The Acoustimeter

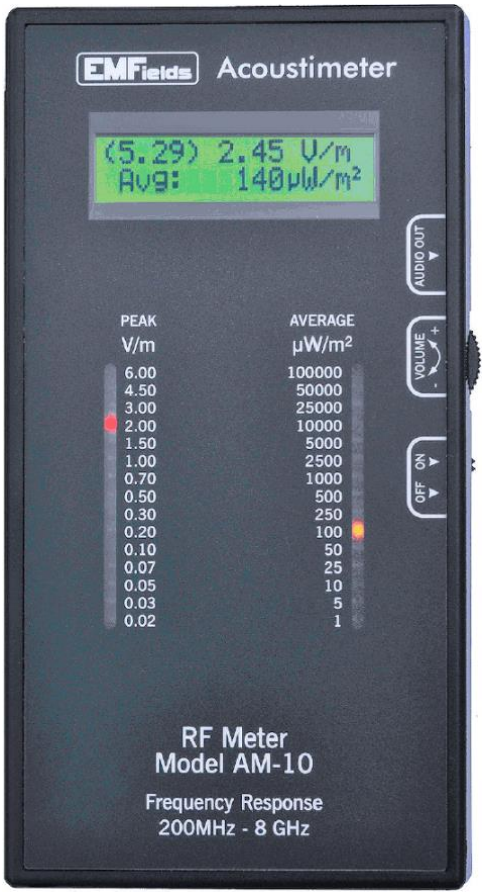
The Acoustimeter is a microwave detector that presents radio frequency (RF) measurements as an audio signal. It is designed to enable you to make a quick and informed judgement regarding the level and nature of microwave signals in your environment.

It is a broadband instrument that accurately measures the totality of the radiation in the range 200 MHz to about 8000 MHz (8 GHz), which covers the frequencies used by most modern communication systems encountered in our everyday environment. Additionally, it is sensitive down to 0.02 V/m, making it a suitable instrument for those with severe electrosensitivity.

Readings

The readings are shown on both an LCD display and two series of graduated LED lights. The LEDs update rapidly, allowing you to quickly gauge the levels in an area and find hot-spots. The LCD display offers high accuracy with a lower update speed, giving you time to take note of the readings. It also has a speaker and audio output socket for headphones, allowing you to determine what type of device is creating the levels that are present.

The Acoustimeter is unique in the way it displays measurement information. There are two displayed results showing both Peak and Average measurements on the LCD and also using two rows of LEDs. At first, this may seem confusing and make the readings difficult to understand. However, they are both important in assessing exposure to modern telecommunication signals.



The Acoustimeter reads differently from some meters as:

1. It has a very fast response (up to over 8 GHz and reacts to very short pulses)

2. Peak readings show the highest sampled reading - though the sampling and processing rate means that there are some gaps.

   It will not always react to a single, very short pulse (<5µs), though it will react correctly to much shorter pulses that are regularly transmitted (such as from WiFi).

The peak-hold reading on the LCD screen can be higher for some signals than the highest LED seen flashing, as the Peak LED display does not show all pulses in order to make it easier to see. The LCD peak-hold is the highest measured since switch-on. It is cleared by switching the meter off and on again.

3. The Average reading is a true mathematical time-averaged reading of about the last 1000 samples.

   This gives the correct reading for DECT and WiFi and is much lower than many other instruments which use the highest peak reading and then translate it into an equivalent average power.

   That is not correct as power is measured as total energy used/delivered per second and not the energy in a short pulse of 10 ms followed by a 990 ms gap.

NOTE: The internal antenna is at the top rear of the case. Signals are best measured when the source is behind the instrument, but also quite good with the source to one or other side.

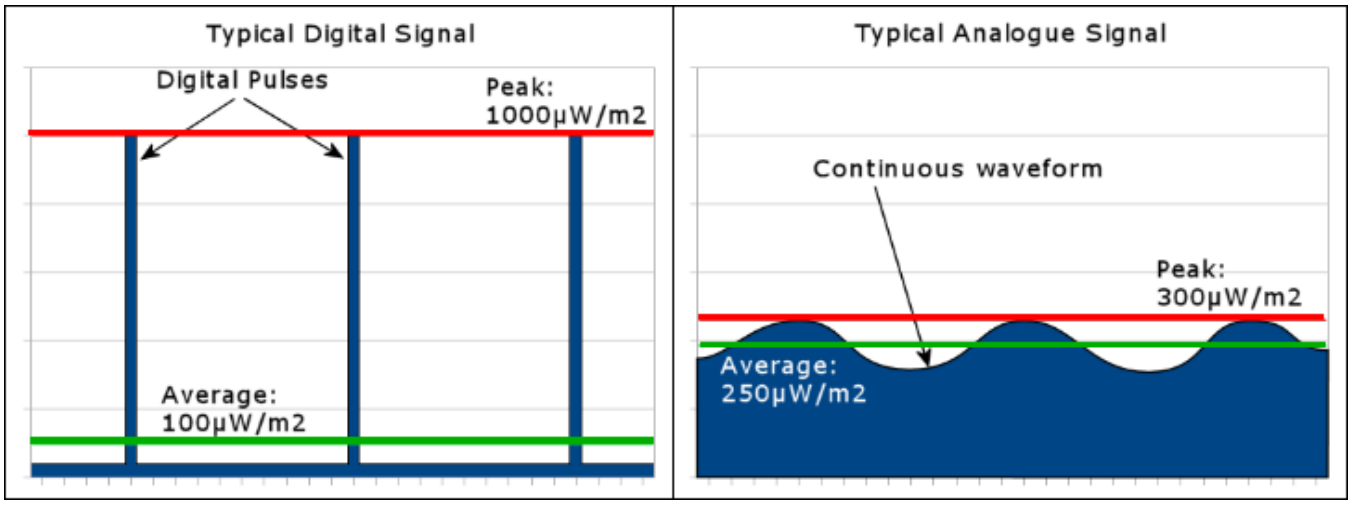
Digital and Analog: What is the difference?

Many modern wireless devices use a digital system of communicating. This includes Mobile Phones (GSM & 3G/UMTS and 4G/LTE), WiFi, Cordless phones (DECT), Digital TV & Digital (DAB) Radio. Many digital systems turn the signal on and off at high speeds to represent data, often with long gaps between data bursts. This produces a non-continuous signal, also called "pulsing".

An analog signal is a system of communication that is not digital. Examples include old TV system, most radios, walkie-talkies and hearing aids. It uses a continuous waveform, and instead of turning on and off to represent data, it will vary its frequency (FM) or strength (AM).

How this affects Peak and Average

With an analog system, the peak and average levels should be similar, as the signal is continuously on while it is being used. However, because most digital systems spend a large proportion of their time not transmitting, the average level does not represent the actual waveform even though it's technically accurate. Because of this, more powerful, but shorter pulses of much higher signal strength are not captured. See the diagrams for a visual example.



Why does this matter?

Traditionally, the only method used to measure exposure has been the average, due to wireless communication having been exclusively analog until the past couple of decades. It is also the most sensible metric to use when looking at thermal effects, which for a long time was the only "established" mechanism for health effects caused by EMFs. The metric typically used for measuring the averaged power of microwave frequency EMFs is microwatts per square metre (µW/m2), and so it is used for the Acoustimeter's average power measurement.

However, there have been numerous studies finding non-thermal effects from EMFs, which means that the measurement system needs to be re-addressed to suit much lower signal levels and different characteristics. Peak signal strength is an appropriate way to measure digital, non-continuous signals in a meaningful manner. Signal strength measured in volts per metre (V/m) is a suitable metric for this.

You can convert between V/m and µW/m2, but this is only accurate if you have an analog, continuous waveform.

Additional Information

Visit http://www.emfields-solutions.com/detectors/acoustimeter.asp for sound file examples and technical specifications.