

Applications for Scope mode



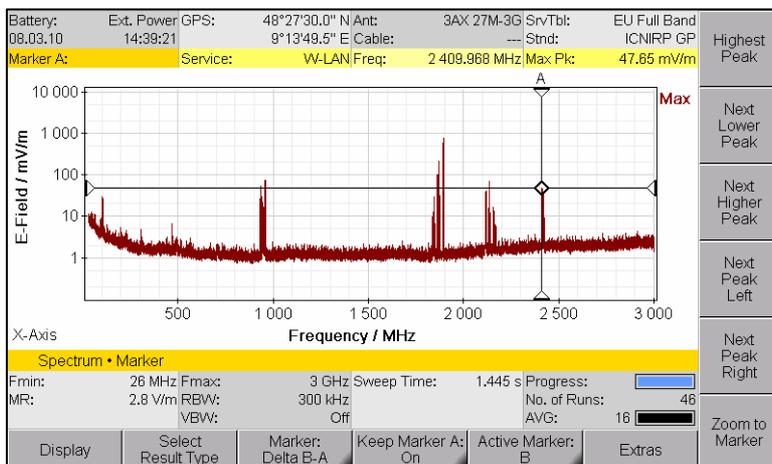
In *Scope* mode, the Selective Radiation Meter can display the time characteristic in real time of a signal captured using frequency selection. As with an oscilloscope, you can measure pulse widths and periodic times and set triggers. The settable time intervals range from 24 hours down to microseconds, with a resolution down into the nanosecond range. Thus you can make long term observations of individual radio channels over a whole day as well as capture the briefest of impulses from radar equipment, to give just two examples.

This combination of frequency-selective measurement and time-domain display opens up possibilities that are not available from either a pure spectrum analyzer or a simple measurement over time. Some examples:

The Selective Radiation Meter SRM-3006 from Narda Safety Test Solutions has been specially developed for environmental and safety measurements in electromagnetic fields. Using isotropic measuring antennas, the instrument covers the entire frequency range from 9 kHz to 6 GHz. It can therefore be used equally well to investigate safety in the near field region of long wave transmitters, make measurements on radio and TV broadcast transmitters, and determine exposure levels caused by the latest generation of mobile telecommunications services.

▲ Unknown multi-frequency environments

Specialists can determine the types of field sources by marking a frequency line in the spectrum and switching to *Scope* mode in order to view the variation with time, which shows characteristics typical of mobile telecoms services such as **WiFi, WLAN, WiMAX, ZigBee, Bluetooth** or **DECT**.



**Unique:
Time domain -
frequency-selective**

Figure 1: Spectrum Analysis provides an overview. It shows distinct frequency components for GSM-900, GSM-1800 and UMTS (2200 MHz), but what's happening at 2450 MHz?

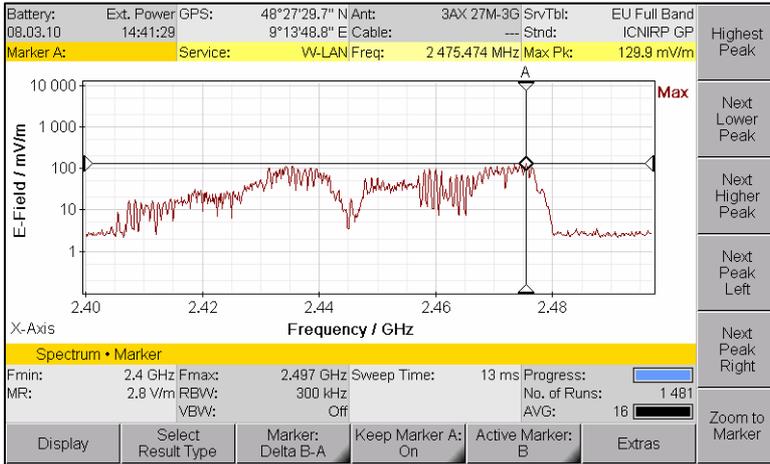
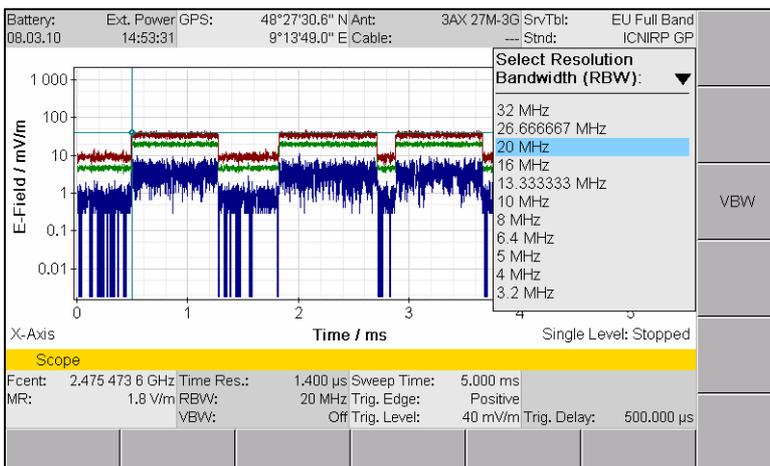


Figure 2: Frequency zoom gives the typical display for a WLAN connection with frequency hopping. The measured maximum values did not occur simultaneously, i.e. the evaluation of this result would lead to an overestimate.



**Unique:
No correction needed**

Figure 3: In Scope mode, the actual field strengths are shown versus time with their minimum, average, and maximum values. The resolution bandwidth (RBW) can be set between 40 kHz and 32 MHz, which is enough to capture the entire link. Correction calculations are therefore unnecessary!

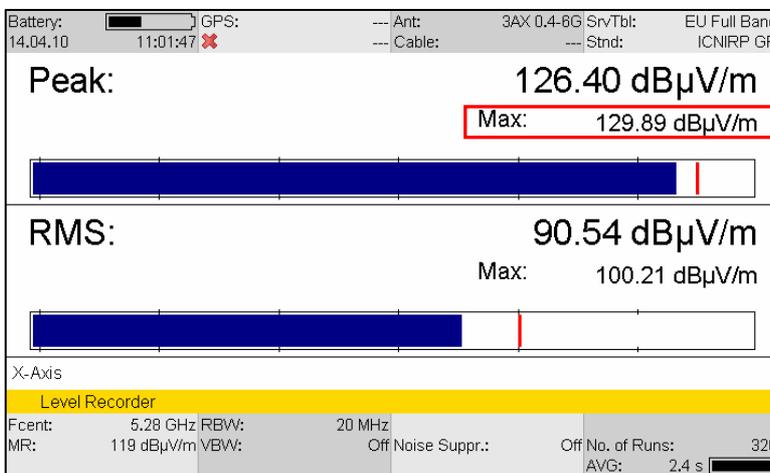


Figure 4: Level Recorder mode is an easier way to get the results if you don't need to know when the events occurred. Here, the SRM-3006 shows the peak value and RMS value for the field strength. The actual values at the time are shown as blue bars. The maximum values occurring during the measurement period are shown as red lines and are also displayed numerically. The maximum values can thus be read off easily, regardless of when they occurred.

▲ Time characteristic for known frequencies

With known signals such as those from **GSM** base stations, operators can isolate an individual traffic channel (TCH) of bandwidth 200 kHz and use *Scope* mode to determine the loading of each separate timeslot within the frequency channel.

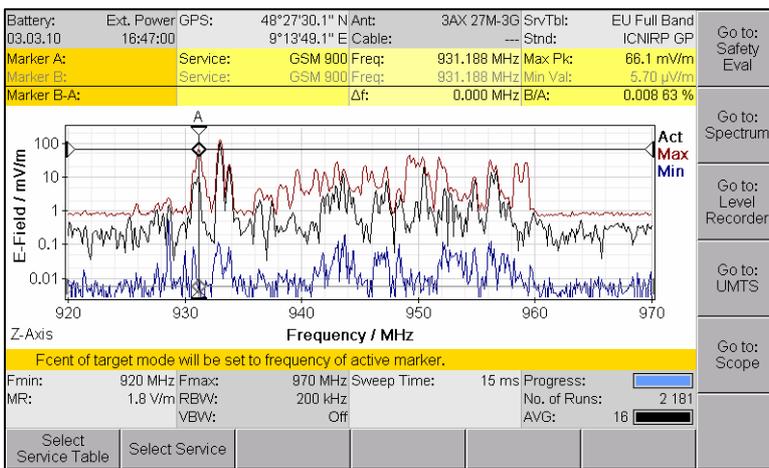
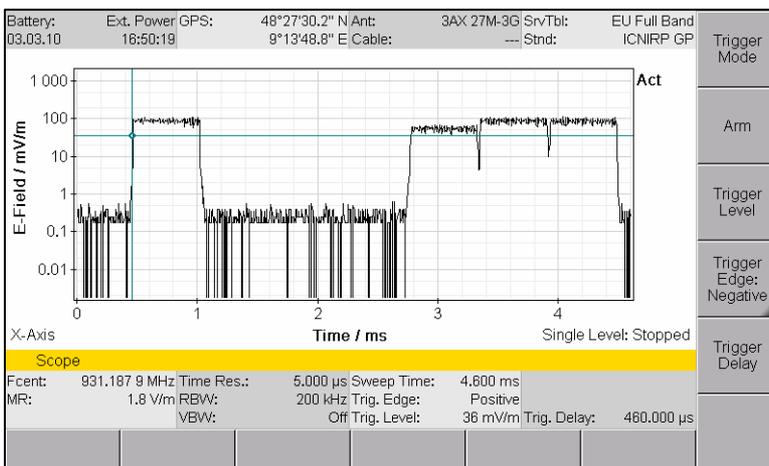


Figure 5: Selection of a GSM channel using the marker. The large difference between the maximum and minimum values shows that this is a traffic channel (TCH) rather than a control channel (BCCH).



**Unique:
Time slots can be
measured directly**

Figure 6: In Scope mode, the SRM-3006 shows the instantaneous loading of the timeslots within the TCH.

▲ Radio control signals in complex environments

In the field of industrial radio control, e.g. communications between machines or between man and machine, **ZigBee, WLAN, Bluetooth** or proprietary wireless systems are superimposed on fields that are caused by the industrial processes, particularly in the license-free ISM bands. In *Scope* mode, the SRM-3006 selectively detects the true peak values of a wireless link. The SRM-3006 excludes all other signals, thanks to its steep cutoff selection filter.

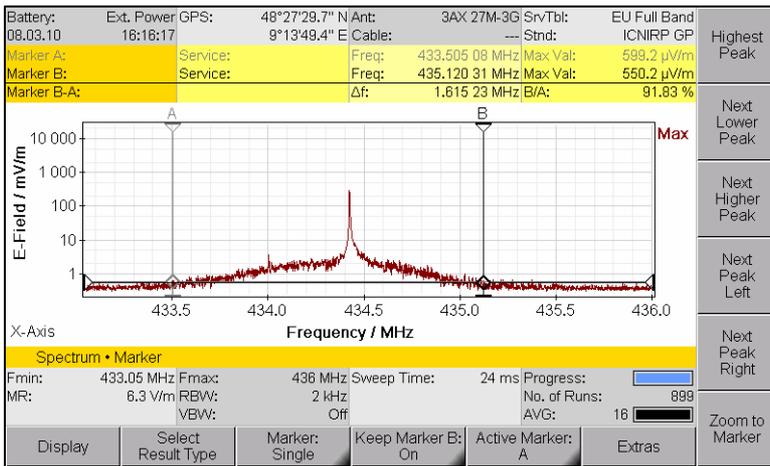


Figure 7: Measurement of a control signal in the 433 MHz ISM band (433.05 to 434.79 MHz) in Spectrum Analysis mode. The signal has a spectral width of about 1.8 MHz, as indicated by the marker difference B-A.

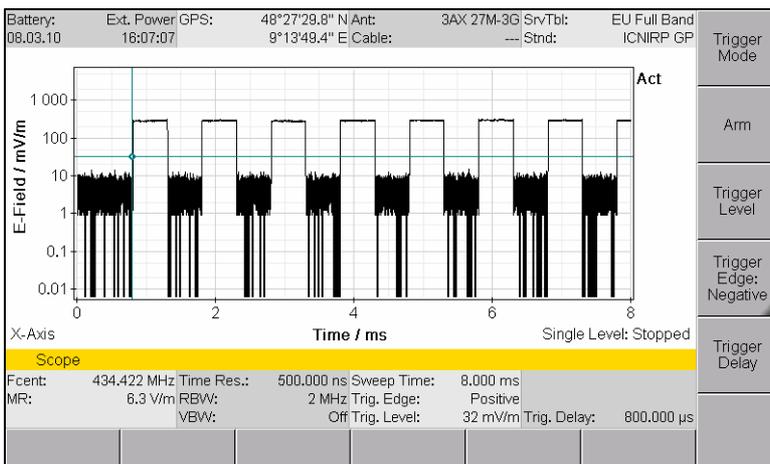


Figure 8: Measuring the field versus time in Scope mode with a resolution bandwidth of 2 MHz therefore precisely captures the control signal – and only that signal – regardless of any fields that may be present in other frequency ranges.

Electrical signals in the laboratory

The SRM-3006 is also ideal for laboratory use. The standard N connector allows you to connect antennas and RF cables from different manufacturers. Being hand-held, it is always ready for immediate use, and it doesn't take up a lot of space. Despite its small size, it has excellent signal to noise characteristics and an unusually wide selection of resolution bandwidths from 40 kHz to 32 MHz.

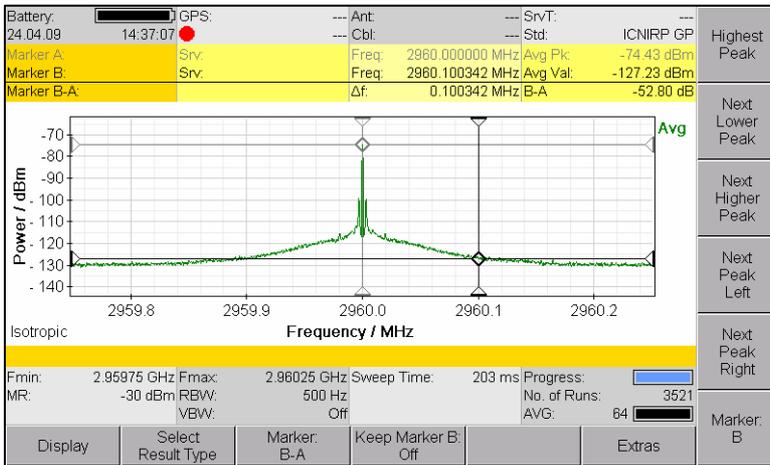


Figure 9: Measuring the spectral purity of a PLL (phase-locked loop).

Technical Notes from Narda Safety Test Solutions

These notes report, in no particular order, on the possible applications of Narda measuring equipment. Typical applications for the Selective Radiation Meter SRM-3006 are safety measurements on

- **Radio and TV transmitters (AM, FM, DAB, DVB-T)**
- **Mobile phone stations (GSM-900, GSM-1800, UMTS, CDMA, W-CDMA, LTE)**
- **Wireless communications networks (WiFi, WLAN, WiMAX, DECT, ZigBee, Bluetooth)**
- **Radio controls using ISM frequencies**

The Technical Notes are found on www.narda-sts.de under Literature ► High Frequency

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