

Test Report

Onn Model ONA14AA011 Wireless Headphones Transmitter

There has been some discussion lately among Part 15 broadcasting types that perhaps wireless headphones and microphones, which transmit on “white space” just below the FM broadcast band might be useable for hobby broadcasting.

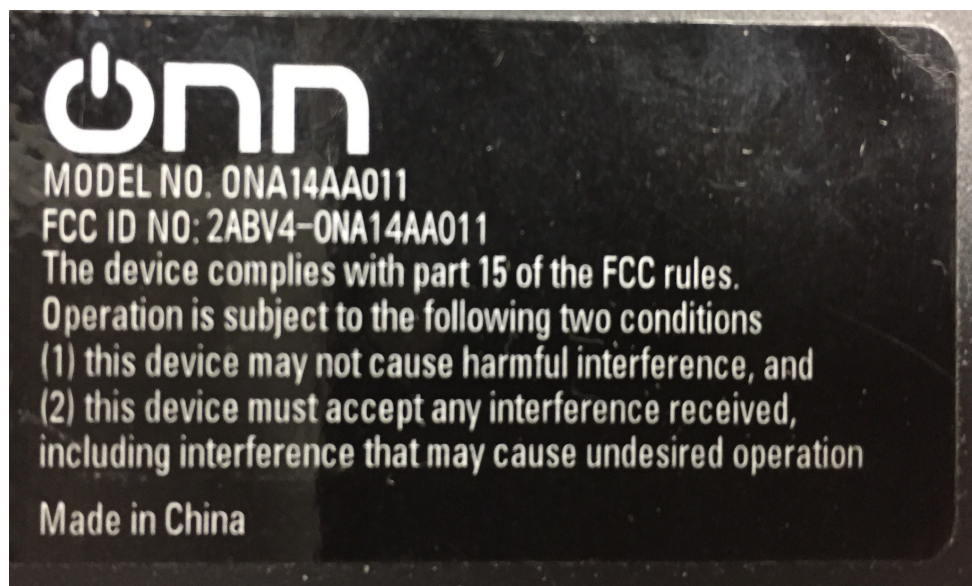
The Onn Model ONA14AA011 was brought up as a model that operated at 84.922 MHz and might be suitable. Just for the sake of curiosity I bought one of these and subject it to my normal Part 15 FM transmitter tests. Let me say upfront this is an inexpensive unit and it meant to broadcast to it's matching headphones not to the general public via FM radios. There are a limited number of radios that can receive at this frequency as it's out of the FM band in the USA. Radios that can operate in “Japanese mode” can tune it, as can radios that had the TV Audio tuning band included back in the days of analog TV. So not only is it out of band, but the frequency of 84.922 can not be tuned accurately on any digitally tuned receiver. That all being said, lets see what we have here.

All testing was done with my usual setup, taking field strength, etc in an open field using a Potomac Field Strength Meter, properly calibrated. A Inovonics modulation meter was used, as well as a spectrum analyzer, Coaxial Dynamics wattmeter with a custom made slug for the FM band with a full scale reading of 100 mW, and a frequency counter. All testing was done with two brand new alkaline batteries installed in the transmitter.

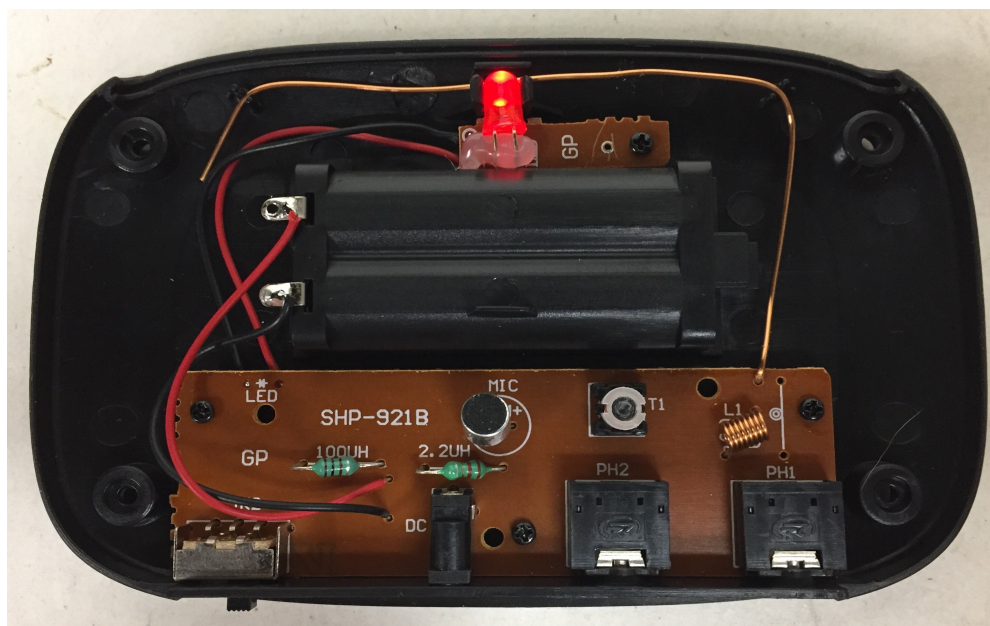


I purchased my Onn online, at retail for \$13 including shipping. It arrived intact. This feels like a toy. It weighs 2.5 ounces with the two “AAA” batteries installed. Controls include only an on/off switch. Connections include audio in, mic out, and 3V external power in. The “mic out” is for a small microphone inside the case that is meant to connect the “mic in” jack on a computer. Not sure what the point of this might be as it's a wired mic connection. Presumably if you have the transmitter plugged into your computer and were using the computer you would be equally close to the computer's own mic as you would be to the device mic. I suspect this unit dates back to the days before every computer had a built in microphone. This mic does NOT broadcast on the signal generated by the transmitter.

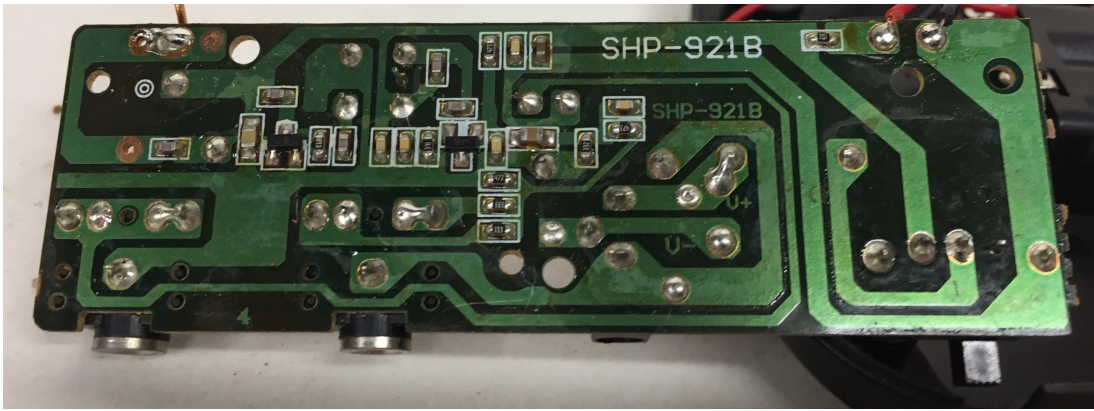
It states it is FCC certified under Part 15, however the FCC ID number affixed to the unit takes us to the FCC database where it states it is certified under part 74 as a wireless microphone, but it also appears to fall under Part 15.236. I won't attempt to analyze or debate the legal parameters.



First thing I did was power up and check the frequency. The certification says operation at 84.922 MHz. My device transmitted at 84.828. Confirmed with both a spectrum analyzer and frequency counter. Next was to check output power. I've seen these discussed online with outputs claimed ranging from 5.5 mW to 50 mW. The certification says 5.5 mW. Actual measured output was about .5 mW (yes, that's point five). Remember under 15.236 output is measured in EIRP, NOT power out at the transmitter. For all practical purposes that's field strength.



You will notice in this photo of the interior the antenna is about 4 inches of bare wire inside the case.



As usual there are always some claims posted in the reviews about range. Reading reviews for this transmitter one would think it would work anywhere from barely 5 feet to a mile, depending. Note I did NOT use the matching headphones for any testing as our purposes would be for transmitting to radios. I set the transmitter in a second floor window fed music from an iPod. I went out into my neighborhood with two different portable FM radios that included the expanded FM band, a Sony ICF-801 and a Tecsun PL-310. With either radio the best range I could get was a measured 250 feet. This was in clear line of sight from the transmitter in my window to the receiver. No obstructions at all. I would normally try testing for range on a car radio but I own no car with a radio that will tune below the USA FM broadcast band. Range testing in this manner is very subjective and non-scientific.

This led to the field strength test, usual setup. Now, I realize that for certification, depending on which rules are being followed field strength may or may not apply. But I wanted to do the tests so we could compare to other Part 15 FM band transmitters. So I did the test at 3 meters as the FCC Part 15 certification requires. This clocked in at 620 uVm, well over the 250 uVm limit for regular FM band Part 15 devices. As was the case with every other Part 15 transmitter I've ever tested, plugging in a 6 foot long audio cable increased the output, in this case to 950 uVm. However, well within the limits of 15.236.

As for modulation, this unit can indeed readily modulate to 100% with no problem. However, it has no indicator at all for modulation peaks or over modulation. There is clearly zero audio processing, limiting, leveling, etc in this unit as modulation increased and decreased as the audio input was varied. And the jump from 100% modulation to grossly over modulating was a very small step. Setting a decent level without a good modulation meter would be difficult.

One interesting observation – while checking modulation with a very diverse jazz selection I noticed the left and right modulation were identical. Knowing the material should have been giving some rather obvious differences between levels on the two channels I quick checked the stereo pilot level. There wasn't one. None. This is a MONO transmitter. Clearly it is summing the left and right audio. I confirmed this running a stereo test program with various tones on left and right, sweeping left and right tones, etc and everything was broadcast in mono.

As for the headphones I found their audio substandard, they were uncomfortable to wear for more than a few minutes. The audio from the transmitter would fuzz in and out as I moved about the small room where I was trying the out.

What we have here is a short range MONO transmitter that operates outside the USA FM band requiring an oddball radio to receive the signals. Published April 28, 2019 5PM CDT