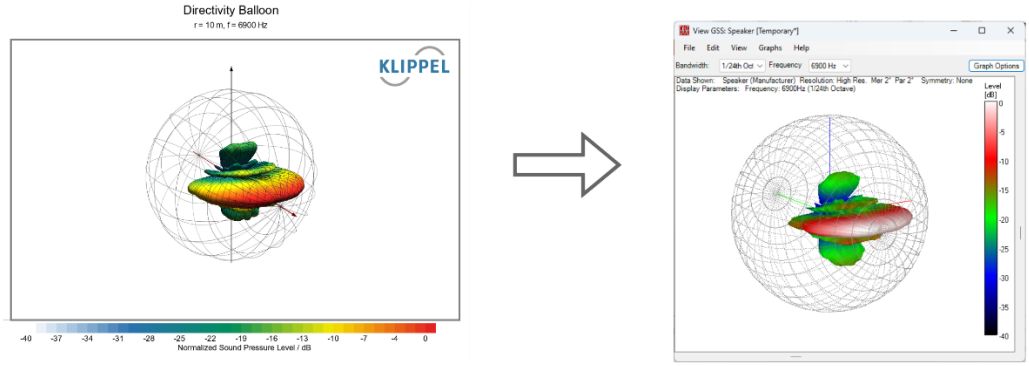
Export NFS data to EASE AN85

Application note for the KLIPPEL ANALYZER SYSTEM (Document Revision 1.0)

DESCRIPTION

Accurate loudspeaker modeling in EASE requires precise measurement data. The KLIPPEL NFS Visualization operation seamlessly exports far-field balloon data, either as frequency responses (magnitude and phase) or as impulse responses, into external software such as EASE. Users can import high-resolution 3D directivity data measured with the Klippel Near Field Scanner System into EASE-SpeakerLab, where it is processed to generate an EASE GSS file, an essential step in creating an EASE GLL loudspeaker model.

This guide outlines the step-by-step process of exporting balloon data from the NFS Visualization, including sensitivity and impedance, into EASE SpeakerLab for loudspeaker modeling and simulation.



CONTENT

1 Requirements

1.1 Software

dB-Lab 212.805 or higher	The frame software of the complete Klippel product line where you can configure and run measurements, analyze results, and organize your data.
NFS Visualization	The NFS Visualization calculates the far field characteristics, near field visualization as well as data for further analysis with external software like MATLAB, EASE, etc. It is included in the NFS Basic Software Set.
EASE SpeakerLab	Software for loudspeaker data analysis and GLL creation. Further information please refer to https://www.afmg.eu/en/ease-speakerlab.
License	• NFS Visualization (included in NFS Basic Software Set) • NFS Complex Data Export module • Software license for EASE SpeakerLab

2 Step by Step Guide

The export interface in NFS Visualization extracts balloon data in standard data formats that are compatible with EASE-SpeakerLab. The user can define parameters like radius, angular range as well as angular resolution. The following ASCII formats are supported:

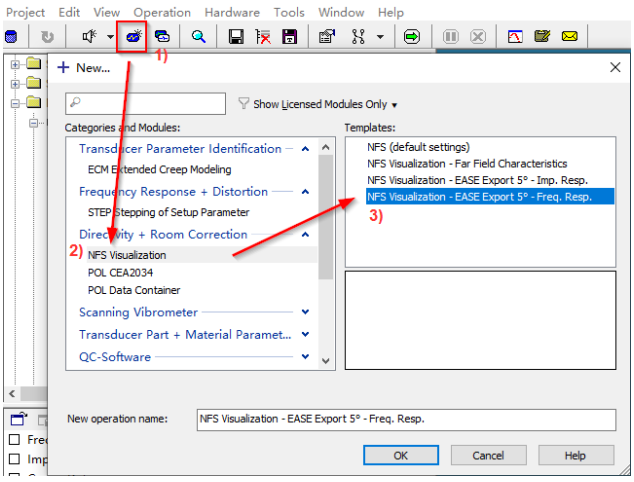
- Frequency Response – LMS Frequency Data Format
- Impulse Response – Clio Time Data Format

In the following guide, the frequency response export is illustrated as an example.

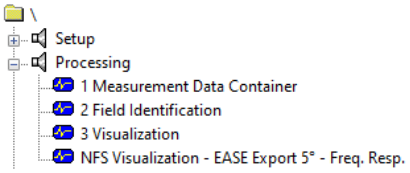
2.1 Extract data from NFS Visualization software

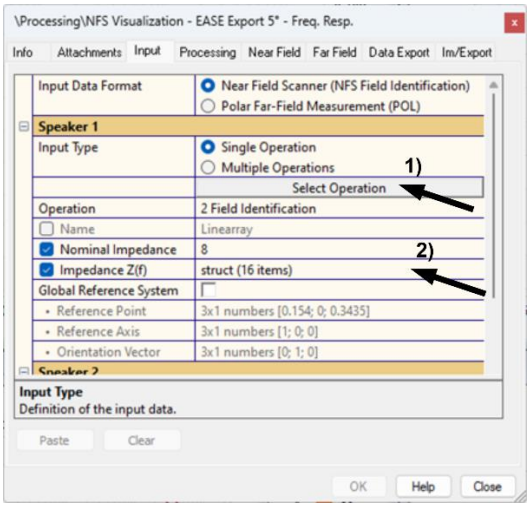
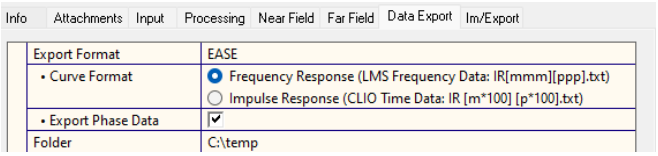
NFS Visualization Export Template

Create a new NFS Visualization operation and select the template **NFS Visualization – EASE Export**



Make sure the new NFS Visualization operation is located under the **Processing** object.



Link NFS Field Identification	Open the **Property page** of the NFS Visualization operation and navigate to the **Input** tab. 1) Link the NFS Field Identification operation by clicking **Select Operation**  2) Additionally, the electrical impedance can be defined for passive systems. To do so, activate **Impedance Z(f)** and copy/paste the impedance curve from an LPM or TRF measurement operation of the same speaker. Also, specify the Nominal Impedance. The impedance curve will be exported with the balloon data in an EASE-compatible format.
General Export Settings	Open Property page of the NFS Visualization operation and navigate to the **Data Export** tab. Select the following: • *Export Format*: **EASE** • *Curve Format*: **Frequency Response (LMS Frequency Data: IR[mmm][ppp].txt)**  Also, activate **Export Phase Data** and specify an export **Folder**.

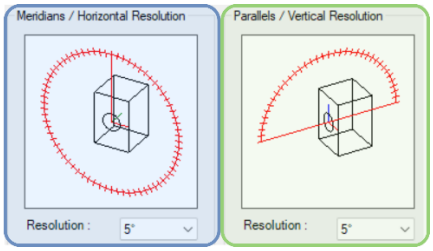
Coordinate Settings

The balloon data can be calculated at any distance r (Radius) and with user-defined angular settings by specifying the minimum, maximum, and resolution for both spherical angles phi and theta.

The angles theta and phi correspond to the following naming in EASE SpeakerLab:

- Phi: Meridians / Horizontal Resolution
- Theta: Parallels / Vertical Resolution

Coordinates	
Radius	10
Phi - Minimum	0
Phi - Resolution	5
Phi - Maximum	360
Theta - Minimum	0
Theta - Resolution	5
Theta - Maximum	180



Typically, a full balloon with 5° resolution has the following settings:

	Minimum	Resolution	Maximum
Phi-Angle	0°	5°	360°
Theta-Angle	0°	5°	180°

Note: When assuming symmetry of the device (e.g. horizontal, vertical, or quarter), the angular range can be adjusted to minimize the calculation and export time.

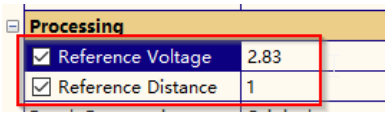
Recommended angle settings for Symmetry:

Symmetry (EASE)	Phi-Angle		Theta-Angle	
	Min.	Max.	Min.	Max.
Horizontal	0°	180°	0°	180°
Vertical	-90°	90°	0°	180°
Quarter (90°)	0°	90°	0°	180°
Axial	0°	0°	0°	180°

Sensitivity

In order to specify the sensitivity curve of the loudspeaker in EASE-SpeakerLab, the exported frequency responses can be scaled to a certain input level using the parameters **Reference Voltage** and a certain distance using the parameter **Reference Distance**. The distance scaling applies the 1/r-law.

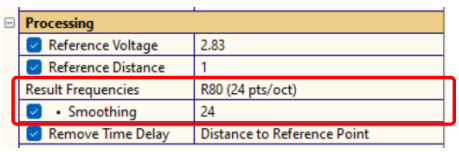
For example, set the distance to 1 m and the voltage of 2.83V for 1W at 8Ω.



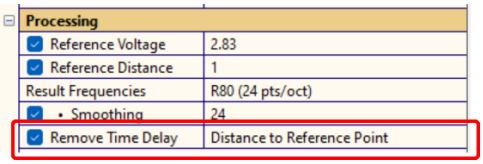
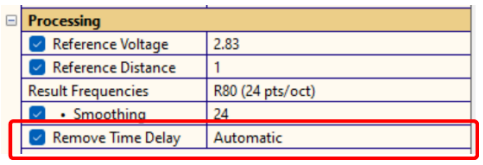
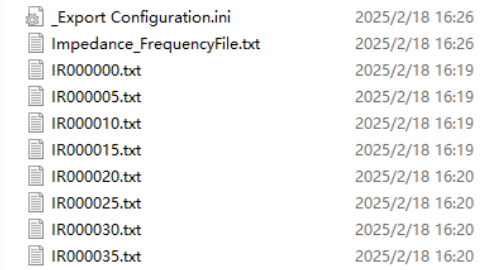
Frequency Resolution and Smoothing

EASE recommends a minimum frequency resolution of 24 points per octave to ensure accurate sound field simulation results.

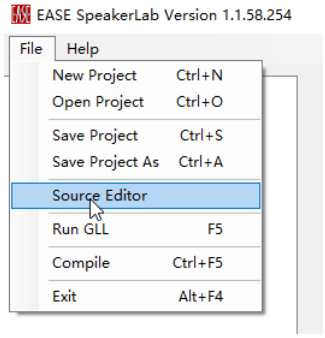
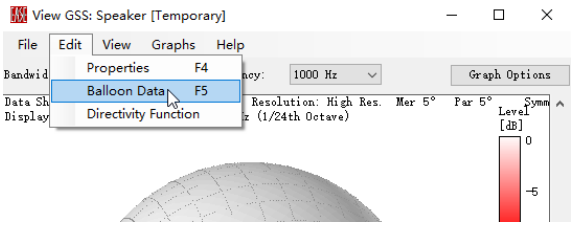
To meet this requirement, ensure that the resolution of the exported **Result Frequencies** is at least 24 points per octave (e.g. R80 ISO frequencies). Additional **Smoothing** can be applied, but the resolution should also be higher or equal to 24th of an octave.

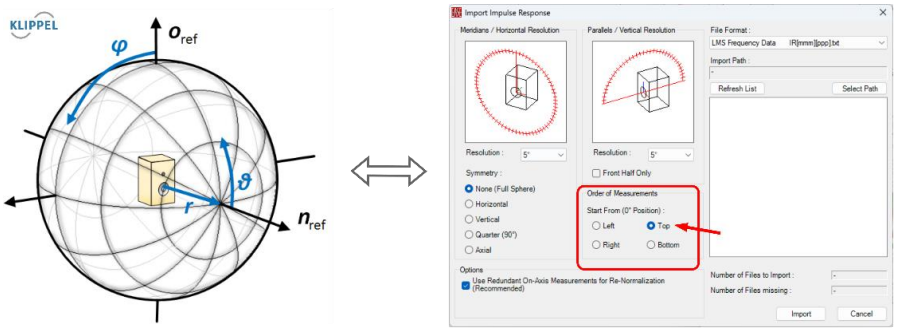
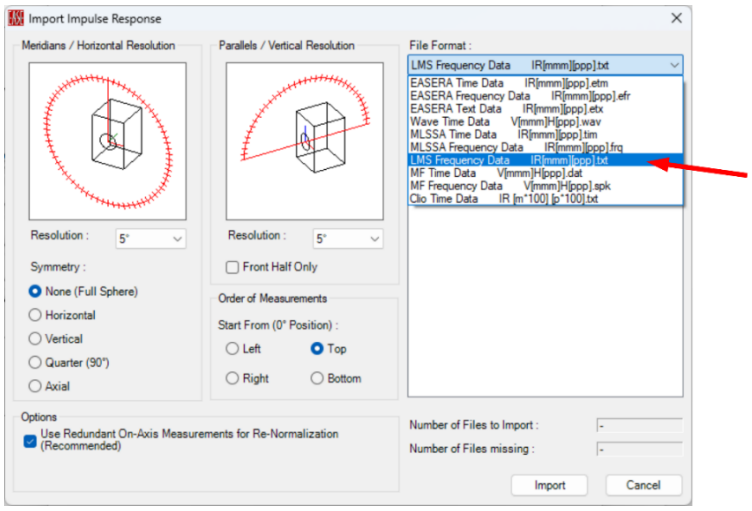
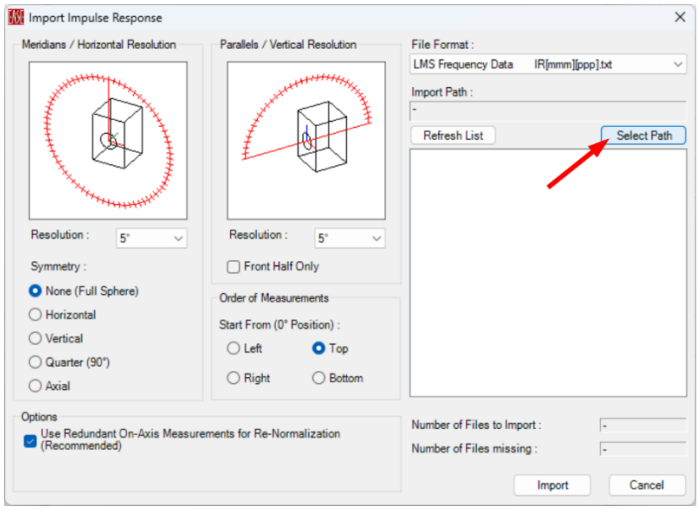


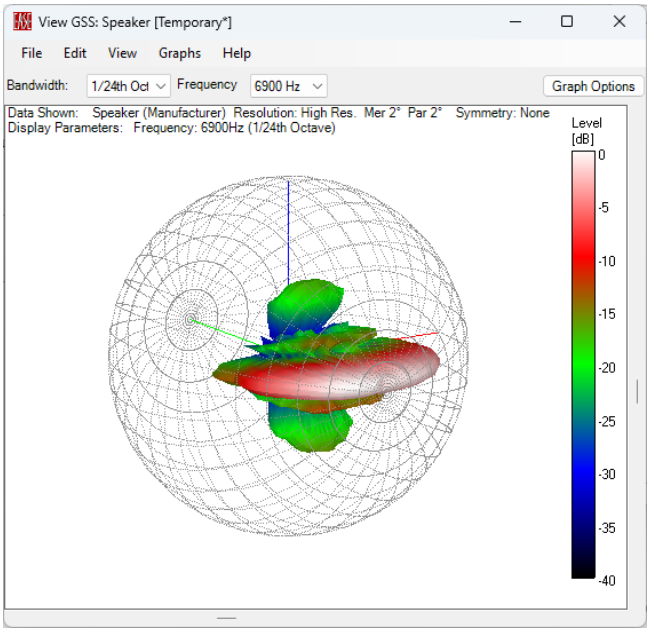
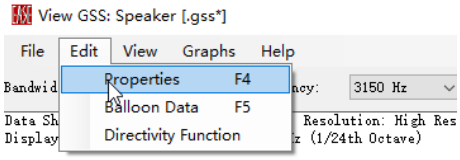
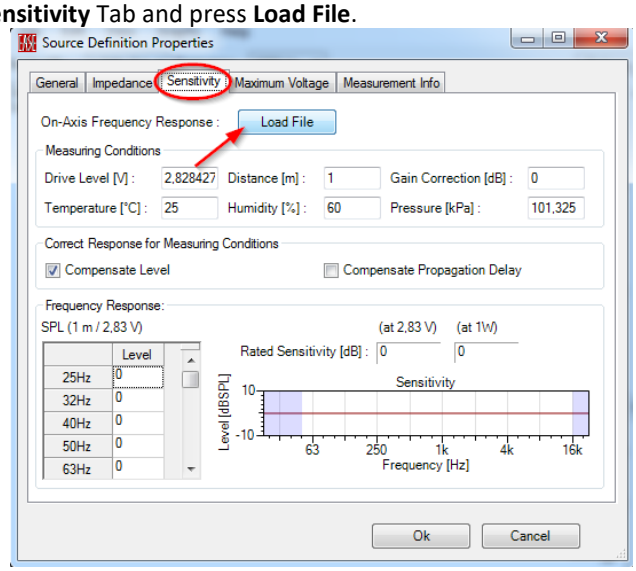
Note: During the export, the **FREQUENCY** resolution is checked. If the resolution is insufficient, the NFS **V**isualization will display a warning.

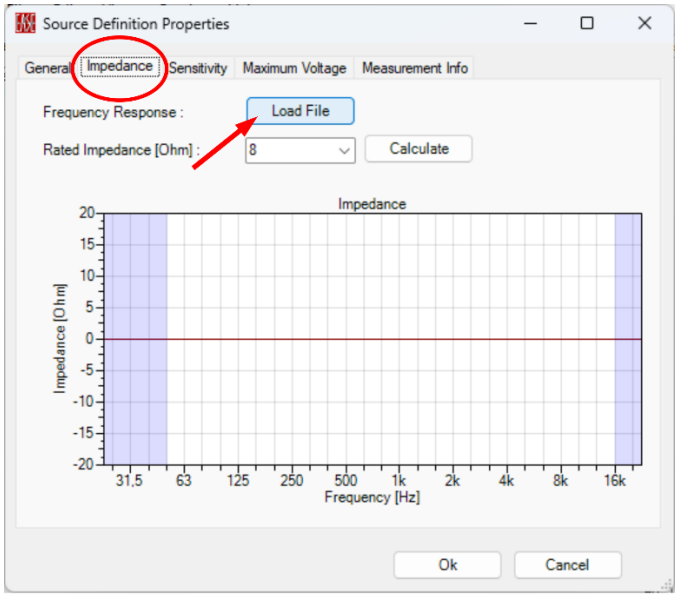
Remove Time Delay	When exporting frequency data, it is recommended to remove the propagation delay. This is important to minimize phase shift, especially at high frequencies, and avoid phase interpolation errors. The NFS Visualization supports for this the Remove Delay option: **Distance to Reference Point**  However, when measuring **active systems** with additional internal latency, the **Automatic** option is recommended. 
Run operation to export the data	Press the **Run** button  in dB-Lab to start the export. After finishing the export, the required data is saved in the selected folder: 

2.2 Import data into EASE SpeakerLab

Open Source Editor and Select Balloon Data	Open the **Source Editor** in the EASE SpeakerLab.  Open the **Edit** Menu and select **Balloon Data F5**. 

Define Orientation of Coordinates	According to IEC 60268-21, the NFS Near Field Scanner System defines the position at the top of the speaker as phi = 0°. To align with this orientation in EASE SpeakerLab select **Start From (0° Position): Top** 
Select Data and Import	As **File Format** select **LMS Frequency Data IR[mmm][ppp].txt**  Press **Select Path** and choose the extracted file **IR 000000.txt**  Ensure **Number of Files missing: 0** and press **Import**

View Balloon Data	After finishing the import, the data is visualized in EASE SpeakerLab. 
Import Sensitivity	• To import the Sensitivity Curve, open the **Edit** Menu and press **Properties**.  • Select the **Sensitivity** Tab and press **Load File**.  • Select the file **IR000000.txt**, then the sensitivity curve is visualized.

Import Impedance	Select the **Impedance** Tab and press **Load File**.  Select the file **Impedance_FrequencyFile.txt** (CLIO Frequency Files format), then the impedance curve is visualized.

3 References

Related Products	• NFS – Near Field Scanner system • EASE SpeakerLab
Related Documentation	• Online manual for KLIPPEL NFS • Specification C8 for KLIPPEL NFS

Find explanations for symbols at:
http://www.klippel.de/know-how/literature.html
Last updated: April 10, 2025
Designs and specifications are subject to change without notice due to modifications or improvements.