

50 neutral and extra-bass over-ear headphones

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Open = open-back | **Closed** = closed-back
Sen=sensitivity (V) | **Imp**=impedance | **Wgt**=weight (G) | **Pri**=price
orange or **red** = notice this, ≠ inappropriate values

A

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

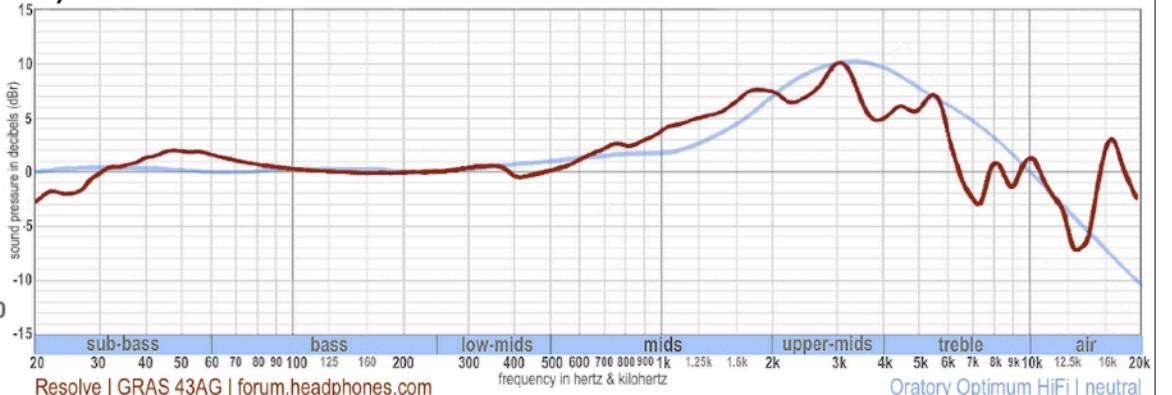
[Explanatory notes](#)

Abyss Diana Phi (DMS mod)



Open
Planar

Sen: 91
Imp: 35
Wgt: 240
Pri: \$4K



Resolve | GRAS 43AG | forum.headphones.com

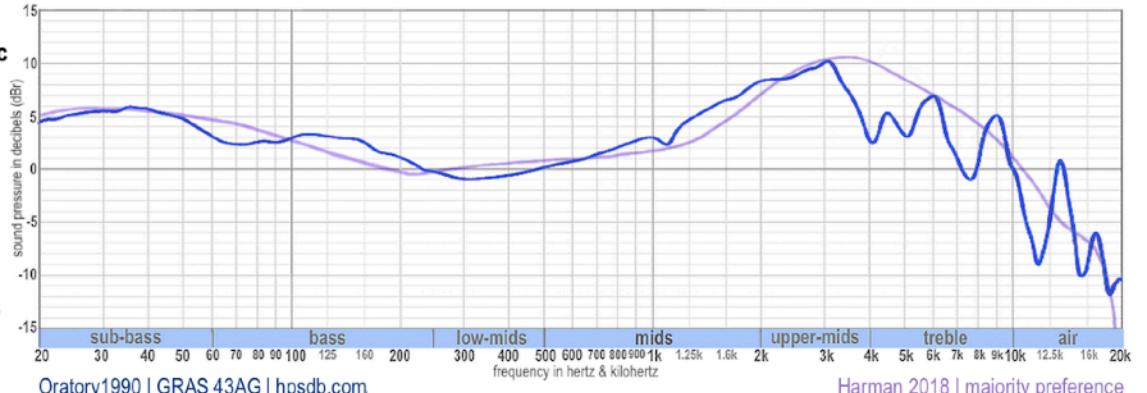
Oratory Optimum HiFi | neutral

AKG K361



Closed
Dynamic

Sen: 114
Imp: 32
Wgt: 218
Pri: \$85



Oratory1990 | GRAS 43AG | hpsdb.com

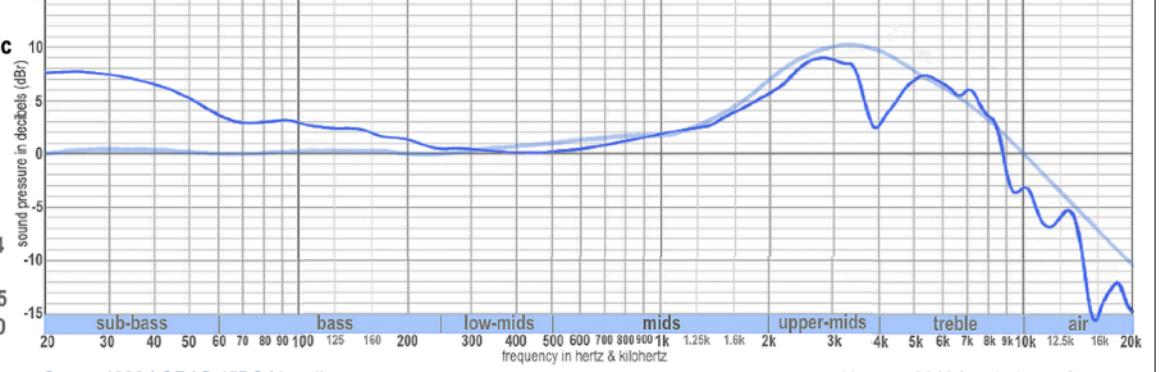
Harman 1990 | majority preference

AKG K371



Closed
Dynamic

Sen: 114
Imp: 35
Wgt: 275
Pri: \$120



Oratory1990 | GRAS 45BC | hpsdb.com

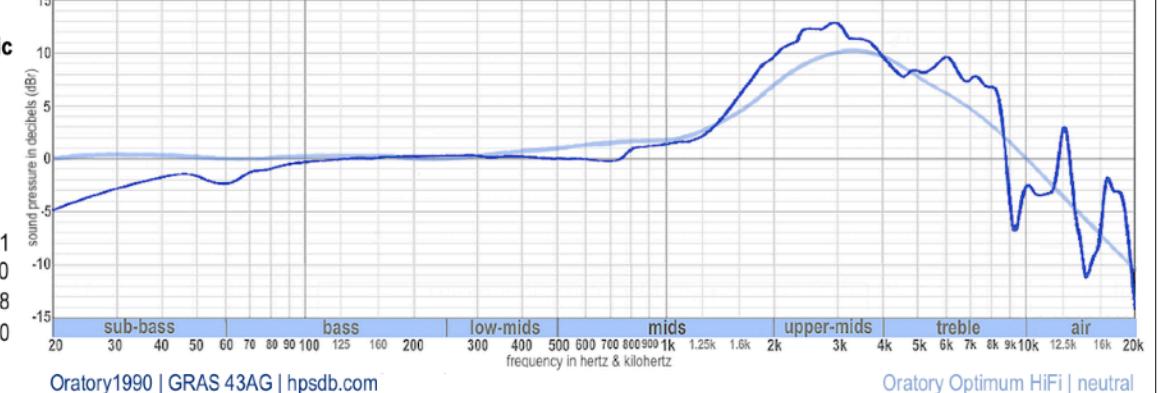
Harman 2018 | majority preference

AKG K612



Open
Dynamic

Sen: 101
Imp: 200
Wgt: 238
Pri: \$200



Oratory1990 | GRAS 43AG | hpsdb.com

Oratory Optimum HiFi | neutral

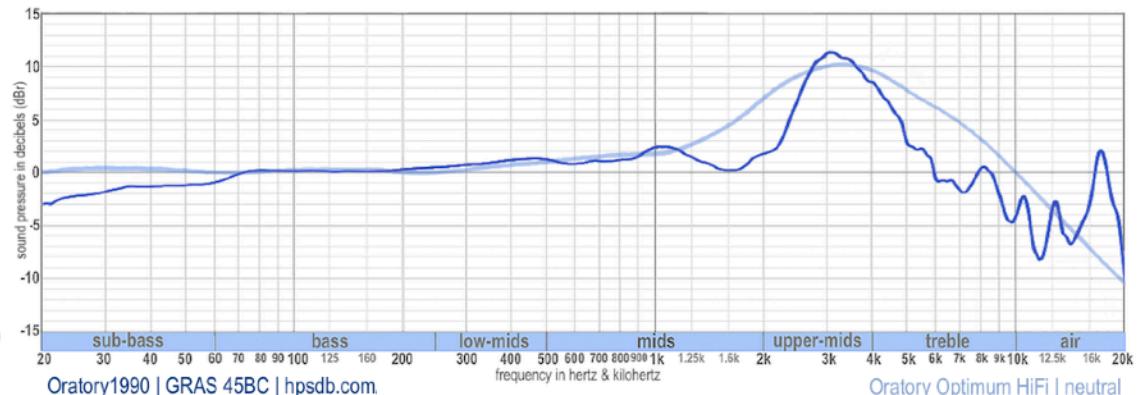
50 neutral and extra-bass over-ear headphones

Audeze LCD-1



Open
Planar

Sen: 117
Imp: 16
Wgt: 260
Pri: \$300

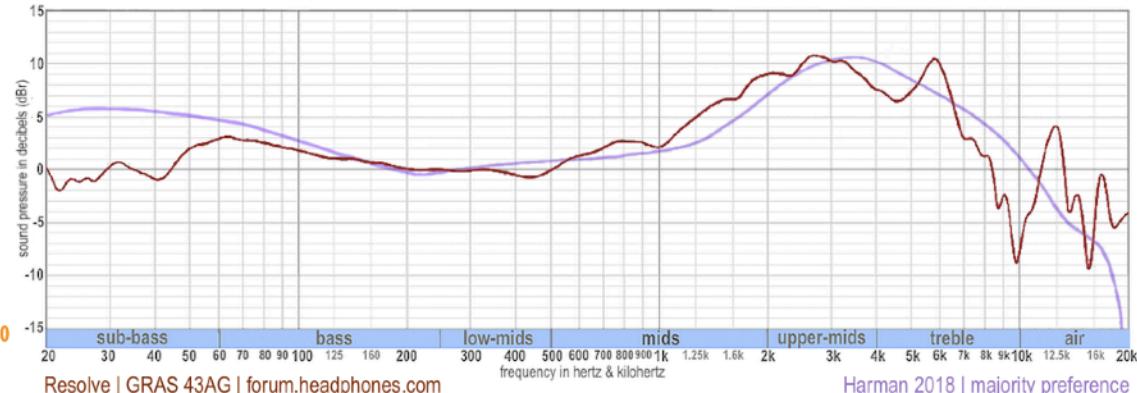


Audeze LCD-XC



Closed
Planar

Sen: 117
Imp: 20
Wgt: 720
Pri: \$1300

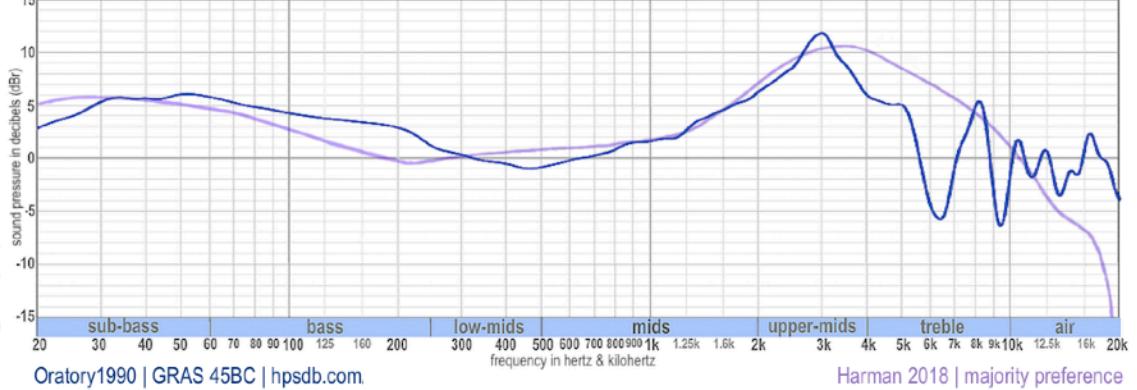


Audeze Mobius (gaming)



Closed
Planar

Sen: N/A
Imp: N/A
Wgt: 350
Pri: \$250

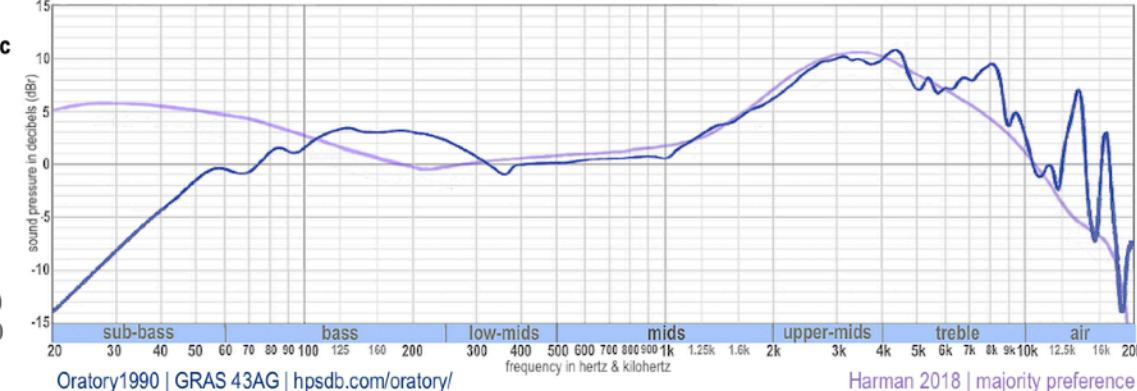


Audio-Technica ATH-M40x



Closed
Dynamic

Sen: 113
Imp: 35
Wgt: 240
Pri: \$100



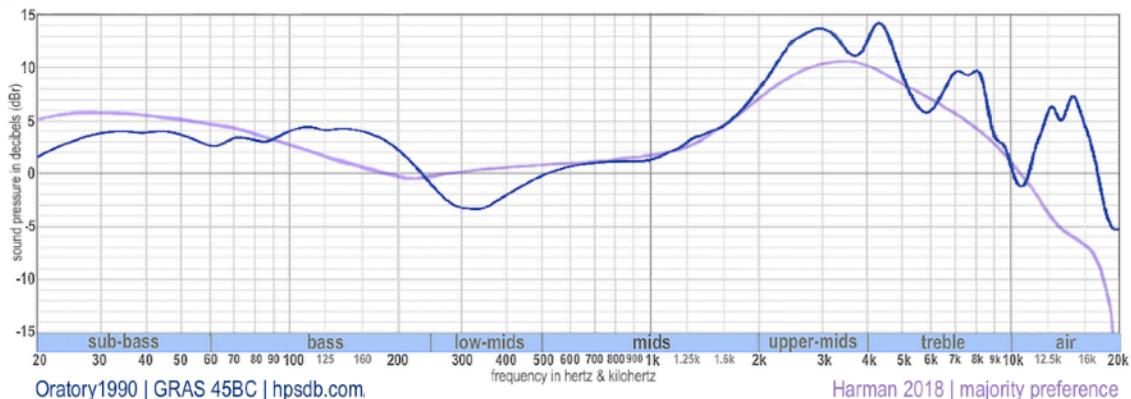
50 neutral and extra-bass over-ear headphones

Audio-Technica ATH-M50x



Closed
Dynamic

Sen: 113
Imp: 38
Wgt: 285
Pri: \$150

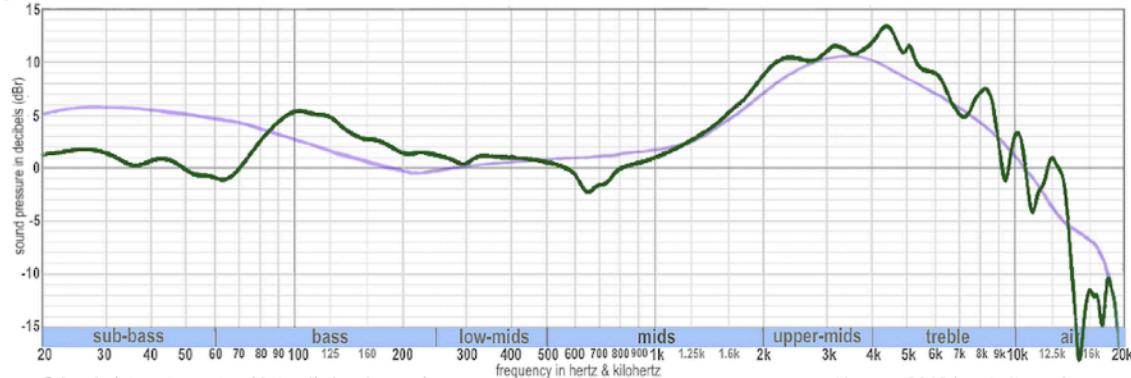


Audio-Technica ATH-M70x



Closed
Dynamic

Sen: 112
Imp: 35
Wgt: 280
Pri: \$350

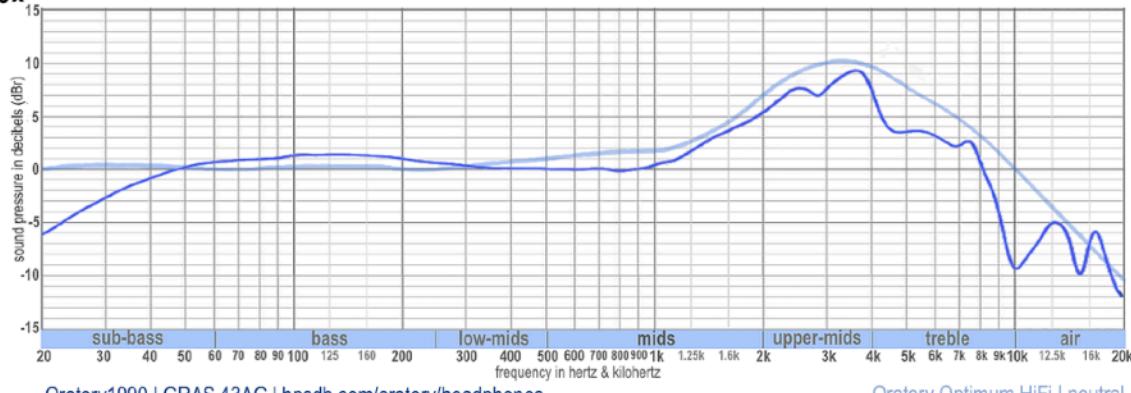


Audio-Technica ATH-R70x



Open
Dynamic

Sen: 99
Imp: 470
Wgt: 210
Pri: \$350

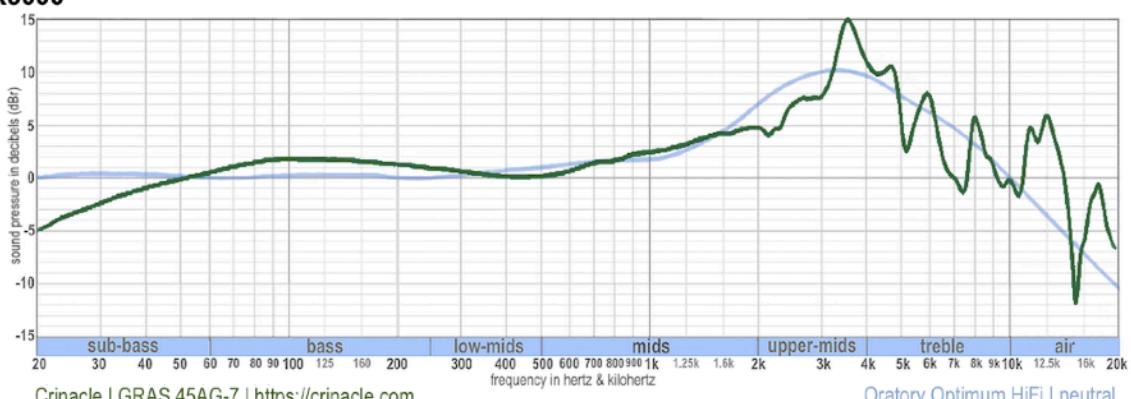


Audio-Technica ATH-ADX5000



Open
Dynamic

Sen: 104
Imp: 420
Wgt: 270
Pri: \$2250



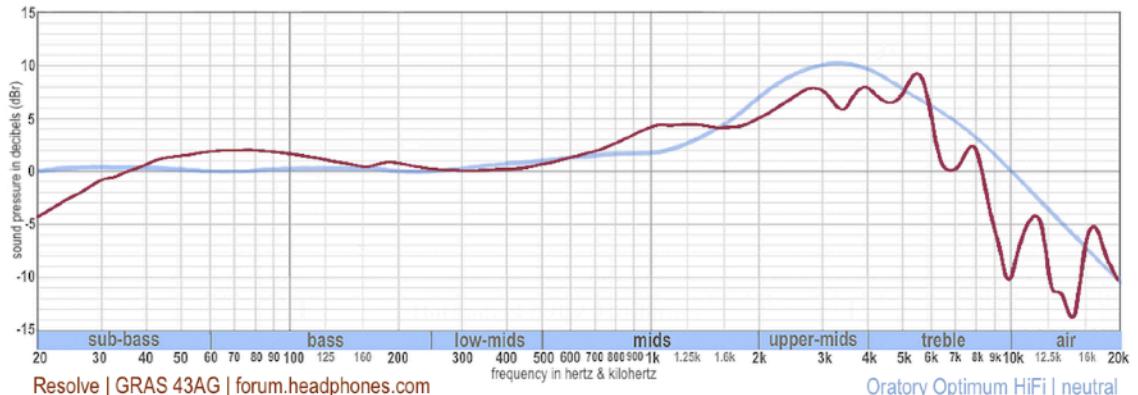
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Auroris Audio Borealis



**Open
Dynamic**

Sen: 114
Imp: 32
Wgt: 484
Pri: \$899



Resolve | GRAS 43AG | forum.headphones.com

Oratory Optimum HiFi | neutral

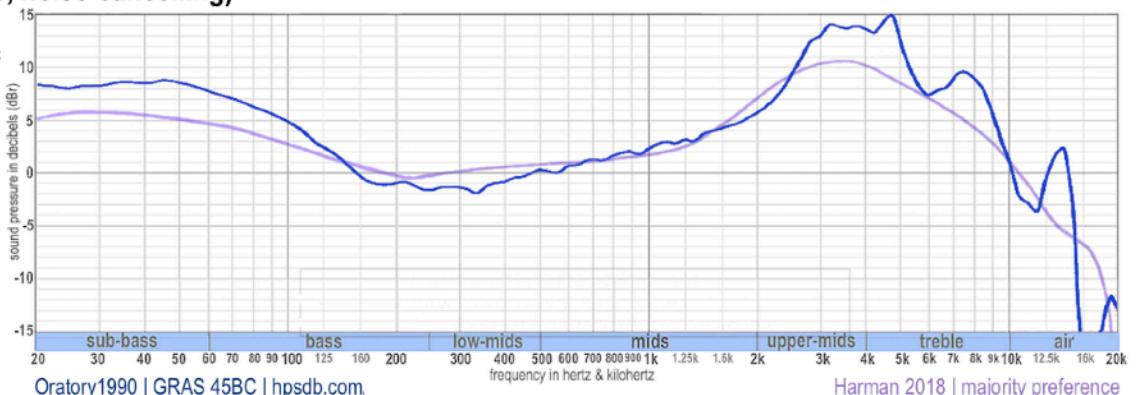
B

Beats Solo Pro (wireless, noise-cancelling)



**Closed
Dynamic**

Sen: N/A
Imp: N/A
Wgt: 262
Pri: \$199



Oratory1990 | GRAS 45BC | hpsdb.com

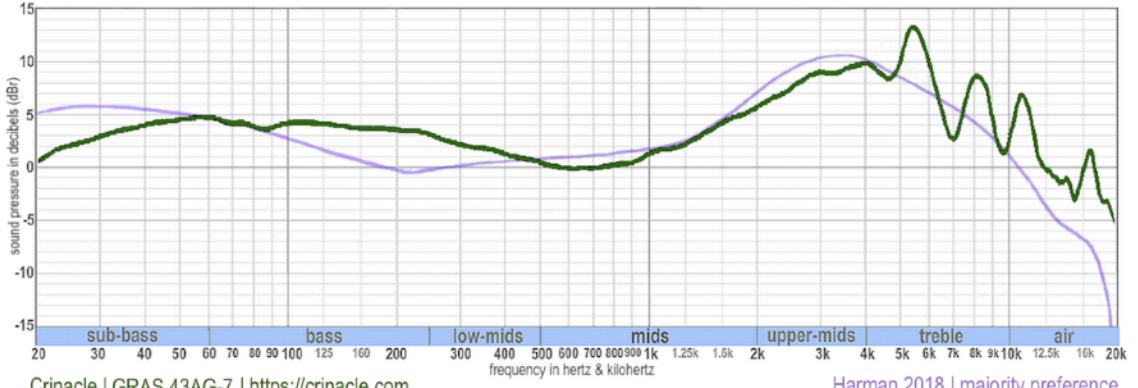
Harman 2018 | majority preference

beyerdynamic TYGR 300R



**Closed
Dynamic**

Sen: 111
Imp: 32
Wgt: 290
Pri: \$180



Crinacle | GRAS 43AG-7 | https://crinacle.com

Harman 2018 | majority preference

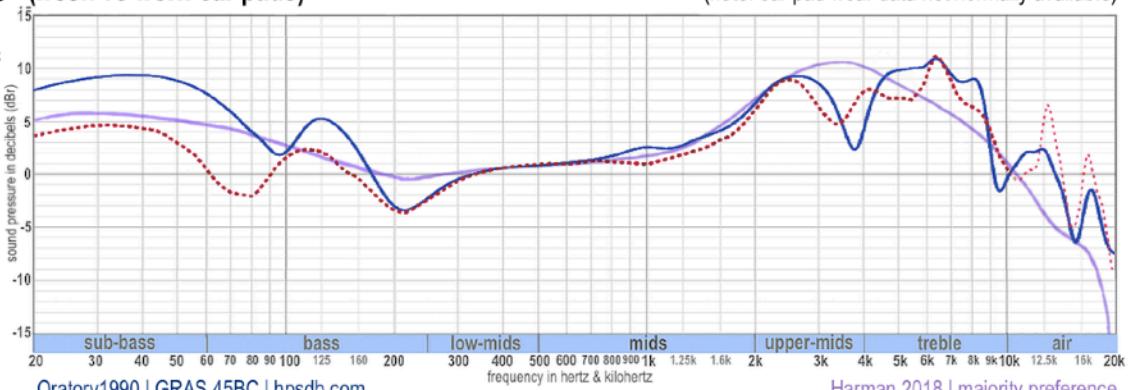
beyerdynamic DT770 Pro (fresh vs worn ear pads)

(note: ear pad wear data not normally available)



**Closed
Dynamic**

Sen: 102
Imp: 250
Wgt: 270
Pri: \$160



Oratory1990 | GRAS 45BC | hpsdb.com

Harman 2018 | majority preference

50 neutral and extra-bass over-ear headphones

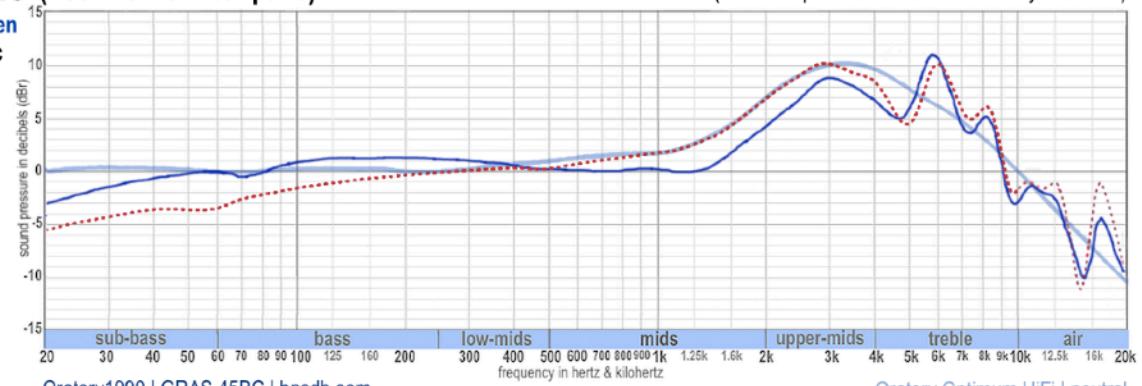
beyerdynamic DT 880 Pro (fresh vs worn ear pads)

(note: ear pad wear data not normally available)



Semi-open
Dynamic

Sen: 102
Imp: 250
Wgt: 290
Pri: \$230

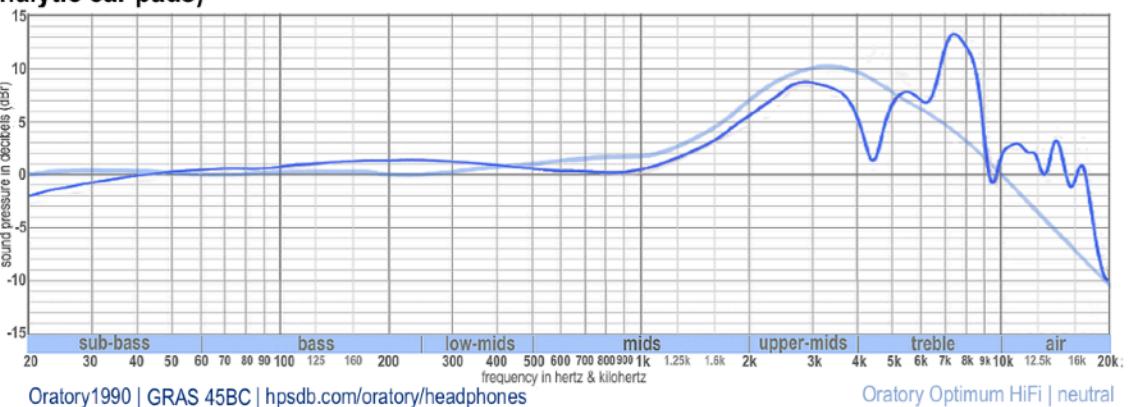


beyerdynamic DT1990 (analytic ear pads)



Open
Dynamic

Sen: 108
Imp: 250
Wgt: 379
Pri: \$600



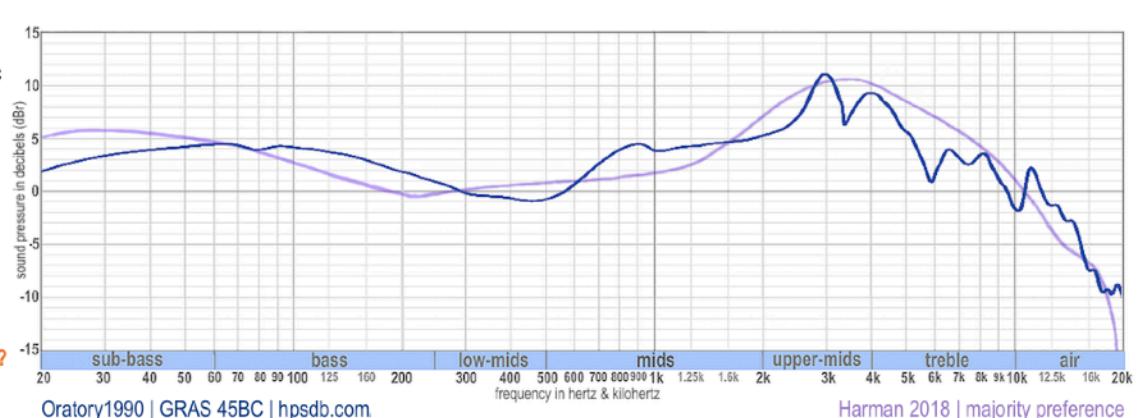
C

Creative Aurvana Live!



Closed
Dynamic

Sen: ?
Imp: ?
Wgt: 210
Pri: Disc.?



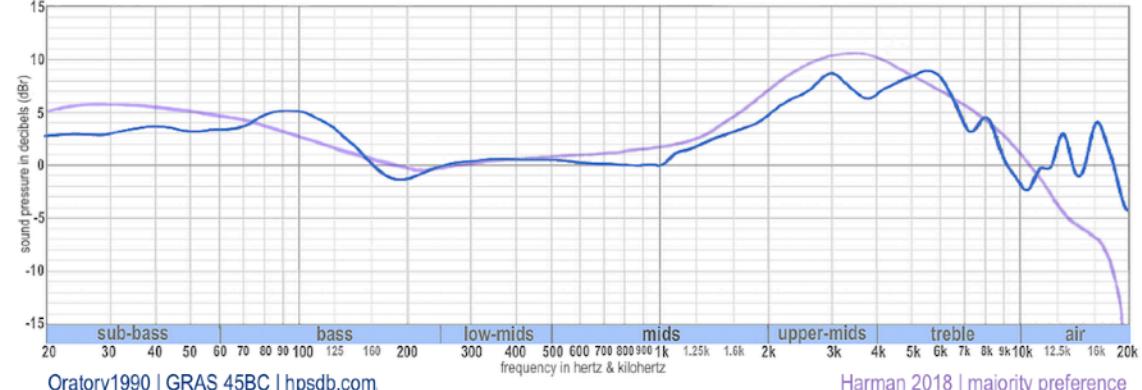
D

Dan Clark Audio Aeon 2 Noire



Closed
Planar

Sen: 111
Imp: 13
Wgt: 328
Pri: \$900



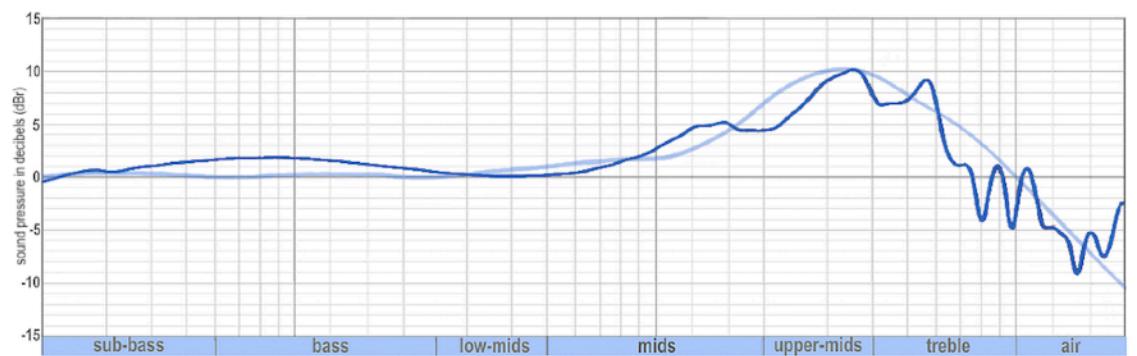
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Drop+Focal Elex



Open
Planar

Sen: 115
Imp: 80
Wgt: 450
Pri: \$700



Oratory1990 | GRAS 43AG | hpsdb.com

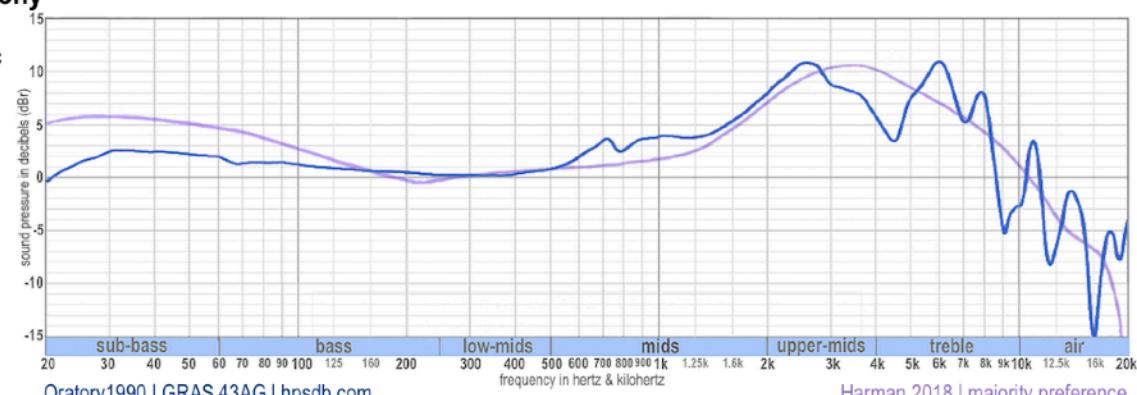
Oratory Optimum HiFi | neutral

Drop+Fostex TR-X00 Ebony



Closed
Dynamic

Sen: 111
Imp: 25
Wgt: 450
Pri: discl.



Oratory1990 | GRAS 43AG | hpsdb.com

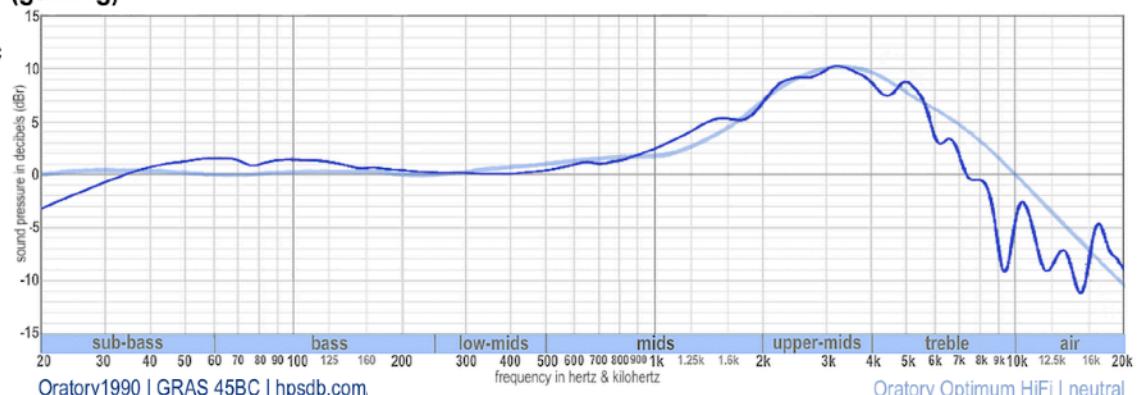
Harman 2018 | majority preference

Drop+Sennheiser PC38X (gaming)



Open
Dynamic

Sen: 109
Imp: 28
Wgt: 253
Pri: \$169



Oratory1990 | GRAS 45BC | hpsdb.com

Oratory Optimum HiFi | neutral

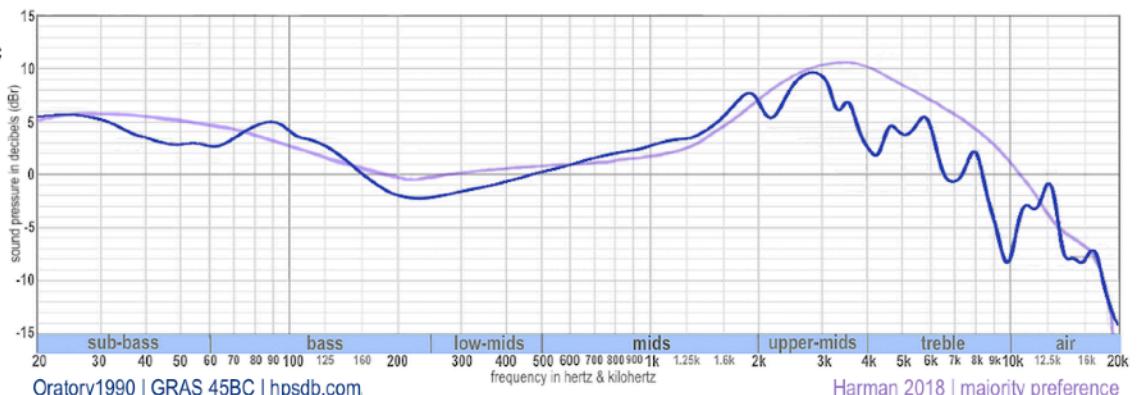
F

Focal Celestee



Open
Dynamic

Sen: 120
Imp: 35
Wgt: 430
Pri: \$990



Oratory1990 | GRAS 45BC | hpsdb.com

Harman 2018 | majority preference

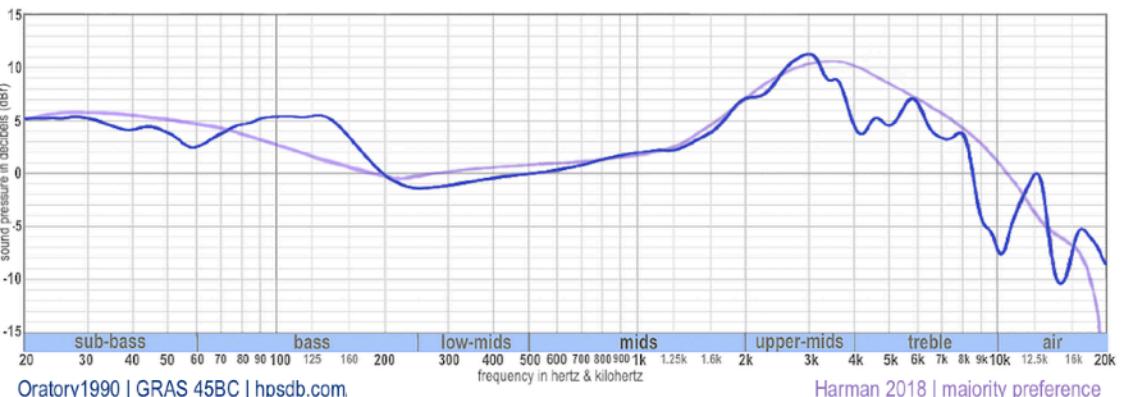
50 neutral and extra-bass over-ear headphones

Focal Radiance



**Open
Dynamic**

Sen: 115
Imp: 35
Wgt: 435
Pri: \$1290

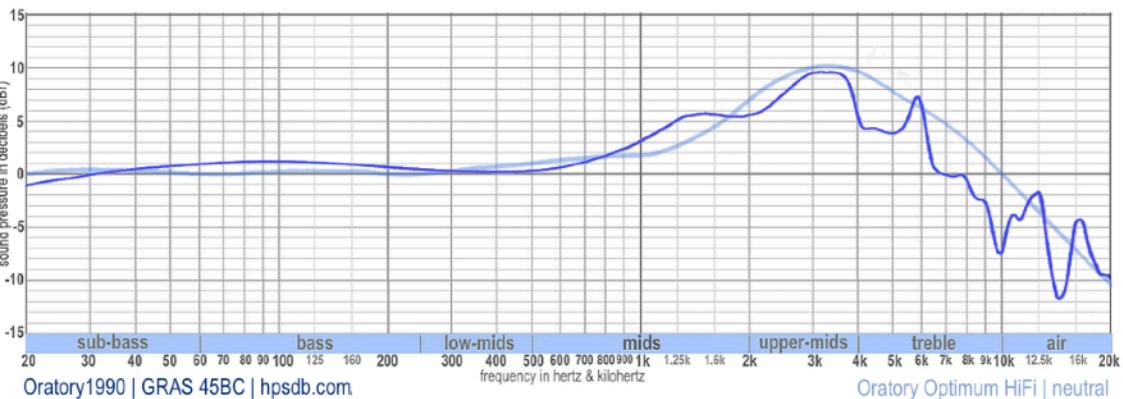


Focal Clear



**Open
Dynamic**

Sen: 116
Imp: 55
Wgt: 450
Pri: \$1490

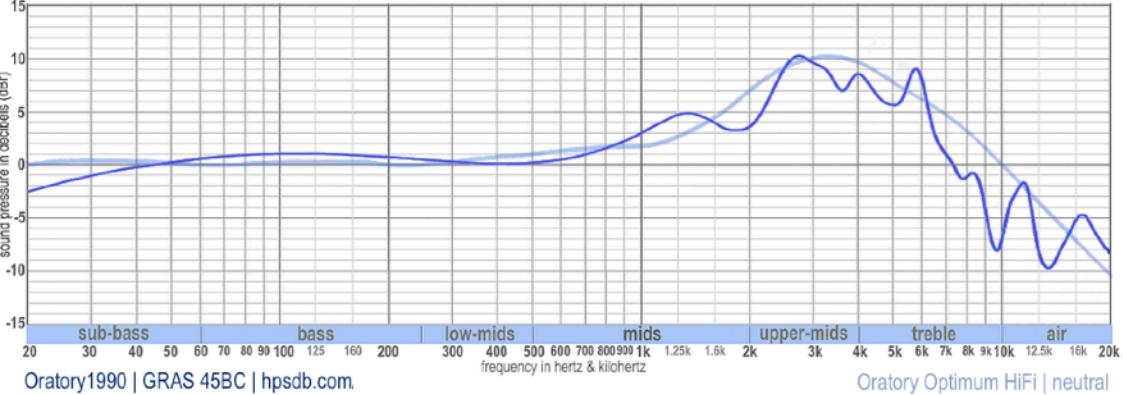


Focal Utopia



**Open
Dynamic**

Sen: 109
Imp: 80
Wgt: 490
Pri: \$3330



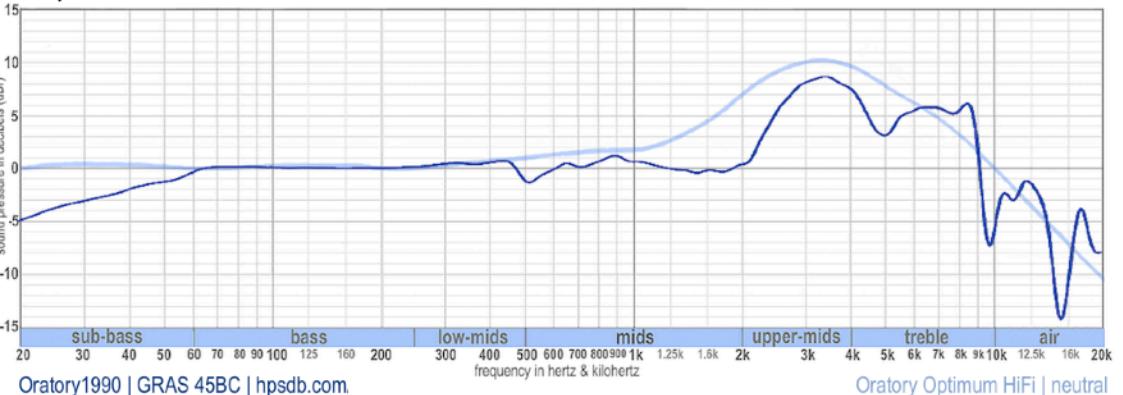
H

Hifiman HE400i (2020 revision)



**Open
Planar**

Sen: 107
Imp: 35
Wgt: 370
Pri: \$200



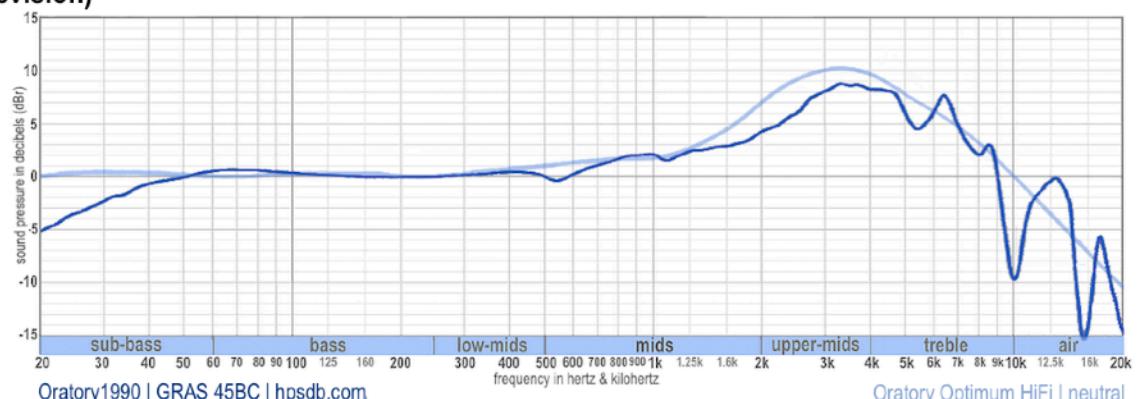
50 neutral and extra-bass over-ear headphones

Hifiman Sundara (2020 revision)



Open
Planar

Sen: 108
Imp: 37
Wgt: 372
Pri: \$350

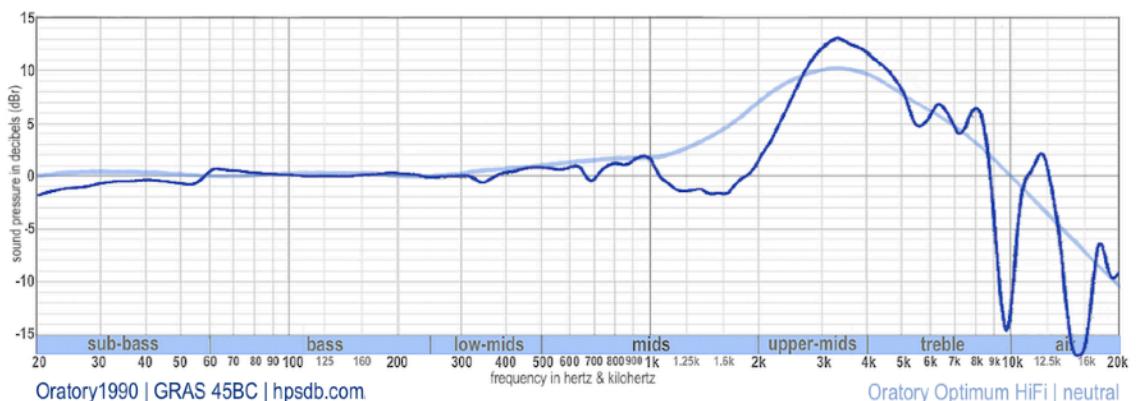


Hifiman Ananda



Open
Planar

Sen: 103
Imp: 25
Wgt: 399
Pri: \$850

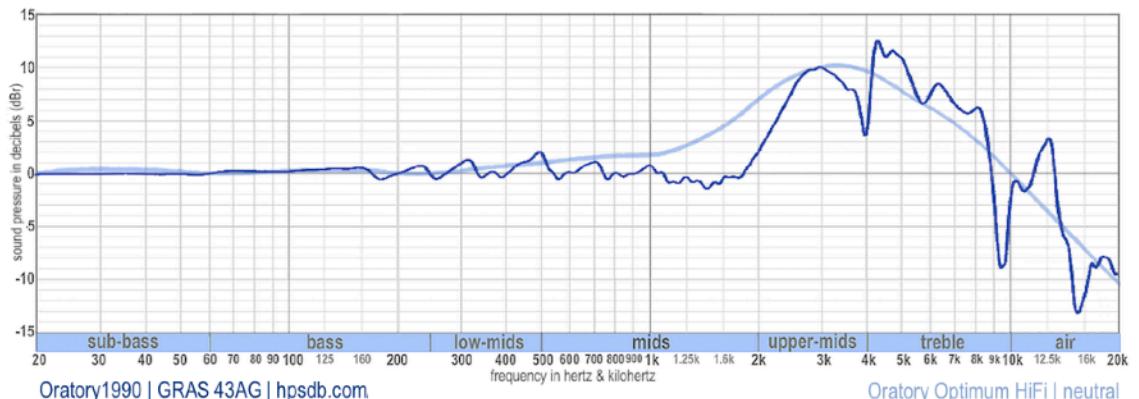


Hifiman Arya



Open
Planar

Sen: 105
Imp: 35
Wgt: 399
Pri: \$160



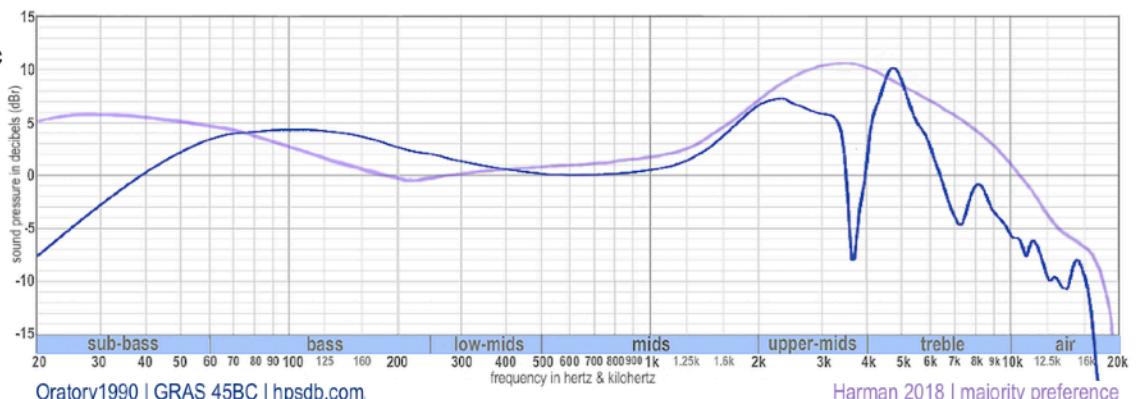
K

Koss Porta Pro



Open
Dynamic

Sen: 101
Imp: 60
Wgt: 79
Pri: \$45



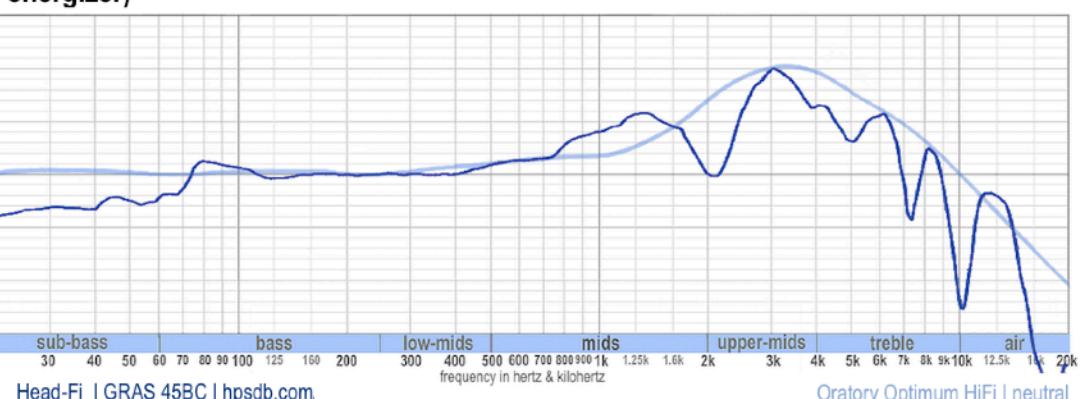
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Koss ESP950 (supplied with energizer)



**Open
Electro-
static**

Sen: 104
Imp: 100K
Wgt: 353
Pri: \$999



Head-Fi | GRAS 45BC | hpsdb.com

Oratory Optimum HiFi | neutral

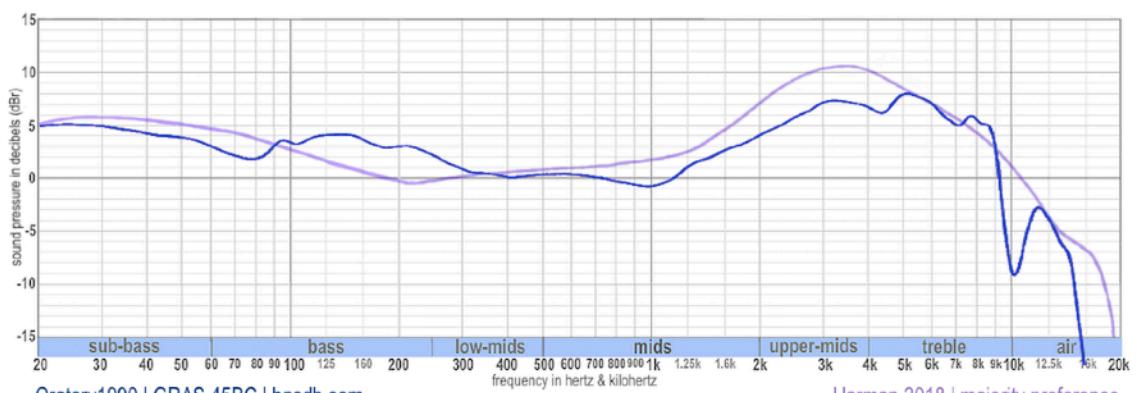
N

NAD Viso HP 50



**Closed
Dynamic**

Sen: 115
Imp: 32
Wgt: 272
Pri: \$250



Oratory1990 | GRAS 45BC | hpsdb.com

Harman 2018 | majority preference

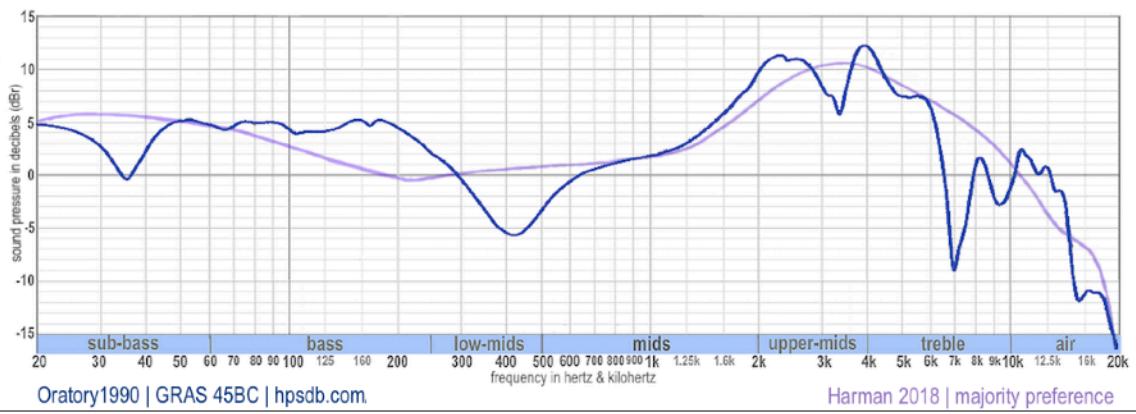
O

Oollo S4R



**Closed
Dynamic**

Sen: 111
Imp: 32
Wgt: 382
Pri: \$390



Oratory1990 | GRAS 45BC | hpsdb.com

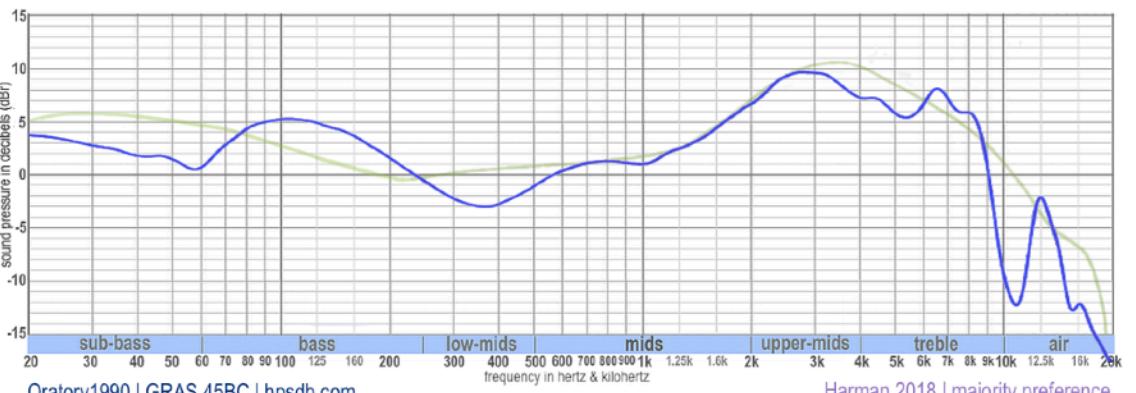
Harman 2018 | majority preference

Oppo PM-3



**Closed
Planar**

Sen: 118
Imp: 26
Wgt: 373
Pri: Disc.



Oratory1990 | GRAS 45BC | hpsdb.com

Harman 2018 | majority preference

50 neutral and extra-bass over-ear headphones

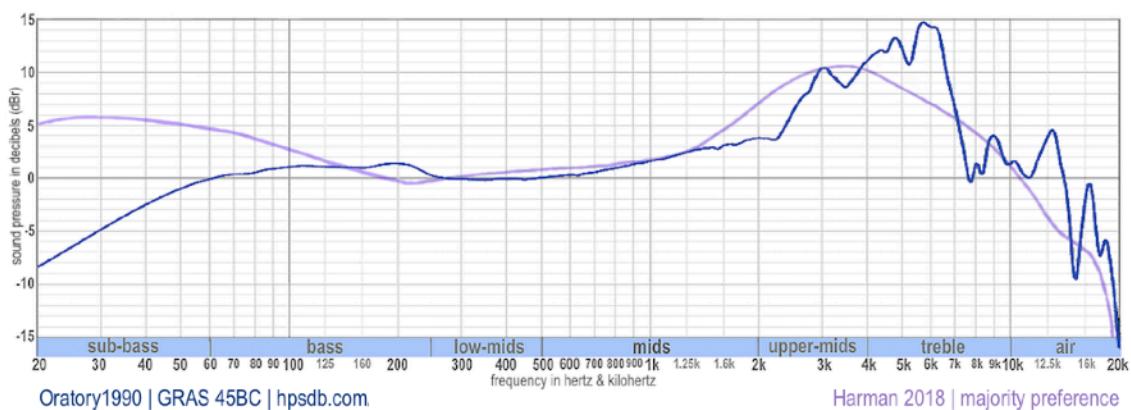
P

Philips SHP9500



Open
Dynamic

Sen: 101
Imp: 32
Wgt: 320
Pri: \$90

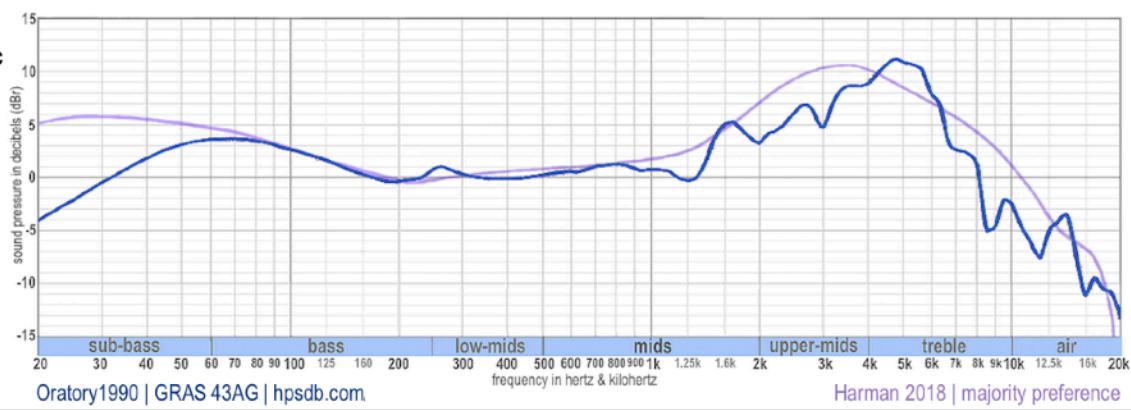


Philips Fidelio X2/HR



Open
Dynamic

Sen: 115
Imp: 30
Wgt: 380
Pri: \$145



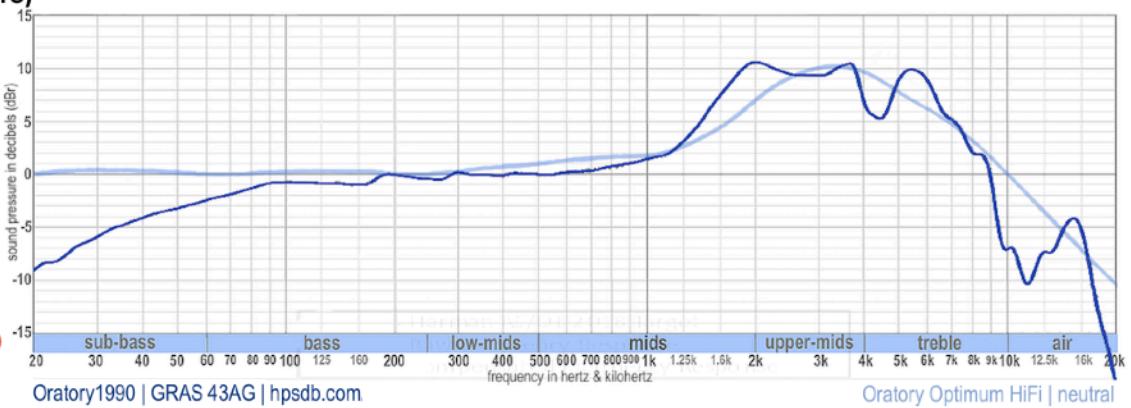
R

RAAL SR1a (ear speakers)



Open
Ribbon

Sen: 128
Imp: 0.2
Wgt: 425
Pri: \$3500



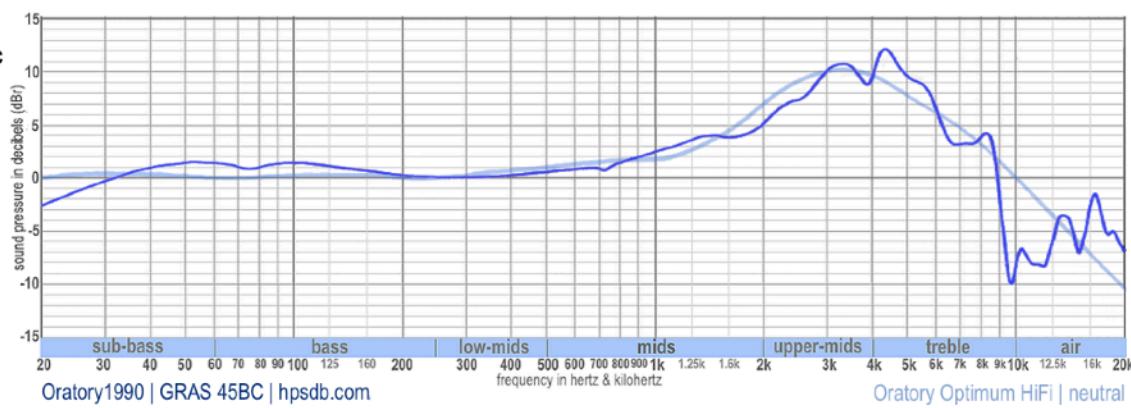
S

Sennheiser HD 560S



Open
Dynamic

Sen: 110
Imp: 120
Wgt: 240
Pri: \$200



50 neutral and extra-bass over-ear headphones

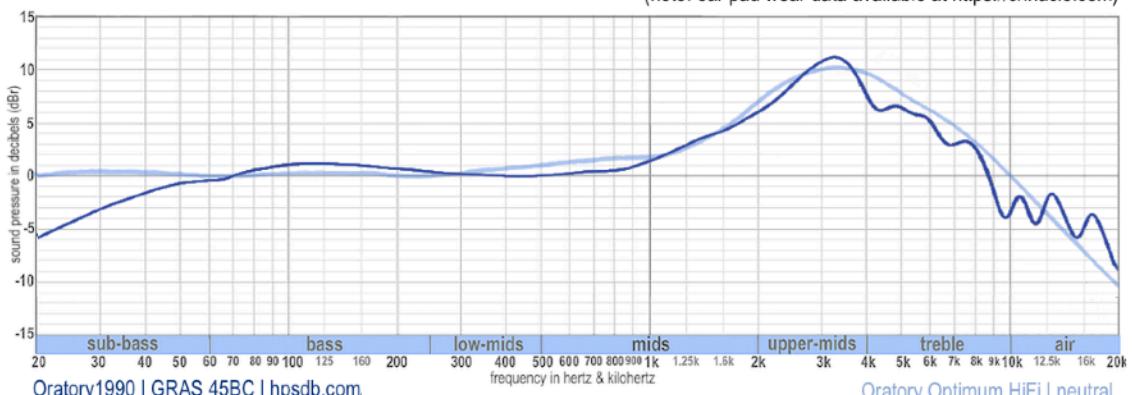
Sennheiser HD 600



**Open
Dynamic**

Sen: 104
Imp: 300
Wgt: 260
Pri: \$400

(note: ear pad wear data available at <https://crinacle.com>)



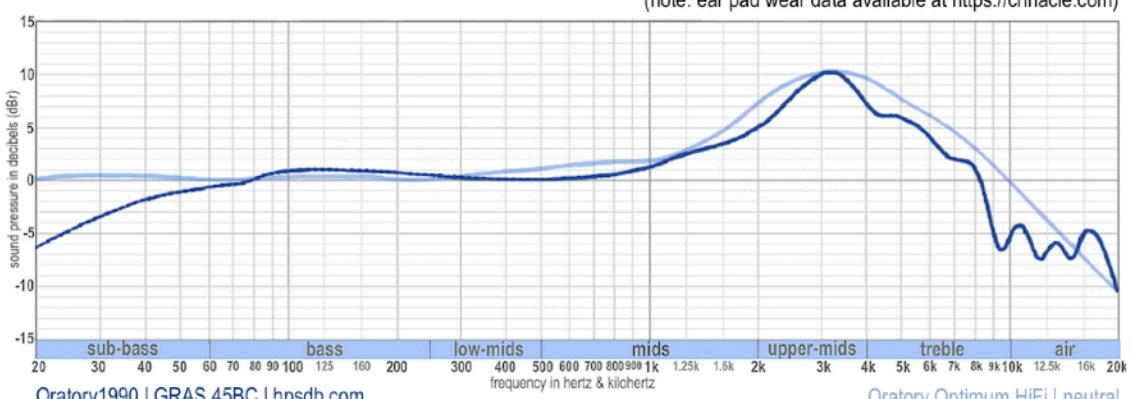
Sennheiser HD 650



**Open
Dynamic**

Sen: 104
Imp: 300
Wgt: 260
Pri: \$400

(note: ear pad wear data available at <https://crinacle.com>)

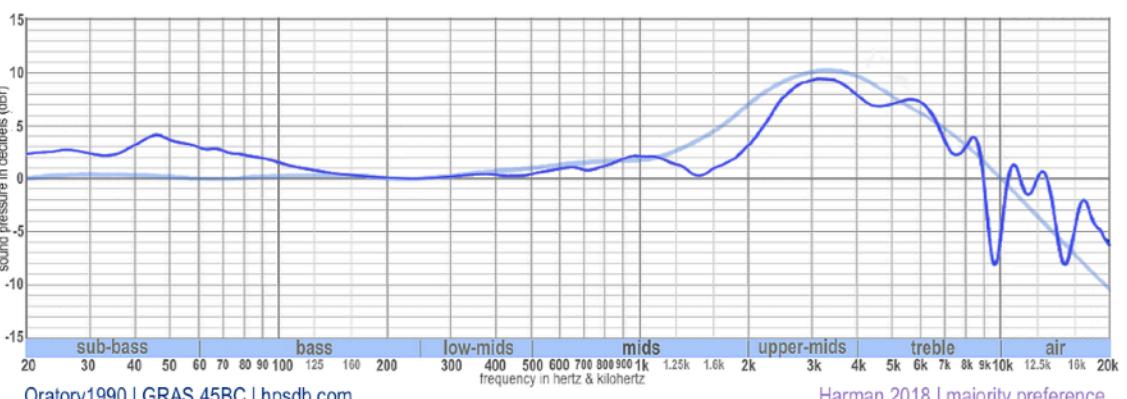


Sennheiser HE 1



**Open
Electrostatic**

Sen: n/a
Imp: n/a
Wgt: 550
Pri: \$65K

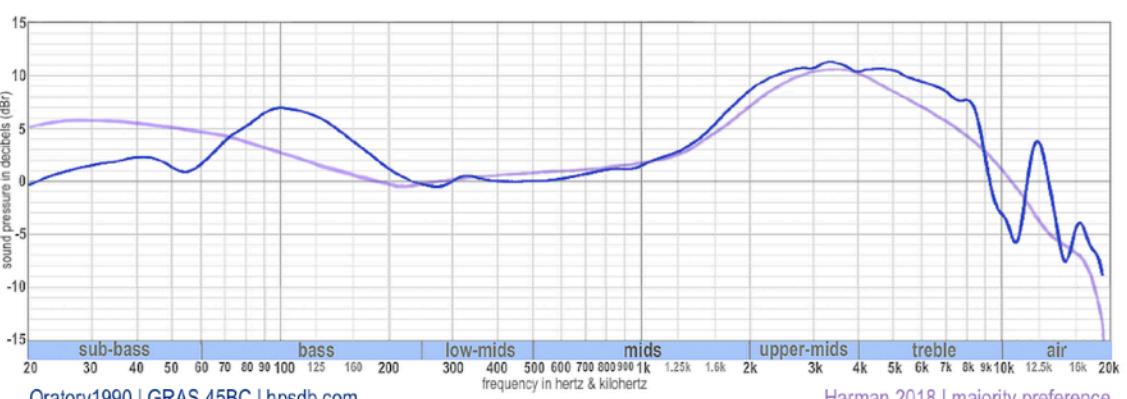


Shure SRH840



**Open
Dynamic**

Sen: 116
Imp: 44
Wgt: 374
Pri: \$149



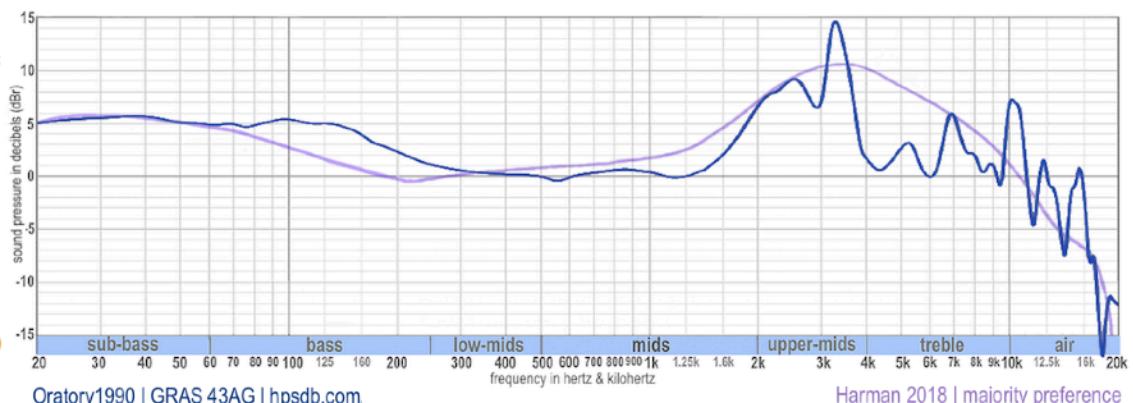
50 neutral and extra-bass over-ear headphones

Sony MDR Z1R



Closed
Dynamic

Sen: 112
Imp: 64
Wgt: 385
Pri: \$1800

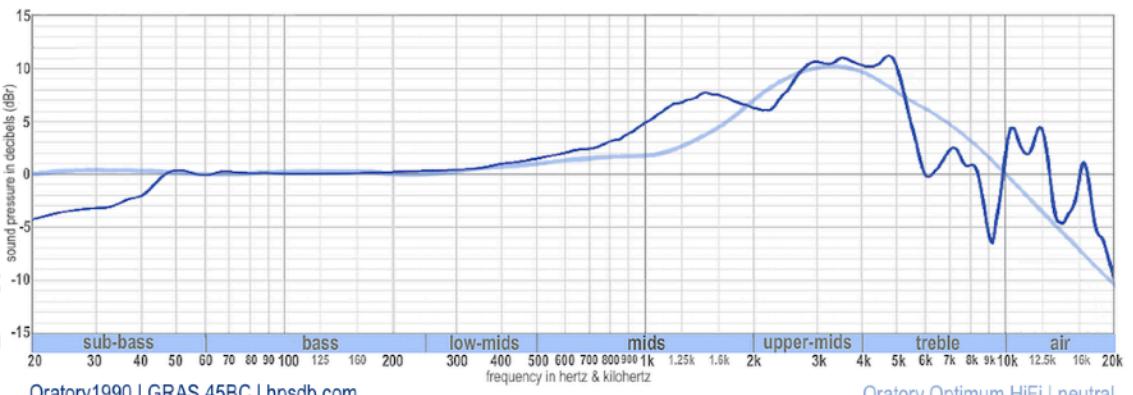


Stax SR-009



Open
Electro-
static

Sen: 80
Imp: 145K
Wgt: 441
Pri: \$4020

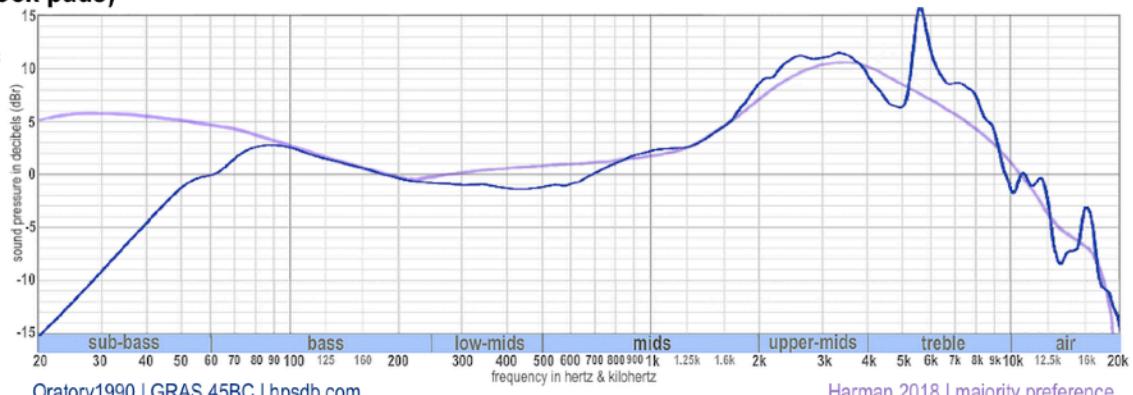


Superlux HD-668B (stock pads)



Semi
Dynamic

Sen: 111
Imp: 56
Wgt: 222
Pri: \$37

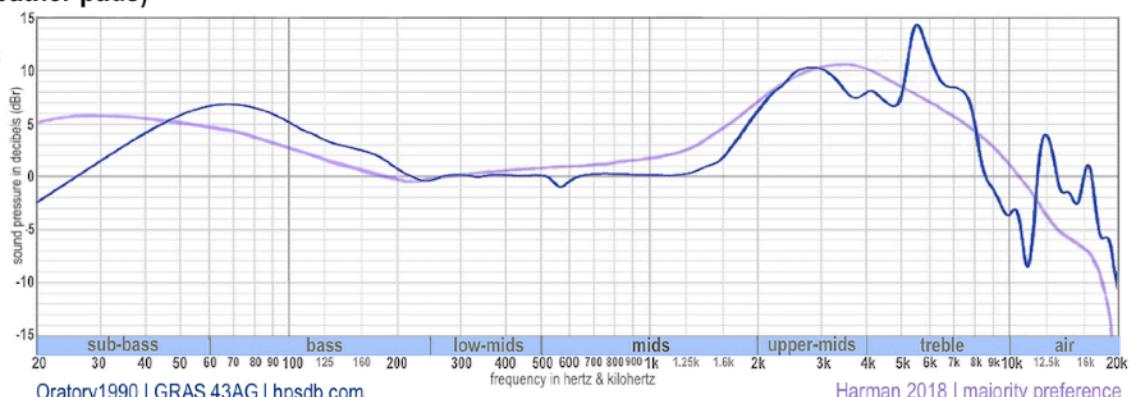


Superlux HD-681B (pleather pads)



Semi
Dynamic

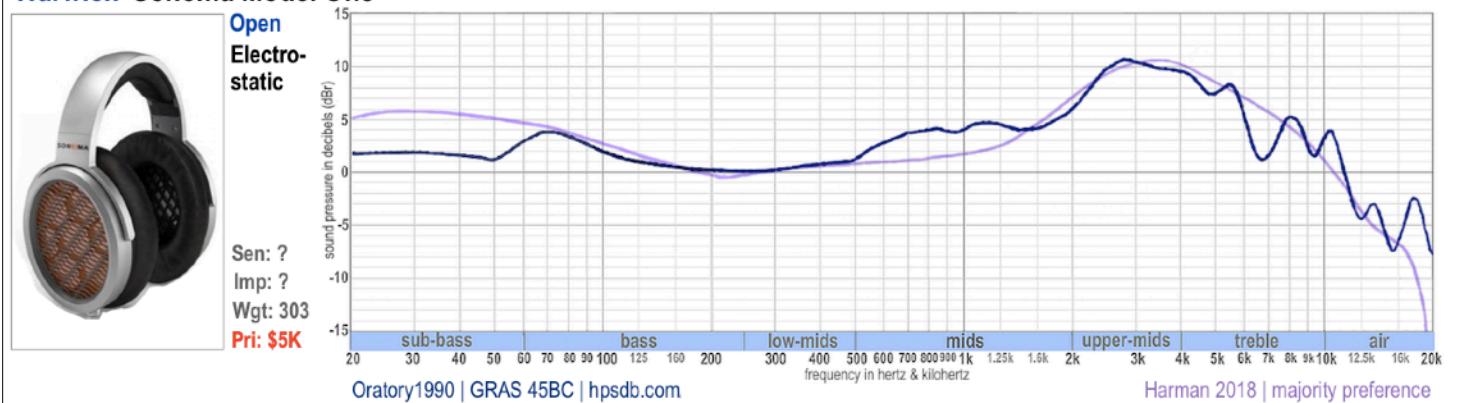
Sen: 113
Imp: 32
Wgt: 221
Pri: \$34



50 neutral and extra-bass over-ear headphones

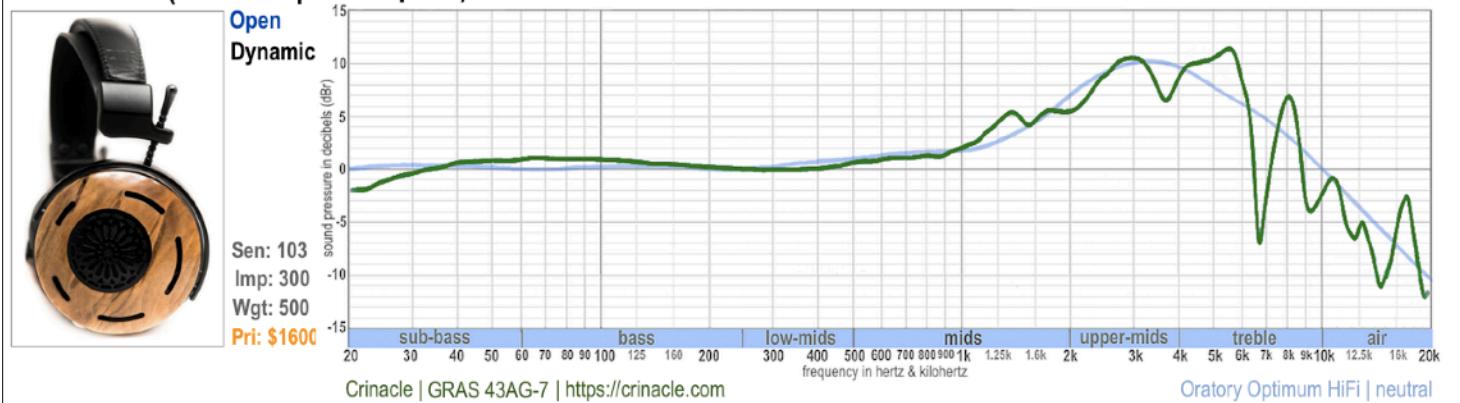
W

Warwick Sonoma Model One



Z

ZMF Auteur (lambskin perf. earpads)



Explanatory notes

I explain the rationale for this oddball collection of headphones starting on pages 11-13 of [Wrapping your head around the whole flat/neutral/Harman thing](#).

Note: this resource doesn't tell you anything about sound quality, except how much departure the headphone exhibits compared to neutral or consumer preference.

Regardless, you may find it useful if researching the purchase of a headphone with a relatively accurate/uncoloured frequency response. If frequency response graphs look confusing or intimidating, you might want to read my tutorial [The Skinny on Headphone Frequency Response Graphs](#). The general idea, however, is simplicity itself. If the jagged line of the headphone measurements goes above or below the pale blue or purple smoothly curved line, that's a possible source of concern. The labeling in the blue bar at the bottom shows you where from bass to treble a given area of concern lies. Headphones with a pale blue reference curve are best considered if you're looking for all-around accuracy/neutral. The pale purple reference curve shows what a reasonable amount of boosted bass looks like, including especially where the boost should taper off to zero.

That said, a common mistake is to assume that the *amount* of bass loudness tells the whole bass story. In fact, a headphone with a very incisive, resonant bass *quality* (like many planar magnetic models) can be more satisfying without a loudness boost, than other headphones with bass that is only boosted in *quantity*. This points to the limitation of frequency response graphs. They give a lot of information about one dimension of the headphone sound experience, but none at all about other dimensions, such as stereo imaging, dynamics and transients. They also don't tell the complete story on detail/clarity — although serious deviations in frequency response are absolutely culprits in muddying the detail waters.

50 neutral and extra-bass over-ear headphones

Another caveat regarding the graphs is that both the sub-bass and the air regions on the far left and right seldom come into play. No voices and very few instruments (or even natural phenomena) produce sounds at either extreme. These are also areas in which even the best measuring equipment has serious limitations.

Another, practical, issue is sound isolation. Each headphone has an indication of open vs closed. **Open-back** means the headphone allows at least a significant amount of sound to spill out into the surrounding air. So an open-back headphone is already a non-starter in situations in which you need to keep from annoying other people. But for sealing *out* external sound, even **closed-back** models vary drastically in effectiveness. Headphones with a porous ear pad construction allow sound to leak in.

As well as the graph, each headphone model includes a short list of sensitivity, impedance, weight and price numbers:

Sensitivity expressed as dB_{SPL}/1Volt (rather than the more common dB_{SPL}/1mW) directly corresponds to the loudness dial on your device. For a portable player like a smart phone, any sensitivity number over roughly 98 to 100 should work just fine. (These devices typically output 1.2 volts).

Impedance essentially shows how much electrical current your headphone requires to produce sound. Here values that are too *low* are of concern. Anything under roughly 30 (Ohms) has a good chance of demanding more sustained current flow than an unaided portable player can deliver.

Weight. It's impossible to express comfort/fit in a simple way. Weight is just one aspect. But headphones weighing more than a pound (454 grams) are fairly likely to be problematic for a long listening session.

The **Price** given for each model is its US dollars list. This gives you a general idea whether a headphone is even worth looking at, depending on your budget. Many uninitiated into the depths of the headphone enthusiast microcosm will be flabbergasted that such a thing as a headphone selling for more than \$500 dollars even exists (let alone the roughly \$60,000 of the current model Sennheiser HE 1). Nevertheless, for the headphones in this collection evidence suggests sound quality more or less scales with price — just not linearly, especially after \$1000. Law of diminishing returns.

Worn vs **fresh** ear pads: at this time the graphs for the DT 770 and DT 880, plus Crinacle's measurements of the HD 600 and HD 650 are the only measurements available for pad wear. It is not possible to generalize that other headphones would exhibit similar pad wear. Some headphones with memory foam ear pads may exhibit very little change. My beyerdynamic DT 1990 has Visco memory foam inside the ear pads and have had 2½ years of extensive use. I can tell by how well they EQ based on the graph in this collection that they still sound much as the graph shows.