

Sound

Sound Blaster® Xfi™ Testing Methodology & Results For RMAA v5.5



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Sound Blaster® X-Fi® RMAA Testing Methodology and Results

July 2005

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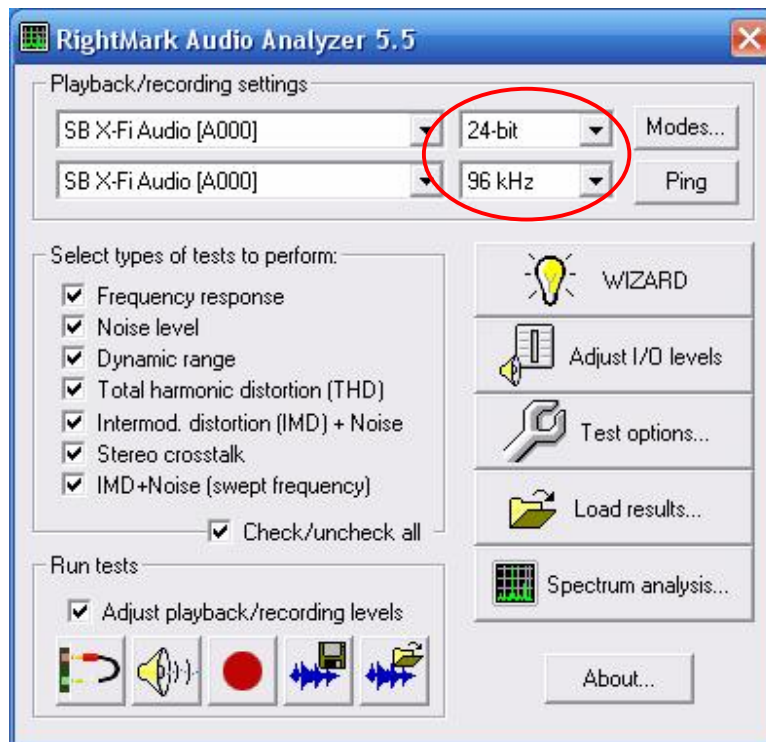
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Testing Methodology using RMAA v5.5

In this section, we will guide you through setting up your Sound Blaster® X-Fi, 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.

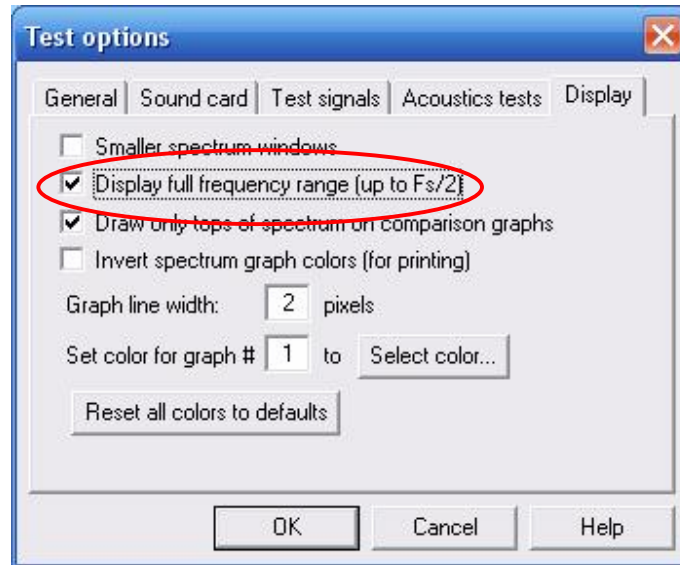
Setting Up RMAA for Analog Measurement:

- Launch RMAA v5.5
This latest version of the RMAA can be downloaded from the following web site:
<http://audio.rightmark.org/download.shtml>
- Select the bit depth and sampling rate you which to test.
 - **Note that Sound Blaster X-Fi 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.**



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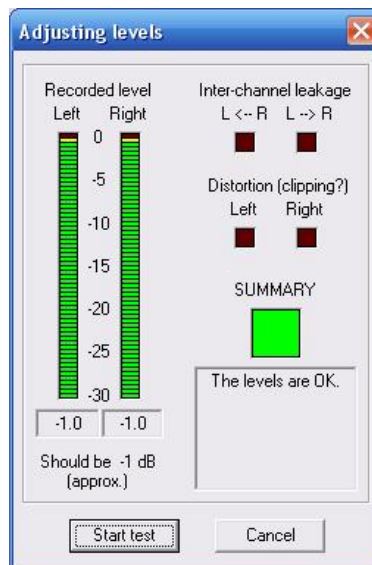
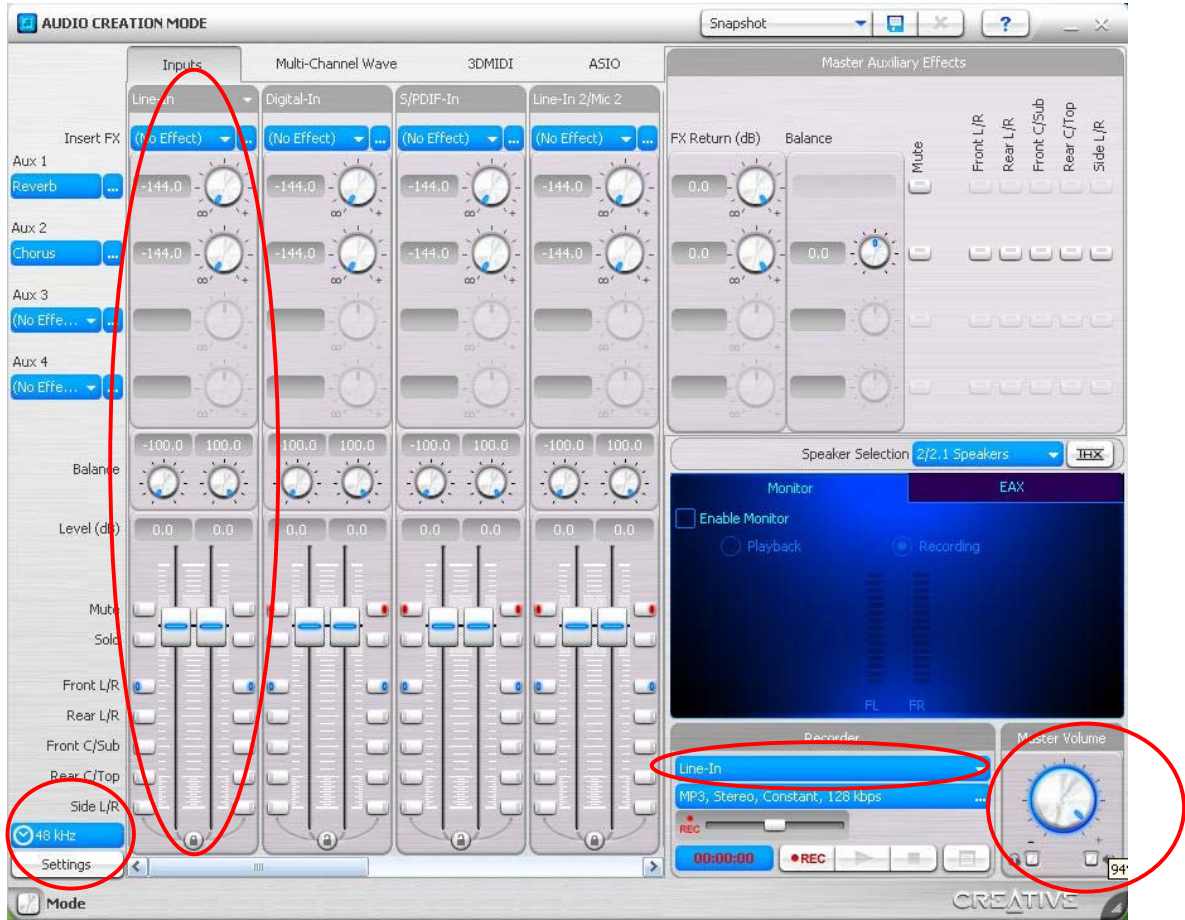
- Click on “Test Options”, “Display” and select “Display full frequency range (up to $F_s/2$)”.



- Loopback cable connection:
 - Connect a 3.5mm mini-Stereo cable from Line Out 1 to Line In located at the top of the soundcard back panel.
- Establishing playback and recording levels:
 - Disable All Effects, including CMSS-3D, EAX, 24-Bit Crystalizer, Graphic Equalizer, THX Setup.
 - Click “Adjust I/O Levels”,
 - Launch Audio Creation Mode (using the Sound Blaster X-Fi Mode Switcher app) and adjust the mixer with followings settings:
 - Sound Blaster X-Fi:
 - Master Sampling Rate: Matched to the test performed e.g. 96kHz
 - Master Volume: 94%
 - Wave: 100%
 - All Others: 0% and Muted
 - Record Source: Line-In/Mic-In @ 50% (no record gain, i.e. 0dB)

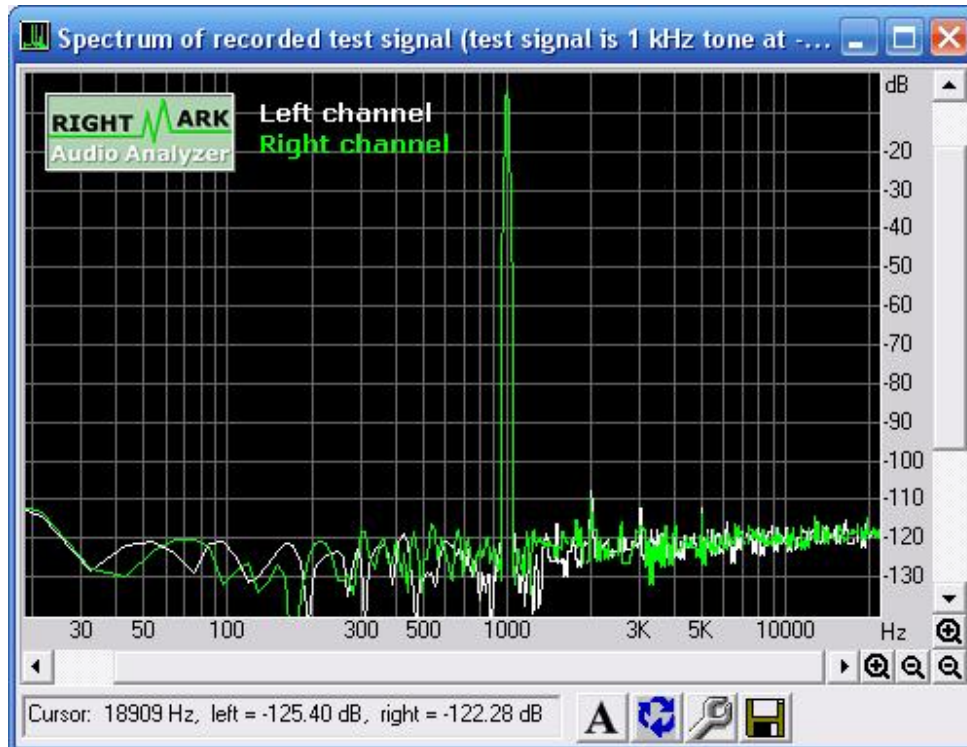
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Sound Blaster X-Fi Audio Creation Mode Mixer Settings



Sound Blaster® X-Fi® RMAA Testing Methodology and Results

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



Results from RMAA v5.5 Tests

Summary results for
Sound Blaster X-Fi Elite Pro
(Model Number SB0550)

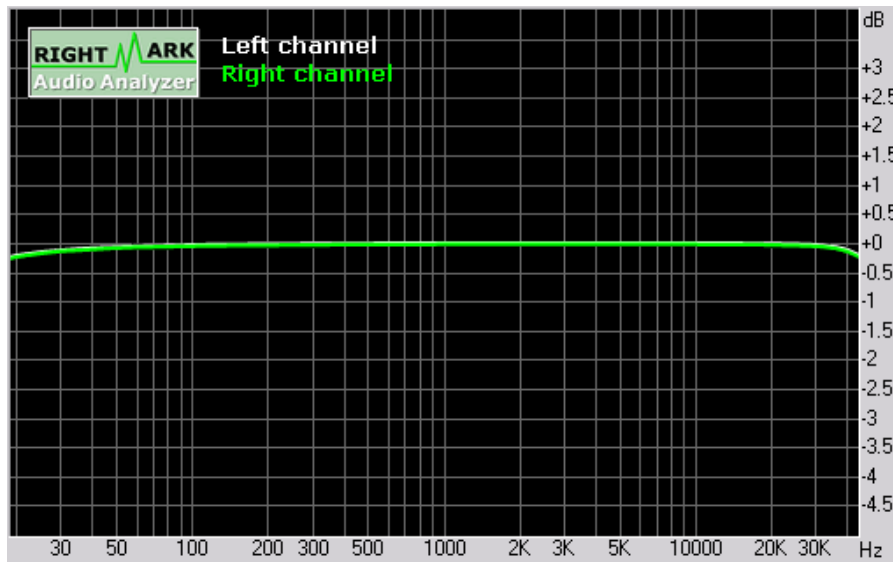
Testing chain: External loopback (line-out - line-in)
Sampling mode: 24-bit, 96 kHz

Frequency response (from 40 Hz to 15 kHz), dB:	+0.01, -0.07	Excellent
Noise level, dB (A):	-113.3	Excellent
Dynamic range, dB (A):	112.5	Excellent
THD, %:	0.0007	Excellent
IMD + Noise, %:	0.0010	Excellent
Stereo crosstalk, dB:	-102.8	Excellent
IMD at 10 kHz, %:	0.0009	Excellent

General performance: Excellent

Full results (Sampling mode: 24-bit, 96 kHz)

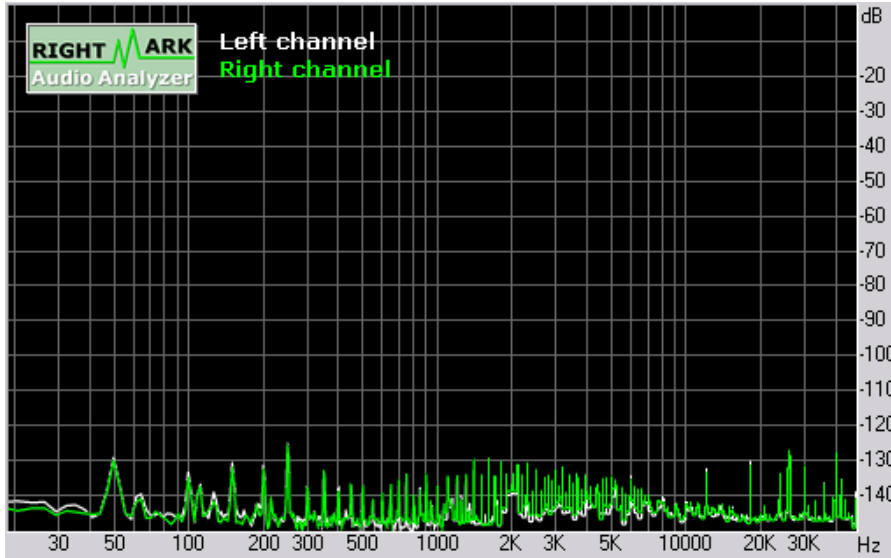
Frequency response



Frequency range	Response
From 20 Hz to 20 kHz, dB	-0.20, +0.01
From 40 Hz to 15 kHz, dB	-0.07, +0.01

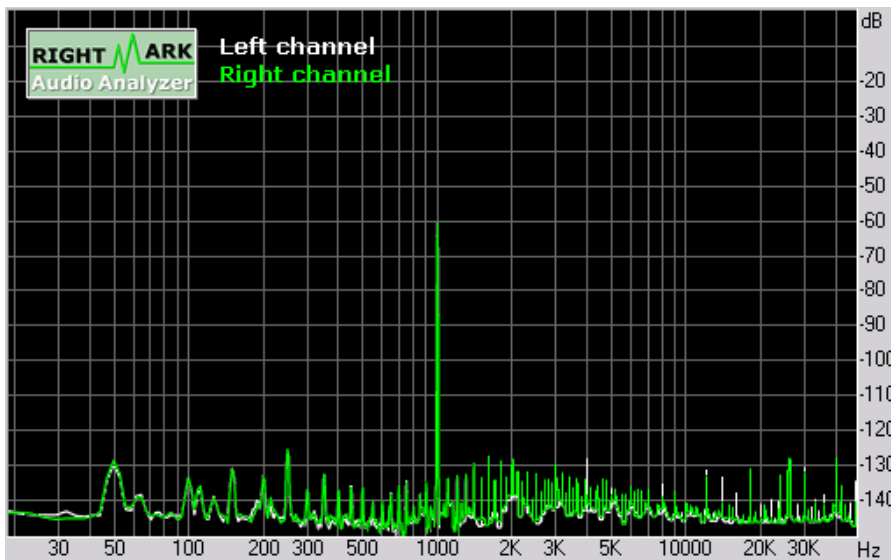
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Noise level



Parameter	Left	Right
RMS power, dB:	-112.7	-112.3
RMS power (A-weighted), dB:	-113.3	-112.7
Peak level, dB FS:	-84.7	-84.6
DC offset, %:	0.00	0.00

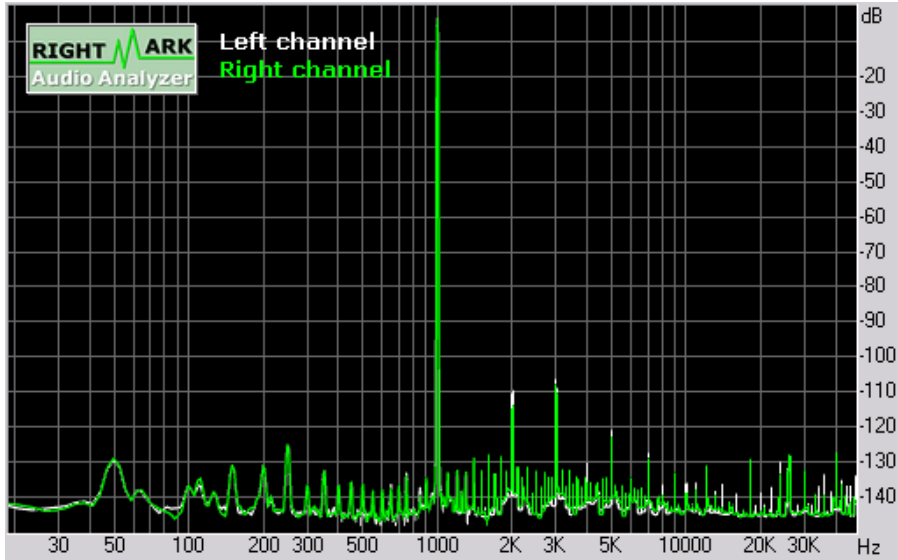
Dynamic range



Parameter	Left	Right
Dynamic range, dB:	+112.6	+112.1
Dynamic range (A-weighted), dB:	+113.2	+112.5
DC offset, %:	0.00	0.00

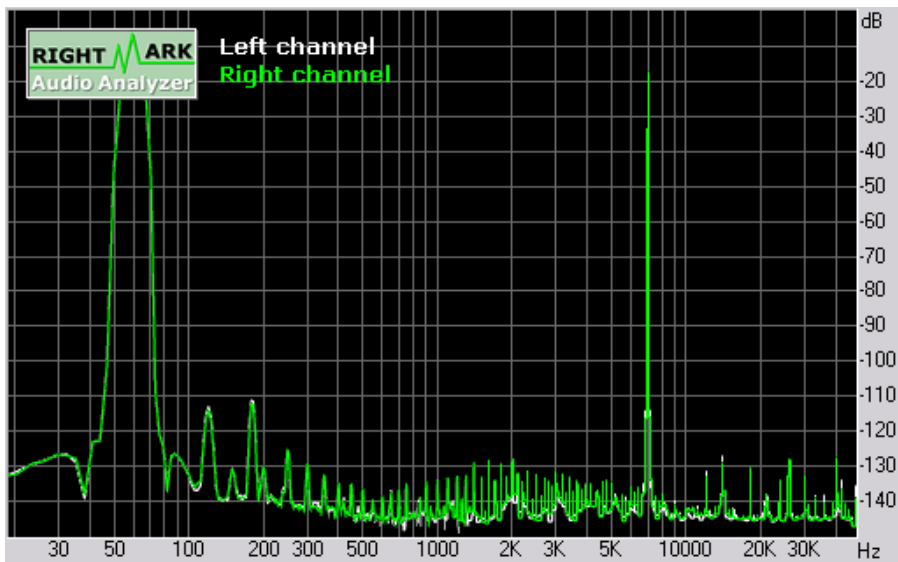
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

THD + Noise (at -3 dB FS)



Parameter	Left	Right
THD, %:	0.0008	0.0007
THD + Noise, %:	0.0010	0.0008
THD + Noise (A-weighted), %:	0.0012	0.0010

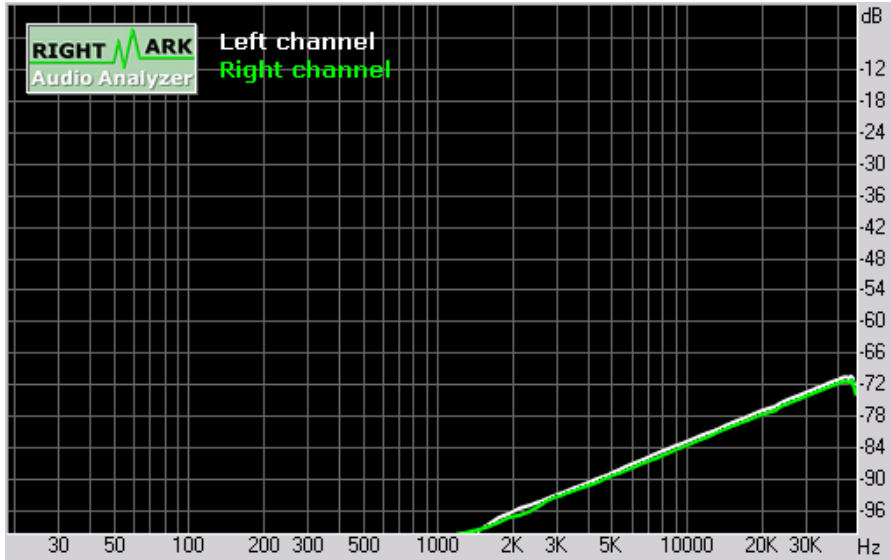
Intermodulation distortion



Parameter	Left	Right
IMD + Noise, %:	0.0011	0.0010
IMD + Noise (A-weighted), %:	0.0008	0.0007

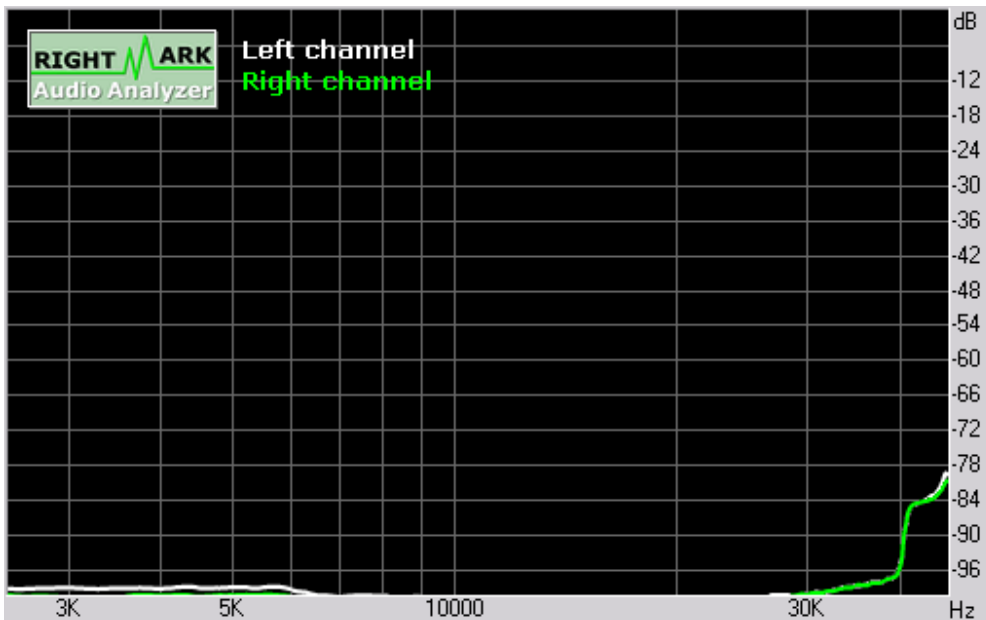
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Stereo crosstalk



Parameter	L <- R	L -> R
Crosstalk at 100 Hz, dB:	-105	-108
Crosstalk at 1 kHz, dB:	-102	-101
Crosstalk at 10 kHz, dB:	-82	-82

IMD (swept tones)



Parameter	Left	Right
IMD + Noise at 5 kHz, %:	0.0011	0.0010
IMD + Noise at 10 kHz, %:	0.0009	0.0008
IMD + Noise at 15 kHz, %:	0.0009	0.0008

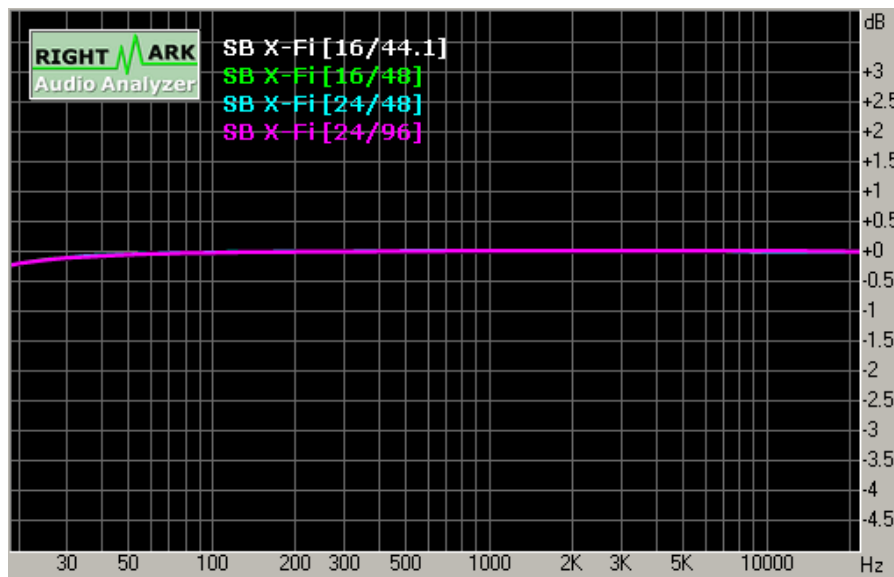
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Comparison of: SB0550 @ 16-bit/44.1kHz,
16-bit/48kHz, 24-bit/48kHz and 24-bit/96 kHz

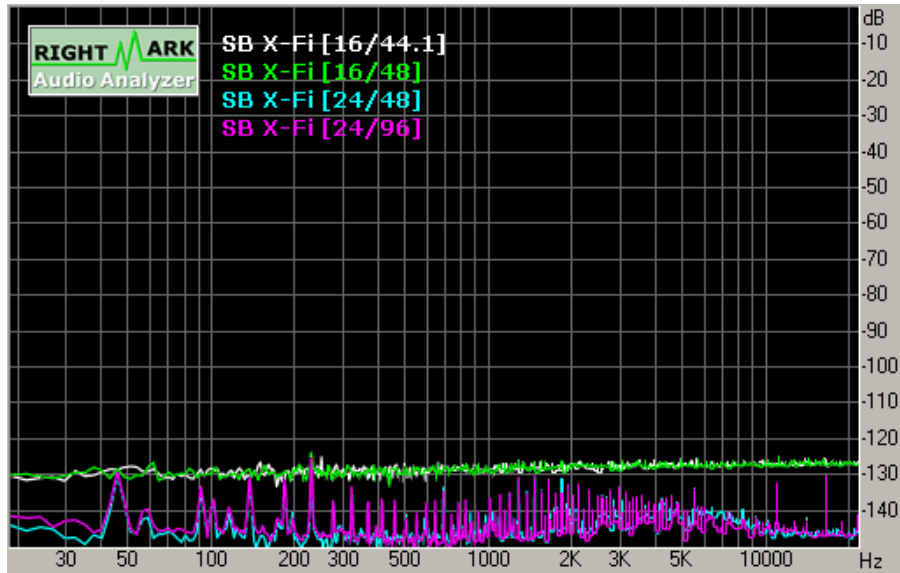
Test	SB0550 [16/44.1]	SB0550 [16/48]	SB0550 [24/48]	SB0550 [24/96]
Frequency response (from 40 Hz to 15 kHz), dB:	+0.01, -0.07	+0.01, -0.07	+0.01, -0.07	+0.01, -0.07
Noise level, dB (A):	-94.8	-95.1	-113.0	-113.3
Dynamic range, dB (A):	94.7	95.1	112.8	112.5
THD, %:	0.0009	0.0009	0.0007	0.0007
IMD + Noise, %:	0.0051	0.0049	0.0010	0.0010
Stereo crosstalk, dB:	-95.1	-95.5	-102.7	-102.8

Frequency response

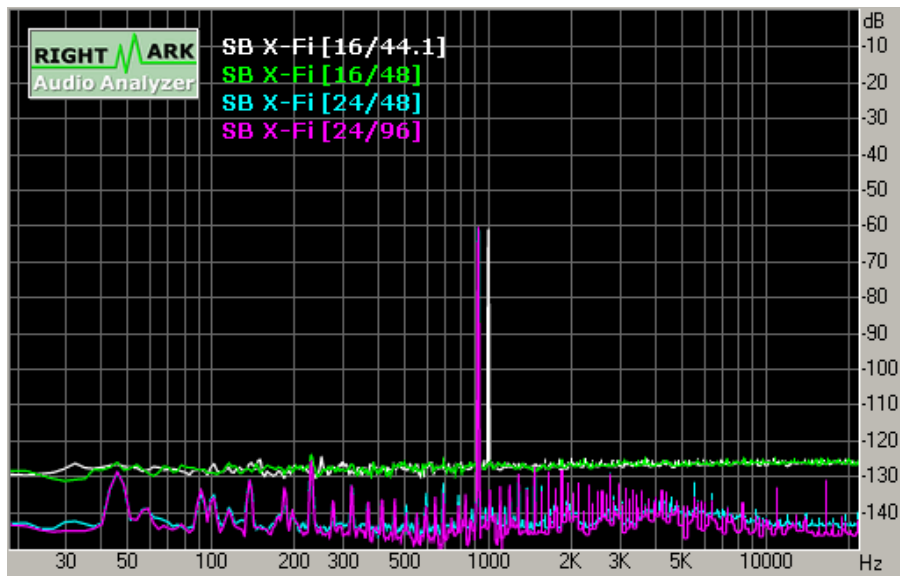


Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Noise level

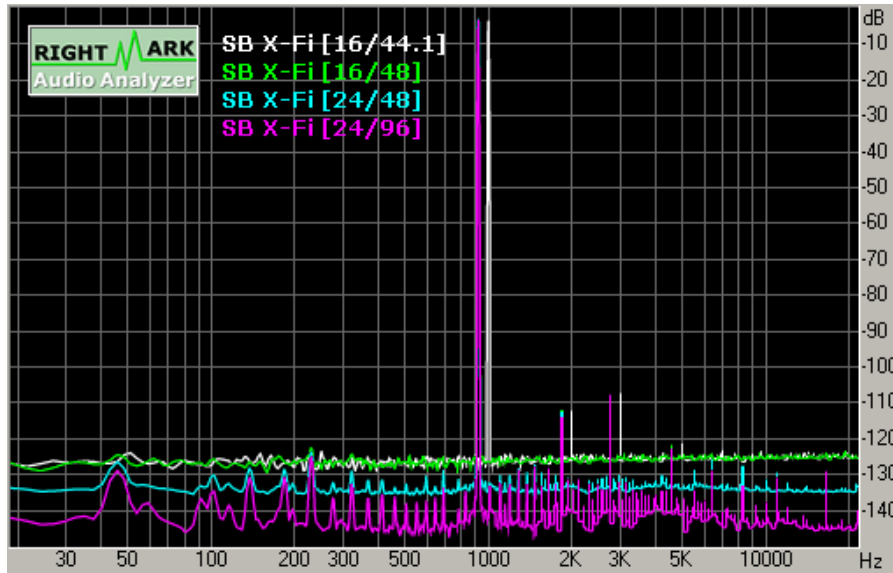


Dynamic range

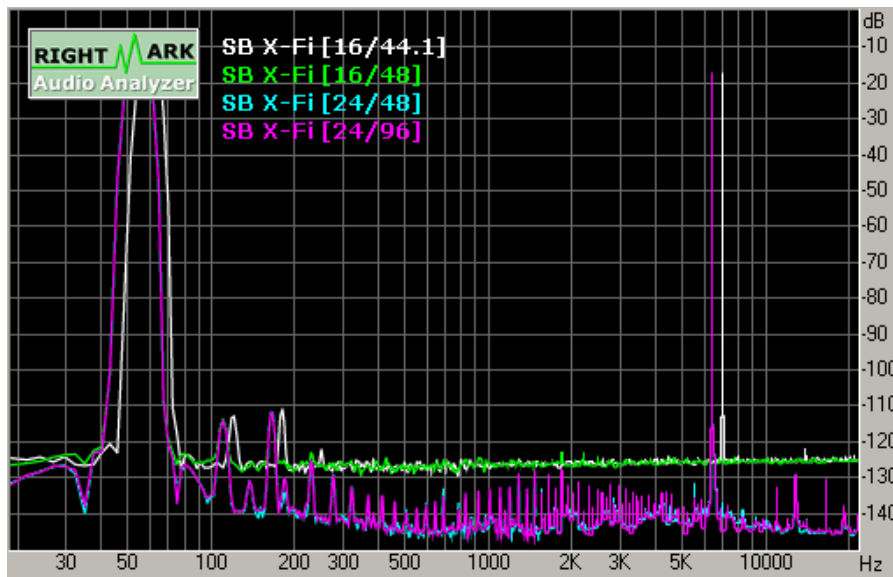


Sound Blaster® X-Fi® RMAA Testing Methodology and Results

THD + Noise (at -3 dB FS)

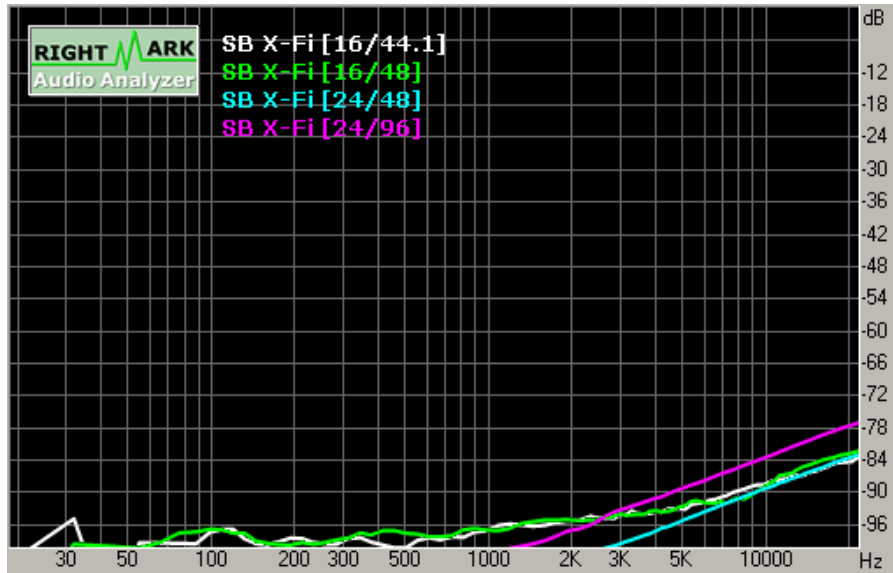


Intermodulation distortion



Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Stereo crosstalk



Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Summary results for Sound Blaster X-Fi XtremeMusic Sound Blaster X-Fi Platinum Sound Blaster X-Fi Fatal1ty FPS (Model Number SB0460)

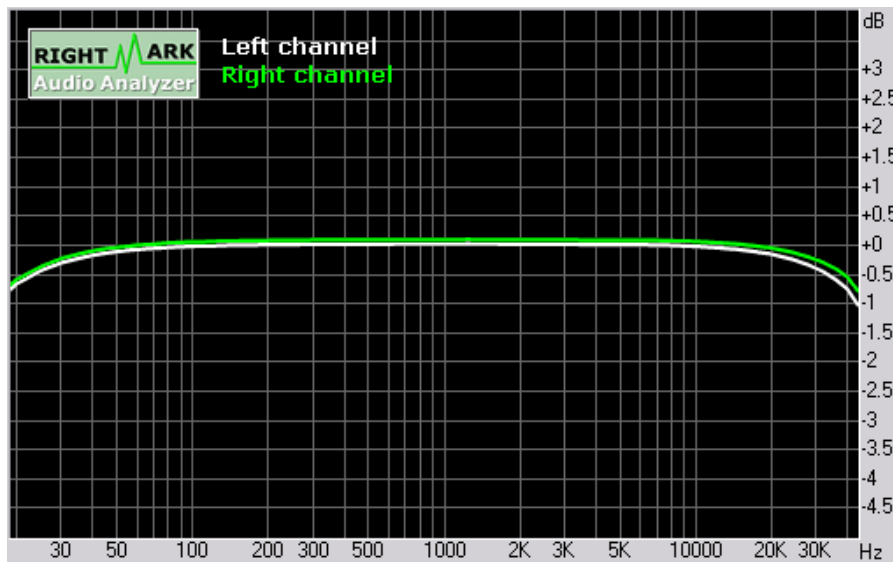
Testing chain: External loopback (line-out - line-in)
Sampling mode: 24-bit, 96 kHz

Frequency response (from 40 Hz to 15 kHz), dB:	+0.02, -0.17	Very good
Noise level, dB (A):	-102.2	Excellent
Dynamic range, dB (A):	102.0	Excellent
THD, %:	0.0008	Excellent
IMD + Noise, %:	0.0025	Excellent
Stereo crosstalk, dB:	-98.6	Excellent
IMD at 10 kHz, %:	0.0052	Excellent

General performance: Excellent

Full results (Sampling mode: 24-bit, 96 kHz)

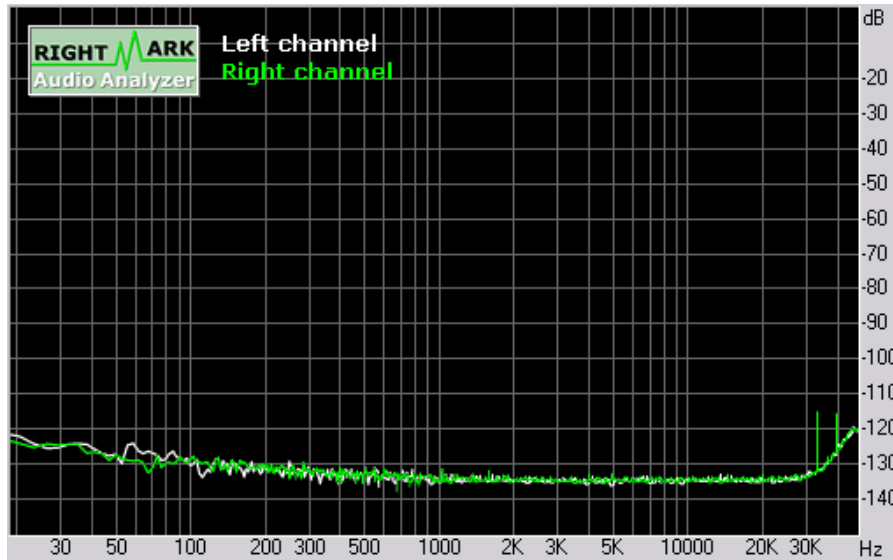
Frequency response



Frequency range	Response
From 20 Hz to 20 kHz, dB	-0.66, +0.02
From 40 Hz to 15 kHz, dB	-0.17, +0.02

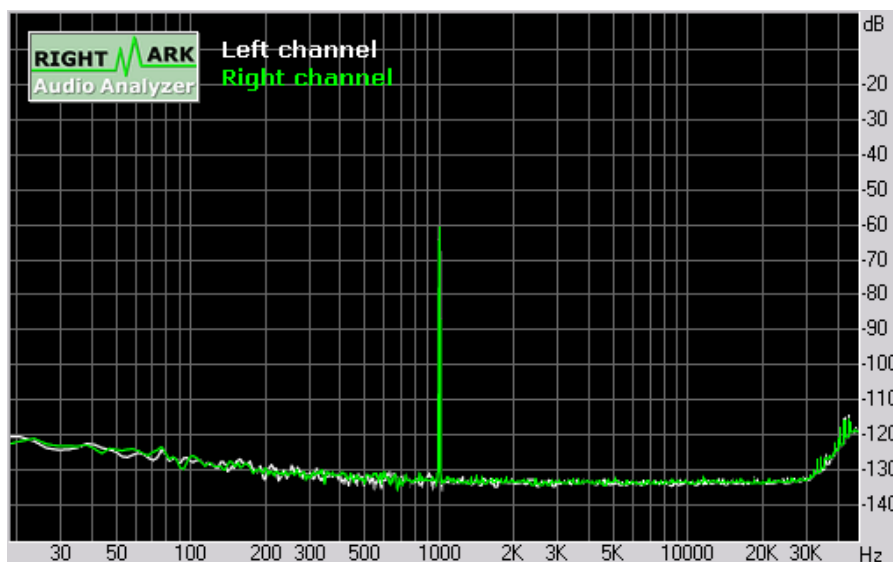
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Noise level



Parameter	Left	Right
RMS power, dB:	-101.0	-100.9
RMS power (A-weighted), dB:	-102.2	-102.0
Peak level, dB FS:	-78.3	-78.1
DC offset, %:	0.00	0.00

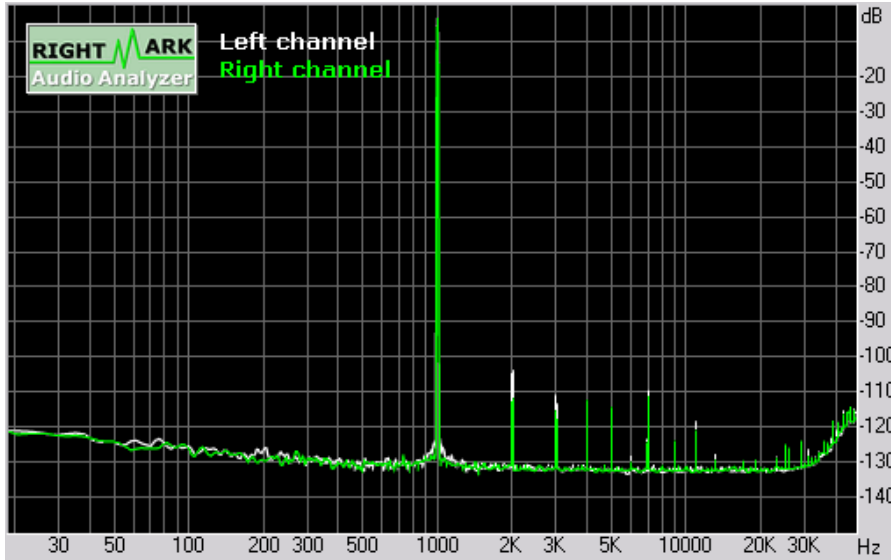
Dynamic range



Parameter	Left	Right
Dynamic range, dB:	+101.1	+100.9
Dynamic range (A-weighted), dB:	+102.2	+102.0
DC offset, %:	0.00	0.00

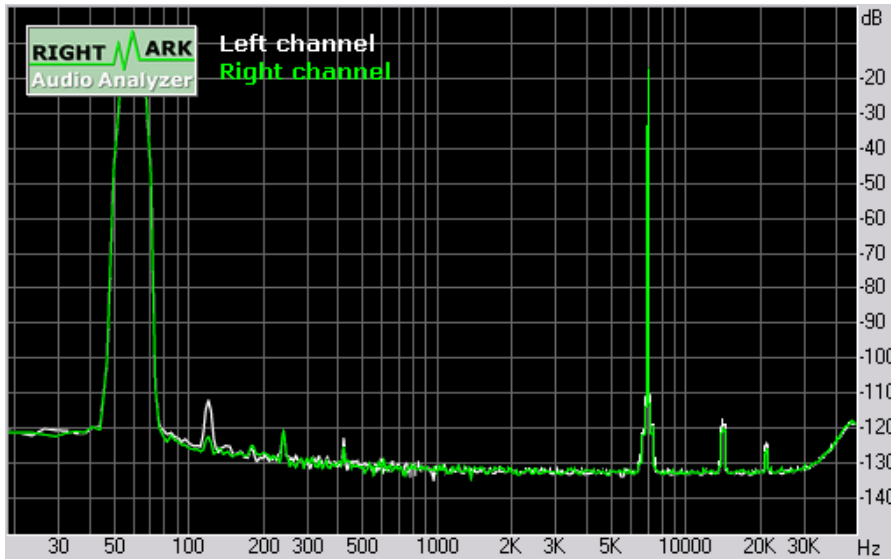
Sound Blaster® X-Fi® RMAA Testing Methodology and Results

THD + Noise (at -3 dB FS)



Parameter	Left	Right
THD, %:	0.0012	0.0008
THD + Noise, %:	0.0023	0.0020
THD + Noise (A-weighted), %:	0.0023	0.0019

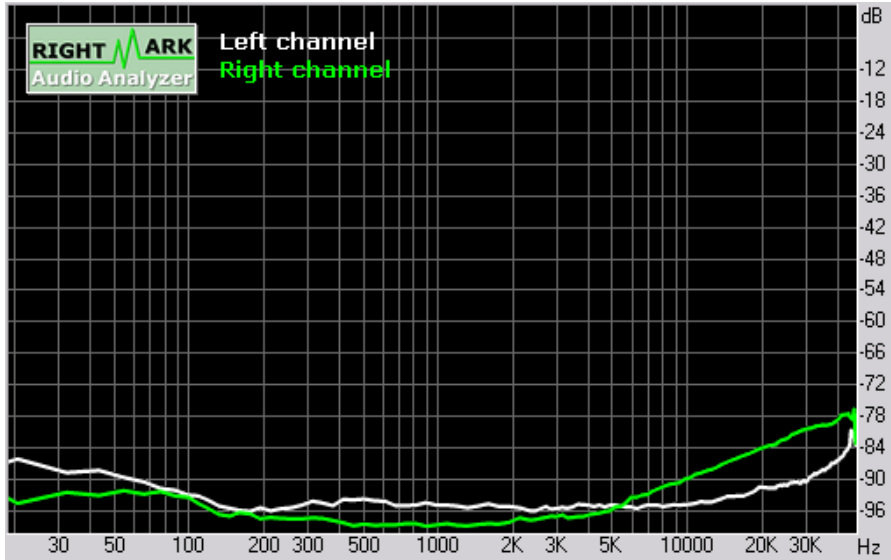
Intermodulation distortion



Parameter	Left	Right
IMD + Noise, %:	0.0027	0.0025
IMD + Noise (A-weighted), %:	0.0024	0.0023

Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Stereo crosstalk



Parameter	L <- R	L -> R
Crosstalk at 100 Hz, dB:	-92	-92
Crosstalk at 1 kHz, dB:	-94	-98
Crosstalk at 10 kHz, dB:	-94	-89

IMD (swept tones)



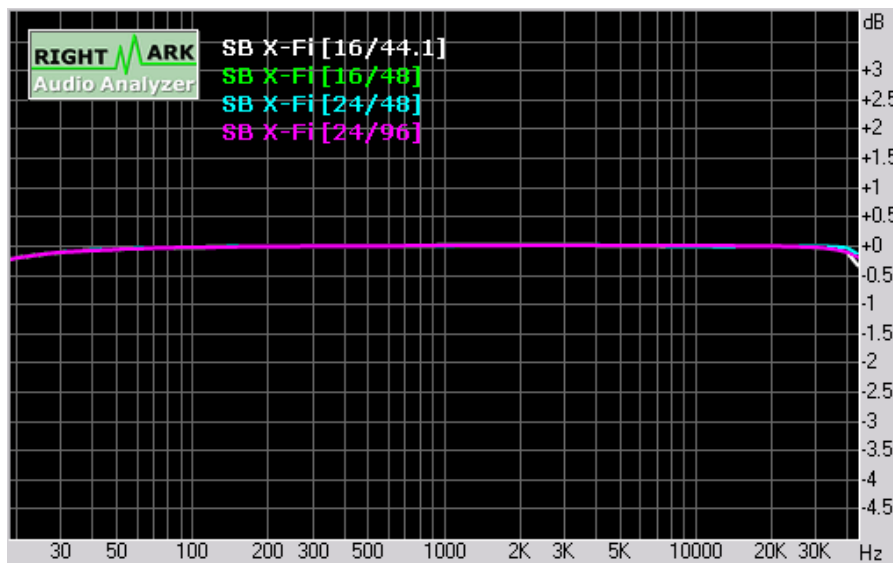
Parameter	Left	Right
IMD + Noise at 5 kHz, %:	0.0047	0.0043
IMD + Noise at 10 kHz, %:	0.0050	0.0046
IMD + Noise at 15 kHz, %:	0.0071	0.0066

Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Comparison of: SB0460 @ 16-bit/44.1kHz,
16-bit/48kHz, 24-bit/48kHz and 24-bit/96 kHz

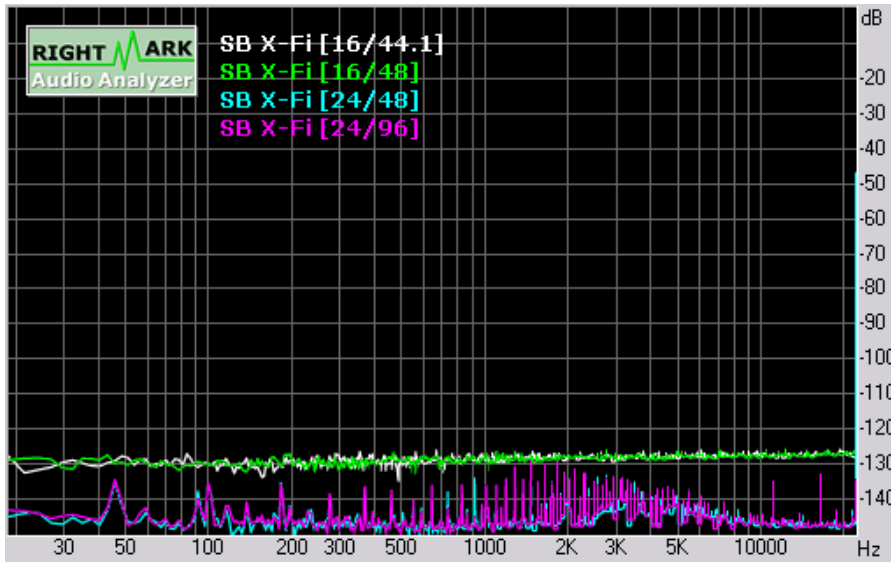
Test	SB0460 [16/44.1]	SB0460 [16/48]	SB0460 [24/48]	SB0460 [24/96]
Frequency response (from 40 Hz to 15 kHz), dB:	+0.02, -0.08	+0.01, -0.09	+0.01, -0.09	+0.02, -0.17
Noise level, dB (A):	-94.1	-94.5	-102.1	-102.2
Dynamic range, dB (A):	94.0	94.3	101.6	102.0
THD, %:	0.0009	0.0009	0.0008	0.0008
IMD + Noise, %:	0.0057	0.0054	0.0026	0.0025
Stereo crosstalk, dB:	-97.0	-94.5	-101.5	-98.6

Frequency response

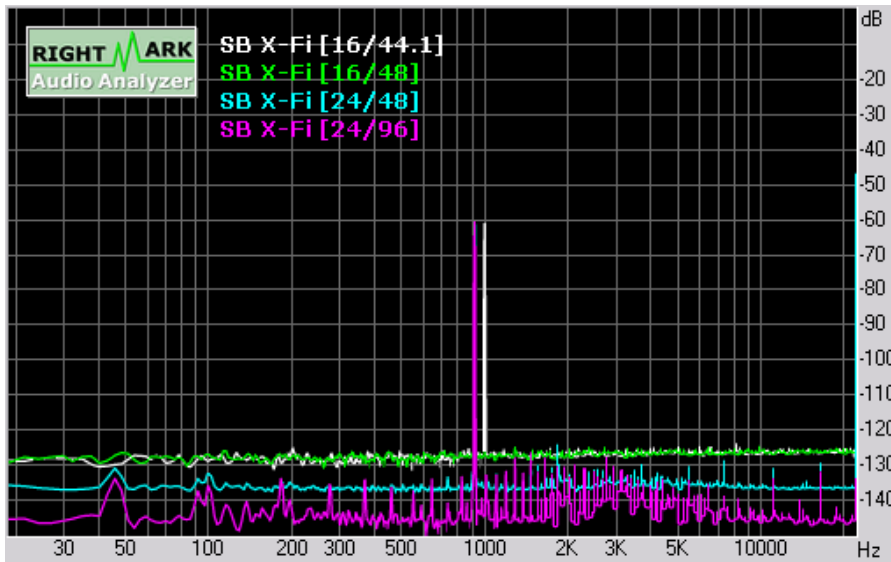


Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Noise level

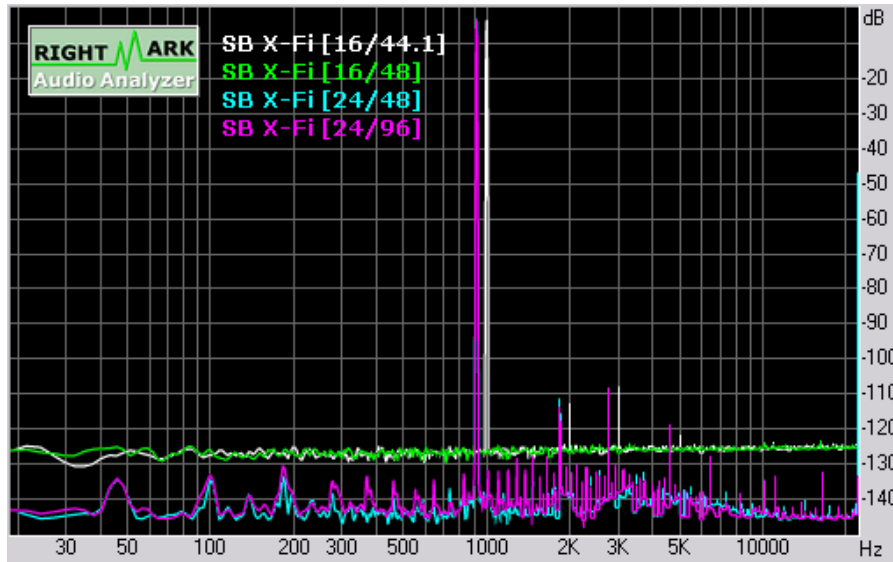


Dynamic range

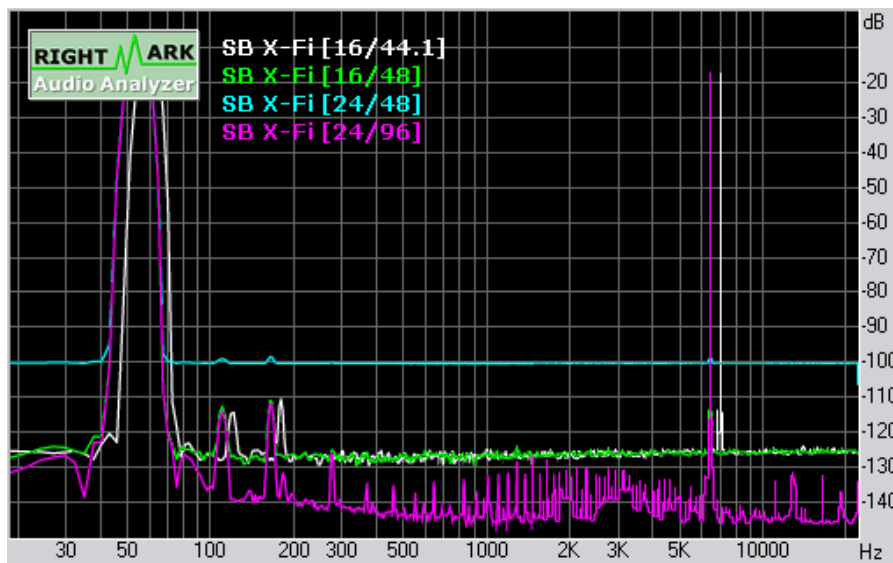


Sound Blaster® X-Fi® RMAA Testing Methodology and Results

THD + Noise (at -3 dB FS)



Intermodulation distortion



Sound Blaster® X-Fi® RMAA Testing Methodology and Results

Stereo crosstalk

