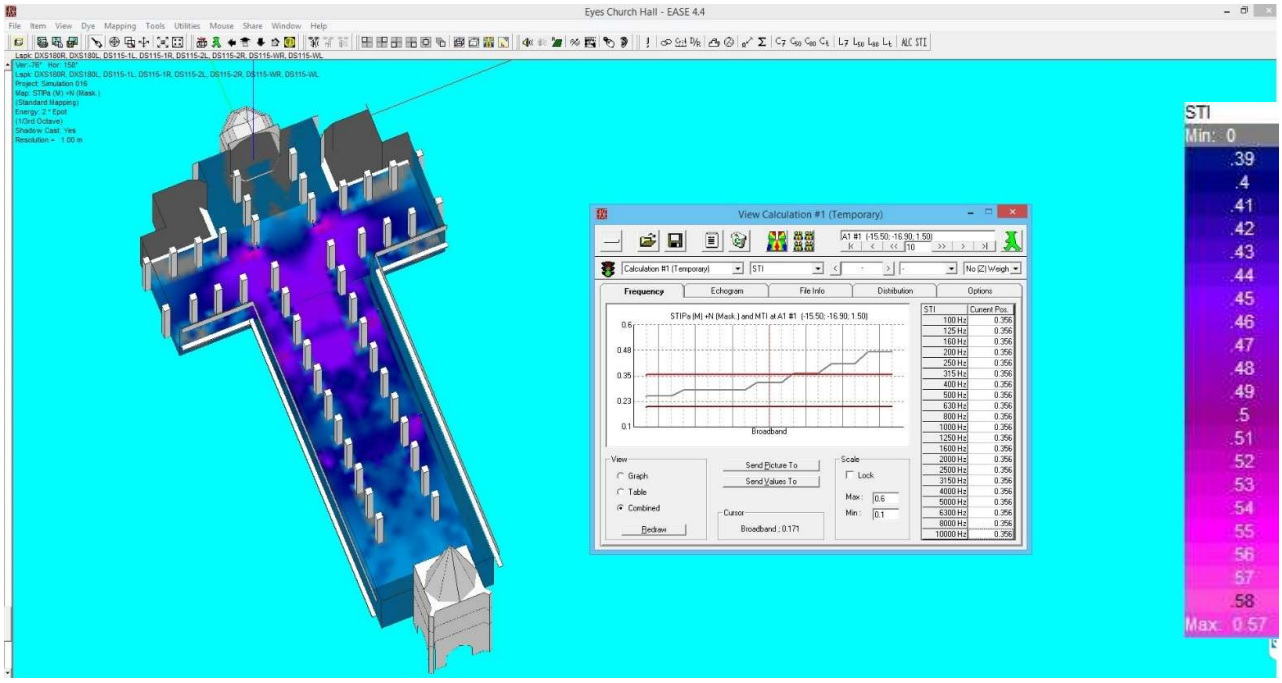
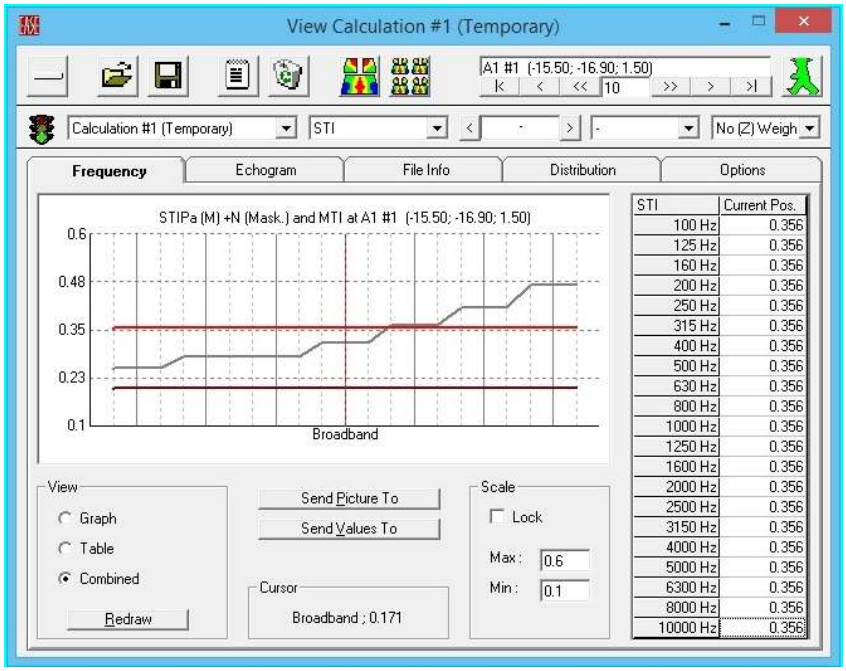


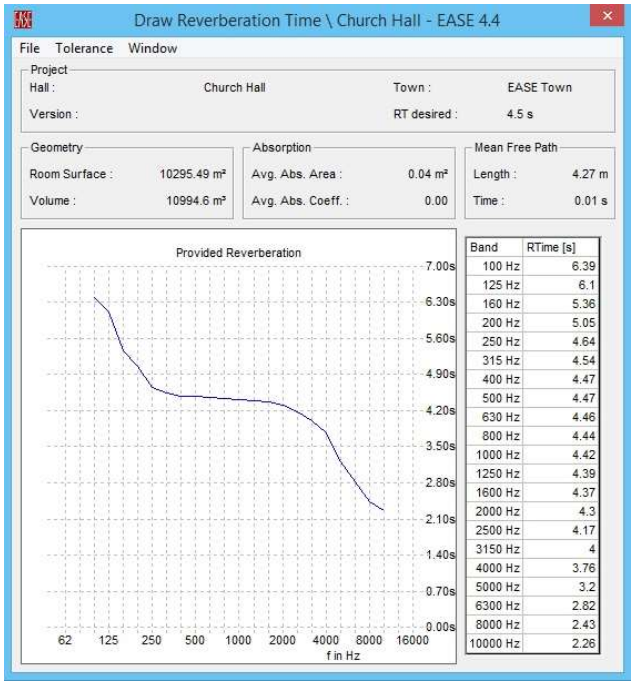
Table Calculation of Frequency (0.40 STI Average)

Simulation based on IEC 60268-16 STI Edition 4.0 (2011)

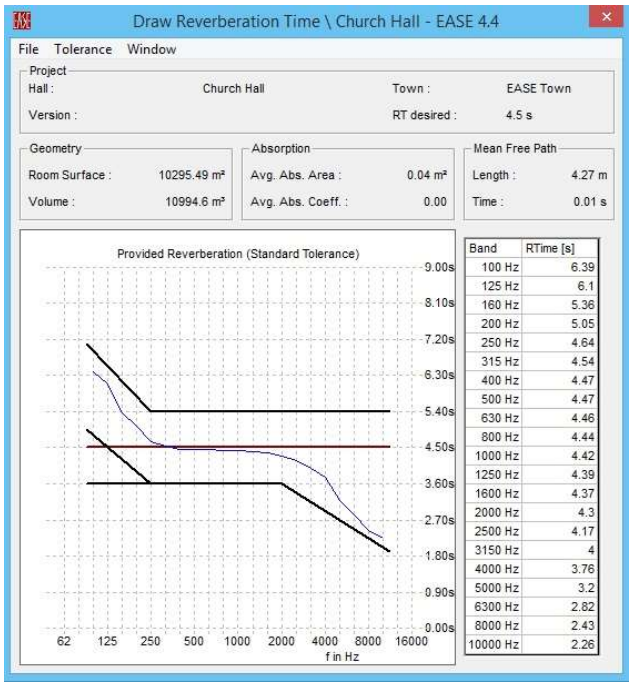


VIII. REVERBERATION TIME (Standard Mapping)

RT Optimization @ 4.5s with Standard Tolerance



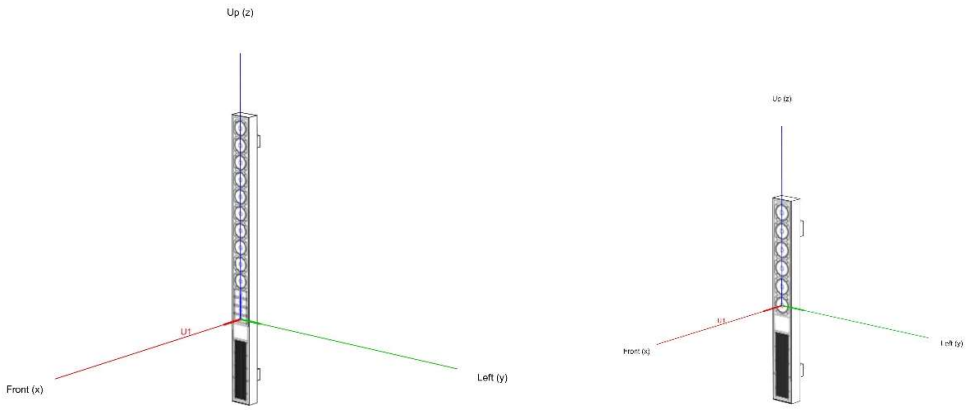
Standard Tolerance



IX. Loudspeaker Positions and DDA Analysis

Table of XYZ Plot from X (Left to Right Position as negative towards the left, while Y as the distance from front to rear and Z for the height)

Item	x [m]	y [m]	z [m]	Hor [°]	Ver [°]	Rot [°]
DXS180R	-9.38	2.00	0.0	0.0	0.0	0.00
DXS180L	-9.38	2.00	0.0	0.0	0.0	0.00
DS115-1L	-6.25	-21.00	2.00	45.0	0.0	0.0
DS115-1R	6.25	-21.00	2.00	-45.0	0.0	0.0
DS115-2L	-6.25	-33.55	2.00	45.0	0.0	0.0
DS115-2R	6.25	-33.55	2.00	-45.0	0.0	0.0
DS115-WR	-3.70	-9.34	2.00	-70.0	0.0	0.0
DS115-WL	3.70	-9.34	2.00	70.0	0.0	0.0

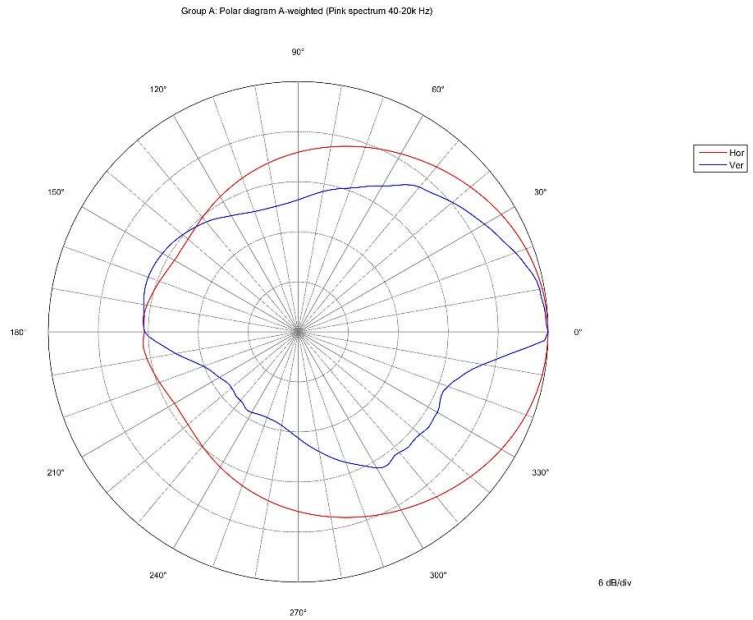


JBL Intellivox DXS180 and DS115

X. DDA ANALYSIS

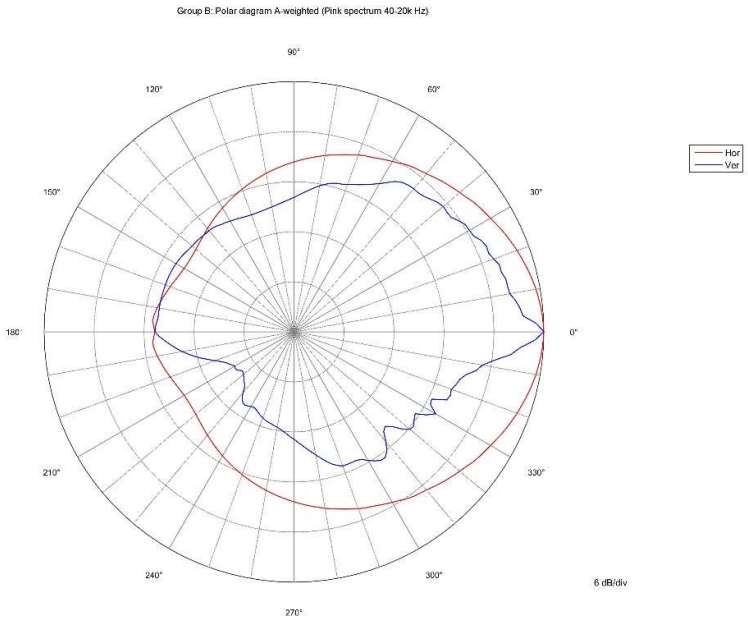
The following are data information obtained from the DDA analysis simulation where EASE for Intellivox also utilizes its information.

DXS180 as Group A (Polar diagram A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



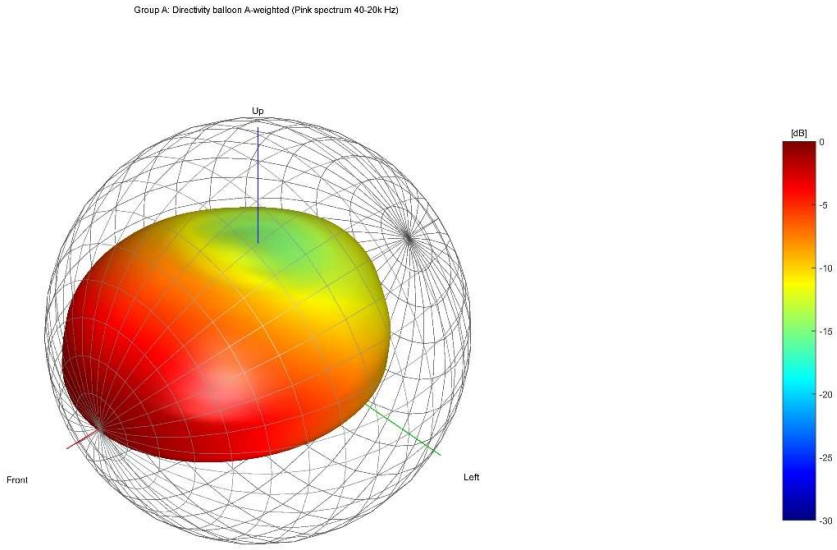
DDA ANALYSIS

DS115 as Group B (Polar diagram A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



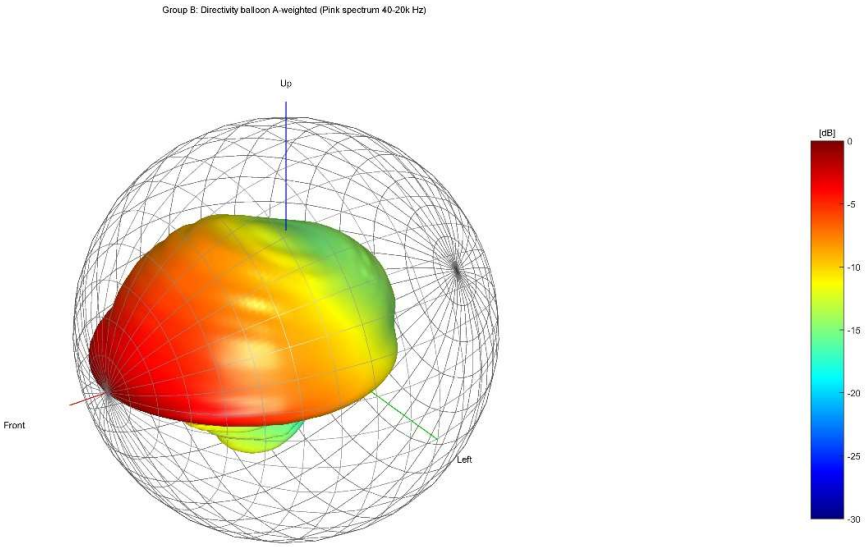
DDA ANALYSIS

DXS180 as Group A (Directivity Balloon A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



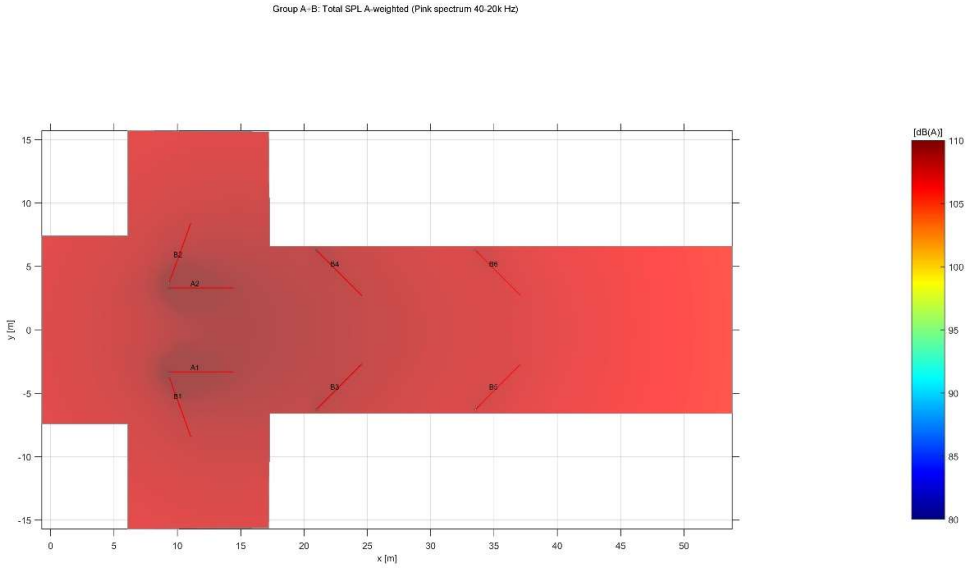
DDA ANALYSIS

DS115 as Group A (Directivity Balloon A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



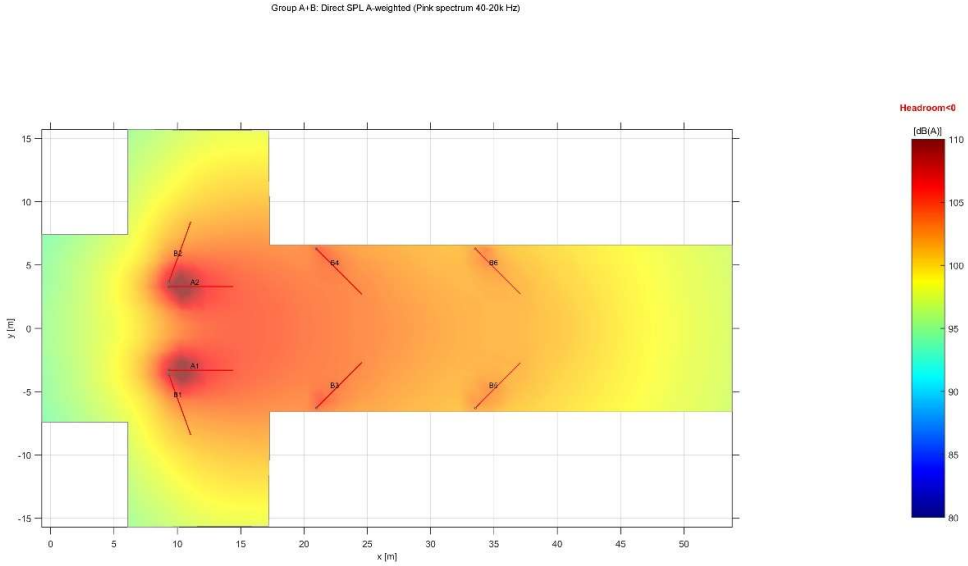
DDA ANALYSIS

DXS180 and DS115 Total SPL (A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



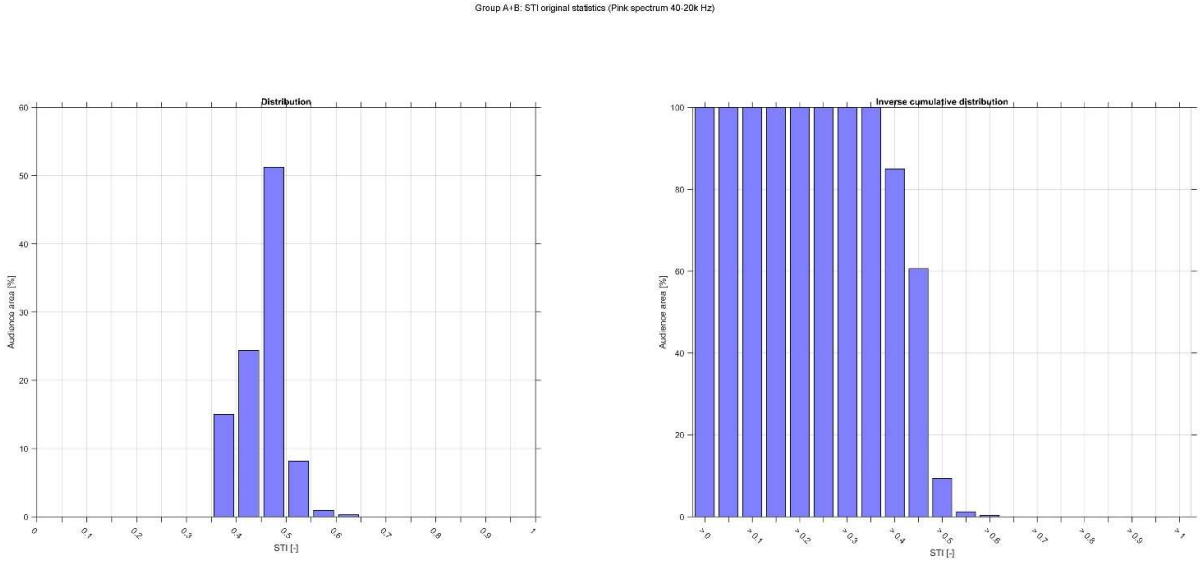
DDA ANALYSIS

DXS180 and DS115 Direct SPL (A-Weighted (Pink Spectrum 40 Hz to 20000 Hz)



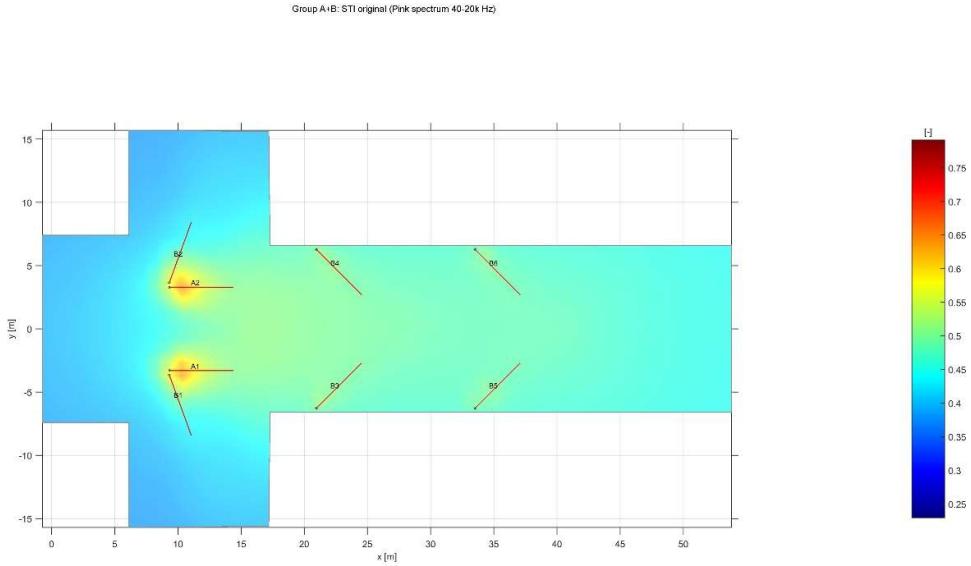
DDA ANALYSIS

STI Statistics (Pink Spectrum 40 Hz to 20000 Hz)



DDA ANALYSIS

STI Statistics (Pink Spectrum 40 Hz to 20000 Hz)



XI. Loudspeaker profile

The Intellivox is a digitally controlled loudspeaker which focuses the sound where you want it, at the listener. In visual terms it can be thought as a spotlight as opposed to a flood light. Intellivox loudspeakers have a very narrow vertical coverage angle and a very wide horizontal coverage angle. In large reverberant spaces this type of loudspeaker has many benefits:

- The sound is digitally aimed at the listener.
- There is less sound reflected from walls and ceilings therefore you hear less reflections
- It is highly efficient at distributing the available power from the loudspeaker
- The SPL of the loudspeaker is approximately the same if you are close or if you are 60 m away

Result is a very natural, clear and direct sound, which is essential for achieving the required levels of speech intelligibility and getting your announcement understood.

JBL Intellivox are beam forming self-powered loudspeaker arrays.

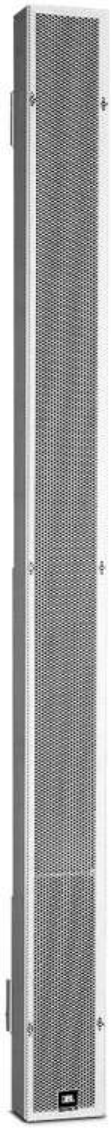
Model:

JBL Intellivox DXS180

Ideally suited for smaller less reverberant environments where improved speech intelligibility is required. It also can be used as a 'fill system' in larger Intellivox installations, providing coverage in shadow zones. A single Intellivox-DSX180 can cover an area of up to 25 meters while maintaining an even sound pressure over the audience area. The ten, custom designed, 4" loudspeakers and the four 1" dome tweeters are driven by an eight-channel class-D amplifier, powered by a sophisticated switched mode power supply, all of which combine to ensure years of reliable operation.

The dome tweeters in the DSX units not only improve the horizontal coverage at high frequencies but also enhance the subjective sound quality of the system for both speech and music.

An extensive set of surveillance functions have also been implemented to meet the stringent demands of typical Voice Alarm (life safety) applications. The unit can be controlled using our proprietary WinControl software which offers user friendly control of the beam steering parameters, audio processing and surveillance features. Its modest array length makes the Intellivox-DSX180 suitable for easy and unobtrusive implementation in even the most architecturally sensitive environment.



Features
Superb Speech Intelligibility
Slim Unobtrusive Design
Extended Frequency Response - up to 18kHz
Higher Fidelity
Wide Horizontal Dispersion
Vertical Beam Shaping (DDS Technology)
32-bit floating point DSP
Control of Vertical Beam Shaping
Dual Line Inputs
Volume Control
Delay (up to 20 seconds)
8 band parametric EQ
8 user definable, password protected presets on board (recallable through third party control devices)
AVC (Automatic Volume Control) via build-in ambient mic.
Upgradeable firmware
Network Ready
Integral Surveillance
Simulation via DDA, Catt-Acoustic, Odeon and EASE4.3

Applications

Fill or Delay System in larger Intellivox installations
Places of Worship
Conference Facilities
Lecture Halls
A/V Presentation Rooms

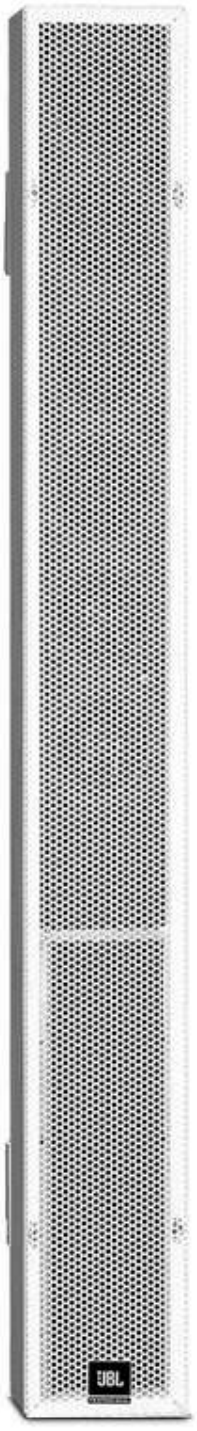
Options

External Ambient Noise and Temperature Sensor
Input section with 1 x 0dBV and 1 x 100V
Input section with 2 x 100V
Full range of mounting accessories
Color matching service

JBL Intellivox DS115

The Intellivox-DS115, the smallest member of the Intellivox DDS range, is primarily designed to be used as a 'fill system' in larger Intellivox installations, providing high frequency coverage in off axis or shadowed areas. The Intellivox-DS115 offers remarkable directivity and can cover an area up to 15 m while maintaining an even sound pressure over the audience area. The six, custom designed, 4" loudspeakers and two dome tweeters are driven by an eight-channel class-D amplifier, powered by a sophisticated switched mode power supply, all of which combine to ensure years of reliable operation.

An extensive set of surveillance functions have been implemented to meet the stringent demands of typical Voice Alarm (life safety) applications. The unit can be controlled using our proprietary WinControl software which offers user friendly control of the DDS Beam files, audio processing and surveillance features. Its compact array length makes the Intellivox-DS115 suitable for easy and unobtrusive implementation in even the most architecturally sensitive environment.



Features

Superb Speech Intelligibility
Slim Unobtrusive Design
Extended Frequency Response, up to 20kHz
Wide Horizontal Dispersion
Vertical Beam Shaping (DDS Technology)
32-bit floating point DSP
Control of Vertical Beam Shaping
Dual Line Inputs
Volume Control
Delay (up to 20 seconds)
8 band parametric EQ
8 user definable, password protected presets on board (recallable through third party control devices)
AVC (Automatic Volume Control) via build-in ambient mic.
Upgradeable firmware
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Applications

Boardrooms
Fill System in larger Intellivox installations
Hotel Style Conferencing
Mobile Applications
Press Rooms
A/V Presentation Rooms

Options

External Ambient Noise and Temperature Sensor
Input section with 1 x 0dBV and 1 x 100V
Input section with 2 x 100V
Full range of mounting accessories
Color matching service