

Measurement, analysis, and monitoring of RF signals

19" rack mountable Spectrum Analyzer for remote controlled measurements and analysis of electrical signals ranging from 9 kHz up to 6 GHz.

- ▲ **Application-oriented operating modes with RBWs up to 32 MHz**
 - ▲ Spectrum Analysis mode with Wideband FFT and Channel Monitoring
 - ▲ Multi-Channel Power mode for fast transponder evaluation (optional)
 - ▲ Level Meter mode with True RMS and PEAK detection (optional)
- ▲ **Easy integration and remote control of NRA into measurement environment via Ethernet**
- ▲ **Simply and conveniently using easy to understand commands**
- ▲ **Outstanding remote documentation with examples and Demo Software**
- ▲ **High speed measurement**
- ▲ **Fan-less design for silent, continuous operation**
- ▲ **Compact size saving 1.75" (1RU) high**



INTRODUCTION

The digital design of the NRA Analyzers is based on a smart combination of the super heterodyne principle with leading-edge FFT analysis and trigger functions. It captures pulsed and random signals and is ideal for short- and long-term observation of all types of RF signals. Evaluation functions and signal integration capabilities reduce the amount of raw data and increase measurement speed and performance.

THE NRA FAMILY

The NRA family is an application orientated product concept. Each NRA type is aimed at a specific RF signal measurement task. The compact size and wide range of remote operation facilities make integration with 3rd party software for monitoring & surveillance applications both fast and straightforward. The devices use ASCII based commands for all the measurement tasks needed for long-term monitoring, such as stability of carrier/band power.

To help you with programming, the NRA offers various demo software and web server applications. Wherever you are, you can obtain information from the NRA spectrum analyzer by accessing it from a PC using a standard web browser, as long as Ethernet connectivity is provided.



NRA – Front view

NRA-2500

- ▲ Signal Analysis from 5 MHz to 2.5 GHz
- ▲ Powerful L-Band (950 – 2150 MHz) analyzer for satellite pointing and tracking, antenna peaking, and carrier monitoring
- ▲ Optimized for use in D-SNG vehicles, at teleports and mission-critical V-SAT sites in offshore or other maritime applications

NRA-3000

- ▲ Signal Analysis from 9 kHz to 3 GHz
- ▲ Versatile analyzer for line-up, troubleshooting and wideband monitoring of TV / radio / telemetry carriers
- ▲ Optimized for use in operation & maintenance stations and at mission-critical tower sites

NRA-6000

- ▲ Signal Analysis from 9 kHz to 6 GHz
- ▲ Ideal solution for managing wireless transmission systems, from radio to cellular (GSM / UMTS / LTE) and WiMAX



NRA – Rear view

NRA AND ITS APPLICATIONS

Satellite newsgathering

NRA is particularly suitable for use in satellite newsgathering trucks for SD or HDTV transmissions (D-SNG). Its compactness and wide variety of remote operation possibilities make for quick and straightforward integration.

When using NRA with 3rd party software for control & monitor (C&M) applications, ASCII based commands can be used to perform all the measurement tasks needed for antenna peaking and satellite tracking, as well as for transponder and carrier monitoring. However, semi-automated work procedures are quite common in smaller SNG vehicles. Functions and costs can be exactly tailored to specific needs with the aid of a broad range of options.

Recommended product:

NRA-2500, NRA-3000 or NRA-6000



Teleports

The NRA provides rapid measurement with reliable and accurate results required by specialists performing tests on SatCom network operation centers. As well as handling standard line up procedures, Multi Channel Power mode allows the spectrum analyzer to quickly determine trends, e.g. when weather conditions affect a whole band. Level Meter mode provides fast, real-time determination of true RMS power, as well as long-term level stability testing. NRA is also a valuable tool for checking guard times between TDMA signals, for example.

Recommended product:

NRA-2500, NRA-3000 or NRA-6000



OPERATION AND MONITORING SYSTEM

The compactness and wide range of remote operation functions of the NRA allow quick and straightforward integration with operational support software (OSS) or comparable control & monitor (C&M) systems. Measurement tasks can be carried out with the analyzer using the simple ASCII-based command set in conjunction with 3rd party software. The broad range of options means that the cost of the analyzer can be exactly tailored to specific needs and / or the available budget.

NRA provides straightforward remote performance and condition analysis for different signals. The analyzer can also give a rapid overview of occupancy and signals in neighboring channels, which can help to resolve potential interference issues before they start to affect service quality

Radio monitoring / spectrum management

The NRA provides the high accuracy, stability and dynamic range required by specialists performing tests on network operation centers. As well as handling standard line up procedures, Multi Channel Power mode allows the spectrum analyzer to quickly determine trends, e.g. when weather conditions affect a whole band. Level Meter mode provides fast, real-time determination of true RMS power (no sweep). NRA is also a valuable tool for checking digitally modulated signals, for example.

Recommended Product:

NRA-3000 or NRA-6000

Monitoring on-site

The NRA is especially useful for testing on-site at mobile phone towers. With the aid of the wide range of test modes, you can either get a quick overview of entire bands or analyze individual channels in depth (GSM).

- Spectrum analysis including level integration
- Detailed channel table showing individual power levels
- Level meter mode for true RMS measurements

Additionally, the NRA provides a wide choice of result types, such as ACT (current or instantaneous level), MAX, MIN, AVG, average MAX and average MIN.

Recommended Product:

NRA-3000 or NRA-6000

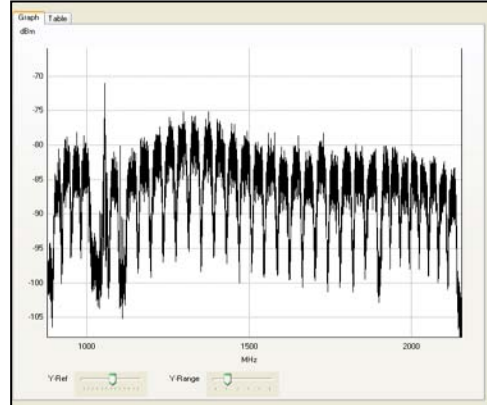


OPERATING MODES

The NRA is designed for flexible multi-purpose use, and is equipped with general and special measurement modes for spectrum, power level, and oscilloscopic observation of RF signals. Highly specialized setups can be programmed and stored in all measurement modes.

SPECTRUM ANALYSIS

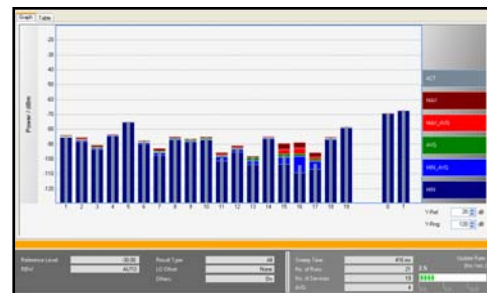
Spectrum Analysis mode operates over a wide frequency range depending on version from 9 kHz to 6 GHz with extremely broad resolution bandwidths (up to 20 MHz), allowing you to overview the entire RF spectrum or to analyze individual spectrum components.



*L-Band satellite signal
(Screen NRA Demo Software)*

MULTI CHANNEL POWER (Option)

In this operating mode, the NRA can be configured to integrate total RF power of individual, user-definable frequency bands. Multi Channel Power mode provides an immediate overview of the contributions of individual frequency bands or channels to the overall RF power level in a given frequency band. The total power including or excluding the gaps between selected channels, where applicable, can be displayed.



*Multi-channel view (Bar graph or Table)
(Screen NRA Demo Software)*

LEVEL METER (Option)

Level Meter mode allows measurement of RF power level at a pre-settable frequency. The measurement results are continuously processed in real time. The instantaneous (ACT) or maximum (MAX) value can be displayed numerically using the PEAK detector. The average of measurement values over a variable averaging time can additionally be displayed by selecting the RMS detector.

The NRA uses special steep cutoff channel filters in this mode to selectively monitor a specific frequency or frequency band over a period of time to exclude practically all the effects of adjacent signals.



*True RMS analysis by selecting Fcent and RBW
(Screen NRA Demo Software)*

PRODUCT INFORMATION

Narda Rack Mount Analyzer		NRA-2500	NRA-3000	NRA-6000
Frequency range		5 MHz to 2.5 GHz	9 kHz to 3 GHz	9 kHz to 6 GHz
Modes		Spectrum Analysis Multi Channel Power (option) Level Meter (option) Scope (option)		
RF features				
Frequency	Resolution bandwidth (RBW)	See specifications for each mode		
	Phase noise ^{a)} (SSB)	10 kHz carrier spacing < -70 dBc / Hz 300 kHz carrier spacing < -100 dBc / Hz		
	Reference frequency	Initial deviation < 1.0 ppm Aging < 1.0 ppm / year < 5.0 ppm / 15 years Thermal drift < 1.5 ppm (within temperature range -10°C to 50°C)		
Amplitude	Reference level (RL) (in 1 dB steps)	-30 dBm to 0 dBm	-30 dBm to +20 dBm	
	Display Range	-110 dBm to +1 dBm (RBW = 1 kHz)	-150 dBm to + 21 dBm (RBW = 10 Hz)	
	RF attenuation (coupled with RL)	0 to 30 dB in steps of 1 dB	0 to 50 dB in steps of 1 dB	
	Maximum RF power level	+27 dBm (destruction limit)		
	Maximum DC voltage	50 V		
	Display Average Noise Level (DANL) RL=-30 dBm (input attenuation = 0 dB)	< -140 dBm / Hz (noise figure < 34 dB)	f ≤ 30 MHz: < -160 dBm / Hz (noise figure < 14 dB)	
			f ≤ 2 GHz: < -156 dBm / Hz (noise figure < 18 dB)	
			f ≤ 3 GHz: < -155 dBm / Hz (noise figure < 19 dB)	f ≤ 4 GHz: < -155 dBm / Hz (noise figure < 19 dB) f ≤ 6 GHz: < -150 dBm / Hz (noise figure < 24 dB)
	3rd order intermodulation products	< -60 dBc for two single signals in the level of -36 dB and a spectral line spacing of more than 1 MHz		
	Extended level measurement uncertainty ^{b)}	< +/- 1.5 dB (within temperature range 15°C to 30°C)	< +/- 1.2 dB (within temperature range 15°C to 30°C)	
< +/- 2.3 dB (within temperature range -10°C to 50°C)		< +/- 2.0 dB (within temperature range -10°C to 50°C)		
Spurious responses (input related) ^{c), d)}	< -50 dBc or RL -50 dB	< -60 dBc or RL -60dB		
Spurious responses (residual) RL=-30 dBm (input attenuation = 0 dB)	< -80 dBm	< -90 dBm except for the frequency range 294 to 306 MHz and 4534 to 4586 MHz, where the value is < -85 dBm		
RF input	Type	N-connector, 50 Ω		
	Return loss ^{e)} RL ≥ -28 dBm (input attenuation ≥ 2 dB)	> 10 dB	> 12 dB	> 12 dB for f ≤ 4.5 GHz > 10 dB for f > 4.5 GHz

Unless otherwise stated, the quoted specifications apply within the temperature range 20°C to 26°C and relative humidity between 25 % and 75 %.

The device must be switched on for at least 30 minutes before the specifications can be checked. All specifications are valid only for remote control using the Ethernet (100 BaseTx) interface.

a) Verification at 57.5 MHz; 2140.5 MHz and 4500.5 MHz (NRA-6000)

b) 95 % confidence level, includes absolute uncertainty, frequency response in all RL (attenuator) settings and temperature response, valid for Spectrum and Multi Channel Power Mode

c) Frequency separation to carrier (df) > 1 MHz

d) Whichever is worse

e) Typical values

SPECTRUM ANALYSIS		NRA-2500	NRA-3000	NRA-6000
Frequency span		10 kHz to 2.495 GHz	1 kHz to 2.999 GHz	1 kHz to 5.999 GHz
Measurement principle		Spectrum analysis		
Reference Level (RL)		Set individually from a list		
Resolution bandwidths (RBW) (-3 dB) (list depends on selected sweep SPAN)		1 kHz to 1 MHz (in steps of 1, 2, 3, 5, 10, 20)	10 Hz to 20 MHz (in steps of 1, 2, 3, 5, 10, 20)	
Video bandwidth (VBW)		Off, 0.2 Hz to 2 MHz (in steps of 1, 2, 3, 5, 10, 20 depending on the selected RBW)		
Sweep time (typically, inclusive communication over Ethernet 100baseTx)		< 130 ms for Span = 1 GHz and RBW = 1 MHz (2001 samples for one Result Type) < 33 ms for Span = 50 MHz and RBW = 500 kHz (201 samples for one Result Type)		
Filter	Type	Gaussian		
	Shape factor (-3 dB / 60 dB)	<3.8 (for RBW ≤ 100 kHz)		
Result Type		ACT: Displays current (actual) spectrum MAX: Maximum hold function AVG: Average over a selectable number of spectra (4 to 256) or a selectable time period (1 to 30 minutes) Max AVG: Maximum hold function after averaging over a defined number of spectra Min: Minimum hold function Min AVG: Minimum hold function after averaging over a defined number of spectra		
MULTI CHANNEL POWER (OPTION)				
Measurement principle		Spectrum analysis, followed by Channel Power evaluation (Number of Channels 1 to 500)		
Resolution bandwidths RBW (-3 dB)		Auto: automatically set depending on the narrowest user-defined service bandwidth Manual: user-defined for all services, Individual: separately defined for each individual service		
Channel band width (CBW), (-3 dB)		Individually selectable for each channel, from 40 Hz to 6 GHz		
Applied Resolution bandwidths RBW (-3 dB)		Automatic: Frequency range of channel divided by 4 but not more than 20 MHz Manually: Can be set in the range of available RBWs of spectrum analysis, but not more than CBW of channel divided by 4 Individual: separately defined for each individual service		
Detection		Root mean square value (RMS), $RMS \left(\text{integration time} \approx \frac{1}{RBW} \right)$		
Filter		See Spectrum Analysis mode		
Result Type		See Spectrum Analysis mode		
Others On / Off		Summarizes all measurement values for frequency gaps within the list of channels and shows the total value for all gaps. Value is displayed as an additional channel in the channel list. Can be switched off if not required		
LEVEL METER (OPTION)				
Measurement principle		Selective level measurement at a fixed frequency setting.		
Detection		Peak Root mean square value (RMS), RMS (integration time = 480 ms)		
Filter	Type	Steep cutoff channel filter		
Resolution bandwidth RBW (-6 dB)		40 kHz to 32 MHz (10 steps per decade)		
Video bandwidth (VBW)		4 Hz to 32 MHz (depending on the selected RBW)		
Result Type		Peak ACT: Displays the current (actual) value Peak MAX: Max hold function RMS ACT: Averaging over a defined time period (0.48 seconds to 30 min) RMS MAX: Max hold function over the averaged values – with RMS detector only.		

GENERAL MEASUREMENT FUNCTIONS			
Setups	Complete device configurations can be saved in the basic unit; up- and downloadable		
Trace Data	Up to 27000 samples (data points) per Result Type and Sweep		
GENERAL SPECIFICATIONS			
Remote access	ASCII based command sets		
Web server	Web applications "NRA Web Terminal" and "NRA Live Display Viewer" based on Java Applets and HTML		
Operating temperature range	-10 °C to +50 °C		
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3) extended to -10 °C to +50 °C
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	ESD and EMC	EN 61326 -1 : 2006	
	Dust and water resistance	IP 50	
	Safety	EN 61010-1:2002	
EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS) 2002/96/EG 27.01.2003 (WEEE)		
CE (European Community) approval	Yes		
Air humidity (operating range) RF	< 29 g/m ³ (< 93 % at +30 °C)		
Dimensions	Standard EIA Rack Unit (1RU): 482 mm (19" w) x 45 mm (1.75" h) x 362 mm (14.3" d)		
Weight	< 5 kg		
Interface	USB mini B (USB 2.0) on the front panel - for programming/debugging and updates		
	Ethernet (100BaseT) on the back side - for measurement control		
Status information	System - LED (bicolored) and LAN (single-colored)		
Power supply	100 to 240 V (AC), 50/60Hz, < 20 W		
Recommended calibration interval	24 months		
Country of origin	Germany		

ORDERING INFORMATION

NRA	Part number
NRA-2500 Remote Analyzer, 5 MHz – 2.5 GHz	3201/101
NRA-3000 Remote Analyzer, 9 kHz – 3 GHz	3202/101
NRA-6000 Remote Analyzer, 9 kHz – 6 GHz	3203/101
OPTIONS	
Option, Multi Channel Power	3200/95.01
Option, Level Meter	3200/95.02
Option, Calibration Report	CAL3201/01 for NRA-2500 CAL3202/01 for NRA-3000 CAL3203/01 for NRA-6000

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