Test report Anatal Electronics XBAY crosspoint switch

Commisioned by:
Anatal Electronics
Dennis Bekkering

Execution:
Linear Audio
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Testequipment:
Audio Precision AP SYS2722 sn 27075, calibration date December 2018

Date of execution:
14 february 2019

Test-results (note: all levels in Vrms unless otherwise noted).

1. Harmonic distortion at spot frequencies. Measurements have been performed at 1kHz and 5kHz. 1KHz measurements have been performed at 100k load and 10k load, all in balanced mode and 1V input signal. Results are shown in figures 1, 2 and 3 below.

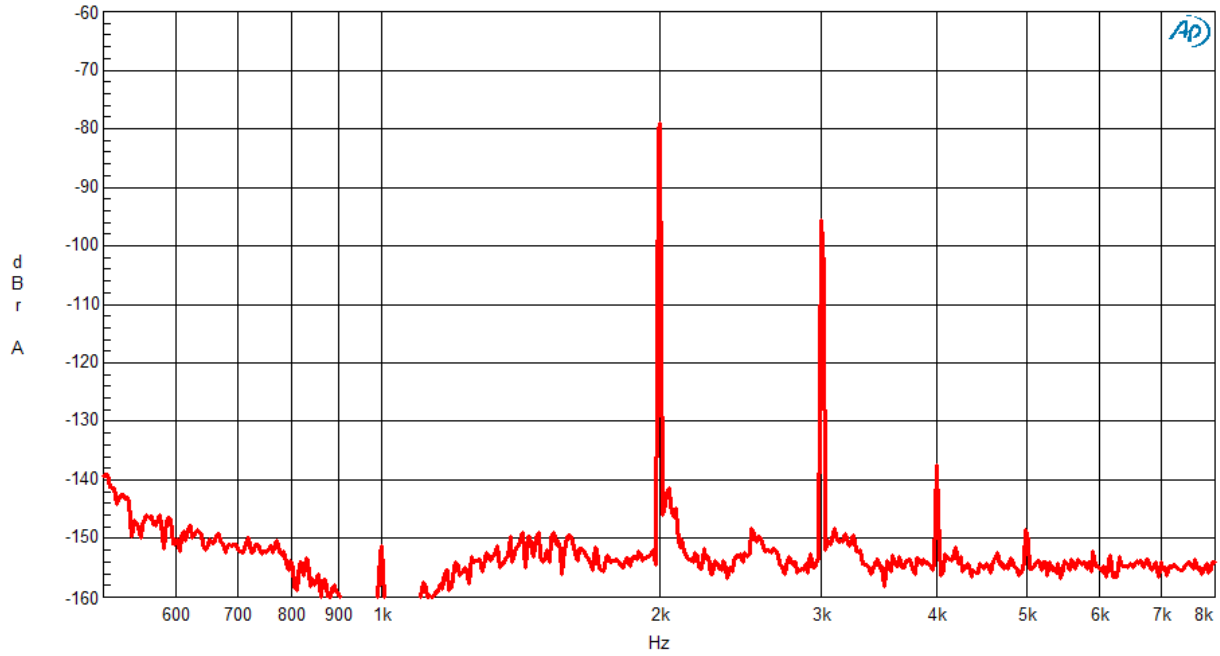

Fig.1 THD at 1kHz, 1V, balanced, 10k load

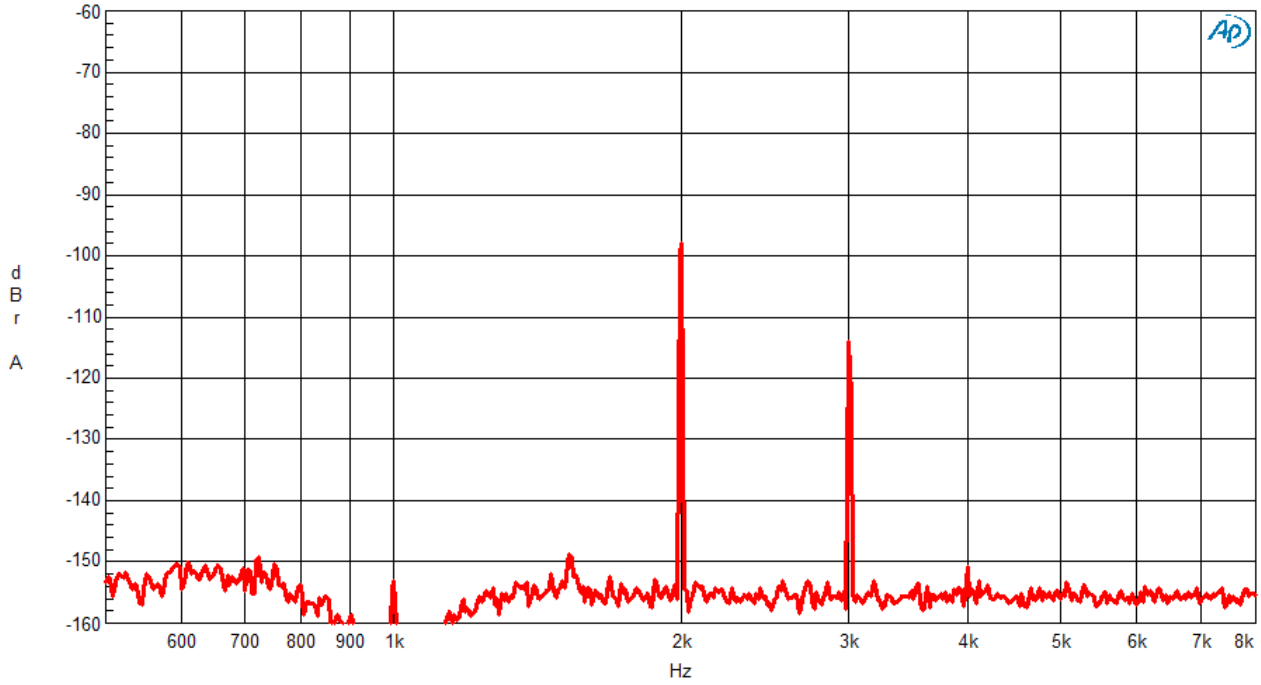

Fig.2 THD at 1kHz, 1V, balanced, 100k load

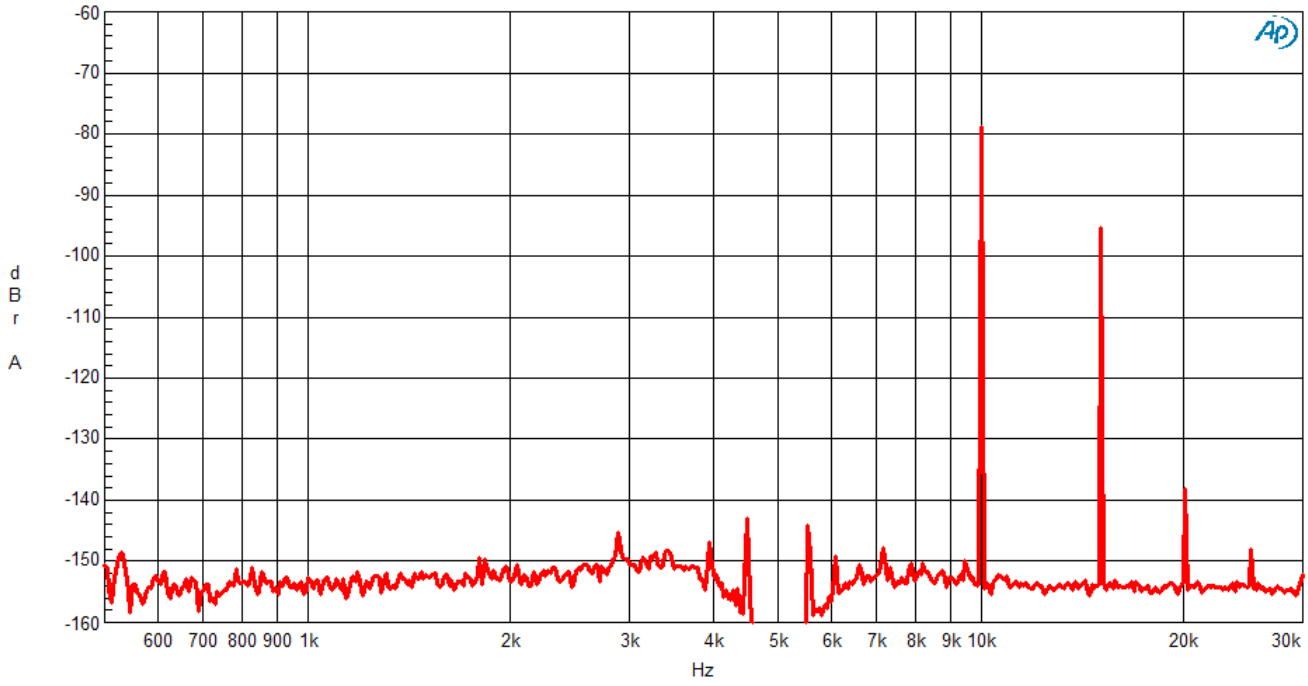

Fig.3 THD at 5kHz, 1V, balanced, 100k load

Comment: As expected THD depends on load impedance. 10K load can be considered worst-case; in practice results will be at least as good as shown with a 100k load.

2. Harmonic distortion as a function of level. Measurements have been performed at 1kHz, with both 10k and 100k load. Results as shown in figures 4 and 5.

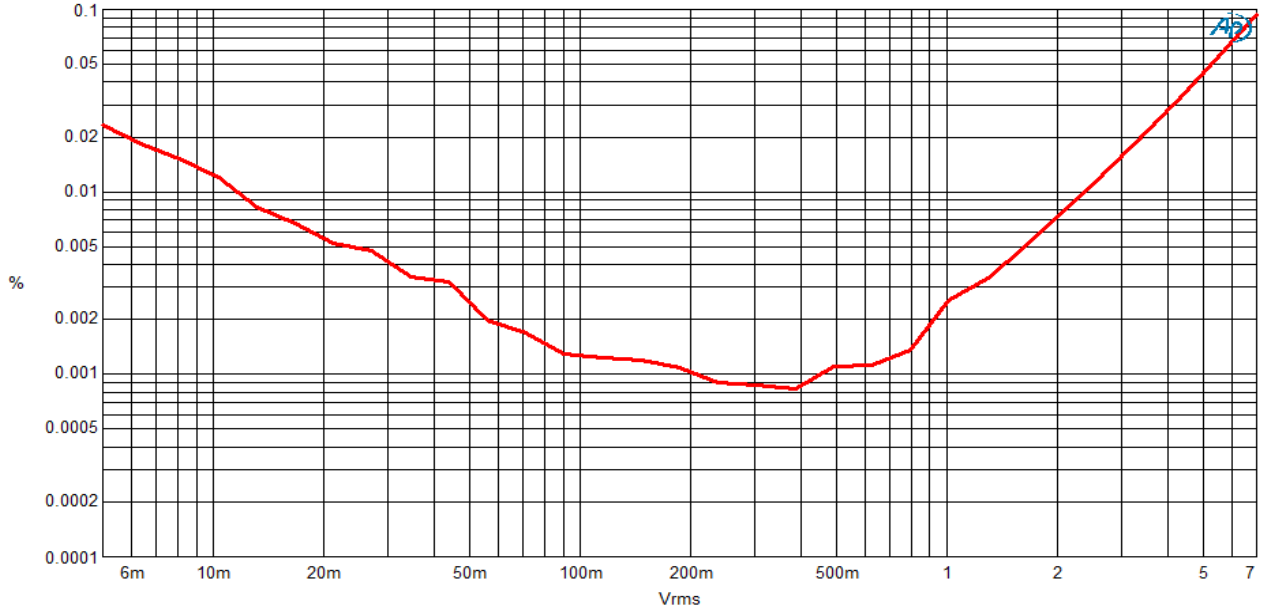

Fig.4 THD vs. level at 1kHz and 10k load

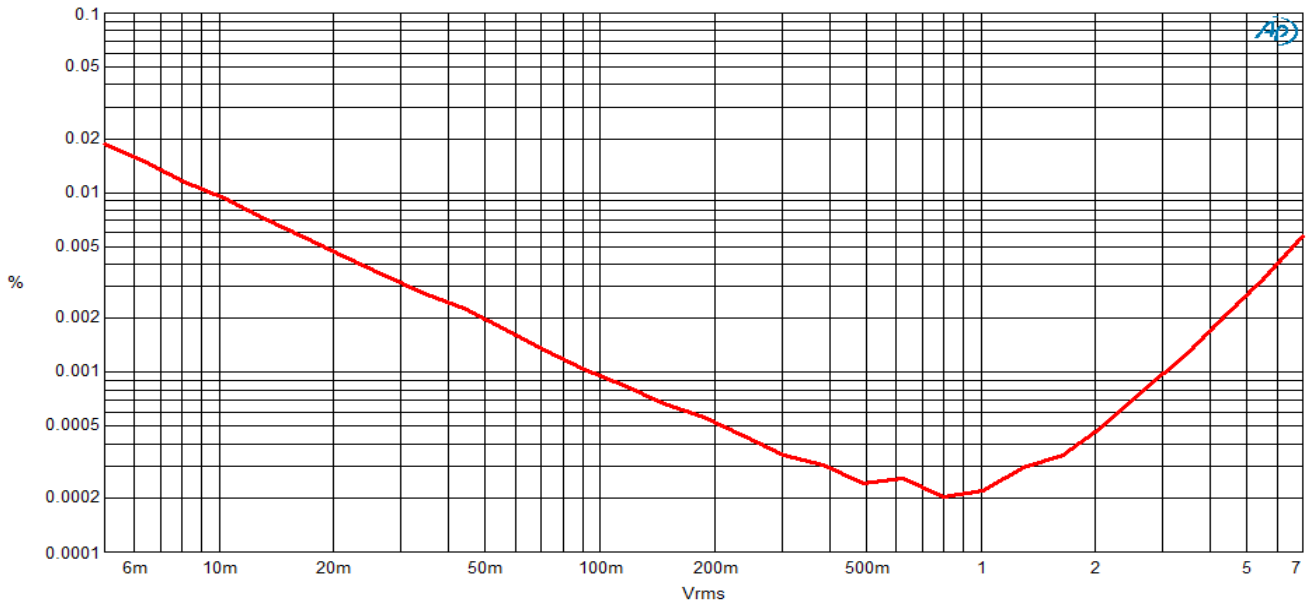

Fig.5 THD vs. level at 1kHz and 100k load

Comment: THD is very low in the normal operating range, especially with load impedances at 100k or higher, which will normally be the case.

3. <u>Frequency and phase flatness over frequency.</u> This is shown in a single graph, figure 6. Measured with 1V input and 10k load. Red trace is frequency response magnitude, blue curve is frequency response phase.

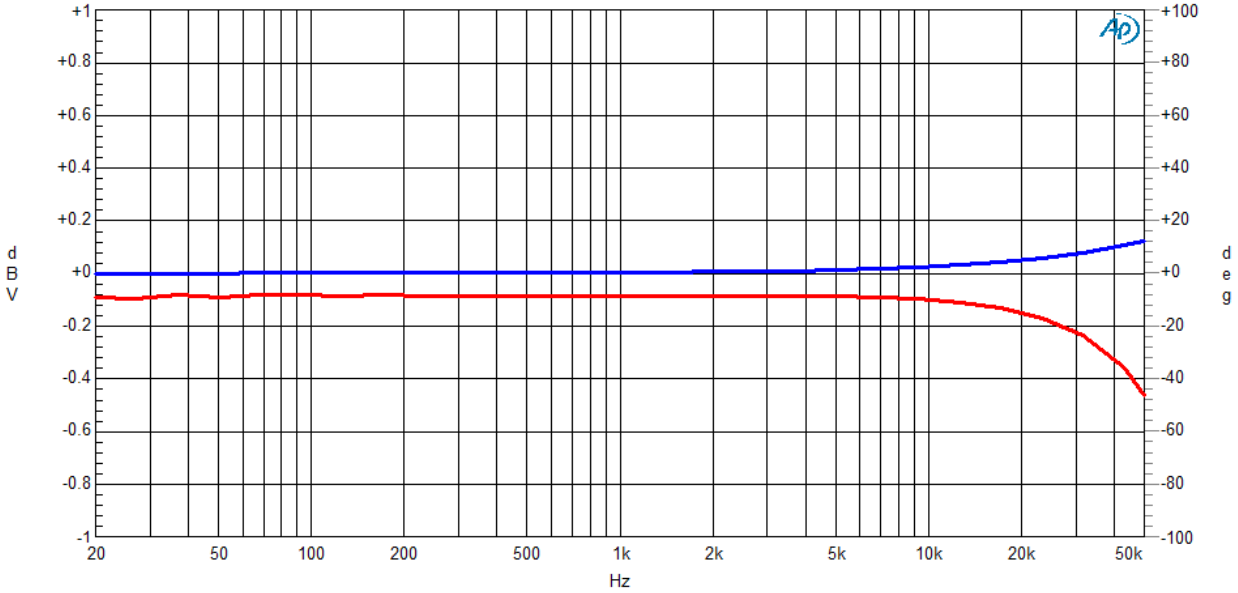

Fig.6 Frequency (red) and phase (blue) response at 1V and 10k load

Comment: Frequency response is flat to better than 0.1dB over the audio band, with a commensurate flat phase response deviating less than 5 degrees at 20kHz.

4. Noise floor over frequency. Measurement of noise with a sliding bandpass filter. The noise at each frequency point is measured in the filter pass-band, corrected for bandwidth of the filter and for the filter slopes, and dimensioned to V per root Hz. Result is shown in fig. 7.

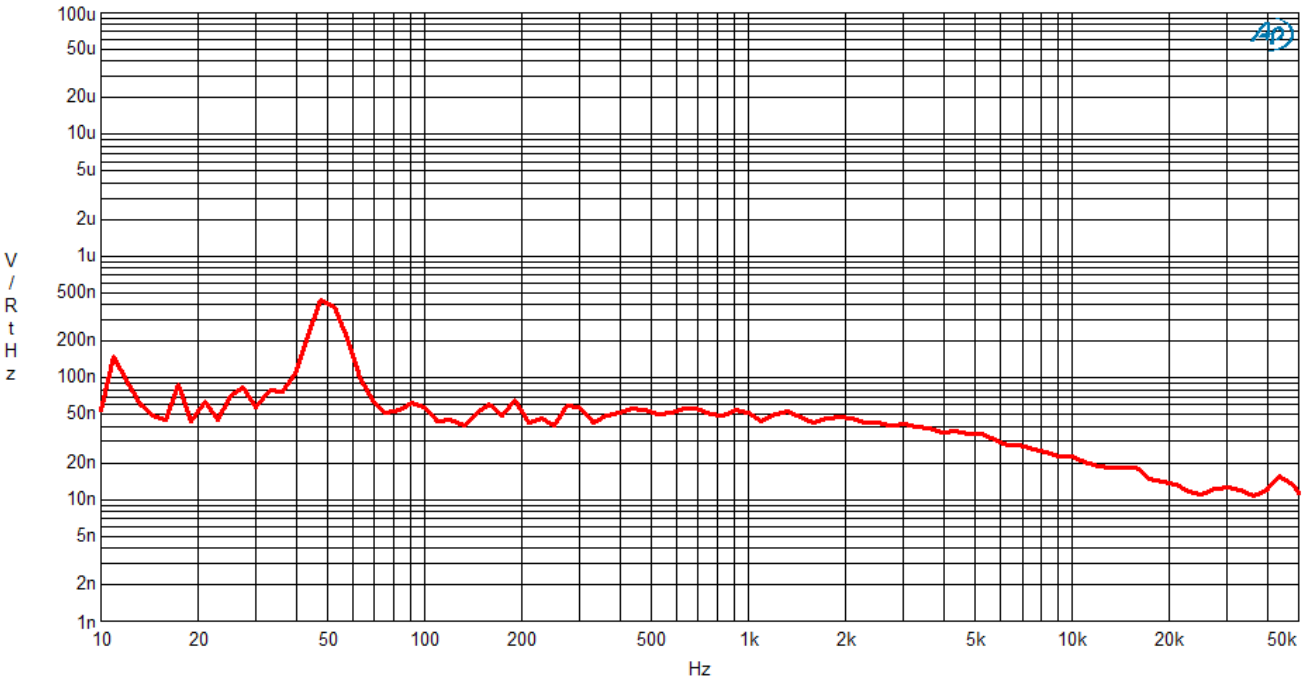

Fig.7 Noise over frequency in V/RtHz

Comment: Noise floor is very low over most of the frequency band. There is a small 50Hz mains hum visible, but still quite low. This will be inaudible. Taking the average of 50nV/RtHz and integrating over a 20Hz-20kHz frequency band gives a broadband noise level of just 7.07uV.

5. Dynamic range This can be calculated as the difference between a specified input level and the broadband noise level. The maximum input level for distortion free reproduction is given in fig. 9 as 2.1V over the entire audio band. This represents a dynamic range at any frequency in the audio band of over 110dB. At up to 3kHz the dynamic range is over 115dB.

6. <u>CCIF intermodulation test</u>. Measured with 19kHz and 20kHz, -6dBV signals, 10k load. Result is shown in fig 8.

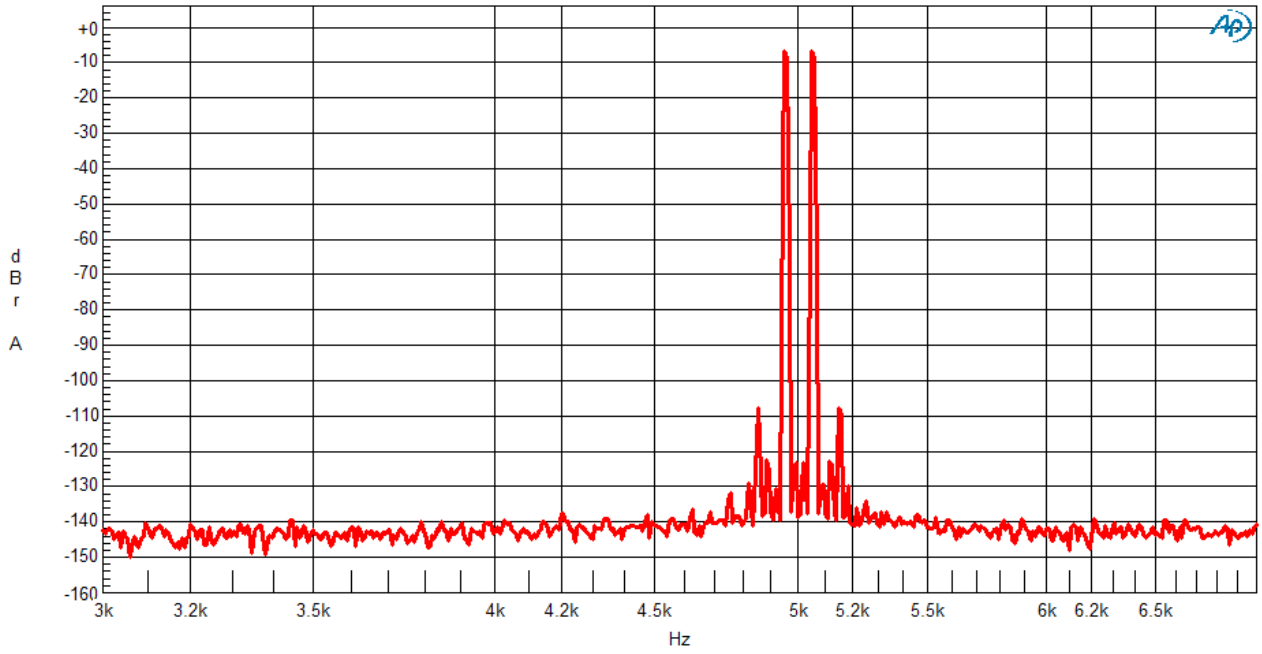

Fig.8 CCIF IMD test, 19+20kHz, -6dBV, 10k load

Comment: Intermodulation performance generally shows better conformance with subjective listening preferences than THD performance. The CCIF IMD performance shown here is very good; the main sidelobes are just above -110dB and other sidelobes are all but invisible.

7. Maximum input signal level versus frequency for less than 0.01% THD. With this test, the 0.01% THD+N is used as reference. At each frequency point, the input level is increased until THD+N reaches 0.01%. Results are shown in figure 9, with the blue curve showing the 0.01% reference line, left Y-axis, and the red curve showing the max. level at each frequency with the right Y-axis.

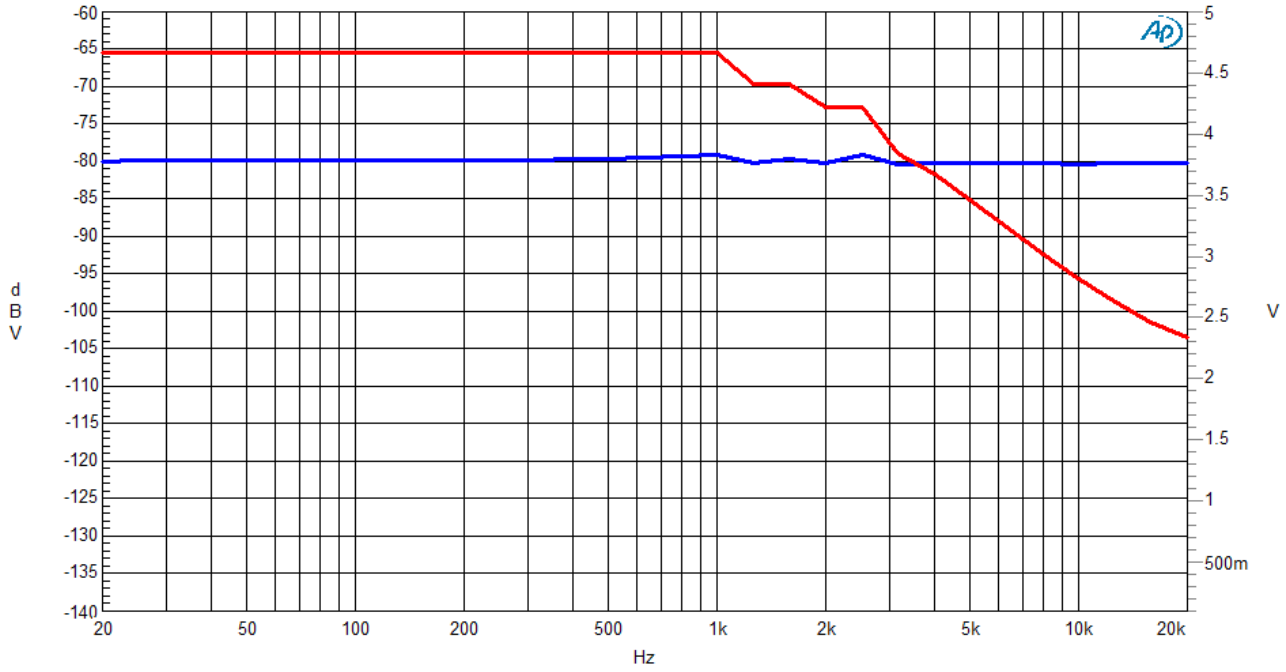

Fig.9 Max. input level vs frequency for 0.01% THD+N

Comment: As is normal, THD+N rises with frequency which means that the max. input level for a specific THD+N level decreases with frequency. Performance shown here guarantees that as long as the input level remains below approximately 2.1V, the THD+N will always be less than 0.01% at any frequency in the audio band.

8. Cross-talk into adjacent channel. This is tested by driving one balanced channel and measuring the spill-over into an adjacent channel. Result as shown in figure 10. Note that the input level here needed to be set to 8V (!) to obtain a meaningful result.

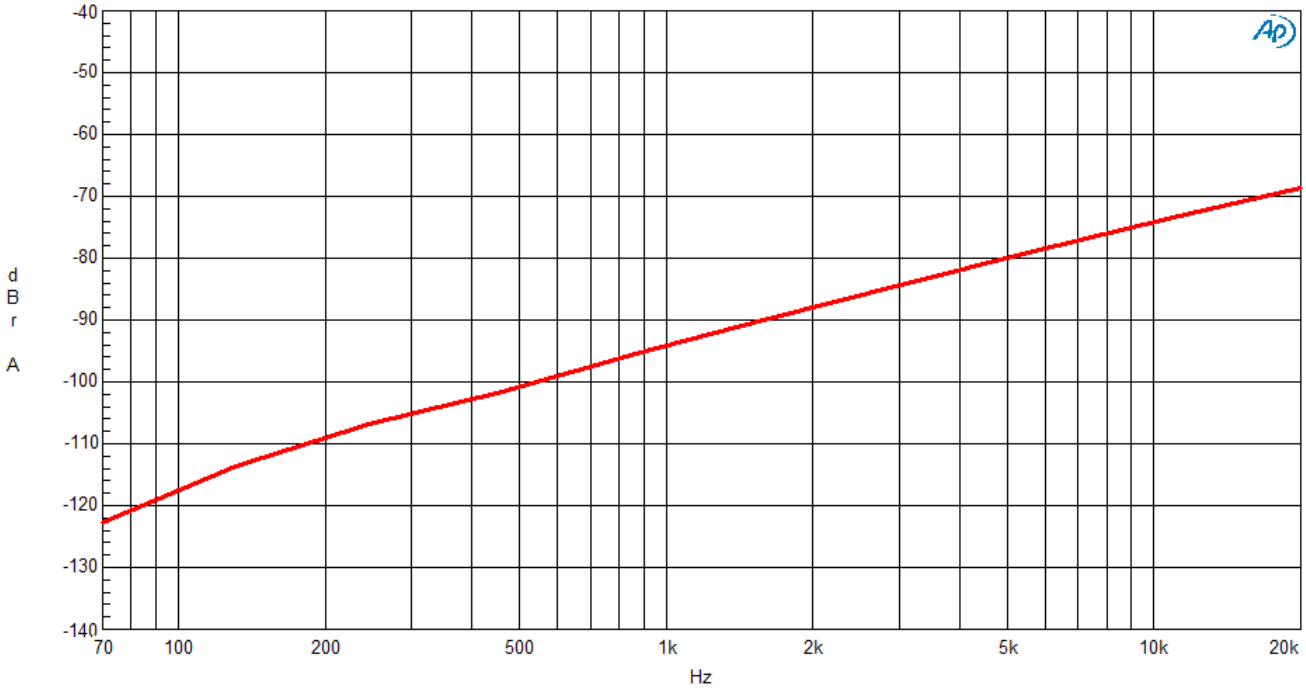

Fig.10 Cross-talk into adjacent channel at 8V into driven channel. 10 k load.

Comment: Cross-talk in the important section of the audio band is very low, remaining low even at high frequencies. Cross-talk below 100Hz is not shown as it was below the residual of the test equipment.

Final comment. This equipment performs very well in the tests performed.

The distortion performance depends somewhat on the load impedance, which is fully explainable from the used cross-point devices. This dependence can be fully eliminated with the use of a DI-box or a similar high-impedance interface on the XBAY outputs.

Turnhout, 18 februari 2019
for Linear Audio,

Jan Didden