Testing Methodology and Results for RMAA v5.3

CREATIVE

Testing Methodology using RMAA v5.3

In this section, we will guide you through setting up your Sound Blaster® Audigy™ 2 ZS, Audigy 2 ZS Platinum or Audigy 2 ZS Platinum Pro for RMAA measurement in Real-time 24-bit/96kHz Playback and Recording using the Analog Inputs and Outputs. Comparison charts for the 16-bit/48kHz and 16-bit/44.1kHz results are also included. These Analog I/O tests prove that superb quality analog audio inputs and outputs are achieved from very high quality DAC, ADC and board design.

N.B. When testing Sound Blaster® Audigy™ 2 ZS Platinum and Platinum Pro

For accurate RMAA testing results of the Audigy 2 ZS Platinum Pro it is essential that ONLY Line-In 3 be used. Due to the testing methodology of RMAA, i.e. the loop-back method, a ground-loop is created (caused by the fact that Line-In 1 & 2 in the External I/O Module share the same Ground as the Line-Out on the card), which artificially distorts the RMAA results negatively. Due to this we have specifically isolated the Ground for Line-In 3 (The RCA inputs at the back of the I/O Module) and have included a Mini-Jack to RCA converter cable to facilitate your tests. Line-In 3 was chosen because of its simplicity to isolate and also to avoid having to use a 3.5mm to 6mm converter jack (which adds noise to the signal due to the connection between the jack and the converter socket). It is very important to understand that this loop-back setup is never used under normal recording methods. Therefore the results gleaned from Line-In 1 & 2 are not real (as under normal use a ground-loop is never created). That is to say that the recording/playback quality of all inputs/outputs under normal usage are the same and according to Line-In 3.

Sound Blaster® Audigy™ 2 ZS Platinum is affected in the same way. However due to the fact that it does not have a Line-In 3 connector the back panel Line-out to Line-In connectors (on the card itself) should be used.

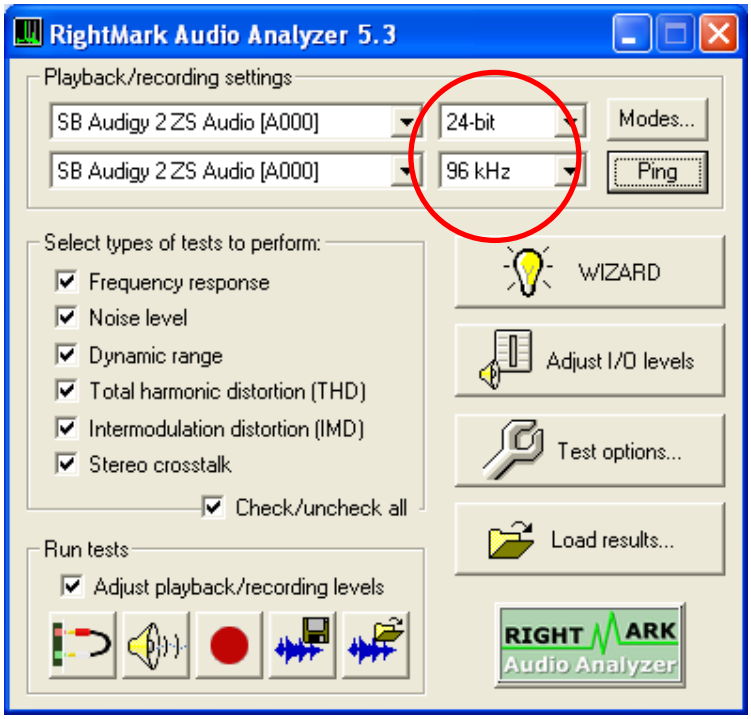
For those wishing to test the audio quality of all the inputs and to avoid the ground-loop issues then a two-card test methodology should be implemented. This method of testing utilizes a second card as the "Control" card. However it should be noted that only very high quality cards should be used for this methodology (known as "reference" cards) else the results will be tainted by the poor quality DACs/ADCs used on the "control" card. For a list of recommended "control" cards please visit http://audio.rightmark.org/results.html**.**

SETTING UP RMAA FOR ANALOG MEASUREMENT:

- Install the Soundcard, if not already installed, and leave running (playing music) for 10 – 20mins to warm up to its operating temperature. If you do not do this you will achieve different results over that period of time if you run the RMAA tests multiple times. If in doubt you should keep running the tests until the results stabilize. In our tests the results improve significantly by the end of that period of time.

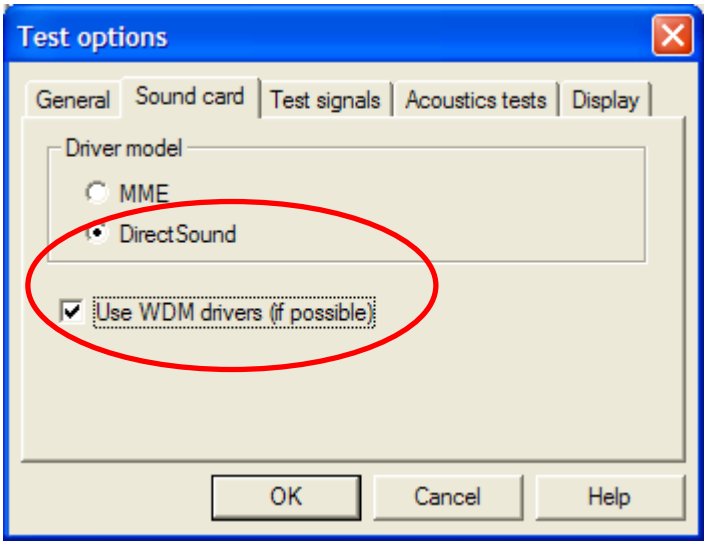
- Launch RMAA 5.3

This latest version of the RMAA can be downloaded from the following web site:
http://audio.rightmark.org/downloads/rmaa53.exe

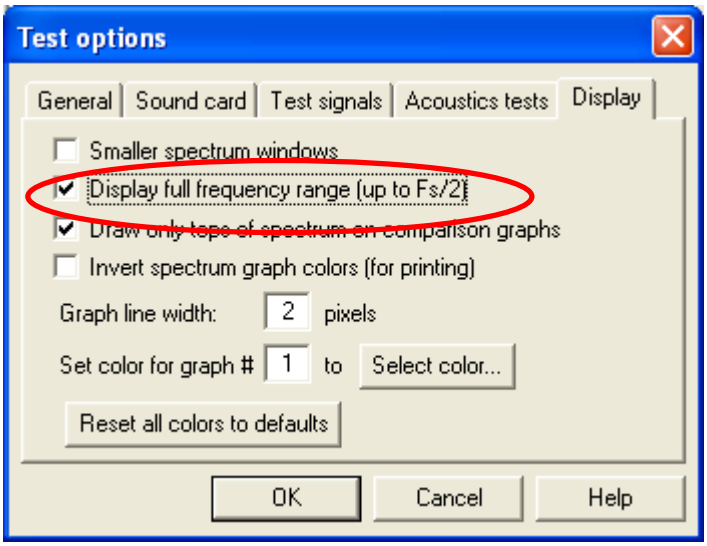


- Select the bit depth and sampling rate you which to test.
  - ***Note that Sound Blaster Audigy 2 ZS max playback sampling rate is 192kHz, but the max recording sampling rate is 96kHz. Therefore the resolution must be set to 24-bit, 96kHz (or lower) for the test to work.***
  - ***Sound Blaster Audigy 2 ZS has truly exceptional playback quality due to the extremely high quality DAC implemented (required for Advanced Resolution DVD-Audio playback at 192kHz). The ADCs used on the card are very high quality, but do not as high as the DAC. Therefore using the Loop-Back method will derive a result based on the lowest of the two specs, which is the recording path, and therefore will not reflect the true quality of the Playback path. To measure the playback path accurately the two-card method should be used as highlighted on page 1.***

- Click on "Test Options", "Sound Card" and select the "DirectSound" option. Also ensure that "Use WDM drivers (if possible)" is selected.
  (It is very important that you use the "DirectSound" setting as using MME will give lower results. Creative supports the MME driver interface for legacy purposes whereas the DirectSound interface is optimized for best performance.)



- Now while still in the Test Options area click on the "Display" tab and select "Display full frequency range (up to Fs/2)".



- Loopback cable connection:
  - Audigy 2 ZS Platinum Pro: Connect a 3.5mm Mini-to-RCA cable from Line_Out_1 to Line_In_3 located at the back of the External I/O Hub.
  - Audigy 2 ZS/Audigy 2 ZS Platinum: Connect a 3.5mm Mini cable from Line_Out_1 to Line_In located at the back panel of the main card.

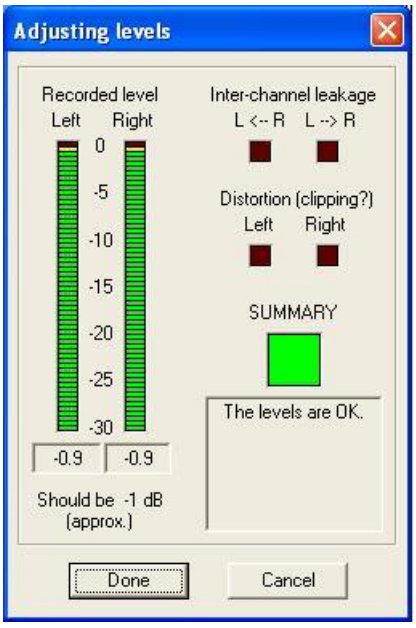
  Any other cable configuration will give false readings (please see page 1)

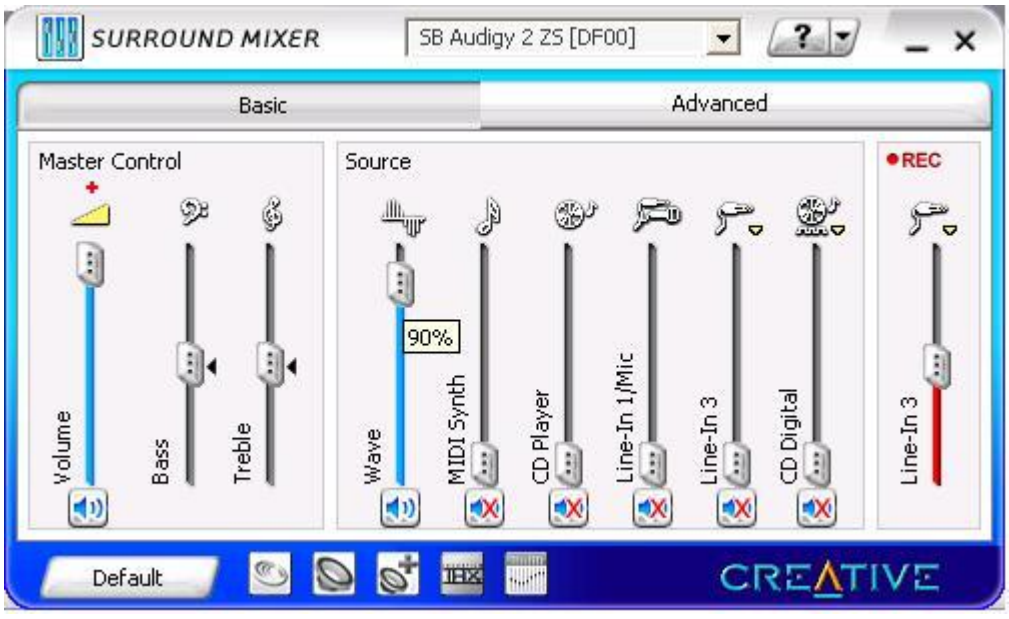
- Establishing playback and recording levels:
  - Disable All Effects, including CMSS 3D, EAX, Karaoke, Equalizer, THX Setup and Speaker Calibration.
  - Click "Adjust I/O Levels", launch Creative Surround Mixer and adjust the mixer with followings settings:

  - Sound Blaster Audigy 2 ZS Platinum Pro:
    - Master: 100% (0dB)
    - Wave/MP3: 90%
    - Others: 0% and Muted
    - Record Source: Line-In 3 @ 50% (no record gain, ie 0dB)

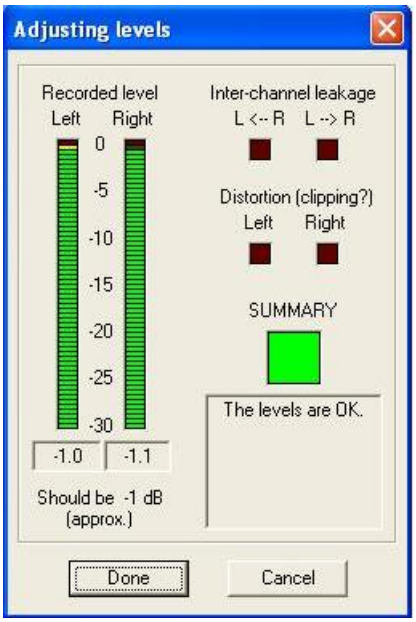
  - Sound Blaster Audigy 2 ZS/ Audigy 2 ZS Platinum :
    - Master: 100% (0dB)
    - Wave/MP3: 100%
    - Line-In: 58%(0dB)
    - Others: 0% and Muted
    - Record Source: Analog Mix(Line-In) @ 50% (no record gain, ie 0dB)

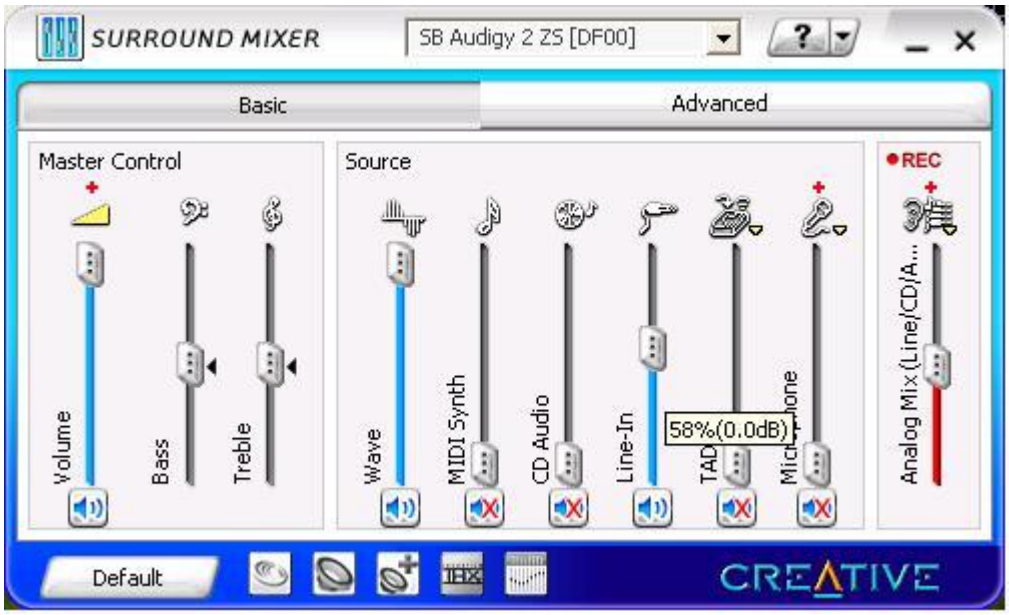
SOUND BLASTER AUDIGY 2 ZS PLATINUM PRO MIXER SETTINGS





SOUND BLASTER AUDIGY 2 ZS AND AUDIGY 2 ZS PLATINUM MIXER SETTINGS





- Enable "Record Without Monitoring" in Record Advance Controls

- Now you can begin your tests by  clicking on the "Run Test" panel.
- Results are presented in plots and are also tabulated.

Results from RMAA v5.3 Tests

Summary results for Sound Blaster Audigy 2 ZS Platinum Pro

Testing chain: External loopback (line-out1 - line-in3)
Sampling mode: 24-bit, 96 kHz

Frequency response (from 40 Hz to 15 kHz), dB:	+0.01, -0.08	Excellent
Noise level, dB (A):	-104.3	Excellent
Dynamic range, dB (A):	104.2	Excellent
THD, %:	0.0015	Excellent
IMD, %:	0.0070	Excellent
Stereo crosstalk, dB:	-103.2	Excellent

General performance: Excellent

Summary results for Sound Blaster Audigy 2 ZS / Sound Blaster Audigy 2 ZS Platinum

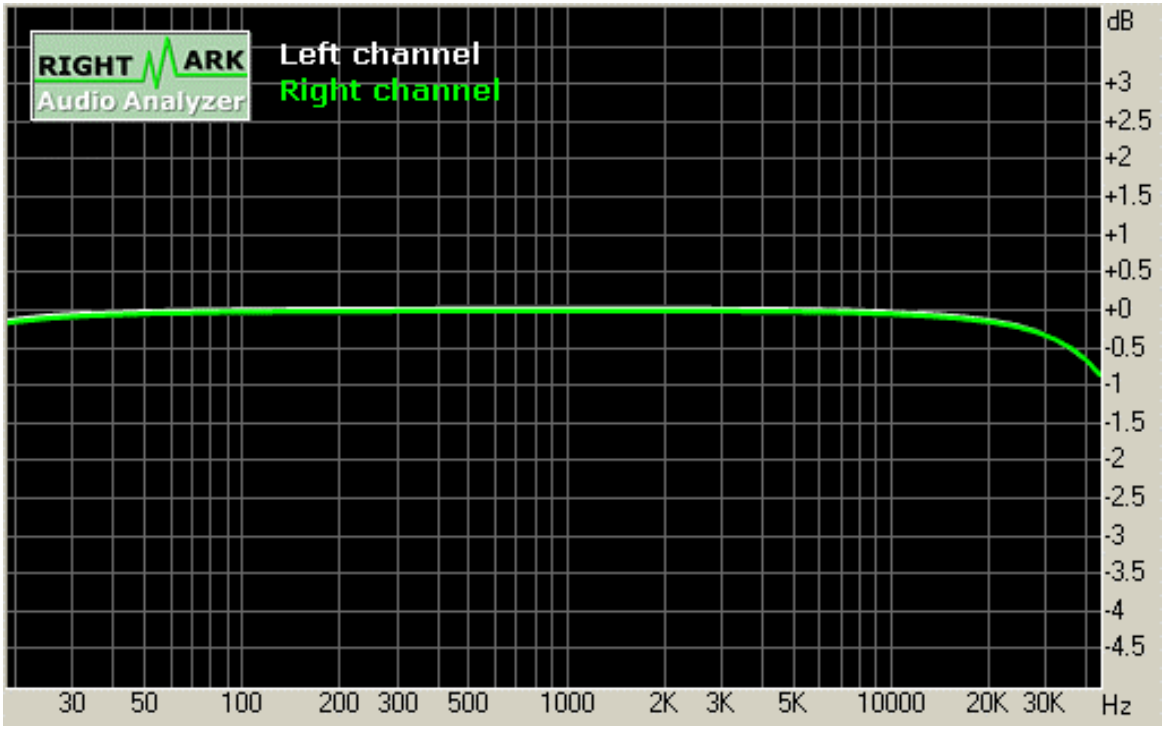
Testing chain: External loopback (line-out1 - line-in)
Sampling mode: 24-bit, 96 kHz

Frequency response (from 40 Hz to 15 kHz), dB:	+0.01, -0.08	Excellent
Noise level, dB (A):	-101.3	Excellent
Dynamic range, dB (A):	101.3	Excellent
THD, %:	0.0034	Very good
IMD, %:	0.0080	Very good
Stereo crosstalk, dB:	-91.8	Excellent

General performance: Excellent

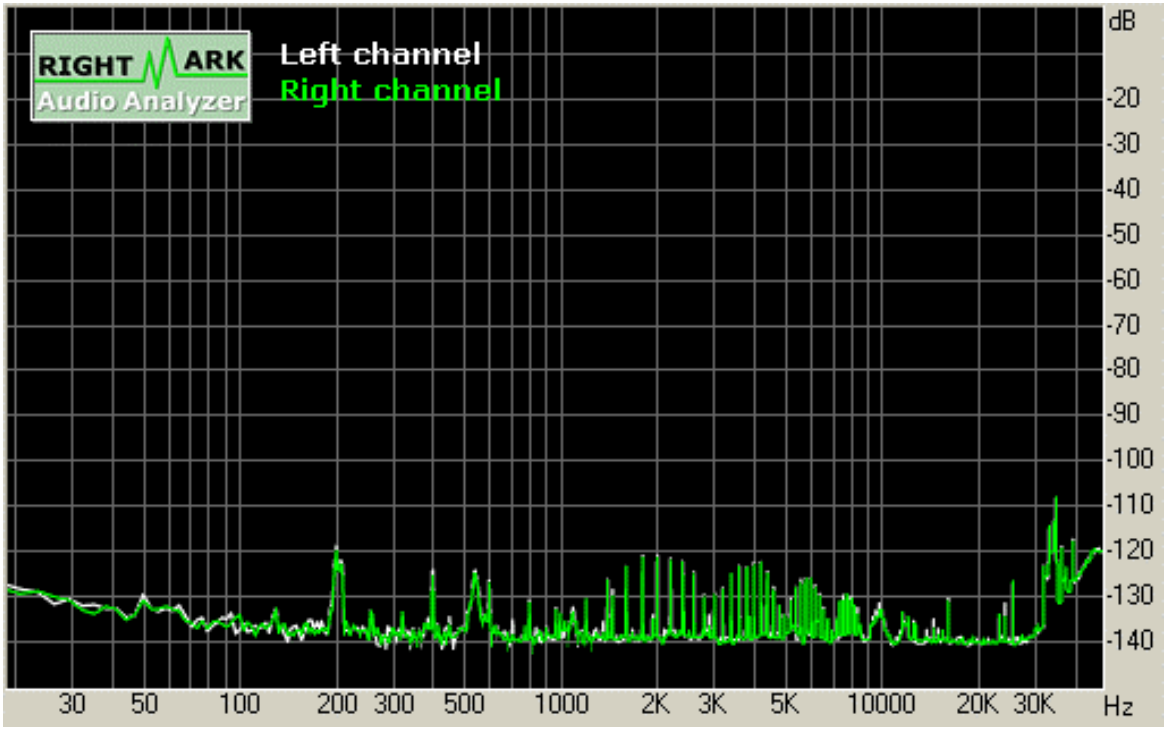
Full results for Sound Blaster Audigy 2 ZS Platinum Pro (Sampling mode: 24-bit, 96 kHz)

Frequency response



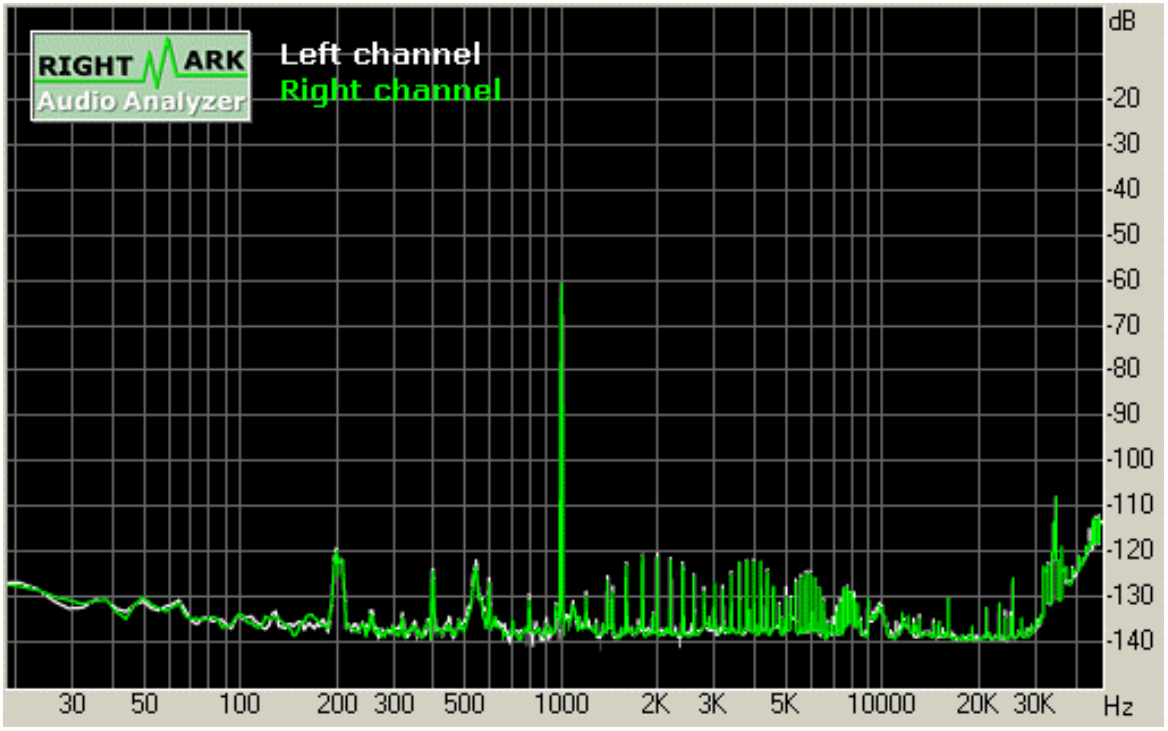
Frequency range	Response
From 20 Hz to 20 kHz, dB	-0.14, +0.01
From 40 Hz to 15 kHz, dB	-0.08, +0.01

Noise level



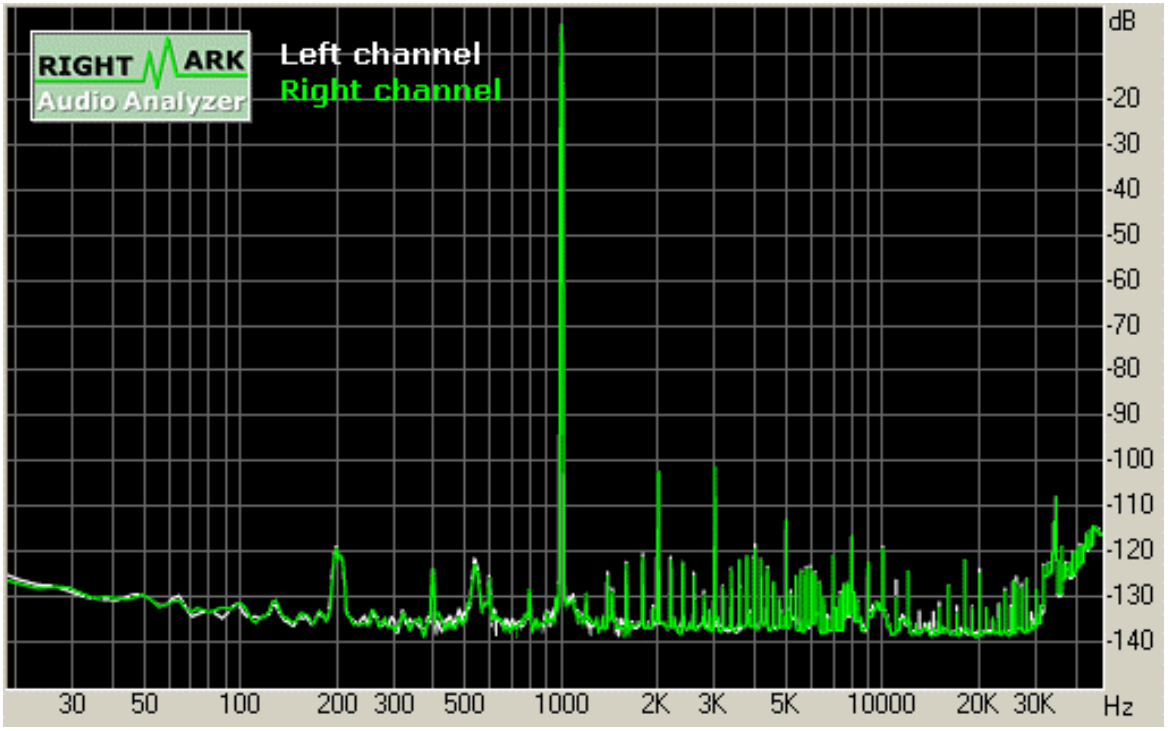
Parameter	Left	Right
RMS power, dB:	-91.1	-91.2
RMS power (A-weighted), dB:	-104.0	-104.3
Peak level, dB FS:	-75.9	-75.9
DC offset, %:	0.00	0.00

Dynamic range



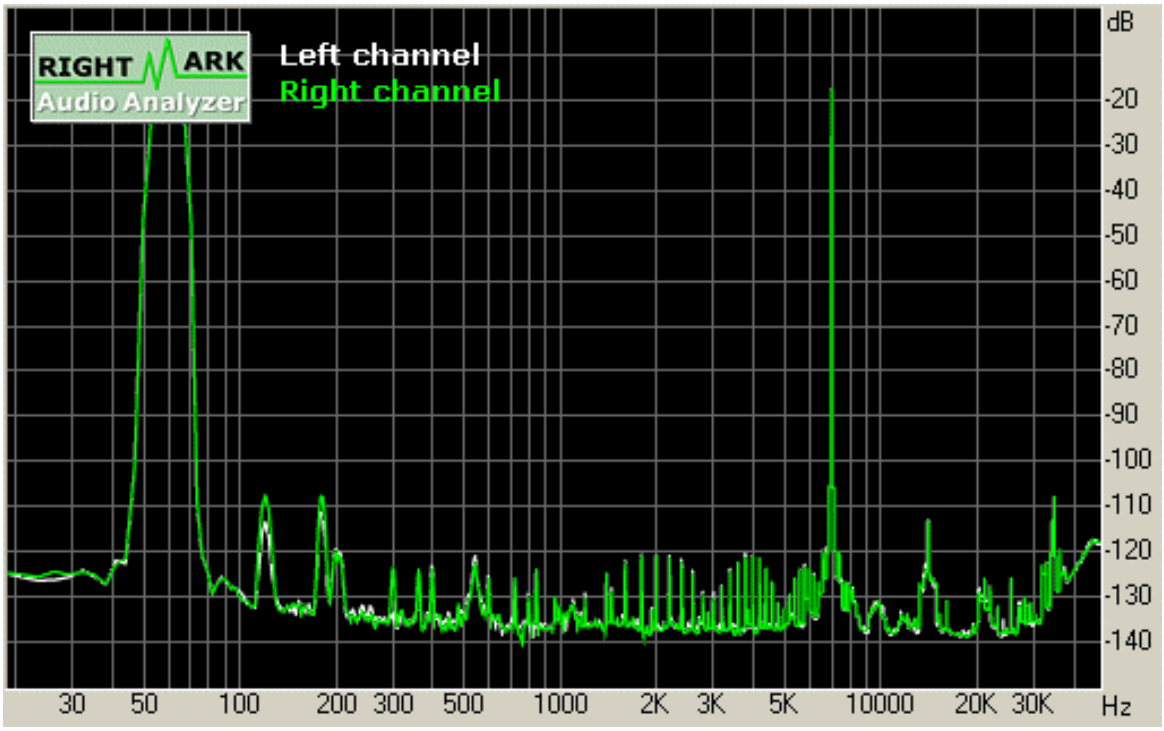
Parameter	Left	Right
Dynamic range, dB:	+91.4	+91.3
Dynamic range (A-weighted), dB:	+104.2	+104.3
DC offset, %:	-0.00	-0.00

THD + Noise (at -3 dB FS)



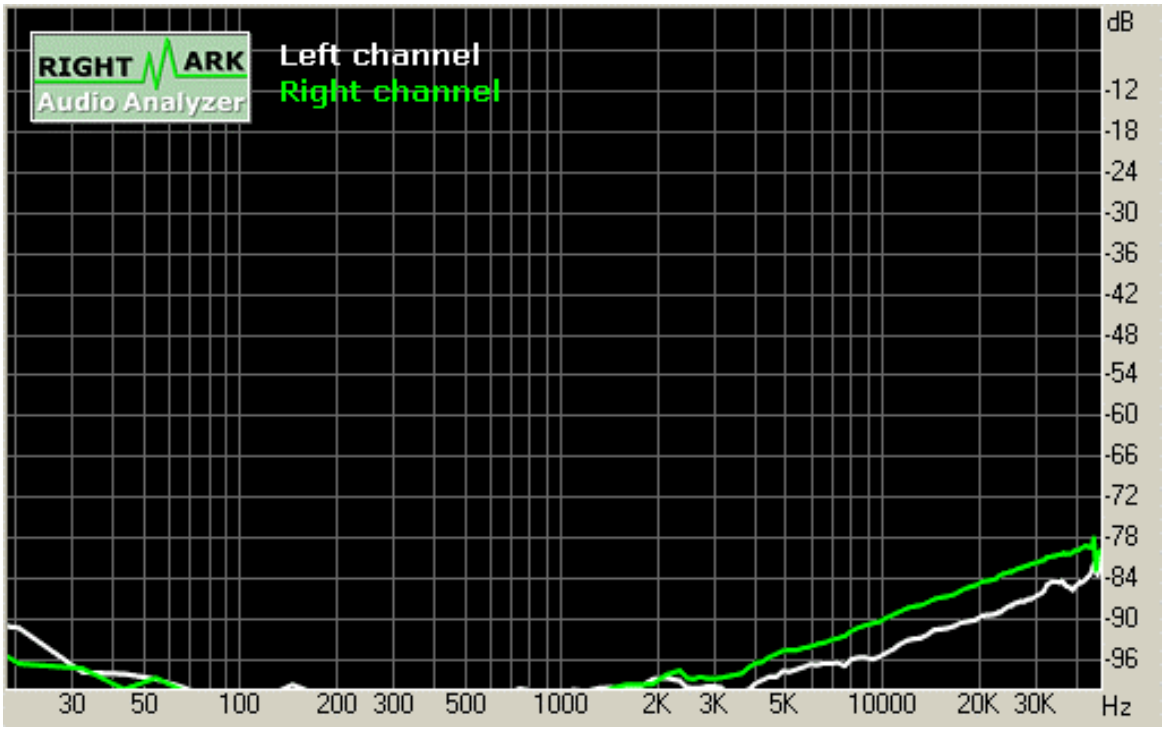
Parameter	Left	Right
THD, %:	0.002	0.002
THD + Noise, %:	0.006	0.006
THD + Noise (A-weighted), %:	0.002	0.003

Intermodulation distortion



Parameter	Left	Right
IMD + Noise, %:	0.007	0.007
IMD + Noise (A-weighted), %:	0.002	0.002

Stereo crosstalk

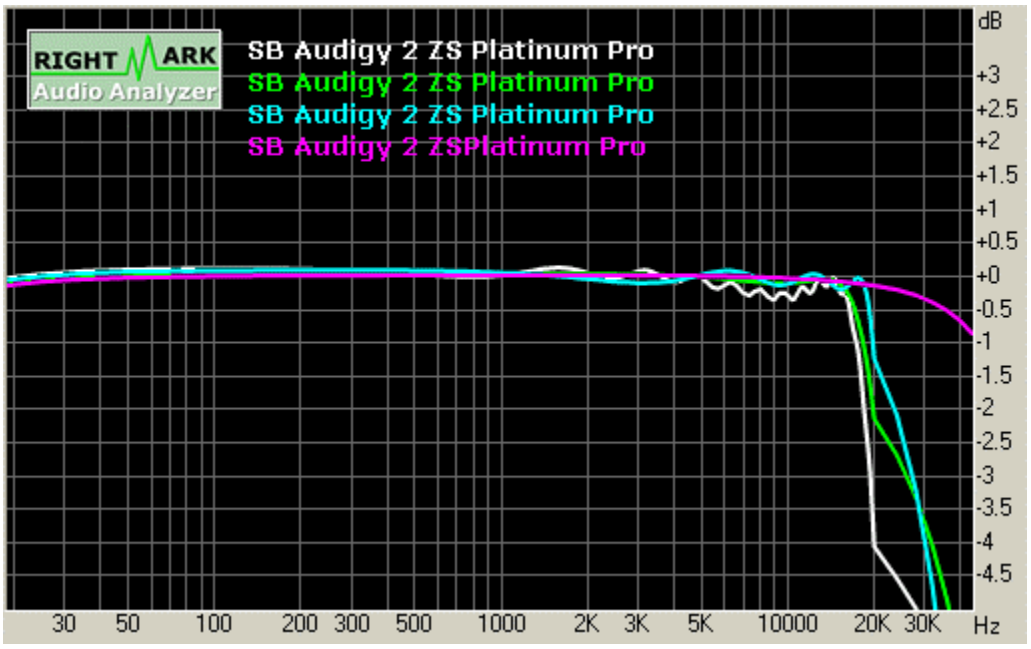


Parameter	L <- R	L -> R
Crosstalk at 100 Hz, dB:	-100	-101
Crosstalk at 1 kHz, dB:	-101	-102
Crosstalk at 10 kHz, dB:	-94	-89

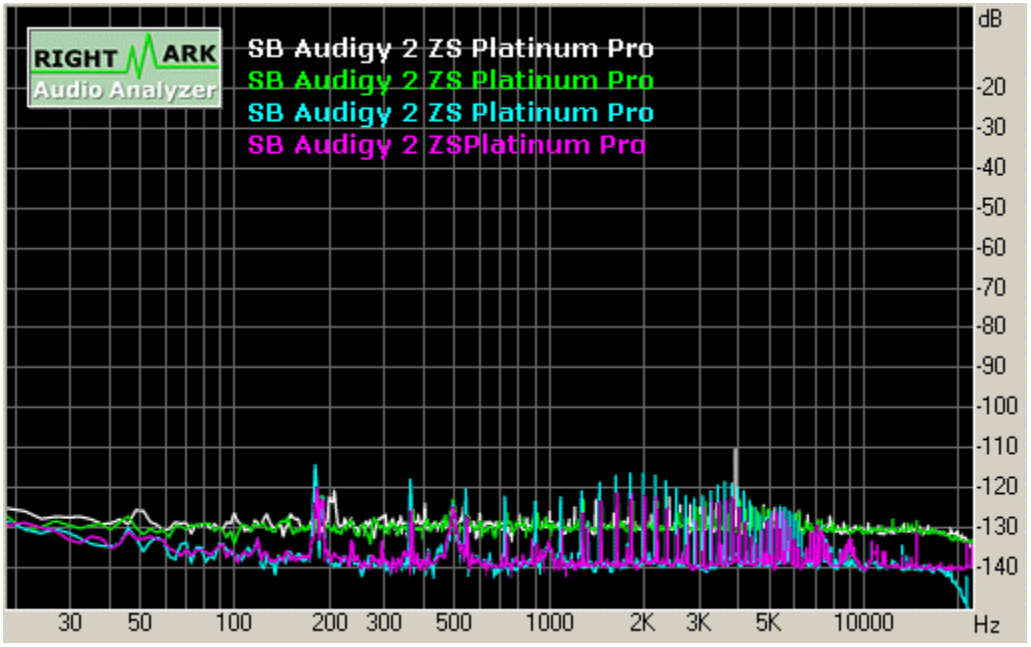
Comparison of:
Sound Blaster Audigy 2 ZS Platinum Pro @ 16-bit/44.1kHz, 16-bit/48kHz, 24-bit/48kHz and 24-bit/96 kHz

Test	SB Audigy 2 ZS [16/44.1]	SB Audigy 2 ZS [16/48]	SB Audigy 2 ZS [24/48]	SB Audigy 2 ZS [24/96]
Frequency response (from 40 Hz to 15 kHz), dB:	+0.13, -0.36	+0.03, -0.10	+0.09, -0.18	+0.01, -0.08
Noise level, dB (A):	-96.8	-97.6	-102.9	-104.3
Dynamic range, dB (A):	95.5	96.1	102.6	104.2
THD, %:	0.0029	0.0034	0.0016	0.0015
IMD, %:	0.0082	0.0070	0.0027	0.0070
Stereo crosstalk, dB:	-96.6	-96.2	-104.0	-103.2

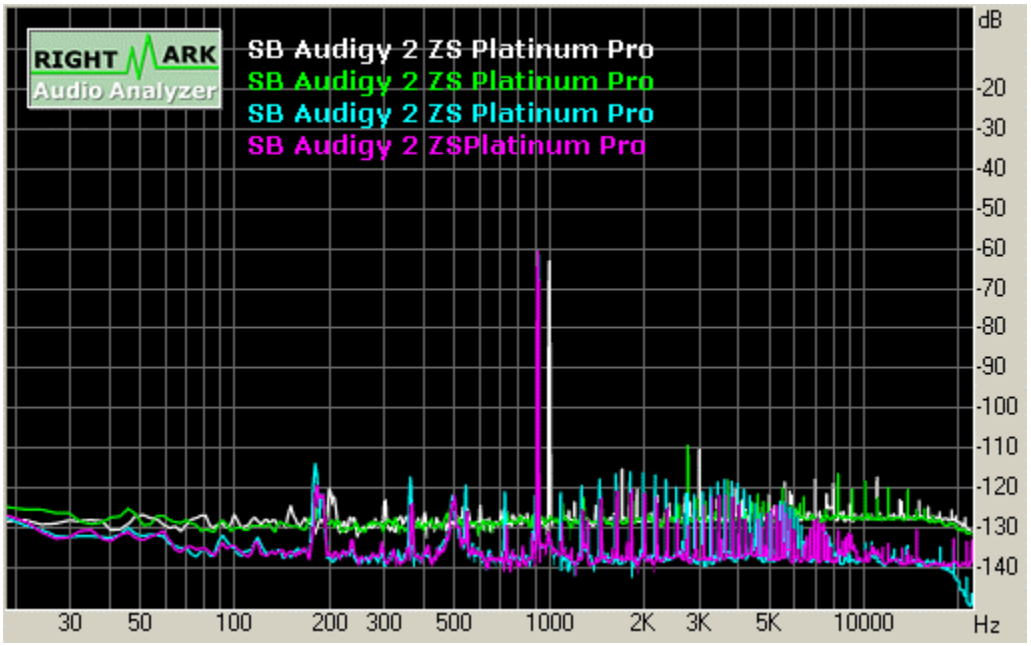
Frequency response



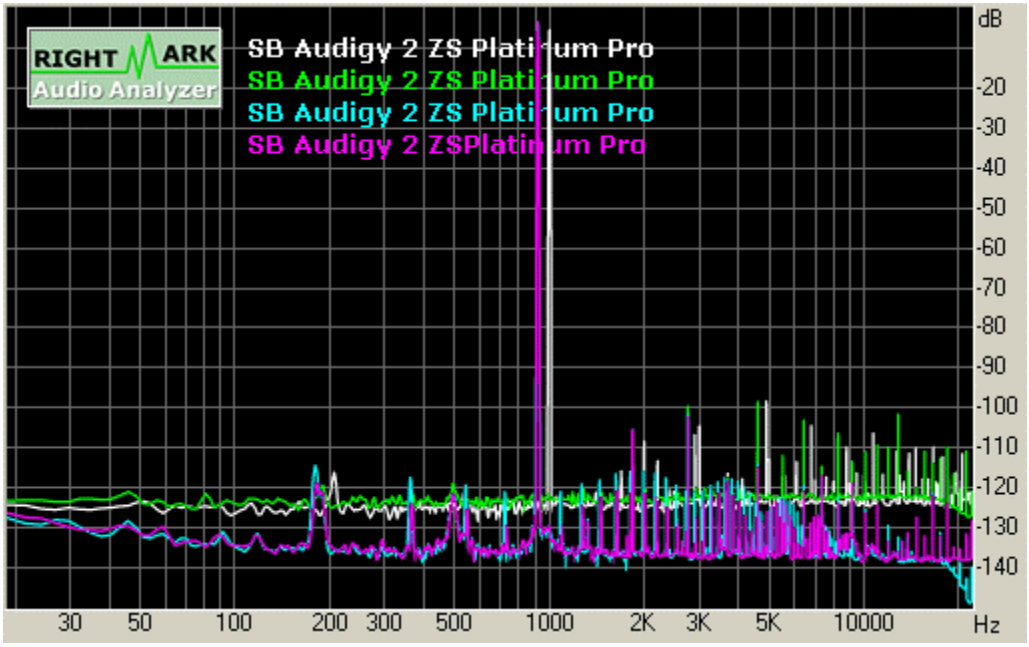
Noise level



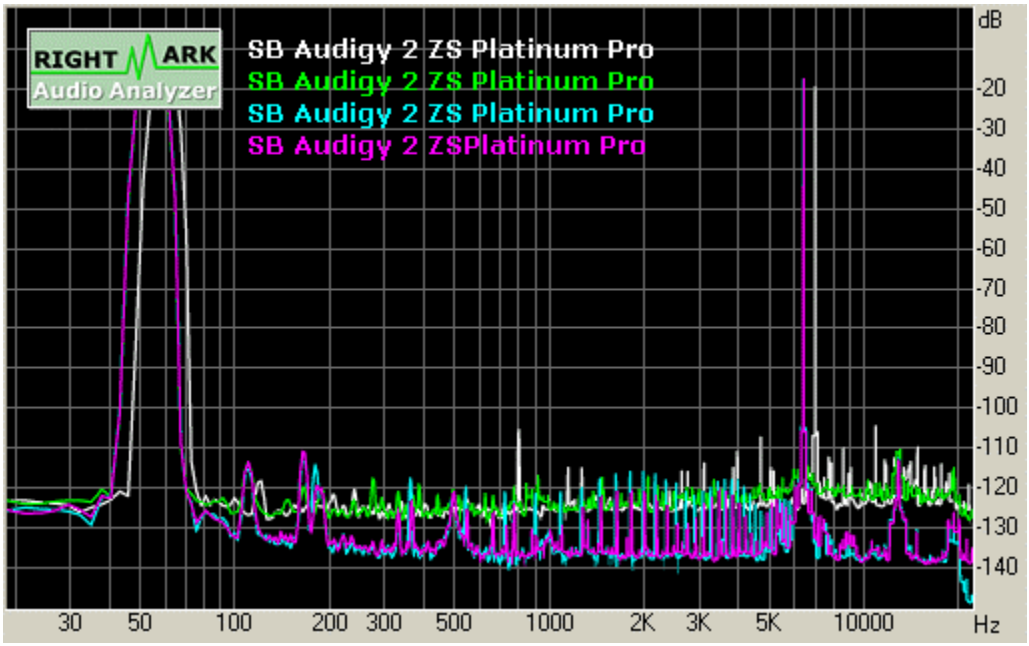
Dynamic range



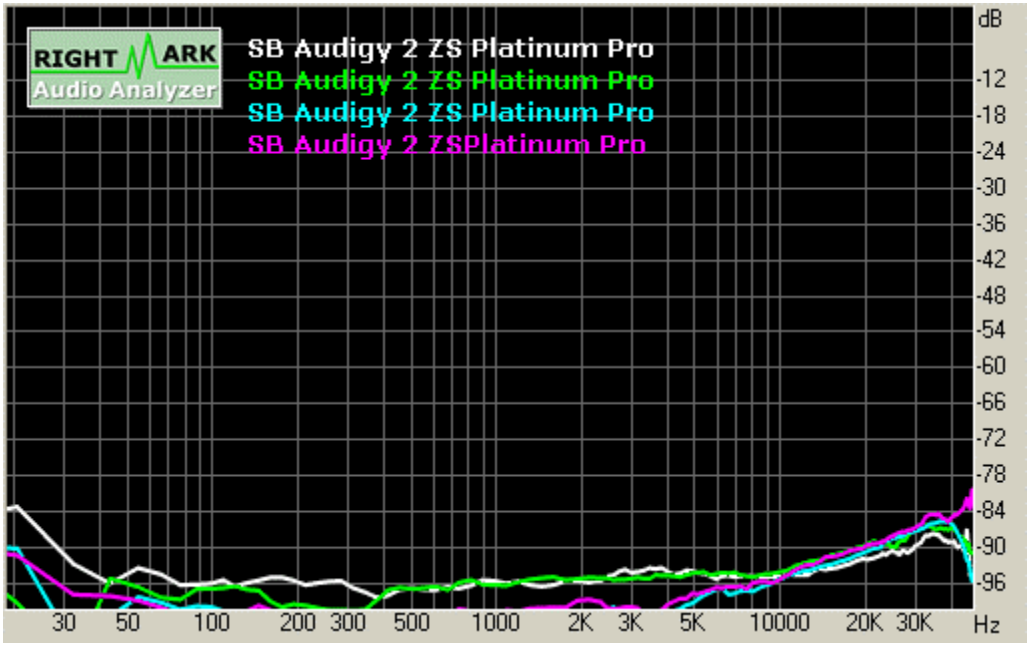
THD + Noise (at -3 dB FS)



Intermodulation distortion

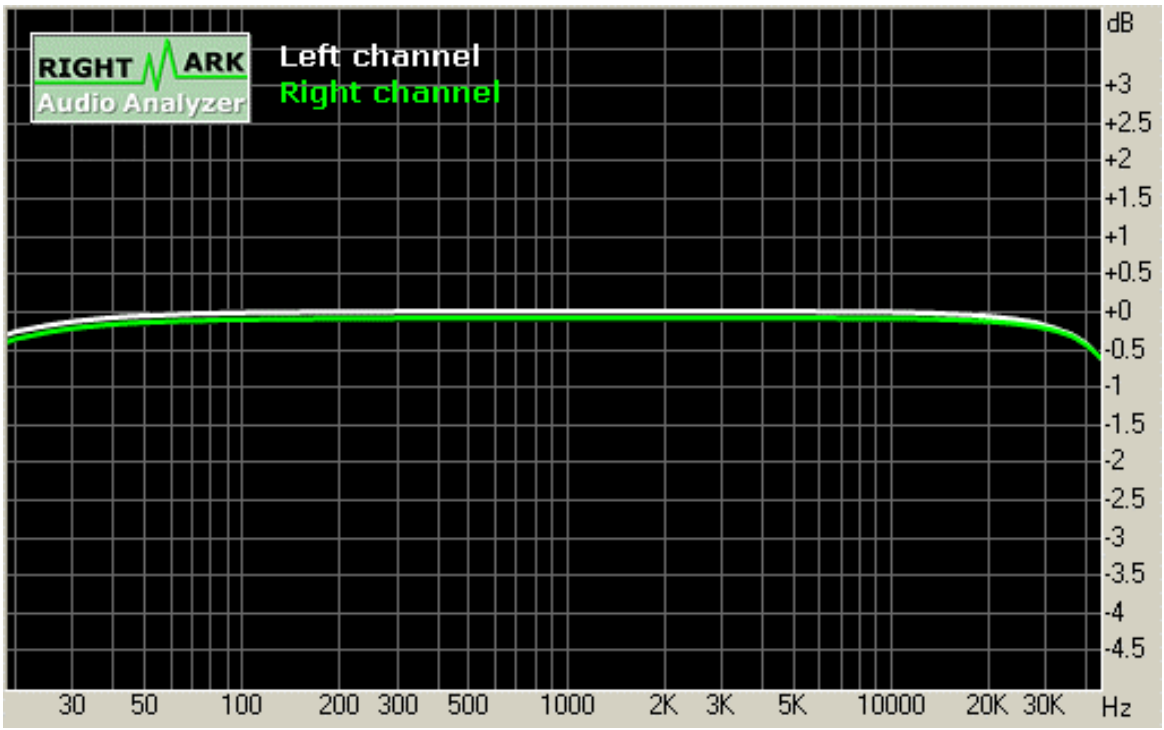


Stereo Crosstalk



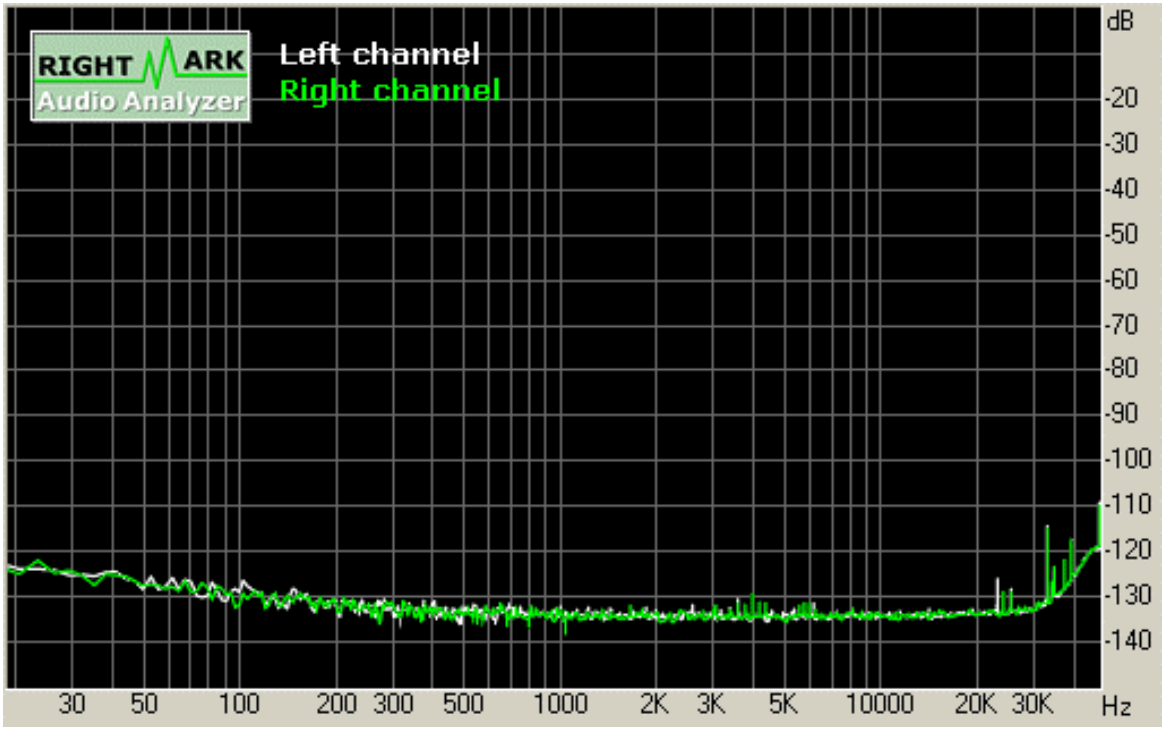
Full results for Sound Blaster Audigy 2 ZS / Audigy 2 ZS Platinum (Sampling mode: 24-bit, 96 kHz)

Frequency response



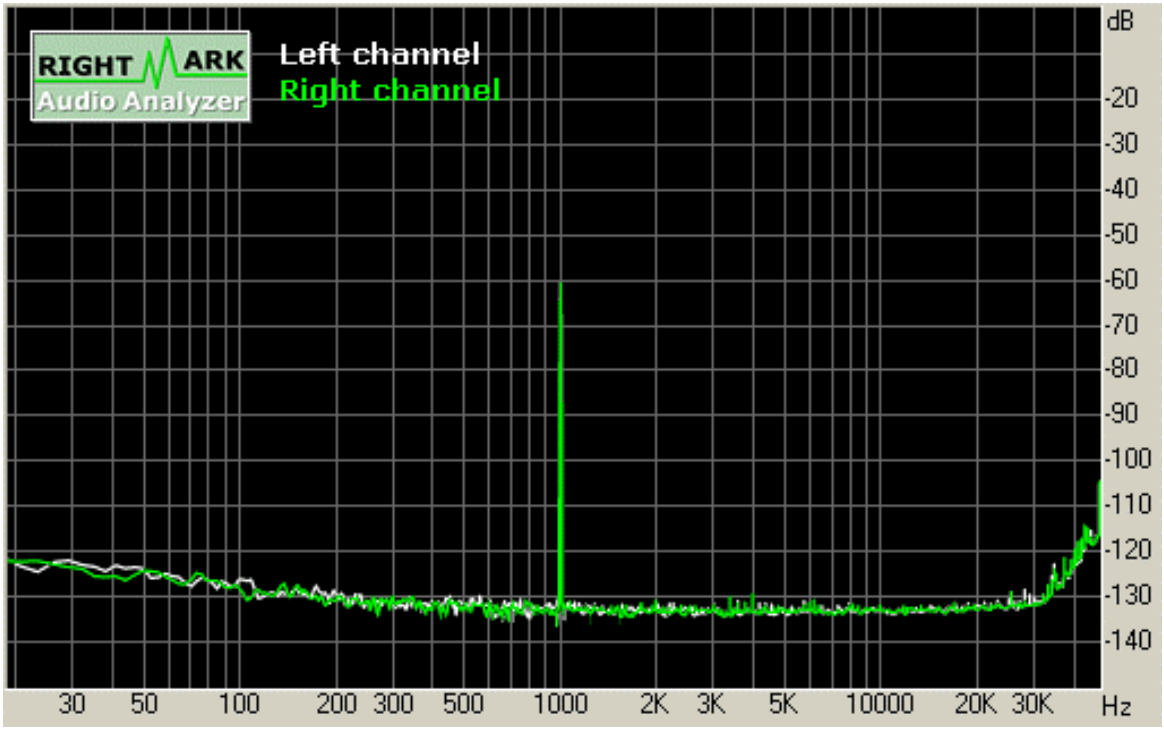
Frequency range	Response
From 20 Hz to 20 kHz, dB	-0.27, +0.01
From 40 Hz to 15 kHz, dB	-0.08, +0.01

Noise level



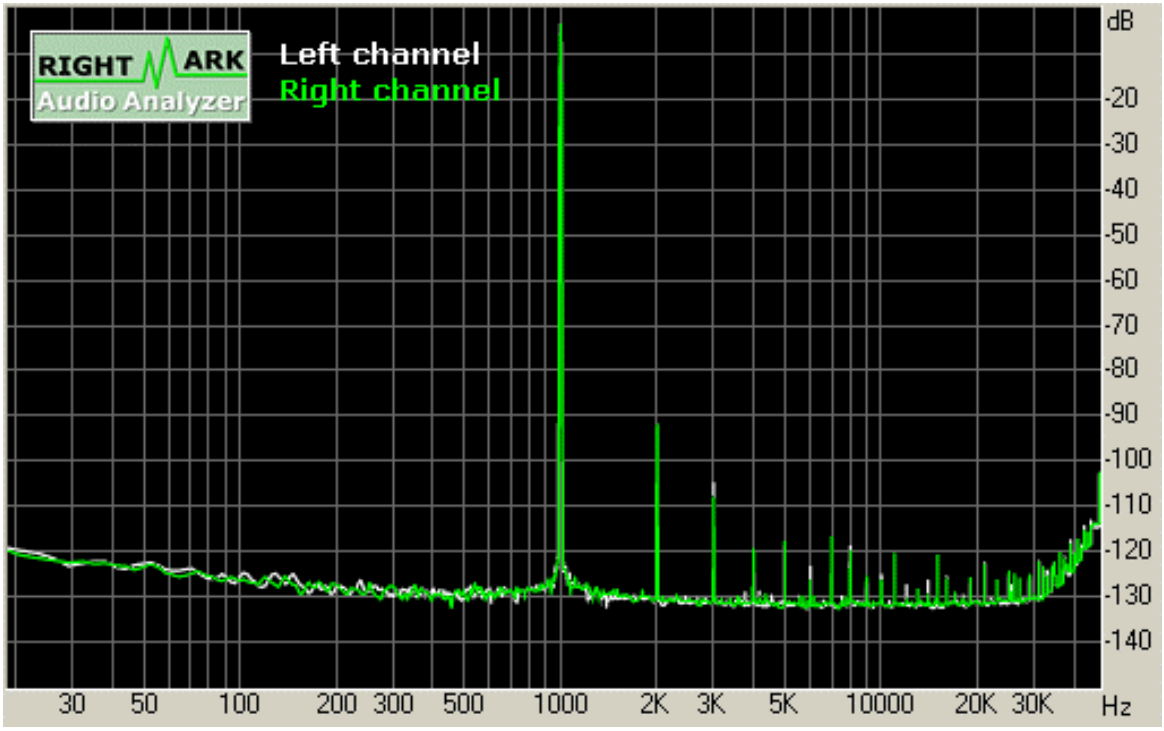
Parameter	Left	Right
RMS power, dB:	-90.3	-90.3
RMS power (A-weighted), dB:	-101.3	-101.3
Peak level, dB FS:	-77.1	-77.1
DC offset, %:	0.00	0.00

Dynamic range



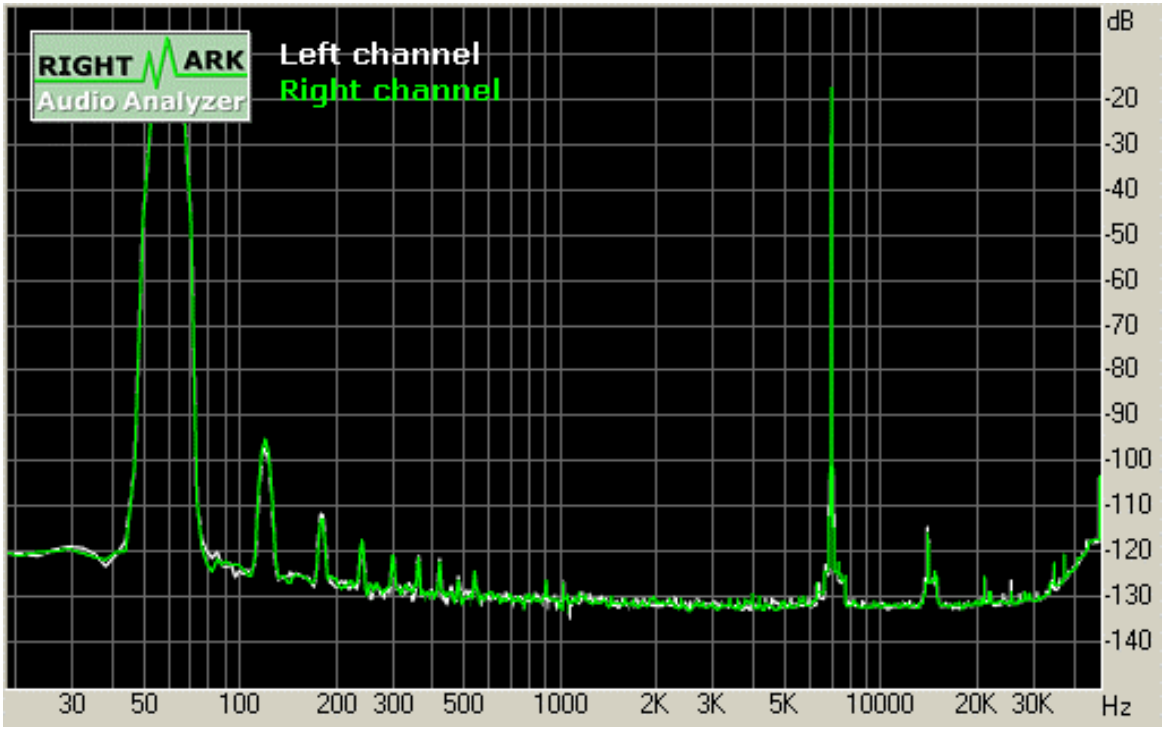
Parameter	Left	Right
Dynamic range, dB:	+90.5	+90.5
Dynamic range (A-weighted), dB:	+101.3	+101.5
DC offset, %:	0.00	0.00

THD + Noise (at -3 dB FS)



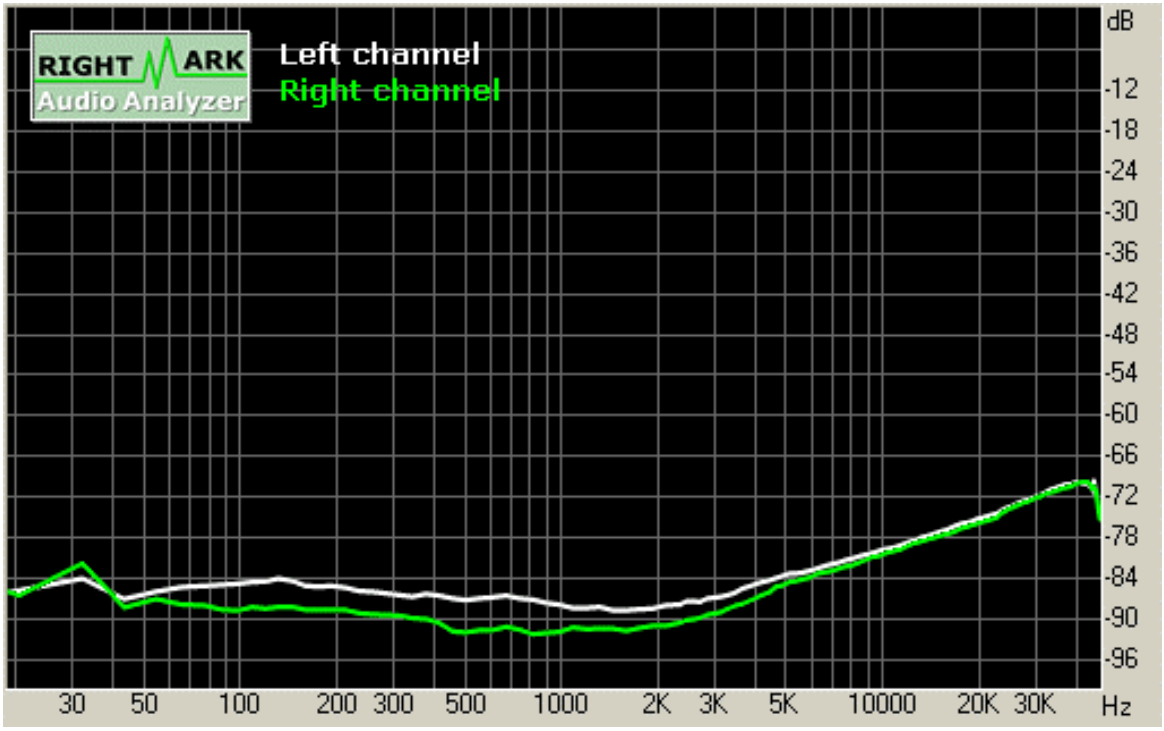
Parameter	Left	Right
THD, %:	0.003	0.004
THD + Noise, %:	0.007	0.007
THD + Noise (A-weighted), %:	0.005	0.005

Intermodulation distortion



Parameter	Left	Right
IMD + Noise, %:	0.008	0.008
IMD + Noise (A-weighted), %:	0.003	0.003

Stereo Crosstalk

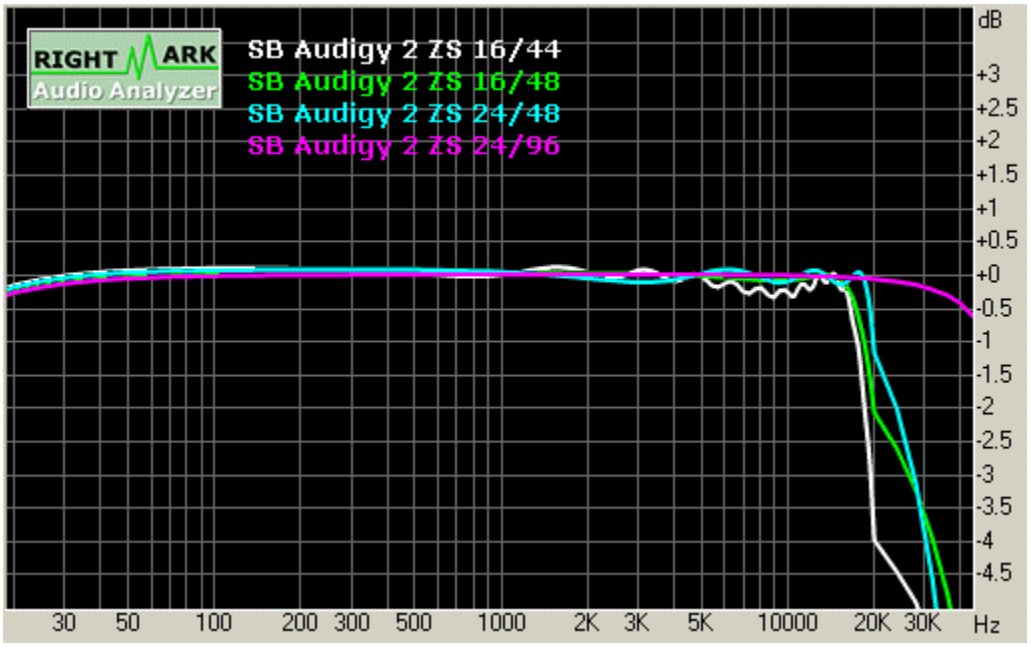


Parameter	L <- R	L -> R
Crosstalk at 100 Hz, dB:	-84	-88
Crosstalk at 1 kHz, dB:	-87	-91
Crosstalk at 10 kHz, dB:	-79	-79

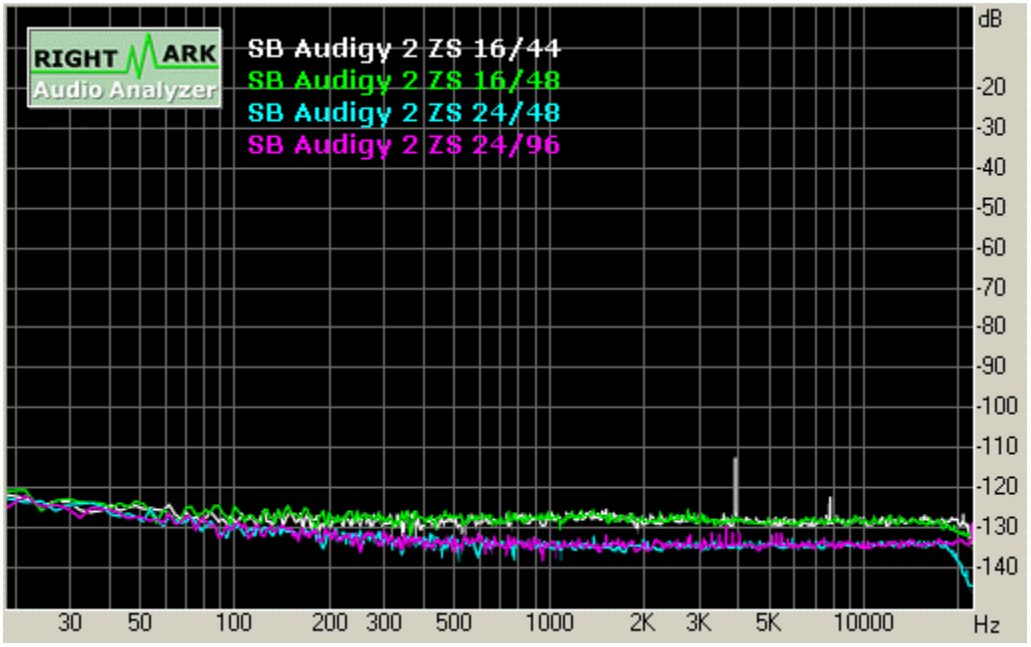
Comparison of:
Sound Blaster Audigy 2 ZS / Audigy 2 ZS Platinum @ 16-bit/44.1kHz, 16-bit/48kHz, 24-bit/48kHz and 24-bit/96 kHz

Test	SB Audigy 2 ZS [16/44.1]	SB Audigy 2 ZS [16/48]	SB Audigy 2 ZS [24/48]	SB Audigy 2 ZS [24/96]
Frequency response (from 40 Hz to 15 kHz), dB:	+0.12, -0.34	+0.03, -0.08	+0.09, -0.13	+0.01, -0.08
Noise level, dB (A):	-95.4	-95.5	-101.9	-101.3
Dynamic range, dB (A):	94.5	94.8	101.4	101.3
THD, %:	0.0044	0.0057	0.0034	0.0034
IMD, %:	0.0088	0.0081	0.0043	0.0080
Stereo crosstalk, dB:	-92.6	-90.4	-91.0	-91.8

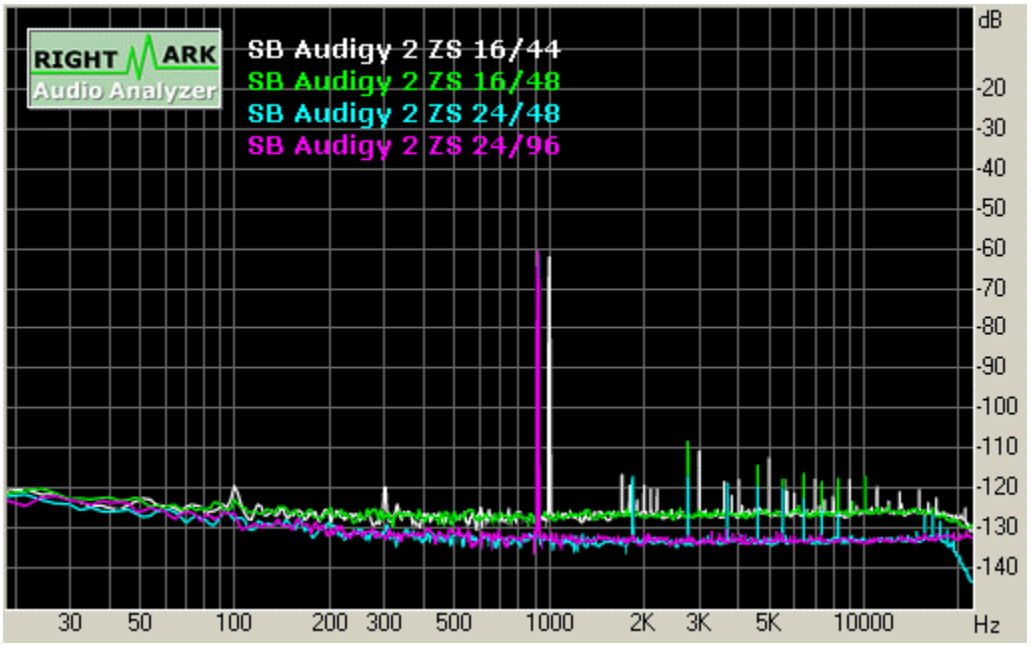
Frequency response



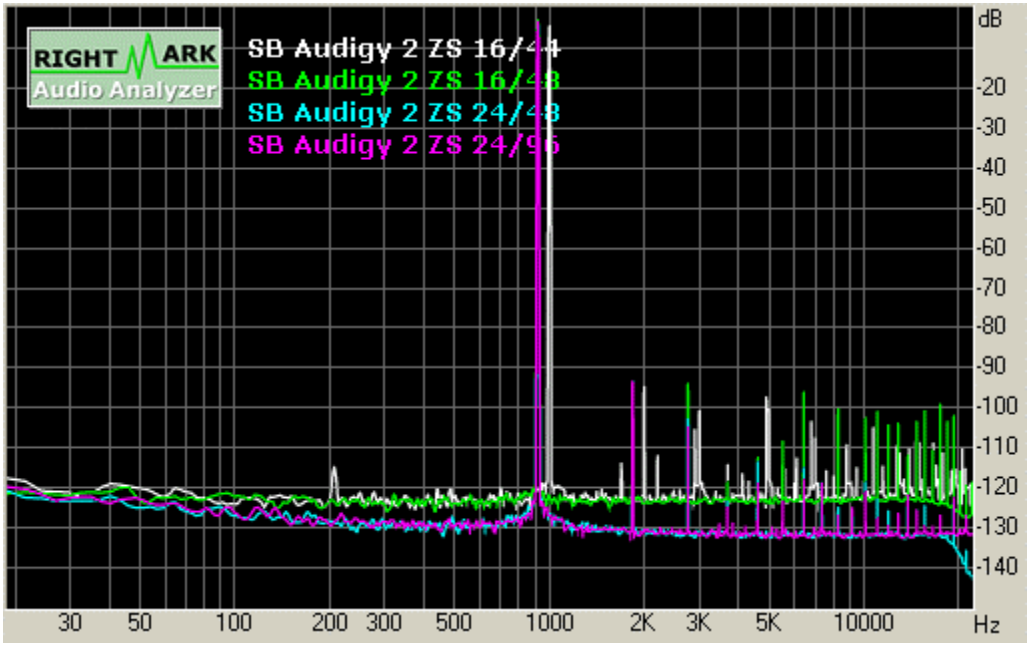
Noise level



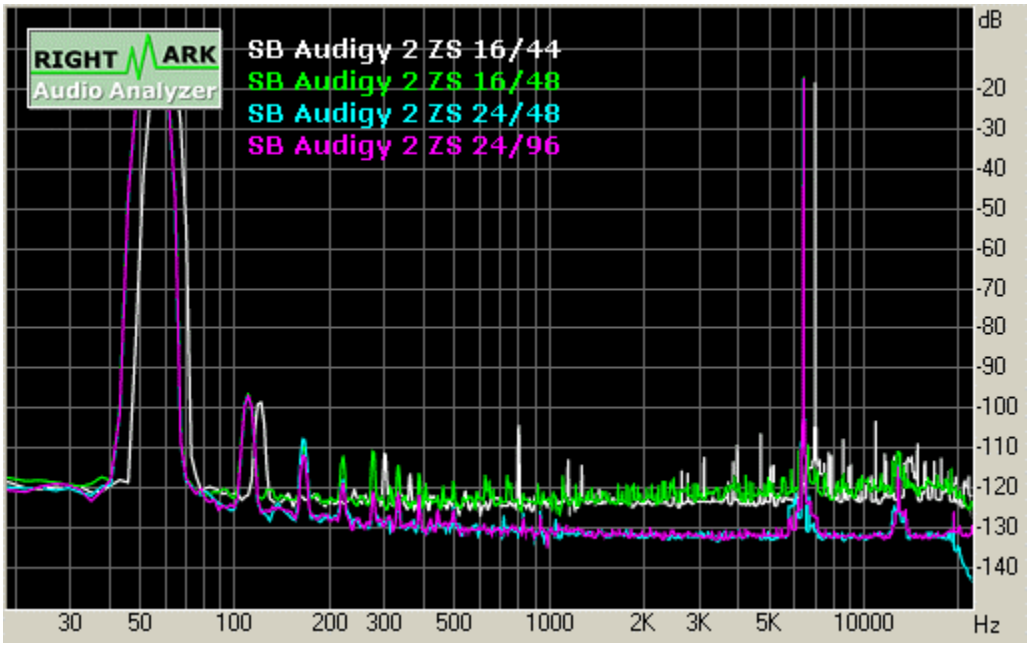
Dynamic range



THD + Noise (at -3 dB FS)



Intermodulation distortion



Stereo Crosstalk