LIGHTBEE©

LIGHT NOISE DETECTOR

The LightBee lets you instantly find out whether a light source has a clean, stable emission, or whether it generates a light with significant noise.

HOW IS THE LIGHTBEE USED?

To test a light source, simply:

- aim the LightBee towards the light
- press the ACTIVATE button

If the light output is clean, the LightBee will remain silent. If the light contains any noise, the LightBee will emit a buzzing sound – the louder the sound, the more pronounced the light noise level.

USAGE TIPS

- ✓ The LightBee is designed to be quite directional. Aim it precisely towards the light you are testing. Test over a range of distances, from a few centimeters up to one or two meters. A clean light will be silent at all distances.
- ✓ **The LightBee can saturate if held too close to a bright light source.** In this case it emits a distinctive rumble sound, unrelated to light noise. For proper testing bring it further away until the rumble stops.
- ✓ The LightBee requires two AA batteries. The BATTERY indicator will shine brightly while pressing the Activate button so long as batteries are good. When the indicator starts to fade, batteries are low and should be replaced.
- ✓ The LightBee detects light noise over the whole visible light spectrum, with frequencies from 100Hz to 3000Hz.

WHAT IS LIGHT NOISE?

"Light noise" refers to instabilities or flickering in the brightness of a light source. Very few artificial light sources emit a perfectly stable light, even if they appear to do so. This is because they often flicker at a speed or frequency which is too fast to be perceived by our visual system (above 50 to 70Hz).

WHY DOES LIGHT NOISE MATTER?

Even when not discernible to the naked eye, light flickering can have adverse effects on our nervous system. These effects are more or less pronounced depending on each individual. To some sensitive people, even a low flicker may lead to migraines, headaches and eye stress. To the rest of us it still adds to the general environmental stress, potentially contributing, in the long run, to various chronic pathologies.

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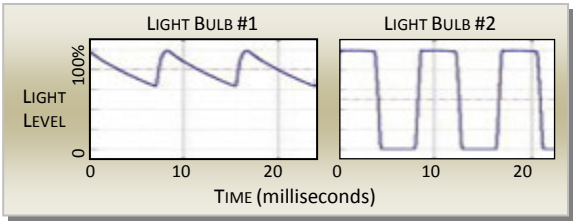
WHICH LIGHT SOURCES EMIT MORE LIGHT NOISE?

Light noise has long been an issue with fluorescent light sources. But it has recently become much more significant with the arrival of the new LED bulbs which are now used almost universally.

This is because LEDs have a much higher response speed than previous light sources. Engineers have been making use of this property by pulsing light to efficiently control LED luminosity*, often without much consideration for the undesirable effects of the light noise thus introduced. Furthermore, cost-cutting results in LED driver electronics with high noise levels.



Light output from typical LED light bulbs, exhibiting high light noise levels

HOW CAN WE REDUCE LIGHT NOISE IN OUR ENVIRONMENT?

An industry regulatory body, the IEEE, now recommends reducing all flicker with frequencies below 3000Hz, a new limit much more stringent than previously recognized**.

But for the time being, the flickering level of commercial light sources is still unregulated and manufacturers usually don't mention it in their specifications. The only way you can evaluate the non-visible flicker level of a light bulb is with a detector such as the LightBee. You will find that different LED light bulbs can emit anywhere from negligible light noise, all the way to extreme levels.

- ✓ Test all light bulbs that you bring into your home and office. Avoid LED and other light bulbs with excessive light noise.
- ✓ Avoid using dimmers with LED light bulbs. You will find that even dimmers specifically designed for LEDs usually generate high light noise.

For more information on light noise and the LightBee, see:
www.sensora.com/lightbee

* Technically known as *Pulse Width Modulation* (PWM).

** *Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers*, Institute of Electrical Engineers and Electronics Std 1789 (2015).