ES9038Q2M Board test with current mode output

Input signal to DAC board: SPDIF from RTX6001.
Minimum phase fast roll-off filter selected.

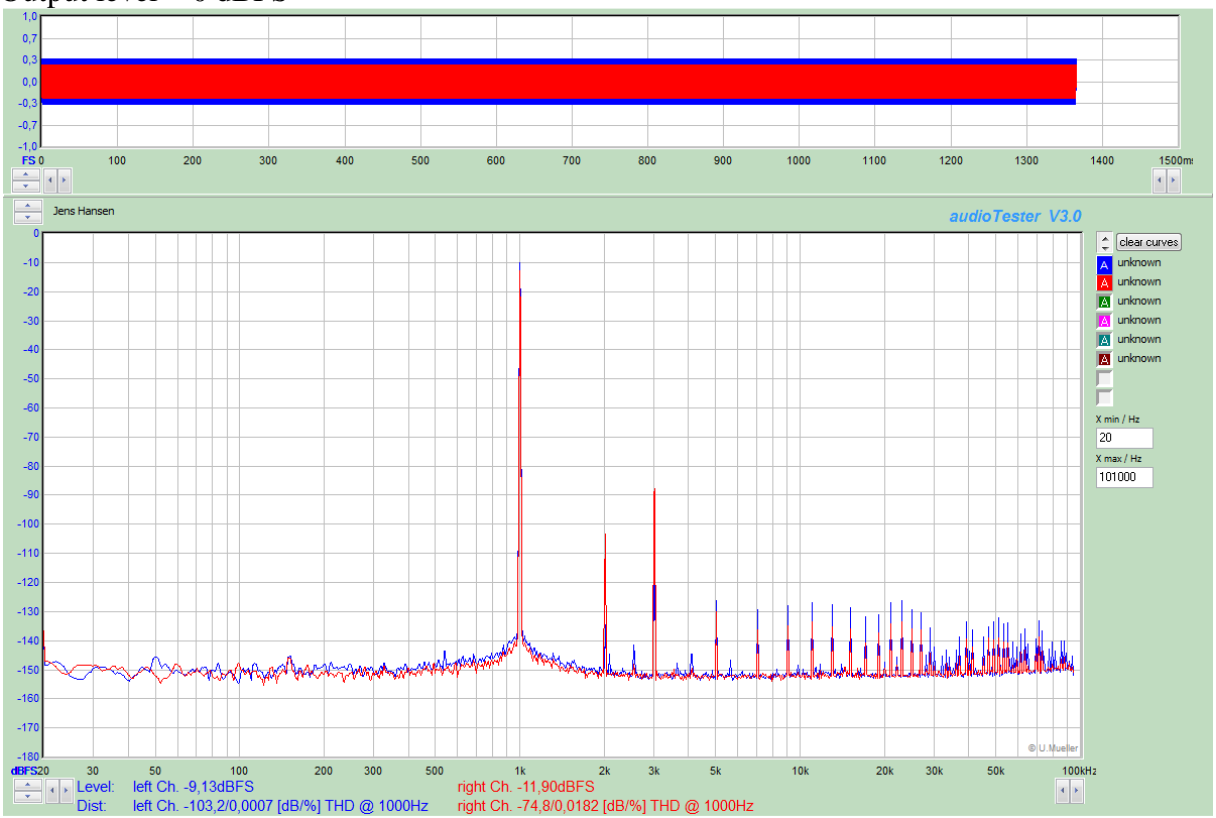
1 With current mode output and original output

Left channel: Current mode output
Right channel: Original voltage mode output

1.1 Level and THD

Input attenuator: 20dBV.
FFT 256k, average over 10

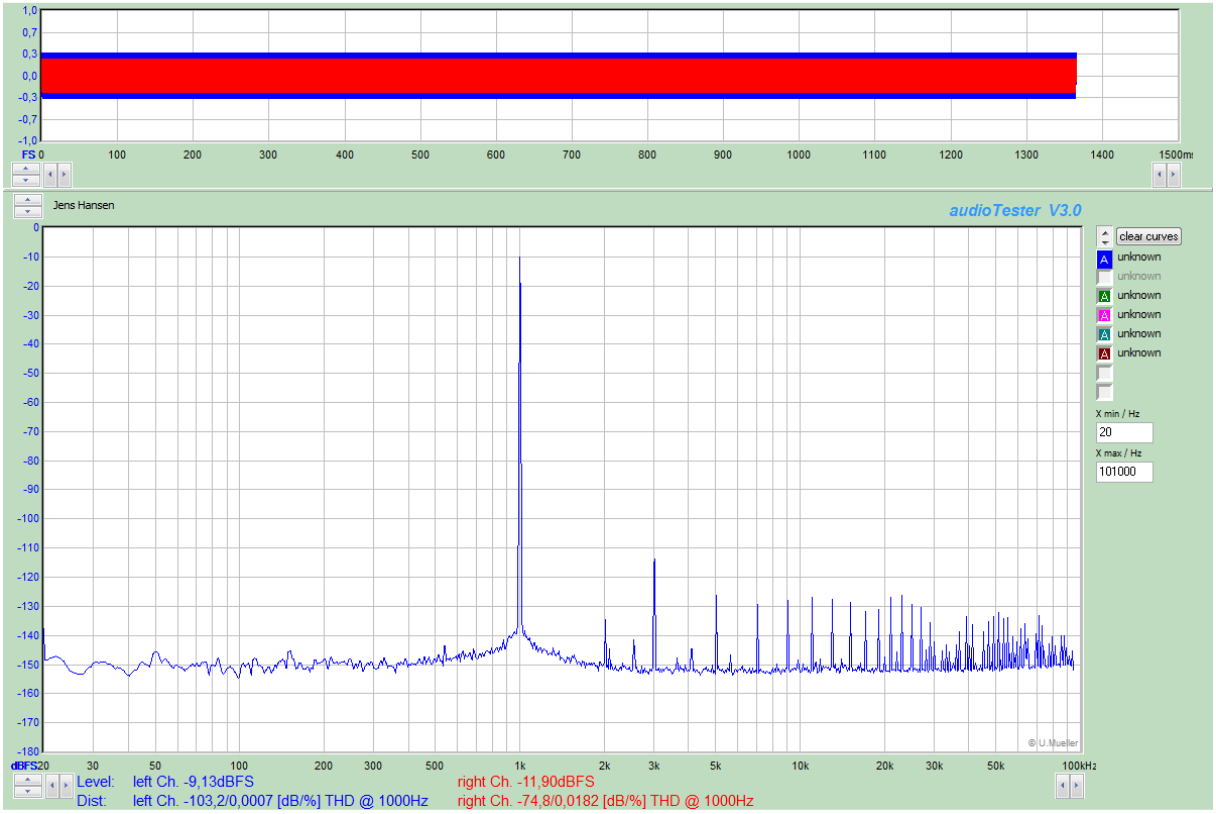
Output level = 0 dBFS



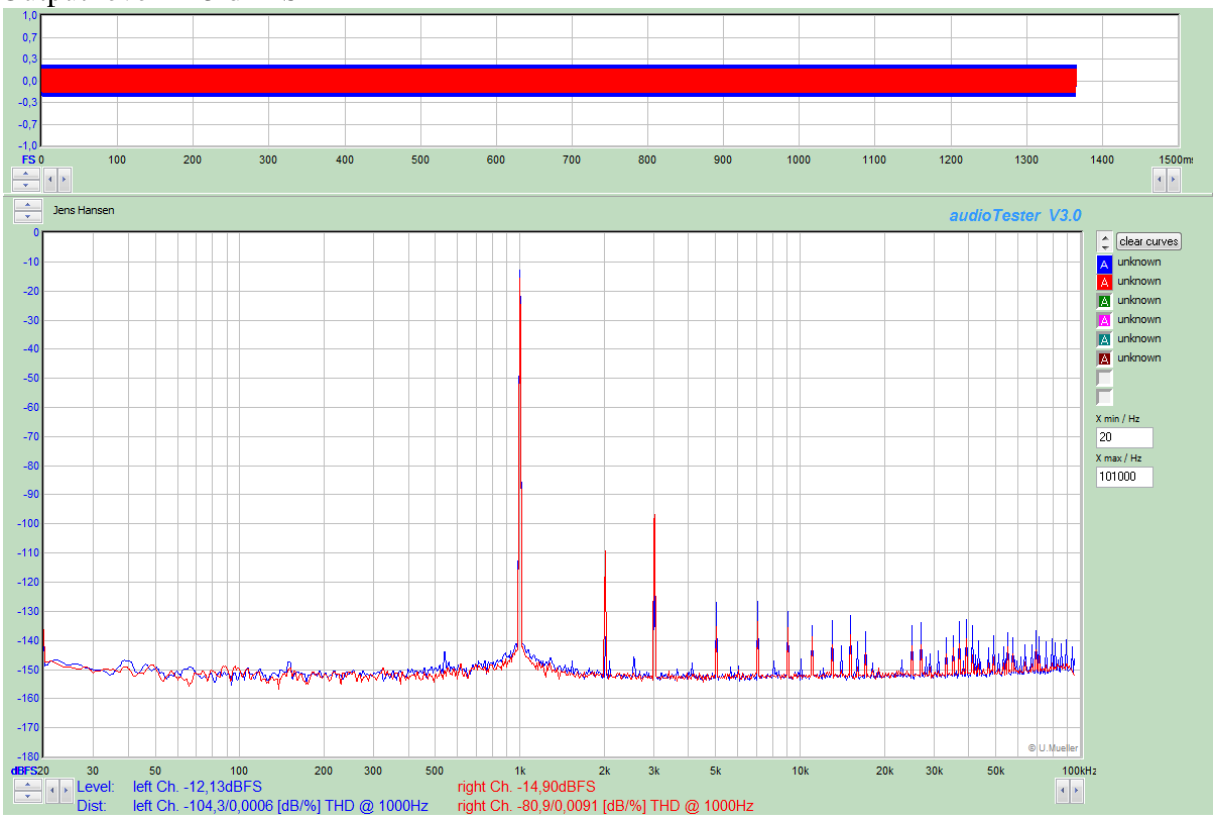
Left (current mode): -9.13 dBFS = 10.87 dBV = 3.495 Vrms
Right (voltage mode): -11,90 dBFS = 8.1 dBV = 2.541 Vrms

The current mode output has a level, which is 2.77 dB higher than the voltage mode due to the feedback resistors used (1.27kohm).

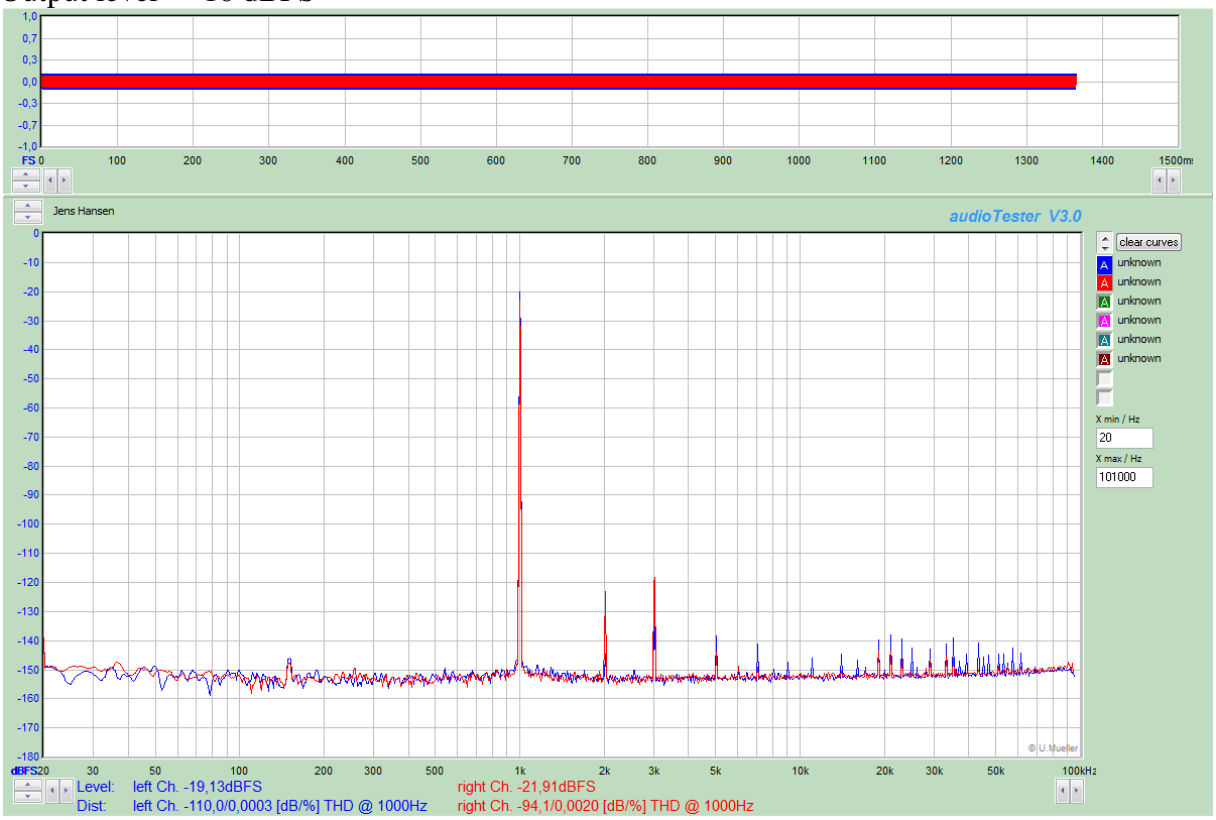
The same measurement, but with only the current mode output visible:



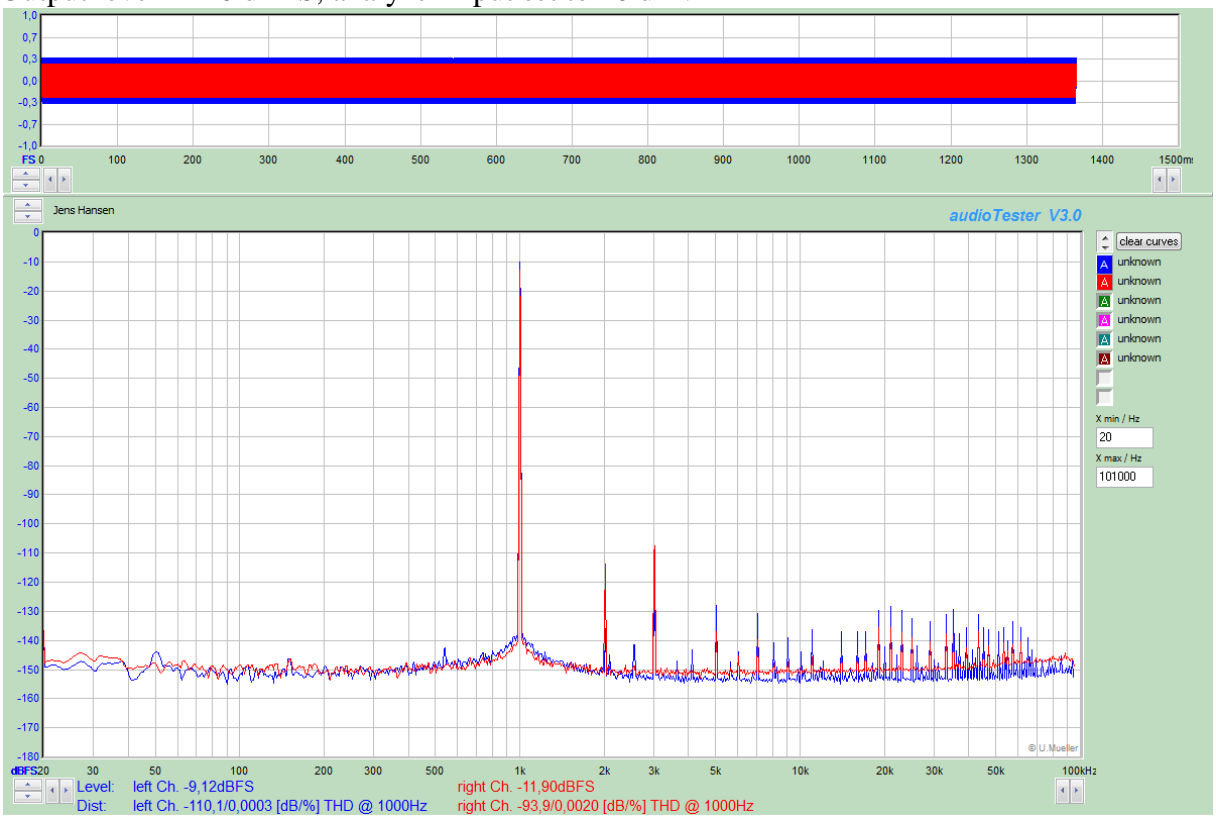
Output level = -3 dBFS



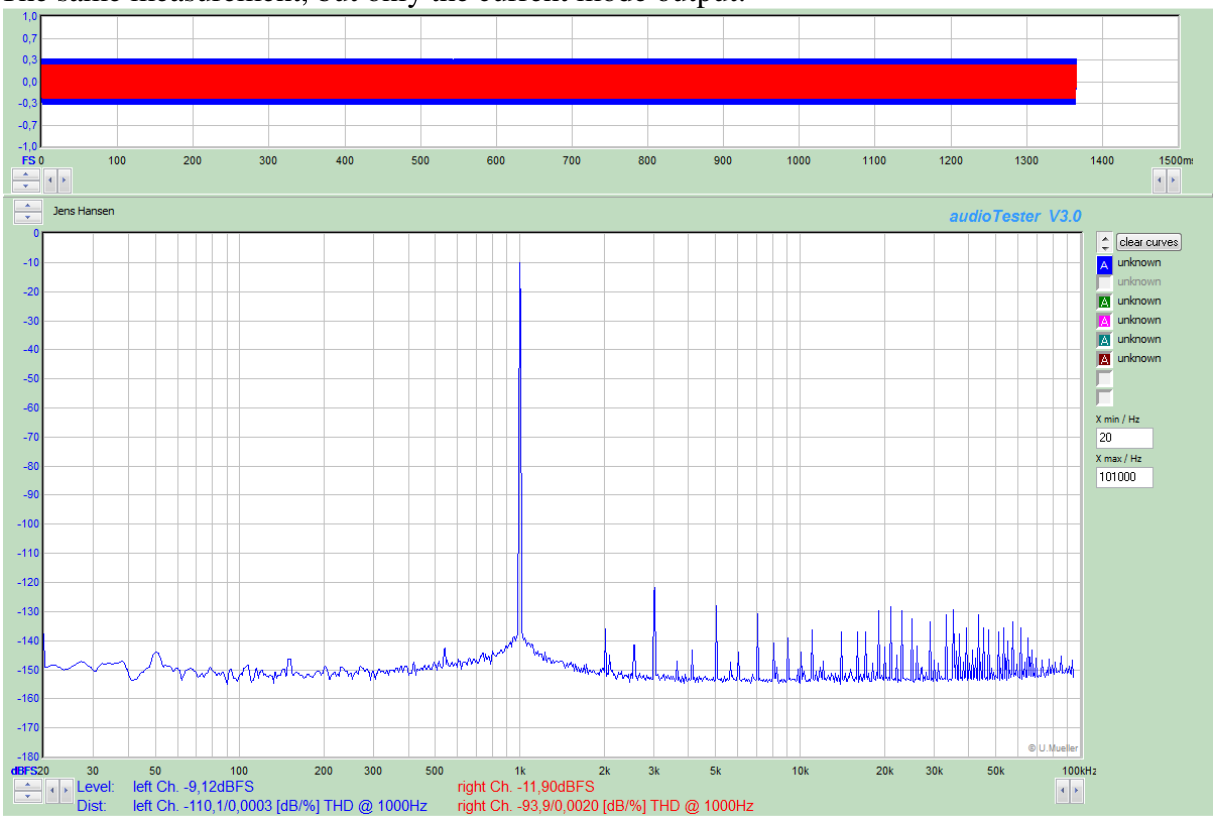
Output level = -10 dBFS



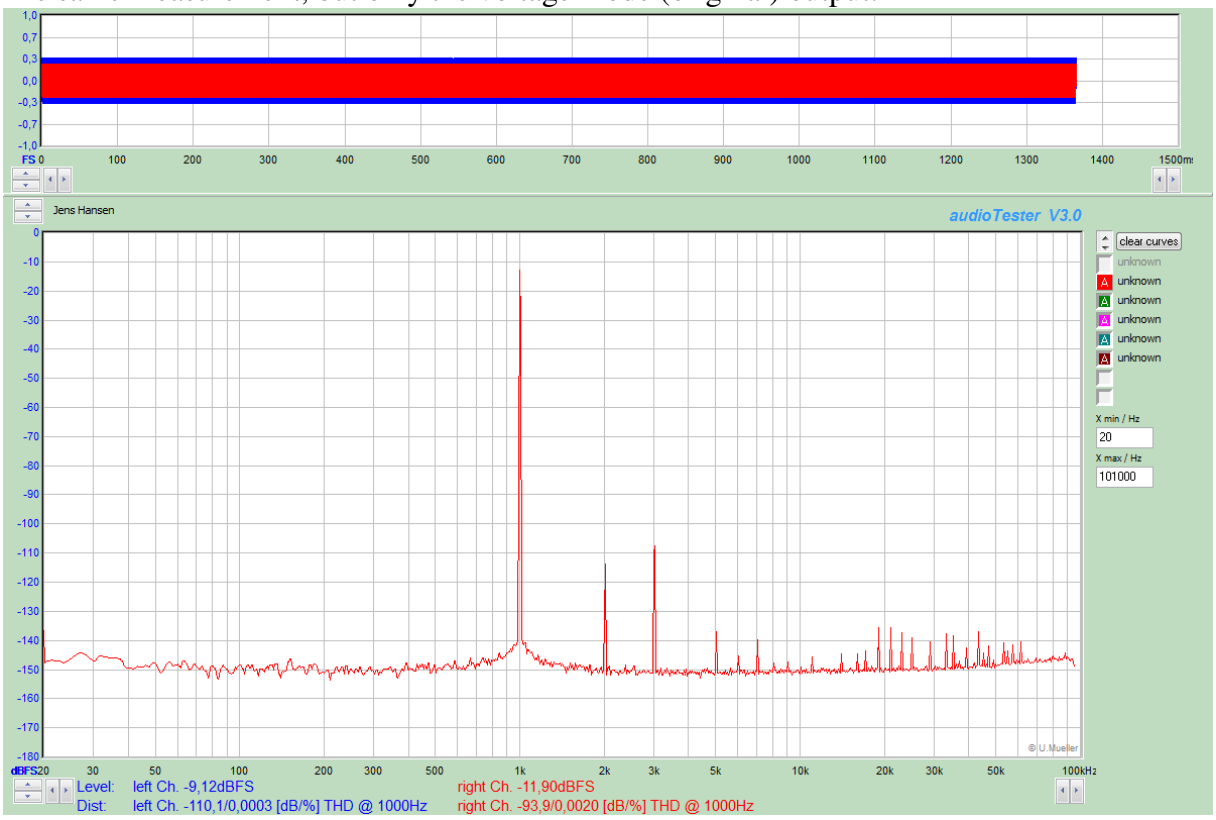
Output level = -10 dBFS, analyzer input set to 10 dBV



The same measurement, but only the current mode output:

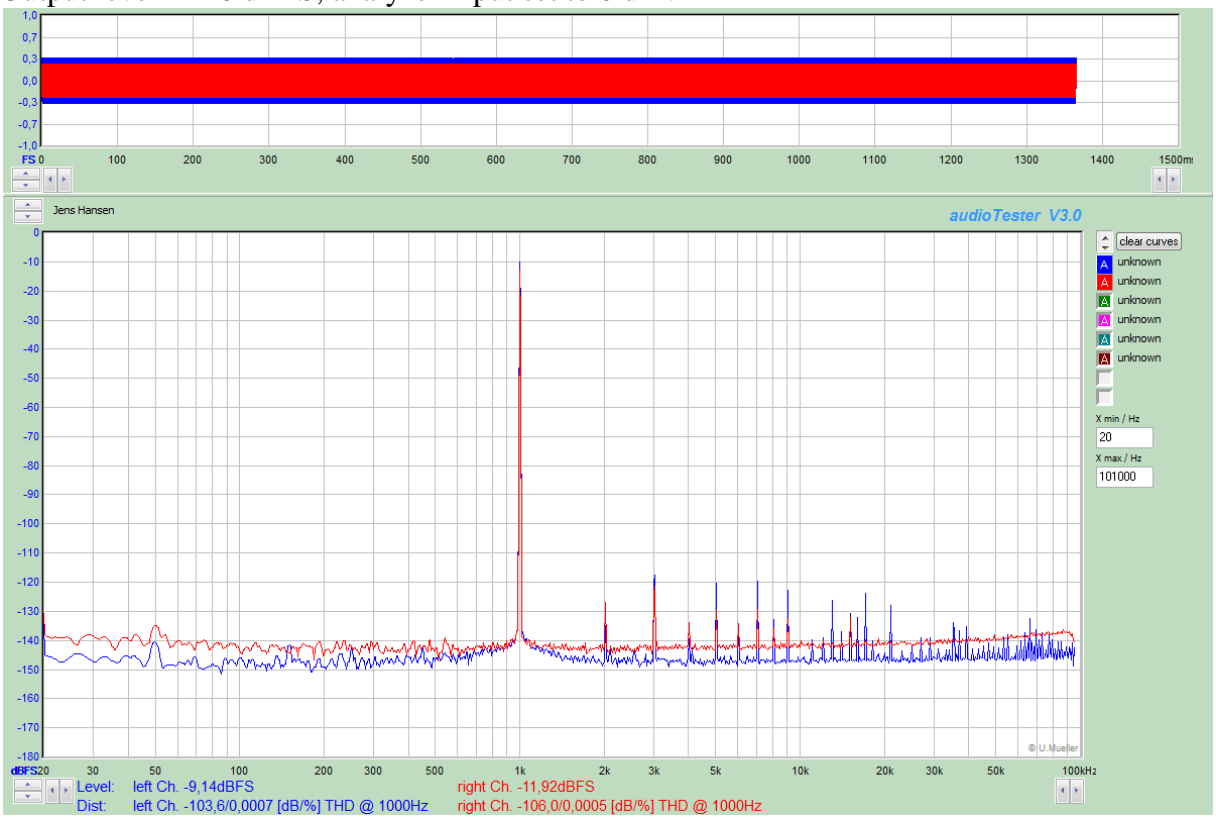


The same measurement, but only the voltage mode (original) output:



The current mode output has a relatively high level of harmonics/image products at the high frequencies. This may be due to the simple filter (first order, -3 dB at 365 kHz) used on the current mode output. Some of the high frequency content may also be due to the less than optimal layout, with the filter board connected with wires.

Output level = -20 dBFS, analyzer input set to 0 dBV



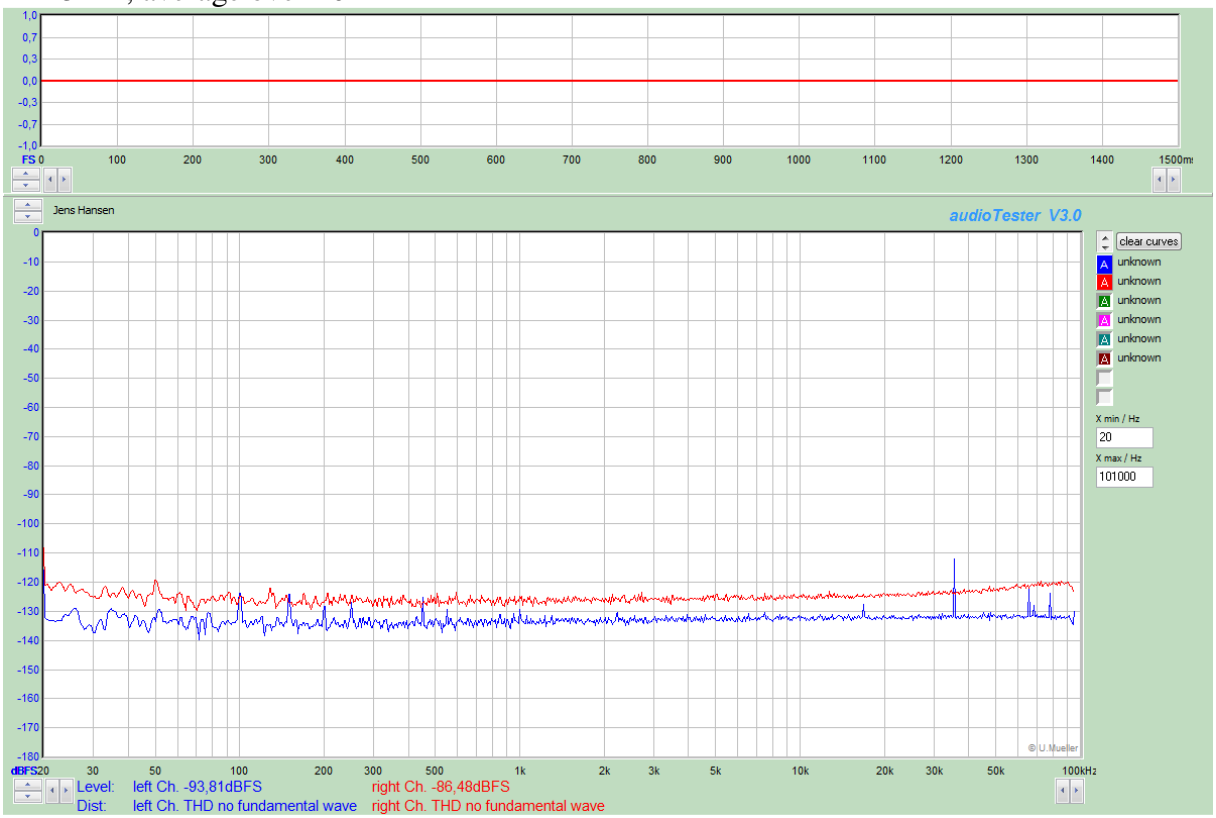
Interestingly the distortion of the voltage output circuit is lower than the distortion of the current mode output circuit at this level.

1.2 Noise

Input attenuator: -20dBV.

1.2.1 Un-weighted

192 kHz
FFT 512k, average over 10

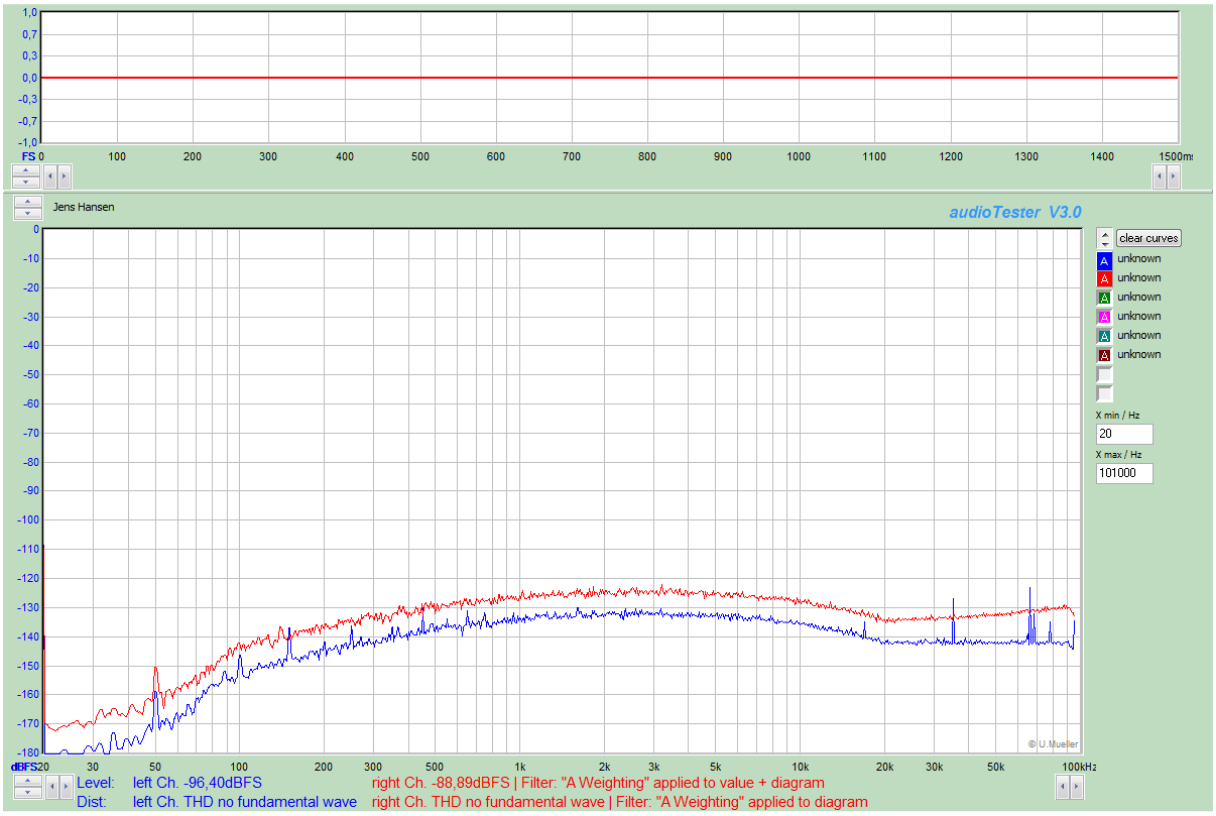


Dynamic range, unweighted:

Left (current mode): 124.68 dB
Right (voltage mode): 114.58 dB

1.2.2 A-weighted

192 kHz
FFT 512k, average over 10



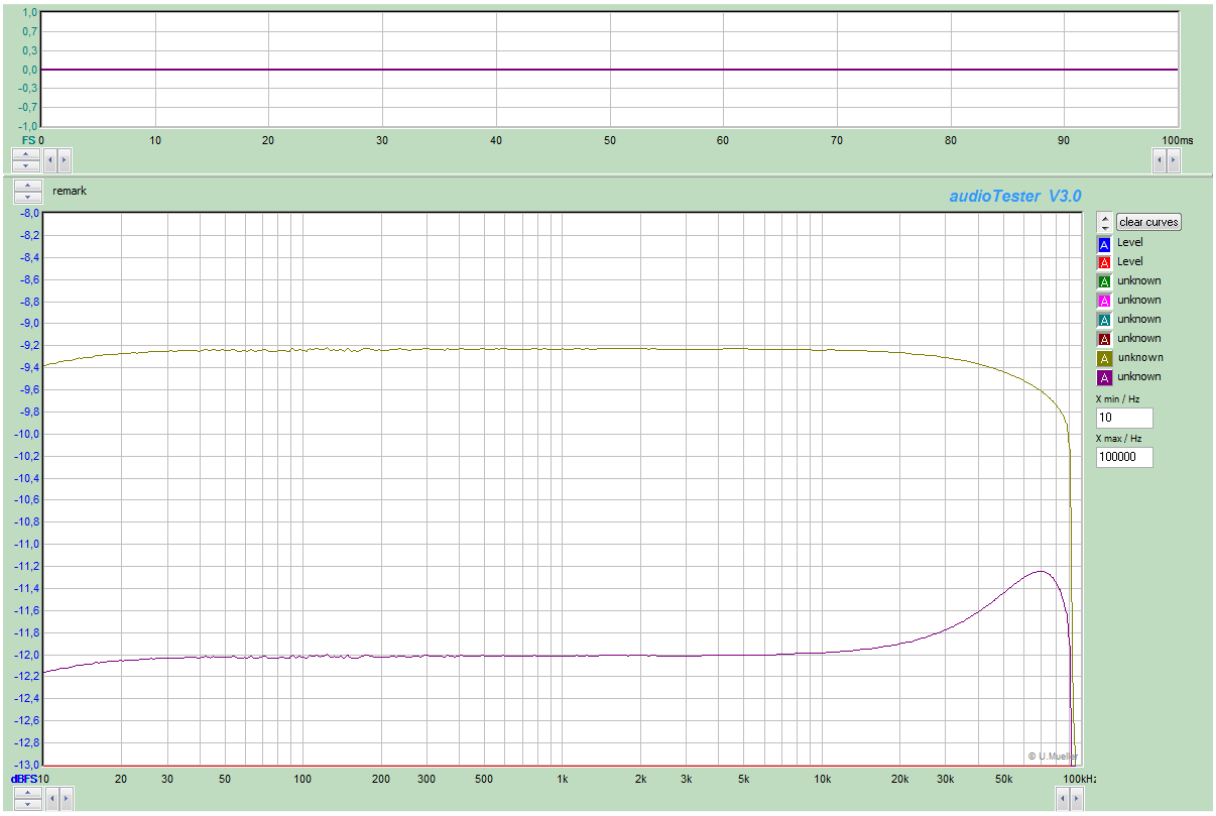
Dynamic range, A-weighted:

Left (current mode): 127.27 dB
Right (voltage mode): 117.99 dB

1.3 Frequency response

Measured at -10 dBFS.

Minimum phase fast roll-off filter selected.



Left (current mode): upper curve
Right (voltage mode): lower curve

The roll off at the lower end is due to the AC coupling used on the analyzer input. The current mode output has a DC-offset of 1.65 V.

2 Test object

A small PCB with the 2 x LME49990 was added to one channel. The alternative buffer was connected directly to the balanced outputs of the DAC IC. The resistors connecting the DAC outputs to the original buffer were removed.