IDA 2

Interference and Direction Analyzer

Light, portable signal analyzer for detecting, analyzing and localizing RF signals and interference in the frequency range from 9 kHz to 6 GHz. IDA 2 combines a frequency scanner / receiver, transmitter detector, spectrum analyzer, signal analyzer and triangulation software in a single mobile device. The sets also include precision directional antennas with built in switchable preamplifier and electronic compass.

- **Extremely fast with a sweep rate of 12 GHz/s**
- **One of the lightest in its class with a weight of less than 3 kg**
- **Impressively sensitive with a noise figure of 7 dB**
- **Embedded GPS receiver and electronic compass for easy emitter location**
- **Convenient interference search with smartDF®: Automatic localization by triangulation of the bearings with result displayed on a map (optional)**
- **I/Q Analyzer with real time trigger, spectrograms with time resolution down to 1 µs and digital afterglow effect (Persistence Spectrum)**

smartDF®

DESCRIPTION

IDA 2 combines excellent RF signal selectivity with fast monitor capabilities and integrated tools such as a double compass and map display for determining the geographical location of RF sources.

The main tasks of the IDA 2 are the detection, analysis and localization of RF signals. Outstanding features of this portable instrument are functions such as Horizontal Scan with automatic azimuth determination and smartDF® for automatic calculation of the emitter position.

The robust, ergonomic design is protected against mechanical stress, weather effects and high power RF irradiation.

Investigating the radiation performance of antenna installations

Measurements made with the IDA 2 quickly yield results thanks to its practically oriented operating modes:

- Spectrum
- Direction Finding
- Level Meter
- Multi-Channel Power
- Time Domain (Scope)
- I/Q Analyzer (I/Q display, Magnitude display, high resolution spectrograms and persistence spectrums)

Searching for hidden bugs before meetings (TSCM)

APPLICATONS

The risk of RF interference due to unintentional emissions and interactions has greatly increased with the growth in the use of wireless technologies. IDA 2 is designed for rapid detection and localization of all types of RF emissions. Some example applications:

- Eliminating faults in mobile telecommunications equipment (2G/3G/4G)
- Tracing interference caused by industrial plant
- Securing communications at large events
- Locating interference transmitters / jammers (e.g. for TETRA, TETRAPOL, POLYCOM, etc.)
- Monitoring radio frequencies and frequency bands
- Detecting signals in security operations
- Localizing bug transmitters (TSCM)
- Signal monitoring for border protection
- Localizing SOS beacons (SAR)

On-site communications intelligence (COMINT)

OPERATING MODES

An extensive set of equipment comprising frequency scanner / receiver, transmitter detector, spectrum analyzer, signal analyzer, directional antennas, amplifier, compass, triangulation software and maps was usually necessary in order to reliably detect, analyze and localize RF signals and interference. IDA 2 combines all these functions in one portable device.

Spectrum

Spectrum mode provides extremely fast scans across the entire frequency range, ideal for detecting, monitoring and analyzing all kinds of signals. A full 6 GHz spectrum scan is performed in less than 500 ms, even for high-resolution results (RBW = 500 kHz, 250 kHz marker resolution).

The extremely low noise level down to -30 dBµV/m in conjunction with Narda Directional Antennas allows the detection even of very low-power devices.

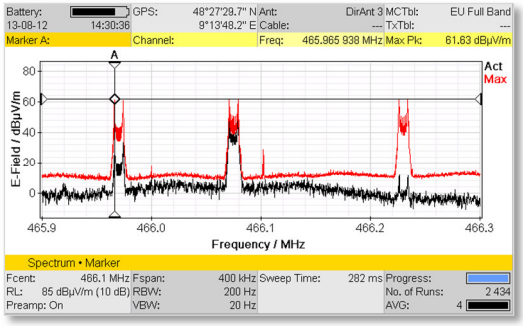
Resolution bandwidths range from 10 Hz to 20 MHz to match any modern communications equipment or even of pulsed signals. Maximum (Max), average value (Avg) and minimum (Min) traces allow initial classification of the nature of a signal.

You can narrow down on suspect signals conveniently using the marker functions, and then quickly zoom in on them and transfer them directly to other operating modes for detailed analysis. It is also possible to demodulate analog modulated signals such as FM, AM, CW, LSB and USB and listen in to them using the built in loudspeaker or headphones, and record them in the instrument memory.

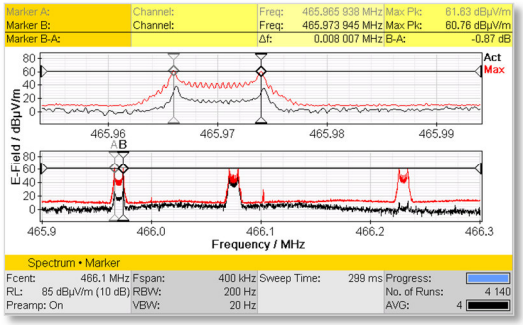
SPECTROGRAM view is ideal for long-term surveillance of the RF spectrum and identification of permanent, transient and frequency-hopping signals. This view also allows identification of emitters with varying power and/or varying bandwidths. An outstanding feature is the capability of simultaneously recording RMS, +Peak and -Peak traces of the spectrogram.

The large 7-inch color display presents the results as

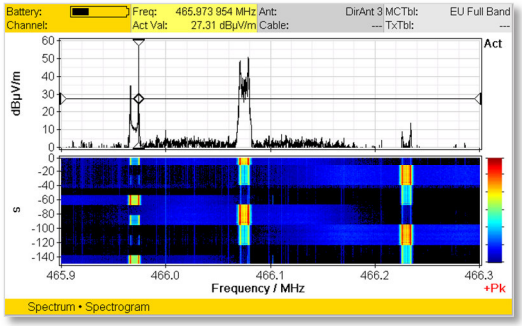
- a spectrum,
- a spectrogram,
- a spectrum and spectrogram,
- or as a table of highest peaks



Spectrum view for signal detection showing three public paging services (POCSAG) with FSK modulation



Signal details displayed in the magnifier window above the spectrum (FSK with +/- 4 kHz, 512 bit/s)



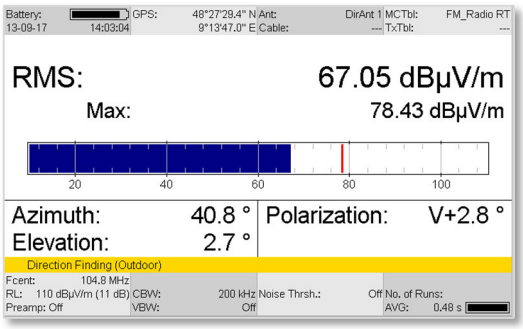
Spectrum and Spectrogram view for transient detection

Direction Finding

Several functions are combined together in Direction Finding mode to determine the direction and location of a signal source. You can also demodulate analog modulated signals such as FM, AM, CW, LSB and USB while you are taking the bearings, and listen to them on the built in loudspeaker or through headphones.

- **Manual Bearing**

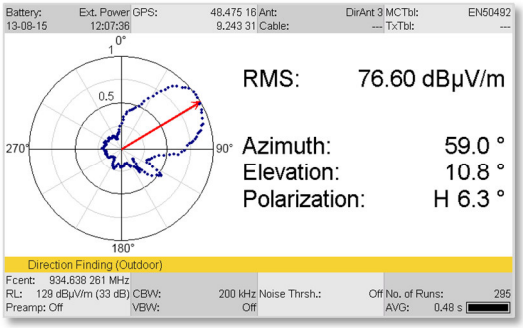
This sub mode can be used as a transmitter detector. Once the signals of interest have been identified, bar graph and numerical representation of the signal level make it easy to determine the direction (maximum level). Alongside the screen information, an audible tone dependent on field strength is available to enable location of hot spots without looking at the monitor. The demodulated signal can be observed at the same time. The current antenna orientation is displayed on the IDA screen, and is updated continuously with the aid of an embedded electronic compass. Supplemented by the position measured by the integrated GPS receiver, this provides ideal support for classical direction finding.



Direction finding using Manual Bearing

- **Horizontal Scan**

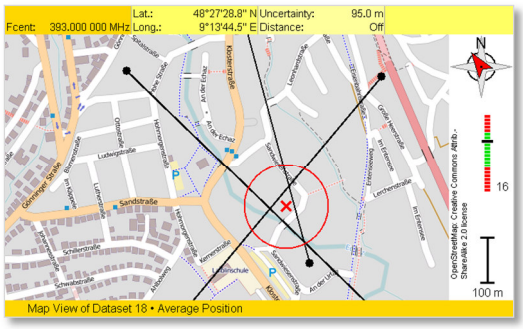
Horizontal Scan provides accurate and automatic determination of the azimuth of the targeted emitter. For each frequency of interest a scan is started and stopped by pushbutton on the antenna handle, with the antenna being smoothly rotated horizontally during the scan. A transmitter table of frequencies can be created to simplify and speed up scanning of multiple signals. The measurement results of a horizontal antenna scan are shown in a polar diagram. Based on this information, IDA calculates the most likely direction of the emitter. A Max Hold function allows location even of interrupted signals. As soon as the scan result has been saved, smartDF handles further processing.



„Horizontal scan is a quick direction finding tool

- smArtDF®

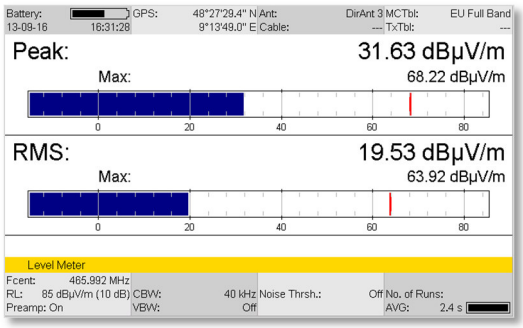
Localization can be performed by triangulation from at least two direction-finding results. An additional estimation of the distance to the emitter can be made by considering the signal attenuation vs. distance. The smartDF® algorithm determines latitude and longitude of the targeted emitter based on the saved Horizontal Scan or Manual Bearing results. Positions and directions are displayed as a graph, underlaid with an optional map. No more need for paper maps, compass and pencil.



Optional maps support easier localization of an emitter

Level Meter

Level Meter mode allows selective measurements at a defined frequency (Fcent) e.g. for monitoring a specific channel (Zero-Span operation). The channel bandwidth (CBW) can be set in the range of 100 Hz to 32 MHz. The steep filter characteristics provide precise separation from adjacent channels. Peak detector values (for short pulsed) and RMS detector values (for fluctuating signals) are displayed simultaneously. Level Meter mode provides gapless and interruption-free measurements. It is also possible to demodulate analog modulated signals such as FM, AM, CW, LSB and USB and listen in to them using the built in loudspeaker or headphones, and record them in the instrument memory.



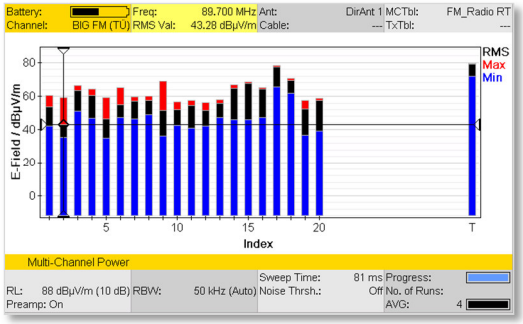
Level Meter for gapless signal measurements

Multi-Channel Power

MCP mode is perfect for a very fast overview of specified frequency bands or channels. Service tables can be defined containing up to 500 freely selectable channels each with a dedicated channel bandwidth CBW and service name.

Simultaneous representation of maximum (Max), average (Avg) and minimum (Min) values allows immediate distinction between permanent and non-permanent signals.

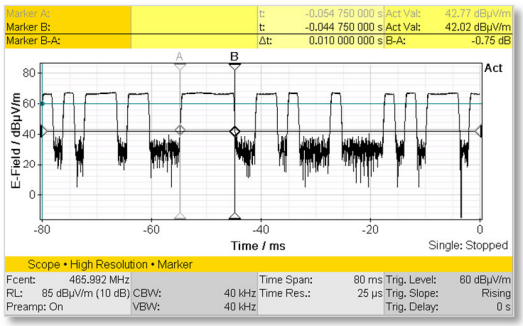
This mode can be used for violation detection in spectrum monitoring, for example. You can define entire frequency bands as “channels”. You will then see immediately when signals occur in these bands.



Multi-Channel Power for an overview of who is on air

Time Domain (Scope) Option

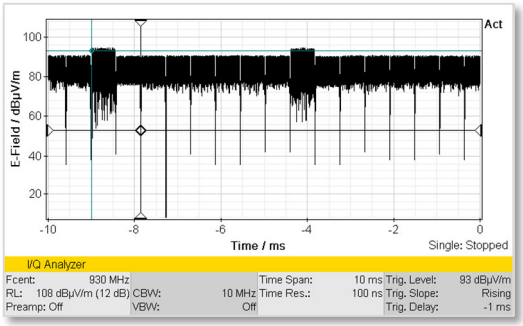
Most signals can be easily classified in the time domain by analyzing the RF power versus time. IDA provides an oscilloscopic view of signals using zero span operation at a tunable fixed frequency for this purpose. The outstanding time resolution (32 ns) and extensive trigger capabilities make this mode a very powerful tool. Selectable bandwidths from 100 Hz to 32 MHz support the display of fast burst signals as well as for monitoring the power of an RF carrier over a full day. You can thus easily find out how a signal is modulated or determine data signal timing.



Scope view for detailed analysis versus time

I/Q Analyzer Option

RF impairments or interference is often very difficult to identify if it occurs only sporadically or is swamped under the scheduled signals. The IDA 2 now includes I/Q analysis functions so that such signals can also be detected reliably. The device records in real time and saves up to 250,000 I/Q data pairs without compression, i.e. without loss of data. Using this data, the IDA 2 generates high resolution spectrograms, persistence spectrums and time domain displays without external computations. RF impairments and interference can thus be detected and analyzed on the spot.



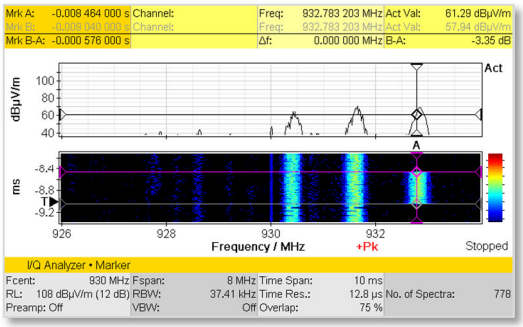
I/Q Analyzer → Magnitude

- **I/Q**

Displays the captured raw data as I (in phase demodulated signal) and Q (quadrature demodulated signal) components versus time. Experts can draw conclusions about the modulation type and interference from the signal shape.

- **Magnitude**

Displays the signal power versus time. The magnitude is also used as a trigger source in the I/Q Analyzer. A video bandwidth VBW can be set to smooth the signal; this may be necessary for triggering. The VBW has no effect on other views.



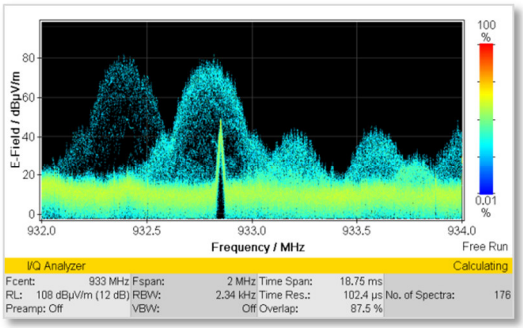
I/Q Analyzer → HiRes Spectrogram Zoom

- **HiRes Spectrogram Zoom**

The measured signal is displayed as a gapless spectrogram with a time resolution down to 1 µs. Each spectrum captured corresponds to a line in the spectrogram display, where the colors represent the signal level. In Hold mode, you can scroll through the spectrogram, which can consist of up to 7805 spectrums.

- **HiRes Spectrogram Full**

Comparable with the “HiRes Spectrogram Zoom” view, but shown on a compressed time scale to enable the entire characteristic to be seen as an overview on the screen. The actual data are not compressed and can be selected with full resolution using the marker and viewed as spectrums.



I/Q Analyzer → Persistence Spectrum

- **Persistence Spectrum**

All the computed spectrums are displayed as level versus frequency. The color indicates the rate of occurrence of the level, which can be compared to a “digital afterglow effect”. This allows you to see sporadic signals clearly. The color display also makes it easy to distinguish interference signals that are swamped by the wanted signals (signals under signals) in other views.

ACTIVE DIRECTIONAL ANTENNA SET

Narda offers a set of three directional antenna modules covering the frequency range from 20 MHz to 6 GHz. This addresses all major applications for interference and direction finding. A high sensitivity loop antenna module for lower frequencies from 9 kHz to 30 MHz is available as an accessory.

The snap-in connector of the Active Antenna Handle picks up one of the directional antenna modules aligned for either horizontally or vertically polarized signals. IDA recognizes the type of antenna, alignment (H or V) and corresponding antenna factors. Correction data based on the frequency response calibration of the handle is automatically transferred to the instrument.

Inside the antenna handle a low noise, switchable amplifier (0 dB/ 20 dB) provides very high sensitivity for weak signals. Position sensors in combination with a 3D high resolution compass accurately determine the current antenna orientation. This information is automatically transferred to the IDA2 and assigned to the measured RF signal

Measurements from different locations are tracked by the IDA embedded GPS receiver. Thus, triangulation can be performed immediately and the results then be graphically displayed on the screen of the IDA2.

Triangulation becomes even more effective with the Option Mapping, drawing bearing results and suspected emitter positions directly onto a map.

Directional Antenna 1, ranging from 20 MHz to 250 MHz

Directional Antenna 2, ranging from 200 MHz to 500 MHz

Directional Antenna 3, ranging from 400 MHz to 6 GHz

- **Antenna adapters for third party antennas** **Option**

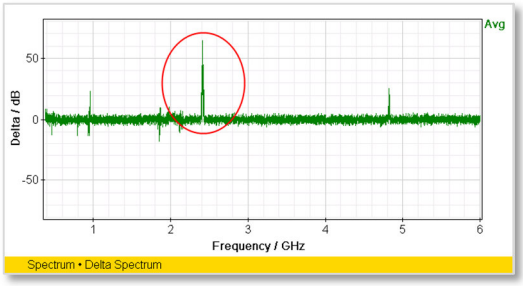
An antenna adapter can be purchased as an option if you want to use your own antennas or those from other manufacturers fitted with an axial N connector (male). This enables you to use the internal 3D compass, built in switchable preamplifier, and automatic polarization detection with third party antennas too. The device also remembers the last third party antenna used with the adapter and selects this automatically when it is plugged in so that the antenna correction values can be applied.

Antenna adapter, N-Connector, male

ADDITIONAL FUNCTIONS

There are further useful functions provided for measurement, analysis and evaluation, making the IDA 2 into an indispensable tool for interference detection, direction finding, and localization.

- Live signals can be compared with a stored spectrum by loading a reference spectrum.
- Newly appearing transmitters can be more easily recognized and distinguished from already known signals using the “Delta Spectrum”.
- The internal data logger with its large capacity memory provides opportunities for recording a wide range of measurements controlled by time or event triggers.
- Analog modulated signals, such as FM, AM, CW, LSB and USB, can be demodulated in a number of operating modes and monitored using the built in loudspeaker or headphones, and recorded in the instrument memory.
- The IDA 2 can be operated by remote control via the built in network connector. It is also possible to stream the I/Q data at a bandwidth of up to 400 kHz. Drivers for the IDA 2 are already available for many commercially available software packages in the fields of radio monitoring and spectrum analysis.



Spectrum→ Delta Spectrum: Measurement Trace (e.g.AVG) vs. Reference Trace. Example shows an ISM band transmitter

DEFINITIONS AND CONDITIONS

Conditions
Unless otherwise noted, specifications apply after 30 minutes warm-up time within the specified environmental conditions. The product is within the recommended calibration cycle.

Specifications with limits
These describe product performance for the given parameter covered by warranty. Specifications with limits (marked as <, ≤, >, ≥, ±, max., min.) apply under the given conditions for the product and are tested during production taking measurement uncertainty into account.

Specifications without limits
These describe product performance for the given parameter covered by warranty. Specifications without limits represent values with negligible deviations which are ensured by design (e.g. dimensions or resolution of a setting parameter).

Typical values (typ.)
These characterize product performance for the given parameter that is not covered by warranty. When stated as a range or as a limit (marked as <, ≤, >, ≥, ±, max., min.), they represent the performance met by approximately 80 % of the instruments. Otherwise, they represent the mean value. The measurement uncertainty is not taken into account.

Nominal values (nom.)
These characterize expected product performance for the given parameter that is not covered by warranty. Nominal values are verified during product development but are not tested during production.

Uncertainties
These characterize an interval for a given measurand estimated to have a level of confidence of approximately 95 percent. Uncertainty is stated as the standard uncertainty multiplied by the coverage factor k=2 based on the normal distribution. The evaluation has been carried out in accordance with the rules of the "Guide of the Expression of Uncertainty in Measurement" (GUM).

SPECIFICATIONS

Basic Unit IDA-3106/02 (IDA 2)			
RF DATA [a]			
Frequency	Frequency range	9 kHz to 6 GHz	
	Phase noise [b] (SSB)	df ≥ 10 kHz < -92 dBc/Hz df ≥ 100 kHz < -100 dBc/Hz	
	Reference frequency	Initial deviation < 1 ppm Aging < 1 ppm/year, < 5 ppm over 15 years Thermal drift < 1.5 ppm (-10 °C to +50 °C)	
Amplitude	Display range	From Displayed Average Noise Level (DANL) to +20 dBm	
	Reference level (RL)	-30 dBm to +20 dBm in steps of 1 dB	
	RF Input attenuation	0 to 50 dB in steps of 1 dB (coupled with reference level)	
	Reference level setting	Set individually from a list or using the "RL Search" function for determining the optimum reference level at a given time	
	Level uncertainty	≤ 1.2 dB (15 °C to 30 °C) valid for Spectrum Analysis and Multi-Channel Power modes	
	Displayed Average Noise Level (DANL) Basic unit only	f ≤ 30 MHz: < -160 dBm/Hz (noise figure< 14 dB) f ≤ 2 GHz: < -156 dBm/Hz (noise figure < 18 dB) f ≤ 4 GHz: < -155 dBm/Hz (noise figure < 19 dB) f ≤ 6 GHz: < -150 dBm/Hz (noise figure < 24 dB)	RL=-30 dBm (input attenuation = 0 dB)
	Displayed Average Noise Level (DANL) with Active Antenna Handle, preamp on, (typ.)	f ≤ 3 GHz < -167 dBm/Hz (noise figure < 7 dB) f ≤ 4 GHz < -166 dBm/Hz (noise figure < 8 dB) f ≤ 6 GHz < -164 dBm/Hz (noise figure < 10 dB)	
	3rd order intermodulation (IP3)	< -60 dBc for two single tones with a level of 6 dB below RL, spaced by 1 MHz or more IP3 ≥ +14 dBm (@ RL = -10 dBm)	
	Spurious responses (input related)	< -60 dBc or RL -60 dB (whichever is worse) and a carrier offset of 100 kHz or more	
	Spurious responses (residual)	< -90 dBm (RL=-30 dBm, input attenuation = 0 dB)	
RF input	Type	N-Connector, 50 Ω, female	
	Maximum RF power level	+27 dBm (destruction limit)	
	Maximum DC voltage	±50 V	
	Return loss	> 12 dB (typ.), f ≤ 4.5 GHz > 10 dB (typ.), f > 4.5 GHz	Reference level RL≥ -28 dBm (input attenuation ≥ 2 dB)

a) RF data apply in the temperature range of 20°C to 26°C and a relative humidity between 25 % and 75 %.

b) Verified at 57.5 MHz / 2140.5 MHz / 4500.5 MHz

OPERATING MODES		
Operating modes	Measurements vs. frequency	• Spectrum (including Spectrogram) • Multi-Channel Power • I/Q Analyzer
	Measurements vs. time	• Level Meter • Time Domain (Scope) //Option • I/Q Analyzer
	Measurement vs. orientation/position	• Direction Finding including Horizontal Scan and Localization

SPECTRUM		
Measurement principle		High resolution spectrum analysis with up to 27000 frequency points per spectrum
Resolution bandwidth RBW, (-3 dB nominal)		10 Hz to 20 MHz (1-2-3-5 steps)
Video bandwidth VBW and RMS detection		0.2 Hz to 2 MHz (1-2-3-5 steps) or off coupled with selected RBW (VBW = RBW/10 … RBW/1000) RMS detection: The effective integration time for forming the RMS value can be defined as T ≈ 0.32 / VBW
Filter	Type	Gaussian
	Shape factor (-60 dB/ -3 dB)	3.8 typical
Measurement		Spectrum: Graphical analysis, peak table, channel power Delta Spectrum: Display of selected traces relative to the Reference Trace (Ref) Spectrogram: Visual representation of recorded spectra Spectrogram & Spectrum: Visual representation of recorded spectra with simultaneous view of the actual trace
Trace (Spectrum)		Act: Clears the previous spectrum and displays the actual measured spectrum Max: Maximum hold function Avg: RMS averaging over a selectable number of spectra (4 to 256) or a selectable time period of 1 to 30 minutes Min: Minimum hold function Ref: User-definable reference trace (any measurement trace can be stored)
Detector (Spectrogram)		+Peak: Maximum value of all values within an interval RMS: Root Mean Squared average power of all the measurements within an interval -Peak: Minimum value of all values within an interval All three detectors are used simultaneously for spectrogram recording
Spectrogram recording		Frequency resolution: ≥ Fspan / 860 Up to 400 traces (spectrogram lines) Observation period: approx. 4 s up to 40 hours Time resolution: as fast as possible, 10 ms to 5 min (1-2-5 steps) or 6 min
Magnifier		Simultaneous display of the selected spectrum and a magnified section of interest (magnification level of 10x or 50x)

LEVEL METER		
Measurement principle		Selective level measurement (zero span mode at a tunable fixed frequency)
Detector		Peak (hold time = 120 ms)
		RMS (average time selectable from 120 ms up to 30 min)
		Peak & RMS simultaneously
Channel bandwidth CBW (-6 dB)		100 Hz to 32 MHz (in steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz, …, 10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz)
Filter	Type	Steep cut-off channel filter (app. raised cosine)
	Roll-off factor	0.16
Video bandwidth (VBW)		0.01 Hz to 32 MHz or off coupled with selected CBW (VBW = CBW/1 … CBW/10000)
Max Hold		Available for Peak and RMS detectors
Noise threshold		Selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor. Measurement values below threshold are shown as “< absolute threshold value”.

DIRECTION FINDING – requires Narda Active Antenna Handle		
Measurement principle		Selective level measurement (zero span mode at a tunable fixed frequency) **Possible parameters and settings as specified under LEVEL METER**
Antenna direction indication		Numerical display of Azimuth, Elevation and Polarization determined by the embedded electronic compass of the antenna handle.
Position indication	Outdoor	Instrument position displayed as latitude and longitude (GPS WGS84) determined by the embedded GPS receiver of the basic unit. Optional: Graphical indication of the current position drawn on a map.
	Indoor	Instrument position set manually on an editable rectangular room layout.
Detector		Peak or RMS detection RMS averaging time: selectable, 120 ms to 30 min
Display modes	Manual Bearing	Bar graph and numerical display of the signal level and indication of the direction
	Horizontal Scan	Polar diagram of the signal level vs. antenna orientation, normalized to the maximum signal. Automatic direction finding and indication
	smartDF® Localization	Graphical indication of the triangulation results for all measurement positions. Accepts measurements being performed by Manual Bearing or Horizontal Scan. Display of the estimated emitter coordinates, optional drawn on a map (Option Mapping).
Horizontal Scan	Continuous	Every 120 ms the polar diagram is updated with the current signal level and compass data. Start and Stop is initiated by key press on the antenna handle. The duration of a scan is limited to a maximum of 4 min. The target azimuth is calculated automatically.
	Discrete	For every key press on the antenna handle the polar diagram is updated with the current signal level and compass data. At least 3 samples are required for calculating the target azimuth (up to 2000 samples are possible). Useful for longer averaging times.
	Discrete with Max Hold	The polar diagram is updated with the Max Hold signal level and compass data by pressing a key on the antenna handle. Allows determination of the direction even of intermittent signals.
smartDF® Localization		Shows the vector of target azimuth related to the measurement position. Triangulation results based on several vectors will be calculated and the geo coordinates of the potential transmitter position will be displayed. Remotely determined vector data can be added by manual entry.
Transmitter Table		Used to simplify frequency settings and speed up finding multiple sources transmitting at different frequencies. Tables can be created on-site and include Fcent and CBW.
Maps (Option)		Display of high-resolution street maps in various zoom levels. OpenStreetMap bitmap tiles can be downloaded from internet free of charge using the Narda Map Download Tool. Map data are stored on microSD card and then plugged into the IDA card slot for portable use.

TIME DOMAIN (SCOPE) // OPTION		
Measurement principle		Selective level measurement versus time (zero span mode at a tunable fixed frequency)
Channel bandwidth CBW, (-6 dB nominal)		100 Hz to 32 MHz (in steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz,…,10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz)
Filter	Type	Steep cut-off channel filter (app. raised cosine)
	Roll-off factor	0.16
Video bandwidth (VBW)		0.01 Hz to 32 MHz or off coupled with selected CBW (VBW = CBW/1 … CBW/10000)
Measurement	High Resolution Scope	Measures the actual magnitude Time resolution coupled to 1/CBW (31.25 ns to 10 ms), up to 250000 samples
	Long-Time Scope	Uses selectable detectors to measure the magnitude. Sweep time 4 µs to 24 h (resolution ≥ 250 ns), up to 62500 samples
Detector		+Peak, RMS, -Peak can be selected individually for Long-Time Scope
Magnifier		Simultaneous display of the selected period and a magnified section of interest. Magnification level: • Long-Time Scope: 10x or 50x • High Resolution Scope: 25x or 500x
Duty Cycle / Time Domain Power		Measurement function for average power, maximum power and for the ratio of both values within a selectable period of time
Triggering (VBW taken into account)		Free run, single, multiple, time controlled Programmable trigger level, trigger slope and trigger delay as well as Auto Save on trigger

MULTI-CHANNEL POWER		
Measurement principle		Spectrum analysis, followed by Channel Power evaluation
Number of channels		1 to 500, to be defined on instrument or by IDA-Tools PC software
Channel band width CBW, (-3 dB nominal)		Individually selectable for each channel, from 40 Hz to 6 GHz
Roll-off factor		< 4 * RBW / CBW
Applied RBW		Automatic: RBW ≤ CBW / 4 (RBW ≤ 20 MHz) Manually: 10 Hz to 20 MHz (1-2-3-5 steps), (RBW ≤ CBW / 4) Individual: separately defined for each channel using IDA-Tools
Channel lists		Automatic creation on the unit or by PC configuration software. Channel name is assigned automatically. User definable channel names (15 characters max.) can be assigned by PC. “Others” summarizes results of all frequency gaps within the list of channels.
Detection		Root mean square value (RMS), integration time T = 1 / RBW
Trace, RBW		See spectrum analysis mode
Display/Views	Table	Channel name, corresponding frequency band, measurement result, RBW if set individually for each channel. Sort function according to columns. Selectable Evaluation function: Distribution of each channel in relation to total amount
	Bar Graph	Bar graph for measurement result of each channel.
Noise threshold		Selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor. Measurement values below threshold are shown as “< absolute threshold value”.

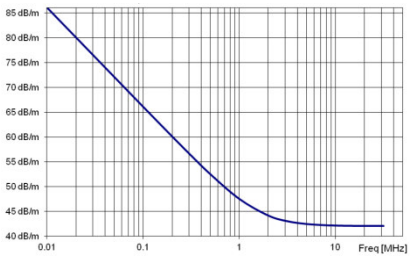
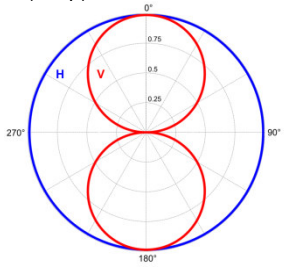
I/Q ANALYZER // OPTION		
Measurement principle		The real (in phase) and / or imaginary (quadrature phase) parts of the signal (up to 250,000 measured values each) are recorded and then evaluated. The tuning frequency and channel bandwidth can be set.
Fast Fourier Transformation (FFT)		• FFT points selectable: 256, 512, 1024, 2048 • FFT overlapping selectable: 50 %, 75 %, 87.5 % • FFT windowing: Nuttall filter
Channel bandwidth CBW, (-6 dB nominal)		100 Hz to 32 MHz (in steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz,…,10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz)
Filter	Type	Steep cut-off channel filter (app. raised cosine)
	Roll-off factor	0.16
Video bandwidth (VBW)		0.01 Hz to 32 MHz or off coupled with selected CBW (VBW = CBW/1 … CBW/10000) VBW can be set to smooth the signal; this may be necessary for triggering. The VBW has no effect on other views.
Views	I/Q	Displays the captured raw data as I (in phase demodulated signal) and Q (quadrature demodulated signal) components versus time. Experts can draw conclusions about the modulation type and interference from the signal shape. Time resolution coupled to 1/CBW (31.25 ns to 10 ms), up to 250000 samples
	Magnitude	Displays the signal power versus time. The magnitude is also used as a trigger source in the I/Q Analyzer. A video bandwidth VBW can be set to smooth the signal; this may be necessary for triggering. The VBW has no effect on other views. Time resolution coupled to 1/CBW (31.25 ns to 10 ms), up to 250000 samples
	HiRes Spectrogram Zoom	The measured signal is displayed as a gapless spectrogram with a time resolution down to 1 µs. Each spectrum captured corresponds to a line in the spectrogram display, where the colors represent the signal level. In Hold mode, you can scroll through the spectrogram, which can consist of up to 7805 spectrums. Fspan = CBW x 0.8 (< 22 MHz)
	HiRes Spectrogram Full	Comparable with the “HiRes Spectrogram Zoom” view, but shown on a compressed time scale to enable the entire characteristic to be seen as an overview on the screen. The actual data are not compressed and can be selected with full resolution using the marker and viewed as spectrums. Fspan = CBW x 0.8 (< 22 MHz)
	Persistence Spectrum	All the computed spectrums are displayed as level versus frequency. The color indicates the rate of occurrence of the level, which can be compared to a “digital afterglow effect”. This allows you to see sporadic signals clearly. The color display also makes it easy to distinguish interference signals that are swamped by the wanted signals (signals under signals) in other views. The persistence range can be set automatically or selected manually. Fspan = CBW x 0.8 (< 22 MHz)
Detector (Spectrogram view)	HiRes Spectrogram Full	+Peak, RMS or -Peak selectable. Maximum value, averaged value or minimum value within a compressed time and frequency range. The actual data are not compressed and can be selected with full resolution using the marker and viewed as spectrums.
	HiRes Spectrogram Zoom	+Peak, RMS or -Peak selectable. Maximum value, averaged value or minimum value within a compressed frequency range. Time axis representation is always uncompressed with maximum resolution. The actual data are not compressed and can be selected with full resolution using the marker and viewed as spectrums.
Magnifier		Simultaneous display of the selected period and a magnified section of interest. Magnification level: • I/Q: 25x or 500x • Magnitude: 25x or 500x
Trigger (Magnitude; VBW taken into account)		Free run, single, multiple, time controlled Programmable trigger level, trigger slope and trigger delay as well as Auto Save on trigger
Probability of intercept – POI		Shortest signal duration for 100% probability of capture within an I/Q recording. HiRes Spectrogram/Persistence: T_{POI} = 9 µs with dT_{FFT} = 1 µs and RBW = 239.43 kHz Magnitude: $T_{POI} \leq$ 64 ns (@ CBW = 32 MHz)
I/Q Streaming, I/Q Data		This is controlled via the Ethernet interface using remote control commands. Gapless streaming of the I/Q data over the Ethernet interface is possible for CBW settings from 100 Hz up to 400 kHz. Additionally, up to 250,000 I/Q data pairs can be retrieved block by block for all CBW settings.

GENERAL SPECIFICATIONS - BASIC UNIT		
Instrument display	Type	TFT color display with backlight
	Size, resolution	7 inch (152 mm x 91 mm), 800 x 480 pixels
Interface		USB mini B (USB 2.0)
		Optical RS 232 (Baud rate 115 200)
		Ethernet (100BaseT)
		Headphone 3.5 mm TRS, ≥ 16 ohms (mono), switches off the integrated speaker when connected
		microSD-card interface for maps and export of measurement data, screenshots and WAV
Cables and external devices		Narda RF cables are automatically detected (type, frequency response and more) Other cables and external devices (e.g. filters) can be defined and selected manually.
Antenna detection		Narda Directional Antennas are automatically detected (type, polarization, consideration of typical antenna factors, preamp gain and frequency response). For other antennas parameters can be defined and selected manually.
Result units	Anytime	dBm, dBV, dBmV, dBµV
	With antenna	V/m, A/m, W/m², mW/cm², dBV/m, dBmV/m, dBA/m, dBµV/m, dBm, dBV, dBmV, dBµV
Display functions		Y-scale reference: -130 dBm to 40 dBm Y-scale range: 20 dB, 40 dB, 60 dB, 80 dB, 100 dB, 120 dB Y-scale auto: automatic scaling
Marker functions		For graphical analysis of Spectrum, Spectrogram, Time Domain (Scope), I/Q Analyzer, MCP Bar Graph • Single marker or Delta marker • Peak Marker: Highest, next, left, right. Adjustable peak threshold and excursion. • Peak tracking (selectable)
Demodulation	Modulation Types	AM, FM, LSB, USB, CW (Spectrum, Level Meter and Direction Finding modes) Demodulation bandwidth 100 Hz to 200 kHz (max. 16 kHz for LSB, USB)
	Representation	Instrument speaker or external earphone
	Squelch	-120 dB to -40 dB nominal, Off
	Audio Recording	Format 16 kHz / 16 bit wave file recording (WAV)
Fast Frequency Setting		Manual frequency entry or by selection list (multi-channel table, transmitter table)
Fast Mode Switch		"Go to: mode" transfers center or marker frequency to the selected operating mode
Setups		IDA can store up to 200 device configurations. Up-/download by configuration software.
Results Storage	Measurement results	ASCII format for further evaluation and import into spreadsheets (e.g. MS-Excel)
	Comments	Voice comments (wave file format) or text comments (ASCII) can be added to saved results
	Screenshots	File format PNG
	Demodulation records	File format WAV
	Auto Save (on trigger)	Automatic saving of up to 500 results initiated by trigger events (Time Domain (Scope) and I/Q Analyzer mode only)
	Time Controlled Storing	Long term monitoring up to 99 hours (Spectrum, Multi-Channel Power, Level Meter mode). Settings for: start date, start time, duration and time interval (6 s to 60 min)
	Memory capacity	128 MB internal memory to store up to 8000 spectra, 4000 screenshots
GPS / Compass		Inside the basic unit is a GPS receiver for position detection (WGS84) and an electronic compass as an aid to orient the map northwards

GENERAL SPECIFICATIONS - BASIC UNIT (continued)			
Environmental	Operating temperature		-10 °C to +50 °C with battery 0 °C to +40 °C with external power supply
	Humidity		< 29 g/m³ (< 93 % RH at +30 °C), non-condensing
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3) restricted -30°C to + 70°C due to display
		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)
	Ingress protection		IP 52 (with antenna attached and interface protector closed) IP 67 (stored in the hardcase)
	EMC	European Union	Complies with EMC Directive 2004/108/EC and IEC/EN 61326 -1: 2006
		Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 basic unit tested up to 200 V/m (RF input power limited to permissible values)
		Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
	Safety		Complies with European Low Voltage Directive 2006/95/EC and IEC/EN 61010-1: 2004
Weight			2.8 kg / 6.2 lbs (basic unit including battery)
Dimensions (H x W x D)			213 mm x 297 mm x 77 mm (8.4” x 11.7” x 3.0”)
Power supply	Battery		Lithium-Ion rechargeable battery pack, hot-swappable during operation operating time: 3 hours (nominal) charging time: 5.5 hours (nominal)
	External power supply		Input: 9 to 15 VDC Adapter 100-240 VAC / 12 V DC, 2.5 A
Recommended calibration interval			24 months
Country of origin			Germany

SPECIFICATIONS OF ANTENNAS

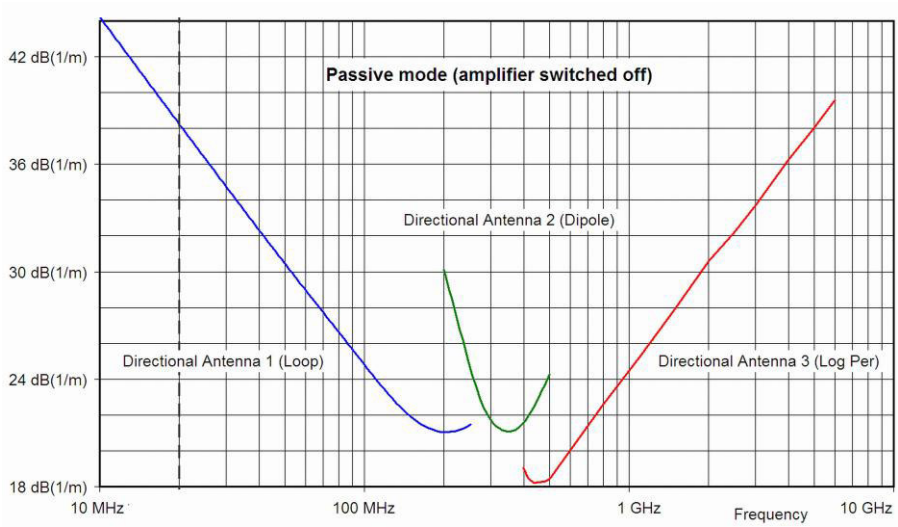
GENERAL SPECIFICATIONS - ANTENNA HANDLE AND ANTENNAS			
Environmental	Operating temperature		-10 °C to +50 °C
	Humidity		< 29 g/m³ (< 93 % RH at +30 °C), non-condensing
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3) extended to -10 °C to +50 °C
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	EMC	European Union	Complies with EMC Directive 2004/108/EC and IEC/EN 61326 -1: 2006
		Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 complete set tested up to 100 V/m (limited by the max. permissible field for the antennas)
		Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
	Safety		Complies with European Low Voltage Directive 2006/95/EC and IEC/EN 61010-1: 2004
Dimensions (L x W x H), Weight (size without cable)			Handle: 165 mm x 165 mm x 43 mm (6.5” x 6.5” x 1.7”), 470 g / 1.04 lbs Dir. Antenna 1: 325 mm x 255 mm x 80 mm (12.8” x 10.0” x 3.1”), 400 g / 0.88 lbs Dir. Antenna 2: 285 mm x 410 mm x 43 mm (11.2” x 16.1” x 1.7”), 300 g / 0.66 lbs Dir. Antenna 3: 478 mm x 332 mm x 50 mm (18.8” x 13.1” x 2.0”), 350 g / 0.77 lbs Loop antenna 3100/14: 430 mm x 370 mm x 42 mm (16.9” x 14.6” x 1.7”), 380 g / 0.84 lbs
Country of origin			Germany

ACTIVE ANTENNA HANDLE (3100/10) - WITH ELECTRONIC COMPASS AND PREAMPLIFIER	
Frequency range [a]	9 kHz to 6 GHz Frequency response correction is applied automatically when used in conjunction with the IDA basic unit.
Preamplifier	Built in, can be switched off Amplification 20 dB, noise figure < 6 dB
Compass	Embedded electronic compass
Compass uncertainty (typ.)	Azimuth uncertainty < 1.5° RMS for tilt < 15° Pitch- and roll uncertainty < 3° RMS in the range of +/- 30° (RMS means the standard deviation of the specified error)
Connection cable to IDA basic unit	RF cable and control cable combined in a flexible tube, length of 1 meter
RF connector to basic unit	N-connector, male, 50 Ω
RF connector to Narda directional antennas	BMA 50 Ω, (female on handle side)
Antenna connectivity	Narda antennas can be plugged in with horizontal and vertical polarization. Type of antenna and polarization detected automatically and transferred to basic unit
Power supply	From basic unit
Mounting	Connecting thread on the underside of the handle for tripod mounting
DIRECTIONAL ANTENNA 1 (3100/11)	
Frequency range	20 MHz to 250 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Loop antenna
Antenna factor	21 dB(1/m) typical @ 200 MHz (passive mode)
DIRECTIONAL ANTENNA 2 (3100/12)	
Frequency range	200 MHz to 500 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Dipole antenna
Antenna factor	21 dB(1/m) typical @ 350 MHz (passive mode)
DIRECTIONAL ANTENNA 3 (3100/13)	
Frequency range	400 MHz to 6 GHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Log-periodic antenna
Antenna factor	18.5 dB(1/m) typical @ 500 MHz (passive mode)
LOOP ANTENNA, H-FIELD (3100/14)	
Frequency range	9 kHz to 30 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Shielded loop antenna
Antenna factor / Radiation pattern	  Passive mode (preamp. off): 66.0 dB(1/m) typical @ 100 kHz 47.5 dB(1/m) typical @ 1 MHz 42.0 dB(1/m) typical @ f > 10 MHz Antenna (Loop) 9 kHz to 30 MHz  Radiation pattern (typ.) for a horizontal scan and vertical polarization (V) or horizontal polarization (H)

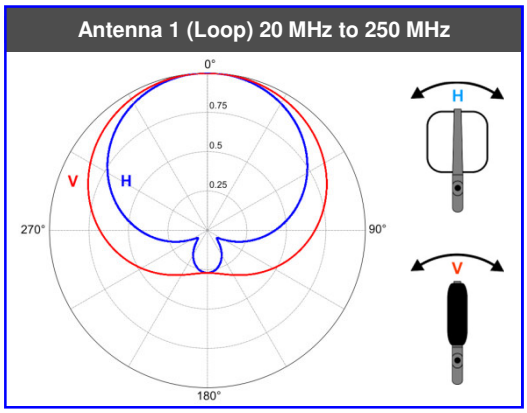
a) Preamplifier lower frequency is limited to 20 MHz for antenna handles produced before year 2013.

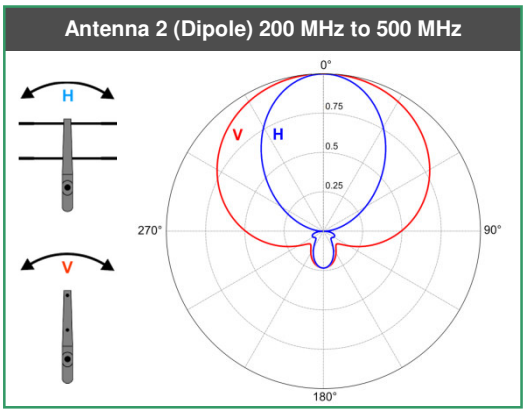
DIRECTIONAL ANTENNAS - CHARACTERISTICS

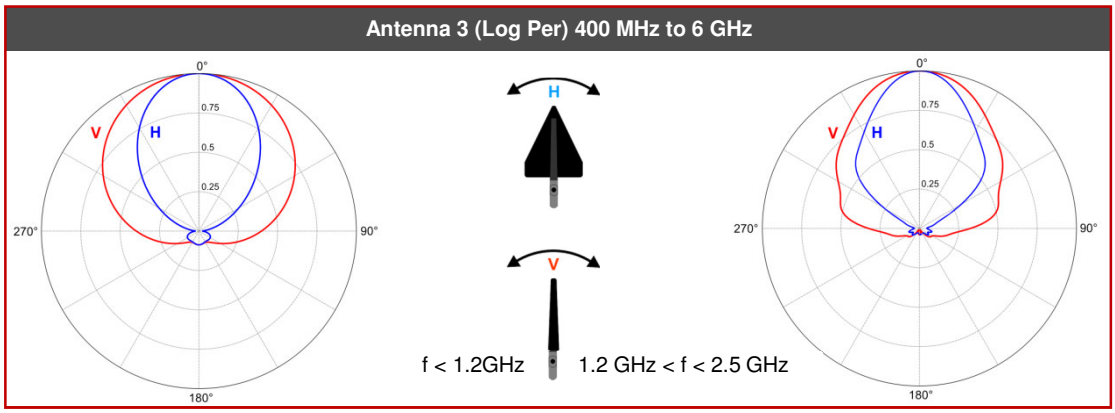
Antenna Factors (typical)



Radiation Pattern (typical)







Patterns above are valid for a horizontal scan and vertical polarization (V) or horizontal polarization (H)

ORDERING INFORMATION

IDA 2	Part number
IDA 2 SET WITH ANTENNAS	
IDA-3106 Interference Analyzer, Set with 20 MHz - 6 GHz Antennas, includes: • IDA-3106/02 Basic Unit • Active Antenna Handle • Directional Antenna 1, 20 MHz - 250 MHz • Directional Antenna 2, 200 MHz - 500 MHz • Directional Antenna 3, 400 MHz - 6 GHz • Arm Support • Headphone, 3.5 mm Plug • Carrying Strap for IDA 2 • Power Supply 12VDC, 100V-240VAC • Cable, USB 2.0, A/B mini, 1.8m • Configuration Software • Mem-Card Reader, microSD / USB • Operating Manual IDA-3106, English • Hardcase for IDA Sets • Calibration Reports (Basic Unit and Handle)	**3106/202**
IDA 2 BASIC UNIT SET	
IDA-3106 Interference Analyzer, Basic Unit Set, includes: • IDA-3106/02 Basic Unit • Power Supply 12 VDC, 100 V-240 VAC • Cable, USB 2.0, A/B mini, 1.8 m • Configuration Software • Mem-Card Reader, microSD / USB • Operating Manual IDA-3106, English • Calibration Report	**3106/201**
OPTIONS	
Option, Mapping	**3100/95.01**
Option, Scope and I/Q Analyzer	**3100/95.02**
ANTENNAS	
Active Antenna Handle (required for Dir. Antennas 1-3 and Loop Antenna, Calibration Report included)	**3100/10**
Directional Antenna 1, 20 MHz - 250 MHz	**3100/11**
Directional Antenna 2, 200 MHz - 500 MHz	**3100/12**
Directional Antenna 3, 400 MHz - 6 GHz	**3100/13**
Loop Antenna, H-Field, 9 kHz - 30 MHz	**3100/14**
Arm Support (for Active Antenna Handle)	**3100/90.10**
Antenna adapter, N-Connector, male (to connect third party antennas to the active antenna handle)	**3100/15**
ACCESSORIES	
Battery Pack, Rechargeable, 7V2 / 6200 mAh (one is included with each IDA Basic Unit)	**3001/90.15**
Charger Set for Battery Pack, External	**3001/90.07**
Power Supply DC Vehicle Adapter	**2260/90.56**
Protective Soft Carrying Bag for IDA-3106/02 Basic Unit	**3001/90.13**
Hardcase for IDA Sets (included in Set 3106/202, space for 4 antennas (3100/11 … /14)	**3100/90.01**
Headphone, 3.5mm Plug (included in Set 3106/202)	**3100/90.11**
Carrying Strap for IDA (included in Set 3106/202)	**3100/90.12**
Memory Card, microSD 8GB (one is included with each IDA Basic Unit Set)	**3100/90.13**
Protective Rubber Cover for IDA Basic Unit	**3100/90.16**
O/E Converter USB, RP-02/USB	**2260/90.07**
Cable, FO Duplex (1000µm), RP-02, 20m	**2260/91.03**
RF-Cable, 9 kHz – 6 GHz, N 50 ohm, 1.5m	**3602/01**
RF-Cable, 9 kHz – 6 GHz, N 50 ohm, 5m	**3602/02**
Tripod, Non-Conductive, 1.65 m, with Carrying Bag	**2244/90.31**
Operating Manual IDA-3106, German	**3106/98.01**

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