SOUNDPRO DLX
REAL TIME ANALYZER

Microphone Addendum

Part number 053-469B
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"THE SYSTEM SOLUTION"

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Microphone addendum

CHAPTER 1

Addendum introduction

This chapter explains the methods, terms and presentation methods that are used in the other chapters of this Addendum. Each of the other chapters contains a series of similar measurements made on one of the ***SoundPro DLX*** microphones.

Overview

Data are presented in relation to a base unit consisting of the microphone, preamplifier (preamp) and the instrument, with the microphone and preamp mounted directly on the instrument.

The data for each microphone are presented in ordered sets starting with the base unit and followed by a series of configurations where one accessory is added at a time. You can find all measurements of directional frequency response, random incidence response, corrections and broadband noise levels for a particular microphone and configuration in one place.

The ordered data sets and added accessories are identified below. Note that the 4110 microphone was not tested with a windscreen and the BK4936 was tested with its Random Incidence Corrector as well as with all the other accessories.[1]

1. Base unit alone.
2. [not the 4110 microphone] Base unit with windscreen.
3. Base unit with remote microphone.
4. [not the 4110 microphone] Base unit with remote microphone and windscreen.
5. [BK4936 microphone only] Base unit with Random Incidence Corrector.
6. [BK4936 microphone only] Base unit with Random Incidence Corrector and windscreen.
7. [BK4936 microphone only] Base unit with remote microphone and Random Incidence Corrector.
8. [BK4936 microphone only] Base unit with remote microphone, Random Incidence Corrector and windscreen.

Calibrations

Calibrations were performed using an electrically injected 1 kHz continuous sine wave at a level which represents the nominal sensitivity of the appropriate microphone at 1 kHz.

For acoustic correction, directional and random incidence measurements, the base unit was calibrated using the Quest QE-20 calibrator set to 114 dB at 1 kHz.

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1. *The Random Incidence Corrector is a small attachment to the BK4936 microphone that causes this free field microphone to behave more like a random incidence microphone. See the instructions packaged with the Corrector.*

Directional measurements

Preamp on the instrument

Because the case of the instrument can reflect and diffract sound, measurements of the microphone response with the preamp on the instrument were made in two, perpendicular orientations.

- **Side toward source** ~ The sound is directly ahead of the microphone at zero degrees, directed at the side of the instrument at 90^{o} and directed at the base of the instrument at 180^{o}.
- **Face toward source** ~ The sound is directly ahead of the microphone at zero degrees, directed at the front of the instrument at 90^{o} and directed at the base of the instrument at 180^{o}.

For both orientations, the microphone is rotated about an axis that passes through the center of the microphone grid. The setups for these orientations are pictured in Figure 1–1 and Figure 1–2, respectively.

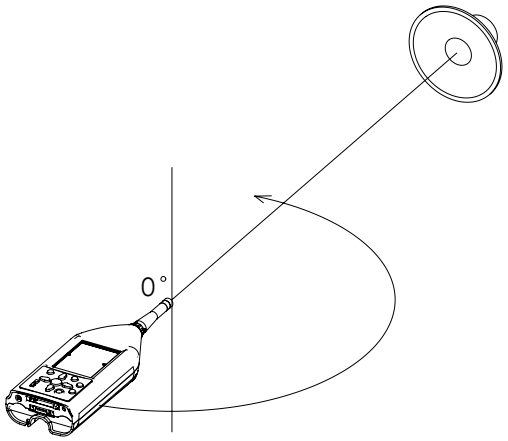

Figure 1–1 Setup with side toward source

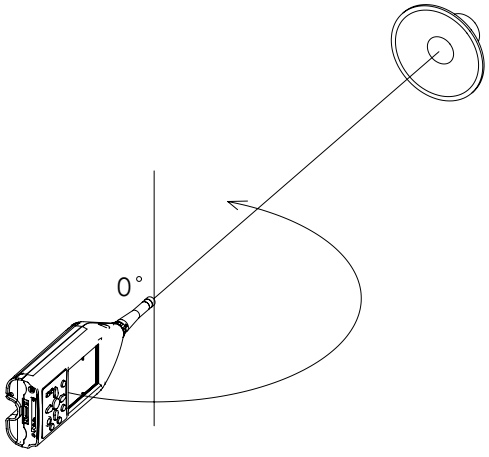

Figure 1–2 Setup with face toward source

Microphone directional frequency response was measured at angles of incidence varying in ten degree steps over the range, 0^o to 180^o. Results are grouped in four ways.

- **± 30 degree plot** ~ The 4 curves obtained at 0^o, 10^o, 20^o and 30^o are plotted together.
- **± 90 degree plot** ~ The 10 curves obtained at 0^o to 90^o are plotted together.
- **± 150 degree plot** ~ The 16 curves obtained at 0^o to 150^o are plotted together.
- **± 180 degree plot** ~ The 19 curves at obtained at 0^o to 180^o are plotted together.

Preamp separated from the instrument

Measurements for the configuration where a cable separated the preamp from the instrument (remote configuration) did not require separate measurements because the instrument was effectively out of the sound field. The setup for this orientation is pictured in Figure 1–3.

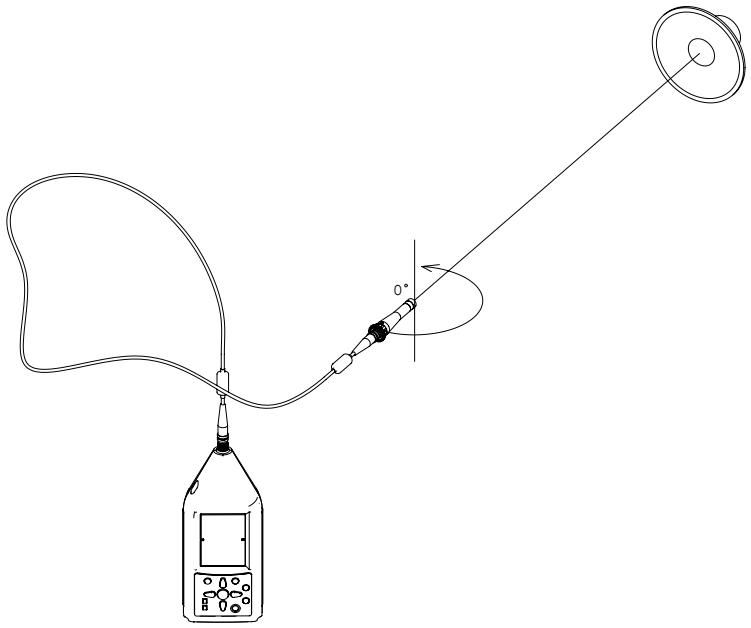

Figure 1–3 Setup for remote configuration

Random incidence measurements

Microphone frequency response to random incidence sound was determined using averaged information based upon sequential measurements made at 10^o steps in a 180^o range for each plane of symmetry. The measurements at each step were suitably weighted in the calculation in relation to the sound power levels at those angles.

Corrections

Two types of microphone corrections were determined: acoustic and windscreen. The corrections were determined at 1/12 octave intervals across the audio measurement spectrum. For either or both types, add the correction to a SPL measurement to calculate a value corrected for the deviation(s).

Acoustic corrections

These corrections account for deviations in the instrument response with respect to those made by an idealized instrument that doesn't disturb the sound pattern (no reflections or diffractions) in an echo-free environment.

Windscreen corrections

These corrections account for deviations in the instrument response with a windscreen attached relative to the same measurements without the windscreen.

Broadband noise level

Frequency-dependent noise that may contribute to ***SoundPro DLX*** measurements was determined for each microphone. For these measurements, calibrations were performed using an electrically injected 1 kHz continuous sine wave at a level which represents the nominal sensitivity of the appropriate microphone at 1kHz. An electrically equivalent microphone impedance device with the correct impedance for each of the microphone types was then installed.

The voltages and capacitances for all ***SoundPro DLX*** microphones are shown in Table 1–1.

Table 1–1: Microphone modeling characteristics

Microphone	Voltage (rms)	Capacitance (pF)
QE4110	0.03548	23.5
QE4130	0.1585	14.6
QE4170	0.5012	49.0
BK4936	0.3981	13.0
QE7052	0.3548	14.6

CHAPTER 2

BK4936 microphone

The base unit for this chapter is the BK4936 microphone and preamp mounted directly on the instrument. For information about terms and concepts related to ***SoundPro DLX*** microphone measurements, see Chapter 1, "Addendum introduction."

1. Base unit

Directional frequency response

Side toward source

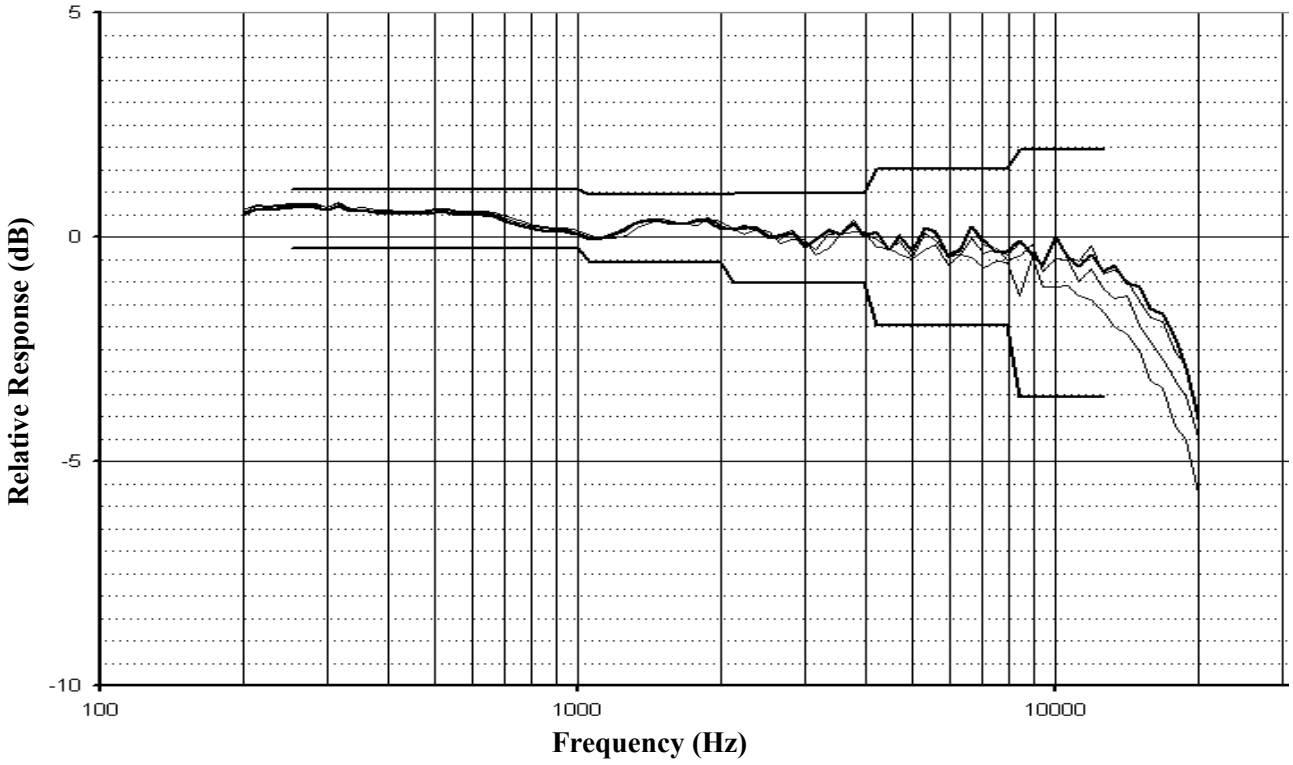

Figure 2–1 Zero to 30 degrees incidence angle

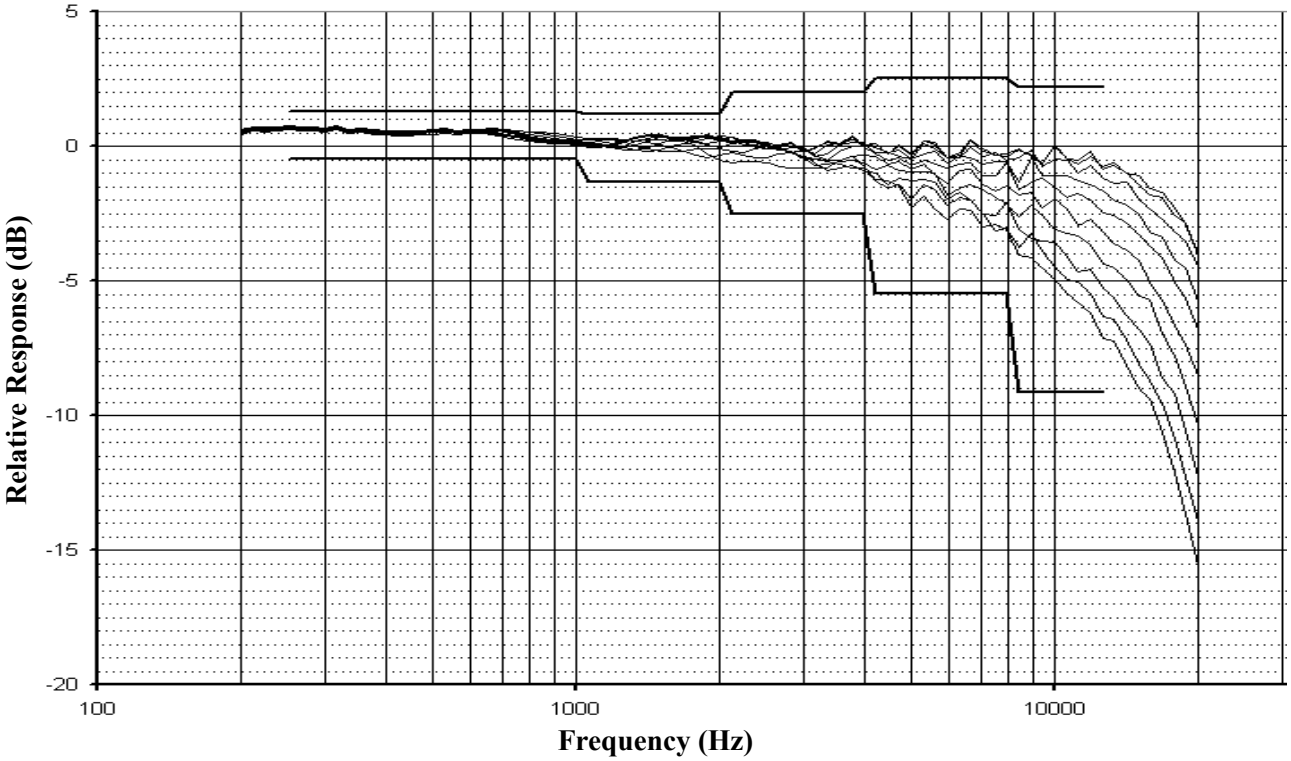

Figure 2–2 Zero to 90 degrees incidence angle

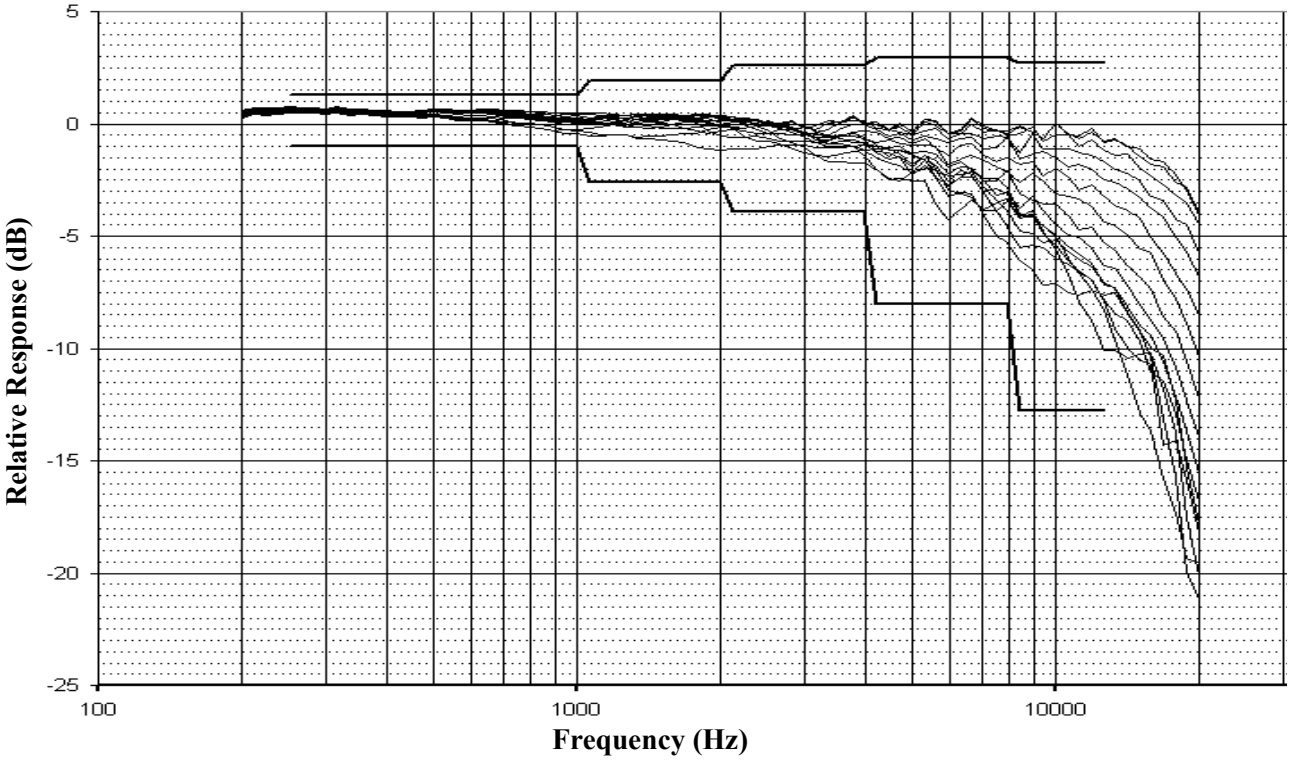

Figure 2–3 Zero to 150 degrees incidence angle

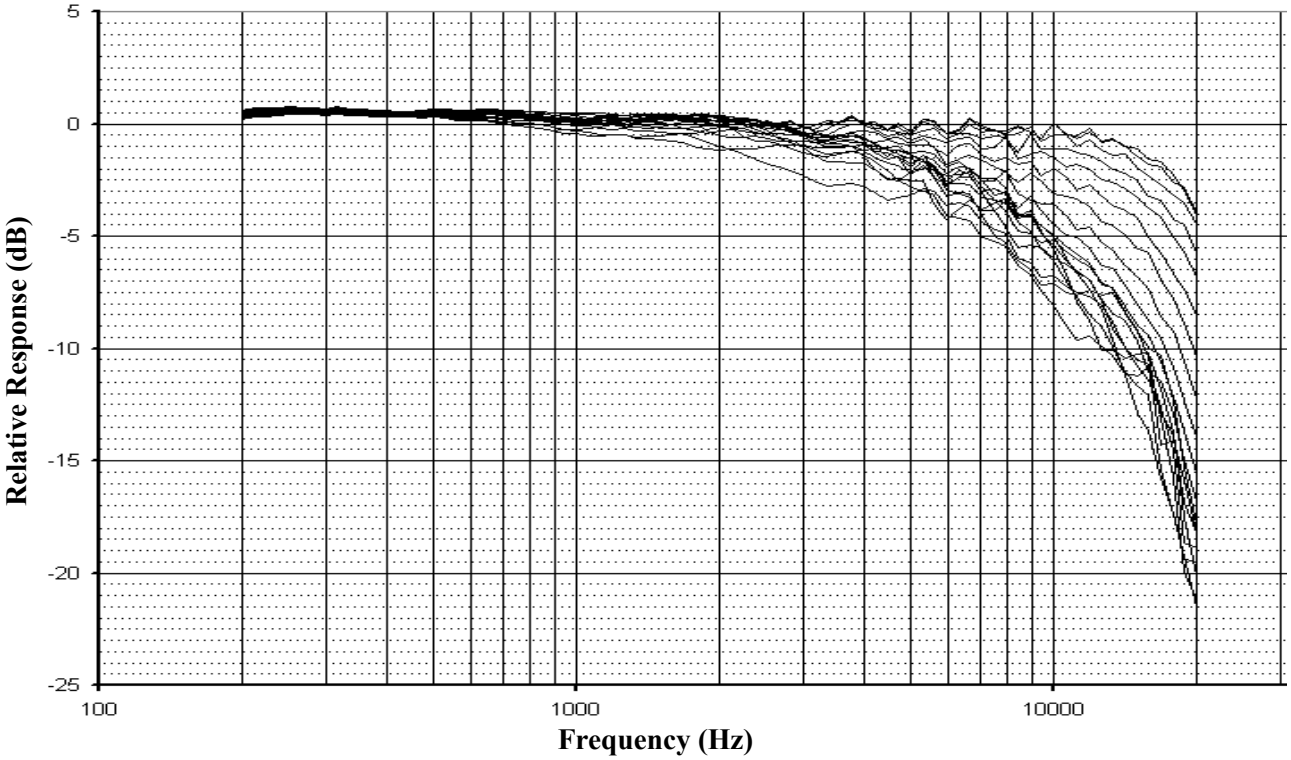

Figure 2–4 Zero to 180 degrees incidence angle

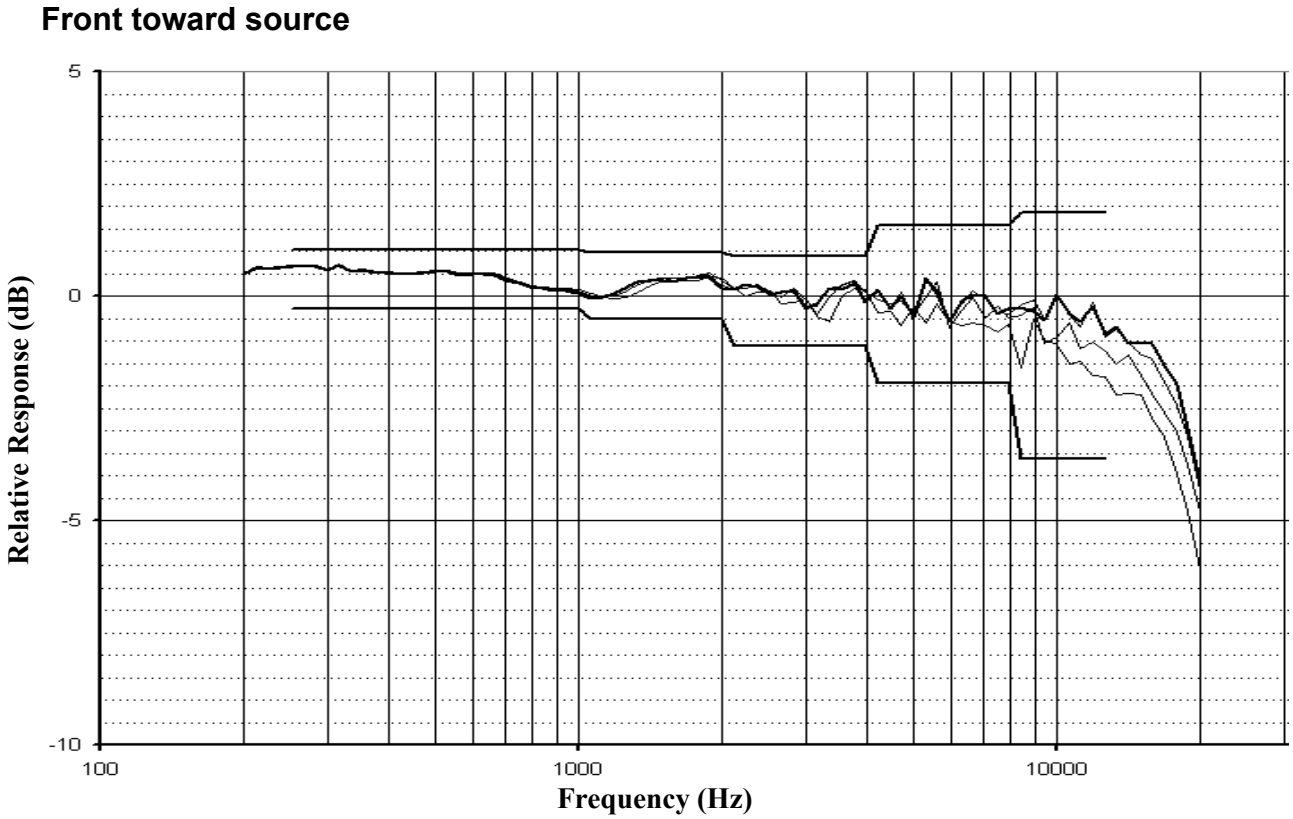

Figure 2–5 Zero to 30 degrees incidence angle

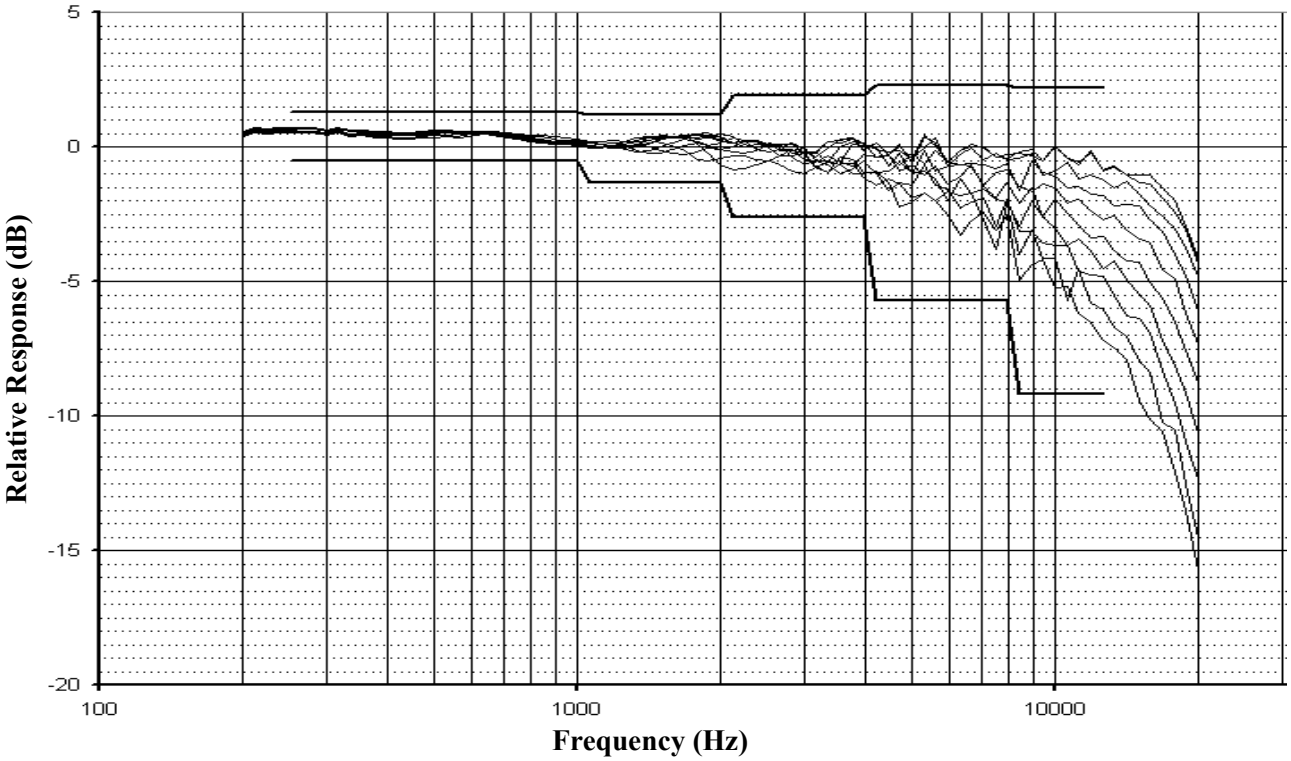

Figure 2–6 Zero to 90 degrees incidence angle

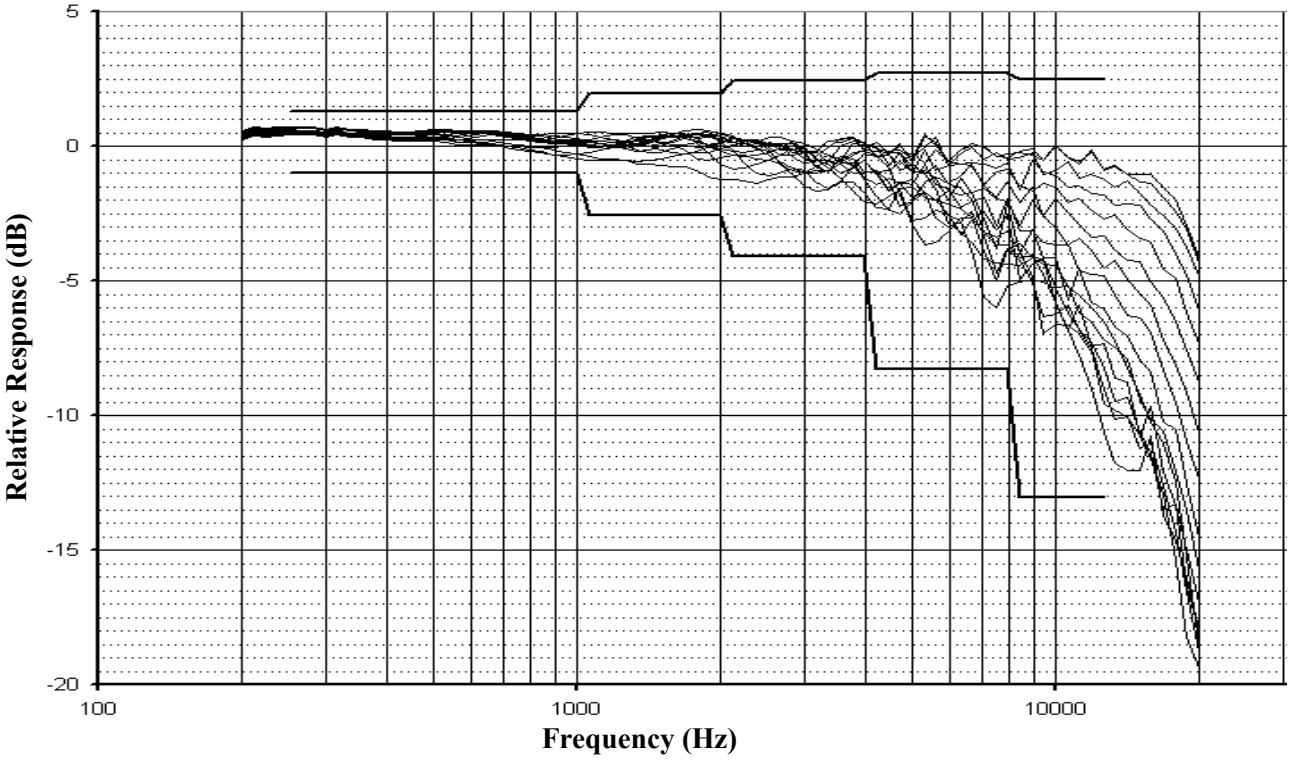

Figure 2–7 Zero to 150 degrees incidence angle

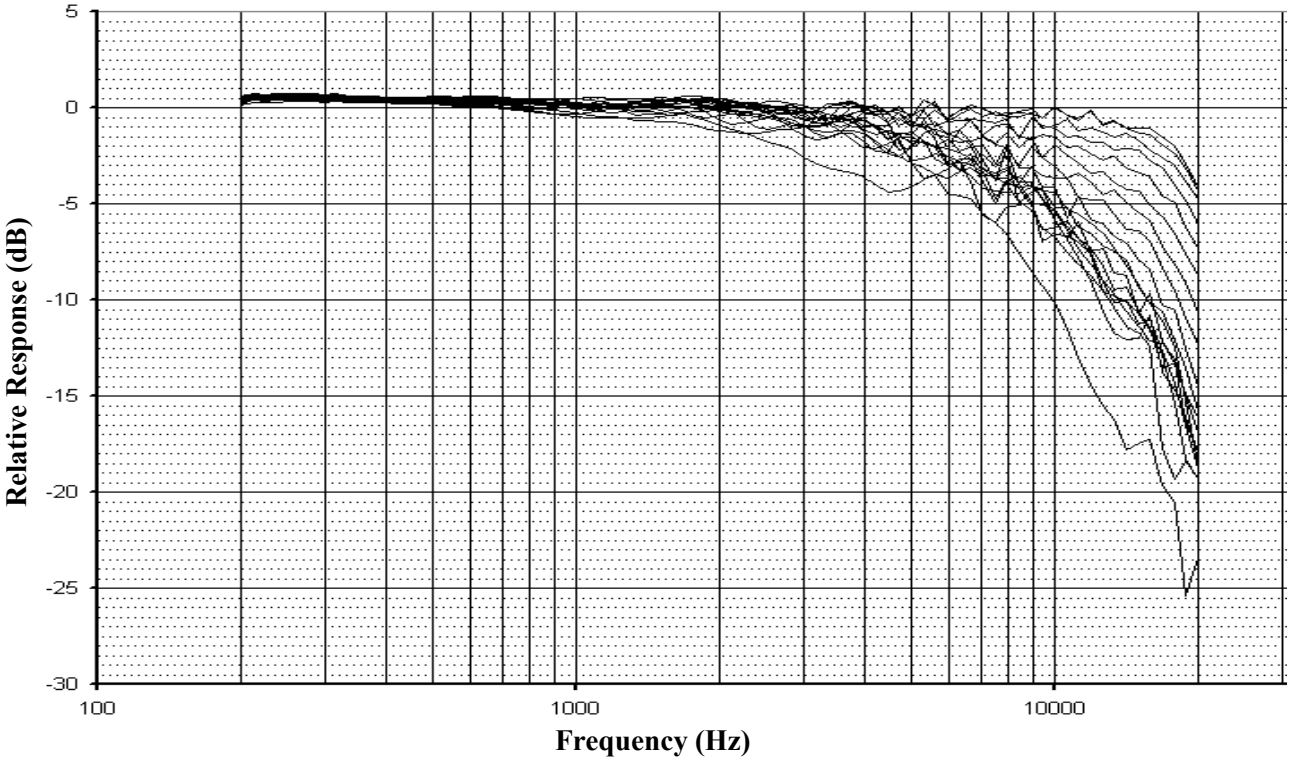

Figure 2–8 Zero to 180 degrees incidence angle

Random incidence frequency response

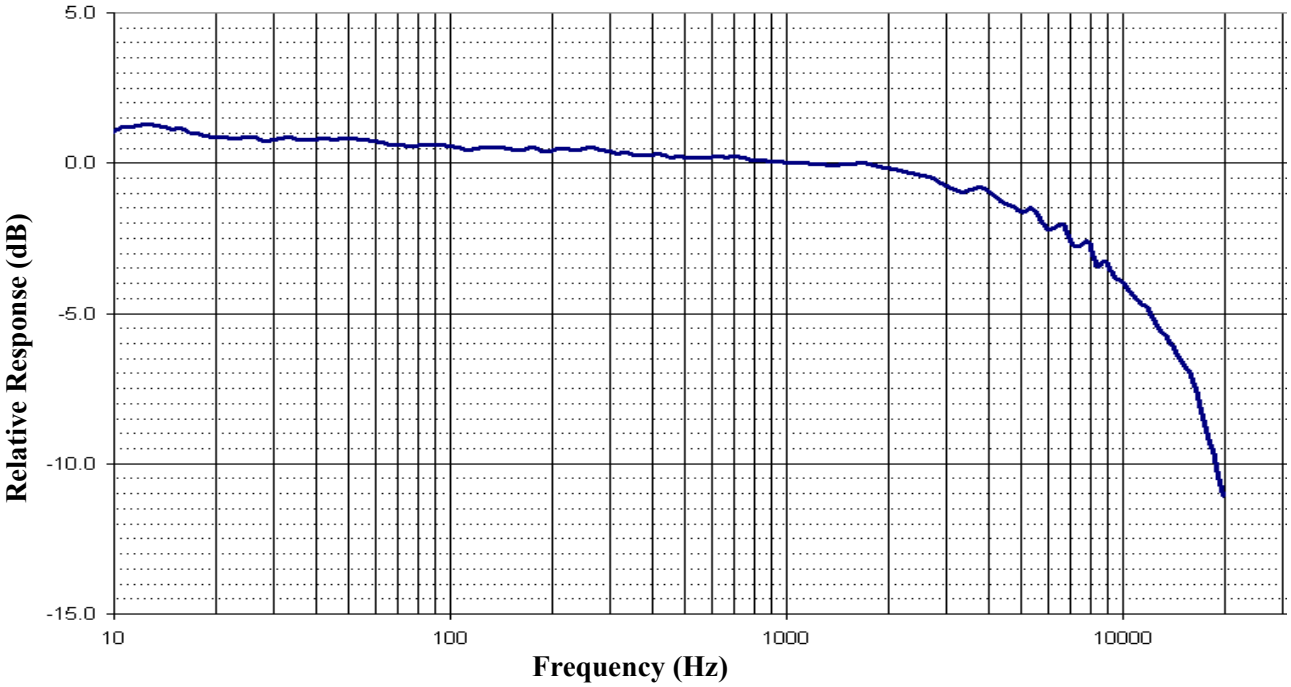

Figure 2–9 Random incidence angle

Acoustic corrections

Table 2–1: Acoustic corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.26	**1334**	-0.31	**5623**	-0.11
13	-1.50	**1413**	-0.34	**5957**	0.33
16	-1.39	**1496**	-0.33	**6310**	0.27
20	-1.11	**1585**	-0.26	**6683**	-0.30
25	-0.99	**1679**	-0.25	**7079**	0.13
32	-1.04	**1778**	-0.35	**7499**	0.25
40	-1.01	**1884**	-0.34	**7943**	0.24
50	-1.04	**1995**	-0.18	**8414**	0.10
63	-0.91	**2113**	-0.15	**8913**	0.35
79	-0.79	**2239**	-0.23	**9441**	0.62
100	-0.78	**2371**	-0.19	**10000**	-0.03
126	-0.65	**2512**	0.02	**10593**	0.39
158	-0.66	**2661**	-0.06	**11220**	0.56
200	-0.62	**2818**	-0.06	**11885**	0.29
251	-0.72	**2985**	0.27	**12589**	0.65
316	-0.55	**3162**	0.05	**13335**	0.49
398	-0.48	**3350**	-0.15	**14125**	0.85
501	-0.41	**3548**	-0.06	**14962**	0.89
631	-0.42	**3758**	-0.34	**15849**	1.35
794	-0.16	**3981**	0.00	**16788**	1.54
1000	0.00	**4217**	-0.12	**17783**	2.04
1059	0.07	**4467**	0.27	**18836**	2.64
1122	0.05	**4732**	0.03	**19953**	3.71
1189	-0.04	**5012**	0.29		
1259	-0.16	**5309**	-0.21		

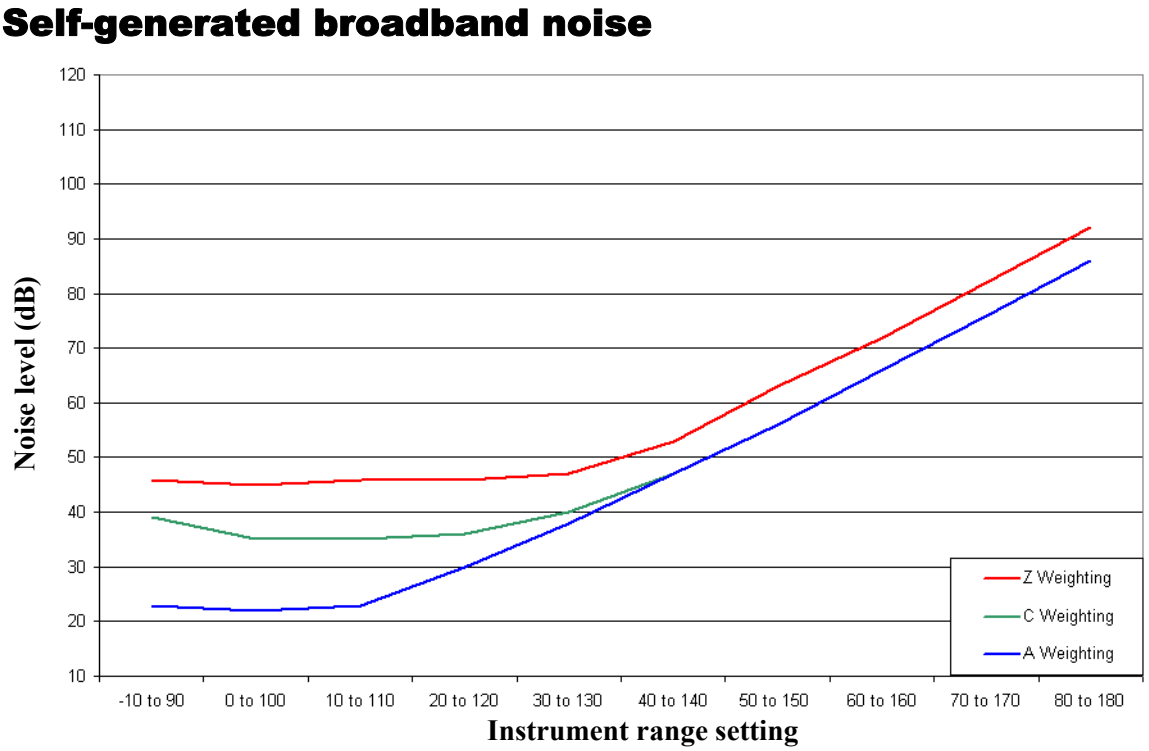

Figure 2–10 Broadband noise

2. With windscreen

Directional frequency response

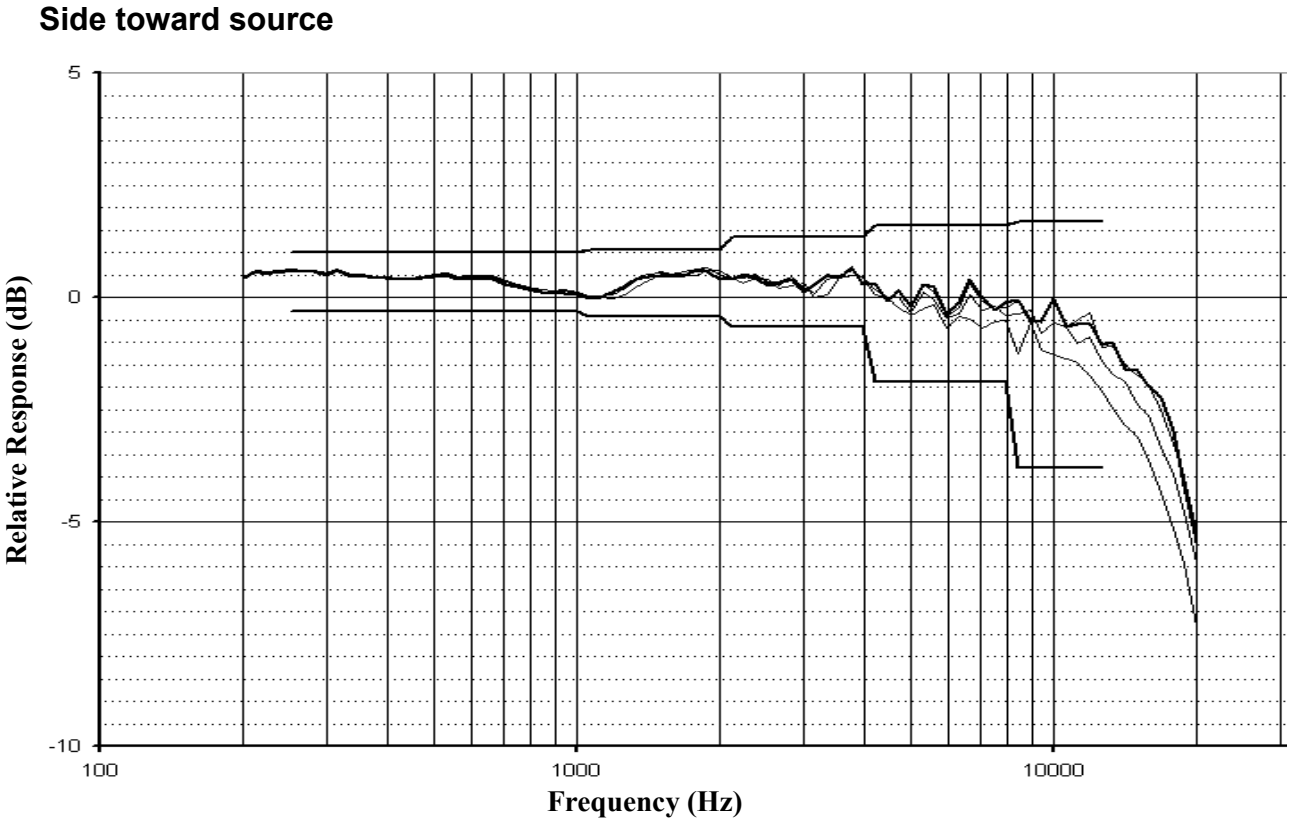

Figure 2–11 Zero to 30 degrees incidence angle

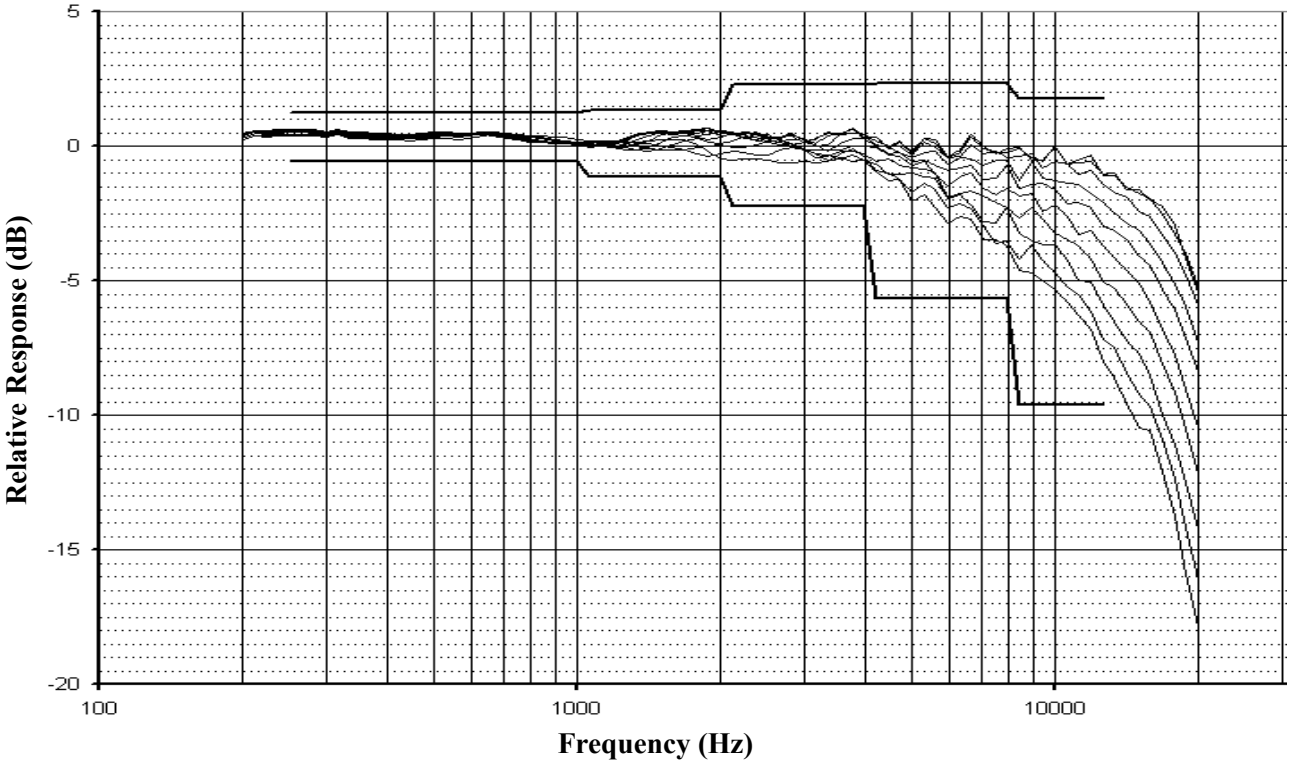

Figure 2–12 Zero to 90 degrees incidence angle

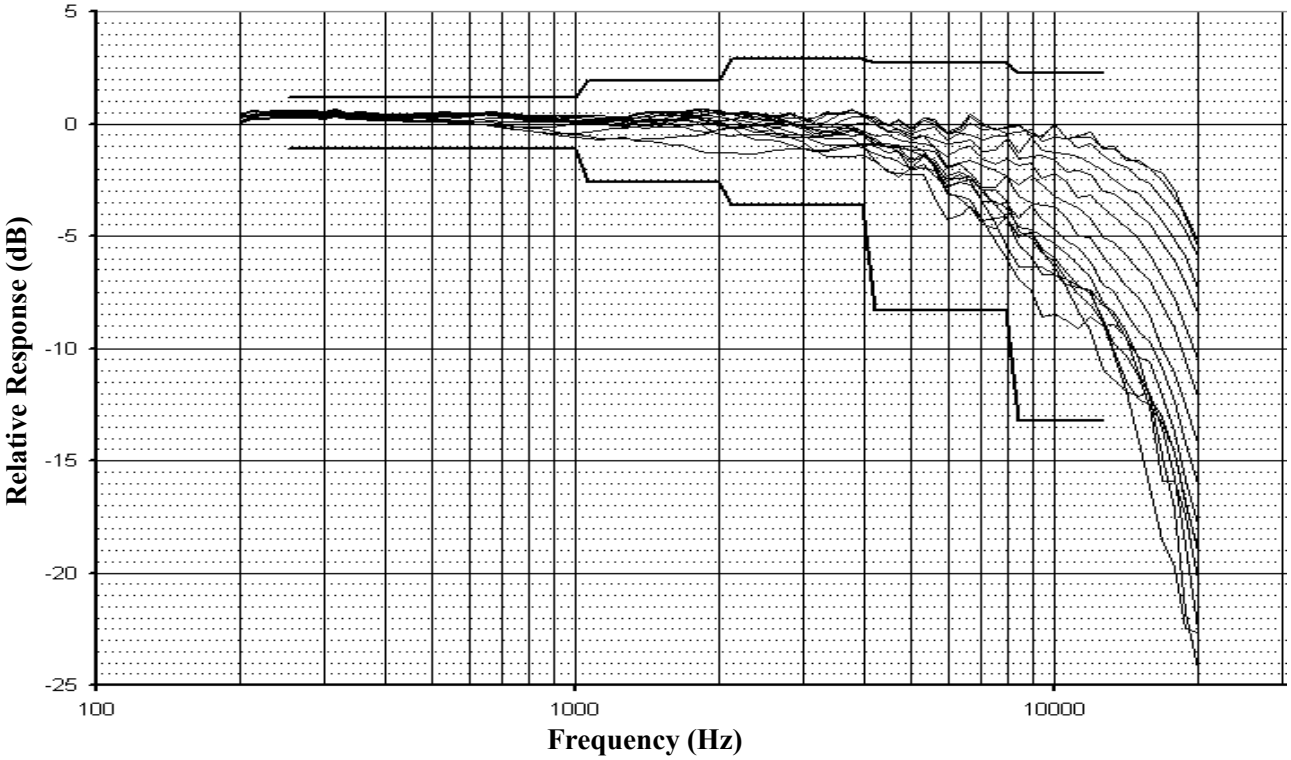

Figure 2–13 Zero to 150 degrees incidence angle

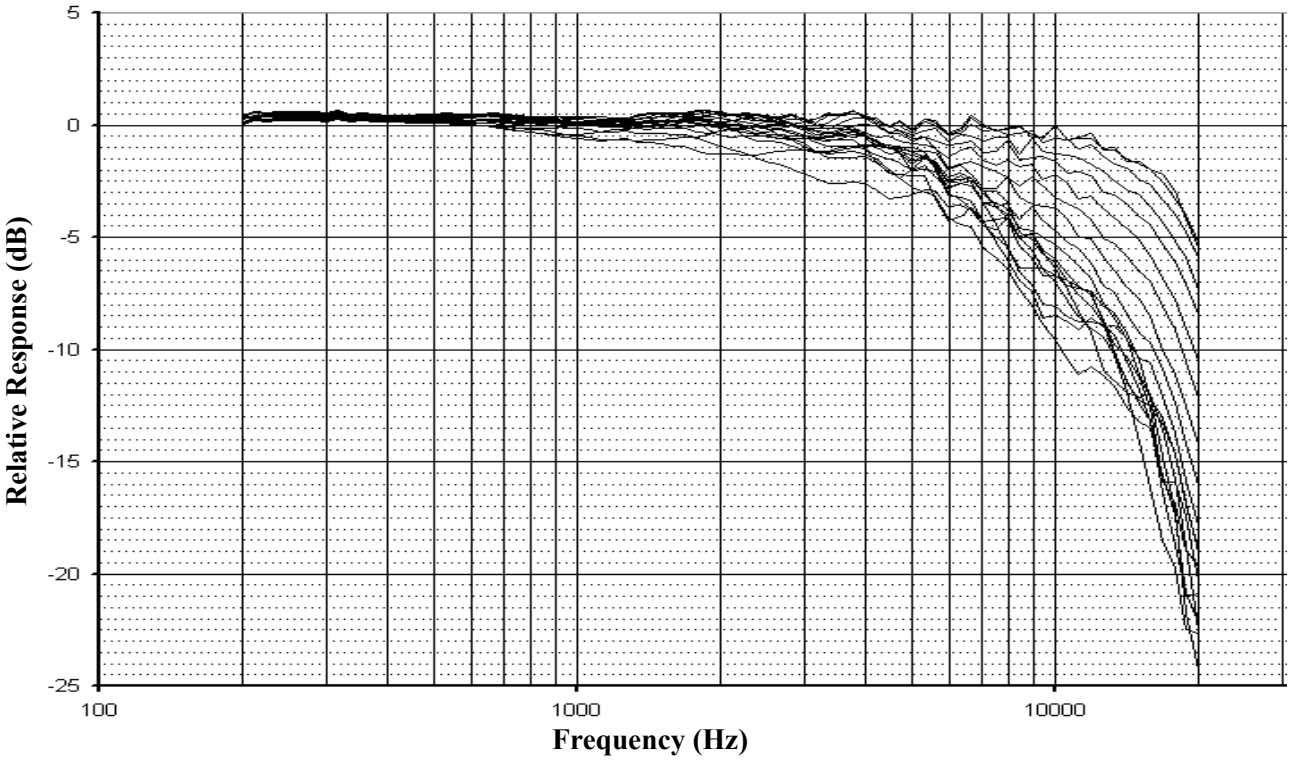

Figure 2–14 Zero to 180 degrees incidence angle

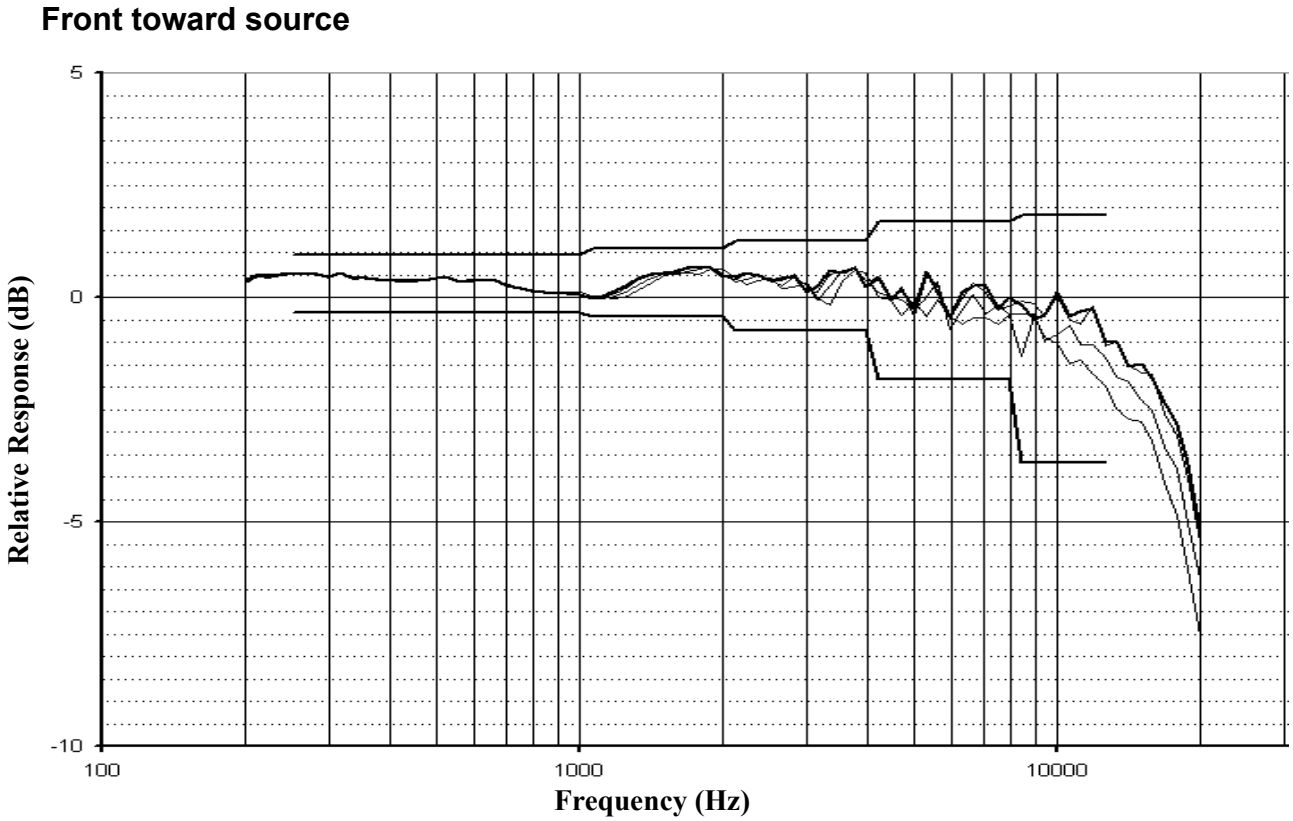

Figure 2–15 Zero to 30 degrees incidence angle

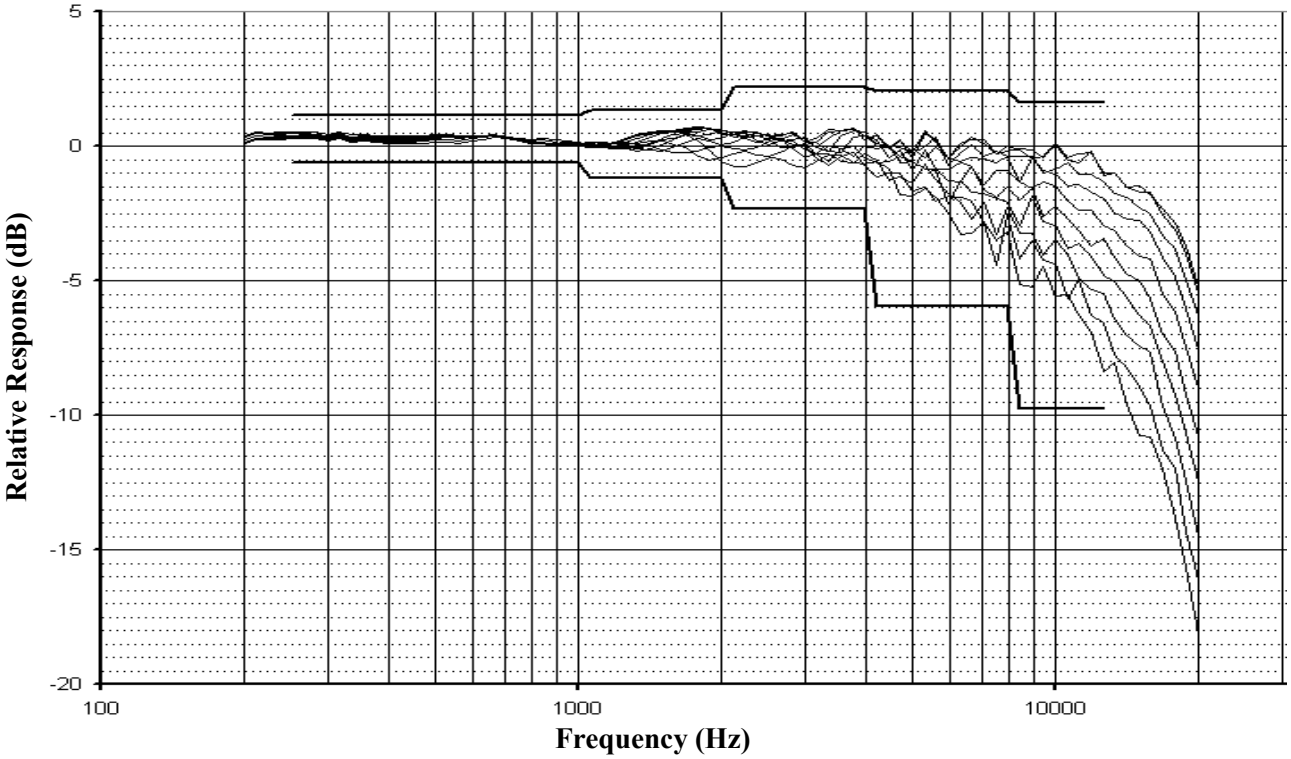

Figure 2–16 Zero to 90 degrees incidence angle

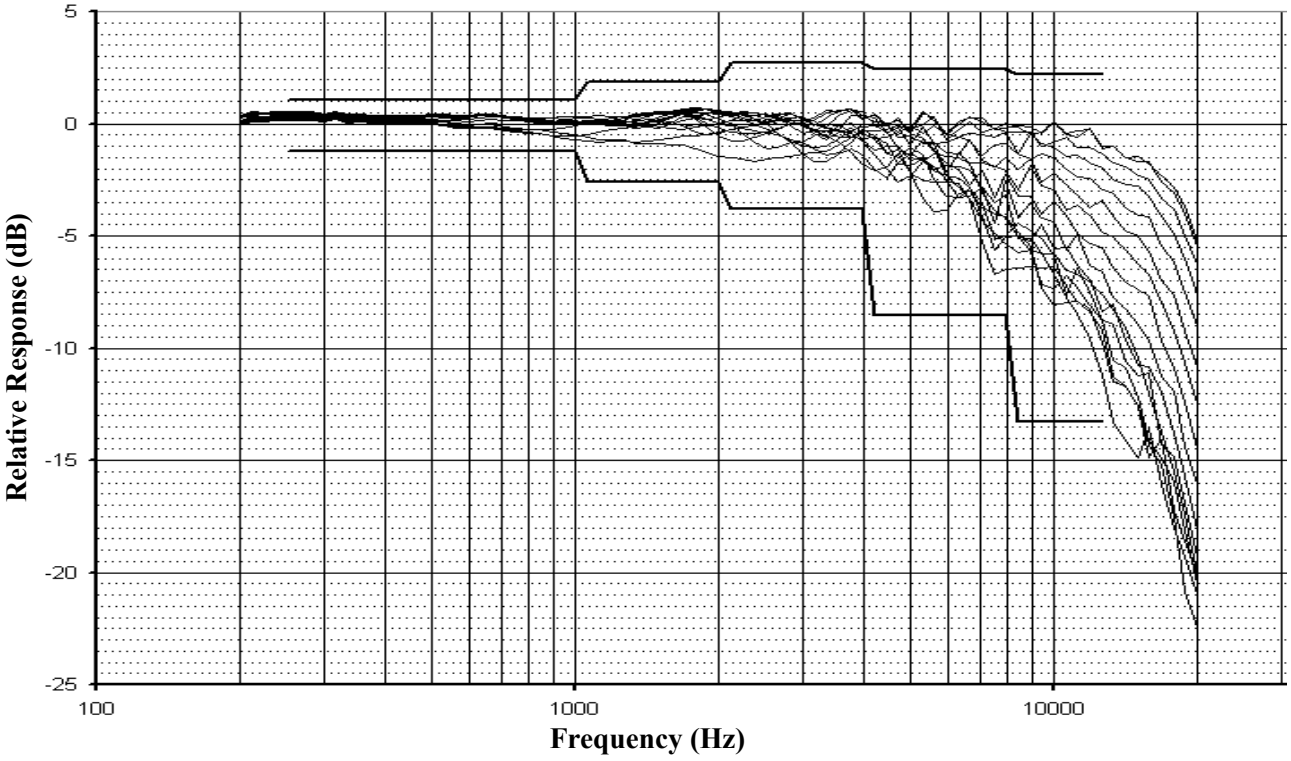

Figure 2–17 Zero to 150 degrees incidence angle

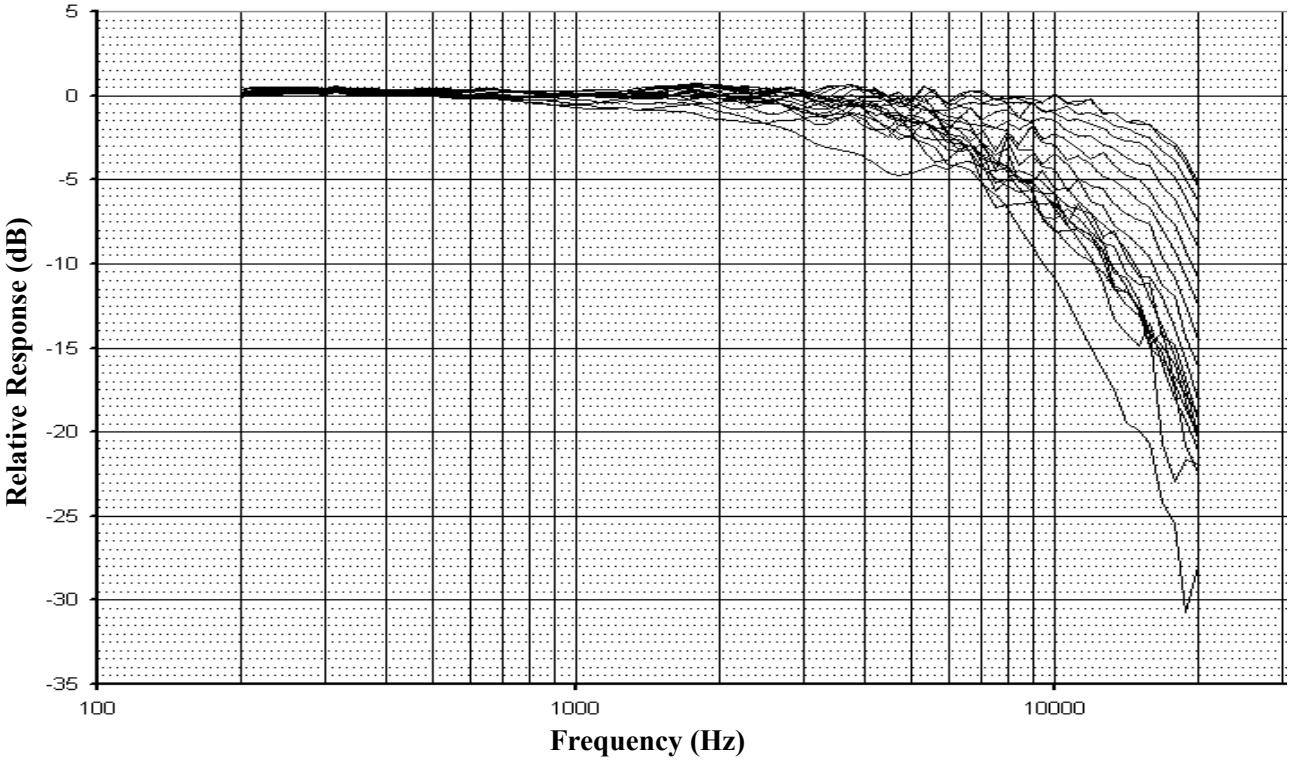

Figure 2–18 Zero to 180 degrees incidence angle

Random incidence frequency response

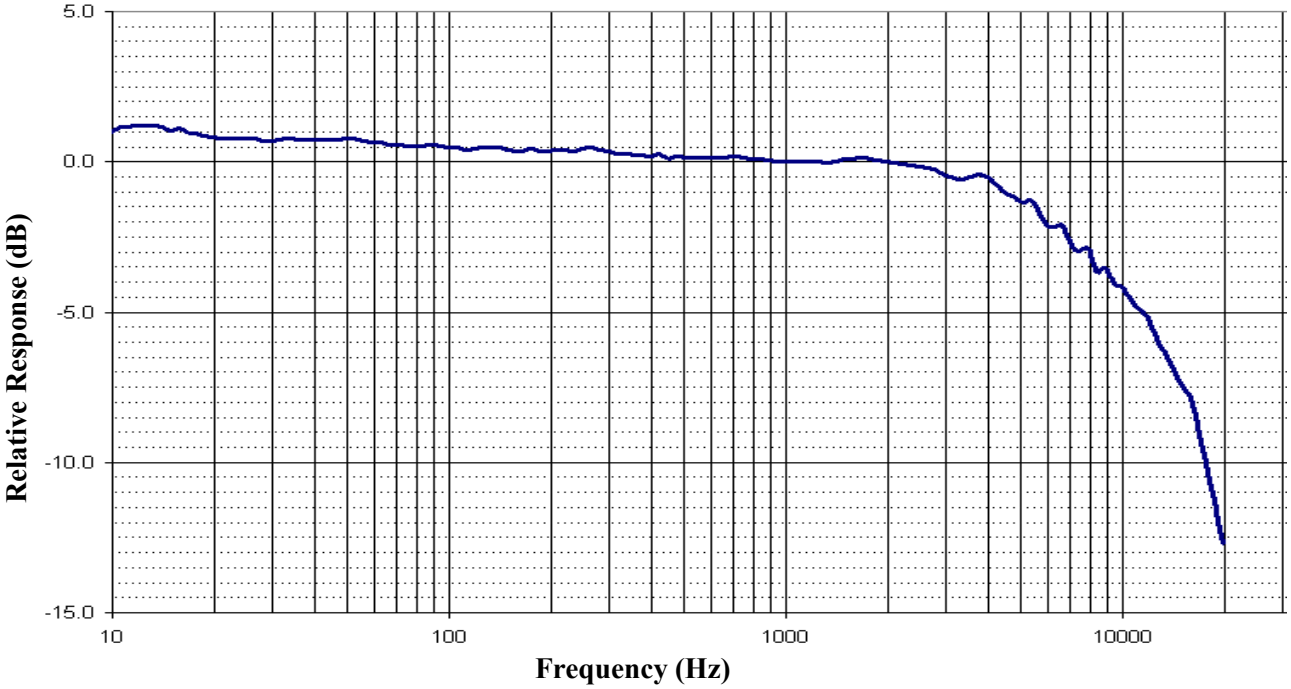

Figure 2–19 Random incidence angle

Acoustic corrections

Table 2–2: Acoustic corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.26	**1334**	-0.31	**5623**	-0.11
13	-1.50	**1413**	-0.34	**5957**	0.33
16	-1.39	**1496**	-0.33	**6310**	0.27
20	-1.11	**1585**	-0.26	**6683**	-0.30
25	-0.99	**1679**	-0.25	**7079**	0.13
32	-1.04	**1778**	-0.35	**7499**	0.25
40	-1.01	**1884**	-0.34	**7943**	0.24
50	-1.04	**1995**	-0.18	**8414**	0.10
63	-0.91	**2113**	-0.15	**8913**	0.35
79	-0.79	**2239**	-0.23	**9441**	0.62
100	-0.78	**2371**	-0.19	**10000**	-0.03
126	-0.65	**2512**	0.02	**10593**	0.39
158	-0.66	**2661**	-0.06	**11220**	0.56
200	-0.62	**2818**	-0.06	**11885**	0.29
251	-0.72	**2985**	0.27	**12589**	0.65
316	-0.55	**3162**	0.05	**13335**	0.49
398	-0.48	**3350**	-0.15	**14125**	0.85
501	-0.41	**3548**	-0.06	**14962**	0.89
631	-0.42	**3758**	-0.34	**15849**	1.35
794	-0.16	**3981**	0.00	**16788**	1.54
1000	0.00	**4217**	-0.12	**17783**	2.04
1059	0.07	**4467**	0.27	**18836**	2.64
1122	0.05	**4732**	0.03	**19953**	3.71
1189	-0.04	**5012**	0.29		
1259	-0.16	**5309**	-0.21		

Windscreen corrections

Table 2–3: Windscreen corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.09	**1334**	-0.08	**5623**	-0.10
13	0.09	**1413**	-0.10	**5957**	-0.05
16	0.09	**1496**	-0.13	**6310**	-0.12
20	0.09	**1585**	-0.18	**6683**	-0.17
25	0.09	**1679**	-0.22	**7079**	-0.11
32	0.09	**1778**	-0.23	**7499**	-0.06
40	0.09	**1884**	-0.22	**7943**	-0.19
50	0.09	**1995**	-0.23	**8414**	-0.05
63	0.09	**2113**	-0.24	**8913**	0.15
79	0.09	**2239**	-0.25	**9441**	-0.12
100	0.09	**2371**	-0.26	**10000**	0.05
126	0.09	**2512**	-0.28	**10593**	0.21
158	0.09	**2661**	-0.29	**11220**	-0.04
200	0.09	**2818**	-0.31	**11885**	0.20
251	0.09	**2985**	-0.33	**12589**	0.30
316	0.09	**3162**	-0.34	**13335**	0.38
398	0.09	**3350**	-0.35	**14125**	0.59
501	0.09	**3548**	-0.36	**14962**	0.53
631	0.07	**3758**	-0.34	**15849**	0.39
794	0.04	**3981**	-0.29	**16788**	0.51
1000	0.00	**4217**	-0.22	**17783**	0.69
1059	-0.02	**4467**	-0.20	**18836**	1.28
1122	-0.03	**4732**	-0.14	**19953**	1.38
1189	-0.05	**5012**	-0.12		
1259	-0.06	**5309**	-0.08		

Self-generated broadband noise

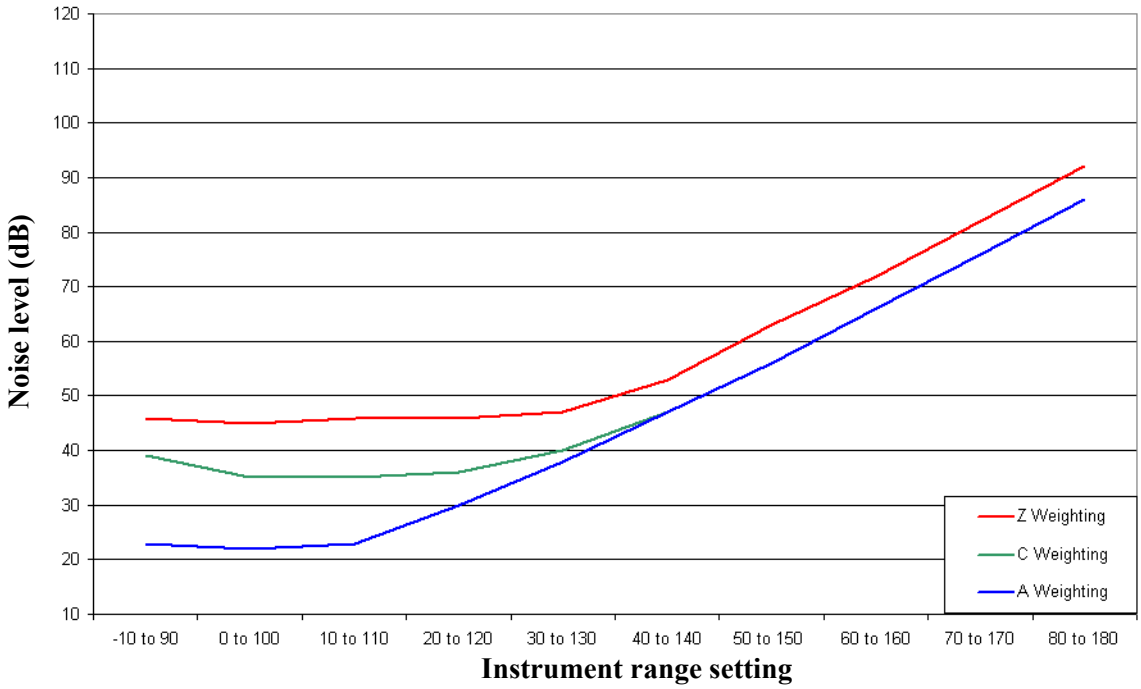

Figure 2–20 Broadband noise

3. Remote microphone

Directional frequency response

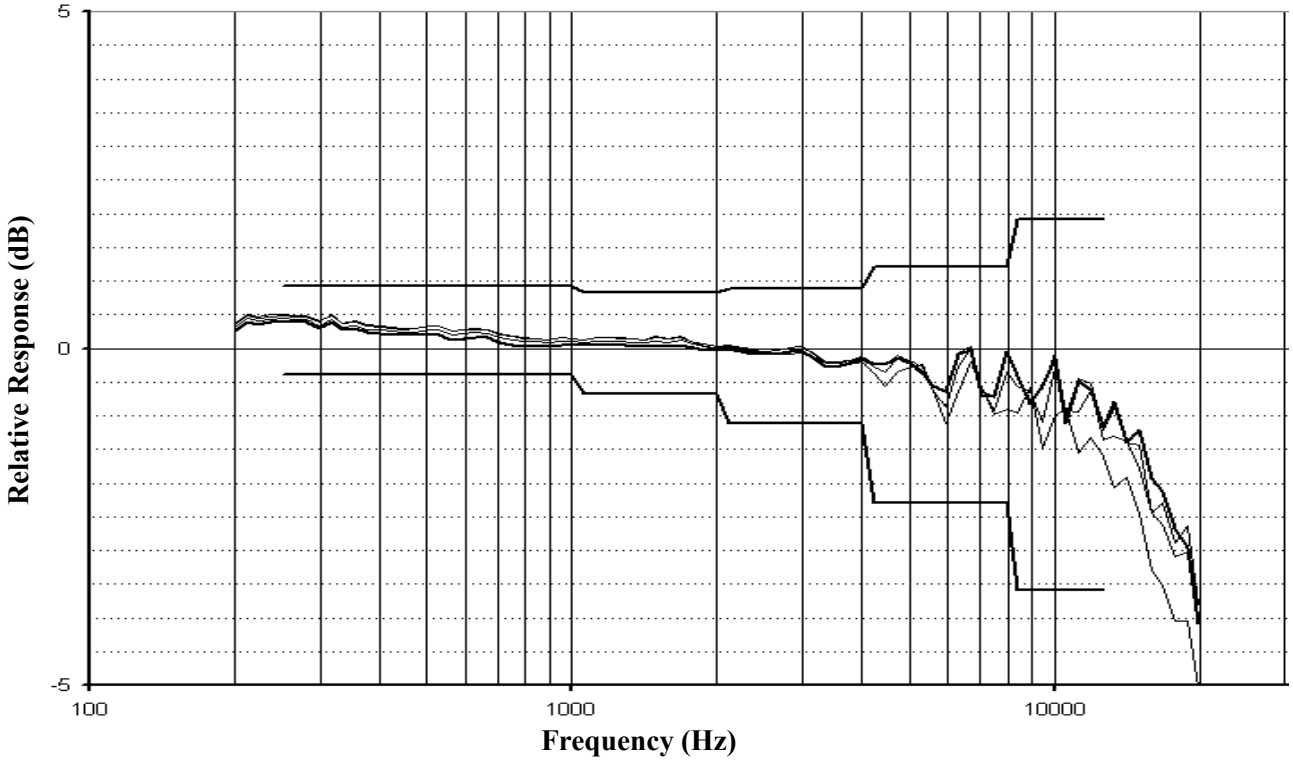

Figure 2–21 Zero to 30 degrees incidence angle

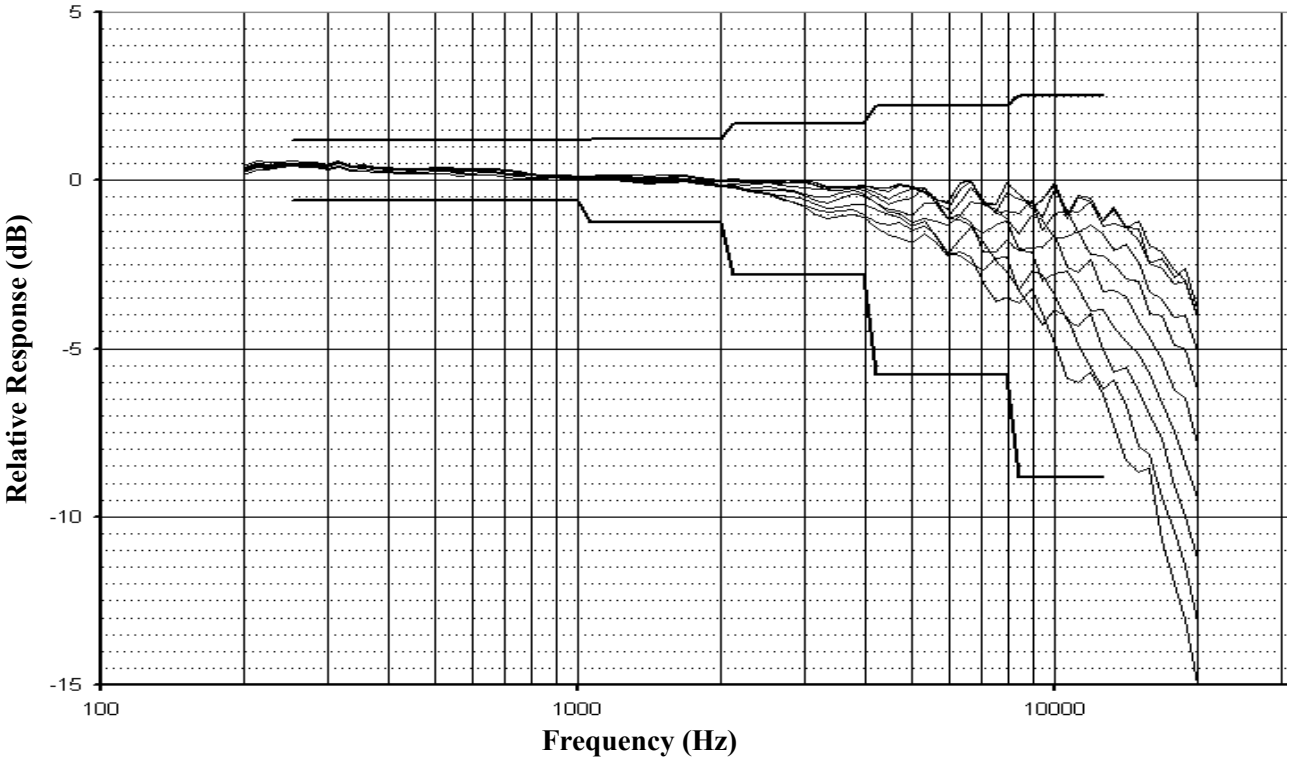

Figure 2–22 Zero to 90 degrees incidence angle

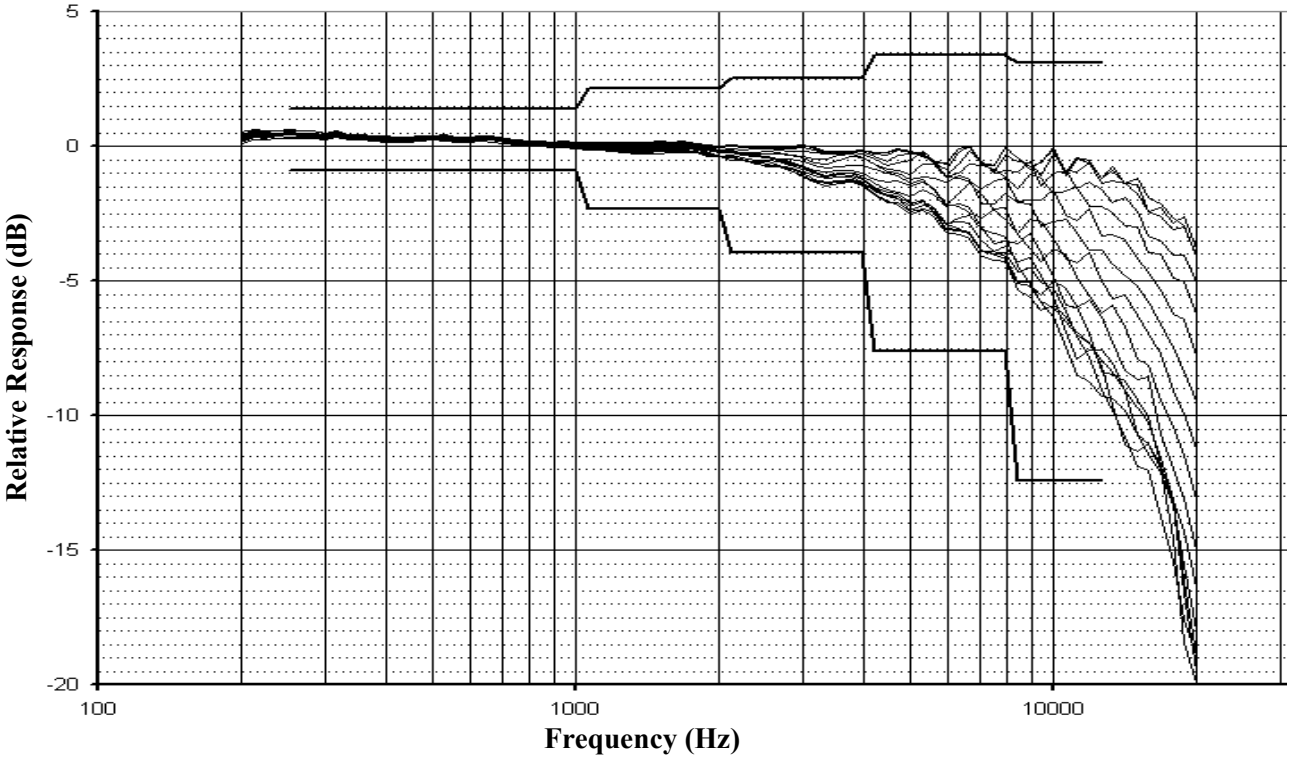

Figure 2–23 Zero to 150 degrees incidence angle

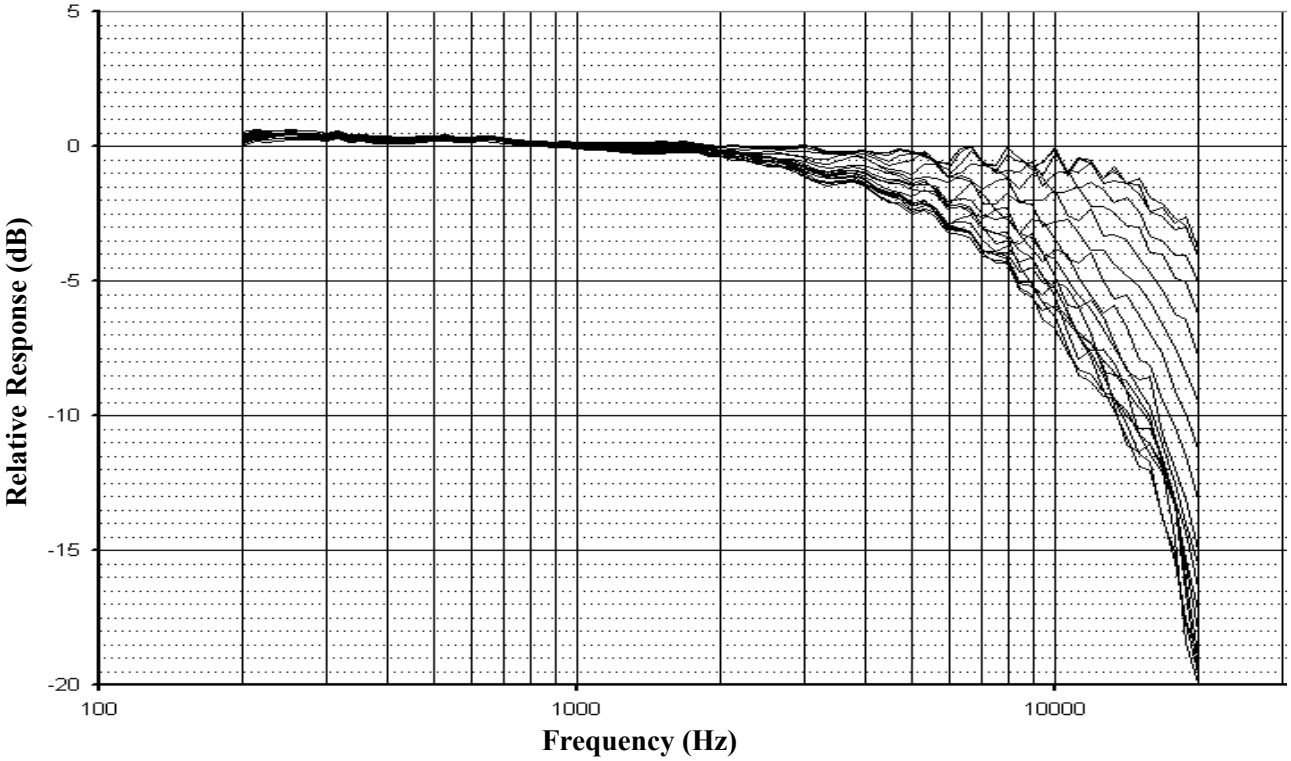

Figure 2–24 Zero to 180 degrees incidence angle

Random incidence frequency response

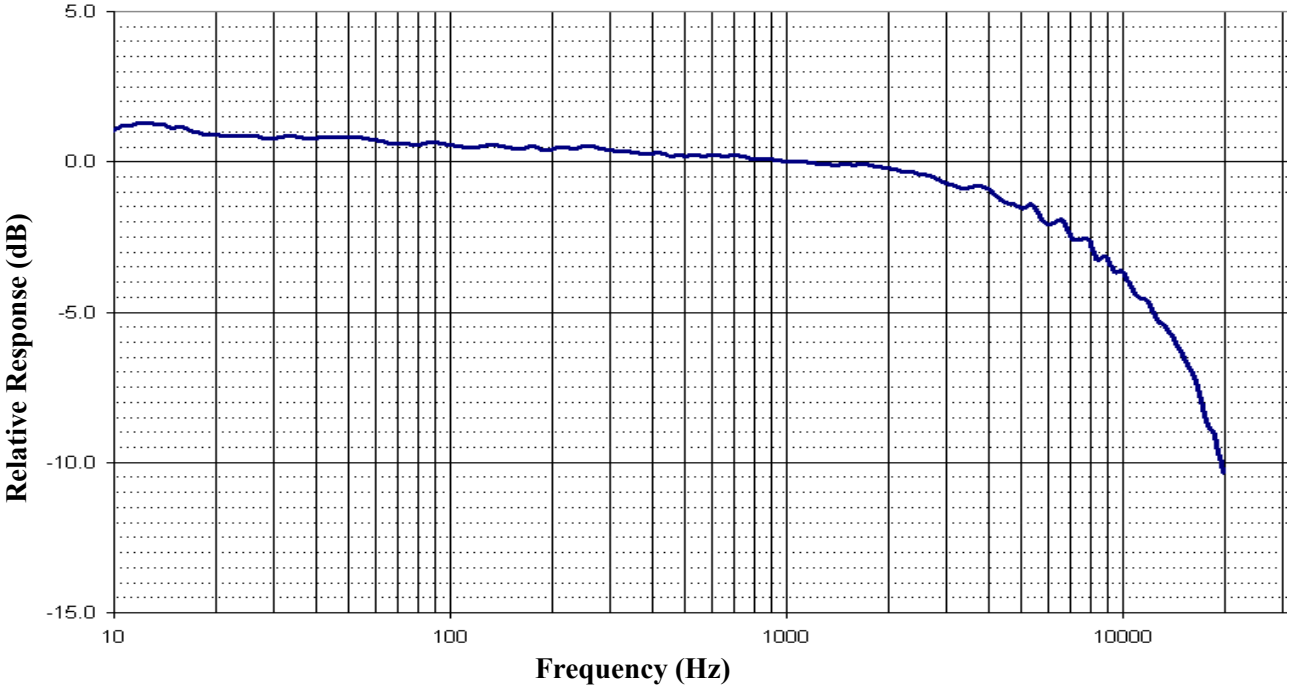

Figure 2–25 Random incidence angle

Acoustic corrections

Table 2–4: Acoustic corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.92	**1334**	-0.02	**5623**	0.57
13	-1.16	**1413**	-0.01	**5957**	0.55
16	-1.05	**1496**	-0.03	**6310**	0.11
20	-0.77	**1585**	-0.02	**6683**	-0.04
25	-0.74	**1679**	-0.03	**7079**	0.73
32	-0.70	**1778**	0.00	**7499**	0.63
40	-0.67	**1884**	0.04	**7943**	-0.02
50	-0.70	**1995**	0.03	**8414**	0.41
63	-0.58	**2113**	0.03	**8913**	0.80
79	-0.45	**2239**	0.06	**9441**	0.52
100	-0.45	**2371**	0.06	**10000**	0.13
126	-0.40	**2512**	0.08	**10593**	1.05
158	-0.32	**2661**	0.06	**11220**	0.40
200	-0.28	**2818**	0.08	**11885**	0.53
251	-0.38	**2985**	0.08	**12589**	1.07
316	-0.21	**3162**	0.13	**13335**	0.64
398	-0.15	**3350**	0.27	**14125**	1.23
501	-0.07	**3548**	0.27	**14962**	1.00
631	-0.08	**3758**	0.21	**15849**	1.68
794	0.00	**3981**	0.17	**16788**	1.97
1000	0.00	**4217**	0.21	**17783**	2.45
1059	-0.03	**4467**	0.21	**18836**	2.68
1122	-0.04	**4732**	0.15	**19953**	3.73
1189	-0.04	**5012**	0.21		
1259	-0.04	**5309**	0.35		

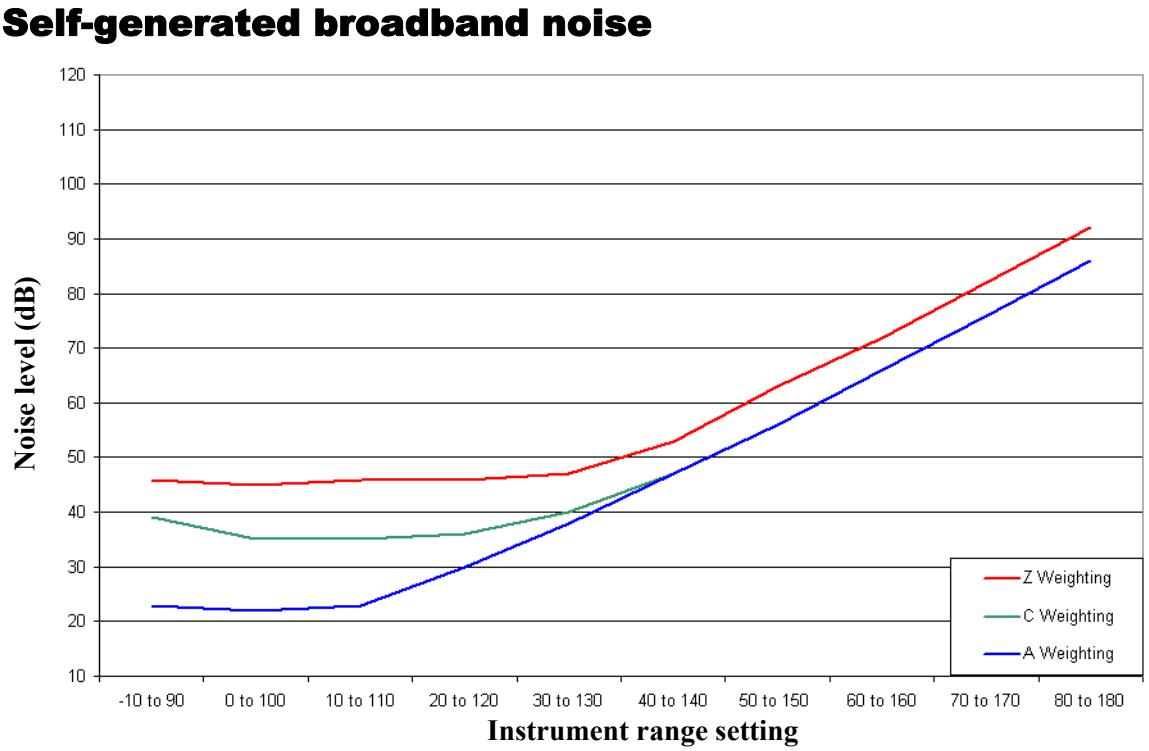

Figure 2–26 Broadband noise

4. Remote with windscreen

Directional frequency response

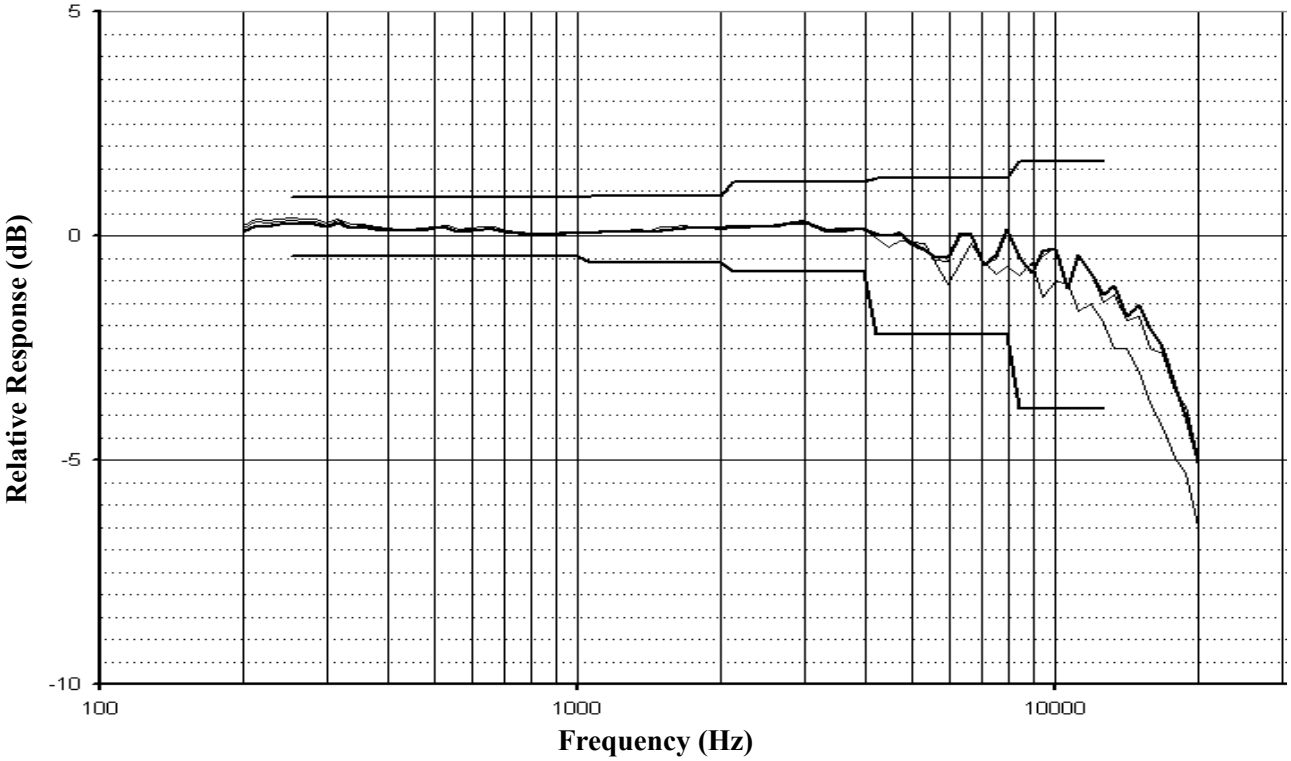

Figure 2–27 Zero to 30 degrees incidence angle

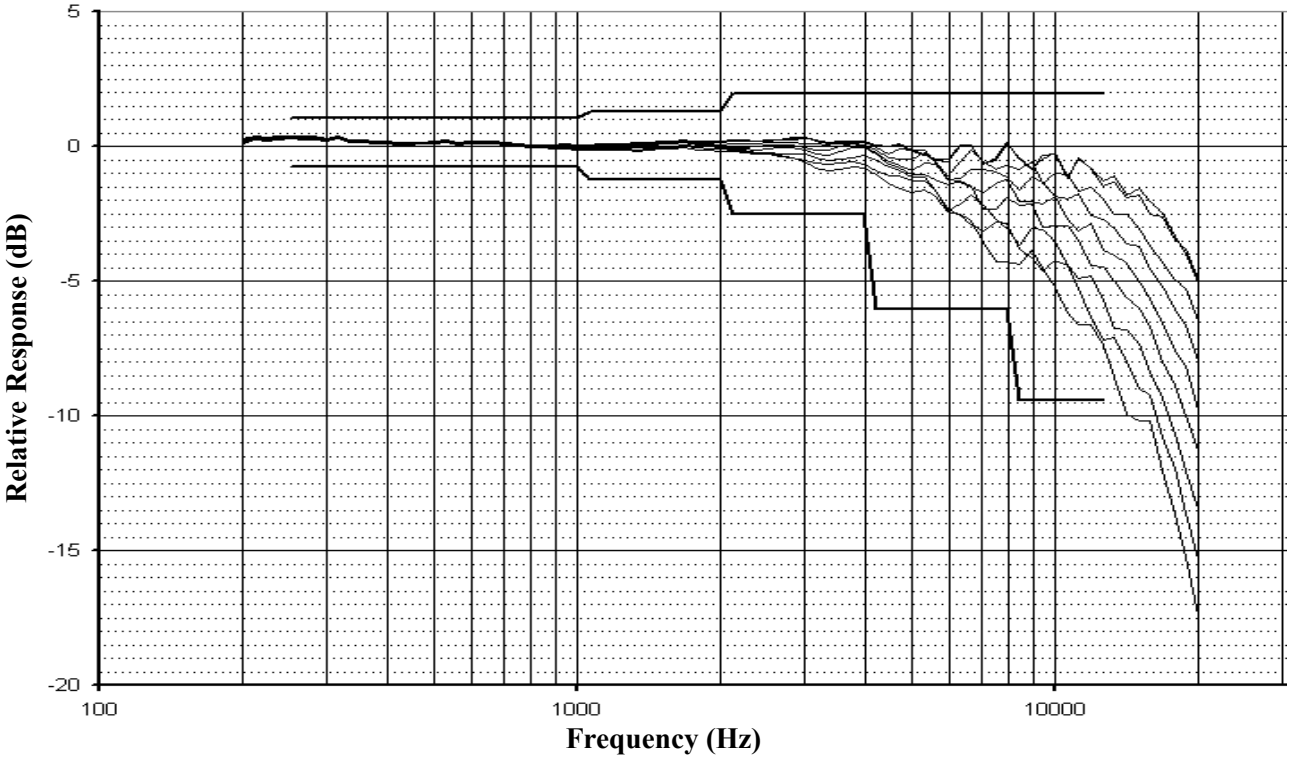

Figure 2–28 Zero to 90 degrees incidence angle

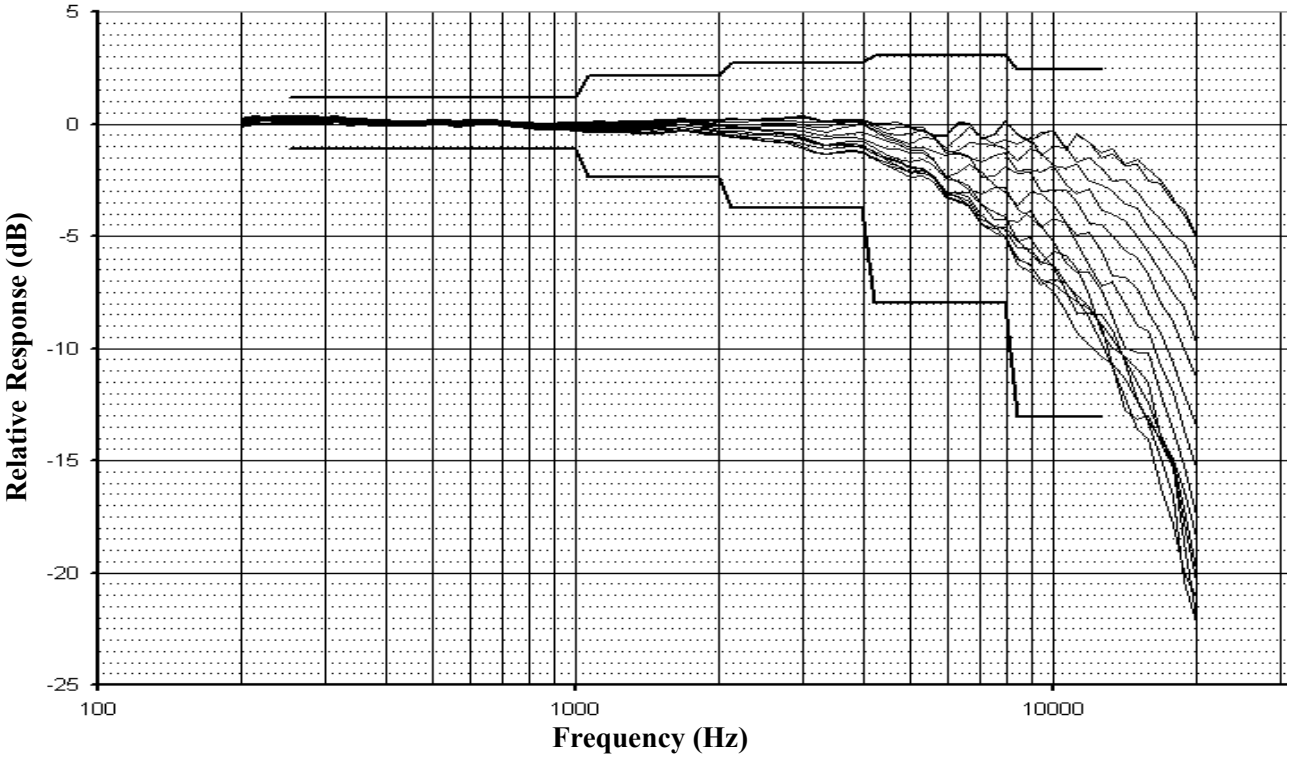

Figure 2–29 Zero to 150 degrees incidence angle

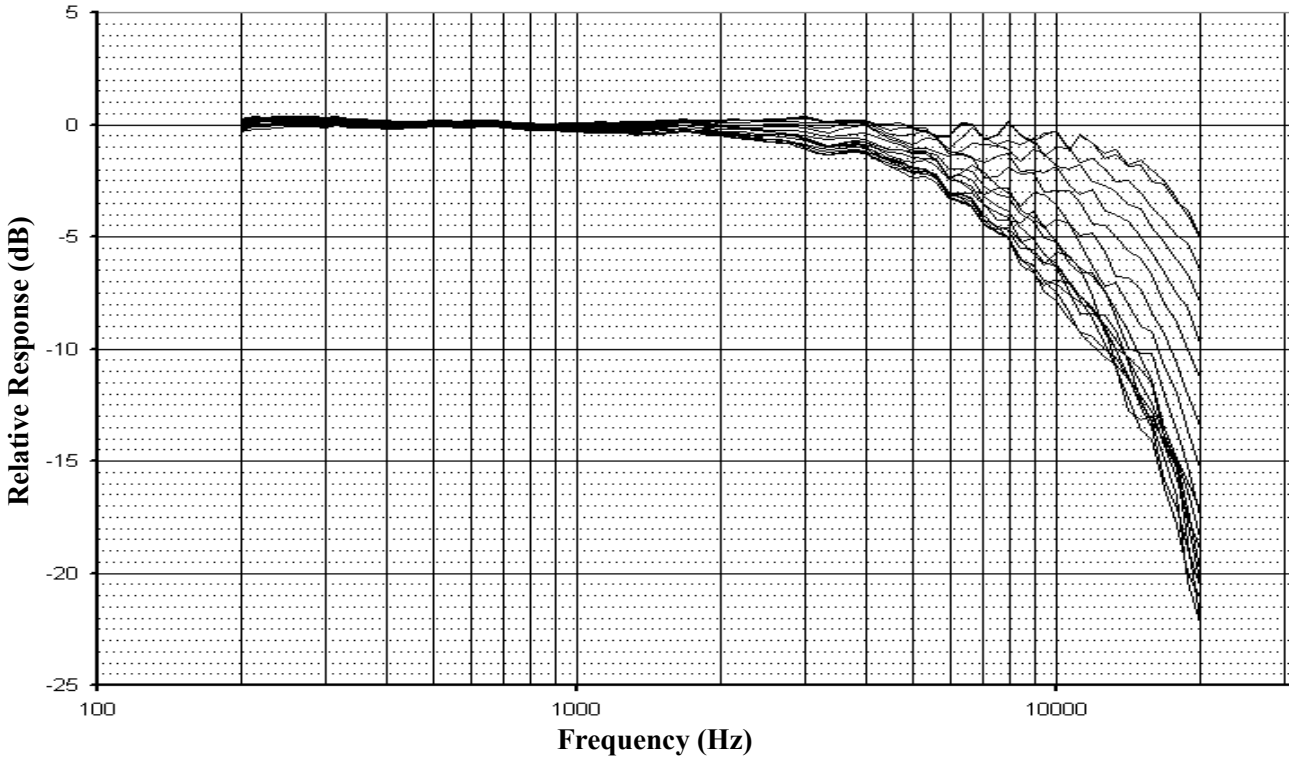

Figure 2–30 Zero to 180 degrees incidence angle

Random incidence frequency response

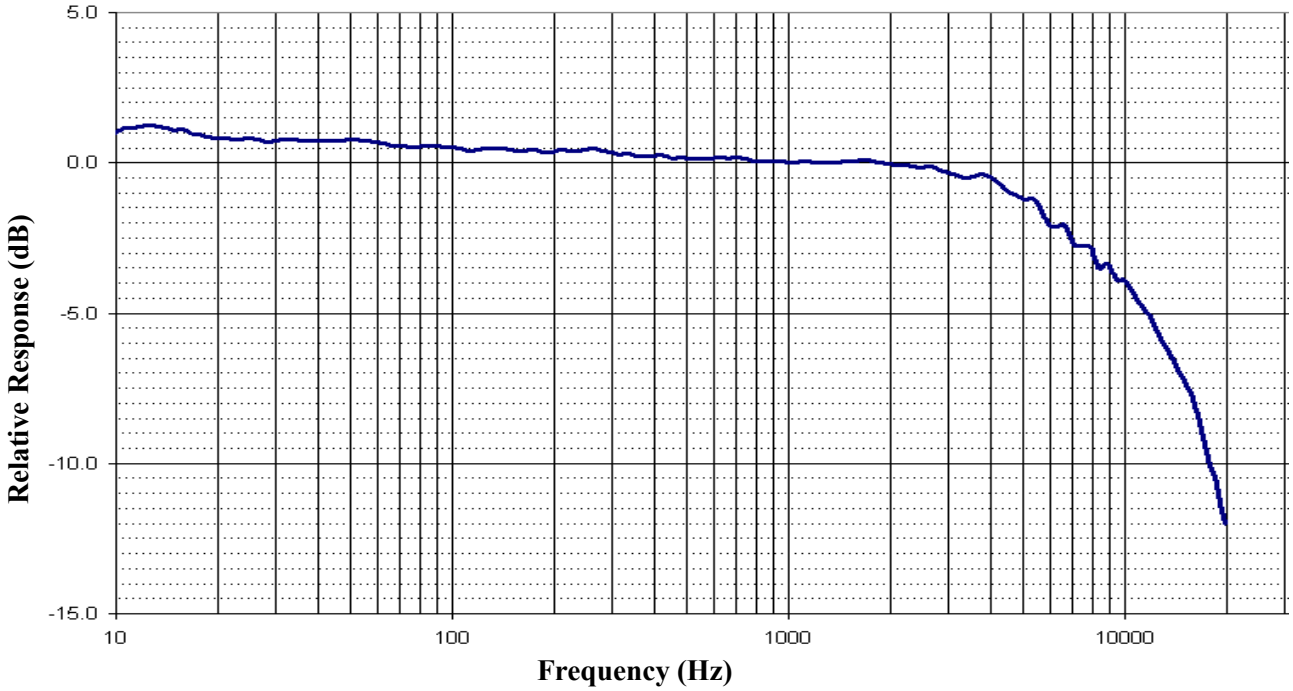

Figure 2–31 Random incidence angle

Acoustic corrections

Table 2–5: Acoustic corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.92	**1334**	-0.02	**5623**	0.57
13	-1.16	**1413**	-0.01	**5957**	0.55
16	-1.05	**1496**	-0.03	**6310**	0.11
20	-0.77	**1585**	-0.02	**6683**	-0.04
25	-0.74	**1679**	-0.03	**7079**	0.73
32	-0.70	**1778**	0.00	**7499**	0.63
40	-0.67	**1884**	0.04	**7943**	-0.02
50	-0.70	**1995**	0.03	**8414**	0.41
63	-0.58	**2113**	0.03	**8913**	0.80
79	-0.45	**2239**	0.06	**9441**	0.52
100	-0.45	**2371**	0.06	**10000**	0.13
126	-0.40	**2512**	0.08	**10593**	1.05
158	-0.32	**2661**	0.06	**11220**	0.40
200	-0.28	**2818**	0.08	**11885**	0.53
251	-0.38	**2985**	0.08	**12589**	1.07
316	-0.21	**3162**	0.13	**13335**	0.64
398	-0.15	**3350**	0.27	**14125**	1.23
501	-0.07	**3548**	0.27	**14962**	1.00
631	-0.08	**3758**	0.21	**15849**	1.68
794	0.00	**3981**	0.17	**16788**	1.97
1000	0.00	**4217**	0.21	**17783**	2.45
1059	-0.03	**4467**	0.21	**18836**	2.68
1122	-0.04	**4732**	0.15	**19953**	3.73
1189	-0.04	**5012**	0.21		
1259	-0.04	**5309**	0.35		

Windscreen corrections

Table 2–6: Windscreen corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.06	**1334**	-0.05	**5623**	-0.07
13	0.06	**1413**	-0.04	**5957**	-0.15
16	0.06	**1496**	-0.08	**6310**	-0.14
20	0.06	**1585**	-0.10	**6683**	-0.06
25	0.06	**1679**	-0.12	**7079**	-0.05
32	0.06	**1778**	-0.15	**7499**	-0.29
40	0.06	**1884**	-0.19	**7943**	-0.20
50	0.06	**1995**	-0.19	**8414**	0.07
63	0.06	**2113**	-0.24	**8913**	0.00
79	0.06	**2239**	-0.25	**9441**	-0.19
100	0.06	**2371**	-0.27	**10000**	0.14
126	0.06	**2512**	-0.30	**10593**	0.06
158	0.06	**2661**	-0.31	**11220**	-0.07
200	0.06	**2818**	-0.33	**11885**	0.20
251	0.06	**2985**	-0.34	**12589**	0.12
316	0.06	**3162**	-0.34	**13335**	0.32
398	0.06	**3350**	-0.36	**14125**	0.40
501	0.06	**3548**	-0.37	**14962**	0.34
631	0.03	**3758**	-0.37	**15849**	0.13
794	0.01	**3981**	-0.32	**16788**	0.36
1000	0.00	**4217**	-0.25	**17783**	0.67
1059	0.00	**4467**	-0.23	**18836**	1.07
1122	-0.03	**4732**	-0.20	**19953**	0.97
1189	-0.02	**5012**	-0.03		
1259	-0.01	**5309**	-0.05		

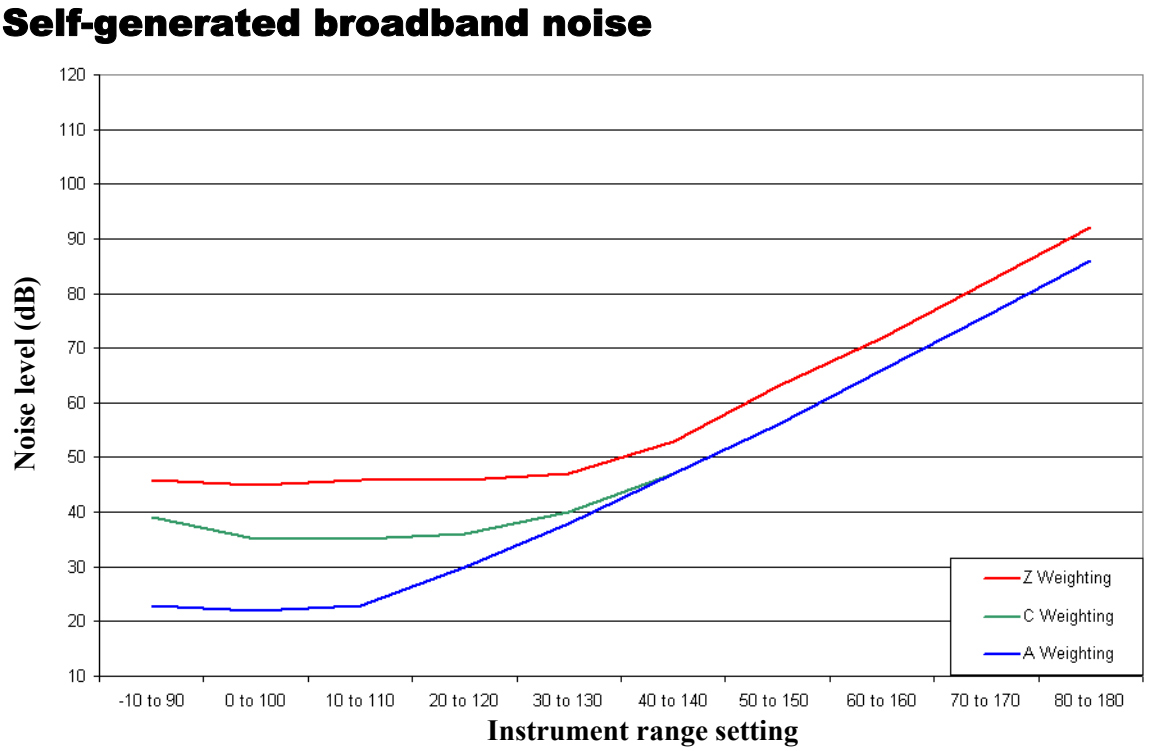

Figure 2–32 Broadband noise

5. With Random Incidence Corrector

Directional frequency response

Side toward source

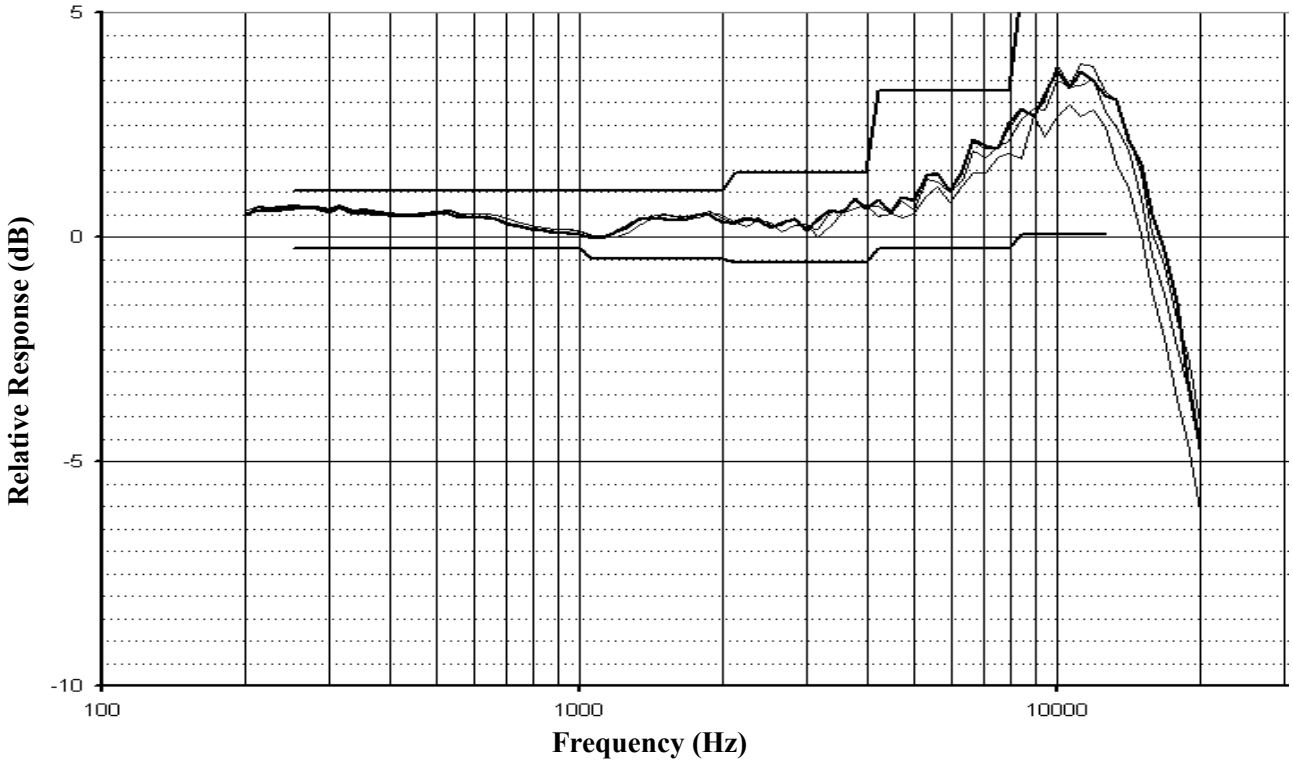

Figure 2–33 Zero to 30 degrees incidence angle

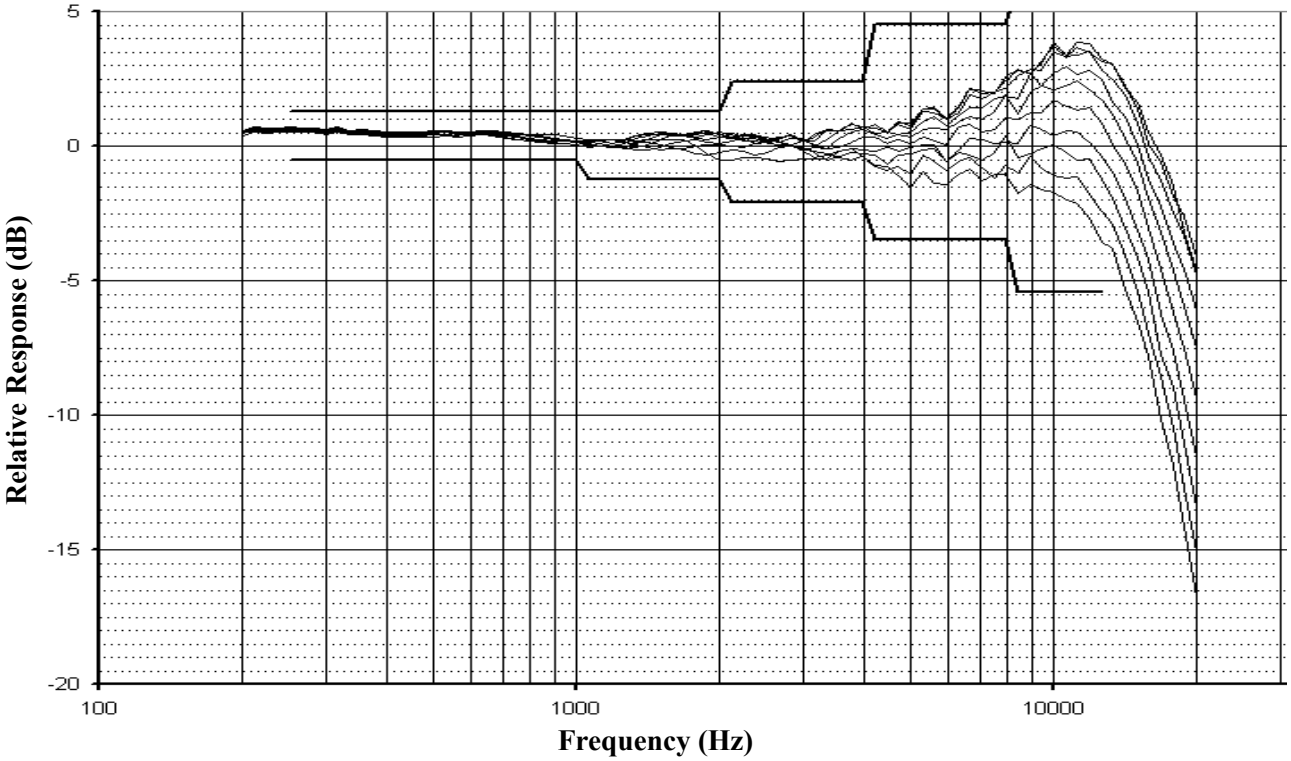

Figure 2–34 Zero to 90 degrees incidence angle

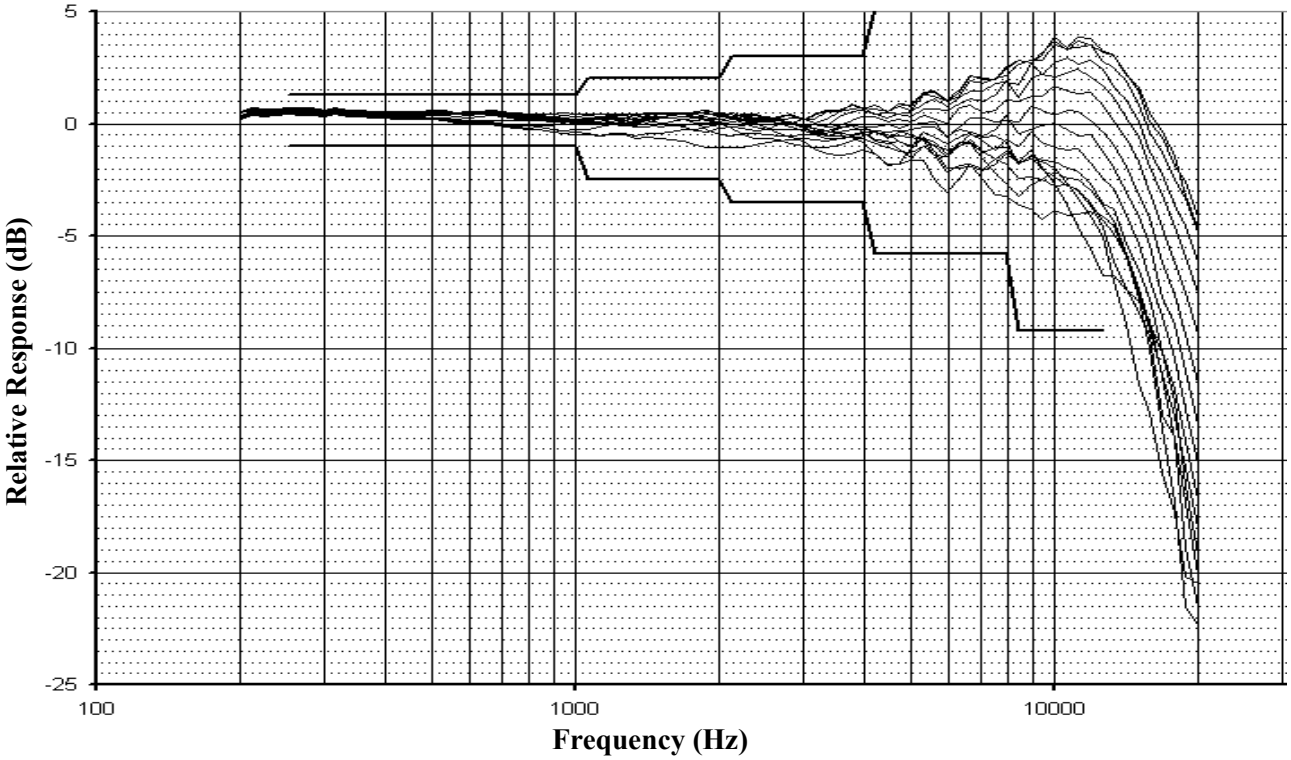

Figure 2–35 Zero to 150 degrees incidence angle

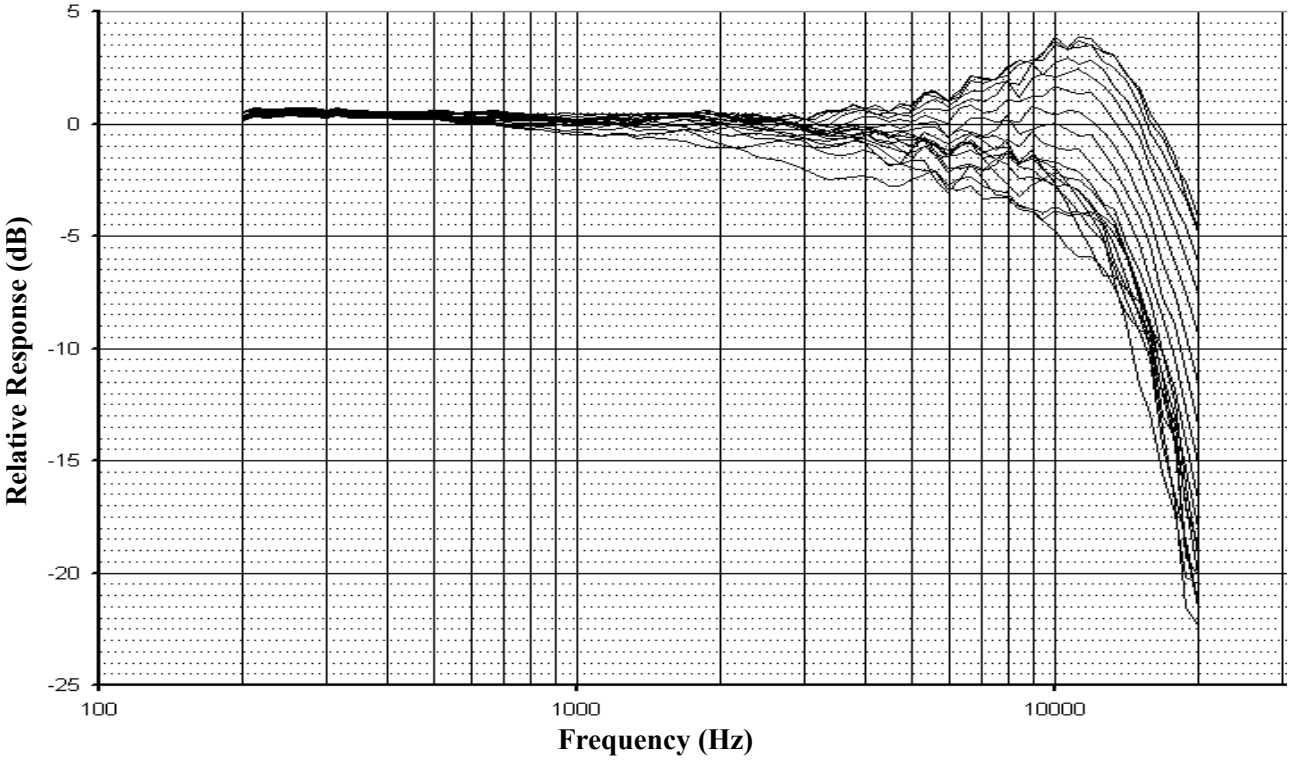

Figure 2–36 Zero to 180 degrees incidence angle

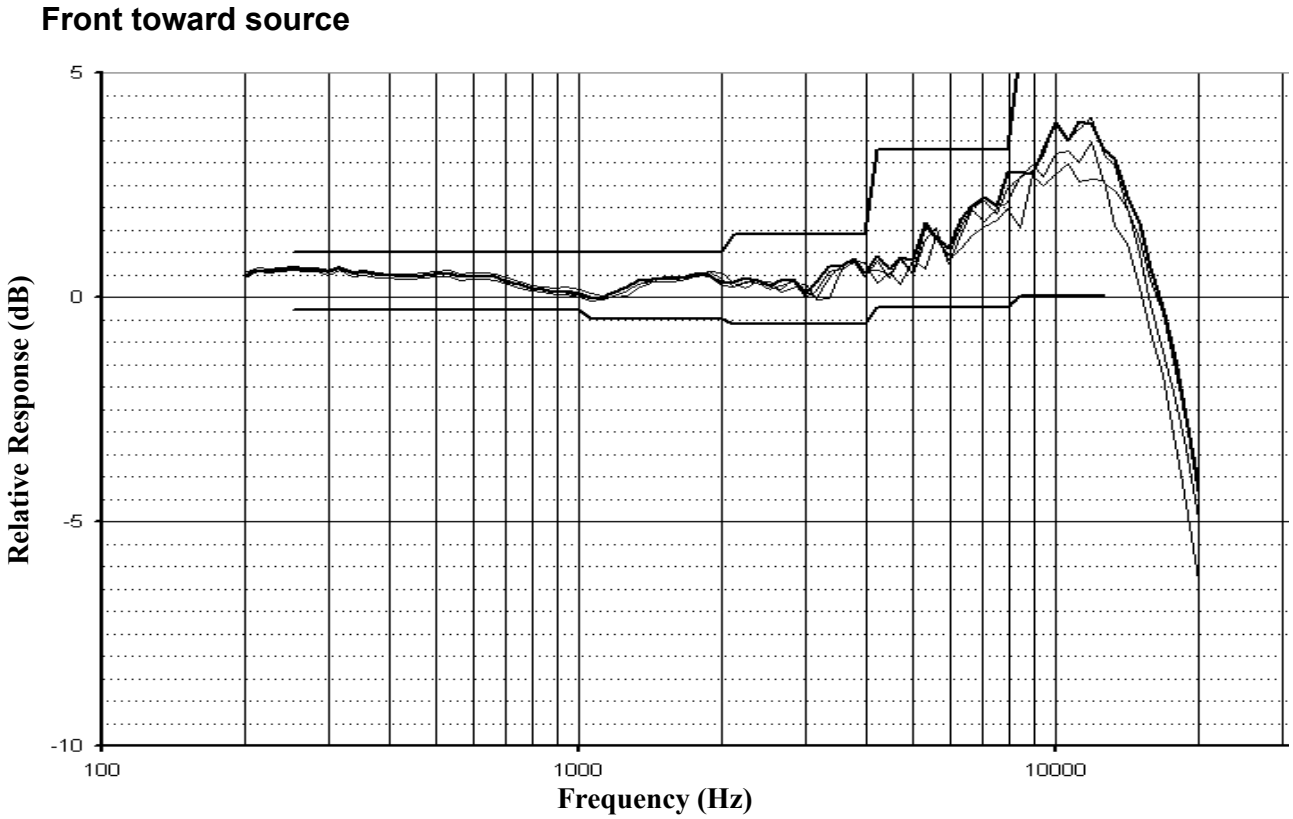

Figure 2–37 Zero to 30 degrees incidence angle

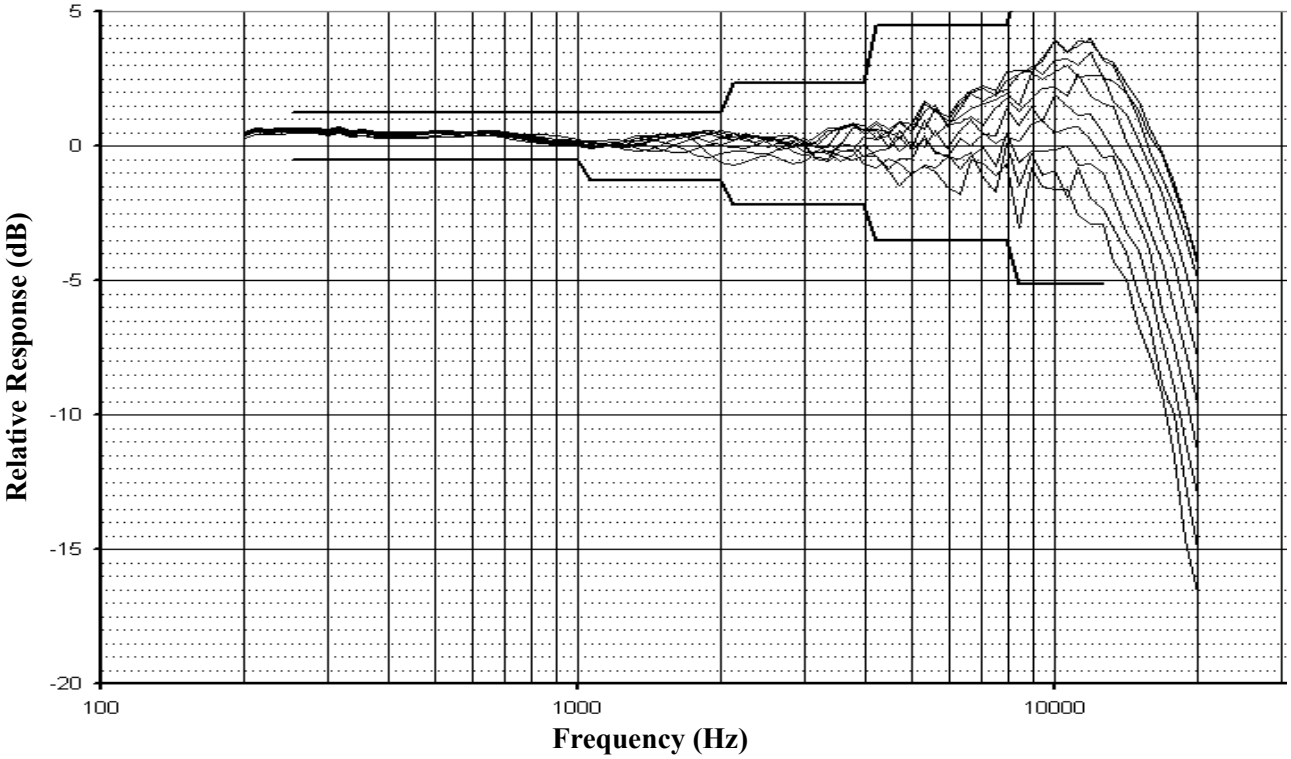

Figure 2–38 Zero to 90 degrees incidence angle

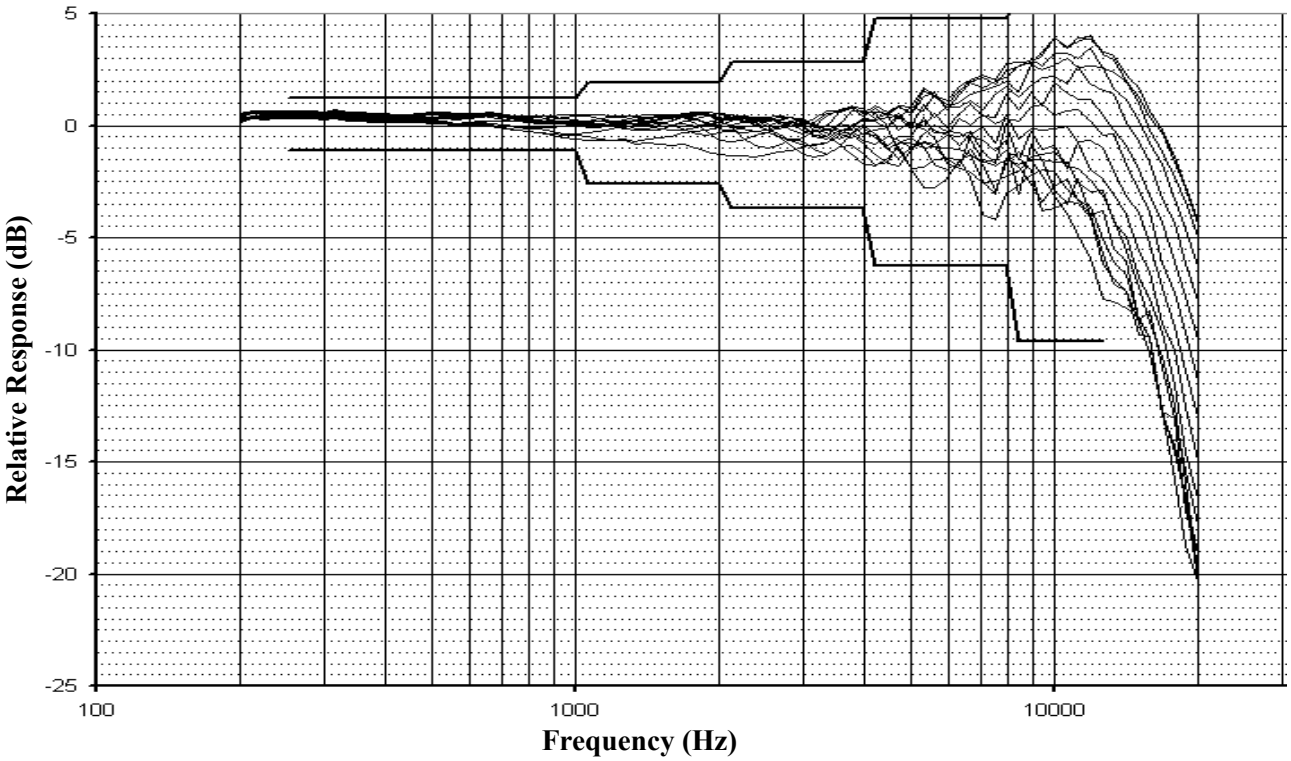

Figure 2–39 Zero to 150 degrees incidence angle

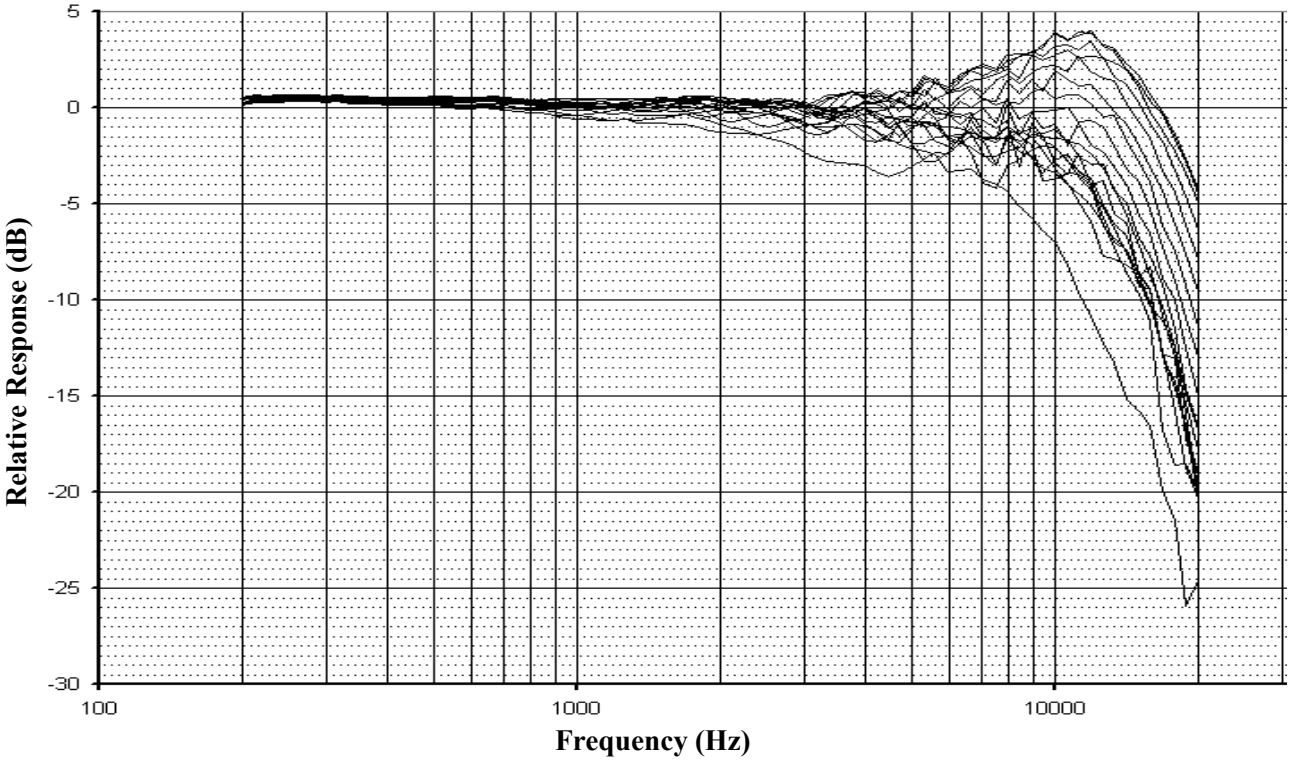

Figure 2–40 Zero to 180 degrees incidence angle

Random incidence frequency response

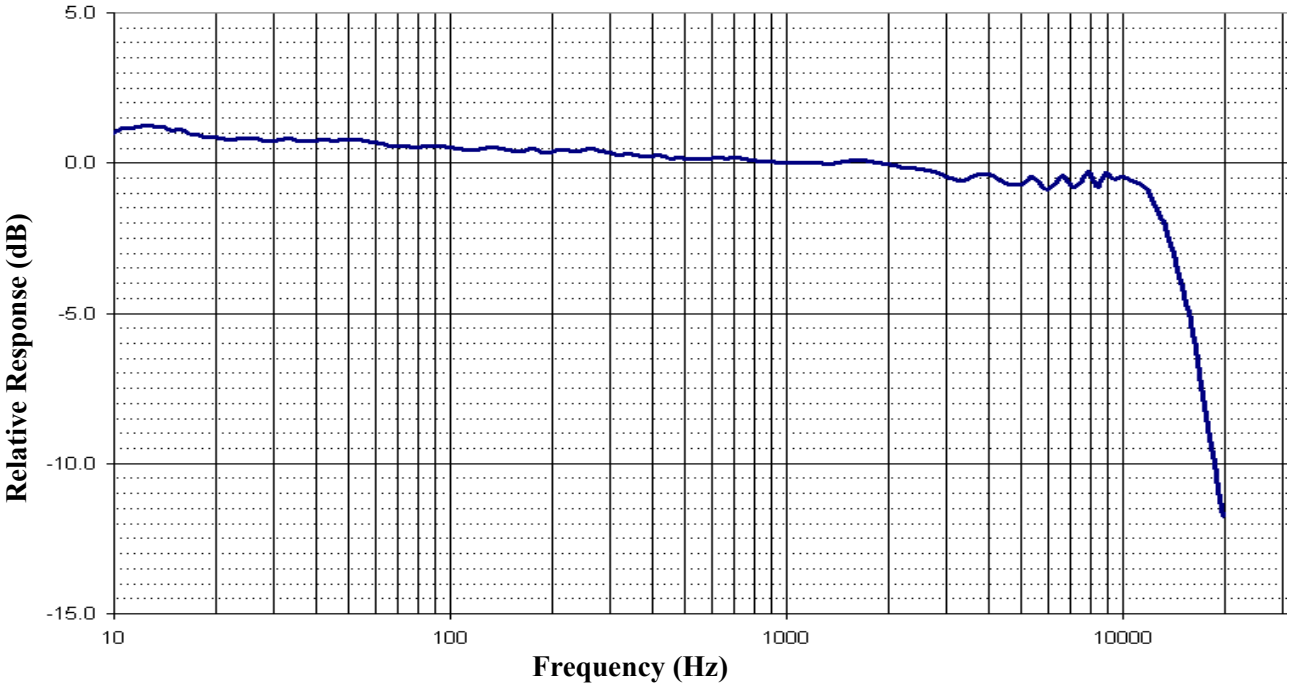

Figure 2–41 Random incidence angle

Acoustic corrections

Table 2–7: Acoustic corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.00	**1334**	0.02	**5623**	0.60
13	-1.24	**1413**	0.00	**5957**	0.88
16	-1.13	**1496**	-0.06	**6310**	0.71
20	-0.85	**1585**	-0.08	**6683**	0.40
25	-0.82	**1679**	-0.11	**7079**	0.79
32	-0.78	**1778**	-0.06	**7499**	0.67
40	-0.75	**1884**	-0.01	**7943**	0.30
50	-0.78	**1995**	0.03	**8414**	0.79
63	-0.65	**2113**	0.09	**8913**	0.33
79	-0.53	**2239**	0.14	**9441**	0.55
100	-0.52	**2371**	0.16	**10000**	0.44
126	-0.49	**2512**	0.21	**10593**	0.59
158	-0.39	**2661**	0.23	**11220**	0.68
200	-0.36	**2818**	0.34	**11885**	0.93
251	-0.46	**2985**	0.46	**12589**	1.52
316	-0.28	**3162**	0.54	**13335**	2.14
398	-0.22	**3350**	0.58	**14125**	3.03
501	-0.15	**3548**	0.46	**14962**	4.13
631	-0.17	**3758**	0.35	**15849**	5.26
794	-0.08	**3981**	0.37	**16788**	7.01
1000	0.00	**4217**	0.52	**17783**	8.41
1059	-0.01	**4467**	0.68	**18836**	9.99
1122	-0.01	**4732**	0.69	**19953**	11.74
1189	0.00	**5012**	0.72		
1259	0.00	**5309**	0.47		

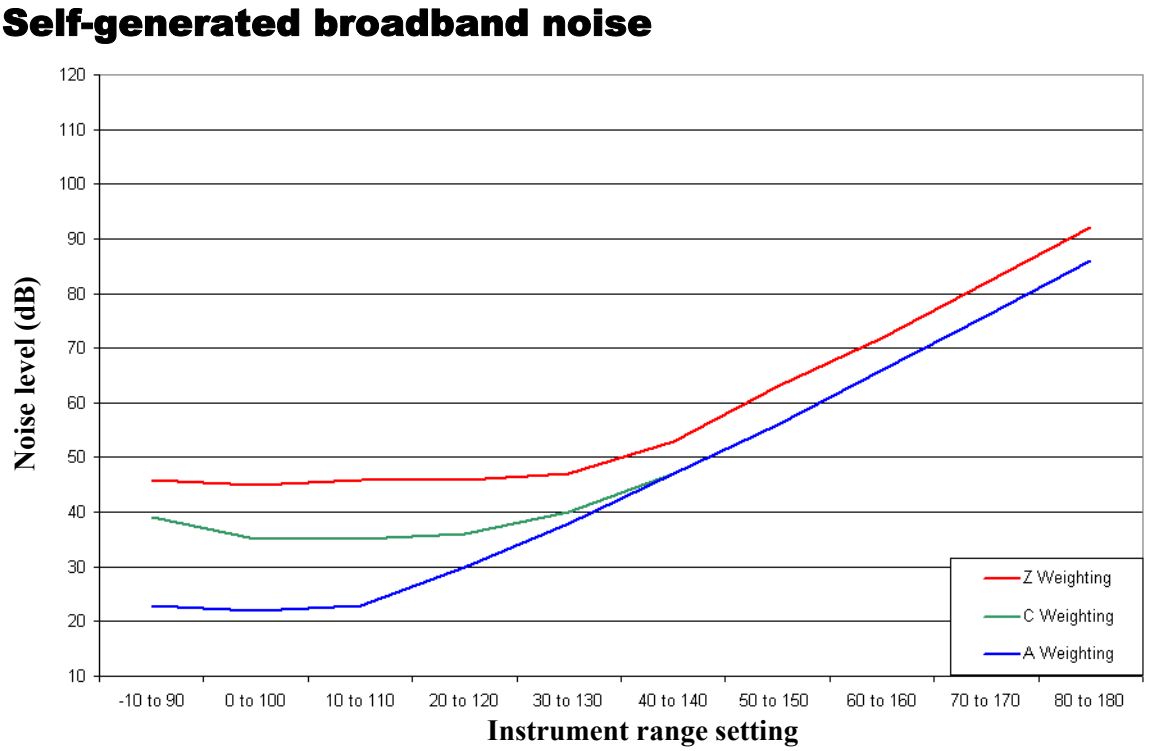

Figure 2–42 Broadband noise

6. Random Incidence Corrector and windscreen

Directional frequency response

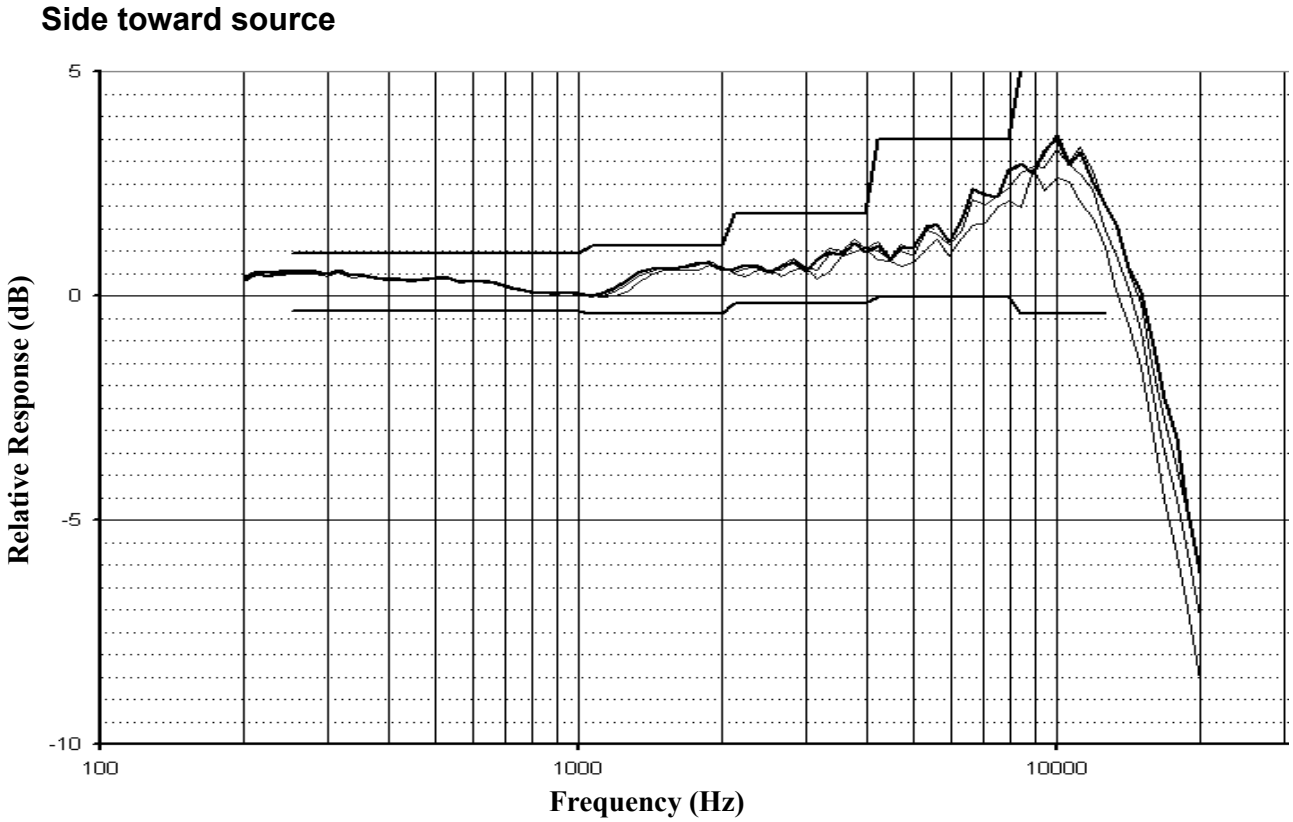

Figure 2–43 Zero to 30 degrees incidence angle

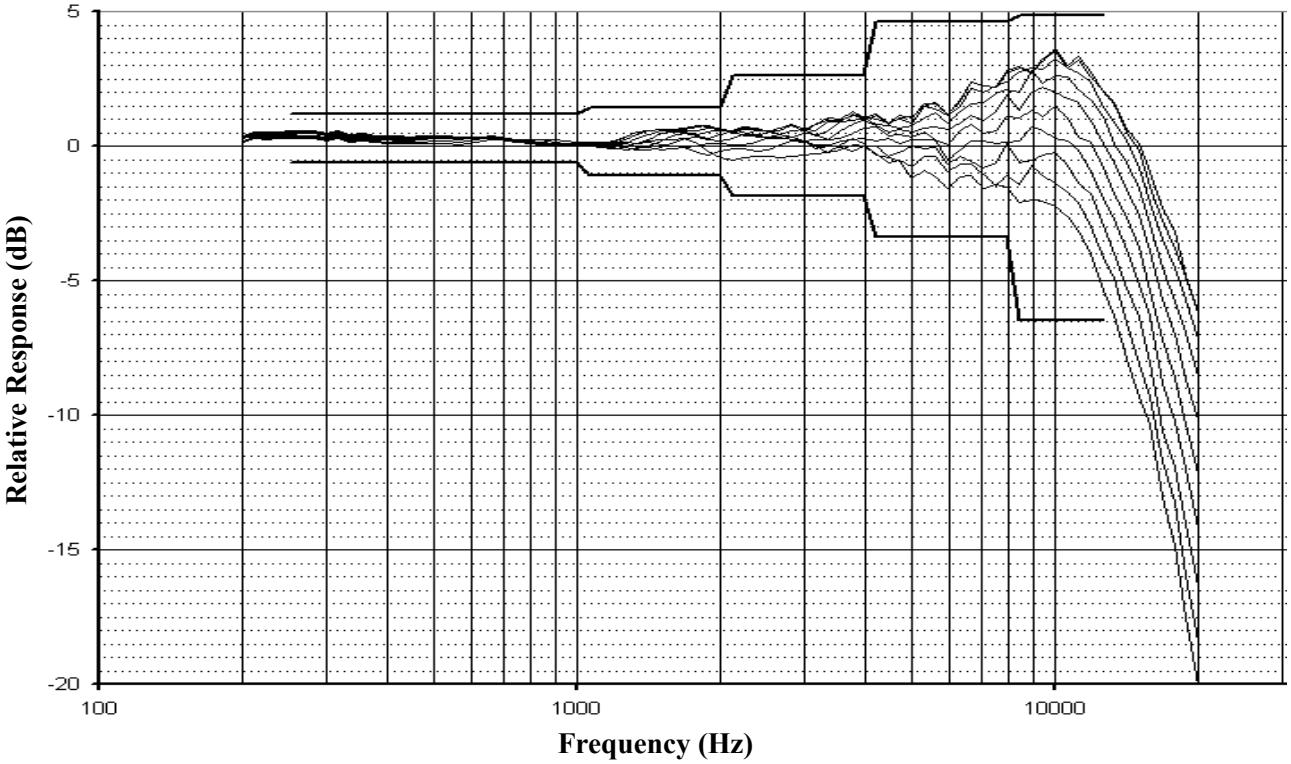

Figure 2–44 Zero to 90 degrees incidence angle

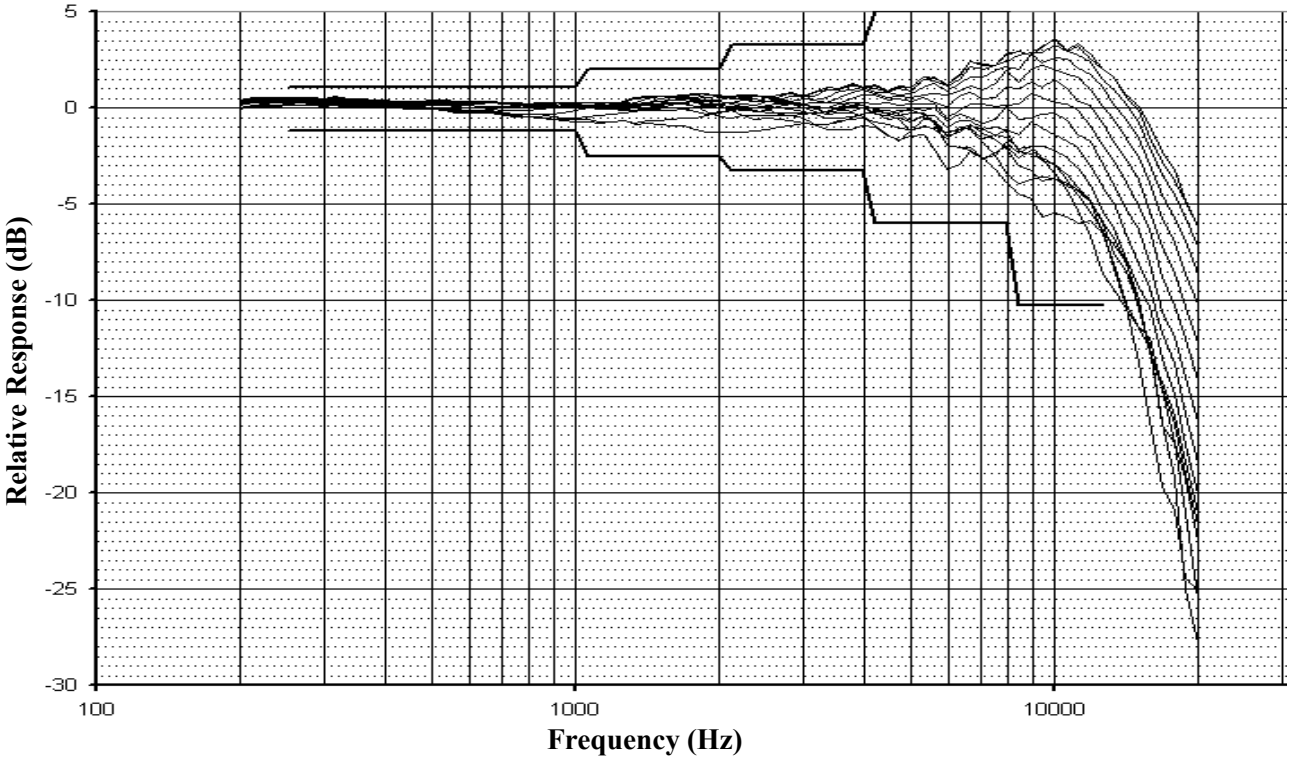

Figure 2–45 Zero to 150 degrees incidence angle

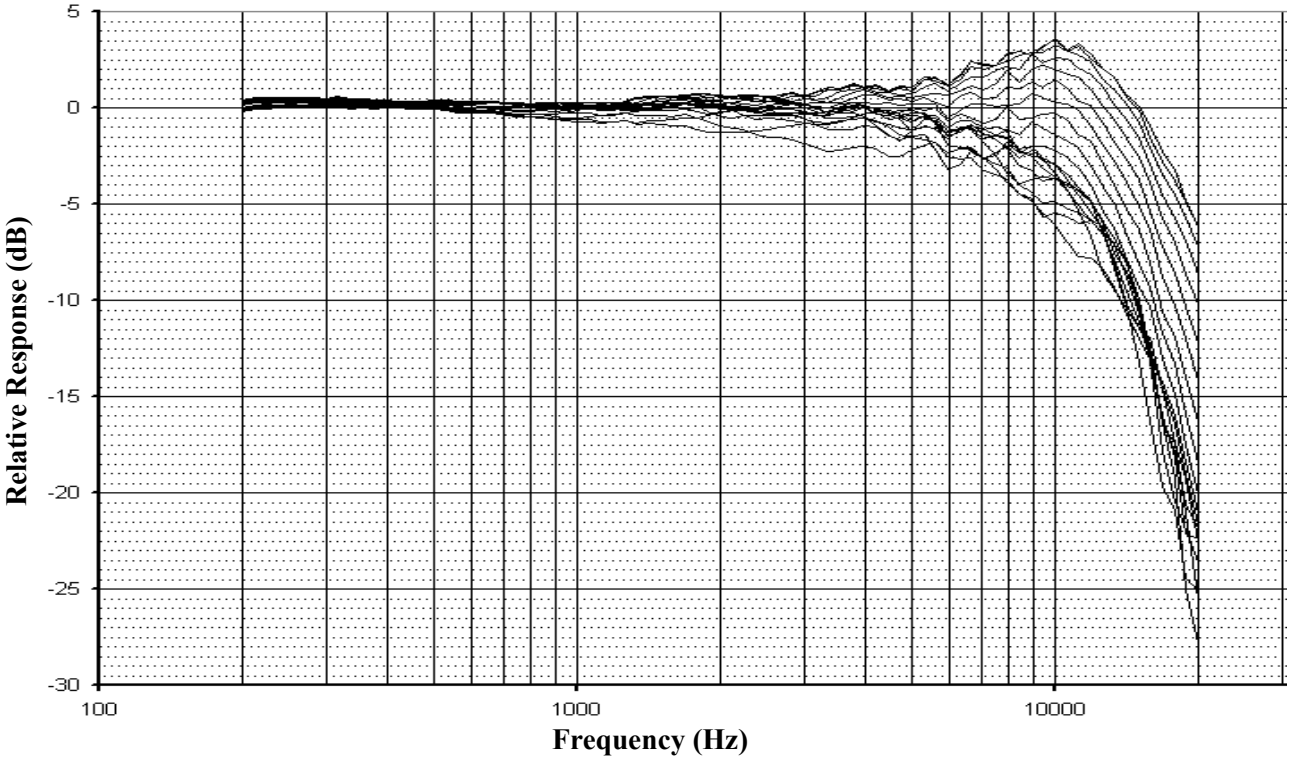

Figure 2–46 Zero to 180 degrees incidence angle

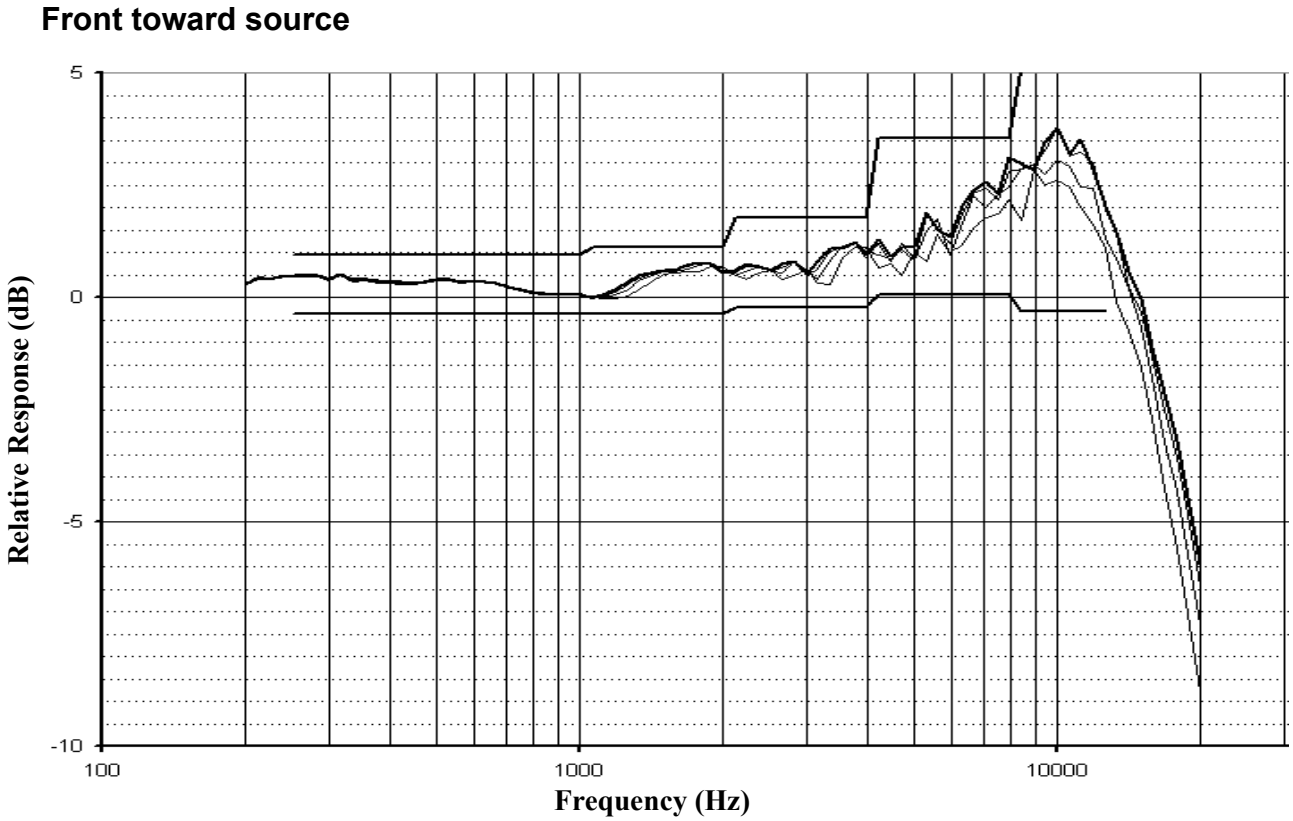

Figure 2–47 Zero to 30 degrees incidence angle

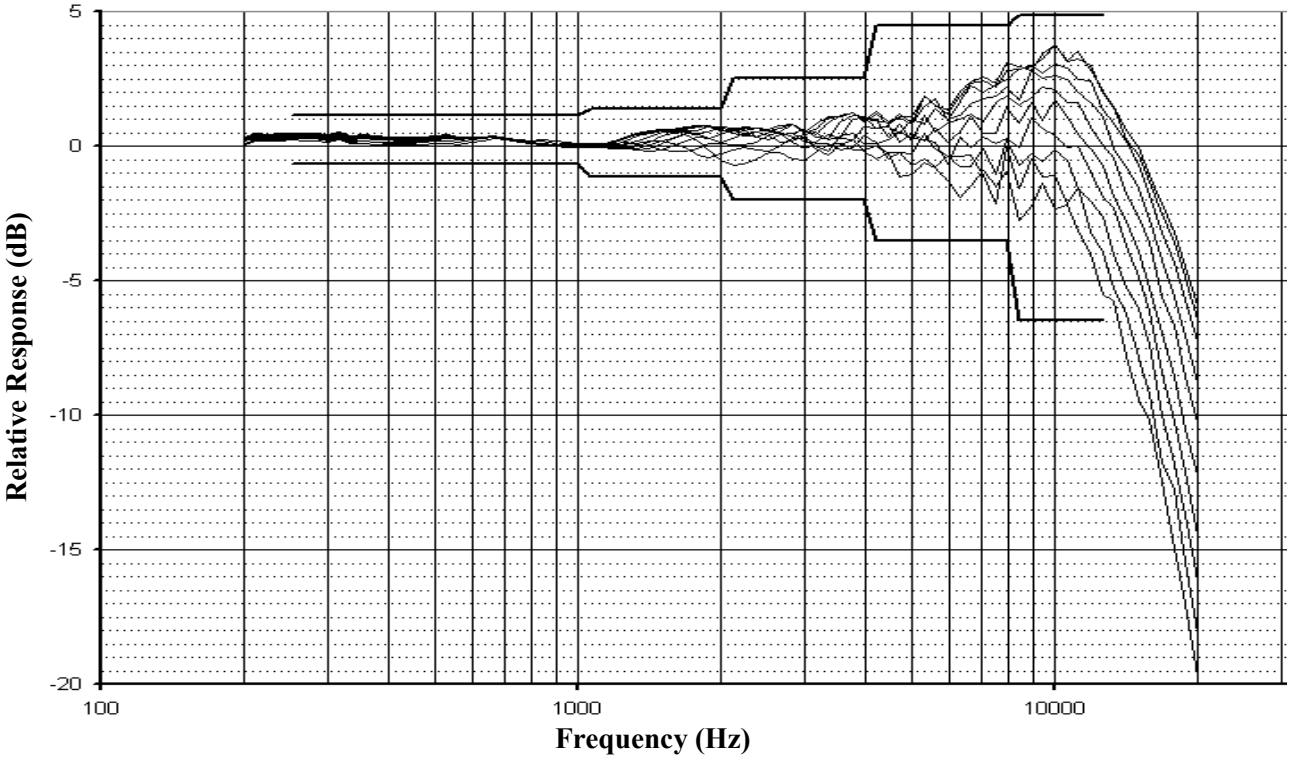

Figure 2–48 Zero to 90 degrees incidence angle

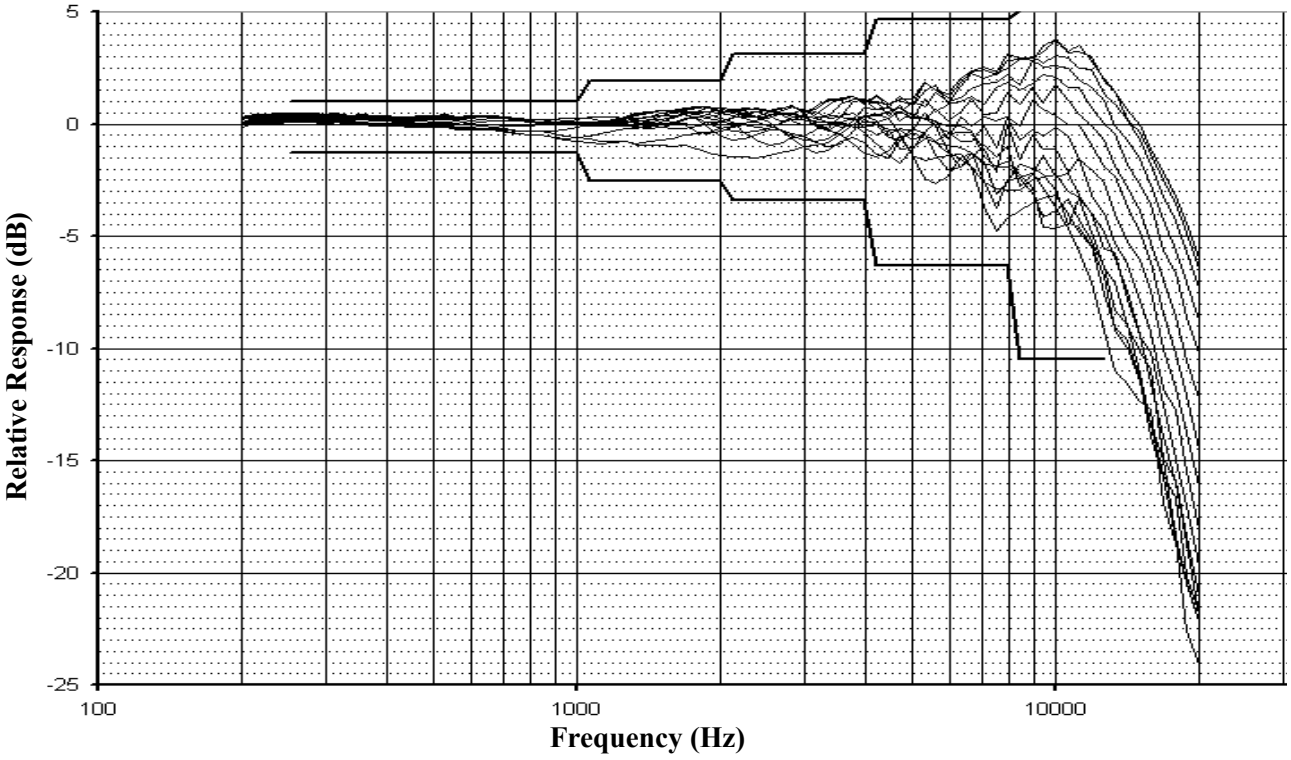

Figure 2–49 Zero to 150 degrees incidence angle

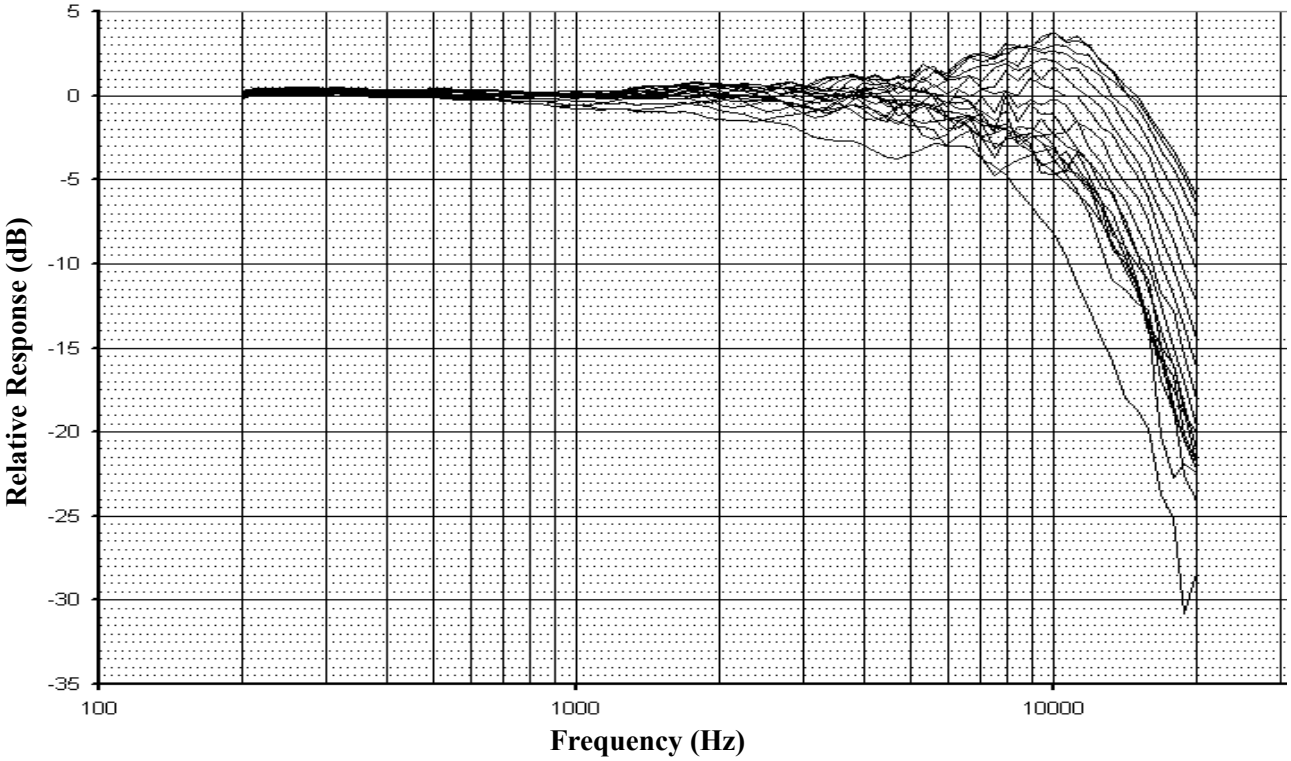

Figure 2–50 Zero to 180 degrees incidence angle

Random incidence frequency response

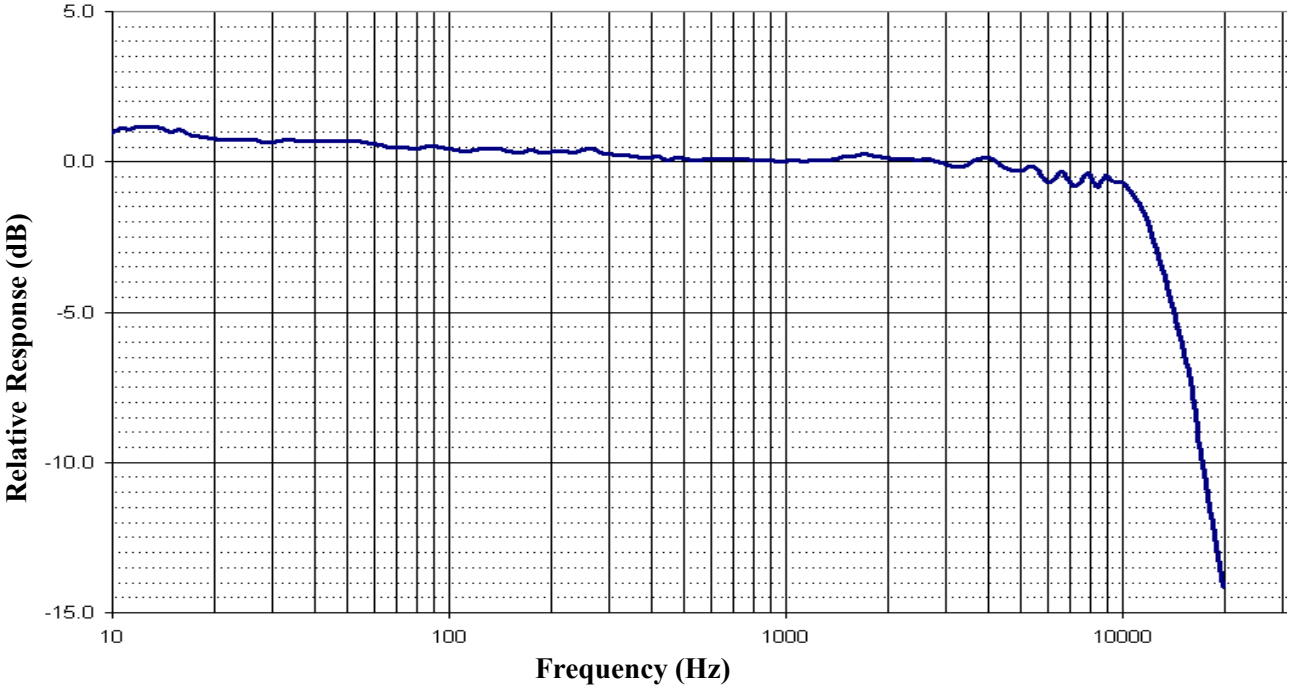

Figure 2–51 Random incidence angle

Acoustic corrections

Table 2–8: Acoustic corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.00	**1334**	0.02	**5623**	0.60
13	-1.24	**1413**	0.00	**5957**	0.88
16	-1.13	**1496**	-0.06	**6310**	0.71
20	-0.85	**1585**	-0.08	**6683**	0.40
25	-0.82	**1679**	-0.11	**7079**	0.79
32	-0.78	**1778**	-0.06	**7499**	0.67
40	-0.75	**1884**	-0.01	**7943**	0.30
50	-0.78	**1995**	0.03	**8414**	0.79
63	-0.65	**2113**	0.09	**8913**	0.33
79	-0.53	**2239**	0.14	**9441**	0.55
100	-0.52	**2371**	0.16	**10000**	0.44
126	-0.49	**2512**	0.21	**10593**	0.59
158	-0.39	**2661**	0.23	**11220**	0.68
200	-0.36	**2818**	0.34	**11885**	0.93
251	-0.46	**2985**	0.46	**12589**	1.52
316	-0.28	**3162**	0.54	**13335**	2.14
398	-0.22	**3350**	0.58	**14125**	3.03
501	-0.15	**3548**	0.46	**14962**	4.13
631	-0.17	**3758**	0.35	**15849**	5.26
794	-0.08	**3981**	0.37	**16788**	7.01
1000	0.00	**4217**	0.52	**17783**	8.41
1059	-0.01	**4467**	0.68	**18836**	9.99
1122	-0.01	**4732**	0.69	**19953**	11.74
1189	0.00	**5012**	0.72		
1259	0.00	**5309**	0.47		

Windscreen corrections

Table 2–9: Windscreen corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.07	**1334**	-0.06	**5623**	-0.34
13	0.07	**1413**	-0.09	**5957**	-0.22
16	0.07	**1496**	-0.10	**6310**	-0.13
20	0.07	**1585**	-0.12	**6683**	-0.05
25	0.07	**1679**	-0.16	**7079**	-0.04
32	0.07	**1778**	-0.16	**7499**	0.03
40	0.07	**1884**	-0.18	**7943**	0.07
50	0.07	**1995**	-0.19	**8414**	0.05
63	0.07	**2113**	-0.20	**8913**	0.12
79	0.07	**2239**	-0.24	**9441**	0.14
100	0.07	**2371**	-0.24	**10000**	0.23
126	0.07	**2512**	-0.27	**10593**	0.42
158	0.07	**2661**	-0.31	**11220**	0.72
200	0.07	**2818**	-0.35	**11885**	1.07
251	0.07	**2985**	-0.38	**12589**	1.43
316	0.07	**3162**	-0.40	**13335**	1.68
398	0.07	**3350**	-0.42	**14125**	1.89
501	0.07	**3548**	-0.44	**14962**	1.92
631	0.08	**3758**	-0.45	**15849**	2.05
794	0.05	**3981**	-0.49	**16788**	2.41
1000	0.00	**4217**	-0.51	**17783**	2.30
1059	-0.02	**4467**	-0.48	**18836**	2.45
1122	-0.02	**4732**	-0.42	**19953**	2.40
1189	-0.03	**5012**	-0.42		
1259	-0.06	**5309**	-0.33		

Self-generated broadband noise

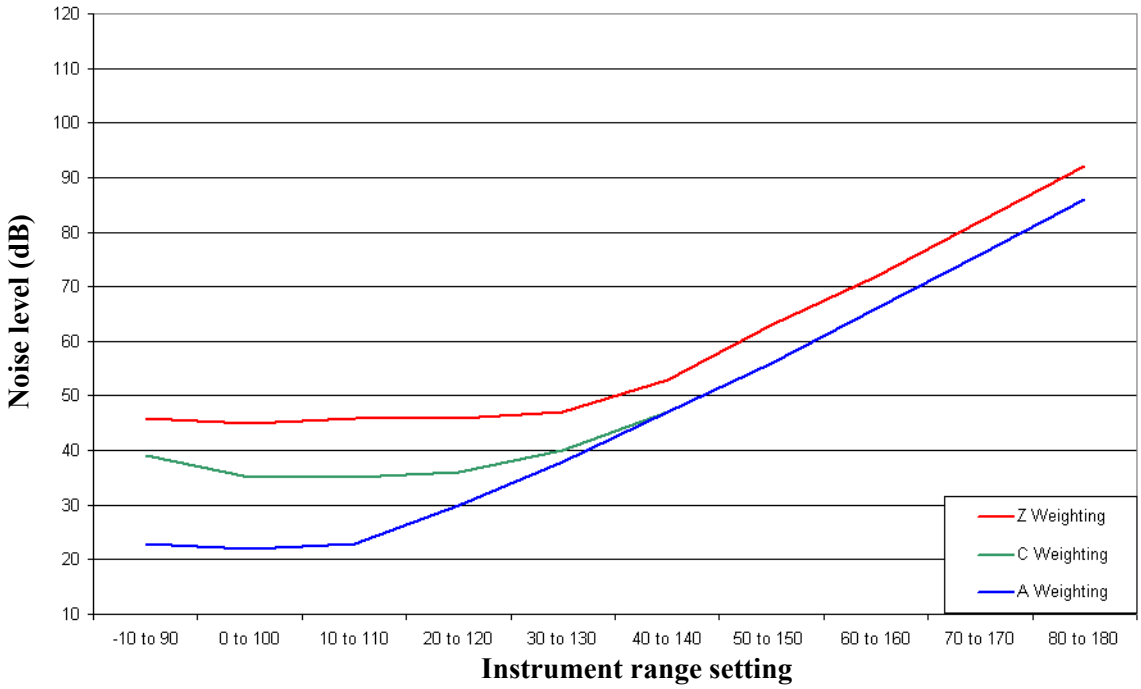

Figure 2–52 Broadband noise

7. Remote with Random Incidence Corrector

Directional frequency response

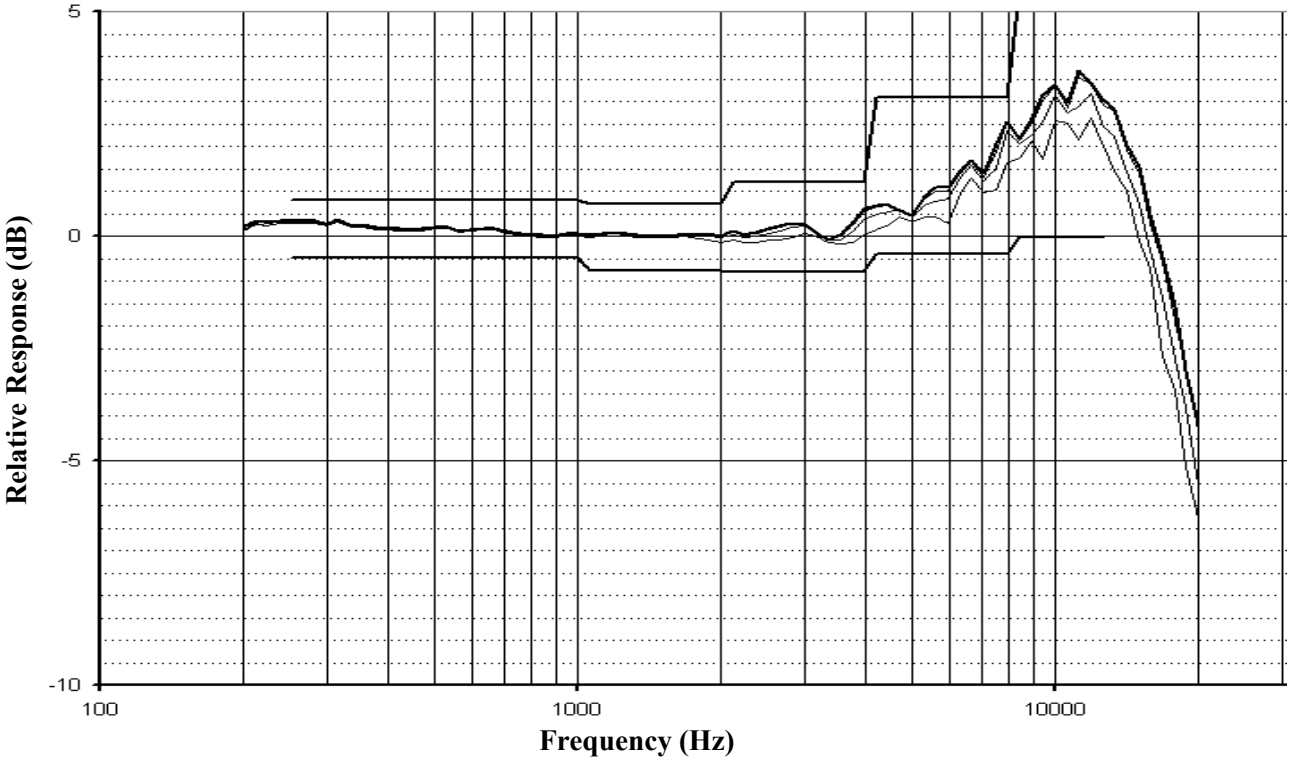

Figure 2–53 Zero to 30 degrees incidence angle

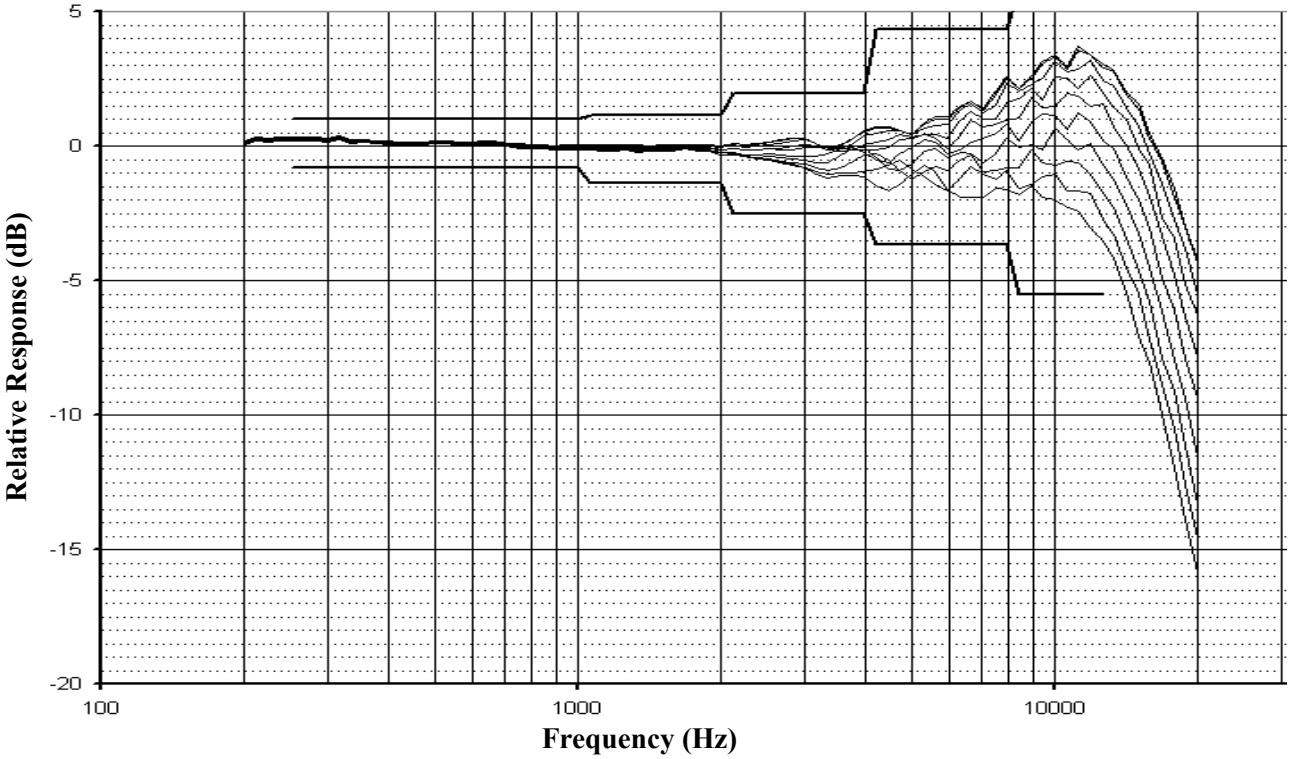

Figure 2–54 Zero to 90 degrees incidence angle

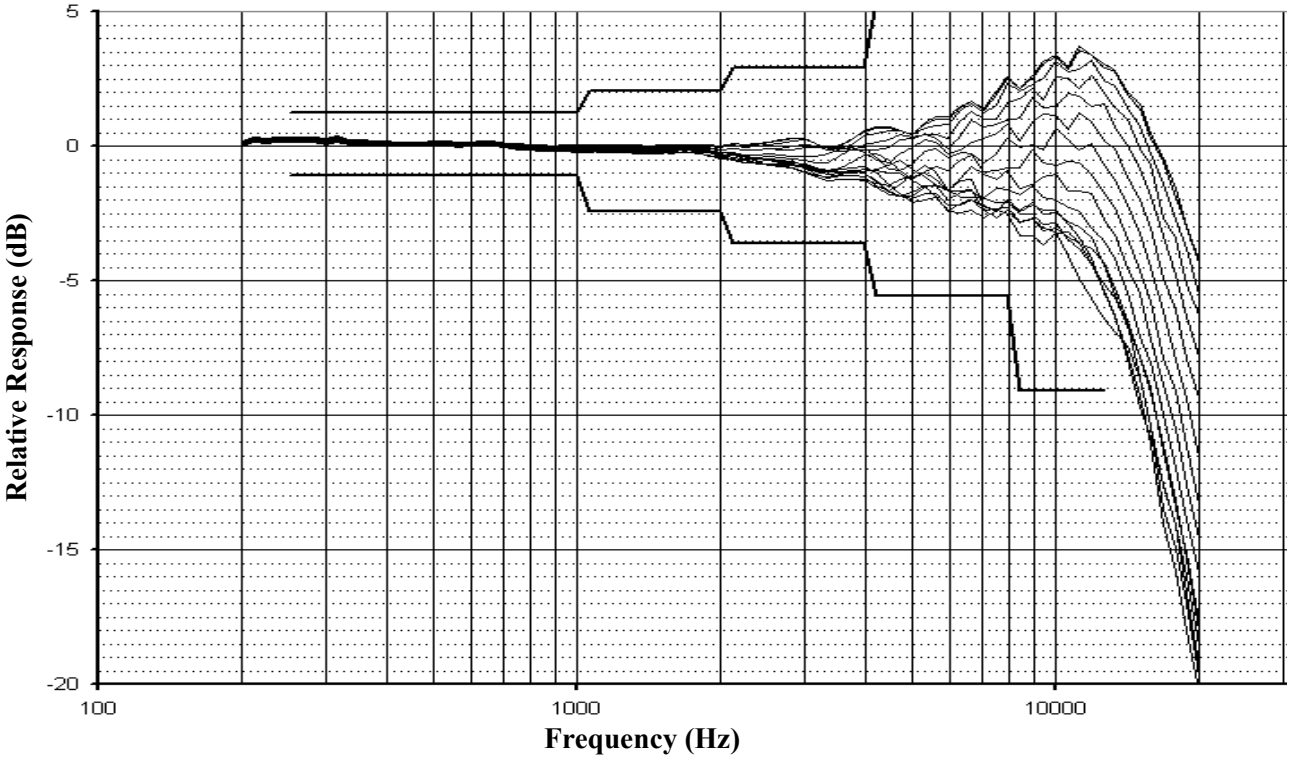

Figure 2–55 Zero to 150 degrees incidence angle

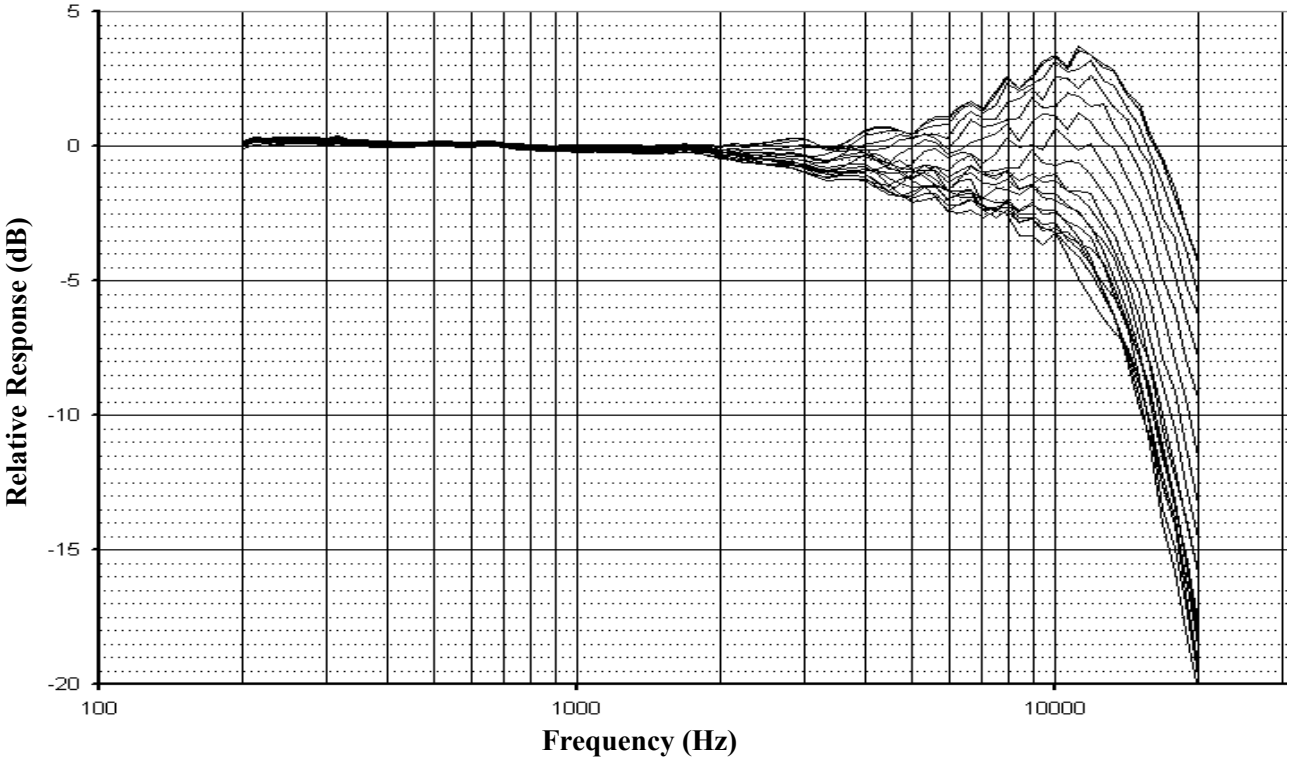

Figure 2–56 Zero to 180 degrees incidence angle

Random incidence frequency response

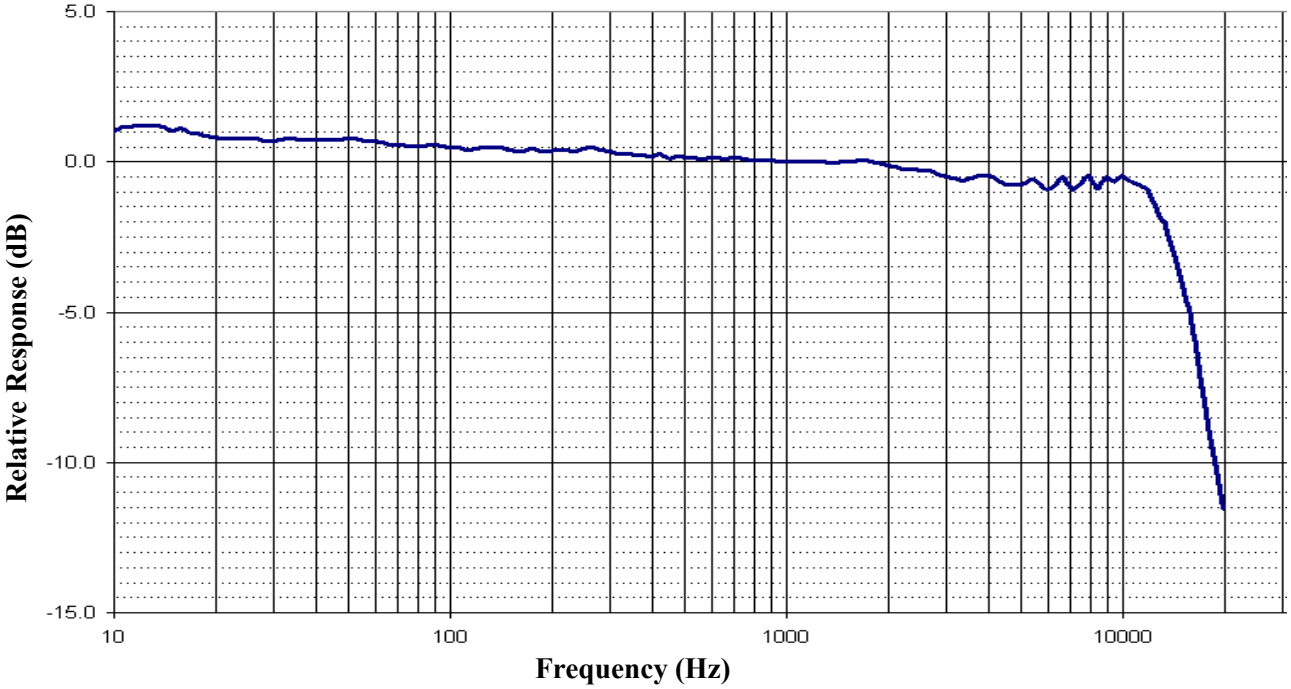

Figure 2–57 Random incidence angle

Acoustic corrections

Table 2–10: Acoustic corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.00	**1334**	0.02	**5623**	0.60
13	-1.24	**1413**	0.00	**5957**	0.88
16	-1.13	**1496**	-0.06	**6310**	0.71
20	-0.85	**1585**	-0.08	**6683**	0.40
25	-0.82	**1679**	-0.11	**7079**	0.79
32	-0.78	**1778**	-0.06	**7499**	0.67
40	-0.75	**1884**	-0.01	**7943**	0.30
50	-0.78	**1995**	0.03	**8414**	0.79
63	-0.65	**2113**	0.09	**8913**	0.33
79	-0.53	**2239**	0.14	**9441**	0.55
100	-0.52	**2371**	0.16	**10000**	0.44
126	-0.49	**2512**	0.21	**10593**	0.59
158	-0.39	**2661**	0.23	**11220**	0.68
200	-0.36	**2818**	0.34	**11885**	0.93
251	-0.46	**2985**	0.46	**12589**	1.52
316	-0.28	**3162**	0.54	**13335**	2.14
398	-0.22	**3350**	0.58	**14125**	3.03
501	-0.15	**3548**	0.46	**14962**	4.13
631	-0.17	**3758**	0.35	**15849**	5.26
794	-0.08	**3981**	0.37	**16788**	7.01
1000	0.00	**4217**	0.52	**17783**	8.41
1059	-0.01	**4467**	0.68	**18836**	9.99
1122	-0.01	**4732**	0.69	**19953**	11.74
1189	0.00	**5012**	0.72		
1259	0.00	**5309**	0.47		

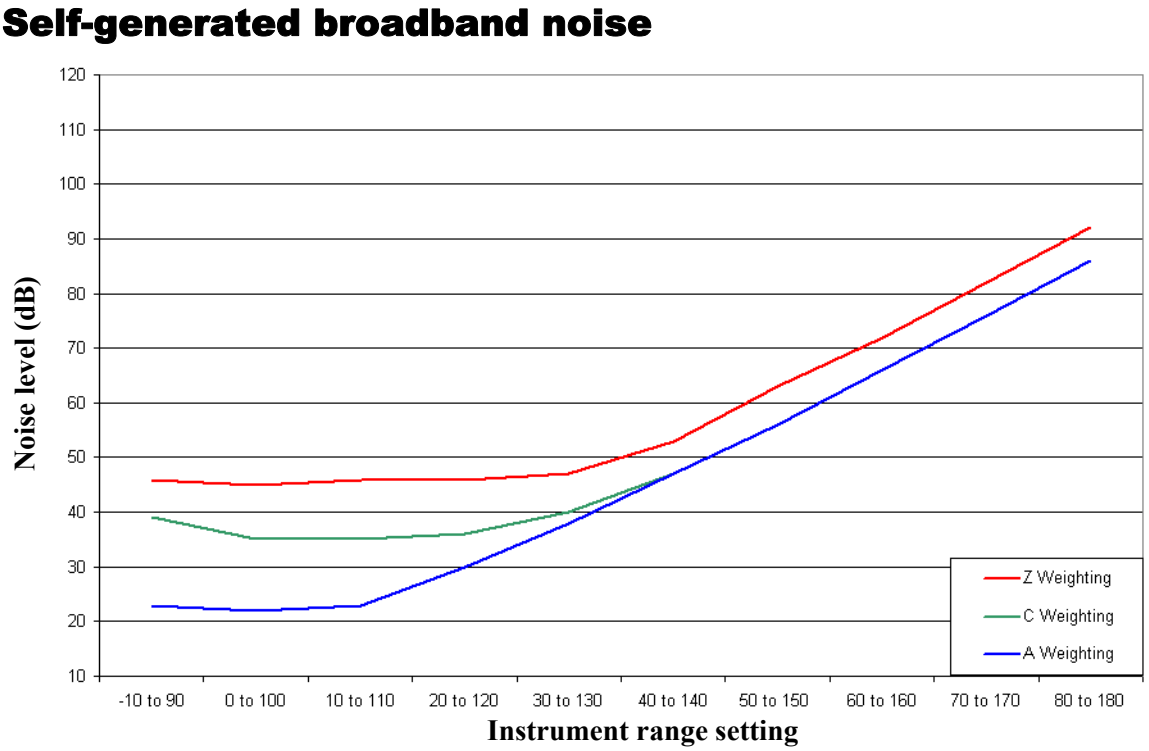

Figure 2–58 Broadband noise

8. Remote with Random Incidence Corrector and windscreen

Directional frequency response

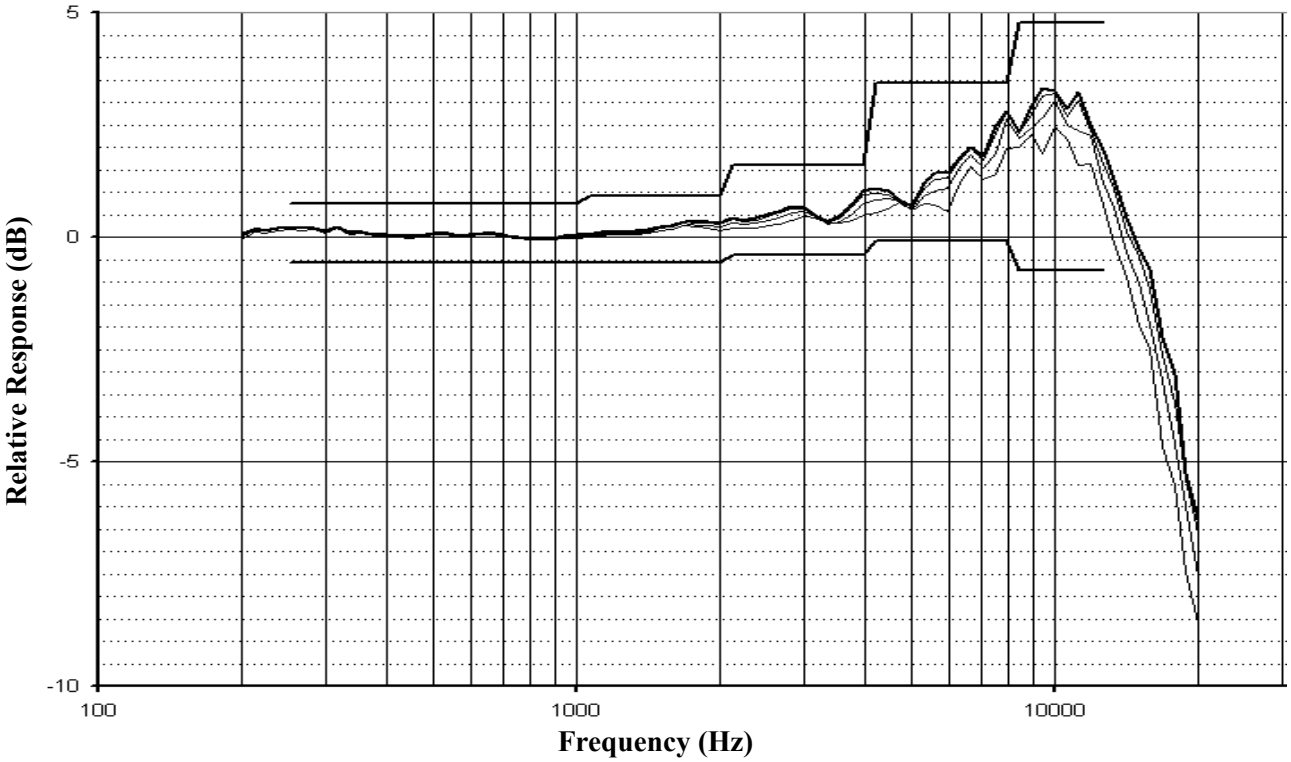

Figure 2–59 Zero to 30 degrees incidence angle

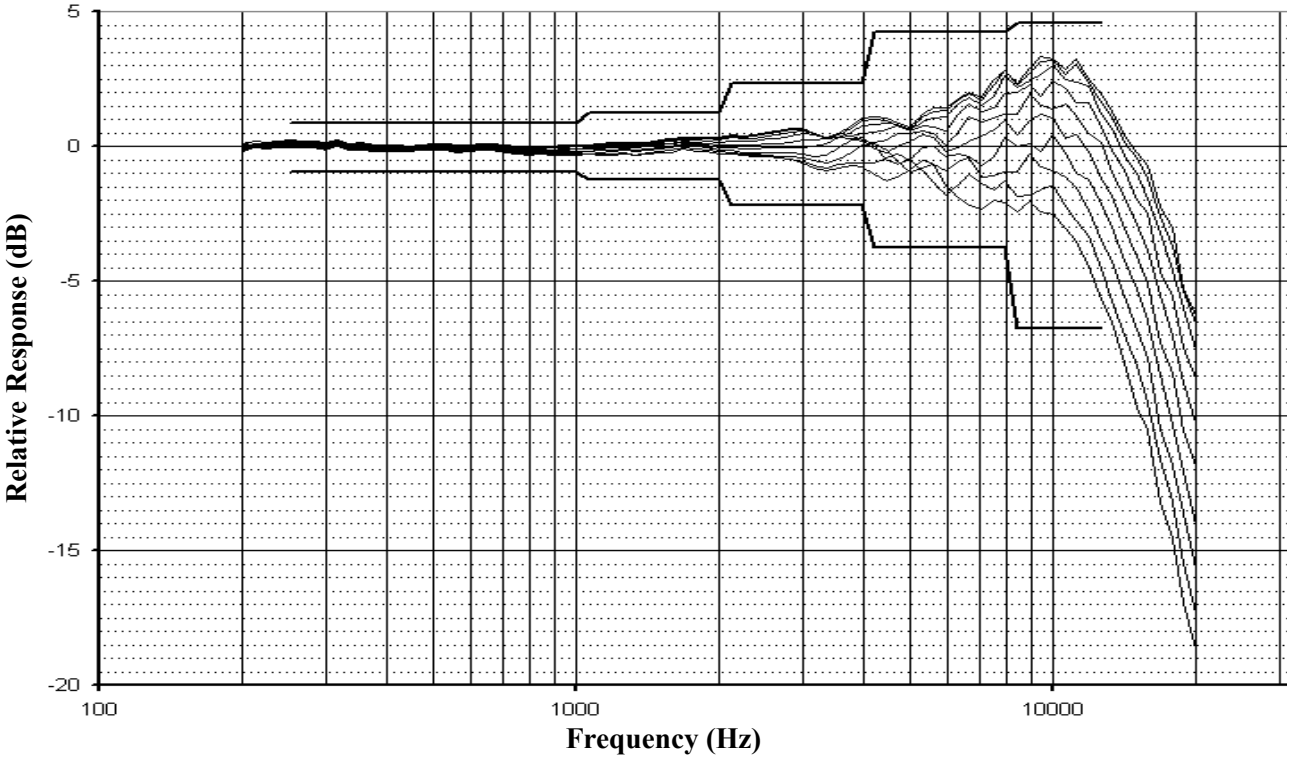

Figure 2–60 Zero to 90 degrees incidence angle

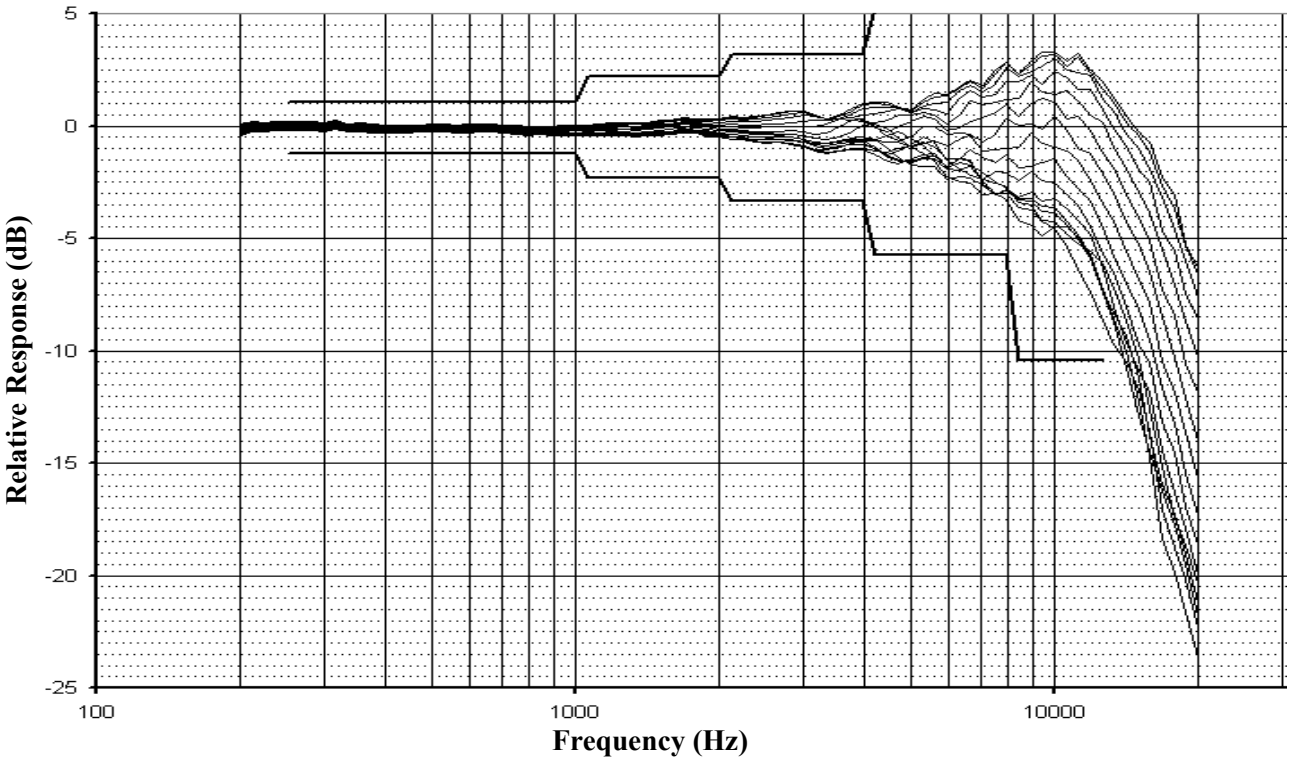

Figure 2–61 Zero to 150 degrees incidence angle

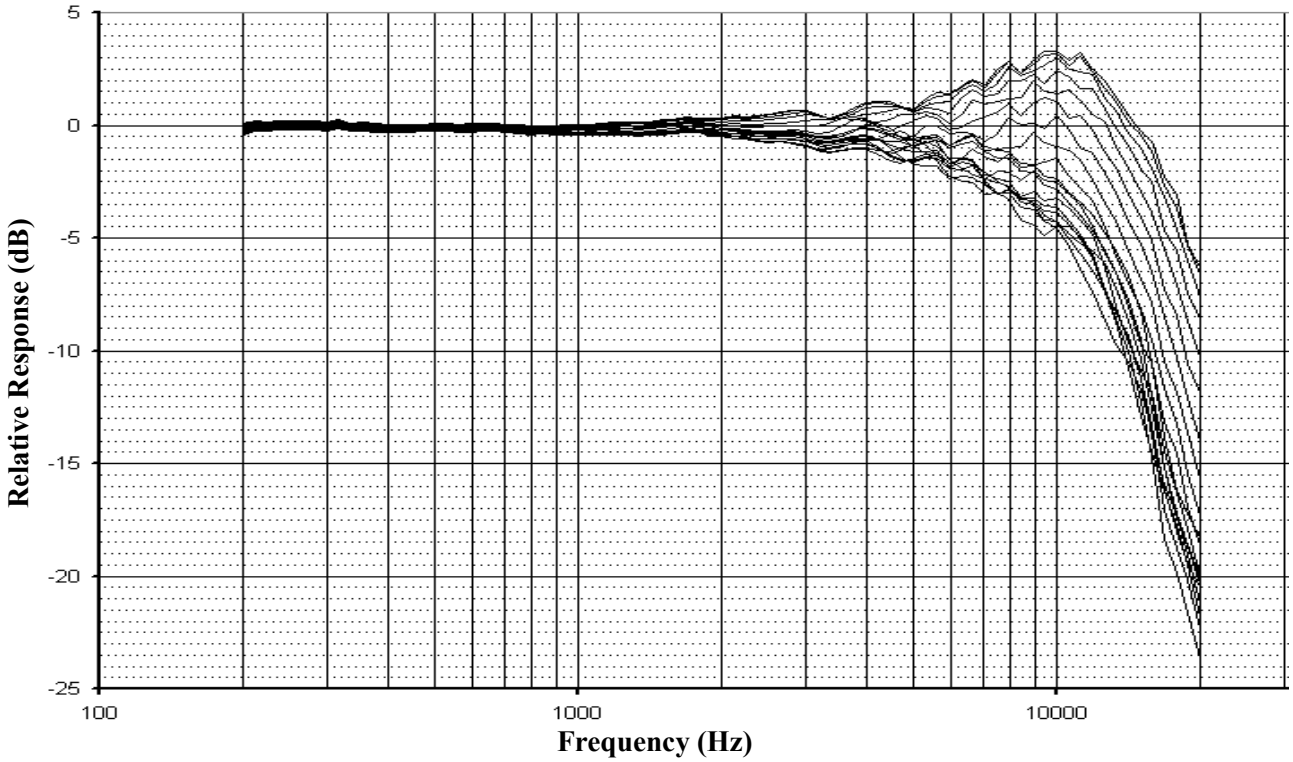

Figure 2–62 Zero to 180 degrees incidence angle

Random incidence frequency response

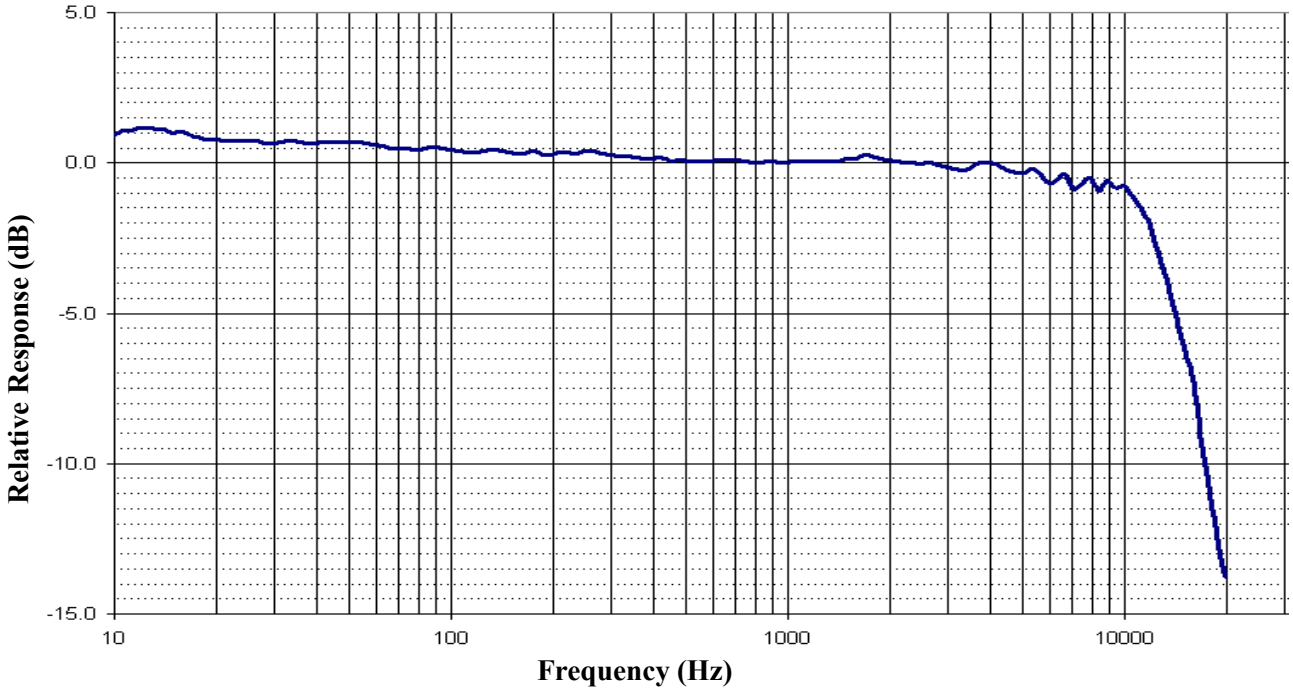

Figure 2–63 Random incidence angle

Acoustic corrections

Table 2–11: Acoustic corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.00	**1334**	0.02	**5623**	0.60
13	-1.24	**1413**	0.00	**5957**	0.88
16	-1.13	**1496**	-0.06	**6310**	0.71
20	-0.85	**1585**	-0.08	**6683**	0.40
25	-0.82	**1679**	-0.11	**7079**	0.79
32	-0.78	**1778**	-0.06	**7499**	0.67
40	-0.75	**1884**	-0.01	**7943**	0.30
50	-0.78	**1995**	0.03	**8414**	0.79
63	-0.65	**2113**	0.09	**8913**	0.33
79	-0.53	**2239**	0.14	**9441**	0.55
100	-0.52	**2371**	0.16	**10000**	0.44
126	-0.49	**2512**	0.21	**10593**	0.59
158	-0.39	**2661**	0.23	**11220**	0.68
200	-0.36	**2818**	0.34	**11885**	0.93
251	-0.46	**2985**	0.46	**12589**	1.52
316	-0.28	**3162**	0.54	**13335**	2.14
398	-0.22	**3350**	0.58	**14125**	3.03
501	-0.15	**3548**	0.46	**14962**	4.13
631	-0.17	**3758**	0.35	**15849**	5.26
794	-0.08	**3981**	0.37	**16788**	7.01
1000	0.00	**4217**	0.52	**17783**	8.41
1059	-0.01	**4467**	0.68	**18836**	9.99
1122	-0.01	**4732**	0.69	**19953**	11.74
1189	0.00	**5012**	0.72		
1259	0.00	**5309**	0.47		

Windscreen corrections

Table 2–12: Windscreen corrections, base BK4936 unit, Random Incidence Corrector

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.07	**1334**	-0.06	**5623**	-0.34
13	0.07	**1413**	-0.09	**5957**	-0.22
16	0.07	**1496**	-0.10	**6310**	-0.13
20	0.07	**1585**	-0.12	**6683**	-0.05
25	0.07	**1679**	-0.16	**7079**	-0.04
32	0.07	**1778**	-0.16	**7499**	0.03
40	0.07	**1884**	-0.18	**7943**	0.07
50	0.07	**1995**	-0.19	**8414**	0.05
63	0.07	**2113**	-0.20	**8913**	0.12
79	0.07	**2239**	-0.24	**9441**	0.14
100	0.07	**2371**	-0.24	**10000**	0.23
126	0.07	**2512**	-0.27	**10593**	0.42
158	0.07	**2661**	-0.31	**11220**	0.72
200	0.07	**2818**	-0.35	**11885**	1.07
251	0.07	**2985**	-0.38	**12589**	1.43
316	0.07	**3162**	-0.40	**13335**	1.68
398	0.07	**3350**	-0.42	**14125**	1.89
501	0.07	**3548**	-0.44	**14962**	1.92
631	0.08	**3758**	-0.45	**15849**	2.05
794	0.05	**3981**	-0.49	**16788**	2.41
1000	0.00	**4217**	-0.51	**17783**	2.30
1059	-0.02	**4467**	-0.48	**18836**	2.45
1122	-0.02	**4732**	-0.42	**19953**	2.40
1189	-0.03	**5012**	-0.42		
1259	-0.06	**5309**	-0.33		

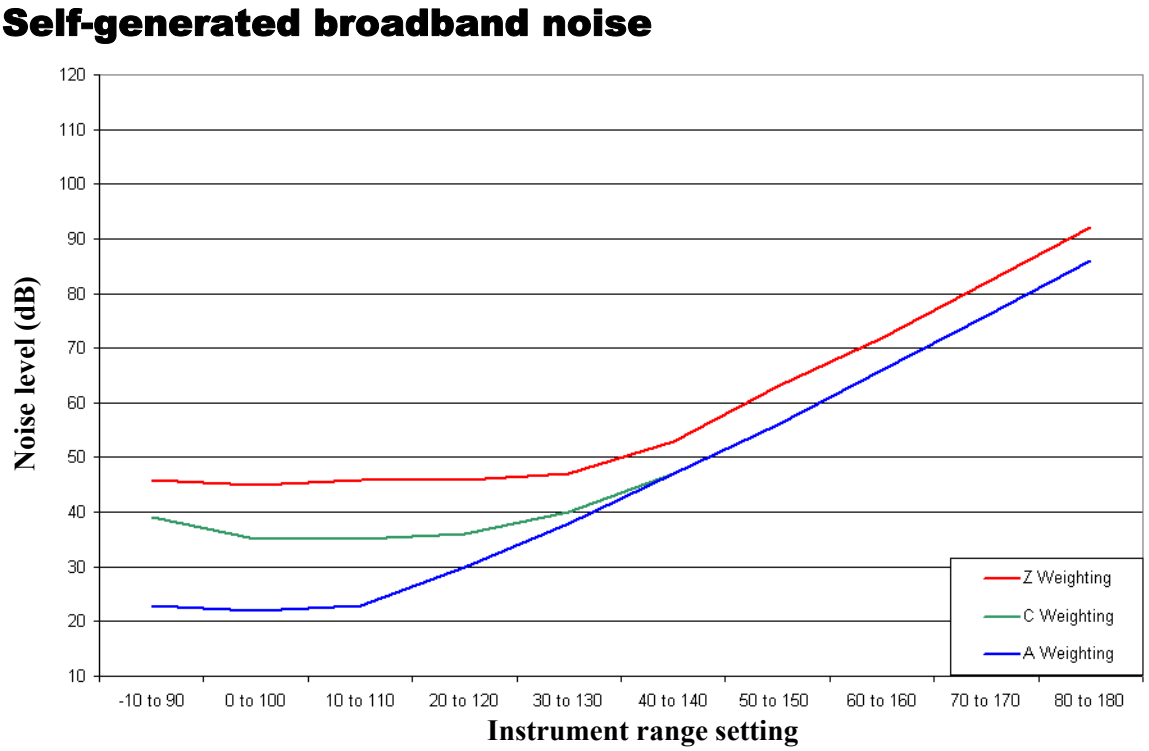

Figure 2–64 Broadband noise

CHAPTER 3

QE7052 microphone

The base unit for this chapter is the QE7052 microphone and preamp mounted directly on the instrument. For information about terms and concepts related to ***SoundPro DLX*** microphone measurements, see Chapter 1, "Addendum introduction."

1. Base unit

Directional frequency response

Side toward source

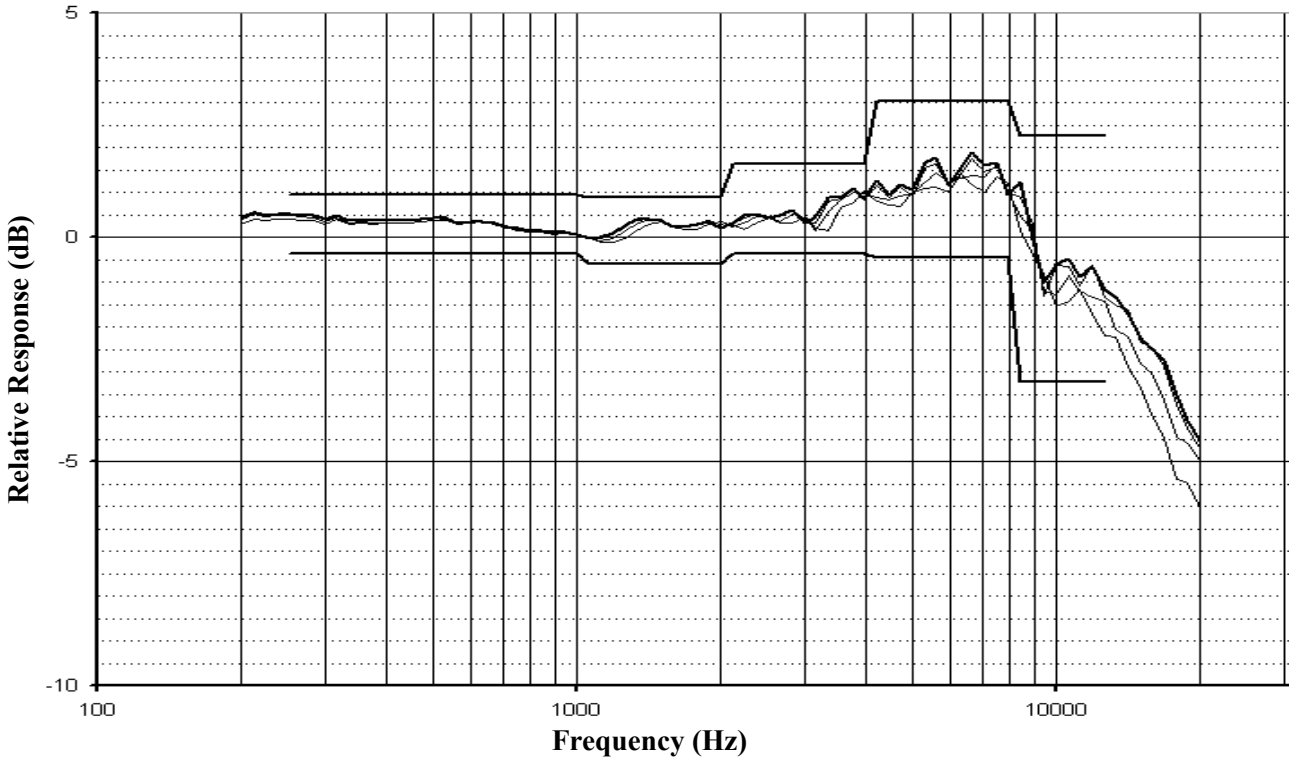

Figure 3–1 Zero to 30 degrees incidence angle

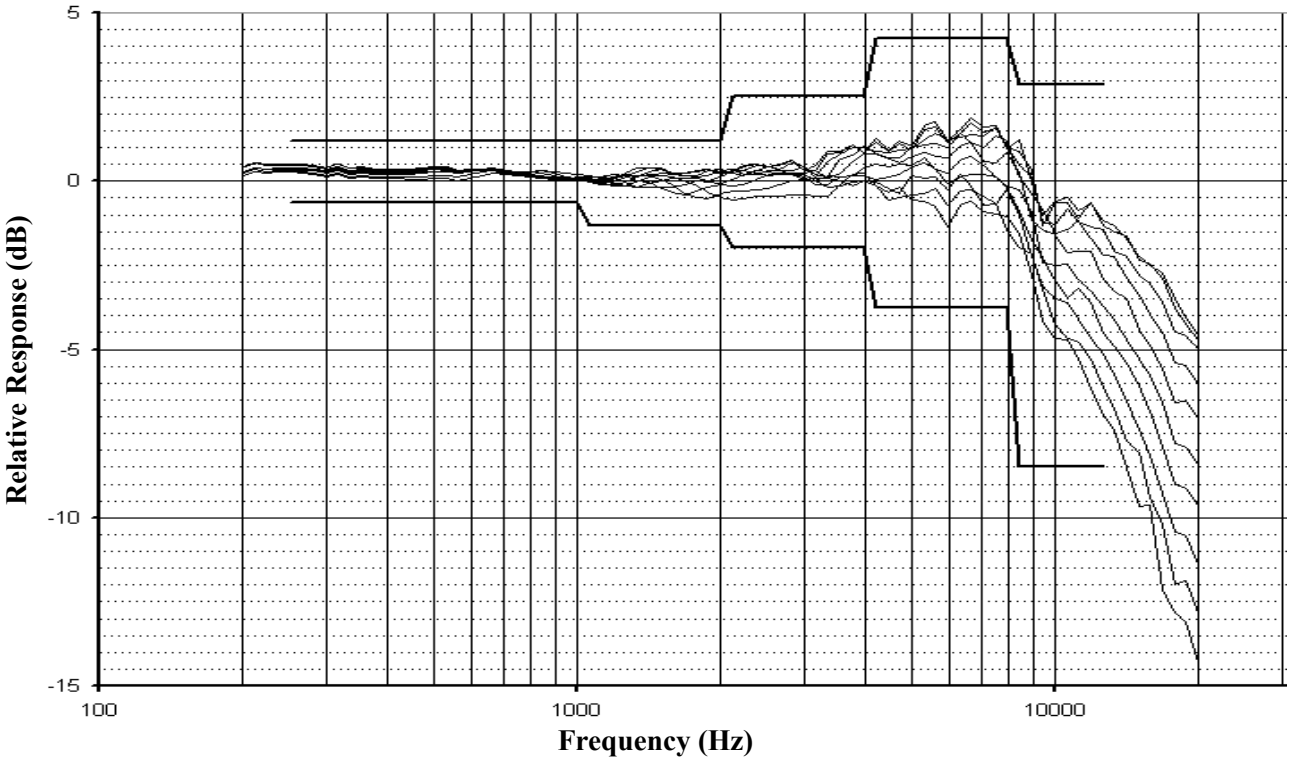

Figure 3–2 Zero to 90 degrees incidence angle

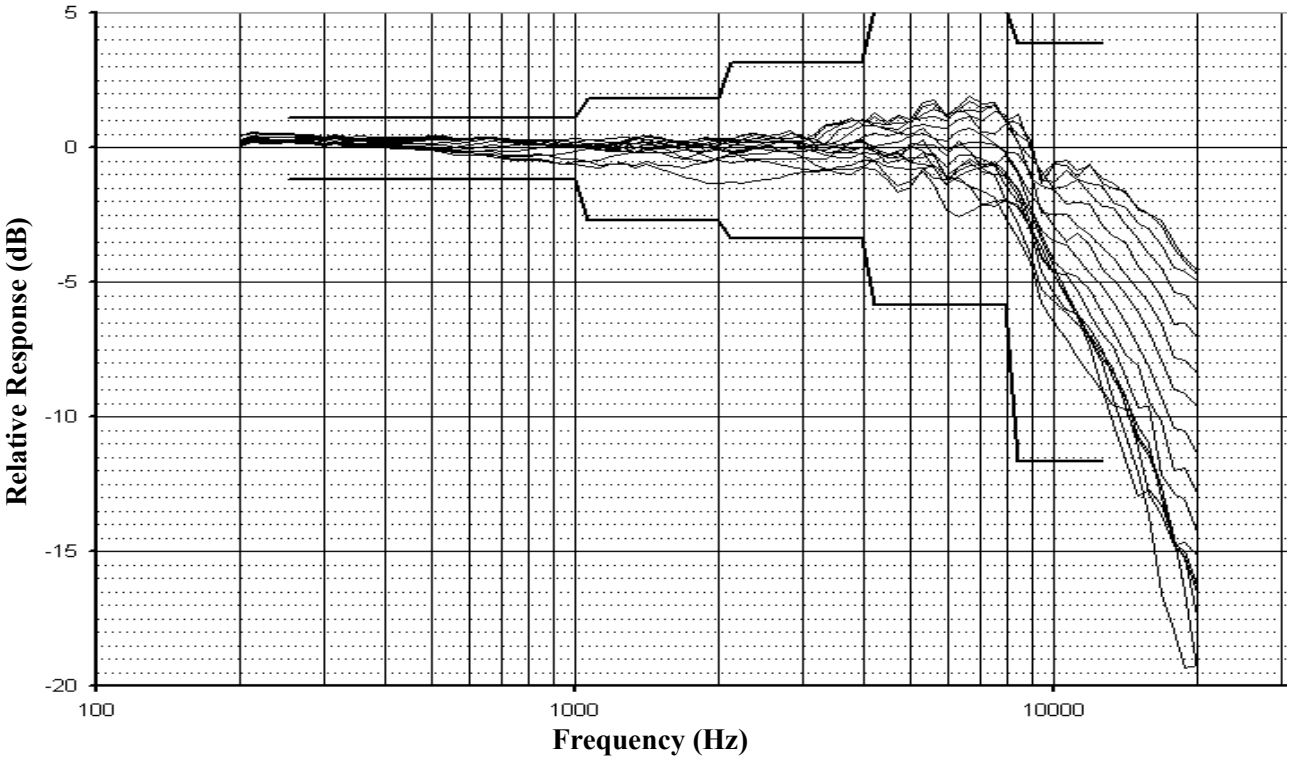

Figure 3–3 Zero to 150 degrees incidence angle

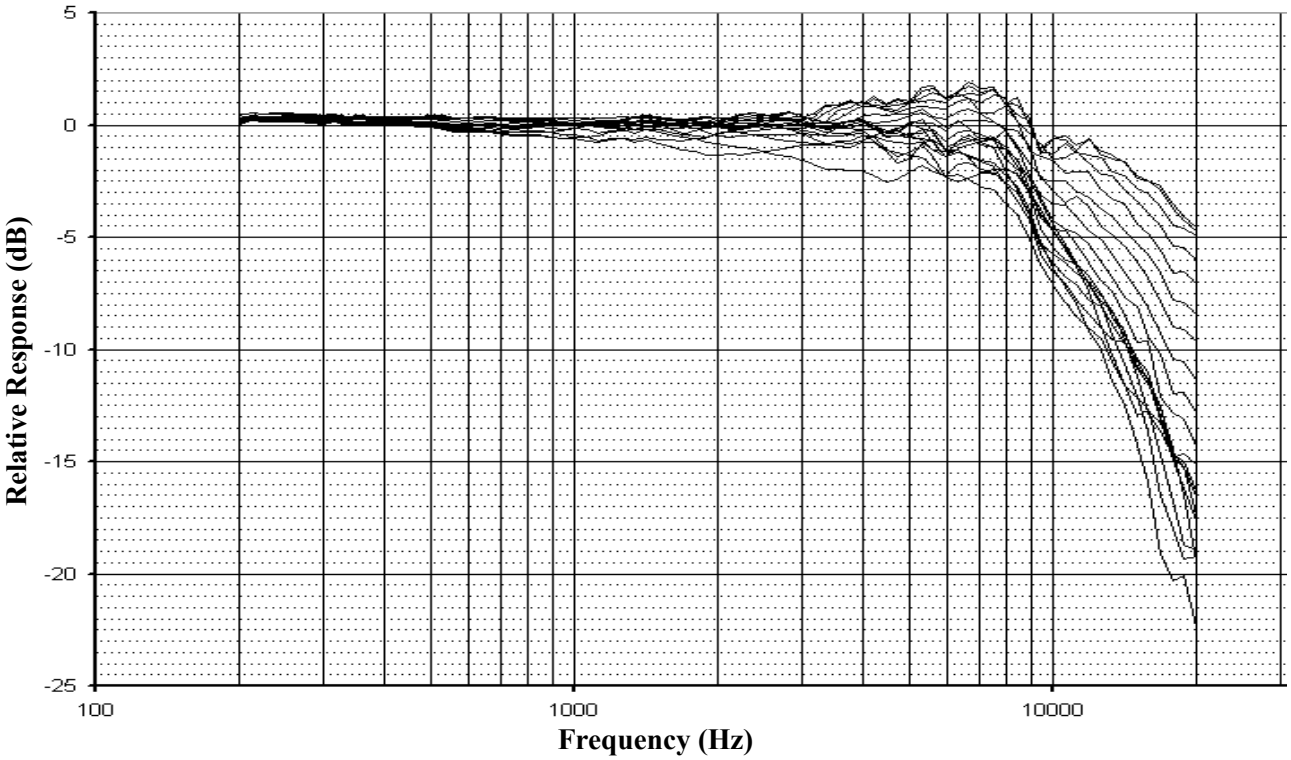

Figure 3–4 Zero to 180 degrees incidence angle

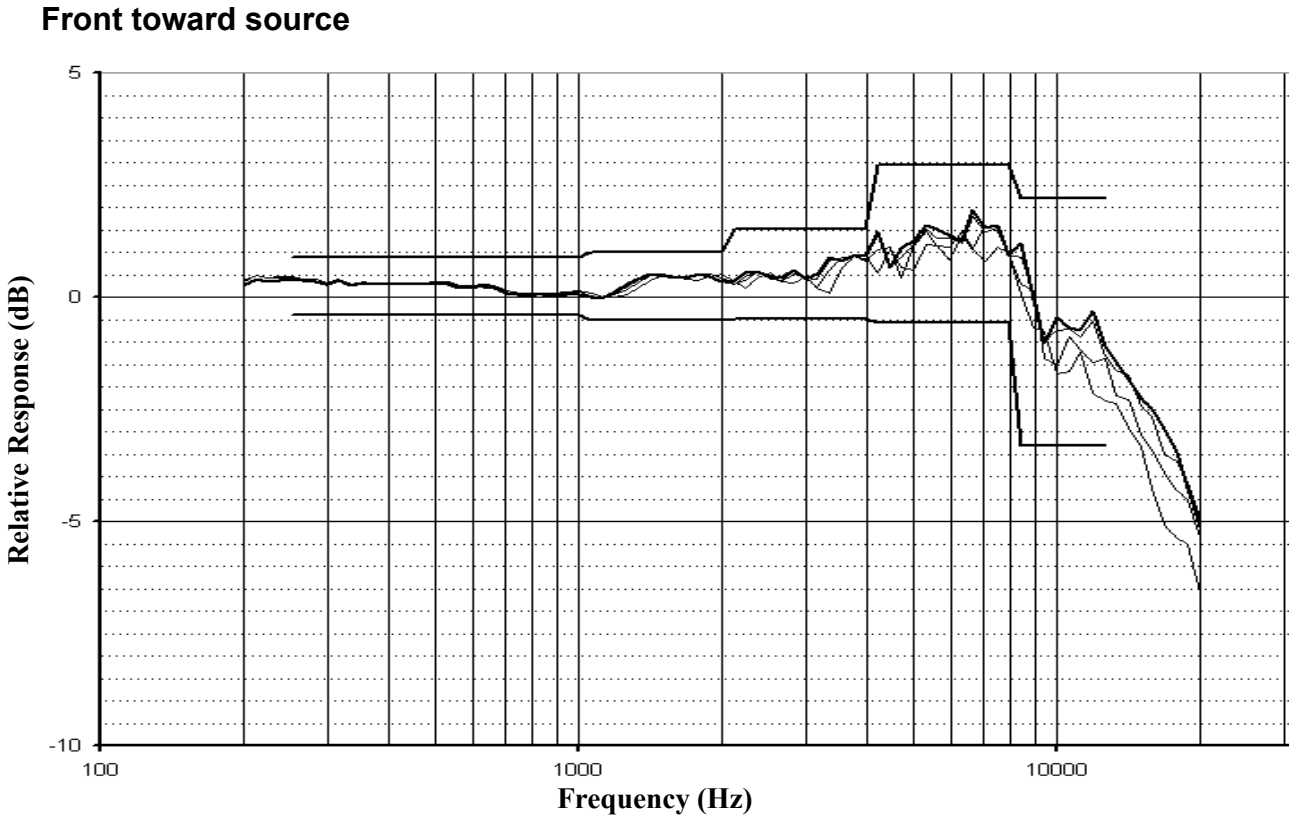

Figure 3–5 Zero to 30 degrees incidence angle

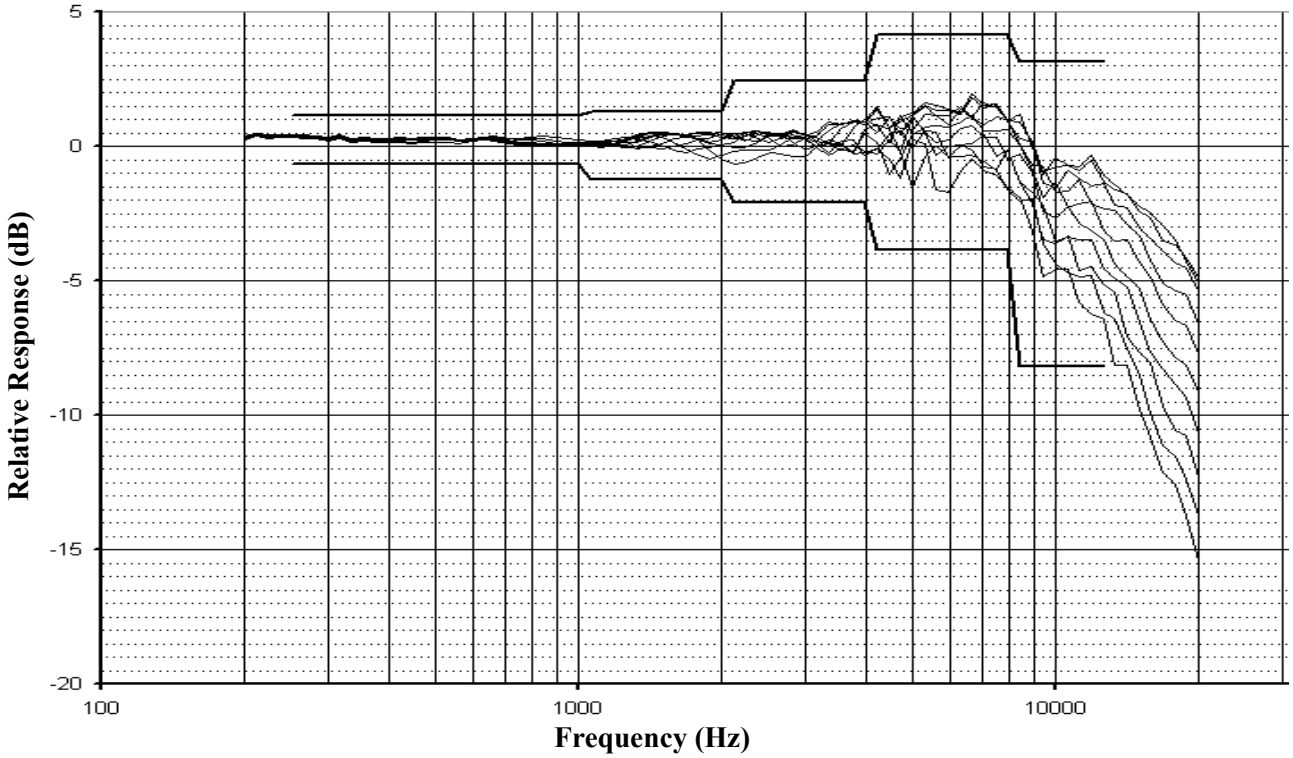

Figure 3–6 Zero to 90 degrees incidence angle

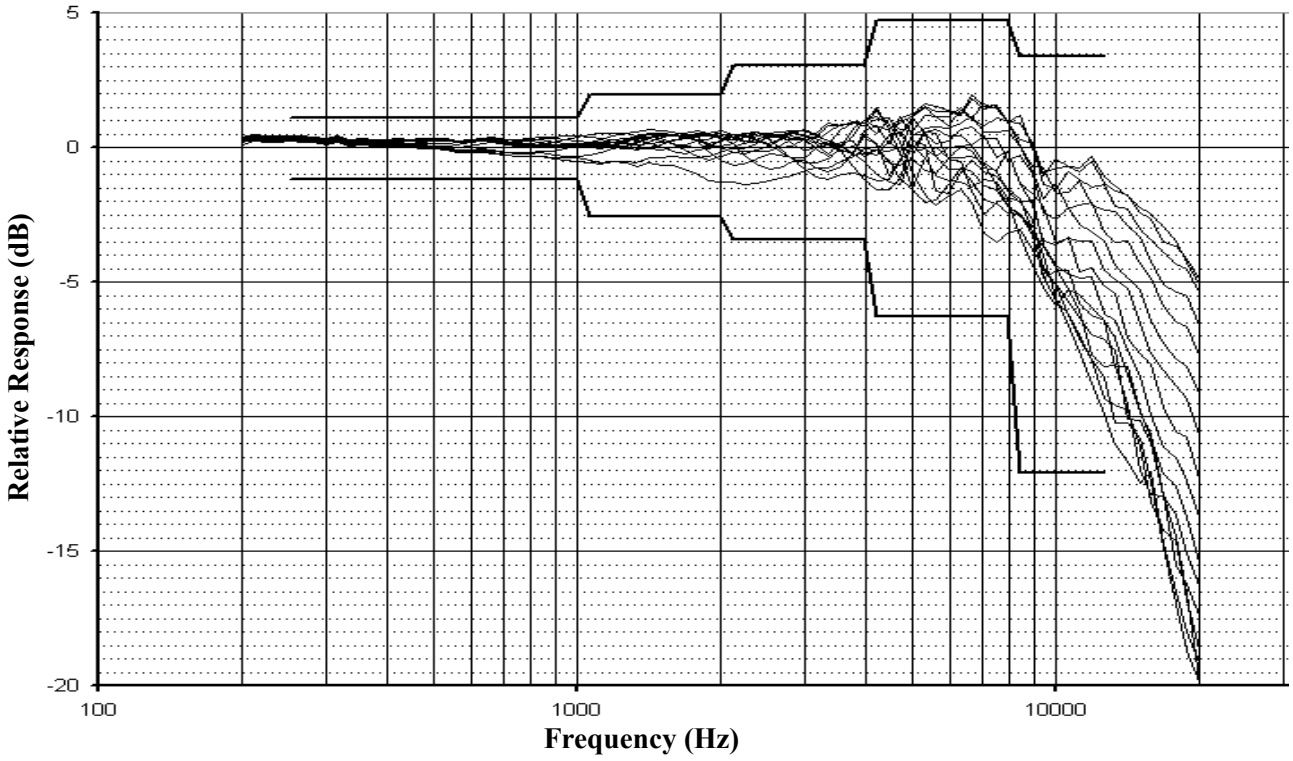

Figure 3–7 Zero to 150 degrees incidence angle

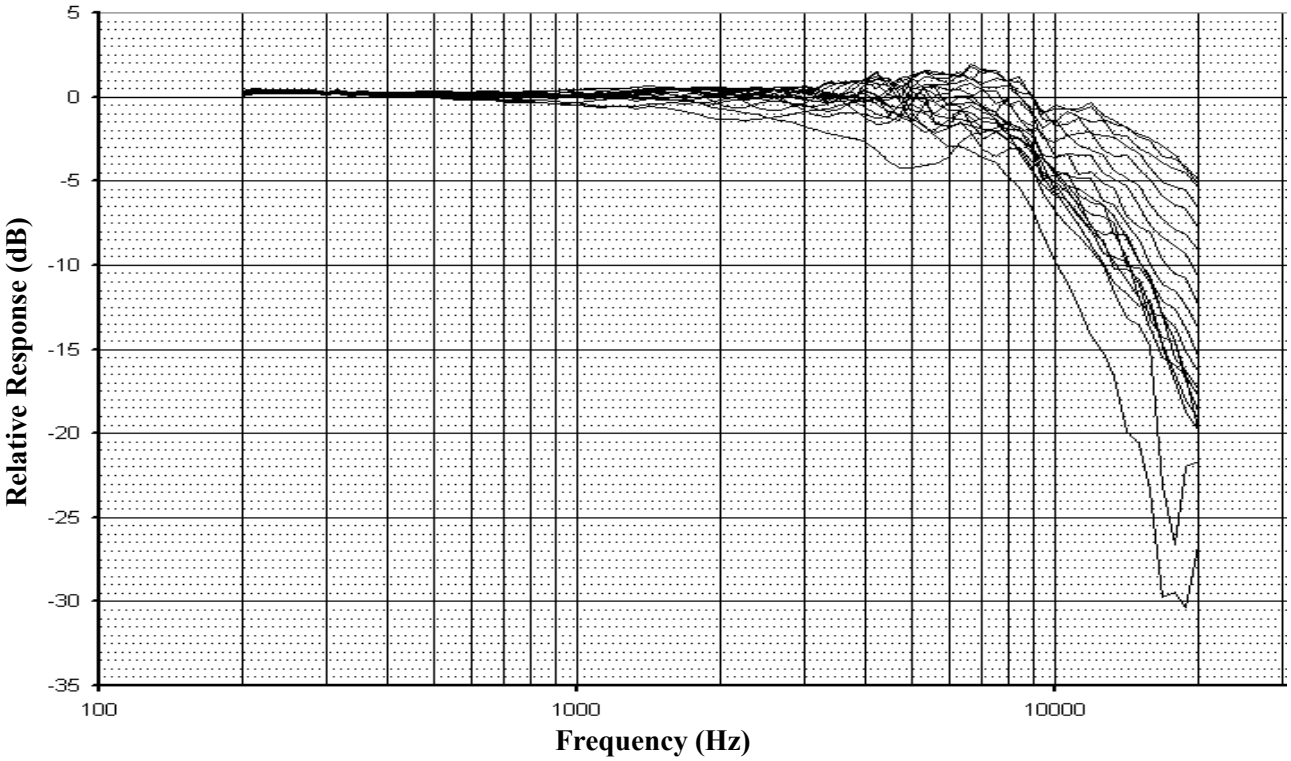

Figure 3–8 Zero to 180 degrees incidence angle

Random incidence frequency response

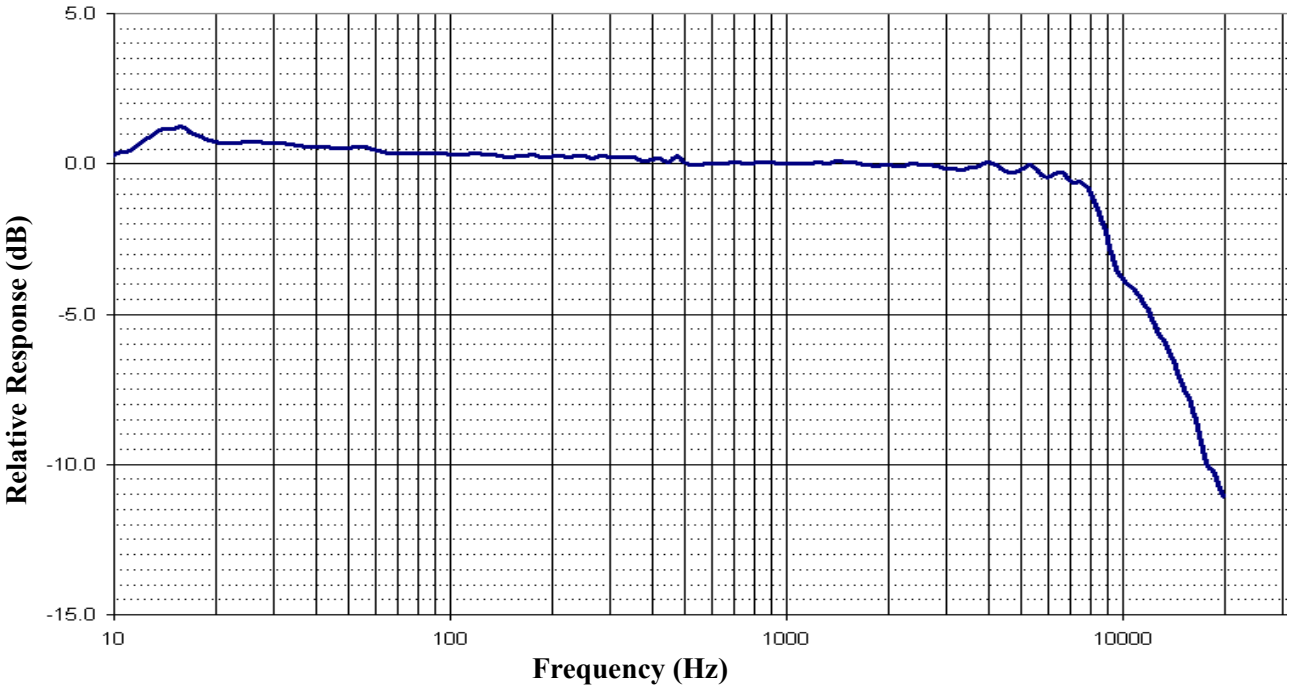

Figure 3–9 Random incidence angle

Acoustic corrections

Table 3–1: Acoustic corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.27	**1334**	-0.03	**5623**	0.24
13	-0.85	**1413**	-0.08	**5957**	0.46
16	-1.24	**1496**	-0.07	**6310**	0.35
20	-0.74	**1585**	-0.03	**6683**	0.28
25	-0.72	**1679**	0.03	**7079**	0.64
32	-0.68	**1778**	0.02	**7499**	0.60
40	-0.55	**1884**	0.07	**7943**	0.85
50	-0.53	**1995**	0.03	**8414**	1.47
63	-0.40	**2113**	0.06	**8913**	2.26
79	-0.36	**2239**	0.06	**9441**	3.32
100	-0.31	**2371**	0.00	**10000**	3.83
126	-0.33	**2512**	0.02	**10593**	4.09
158	-0.28	**2661**	0.02	**11220**	4.44
200	-0.24	**2818**	0.08	**11885**	4.86
251	-0.25	**2985**	0.14	**12589**	5.53
316	-0.22	**3162**	0.18	**13335**	5.97
398	-0.15	**3350**	0.22	**14125**	6.57
501	0.00	**3548**	0.14	**14962**	7.32
631	0.00	**3758**	0.07	**15849**	7.96
794	-0.02	**3981**	-0.03	**16788**	9.03
1000	0.00	**4217**	0.05	**17783**	9.94
1059	-0.02	**4467**	0.23	**18836**	10.29
1122	0.00	**4732**	0.30	**19953**	11.07
1189	-0.03	**5012**	0.16		
1259	-0.05	**5309**	0.04		

Self-generated broadband noise

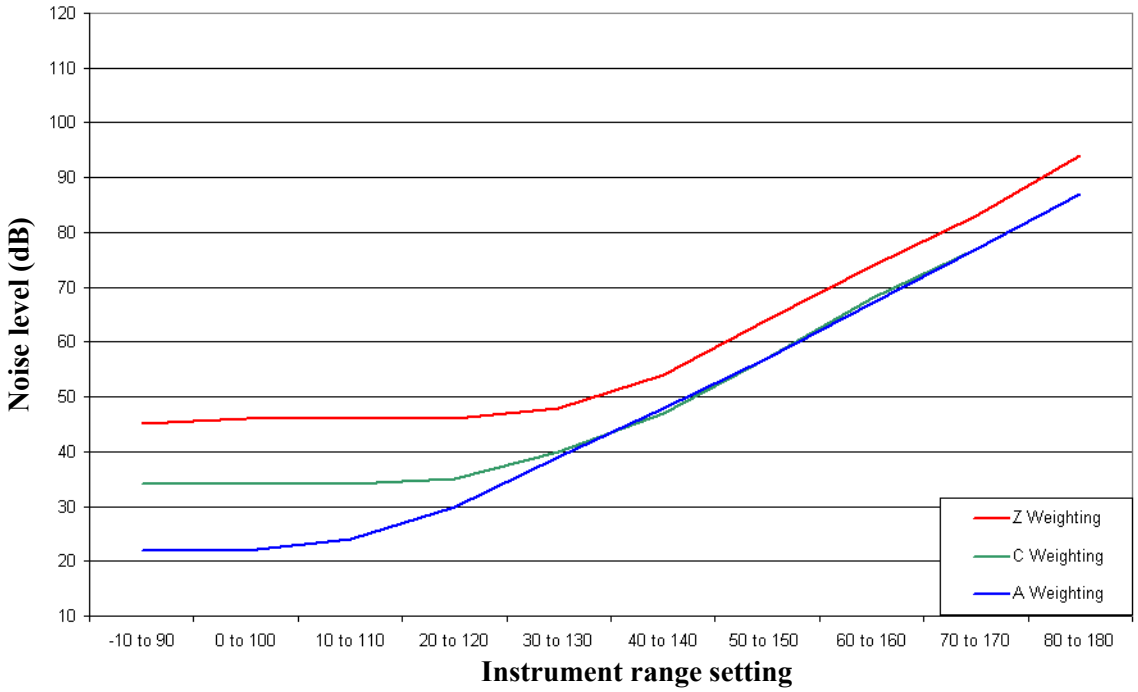

Figure 3–10 Broadband noise

2. With windscreen

Directional frequency response

Side toward source

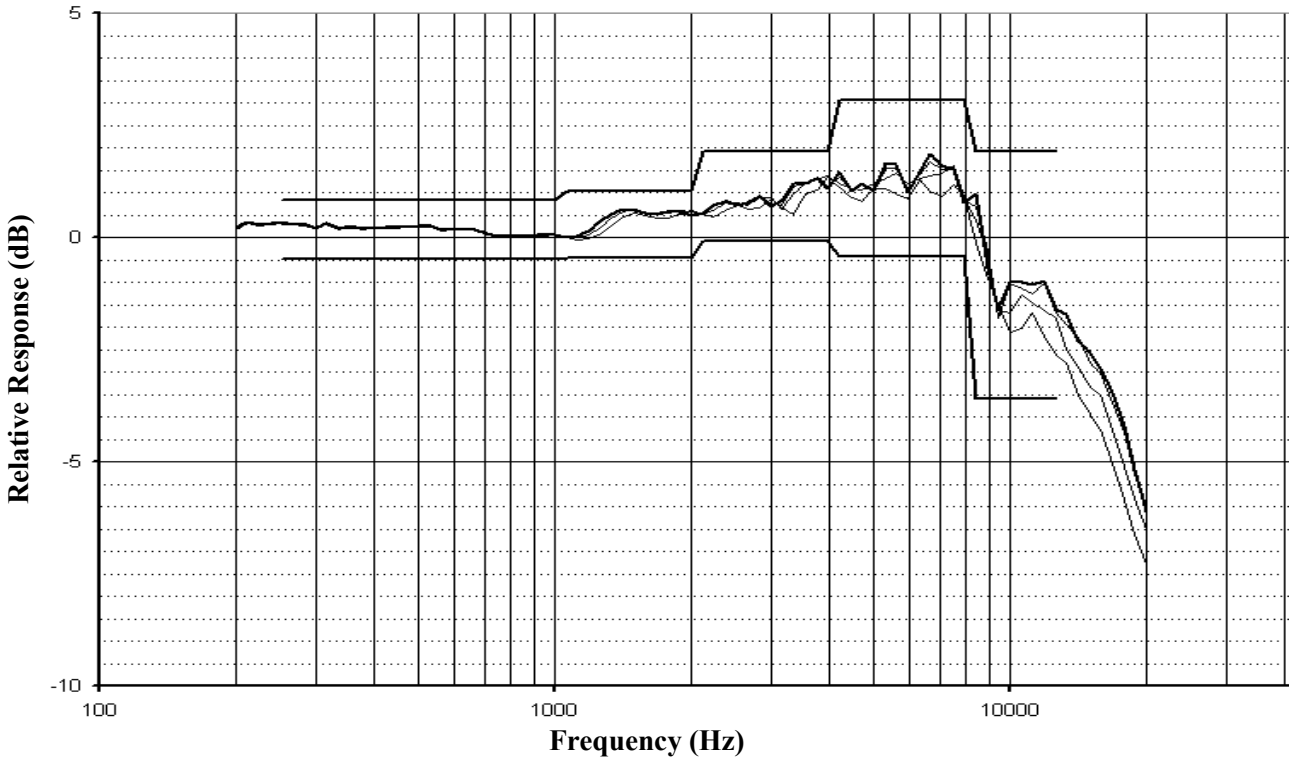

Figure 3–11 Zero to 30 degrees incidence angle

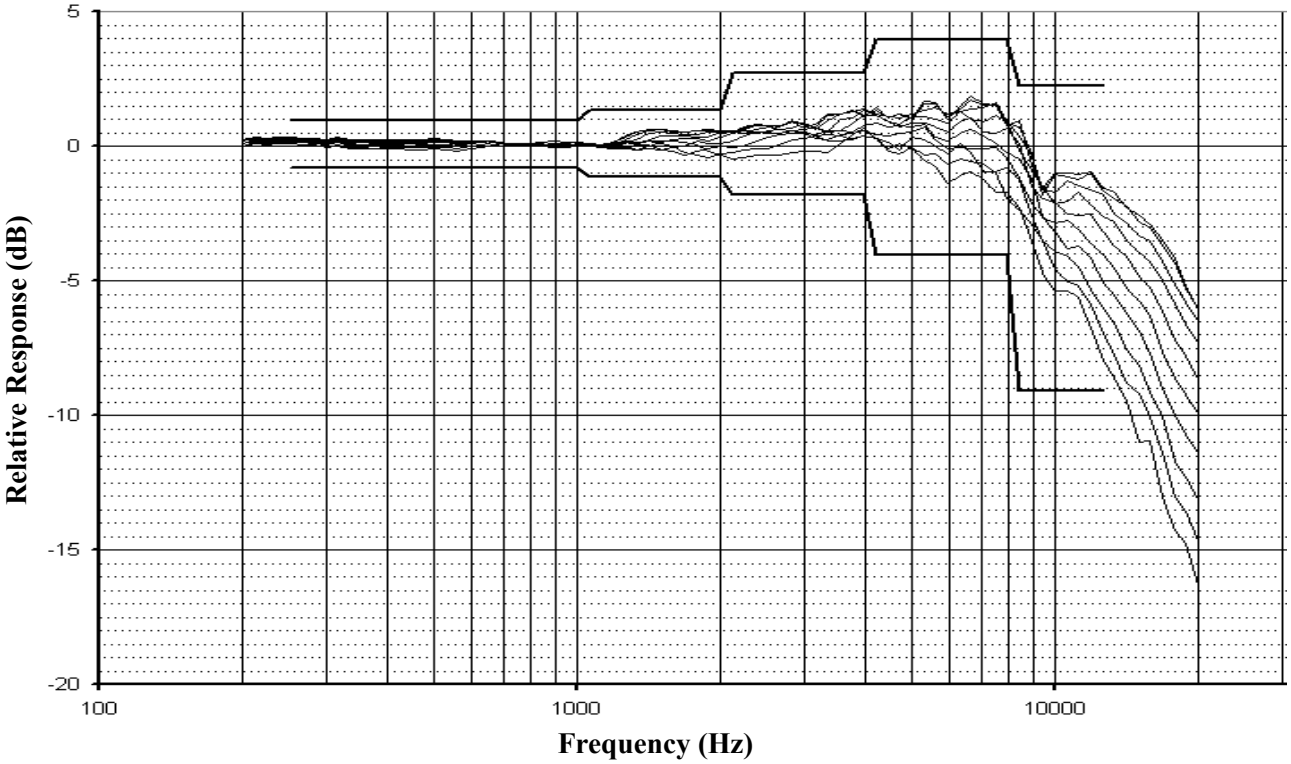

Figure 3–12 Zero to 90 degrees incidence angle

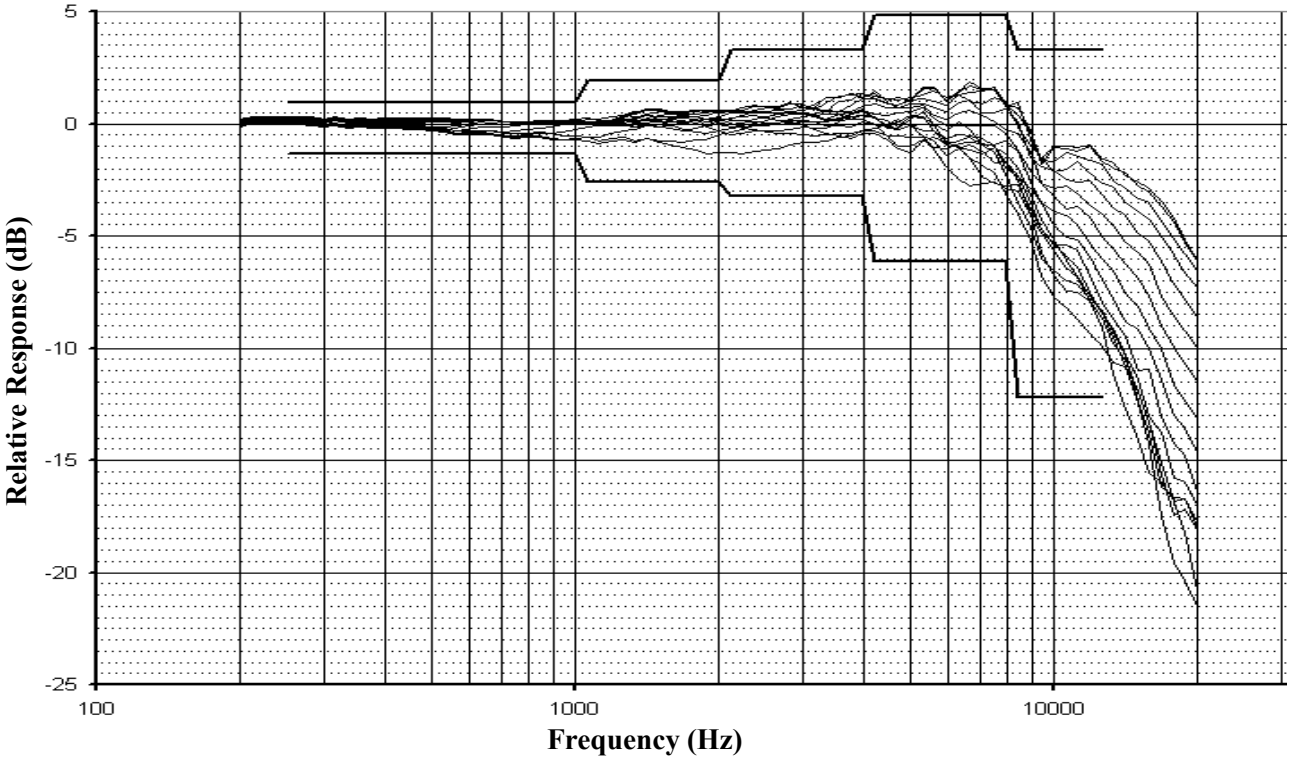

Figure 3–13 Zero to 150 degrees incidence angle

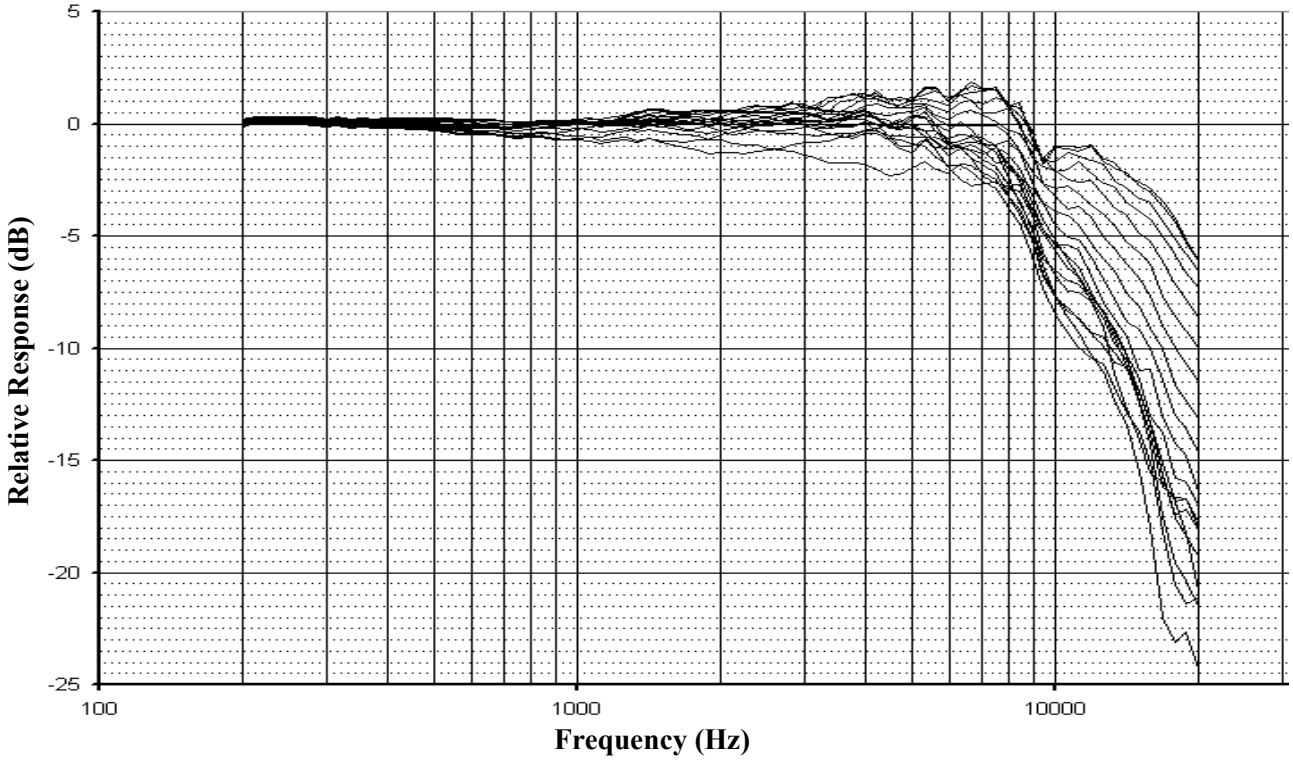

Figure 3–14 Zero to 180 degrees incidence angle

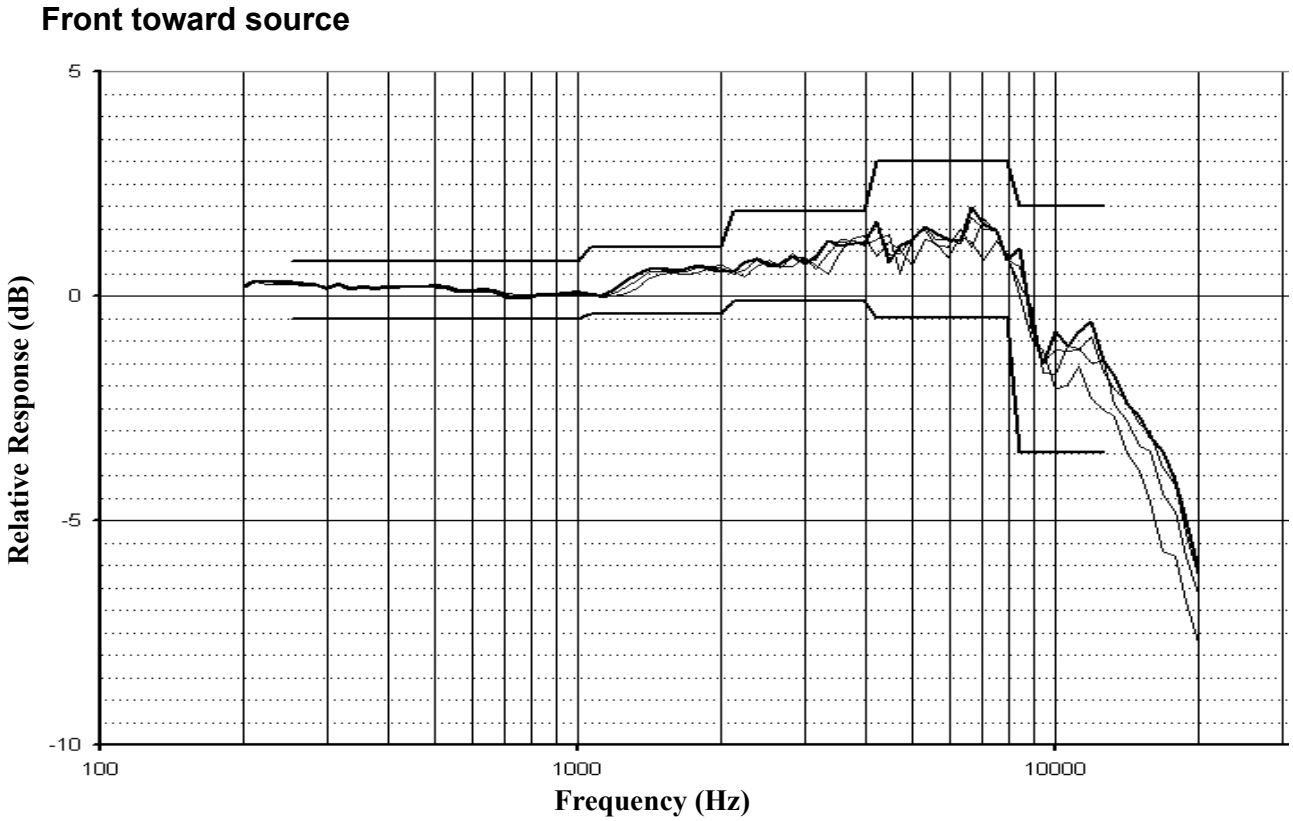

Figure 3–15 Zero to 30 degrees incidence angle

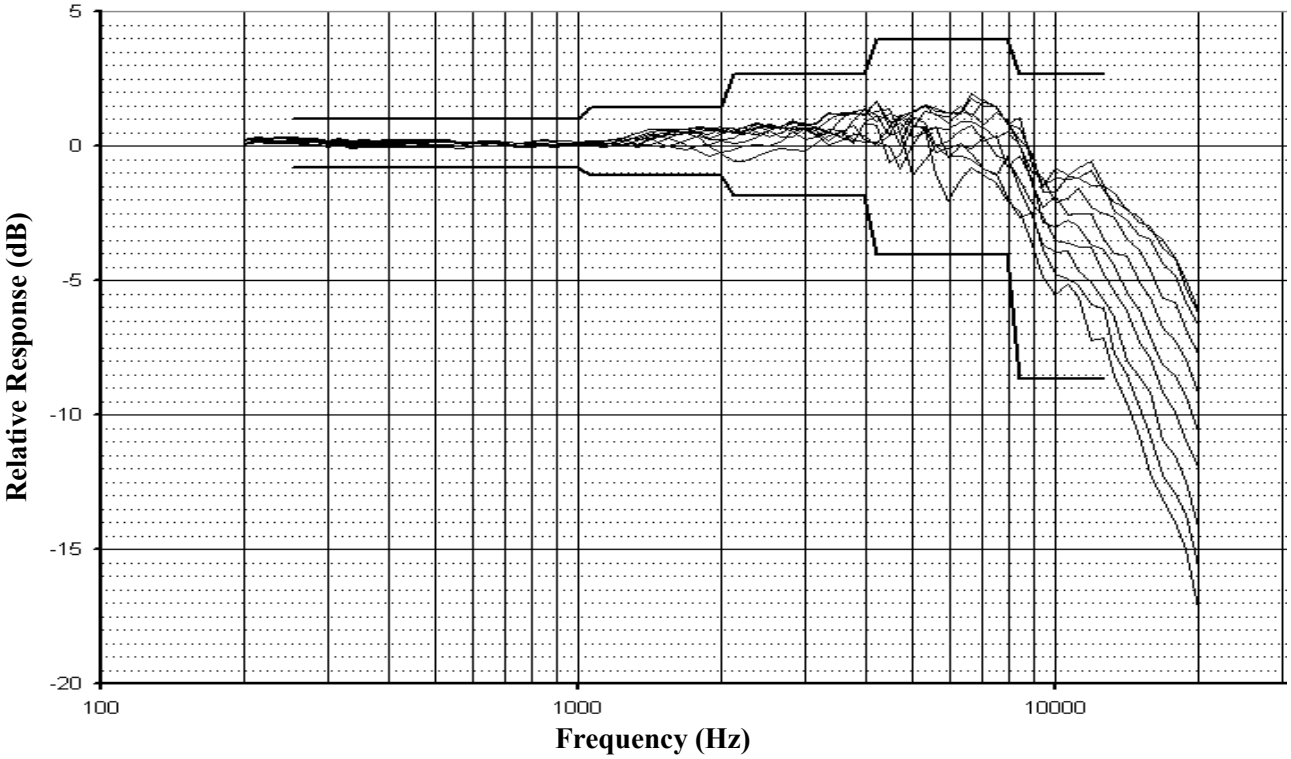

Figure 3–16 Zero to 90 degrees incidence angle

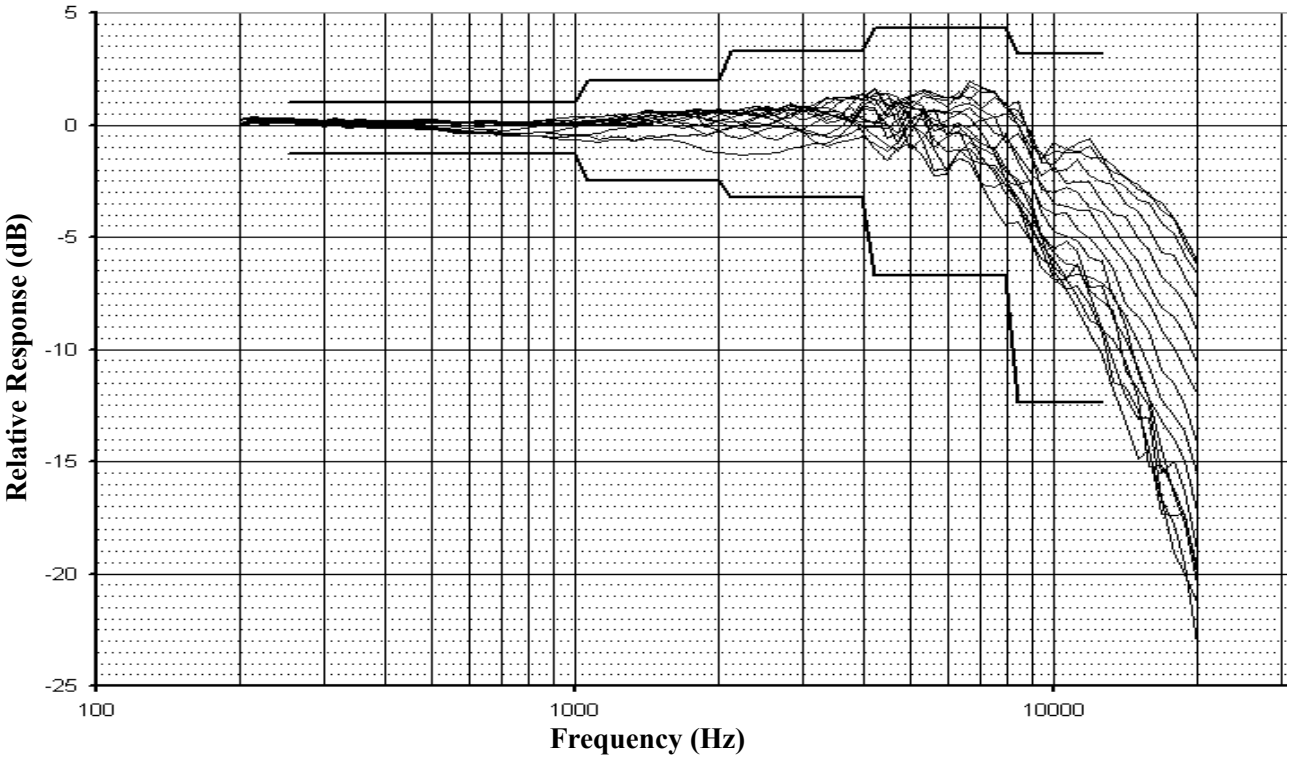

Figure 3–17 Zero to 150 degrees incidence angle

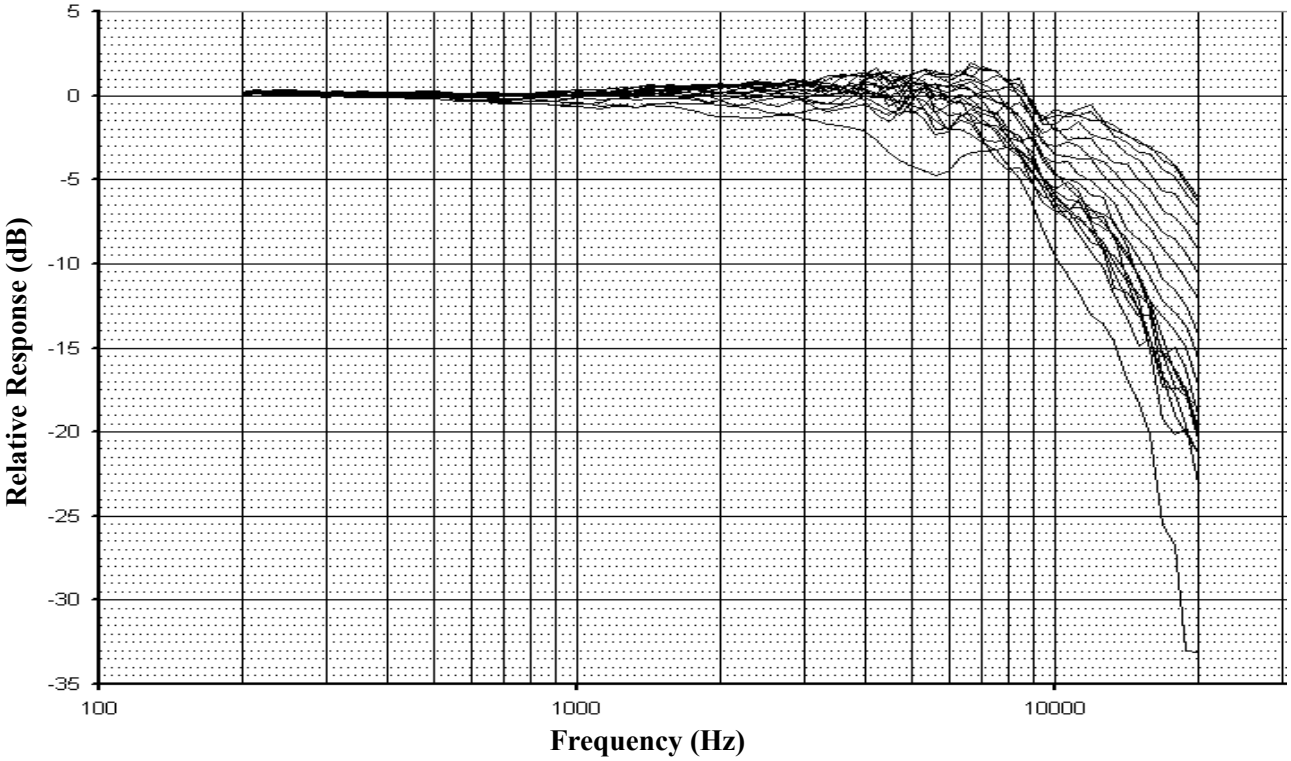

Figure 3–18 Zero to 180 degrees incidence angle

Random incidence frequency response

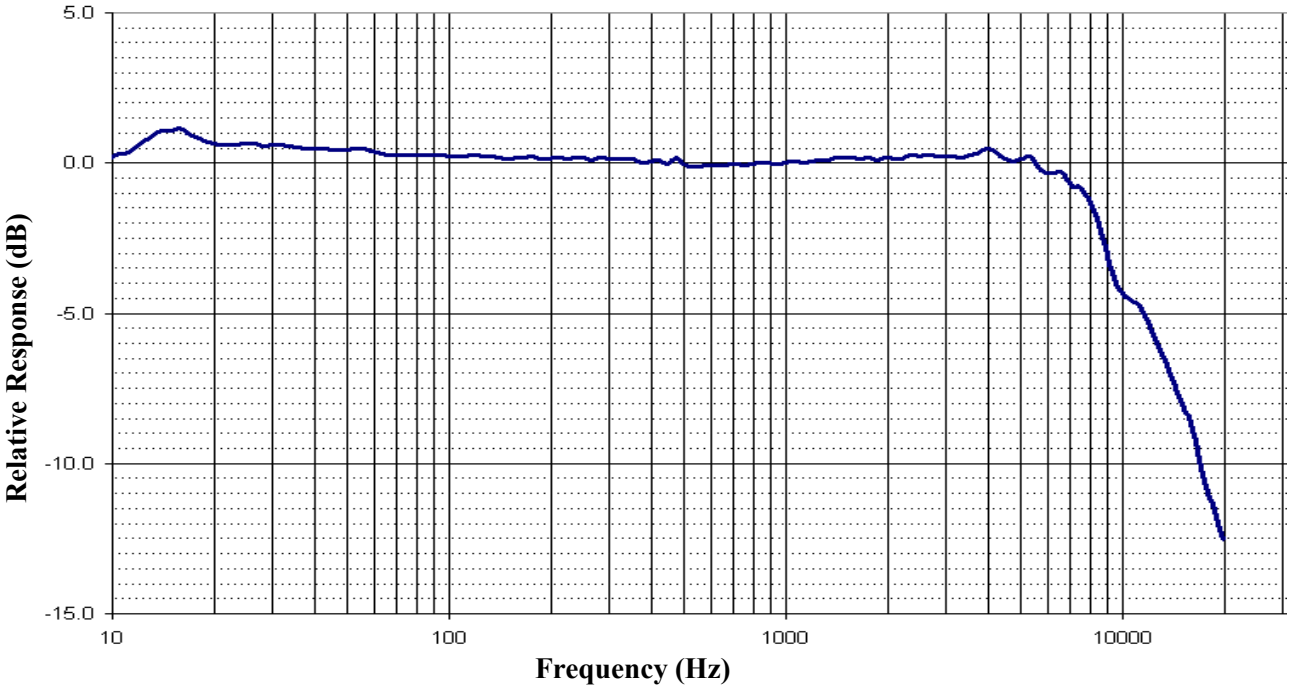

Figure 3–19 Random incidence angle

Acoustic corrections

Table 3–2: Acoustic corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.27	**1334**	-0.03	**5623**	0.24
13	-0.85	**1413**	-0.08	**5957**	0.46
16	-1.24	**1496**	-0.07	**6310**	0.35
20	-0.74	**1585**	-0.03	**6683**	0.28
25	-0.72	**1679**	0.03	**7079**	0.64
32	-0.68	**1778**	0.02	**7499**	0.60
40	-0.55	**1884**	0.07	**7943**	0.85
50	-0.53	**1995**	0.03	**8414**	1.47
63	-0.40	**2113**	0.06	**8913**	2.26
79	-0.36	**2239**	0.06	**9441**	3.32
100	-0.31	**2371**	0.00	**10000**	3.83
126	-0.33	**2512**	0.02	**10593**	4.09
158	-0.28	**2661**	0.02	**11220**	4.44
200	-0.24	**2818**	0.08	**11885**	4.86
251	-0.25	**2985**	0.14	**12589**	5.53
316	-0.22	**3162**	0.18	**13335**	5.97
398	-0.15	**3350**	0.22	**14125**	6.57
501	0.00	**3548**	0.14	**14962**	7.32
631	0.00	**3758**	0.07	**15849**	7.96
794	-0.02	**3981**	-0.03	**16788**	9.03
1000	0.00	**4217**	0.05	**17783**	9.94
1059	-0.02	**4467**	0.23	**18836**	10.29
1122	0.00	**4732**	0.30	**19953**	11.07
1189	-0.03	**5012**	0.16		
1259	-0.05	**5309**	0.04		

Windscreen corrections

Table 3–3: Windscreen corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.09	**1334**	-0.05	**5623**	-0.12
13	0.09	**1413**	-0.10	**5957**	-0.12
16	0.09	**1496**	-0.11	**6310**	-0.03
20	0.09	**1585**	-0.15	**6683**	0.05
25	0.09	**1679**	-0.17	**7079**	0.11
32	0.09	**1778**	-0.19	**7499**	0.20
40	0.09	**1884**	-0.17	**7943**	0.33
50	0.09	**1995**	-0.20	**8414**	0.35
63	0.09	**2113**	-0.19	**8913**	0.52
79	0.09	**2239**	-0.21	**9441**	0.51
100	0.09	**2371**	-0.24	**10000**	0.50
126	0.09	**2512**	-0.24	**10593**	0.46
158	0.09	**2661**	-0.27	**11220**	0.32
200	0.09	**2818**	-0.32	**11885**	0.42
251	0.09	**2985**	-0.36	**12589**	0.44
316	0.09	**3162**	-0.39	**13335**	0.57
398	0.09	**3350**	-0.40	**14125**	0.70
501	0.09	**3548**	-0.40	**14962**	0.67
631	0.09	**3758**	-0.40	**15849**	0.67
794	0.06	**3981**	-0.43	**16788**	0.86
1000	0.00	**4217**	-0.41	**17783**	0.82
1059	-0.02	**4467**	-0.37	**18836**	1.27
1122	-0.01	**4732**	-0.35	**19953**	1.45
1189	-0.04	**5012**	-0.32		
1259	-0.06	**5309**	-0.24		

Self-generated broadband noise

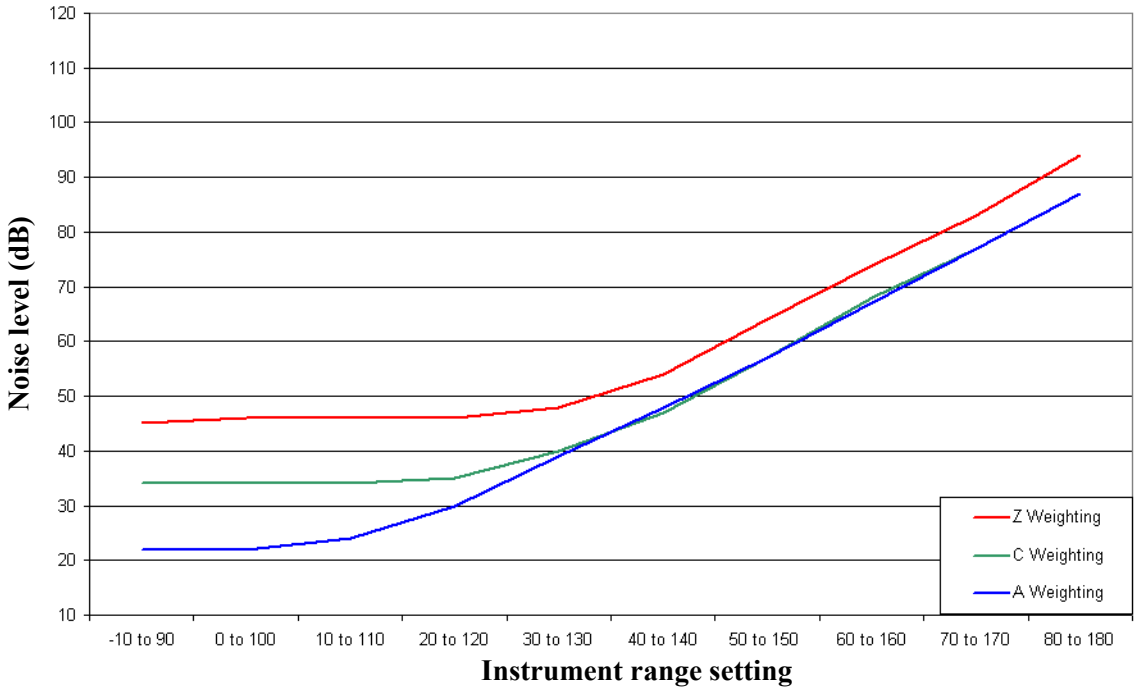

Figure 3–20 Broadband noise

3. Remote microphone

Directional frequency response

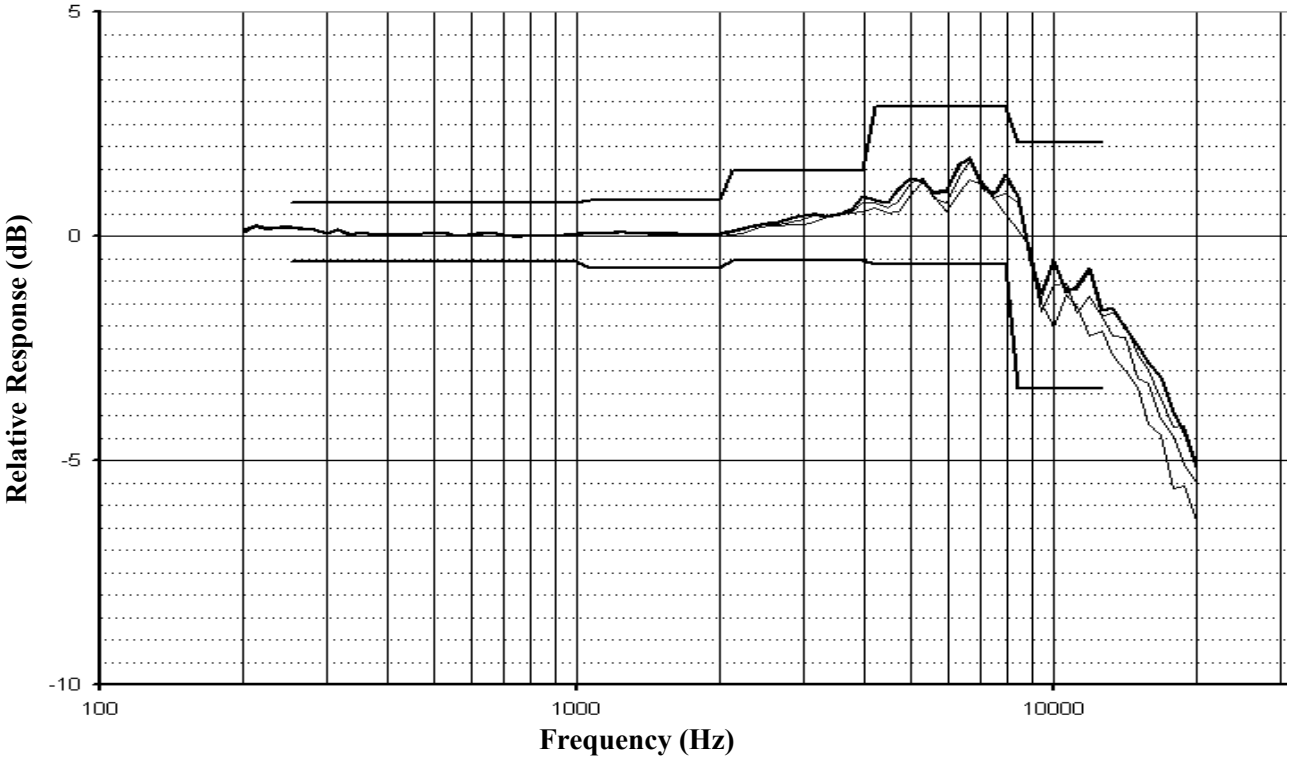

Figure 3–21 Zero to 30 degrees incidence angle

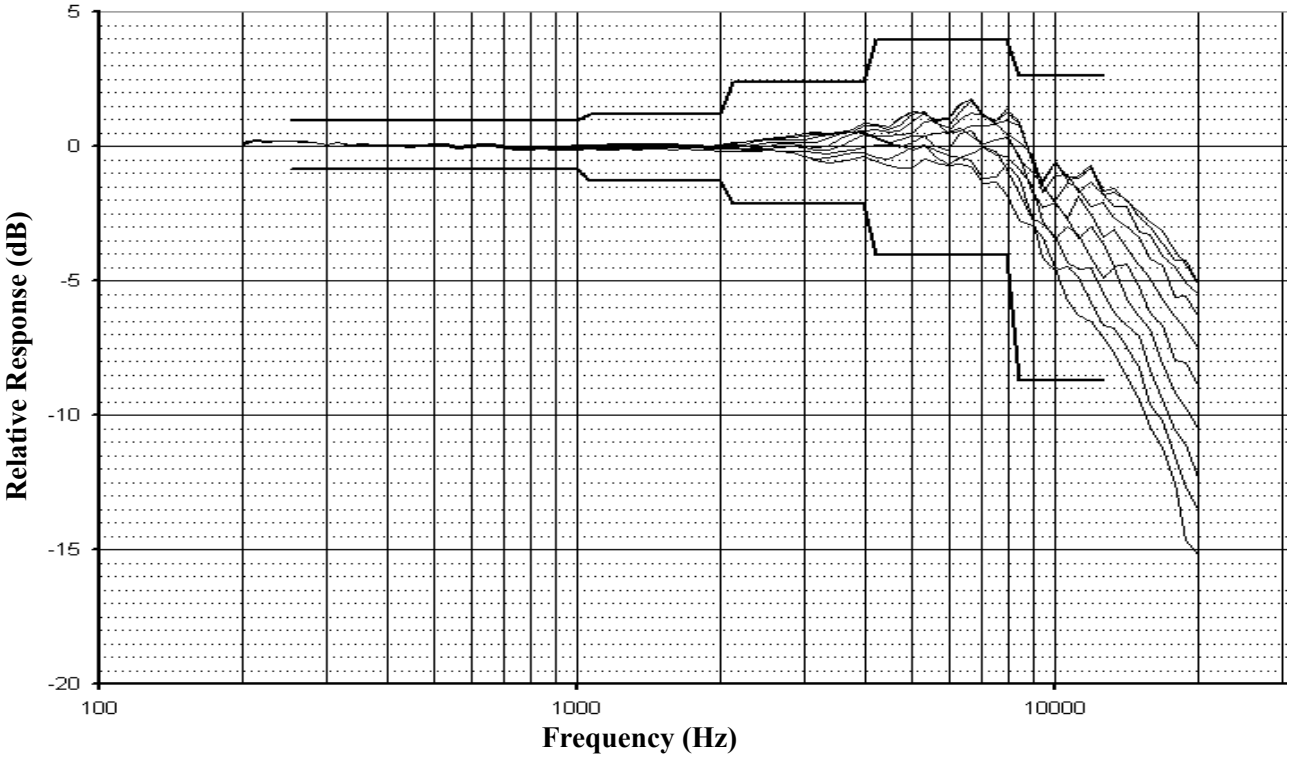

Figure 3–22 Zero to 90 degrees incidence angle

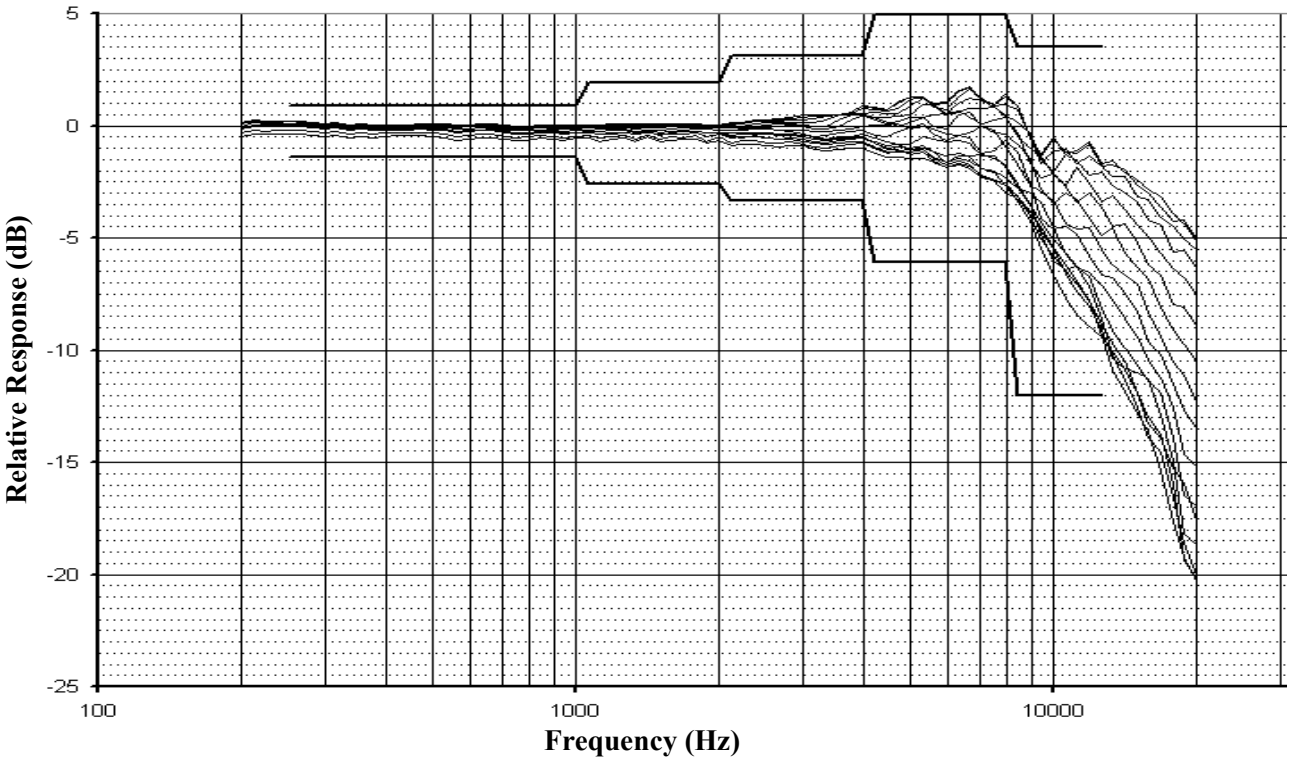

Figure 3–23 Zero to 150 degrees incidence angle

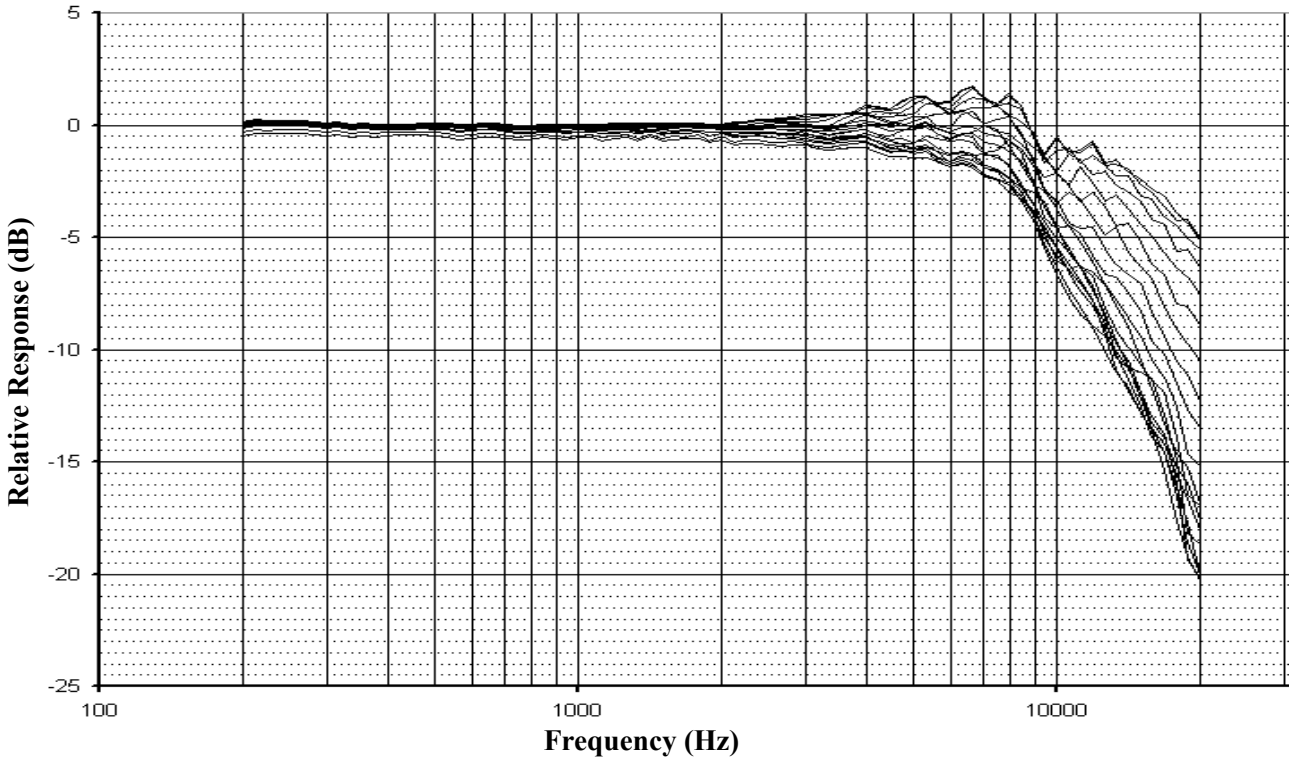

Figure 3–24 Zero to 180 degrees incidence angle

Random incidence frequency response

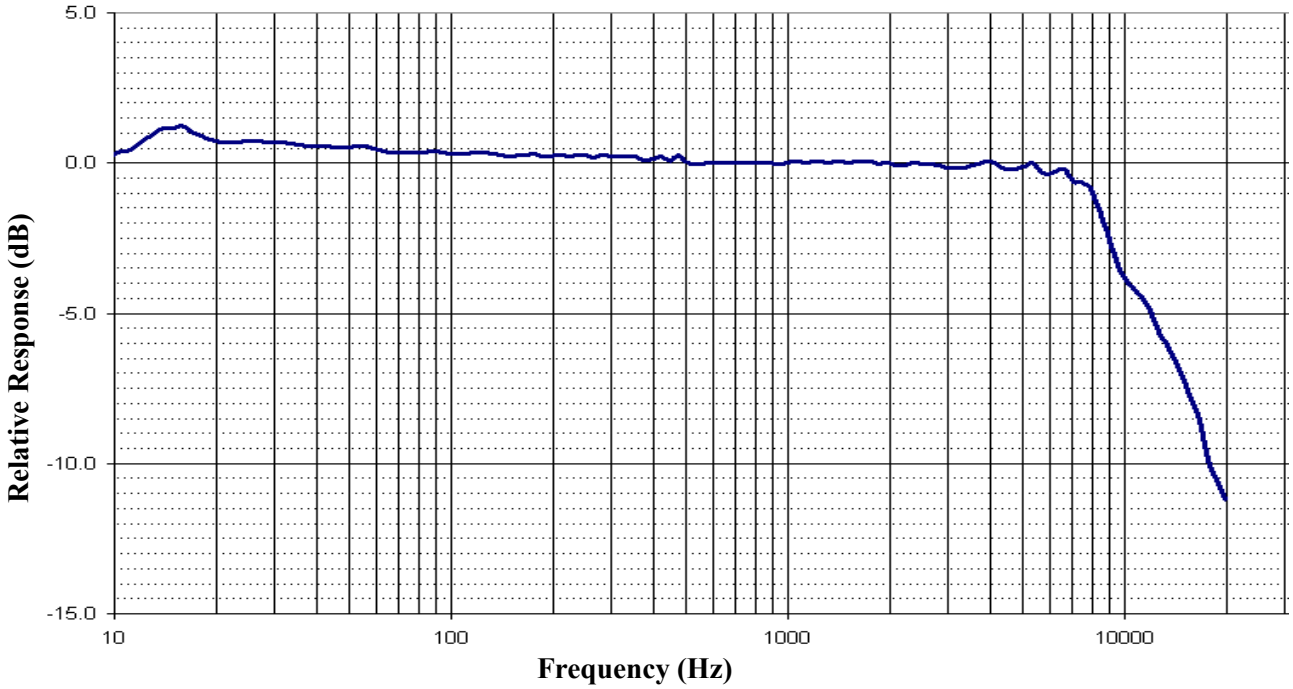

Figure 3–25 Random incidence angle

Acoustic corrections

Table 3–4: Acoustic corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.27	**1334**	-0.01	**5623**	0.25
13	-0.85	**1413**	-0.07	**5957**	0.37
16	-1.24	**1496**	-0.03	**6310**	0.27
20	-0.75	**1585**	-0.04	**6683**	0.19
25	-0.73	**1679**	-0.03	**7079**	0.61
32	-0.68	**1778**	-0.05	**7499**	0.61
40	-0.56	**1884**	0.04	**7943**	0.83
50	-0.54	**1995**	-0.01	**8414**	1.53
63	-0.40	**2113**	0.07	**8913**	2.32
79	-0.36	**2239**	0.06	**9441**	3.24
100	-0.32	**2371**	0.00	**10000**	3.81
126	-0.33	**2512**	0.03	**10593**	4.19
158	-0.29	**2661**	0.02	**11220**	4.48
200	-0.24	**2818**	0.08	**11885**	4.88
251	-0.26	**2985**	0.15	**12589**	5.63
316	-0.23	**3162**	0.16	**13335**	6.06
398	-0.15	**3350**	0.18	**14125**	6.59
501	-0.01	**3548**	0.08	**14962**	7.25
631	0.00	**3758**	-0.02	**15849**	7.98
794	0.01	**3981**	-0.06	**16788**	8.83
1000	0.00	**4217**	0.07	**17783**	9.89
1059	-0.04	**4467**	0.21	**18836**	10.52
1122	0.00	**4732**	0.21	**19953**	11.22
1189	-0.04	**5012**	0.13		
1259	-0.07	**5309**	-0.02		

Self-generated broadband noise

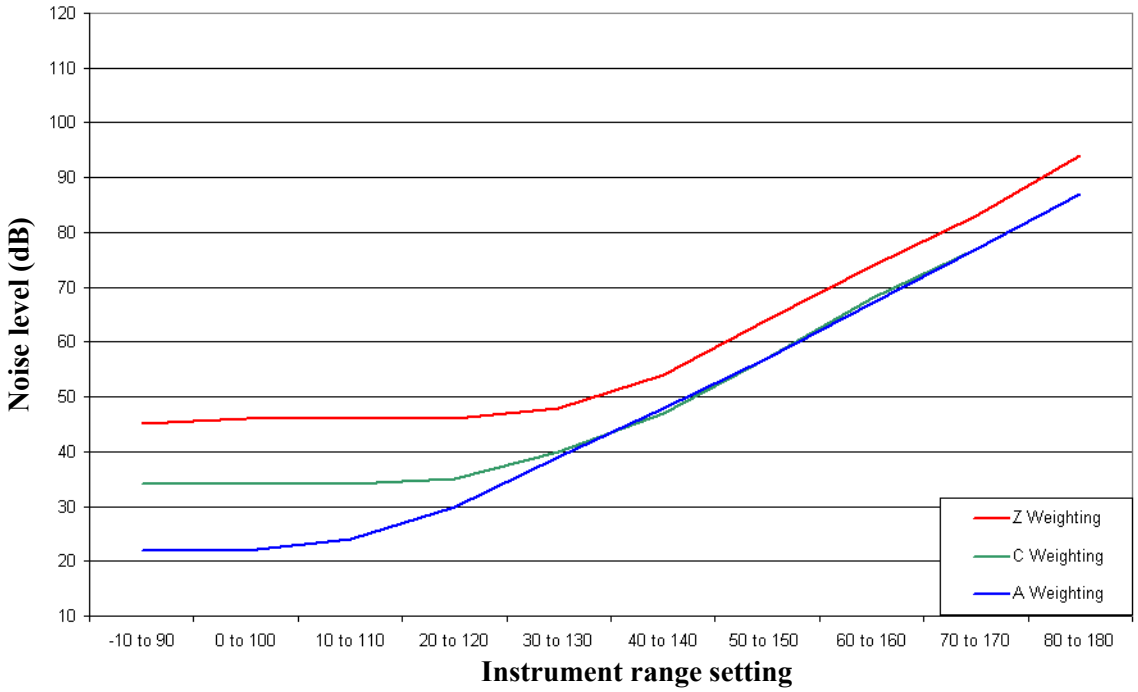

Figure 3–26 Broadband noise

4. Remote with windscreen

Directional frequency response

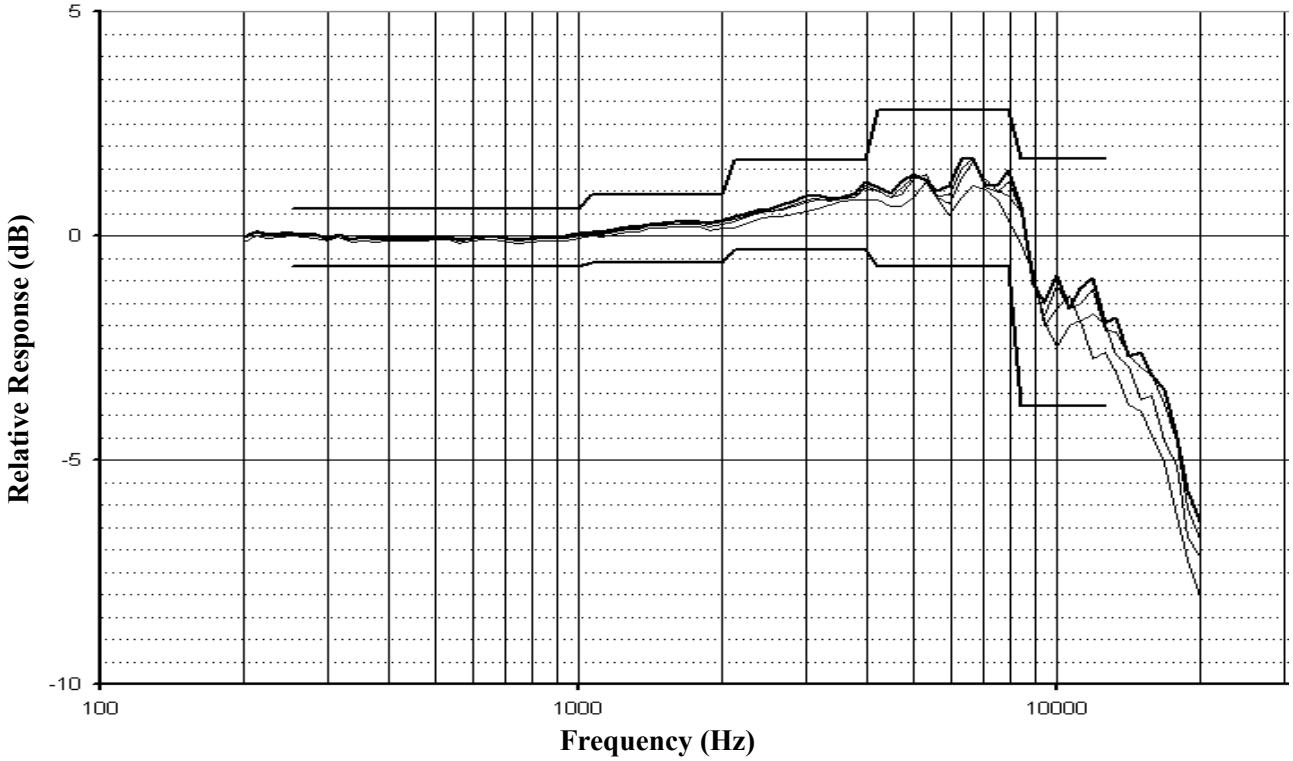

Figure 3–27 Zero to 30 degrees incidence angle

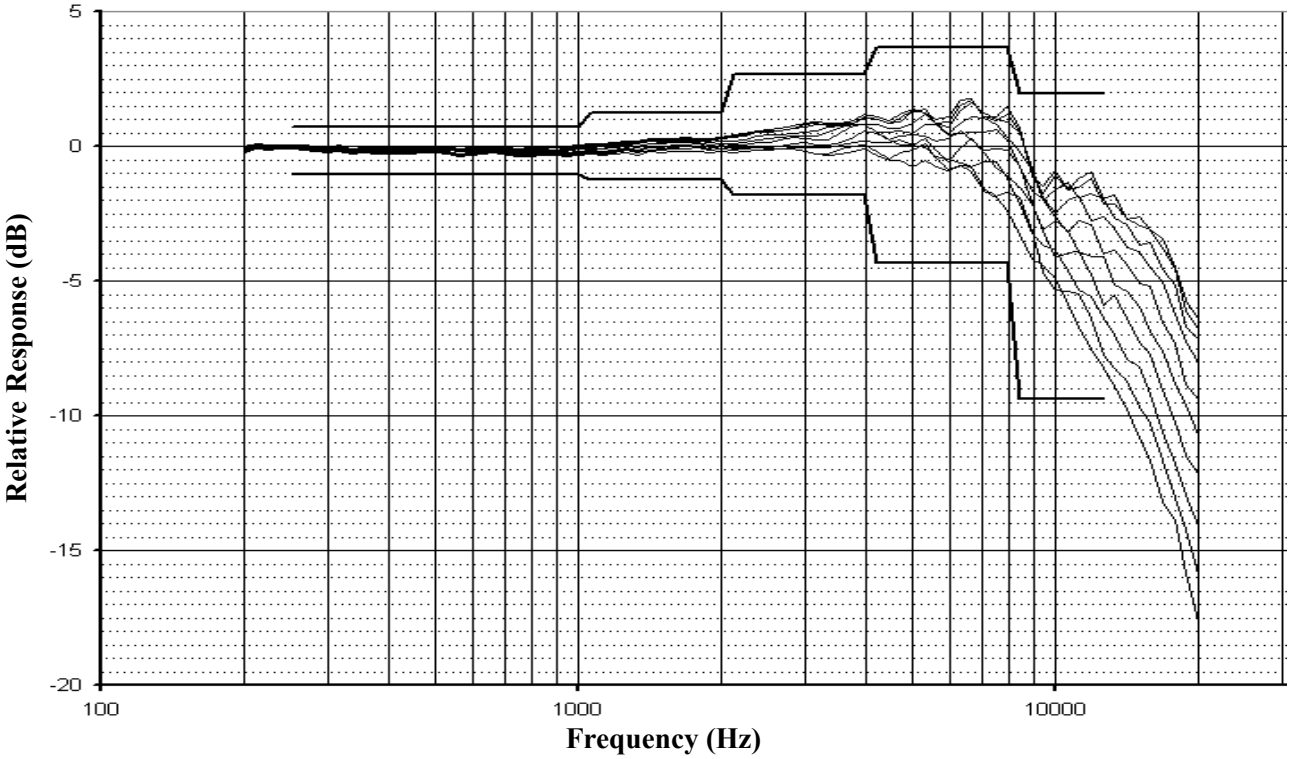

Figure 3–28 Zero to 90 degrees incidence angle

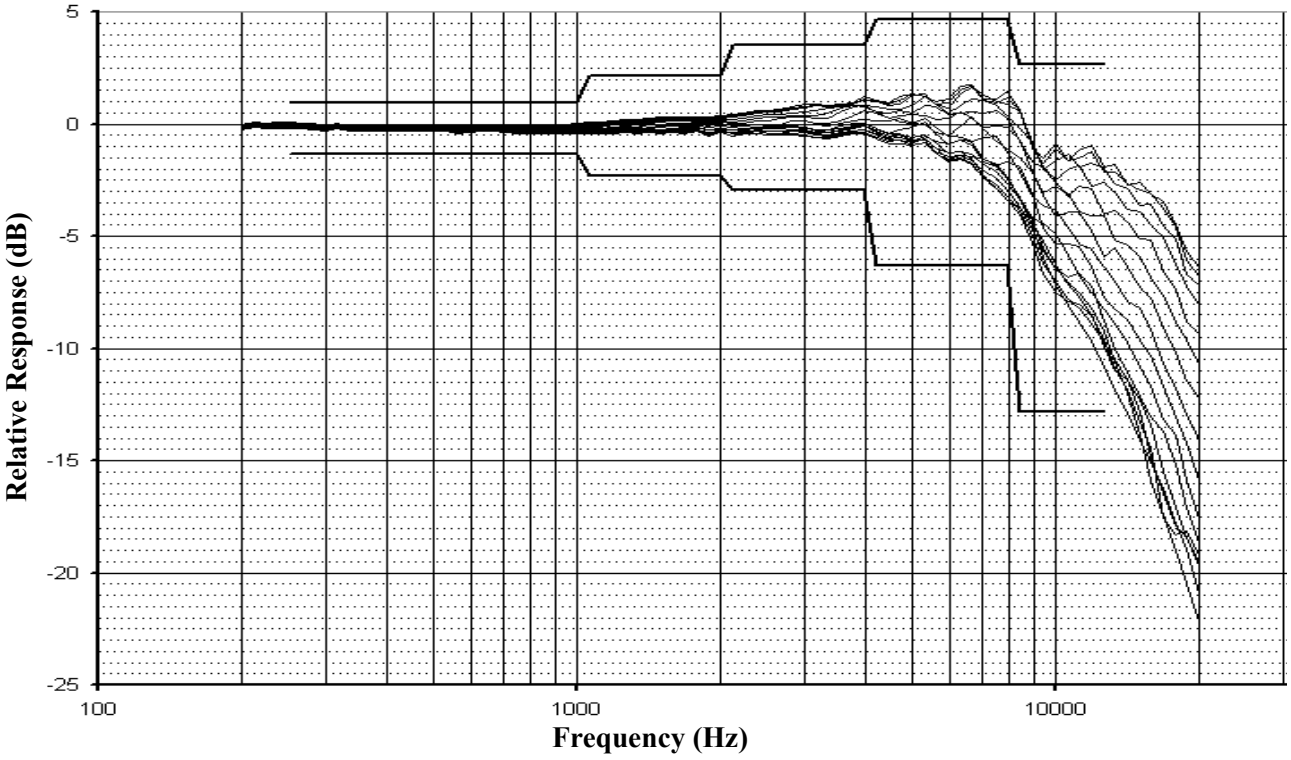

Figure 3–29 Zero to 150 degrees incidence angle

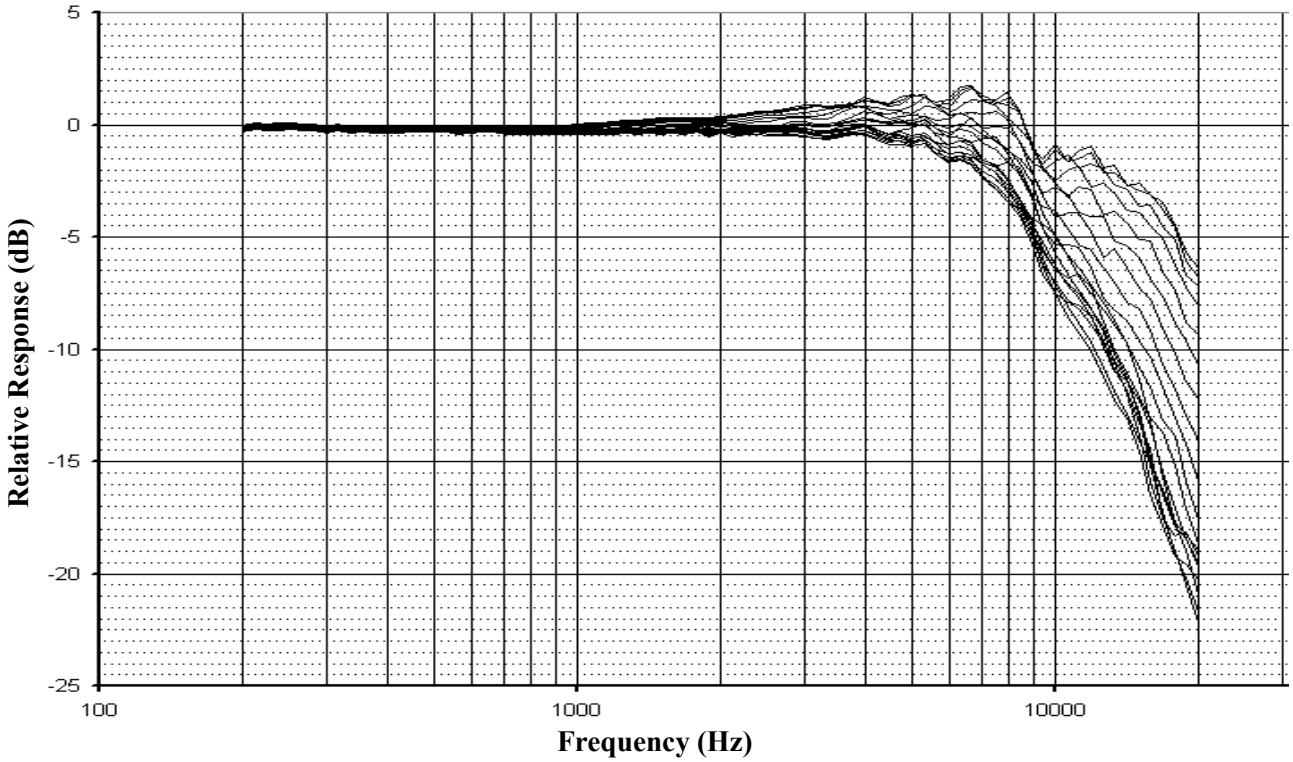

Figure 3–30 Zero to 180 degrees incidence angle

Random incidence frequency response

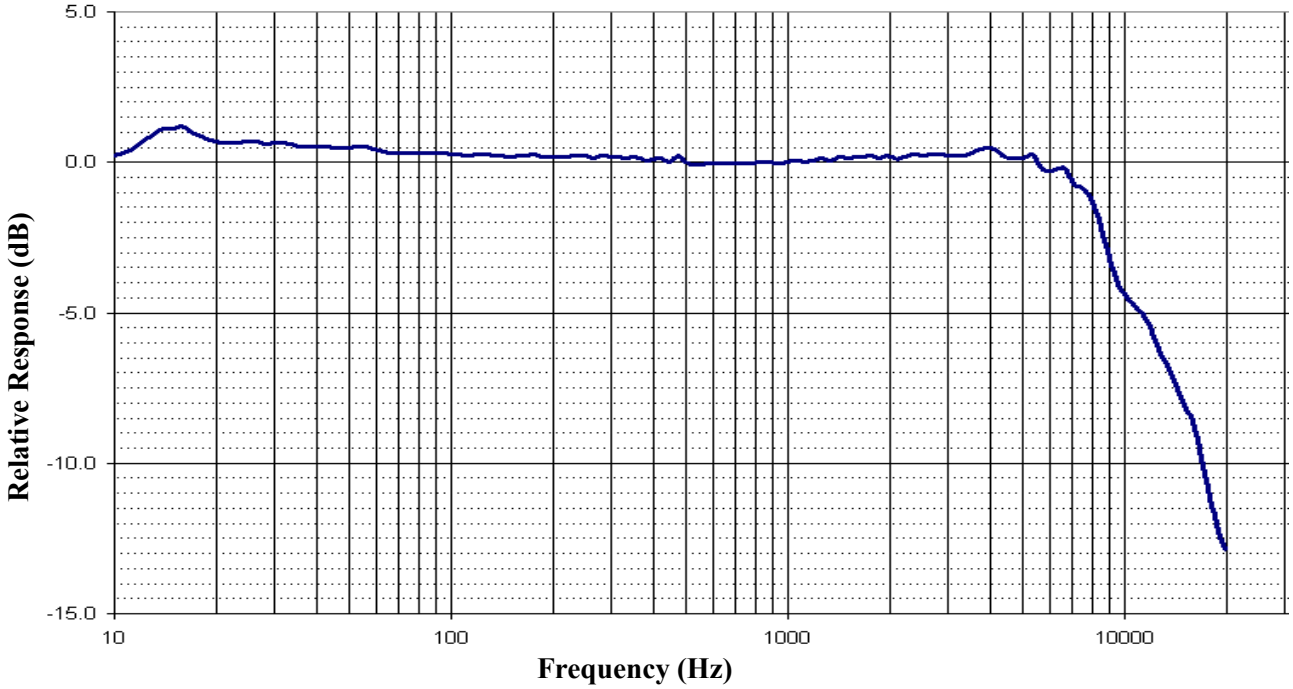

Figure 3–31 Random incidence angle

Acoustic corrections

Table 3–5: Acoustic corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.27	**1334**	-0.01	**5623**	0.25
13	-0.85	**1413**	-0.07	**5957**	0.37
16	-1.24	**1496**	-0.03	**6310**	0.27
20	-0.75	**1585**	-0.04	**6683**	0.19
25	-0.73	**1679**	-0.03	**7079**	0.61
32	-0.68	**1778**	-0.05	**7499**	0.61
40	-0.56	**1884**	0.04	**7943**	0.83
50	-0.54	**1995**	-0.01	**8414**	1.53
63	-0.40	**2113**	0.07	**8913**	2.32
79	-0.36	**2239**	0.06	**9441**	3.24
100	-0.32	**2371**	0.00	**10000**	3.81
126	-0.33	**2512**	0.03	**10593**	4.19
158	-0.29	**2661**	0.02	**11220**	4.48
200	-0.24	**2818**	0.08	**11885**	4.88
251	-0.26	**2985**	0.15	**12589**	5.63
316	-0.23	**3162**	0.16	**13335**	6.06
398	-0.15	**3350**	0.18	**14125**	6.59
501	-0.01	**3548**	0.08	**14962**	7.25
631	0.00	**3758**	-0.02	**15849**	7.98
794	0.01	**3981**	-0.06	**16788**	8.83
1000	0.00	**4217**	0.07	**17783**	9.89
1059	-0.04	**4467**	0.21	**18836**	10.52
1122	0.00	**4732**	0.21	**19953**	11.22
1189	-0.04	**5012**	0.13		
1259	-0.07	**5309**	-0.02		

Windscreen corrections

Table 3–6: Windscreen corrections, base QE7052 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.05	**1334**	-0.06	**5623**	-0.13
13	0.05	**1413**	-0.09	**5957**	-0.07
16	0.05	**1496**	-0.11	**6310**	-0.04
20	0.05	**1585**	-0.14	**6683**	0.02
25	0.05	**1679**	-0.15	**7079**	0.10
32	0.05	**1778**	-0.17	**7499**	0.22
40	0.05	**1884**	-0.16	**7943**	0.37
50	0.05	**1995**	-0.20	**8414**	0.38
63	0.05	**2113**	-0.19	**8913**	0.60
79	0.05	**2239**	-0.22	**9441**	0.62
100	0.05	**2371**	-0.25	**10000**	0.58
126	0.05	**2512**	-0.25	**10593**	0.53
158	0.05	**2661**	-0.28	**11220**	0.49
200	0.05	**2818**	-0.32	**11885**	0.58
251	0.05	**2985**	-0.36	**12589**	0.58
316	0.05	**3162**	-0.37	**13335**	0.67
398	0.05	**3350**	-0.38	**14125**	0.77
501	0.05	**3548**	-0.41	**14962**	0.79
631	0.05	**3758**	-0.42	**15849**	0.64
794	0.03	**3981**	-0.43	**16788**	1.00
1000	0.00	**4217**	-0.40	**17783**	0.92
1059	-0.02	**4467**	-0.35	**18836**	1.50
1122	-0.02	**4732**	-0.37	**19953**	1.64
1189	-0.03	**5012**	-0.26		
1259	-0.05	**5309**	-0.23		

Self-generated broadband noise

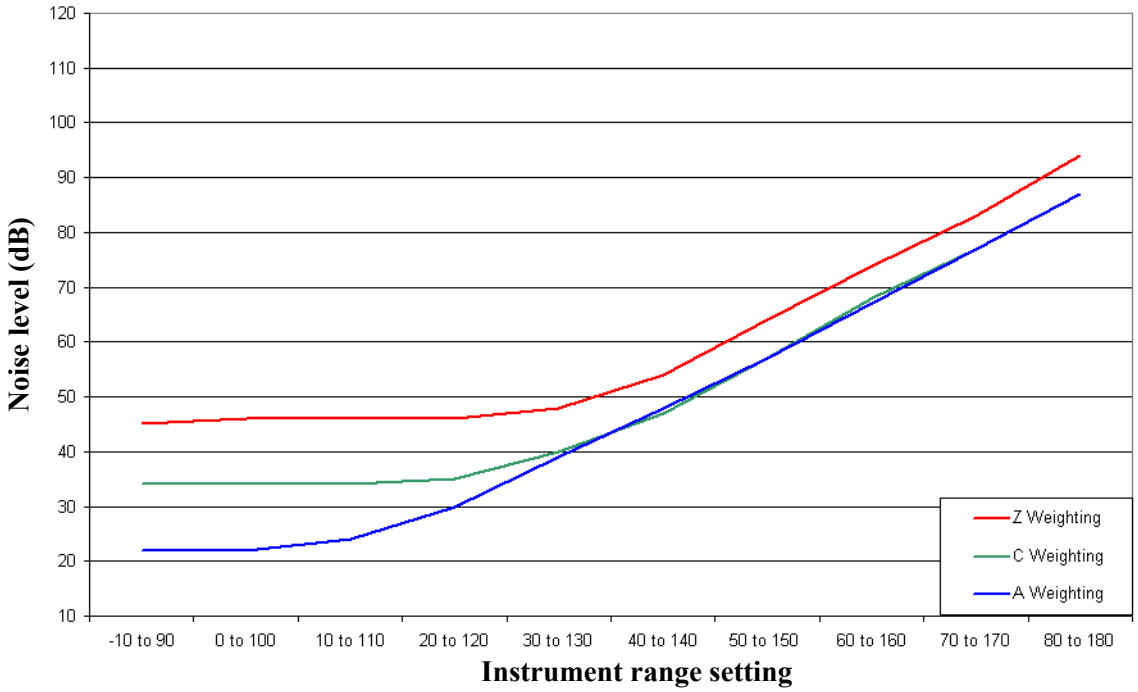

Figure 3–32 Broadband noise

CHAPTER

4

QE4110 microphone

The base unit for this chapter is the QE4110 microphone and preamp mounted directly on the instrument. For information about terms and concepts related to ***SoundPro DLX*** microphone measurements, see Chapter 1, “Addendum introduction.”

1. Base unit

Directional frequency response

Side toward source

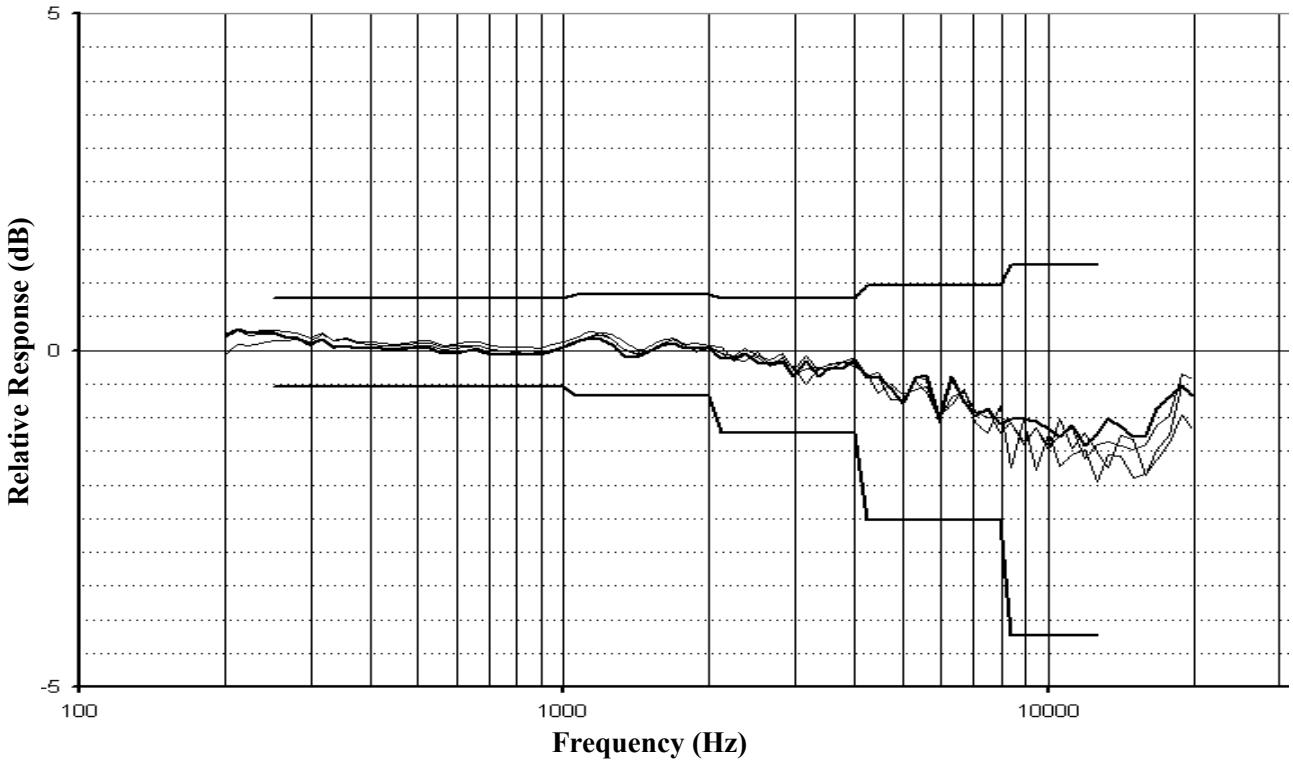

Figure 4–1 Zero to 30 degrees incidence angle

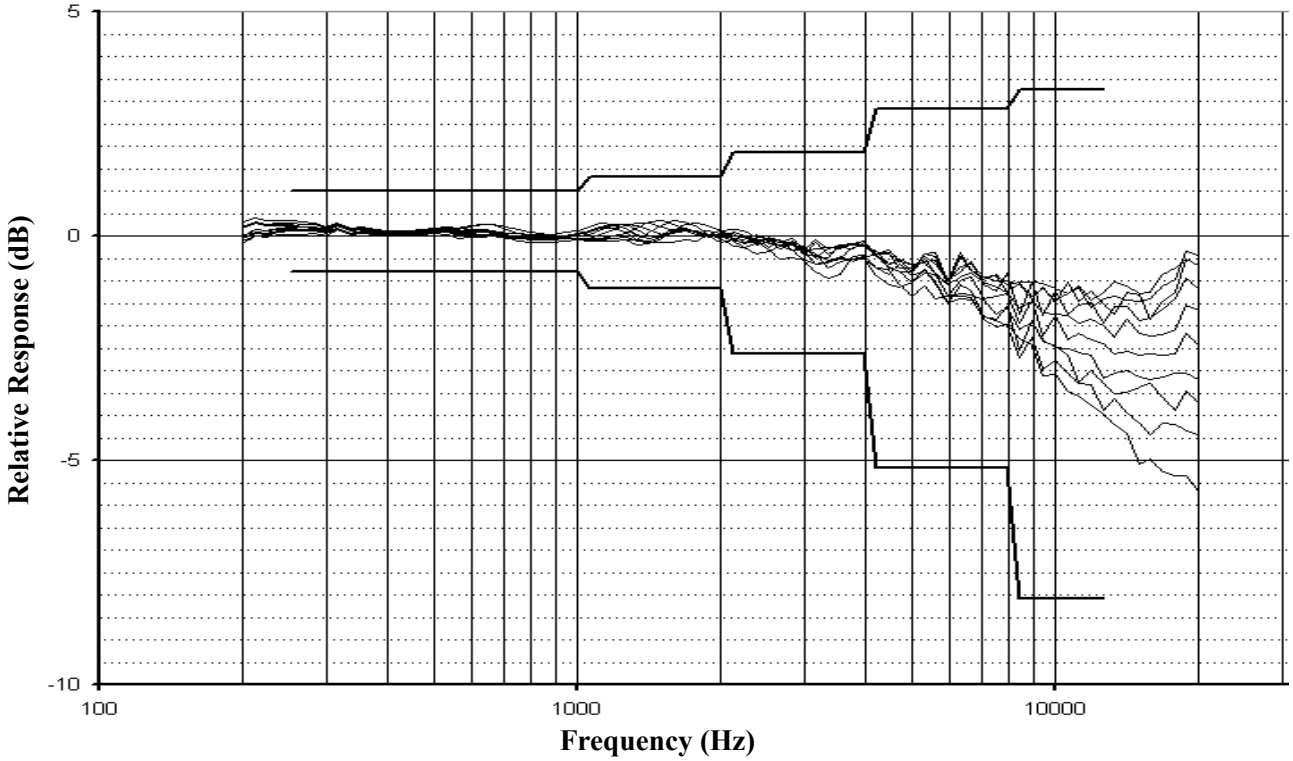

Figure 4–2 Zero to 90 degrees incidence angle

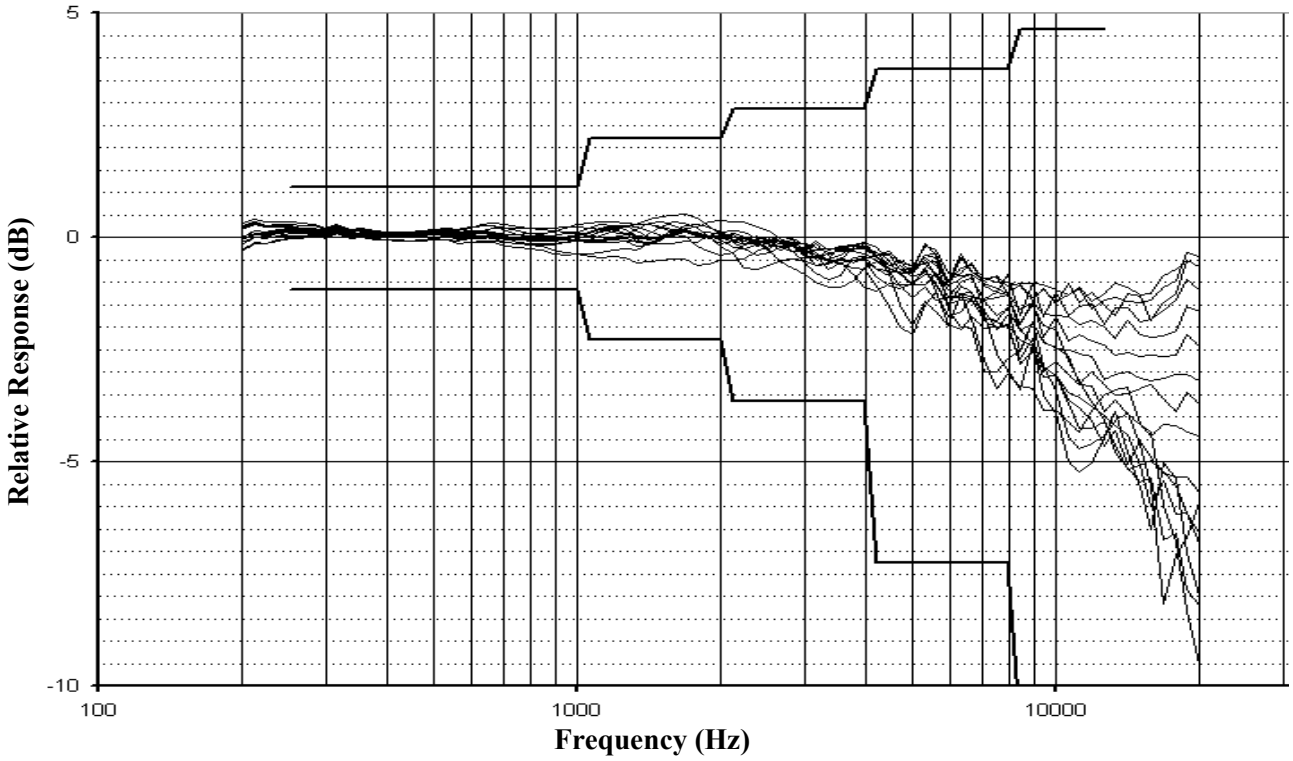

Figure 4–3 Zero to 150 degrees incidence angle

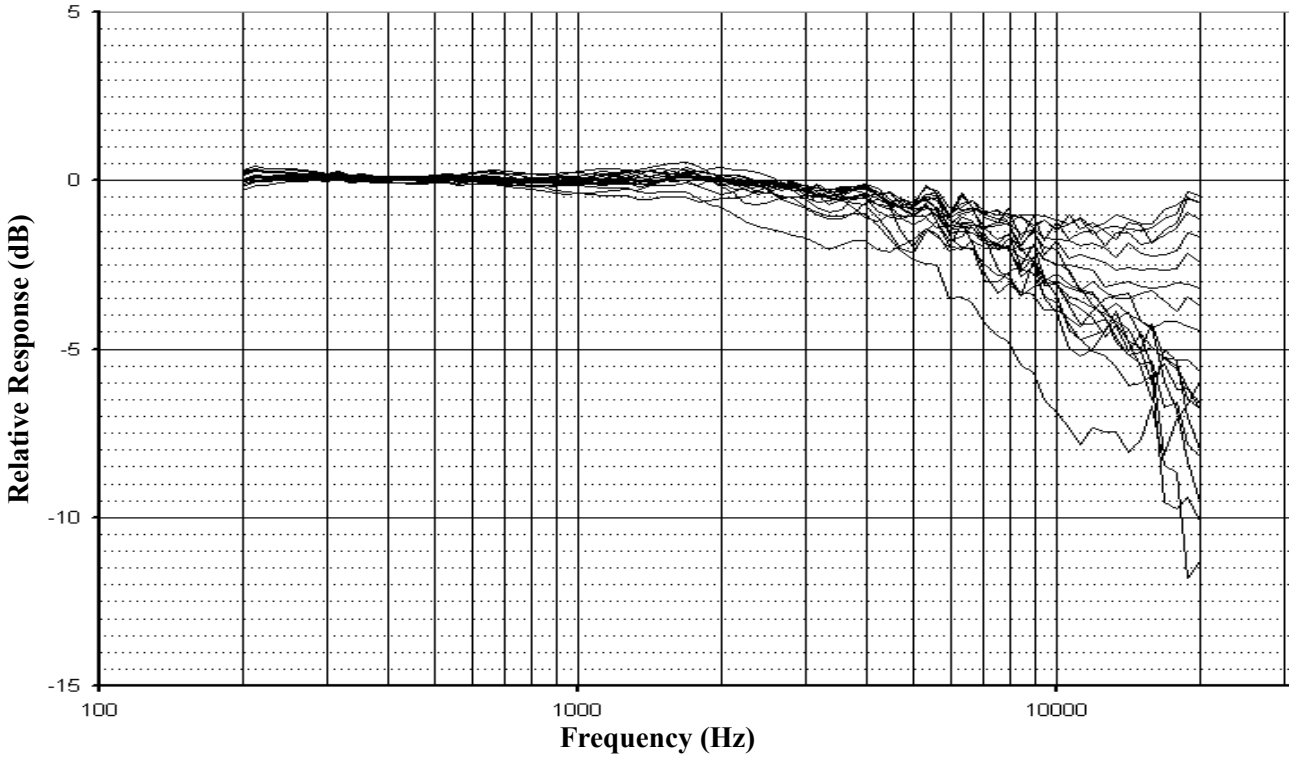

Figure 4–4 Zero to 180 degrees incidence angle

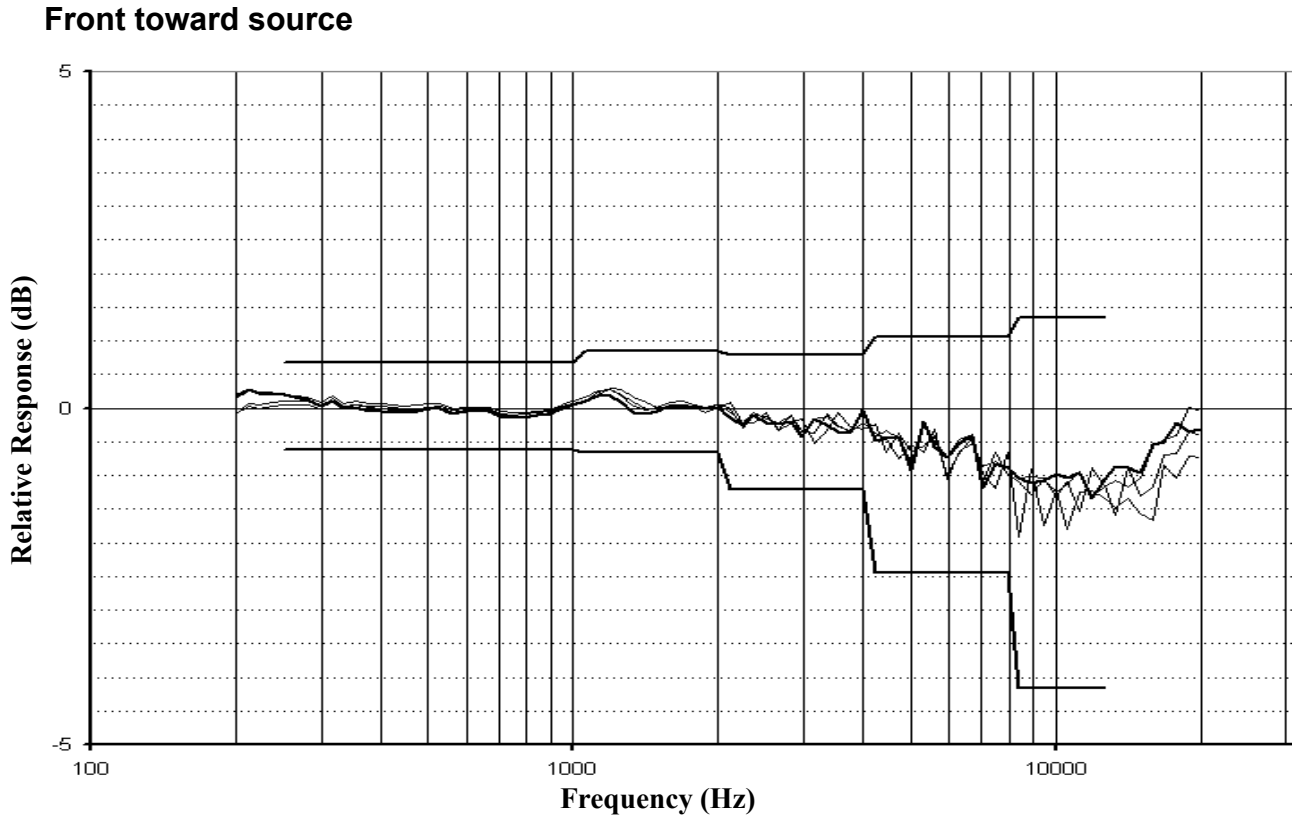

Figure 4–5 Zero to 30 degrees incidence angle

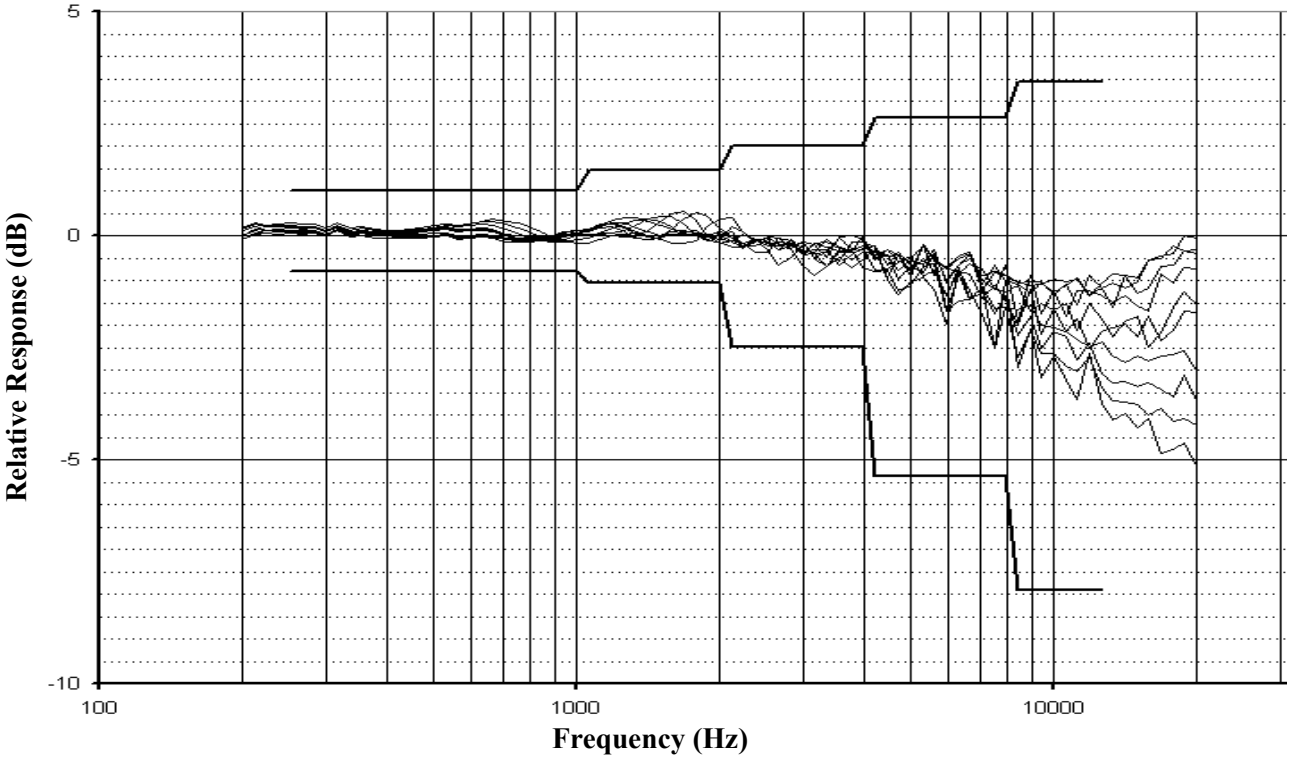

Figure 4–6 Zero to 90 degrees incidence angle

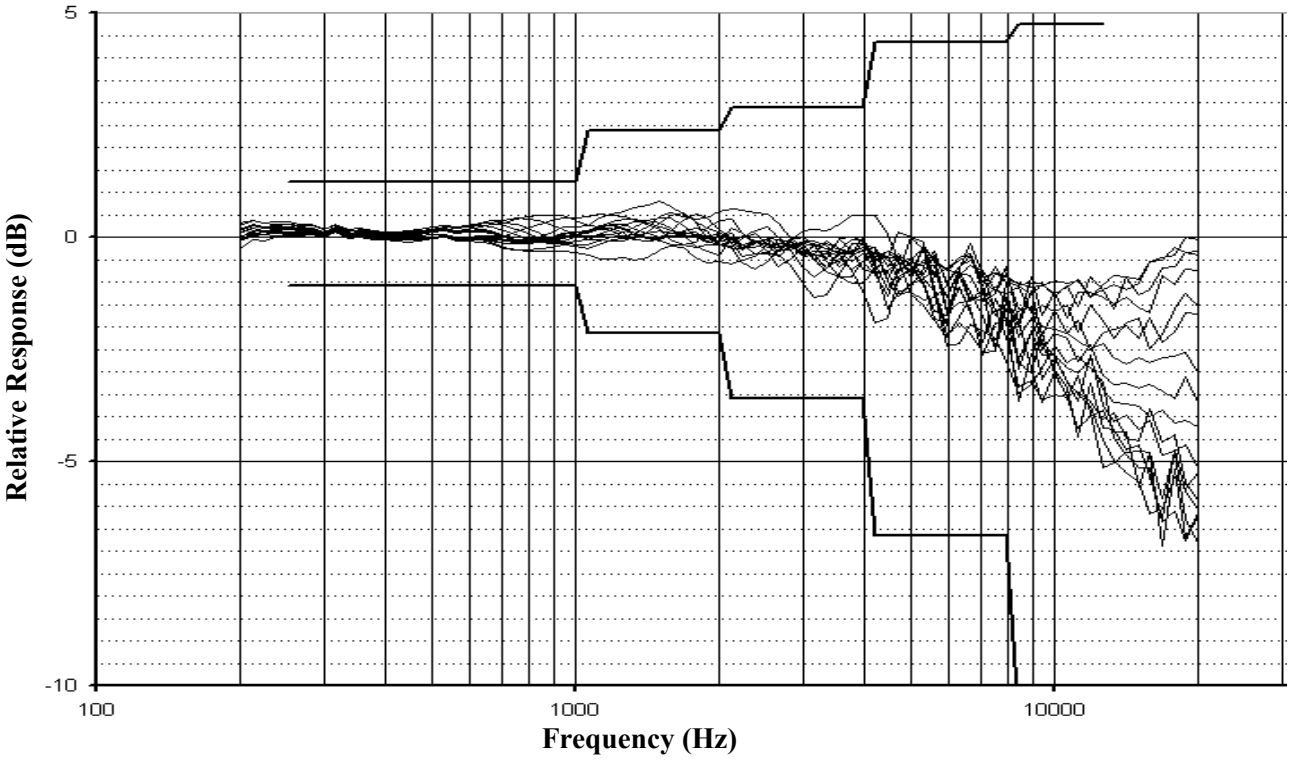

Figure 4–7 Zero to 150 degrees incidence angle

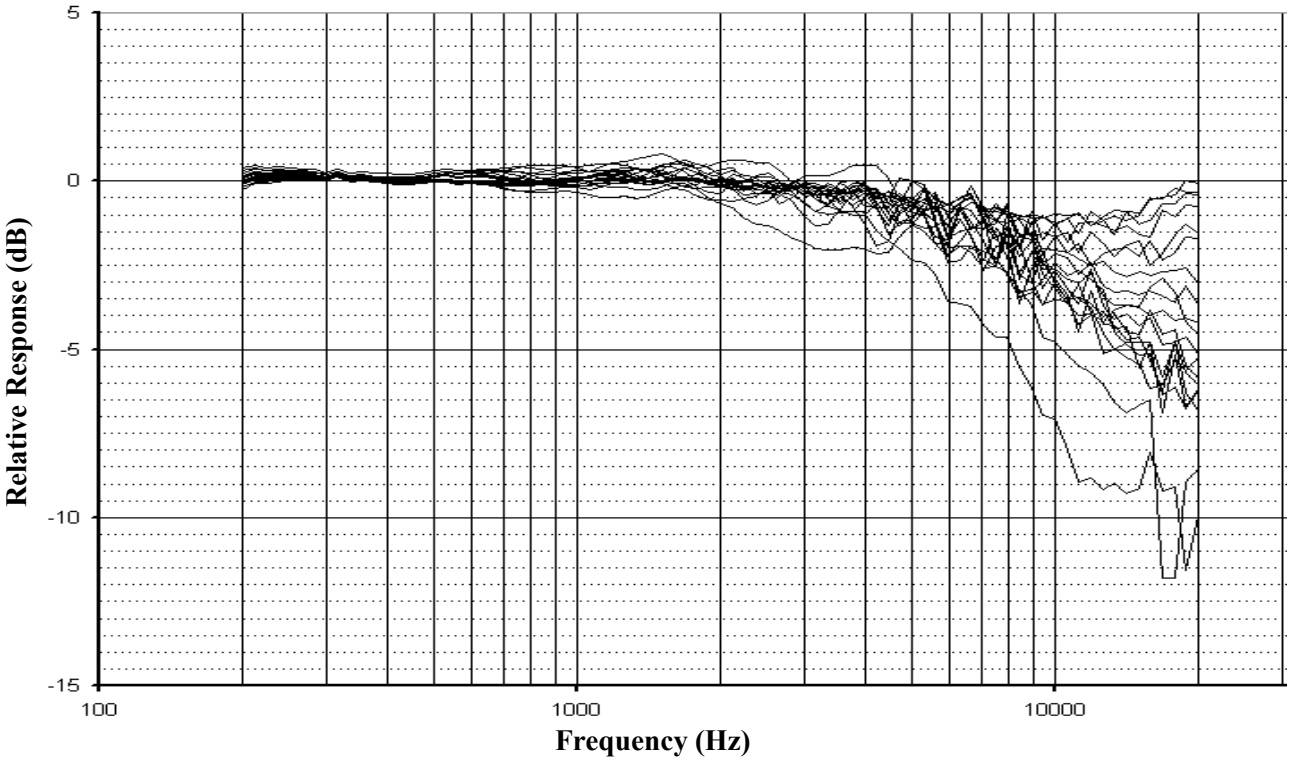

Figure 4–8 Zero to 180 degrees incidence angle

Random incidence frequency response

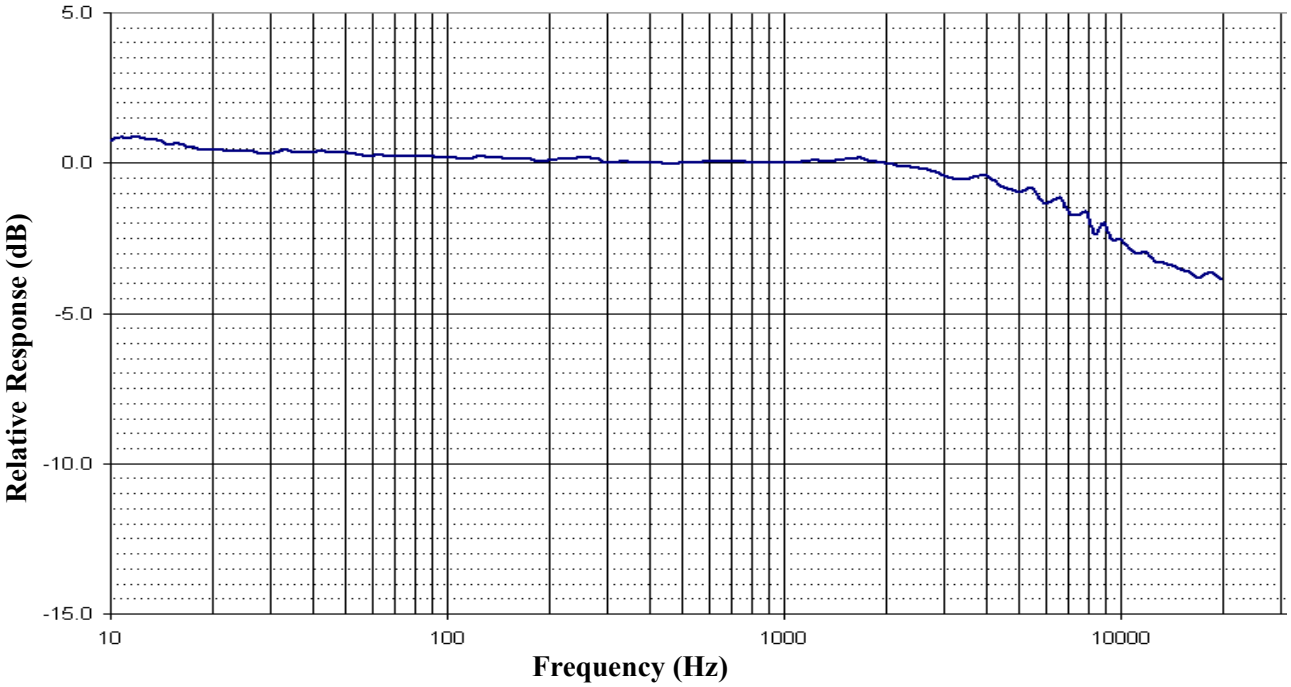

Figure 4–9 Random incidence angle

Acoustic corrections

Table 4–1: Acoustic corrections, base QE4110 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.66	**1334**	0.10	**5623**	0.38
13	-0.74	**1413**	0.14	**5957**	0.92
16	-0.57	**1496**	0.05	**6310**	0.41
20	-0.35	**1585**	-0.06	**6683**	0.71
25	-0.31	**1679**	-0.09	**7079**	1.02
32	-0.30	**1778**	-0.02	**7499**	0.78
40	-0.27	**1884**	-0.03	**7943**	1.03
50	-0.27	**1995**	-0.03	**8414**	1.03
63	-0.17	**2113**	0.14	**8913**	0.98
79	-0.11	**2239**	0.14	**9441**	1.03
100	-0.07	**2371**	0.02	**10000**	1.15
126	-0.12	**2512**	0.17	**10593**	1.23
158	-0.03	**2661**	0.17	**11220**	1.03
200	-0.01	**2818**	0.19	**11885**	1.32
251	-0.09	**2985**	0.44	**12589**	1.13
316	0.09	**3162**	0.14	**13335**	0.87
398	0.08	**3350**	0.37	**14125**	0.96
501	0.10	**3548**	0.25	**14962**	1.08
631	0.11	**3758**	0.27	**15849**	1.03
794	0.10	**3981**	0.15	**16788**	0.70
1000	0.00	**4217**	0.38	**17783**	0.48
1059	-0.10	**4467**	0.37	**18836**	0.25
1122	-0.16	**4732**	0.57	**19953**	0.32
1189	-0.15	**5012**	0.78		
1259	-0.06	**5309**	0.39		

Self-generated broadband noise

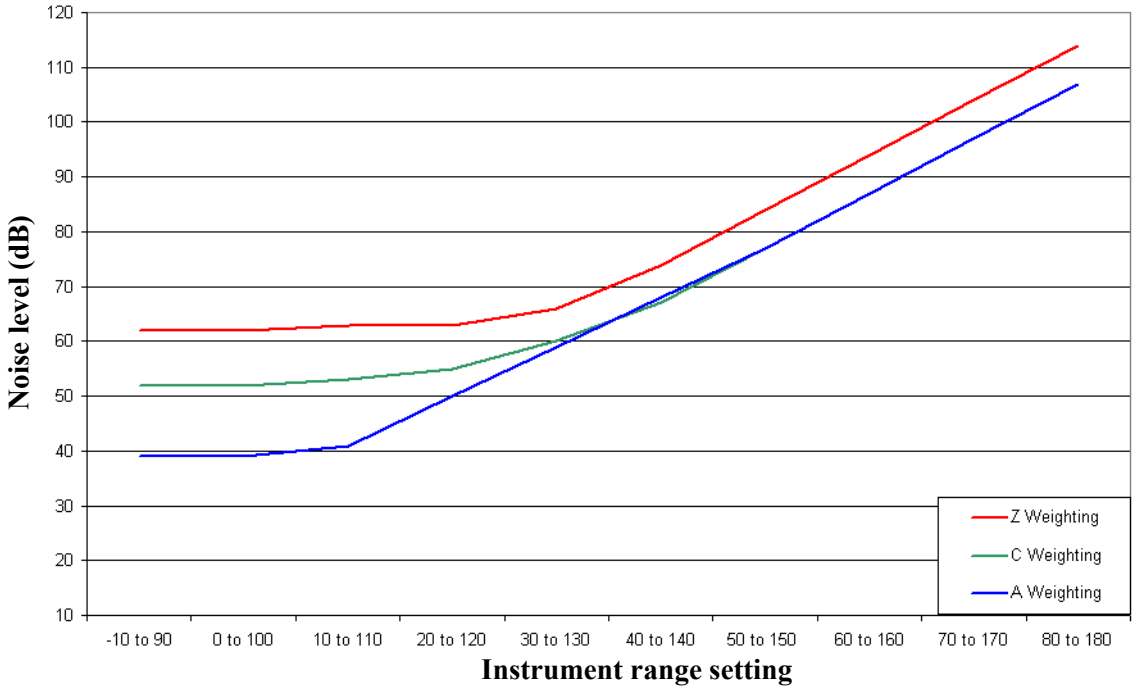

Figure 4–10 Broadband noise

2. Remote microphone

Directional frequency response

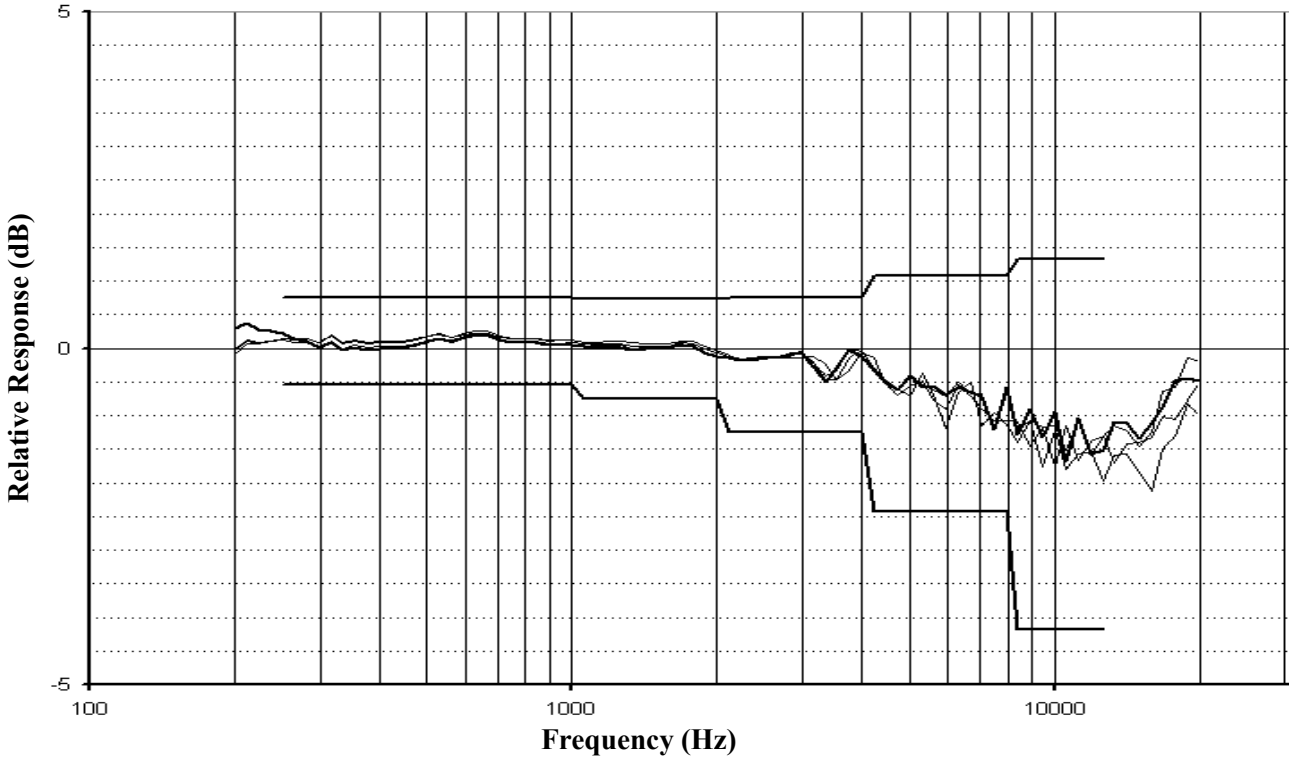

Figure 4–11 Zero to 30 degrees incidence angle

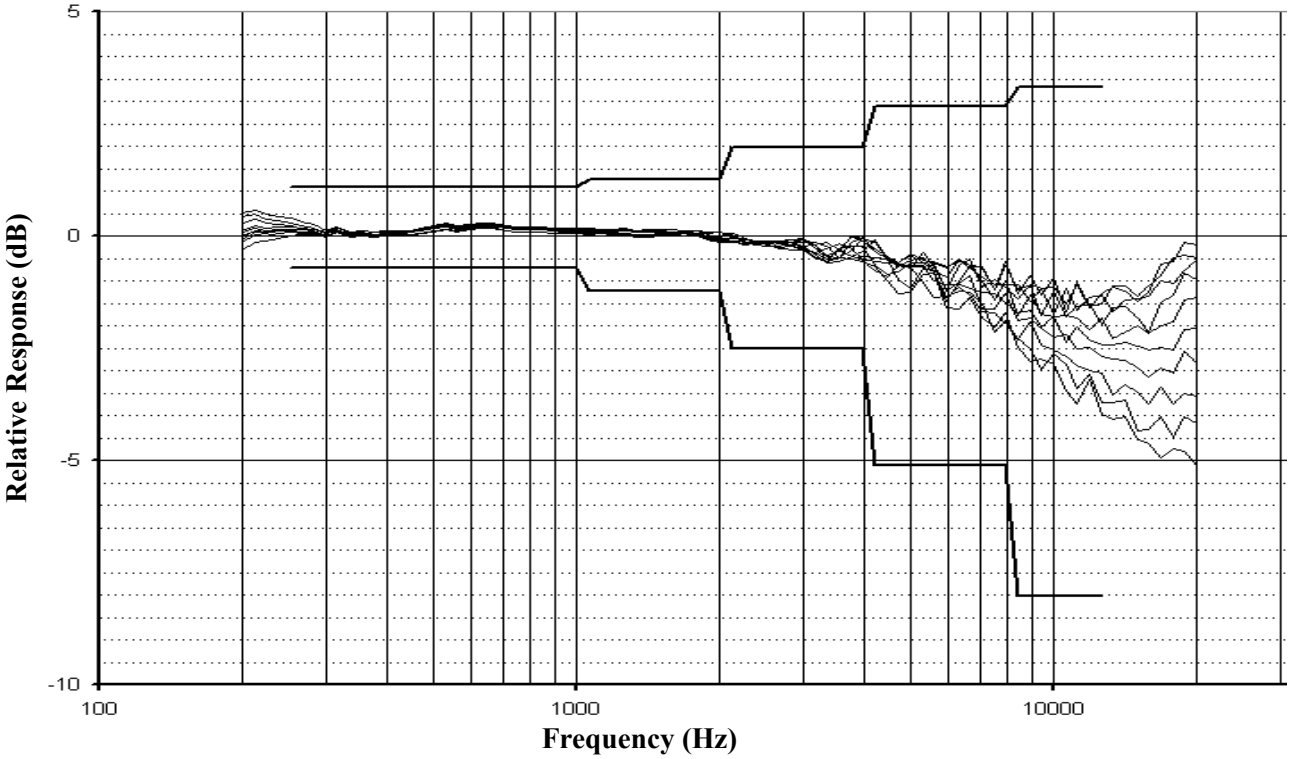

Figure 4–12 Zero to 90 degrees incidence angle

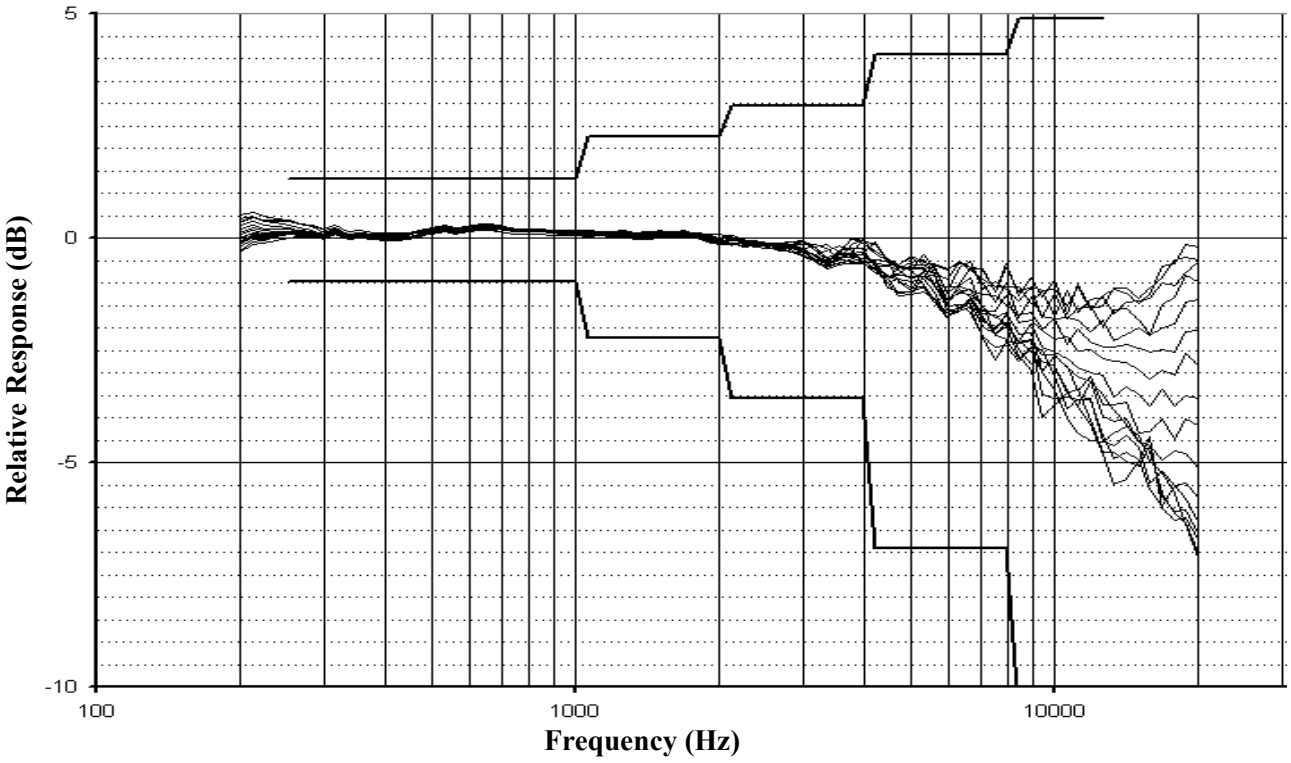

Figure 4–13 Zero to 150 degrees incidence angle

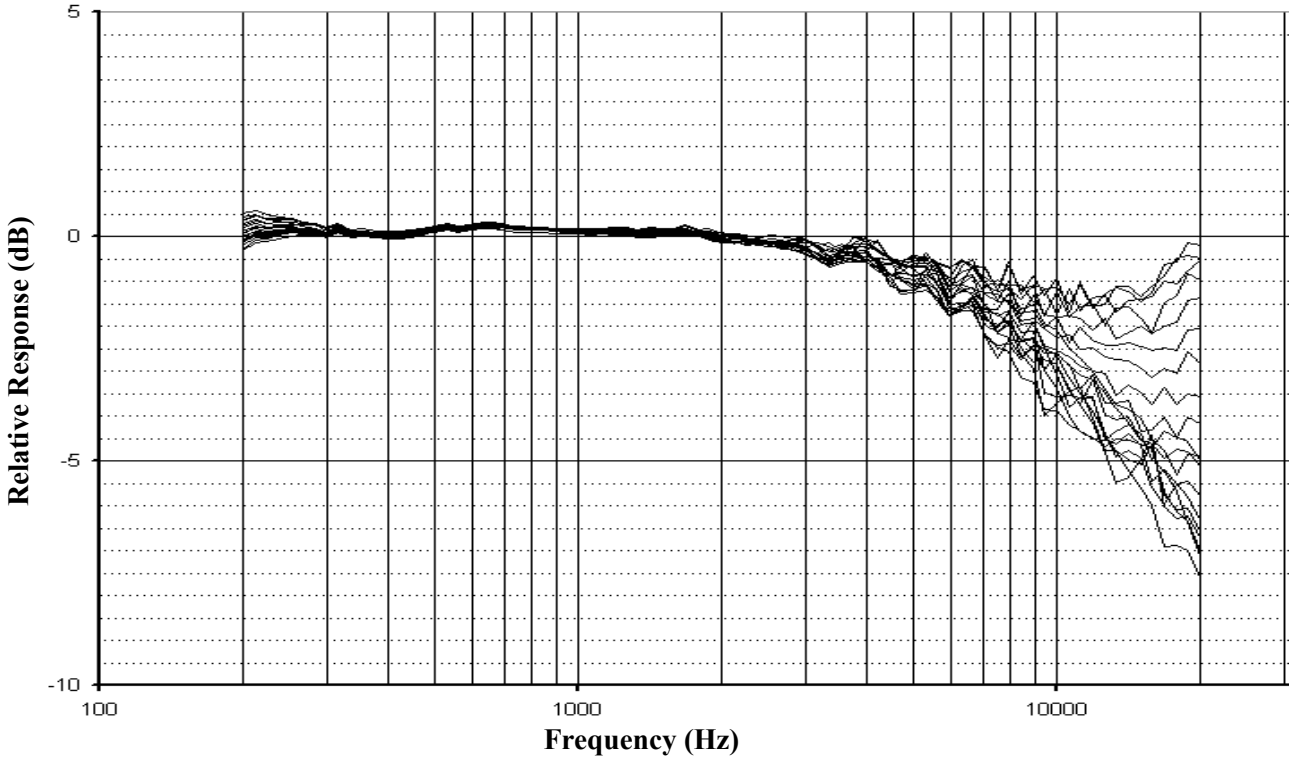

Figure 4–14 Zero to 180 degrees incidence angle

Random incidence frequency response

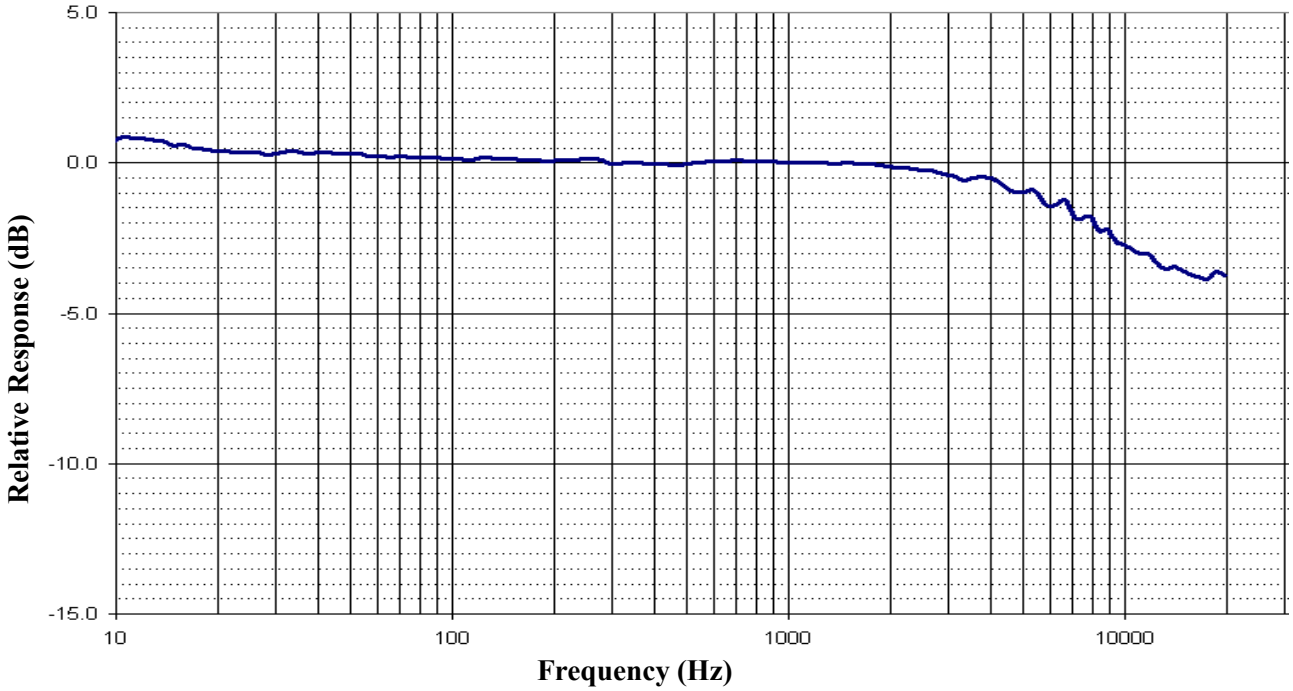

Figure 4–15 Random incidence angle

Acoustic corrections

Table 4–2: Acoustic corrections, base QE4110 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.66	**1334**	0.10	**5623**	0.38
13	-0.74	**1413**	0.14	**5957**	0.92
16	-0.57	**1496**	0.05	**6310**	0.41
20	-0.35	**1585**	-0.06	**6683**	0.71
25	-0.31	**1679**	-0.09	**7079**	1.02
32	-0.30	**1778**	-0.02	**7499**	0.78
40	-0.27	**1884**	-0.03	**7943**	1.03
50	-0.27	**1995**	-0.03	**8414**	1.03
63	-0.17	**2113**	0.14	**8913**	0.98
79	-0.11	**2239**	0.14	**9441**	1.03
100	-0.07	**2371**	0.02	**10000**	1.15
126	-0.12	**2512**	0.17	**10593**	1.23
158	-0.03	**2661**	0.17	**11220**	1.03
200	-0.01	**2818**	0.19	**11885**	1.32
251	-0.09	**2985**	0.44	**12589**	1.13
316	0.09	**3162**	0.14	**13335**	0.87
398	0.08	**3350**	0.37	**14125**	0.96
501	0.10	**3548**	0.25	**14962**	1.08
631	0.11	**3758**	0.27	**15849**	1.03
794	0.10	**3981**	0.15	**16788**	0.70
1000	0.00	**4217**	0.38	**17783**	0.48
1059	-0.10	**4467**	0.37	**18836**	0.25
1122	-0.16	**4732**	0.57	**19953**	0.32
1189	-0.15	**5012**	0.78		
1259	-0.06	**5309**	0.39		

Self-generated broadband noise

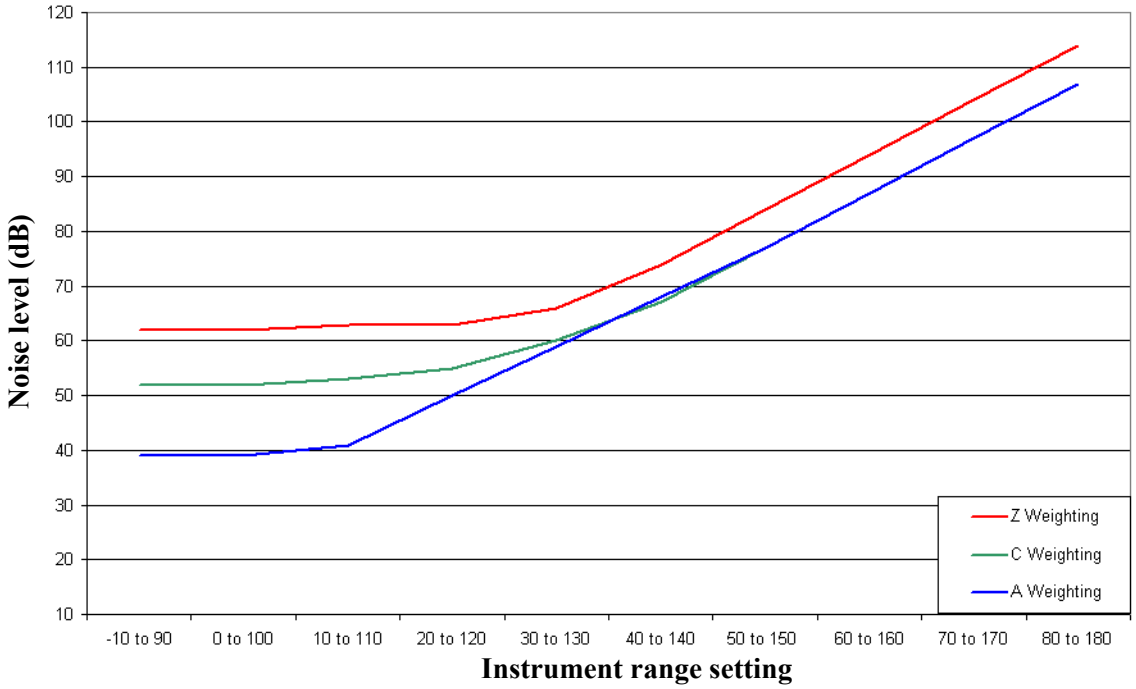

Figure 4–16 Broadband noise

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CHAPTER

5

QE4130 microphone

The base unit for this chapter is the QE4130 microphone and preamp mounted directly on the instrument. For information about terms and concepts related to ***SoundPro DLX*** microphone measurements, see Chapter 1, "Addendum introduction."

1. Base unit

Directional frequency response

Side toward source

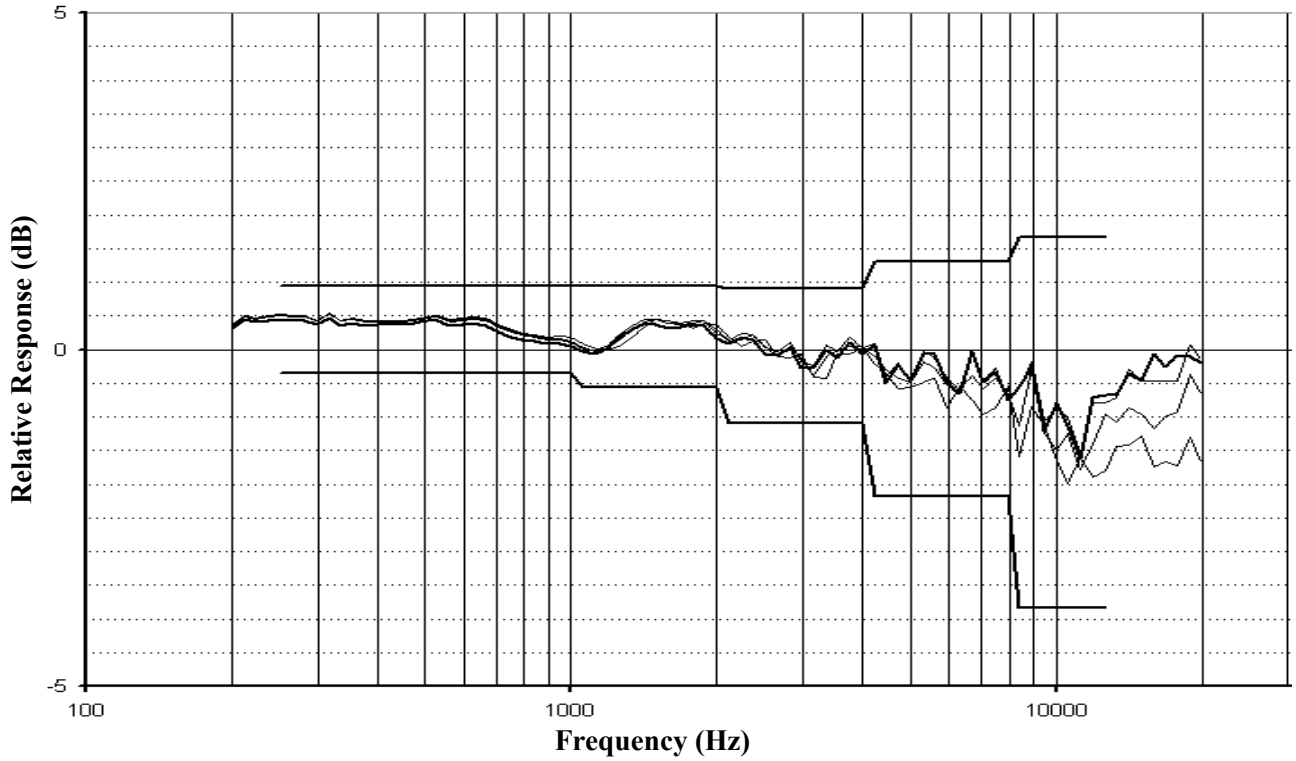

Figure 5–1 Zero to 30 degrees incidence angle

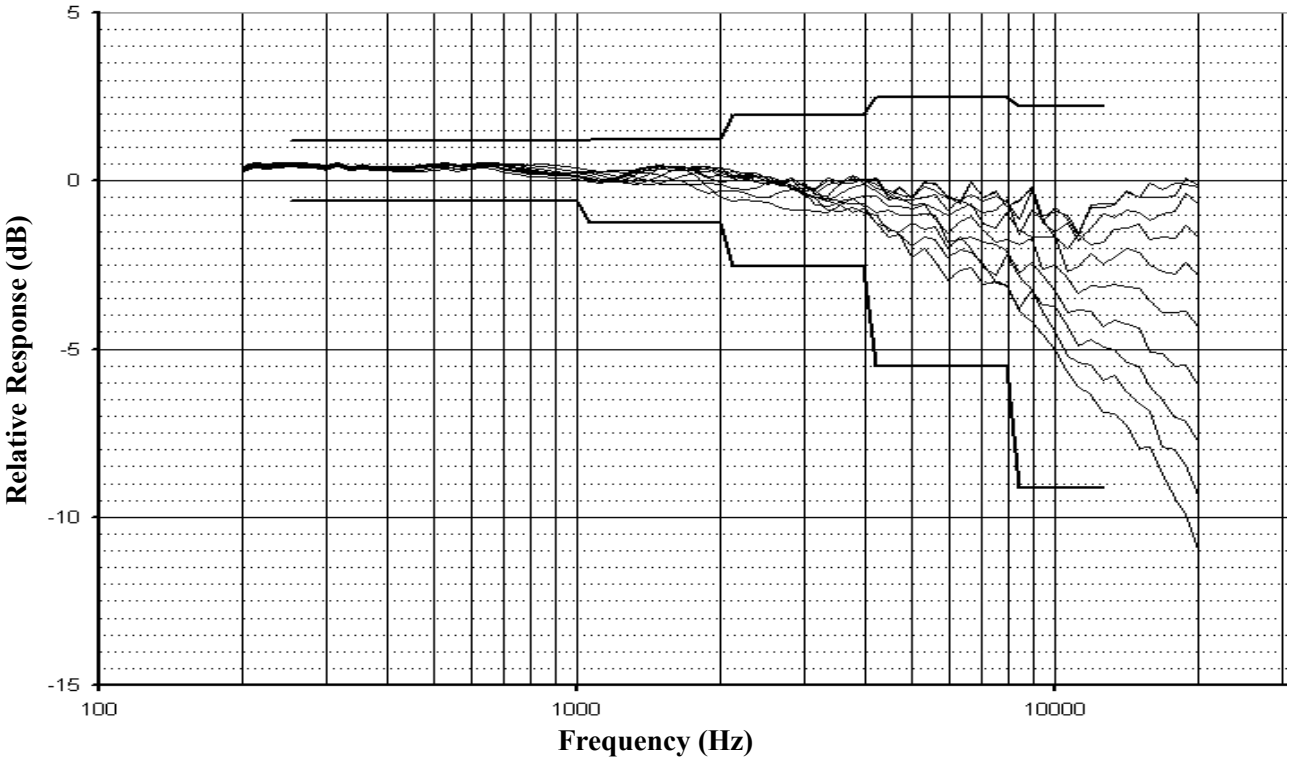

Figure 5–2 Zero to 90 degrees incidence angle

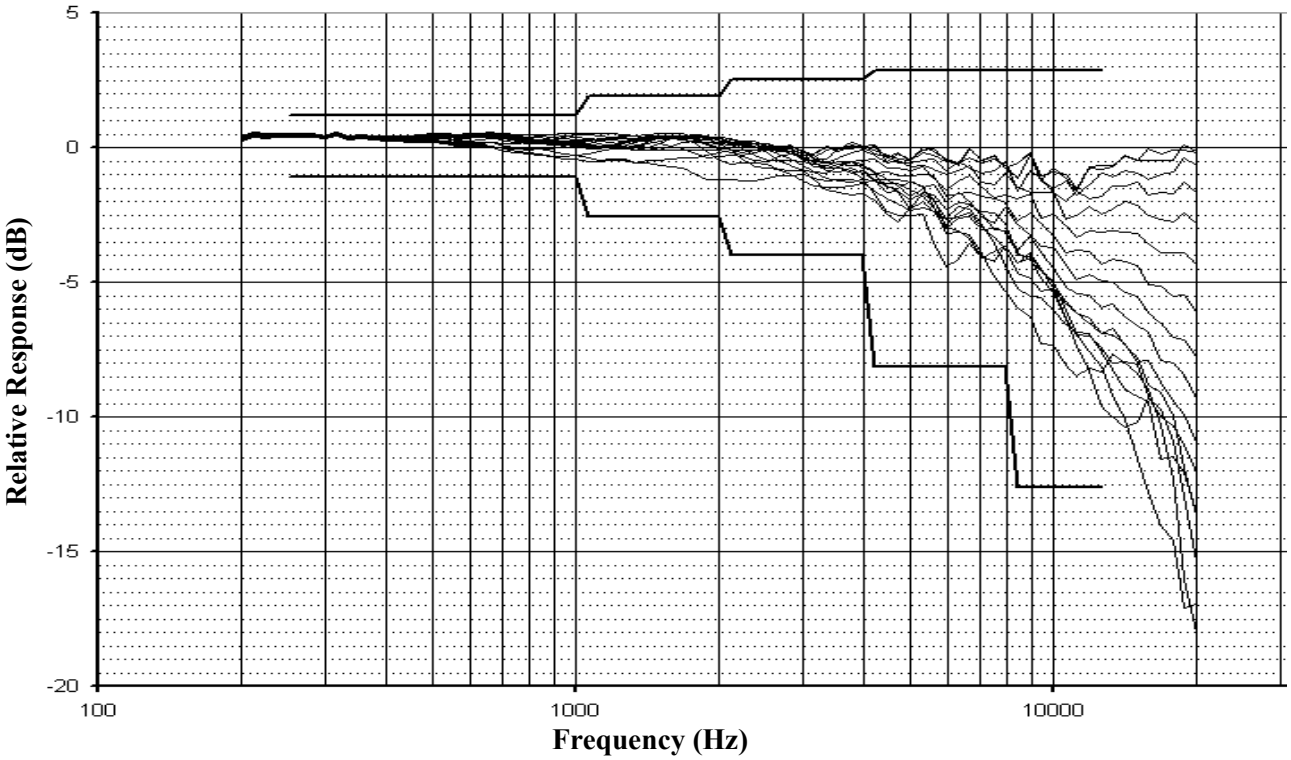

Figure 5–3 Zero to 150 degrees incidence angle

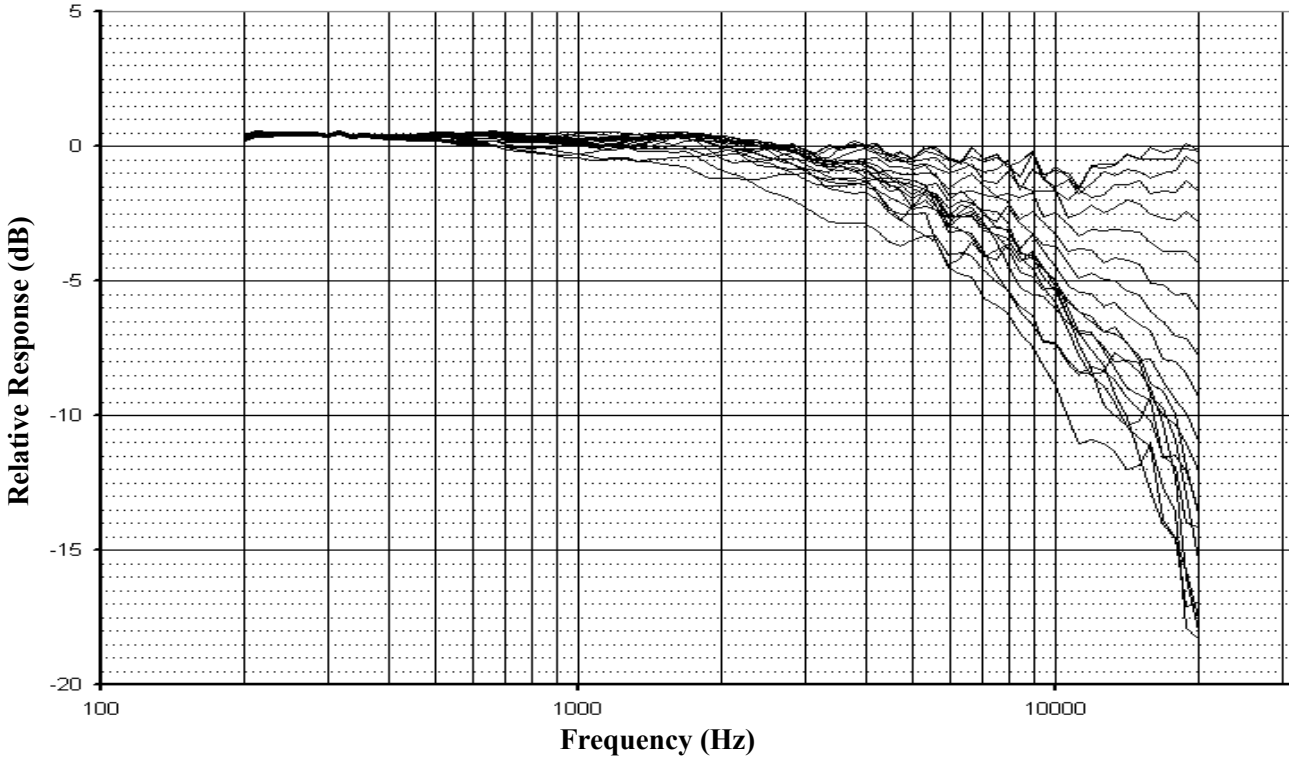

Figure 5–4 Zero to 180 degrees incidence angle

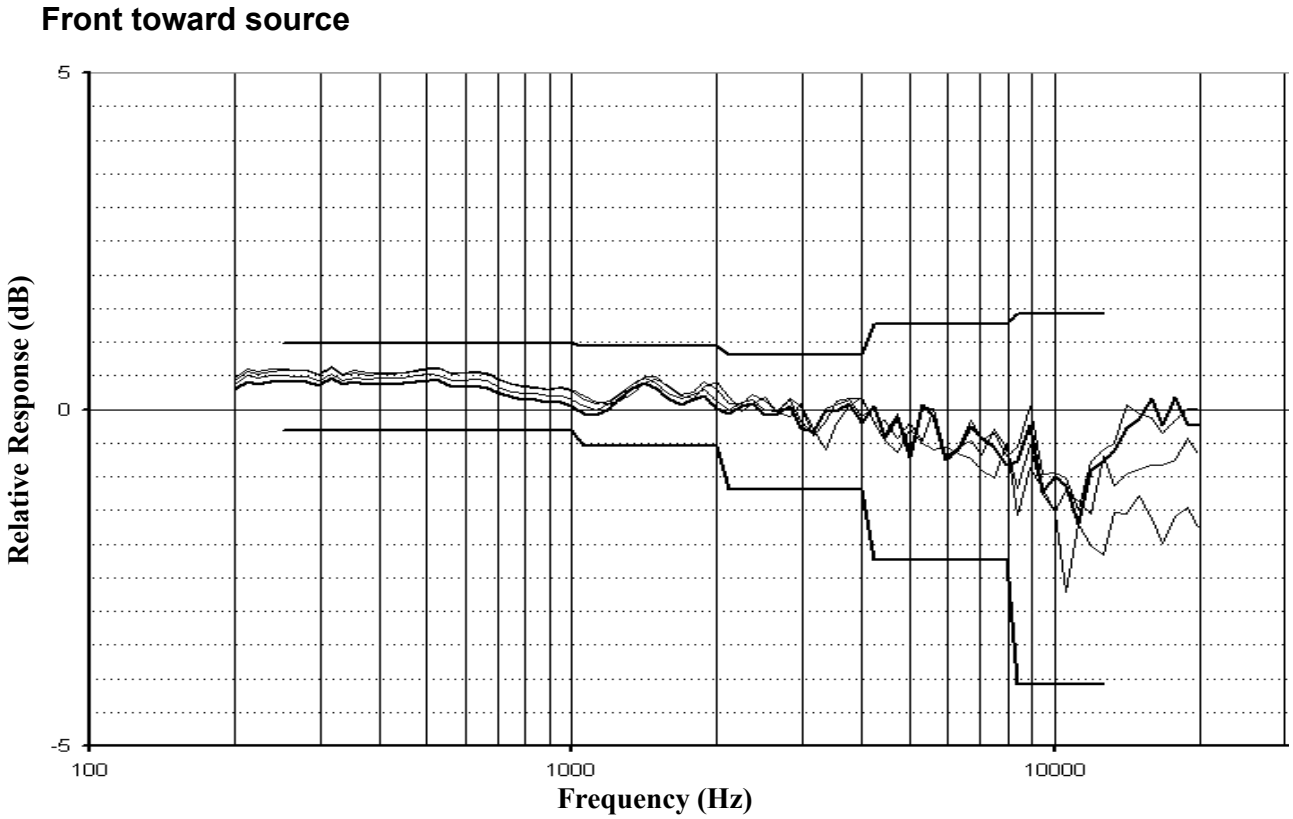

Figure 5–5 Zero to 30 degrees incidence angle

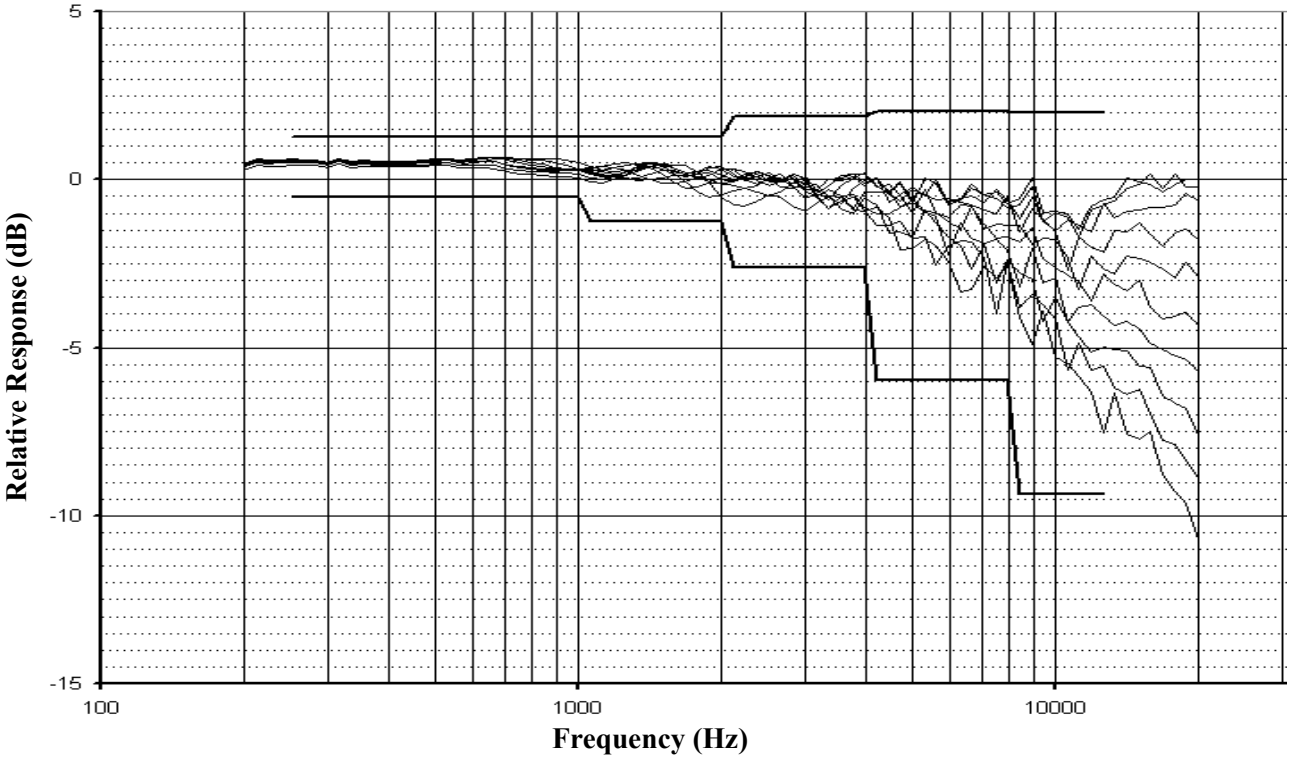

Figure 5–6 Zero to 90 degrees incidence angle

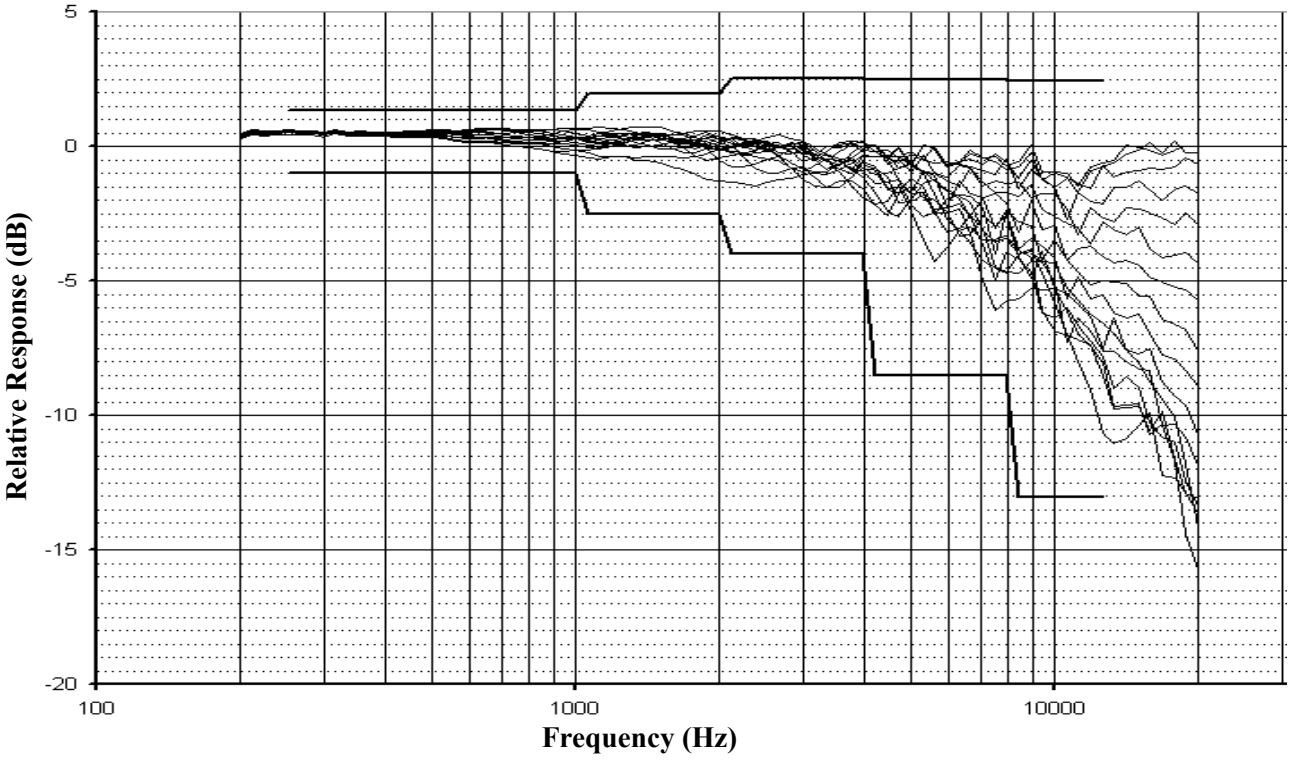

Figure 5–7 Zero to 150 degrees incidence angle

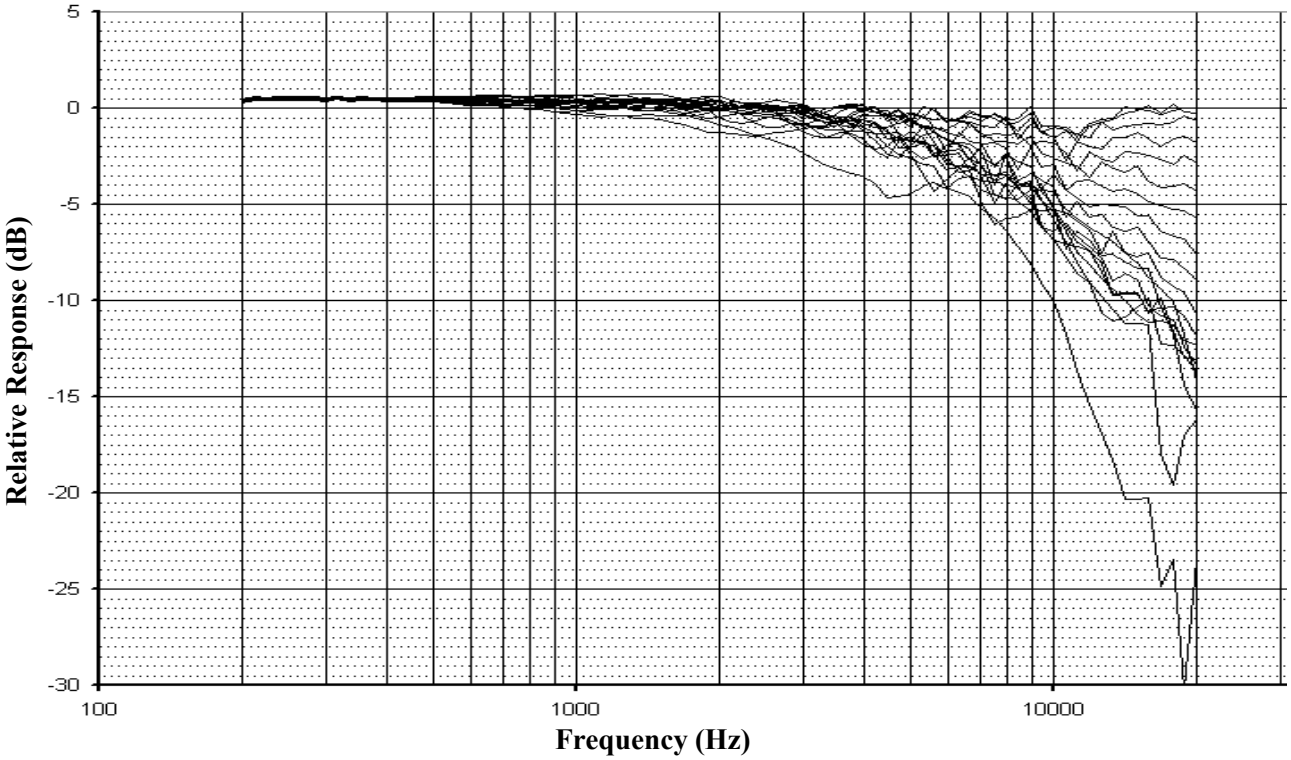

Figure 5–8 Zero to 180 degrees incidence angle

Random incidence frequency response

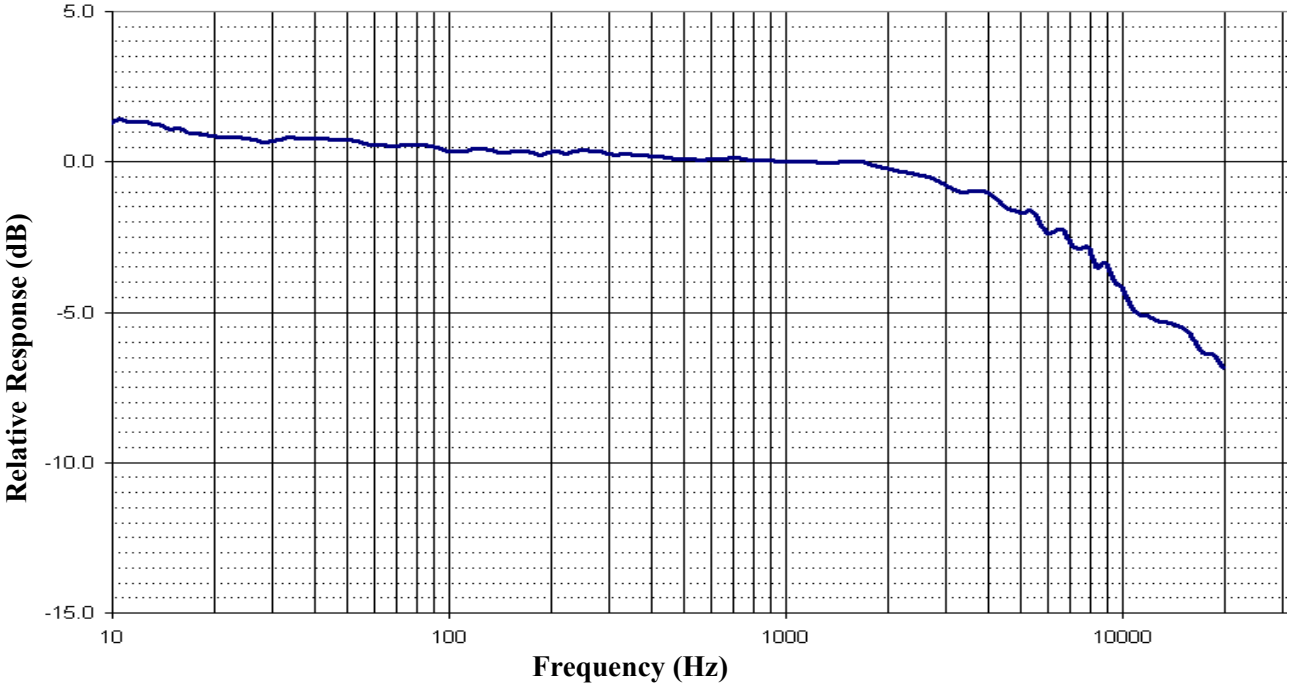

Figure 5–9 Random incidence angle

Acoustic corrections

Table 5–1: Acoustic corrections, base 4310 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.48	**1334**	-0.28	**5623**	0.08
13	-1.51	**1413**	-0.36	**5957**	0.41
16	-1.32	**1496**	-0.35	**6310**	0.69
20	-1.07	**1585**	-0.30	**6683**	-0.04
25	-0.99	**1679**	-0.31	**7079**	0.52
32	-0.95	**1778**	-0.36	**7499**	0.24
40	-0.98	**1884**	-0.33	**7943**	0.68
50	-0.92	**1995**	-0.17	**8414**	0.56
63	-0.76	**2113**	-0.07	**8913**	0.22
79	-0.74	**2239**	-0.17	**9441**	1.18
100	-0.56	**2371**	-0.17	**10000**	0.76
126	-0.65	**2512**	0.06	**10593**	1.06
158	-0.56	**2661**	0.06	**11220**	1.54
200	-0.52	**2818**	0.01	**11885**	0.62
251	-0.60	**2985**	0.33	**12589**	0.56
316	-0.44	**3162**	0.24	**13335**	0.53
398	-0.39	**3350**	-0.01	**14125**	0.18
501	-0.28	**3548**	0.12	**14962**	0.26
631	-0.30	**3758**	-0.13	**15849**	-0.18
794	-0.11	**3981**	0.07	**16788**	0.10
1000	0.00	**4217**	-0.08	**17783**	-0.14
1059	0.05	**4467**	0.49	**18836**	-0.16
1122	0.08	**4732**	0.25	**19953**	-0.15
1189	-0.01	**5012**	0.46		
1259	-0.16	**5309**	0.06		

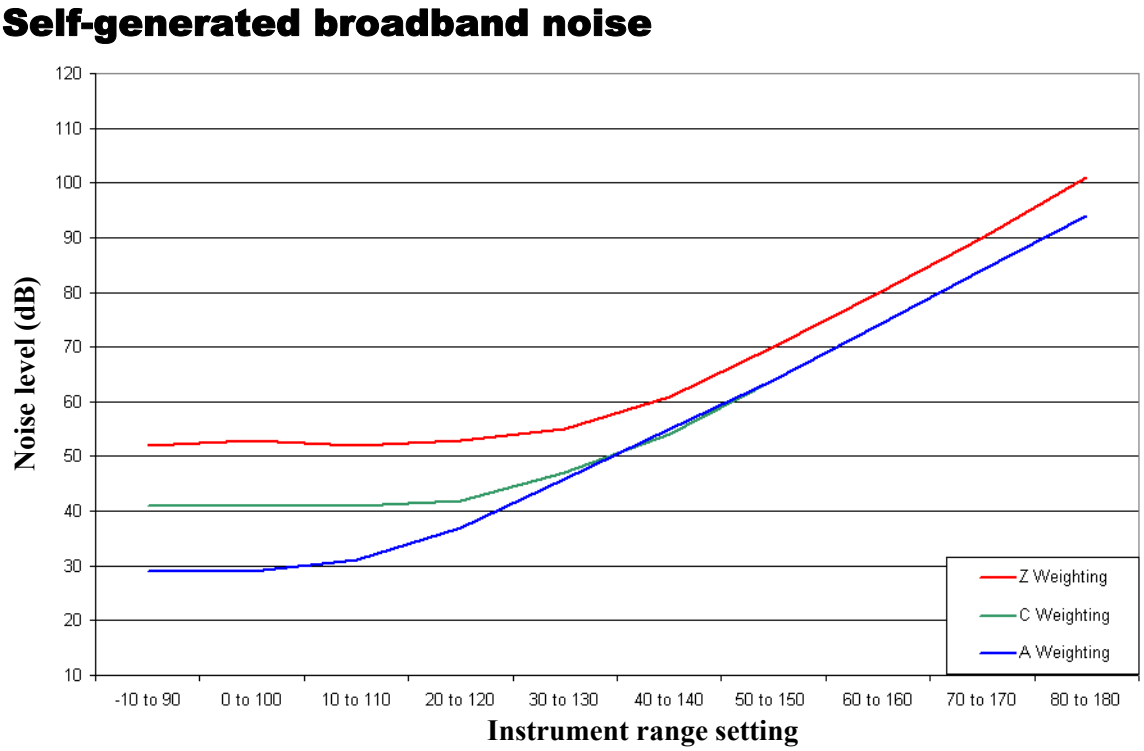

Figure 5–10 Broadband noise

2. With windscreen

Directional frequency response

Side toward source

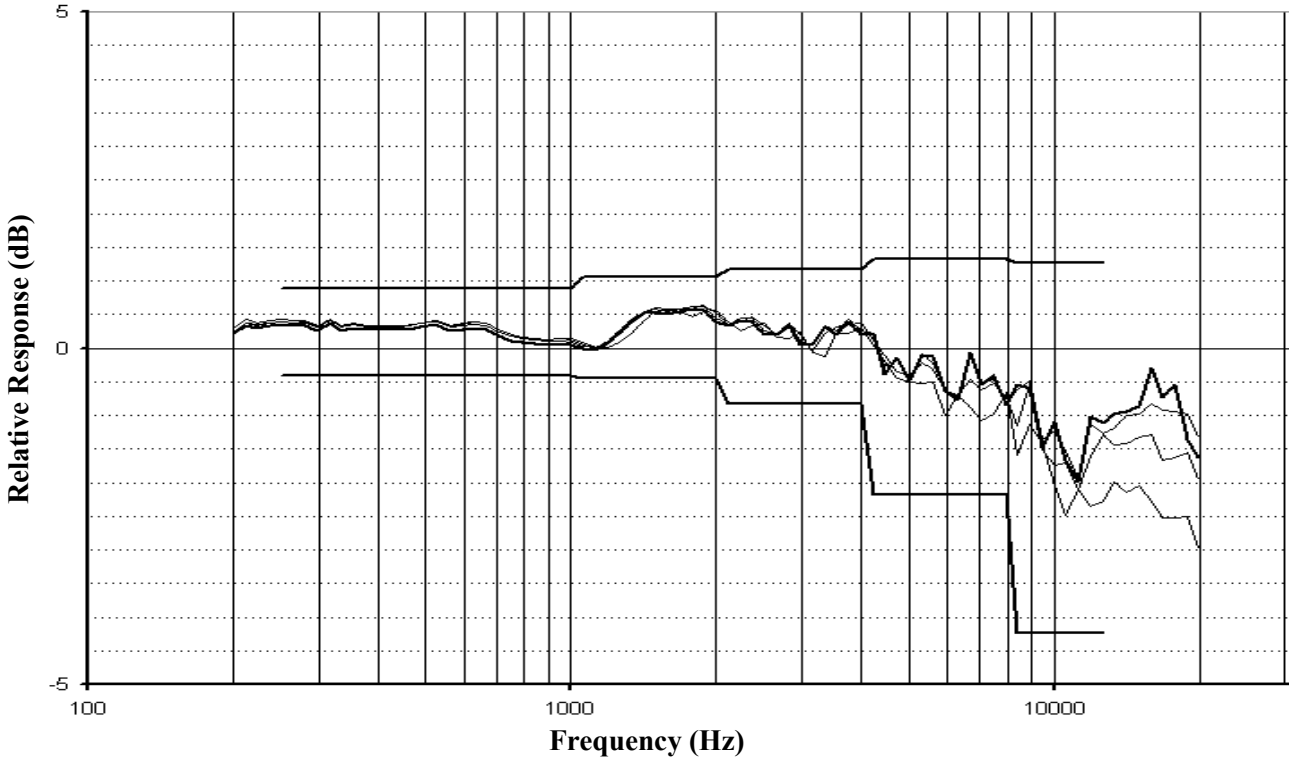

Figure 5–11 Zero to 30 degrees incidence angle

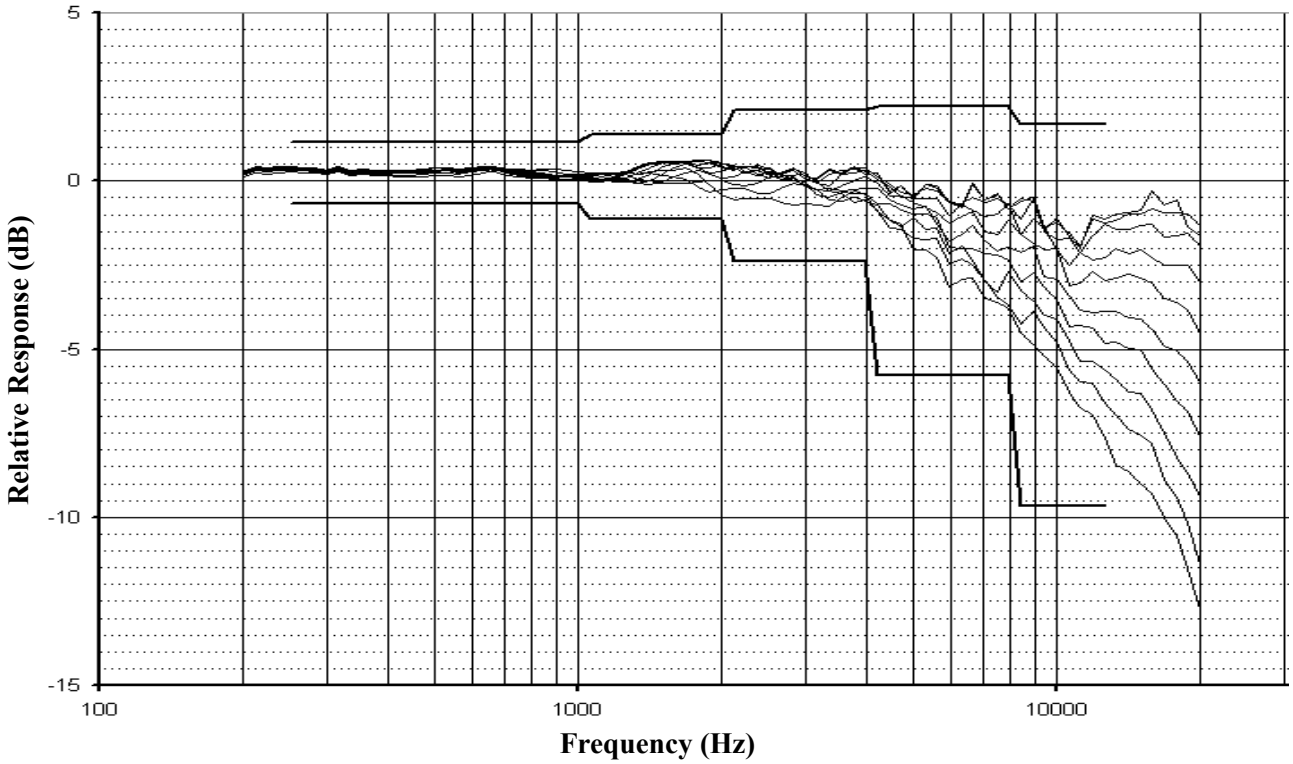

Figure 5–12 Zero to 90 degrees incidence angle

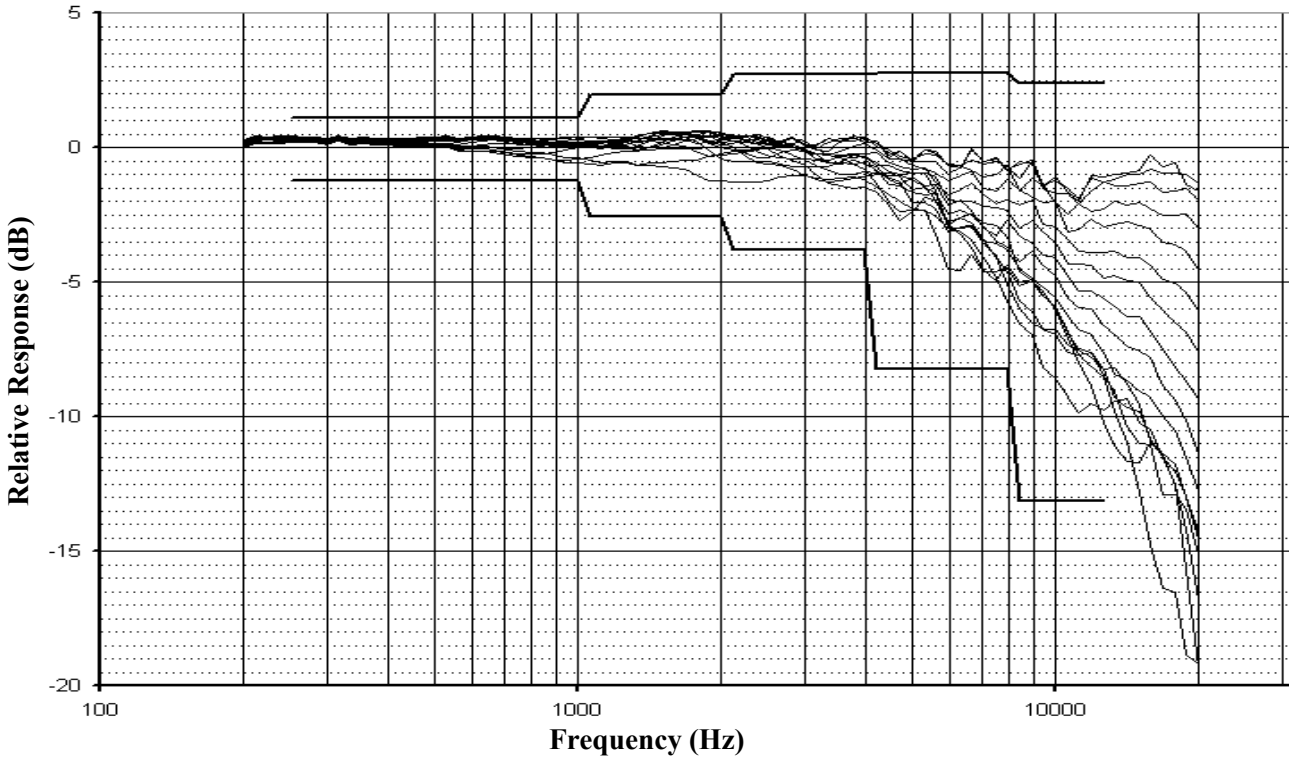

Figure 5–13 Zero to 150 degrees incidence angle

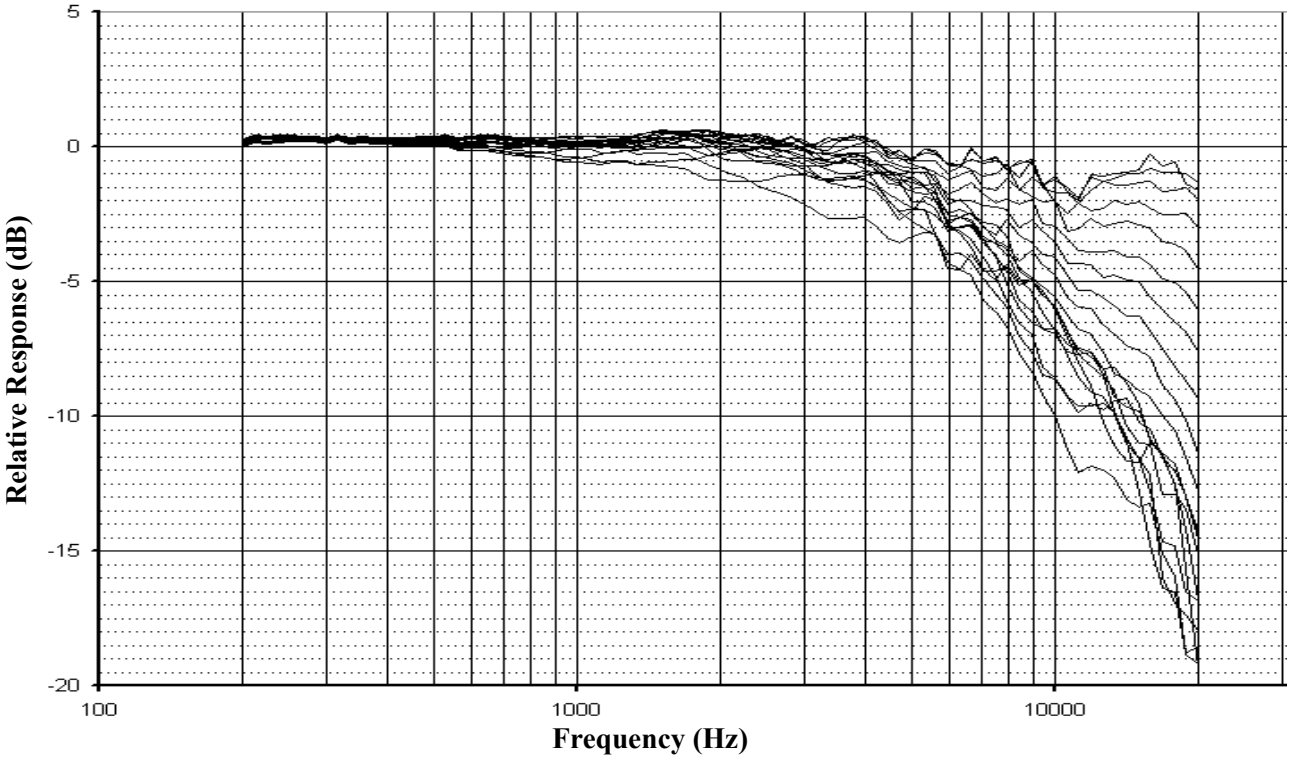

Figure 5–14 Zero to 180 degrees incidence angle

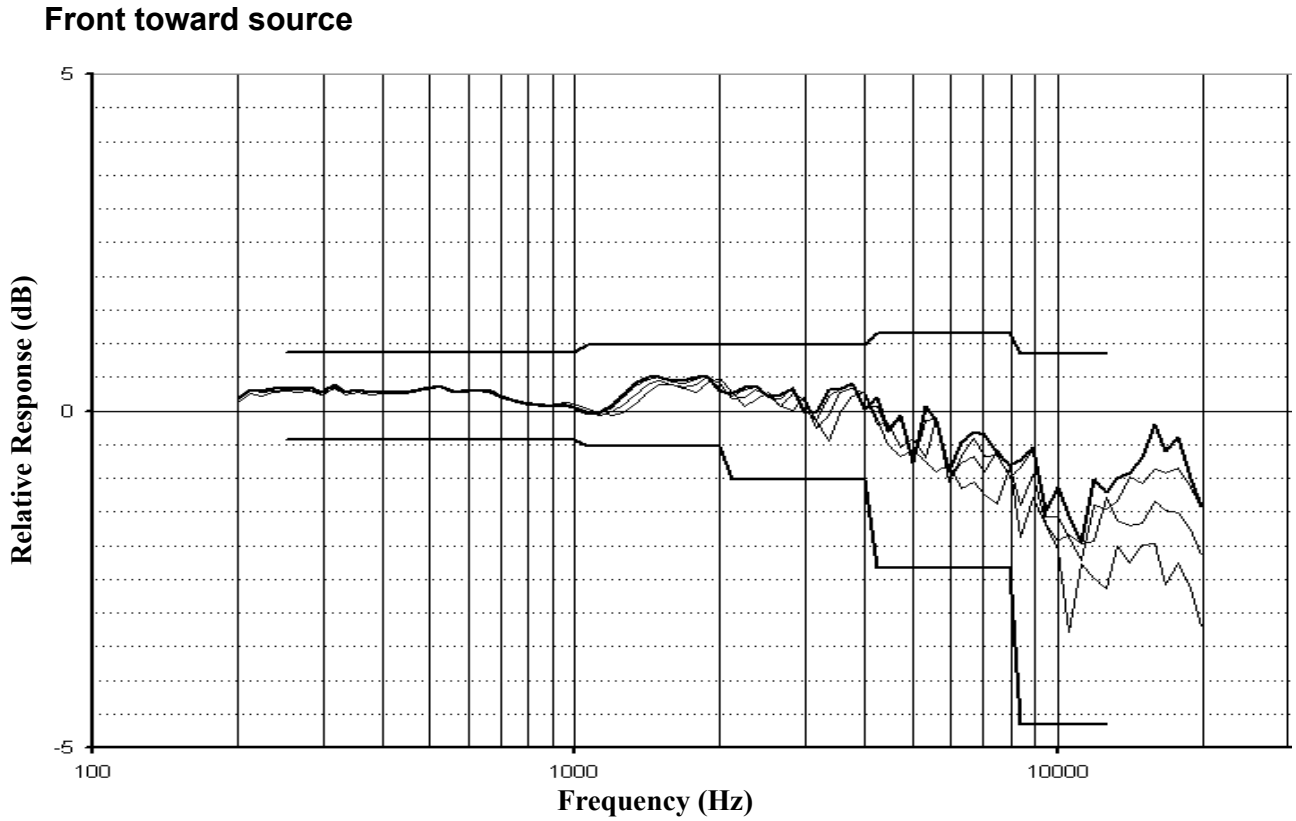

Figure 5–15 Zero to 30 degrees incidence angle

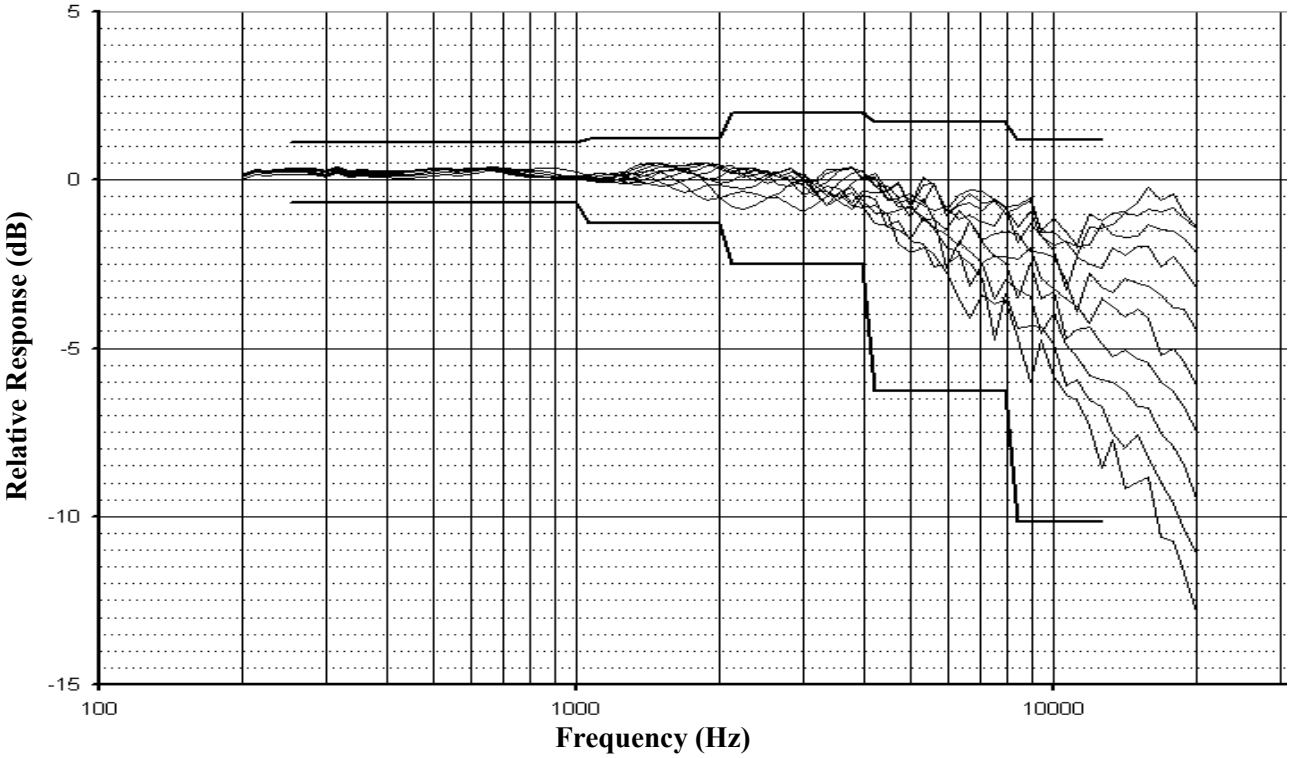

Figure 5–16 Zero to 90 degrees incidence angle

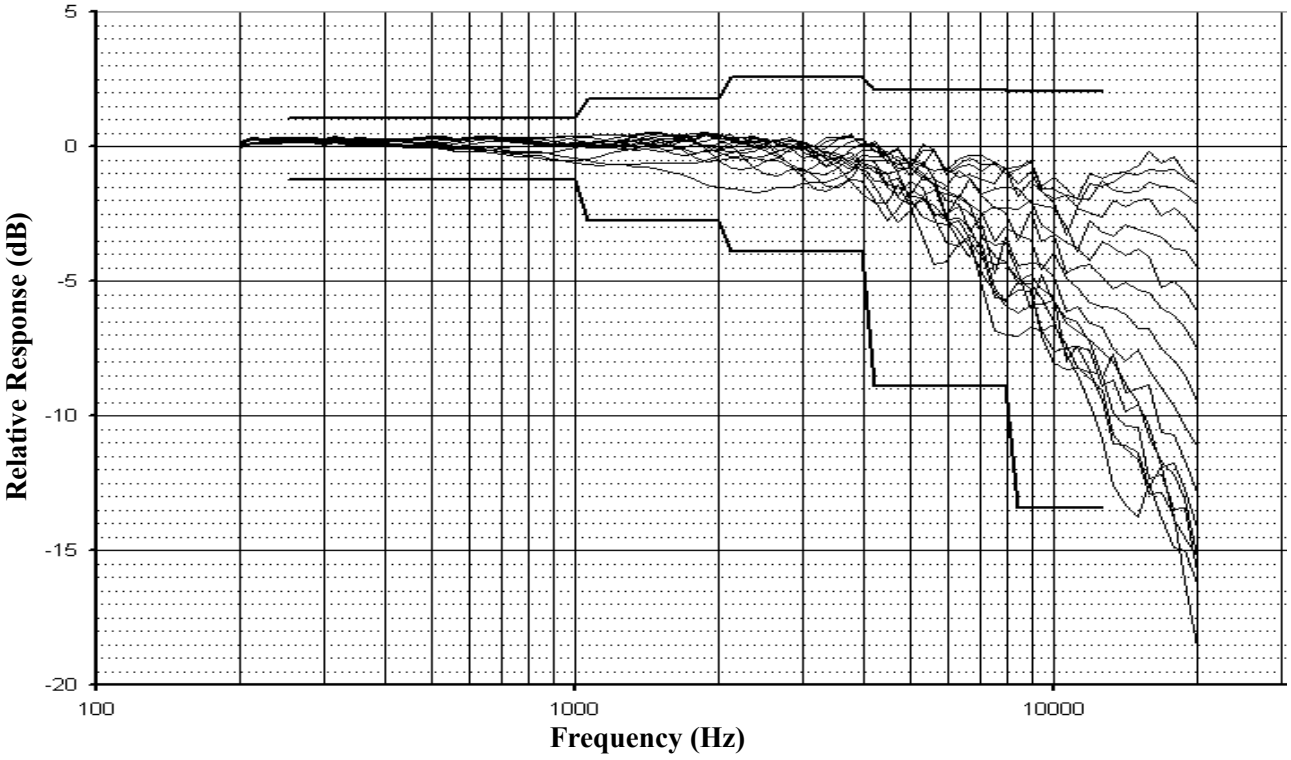

Figure 5–17 Zero to 150 degrees incidence angle

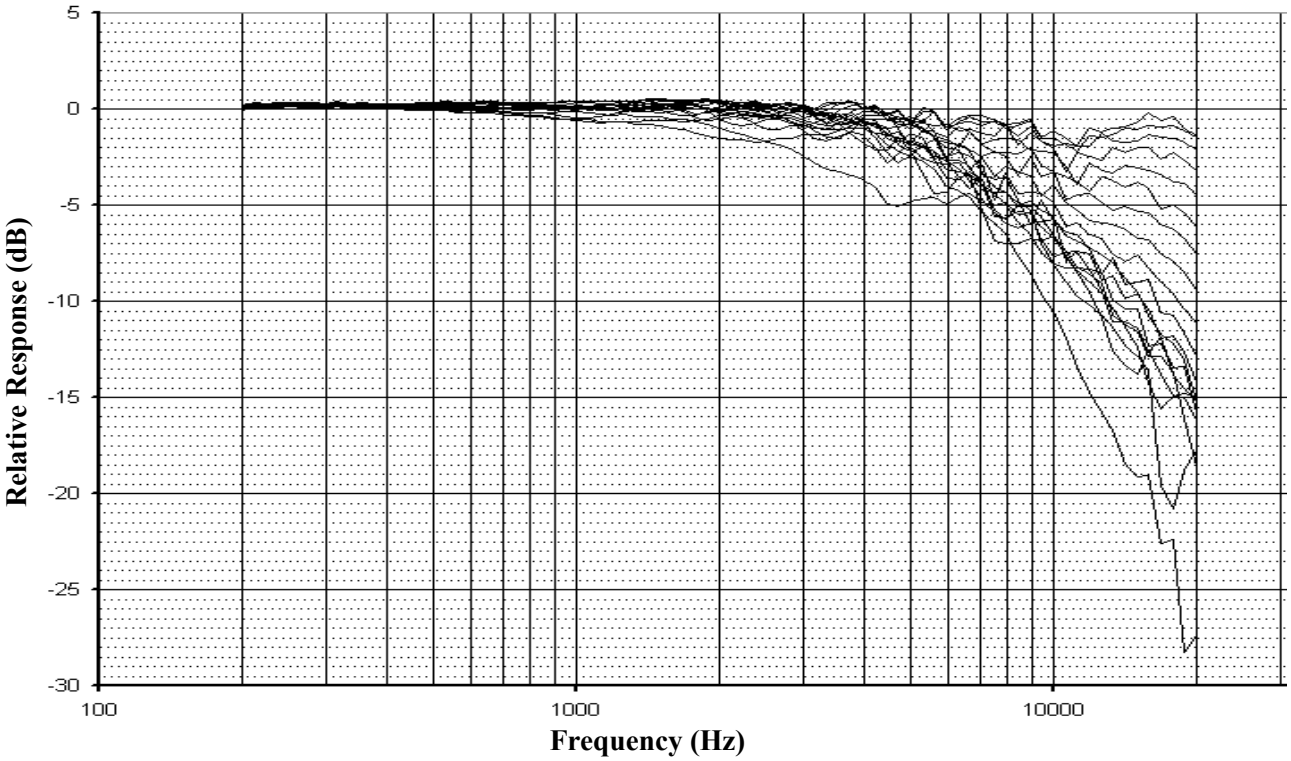

Figure 5–18 Zero to 180 degrees incidence angle

Random incidence frequency response

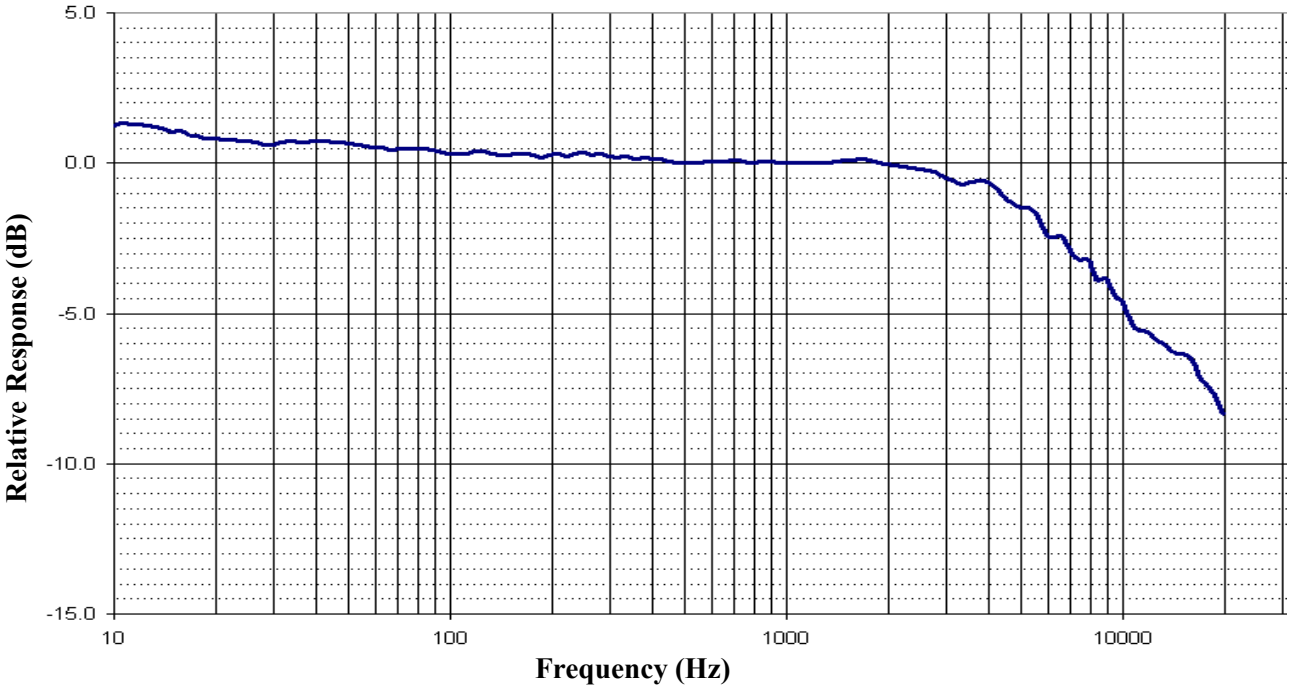

Figure 5–19 Random incidence angle

Acoustic corrections

Table 5–2: Acoustic corrections, base 4310 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.48	**1334**	-0.28	**5623**	0.08
13	-1.51	**1413**	-0.36	**5957**	0.41
16	-1.32	**1496**	-0.35	**6310**	0.69
20	-1.07	**1585**	-0.30	**6683**	-0.04
25	-0.99	**1679**	-0.31	**7079**	0.52
32	-0.95	**1778**	-0.36	**7499**	0.24
40	-0.98	**1884**	-0.33	**7943**	0.68
50	-0.92	**1995**	-0.17	**8414**	0.56
63	-0.76	**2113**	-0.07	**8913**	0.22
79	-0.74	**2239**	-0.17	**9441**	1.18
100	-0.56	**2371**	-0.17	**10000**	0.76
126	-0.65	**2512**	0.06	**10593**	1.06
158	-0.56	**2661**	0.06	**11220**	1.54
200	-0.52	**2818**	0.01	**11885**	0.62
251	-0.60	**2985**	0.33	**12589**	0.56
316	-0.44	**3162**	0.24	**13335**	0.53
398	-0.39	**3350**	-0.01	**14125**	0.18
501	-0.28	**3548**	0.12	**14962**	0.26
631	-0.30	**3758**	-0.13	**15849**	-0.18
794	-0.11	**3981**	0.07	**16788**	0.10
1000	0.00	**4217**	-0.08	**17783**	-0.14
1059	0.05	**4467**	0.49	**18836**	-0.16
1122	0.08	**4732**	0.25	**19953**	-0.15
1189	-0.01	**5012**	0.46		
1259	-0.16	**5309**	0.06		

Windscreen corrections

Table 5–3: Windscreen corrections, base 4310 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.09	**1334**	-0.09	**5623**	0.06
13	0.09	**1413**	-0.13	**5957**	0.15
16	0.09	**1496**	-0.16	**6310**	0.11
20	0.09	**1585**	-0.19	**6683**	0.03
25	0.09	**1679**	-0.21	**7079**	0.05
32	0.09	**1778**	-0.22	**7499**	0.10
40	0.09	**1884**	-0.22	**7943**	0.09
50	0.09	**1995**	-0.23	**8414**	-0.02
63	0.09	**2113**	-0.24	**8913**	0.34
79	0.09	**2239**	-0.24	**9441**	0.26
100	0.09	**2371**	-0.25	**10000**	0.30
126	0.09	**2512**	-0.26	**10593**	0.53
158	0.09	**2661**	-0.28	**11220**	0.36
200	0.09	**2818**	-0.30	**11885**	0.30
251	0.09	**2985**	-0.32	**12589**	0.44
316	0.09	**3162**	-0.32	**13335**	0.30
398	0.09	**3350**	-0.32	**14125**	0.60
501	0.09	**3548**	-0.31	**14962**	0.39
631	0.09	**3758**	-0.29	**15849**	0.23
794	0.06	**3981**	-0.26	**16788**	0.47
1000	0.00	**4217**	-0.17	**17783**	0.47
1059	-0.02	**4467**	-0.12	**18836**	1.25
1122	-0.04	**4732**	-0.09	**19953**	1.44
1189	-0.05	**5012**	0.02		
1259	-0.07	**5309**	0.04		

Self-generated broadband noise

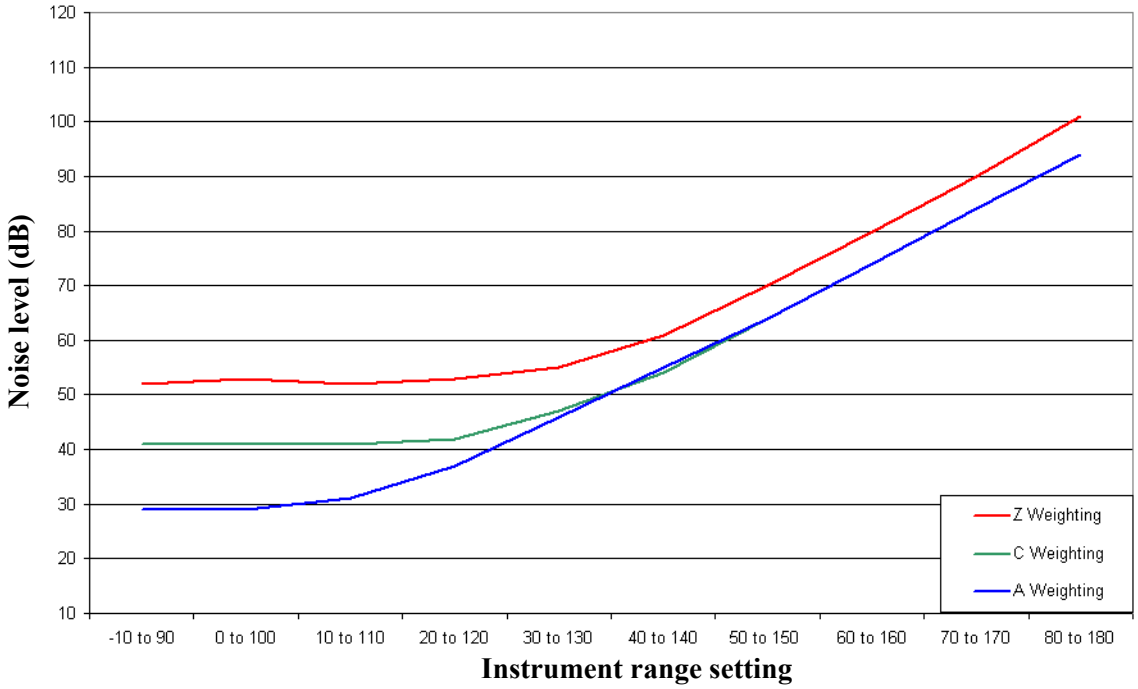

Figure 5–20 Broadband noise

3. Remote microphone

Directional frequency response

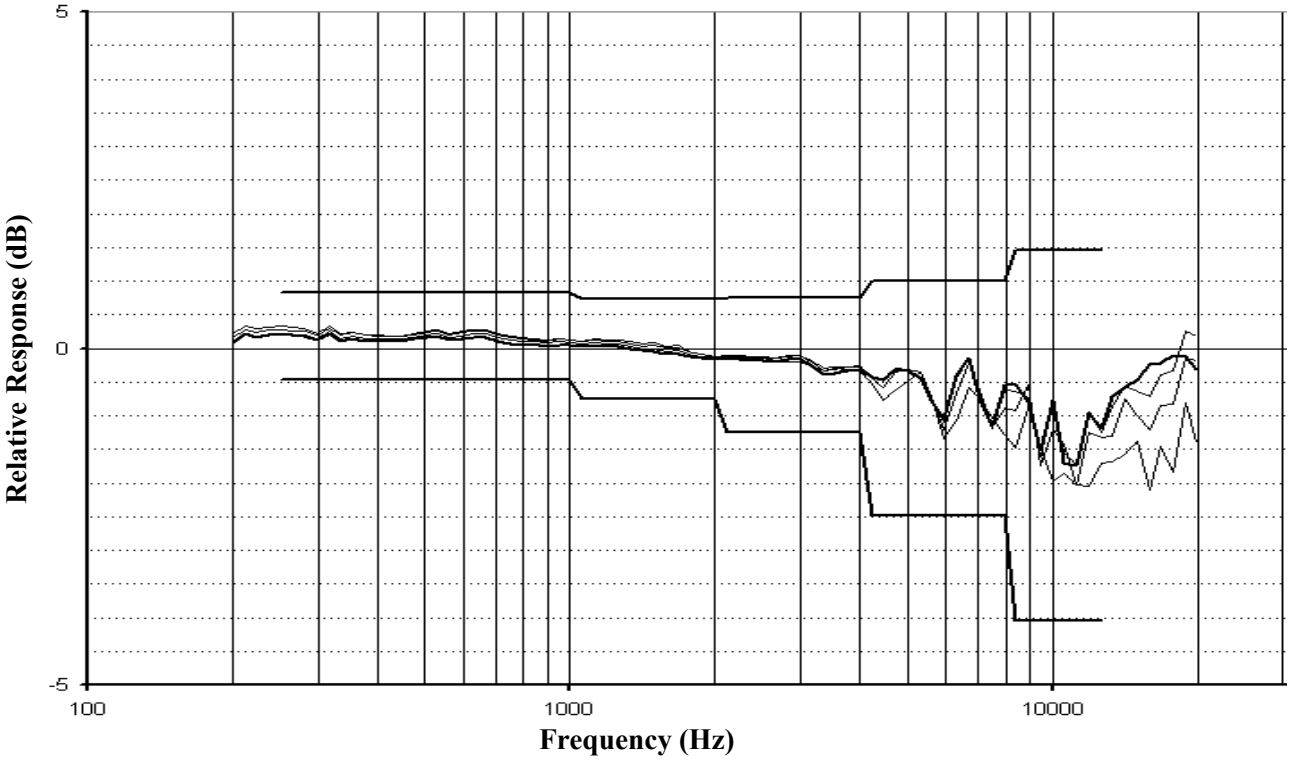

Figure 5–21 Zero to 30 degrees incidence angle

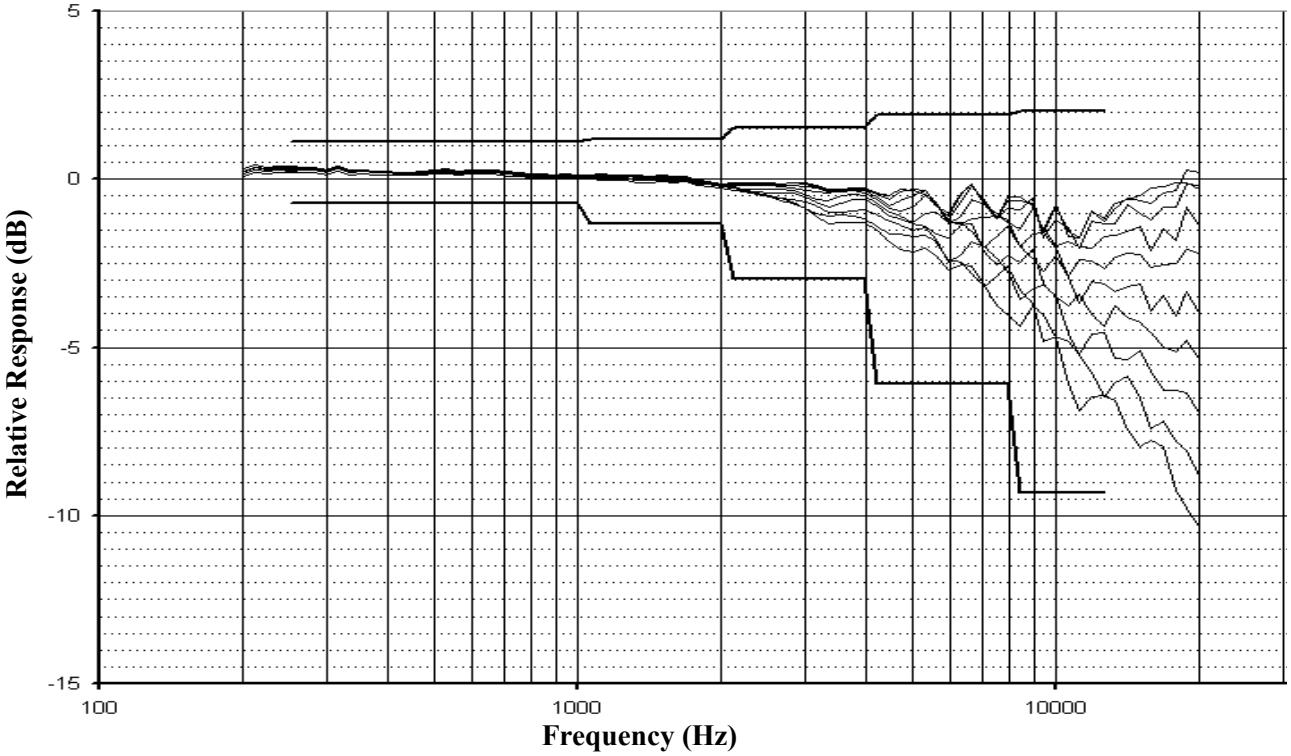

Figure 5–22 Zero to 90 degrees incidence angle

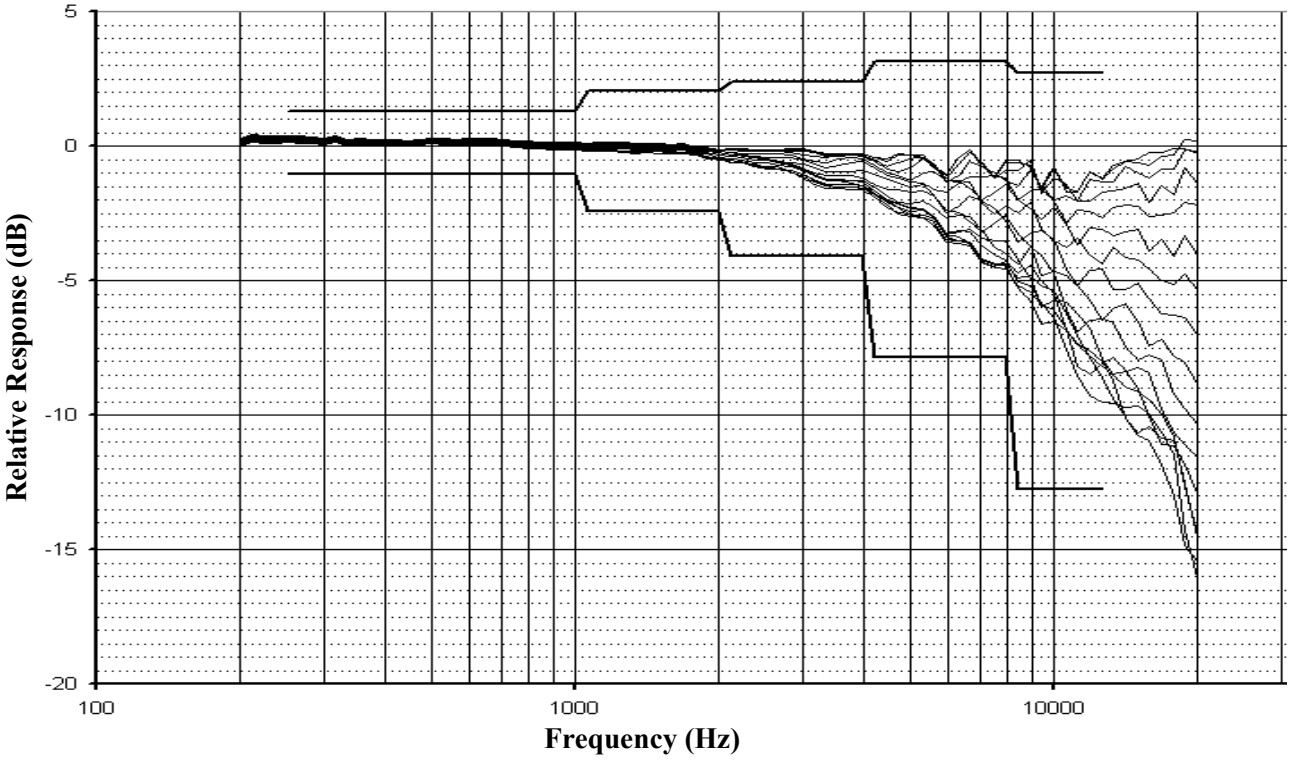

Figure 5–23 Zero to 150 degrees incidence angle

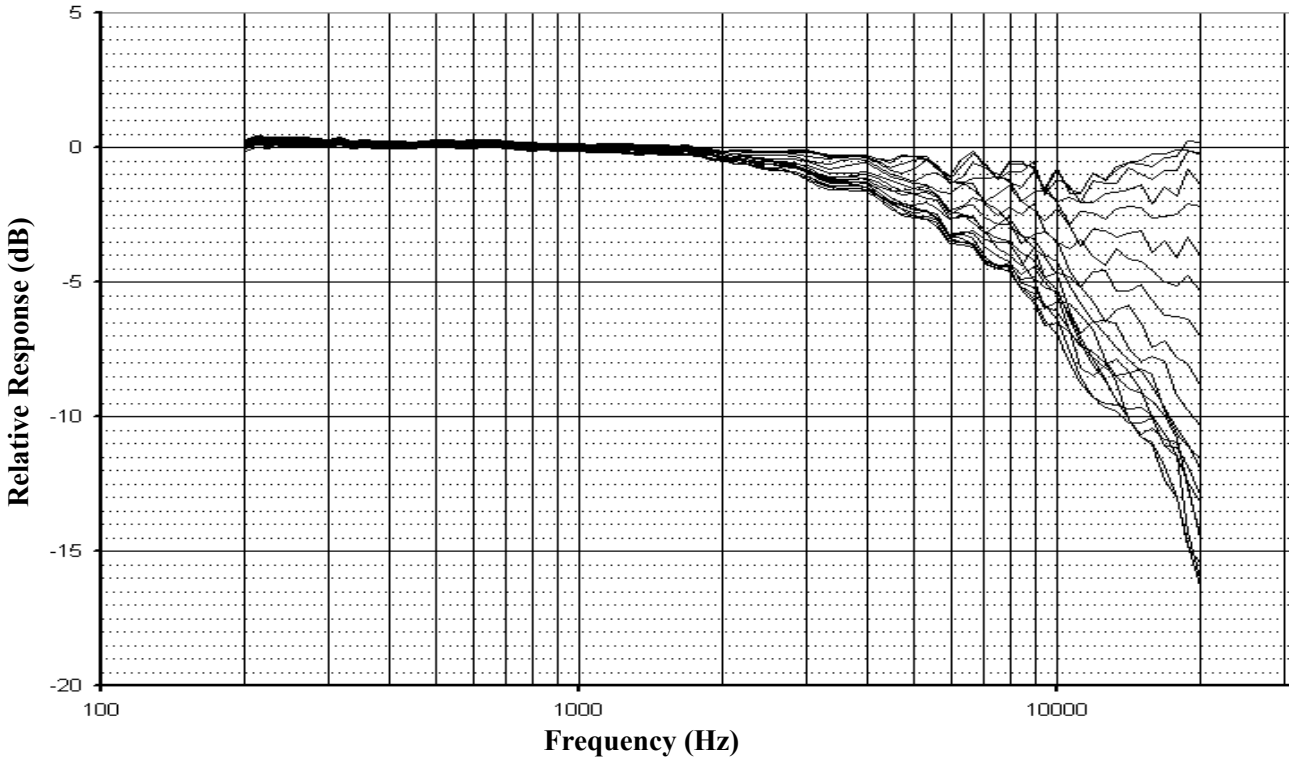

Figure 5–24 Zero to 180 degrees incidence angle

Random incidence frequency response

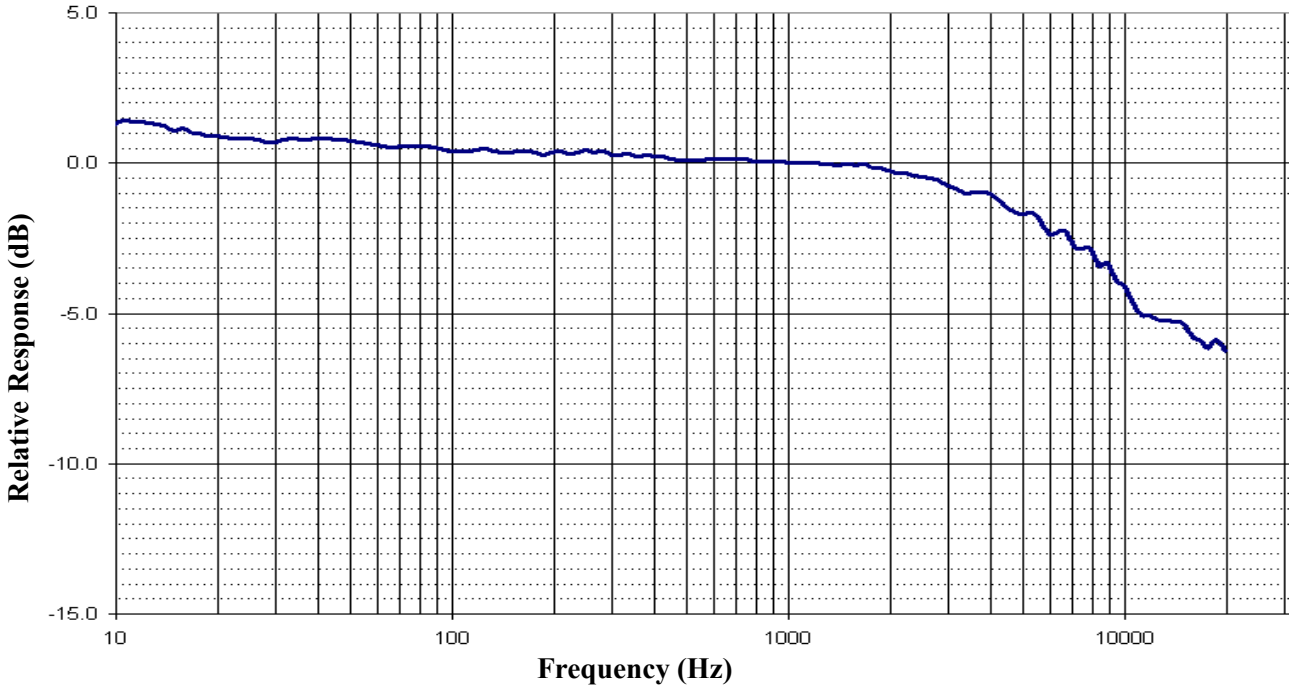

Figure 5–25 Random incidence angle

Acoustic corrections

Table 5–4: Acoustic corrections, base BK4936 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-0.92	**1334**	-0.02	**5623**	0.57
13	-1.16	**1413**	-0.01	**5957**	0.55
16	-1.05	**1496**	-0.03	**6310**	0.11
20	-0.77	**1585**	-0.02	**6683**	-0.04
25	-0.74	**1679**	-0.03	**7079**	0.73
32	-0.70	**1778**	0.00	**7499**	0.63
40	-0.67	**1884**	0.04	**7943**	-0.02
50	-0.70	**1995**	0.03	**8414**	0.41
63	-0.58	**2113**	0.03	**8913**	0.80
79	-0.45	**2239**	0.06	**9441**	0.52
100	-0.45	**2371**	0.06	**10000**	0.13
126	-0.40	**2512**	0.08	**10593**	1.05
158	-0.32	**2661**	0.06	**11220**	0.40
200	-0.28	**2818**	0.08	**11885**	0.53
251	-0.38	**2985**	0.08	**12589**	1.07
316	-0.21	**3162**	0.13	**13335**	0.64
398	-0.15	**3350**	0.27	**14125**	1.23
501	-0.07	**3548**	0.27	**14962**	1.00
631	-0.08	**3758**	0.21	**15849**	1.68
794	0.00	**3981**	0.17	**16788**	1.97
1000	0.00	**4217**	0.21	**17783**	2.45
1059	-0.03	**4467**	0.21	**18836**	2.68
1122	-0.04	**4732**	0.15	**19953**	3.73
1189	-0.04	**5012**	0.21		
1259	-0.04	**5309**	0.35		

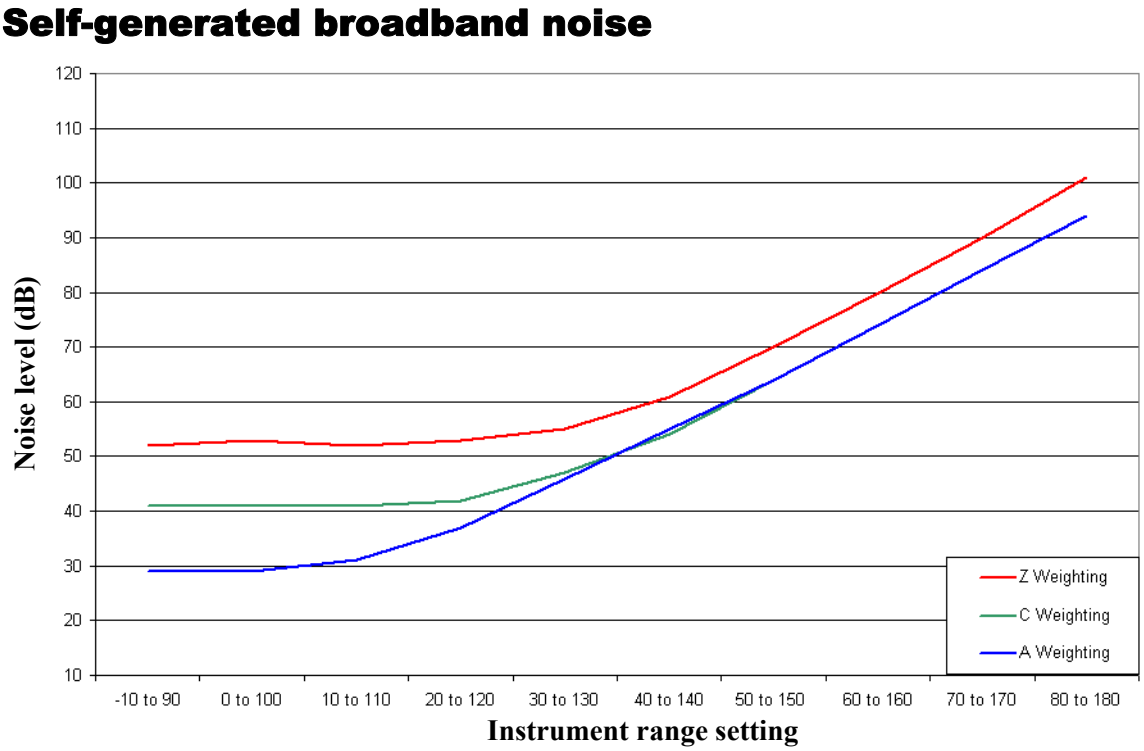

Figure 5–26 Broadband noise

4. Remote with windscreen

Directional frequency response

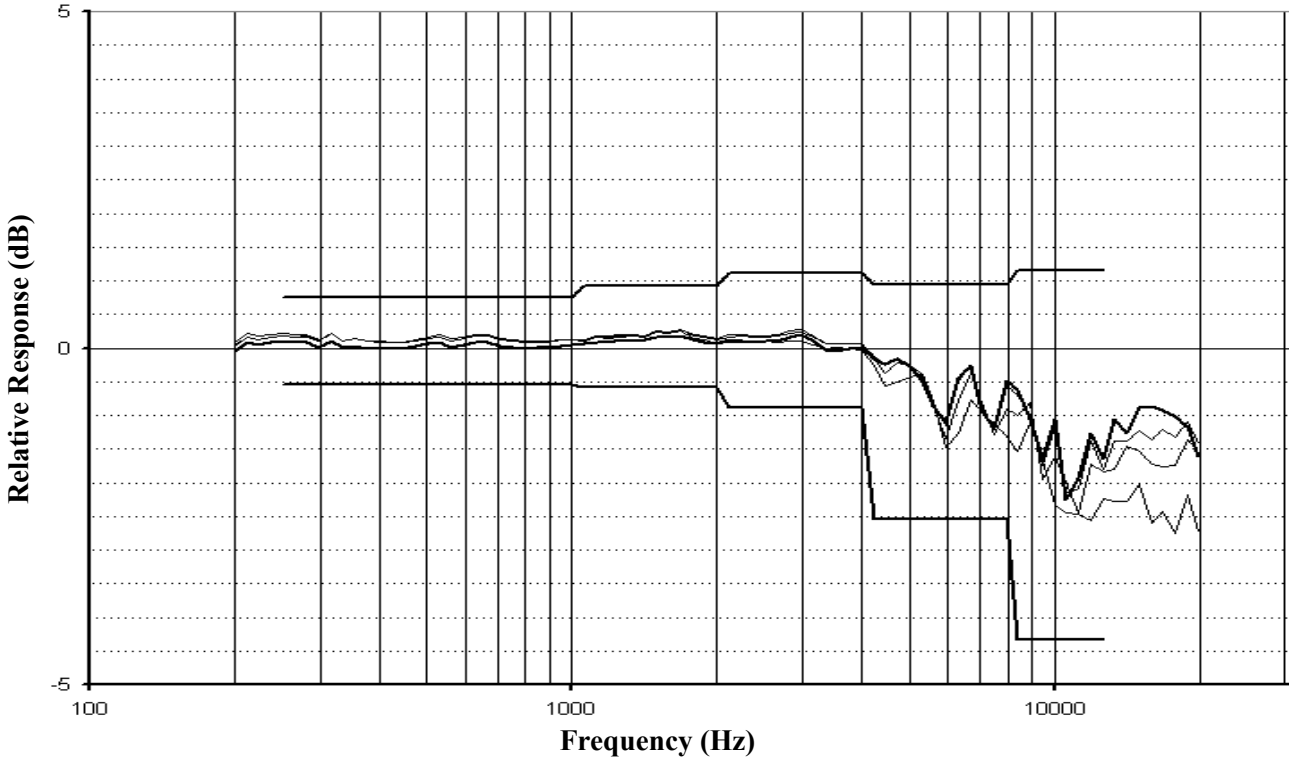

Figure 5–27 Zero to 30 degrees incidence angle

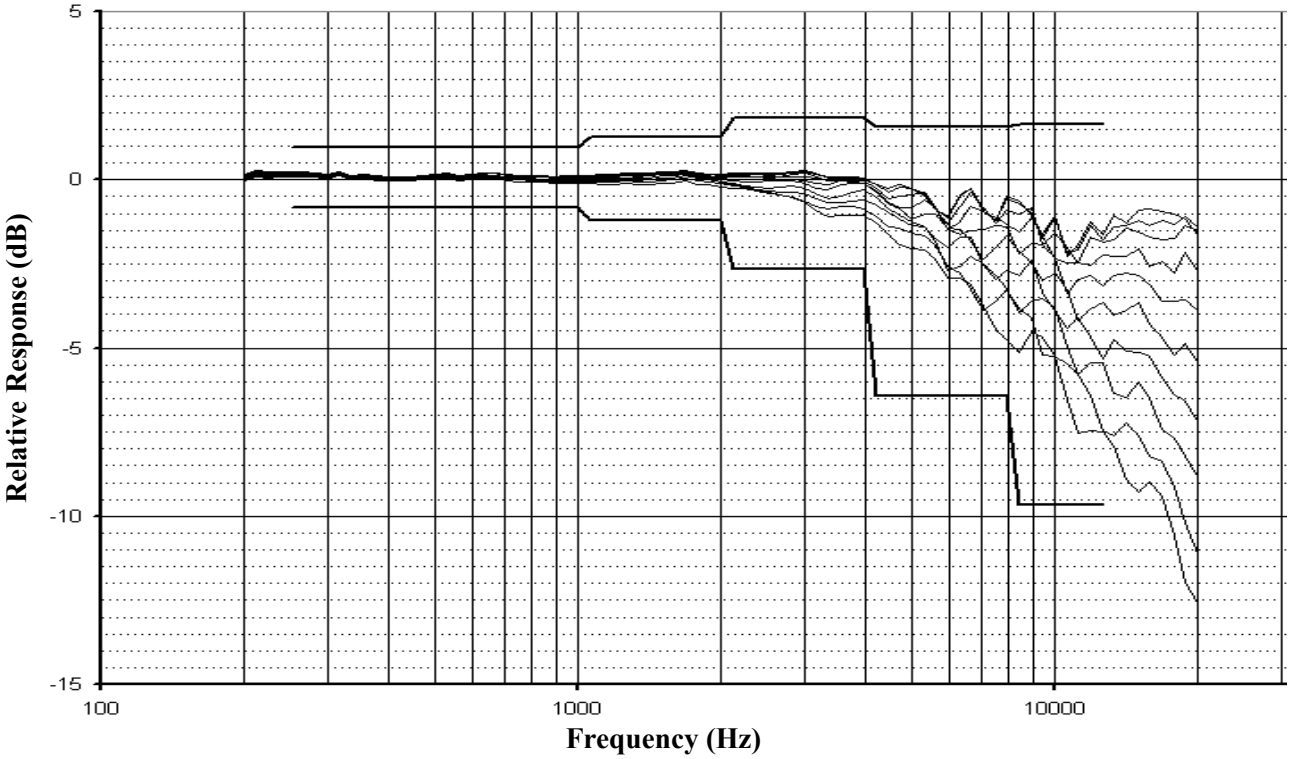

Figure 5–28 Zero to 90 degrees incidence angle

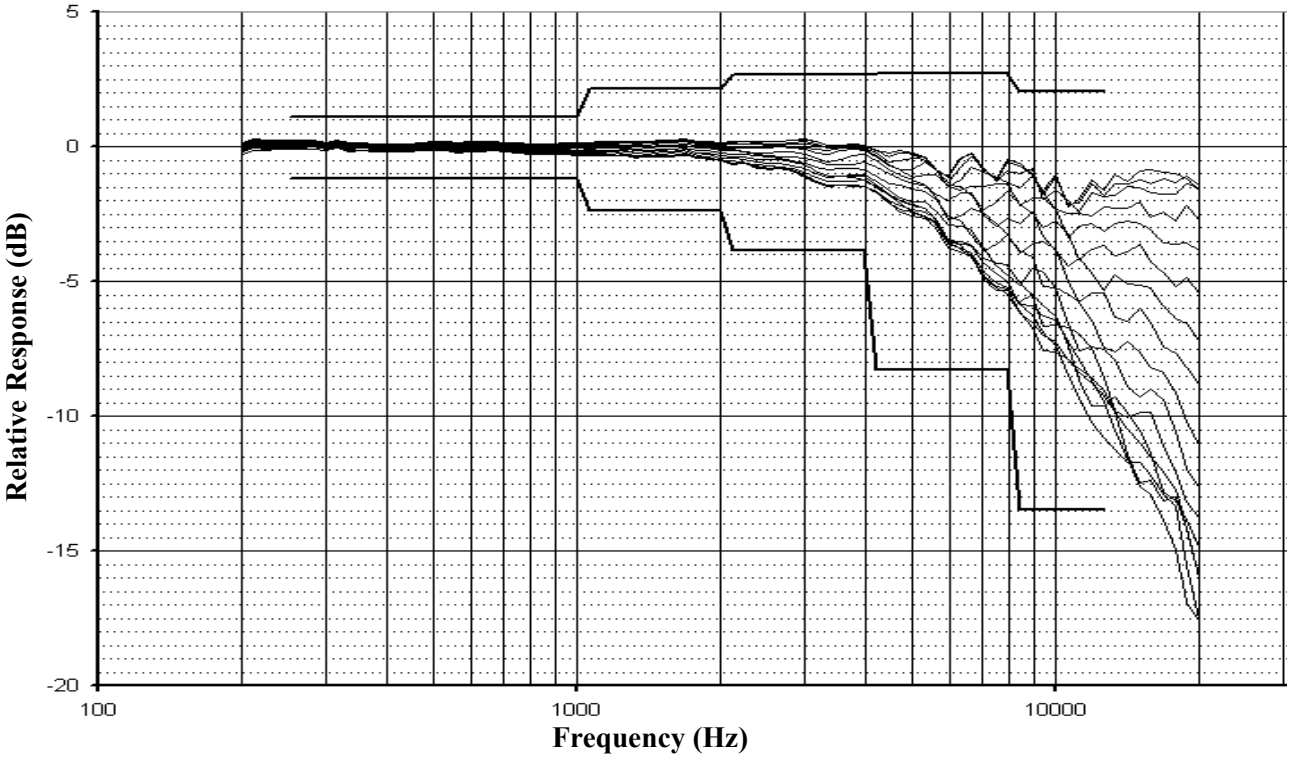

Figure 5–29 Zero to 150 degrees incidence angle

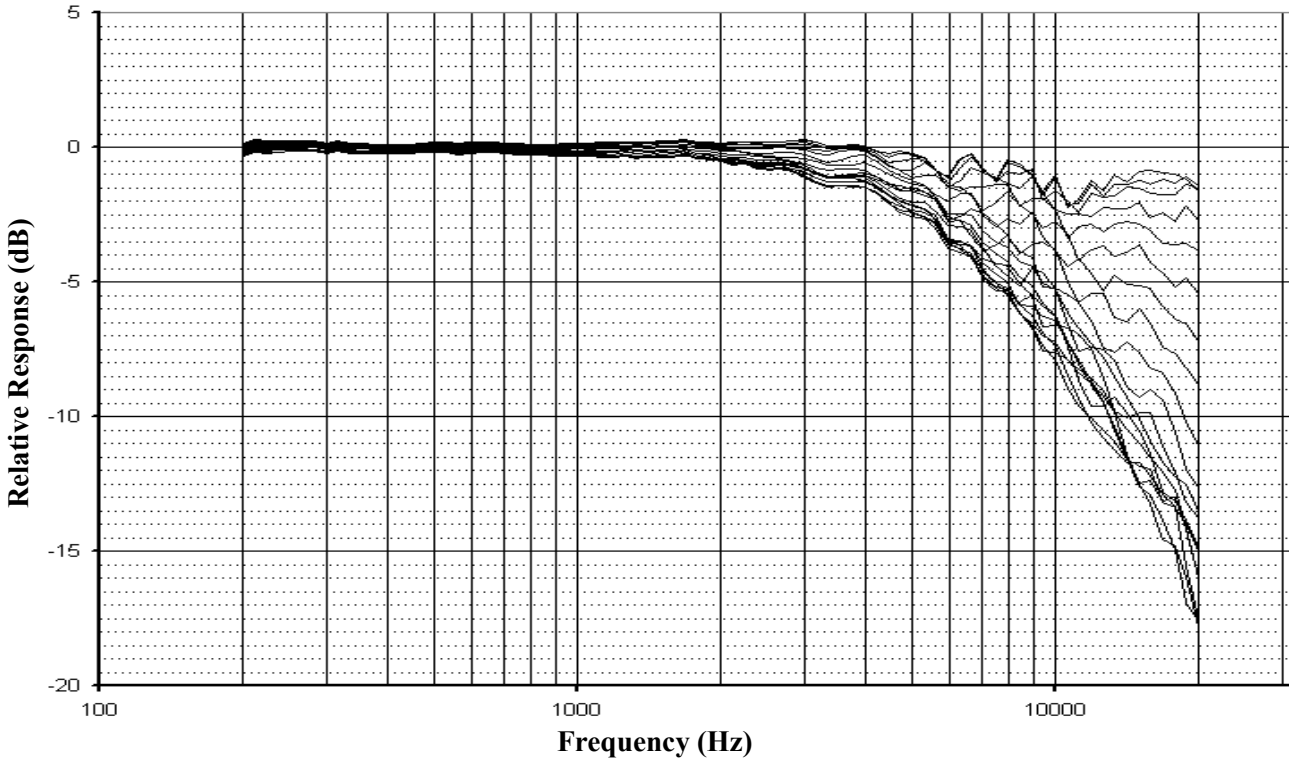

Figure 5–30 Zero to 180 degrees incidence angle

Random incidence frequency response

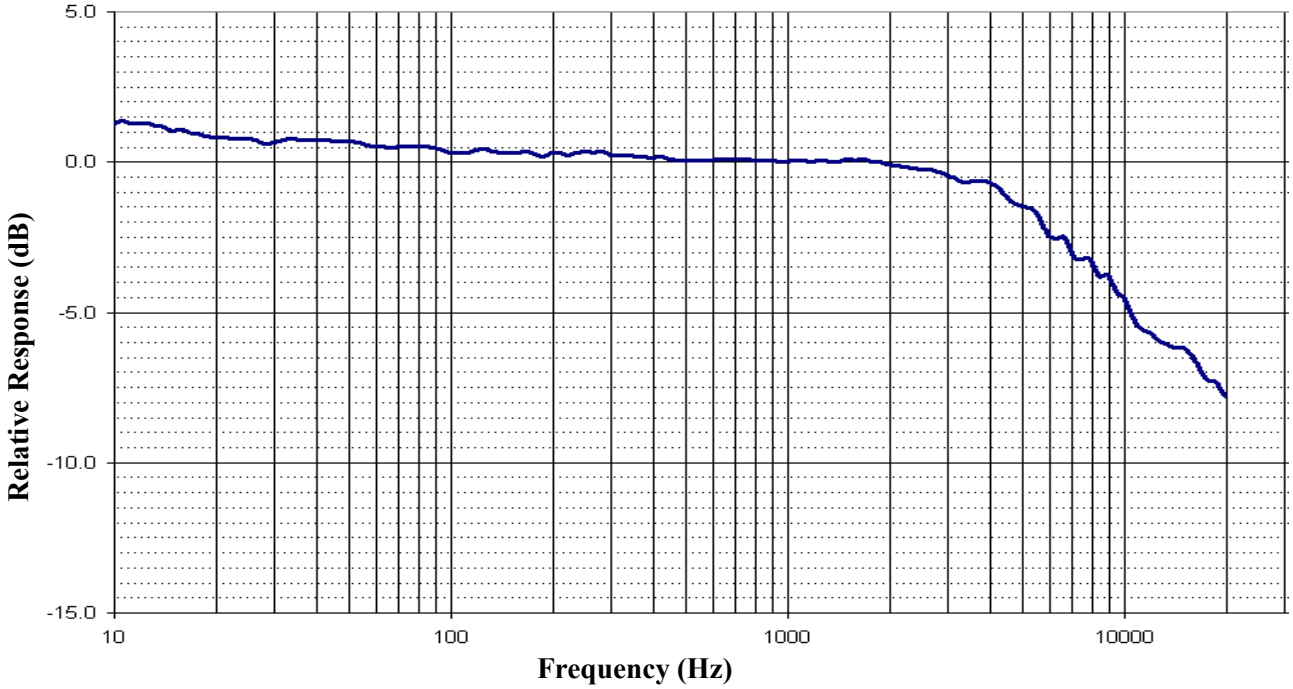

Figure 5–31 Random incidence angle

Acoustic corrections

Table 5–5: Acoustic corrections, base QE4130 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	-1.23	**1334**	0.03	**5623**	0.79
13	-1.26	**1413**	0.06	**5957**	0.94
16	-1.07	**1496**	0.06	**6310**	0.43
20	-0.82	**1585**	0.10	**6683**	0.09
25	-0.74	**1679**	0.10	**7079**	0.78
32	-0.69	**1778**	0.14	**7499**	1.07
40	-0.72	**1884**	0.16	**7943**	0.47
50	-0.67	**1995**	0.15	**8414**	0.55
63	-0.51	**2113**	0.15	**8913**	0.76
79	-0.49	**2239**	0.16	**9441**	1.50
100	-0.31	**2371**	0.15	**10000**	0.74
126	-0.40	**2512**	0.18	**10593**	1.63
158	-0.30	**2661**	0.17	**11220**	1.65
200	-0.27	**2818**	0.20	**11885**	0.85
251	-0.35	**2985**	0.20	**12589**	1.07
316	-0.19	**3162**	0.24	**13335**	0.57
398	-0.13	**3350**	0.37	**14125**	0.42
501	-0.03	**3548**	0.37	**14962**	0.26
631	-0.06	**3758**	0.31	**15849**	0.00
794	-0.02	**3981**	0.31	**16788**	0.05
1000	0.00	**4217**	0.41	**17783**	-0.13
1059	-0.02	**4467**	0.45	**18836**	-0.16
1122	-0.02	**4732**	0.33	**19953**	-0.04
1189	-0.01	**5012**	0.31		
1259	-0.01	**5309**	0.44		

Windscreen corrections

Table 5–6: Windscreen corrections, base QE4130 unit

Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)	Frequency (Hz)	Correction (dB)
10	0.11	**1334**	-0.12	**5623**	0.10
13	0.11	**1413**	-0.15	**5957**	0.06
16	0.11	**1496**	-0.20	**6310**	0.04
20	0.11	**1585**	-0.24	**6683**	0.11
25	0.11	**1679**	-0.27	**7079**	0.19
32	0.11	**1778**	-0.26	**7499**	0.04
40	0.11	**1884**	-0.24	**7943**	-0.06
50	0.11	**1995**	-0.24	**8414**	0.08
63	0.11	**2113**	-0.25	**8913**	0.27
79	0.11	**2239**	-0.27	**9441**	0.10
100	0.11	**2371**	-0.27	**10000**	0.29
126	0.11	**2512**	-0.28	**10593**	0.56
158	0.11	**2661**	-0.30	**11220**	0.20
200	0.11	**2818**	-0.33	**11885**	0.31
251	0.11	**2985**	-0.34	**12589**	0.46
316	0.11	**3162**	-0.35	**13335**	0.35
398	0.11	**3350**	-0.34	**14125**	0.68
501	0.11	**3548**	-0.33	**14962**	0.42
631	0.10	**3758**	-0.31	**15849**	0.63
794	0.06	**3981**	-0.31	**16788**	0.72
1000	0.00	**4217**	-0.28	**17783**	0.92
1059	-0.02	**4467**	-0.23	**18836**	1.06
1122	-0.05	**4732**	-0.15	**19953**	1.30
1189	-0.07	**5012**	-0.05		
1259	-0.09	**5309**	0.05		

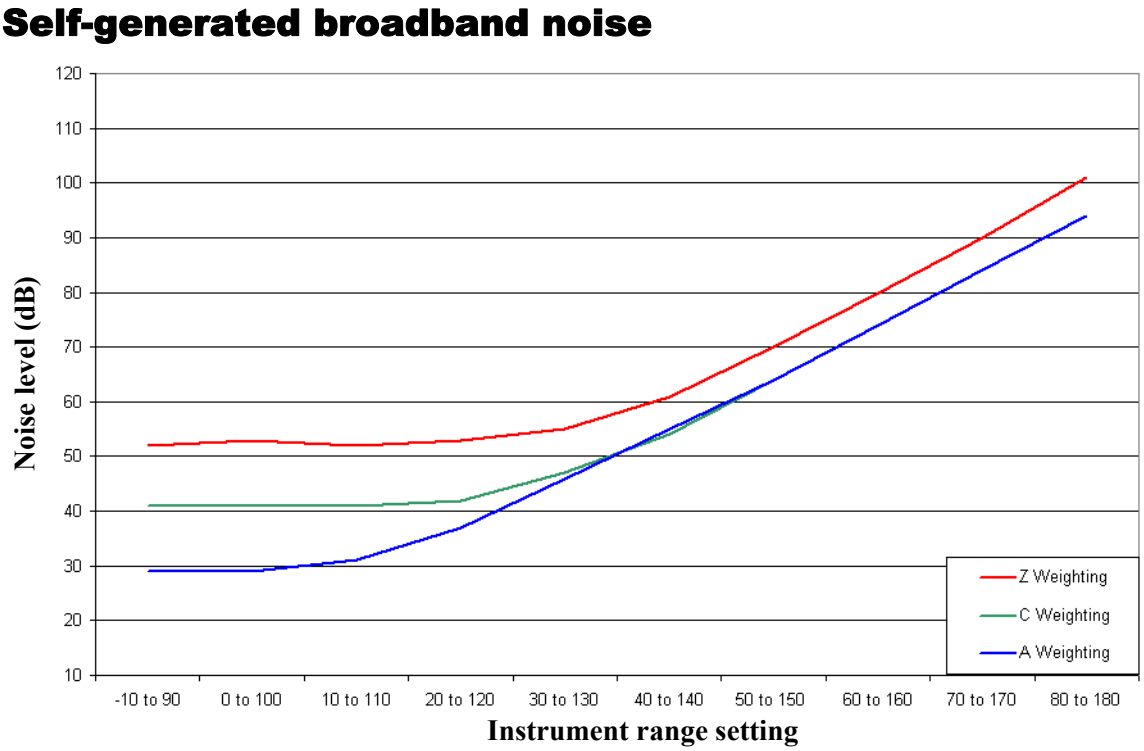

Figure 5–32 Broadband noise