Electrosmog sensor

for the LogIT Microsense® system

Instructions

Overview

The Electrosmog sensor is designed to measure RF radiation in the wide frequency band of 800MHz to 2500MHz which includes many Digital cordless phones, Baby alarms, mobile phones as well as Wireless TV cameras and Bluetooth or WiFi devices.
Because of the broad band received, a simple antenna (a dipole is integrated along the back long edge of the arrowhead shape) it cannot be as accurate as specialised instruments which can cost 20-30 times the cost, but it will enable you to make relative and comparative readings between products, investigate how signal field strength varies with distance and experiment with screening & shielding materials.

In Use

The sensor can be plugged directly into your LogIT or Microsense compatible instrument or used remotely using a single Microsense extension lead.
Because the Electrosmog sensor is essentially an untuned wide band radio receiver it will sense a wide range of radiating devices which may also show unwanted readings or interference from frequencies different from those intended to be measured (sometimes called background radiation), so it is important to conduct experiments away from fields of other radiating devices nearby (such as mobile phones or WiFi routers).
This sensor has an internal microprocessor which processes the signals from the receiver to send Field Strength data back to the Microsense datalogger or interface.
As with other scientific experimentation it is good practice to take a reference readings without the device(s) being measured switched on so that background interference can be assessed and accounted for.
Please note is not compatible with the oscilloscope mode available on some dataloggers.

Specification:

Fieldstrength range: 0 to 8.3 V/m
Recommended Bandwidth range: 800MHz to 2500MHz (2.5GHz)
Maximum Bandwidth range: 100Mhz to 2500Mhz (2.5GHz)

Care

Do not allow this sensor to get damp or exposed to extremes of temperature and do not disassemble.
These instructions are a guide to use only. Never expose any equipment or people to areas of high radiation. Read instructions of devices being measured for their care and safety guidelines. DCP accepts no responsibility for risk assessment which is always the duty of the teaching or supervising adult. Always check your local regulations or a school advisory service for specific guidance on hazards, safety and care.

Updating LogIT or datalogging software

Your software and/or LogIT with display may need updating to support this sensor, which is usually available over the internet free of charge.
If the sensor is not recognised by your software or LogIT (for example if the datalogger displays ???) you probably need a software update.
LogIT Lab will also update the LogIT datalogger - if you are using different data logging software you can download an evaluation version of LogIT Lab to update your LogIT(s):
• Visit the LogIT website www.logitworld.com
• To upgrade your datalogging software click on the 'Downloads' tab followed by 'Software Updates'. The installation instructions are available from the same page.
• To upgrade the datalogger, select the logger from the list on the left of the page followed by the 'Support' tab and then select 'Logger Updates'.
Follow the on screen instructions.

Resources

The ideas for investigations shown overleaf are available along with others for download in PDF format at www.logitworld.com

Measuring Electrosmog

Introduction
Electrosmog is the 21st century name for man-made Radio Frequency Radiation or emissions.
The Radio Frequency band is part of the Electromagnetic Spectrum and the frequency is usually measured in Hz (Hertz/waves per second) and Field Strength in w/m (watts per metre).

Although it is hard to trace the precise origin of the term, it is probably called Electro*smog* because with the many wire-less broadcasting signals, equipment and gadgets in most countries, there is so much of it around us that some people feel it is actually a pollution which can affect general health and interfere with the correct operation of some pieces of equipment, such as hospital instruments or aircraft avionics.

The Electrosmog sensor can be considered as a very wide band radio receiver which does not measure the actual signal content (ie speech), but the signal level, called Field strength. In this way you can take relative and comparative measurements from different pieces of everyday equipment and investigate how their strength is affected by distance and obstructions.

The sensor has a built in dipole aerial which is made of two very thin copper strips located at the rear (long edge) of the Arrowhead. When fitted in most LogIT dataloggers the arrow, and so the antenna, will naturally be vertical (technically called vertically polarised) which will suit the majority of products being measured as most of these have vertical antenna, but you can experiment by rotating its orientation to detect different signals.

Ideas for the Lab...
Plug the Electrosmog sensor into a LogIT datalogger (ideally a remote LogIT with display such as DataVision or Voyager) and move around the room.
• Without switching specific wireless devices on, investigate the radio waves around the lab coming from different areas in the lab, room, building or outside. Are you surprised by the amount of radio frequency activity?

• Are there any particularly strong areas of signal - can you locate the source using the signal strength levels?

• Is the signal continuous or intermittent?
i Some mobile devices do not transmit a signal all of the time. For example mobile phones transmit in bursts, either when they are on standby to tell the cell station they are available or when they are transmitting actual speech where this is digitally compressed into small 'packets'. This is so that one mobile phone does not use its frequency on the radio spectrum all of the time, allowing several mobile phones to use the same frequency but at different slices in time. In practice this all happens extremely quickly many times a second and is not heard by the callers as the packets are decompressed and 'stretched' out in the other phone.

• Compare signal field strengths from different mobile phones on different mobile phone networks by switching on one phone at a time and making a brief call, recording 10 seconds or so of signal strength from each one taking care to always measure the same distance from each phone, because field strength reduces with distance. Do all phones transmit similar power?

i A mobile phone's transmitted power level is dynamic and they only transmit sufficient power to communicate with the nearest 'cell' base station for their network - this reduces inteference to other cells and improves battery life. But it means that telephones on different networks need to transmit at different powers depending on how far away they are from their nearest Cell base station mast.

• Try the same experiment with a Cordless DECT telephone (ie a standard home digital cordless phone) if available and compare results - you may be surprised! We found that most DECT cordless phones we tried transmitted with much more power than the mobile phones we tested!

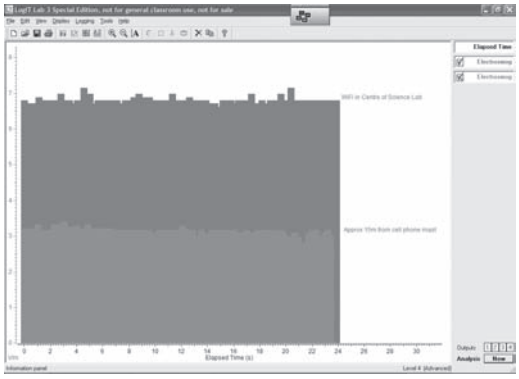
Ideas for outside....

Electrosmog is all around us now in most countries in the Western world.

• You can take a LogIT and Electrosmog sensor out when you go on school / college trips. Does the amount of Electrosmog vary greatly between City, Rural and very remote places like hills and mountains?

• Is there a mobile phone cell mast near you? Does the signal strength change a lot as you get nearer?

• Record a signal a usual distance from a mobile phone mast (ie a nearby path) and another a usual distance from near a WiFi station at school or home. How do the signal strengths compare?



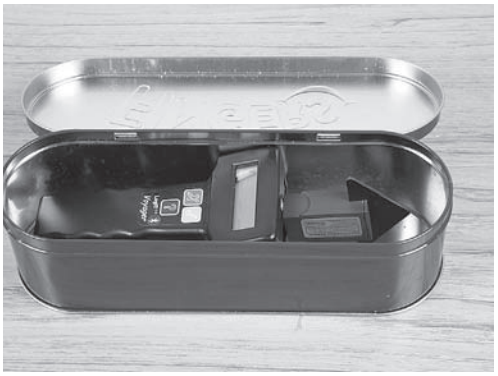
NEVER GO CLOSER TO ANY MAST OR WIFI ANTENNA THAN IS SAFE TO DO SO - FOLLOW YOUR LOCAL RISK ASSESSMENT GUIDANCE WITH ANY EXPERIMENTATION INSIDE OR OUTSIDE THE SCHOOL OR COLLEGE.

• If you have more than one Electrosmog sensor and LogIT, try logging several simultaneously in different places over the same period. Does the signal strength vary a lot in a similar area?

Screening and Reflecting Radio frequency waves

Radio Waves can be reduced or blocked. Metal is often used to 'screen' or shield radio waves but other solid objects like walls also restrict and reflect signals.

• Experiment with different types of material to cut down radio signals such as aluminium foil, glass, plastic, wood, hands, sweet tins etc - it is usually better practice to screen the receiver (in this case the Electrosmog sensor). Does the thickness of the material or whether it is completely sealed make any difference?



• Radio waves can be reflected in a similar way to light - that is why there is a curved disc behind a satellite dish to reflect and focus the waves onto the antenna.
See if you can reflect radio waves onto or away from the Electrosmog sensor.
What does this tell you about Radio waves?

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Please recycle where facilities exist.
Check with your Local Authority or Retailer for recycling advice.

Product ref: D200170 ; Document ref: D773170/1