

X-Altra HPA-1 Using OPA1642 Opamp Measurements

24th March 2021

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The measurements were taken using a QA401 Audio Analyzer with a 33 Ohm load on each channel.

FFT: 64k
Avg: 50 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz
RMS L: 0.0 dBr
RMS R: 0.0 dBr

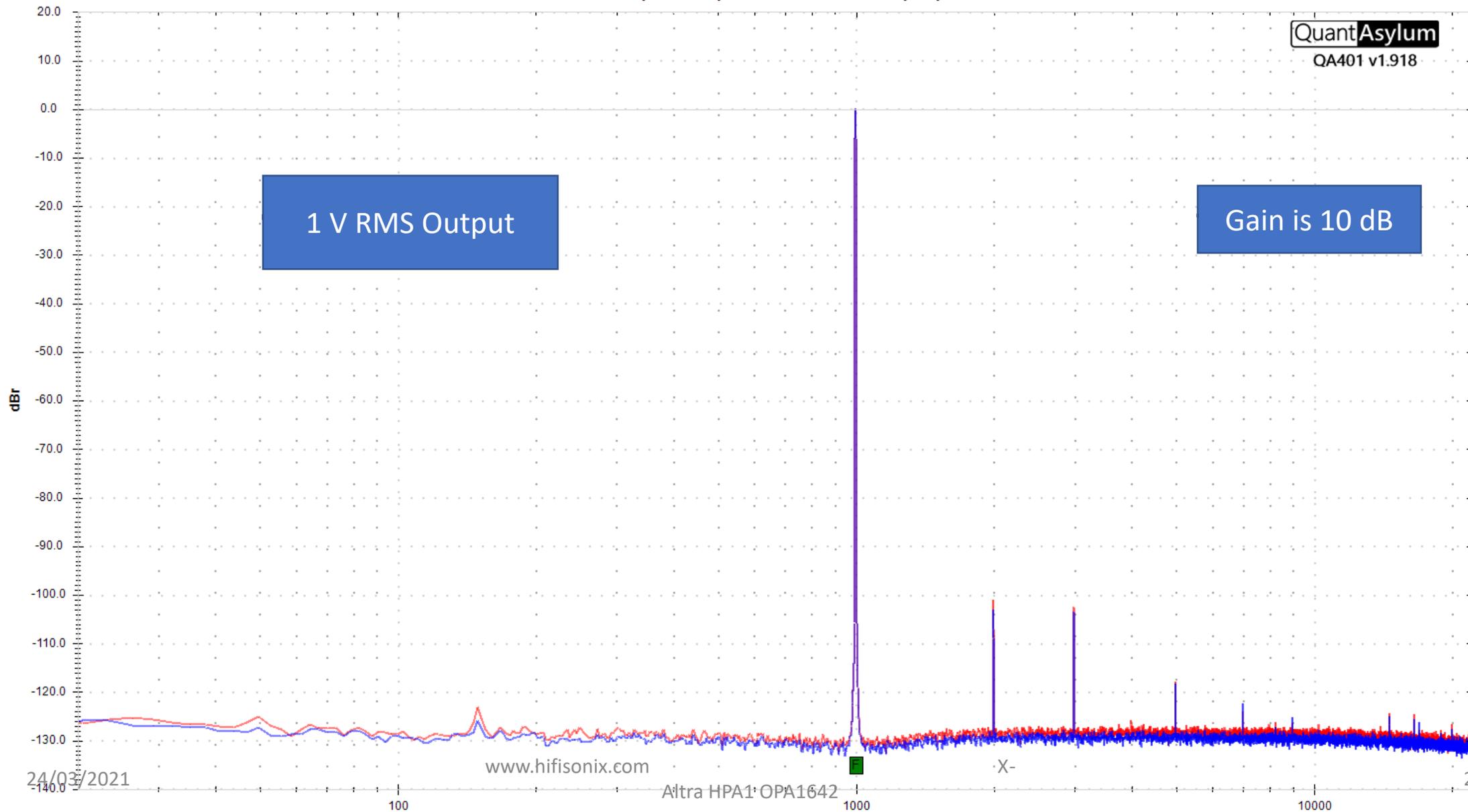
Peak L: 0.00 dBr
Peak R: 0.04 dBr
Peak L: 1.010 Vrms
Peak R: 1.015 Vrms
THD L: -100.1 dB/ 0.00099%
THD R: -98.7 dB/ 0.00116%

Gen 1: 999.0234 Hz @ -9.1 dBr
Gen 2: 2.000976 KHz @ -3.1 dBr

Phase L: -0.05 deg
Phase R: -0.05 deg
Delay L: 10.2 uSec
Delay R: 10.2 uSec
Gain L: 9.08 dB
Gain R: 9.12 dB

X-Altra Headphone amp HPA-1 with OPA1642 Opamps

QuantAsylum
QA401 v1.918



1 V RMS Output

Gain is 10 dB

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Altra HPA1: OPA1642

X-

2

FFT: 64k
Avg: 41 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz
RMS L: 0.0 dBr
RMS R: 0.0 dBr

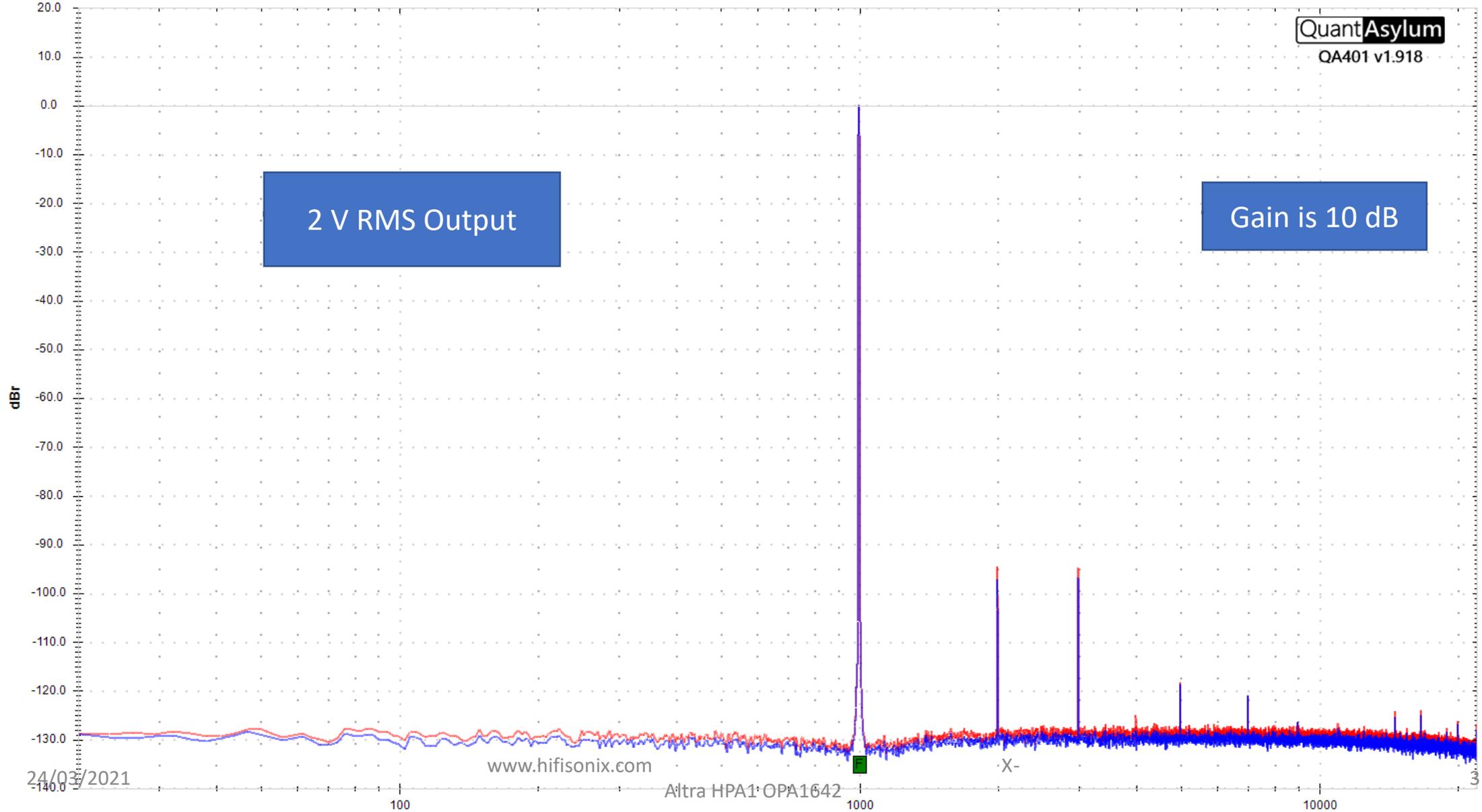
Peak L: 0.00 dBr
Peak R: 0.04 dBr
Peak L: 2.016 Vrms
Peak R: 2.025 Vrms
THD L: -93.9 dB/ 0.00201%
THD R: -91.7 dB/ 0.00260%

Gen 1: 999.0234 Hz @ -9.1 dBr
Gen 2: 2.000976 KHz @ -9.1 dBr

Phase L: -0.05 deg
Phase R: -0.05 deg
Delay L: 10.2 uSec
Delay R: 10.2 uSec
Gain L: 9.08 dB
Gain R: 9.12 dB

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2 V RMS Output

Gain is 10 dB

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Altra HPA1: OPA1642

X-

FFT: 64k
Avg: 29 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz

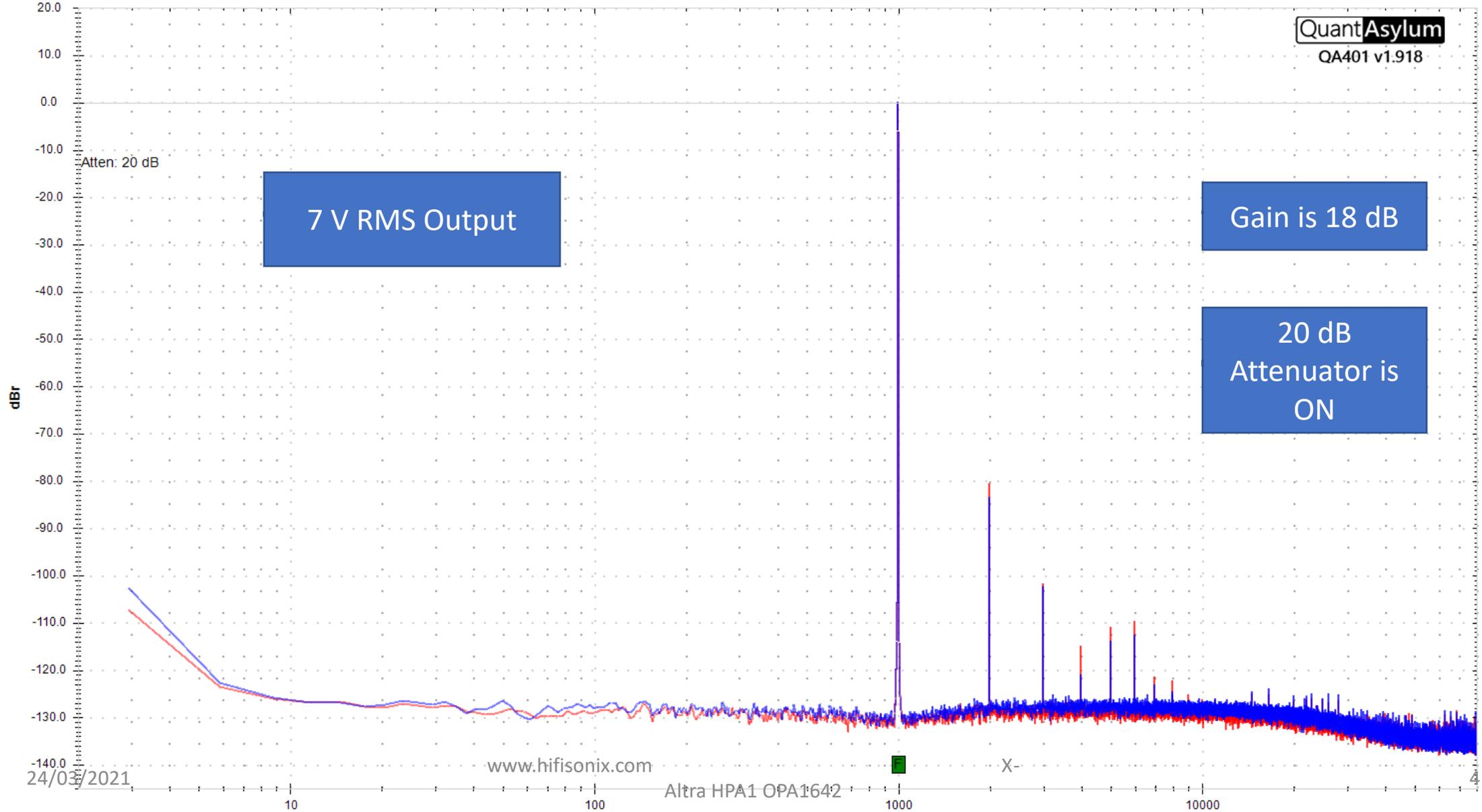
Peak L: 0.01 dB
Peak R: 0.05 dB
Peak L: 7.043 Vrms
Peak R: 7.079 Vrms
THD L: -83.5 dB/ 0.00672%
THD R: -80.7 dB/ 0.00927%

Gen 1: 999.0234 Hz @ 3.1 dB
Gen 2: 18.99902 KHz @ -1.9 dB

Phase L: -0.12 deg
Phase R: -0.11 deg
Delay L: 10.4 uSec
Delay R: 10.4 uSec
Gain L: 16.96 dB
Gain R: 17.01 dB

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Atten: 20 dB

7 V RMS Output

Gain is 18 dB

20 dB
Attenuator is
ON

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Altra HPA1 OPA1642

X-

FFT: 64k
Avg: 42 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz

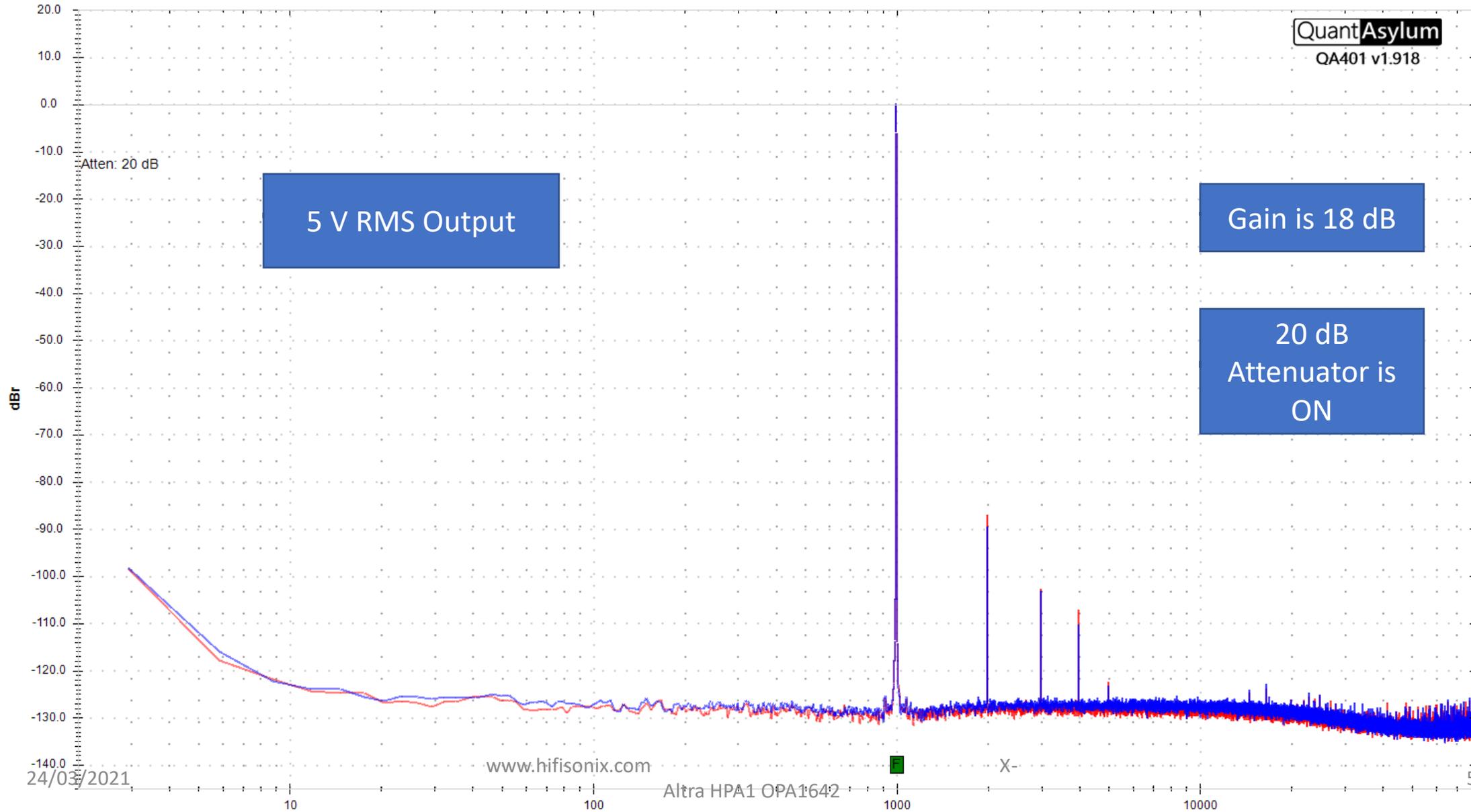
Peak L: -0.03 dB
Peak R: 0.02 dB
Peak L: 4.979 Vrms
Peak R: 5.004 Vrms
THD L: -89.3 dB/ 0.00343%
THD R: -86.9 dB/ 0.00454%

Gen 1: 999.0234 Hz @ 3.0 dB
Gen 2: 18.99902 KHz @ 1.0 dB

Phase L: -0.12 deg
Phase R: -0.11 deg
Delay L: 10.4 uSec
Delay R: 10.4 uSec
Gain L: 16.95 dB
Gain R: 17.00 dB

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Altra HPA1 OPA1642

X-

FFT: 64k
Avg: 50 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz

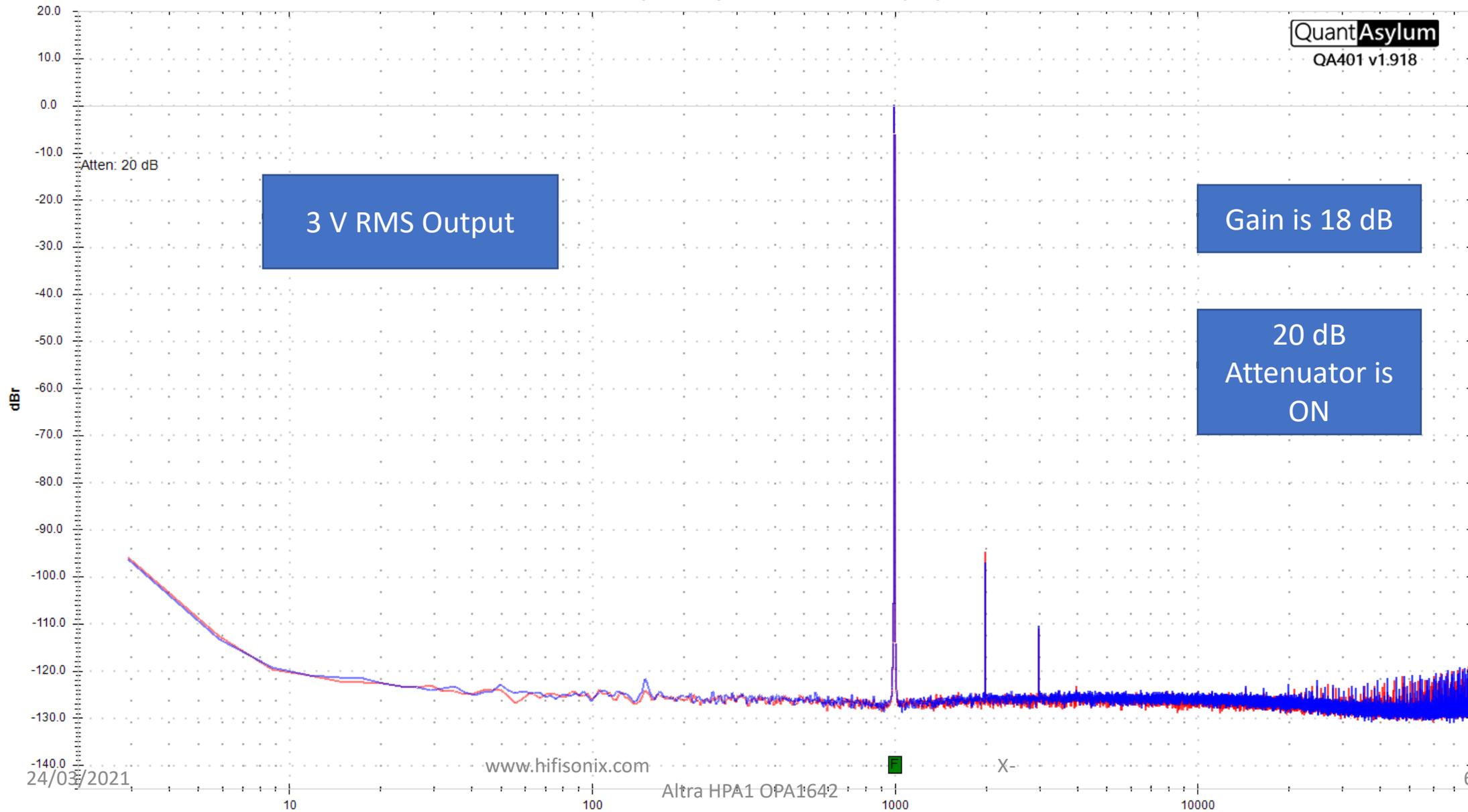
Peak L: 0.00 dBr
Peak R: 0.04 dBr
Peak L: 2.970 Vrms
Peak R: 2.985 Vrms
THD L: -96.7 dB/ 0.00146%
THD R: -94.7 dB/ 0.00183%

Gen 1: 999.0234 Hz @ 3.0 dBr
Gen 2: 18.99902 KHz @ 5.5 dBr

Phase L: -0.12 deg
Phase R: -0.11 deg
Delay L: 10.4 uSec
Delay R: 10.4 uSec
Gain L: 16.96 dB
Gain R: 17.01 dB

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Altra HPA1 OPA1642

X-

©

FFT: 64k
Avg: 50 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz

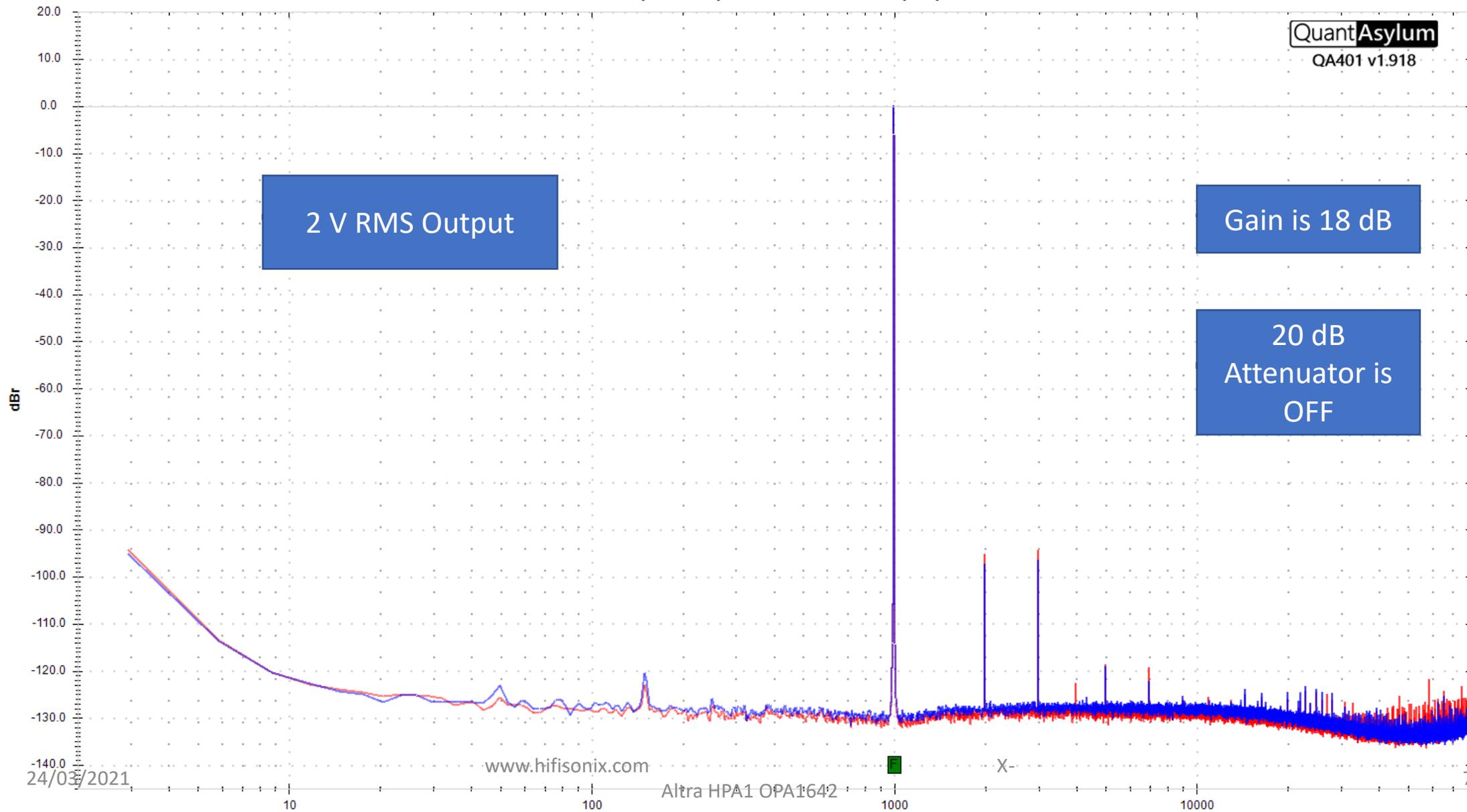
Peak L: 0.00 dB
Peak R: 0.05 dB
Peak L: 2.121 Vrms
Peak R: 2.132 Vrms
THD L: -93.8 dB/ 0.00204%
THD R: -91.8 dB/ 0.00257%

Gen 1: 999.0234 Hz @ -17.0 dB
Gen 2: 18.99902 KHz @ -11.5 dB

Phase L: -0.10 deg
Phase R: -0.09 deg
Delay L: 10.3 uSec
Delay R: 10.3 uSec
Gain L: 17.04 dB
Gain R: 17.08 dB

X-Altra Headphone amp HPA-1 with OPA1642 Opamps

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2 V RMS Output

Gain is 18 dB

20 dB
Attenuator is
OFF

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Altra HPA1 OPA1642

X-

FFT: 64k
Avg: 50 of 50
Res: 2.92 Hz
Fs: 192 KHz
Win: Hann
Weight: None

Meas Start: 20.0 Hz
Meas Stop: 20.0 KHz

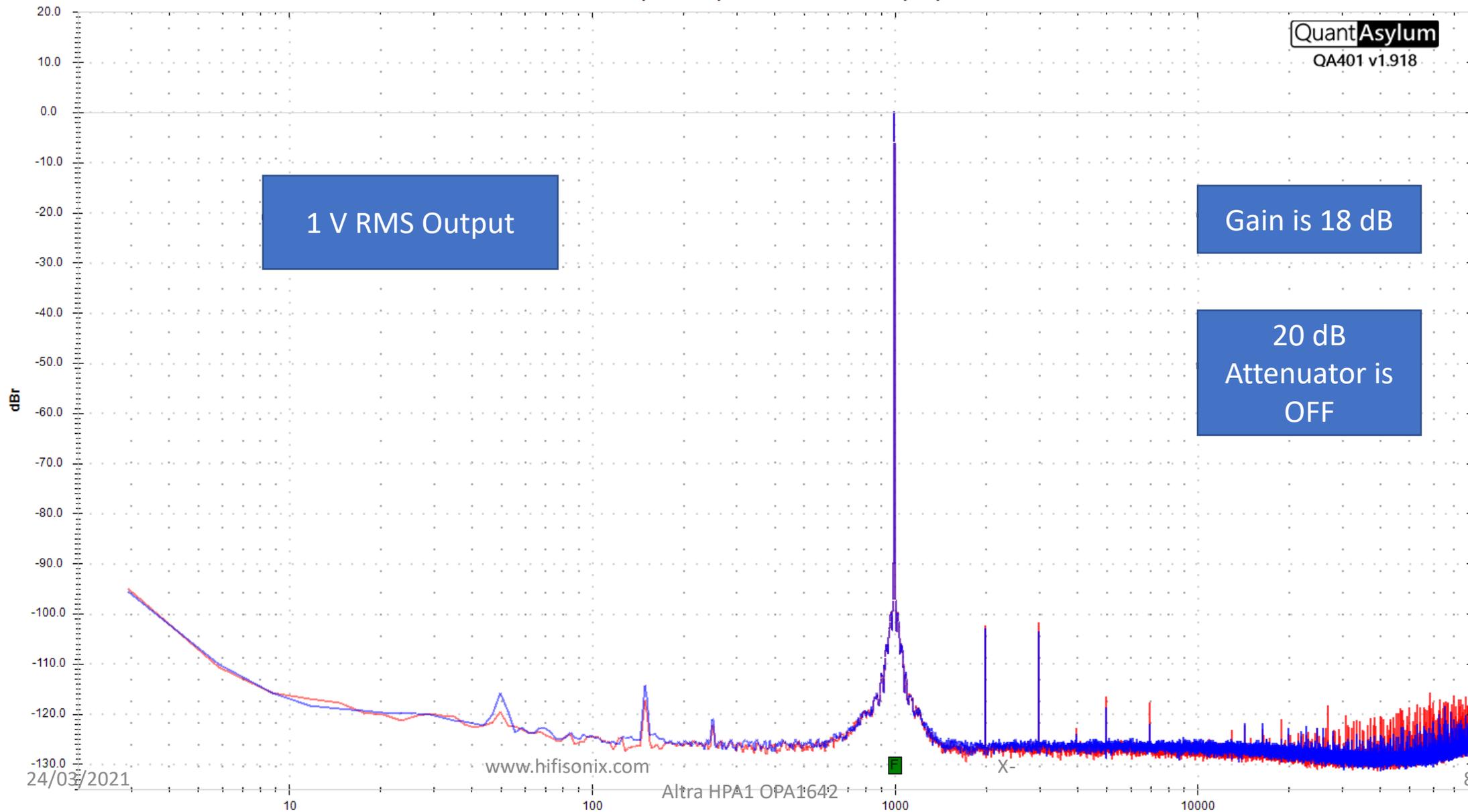
Peak L: 0.00 dBr
Peak R: 0.05 dBr
Peak L: 1.063 Vrms
Peak R: 1.068 Vrms
THD L: -100.0 dB/ 0.00100%
THD R: -99.0 dB/ 0.00113%

Gen 1: 999.0234 Hz @ -17.0 dBr
Gen 2: 18.99902 KHz @ -5.5 dBr

Phase L: -0.10 deg
Phase R: -0.09 deg
Delay L: 10.3 uSec
Delay R: 10.3 uSec
Gain L: 17.04 dB
Gain R: 17.09 dB

X-Altra Headphone amp HPA-1 with OPA1642 Opamps

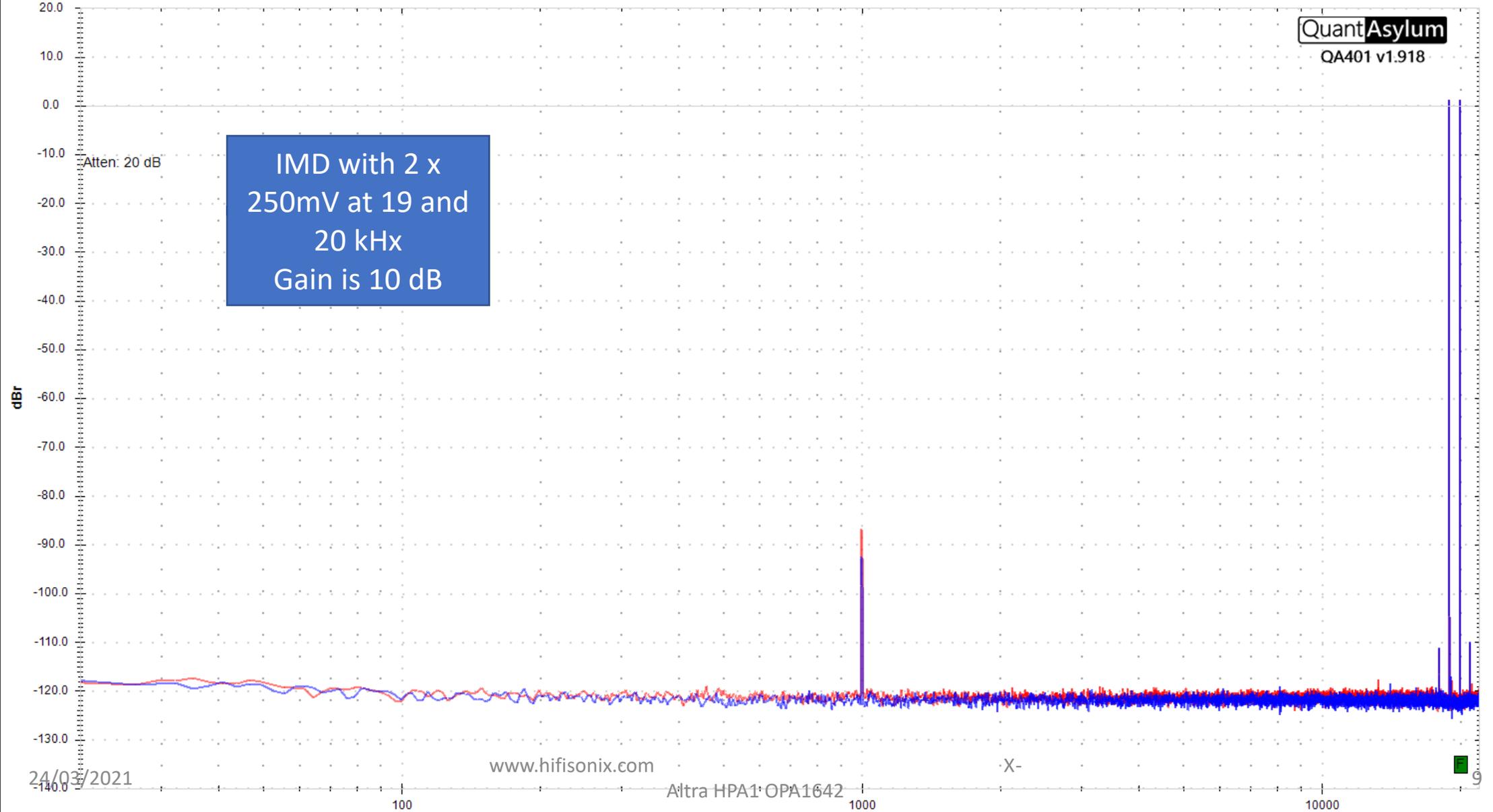
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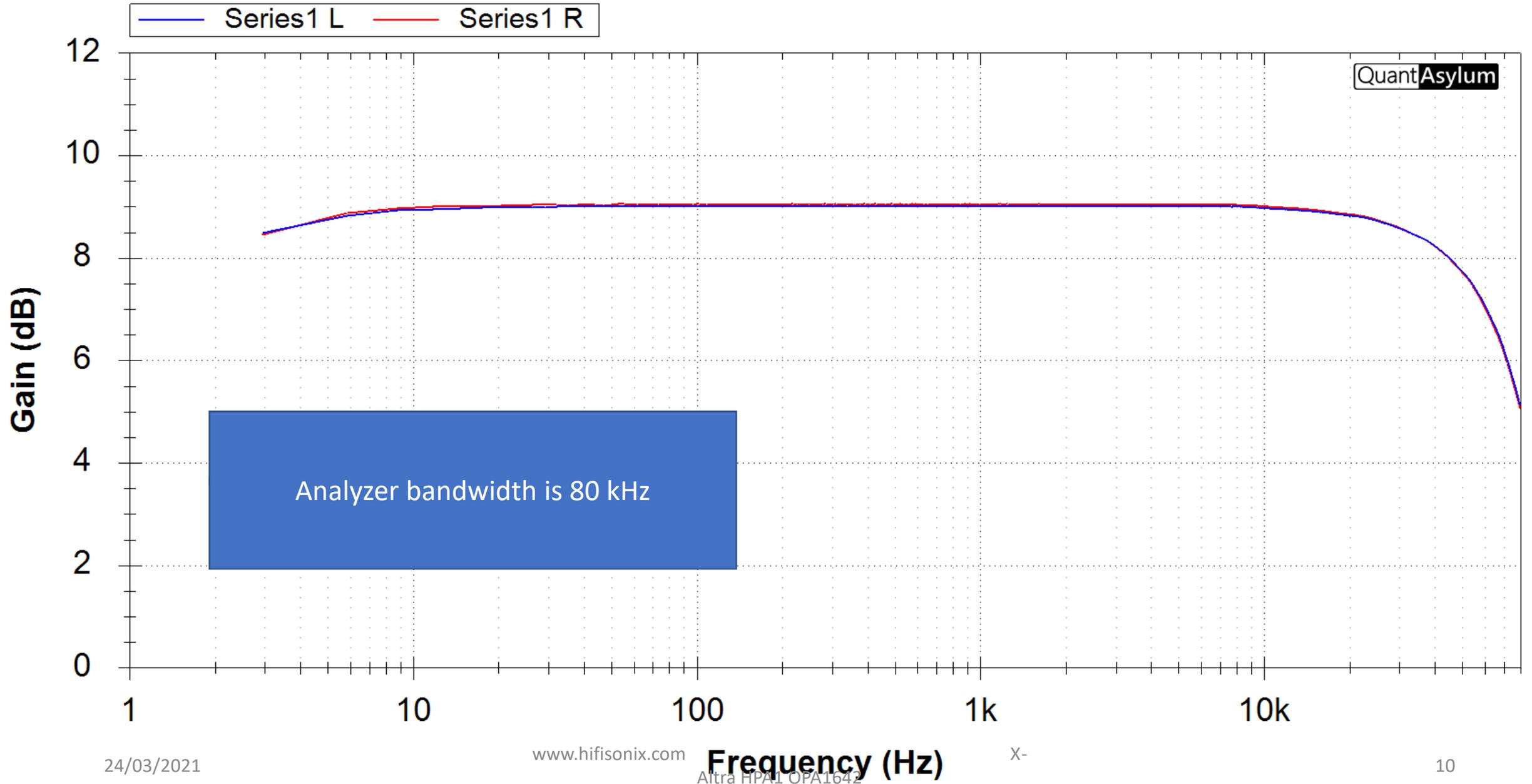
FFT: 64k Meas Start: 20.0 Hz Peak L: 1.00 dBr Gen 1: 20.00097 KHz @ 12.2 dBr
Avg: 38 of 50 Meas Stop: 20.0 KHz Peak R: 1.03 dBr Gen 2: 18.99902 KHz @ 12.2 dBr
Res: 2.92 Hz RMS L: 1.0 dBr Peak L: 1.552 Vrms
Fs: 192 KHz RMS R: 1.0 dBr Peak R: 1.557 Vrms
Win: Hann THD L: -∞ dB/ 0.000000%
Weight: None THD R: -∞ dB/ 0.000000%

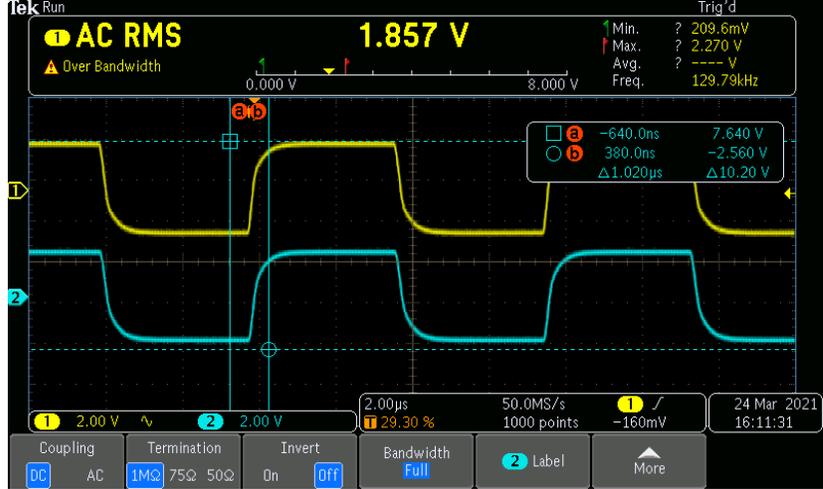
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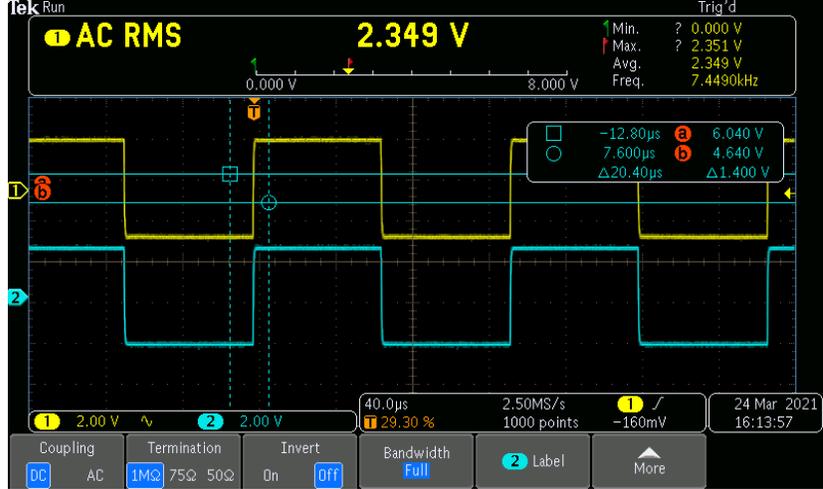


HPA-1 Freq. Response

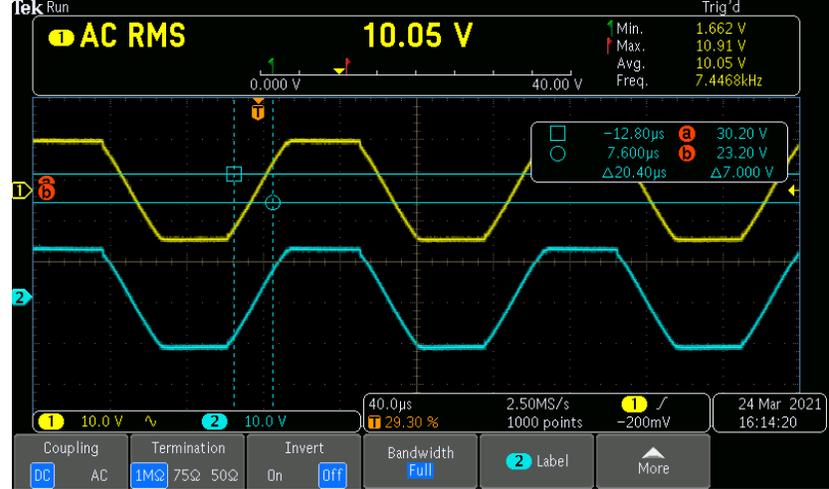




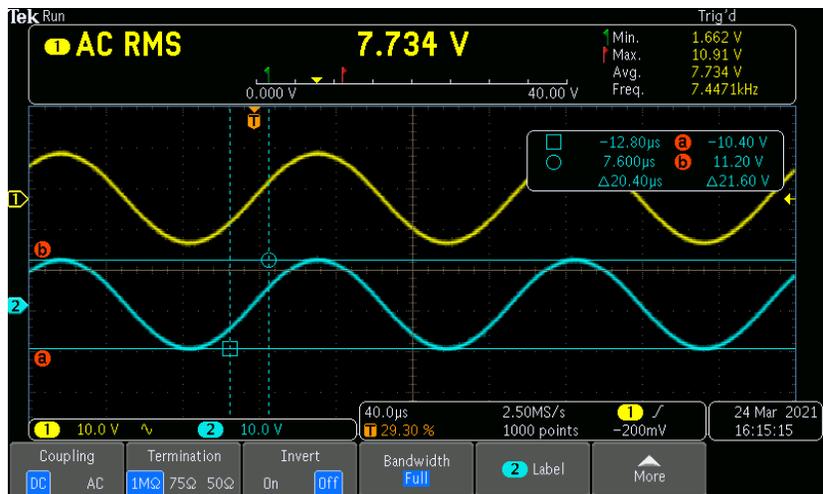
130 kHz into 33 Ohms resistive load



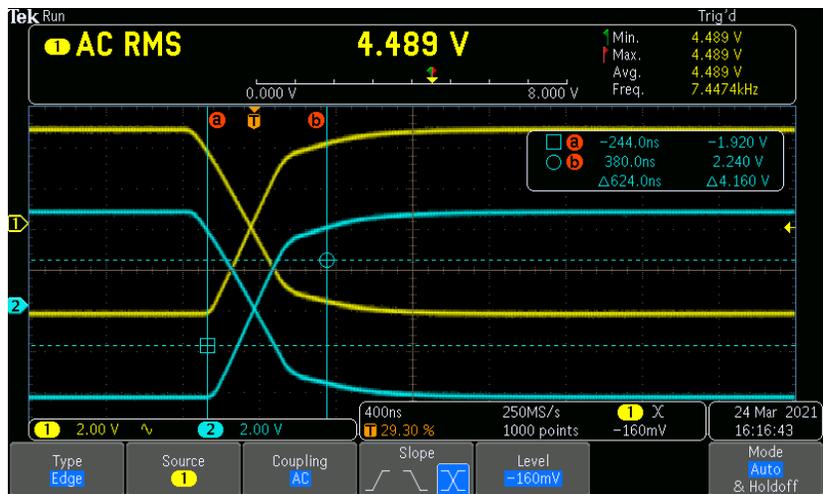
7.5 kHz into 33 Ohms resistive load



Hard clipping at 23 V pk-pk into 33 Ohms



7.5 kHz at 21 V pk-pk into 33 Ohms



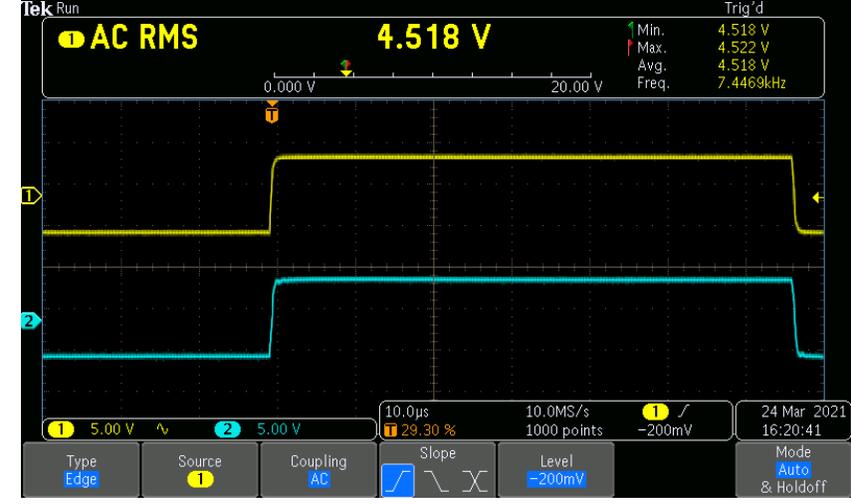
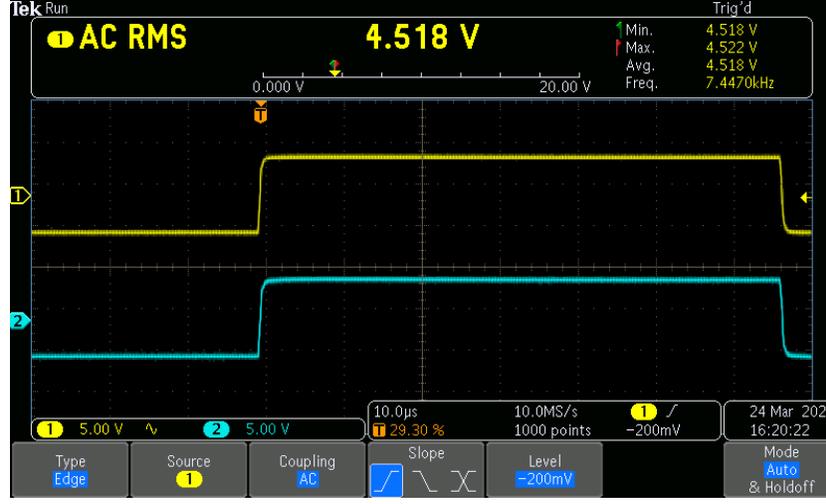
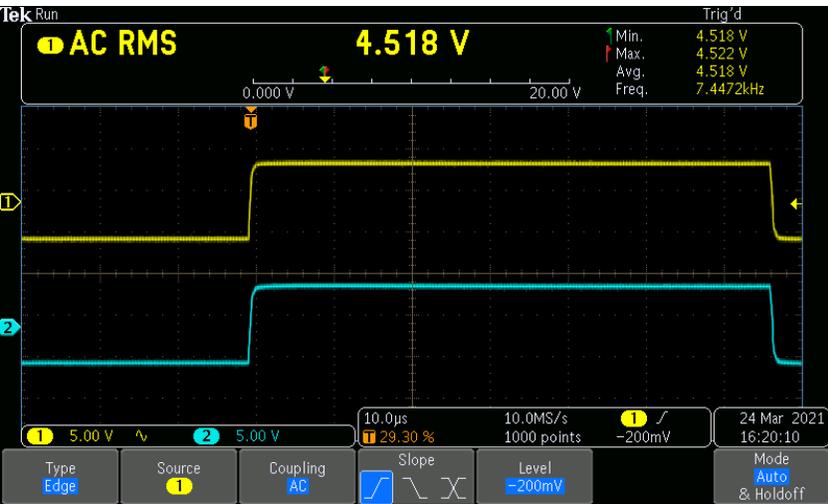
Rise/fall time is < 700 ns (33 Ohm Resistive load)

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Altra HPA1 OPA1642

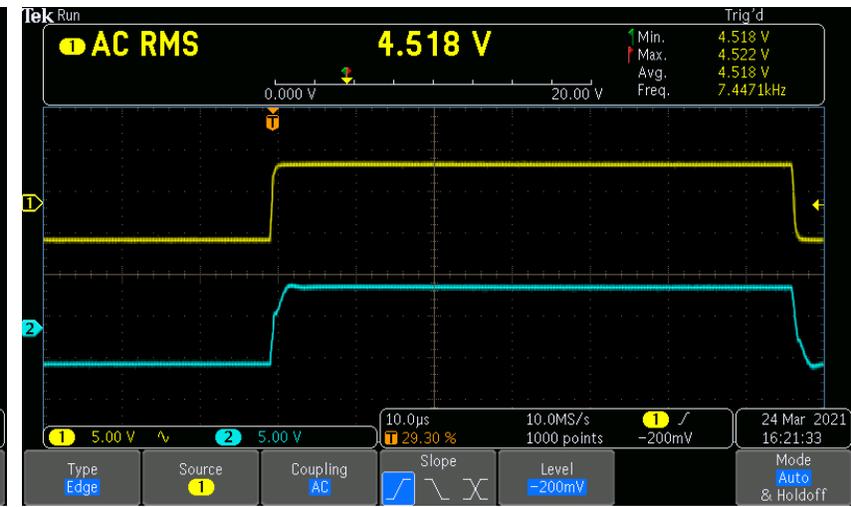
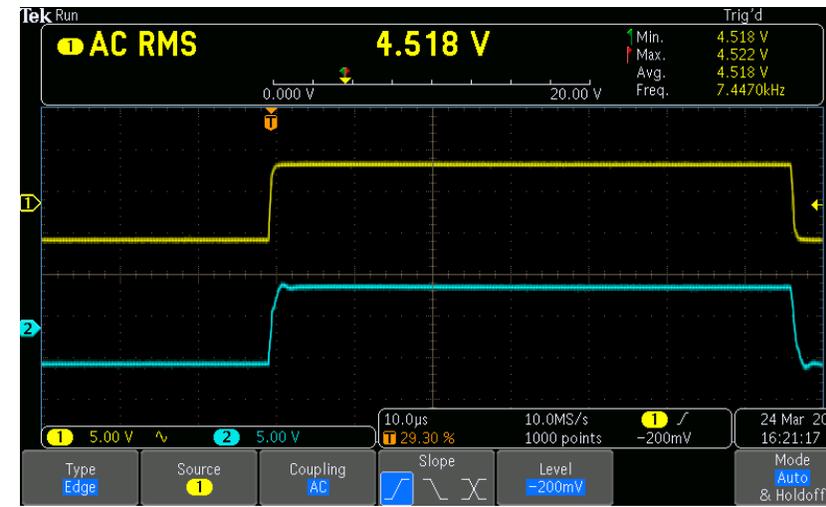
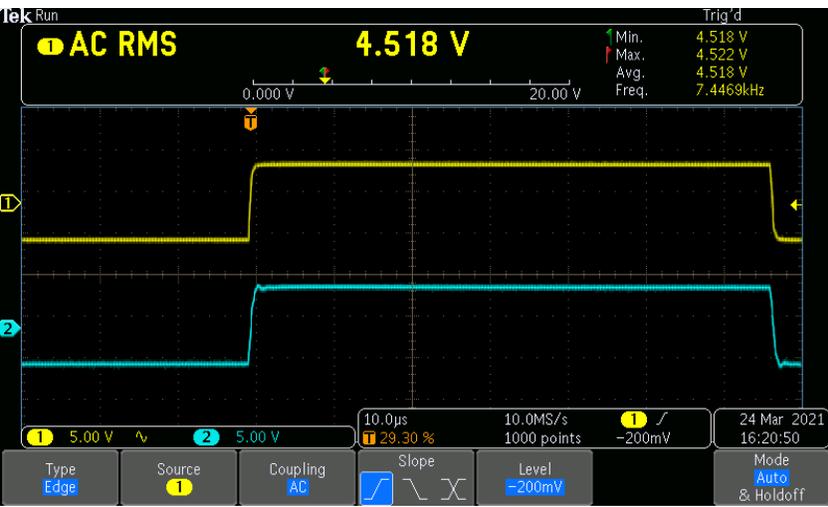
X-



47 pF //33 Ohms Blue Trace only. Yellow trace is reference

470 pF //33 Ohms Blue Trace only. Yellow trace is reference

10nF //33 Ohms Blue Trace only. Yellow trace is reference



22nF //33 Ohms Blue Trace only. Yellow trace is reference
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44nF //33 Ohms Blue Trace only. Yellow trace is reference
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0.1µF //33 Ohms Blue Trace only. Yellow trace is reference

Conclusions – X-Altra HPA-1 using OPA1642 Opamps

The HPA-1 using the OPA1642 is stable into capacitive loads from 47pF to 0.1uF in parallel with 33 Ohms.

The distortion measurements remain excellent, although the LM4562 results are slightly better.