Thank you!

We appreciate the confidence you have shown in purchasing this HF Analyser. It will allow a professional analysis of the exposure with high frequency (HF) radiation corresponding to the baubiology recommendations.

Further to this manual you are welcome to have a look at the training videos on our homepage (www.gigahertz-solutions.de) for an optimal use of our measurement technology.

If you should encounter any problems, please contact us immediately. We are here to help.

For your local distributor pls check: www.gigahertz-solutions.com

Contents

Functions & Controls 2
Getting Started 3
Introduction to Properties and Measurement of HF Radiation 4
Step-by-Step-Instruction to HF-Measurement 7
Limiting values, recommendations and precautions 11
Audio Frequency Analysis 12
Analysis of the modulated / pulsed signal 13
Use of Signal Outputs 13
Battery management 14
Remediation and Shielding 14
Warranty 14
Conversion tables 16

Safety Instructions:
The HF analyser should never come into contact with water or be used outdoors during rain. Clean the case only from the outside, using a slightly moist cloth. Do not use cleaners or sprays.

Due to the high sensitivity level, the electronics of the HF analyser are very sensitive to heat, impact as well as touch. Therefore do not leave the instrument in the hot sun, on a heating element or in any other damaging environment. Do not let it drop or try to manipulate its electronics inside when the case is open.
Functions and Controls

1) Volume control for the audio analysis (on/off switch).
2) Jack, 3.5 mm : AC output for the modulated part of the signal, for audio analysis via PC or headset (mono).
3) Only for HF59B: Normed AC output 1 Volt peak-peak, proportional to the field strength.
4) Jack, 12-15 Volt DC for charging the battery. AC adapter for 230 Volt/50 Hz and 60 Hz is included. For other Voltages/Frequencies please get an equivalent local AC adaptor with the output parameters 12 – 15 Volt DC / >100mA.

Caution: If an alkaline battery is used, under no circumstances should the power adapter be connected at the same time, otherwise the battery may explode.

5) Measurement ranges
   - max = 19.99 mW/m² (= 19,990 µW/m²)
   - med = 199.9 µW/m²
   - min = 19.99 µW/m²
   Scaling differs when applying an amplifier or damper!

6) Selector switch for signal evaluation.
   Standard setting: “Peak hold”. In the peak hold mode you can choose a time setting for the droop rate (Standard = “+”). The peak hold value can be manually reset by pressing (14) “clear”.

7) A little bar on the very left of the LCD indicates the unit of the numerical reading: bar on top = mW/m² (Milliwatts/m²) bar on bottom = µW/m² (Microwatts/m²)

8) DC output, allows you to connect additional instruments, e.g. data logging devices for longterm recordings. Scalable to 1 V DC full scale. (For HF59B: scalable to 2 V DC, only for the use of an external display unit).

9) Connecting socket for antenna cable. The antenna is inserted into the cross slot at the front tip of the instrument.

10) Power Level Adapter Switch for external optional amplifier or attenuator only (not part of the standard scope of supply). For regular use of the instrument the switch should be in pos. “0 dB”. (Any other position will shift the decimal point to an incorrect position).

11) ON/OFF switch. Using the top switch-position activates the audio analysis mode.

12) Load indicator

13) Signal fraction: In the “Full” mode, the total signal strength is displayed. In the “Pulse” mode, only the pulsed / amplitude modulated part of the signal is displayed.

14) Push button to reset peak hold. (Push and hold for 2 seconds or until the reading no longer drops)

15) For HF58B-r and HF59B only: Switch for choosing the Video Bandwidth. Standard setting: “VBW Standard”

Typical default settings of major functions are highlighted in the above text.
Long and short switches
Long switches: Standard functions.

Short switches: In order to avoid unintentional switching for rarely used functions, some of the switches are recessed in the casing of the instrument.

Contents of the package
Instrument
Attachable antenna incl. cable
NiMH rechargeable Batteries (inside the meter)
Mains adapter
Comprehensive instruction manual

Getting Started

Connecting the LogPer Antenna
Screw the angle connector of the antenna connection into the uppermost right socket of the HF analyser. It is sufficient to tighten the connection with your fingers. (Do not use a wrench or other tools because over tightening may damage the threads.)

This SMA connector with its gold-plated contacts is the highest quality commercial HF connector in that size.

Carefully check the tight fit of the connection at the antenna tip. This connection, at the tip of the antenna, must not be opened.

At the tip of the antenna, there are two LEDs for monitoring the proper function of all connections of the antenna and the cable during operation. The red LED checks the cable, the green one the antenna itself.

Slide the antenna into the vertical / cross shaped slot at the rounded top end of the HF analyser. Make sure the antenna cable has no tension and lies below the instrument. It may help to loosen the SMA-connector temporarily to let the cable fall into a “relaxed” position.

Do not bend, break or stretch the antenna cable!

Check the HF analyser and its antenna by following the instructions under “Getting Started.”

There are small ferrite-rolls fitted on the connectors of the antenna cable. They serve the purpose of fine-tuning. Do not remove them!

1 Should they loosen in the course of time, they can be glued with any household glue

The connection of the UBB27-antenna (optional for the HF59B, but included in the HF59B-kit) is described in its manual.

Checking Battery Status
If the “Low Batt” indicator appears in the center of the display, measurement values are no longer reliable. In this case, the battery needs to be charged.

If there is no display at all upon switching the analyser on, check the connections of the rechargeable battery. If that does not help try to insert a regular 9 Volt alkaline, (non-rechargeable) battery. If a non-rechargeable battery is used, do not connect the analyser to a charger / AC-adaptor!

Insert fully charged batteries only.

Note
Each time you make a new selection (e.g. switch to another measurement range), the display will systematically overreact for a moment and show higher values which will, however, droop down within a couple of seconds.

The instrument is now ready for use.

In the next chapter you will find the basics for true, accurate HF-measurement.
Introduction to Properties and Measurements of HF Radiation

This instruction manual focuses on those properties that are particularly relevant for measurements in residential settings.

Across the specified frequency range (and beyond), HF radiation causes the following effects in materials exposed to it:
1. Partial Permeation
2. Partial Reflection

The proportions of the various effects depend, in particular, on the exposed material, its thickness and the frequency of the HF radiation. Wood, drywall, roofs and windows, for example, are usually rather transparent spots in a house.

Minimum Distance

In order to measure the quantity of HF radiation in the common unit “power density” (W/m²), a certain distance has to be kept from the HF source. The distance depends on the frequency – the higher the frequency the lower the distance. The transition frequency between so called far field and near field conditions is not determined exactly, but here are some typical distances:
- 27 MHz from approx. 27 meters
- 270 MHz from approx. 2.7 meters
- 2700 MHz from approx. 0.27 meters

That means the distances are inversely proportional to the frequencies.

Polarization

When HF radiation is emitted, it is sent off with a “polarization”. In short, the electromagnetic waves propagate either vertically or horizontally. Cellular phone technology, which is of greatest interest to us, is usually vertically polarized. In urban areas, however, it is sometimes already so highly deflected that it runs almost horizontally or at a 45-degree angle. Due to reflection effects and the many ways in which a cellular handset can be held, we also observe other polarization patterns. Therefore, it is always strongly recommended to measure both polarization planes, which is defined by the orientation of the antenna.

Please note that the LogPer-antenna supplied with this instrument is optimized for one polarization only.

Fluctuations with Regards to Space and Time

Amplification or cancellation effects can occur in certain spots, especially within houses. This is due to reflection and is dependent on the frequencies involved. Most transmitters or cellular handsets emit different amounts of energy during a given day or over longer periods of time, because reception conditions and network usage change constantly.

All the above-mentioned factors affect the measurement technology and especially the measurement procedure. This is why in most cases several measurement sessions are necessary.

Measuring HF Radiation

When testing for HF exposure levels in an apartment, home or property, it is always recommended to record individual measurements on a data sheet. Later this will allow you to get a better idea of the complete situation.

It is important to repeat measurements several times: First, choose different daytimes and weekdays in order not to miss any of the fluctuations, which sometimes can be quite substantial. Second, once in a while, measurements should also be repeated over longer periods of time, since a situation can literally change “overnight”. A transponder only needs to be tilted down by a few degrees in order to cause major changes in exposure levels (e.g. during installation or repair of cellular phone transmitters). Most of all it is the enormous speed with which the cellular phone network expands every day that causes changes in exposure levels. In the future we will also have to deal with third generation networks (e.g. UMTS or LTE), which are expected to increase exposure levels considerably since their system design requires much more tightly woven “cells” of base stations compared to current GSM networks.

Even if you only intend to test indoors, it is recommended first to take measurements in each direction outside of the building. This will give you an initial awareness of the “HF tightness” of the building and also potential HF sources inside the building (e.g. 2.4 GHz telephones, also from neighbours).

Furthermore, you should be aware that taking measurements indoors adds another dimension of testing uncertainties to the speci-
fied accuracy of the used HF analyser due to the narrowness of indoor spaces. According to the “theory”, quantitatively accurate HF measurements are basically only reproducible under so-called “free field conditions”, yet we have to measure HF inside buildings because this is the place where we wish to know exposure levels. In order to keep system-immanent measurement uncertainties as low as possible, it is imperative to carefully follow the measurement instructions.

As mentioned earlier in the introduction, even slight changes in the positioning of the HF analyser can already lead to rather substantial fluctuations in measurement values. (This effect is even more prevalent here than in the ELF range.) It is suggested that exposure assessments are based on the maximum value within a locally defined area even though this particular value might not exactly coincide with a particular point of interest in, for example, the head area of the bed.

The above suggestion is based on the fact that slightest changes within the environment can cause rather major changes in the power density of a locally defined area. The person who performs the HF testing, for example, affects the exact point of the maximum value. It is quite possible to have two different readings within 24 hours at exactly the same spot. The maximum value across a locally defined area, however, usually only changes if the HF sources are subject to change. This is why the latter value is much more representative for the assessment of HF exposure.

The descriptions in the following mainly refer to immission measurements, i.e. to the definition of the total power flux density relevant for limit value comparisons.

In addition, this device can also be used to identify the source of radiation, and – most important – to determine appropriate shielding measures. The logper antenna which comes with the meter is predestined for this aim.

**Preliminary Notes Concerning the Antenna**

The supplied logarithmic-periodic antenna (or aerial), has **exceptional directionality**. Thus it becomes possible to reliably locate or “target” specific emission sources in order to determine their contribution to the total HF radiation level. To know exactly the direction from where a given HF radiation source originates is a fundamental prerequisite for effective shielding. Our logarithmic periodic antenna, the “LogPer antenna”, provides a distinct division of the horizontal and vertical polarization plane. Also the frequency response is exceptional. There is a patent pending for its design.

The missing directionality of standard telescope antennae is one of the reasons why they are not suited for reliable HF measurements in building biology EMR.

**Important:**

As the LogPer Antenna provided with this instrument is shielded against ground influences one should “aim” about 10 degrees below the emitting source one wants to measure. This is to avoid distortions of the reading.

The upper edge of the foremost resonator is a good “aiming aid” for the required angle. It does not matter if the angle gets a little too wide.

The readings from the instrument’s display always reflect the integral power density at the measurement location coming from the direction the antenna is pointing at (i.e. based on the spatial integral of the “antenna lobe”).

The LogPer aerial supplied with the meter covers a frequency range of approx. 800 MHz to 2700 MHz (= 2.7 GHz), i.e. cellular phone frequencies (e.g. GSM900, GSM1800, TDMA, CDMA, AMPS, iDEN), 2.4-GHz (DECT) cordless phones, frequencies of third and fourth generation (3G/4G) technologies, such as UMTS, LTE, WLAN and Bluetooth, as well as other commercial frequency bands and microwave ovens. All the frequencies in between are also included. This is the frequency range in which you would find most of the pulse-modulated signals concerned scientists are worried about.

In order to avoid measurement values to be falsified by radiation sources from frequencies below 800 MHz when measuring with the LogPer antenna, the HF58B and the HF58B-r are equipped with an additional internal high pass filter at 800 MHz, causing these lower frequencies to be suppressed.

As the HF59B picks up frequencies below 800 MHz, it has no integrated high pass filter. However the filter is available for external connection if needed, and is to be placed between the antenna entry and the antenna cable.
In addition, the HF59B is able to capture numerous sources of radiation in the lower HF band which are not pulsed (i.e. amplitude modulated). By their nature these non-pulsed sources are not available for audio analysis. That means you can get a significant reading on the instrument without hearing any audio signal, which makes the interpretation of the readings more difficult. To avoid this source of misinterpretation the instrument marks those “inaudible” signals by a rattling tone, the loudness of which is in proportion to its share in the total signal. The frequency of this marking is very low (16 Hertz). An example of it can be found on our homepage. With the switch to the right of the display in the “Pulse” position, these sources of radiation as well as the corresponding rattling “marking” are blanked out.

For a quantitative measurement of frequencies below 800 MHz with the HF59B, Gigahertz Solutions provides the active, horizontally isotropic ultra broadband antenna UBB27_G3 responding to frequencies from 27 MHz right up to more than 3.3 GHz.

**LogPer or Isotropic Aerial?**

The selection depends on the objective of the measurements and is clear in the following cases:

- For frequencies below 800 MHz the UBB27 aerial is the only option, as for geometrical reasons the LogPer antenna only starts at 800 MHz.

- For long term data logging in most cases the isotropic observations make most sense: Again UBB27.

- For a quick survey of the total immission (that is: Total exposure to radiation) the UBB also has clear advantages.

- However, when it comes to improve a given situation by shielding measures, then the location of the emission of the radiation needs to be identified. To do that the LogPer technique is definitely superior to the isotropic measurement.

When it comes to quantifying the total emission in more detail, then one has to weigh the pros and cons of the two approaches against each other:

- Under typical measuring conditions, an isotropic measurement has a broader error band by its very nature, and the interpretation of the results is also more difficult. But the measurement is faster and more encompassing.

- On the contrary the LogPer aerial offers a higher precision and better localization for the same kind of work, and the interpretation of the results is easier. But a comprehensive measurement is more time consuming and restricted to a smaller frequency band.

Up to now no reliable and affordable isotropic aerials have been available. That is why most of the current guides to measuring techniques for biological evaluation of buildings consider LogPer aerials only. The UBB27 now offers an alternative. It remains to be seen how the community of experts will respond in the next few years.
Step-by-Step-Instruction to HF-Measurement

Measurements for a Quick Overview
This is helpful to gain insight into the overall situation. Since the actual number values are of secondary interest in this phase, it is usually best to simply follow the audio signals which are proportional to the field strength.

Procedure for the Quick Overview Measurement:
The HF analyser and antenna are to be checked following the instructions under “Getting Started.” First set the measurement range (“Range”) switch to “max”. Only if the displayed measurement values are persistently below approx. 0.10 mW/m², change to the measurement range “med” (199.9 µW/m²) or to “min” (19.99 µW/m²).

Note: When switching from “max” to “med”, the volume of the audio signals will increase considerably; Between “med” and “min”, there is no difference in loudness.

Set the “Signal” switch to “Peak”
HF radiation exposure can differ at each point and from all directions. Even though the HF field strength of a given space changes far more rapidly than in the lower frequencies, it is neither feasible nor necessary to measure all directions at any given point.

Since there is no need to look at the display during an overview measurement, you only need to listen to the audio signal. It is very easy to walk slowly through in-door or outdoor spaces in question. In doing so, constantly move the antenna or the HF analyser with attached antenna in each direction. This will provide you with a quick overview of the situation. In in-door spaces, antenna movements towards the ceiling or the floor will reveal astonishing results.

Quantitative Measurement:
Settings
Once the relevant measurement points have been identified following the instructions in the previous section, the quantitative and precise measurements can be started.

Setting: “Range”
Select the appropriate switch settings as described under “Quick Overview Measurements”. Start with the switch set to “max”, and only switch to “med” or even “min” if the display constantly shows very low values. Basic rule for measurement range selection:

As coarse as necessary, as fine as possible.

Recommendations for the range “max”:
Values < 0.15 mW/m²: Switch to “med”
Values > 0.15 mW/m² up to 1.5 mW/m²:
- Ideally use HV10!
- Alternatively the larger value applies.

If you intend to do comparative measurements (such as “before vs. after”), please always measure in the same range.

Note: When switching from “min” to “med”, there will be no difference in volume.

Power densities beyond the designed range of the instrument (display shows “1” on its left side with the range set to “max”) can still be measured by inserting the attenuator DG20_G3, available as an optional accessory. By setting the “ext. adapt.” switch to 20 dB on your instrument, you will ensure a correct display of the measurement value.

Also available is a HF preamplifier for a factors 10 (HV10) as a plug-in into the antenna input socket.

A list of all possible ranges can be found at the end of this brochure.

Setting: Signal - Peak / RMS
A pulsed signal consists of sections of its time period with high output and another sections with zero output. Their maximum output is the wave peak. The following illus-

2 There is a factor of 100 between “med” and “max” thus allowing to display as large power flux densities as possible without having to apply an attenuator.

3 Please note that you will have a very high noise level when doing recordings or using peak hold in this combination.
tration shows the difference in the evaluation of a pulsed signal if displayed as an average value reading or a peak value reading ("RMS" and "Peak"):  

![Graph showing peak and average values](image)

Note: The **peak HF radiation value**, not the average value, is regarded as the measurement of critical "biological effects". The peak value is displayed in the switch setting: "Peak". The average value is displayed in the switch setting: "RMS".

An experienced measuring technician will be able to obtain additional information from the comparison of average and peak values. Basic Rule: The more the two measurement values differ from one another (in 2.4-GHz cordless phones the ratio can be as high as 1:100.), the higher is the potential of a contribution from e.g. a 2.4-GHz cordless phone or other pulsed signal source to the total maximum value.

Still today, some field meters only display average values. They are of little help when considering the potential health risks associated with pulse-modulated HF radiation since through the "averaging" of steep HF pulses, HF radiation exposure can be underestimated up to a factor of 100, such as modern cordless phones (DECT).

### Setting: Signal - Peak Hold

Many measuring technicians work with the function "Signal" "Peak hold". In "Peak hold" mode the highest value of the signal within a defined time span can be obtained /"collected".

In order to obtain accurate readings you must use the small black button on the meter face labeled "clear". Failure to clear the LCD display screen by pressing this button, for two seconds, will result in inaccurate readings. While this button is pushed and held, the readings are regular "Peak" readings. If any switch settings are changed while measuring, and also in order to start any new "Peak hold" measurement, you must always first hold this "clear" button for 2 seconds, then release it. This will ensure accurate readings.

In everyday measurement practice this function has great value. The peak value is related to the actual signal situation. This is important because the immission situation can change rapidly with time, direction of the radiation, polarization, and the points of measurements. The "Peak hold" mode guarantees that you do not miss single peaks.

The tone signal works independently of data collection in the peak hold mode. Its sound is proportional to the actual value measured. It helps to identify the location, direction, and polarization of the maximum field strength.

You can chose the (inevitable) droop rate, at which the held peak value decreases over time. Set the switch below the signal evaluation switch (recessed in the casing) to “+” or “-”. In the slow mode it takes about 20 minutes to run out of tolerance, but in order to get an accurate reading the display should be checked frequently. If very short signal peaks occur then the holding capacity of the function needs some recurrences to load fully.

### Quantitative Measurement: Determination of Total High Frequency Pollution

As described in Getting Started, attach the LogPer **antenna to the HF analyser**. Hold the HF analyser with a **slightly outstretched arm** because objects (mass) directly behind it "like yourself", have effects on the testing result. Your hand should not get too close to the antenna, but should be near the bottom end of the instrument.

In the area of a **local maximum**, the positioning of the HF analyser should be changed until the highest power density (the most important measurement value) can be located. This can be achieved as follows:

- **When scanning “all directions”** with the LogPer to locate the direction from which the major HF emission(s) originate, move your wrist right and left. For emission sources behind your back, you have to turn around and place your body behind the HF analyser. When scanning with the isotropic UBB27 aerial (HF59B), it is sufficient to move the instrument to see the field distortions effected by your body.

- Through **rotating the HF analyser**, with attached LogPer antenna, around its longitudinal axis, determine the polarization
plane of the HF radiation. When using the UBB27 (HF59B) you only need to do this in locations, where radiation from directly below or above cannot be ruled out (multistorey buildings, town houses, etc)

- **Change the measurement position** and avoid measuring exclusively in one spot, because that spot may have local or antenna-specific cancellation effects.

Some manufacturers of field meters propagate the idea that the effective power density should be obtained by taking measurements of all three axes and calculating the result. Most manufacturers of professional testing equipment, however, do not share this view.

In general, it is well accepted that exposure limit comparisons should be based on the maximum value emitted from the direction of the strongest radiation source. When using the UBB27, of course, the directional component will not apply.

But the details of the situation need to be considered! For example, if a 2.4-GHz telephone inside the house emits a similar level of microwaves as a nearby cellular phone base station outside the house, it would be helpful to first turn off the 2.4-GHz telephone in the house. Now measure the exposure level originating from the outside. After having measured the emission of the 2.4-GHz telephone on its own, the sum of both measurement values could be used for the exposure assessment. (This is necessary only when using the LogPer aerial. The isotropic UBB27 does this in a single measurement.)

There is no "official regulation" nor clearly defined testing protocol, because according to national standard's setting institutions, as described earlier, quantitatively reliable, targeted and reproducible measurements are only possible under "free field conditions" but not in indoor environments.

Cellular phone channel emissions vary with the load. The minimum HF level occurs, when only the control channel operates. It is suggested that measurements should be taken at different times during the day / week in order to find out the times of highest traffic.

**Evaluating the different radio services**

As the standard please set the instrument to "Peak hold" and "VBW standard" (default in the HF58B).

The displays of the meters of this series show the sum of the total power density within the frequency range of the most common digital radio services. This means for the often dominating sources GSM, PCT/DECT or the wireless LAN beacon signal (standby-"rattling"), as well as analogue sources: Simply take the readings and compare them to the building biology standard values!

To be able to evaluate the different radio standards, transmission and modulation patterns with one single measurement technology, compensation is required. The following approach is recommended:

**CDMA, UMTS/3G, LTE/4G, WiMAX, DVB, Wireless LAN during full data transmission:**

The modulation of these high-speed services includes high, needle-like peaks compared to the average power transmitted. Such signals are referred to as "high crest factor" signals.

Measure these signals for 1 or 2 minutes (with peak hold) by slightly panning the meter pointing to the direction of the main source. For the assessment of the peak values of such signals (including the crest factors) keep the standard setting "Peak hold" and "VBW standard" (default in the HF58B).  

For the compensation of the crest factor multiply the displayed reading by a correction factor. A flat factor of 10 offers a good approximation.

Often you will find different telecommunications services being present at the same time. With the help of the audio analysis, you will be able to estimate how much of the total value shown is caused by such high crest factor signals.

---

1. Ideally one would keep the setting "RMS", as the utilized circuitry by its nature ensures the correct display of RMS values independently of the signal’s crest factor. For practical reasons one can nonetheless use the convenient "Peak hold" setting, as with "VBW standard" the readings for RMS and Peak won’t differ significantly for the signals in question.

2. Even if the standards of these radio services in specify far higher crest factors, the industry strives for crest limitation for economic reasons, so that the resulting correction doesn’t exceed a factor of 10.
Depending on the proportion to the total signal, please apply the following “rules of thumb”:

- Slightly audible portion of “high crest factor signals”: multiply display reading by 2.
- “Fifty-fifty”-ratio: multiply display reading by 5
- Dominating “high crest factor signals”: multiply display reading by 10.

This adjusted measurement value can now be recorded or compared directly to the building biology recommendations. Taking into account the multiple external factors of measurement uncertainty, this approach is perfectly adequate for an assessment of the total pollution.

The use of a frequency filter and service specific correction factors will allow an increased accuracy.¹

Note the background noise level. In the combination of settings “VBW Maximum”, “Range: min” and “Peak hold” noise can sum up to a value of 1.00 or more on the display. In order to reach lower levels you can use the preamplifier HV10.

For obvious reasons the use of a correction factor only makes sense for readings above the noise level.

**Radar**

For air and sea navigation a radar antenna slowly rotates around its own axis, thereby emitting a tightly bundled “radar ray”. Even with sufficient signal strength, this ray can only be detected every couple of seconds, for a few milliseconds. This requires special measurement technology.

HF58B-r and HF59B: Select setting “VBW Maximum”. Set signal switch to “Peak hold” and direct the LogPer antenna towards the signal emitting source. Wait for several circles of the radar ray, move the instrument left and right in order to identify the main direction of the source and get the relevant quantitative measurement value.

If the location of the radar station is unknown it is particularly convenient to use the isotropic UBB27 antenna. However the trade-off is no information of the direction. The long delays between pulses may consume a great deal of time trying to detect signal direction with a LogPer aerial.

HF58B only: The HF58B does not have the required VBW to perform a quantitative measurement of radio signals.

However the audio analysis identifies even those radar pulses that cannot be measured quantitatively. As long as the radar pulse results in a reading above the surrounding signal level you get a rough estimation by the following procedure:

To begin with use of the “Peak” setting to identify the main direction of the source and to check if the pulses are above the surrounding signal level.

Then switch to “Peak hold”. Several circles of the radar ray should be awaited to reach a balance between drop and rise. This can take several minutes. Depending on the type and distance of the radar station, the real flux density will be at least a factor ten higher than the displayed reading.

Please note that there are radar systems that are operated at even higher frequencies than can be measured with these instruments.

**Quantitative Measurement: Smart Meters**

The frequencies / radio services implied are those of standard wireless communication standards. The challenge with measuring emissions of smart meters lies in their duty cycles. They transmit data in very short, but intensive bursts that happen only about every 1 to 10 or even more minutes, where the period between the bursts is subject to change unpredictably.

To measure these bursts use the standard setting (Peak hold/VBW standard), keep the meter in the same location and monitor it until a burst occurs.

For the HF58B it is helpful to use the “-“ ("minus") setting for Peak hold to catch the short bursts.

The HF58B-r and HF59B have a patented circuitry that allows for the exact measurement of the extra fast rise times of the bursts even in the “+“-setting for Peak hold.

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¹ For the time being with LTE a factor of 20 may still occur. For TETRA a factor of 2, for WLAN ("standby-rattling") a factor 4 is enough.
Quantitative Measurement:  
Identify where the radiation enters a structure

As a first step eliminate sources from within the same room (e.g. cordless phones, wireless routers, etc.). Once this is completed, the remaining radiation will originate from outside. For remedial shielding it is important to identify those areas of all walls (including doors, windows and window frames), ceiling and floor, which are penetrated by the radiation. To do this one should not stand in the centre of the room, measuring in all directions from there, but monitor the permeable areas with the antenna (LogPer) directed and positioned close to the wall. That is because the antenna lobe widens with increasing frequency. In addition reflections and cancellations inside rooms make it difficult and often impossible to locate the “leaks” accurately. See the illustrating sketch below!

The shielding itself should be defined and surveyed by a specialist and in any case the area covered by it should be much larger than the leak.

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Limiting values, reference values, and precautionary values

Precautionary recommendation for pulsed radiation in sleeping areas

Below 0.1 µW/m²  
(SBM 2008: “no concern”)

below 1 µW/m²  (“for indoors”)  
(Landessanitätsdirektion Salzburg, Austria)

The official regulations in many countries specify limits far beyond the recommendations of environmentally oriented doctors, “building biologists” and many scientific institutions and also those of other countries. They are vehemently criticised, but they are nonetheless “official”. The limits depend on frequencies and in the HF range of interest here they are between 4 and 10 W/m², far beyond 10 million times the recommendations (1 W/m² = 1,000,000 µW/m²). Official limits are determined by the potential heat generation in the human body and consequently measurements of averages rather than peaks. This ignores the state of environmental medicine. The “official” limits are far beyond the range of this instrument, which is optimized for accurate measurement of power densities targeted by the building biologists.

The standard SBM 2008 cited above classifies power densities of below 1 µW/m² as “no anomaly” for non pulsed radiation in sleeping areas, and for pulsed radiation one tenth of that.

Critical radio waves, such as pulsed or periodic signals (mobile phones, DECT, WLAN, digital radio, etc.) should be considered more damageable, especially when frequently measured, whereas less critical radio waves, such as unpulsed or non periodic signals (VHF, short wave, MW, LW, analogue radio, etc.) can be considered less important, especially when less frequently measured.

The "Bund fuer Umwelt und Naturschutz Deutschland e. V." (BUND) proposes 100 µW/m² outside buildings. In view of the shielding properties of normal building materials, far lower values exist inside buildings.

In February 2002 the Medical Authority of the Federal State of Salzburg, Austria, recommends to reduce its “Salzburger Precautionary Recommendation” from 1,000 µW/m² to 1 µW/m² inside buildings and 10 µW/m² outside. These limits are based on empirical evidence over the past few years.

The ECOLOG-Institute in Hanover, Germany made a recommendation only for outside areas, namely 10,000 µW/m². This is well above the recommendation by building biologists and aims at getting consent also from the industry. This would possibly enable a compromise for a more realistic limit than the government regulations cited above. The authors qualify their recommendation in:

- The limit should be applicable to the maximum possible emission of the transmitting...
stations. As the emission measured depends on the constantly varying actual load, this restricts the normal exposure much further.

- A single station should not contribute more than one third to this total.

- The extensive experience and findings of medical and building biology specialists could not be considered for the proposed limits, as their results are not sufficiently documented. The authors state, that “scientific scrutiny of their recommendations is needed urgently”.

- Not all effects on and in cells found in their research could be considered for the proposed limits, as their damaging potential could not be established with sufficient certainty.

In summary it confirms the justification of precautionary limits well below the present legal limits.

**Note for owners of cellular phones:**
Unimpaired reception of calls is possible with power densities far below even the very strict precautionary recommendation of 0.01 µW/m² for pulsed HF frequencies by the SBM.

**Audio Frequency Analysis**
Many different frequencies are being used by many different services. The audio analysis of the modulated portion of the HF signal, helps to identify the source of a given HF radiation signal.

First get the HF analyser ready for testing by following the instructions in the relevant section.

**Important:** For the audio analysis switch the small switch on the right of the display to “Pulse”. This will eliminate the content of unpulsed signals, since their acoustical marking (“rattling” with 16 Hz) will make the acoustical analysis difficult.

How to proceed:
For audio analysis, simply turn the volume knob of the speaker at the top of the case all the way to the left (“-“). If you are switching to audio analysis while high field strength levels prevail, high volumes can be generated quite suddenly. This is especially true for measurements which are to be taken without audio analysis. The knob is not fastened with glue to prevent over winding. However, if by accident you should turn the knob too far, simply turn it back again. No damage will be caused.

Sounds and signals are very difficult to describe in writing. The best way to learn the signals is to approach known HF sources very closely and listen to their specific signal patterns. Without detailed knowledge, the characteristic signal patterns of the following HF sources can be easily identified: 2.4-GHz telephones as well as cellular phones, the signal patterns of which can be divided into “a live connected phone call”, “stand-by mode” and especially the “establishing of a connection”. The typical signal patterns of a cellular phone base station can also be identified this way. For comparison reasons you are well advised to take measurements during high-traffic times, as well as some times during the night, in order to familiarize yourself with the different noises.

The volume can be controlled with the “audio” knob. Note: The power consumption of the speaker is directly proportional to the volume.

There is a selection of audio data samples on our homepage (www.gigahertz-solutions.de) – follow “Multimedia” – for you to have a listen to.

For a quantitative differentiation of the various radio services, we can offer selective frequency filters.
Analysis of the modulated / pulsed signal (Full/Pulse)

The feature to distinguish between these two types of radiation in absolute numbers has been introduced for a broad band instrument of this price range for the first time. This is a significant advantage over the commercial spectrum analysers, with which this differentiation requires extra work.

The little switch to the right of the display allows one to distinguish between the complete signal including the pulsed part and its pulsed or modulated part only. In the “Full” setting, the power densities of all signals in the frequency range of interest are displayed. In “Pulse” setting only those which are amplitude modulated are displayed. Signals like GSM (mobile phone), DECT, Radar and WLAN/Bluethooth and others can have similar intensities in either switch setting. Even within tolerance limits, they have no content of carrier frequency. Superposition and background radiation, however, will mostly lead to a moderate difference in intensity.

Marking of CW signals

Un-pulsed signals by their very nature are not audible in the audio analysis and therefore easily missed. For that reason they are marked by a uniform “rattling” tone, with its volume proportional to its contents of the total signal. This “marking” has a frequency of 16 Hz, and is also available as audio sample on our website (see Multimedia).

For HF59B: Please note: When using the UBB27, the frequency band 27 to 800 MHz, which this antenna handles additionally, contains very many unpulsed frequencies. So you are likely to often find a “rattling” marker tone ...

This marking tone will only be audible with the switch to the right of the display set to “Full”. If the switch is set to “Pulse” the circuitry to suppress the content of unpulsed signals is activated. There will be nothing to be marked.

Note concerning the switch setting “Pulse”:
Under special laboratory conditions a signal can be created, which causes an additional deviation from the actual value of up to -3 dB. Under field conditions like DECT and GSM signals only minimal deviations.

Use of Signal Outputs

AC output:
The AC output “PC/head-set”, 3.5 mm jack socket, is meant for in-depth analysis of the AM/pulsed content of the signal by headset or a corresponding PC-audiocard.
For PC sound card or headphones or PC software please ask or write us.

DC output (2.5 mm jack socket):
For a long-term recording of the display value. When “Full Scale” is displayed, it has 1 VDC output, and 2 VDC can be set for HF59B.
The auto power off function is automatically deactivated as soon as external devices are connected, but only as long as there is no threat of total discharge.

Further Analysis / Optional Accessories:

Available from Gigahertz Solutions:
- Attenuators allowing an upward extension of the measurement range for strong signal sources
- Frequency filters for a more specific differentiation of the various sources
- Meters for HF from 2.4 to 6 or 10 GHz allowing the analysis of even higher frequencies, i.e. the HFW35C (2.4 - 6 GHz) or HFW59D (2.4 - 10 GHz)

Meters for the low frequencies:
Also for this frequency range, Gigahertz Solutions offers a broad range of professional measurement technology. The new NFA series, for instance, which allows a three-dimensional measurement of alternating electrical and magnetic fields.
All NFA-meters can equally be applied as data loggers for long-term recordings with our HF analysers (only those with DC output).
Battery Management

The instrument comes with a rechargeable, high quality internal NiMH-Battery. The quality of these high-capacity NiMH batteries (far better than NiCd batteries, for instance) can be best maintained if they are almost totally discharged (i.e. used) before being fully re-charged (until the green charging LED turns off).

Changing the rechargeable Battery

The battery compartment is at the back of the analyser. To remove the lid, press on the grooved arrow and pull the cap off. Insert only rechargeable batteries. If you use regular alkaline (non – rechargeable) batteries do not use a charger or AC-adapter!

Auto-Power-Off

This function conserves energy and extends the total operating time.

1. In case you have forgotten to turn OFF the HF analyser or it has been turned ON accidentally during transport, it will shut off automatically after 40 minutes.
2. If “low batt” appears vertically between the digits in the center of the display, the HF analyser will turn OFF after 3 min in order to avoid unreliable measurements. In that case charge the rechargeable battery.

3. The built-in function, Auto-Power-Off, will automatically be de-activated by plugging in a 2.5 mm DC. The function will also automatically be re-activated to prevent a total discharge of the battery by further operation.

Mains operation

The HF analyser can also be supplied with power by using the mains adapter (for instance for long-term measurements). When doing so, please take care to turn the volume button right down to zero (“-“), otherwise you will be hearing the 50 Hertz noise of the mains voltage.

Remediation and Shielding

Please call us or send us an e-mail.

We will assist you in any shielding project you might have.

Any professionally implemented shielding solution will be of proven effect. There is a large selection of shielding possibilities, and an individually fitted solution is definitely recommendable.

The shielding effect of the various materials is normally stated in “- dB”, e.g. “- 20 dB”.

Conversion of shielding effect into reduction of power density

“-10dB” is measured value divided by 10
“-20dB” is measured value divided by 100
“-30dB” is measured value divided by 1000

Please be aware of the manufacturer’s notes about the normally achievable shielding effects, as 100% shielding is almost always impossible. Partial shielding reduces the attenuation considerably. That is why shielding of seemingly radiation tight adjacent areas is highly recommended.

Warranty

We provide a two year warranty on factory defects of the HF analyser, the antenna and accessories.
### Measurement Ranges

<table>
<thead>
<tr>
<th>Range</th>
<th>Bar on LCD</th>
<th>Instrument as delivered, i.e. without preamplifier or attenuator switch &quot;Adapter&quot;(&quot;Pegelanpassung&quot;) to &quot;0 dB&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>max</td>
<td>0.01 - 19.99 mW/m²</td>
<td></td>
</tr>
<tr>
<td>med</td>
<td>0.01 - 19.99 µW/m²</td>
<td></td>
</tr>
<tr>
<td>min</td>
<td>0.01 - 19.99 µW/m²</td>
<td></td>
</tr>
</tbody>
</table>

**Displayed value & unit**

- Simply read out, no correction factor

---

<table>
<thead>
<tr>
<th>Range</th>
<th>Bar on LCD</th>
<th>With ext. Attenuator DG20, switch &quot;Adapter&quot; to &quot;Attenuator -20 dB&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>max</td>
<td>1 - 1999 mW/m²</td>
<td></td>
</tr>
<tr>
<td>med</td>
<td>0.01 - 19.99 mW/m²</td>
<td></td>
</tr>
<tr>
<td>min</td>
<td>0.001 - 1.999 mW/m²</td>
<td></td>
</tr>
</tbody>
</table>

**Displayed value & unit**

- Simply read out, no correction factor

---

<table>
<thead>
<tr>
<th>Range</th>
<th>Bar on LCD</th>
<th>With ext. Preamplifier HV10, switch &quot;Adapter&quot; to &quot;Amplifier +10dB&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>max</td>
<td>0.01 - 19.99 µW/m²</td>
<td></td>
</tr>
<tr>
<td>med</td>
<td>0.01 - 19.99 µW/m²</td>
<td></td>
</tr>
<tr>
<td>min</td>
<td>0.001 - 1.999 µW/m²</td>
<td></td>
</tr>
</tbody>
</table>

**Displayed value & unit**

- Simply read out, no correction factor

---

### Conversion Table

#### (µW/m² to V/m)

<table>
<thead>
<tr>
<th>µW/m²</th>
<th>mV/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>1.94</td>
</tr>
<tr>
<td>0.02</td>
<td>2.75</td>
</tr>
<tr>
<td>0.03</td>
<td>3.36</td>
</tr>
<tr>
<td>0.04</td>
<td>3.88</td>
</tr>
<tr>
<td>0.05</td>
<td>4.34</td>
</tr>
<tr>
<td>0.06</td>
<td>4.76</td>
</tr>
<tr>
<td>0.07</td>
<td>5.14</td>
</tr>
<tr>
<td>0.08</td>
<td>5.49</td>
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<tr>
<td>0.09</td>
<td>5.82</td>
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<tr>
<td>0.10</td>
<td>6.14</td>
</tr>
<tr>
<td>0.12</td>
<td>6.73</td>
</tr>
<tr>
<td>0.14</td>
<td>7.26</td>
</tr>
<tr>
<td>0.16</td>
<td>7.77</td>
</tr>
<tr>
<td>0.18</td>
<td>8.24</td>
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<tr>
<td>0.20</td>
<td>8.68</td>
</tr>
<tr>
<td>0.25</td>
<td>9.71</td>
</tr>
<tr>
<td>0.30</td>
<td>10.6</td>
</tr>
<tr>
<td>0.35</td>
<td>11.5</td>
</tr>
<tr>
<td>0.40</td>
<td>12.3</td>
</tr>
<tr>
<td>0.50</td>
<td>13.7</td>
</tr>
<tr>
<td>0.60</td>
<td>15.0</td>
</tr>
<tr>
<td>0.70</td>
<td>16.2</td>
</tr>
<tr>
<td>0.80</td>
<td>17.4</td>
</tr>
<tr>
<td>0.90</td>
<td>18.4</td>
</tr>
</tbody>
</table>

**Why no column „dBm”?**

Most recommended limiting values for HF radiation are given in W/m² (sometimes also in V/m), which is why this instrument is displaying in power density, µW/m² resp. mW/m². A display in dBm as e.g. on a spectrum analyser requires transformation by a complicated formula, which depends on frequency and specifics of the antenna used. A "reconversion" therefore does not make sense.
**UBB27 Ultrabreitbandantenne**

Aktive Antenne mit quasi-isotrope Richtcharakteristik von 27 MHz bis über 3,3 GHz

---

**Professionelle Technik**

Die hervorragenden technischen Parameter der quasi-isotropen Ultrabreitbandantenne UBB27 von GIGAHERTZ SOLUTIONS® eröffnen eine Vielzahl Analysemöglichkeiten.

Sie ermöglicht - mit einem entsprechenden, fernsteuerfähigen Basisgerät zur Auswertung (z.B. HFE35C oder HF59B) - eine qualifizierte Messung hochfrequenter Strahlung von 27 MHz bis weit über 3,3 GHz. Dieser Bereich umfasst alle HF-Strahlungsquellen vom CB-Funk und anderen Amateurfunkfrequenzen über Rundfunk und Fernsehen (analog und digital), Mobilfunk (GSM, UMTS, LTE), schnurlose Telefone (CT1+, DECT), bis hin zu den Radar- und WLAN-Quellen in diesem Frequenzbereich.

Wir danken Ihnen für das Vertrauen, das Sie uns mit dem Kauf dieses Gerätes bewiesen haben und sind überzeugt, es wird Ihnen nützliche Erkenntnisse bringen.

Über diese Anleitung hinaus bieten wir zusammen mit unseren Partnerunternehmen **Anwenderseminare** zur optimalen Nutzung unserer Messtechnik sowie zu wirksamen Schutzlösungen an.

Bei Problemen bitten wir Sie, uns zu kontaktieren! Wir helfen Ihnen schnell, kompetent und unkompliziert.

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**Inhaltsverzeichnis**

- Aufbau der Antenne und Funktionselemente 2
- Montage 2
- Technische Hinweise zum Betrieb 2
- Richtcharakteristik / Empfangseigenschaften 3
- Durchführung der Messung 3
- Garantie 4
- Serviceadresse 4
- English 5
- Italiano 9
- Français 13

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**Sicherheitshinweise:**

Bitte lesen Sie diese Bedienungsanleitung unbedingt vor der ersten Inbetriebnahme aufmerksam durch. Sie gibt wichtige Hinweise für die Sicherheit, den Gebrauch und die Wartung des Gerätes.


Vor der Reinigung Antenne vom Messgerät trennen. Es befinden sich keine durch den Laien wartbaren Teile im Inneren des Gehäuses.

Die Antenne ist hitze-, stoß- und berührungsempfindlich. Deshalb nicht in der prallen Sonne oder auf der Heizung o.ä. liegen lassen, nicht fallen lassen oder öffnen.

Dieses Gerät nur für die vorgesehenen Zwecke verwenden. Nur mitgelieferte oder empfohlene Zusatzteile verwenden.

Aufbau der Antenne und Funktionselemente

1) HF-Analyser (zur Illustration, nicht enthalten).
2) Resonator („Dicker Monopol“)
3) Leuchtdioden (LEDs) zur Funktionsüberwachung:
   - rot  = Kontaktierung zum Messgerät und Stromversorgung ok
   - grün = Kontaktierung des Resonators ok
4) „Ground Plane“ zur Abschirmung verfälschender Einflüsse von unten, z.B. durch das angeschlossene Messgerät.
5) Ferritringe zur Verbesserung der elektrischen Eigenschaften, der obere Ring ist absichtlich nicht starr montiert.
6) Gehäuse für Elektronik zur Signalaufbereitung (inkl. Filter und Kompensation)
7) Mechanische Halterung zum Einstecken in die Stirnseite des HF-Analysers.
8) Antennenkabel mit weiteren Ferritringen.
9) SMA-Stecker zum Anschluss an das Messgerät mit Aufdrehhilfe (nicht abgebildet)

Montage


Der eigentliche Resonator ist aus technischen Gründen an seinem Fußpunkt so dünn wie möglich und deshalb empfindlich. Eine leichte Neigung hat allerdings nur geringen Einfluss auf das Messergebnis.

Technische Hinweise zum Betrieb der UBB27

In die „Ground Plane“ sind zwei Leuchtdioden zur Funktionsdiagnose bei eingeschaltetem Messgerät eingelassen:

Die grüne LED überprüft die interne Elektronik der Antenne und leuchtet, wenn diese ordnungsgemäß funktioniert. Zugleich ist sie eine Anzeige für die ausreichende Stromversorgung.

Die rote LED leuchtet, wenn die Antenne richtig anschlossen ist, sowie die Steckverbindungen und die Antennenleitung ordnungsgemäß kontaktiert sind.

Die Überwachungs-LEDs sind analog angesteuert, sie gehen bei knapper Stromversorgung nicht „schlagartig“ aus, sondern leuchten zunächst nur schwächer.

Die UBB27 wird durch den Antennenausgang der HF-Analyser (HFE35C, HF59B) oder Frequenzfilters (FF6E) ferngespeist, d.h. mit dem nötigen Strom für deren interne Elektronik versorgt.

Die UBB27 verbraucht schon für sich allein mehr Strom als das ganze Messgerät: Die Batterie-/Akkulaufzeit ist mit der UBB also auf weniger als die Hälfte reduziert. Für Langzeitaufzeichnungen ist das Messgerät somit nur mit einer externen Spannungsversorgung zu betreiben.

Richtcharakteristik / Empfangseigenschaften der UBB27

Das Richtdiagramm der senkrecht gehaltenen Antenne ähnelt einem liegenden Donut (natürlich ohne das Loch in der Mitte!), etwa wie in folgender Zeichnung angedeutet:

Die optimalen isotropen Empfangseigenschaften hat sie also

in der horizontalen Ebene um die Achse des Resonators

und zwar für vertikal polarisierte Sender

während die Antenne für einen Bereich in der senkrechten Achse nach oben deutlich unterempfindlicher ist und senkrecht nach unten zusätzlich durch die „Ground Plane“ abgeschirmt wird um den verfälschenden Einfluss des Gehäuses, der Verbindung zum Messgerät und des Messgeräts selbst zu minimieren. Wenn man die Antenne überkopfhoch hält, wird auch der störende Einfluss der messenden Person minimiert.

Horizontal polarisierte Sender in der horizontalen Ebene werden in dieser Position in der Größenordnung von bis zu 10 dB zu niedrig angezeigt. Wenn man nun z.B. einen horizontal polarisierten Fernsehsender „genauer“ messen möchte, so muss man die UBB27 horizontal ausrichten (so dass der „Teller“ -bildlich gesprochen - wie ein Rad auf die Feldquelle „zurollen“ könnte.)

Die Richtcharakteristik und die Empfangseigenschaften ähneln sehr den bekannten bikonischen Antennen, wobei die Position der senkrecht gehaltenen UBB der Ausrichtung einer bikonischen Antenne mit den „Käfigen“ noch oben und unten entspricht. Zusätzlich weist die UBB aber noch die Abschirmung nach unten auf, um die Messung unabhängig vom Untergrund und somit produzierbarer zu machen.

Fernfeldbedingungen beachten!

Bitte bedenken Sie, dass diese Antenne für Messungen unter Fernfeldbedingungen (ebenso wie z.B. LogPer-Antennen) gebaut ist und nur unter Fernfeldbedingungen quantitativ richtige Messwerte anzeigen kann.

Auch in der Fachliteratur findet man unterschiedliche Angaben darüber, wo die Fernfeldbedingungen beginnen, wobei die Angaben zwischen dem 1,5-fachen und dem 10-fachen der Wellenlänge liegen. Als einfach zu merkende Faustregel können Sie von folgenden Untergrenzen ausgehen: (entsprechend etwa der 2,5-fachen Wellenlänge)

- Bei 27 MHz ab ca. 27 Metern
- Bei 270 MHz ab ca. 2,7 Metern
- Bei 2700 MHz ab ca. 27 Zentimetern

Hintergrund: Im Nahfeld müssen die elektrische und magnetische Feldstärke des HF-Feldes separat ermittelt werden (d.h. sie sind nicht ineinander umrechenbar); während man diese im Fernfeld ineinander umrechnen kann und in Deutschland meist als Leistungsflussdichte in W/m² (bzw. µW/m² oder mW/m²) ausdrückt.

Durchführung der Messung mit der UBB27

Das Richtdiagramm legt für die allermeisten Fälle den Einsatz in vertikaler Ausrichtung (wie ein Fernsehturm) nahe.

Das Messgerät mit der Antenne sollte relativ hoch und am ausgestreckten Arm gehalten werden, um den Einfluss der messenden Person zu reduzieren. Wenn das Messgerät mit der Antenne direkt vor den Körper gehalten wird, schirmt die messende Person die von hinten kommende Strahlung teilweise ab.

Die Messung selbst erfolgt ähnlich wie mit einer logarithmischperiodischen Antenne, außer dass die gesonderte Messung in alle Richtungen entfällt, weil die Antenne systemimmanent in alle Richtungen misst. Zum Vorgehen im Einzelnen informieren Sie sich bitte in der Anleitung zum Messgerät.

Die UBB27 ermittelt in aller Regel höhere Anzeigewerte als LogPer-Antennen. Das hat zwei Gründe:

Die geringen Abmessungen lassen sogenannte „Hotspots“ also Punkte großer Strahlungsüberhöhungen durch Mehrfachreflexionen u.a. deutlicher zutage treten. Quellen im erweiterten Frequenzbereich unterhalb des für die LogPer-Antennen
spezifizierten Bereichs können die Gesamtbelastung zusätzlich erhöhen.

Sie ist so kalibriert, dass die angezeigten Messwerte auch dann nicht unter denen einer LogPer-Antennenmessung liegen, wenn das betrachtete Frequenzband gerade in einem Frequenzbereich liegt, wo die LogPer-Antenne eine plus-Toleranz aufweist.


„Knatterton“ zur Markierung ungepulster Sender


UBB27 ist optimal mit dem Frequenzfilter FF6E verwendbar

Sie wird über dessen Fernspeisung des Filters mit Strom versorgt. Der „Allpass“ des Filter umfasst den gesamten Frequenzbereich und hat keine Durchgangsdämpfung, während die wichtigsten Funkdienste als hochselektive Bandpassfilter genau analysierbar sind.

UBB27 ist nur bedingt mit dem HF-Verstärker HV10 und nicht mit dem HV30 verwendbar


Genauigkeit

Für sich allein betrachtet hat die UBB27 eine Genauigkeit von +/- 3dB ab ca. 85 MHz aufwärts bis 3,3 GHz. Auch über 3,3 GHz empfängt die Antenne noch, allerdings mit zunehmender Dämpfung.

Die Genauigkeit unserer HF-Analyser ist für das Gesamtsystem aus Basisgerät und Antenne angegeben und gilt für eine Freifeldmessung unter definierten Bedingungen. Für eine möglichst genaue „Alltagsmessung“ sollte das Messgerät auf einer nicht leitfähigen Unterlage abgestellt werden. Für die Genauigkeit des Gesamtsystems heißt das:

Für das HFE35C bleibt die Gesamtgenauigkeit des Systems aus Basisgerät und UBB27 gleich.

Beim HF59B erhöht sich die Toleranz des Gesamtsystems bei Verwendung der UBB27 leicht und zwar auf +/- 4,5dB

Unterhalb von ca. 85 MHz geht die Messunsicherheit der Kalibrierung stark in die Qualifikation ein so dass die Kalibrierung mit größerer Unsicherheit behaftet ist. Laut Simulation, welche im oberen Frequenzbereich eine hervorragende Überdeckung mit den real gemessenen Werten zeigte, ist allerdings bis hinab auf 27 MHz eine sehr gute Linearität zu erwarten, kann jedoch nicht mit derselben Toleranz garantiert werden. Frequenzen unterhalb von 27 MHz werden mit einem internen steilflankigen Hochpassfilter unterdrückt, um Fehlmessungen zu vermeiden.

Garantie und Serviceadresse

Auf diese Antenne gewähren wir zwei Jahre Garantie auf Funktions- und Verarbeitungsfehler bei sachgemäßem Einsatz.

Kontakt- und Serviceadresse:
Gigahertz Solutions GmbH
Am Galgenberg 12
90579 Langenzenn, Deutschland
Telefon 09101 9093-0, Fax -23
www.gigahertz-solutions.de
info@gigahertz-solutions.de
Professional Technology

The excellent technical parameters of the antenna opens a multitude of analysis to you. The antenna enables the HFE35C or the HF59B, a high quality measurement of RF radiation from 27 MHz to far beyond 3.3 GHz. This band contains all sources of radiation from CB-radio and other amateur frequencies, broadcasting, TV (analogue and digital), mobiles (GSM, 3G, 4G), cordless phones (DECT) up to radar and WLAN.

We appreciate the confidence you have shown in our product by your purchase. We are convinced that it will provide you useful information.

Should you ever encounter a problem, please contact your dealer or check for your local Gigahertz representative on

www.gigahertz-solutions.com!

We are ready to assist you quickly and efficiently.

Table of contents

Design of the antenna and its elements 6
Assembly 6
Technical instructions for operation 6
Directional pattern, reception characteristic 7
How to perform measurements 7
Warranty 8
Service contact data 8

Safety instructions

Again: Please read this manual carefully before using this instrument for the first time! It contains important information for use, safety and maintenance of the antenna.

Do not allow the antenna to contact water. Do not use it outdoors while it rains. Clean its outside only, and with a slightly moist cloth. No cleaning agent or spray!

Before cleaning remove the antenna from the instrument.

There are no user-serviceable parts inside the instrument.

The antenna is sensitive to heat, shock and touch. Do not leave it exposed to the sun or hot surfaces. Do not let it drop. Do not open it.

Use it only for purposes it has been designed for. Use it only with instruments or accessories recommended or supplied with it.

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Design of the antenna and its elements

1) HF-Analyser, for illustration, not supplied.
2) Resonator (“large monopole”)
3) Indicator lights (LED’s)
   - Red = contact to circuitry and power supply ok
   - green = contact of the resonator ok
4) Ground plane for shielding radiation from sources below, including the instrument itself.
5) Ferrites for enhancement of the electric characteristics of the antenna.
6) Casing for the circuitry (incl. Filter and compensation).
7) Mechanical holding fixture fitted for our HF-Analysers.
8) Antenna cable with further ferrites.
9) SMA connector to the instrument with easy-mount screw (not in picture).

Assembly

Insert the holding fixture into the crossed slot in the front section of the HF-Analyser. Connect the antenna cable to the antenna input of the HF-Analyser. Try not to bend the cable too sharply.

Note of caution:
For technical reasons the resonator is a very delicate part. The slim foot end should be as slim as possible from a technical point of view. Avoid touching it, even though a slight inclination does not influence to measurement significantly.

Technical instructions for the use of the UBB27

The two LED’s indicate functionality of the antenna with the instrument when the instrument is switched on:

- The green LED checks the internal circuitry of the antenna and is on only when it is ok. At the same time it indicates an adequate power supply.

- The red LED verifies the antenna is correctly connected to the instrument. The red LED turns on if the connectors and contacts are ok.

Both LED’s are part of an analogue circuit. When the power becomes “low”, they do not go off completely, instead they become dimmer.

The power for the active circuits of the UBB27 is supplied by the RF analyser (HFE35C or HF59B) or Frequency Filter (FF6E) through the antenna socket.

The power consumed by the UBB27 alone is higher than that of the instrument itself. The time one battery charge can power the instrument plus antenna therefore is reduced to less than half. For long term recordings use the external power supply.

As long as the display does not show “low batt”, the measurements are reliable, regardless of the reduced brightness of the LED’s.
Directional pattern / reception characteristic of the UBB27

The directional pattern of reception of the antenna held upright resembles a lying doughnut, like indicated in the following drawing:

Its best reception is:
Isotropic (uniform over the whole circumference) in the perpendicular plane around the resonator axis.

For vertically polarized radiation sources.
Its sensitivity decreases with an increased angle of incidence to the ground plane. The radiation from below is shielded by the ground plane. This considerably reduces the distortions of the radiation field to be measured. It also isolates the antenna from the instrument, casing, connectors and the measuring technician below the antenna.

Power densities of horizontally polarized sources in the horizontal plane will be displayed as lower values by up to ~ 10 dB. To better analyze a horizontally polarized TV transmitter, turn the UBB27 horizontally with the ground plane in the direction of the transmitter (like a wheel rolling towards the source to be measured).

Directional pattern and reception characteristics are similar to those of the so-called bi-conical antennas, with the UBB held vertically corresponding to the bi-conicals, and their “cages” upwards and downwards. An advantage of the UBB over the bi-conical antenna is the measurements are more reproducible. This is because of the downward shielding of the ground plane.

Note of caution concerning far field conditions

Please remember, that this antenna (and the LogPer as well) has been designed for far field conditions and provides reliable data only when those prevail.

Where does the far field begins? From 1.5 to 10 times the wave length. A simple rule of thumb for this complex subject. (2.5 wave lengths) gives

- 27 meters at 27 MHz
- 2.7 meters at 270 MHz
- 27 centimeters at 2.7 GHz.

Note: Inside the Near field the electrical and the magnetic field should be measured separately (one cannot calculate e.g. the magnetic field strength from the electric field strength and vice versa). Under far field conditions a single measurement gives the power density (in W/m², mW/m² or µW/m²).

How to perform measurements

Under most measuring conditions the antenna is to be held vertically.

The instrument should be held relatively high with an outstretched arm to reduce the field distortions from the measuring technicians body. If one holds it directly in front of oneself, then the body partly shields the radiation from the backside.

The measurement itself is executed the same way as with a logarithmic-periodic antenna, except that there is no need to point it in all directions, as the UBB is omni-directional in the plane perpendicular to the resonator. For further detail refer to the instruction manual for the specific instrument in use.

The UBB27 in most typically shows higher readings than a LogPer antenna, for two reasons:

With its smaller dimensions it can show so-called “hot spots”, highly localized areas of intense radiation due to multiple reflections etc, more clearly.

Sources in the expanded frequency band below that specified for the LogPer antennas may contribute to the total immission.

It is calibrated to a slightly higher average readings so that the lower edge of its specified tolerance band still never goes below the reading of a comparative measurement with a logper-antenna even in frequency bands where it is in its specified plus tolerance.

Measurements obtained with the UBB27 are as accurate as those obtained from the LogPer antenna. Please Note: The latter has a narrower tolerance band, because of a lower volatility of their frequency band curve, which on the other hand is much narrower. In addition they are much bigger and provide average power densities over a wider area. Both can be and should be used when evaluating the immersion in a given situation. It is
significant to note which technique was used for each measurement.

“Rattling tone” for marking of un-pulsed transmitters

When using the HF59B in audio analysis mode with the UBB27 attached (The switch “Signalanteil” or “Signal” set to “Voll” or “Full”), one will almost always hear a rattling tone. This is because sources of un-pulsed radiation are almost always present in the very broad frequency range of the UBB27. The loudness of it is proportionate to the percentage of un-pulsed radiation in the total signal received. The marking is done with a frequency of 16 Hz (very low). An audio sample can be down-loaded as a MP3 file from our home page.

UBB27 is a perfect match to the Frequency Filter FF6E

It is remotely power supplied by the filter through the antenna input, the antenna can be assembled to the filter at all times as in the “Allpass” setting all its frequency range is covered while switchable bandpass filters allow for an accurate assessment of the most important radio services.

Limits for using the RF amplifier HV10

Only the HF59B can supply enough Power for the UBB27 plus the HV10.

The external attenuator DG20_G3, may be used with the UBB27 plus either HFE35B or HF59B.

Accuracy

By itself, the UBB27 inaccuracy range of +/-3 dB extends from approx. 85 MHz up to 3.3 GHz. The antenna continues to work beyond that, but with increasing attenuation.

We state the total accuracy of our HF analyzers for the complete assembly of analyzer plus antenna in a far field under well defined conditions. (An “average measurement” with the complete assembly placed on a non-conductive support). The measurement inaccuracies for the complete assembly are the following:

- HFE35C plus UBB27 is the same +/- 3 dB, and
- HF59B plus UBB27 increases moderately to +/- 4.5 dB.

Below 85 MHz the tolerance level of the setup for the calibration becomes predominant and limits the accuracy achievable for the demonstration of the instrument. A simulation, which demonstrated an excellent correlation of actual measurement and simulated signals in the frequency band above the lower limit, proves a very good linearity down to 27 MHz. Without verification we cannot guarantee the accuracy. Frequencies below 27 MHz are damped out by an internal, extremely steep, high pass filter

Warranty

We provide a two-year warranty for factory defects on this antenna.

For questions and service please contact for North America:
www.slt.co

For other Countries contact your local distributor or:
Gigahertz Solutions GmbH
Am Galgenberg 12
90579 Langenzenn, Germany
Phone ++49-(0)9101 9093-0, Fax -23
www.gigahertz-solutions.com
UBB27 Antenna a banda ultralarga

Antenna attiva quasi isotropa con ottima qualità di direzionamento dai 27 MHz a oltre i 3,3 GHz

Tecnica professionale

Gli eccellenti parametri tecnici dell’antenna quasi isotropa a banda ultralarga UBB27 di GIGAHERTZ SOLUTIONS® offrono molteplici possibilità di analisi. Insieme al relativo apparecchio base di valutazione dotato di modalità di telealimentazione (per esempio: HFE35C o HF59B), essa permette di eseguire una misurazione qualificata delle radiazioni ad alte frequenze tra i 27 MHz e oltre i 3,3 GHz. In questa gamma sono comprese tutte le sorgenti di radiazioni AF dal CB ad altre frequenze di radioamatori, radio e televisione (analoga e digitale), la rete di telefonia cellulare (GSM, UMTS), i telefoni senza fili (CT1+, DECT), fino alle sorgenti radar e WLAN.

Vi ringraziamo della fiducia accordataci con l’acquisto di questo strumento e siamo convinti che esso vi fornirà dati preziosi e utili. Oltre alla presente introduzione all'uso, Vi consigliamo la visione dei videoseminari da noi offerti sul nostro sito Internet insieme ai nostri partner circa l’impiego migliore delle nostre tecniche di misurazione e l’identificazione di soluzioni efficaci per la protezione.

In caso di problemi, contattateci! Vi aiutiamo con rapidità, competenza e semplicità.

Indice

Struttura dell’antenna e elementi di funzionamento 10
Montaggio 10
Avvertenze tecniche sull’uso 10
Caratteristica di direzionamento / Qualità di ricezione 11
Misurazione 11
Garanzia 12
Servizio assistenza 12

Avvertenze di sicurezza:

Leggere attentamente le presenti istruzioni per l’uso prima della prima messa in funzione dello strumento. Esse contengono importanti avvertenze per l’uso, la sicurezza e la manutenzione dello strumento.

Non mettere l’antenna a contatto con l’acqua e non utilizzarla sotto la pioggia. Pulire lo strumento solo esternamente servendosi di un panno leggermente umido. Non usare detergenti o spray.

Prima della pulizia, scollegare l’antenna dallo strumento di misurazione. All’interno dello strumento non c’è nessun elemento che una persona non esperta possa riparare. L’antenna è sensibile al calore, agli urti e al contatto. Pertanto, non esporla a lungo a forte radiazione solare, non lasciarla sul termosifone o simili, non farla cadere e non aprirla.

Utilizzare lo strumento solo per il suo impiego previsto. Utilizzare solo parti di ricambio comprese nella fornitura o consigliate.

Struttura dell’antenna e elementi di funzionamento

1) HF-Analyser (per illustrazione).
2) Risonatore (“a monopolio grosso”)
3) LED di controllo del funzionamento:
   - rosso = contatto con lo strumento di misurazione e alimentazione di corrente ok
   - verde = contatto del risonatore ok
4) “Ground Plane” per la schermatura di influssi sfalsanti dal basso, dovuti per esempio allo strumento di misurazione collegato.
5) Anelli in ferrite per il potenziamento delle caratteristiche elettriche, è previsto che l’anello superiore non sia serrato.
6) Alloggiamento del sistema elettronico per l’elaborazione dei segnali (incluso filtro e compensatore)
7) Supporto meccanico per l’inserimento dell’antenna nel lato frontale dell’analizzatore HF.
8) Cavo antenna con altri anelli in ferrite.
9) Spina SMA per il collegamento allo strumento di misurazione con ausilio di svitamento (non illustrato nella figura)

Montaggio

Inserire il supporto nella croce del lato frontale dello strumento di misurazione come illustrato nella figura. Collegare il cavo antenna alla presa ingresso antenna dello strumento di misurazione o del filtro di frequenza, facendo attenzione che il cavo non si pieghi.

Per motivi di ordine tecnico, il risonatore alla base è molto sottile e quindi sensibile. Tuttavia, una sua lieve inclinazione ha un influsso minimo sul risultato della misurazione.

Avvertenze tecniche sull’uso del modello UBB27

Nel “Ground Plane” si trovano due LED per la diagnosi del funzionamento a strumento di misurazione acceso:

- Il LED verde verifica il sistema elettronico dell’antenna ed è acceso quando esso funziona correttamente. Esso serve anche a indicare che l’alimentazione di corrente è sufficiente.
- Il LED rosso acceso segnala che l’antenna è collegata correttamente e che i collegamenti a presa e la linea dell’antenna sono correttamente eseguiti.
- I LED sono a controllo analogico, quando la corrente è debole non si spengono di colpo, bensì iniziano a perdere di intensità.

L’antenna UBB27 viene telealimentata, vale a dire rifornita della corrente necessaria per il sistema elettronico interno, attraverso l’uscita antenna dell’analizzatore HF (HFE35C, HF59B) o del filtro di frequenza (FF6 o FF6E).

- L’antenna UBB27 di per sé consuma più corrente dell’intero strumento di misurazione: il periodo di funzionamento con batteria è quindi pari a meno della metà. Per misurazioni di lungo periodo occorre quindi sempre collegare lo strumento di misurazione alla rete elettrica.
- Il segnale di Low.-Batt. sul display dell’analizzatore HF è decisivo per il corretto uso del sistema complessivo composto da antenna e strumento di misurazione.
Caratteristica di direzionamento / Qualità di ricezione del modello UBB27

Il diagramma di direziona mento dell’antenna in posizione verticale ricorda, nella forma, una ciambella (ovviamente senza il buco al cen tro!), come si può vedere nella figura seguen te:

Essa ha quindi ideali qualità di ricezione
- sul piano orizzontale intorno all’asse del risonatore
- per stazioni emittenti polarizzate sul piano verticale

Per contro, l’antenna è molto meno sensibile nell’ambito dell’asse verticale verso il basso ed è ulteriormente schermata dal “Ground Plane” per minimizzare l’influsso sfalsante dell’alloggiamento, del collegamento con lo strumento di misurazione e dello strumento di misurazione stesso. Se si tiene l’antenna sopra la propria testa, anche l’influsso di disturbo della persona misurante viene ridotto.

In questa posizione, le stazioni emittenti polarizzate sul piano orizzontale fino a 10 dB sono rilevate in maniera troppo debole. Se per esempio si vuole misurare “in modo più preciso” una stazione televisiva polarizzata orizzontalmente, occorre puntare l’antenna UBB27 in direzione orizzontale (come se si volesse che il “piatto” – parlando per immag inì – “rotoli” come una ruota sulla sorgente del campo.

La caratteristica di direzionamento e la qualità di ricezione ricordano quelle della nota ant enna biconica; il modello UBB in posizione verticale equivale al direzionamento di un’antenna biconica con le “gabbie” verso l’alto e verso il basso. Oltre a ciò, però, il mo dello UBB ha la schermatura verso il basso che permette la misurazione indipendente dalla base, rendendola quindi riproducibile.

Attenzione alle condizioni del campo di stanza!

Si prega di osservare che questa antenna per misurazioni è stata concepita per soddisfare le condizioni del campo distante (come per esempio le antenne LogPer) e può indicare valori di misura quantitativamente corretti solo in tali condizioni.

Anche nella letteratura specifica si trovano spesso informazioni contrastanti circa l’inizio delle condizioni del campo distante, indicato con un valore che oscilla tra una volta e mezza e dieci volte la lunghezza d’onda. Ci si può comunque basare sulla seguente regola di massima per definire i limiti minimi: (equivalenti a circa 2,5 volte la lunghezza d’onda)
- a 27 MHz da ca. 27 metri
- a 270 MHz da ca. 2,7 metri
- a 2700 MHz da ca. 27 centimetri

Principio alla base: Nel campo prossimo occorre misurare separatamente l’intensità del campo elettrico da quella del quello magnetico ad alta frequenza (cioè esse non sono rispettivamente commutabili); mentre invece esse sono commutabili nel campo distante – ciò che in Germania viene prevalentemente indicato quale densità di flusso in W/m² (oppure µW/m² oppure mW/m²).

Misurazione con l’antenna UBB27

Il diagramma polare propone il direzionamento verticale (come una torre televisiva) per la stragrande maggioranza dei casi.

Tenere lo strumento di misurazione con l’antenna in posizione relativamente alta e con braccio teso, per ridurre quanto più possibile l’influsso di disturbo della persona misurante. Se si tiene lo strumento di misurazione direttamente davanti al proprio corpo, la persona misurante scherma parzialmente le radiazioni provenienti da dietro di essa.

La procedura di misurazione è analoga a quella con un’antenna logaritmico periodica, l’unica differenza è data dal fatto che non occorre fare singole misurazioni per ogni direzione, poiché quest’antenna misura già di per sé in tutte le direzioni. Per i dettagli della procedura si rimanda alle informazioni sullo strumento di misurazione rispettivamente usato.

L’antenna UBB27 rileva spesso valori più alti di quelli rilevati da un’antenna LogPer. Ciò accade per due motivi:
- Le sue dimensioni più ridotte permettono la comparsa più incisiva di cosiddetti “hotspots”, vale a dire punti di maggiore aumento delle radiazioni a causa di riflessioni multiple
- Le sorgenti nella gamma di frequenza ampliata sotto al campo specificato per le
L'antenna è calibrata in modo tale che i valori di misura visualizzati non siano inferiori a quelli di una misurazione con antenna LogPer neanche se la gamma di frequenza osservata si trovi in un ambito dove l'antenna LogPer ha una tolleranza positiva.

Ovviamente, i risultati registrati dall'antenna UBB27 sono valori di misura reali come quelli rilevati con le antenne LogPer. Queste hanno tolleranze lievemente più basse (dovute alla minore ondulazione della curva dell'antenna), ma comprendono una gamma di frequenza inferiore e a causa della loro forma geometrica rilevano valori di misura in uno spazio leggermente più esteso. Entrambi i risultati possono fungere da base per la valutazione dell'esposizione alle radiazioni. Nella stesura di perizie si consiglia di specificare la tecnica di misurazione adottata.

Il “crepitio” della marcatura di stazioni emittenti non pulsate

Quando il modello UBB27 ha l’interruttore della quota di segnale in posizione “pieno” si sente quasi sempre il crepitio che marca le stazioni emittenti non pulsate, dato che nella banda di frequenza estremamente larga di quest’antenna tali stazioni sono quasi ovunque. Il volume del crepitio è proporzionale alla quota sul segnale totale. La “marcatura” ha una frequenza di 16 Hz (quindi molto bassa) e può essere scaricata sottoforma di file MP3 dal nostro sito internet.

Il modello UBB27 è ideale per l’impiego con il filtro di frequenza FF6E

La telealimentazione di corrente avviene mediante il filtro. Il filtro passa-tutto comprende l’intera gamma di frequenza e non ha nessuna attenuazione di passaggio, mentre i principali servizi radio sono perfettamente analizzabili quali filtri passa-banda altamente selettivi.

L’uso del modello UBB27 è limitatamente possibile con l’amplificatore HF HV10 e impossibile con l’amplificatore HV30

Solo il modello HF59B può telealimentare il modello UBB27 e anche il modello HV10. L’attenuatore DG20_G3 può essere illimitatamente usato con l’antenna UBB27.

Precisione

Di per sé, l’antenna UBB27 offre una precisione di +/- 3dB a partire da ca. 85 MHz a salire fino ai 3,3 GHz. Anche oltre i 3,3 GHz l’antenna riceve segnali, ma essi sono sempre più attenuati.

La precisione del nostro analizzatore HF è indicata in riferimento al sistema completo composto da strumento base e antena e vale per misurazioni in campo aperto a precise condizioni. Per una misurazione quanto più precisa possibile “in condizioni quotidiane” si consiglia di mettere lo strumento di misurazione su una base non conduttrice. In termini di precisione del sistema completo ciò significa:

Con il modello HFE35C la precisione complessiva è la stessa per strumento di base e antenna UBB27.

Con il modello HF59B la tolleranza del sistema completo nell’uso dell’antenna UBB27 aumenta leggermente a +/- 4,5dB

Al di sotto di ca. 85 MHz l’imprecisione di misurazione del dispositivo di calibrazione aumenta nettamente, per cui la calibrazione è gravata da un’imprecisione maggiore. In base alle simulazioni eseguite, che nella gamma di frequenza più alta hanno dimostrato un’eccellente concordanza con i valori realmente misurati, ci si può comunque attendere una linearità molto buona fino a 27 MHz, che però non può essere garantita con la stessa tolleranza. Le frequenze al di sotto dei 27 MHz sono soppresse dal filtro passa-alto con taglio alle basse frequenze onde evitare misurazioni errate.

Garanzia e servizio assistenza

L’antenna è coperta da una garanzia di due anni per difetti di funzionamento e di lavorazione a condizione di un suo uso conforme.

Contatto e servizio assistenza:
Gigahertz Solutions GmbH
Am Galgenberg 12
90579 Langenzenn, Germania
Telefono 09101 9093-0, Fax -23
www.gigahertz-solutions.de
info@gigahertz-solutions.de
UBB27
Antenne d'ultra large bande de fréquence
Antenne active avec une directionnalité quasi isotropique de 27 MHz à 3,3 GHZ.

Mode d’emploi
Ce mode d’emploi sera continuellement mis à jour, augmenté et actualisé. Vous trouverez la dernière version auprès de votre distributeur local.

S’il vous plaît, veuillez lire le mode d’emploi avant de commencer à utiliser l’antenne. Il contient d’importants conseils d’utilisation, de sécurité et de maintenance. En plus, il donne les informations essentielles nécessaires pour réaliser de bonnes mesures.

Technologie professionnelle
Les excellents paramètres techniques de l’antenne à ultra large bande de fréquence ouvrent une multitude d’analyses pour le prix demandé.

L’antenne permet aux instruments HFE35C ou HF59B, d’obtenir une très bonne qualité de mesure des rayonnements de 27 MHz à 3,3GHz. Cette bande de fréquence contient toutes les sources de rayonnements des radio-CB et radio-amateurs, stations TV (analogiques et digitales), la téléphonie mobile (GSM, DCS et UMTS), les téléphones sans fils (CT1+ et DECT), les radars et le WLAN (Wi-Fi).

Au-delà de ces fréquences, il est conseillé d’utiliser l’instrument HFW35C qui mesure la bande de 2.4 GHz à 6 GHz.

Nous apprécions la confiance dont vous nous témoignez en utilisant cette antenne. Nous pensons que votre confiance sera honorée et vous permettra de réussir vos analyses avec beaucoup de succès.

Si vous rencontrez le moindre problème, s’il vous plaît, contactez nous immédiatement, nous pourrons vous aider.

Sommaire
Fonctions & Contrôles 2
Démarrer les mesures 3
Description de l’antenne et des éléments 2
Instructions techniques pour mesurer 2
Directionnalité et caractéristiques de réception 3
Comment réaliser les mesures ? 3
Garantie 4
Service-contact 4

Instructions de sécurité:
Il est impératif d’étudier attentivement le mode d’emploi avant d’utiliser l’antenne.
L’antenne ne doit jamais être en contact avec de l’eau ou être utilisé à l’extérieur lorsqu’il y a de la pluie. Pour le nettoyer, utilisez uniquement un tissu sec ou légèrement humide. Ne pas utiliser de nettoyant en spray !
Avant de nettoyer l’antenne, veuillez la déconnecter de l’instrument.
Etant donné sa sensibilité élevée, les composants électroniques sont très sensibles à la chaleur, conclusion, ne l’exposez pas au soleil ou à proximité d’un endroit très chaud.

Ne le laissez jamais l’antenne brutalement sur le sol ou essayer de la démonter.

Cette antenne ne doit être utilisé que dans le cadre de son usage habituel et avec les instruments recommandés.

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Descriptif de l’antenne et des éléments

1) Résonateur (« large monopole »)

2) indicateur lumineux (LEDs)
  rouge = en contact avec le circuit et alimentation OK
  vert = contact avec le résonateur OK

3) Grande plaque de blindage contre les rayonnements des différentes bandes de fréquences, incluant l'instrument lui-même

4° Boîtier du circuit (incluant le filtre et la compensation)

5) connecteur SMA de l’antenne à l’instrument.

Assemblage

Vissez le connecteur SMA de l’antenne à la douille d’entrée SMA de l’instrument comme indiqué sur la figure de gauche. L’antenne doit être en position verticale lorsque l’on mesure les signaux de radiofréquences RF de polarisation verticale dans le plan horizontal ! Ajustez le montage afin de bien lire votre écran.

Accrochez la rotule sur la douille afin de visser le connecteur aussi loin que possible. Toutes les petites rotules fabriquées par Gigahertz-Solutions sont aussi précises que possible afin de ne pas tomber hors du connecteur une fois placé.

Les deux anneaux de ferrites améliorent considérablement les caractéristiques de l’antenne. Mais le poids important de l’antenne demande une certaine délicatesse lorsque l’on assemble celle-ci à l’instrument.

Note : le résonateur est la partie délicate de l’antenne. Evitez de le toucher !

Instructions techniques d'utilisation de l'antenne UBB27

Les deux LED’s indiquent le bon fonctionnement de l’antenne et de l’instrument. Elles sont allumées lorsque :
- La LED verte s’allume lorsque le circuit interne de l’antenne est bon. En même temps, cela indique une bonne alimentation.
- La LED rouge témoigne que l’antenne est bien connectée à l’instrument.
- Les deux LED font partie d’un circuit analogique. Lorsque l’énergie devient faible, elles ne s’éteindront pas complètement, elles clignotent légèrement.

La puissance active pour alimenter les circuits (HFE35C et HFE59B) passe par la douille de raccordement de l’antenne UBB27.
- L’énergie consommée par l’antenne UBB27 plus importante que cette utilisée par l’instrument lui-même.
Le temps d’utilisation de l’instrument avec cette antenne est diminué de moitié par rapport à l’usage habituel. Pour des enregistrements sur de longues périodes, utilisez l’alimentation externe.
- Aussi longtemps que l’écran n’indique pas "low batt", les diodes LED resteront allumées.
Directionnalité, réception et caractéristiques de l’antenne UBB27.

Le modèle directionnel de réception de l’antenne ressemble à un mini « donut ». (avec bien entendu un trou au milieu du centre)
Sa meilleure réception est isotropique (uniforme tout autour de l’ensemble de la circonférence).
- Dans la plaque autour de l’axe du résonateur,
- Pour des sources de polarisation verticales 

Sa sensibilité décroit avec un angle d’incidence plus grand sur la « grande plaque ». Le rayonnement situé en dessous est blindé par la grande plaque. Ceci concentre considérablement le champ de rayonnement qui doit être mesuré.

Cela isole également l’antenne de l’instrument, le boîtier, les connecteurs et le technicien situés derrière l’antenne.

Les densités de puissance des sources polarisées horizontalement seront affichées en tant que valeurs plus basses jusqu’à -10 dB.

Pour mieux analyser les émetteurs TV polarisés horizontalement, tournez l’antenne UBB27 horizontalement avec la grande plaque orientée dans la direction de l’émetteur (comme une roue dirigée vers la source à mesurer).

Les caractéristiques de réception et de directionnalité sont similaires à celles des antennes de forme “biconiques” lorsque l’antenne UBB27 est tenu verticalement, ainsi que leur forme de “cage” conique orientée vers le haut et vers le bas.

Un avantage de l’UBB27 comme l’antenne biconique est la reproductibilité plus importante des mesures. Ceci parce que y a un blindage créé par la grande plaque circulaire.

Note concernant les conditions de champs lointains.

S’il vous plaît, souvenez-vous, que cette antenne (comme l’antenne Log périodique) a été fabriquée pour mesurer en champs lointains et produit des données utilisables uniquement dans ce cas.

Même où commencent les champs lointains ? Entre 1,5 et 10 fois la longueur d’onde de l’onde électromagnétique que vous mesurez.

Voici un règle simple pour ce sujet complexe : (2,5 fois la longueur d’onde) :
- 27 mètres à 27 MHz
- 2,7 mètres à 270 MHz
- 27 centimètres à 2,7 GHz.

Note: A l’intérieur de la zone de champ proche, le champ électrique et magnétique doivent être mesurés séparément (on ne sait pas calculer l’intensité du champ électrique à partir de l’intensité du champ magnétique et inversement). Dans les conditions de champ lointain, une simple mesure de l’intensité du champ électrique ou magnétique donne la densité de puissance (en W/m², mW/m² ou µW/m²).

Comment réaliser les mesures ?

Dans la plupart des cas, l’antenne de l’instrument est positionnée verticalement. Cette position est très pratique car elle permet de lire les mesures facilement à l’écran.

L’instrument devrait être tenu à bout de bras afin d’éviter une distorsion des valeurs mesurées par le corps du technicien.

Si l’instrument est tenu trop proche du corps, il blinde en quelque sorte et fait écran vis à vis des rayonnements qui se situent dans son dos

La mesure se déroule de la même manière qu’avec une antenne Log périodique excepté qu’il n’est pas nécessaire de pointer dans toutes les directions puisque l’antenne UBB27 est omnidirectionnelle lorsque plaque est perpendiculaire au résonateur.

Pour plus de détails référez vous au manuel sur l’utilisation de l’instrument.

S’il vous plaît, notez:

L’antenne UBB27 offre des mesures plus élevées généralement que l’antenne log périodique et ce ci pour deux raisons :

À Avec ses dimensions plus petites, elle peut capter plus facilement ce que l’on appelle en anglais les “hot spots” c’est à dire les zones de point plus intense dans une pièce et qui se produisent avec les réflexions multiples des matériaux.

Les sources de rayonnements sont mesurées dans une bande de fréquences élargie de manière à déterminer l’ensemble de
l'immission (champ total) comparativement à un champ spécifique mesuré avec l'antenne.

Les mesures obtenues avec une antenne UBB27 sont équivalentes à celles obtenues une antenne Log périodique.

Notez que : cette antenne Log périodique possède une tolérance plus ciblée dans une bande de fréquence précise parce qu'elle est moins volatile compte tenu de sa courbe de bande de fréquence.

En plus, elle est plus grande et permet de mesurer des densités de puissance moyennées sur une plus grande surface. Donc les deux antennes devraient être utilisées pour évaluer l'immission totale d'une situation donnée.

C'est à vous à déterminer qu'elle technique vous voulez utiliser en fonction des différentes mesures.

Usage du “son par à-coups” pour indiquer les champs non pulsés produits par les émetteurs.

Lorsque vous utilisez un instrument HF59B connecté à l'antenne UBB27 en mode d'analyse (l'interrupteur de droite correspondant au signal de l'antenne doit être réglé uniquement sur “Full” (angl.), des signaux vous entendrez presque toujours des sons par à-coups « tac tac »...Ceci est produit par les sources de toutes nature qui sont captées par l'antenne d'ultra large bande de fréquence UBB27.

Le son est proportionnel au pourcentage de rayonnements non pulsés dans la bande totale de signaux reçus par l'antenne. Le son est facilement audible grâce à un choix d’une fréquence sonore de 16 Hz (très bas).

Limites d'utilisation des filtres de fréquence variable VF2 et VF4;

Lorsque vous êtes réglé sur la position « bypass » du filtre de fréquence variable VF2 ou VF4, l'intensité correspondant à la courbe de fréquence mesurée s'atténuent progressivement autour de quelques centaines de Mégahertz. L'analyse de la bande de 27 MHz à quelques centaines de Mégahertz ne peut se faire avec les filtres VF2 et VF4.

Limites d'utilisation des amplificateurs HV10 ou HV30

L'alimentation passe par la douille « sma » de connexion de l'antenne UBB27 au modèle instrument HFE35C. Elle est suffisante pour supporter l'antenne UBB27, mais trop faible pour recevoir en plus un amplificateur intermédiaire.

- L'instrument HF59B peut alimenter à la fois l'antenne UBB27 et un amplificateur HV10.
- L'amplificateur HV30 ne peut être utilisé. Cependant, l'amplificateur HV30 peut être utilisé avec le HF59B lorsqu'il est connecté à l'antenne Log périodique.
- L'atténuateur externe (passif) DG20 peut être utilisé avec l'antenne UBB27 et les instruments HFE35B ou HF59B.

Précision

L'antenne UBB27 possède un facteur d'inexactitude (comme toutes les antennes) qui se situe autour de +/- 3 dB entre approximativement 85 MHz et 3.3 GHz. L'antenne continue à fonctionner en dessous de cette bande de fréquence mais avec une diminution importante de sensibilité. Nous conseillons de mesurer toujours dans le champ loin- tain afin d'obtenir un résultat fiable (Vous pouvez aussi lors des mesures moyennes, placer l'ensemble du matériel sur un support isolant). L'inexactitude résultant de l'assemblage instrument et antenne UBB27 est le suivant :
- HFE35C plus UBB27: identique +/- 3 dB, et
- HF59B plus UBB27 augmente modérément jusqu’à maximum +/- 4.5 dB.

En dessous de 85 MHz, le niveau de tolérance en fonction de l'étalonnage devient limite. Lors d’une simulation, nous avons analysé l’excellente corrélation entre la mesure faite avec l’instrument et les signaux réels dans la bande de fréquence située en dessous de la limite la plus basse. Nous avons obtenus une très bonne linéarité jusqu’à 27 MHz. Sans cette vérification, nous n’aurions pas pu garantir cette précision. Les fréquences situées en dessous de 27 MHz sont amorties par le filtre à bande passante élevée.

Garantie

Nous offrons une garantie de 2 ans sur les défectuosités de l’antenne UBB27.

Pour toutes questions et service en français s’il vous plaît, contacter notre importateur francophone :

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