Loudspeaker Data Sheet

Acoustic Line Seeburg

GL Series

11/9/09

Audio & Acoustics Consulting

Prof. Dr. Anselm Goertz ; Dr. Michael Makarski
In der Linen 21 , 52134 Herzogenrath-Kohlscheid ; Germany
Phone: +49 2407 565111 ; Fax: +49 2407 565112
e-mail: anselm.goertz@t-online.de
www.anselmgoertz.de

Measurement equipment and conditions

Class-1 semi anechoic chamber (above 100 Hz)
(net dimensions: width x length x height: 6 m x 10 m x 5 m)

B&K 2610 preamplifier with B&K 4190 1/2”
and B&K 4165 1/4” condenser microphones

Loudspeaker-Microphone distance: 8 m

MF-Software with Robo Frontend and RME Multiface

- 24-Bit/96kHz eight channel analogue/digital in/out
- 110 dB S/N ratio
- Sweep and MLS measurements
- Highest frequency resolution up to 0,01 Hz linear at 96 kHz SR

Crown Reference I power amplifier

Stepper machine:

- up to 100 kg maximum loudspeaker weight
- up to1,4 m maximum diagonal loudspeaker dimension
- high precision drive unit up to 1° resolution
- Data acquisition in EASE, EASE-Focus, EASE Speaker-Lab GLL Ulysses UNF, CLF, SPK raw data and other formats

Technical Equipment (left) and anechoic chamber (right) with stepper machine to move the speakers for balloon and polar measurements.

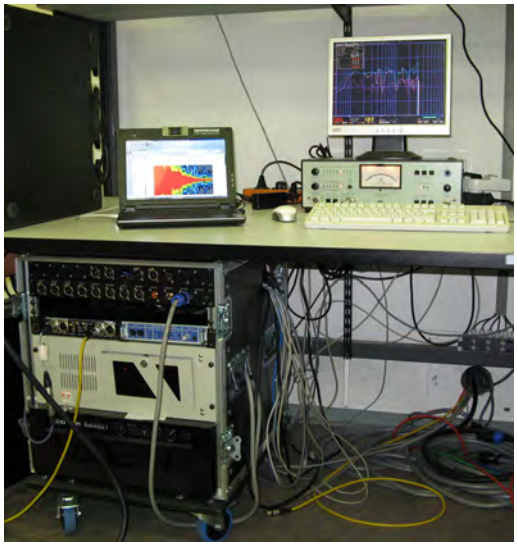


TABLE OF CONTENTS

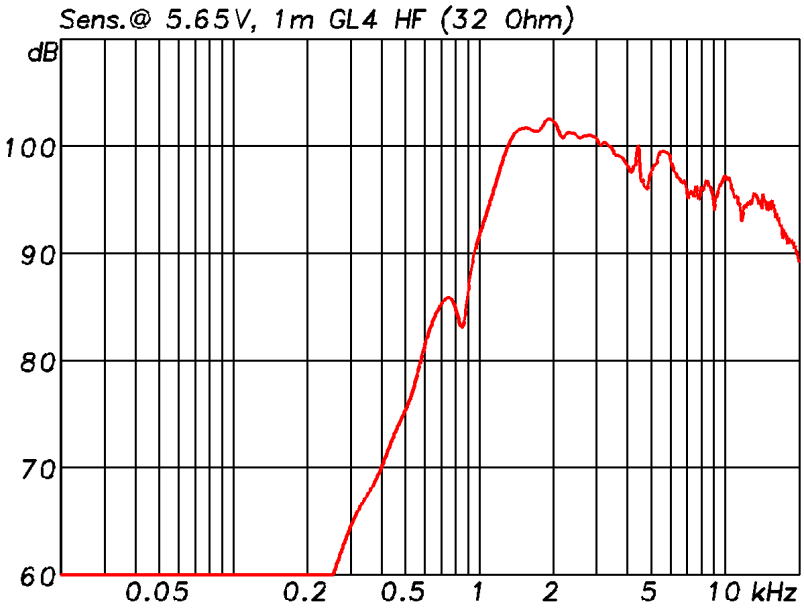
1. Frequency Resp. HF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Sensitivity [dB SPL]

Sensitivity calculated for 1W/1m corresponding to 5,65V_{eff}/1m
Free Field 4π conditions !
No frequency smoothing !

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL4-HF-FRE.PNG

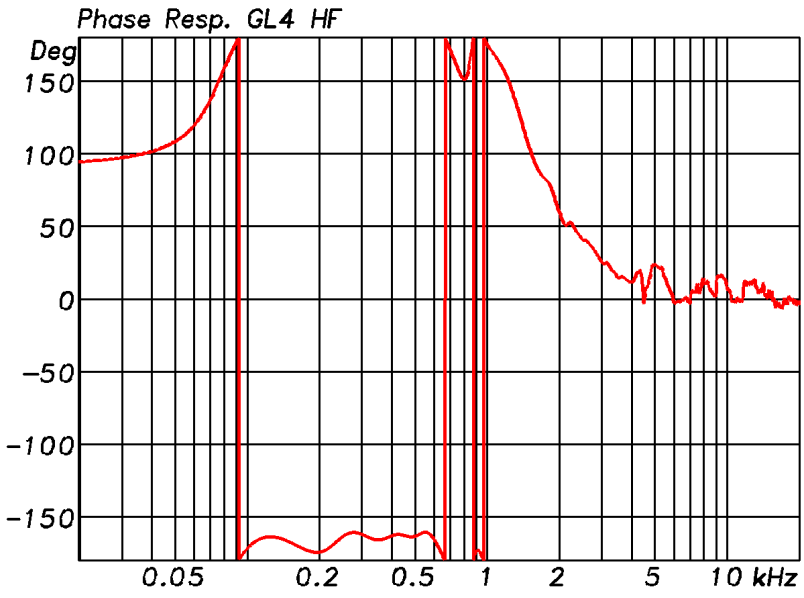
2. Phase Response HF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Phase [Deg°]

Measuring Distance Loudspeaker to Microphone: 8 m

(group delay due to the measurement distance is eliminated for the phase plot)



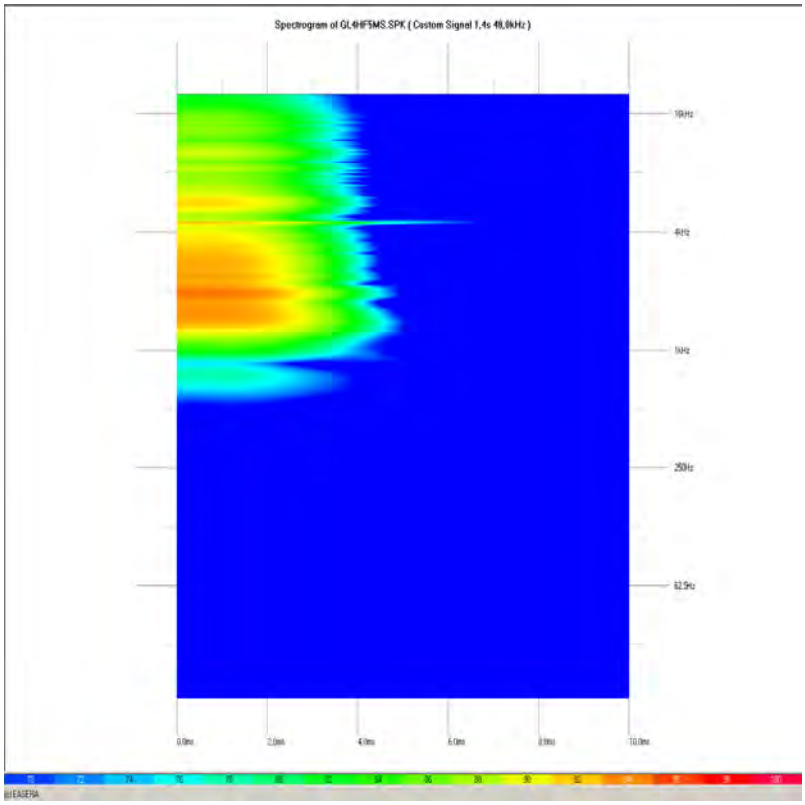
Graphics-File: GL4-HF-PHA.PNG

3. Spectrogram HF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Time [ms]
z-Axis: Level [dB]

4k FFT length
90% Tukey time window



Graphics-File: GL4-HF-ZER.PNG

4. Impedance HF

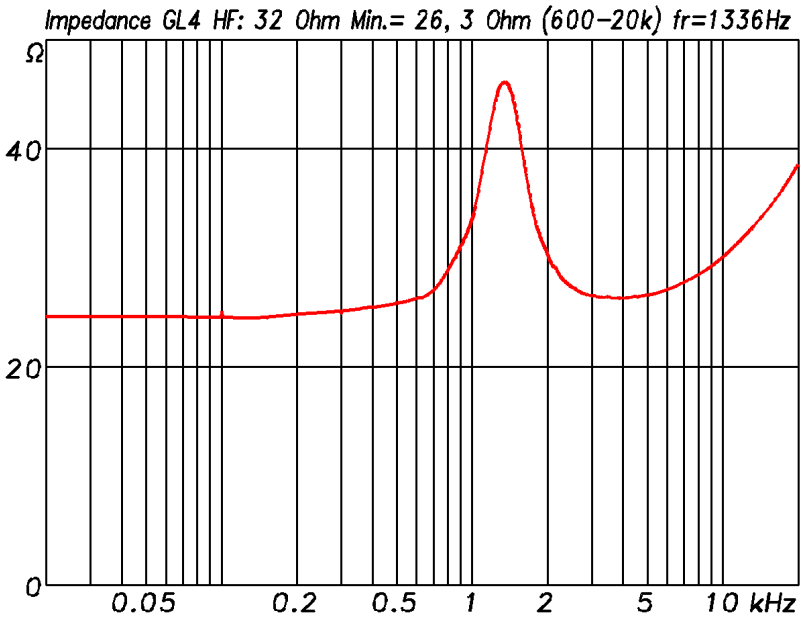
single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Impedance [Ohm]

Nominal Impedance: 32 Ohm
Minimum Impedance: 26,3 Ohm

Minimum of 26,3 Ohm at 600 Hz for a rated operating frequency range from 600 Hz to 20 kHz

Driver resonance at 1336 Hz



Graphics-File: GL4-HF-IMP.PNG

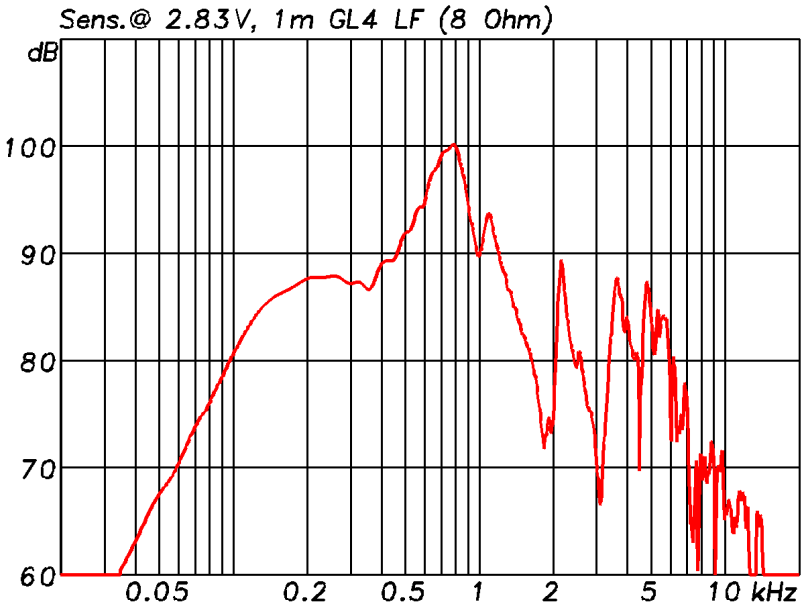
5. Frequency Resp. LF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Sensitivity [dB SPL]

Sensitivity calculated for 1W/1m corresponding to 2,83V_{eff}/1m
Free Field 4π conditions !
No frequency smoothing !

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL4-LF-FRE.PNG

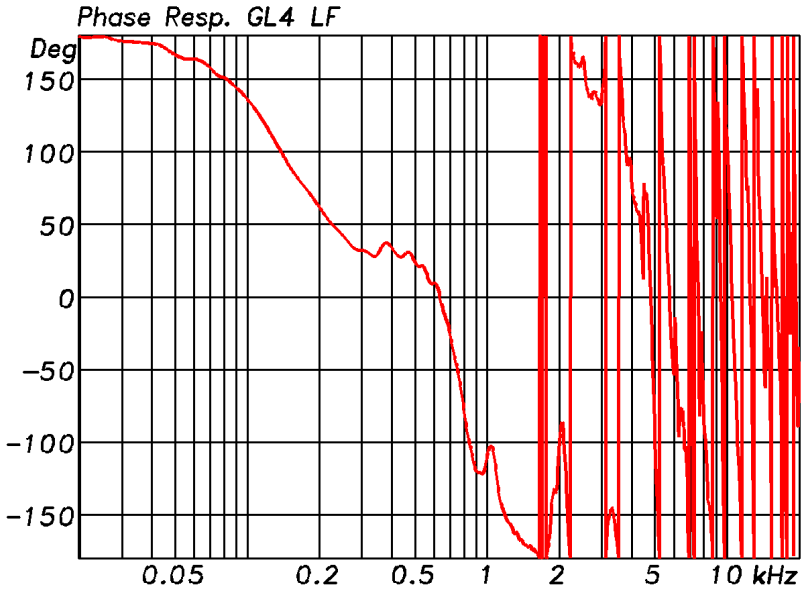
6. Phase Response LF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Phase [Deg°]

Measuring Distance Loudspeaker to Microphone: 8 m

(group delay due to the measurement distance is eliminated for the phase plot)



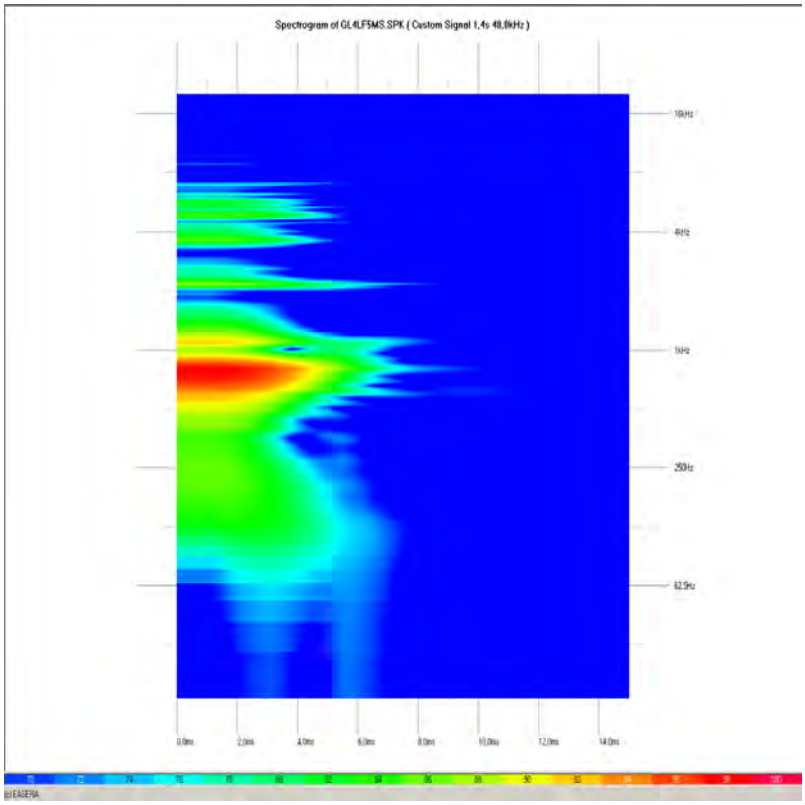
Graphics-File: GL4-LF-PHA.PNG

7. Spectrogram LF

single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Time [ms]
z-Axis: Level [dB]

4k FFT length
90% Tukey time window



Graphics-File: GL4-LF-ZER.PNG

8. Impedance LF

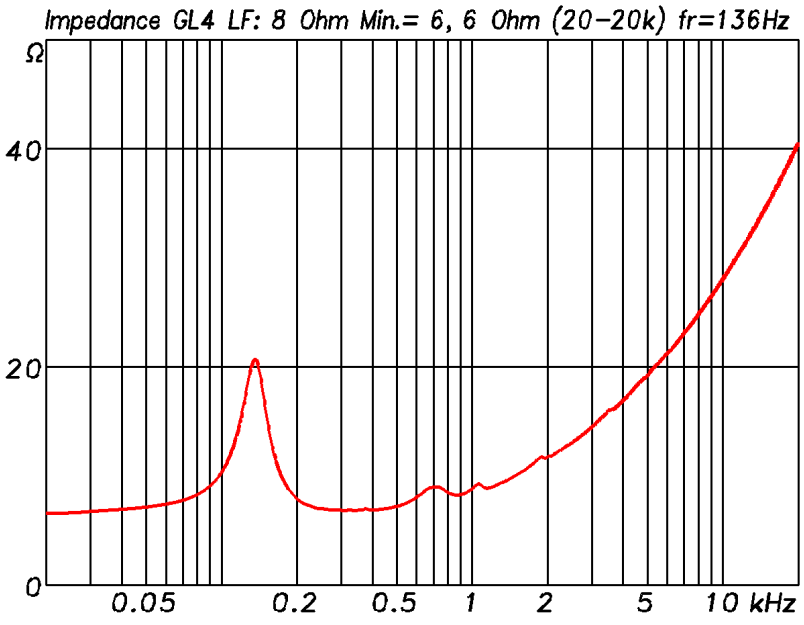
single GL4 unit

x-Axis: Frequency [Hz]
y-Axis: Impedance [Ohm]

Nominal Impedance: 8 Ohm
Minimum Impedance: 6,6 Ohm

Minimum of 6,6 Ohm at 20 Hz for a rated operating frequency range from 20 Hz to 20 kHz

Driver resonance at 136 Hz



Graphics-File: GL4-LF-IMP.PNG

9. Isobars (horizontal) GL4 HF unit

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

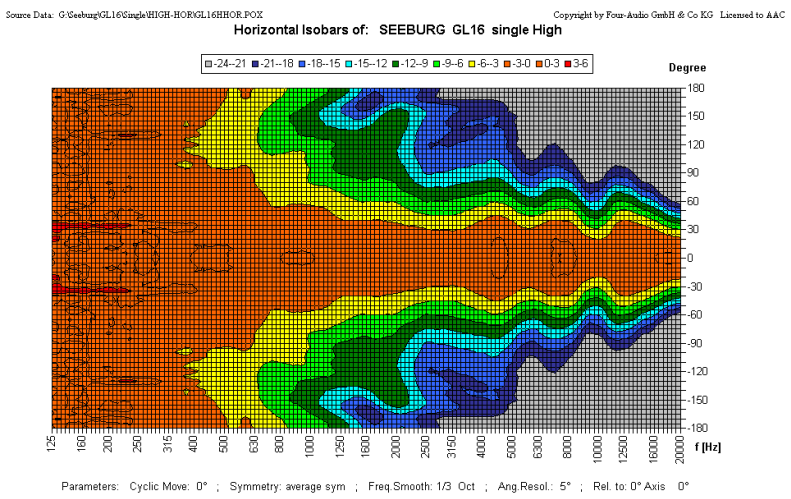
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL4-HF-HOR.PNG

10. Isobars (horizontal) GL4 LF unit

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

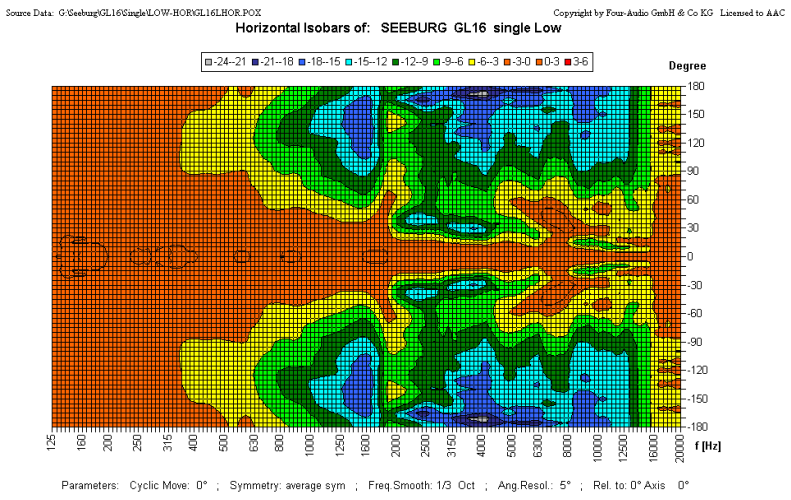
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL4-LF-HOR.PNG

11. Isobars (vertical) GL4 HF unit

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

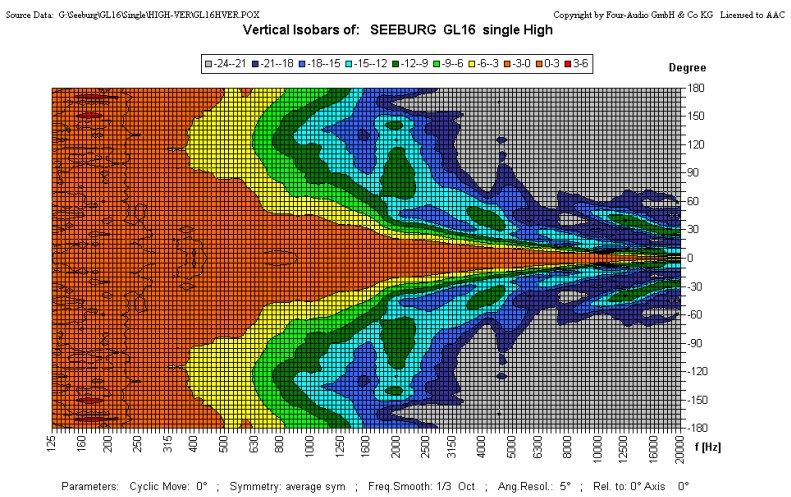
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL4-HF-VER.PNG

12. Isobars (vertical) GL4 LF unit

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

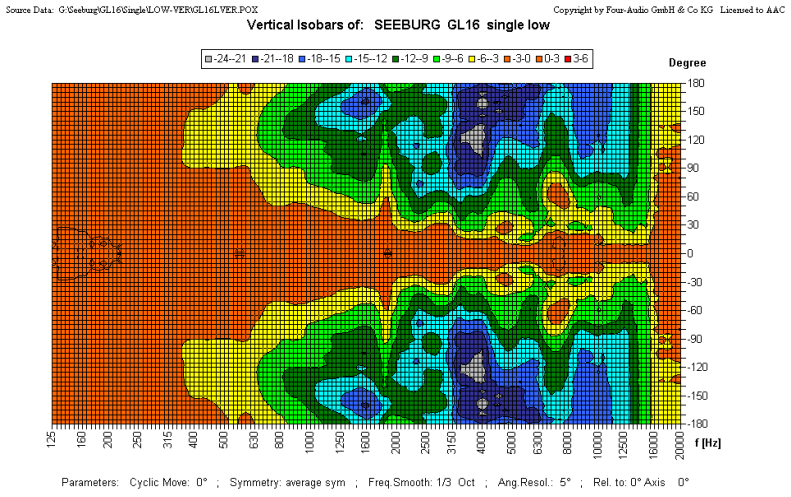
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



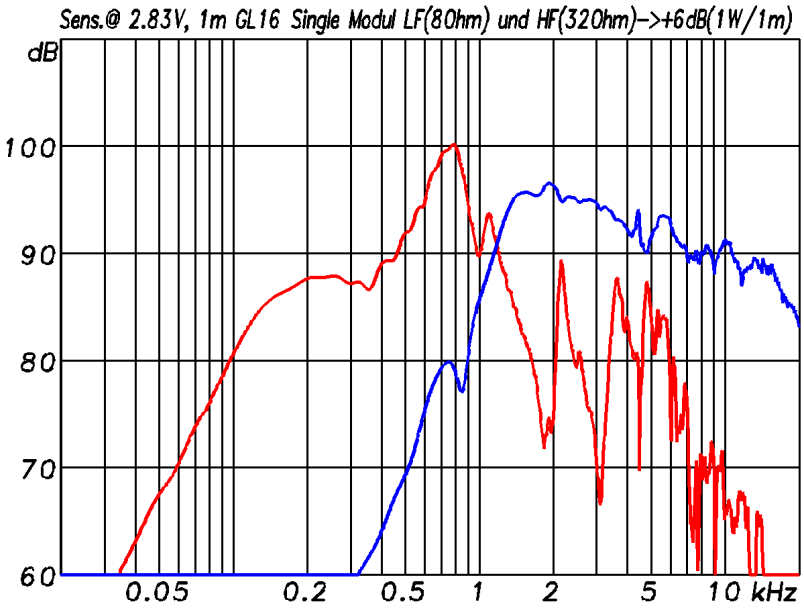
Graphics-File: GL4-LF-VER.PNG

13. Frequency Resp. GL4

x-Axis: Frequency [Hz]
y-Axis: Sensitivity [dB SPL]

LF and HF for **2,83V/1m**

Red: LF 1x6,5”
Blue: HF 4x1”



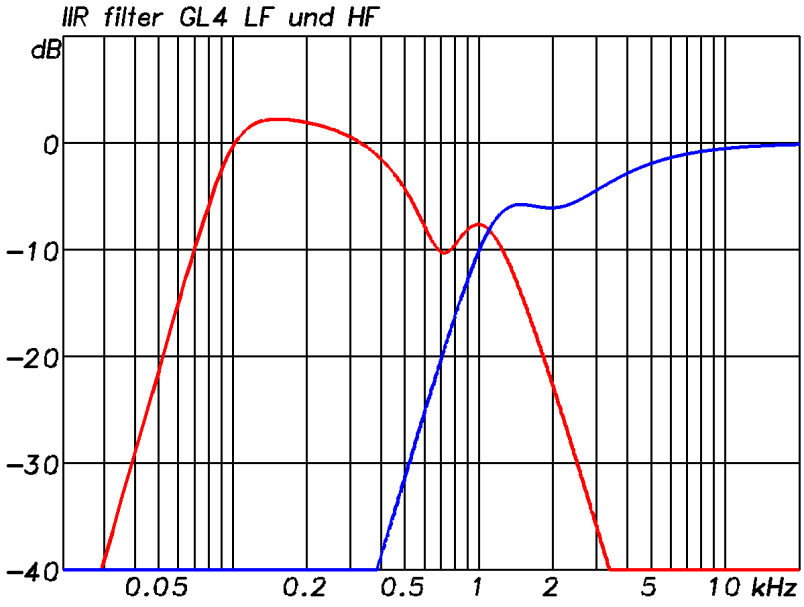
Graphics-File: GL4A-FRE.PNG

14. Controller Resp. GL4

x-Axis: Frequency [Hz]
y-Axis: Level [dB]

GL4 IIR-Setting

Red: LF 1x6,5”
Blue: HF 4x1”

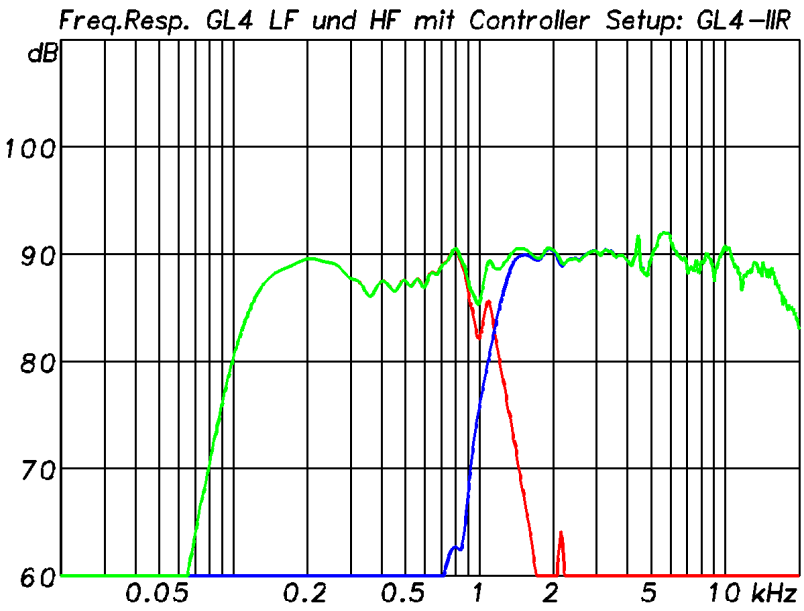


Graphics-File: GL4A-CNT.PNG

15. Frequency Resp. GL4

x-Axis: Frequency [Hz]
y-Axis: Sensitivity [dB SPL]

Blue: HF 4x1" + Controller
Red: LF 1x6,5" + Controller
Green: Sum

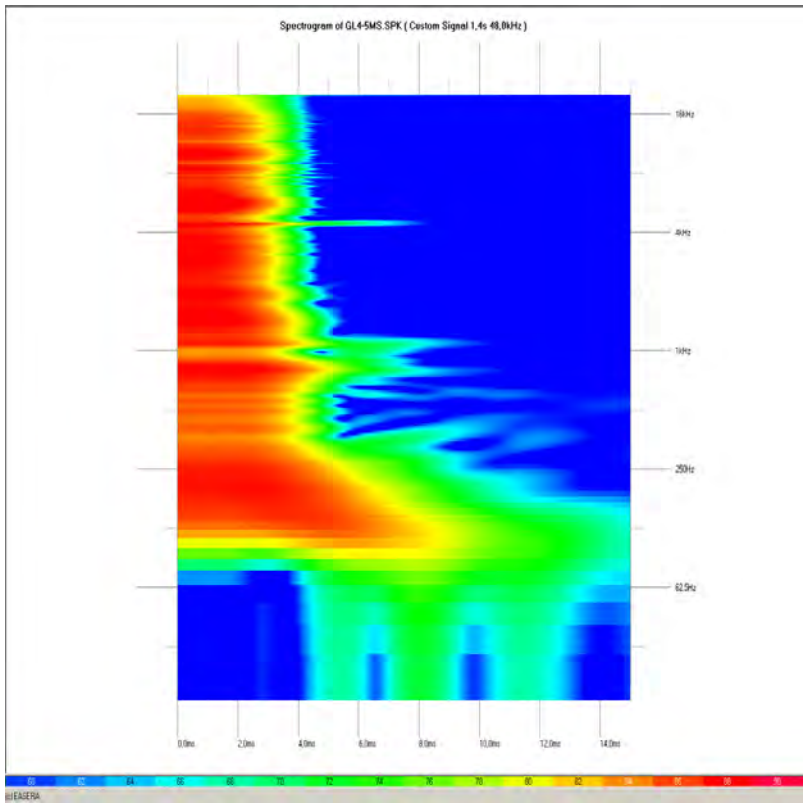


Graphics-File: GL4-FRE.PNG

16. Spectrogram GL4

x-Axis: Frequency [Hz]
y-Axis: Time [ms]
z-Axis: Level [dB]

4k FFT length
90% Tukey time window



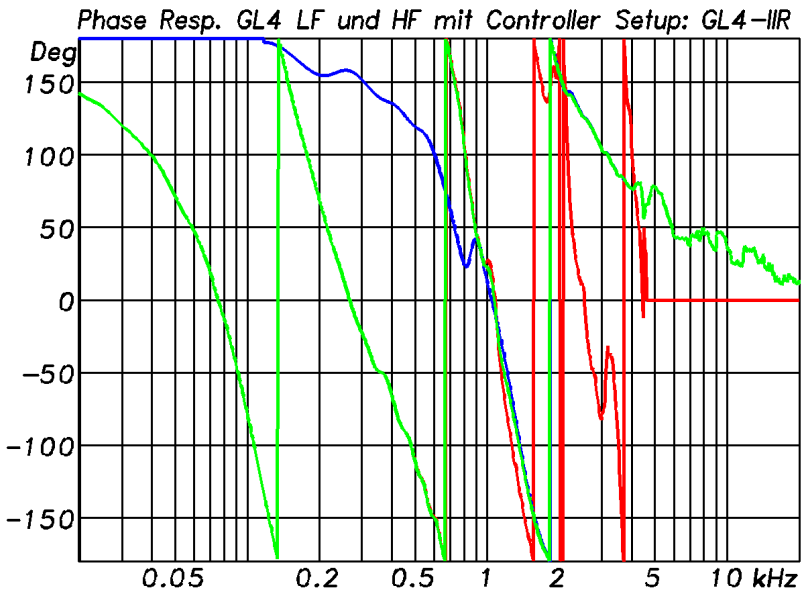
Graphics-File: GL4-ZER.PNG

17. Phase Resp. GL4

x-Axis: Frequency [Hz]
y-Axis: Phase [Deg°]

Blue: HF 4x1" + Controller
Red: LF 1x6,5" + Controller
Green: Sum

(group delay due to the measurement distance is eliminated for the phase plot)

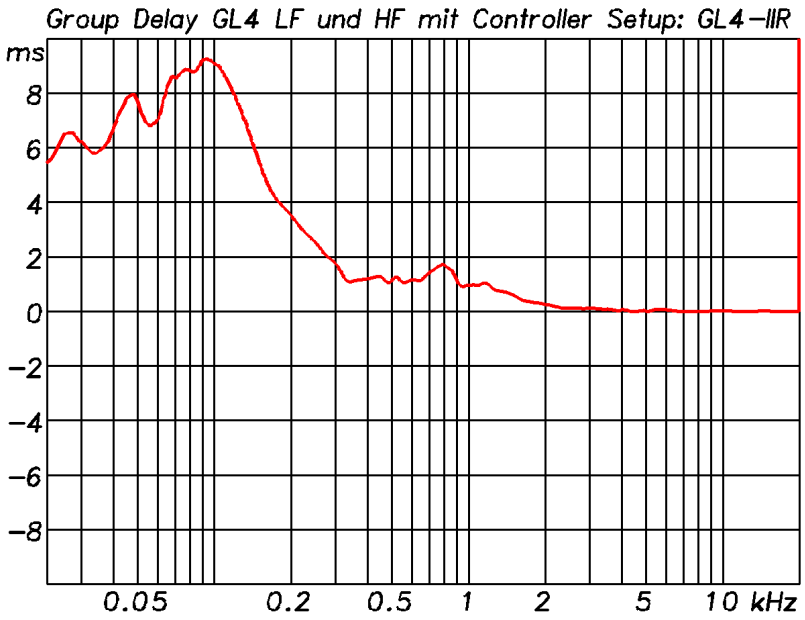


Graphics-File: GL4-PHA.PNG

18. Group Delay GL4

x-Axis: Frequency [Hz]
y-Axis: Group Delay [ms]

(group delay due to the measurement distance is eliminated for the phase plot)



Graphics-File: GL4-LAU.PNG

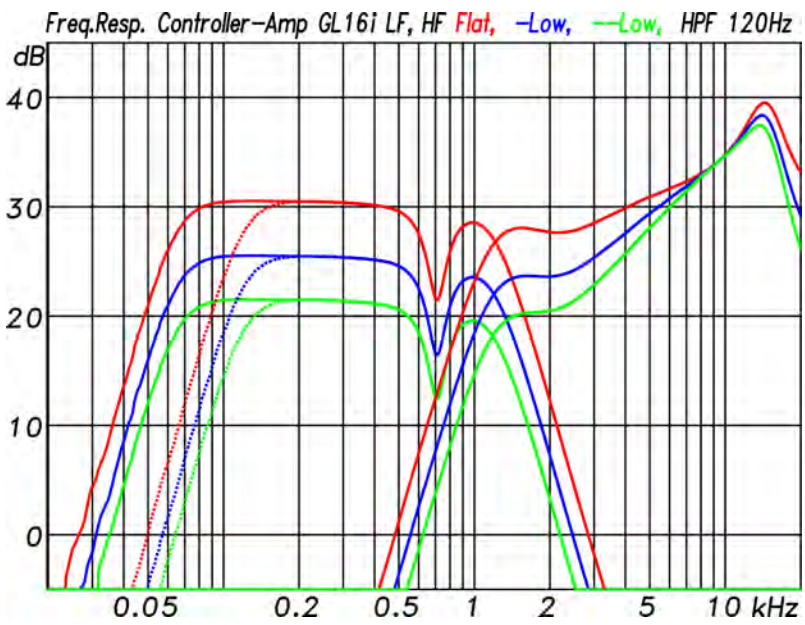
GL16i / GL16c

19. Controller Resp. GL16

x-Axis: Frequency [Hz]
y-Axis: Level [dB]

Red: Flat
Blue: -Low
Green: --Low

Dotted Lines with 120 Hz HP-Filter



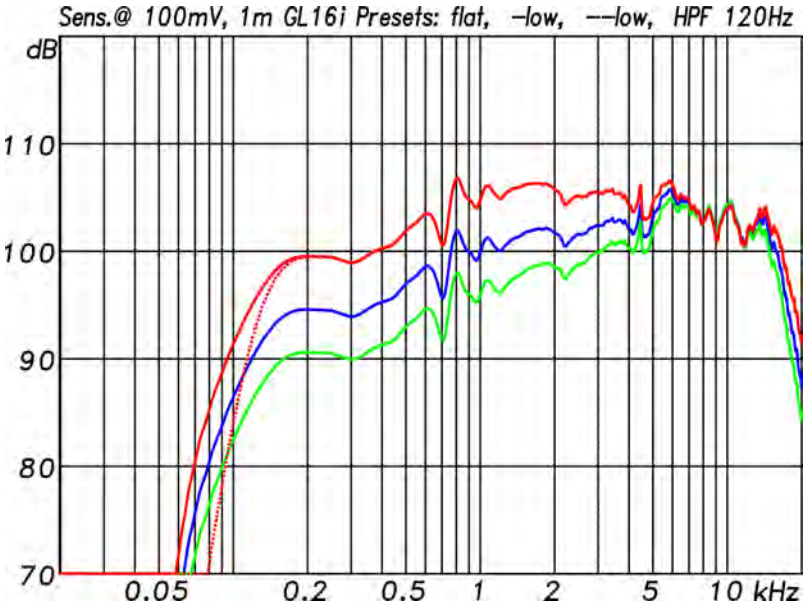
Graphics-File: GL16IC-CNT.PNG

20. Frequency Resp. GL16i

x-Axis: Frequency [Hz]
y-Axis: Level [dB]

Red: Presets flat
Blue: Preset -Low
Green: Preset --Low

Dotted Line Flat with
120 Hz HP-Filter



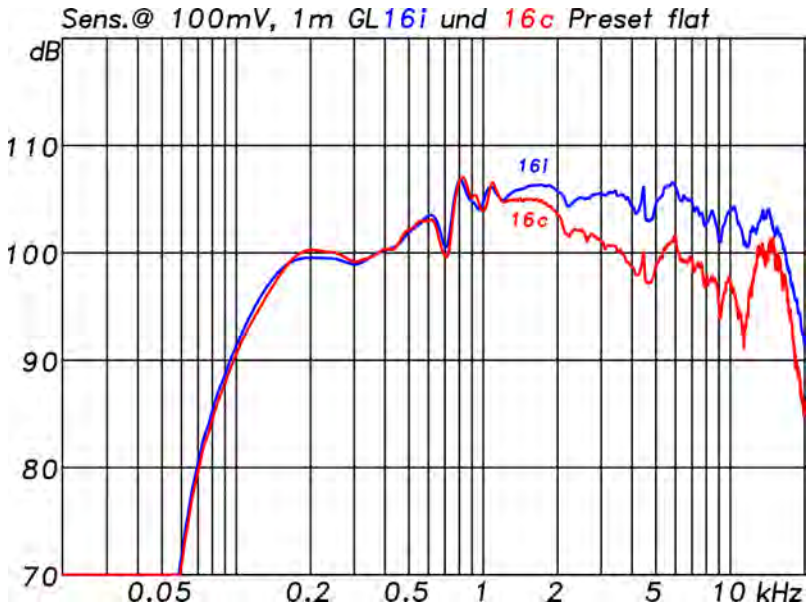
Graphics-File: GL16I-PRESETS.PNG

21. Freq. Resp. GL16i/c

x-Axis: Frequency [Hz]
y-Axis: Level [dB]

Preset: Flat

Red: GL16c Preset Flat
Blue: GL16i Preset Flat



Graphics-File: GL16IC-FRE.PNG

22. Max. SPL GL16i/c

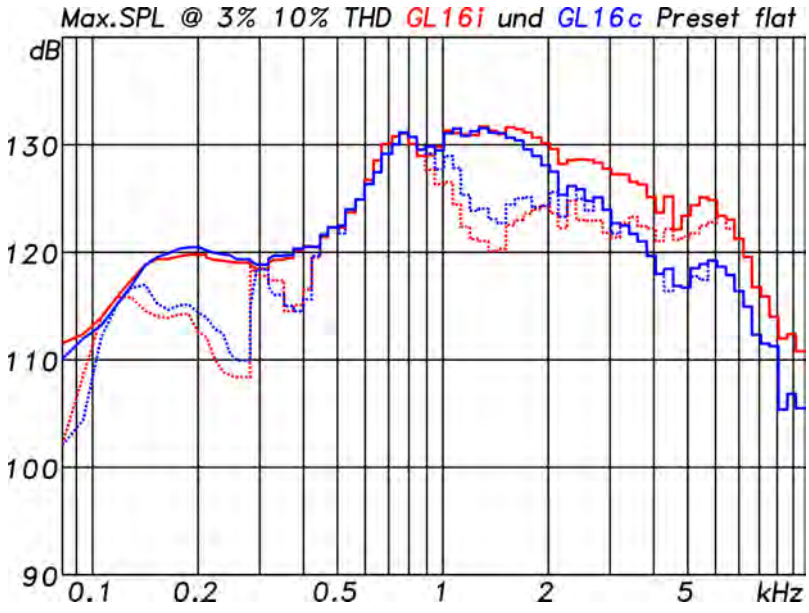
x-Axis: Frequency [Hz]
y-Axis: Max.SPL dB @ 1m

Lines: THD: max. 10% = -20dB

Dotted: THD: max. 3% = -30dB

Red: GL16i
Blue: GL16c

Excitation signal:
185 ms Sinusburst
1/12 Octave steps



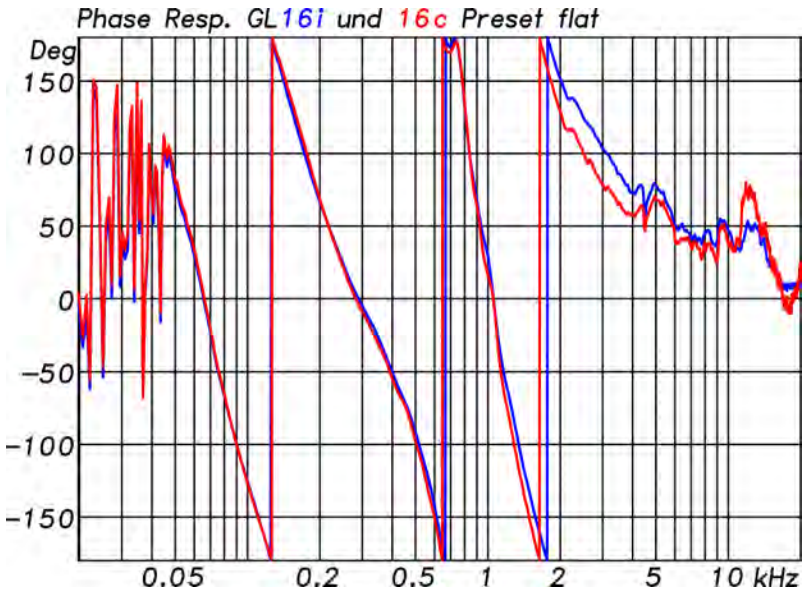
Graphics-File: GL16IC-MAX.PNG

23. Phase Resp. GL16i/c

x-Axis: Frequency [Hz]
y-Axis: Phase [°]

Preset: Flat

Red: GL16c Preset Flat
Blue: GL16i Preset Flat



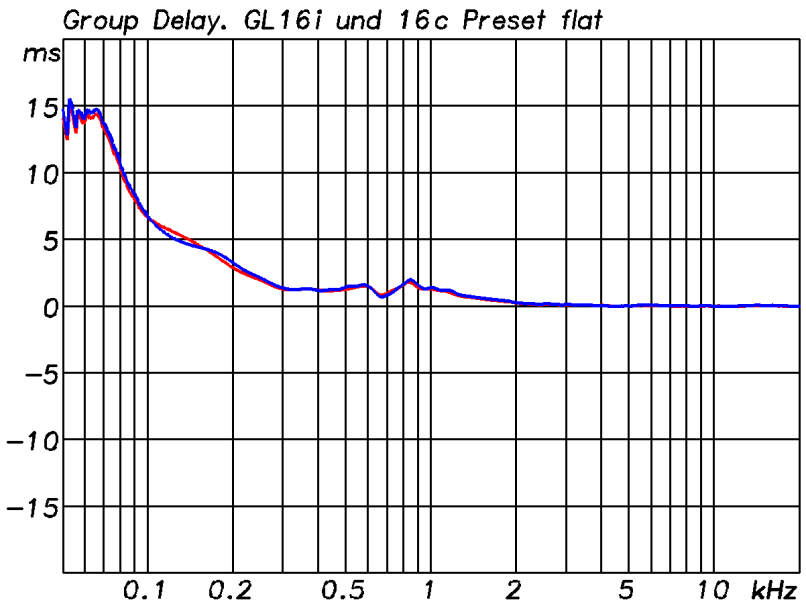
Graphics-File: GL16IC-PHA.PNG

24. Group Delay GL16i/c

x-Axis: Frequency [Hz]
y-Axis: Group Delay [ms]

Preset: Flat

Red: GL16c Preset Flat
Blue: GL16i Preset Flat



Graphics-File: GL16IC-LAU.PNG

25. Isobars (horizontal) GL16i

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

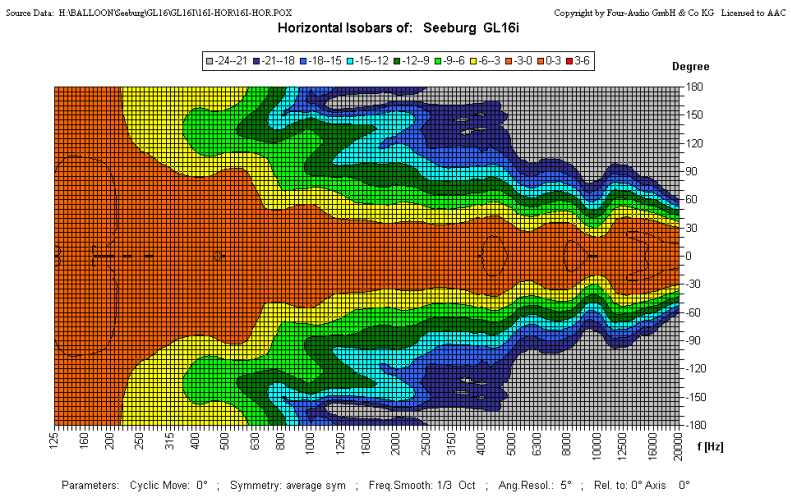
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL16i-HOR.PNG

26. Isobars (vertical) GL16i

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

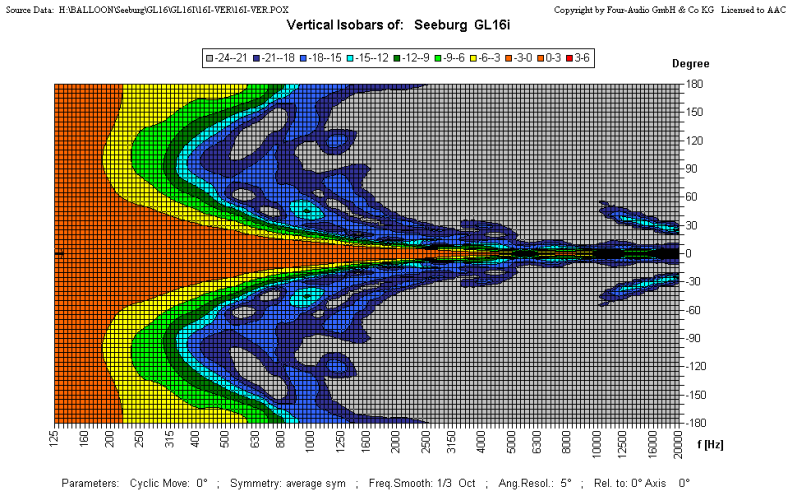
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL16i-VER.PNG

27. Isobars (horizontal) GL16c

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

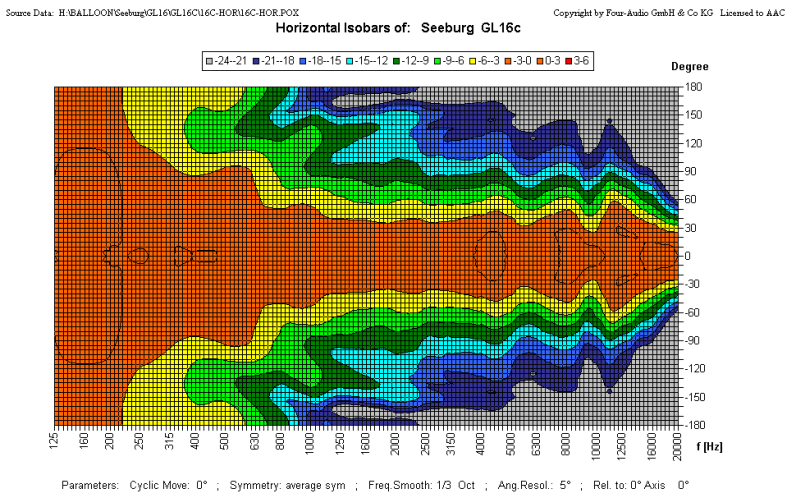
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL16c-HOR.PNG

28. Isobars (vertical) GL16c

x-Axis: Frequency [Hz]
y-Axis: Angle [Deg°]

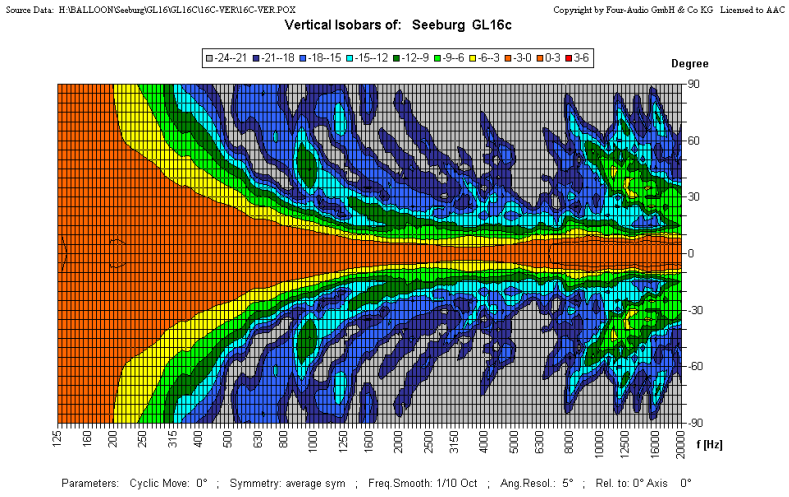
Isobars calculated in relation to on-axis response at 0°

Frequency smoothing: 1/3 octave

Angle resolution: 5°

-6 dB from yellow to light green

Measuring Distance Loudspeaker to Microphone: 8 m



Graphics-File: GL16c-VER.PNG

29. EASE GLL V1.1 Generic Loudspeaker Library Data

EASE Speaker Lab Generic Loudspeaker Library (GLL) Data build from MF SPK raw data.

Angle Resolution:	LF 5° HF 2°
Frequency Resolution:	raw data: 2,93 Hz at 48 kHz sample rate and 16k FFT length
Box types:	GL4, GL16i, GL16c, GL24
Phase Data:	yes
Files:	1
File Name:	*GL16-V15.GLL* *V1.5 compiled at 11/9/2009*
Applications:	EASE V4.2 or higher EASE Focus Line Array Aiming Software V2.0 or higher

30. EASE 40 SPK Speaker Data

Standard EASE Speaker Base Data build from MF raw data.

Angle Resolution:	5°
Frequency Resolution:	1/3 Octave
Box types:	GL4, GL16i, GL16c, GL24
Phase Data:	yes
Files:	6 per box .spk, .lob, .phs .fed, .frd, .fvt
File Name:	*EASE40-DATA-V15.ZIP*

!! Max. SPL calculation with EASE SPK files is only a rough approximation. !!

31. Ulysses Speaker Base Data

Ulysses Speaker Base Data (USB) build from Ulysses Native Format (UNF) ASCII data.

Angle Resolution:	5°
Frequency Resolution:	1/1 Octave
Phase Data:	no
Files:	one USB file for multiple speakers
File Name:	*GL-Series-V15.USB*

* *Future formats with higher frequency resolution and phase data can be calculated from the MF raw data set.*

!! Max. SPL calculation with Ulysses USB files is only a rough approximation. !!

32. CLF Data

Common Loudspeaker Format Data (CLF) build from a special MF (TXT) ASCII data.

Angle Resolution:	5°
Frequency Resolution:	1/3 (CLF2) or 1/1 Octave (CLF1)
Phase Data:	no
Files:	one CLF1 and one CLF2 file per speaker
File Name:	*GL4-IIR-V15.CF2* *GL16I-FLAT-V15.CF2* *GL16C-FLAT-V15.CF2* *GL24-FLAT-V15.CF2*

* *Future formats with higher frequency resolution and phase data can be calculated from the MF raw data set.*

!! Max. SPL calculation with CLF files is only a rough approximation. !!