



# Xonar D2/D2X

7.1 Channel Audio Card

192KHz/24Bit DuplexHD™

*Featuring Dolby® and DTS® Technologies for Home Entertainment*

## **RMAA V.6.0.5 Test Guide and Results**

**Revision: 1.2**

**Date: Sep. 13, 2007**



The Xonar D2/D2X sound card package 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 now available. This document describes the test guideline with RMAA v6.0.5, [not only for Windows XP but also for Windows Vista](#), and the complete reference test results by latest Xonar D2/D2X driver package. The measurements are conducted by RMAA loop-back test approach, that is playing and recording the test signals (Out-to-In loop-back test), and using frequency analysis algorithms. The following provides a step-by-step loop-back test guide for your Xonar D2/D2X audio card. The test platforms are specified here:

OS: [Windows XP or Vista 32bit](#)

RMAA Version: [V.6.0.5 \(By its loop-back test\)](#)

Audio Card: [Xonar D2 or D2X audio card \(similar audio performance\)](#)

XP Driver Version: [8.17.20](#)

Vista Driver Version: [8.17.25](#)

## **[1. Setting Up Xonar D2/D2X Audio Card](#)**

Firstly open the Xonar D2/D2X 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) If the Windows platform is Vista, please mind to also select "**2 channels**" for Audio Channel as the following picture.



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/D2X 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. Turn the master volume knob to the MAX level (0dB)
6. Click "Reset" on the playback volume mixer page to keep the volume to default settings.  
(i.e. WAVE volume to max (100) and LEFT and Right channel volume to default level (76))

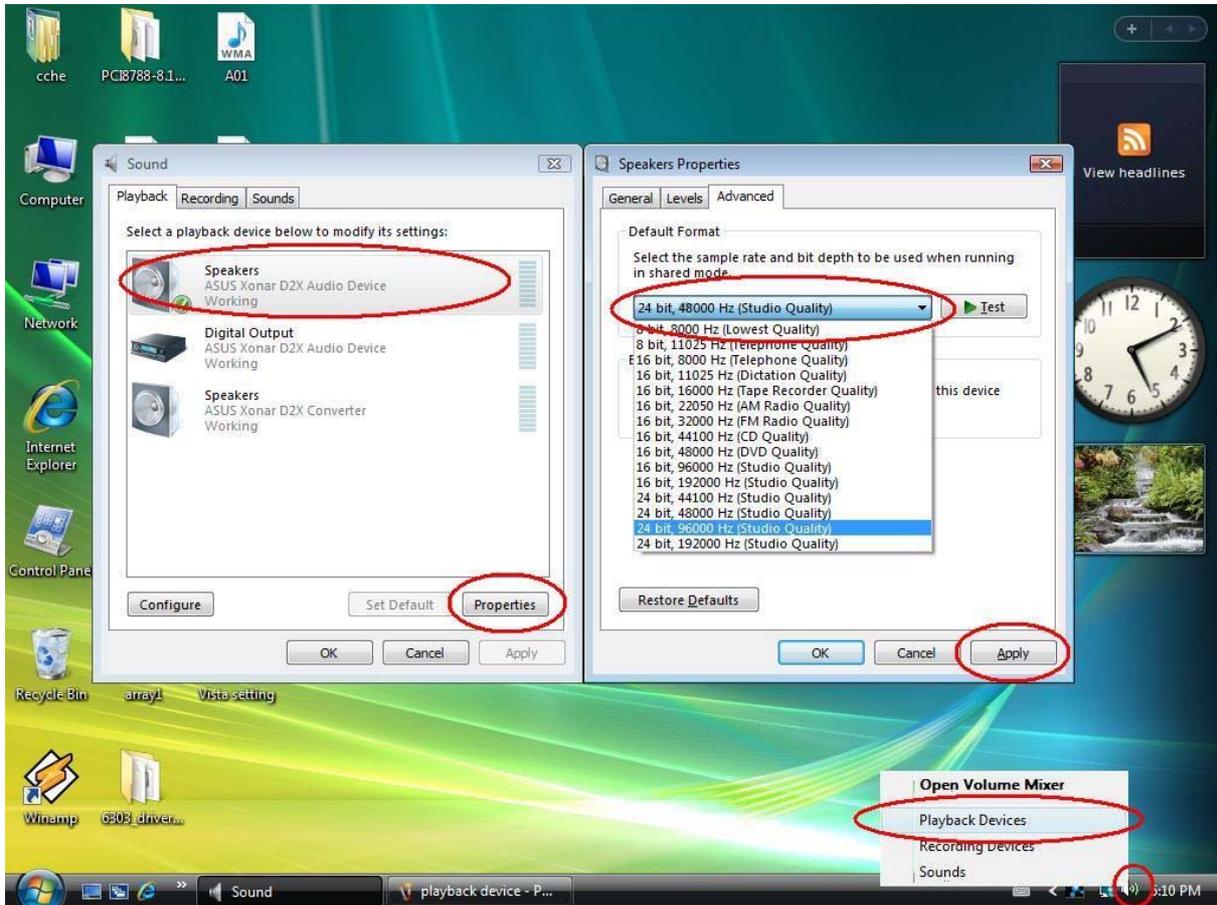


## 2. Configuration on Vista (for Windows Vista only)

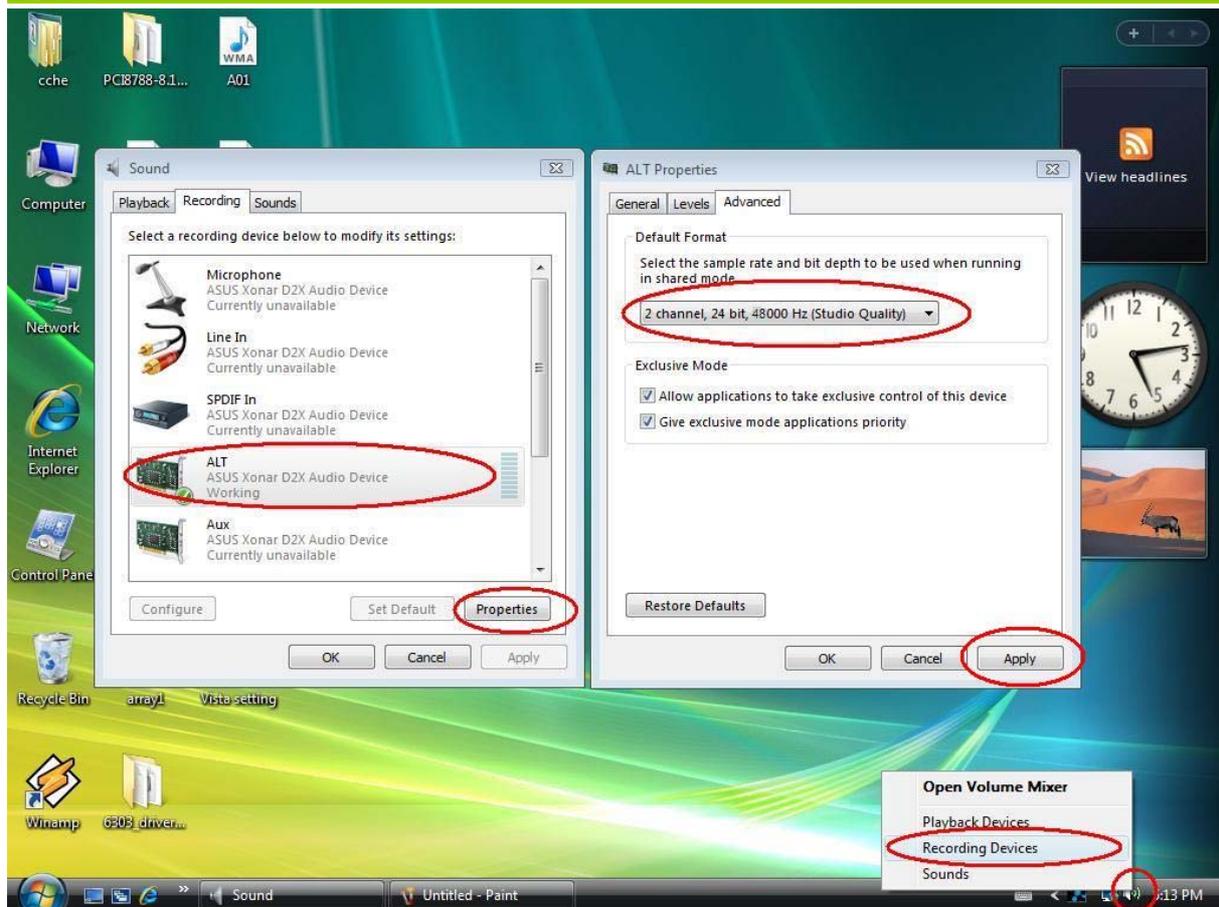
To achieve the best hardware quality and to test RMAA on Vista, it's recommended to do some additional audio format configuration for both playback and recording on Vista sound device panel:

1. Setting the right format for playback: Right click the sound icon in the system tray=>select playback devices=>select "Speakers (ASUS Xonar D2/D2X Audio Device)"

=>open "Properties" => Click "Advanced" tab => select "24bit, 48000 Hz" in the format pull-down menu (for 24bit/48KHz test in RMAA)



2.Setting the right format for recording: Right click the sound icon in the system tray=>select Recording devices=>select "ALT (ASUS Xonar D2/D2X Audio Device)" =>open "Properties" => Click "Advanced" tab => select "24bit, 48000 Hz" in the format pull-down menu (for 24bit/48KHz test in RMAA)

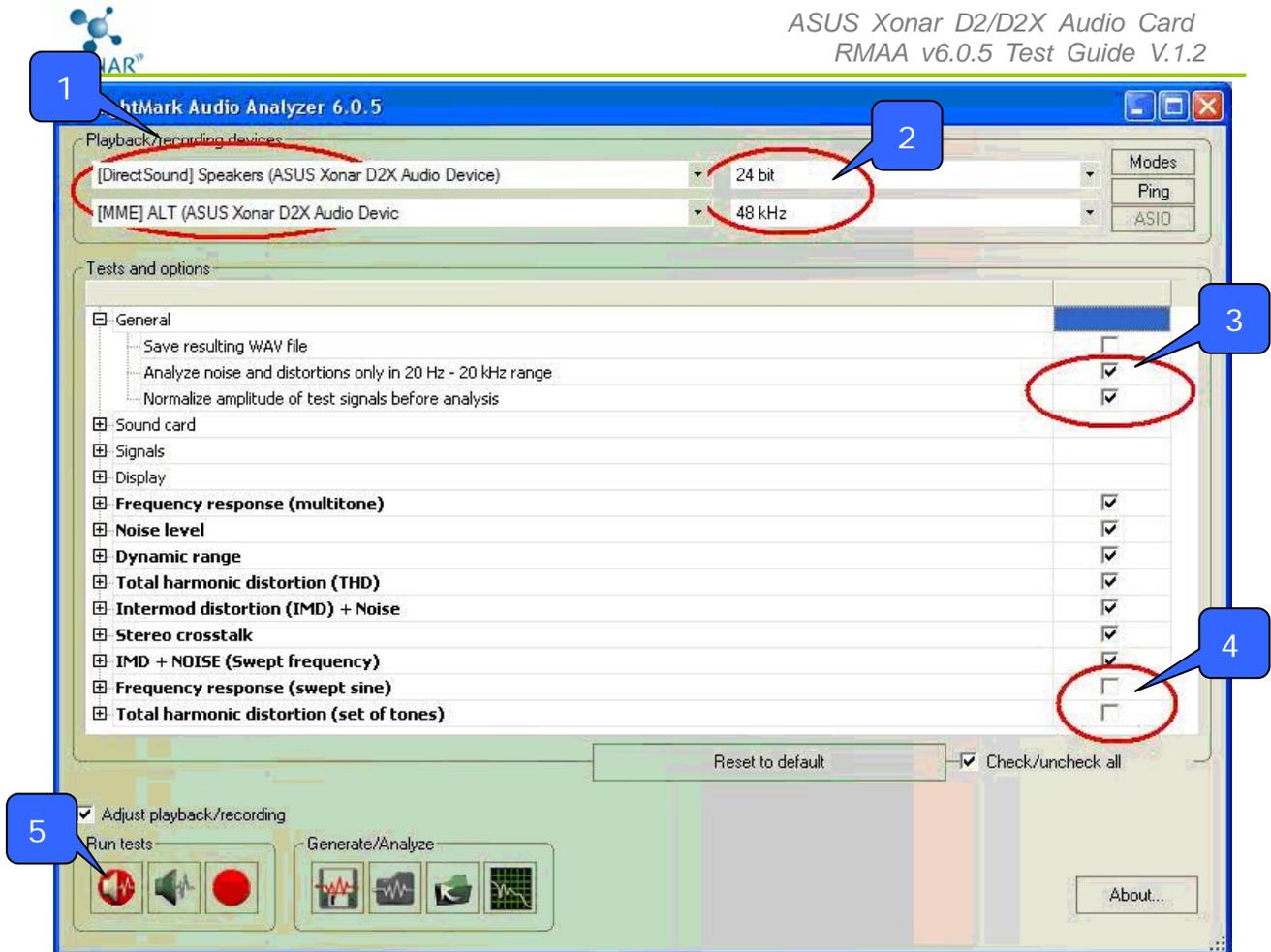


Again, in the case using a line cable for loop-back test, please set the format for "Line In" device in the recording page.

### 3. Configuration and Test with RMAA

Start RMAA and follow the setup procedure below.

1. On Vista, please select the playback device as "[DirectSound] Speakers (ASUS Xonar D2/D2X Audio Device)" (or [MME] Speakers (ASUS Xonar D2/D2X Audio Device)) and recording device as "[MME] ALT (ASUS Xonar D2/D2X Audio Device)". On XP, those will be "[DirectSound] ASUS Xonar D2/D2X Audio Device" for playback and "[MME] ASUS Xonar D2/D2X Audio Device". (Please also mind that **NOT to select "ASUS Xonar D2/D2X Audio Converter", which is for ALT and PMP purpose.**)



2. Select **24bit and 48KHz** for the test signals. (Before you change the format here for next test, please remember to go back to set the **SAME sample rate** output first in the Xonar D2/D2X Audio Center and Vista sound properties like the above procedure as well. Please mind that Xonar D2/D2X currently supports 44.1K, 48K, 96K, and 192KHz. 88.2K, 176.2KHz, and 32bit(float) tests are not supported.)

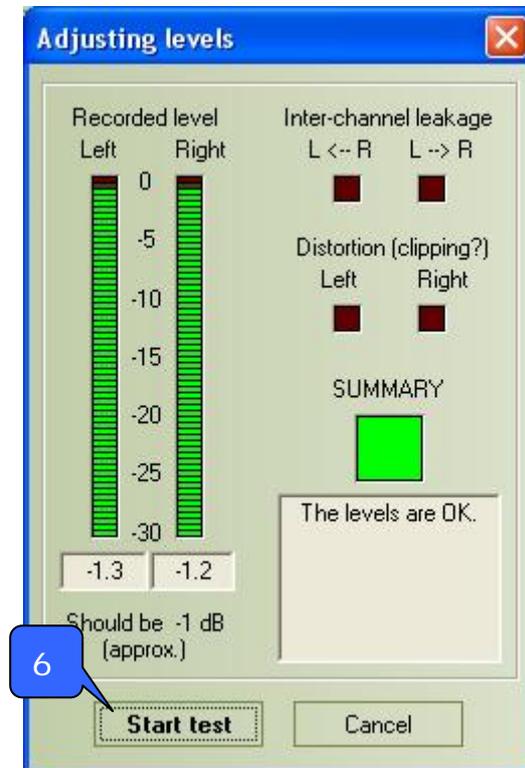
3. Click the **General** test options in RMAA and make sure "**Analyze noise and distortion only in 20Hz-20KHz range**" (audio in-band for human hearing) is selected.

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. Please uncheck the two items.

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

6. Check that the Adjusting level window shows that the recorded levels are OK (the level meter summary is green light. The value should be ideally as close as to -1dB. Too high

or low level may affect the test authenticity). Begin the test by clicking the “Start test” button.



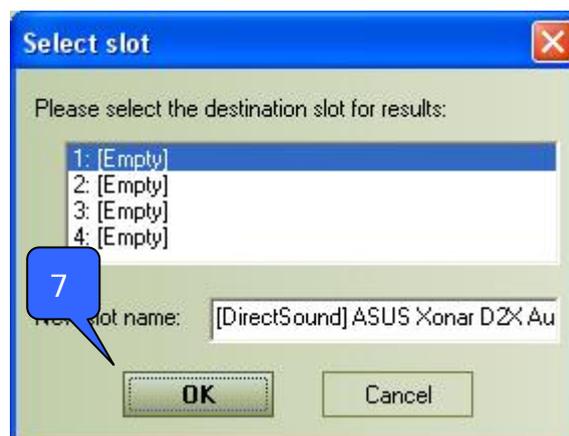
If the recorded level is not high enough, please check and make the WAVE and Master Volume have been at the maximum level; Instead, if the recorded level is too high, please lower the WAVE and Master volumes gradually until the level is ok. (In case you cannot get the level to be “OK” after fine-tuning or RMAA may sometimes show some inter-channel leakage alert, please try to ignore it first and just click “Start test” anyway. It sometimes happens because RMAA programming rules but it doesn’t necessarily imply any hardware quality issue.)



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

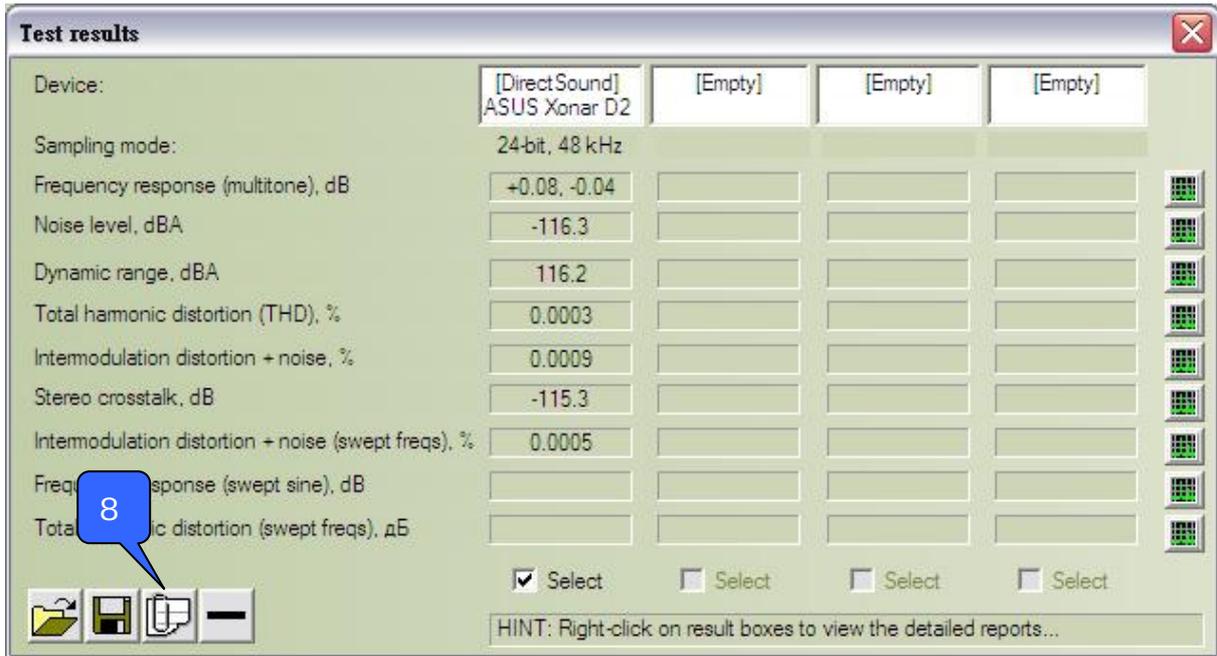


7. Select one empty slot to save the data and you may change the name. Then click "OK".



8. RMAA will pop up the Test results window as follows. 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” to generate the HTML report in an assigned directory.



## 4. Xonar D2/D2X 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/D2X can achieve around 116dB SNR for 24-bit and 96~103dB SNR for 16bit in RMAA loop-back test. Most important, all results can get "Excellent" general performance credits. (Please note that though Xonar D2/D2X 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

Test results				
Device:	[DirectSound] ASUS Xonar D2	[DirectSound] ASUS Xonar D2	[DirectSound] ASUS Xonar D2	[DirectSound] ASUS Xonar D2
Sampling mode:	16-bit, 44 kHz	16-bit, 48 kHz	16-bit, 96 kHz	16-bit, 192 kHz
Frequency response (multitone), dB	+0.07, -0.04	+0.08, -0.04	+0.10, -0.04	+0.10, -0.05
Noise level, dBA	-96.1	-97.1	-99.3	-102.7
Dynamic range, dBA	96.2	96.9	99.8	102.7
Total harmonic distortion (THD), %	0.0005	0.0005	0.0005	0.0007
Intermodulation distortion + noise, %	0.0044	0.0041	0.0029	0.0021
Stereo crosstalk, dB	-96.5	-97.4	-98.9	-99.9
Intermodulation distortion + noise (swept freqs), %	0.0046	0.0042	0.0030	0.0023
Frequency response (swept sine), dB				
Total harmonic distortion (swept freqs), dB				
	<input checked="" type="checkbox"/> Select			

HINT: Right-click on result boxes to view the detailed reports...

### DirectSound 24-Bit Test Results

Test results				
Device:	[DirectSound] ASUS Xonar D2			
Sampling mode:	24-bit, 44 kHz	24-bit, 48 kHz	24-bit, 96 kHz	24-bit, 192 kHz
Frequency response (multitone), dB	+0.07, -0.04	+0.08, -0.04	+0.10, -0.04	+0.10, -0.05
Noise level, dBA	-107.7	-116.3	-116.2	-115.7
Dynamic range, dBA	107.7	116.2	116.2	115.5
Total harmonic distortion (THD), %	0.0003	0.0003	0.0004	0.0006
Intermodulation distortion + noise, %	0.0016	0.0009	0.0008	0.0008
Stereo crosstalk, dB	-108.0	-115.3	-114.7	-110.6
Intermodulation distortion + noise (swept freqs), %	0.0015	0.0005	0.0006	0.0009
Frequency response (swept sine), dB				
Total harmonic distortion (swept freqs), dB				
	<input checked="" type="checkbox"/> Select			

HINT: Right-click on result boxes to view the detailed reports...

### MME 16-Bit Test Results

Test results				
Device:	[MME] ASUS Xonar D2 Audio			
Sampling mode:	16-bit, 44 kHz	16-bit, 48 kHz	16-bit, 96 kHz	16-bit, 192 kHz
Frequency response (multitone), dB	+0.07, -0.04	+0.08, -0.04	+0.10, -0.04	+0.10, -0.05
Noise level, dBA	-97.3	-96.7	-100.6	-102.8
Dynamic range, dBA	96.1	96.9	99.2	102.7
Total harmonic distortion (THD), %	0.0005	0.0006	0.0007	0.0007
Intermodulation distortion + noise, %	0.0044	0.0041	0.0029	0.0021
Stereo crosstalk, dB	-97.7	-97.6	-98.2	-100.1
Intermodulation distortion + noise (swept freqs), %	0.0046	0.0042	0.0030	0.0023
Frequency response (swept sine), dB				
Total harmonic distortion (swept freqs), dB				
	<input checked="" type="checkbox"/> Select			

HINT: Right-click on result boxes to view the detailed reports...

### MME 24-Bit Test Results

Test results				
Device:	[MME] ASUS Xonar D2 Audio			
Sampling mode:	24-bit, 44 kHz	24-bit, 48 kHz	24-bit, 96 kHz	24-bit, 192 kHz
Frequency response (multitone), dB	+0.07, -0.04	+0.08, -0.04	+0.10, -0.04	+0.10, -0.05
Noise level, dBA	-107.8	-116.4	-116.2	-115.8
Dynamic range, dBA	107.7	116.1	116.3	115.8
Total harmonic distortion (THD), %	0.0003	0.0003	0.0004	0.0006
Intermodulation distortion + noise, %	0.0016	0.0009	0.0007	0.0008
Stereo crosstalk, dB	-108.7	-114.5	-113.9	-109.7
Intermodulation distortion + noise (swept freqs), %	0.0015	0.0005	0.0006	0.0009
Frequency response (swept sine), dB				
Total harmonic distortion (swept freqs), dB				
	<input checked="" type="checkbox"/> Select			

HINT: Right-click on result boxes to view the detailed reports...

## 5. Xonar D2/D2X HTML Test Report

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/D2X 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)

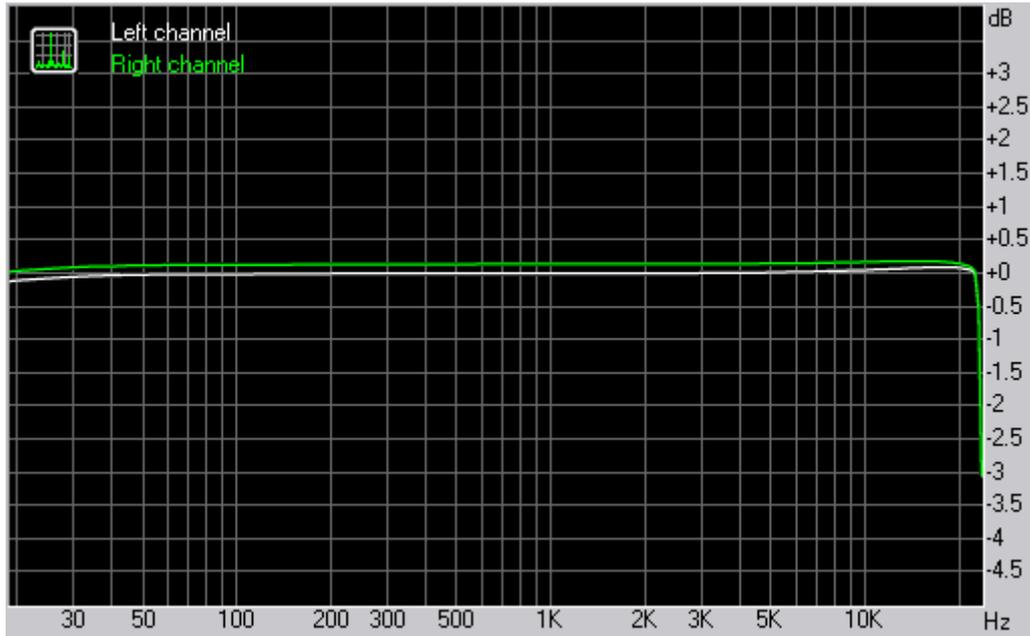


RMAA Version	6.0.5
20 Hz - 20 kHz filter	ON
Normalize amplitude	ON
Mono mode	OFF
Calibration signal, Hz	1000
Polarity	inverted/correct

### 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
<b>General performance</b>		<b>Excellent</b>

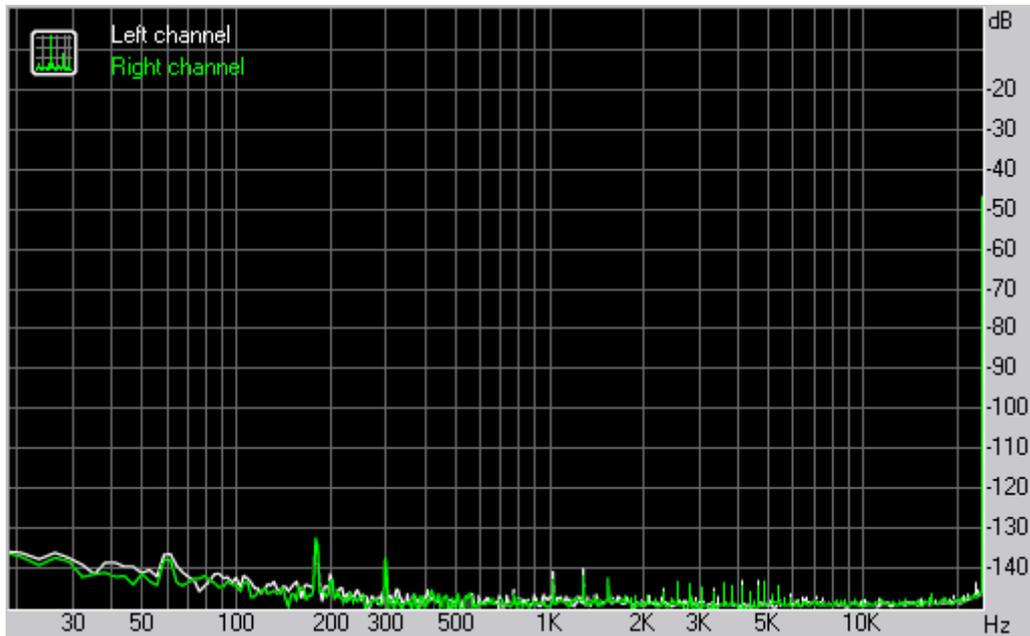
### Frequency response



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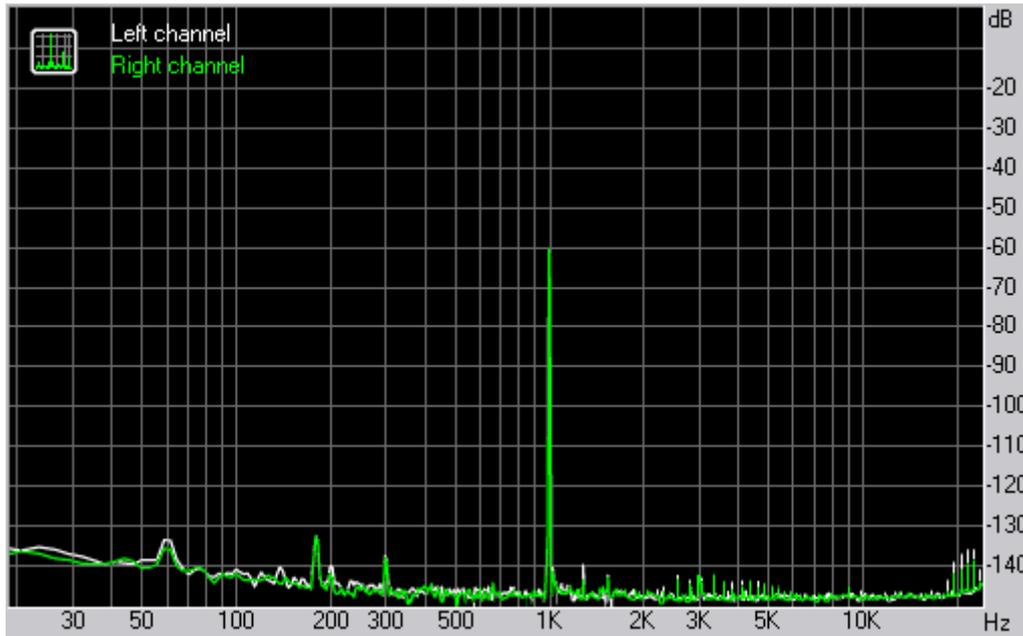
### Noise level



	Left	Right
RMS power, dB	-115.0	-115.2

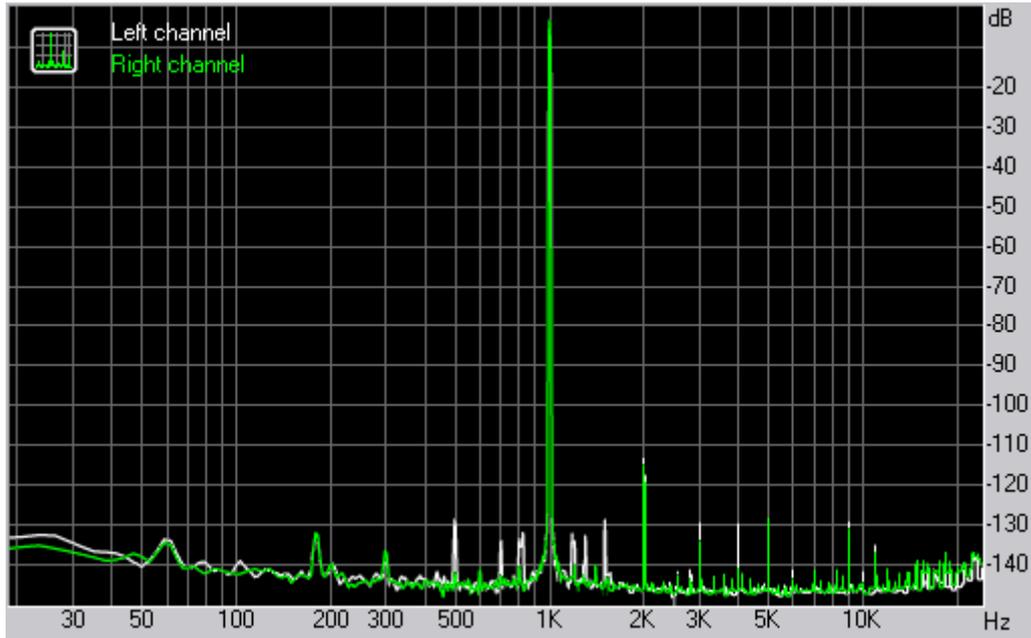
RMS power (A-weighted), dB	-116.2	-116.4
Peak level, dB FS	-92.8	-93.2
DC offset, %	-0.0	-0.0

### Dynamic range



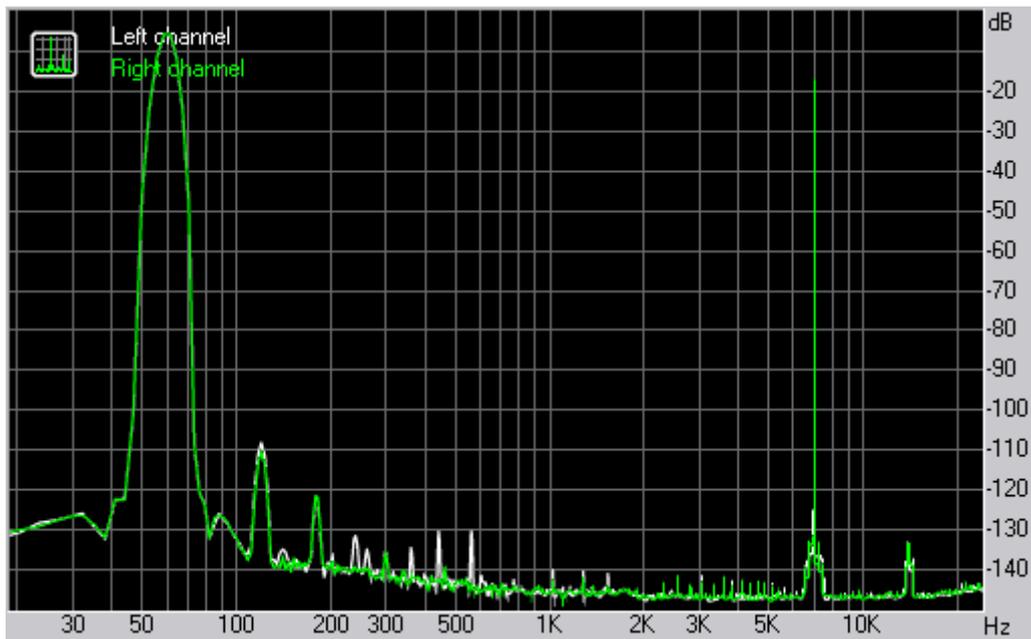
	Left	Right
Dynamic range, dB	+115.0	+115.1
Dynamic range (A-weighted), dB	+116.2	+116.3
DC offset, %	-0.00	-0.00

### THD + Noise (at -3 dB FS)



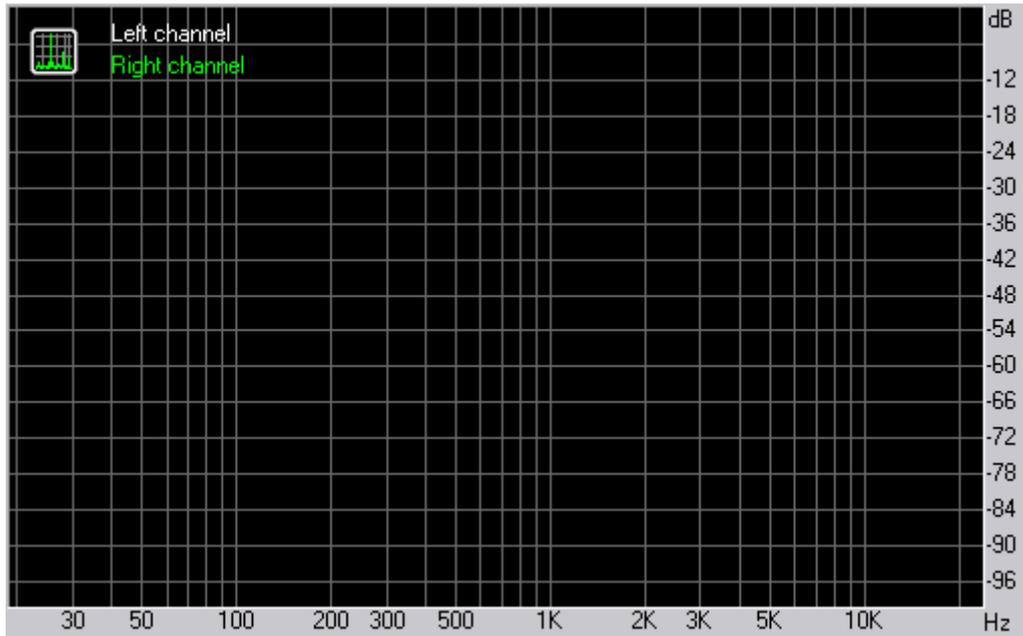
	Left	Right
THD, %	+0.0003	+0.0003
THD + Noise, %	+0.0005	+0.0005
THD + Noise (A-weighted), %	+0.0006	+0.0005

### Intermodulation distortion



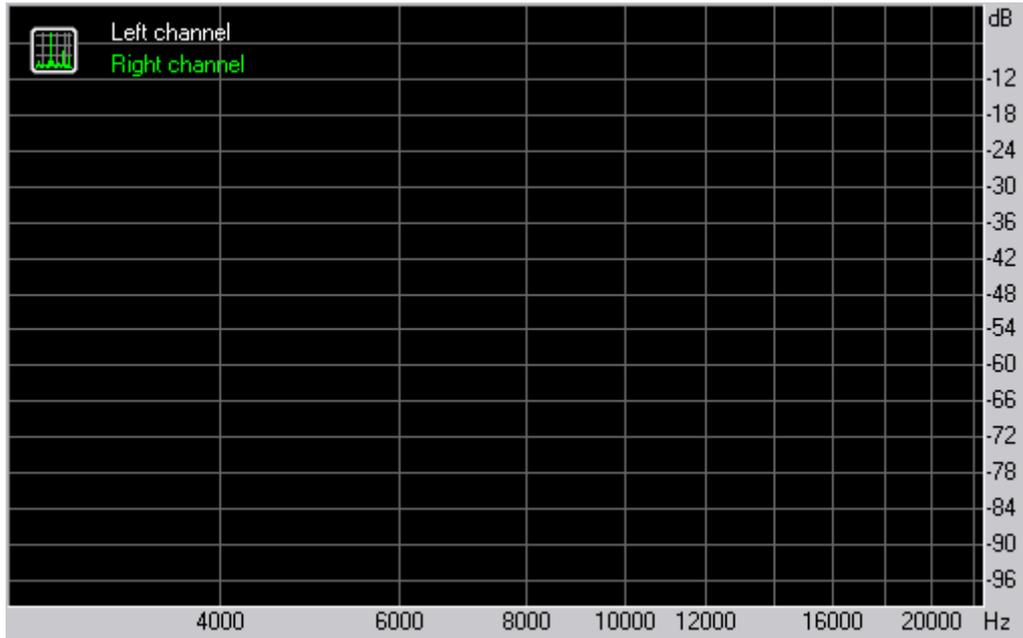
	Left	Right
IMD + Noise, %	+0.0010	+0.0009
IMD + Noise (A-weighted), %	+0.0005	+0.0004

### 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