I've built various amplifier boards over the years, but they never seemed to ever make it into a final chassis, due to different design tradeoffs that never met the performance I was expecting in the end. Some notable amps that I have built and are using currently are from Neurochrome and Orchard Audio, but even these great amps have their drawbacks, lack of gain, lack of power, or too easy to build, as most are completed SMD boards that only require wiring. Which to some is perfect, but for me, not enough of a challenge or sense of accomplishment.

So, the search was on to find that perfect Amp, which leads me to this review.

I was absolutely floored by the quality, fit and finish of the PCB's when they arrived. They have by far the best thought out layout and placement, for both assembly and performance I have had the pleasure of working with, and not for one second would you think they were made possible by a group of DIY'ers. I have both black and green in 3 output and 4 output pairs, and they are all amazing, but to me if I had only one choice, I would go with green. Just the way it contrasts the gold pads, is like a fine piece of art!

No successful build is possible without detailed documentation, and this project presents that in spades. The attention to detail didn't stop with the design or PCB as many projects do, it carries forward into a very precise and accurate build guide and BOM. As of this writing the build guide is on Rev 20. 20! Not 1.01, this team is committed to accuracy and completeness, and it has shown in every aspect of the documentation as well. In the 40 some odd pages of Rev17 that I worked with, I found 2 very minor points that needed clarified, that's it! I remember in the past getting to that on the 1st page of build guides.

The build itself was very straightforward due to the documentation and BOM, I would rate it as just enough of a challenge, but I do think that with patience even a novice could complete it successfully. It flowed along just like all others, start with the small stuff and test along the way, pay attention to stuffing and there will be no issues. For me the most time-consuming part was manufacturing the heatsinks, as I built 6 boards that was a total of 18, of which I spent most of a full weekend cutting, drilling and tapping and the whole time dreaming of a CNC router! But all kidding aside once the mechanical is out of the way, the electrical is easy. The component spacing and lead pitches make soldering in the parts nontrivial, as does the quality of the PCB.

My case of choice for the EF3-3 boards was a diyaudio store Deluxe 4u 300mm, with predrilled heatsinks. Man does that make life easy, all mounting points and transistor holes were a perfect match, now it was onto feeding it some power. The adjustments required settled in quite nice, but drifted a bit more then I expected, but this was my fault as I was testing with the heatsink flat on the bench, which caused the thermals to keep rising. Once I stood it up so the heatsink was vertical the heatsink temperature stabilized and so did my adjustments. CCS, Offset and Bias locked right in, and after multiple power/thermal cycles, they all come right back to their adjustment points. Temps are very reasonable at the bias setting, as is power draw. Roughly 100 watts or so from the wall, with heatsinks around 40 Celsius.

The actual performance of the amplifier is bang on the estimated. I measured 200 watts 8 ohms and 400 watts 4 ohms, 1khz, with a 63 Volt supply, which to me is ideal 2x power ratio. Measurements acquired with my Quant Asylum QA403 concluded that the performance of the amplifier exceeds the limits of my audio analyzer, and without a distortion magnifier cannot be measured accurately with my equipment. As the graph shows, distortion was well under .001% from 50mW until clipping. The bumps at 5 and 10 watts are due to the ranging of the analyzer.

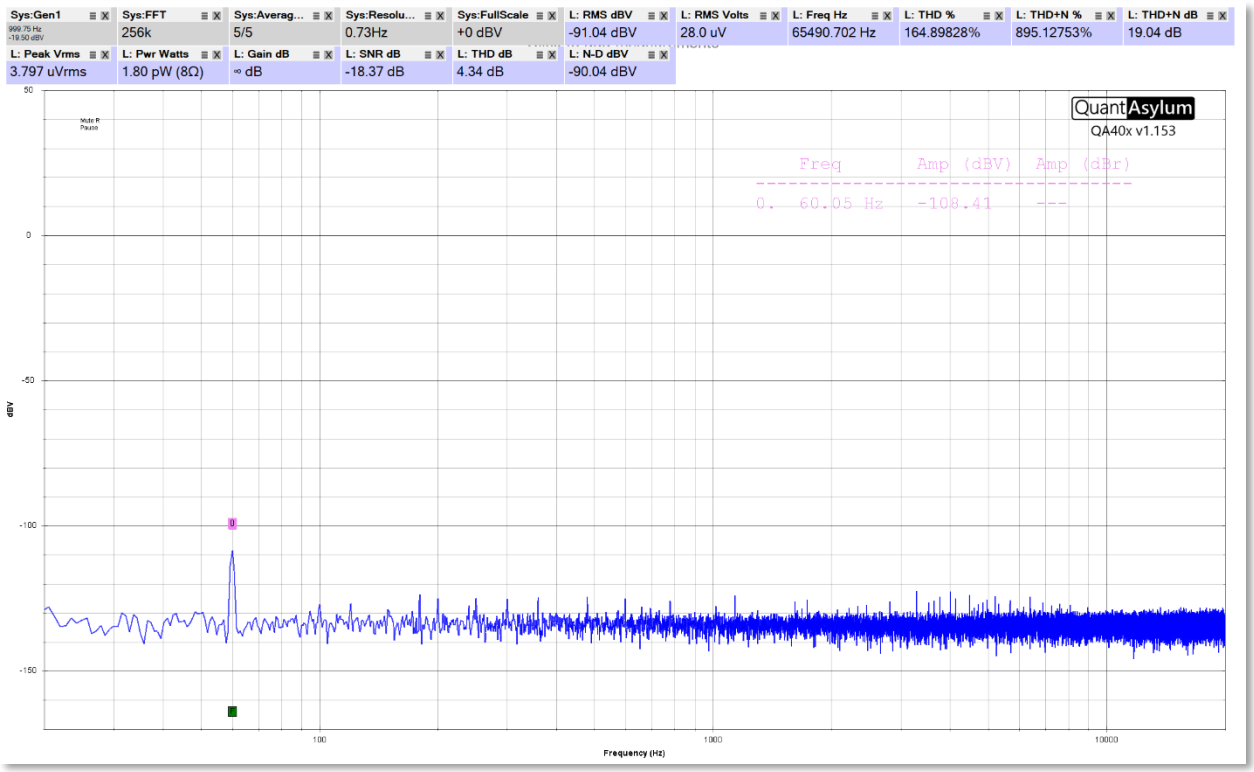
My completed amplifier has been in service now for roughly 4 weeks and is powering a pair of JBL Studio 590's without hesitation. I am a firm believer in the camp of "If it measures excellent, it will sound excellent" and that's exactly how it performs. Clean, open, and dynamic without any colour, a Perfect amplifier!

From the low bass to the upper treble, it has no issues staying true to the source, and to the nay-sayers of SMPS in class A or AB amps, try it you will be surprised, I was! There is no lack of bass or transients in any material I have listened too, from AC/DC to Eminem to Johnny Cash, it is the best I have ever heard!

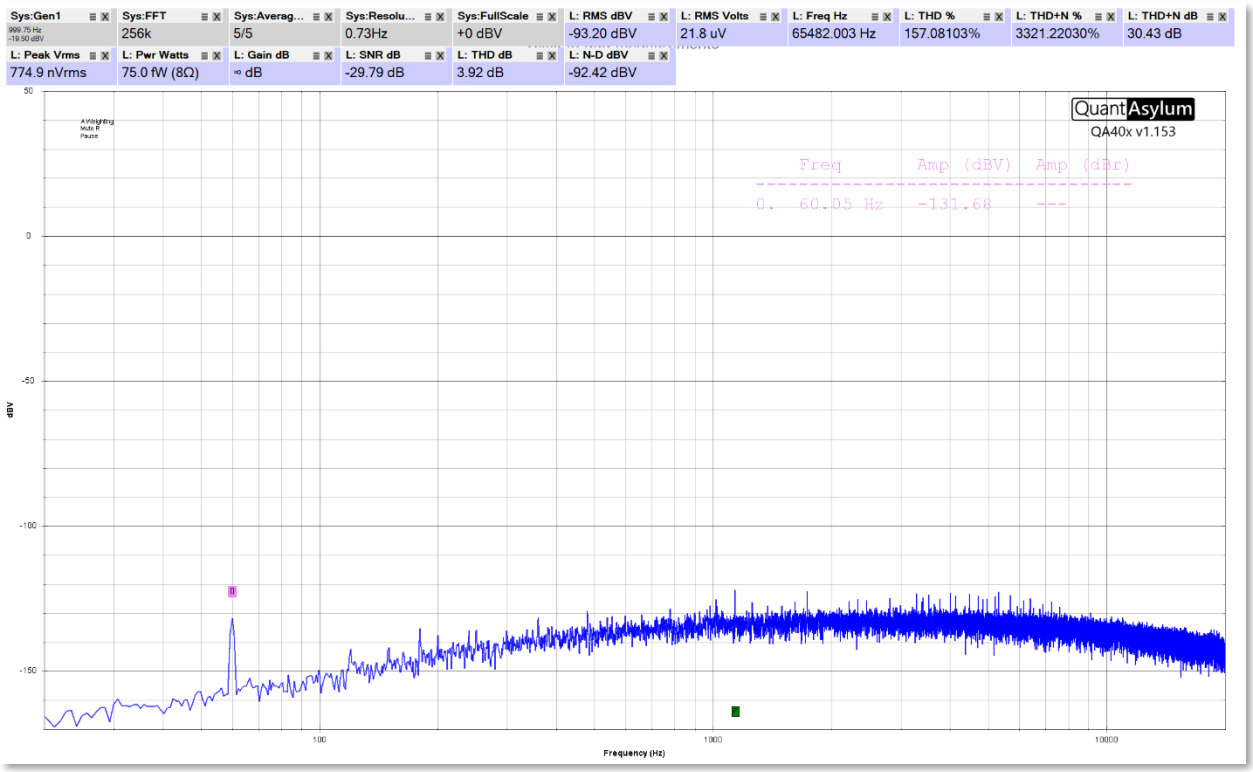
I want to thank the whole Wolverine team, for their efforts in bringing this project to life and really making one of the best amplifier designs in the world. Commercial or otherwise, I think it would be very hard to beat! Also, thanks to Sami at Microaudio for his amazing work, communication and craftmanship with his lineup of power supplies!

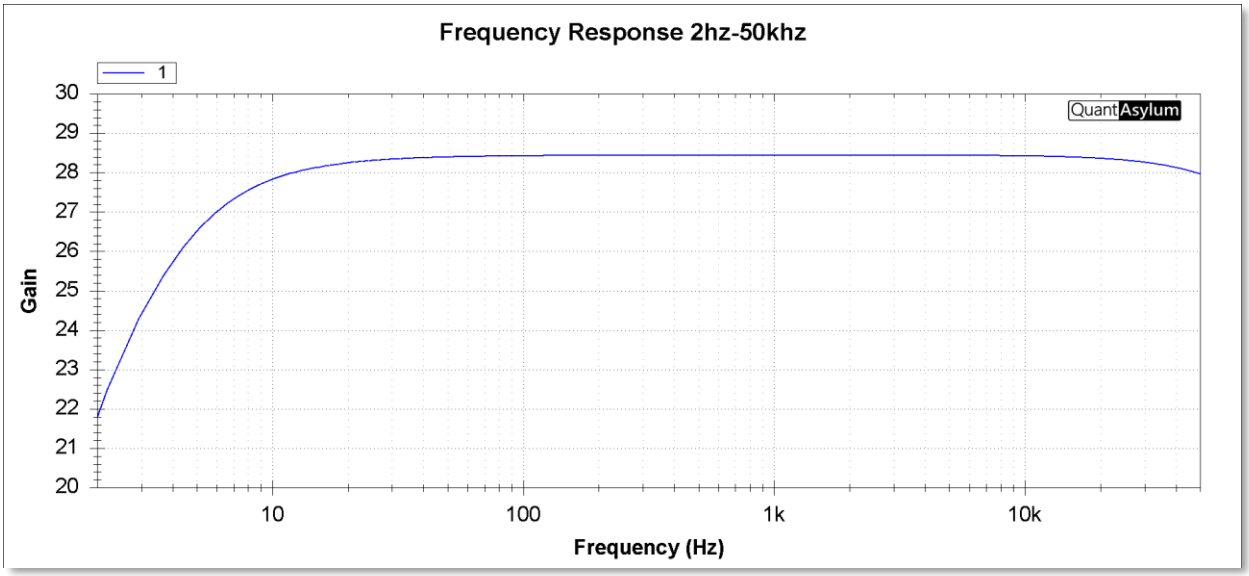
fireanimal

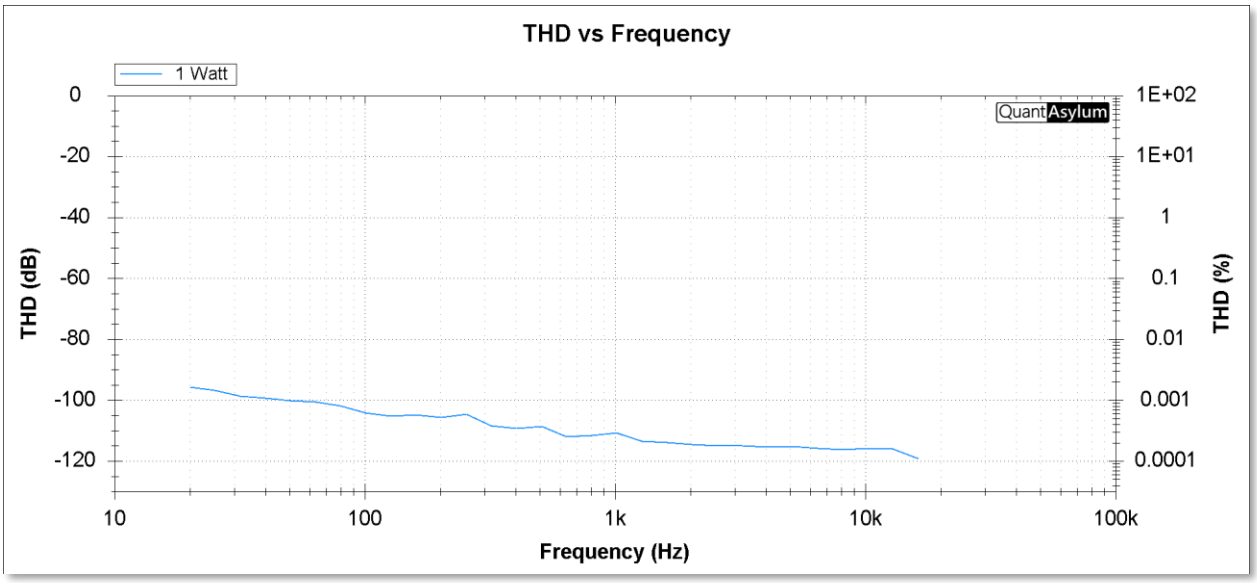
Noise Unweighted 20hz-20khz

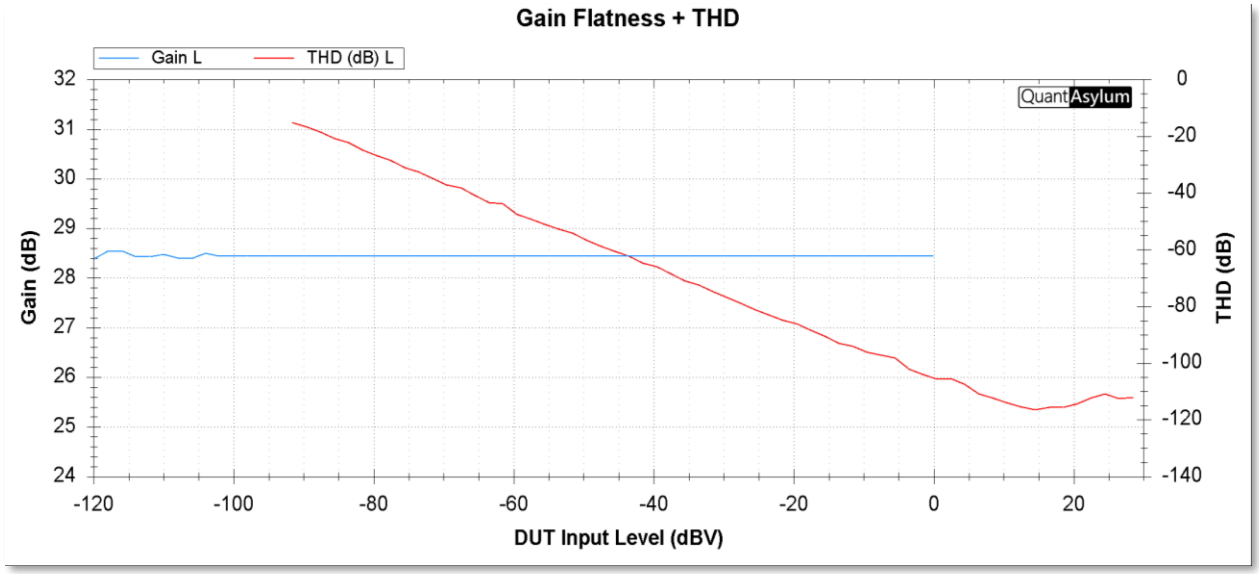


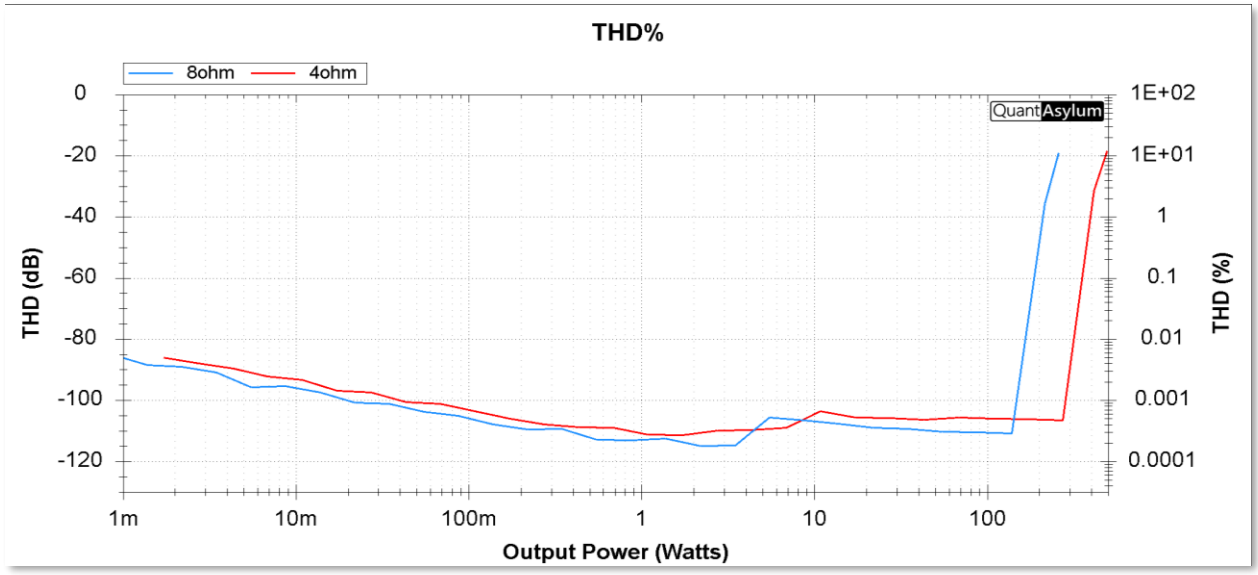
Noise A-Weighted 20hz-20khz



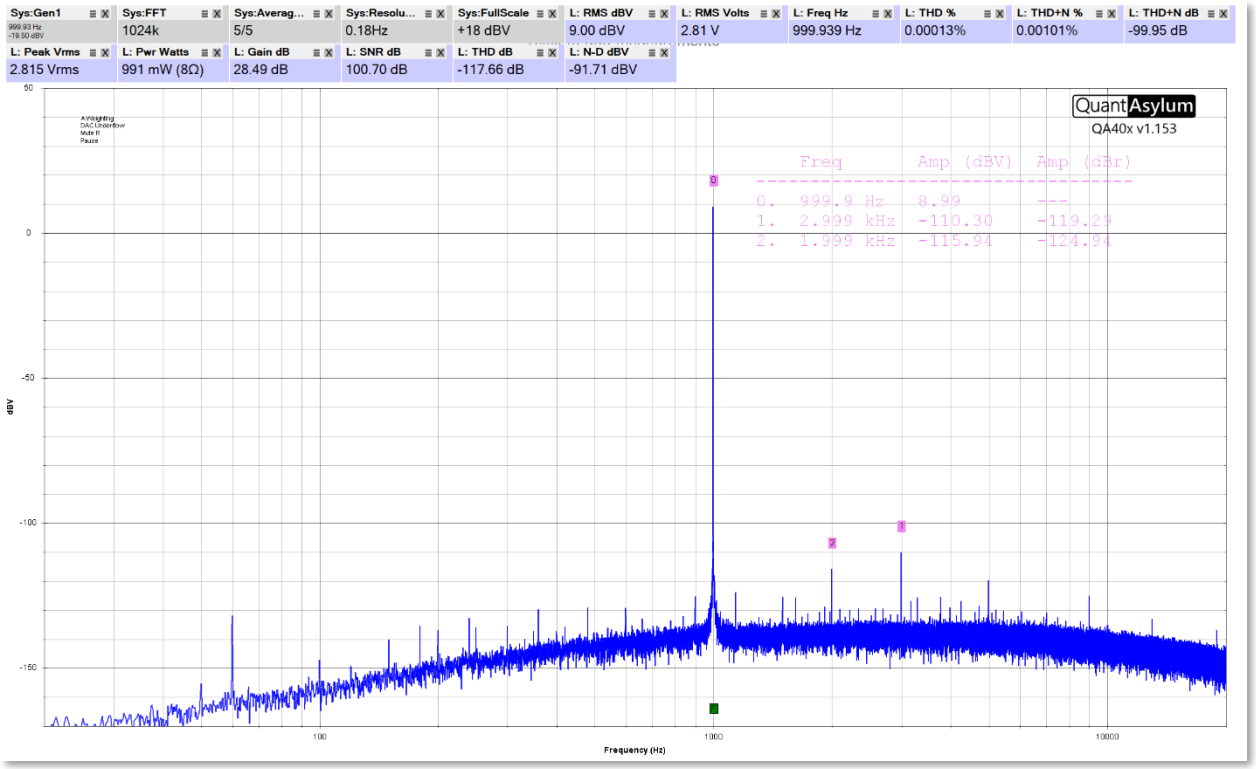

Frequency Response 2hz-50khz
1
QuantAsylum
Gain
30
29
28
27
26
25
24
23
22
21
20
10
100
1k
10k
Frequency (Hz)


THD vs Frequency
1 Watt
QuantAsylum
THD (dB)
0
-20
-40
-60
-80
-100
-120
THD (%)
1E+02
1E+01
1
0.1
0.01
0.001
0.0001
10
100
1k
10k
100k
Frequency (Hz)

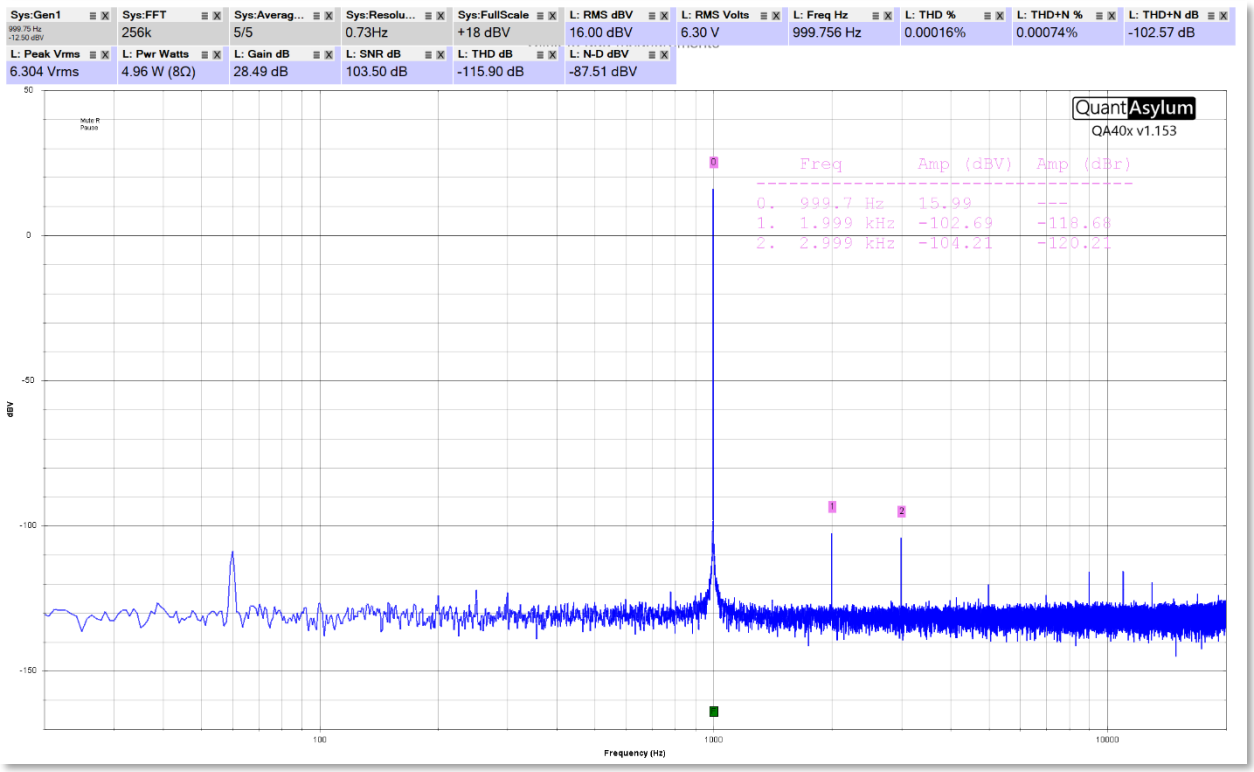

Gain Flatness + THD
Gain L
THD (dB) L
QuantAsylum
Gain (dB)
THD (dB)
DUT Input Level (dBV)
32
31
30
29
28
27
26
25
24
0
-20
-40
-60
-80
-100
-120
-140
-120
-100
-80
-60
-40
-20
0
20


THD%
8ohm
4ohm
QuantAsylum
THD (dB)
THD (%)
Output Power (Watts)
0
-20
-40
-60
-80
-100
-120
1E+02
1E+01
1
0.1
0.01
0.001
0.0001
1m
10m
100m
1
10
100

1 Watt SNR A-Weighted



8 ohm 5 Watts



4 Ohm 5 Watts