GRAS KEMAR 45BC

OLLO audio
research & development

Measurements Report

2023-DECEMBER

Prepared for

Public, open document

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Thank you for taking the time to dive **deeper**

List of included headphones

OLLOAUDIO S5X 1.0 & 1.1 USC calibrated
OLLOAUDIO S4X 1.2, 1.1, 1.0 & 1.3 USC calibrated
OLLOAUDIO S4R 1.2, 1.1, 1.0 & 1.3 USC calibrated

AUDEZE LCD X, LCD 1
BEYERDYNAMIC DT1990/1770, DT900/700, DT770
FOCAL CLEAR PROFESSIONAL
SENNHEISER HD650, HD560s
AUSTRAIN AUDIO Hi 55, Hi 65
SHURE SRH 840 and 1440
AKG K371,702,712
ATH M50x R70x

More in the next update. Let us know via support the model you'd like to see in this report.

Who is this for

We strongly believe that transparency is the future of all business communication. There is no need to hold information inside R&D labs as general public and our users are more and more educated in audio engineering. We can now freely share information and know how, knowing that enough of the final users will understand it in depth.

If you're reading this, then it's for you. You're the one we made this for.

info@olloaudio.com

Why we offer measurements

We believe in full transparency in designing professional audio equipment. This report gives information on how we create our products, what standards we use and how products' characteristics fall into one's signal chain or workflow. That's the basis of achieving top-level results in any studio environment, home or professional - **knowing your gear.**

There is no real consensus in the audio industry when it comes to measuring the quality of sound. There are ways that we agree on, to some extend. Whenever we compare products, we have to use exactly the same systems and listening environments to have any valid reference point, for results that matter. You can read a lot on this topic of sound quality in the AES library, here's one of the scientific articles (Francis Rumsey) available here: https://www.aes.org/e-lib/browse.cfm?elib=15525

In short, the quality of sound is very subjective and measuring it is always somewhat abstract. Many authors in the AES library suggest brain waves recording, but there's still some ambiguity left to the different ear canal and pinna shapes. Not to mention how little we know and understand the human brain, even more so in the audio domain. We'd also argue that any sound quality-related research will be altered depending on your historical experience with sound. You can read about audio perception and historical experience with sound influencing your perception by Terry Pennington at this link: https://www.aes.org/e-lib/browse.cfm?elib=11474
A small abstract of Terry's paper says:

"It is critical that anyone involved in such subjective evaluation be aware that what we believe we hear is much more a function of what goes on inside our heads than what occurs on the outside. It is also imperative that audio equipment manufacturers realise, that subjective evaluation must not take precedence over science and common sense,"

...and we can sign under that statement as well. Science first, but listening to subjective experiences close second.

Access
all information

We offer data sets from your headphones' individual mesurements

Feedback
is our drive

Every email, support ticket and social media chat is heard. Feedback gathering and analytics are in the core of OLLO

Good research
is timeless

We rely heavily on reserch and methods prooven over decades

Where does that leave us?

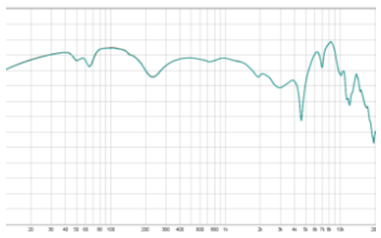
We believe sharing our methods, exact standards and gear used, can benefit our users' understanding and interpretation of measurements per se, more importantly, can help them make their purchasing decisions. Not necessarily our product.

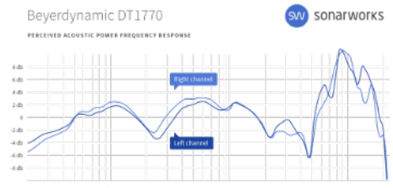
When designing OLLO lab, we went to Bang& Olufsen facilities in Struer Denmark to get first-hand information and experience in their Sound Hub. To skip ahead, we purchased G.R.A.S. 45CC + IEC 60318-1 over the ear headphones coupler RA0039. You can watch OLLO Measurements Engineer David Rijavec talk about it in this video: MEASUREMENTS OF HEADPHONES AT OLLO AUDIO - PART 2 | #012 – OLLO Audio

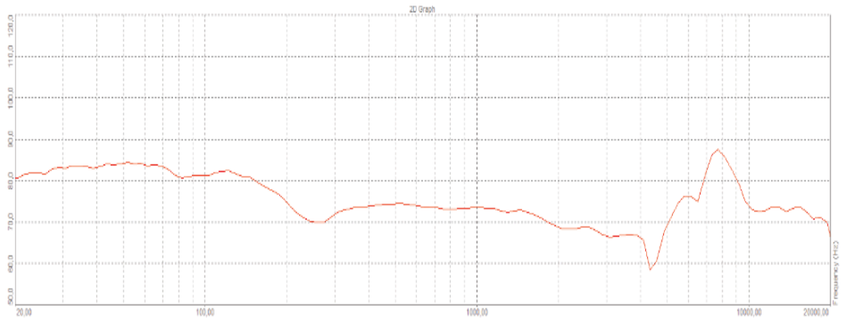
There is no ideal measurement gear, and there is no perfect target curve to go after. We can only work with approximations and averages as do IEC and ISO standards. That is the reason we do not have a unified standard for so-called “flat” monitoring systems. Best audio labs can do, is design products within x% tolerances of such and such standard (IEC, ISO, etc.).

Based on above, we believe sharing our methods, exact standards and gear used, can benefit our users' understanding and interpretation of measurements per se, more importantly, can help them make their purchasing decisions. Not necessarily our product.

A quick internet search will result in many very different measurements for the same headphones model. Below is an example of DT 1770 headphones measured at DIY Heaven and Sonarworks. (Source google images)







The above are DT1770 measured at OLLO Audio lab on IEC 60318-1 RA0039 device (L&R avg)

Different Labs use different gear and standards. That is fine as long as you know what standard they use in performing their measurements.

These are very different curves. Making any decisions or constructing your own opinion based on these is very hard. You need to fully understand how they perform measurements and what you’re looking at. So both labs are doing their job just fine. The issue is that results are not directly comparable. That makes it impossible for the final user to make decisions based on plots from two different labs.

That’s the core reason why we publish our measurements and include comparisons with other headphones models by different manufacturers.

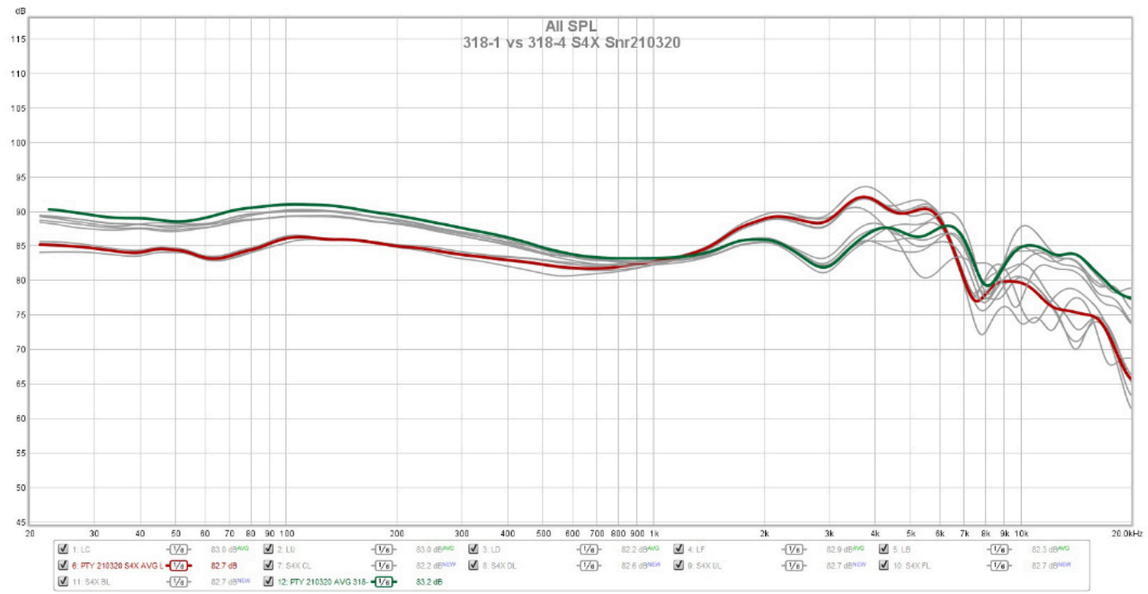
Is our way better? No, not at all! Just another lab results that are not directly comparable. In a way, this forces final users to make educated decisions based on one or another lab results.

Different Labs use different gear and standards. That is fine as long as you know what standard they use in performing their measurements. The most questionable results are from labs that are secretive about their techniques and standards used. To address this we decided to offer as much as possible about the gear and processes we use, so the final user of our headphones and measurements can interpret them and compare with other lab results.

S4X 1.1 2021

S4X - Open back - Mixing headphones

Red:60318-4, Green: 60318-1



The above are measurements of S4X unit serial Number PTY 210320 using both standards. These plots have 1/6 smoothing applied. Red is so-called 711 coupler and Green is RA39.

How we measure headphones frequency response

First measurements of headphones were made by telecom companies in the early 20th century when head-sets were first developed for telco operators.

It starts with the signal exciting the drivers. So even if two labs would be identical, they can still use different test signals that will produce different results. For example, if you're using pink noise or white noise, the results will be very different. Also, a log frequency sweep or pink noise will have slightly different results.

In our opinion, the best representation of music is pink noise. So we use that in our research measurements but many times also a sweep signal.

After the signal is generated, it will be amplified and then converted from digital signal to analogue. DA conversion happens inside the sound interface where it's important to have DA conversion at the highest level. When measuring, it's crucial to have reproduction at levels that reflect real scenarios. In our case, we decided to go with 85dB SPL per channel for calibration. If you drive the unit at 100+ dB SPL, distortion will change and alter the response. The same goes for low SPL levels. After researching best SPL levels for mixing music, we learned that most music producers would use about 83-90dBPSL when working on a production. Also, a well known K metering by Bob Katz is based on these numbers and adopted worldwide. We also did a short take on K-Metering using headphones in this video: K-metering with S4X studio headphones I #017 – OLLO Audio
After calibration is set, we run the measurements 5 times at different positions on the measurement fixture. Results are averaged to have as accurate representation as possible.

Hardware text fixture is GRAS 45CC with RA 0039 coupler based on IEC 60318-1 standard. The signal is produced by RME Fireface UCX or 400 and picked up by Dewesoft Sirius Mini DAQ with their native software Dewesoft X run on Windows 10.

You can watch a short video we did when Dewesoft come to us for the first installation here: MEASUREMENTS OF HEADPHONES AT OLLO AUDIO - PART 1 I #010 – OLLO Audio

To be more precise we have 45CC set to KEMAR head size at 14.3cm breadth, output on Fireface is at 4dBu standard and calibration is done using pink noise to achieve 85dBSPL on each channel. Pinknoise is generated by Studio One Professional 4 built-in tone generator (crest 9.6) and Dewesoft DAQ is calibrated with ear simulators to show 100% true SPL values. Microphones are calibrated once a year by G.R.A.S.

IEC 60318-1

We use IEC60318-1 with RA 0039 couplers by GRAS in all individual measurements charts you get from us.

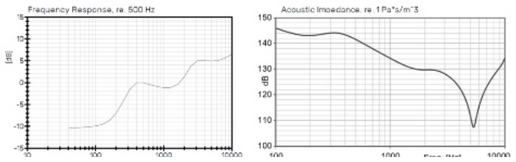
IEC 60318-4

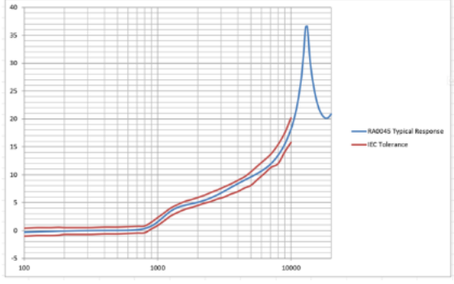
We use IEC60318-1 with RA 0039 couplers by GRAS. We often see that even reviewers do not fully understand the difference between their gear and our gear, **leading to false conclusions and misinformation.** In short, these are two very different ways of measuring headphones frequency responses and can not be directly compared. Neither is better, just made for a different purpose. For example, IEC60318-1 is far more consistent with results while 60318-4 is very hard to position headphones the same way, every time. The latter is also a DRP device while IEC60318-1 is an ERP device. DRP means that sound waves are recorded at the simulated eardrum position while ERP means ear reference point for picking up sound waves. That's just before they enter the ear canal. Just that alone will result in a very different results and plots.

UNIT SPECIFIC CALIBRATION is carried out using this earsimulator and applying our target curves for spatial, stereo or recording use cases. We do not use harman, diffuse or sonarworks targets. Would you like to see those too? Let us know via e-mail.

IEC 60318-1

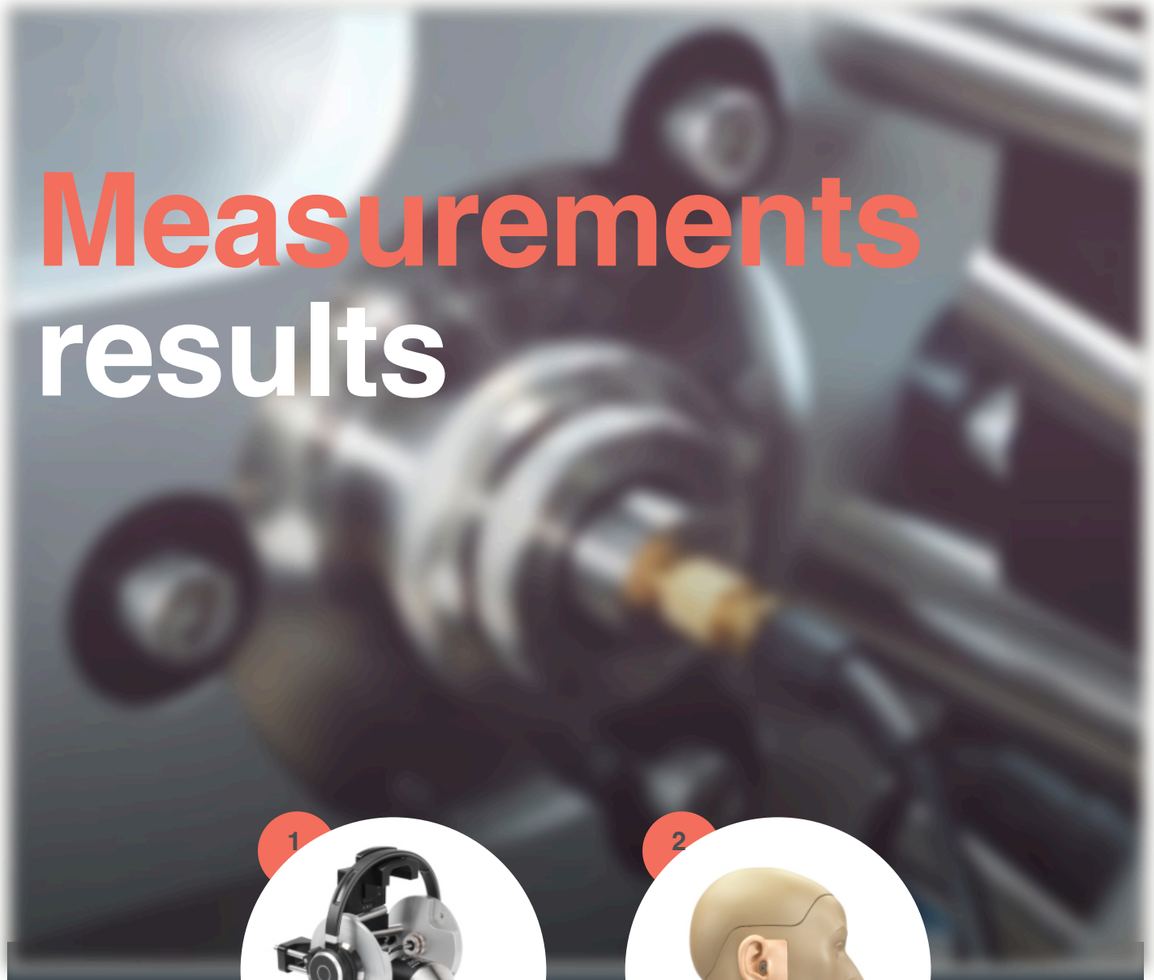
IEC 60318-4





GRAS Sound & Vibration

Picture from grasacoustics.com



Measurements results

1

Comparisons
IEC60318-1

For detailed research into frequency response based on ERP (ear reference point) measurements.

2

Comparisons
IEC 60318-4

For in depth research based on DRP (ear-drum reference point) and ability to compare with other labs using this standard.

Measurements
Sections

Please understand measurements do not answer the question, which headphones sound better than others. That's on you. Also note that we only test one unit of each model and only focus on FR.

1. Compensated

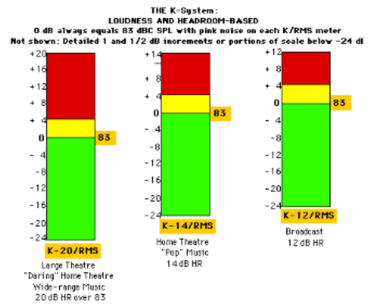
The first chart is a compensated frequency response measured with IEC60318-4 applying our target curve for every model. That means comepnsation for the S4X is made by using its target curve.

2. IEC 60318-4 & IEC 60318-1

Smaller chart on the left are RAW measurements with adherence to target with 1/3 octave smoothing on IEC60318-4 and sweep distribution on IEC60318-1 on the right. RAW target also plotted in black.

K-metering SPL

At the bottom are technical specifications and a recommended dBu output setting for each model to achieve 85dBSPL in each earcup.
Play pink noise 0.5-2kHz limited with RMS at 0 dBr in your master channel with K-metering scale. Adjust levels to hit that. Then adjust monitoring output to read specified dBu in RMS. Note dBu is not dBFS! For example any RME interface with 4dBu operation has 13dBu at 0dBFS and RMS would be 3dB lower with 1kHz and depending on crest factor of Pink noise, can be even further down. Always look at the RMS and you'll be fine.



Anything you play to your headphones monitoring output that reads specified dBu RMS levels will be at ~85dBSPL.

Explore charts in the following pages.

What they said about us

"I love my S4X reference headphones: they sound fantastic, are reliable and trustworthy, sit comfortably on my head and around my ears, don't give me ear-fatigue and don't press my ear onto the glasses allowing for continued and comfortable use."

MARC URSELLI
SENIOR SOUND ENGINEER
AUDIO MIXER
MUSIC PRODUCER
U2,
FOO FIGHTERS,
NICK CAVE,
LOU REED,
STING,
KEITH RICHARDS, ...

"These headphones are such a pleasure to work on - natural, comfortable and true."

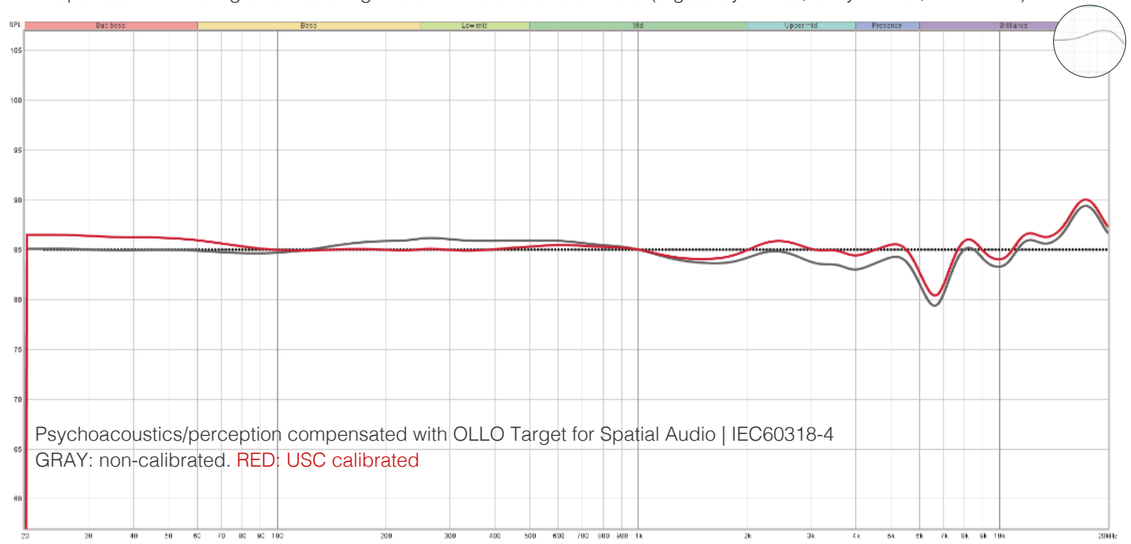
LEO ABRAHAMS
LADY GAGA,
ADELE,
FLORENCE AND THE MACHINE,
CHRISTINA AGUILERA,
PAOLO NUTINI,
LILY ALLEN

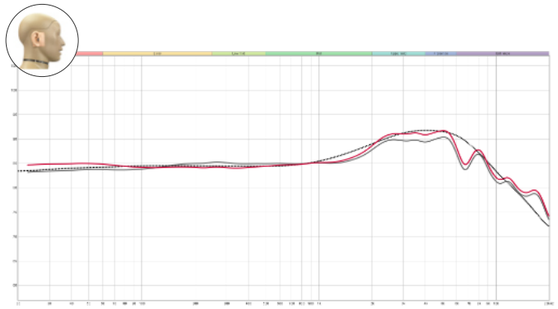
"These are my favorite headphones. They sound great and are very comfortable. I'm able to use them for long hours without listening fatigue or discomfort. They come in "closed back" for recording and "open back" for mixing duties."

GARY NOBLE
AMY WINEHOUSE,
JOSS STONE,
JESSIE J,
JAMES ARTHUR,
SEAN PAUL,
ESTELLE,
3X GRAMMY WINNING

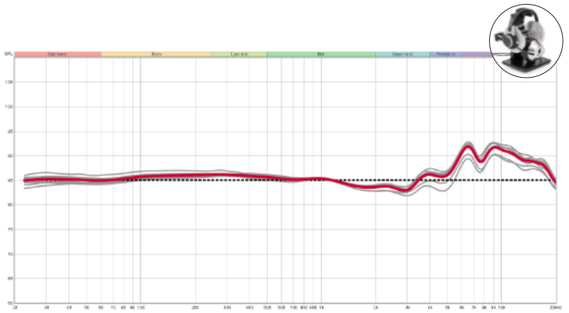
S5X 1.1 USC

S5X - Open Back for mixing and mastering in stereo or immersive binaural (e.g.Dolby Atmos, Sony 360RA, Unreal etc)





RAW | 1/3 oct | target adherence | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu RMS 1 kHz produces (+/-1) 108 dBSPL

@ -23 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 14.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 12 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 57.5mm / 95mm / 20mm

Impedance

+/- 5% 50 Ohm

Weight

414g

Clamping pressure N/cm²

@14.3cm breadth ~0.127 N/cm²

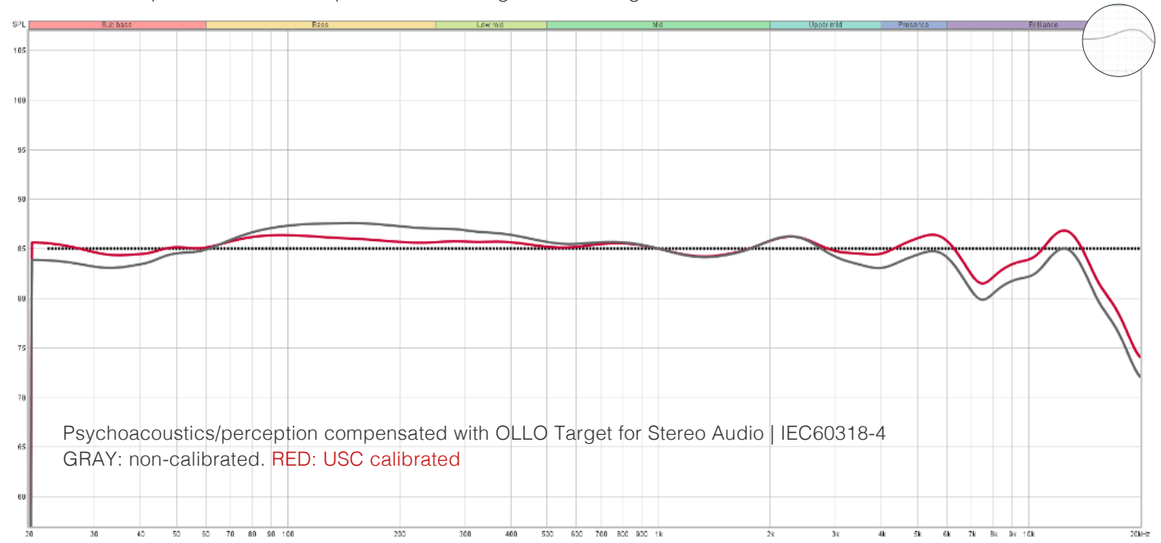
85 dBSPL @ -23 dBu RMS

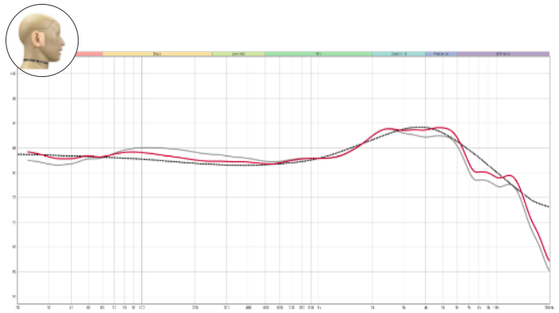
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant, **OLLO Target 2022: 1. Capturing Dolby Atmos certified studio FR with GRAS 45BC "711". 2. Analyzing and extrapolating datasets. 3. Human A/B pychoacoustics testing of proto headphones and Dolby Atmos certified room; results added to datasets as weight. 4. Measuring other headphones for stereo and immersive mixing that were verified by the community and adding them to the datasets as weight. 5. Official G.R.A.S KEMAR free and diffuse field tolerances for the same coupler used in extrapolating from datasets mentioned. 6. Deriving final OLLO target 2022 for IEC60318-4; used in this report for compensated measurements.

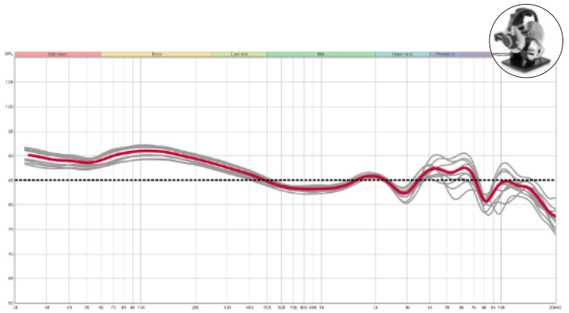
S4X 1.3 USC

S4X 1.3 Unit specific calibrated - Open Back for mixing and mastering stereo





RAW | 1/3 oct | target adherence | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 109.5 dBSPL

@ -25 dBu pink 9.6 crest produces (+/-1) 85 dBSPL

Frequency range*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 16.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 13.7 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 52.5mm / 90mm / 20mm

Impedance

+/- 5% 30 Ohm

Weight

350g

Clamping pressure N/cm²

@14.3cm breadth ~0,182 N/cm²

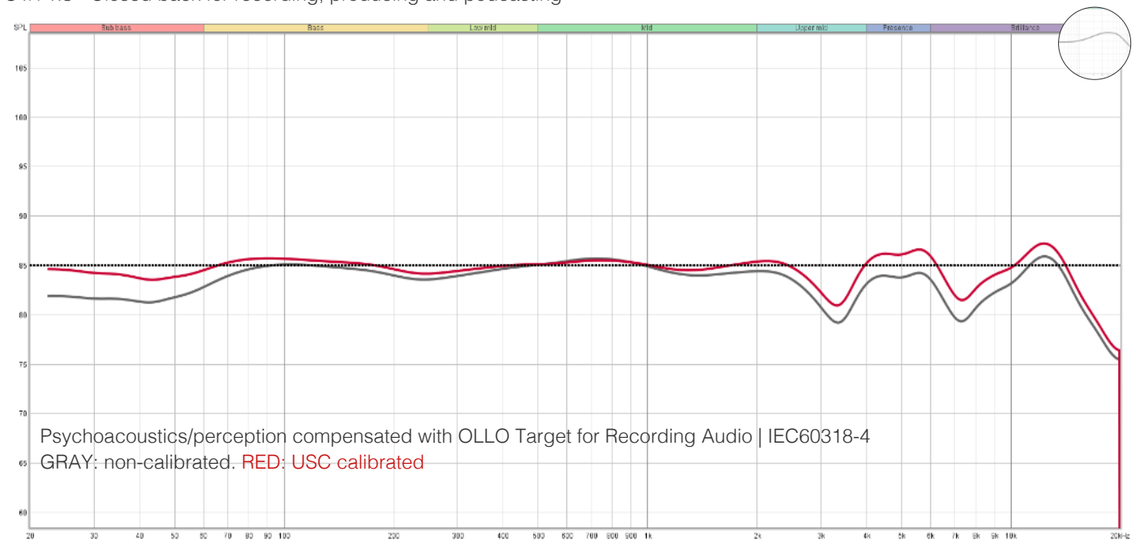
85 dBSPL @ -25 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

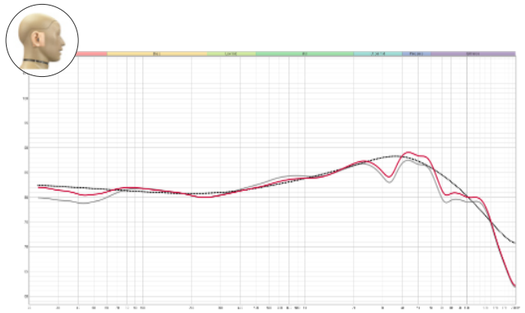
*IEC60318-1 compliant

S4R 1.3 USC

S4R 1.3 - Closed back for recording, producing and podcasting



Psychoacoustics/perception compensated with OLLO Target for Recording Audio | IEC60318-4
GRAY: non-calibrated. RED: USC calibrated



RAW | 1/3 oct | sweep distribution | IEC60318-4

N/A

RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity 1.3*

@ 0 dBu with 1 kHz RMS produces (+/-1) 111 dBSPL

@ -26 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range 1.2, 1.1*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 17.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 10 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 52.5mm / 90mm / 20mm

Impedance

+/- 5% 30 Ohm

Weight

370g

Clamping pressure N/cm²

@14.3cm breadth ~0,182 N/cm²

85 dBSPL @ -26 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

ALL THE FOLLOWING CHARTS ARE COMPENSATED WITH OLLO Target for S5X headphones

1. Compensated

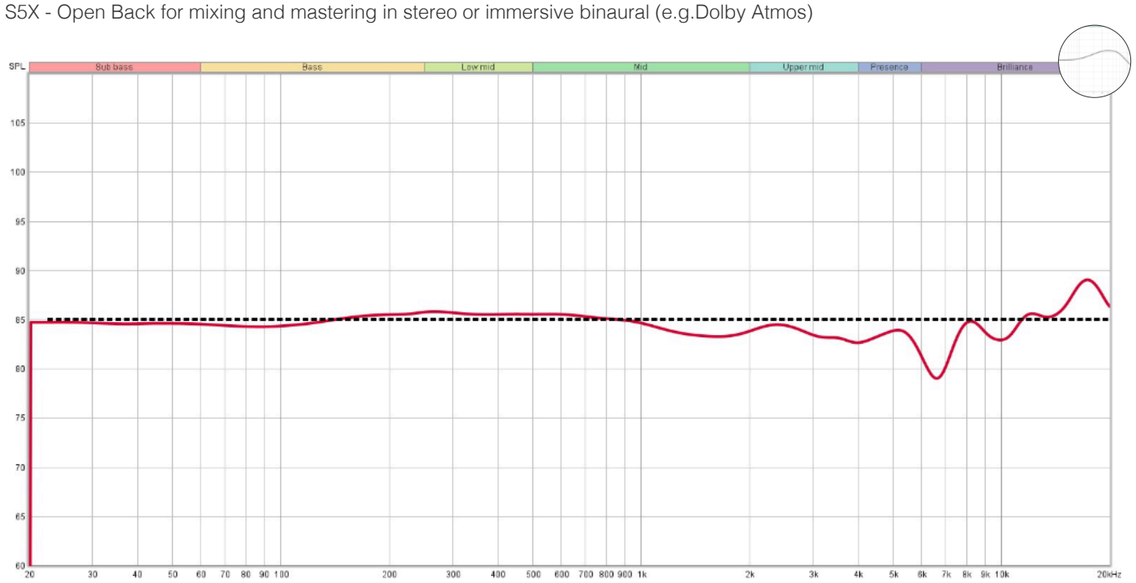
The first chart is a compensated frequency response measured with IEC60318-4 applying our target curve used with S5X headphones. It's not ideal for some headphones and should only be used as a guide.

The second (bottom left) are RAW measurements with the 60318-4 ear simulator. The third one is with 60318-1 simulator.

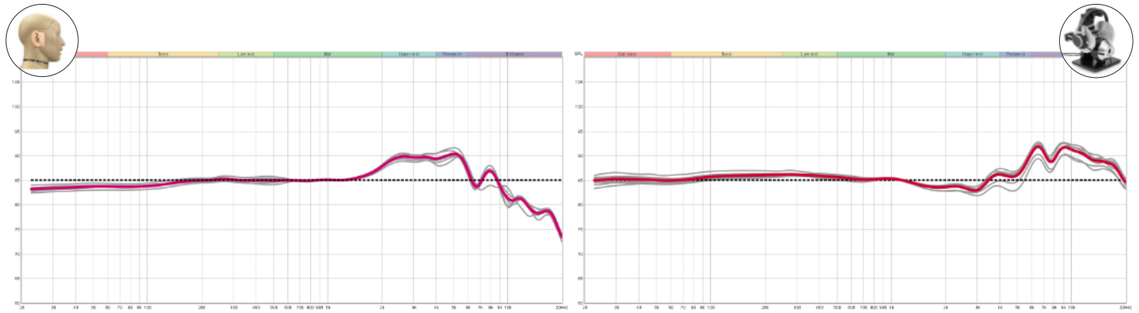
HOW DO THEY SOUND AND COMPARE TO EACHOTHER?
Focus on compensated graphs and the differences you see are the ones that will also be heard.

S5X 1.0

S5X - Open Back for mixing and mastering in stereo or immersive binaural (e.g.Dolby Atmos)



Psychoacoustics/perception compensated with OLLO Target 2022** | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4

RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu RMS 1 kHz produces (+/-1) 108 dBSPL

@ -23 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 14.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 12 dBSPL

Earpads in/out diameter / depth

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Impedance

+/- 5% 50 Ohm

Weight

414g

Clamping pressure N/cm²

@14.3cm breadth ~0.127 N/cm²

85 dBSPL @ -23 dBu RMS

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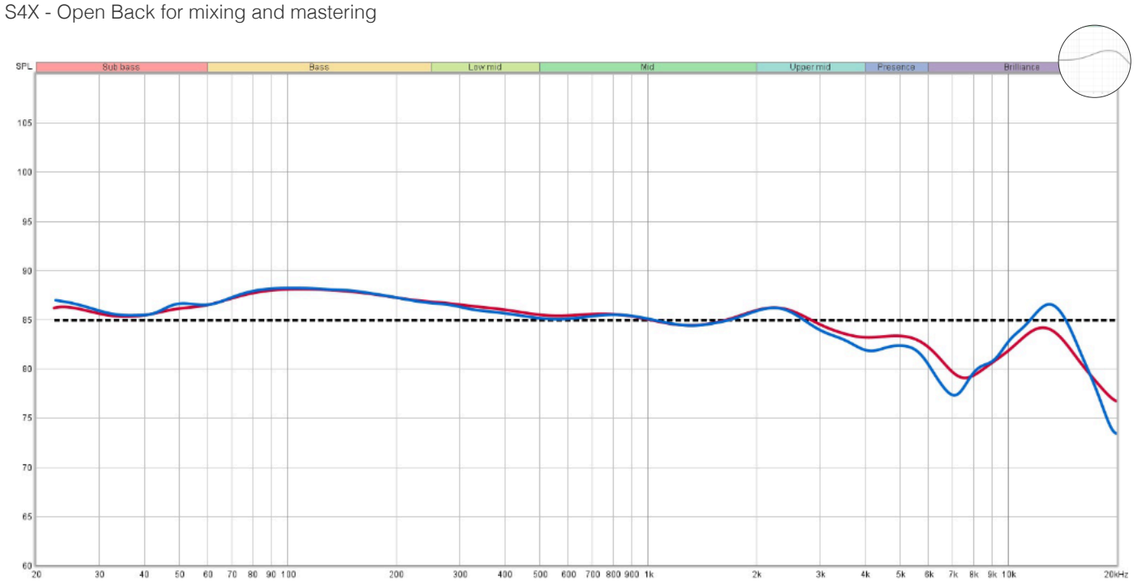
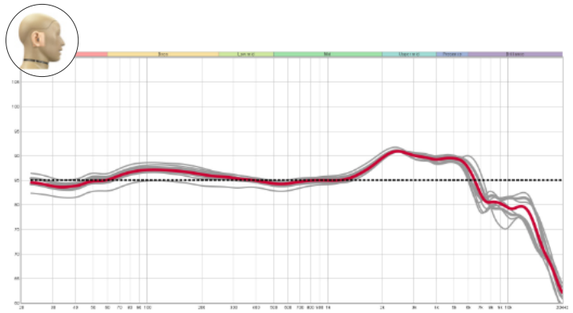
S4X 1.2, 1.1, 1.0

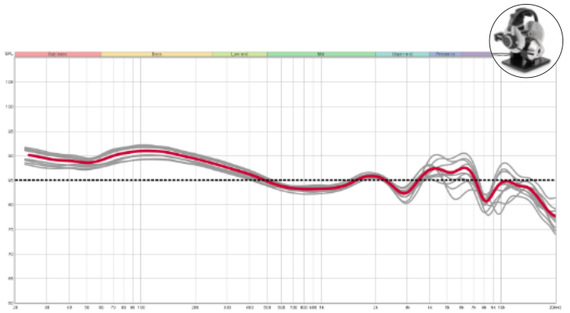
S4X - Open Back for mixing and mastering



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 109.5 dBSPL

@ -25 dBu pink 9.6 crest produces (+/-1) 85 dBSPL

Frequency range*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 16.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 13.7 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 52.5mm / 90mm / 20mm

Impedance

+/- 5% 30 Ohm

Weight

350g

Clamping pressure N/cm²

@14.3cm breadth ~0,182 N/cm²

85 dBSPL @ -25 dBu

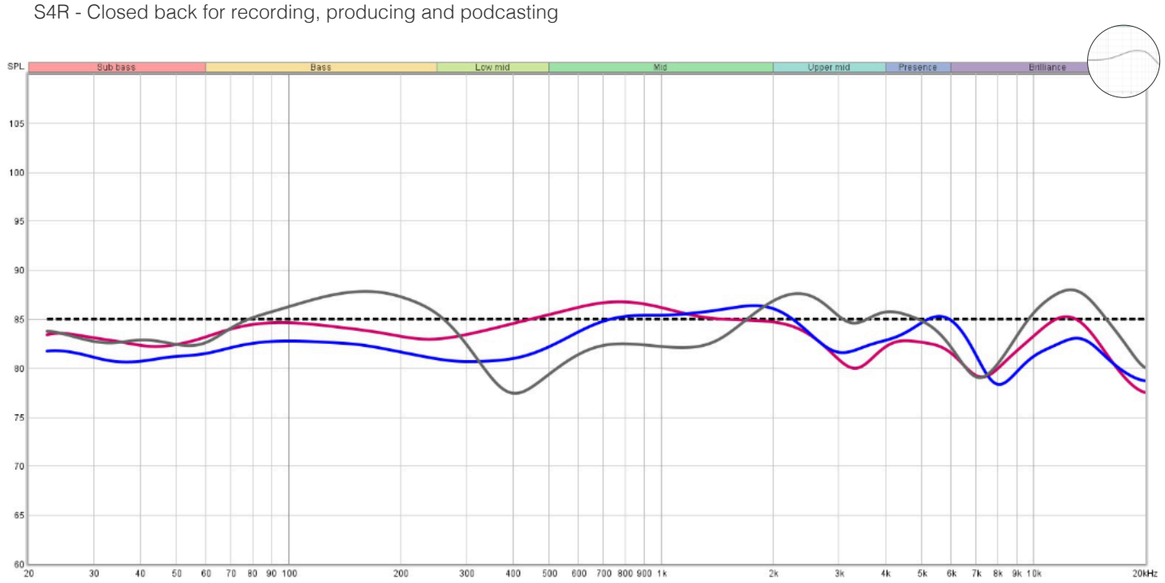
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

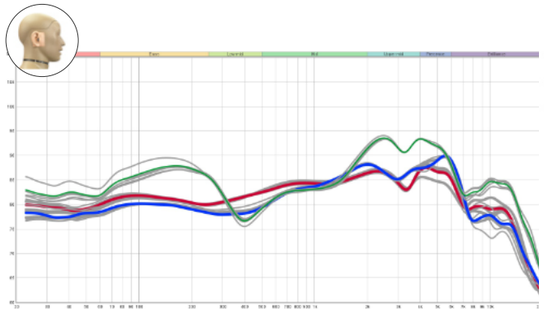
OLLO Audio

S4R 1.2, 1.1, 1.0

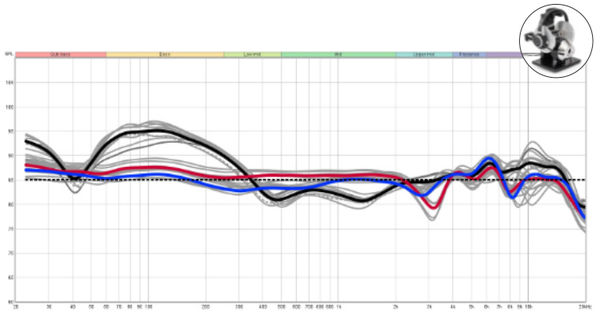
S4R - Closed back for recording, producing and podcasting



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4 | 5oct AVG align 85dB



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity 1.2, 1.1*

@ 0 dBu with 1 kHz RMS produces (+/-1) 111 dBSPL

@ -26 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range 1.2, 1.1*

15 Hz - 22 kHz sweep 1/3 oct p-p range (+/-1) 17.5 dBSPL

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 10 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 52.5mm / 90mm / 20mm

Impedance

+/- 5% 30 Ohm

Weight

370g

Clamping pressure N/cm²

@14.3cm breadth ~0,182 N/cm²

85 dBSPL @ -26 dBu

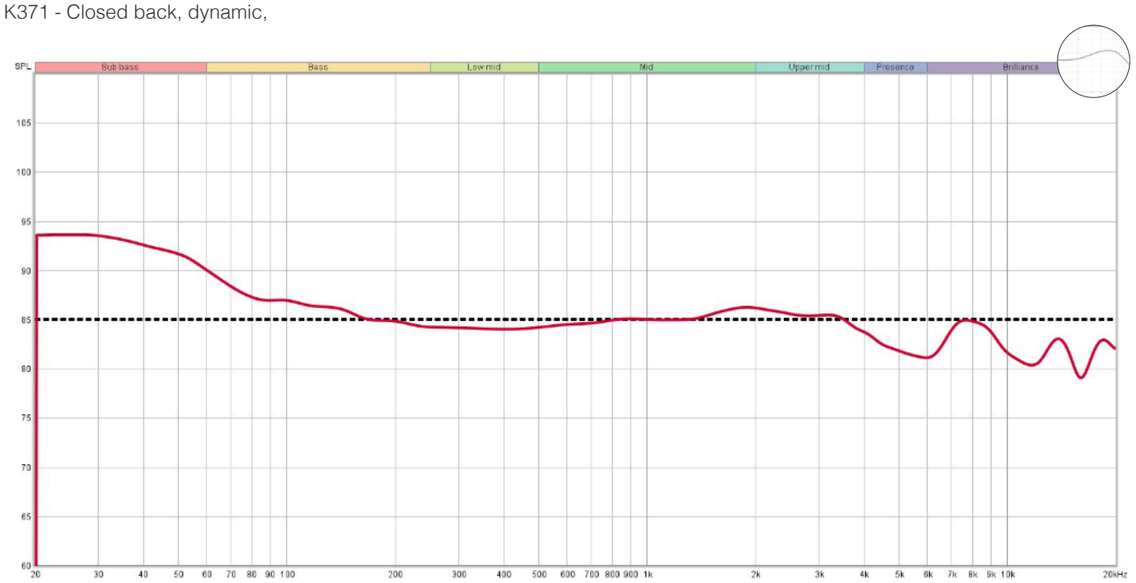
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

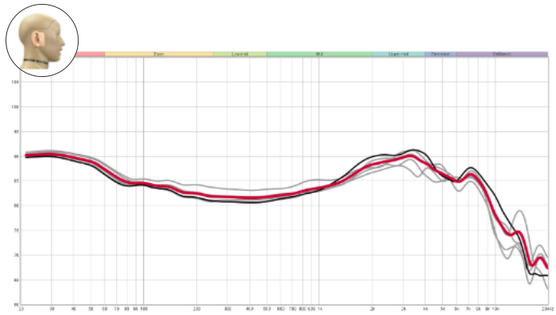
AKG

K371

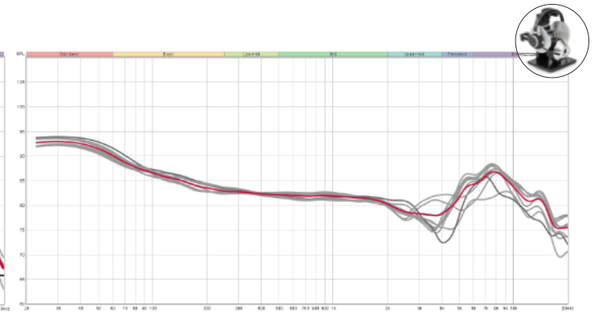
K371 - Closed back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 109.3 dBSPL

@ -25 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (data from manufacturer)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 18.5 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 65:45mm$^{ver:hor}$/ 100:75mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 32 Ohm(data from manufacturer)

Weight

258g

Clamping pressure N/cm²

@14.3cm breadth ~0,189 N/cm²

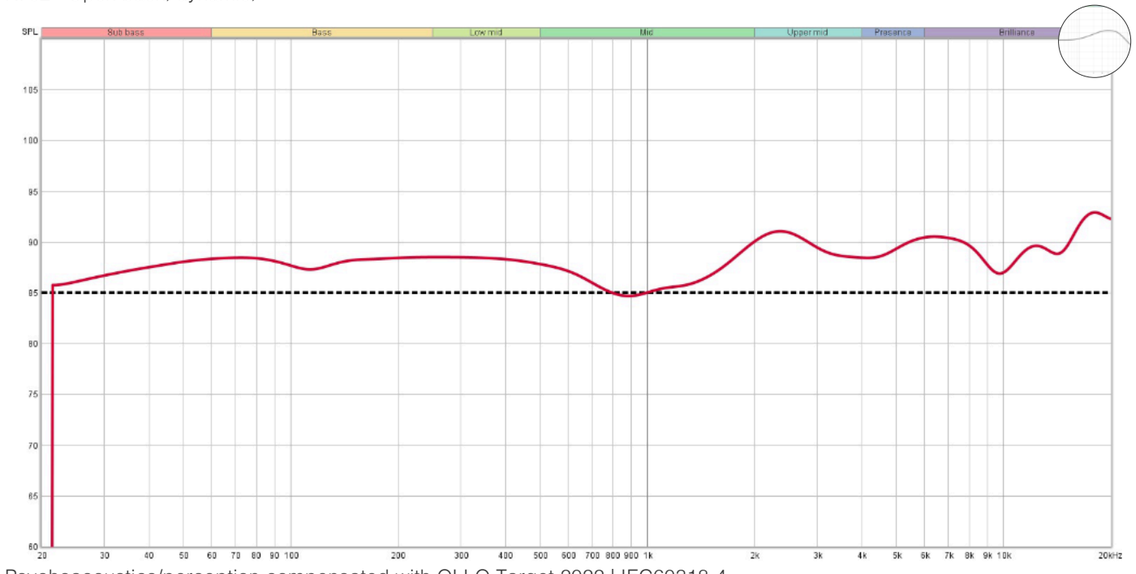
85 dBSPL @ -25 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

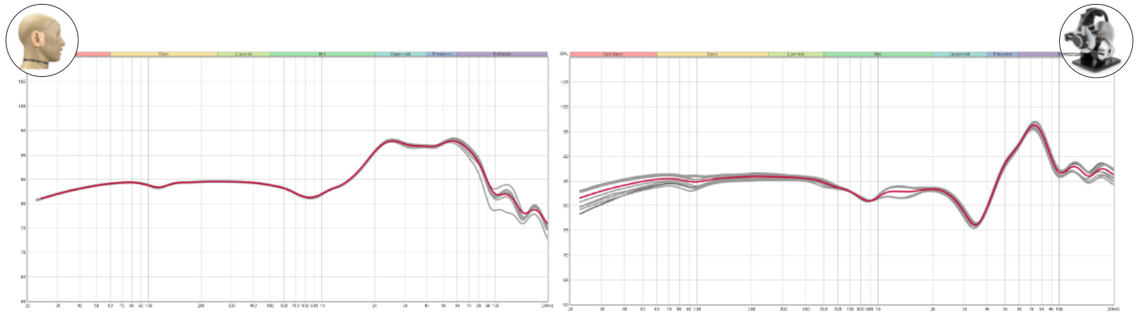
*IEC60318-1 compliant

K702

K702 - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4

RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 95.6 dBSPL

@ -16 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

10Hz - 39.8kHz (data from manufacturer)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 19.5 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:105mm$^{ver:hor}$/ 60:60mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 62 Ohm(data from manufacturer)

Weight

292g

Clamping pressure N/cm²

@14.3cm breadth ~0,086 N/cm²

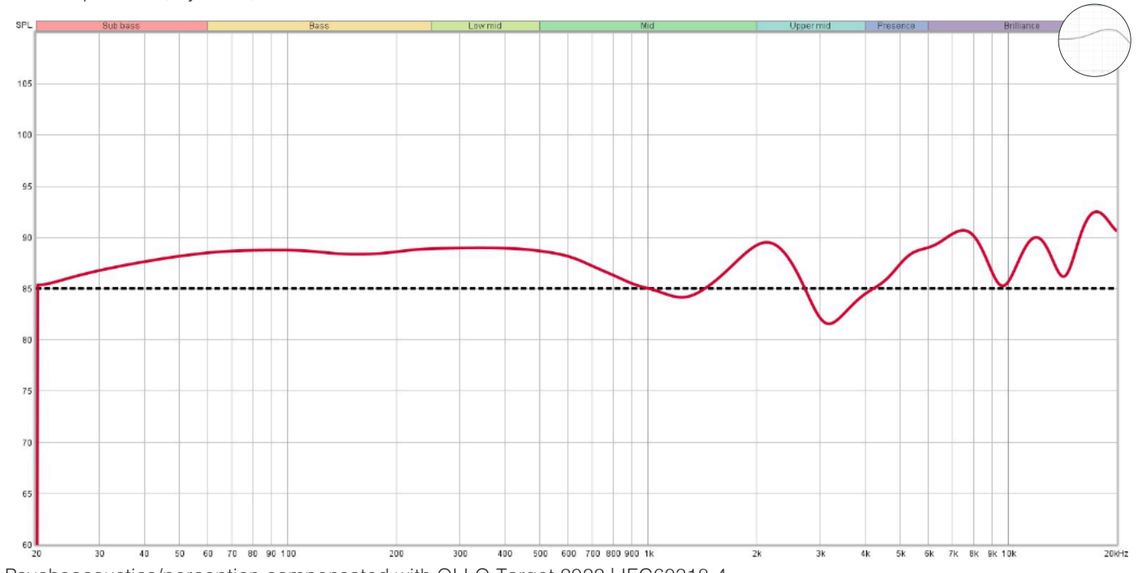
85 dBSPL @ -16 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

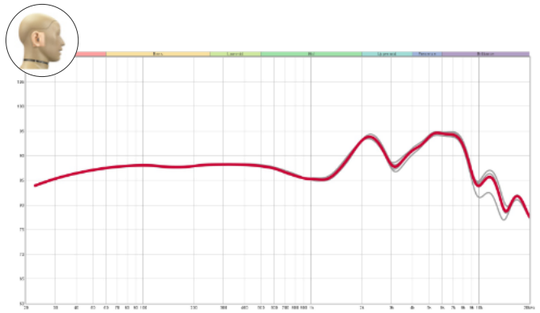
*IEC60318-1 compliant

K712

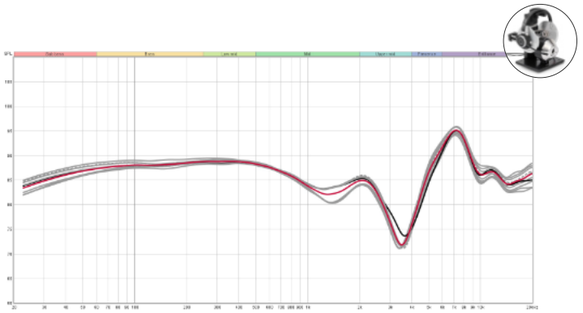
K712 - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 97.4 dBSPL

@ -15 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

10Hz - 39.8kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 17.5 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:105mm$^{ver:hor}$/ 60:60mm$^{ver:hor}$/ 25mm

Impedance and Weight

+/- ?% 62 Ohm(data from manufacturer)

Weight

298g

Clamping pressure N/cm²

@14.3cm breadth ~0,086 N/cm²

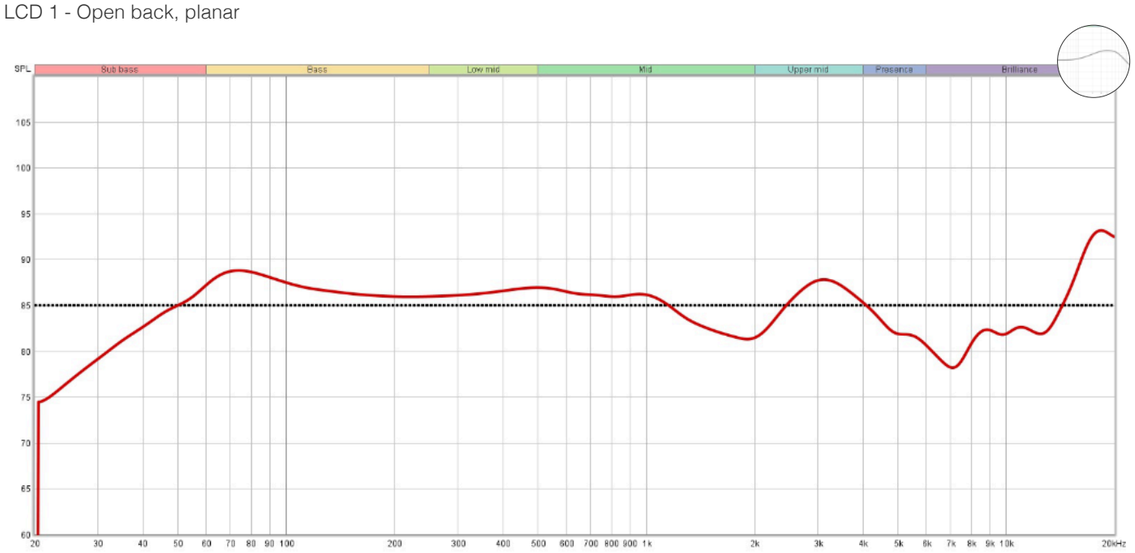
85 dBSPL @ -15 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

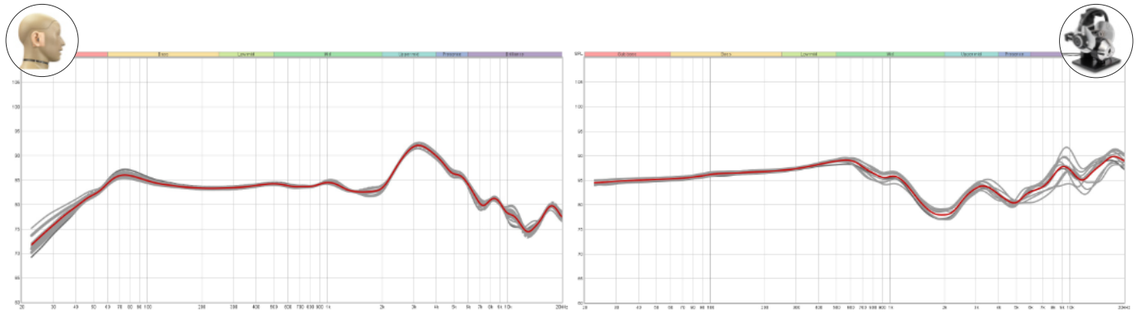
*IEC60318-1 compliant

LCD 1

LCD 1 - Open back, planar



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4 ***WAS NOT ABLE TO SEAL



RAW | 1/3 oct | sweep distribution | IEC60318-4

RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 104.5 dBSPL

@ -20 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

10Hz - 50kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 12.5 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 90:75mm$^{ver:hor}$/ 60:35mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 16 Ohm$^{(data\ from\ manufacturer)}$

Weight

250g

Clamping pressure N/cm²

@14.3cm breadth ~0,137 N/cm²

85 dBSPL @ -20 dBu

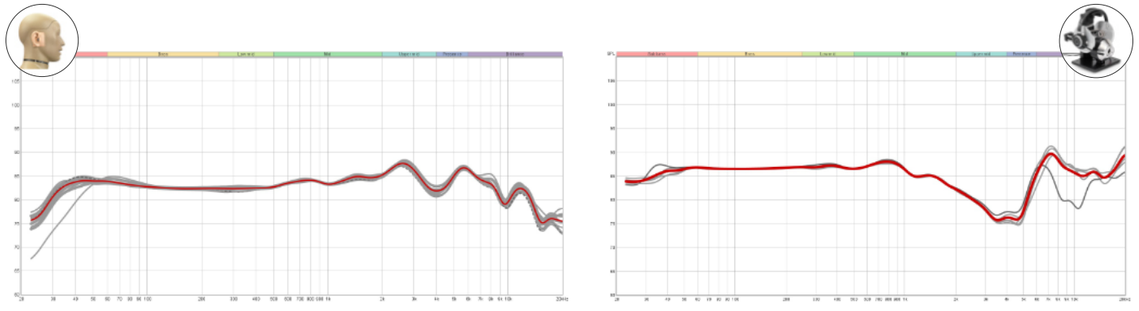
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

LCD X

LCD X - Open back, planar

Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4

RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 105.8 dBSPL

@ -22 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

10Hz - 50kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 14.8 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 110:110mm$^{ver:hor}$/ 70:50mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 20 Ohm$^{(data\ from\ manufacturer)}$

Weight

614g

Clamping pressure N/cm²

@14.3cm breadth ~0,089 N/cm²

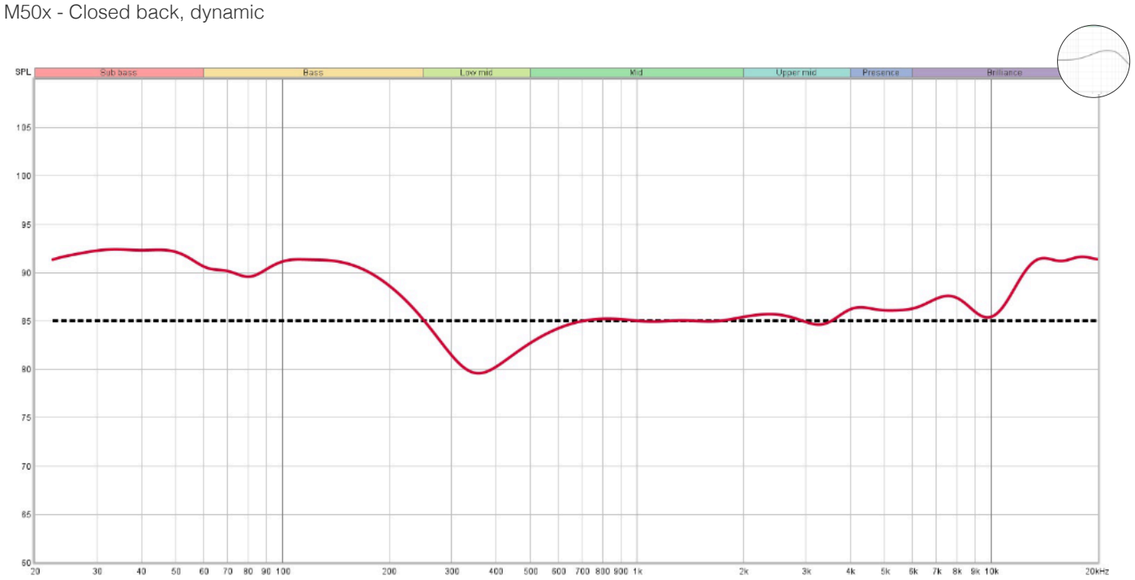
85 dBSPL @ -22 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

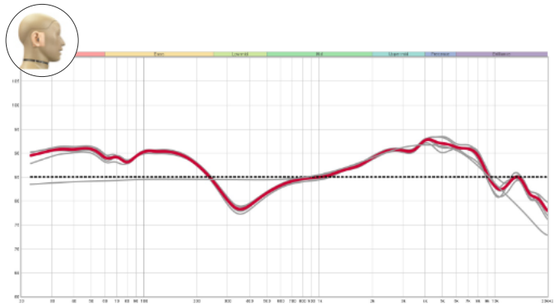
*IEC60318-1 compliant

M50X

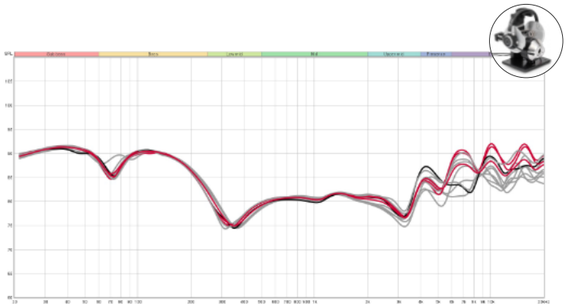
M50x - Closed back, dynamic



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 105.4 dBSPL

@ -26 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

15Hz - 28kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 17 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 100:80mm$^{ver:hor}$/ 55:40mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 38 Ohm$^{(data\ from\ manufacturer)}$

Weight

286g

Clamping pressure N/cm²

@14.3cm breadth ~0,108 N/cm²

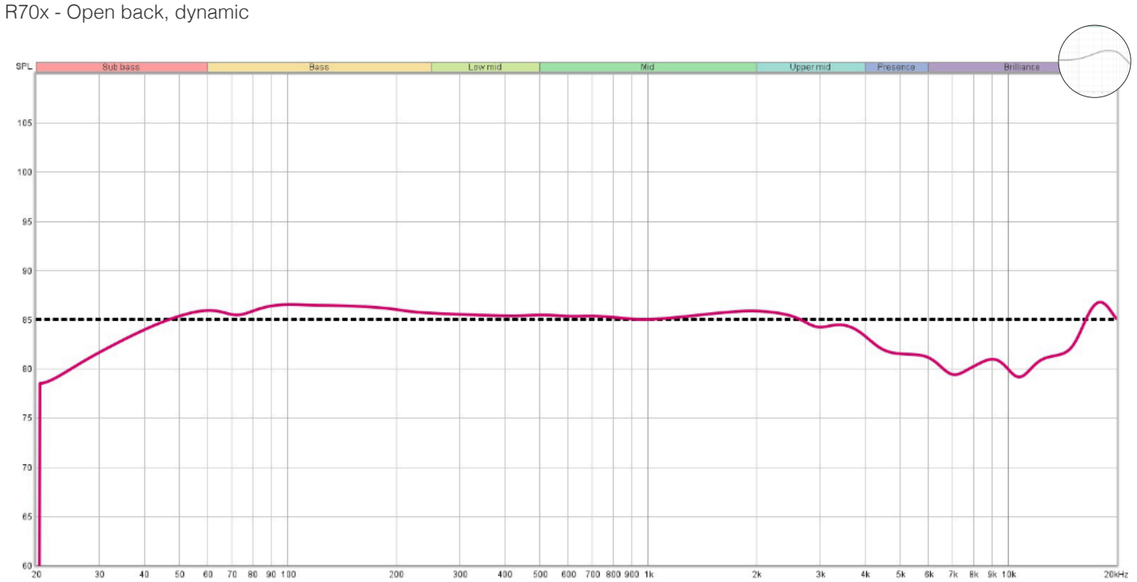
85 dBSPL @ -26 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

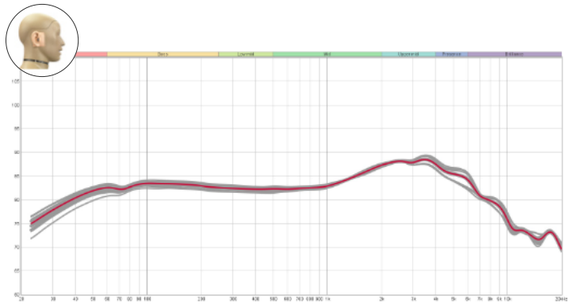
*IEC60318-1 compliant

R70X

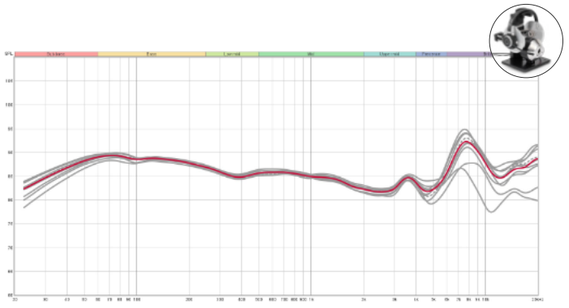
R70x - Open back, dynamic



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 99.5 dBSPL

@ -18 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 10 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 470 Ohm$^{(data\ from\ manufacturer)}$

Weight

206g

Clamping pressure N/cm²

@14.3cm breadth ~0,106 N/cm²

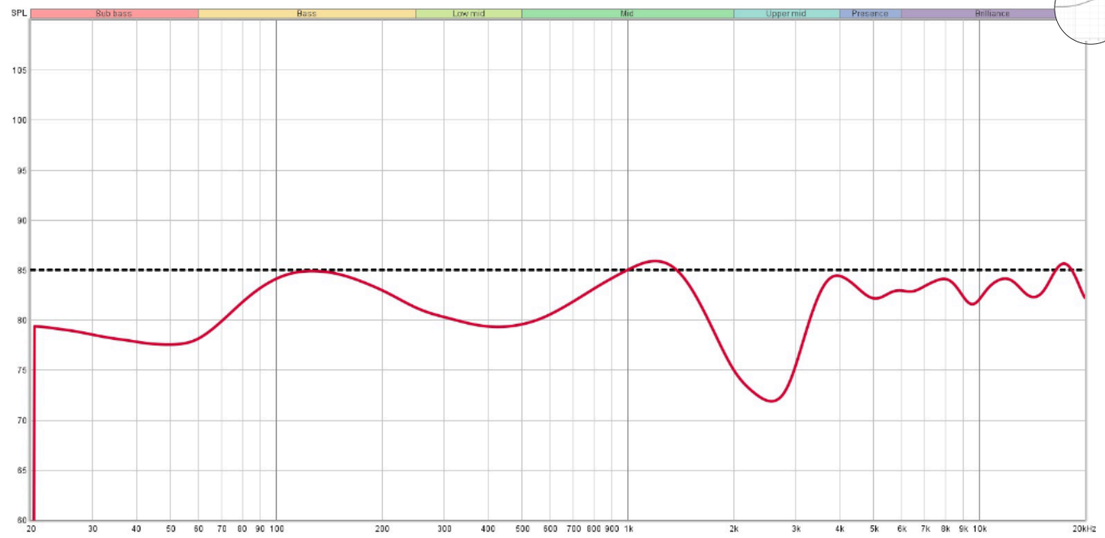
85 dBSPL @ -18 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

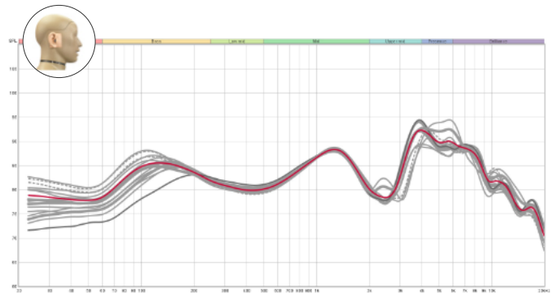
*IEC60318-1 compliant

HI-X55

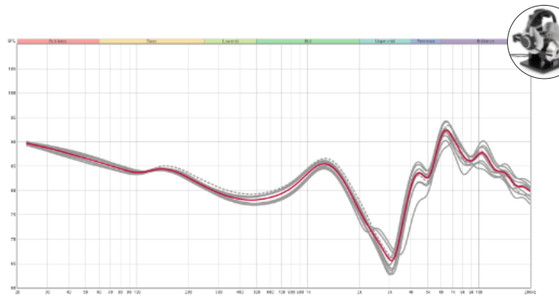
Hi-X55- Closed back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 110.7 dBSPL

@ -24 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 28kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 28 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:75mm$^{ver:hor}$/ 75:45mm$^{ver:hor}$/ 22mm

Impedance

+/- ?% 25 Ohm$^{(data\ from\ manufacturer)}$

Weight

318g

Clamping pressure N/cm²

@14.3cm breadth ~0,170 N/cm²

85 dBSPL @ -24 dBu

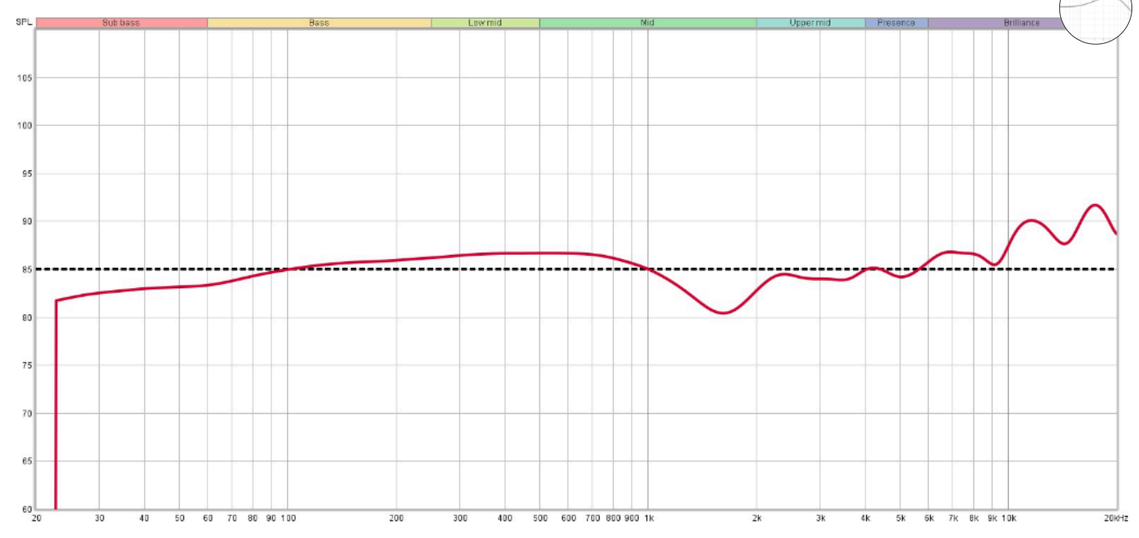
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

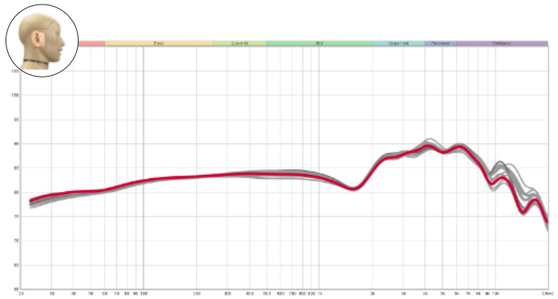
We sent this unit back to manufacturer after innitial measurements asking to verify the unit is 100% operational. It was returned as all is good. We're still sceptical this unit is 100% as intended by the manufacturer.

HI-X65

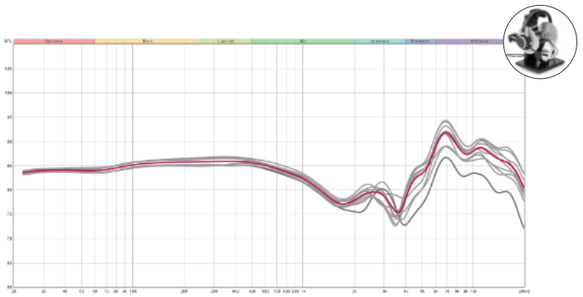
Hi-X65- Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 105.0 dBSPL

@ -22 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 28kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 16 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:75mm$^{ver:hor}$/ 75:45mm$^{ver:hor}$/ 22mm

Impedance

+/- ?% 25 Ohm$^{(data\ from\ manufacturer)}$

Weight

308g

Clamping pressure N/cm²

@14.3cm breadth ~0,170 N/cm²

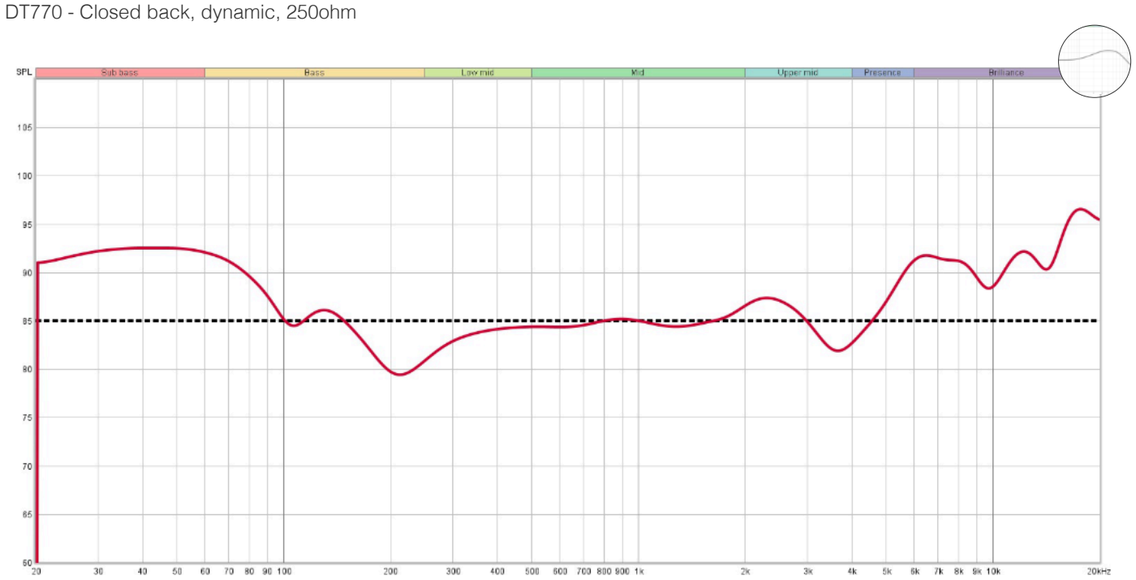
85 dBSPL @ -22 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

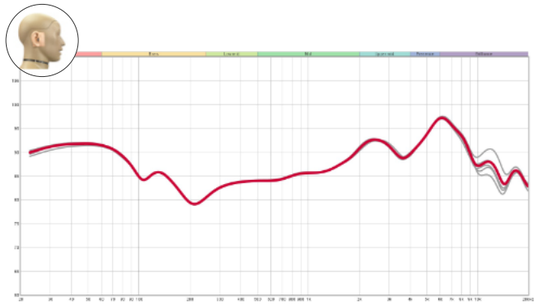
*IEC60318-1 compliant

DT 770

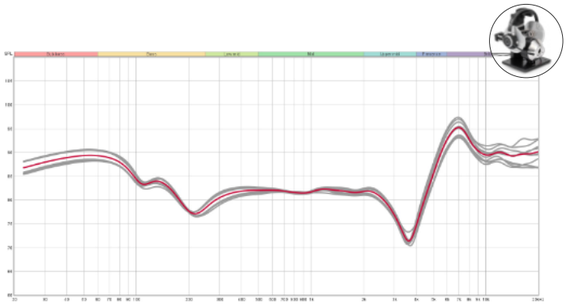
DT770 - Closed back, dynamic, 250ohm



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 98.3 dBSPL

@ -14 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 35kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 23 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 250 Ohm$^{(data\ from\ manufacturer)}$

Weight

282g

Clamping pressure N/cm²

@14.3cm breadth ~0,106 N/cm²

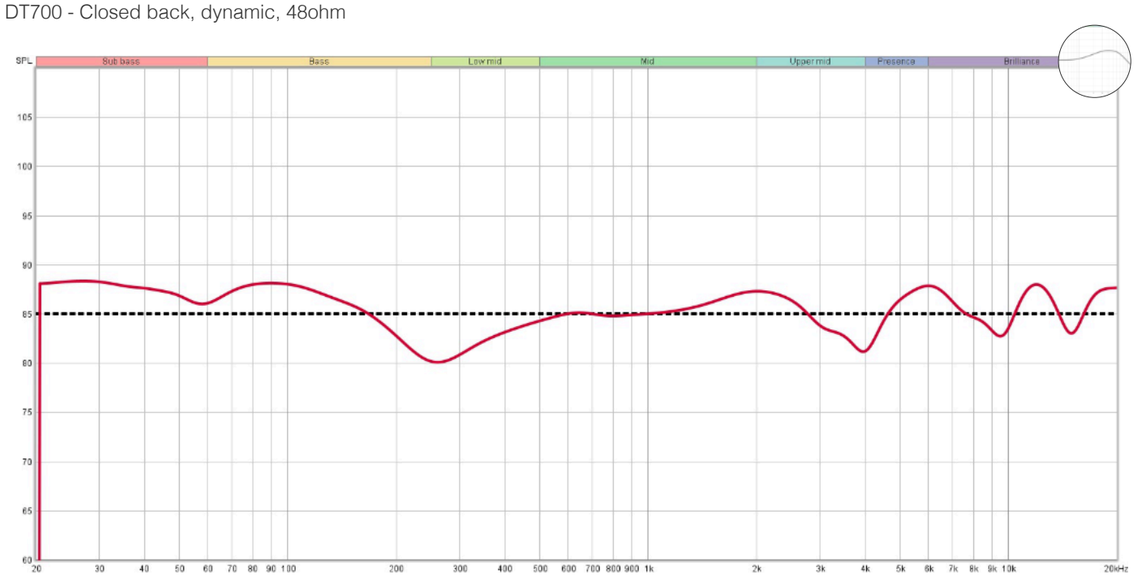
85 dBSPL @ -14 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

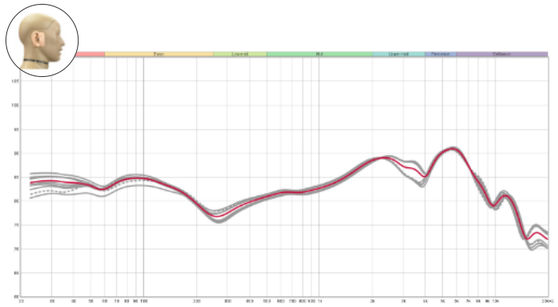
*IEC60318-1 compliant

DT 700 PRO X

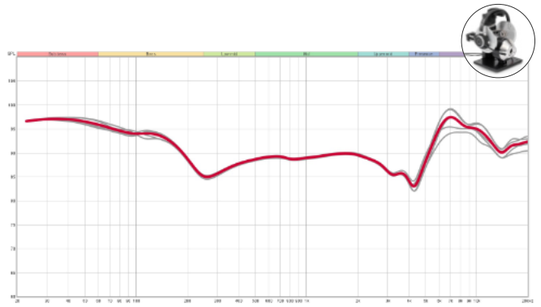
DT700 - Closed back, dynamic, 48ohm



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 108.7 dBSPL

@ -24 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 15.5 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 48 Ohm$^{(data\ from\ manufacturer)}$

Weight

352g

Clamping pressure N/cm²

@14.3cm breadth ~0,151 N/cm²

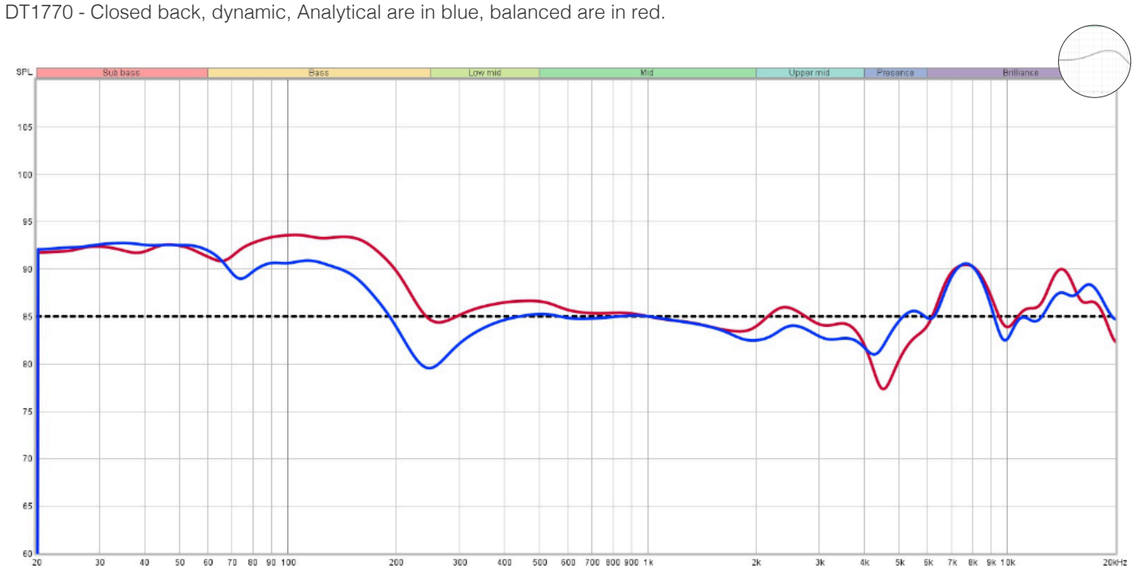
85 dBSPL @ -24 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

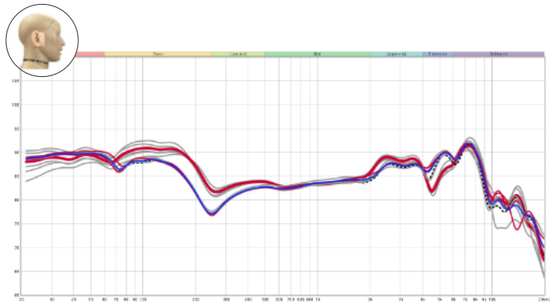
*IEC60318-1 compliant

DT 1 7 7 0

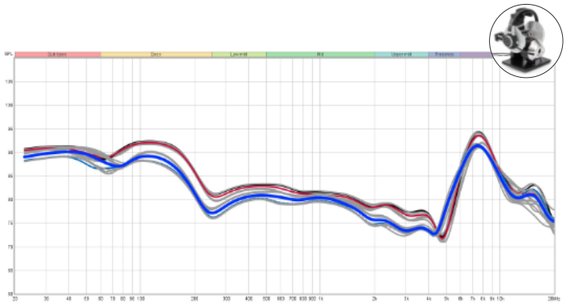
DT1770 - Closed back, dynamic, Analytical are in blue, balanced are in red.



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 102.8 dBSPL

@ -18 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 24 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 250 Ohm$^{(data\ from\ manufacturer)}$

Weight

376g

Clamping pressure N/cm²

@14.3cm breadth ~0,191 N/cm²

85 dBSPL @ -18 dBu

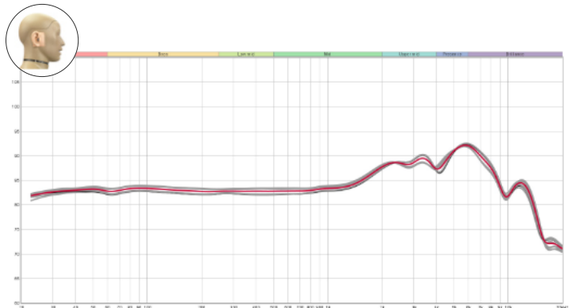
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

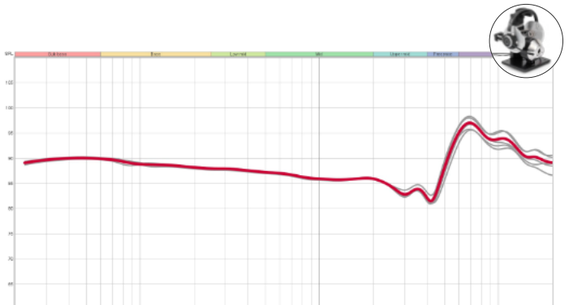
DT 900 PRO X

DT900 - Open back, dynamic, 48ohm

Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 107.4 dBSPL

@ -24 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 16 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 48 Ohm$^{(data\ from\ manufacturer)}$

Weight

342g

Clamping pressure N/cm²

@14.3cm breadth ~0,151 N/cm²

85 dBSPL @ -24 dBu

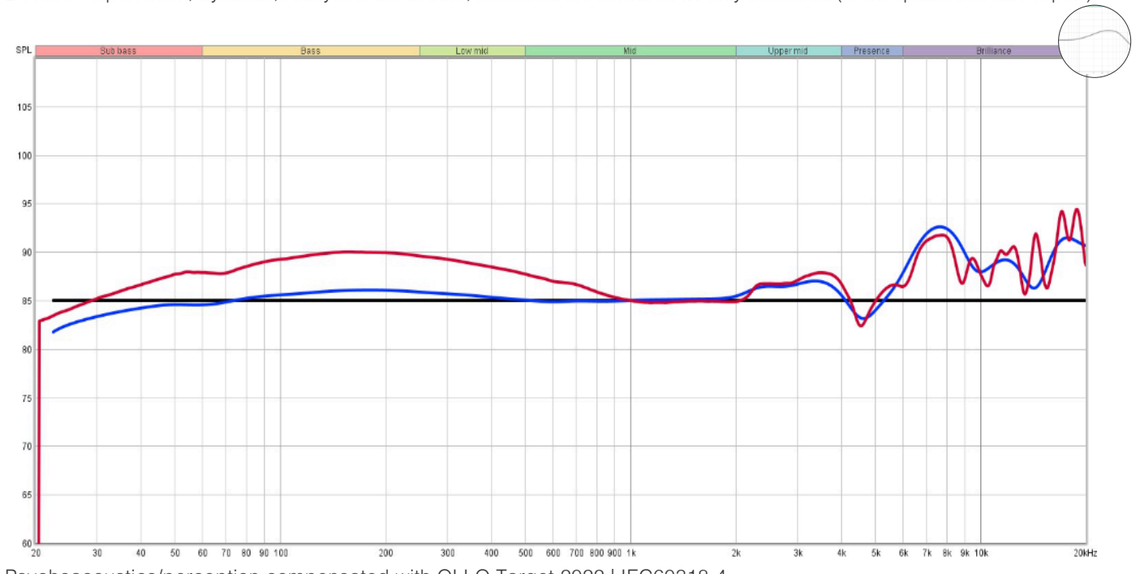
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

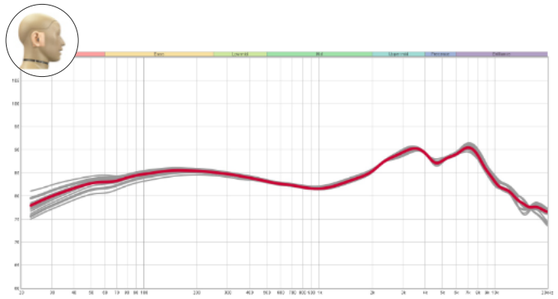
BEYERDYNAMIC

DT1990

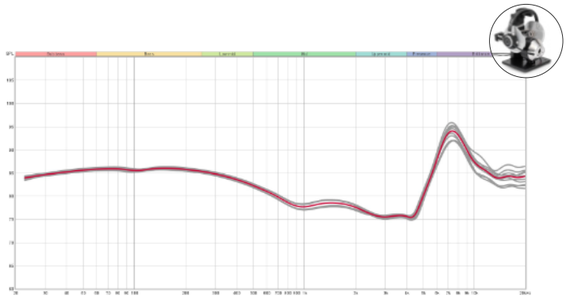
DT1990 - Open back, dynamic, Analytical are in blue, balanced are in red. RAW only balanced (to be updated in next report)



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 100.5 dBSPL

@ -18 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 40kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 18 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 95:95mm$^{ver:hor}$/ 55:55mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 250 Ohm(data from manufacturer)

Weight

370g

Clamping pressure N/cm²

@14.3cm breadth ~0,191 N/cm²

85 dBSPL @ -18 dBu

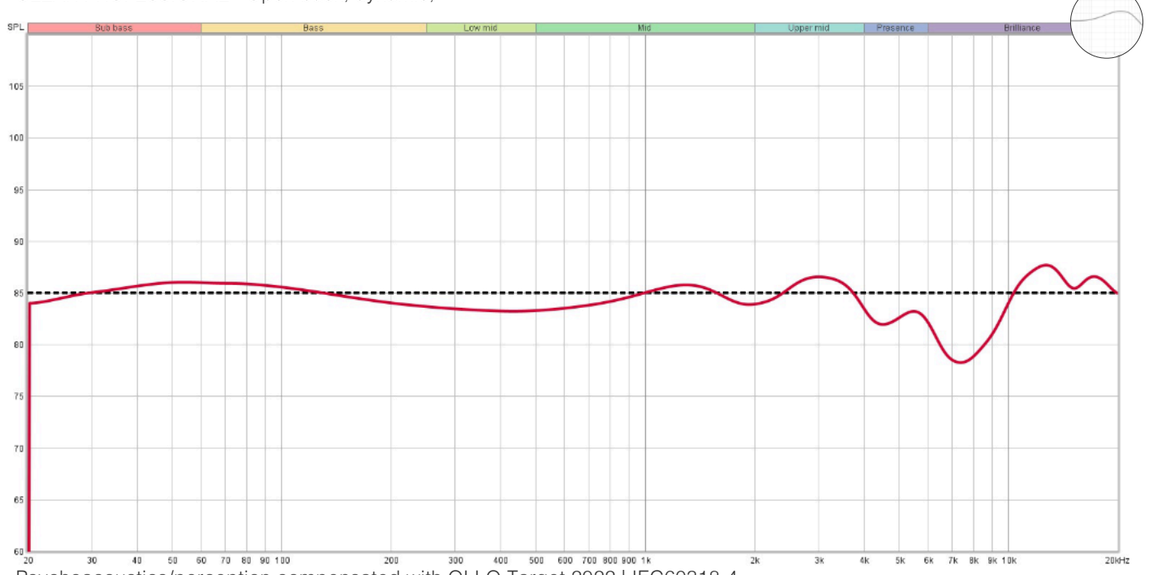
Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

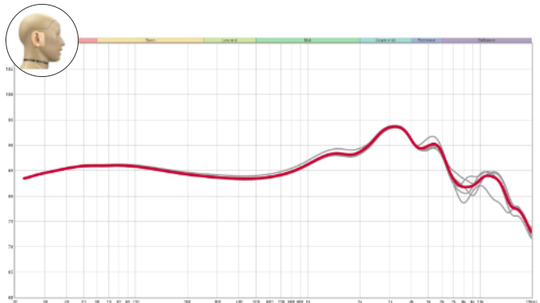
FOCAL

CLEAR PRO

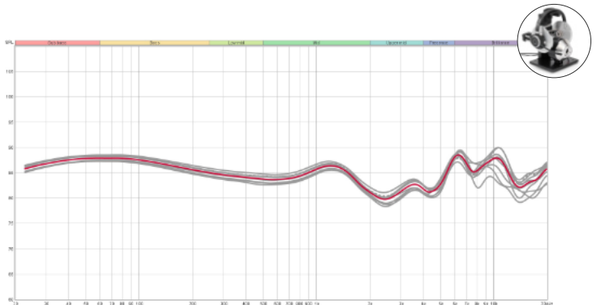
CLEAR PROFESSIONAL - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 105.3 dBSPL

@ -20 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 28kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 9 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 100:90mm$^{ver:hor}$/ 65:50mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 55 Ohm(data from manufacturer)

Weight

444g

Clamping pressure N/cm²

@14.3cm breadth ~0,141 N/cm²

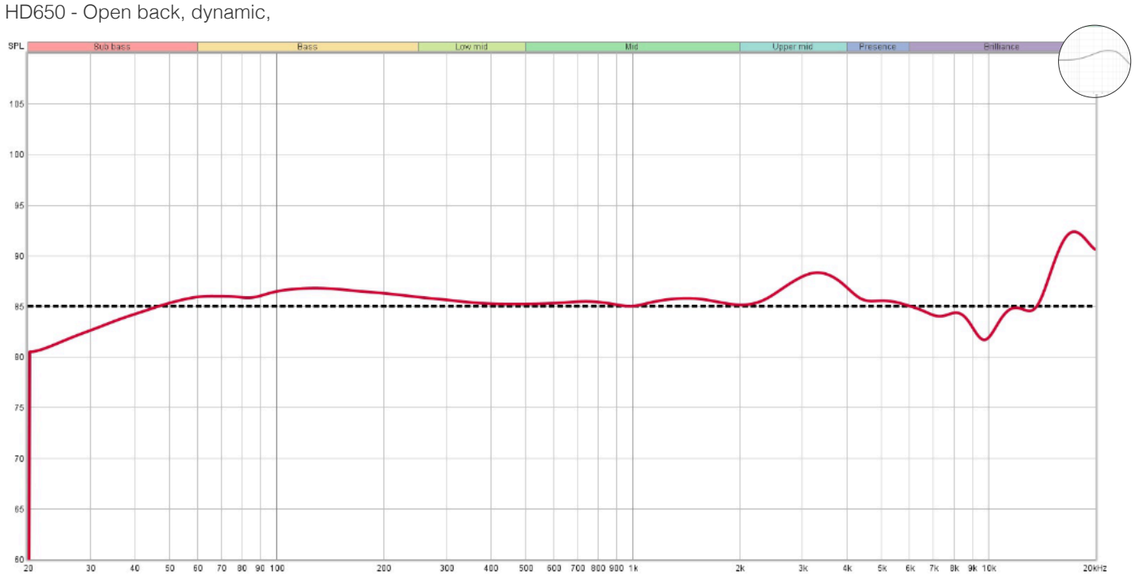
85 dBSPL @ -20 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

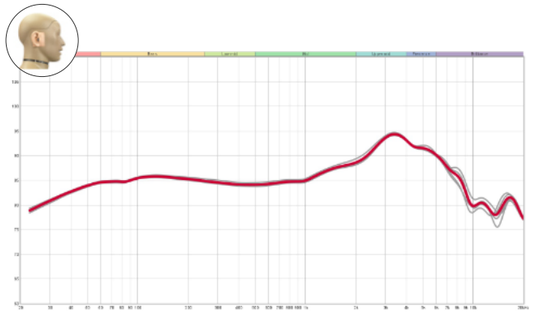
*IEC60318-1 compliant

HD650

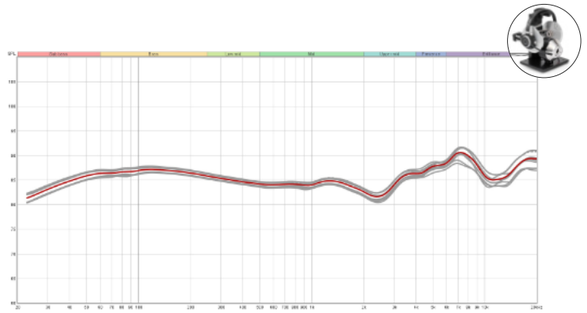
HD650 - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 101.2 dBSPL

@ -17 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

12Hz - 41kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 9 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 100:80mm$^{ver:hor}$/ 65:45mm$^{ver:hor}$/ 25mm

Impedance

+/- ?% 300 Ohm$^{(data\ from\ manufacturer)}$

Weight

260g

Clamping pressure N/cm²

@14.3cm breadth ~0,171 N/cm²

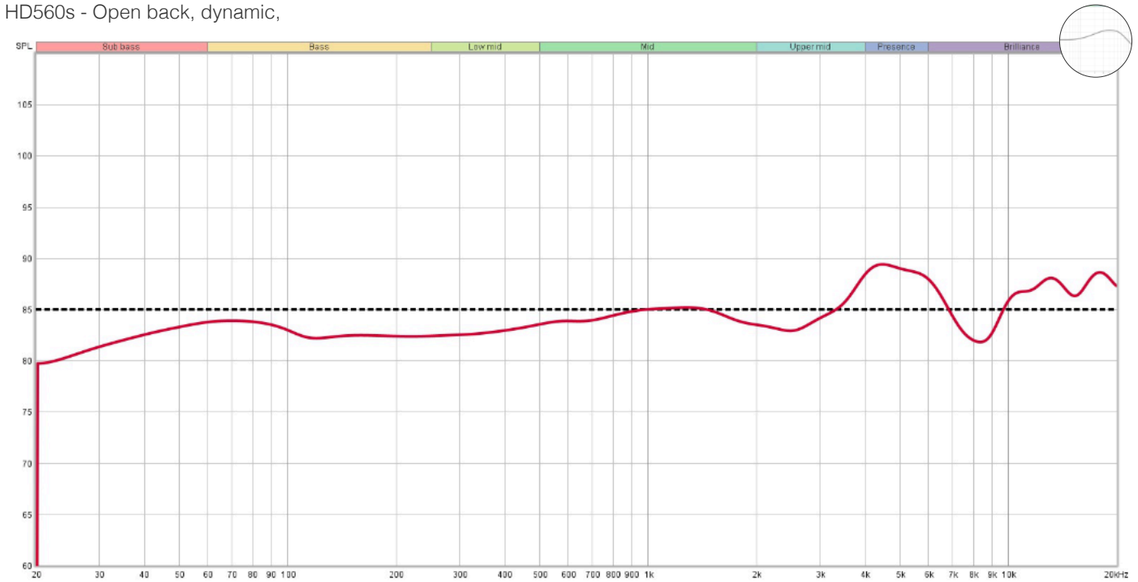
85 dBSPL @ -17 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

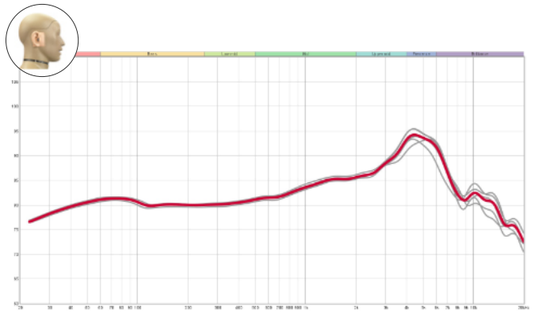
*IEC60318-1 compliant

HD560S

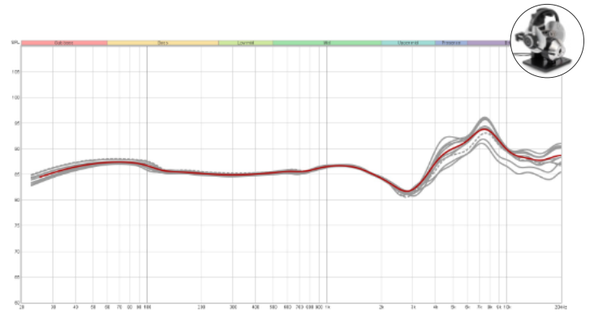
HD560s - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 103.6 dBSPL

@ -20 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

6Hz - 38kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 14 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 110:85mm$^{ver:hor}$/ 75:45mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 120 Ohm$^{(data\ from\ manufacturer)}$

Weight

240g

Clamping pressure N/cm²

@14.3cm breadth ~0,136 N/cm²

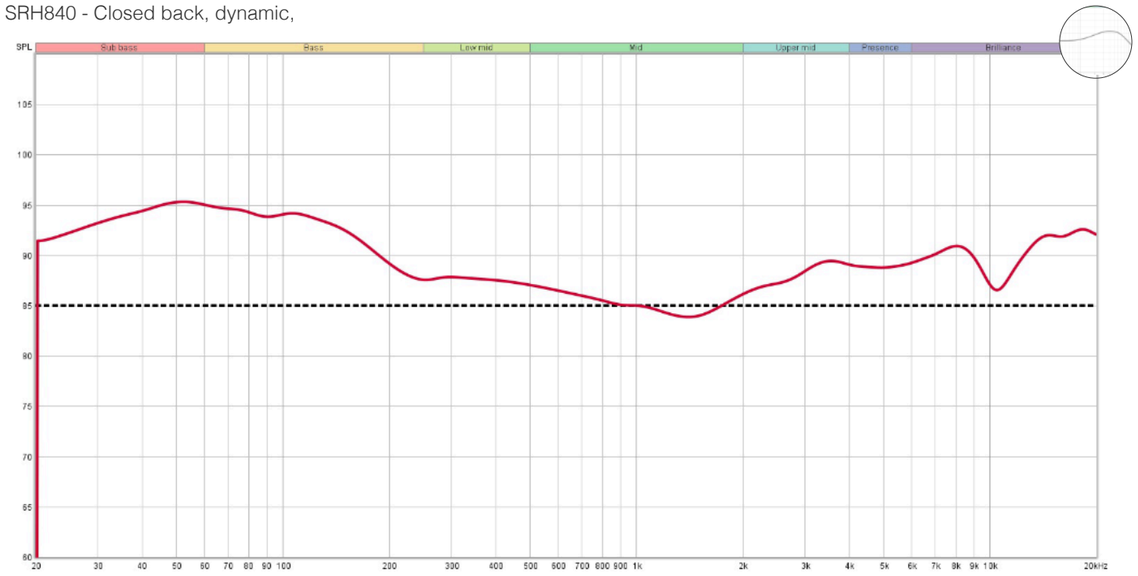
85 dBSPL @ -20 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

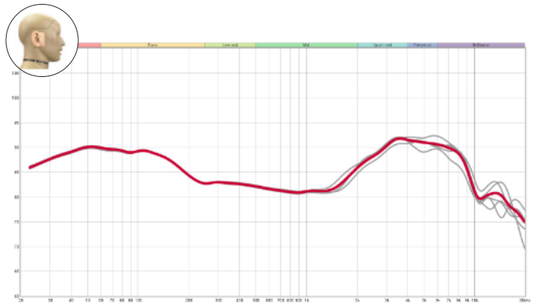
*IEC60318-1 compliant

SRH840

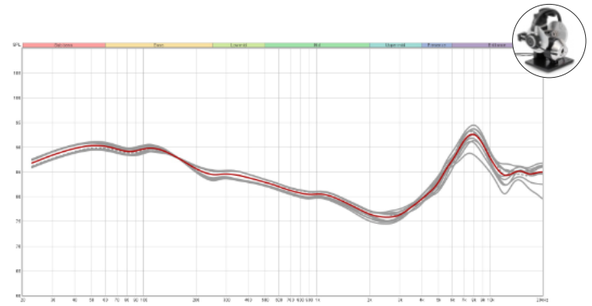
SRH840 - Closed back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 105.9 dBSPL

@ -23 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

5Hz - 25kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 20 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:85mm$^{ver:hor}$/ 65:50mm$^{ver:hor}$/ 20mm

Impedance

+/- ?% 44 Ohm$^{(data\ from\ manufacturer)}$

Weight

374g

Clamping pressure N/cm²

@14.3cm breadth ~0,112 N/cm²

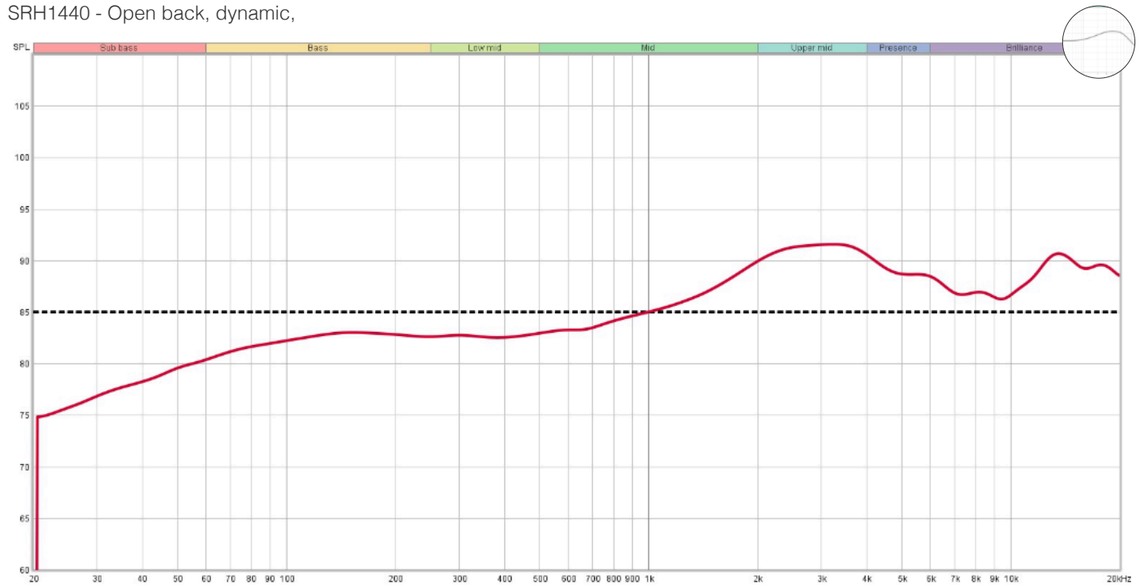
85 dBSPL @ -23 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

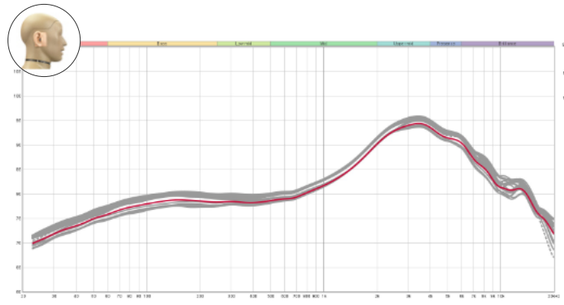
*IEC60318-1 compliant

SRH1440

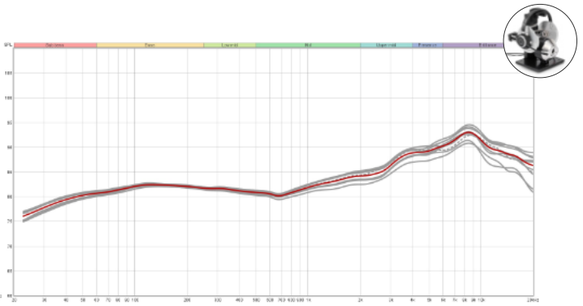
SRH1440 - Open back, dynamic,



Psychoacoustics/perception compensated with OLLO Target 2022 | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-4



RAW | 1/3 oct | sweep distribution | IEC60318-1

Sensitivity*

@ 0 dBu with 1 kHz RMS produces (+/-1) 106.0 dBSPL

@ -25 dBu RMS 0.5-2kHz pink produces (+/-1) 85 dBSPL

Frequency range*

15Hz - 27kHz (from manufacturer data)

20 Hz - 20 kHz sweep 1/3 oct p-p range (+/-1) 18 dBSPL

Earpads in/out diameter / depth

+/- 2.5mm 105:85mm$^{ver:hor}$/ 65:45mm$^{ver:hor}$/ 22mm

Impedance

+/- ?% 37 Ohm$^{(data\ from\ manufacturer)}$

Weight

342g

Clamping pressure N/cm²

@14.3cm breadth ~0,181 N/cm²

85 dBSPL @ -25 dBu

Maximum volume setting for safe listening and also the K-metering 0dB for K12, K14 or K20 scale with headphones monitoring. As headphones speakers do not sum in SPL as speakers in a room do, we recommend using 85 dB for K-metering. Tidal, Spotify, Youtube, etc. require on average 3-5dB increase in comparison to DAW levels (apps and OS leave 3-5 dB headroom in FS). For casual listening or long sessions set a dim level with additional reduction of 5 dBu.

*IEC60318-1 compliant

A WORD OF **CAUTION**

Measurements are here to help with educated decision when you're considering buying OLLO Audio headphones.

No standard or method for measuring headphones performance is designed to mimic your ears and your taste. Please take this into consideration.

Our advice is to try them out as this is the only way to know for sure, if they meet your expectations. If you need more info on trial period, please reach out via info@olloaudio.com or social media chat channels.

Rok Gulič, founder