



Photo 42 935

FIG 1  
Full functionality for mobile use: Power Reflection Meter NRT with Sensor NRT-Z44

## Power Reflection Meter NRT Fit for 3G digital mobile radio

Power Reflection Meter NRT [\*] has firmly established itself as a tool for testing digital mobile radio equipment, especially in the role of measuring the transmitted power of base stations during production, in service and for commissioning and installation. Major factors in its success are the high accuracy of Power Sensors NRT-Z43 and NRT-Z44, the simpler handling compared with a terminating power meter, plus the possibility of operating the two sensors directly from a PC or laptop. Now NRT has been upgraded to measure components of third-generation mobile radio (3G).

### The challenge of 3G

With digital mobile radio, Power Reflection Meter NRT (FIG 1) is a preferred tool for GSM applications. Of late, measurements on third-generation base stations have increasingly been in demand. Where power meters are concerned, the essential difference between the generations is that in 3G the envelope of the transmitted signal

is modulated, with peak powers of up to 13 dB above the mean. This signal characteristic not only makes measuring mean power with conventional diode detectors more difficult, it also calls for completely new functions beyond the scope of classic power measurement: peak power, crest factor (peak to mean power ratio) and CCDF (complementary cumulative distribution function).

NRT was able to handle these tasks in the past, but only at chip rates of 1.23 Mc/s for IS-95CDMA. 3.84 Mc/s and 4.1 Mc/s are presently required for W-CDMA, meaning a totally different hardware concept for power measurements. But Rohde & Schwarz chose a different approach to maintain the attractive price/performance ratio of its sensors. The microprocessor in the NRT sensor uses mathematical models

of the whole signal path to calculate the deviation to be expected for the particular waveform and corrects the result accordingly. In addition to improved calibration of the sensor by means of even more accurate equipment, these corrections lead to an uncertainty for the measurement of mean power that is hardly above that of an unmodulated sinusoidal signal. The deviation for the crest factor is below 1 dB.

So what must the user do to enjoy the benefits of higher measurement accuracy? Simply enter the signal type – eg W-CDMA – and the chip rate. The sensor takes care of the rest.

### Not forgetting cable loss

Another NRT innovation that makes working with it easier is that cable losses between sensor and source or sensor and load are fully taken into account. This new correction function allows virtual shifting of the measurement plane along the connecting cables, as if the sensor were directly at the source or the load. This enables not only correction of the power value but also a VSWR indication exactly at each measurement point.

Example: given cable loss of 1.5 dB between sensor and antenna, a directional power meter indicates return loss with reference to the antenna connector that is 3 dB too high; an error of this size is quite common and is normally disregarded in everyday measurements. With the new NRT, this error can be avoided by simply entering the cable loss.

All new NRT features are available on the basic unit as well as via the Windows™ “Virtual NRT” user interface (FIGS 2 and 3).

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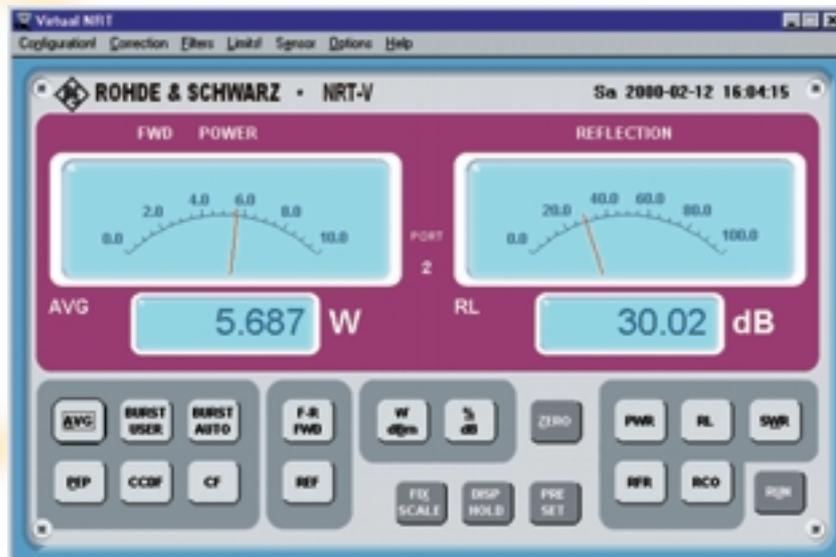


FIG 2 “Virtual NRT” user interface offers all functions of a power reflection meter and more on any laptop or PC

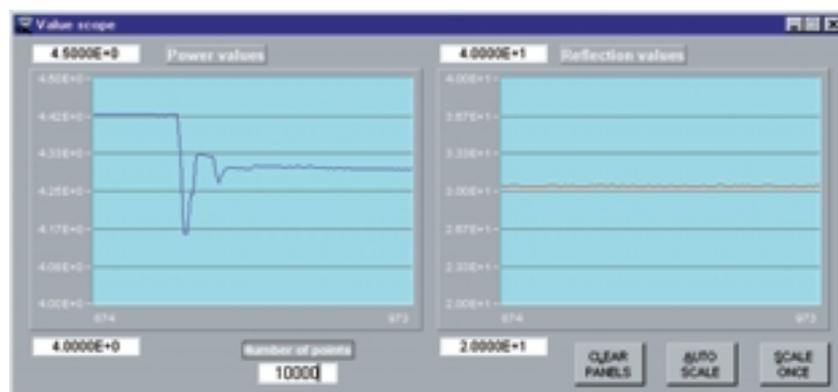


FIG 3 No problem thanks to “Virtual NRT” – recording one-shot or long-term events. Results can also be stored in a file with date and time

#### REFERENCES

- [\*] Reichel, Thomas: Power Reflection Meter NRT – The next generation in directional power meters. News from Rohde & Schwarz (1997) No. 153, pp 7–9