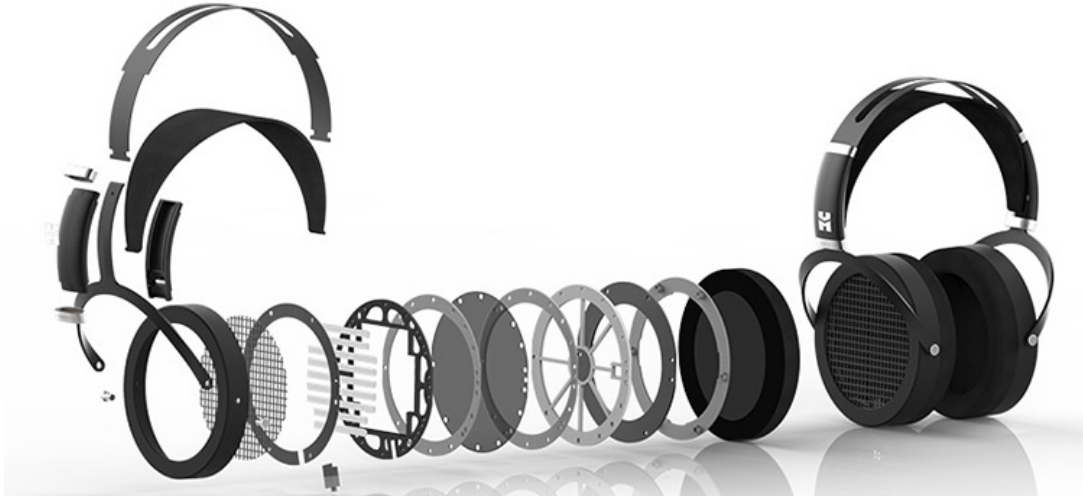


Hifiman Sundara (2020) Owner's Report

Copyright © 2021 by Dale Cotton. All rights reserved. Version 1.3 (November 2021)

You may re-circulate this document. You may not claim authorship or copyright to it.

(Photographs are advertising copy in the public domain: copyright to them belongs to the original photographers.)



Summary: this is a reasonably well-built, potentially very comfortable headphone within a specific range of head sizes and ear sizes and shapes. It has excellent sound quality excelling in neutrality with excellent detail, punch and spatiality. While reaching good loudness and very decent sound quality with today's better smartphones, it improves with quality electronics and is not especially amp picky.

Caveat: bouts of Sundara driver and other failures were reported over the first two years of production. So far as I can tell this is no longer the case, but to be safe you'll need to do your own research.

Reliability

It's essentially a meme now that Hifiman headphones are rife with failure points. Not only do they sport ultra-thin diaphragms, but they have had seemingly endless issues with material failures in the headband, ear pads, etc. The Sundara seems almost like a statement piece of Hifiman tackling this issue head on. The chassis build is all-metal except for the small yoke-to-headband connectors. The only external moving parts are the height extenders and the yokes — and even the yokes only have one of the two necessary axes of rotation.

Early on Sundara ear pads were coming apart at the seams, so Hifiman improved their design (and in doing so improved the Sundara's frequency response). As I write this the earliest batch of Sundaras with the problem ear pads seem to be well out of the supply chain. Following that, customer reports of problems with the Sundara seemed to mostly centre around the drivers. This is an issue that isn't unique to Hifiman. Planar drivers are often made with an ultra-thin diaphragm that seems to be especially prone to failure if assembly isn't just right. Examining Amazon feedback plus several Sundara-specific forum threads for the past six months as I write this, I'm no longer finding even driver failures appearing. I'm in no position to declare that Sundaras are a safe purchase. But I can say my own concerns are considerably allayed after performing this investigation.

My own unit only has a few weeks use on it. I'll certainly be updating this report to include my own experiences with reliability.

Physical considerations

This is an over-ear, open-back headphone with planar magnetic drivers.

- Over-ear means the ear pads surround the ears rather than resting upon them or in them.
- *Open-back* means sound is vented to deliberately leak sound to the world surrounding the wearer. But in this case what the wearer hears as a roar when listening to the Sundara's, others hear as more like quiet conversational sound level. Conversely, sounds from the outside world leak into the headphones and do so much more clearly. These headphones are designed for quiet-environment listening, not recording sessions or commutes.
- *Planar magnetic* means the sound producers inside each ear cup use a fundamental different technology than that of the loudspeakers we commonly see in use. A single, ultra-thin disc pushes air toward the ear by vibrating in response to another disc with an electromagnetic pattern on it. As best I can determine the drivers are 60 mm (2 $\frac{1}{3}$ in), but note that driver size does not correlate with bass performance.
- The Sundaras have a sensitivity (loudness) of 108 dB per 1 volt, an efficiency of 94 mW and an impedance of 37 Ohms.

Power requirements

Translating the last bullet point above, most, but not necessarily all, smartphones, laptops and desktop computers from the past five to ten years will have enough power to drive the Sundara to a (literally) deafening loudness. My iPhone 6S certainly does. An external amplifier is recommended to provide more bass control and to improve the sound stage. The Sundara is not particularly amp picky. It will reflect increasing amp and DAC quality into the kilobuck price range but does not generally respond well to at least OTL (output transformer-less) tube amplifiers, given its low impedance. The headphone enthusiast community generally recommends about one watt of amplifier power for maximum goodness, but it's really about how much *current* the amp can deliver, not voltage. My little Earmen TR-amp does a spectacular job between its 9038 Sabre DAC and its current feedback A/B topology amplifier. This despite providing a mere 3.4 V and 350 mW at 32 Ohms. I can only infer that the unusual, current feedback topology is responsible for its success.

Build, fit and comfort



The Sundara's 372 grams (13 ounces) is relatively light by planar magnetic standards. Fortunately, its suspension strap design does an excellent job at making the heft disappear. I've literally fallen asleep wearing them.

One of three potential design issues is that it's missing any form of lateral swivel between the headband and the ear cups. The ear pads are tapered to compensate for the lack of swivel — just not quite enough for my head. Because I have a small head by adult male standards, the

Sundara Owner's Report

clamp force, which many males find a bit too strong, for me was a bit too loose. I pressed the metal head band inward for a few seconds to achieve just the right clamp.

More problematic is head band size. I purchased my Sundara practically unused from its previous owner because even at maximum extension the head band was too small for him. Ironically, my head is so small at 56 mm (22 inches) around just above the ears and 13 mm (5 inches) from ear canal to crown that the fit was too loose even with the extenders fully retracted. I needed to add a ½ inch of padding to the head band strap to raise the ear cups to the proper height.

The ear pads provide the third potential issue with fit. My ears are population average 60 mm (2 inches) top to bottom. This just clears the 60 mm diameter of the circular ear cup hollow. My ears are also pretty typical with 18 mm (3/4 inch) protrusion from my skull. I have no problem from my ears pressing against the (foam-lined) inner wall of the ear cup, but those with more ear protrusion do. Ear pad depth is a maximum 26 mm (1 inch), but on your head that clearance will shrink depending on the clamp force.

Upshot: you need to consider your head size plus your ear size and protrusion before opting to purchase the Sundara.

Provided accessories

The Sundara comes in a standard cardboard box with form-fitted foam insert loosely covered with a piece of black satin-like cloth. This is the only storage option provided.

The provided, detachable 1.5 meter (59 inch) long, straight cable is loosely insulated in a black rubber-like tube. It splits into a 50 cm (19 in) Y run leading to separate connections at the ear cups. These lack any obvious sign of strain relief and look like a vulnerable point to me. The ear cup connectors are sensible 2.35 cm (1/8 inch) phone jacks. The cable terminates at the other end in a right-angle 2.35 cm (1/8 inch) TRRS phone jack (typically needed for smartphones and portable music players) but comes with the slip-on 6.3 mm (1/4 inch) termination adapter typically needed for external amplifiers. The cable is stiff and annoyingly retentive of its curled-up state.

Maintenance

The outer ear pad covering is an ultra-thin pliable, ultra-delicate looking plastic that looks very like the ear pad covering used on the Audio-Technica M50x. This disintegrated in three years on my M50x. The booklets for both headphones say to wipe the ear pad covering with a soft cloth after use. Presumably skin oils are destructive to this material over time.

Sound considerations

That the Sundara has a nearly accurate/neutral sound signature is either good news or a show-stopper, depending on your idea of what a headphone should do.

Frequency response / tonality

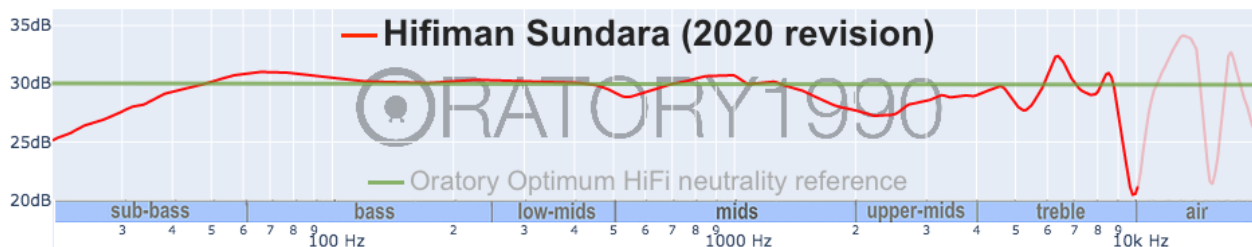


Fig. 1: Sundara frequency response, deviation from neutral (source: [Oratory Grapher](#))

Fig. 1 is a frequency response measurement graph for the Sundara. The measurements were made using professional-grade equipment. I can vouch for its accuracy in matching my own Sundara.

Sundara Owner's Report

Don't be put off if Fig. 1 makes you want to run for cover. I'll explain everything you need to know. The vertical axis in Fig. 1 is loudness, the horizontal axis is frequency (lower/deeper pitches on the left to higher pitches on the right). The green line is the hypothetically accurate response for an over-ear headphone. The red line is one way of displaying how the Sundara measures using state-of-art equipment. Just focusing on the red line, as you can see it departs from the green line in several places that I've circled and numbered in Fig. 2. This is getting into true nit-pickery, but let's examine each of them in turn:

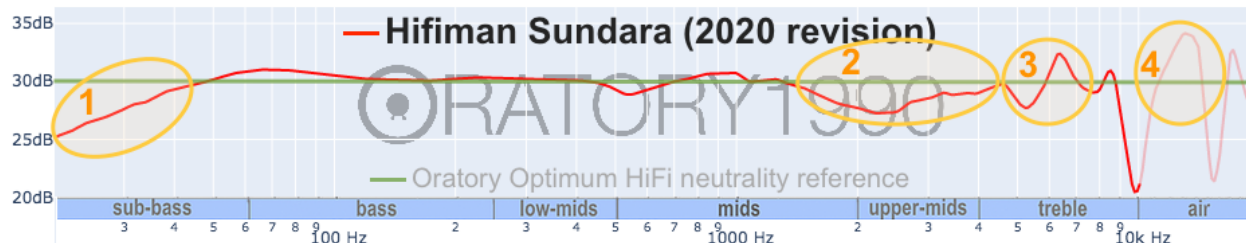


Fig. 2: Sundara measurements with deviation areas circled

1. This sub-bass loudness roll-off looks serious but will only affect a small percentage of recorded music, since no voices and very few musical instruments produce sound in this range (genres like EDM being notable exceptions). Sub-bass roll-off is typical of the open-back headphone design.
2. This fairly moderate recession is beyond the normal human vocal range and is in the highest register of instruments like violin, guitar and winds. It also comes into play as part of the overtone series for lower pitched sounds. I find filling this recession in via EQ does provide a slight increase in clarity but is not a major difference maker for me.
3. The imperfection in this region varies from unit to unit of the Sundara. The peak shown is more of an extreme case and even then will only affect a small percentage of people.
4. Spikes in this region vary so significantly depending on a given individual's ear anatomy, that it's essentially meaningless to focus on what the measurement rig shows here. Again, only a small percentage of people are likely to be bothered by any spikes in this region.

The overall result of the Sundara frequency response tends to be reported as being slightly on the bright side of neutral. Bass is highly realistic and punchy but not boosted in loudness.

Noise and distortion

Another potential problem area having to do with frequency reproduction is measured as *total harmonic distortion plus noise* (roughly, any unwanted variation from the original signal):

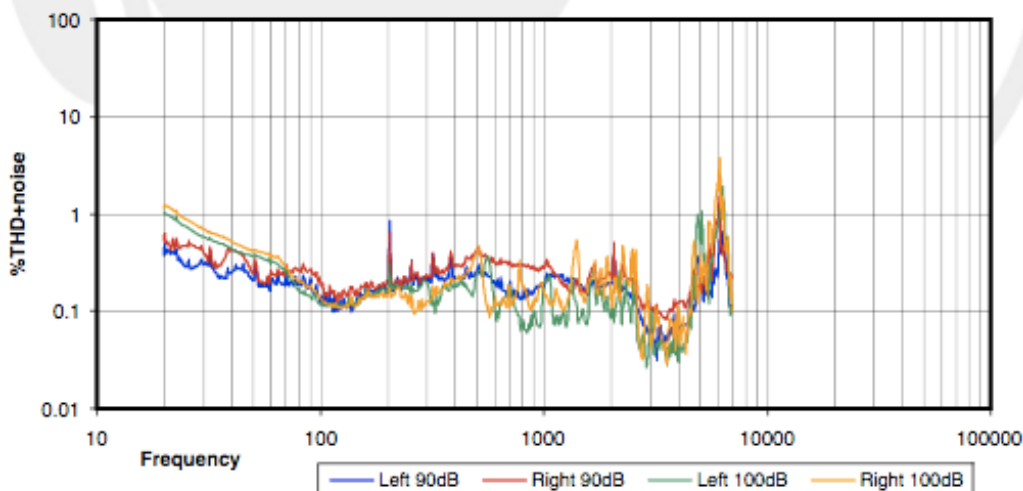


Fig. 3: Sundara harmonic distortion (source: [InnerFidelity.com](https://www.innerfidelity.com))

Sundara Owner's Report

The Sundara measures well below the 5 to 10% threshold for humans to actually hear distortion during music playback. In all, this is actually a very good showing for the Sundara. That's potentially important, given low distortion means a greater ability to respond to EQ. Bass lovers can safely add extra bass via EQ or tone controls.

While frequency is the single most important aspect of sound reproduction, other factors also make a big difference.

Speed and detail

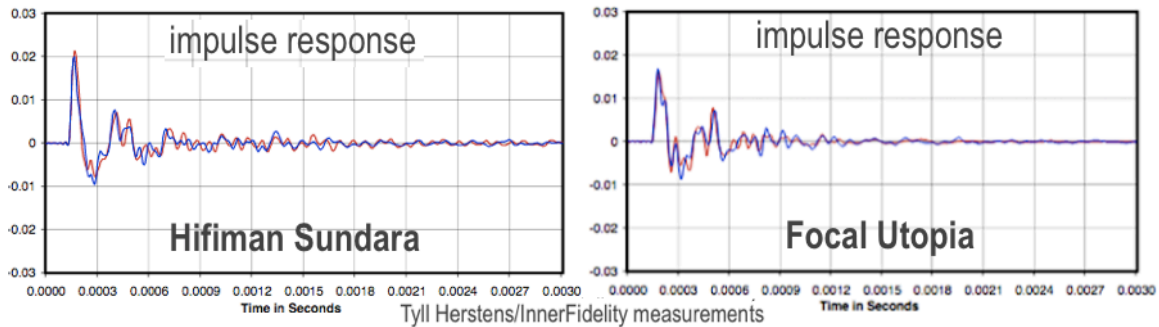


Fig. 4: impulse response comparison (source: InnerFidelity.com)

In this context speed refers to how quickly a headphone can start and stop producing a sound. This is technically referred to as *impulse response* or *ringing*. A faster headphone has greater accuracy than a slower one in the time domain. A “fast” headphone is not still producing a sound beyond it's actual presence in the recording. That said, it's rare that any headphone fails to reproduce the whole auditory range out to at least 20,000 hertz (20,000 vibrations each second). So 0.00005 second seems plenty adequate to achieve sound separation. In fact, as we see in Fig. 4, the InnerFidelity impulse response graph for the (original) Sundara is virtually identical to that of the 10x pricier Focal Utopia.

But going beyond the objectives, the Sundara certainly *sounds* as though it's handling the time domain in an exceedingly crisp, precise manner.

Dynamics

Dynamics is, at least partially, another time domain property. It refers both to the range from quiet to loud a device is capable of reproducing, and to how well it can reproduce sudden changes in loudness. Time domain measurements are hard to come by and in any case no one knows how to measure dynamics, but reviewers are pretty consistent in reporting that the Sundara has excellent, realistic dynamics with no shortage of a punchy delivery. This matches my own experience.

Soundstage and imaging

Soundstage is the ability of speakers or headphones to create the auditory illusion that the sound they produce comes from a larger three dimensional space instead of just from the devices themselves. Imaging is the precision in which sound sources can be located within this illusory space.

Due to some hearing loss in one ear I cannot properly evaluate this feature. Other reviewers are very consistent in reporting that the Sundara has a medium-sized sound-stage with good, if not world-shattering imaging.

Timbre

The word timbre usually refers to the characteristic sound of one musical instrument vs another. But sound reproduction devices can sometimes have a distinctive departure from naturalness of their own, such as a metallic or plasticky accent. Despite the planar reputation for having a plasticky timbre, I'm hearing no such thing. I'm finding that the Sundara has the natural timbre typical of a non-metallic dynamic driver.

EQ-ability

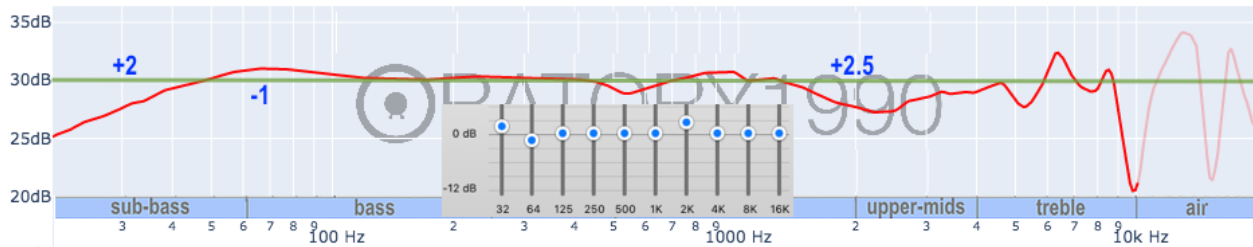


Fig. 5: possible 10-band EQ for Sundara 2020

If you should desire an even more accurate sound reproduction Fig. 4 shows that you can achieve excellent results — with the unlikely but possible exception of the spike at 6½ kilohertz — using even one of the 10-band graphic EQ tools that tend to be readily available. One measurement I've seen shows a 2 decibel peak right at 1 kilohertz, so you may want to experiment with a dip at that point. Note also that a quality frequency response graph, such as shown in Fig. 4, is based on a population-average ear anatomy. Your ears will differ from that, so you need to tweak the shown adjustment values as needed, especially above 4 kilohertz until an aggregate of many tracks of music sounds most correct.

Elevating the bass via EQ also seems to be achievable, at least at reasonable loudness levels. To achieve the Harman target bass set the 32 decibel band to +7.5 (but preferably less), the 64 decibel band to +4 and the 125 decibel band to +2. The rest would stay the same as shown in Fig. 4. (Caveat: not having a sub-bass heavy playlist, I'm not qualified to stress test this.)

Value



Assuming the Sundara's reliability issues are indeed behind them, I rate their value at US\$350 as excellent for anyone who is looking for a highly accurate sound and who passes the head and ear considerations described in the [Build, fit and comfort](#) section above.

In 2019 I purchased the beyerdynamic DT 1990 as a well-built and excellent sounding headphone but knowing I would need to use EQ. At that time the only headphone that I felt would satisfy my ultra-picky neutrality requirement was the ultra-expensive Focal Clear. A year later I decided to buy the Sennheiser HD 600 to see if I could adapt to its fairly minor departure from neutrality without resorting to EQ. I couldn't. But in the interim Hifiman's change to the Sundara's ear pads resulted in a near-neutral frequency response. At the same time reviewers were consistently heaping piles of sound quality praise upon it. Plus, I had never heard a planar. Finally, a good used deal overcame my concern over the Hifiman reliability thing. So I now have a comfortable solid-looking headphone with all the sound quality of my DT 1990, but needing no EQ and costing me half what I paid for the 1990.

Appendix: Sundara unit variation

For those who are comfortable with raw measurement data, here are a some data points to give some idea how much production variability there is in the current Sundara's frequency response:

Sundara Owner's Report

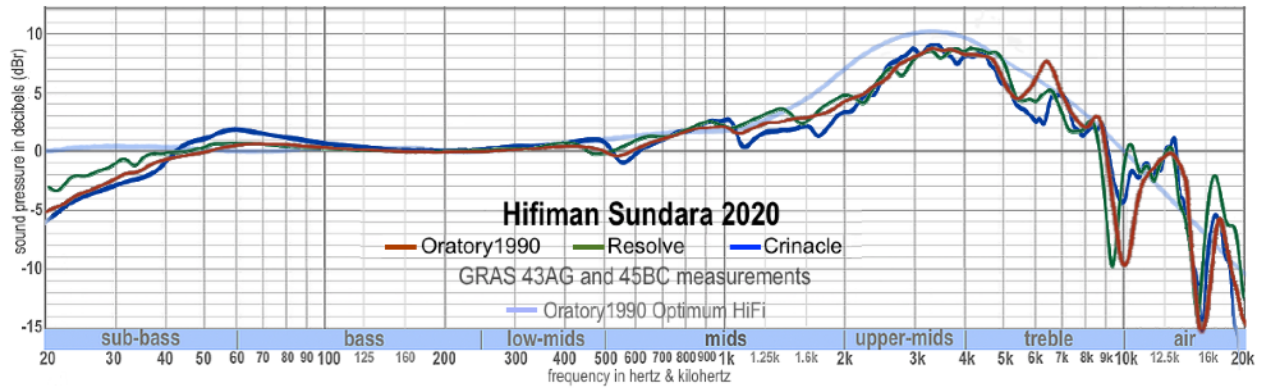


Fig. A1: different units measured by different technicians (source: [Oratory1990](#) [Resolve](#) [Crinacle](#))

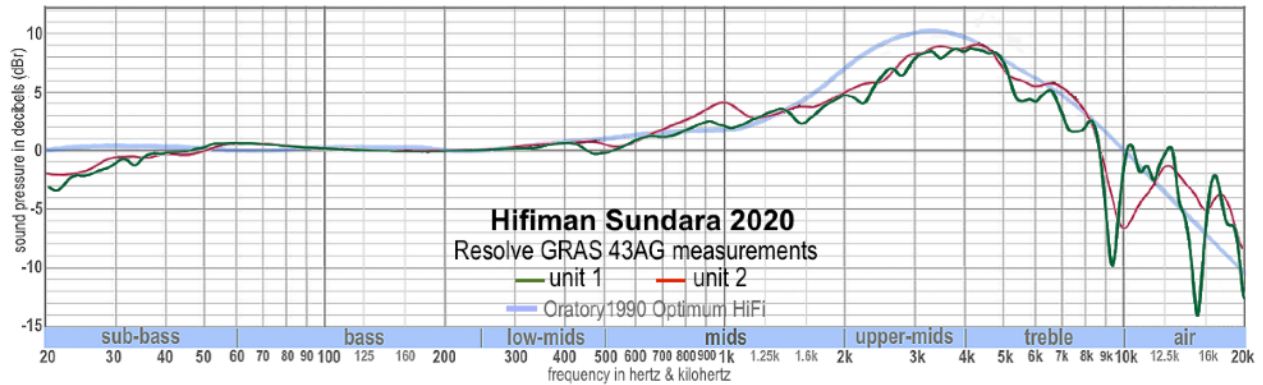


Fig. A2: GRAS measurements of 2 different units by same technician (source: [Headphones.com forum](#))

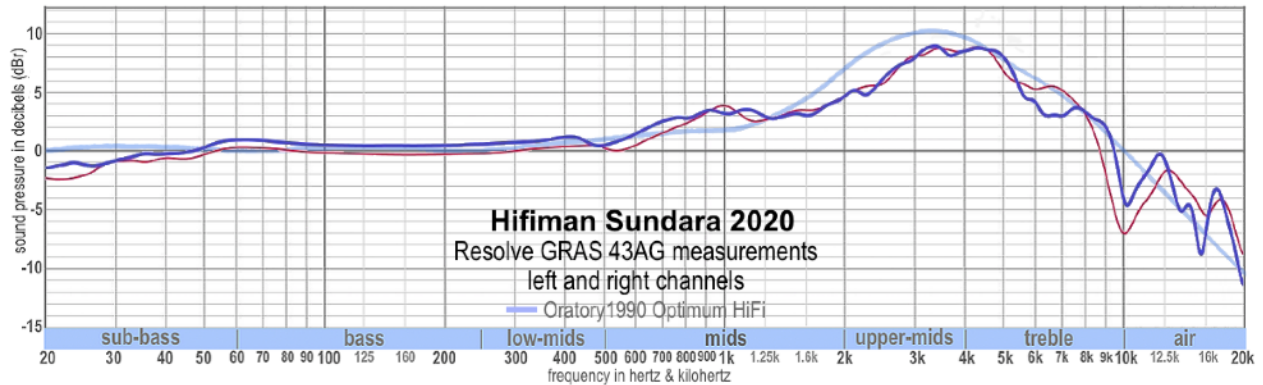


Fig. A3: left/right channels for the Sundara unit 2 shown in Fig. A2 (source: [Headphones.com forum](#))

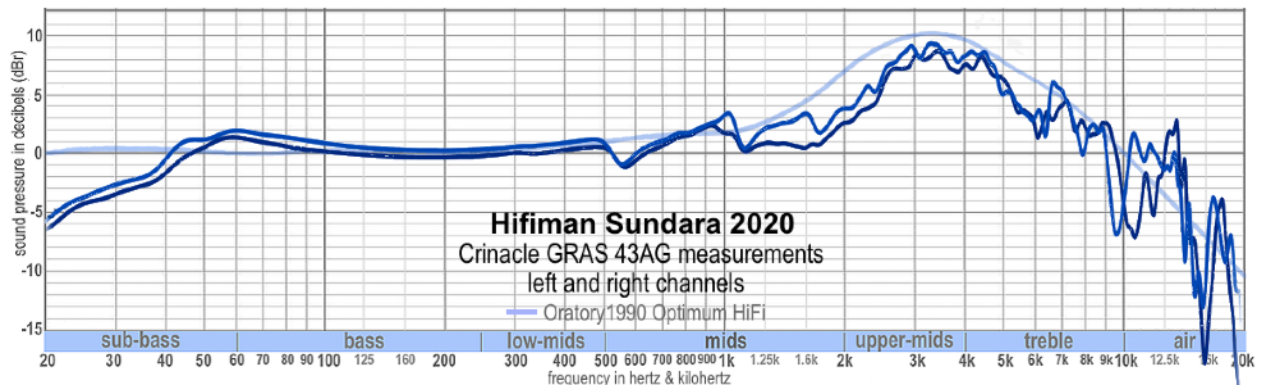


Fig. A4: left/right channels for a different Sundara unit (source: [Crinacle](#))

These results are right up there with Sennheiser for unit-to-unit consistency.