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Micromega WM-10 *AirStream* is *NOT* just an Airport Express

The Apple Airport Express is a highly popular, wireless device designed for listening to music without having a physical connection between the computer and the music reproduction system.

However, for audiophiles and discerning music lovers, the quality of its sonic fidelity is limited and clearly not as good as it could be..

When opening the airport express box, some of these limitations are obvious while others are hidden that in total limit the products ultimate potential. The two biggest areas that need improvement are:

Power Supply – The *AE* uses a very noisy (Electrically) low-cost switch-mode power supply. These types of power supplies are nightmares for any audio designer as the noise generated by the supply itself is impossible to remove once inside the signal path.

This is why WM-10 uses a sophisticated linear power supply. This high-performance power supply is built with a specially designed very low-bandwidth R-CORE transformer, which creates a natural line-filter, effectively removing a great part of the high frequency noise present in the AC mains line. Robust rectification is deliberately employed using a 25A bridge rectifier where film capacitors have been inserted in parallel with each diode to smooth the switching peak.

A smoothing C (capacitor), R (resistor), C (capacitor) network takes care of the AC mains ripple. A low noise, fast response linear regulator has been selected to provide a very clean 3V supply to the main module. The noise figure of this main power supply is below 100uV rms from 10Hz to 20KHz. Thanks to this power supply, the module is now *“breathing fresh air with almost no pollution”*.

Clock – The less obvious, but weakest part of the *AE* wireless device is the clock inside the 88F6-BGH2 Marvell module responsible for the digital data stream to the D/A converter. This master clock is a simple “gate type” oscillator, internal to the IC itself, and uses a basic crystal. There are two main drawbacks to this technique; first, the oscillator shares its power supply with the rest of the components, and second, the gate oscillator is hard on the crystal itself and creates jitter.

Micromega designed a very low jitter 25.000MHz clock with a dedicated extremely low noise power supply. This power supply has its own winding on the secondary side of the R-CORE transformer and uses sophisticated regulation techniques to reach a noise level of $7\text{nV}/\sqrt{\text{Hz}}$. This technical solution brings a total separation between the main and the clock supply reducing jitter down to levels that eliminate the harsh time domain errors generally associated with low quality digital decoding.