

Spoilt for choice — which 5532?

It is an unsettling fact that not all 5532 opamps are created equal. The design is made by a number of manufacturers, and there are definite performance differences. While the noise characteristics appear to show little variation in my experience, the distortion performance does appear to vary significantly from one manufacturer to another. Although, to the best of my knowledge, all versions of the 5532 have the same internal circuitry, they are not necessarily made from the same masks, and even if they were, there would inevitably be process variations between manufacturers

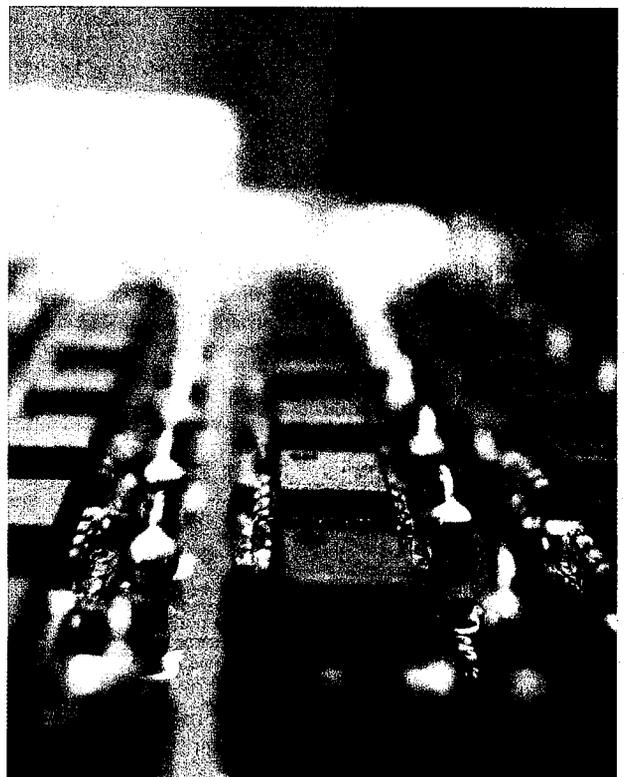
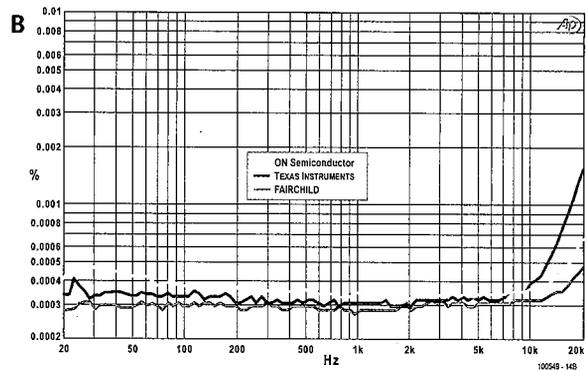
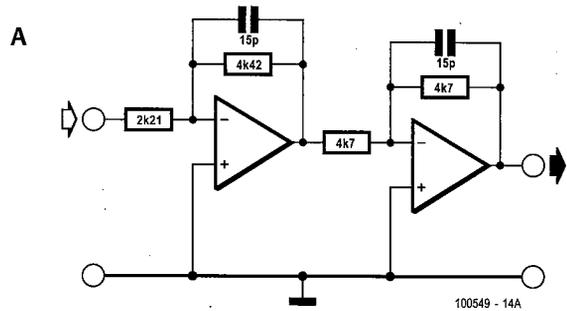
Since the distortion performance of the amplifier is unusually, and possibly uniquely, dependent on only one type of semiconductor, it makes sense to use the best parts you can get. In the course of the development of this project 5532s from several sources were tested. I took as wide a range of samples as I could, ranging from brand-new devices to parts over twenty years old, and it was reassuring to find that without exception, every part tested gave the good linearity we expect from a 5532. The information here will be of use not only in the 5532 power amplifier project, but should prove very valuable for anyone using 5532s in high-quality applications.

The main sources at present are Texas Instruments, Fairchild Semiconductor, ON Semiconductor, (was Motorola) NJR, (New Japan Radio) and JRC (Japan Radio Company). TI, ON Semi and Fairchild samples were compared in the Elektor labs by Ton Giesberts. The author for his part did THD tests on six samples from Fairchild, JRC, and Texas, plus one old Signetics 5532 for historical interest. The Elektor lab tests were carried out on an actual and very crucial section of the OpAmp design: the driver section! See **Figure A** for the circuit and **Figure B** for the AP2 plots.

As it turned out, the Texas 5532s (green line) proved to be distinctly inferior, both in the Elektor Labs and in the author's tests. We have to admit this surprised us, as we have always thought that the Texas part was one of the best available, but the measurements say otherwise. Distortion at 20 kHz ranges from 0.001% to 0.002%, showing more variation than Fairchild and ON Semi as well as being higher in general level. The low-frequency section of the plot, below 10 kHz, is approaching the measurement floor, as for all the other devices, and distortion is only just visible in the noise.

Compared with other maker's parts, the THD above 20 kHz is much higher—and at least 3 times greater at 30 kHz. Fortunately this should have no effect unless you have very high levels of ultrasonic signals that could cause intermodulation. If you have, then you have bigger problems on your hands than picking the best opamp manufacturer...

The graphs show beyond doubt that the Fairchild 5532s (blue line) are top of the bill and true audio purists should select these devices even if they come at a slightly higher price as well as being awkward in terms of type code print on the device. Check with your supplier, it should be worth your while. There is effectively no distortion visible above the noise floor up to about 12 kHz, and distortion at 20 kHz is less than 0.0005%.



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