UBB27

27 MHz - 3,3 GHz

English

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RF-Analyser

High Frequency Analyser for Frequencies from 800 MHz to 2.7 (3.3) GHz

Manual

Safety instructions

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.

English

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

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) 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, without “spatial averaging”. This often accounts a factor of 2 to 4 in interior situations.
- 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 immission 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.

Limits for using the RF amplifier HV10

- Only the HF59B can supply enough Power for the UBB27 *plus* the HV10. The battery life decreases by ~20%.
- The external attenuator DG20_G3, may be used with the UBB27 plus either HFE35C 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 stays the same, 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.

NOTE: The UBB27 causes a noise of up to 5 µW/m² in the ”Min” range. With the HF59B this can be reduced significantly by using the “Pulse” mode.

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