

RF EMF Strength Meter



High Frequency measurement for EMF

Monitor high frequency radiation in the 50MHz to 3.5GHz frequency range

Features:

- For electromagnetic field strength measurement including mobile phones, cell phones, base stations, and microwave leakage
- Measurement optimized for 900MHz, 1800MHz and 2.7GHz
- Non-directional (isotropic) measurement with three-channel (triaxial) measurement probe
- Max Hold and Average functions
- Manual store/recall up to 99 sets
- Level exceed audible alarm with user selectable threshold
- Complete with 9V battery and carrying case



Applications

- RF electromagnetic wave field strength measurements
- Mobil phone base station antenna radiation power density measurement
- Radiation safety level tests
- Locating RF "Hot Spots" in the workplace or at home
- Microwave oven leakage tests
- RF "Electrosmog" detection
- Wireless network (Wi-Fi) RF detection

Specifications	
Sensor Type	Electric Field
Frequency Range	50MHz to 3.5GHz (Measurement optimized for 900MHz, 1800MHz and 2.7GHz)
Units of Measure	mV/m, V/m, μ A/m, mA/m, μ W/m ² , mW/m ² , W/m ² , μ W/cm ² , mW/cm ²
Measuring Ranges	20mV/m to 108.0V/m 53 μ A/m to 286.4mA/m 1 μ W/m ² to 30.93mW/m ² 0 μ W/cm ² to 3.093mW/cm ²
Resolution	0.1mV/m, 0.1mA/m, 0.1mW/m ² , 0.001mW/cm ²
Audible Alarm	Adjustable threshold with On/Off
Memory	Manual store/recall of 99 sets
Dimensions	9.3 x 2.4 x 2.4" (237 x 60 x 60mm)
Weight	7oz (200g)

2.0 - Introduction

2-1 Fundamentals

- **Electromagnetic Radiation**
This meter is used to indicate radiated electromagnetic fields. Wherever there is a voltage or a current, electric (E) and magnetic (H) fields arise. Examples include the electromagnetic fields from radio broadcasting and TV transmitters.
- **Electric Field Strength**
This is a field vector quantity that represents the force (F) on an infinitesimal unit positive test charge (q) at a point divided by that charge. Electric field strength is expressed in units of volts per meter (V/m).
Use the units of electric field strength for measurements in the following situations:
 - In the near-field area of the source
 - Where the nature of the electromagnetic field is unknown
- **Magnetic field strength (H) :**
This is a field vector that is equal to the magnetic flux density divided by the permeability of the medium. Magnetic field strength is expressed in units of amperes per meter (A/m).
- **Power density (S) :**
Power per unit area in the direction of propagation, usually expressed in units of watts per square meter (W/m²) or, for convenience, units such as milliwatts per square centimeter (mW/cm²).
- **The characteristic of electromagnetic fields :**
Electromagnetic fields propagate as waves and travel at the speed of light (c). The wavelength is proportional to the frequency.

$$\lambda(\text{wavelength}) = \frac{c(\text{speed of light})}{f(\text{frequency})}$$

Near-field is assumed if the distance to the field source is less than three wavelengths. For far-fields, the distance is more than three wavelengths. In the near-field, the ratio of electric field strength (E) and magnetic field strength (H) is not constant, so measure each separately. In the far-field, however, it is enough to just measure one field quantity, and compute the other accordingly.

2-2 Application

- High frequency (RF) electromagnetic wave field strength measurement
- Mobile phone base station antenna radiation power density measurement
- Wireless communication applications (CW, TDMA, GSM, DECT)
- RF power measurement for transmitters
- Wireless LAN (Wi-Fi) detection, installation
- Spy camera, wireless bug finder
- Cellular/Cordless phone radiation safety level
- Microwave oven leakage detection
- Personal, environmental EMF safety

2-3 Features

This meter is a broadband device for monitoring high-frequency radiation in the specific ranges of 900MHz, 1800MHz, and 2.7GHz. Other measurements can be made, for reference purposes only, using the entire range of 50MHz to 3.5GHz. The non-directional electric field and high sensitivity also allow measurements of electric field strength in TEM cells and absorber rooms.

The unit of measurement and the measurement types are expressed in units of electrical and magnetic field strength and power density.

At high frequencies, the power density is of particular significance. It provides a measure of the power absorbed by a person exposed to the field. This power level must be kept as low as possible at high frequencies. The meter can be set to display the instantaneous value, the maximum value measured or the average value. Instantaneous and maximum value measurements are useful for orientation, e.g. when first entering an exposed area.

- Measurements in the specific frequency ranges of 900MHz, 1800MHz, and 2.7GHz
- For isotropic measurements of electromagnetic fields
- Non-directional (isotropic) measurement with three-channel measurement sensor
- High dynamic range due to three-channel digital processing
- Configurable alarm threshold and memory function

3.0 - Specifications

3-1 General Specifications

- **Measurement method:** Digital, triaxial measurement.
- **Directional characteristic:** Isotropic, triaxial.
- **Measurement ranges:** One continuous range
- **Display resolution:** 0.1mV/m, 0.1 μ A/m, 0.1 μ W/m², 0.001 μ W/cm²
- **Setting time:** Typically 1s (0 to 90% of measurement value).
- **Display refresh rate:** Typically 0.5 seconds
- **Display type:** 4-digit Liquid-crystal display (LCD)
- **Audible alarm:** Buzzer.
- **Units:** mV/m, V/m, μ A/m, mA/m, μ W/m², mW/m², W/m², μ W/cm², mW/cm²
- **Display value:** Instantaneous measured value, maximum value, or maximum average value.
- **Alarm function:** Adjustable threshold with ON/OFF.
- **Manual data memory and read storage:** 99 data sets.
- **Dry batteries:** 9V NEDA 1604/1604A
- **Battery life:** > 15 hours
- **Auto power off:** 15 minutes.
- **Operating temperature range:** 0°C to +50°C
- **Operating humidity range:** 25% to 75%RH
- **Storage temperature range:** -10°C to +60°C
- **Storage humidity range:** 0% to 80%RH
- **Dimensions:** Approx. 60(W) \times 60(T) \times 237(L)mm.
- **Weight (including battery):** Approx. 200g
- **Accessories:** Instruction manual, battery, carrying case.

3-2 Electrical Specifications

❑ **Unless otherwise stated, the following specifications hold under the following conditions:**

- The meter is located in the far-field of a source, the sensor head is pointed towards the source.
- Ambient temperature: $+23^{\circ}\text{C}\pm 3^{\circ}\text{C}$
- Relative air humidity: 25% to 75%

❑ **Sensor type:** Electrical field (E)

❑ **Frequency ranges:** 900MHz, 1800MHz, and 2.7GHz (measurements can be made, for reference purposes only, using the entire range of 50MHz to 3.5GHz)

❑ **Specified measurement range:**

- **CW signal ($f > 900\text{MHz}$):** 20mV/m to 108.0V/m ,
53 $\mu\text{A}/\text{m}$ to 286.4mA/m,
1 $\mu\text{W}/\text{m}^2$ to 30.93W/m²,
0 $\mu\text{W}/\text{cm}^2$ to 3.093mW/cm²

❑ **Dynamic range:** Typically 75dB

❑ **Absolute error at 1 V/m and 50 MHz:** $\pm 1.0\text{dB}$

❑ **Frequency response:**

- **Sensor (taking into account typical CAL factors):**
 $\pm 1.0\text{dB}$ (900MHz, 1800MHz)
 $\pm 2.4\text{dB}$ (2.7GHz)
- **Isotropy deviation:** Typically $\pm 1.0\text{dB}$ ($f > 900\text{MHz}$)
- **Overload limit:** 10.61mW/cm² (200V/m)
- **Thermal response (0 to 50°C):** $\pm 0.2\text{dB}$