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Studio Headphone guide 2018

Known for more than half a century, only recently have headphones stepped into the forefront of audio consumption and production. Unfortunately, finding the rightset for the job at hand isn't trivial, especially when audition is out of the question.

We at Sonarworks have spent the last 5 years researching and measuring headphones to find how to perfect them. In this guide we've distilled our experience and knowledge into an exciting and easy read.

Content:

What makes a good studio headphone?

1. **Flat frequency response** (at least 50Hz - 17kHz with +/-3dB accuracy)

   Why - so you hear music like it is and interact with the mix precisely where it's needed
   How to find out - look at our graphs

2. **THD below 1%** (at least above 100Hz)

   Why - so details don't get mushed
   How to find out - look at our graphs

3. **Replaceable pads**

   Why - pads will wear out and when they do, the sound will change for the worse
   How to find out - look up reviews or manufacturer specs

4. **Replaceable cable**

   Why - all cables brake, no need to lose your cans when it happens
   How to find out - look up reviews or manufacturer specs

5. **Rugged build**

   Why - studio can be a rough place, make sure your tools can take the abuse, lest they break when you most need them
   How to find out - look up reviews, customer comments and try them out in person

When to amp you cans?

Amp or not?

Despite what many avid headphone hobbyists will tell you, you don't have tosplurge for an amp. Most headphones these days are sensitive enough to bedriven from audio interface headphone outputs with sufficient SPL. With that said there are exceptions.

Trouble on the road

Laptop headphone outputs and mobile devices often have handicapped headphone outputs. Especially if one opts for a high impedance headphone like the 300ohm Sennheiser HD600. In this case it pays to invest in a simple USB DAC with a headphone output. It won't add much bulk to your setup and you'll never be left wanting volume wise. In some cases a separate DAC can be useful if your sensitive headphones are too noisy out from the built in headphone jack.

A headphone amp will only do good if your setup only has decent line outputs. In this case the Schiit Audio Modi 3 is a nice choice as it has enough power for just about every can out there. There is a plethora of other options on offer, but their benefits won't be as important for studio work.

When to amp?

When you're forced to work on a laptop or other portable device AND

1. Your cans are 300 Ohms and up OR
2. Your headphone output is too hissy

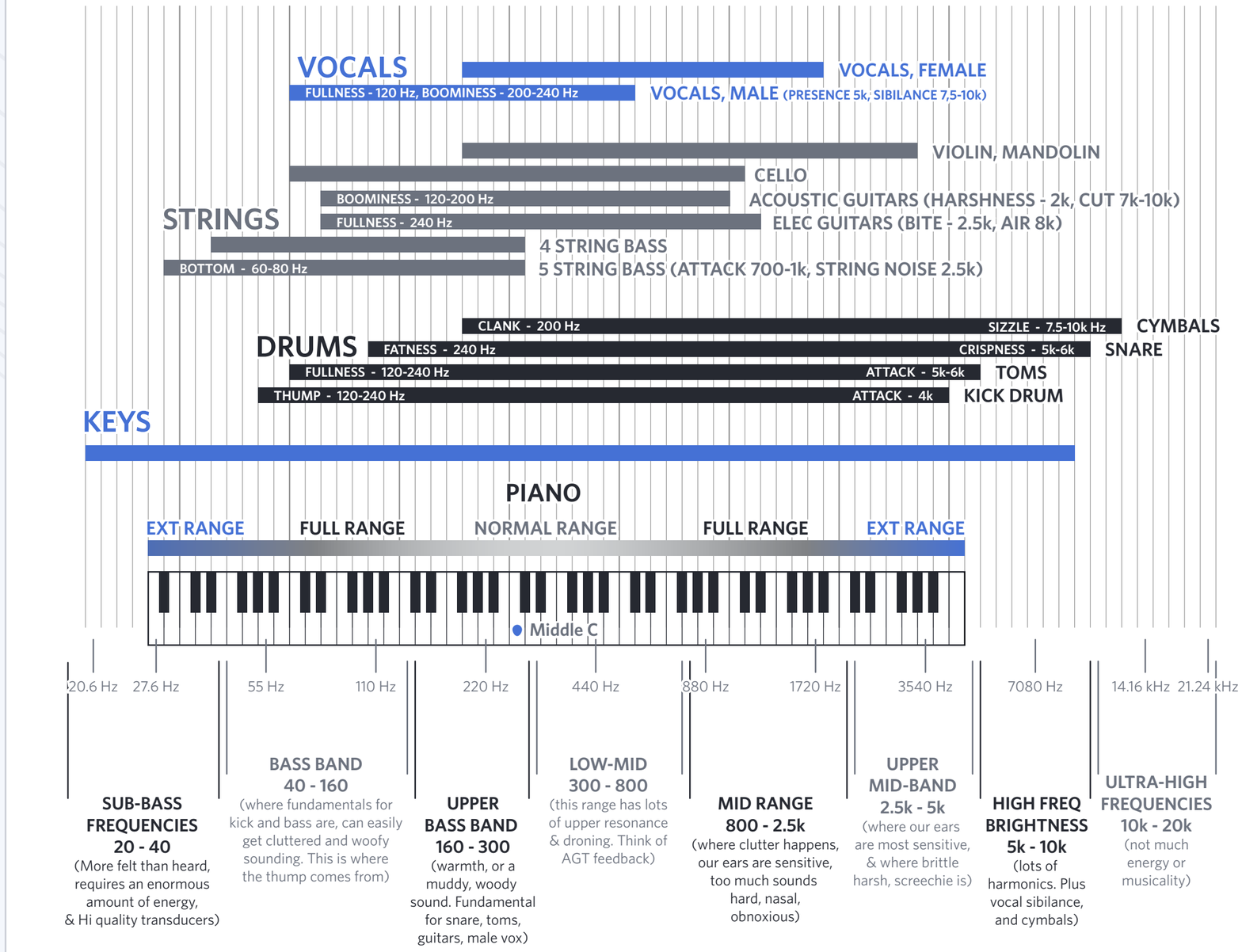
Closed or not?

Much ink has been spilled regarding the best in studio headphones, however there's hardly something like the best cans for everything. First thing you need to find out is whether you need isolation. Do you work in a noisy environment?
Will sound leakage from your cans bother the folks around you?
If so – you need sealed headphones.

If the room is all yours, then generally it's a no brainer to go for open or semi open backed headphones.
9 times out of 10 they will sound better than closed back headphones. One exception would be monitoring bass heavy music – sealed cans keep the air from escaping, so more bass is possible.

Open	Closed
Pros Best mids and highs Less ear fatigue	**Pros** Best bass and sub-bass Seal from outside noise
Cons Sound leaks in and out Low bass lacking	**Cons** Mids can get muddy
Best for Mixing, mastering	**Best for** Mixing bass heavy music, on-site work, working in public places

Where your sounds live on the frequency graph?



TOP headphones list

Open back:

1. Philips SHP9500 - 75$*
2. Beyerdynamic DT990 - 190$
3. Sennheiser HD600 - 286$
4. Audeze LCD-2 - 900$
5. Sennheiser HD800 - 1085$

Closed back:

1. Audio-Technica ATH-M40x - 100$
2. Beyerdynamic DT770 - 175$
3. Sennheiser HD25-II - 190$
4. Focal Spirit Pro - 350$
5. Oppo PM-3 - 400$

*prices taken from major retailers in January 2018

Philips SHP9500

Open back dynamic - 75$

Great build quality coupled with decently neutral frequency response. Just don't expect to monitor bass heavy music with these.

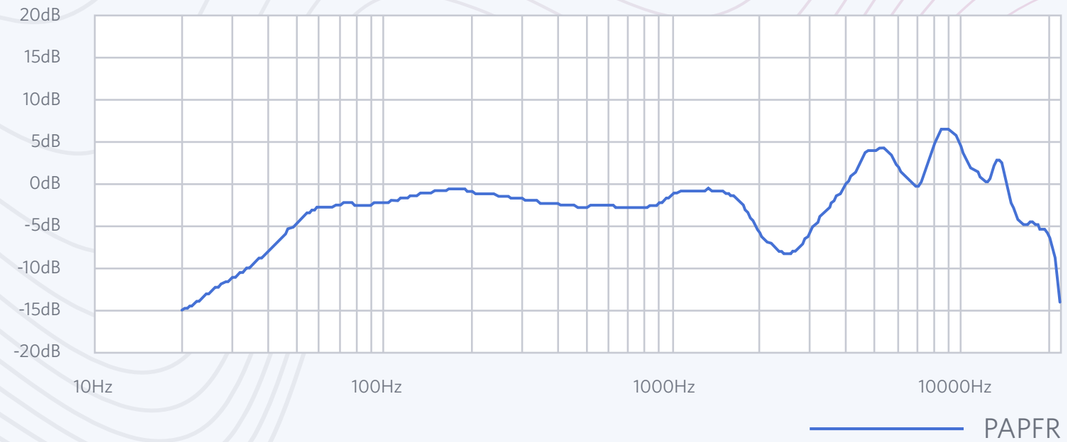
The good:

- Surprisingly neutral
- Ergonomics to die for

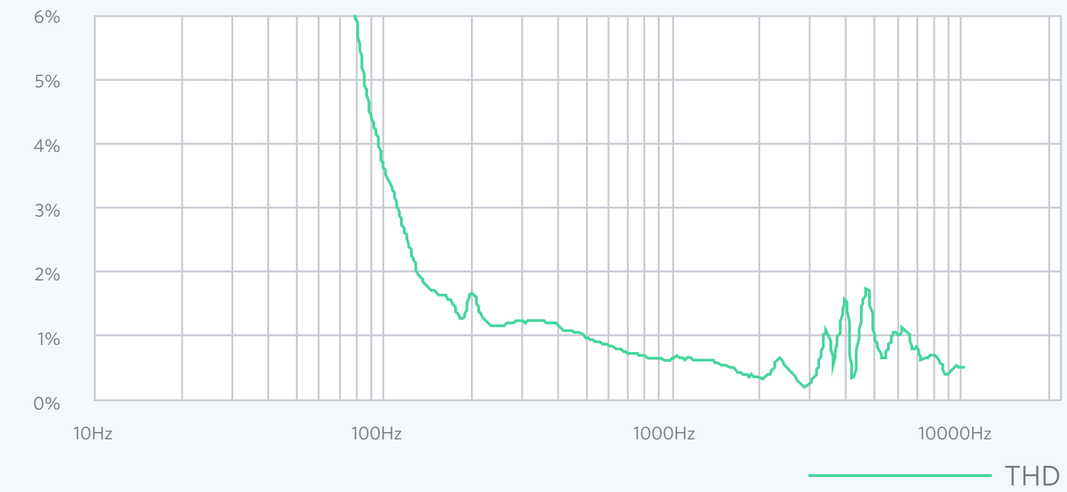
The bad:

- Bass-light
- High THD

Philips SHP9500



Philips SHP9500 (THD at 93dB)



Beyerdynamic DT990

Open back dynamic - 190$

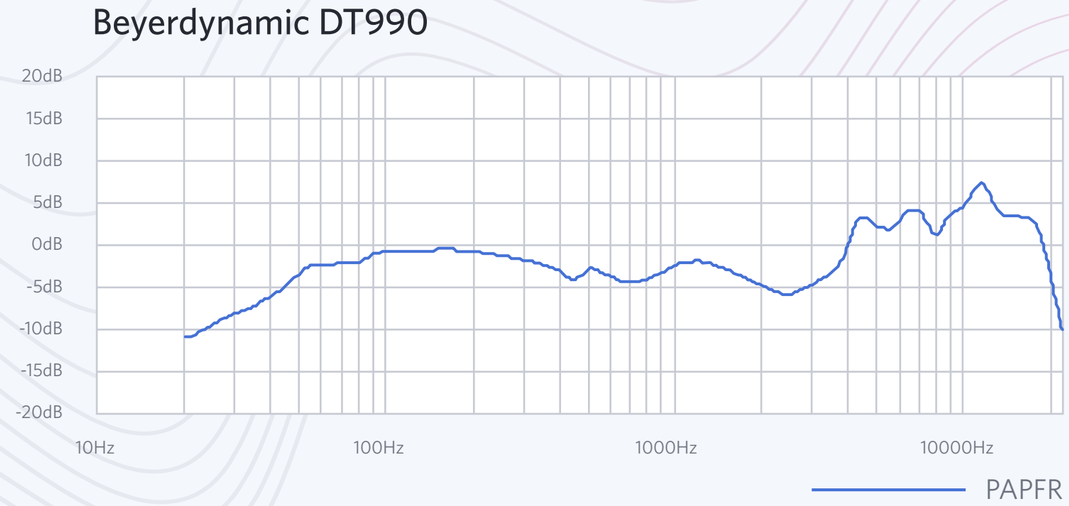
A classic can from Beyer,
no matter which version you opt for.
A bit bright, but THD very good
for an open back.

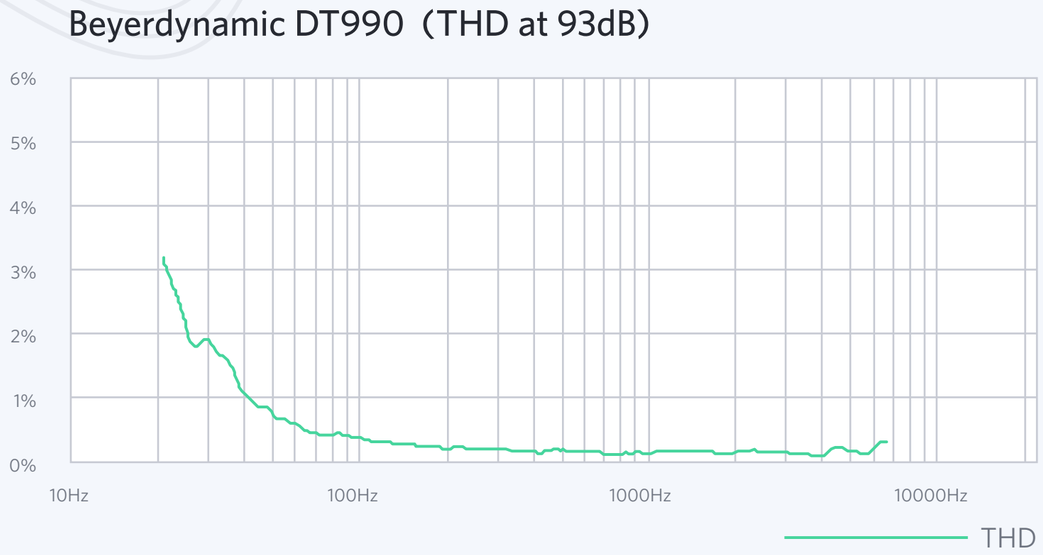
The good:

- Comfy
- Great mids
- Pads replaceable

The bad:

- Bright
- Cable non-replaceable





Sennheiser HD600

Open back dynamic - 286$

Sennheiser HD600 and HD650 are legendary for their near-perfect tonal balance. The only fault for these now aging headphones is sub-bass performance.

The good:

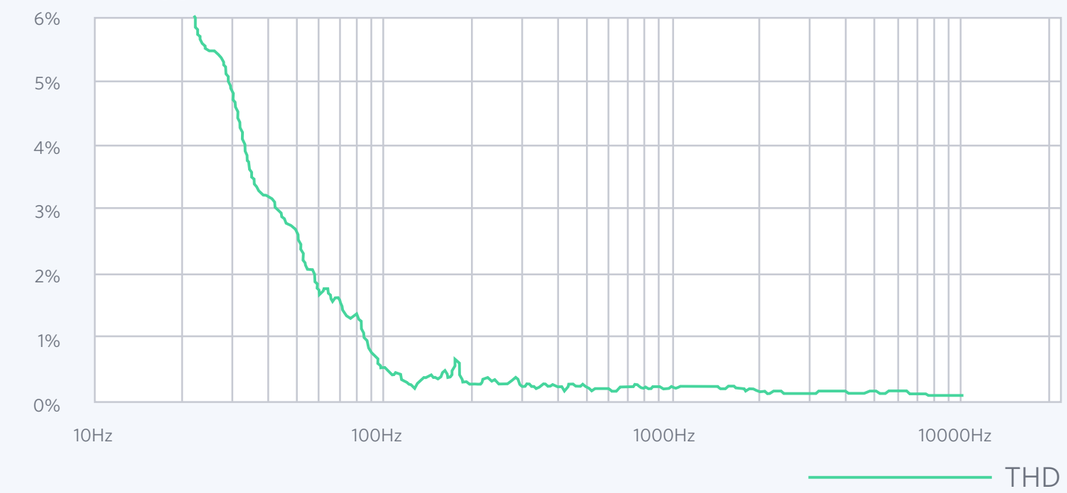
- Terrific tonal balance,
- Comfy
- All parts replaceable without tools

The bad:

- Sub-bass rolled off
- Bass THD is high for todays standards

Shennheiser HD600

Shennheiser HD600 (THD at 93dB)



Audeze LCD-2

Open back orthodynamic - 900$

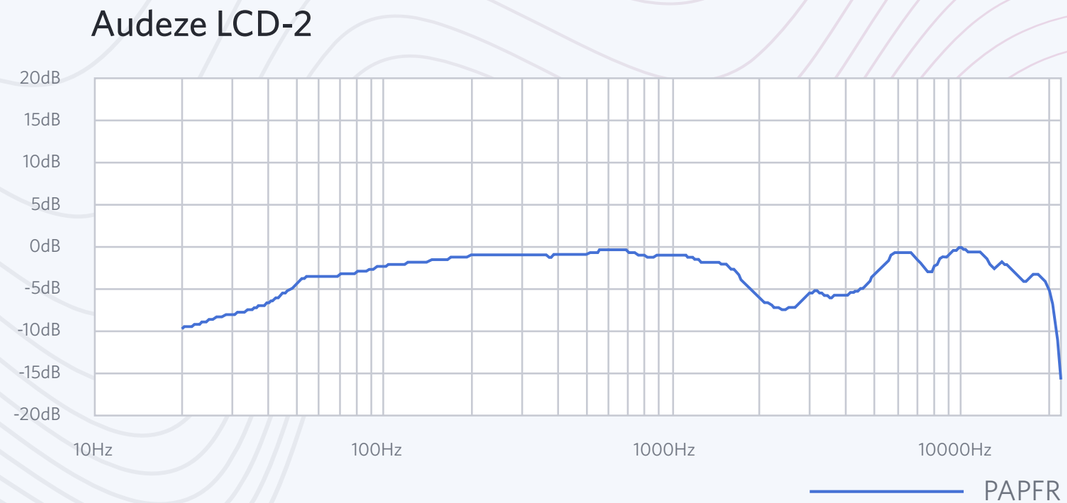
This is what you want for clean sub-bass. Just don't try to headbang as the weight will make these fly off. Smart buyers can find these 2nd hand for 500$.

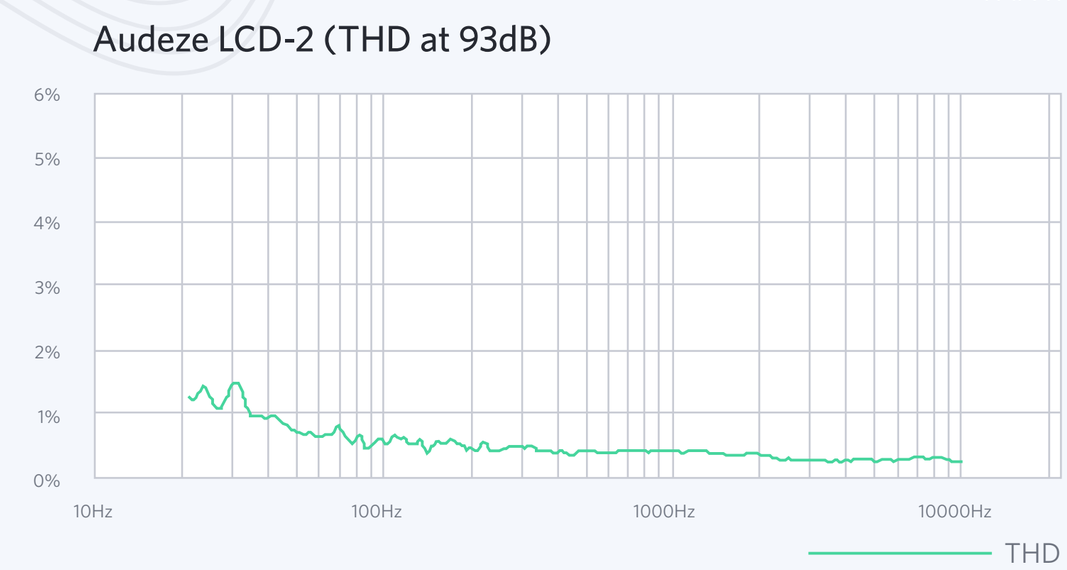
The good:

- Superb sub-bass and mids
- THD inaudible

The bad:

- Heavy





Sennheiser HD800

Open back dynamic - 1085$

Sennheiser HD800 will let you hear all the needles in your haystack of samples. Too bad the treble will make these needles hurt more than they should.

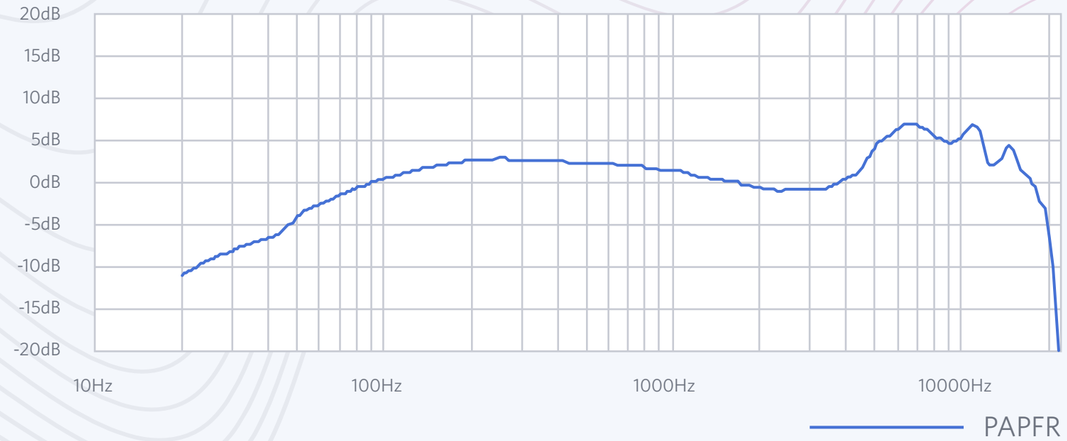
The good:

- Imaging not found in other headphones
- Extreme resolution
- Super-comfy

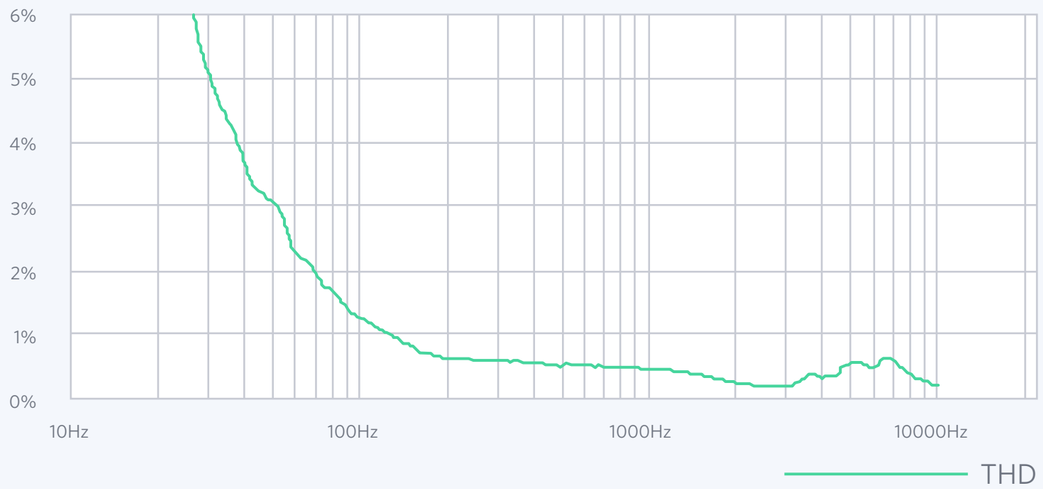
The bad:

- Sub-bass rolled off
- Treble has significant peaks

Sennheiser HD800



Sennheiser HD800 (THD at 93dB)



Audio-Technica ATH-M40x

Closed back dynamic - 100$

Overshadowed by it's older brother ATH-M50x, the M40x presents a better value. Don't trust the treble too much with these, but otherwise nicely usable.

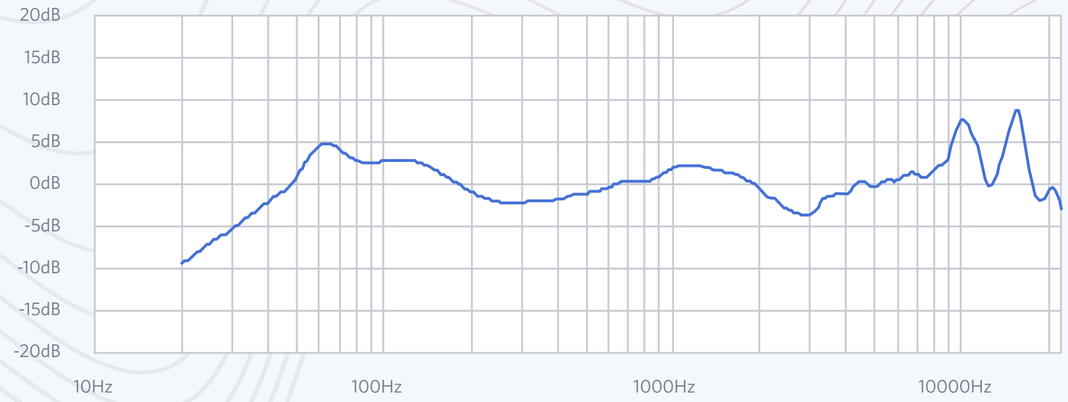
The good:

- A closed back workhorse
- Replaceable cable

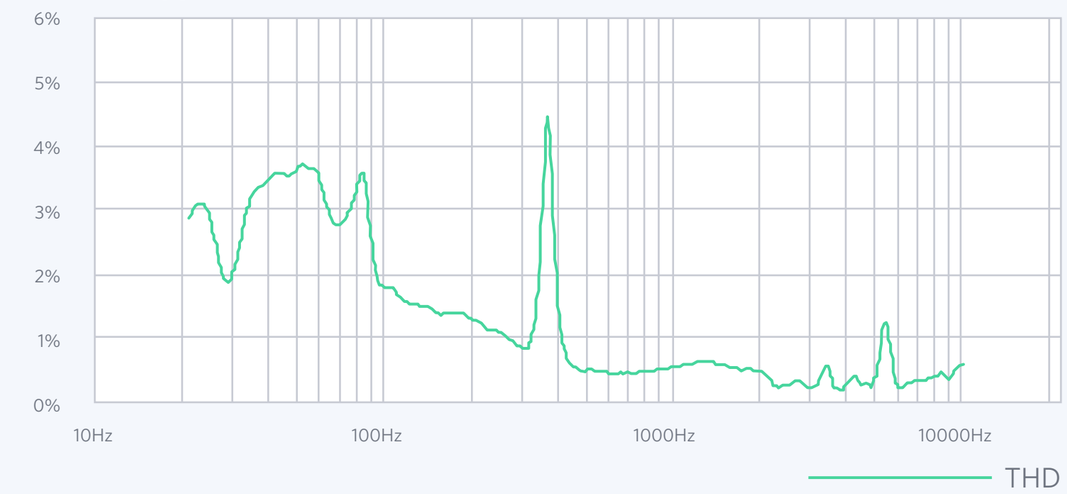
The bad:

- Far from tonally neutral

Audio-Technica ATH-M40x



Audio-Technica ATH-M40x (THD at 93dB)



Beyerdynamic DT770

Closed back dynamic - 175$

DT770 is another closed back classic from Beyer. Nicely extended and free from closed back coloration, if a little bright.

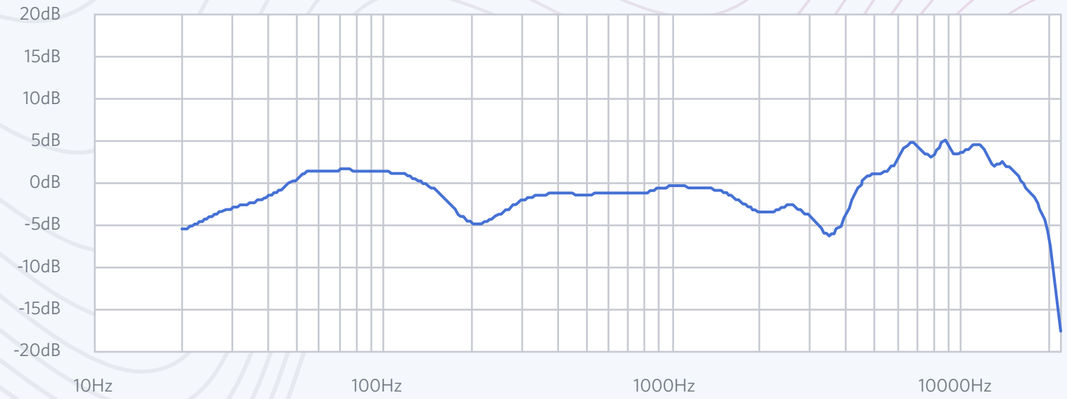
The good:

- Neutral enough for mixing
- Comfortable

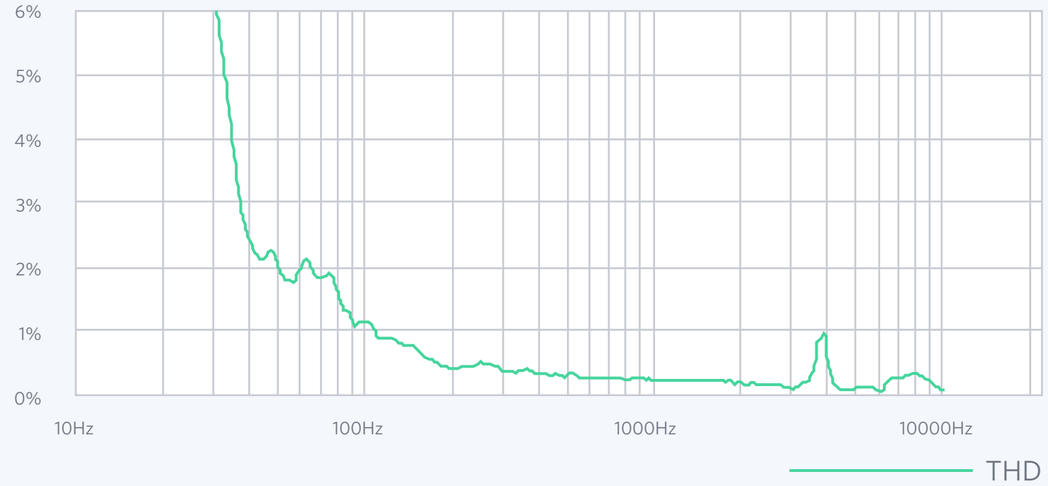
The bad:

- Still bright-ish
- Cable non-replaceable

Beyerdynamic DT770



Beyerdynamic DT770 (THD at 93dB)



Sennheiser HD25-II

Closed back dynamic - 190$

Hard to beat the HD25-II for on-site and DJ work. Hard to call these neutral, but extremely usable, if you keep in mind the limitations.

The good:

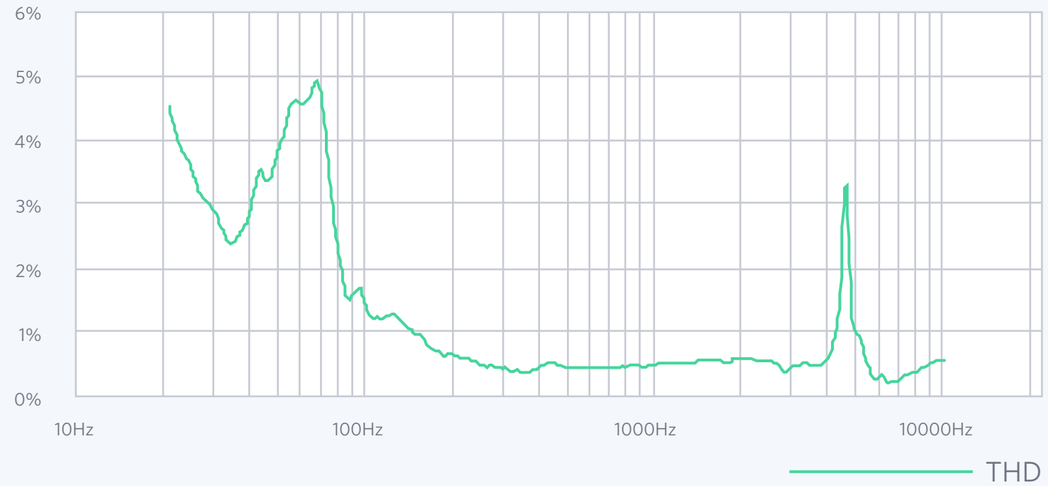
- Seals like crazy
- Built like a tank

The bad:

- Not tonally neutral
- Can get sweaty

Sennheiser HD25-II

Sennheiser HD25-II (THD at 93dB)



Focal Spirit Pro

Closed back dynamic - 350$

If your ears agree with the pad size, then Focal Spirit Pro is a nice option for critical work on the go.

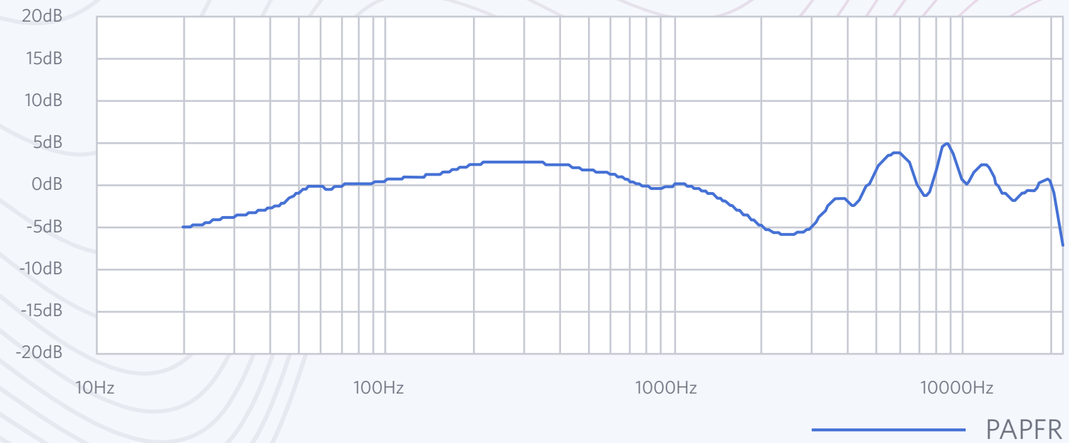
The good:

- Nice resolution
- Frequency extension to extremes

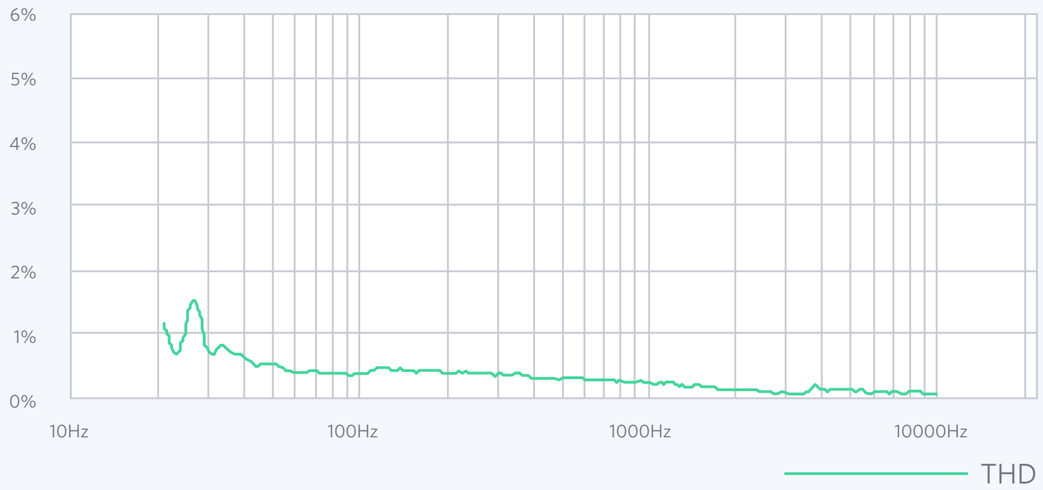
The bad:

- Pads are on the small side so try before buy

Focal Spirit Pro



Focal Spirit Pro (THD at 93dB)



Oppo PM-3

Closed back orthodynamic - 400$

Classy presentation with a sound to match. Don't be afraid of the luxury consumer styling, these headphones brings the goods for studio use as well.

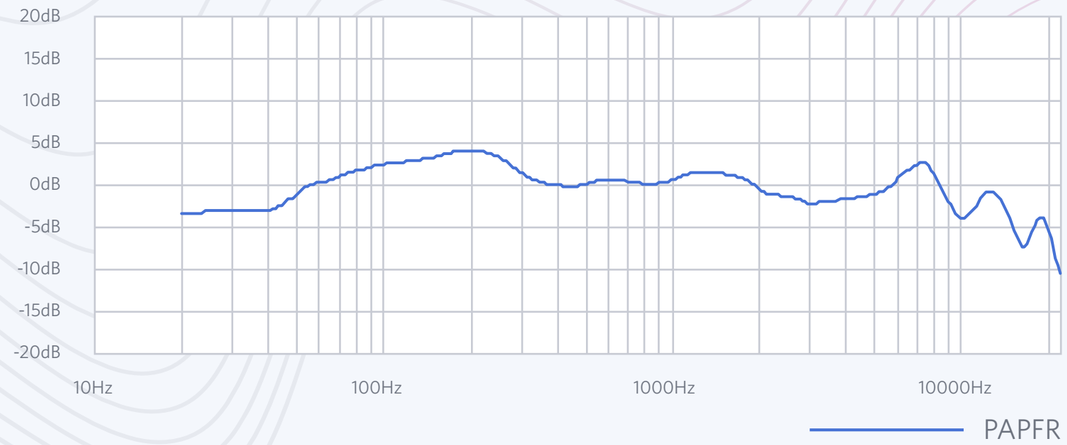
The good:

- By far the most neutral closed backs
- Easy to drive with anything

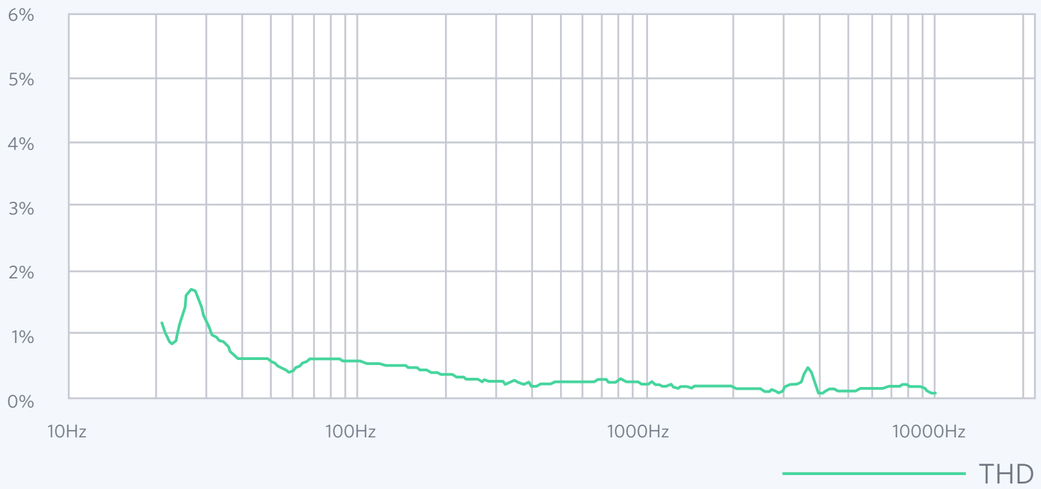
The bad:

- Expensive in EU
- Pads hard to swap

Oppo PM-3



Oppo PM-3 (THD at 93dB)



Glossary

PAPFR
Stands for Perceived Acoustic Power Frequency Response.
This is a measure which is used to characterize how a headphone will sound in various frequencies to human ears

Harmonic distortion
Added overtones that are whole number multiples of the fundamental signal frequency. Even order harmonic distortion can be pleasant to hear as the sound will appear richer, but for critical listening any THD presence will always be detrimental.

Noise
Extra signal that occurs besides harmonic distortion, usually random in nature

Headphone amp
An analog circuit which provides power and control to headphone drivers, can be either built-in or external

DAC
Converts digital data to analog waveforms which are then amplified and fed to headphones

Open-back
A headphone design where the sound from the back of the driver is allowed to freely escape from the earcup

Closed-back
A headphone design where the earcup is sealed and attempts to deal with the driver back waves by damping the earcup

IEM
Stands for “in ear monitor”, a type of headphone which is inserted into the ear canal

Dynamic driver
One of the oldest and most common driver technologies where a cone diaphragm is being driven by a voice coil.

Orthodynamic driver (isodynamic, planar magnetic)
A different driver technology which has been resurrected in the recent years. Voice coil is printed on a thin diaphragm sandwiched between two magnet structures, some use one magnet structure

Electrostatic driver
An exotic type of headphone driver technology where a thin plastic film is driven by an electrostatic field emanating from stators charged with high voltage

Balanced armature driver
A type of small dynamic driver used for IEM headphones.
Often individual drivers have limited bandwidth, which is why sometimes multiple are used together with an analog crossover earcup

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If you're serious about studio headphones, then try this...

The same know-how we've used to make this e-book can be used to vastly improve your headphones. Our Reference 4 calibration software makes your headphones coloration free, so you can work with confidence.

Sonarworks Reference 4 takes our measurements and applies them to your headphones, so any tonal coloration is reversed. The resulting sound will outclass any headphones mentioned in this guide.

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