Xonar D2

7.1 Channel Audio Card

192KHz/24Bit DuplexHD™

Featuring Dolby® and DTS® Technologies for Home Entertainment

RMAA 6.0.5 Test Guide and Results

Revision: 1.1
Date: Aug. 10, 2007

The Xonar D2 driver CD includes RightMark Audio Analyzer (RMAA) v.5.6, popular software intended for testing the quality of audio equipment, be it a sound card, portable MP3 player, consumer CD/DVD player, or a speaker system. However, the latest RightMark Audio Analyzer v6.0.5 is available now. This document describes the test guideline with RMAA v6.0.5 and the complete test results by updated Xonar D2 driver package (8.17.20 or later), which improves RMAA MME test quality inherently limited by Windows to faithfully present Xonar D2's hardware quality. The measurements are conducted by playing and recording test signals, and using frequency analysis algorithms. The following provides a step-by-step loop-back test guide for your Xonar D2 audio card.

1. Setting Up Xonar D2 Audio Card

Open the Xonar D2 Audio Center. Use the settings below:

1. Select the sample rate you will be using with RMAA test (here we set 48KHz for testing 48KHz/24bit signals).
2. Set analog output to 2-speaker mode (to get rid of any channel processing over RMAA stereo signals in the driver)
3. Turn off all sound effects including Dolby, DTS, 7.1 speaker shifter, EQ, Environment, etc. A quick way to do so is to enable the "Hi-Fi mode" button in the Audio Center.

4. Go to the Mixer Recording page and select “ALT” as the recording source. Click “Reset” to make sure the recording volume is on the default highest level (0dB). This is actually a high-quality onboard loop-back path from the Line-out directly to the Line-In. This allows you to get realistic output and input quality ratings for the Xonar D2 audio card.

Note: You may also choose to use an external 3.5mm line cable as follows (as short as possible) to connect the Front-Out jack to the Line-In jack for loop-back testing. In that case, please select “Line In” as the recording source on the mixer page. However, this external cable may cause unexpected performance drop depending on its cable quality.

5. Click “Reset” on the playback volume mixer page to keep the volume setting on default.

6. Turn the master volume to the MAX level (0dB)

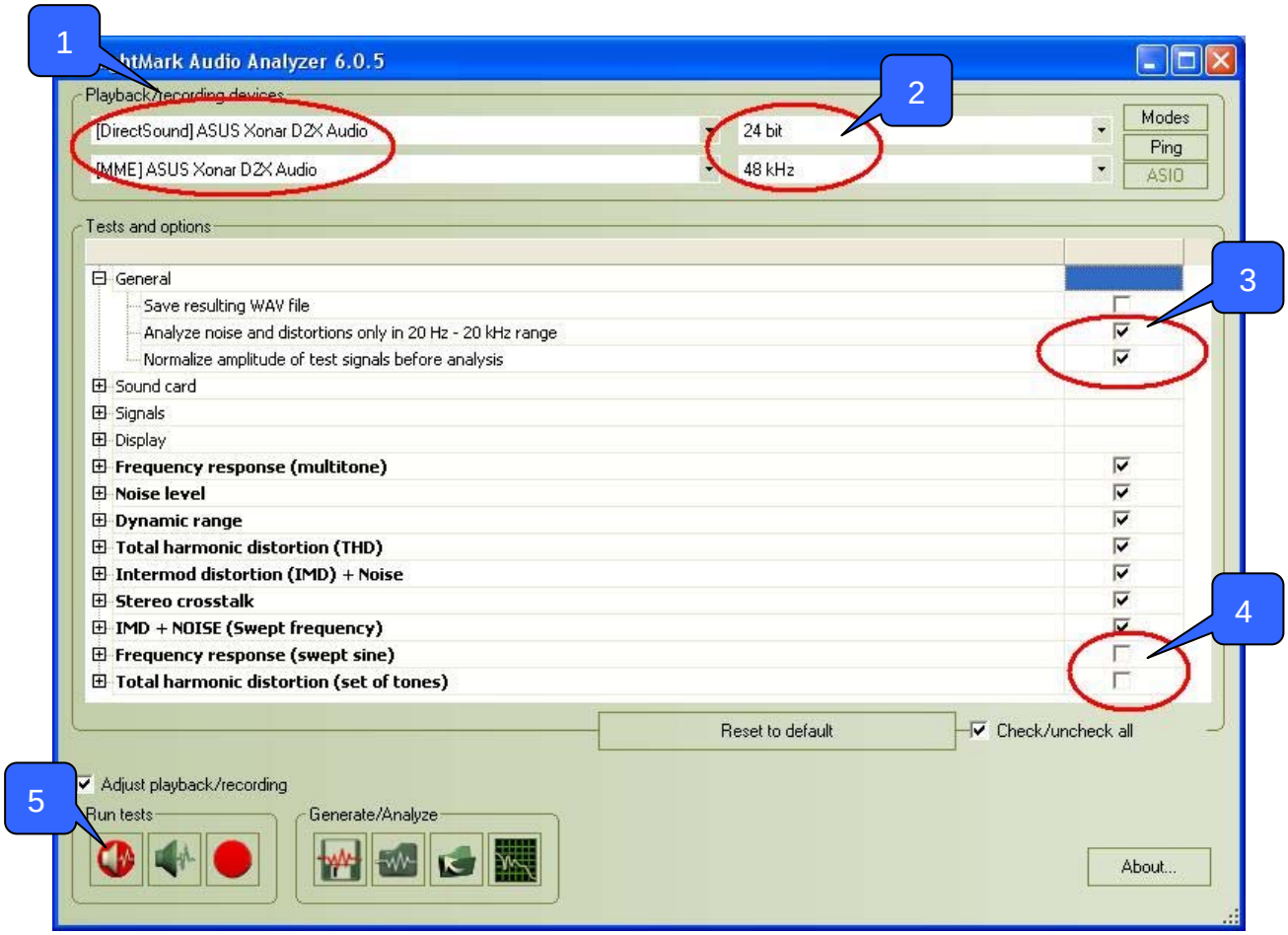
2. Configuration and Test with RMAA

Start RMAA and follow the setup procedure below.

1. Select the playback device as “[DirectSound]ASUS Xonar D2 Audio” (or [MME] ASUS Xonar D2 Audio) and recording device as “[MME] ASUS Xonar D2 Audio”. (Please also mind that NOT to select “ASUS Xonar D2 Audio Converter”, which is for ALT and PMP purpose.)

2. Select 24bit and 48KHz for the test signals. (If you change the format here, please remember to go back to set the SAME sample rate output in the Xonar D2 Audio Center. Please mind that Xonar D2 currently supports 44.1K, 48K, 96K, and 192KHz. 88.2K, 176.2KHz, and 32bit(float) tests are not supported.)

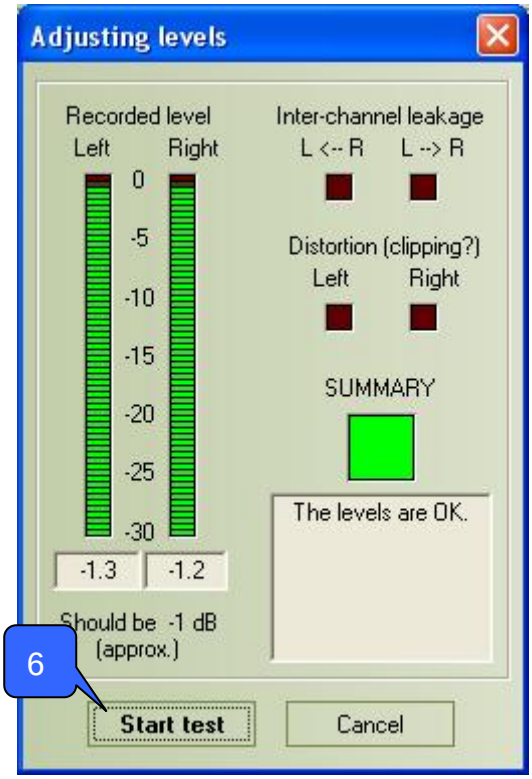
3. Click the General test options in RMAA and make sure "Analyze noise and distortion only in 20Hz-20KHz range" (audio in-band for human hearing) is selected.



4. It's recommended by RMAA to ignore the two tests: "Frequency response (swept sine)" and "Total harmonic distortion (set of tones)", which are for speaker test primarily.

5. Click loop-back playback/record test button  .

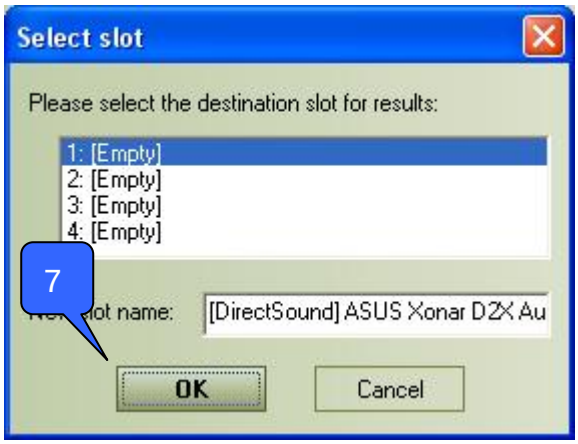
6. Check that the Adjusting level window shows that the levels are OK (the level meter will be green). Begin the test by clicking the "Start test" button.



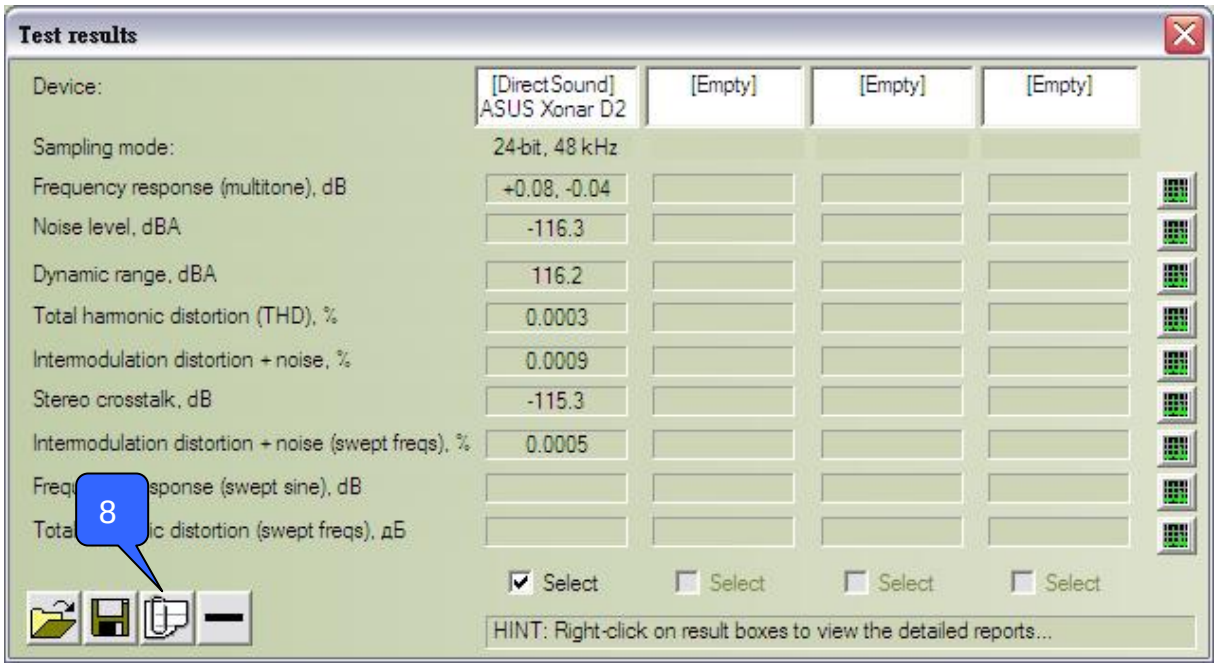
If the recording volume level is not high enough, please check and make the WAVE and Master Volume have been at the maximum level; Instead, if the recording volume level is too high, please lower the WAVE and Master volumes gradually until the level is ok. If you cannot get the level to be “OK” after the previous step, click “Start test” to try anyway.

After starting test, there will be a pop-up progressing bar and please wait a few seconds.

7. Select one empty slot to save the data and you may change the name. Then click “OK”.



8. RMAA will pop up the Test results window. You can click the “Select” checkbox and click  to “Make html report”.

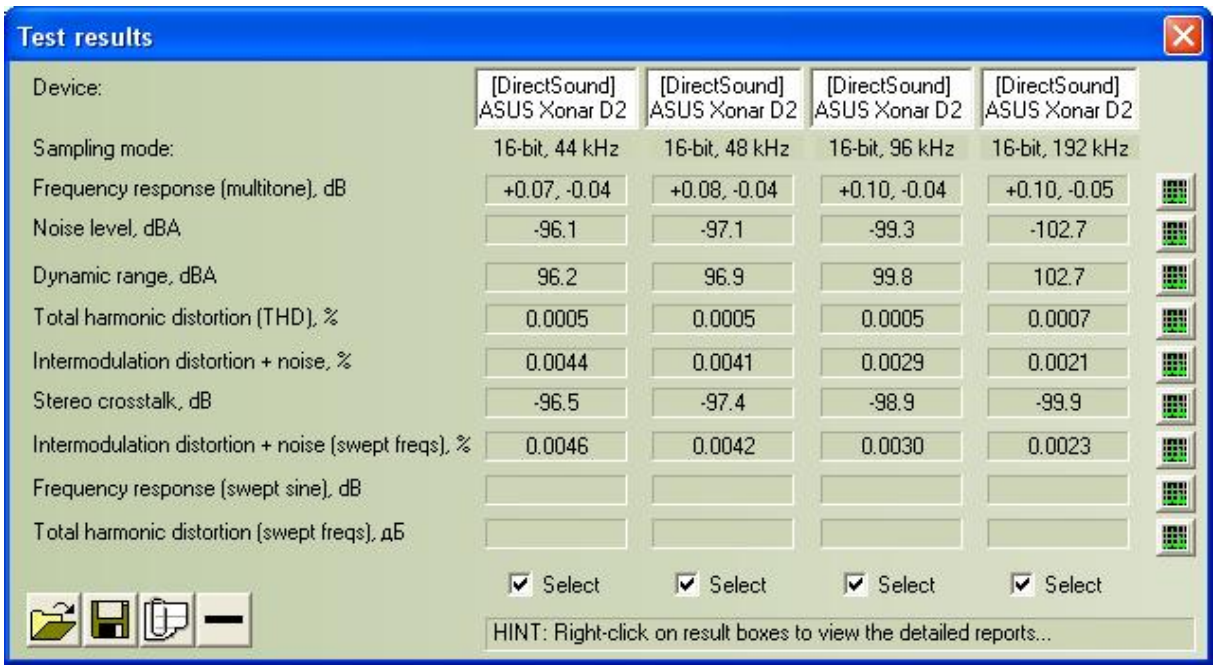


9. Check and key in the report name/options as follows and then click “OK”.

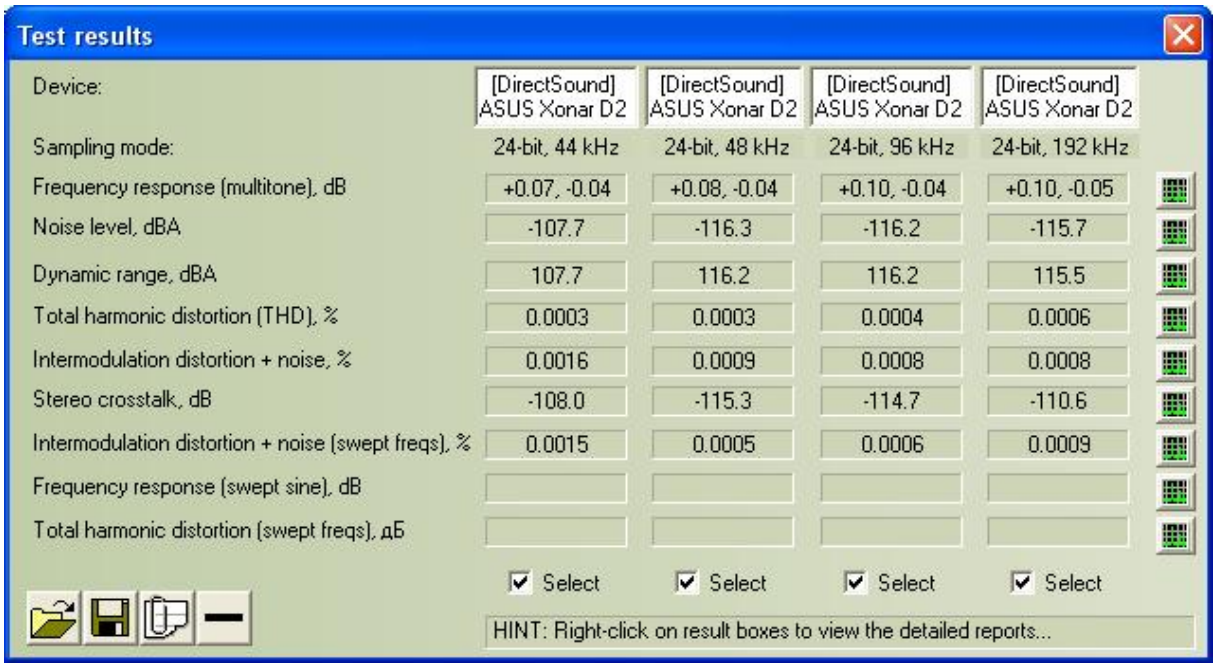
3. RMAA Testing Results

The following tables copied from RMAA disclosed the complete test data results for DirectSound_16bit, DirectSound_24bit, MME_16bit, and MME_24bit. Each table contains 44.1K, 48K, 96K, and 192 KHz sample rate tests. Generally speaking, Xonar D2 can achieve up to 116dB SNR for 24-bit and up to 102dB SNR for 16bit in RMAA loop-back test. Most important, all results can get “Excellent” general performance credits. (Please note that though Xonar D2 has good anti-noise design, the test results may have slight deviation on different PC platforms due to the various levels of system noise interferences and distortion, especially for 24-bit 116dB-high sensitive quality.)

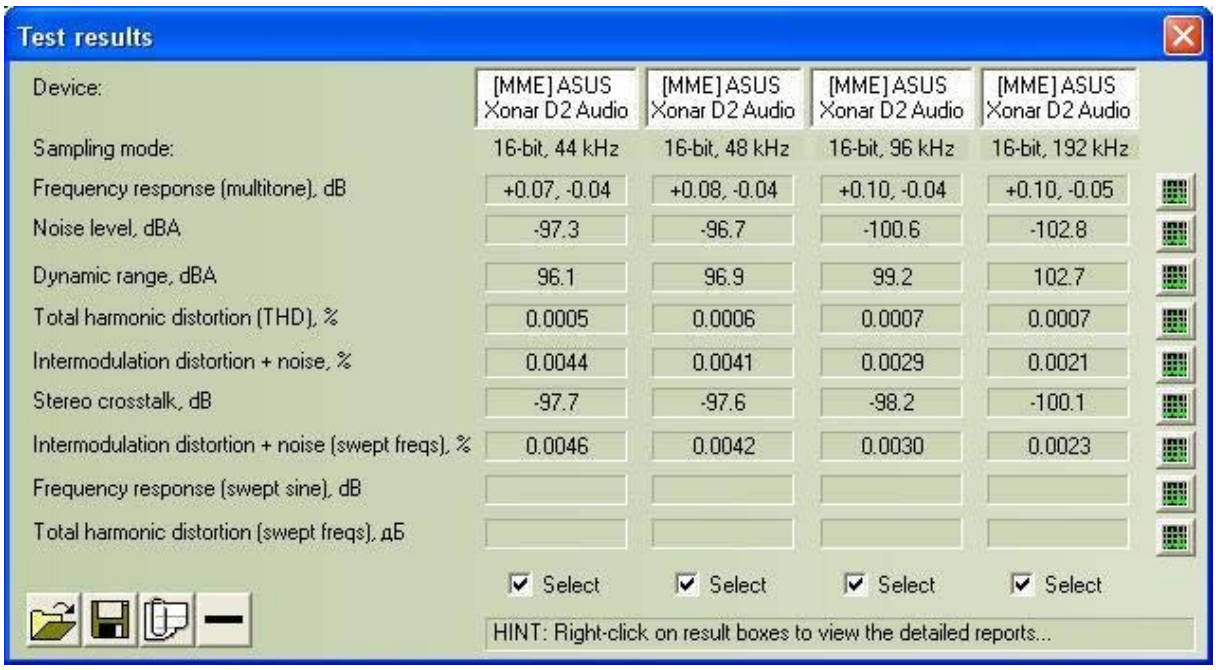
DirectSound 16-Bit Test Results



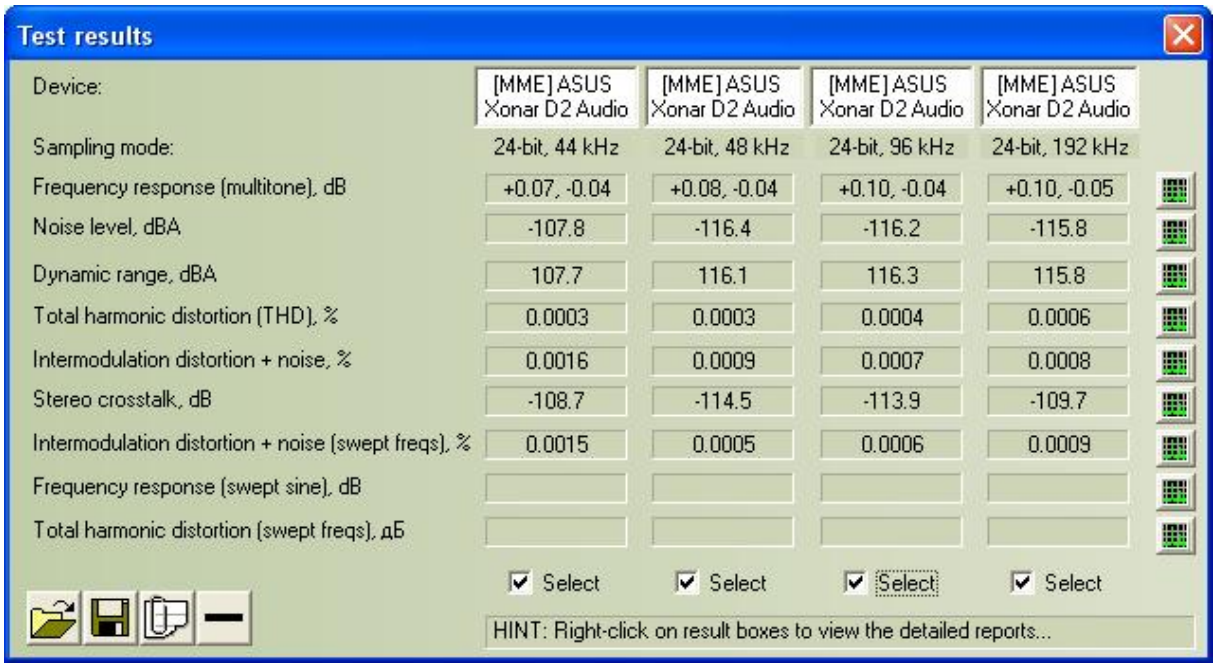
DirectSound 24-Bit Test Results



MME 16-Bit Test Results



MME 24-Bit Test Results



4. HTML Test Reports

You can review the HTML report including the graphics for the test plots. Open the html file you created and saved in the test above (section 2), and it will display the report with both data and plots in your browser. The following report is an example and you can see how high-fidelity and crystal-clean the Xonar D2 audio card is for both output and input (one of the world's finest sound cards, it has even higher quality than most CE devices.) You can also try testing the performance for other sample rates and bit-depths with the same procedure.

RightMark Audio Analyzer test report

Testing device	ASUS Xonar D2 Audio
Sampling mode	24-bit, 48 kHz
Interface	DirectSound
Testing chain	External loopback (line-out - line-in)
RMAA Version	6.0.5

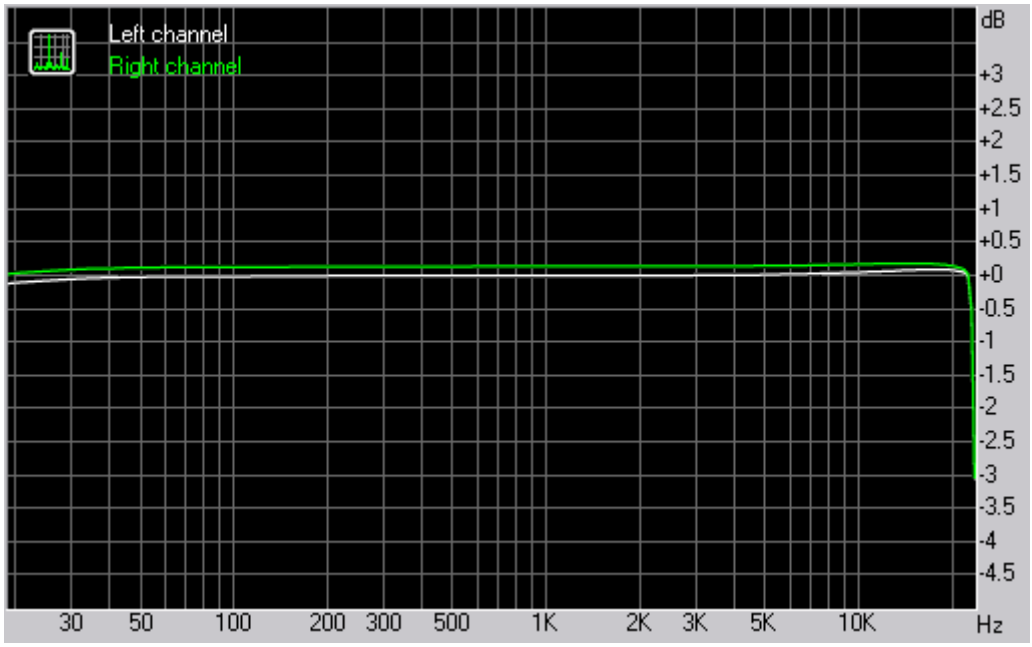
20 Hz - 20 kHz filter	ON
Normalize amplitude	ON
Mono mode	OFF
Calibration singal, Hz	1000
Polarity	inverted/correct

Summary

Frequency response (from 40 Hz to 15 kHz), dB	+0.08, -0.04	Excellent
Noise level, dB (A)	-116.3	Excellent
Dynamic range, dB (A)	116.2	Excellent
THD, %	0.0003	Excellent
THD + Noise, dB (A)	-105.0	Excellent
IMD + Noise, %	0.0009	Excellent
Stereo crosstalk, dB	-115.3	Excellent

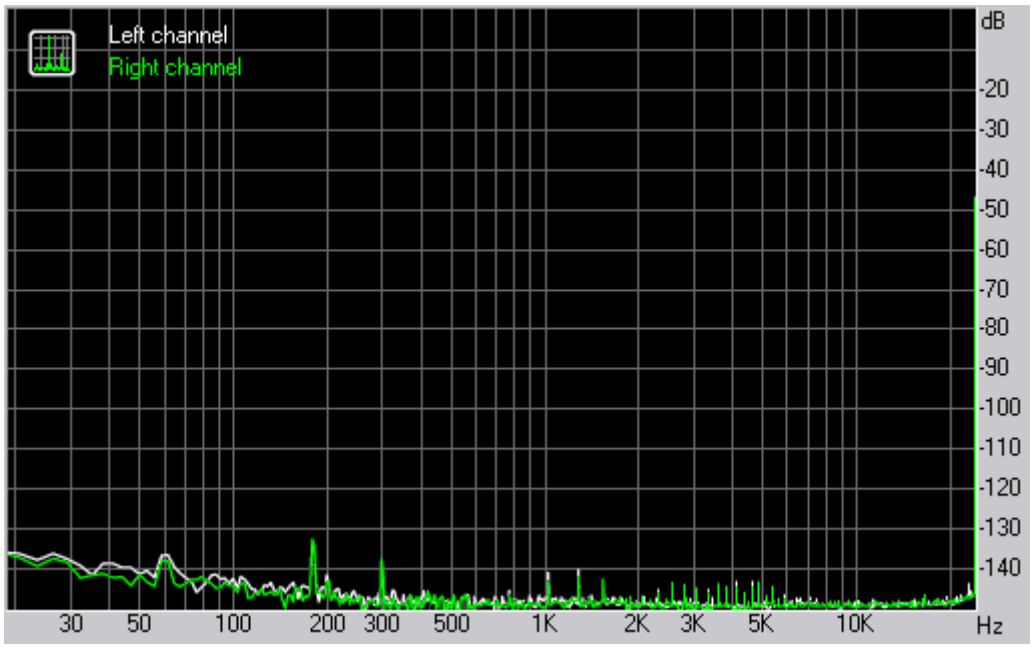
IMD at 10 kHz, %	0.0005	Excellent
General performance		**Excellent**

Frequency response



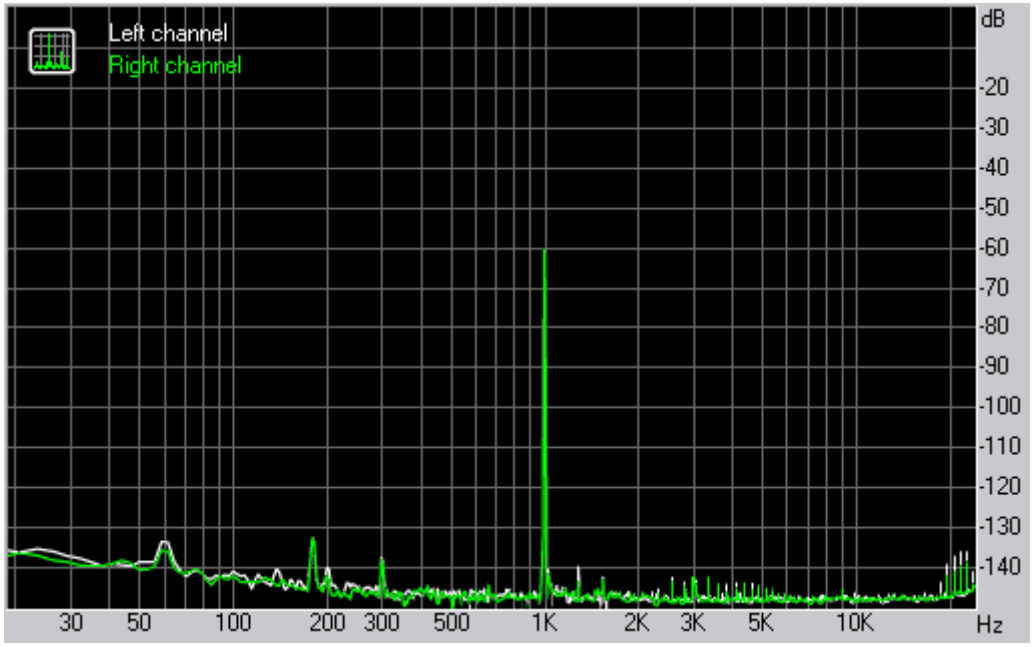
From 20 Hz to 20 kHz, dB	-0.11, +0.09
From 40 Hz to 15 kHz, dB	-0.04, +0.08

Noise level



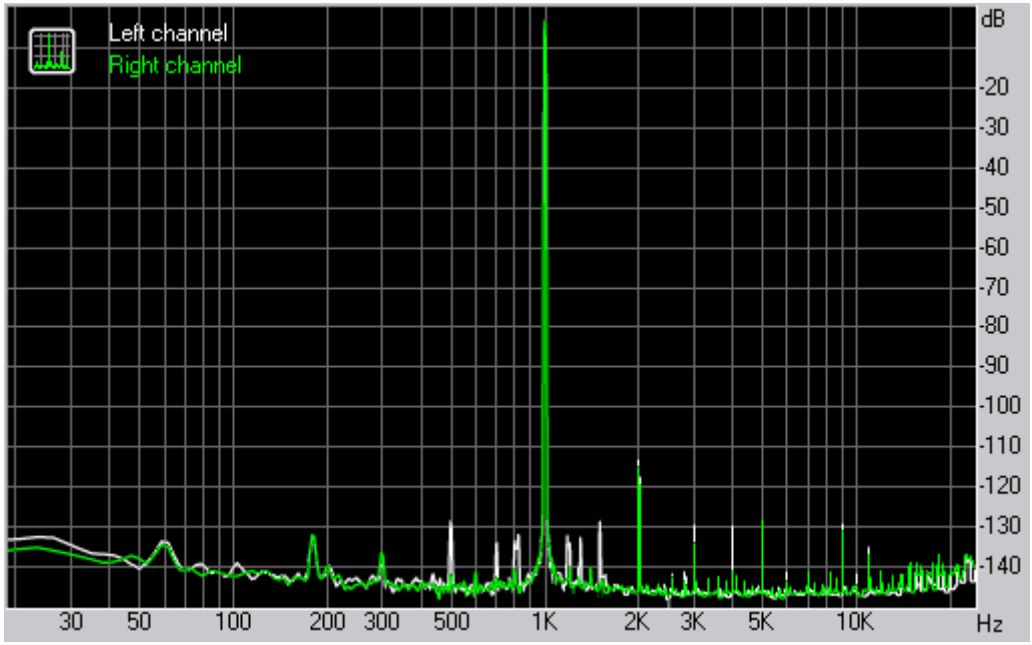
	Left	Right
RMS power, dB	-115.0	-115.2
RMS power (A-weighted), dB	-116.2	-116.4
Peak level, dB FS	-92.8	-93.2
DC offset, %	-0.0	-0.0

Dynamic range



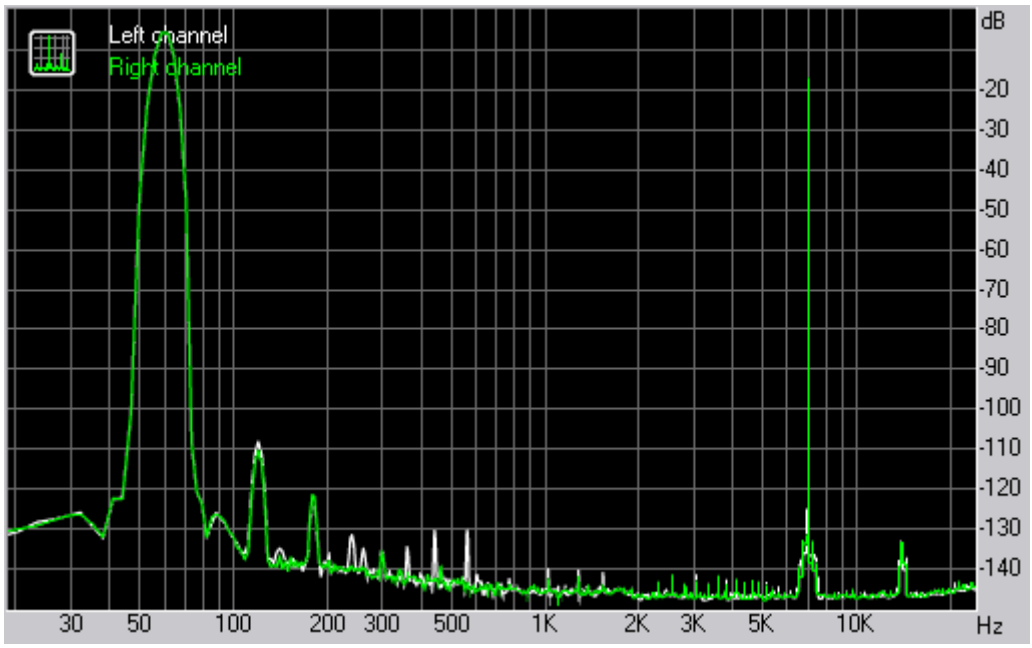
	Left	Right
Dynamic range, dB	+115.0	+115.1
Dynamic range (A-weighted), dB	+116.2	+116.3
DC offset, %	-0.00	-0.00

THD + Noise (at -3 dB FS)



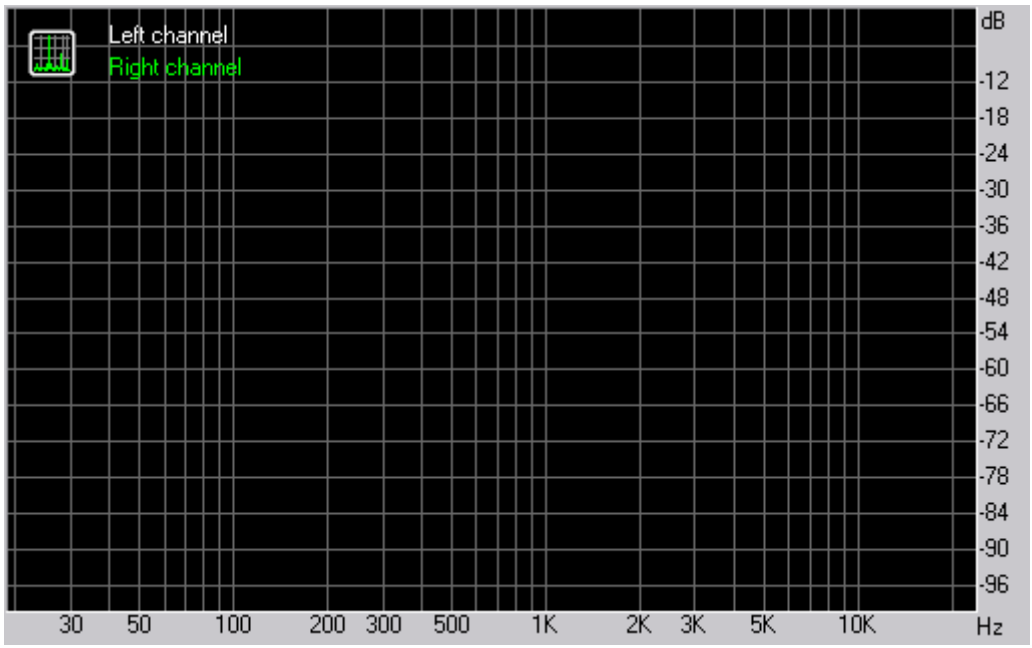
	Left	Right
THD, %	+0.0003	+0.0003
THD + Noise, %	+0.0005	+0.0005
THD + Noise (A-weighted), %	+0.0006	+0.0005

Intermodulation distortion



	Left	Right
IMD + Noise, %	+0.0010	+0.0009
IMD + Noise (A-weighted), %	+0.0005	+0.0004

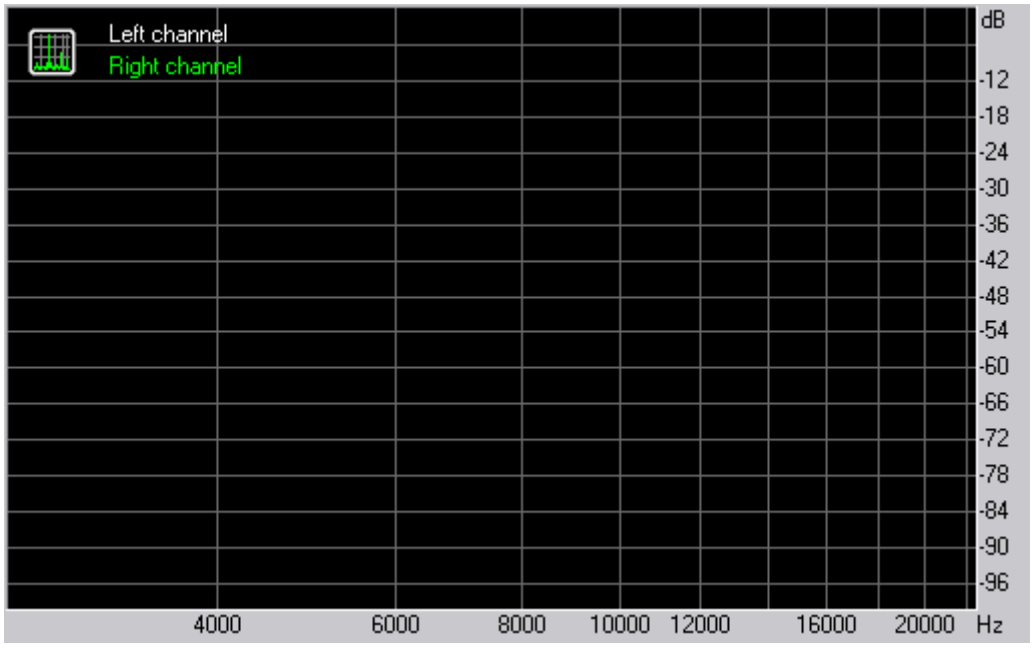
Stereo crosstalk



	Left	Right

Crosstalk at 100 Hz, dB	-116	-112
Crosstalk at 1000 Hz, dB	-115	-114
Crosstalk at 10000 Hz, dB	-112	-112

IMD (swept tones)



	Left	Right
IMD + Noise at 5000 Hz,	0.0006	0.0006
IMD + Noise at 10000 Hz,	0.0005	0.0005
IMD + Noise at 15000 Hz,	0.0005	0.0005