

M A P L E T R E E



AUDIO DESIGN

MAPLE TREE BRANCHES

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Web: www.mapletreeaudio.com email: info@mapletreeaudio.com

- **Ear+ HD update**
- **Evolution of the new Ear+ HD Super II headphone amplifier**

Ear+ HD update Issue 5 of *Branches* covers the *Ear+ Purist HD* in some detail. Since then, the *Purist* label has been dropped for simplicity but the main features remain unchanged. The output coupling capacitors until recently were 47 μ F, 160 V Black Gates. These have become unavailable (production of Black Gate electrolytics ceased some time ago) and have been replaced by Nichicon 47 μ F, 160 V aluminum electrolytics. While it is regrettable that the Black Gate technology is no longer available for audio applications, in the case of the *Ear+ HD*, the sonics have suffered little from the change. The plate resistors of the input stage remain Audio Note Tantalum film type. The current driver tube supplied is the Sovtek 12AX7LPS. Customers are urged to experiment with other brands including NOS 5751 types such as the RCA Command series or GE 5-star.

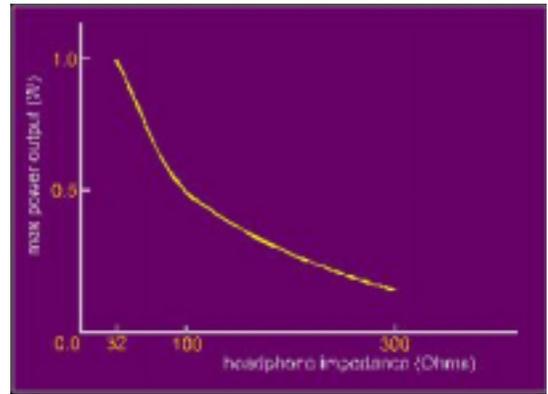


The Ear+ HD250 Special Edition To commemorate reaching the 250th unit milestone (actually a conservative figure since it does not count the special editions of multiple units) a limited special edition of 10 *Ear+ HD250s* was offered. The unique features included the use of EL84 output tubes, and the elimination of all electrolytic capacitors from the power supply and signal path. Large-size Auricap and Solen polypropylene capacitors were utilized which necessitated a somewhat large chassis which also accommodated a high capacity power supply. The principal measurable result was a significant increase in output power from the EL84s (running in triode mode) compared to the 12B4As of the stock HD version.



The maximum available power into 32 Ohms is nearly 1 W. The output impedance was measured to be less than 2 Ohms which means that the output power varies inversely with load impedance as can be seen from the graph to the right.

The drivers for each EL84 were 12AX7s or 5751s in SRPP mode which delivers high gain without the use of electrolytic cathode bypass capacitors.



Note the size of the 33 μ F Auricap output capacitors!

The *Ear+ HD Super II* The *Ear+ HD Super* (shown in special orange here) was introduced in 2008 based



on the *Ear+ HD200* special edition (see Branches 5 for a detailed description). Greater linearity and power output was obtained from the 12B4A output tubes by running at a higher current operating point made possible by a higher output power supply. Similarly, the new *Ear+ HD Super II* introduced in January 2010 is an outgrowth of experience with the



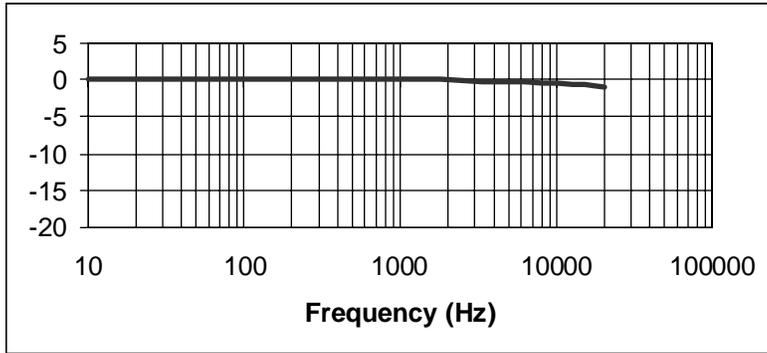
HD250 Special Edition. While the design dispenses with the polypropylene capacitors, it retains the EL84 outputs, SRPP driver stages, and the high output power supply (housed in a separate chassis for the lowest possible



noise floor). Special attention was paid to achieving the best possible clipping waveforms at the point of maximum power output to reduce odd-harmonic distortion components. A passive preamp option is available that provides for up to 3 switched inputs and a passive output affected only by the input source switch and volume control.

Measured performance data

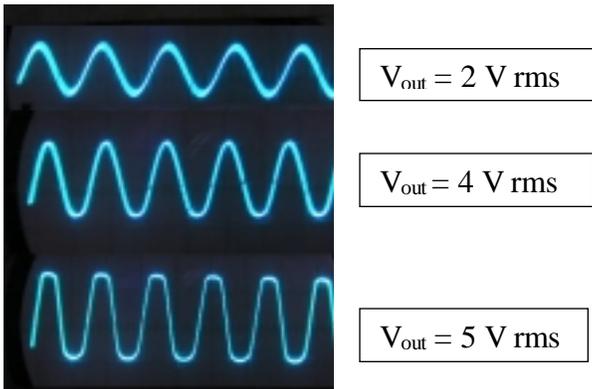
Frequency response at 1 V rms (20 mW) output into 50 Ohms:



Maximum undistorted output at 1 kHz: 4 V rms with 50 Ohm load connected to Hi Z output (= 0.32 W).

$P_{o(max)}$	R_{load}
680 mW	25 Ω
500 mW	32 Ω
160 mW	100 Ω
57 mW	300 Ω
28 mW	600 Ω

Overload characteristic (1 kHz, 50 Ohm load, Hi Z output)



Output impedance at 1 kHz: Hi Z: < 2.6 Ω , Lo Z: < 1.3 Ω

Input impedance: 100 k Ω

Gain: Hi Z: 11 dB, Lo Z: 8 dB

Hum and noise at output (max volume, Hi Z): less than 0.4 mV rms (80 dB below max. output)

Recommended load impedance: 20–600 Ω

Phase: non-inverting

Power consumption: 40 W, 120 or 240 VAC 50-60 Hz

What do you get with the Super II over the stock HD? While the output power of the *Ear+ HD* is more than adequate for most headphones, just as in the case of speaker power amplifiers, the extra headroom seems to add impact to loud transients where short power peaks can run the amplifier into instantaneous overload. You can also run two sets of headphones without limitation. The 400 μ V noise figure is comparable to that of the HD so the advantages of the separate power supply are to reduce the heat build-up in the main amplifier chassis and to offer flexibility on locating the two units. A 12" power interconnect cable is supplied and a 36" cable is available at a nominal price. What is of interest to many customers is the wide availability of the EL84 output tubes, contrasting that of the 12B4As which are only available as NOS. What about the sound? Customer reviews comparing the *Super II* and stock *HD* are forthcoming. The topology of the output stage has not changed since the first *Ear+* model was introduced in 2002. This seems to govern the overall sonic character. *Ear+ HD* customers have noted that sonics are not sensitive to different 12B4A brands. This is undoubtedly a consequence of the cathode follower configuration with its inherent 100% feedback that linearizes the large signal characteristics. To my ears, the *Super II* sonics are difficult to distinguish from those of the previous models without setting up a careful A-B test situation. As with the *Ear+ HD*, changes in the driver tube(s) will impact the sonic character. Like the *HD*, the *Super II* utilizes Tantalum film resistors in the driver stage. Due to the higher voltages in the *Super II* power supply, Black Gate filter capacitors are not an available option, and as for current production of the *Ear+ HD*, Nichicon output capacitors are used..