SignalShark

Real-Time Handheld Analyzer

Real-Time Handheld Analyzer SignalShark®, for the Detection, Analysis, Classification and Localization of RF Signals between 8 kHz and 8 GHz.

Solves complex measurement and analysis tasks reliably and quickly with the same RF performance as comparable desktop instruments.

› Frequency range 8 kHz to 8 GHz
› Wideband frequency monitoring with an extremely fast scan rate of up to 50 GHz/s
› Covers whole frequency bands with a 40 MHz real-time instantaneous bandwidth and a very high frequency resolution
  › FFT overlap at least 75 %
  › FFT size: up to 16 384
› Reliable signal detection due to signal duration with 100 % POI
  › > 3.125 µs without attenuation and spectral growth
  › > 2 ns with attenuation proportional to the spectral growth
› Measures weak signals in the presents of strong transmitters with a receiver based High Dynamic Range (HDR)
› ITU-compliant measurements and applications
› Two independent FFT and receiver path allowing signal visualization as well as signal analysis and demodulation at a time
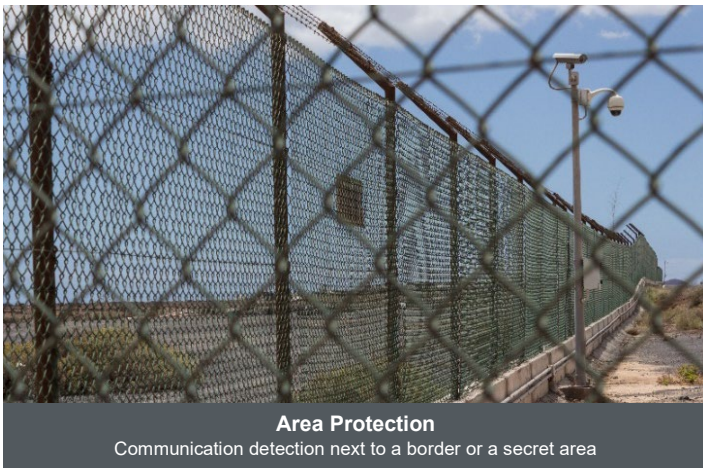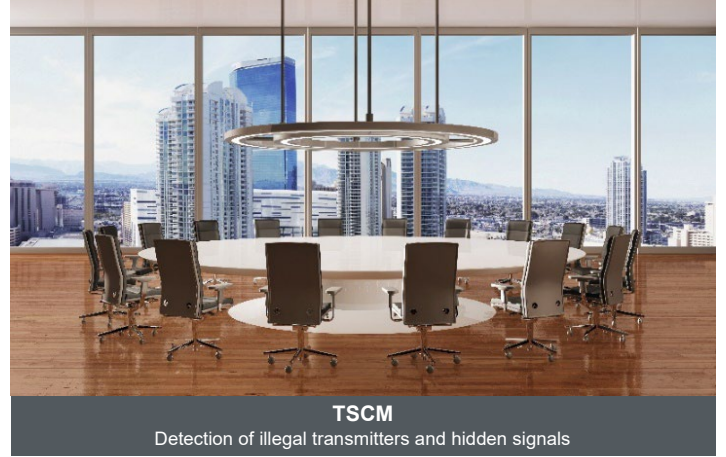› High level accuracy

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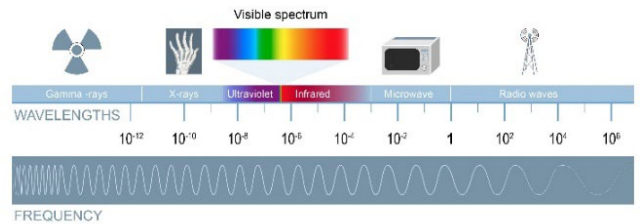ООО «4ТЕСТ»
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Take up the frequency spectrum challenges of today and tomorrow

Spectrum Management
Mobile Networks, IoT, M2M/C2C Communication

TSCM
Detection of illegal transmitters and hidden signals

Area Protection
Communication detection next to a border or a secret area

and many more…

Seven Senses for Signals

Description

Like a Shark, that highly efficient hunter in the ocean, Narda SignalShark derives its success in measurement from the interplay of its highly developed senses.

Its 40 MHz real-time bandwidth captures the spectrum of even very short-pulsed signals > 3.125µs with a POI of 100 %. This guarantees a consistent awareness of all spectrum events.

Due to its distinguished analysis functions as real-time spectrum, spectrogram and persistence, measured signals are analyzed with a very high frequency and time resolution.

Applications

More and more devices have to share the available frequency ranges because of the rapid development in new technologies such as the Internet of Things (IoT), machine-to-machine (M2M) or car-to-car (C2C) communications and expanding 4G/5G mobile networks.

Whether making a wideband measurement of an entire frequency range, detecting hidden signals, reliably capturing very short impulses or localizing interference signals, SignalShark provides comprehensive measurement solutions for the increasingly complex RF spectrum.

Tasks and Views

Customer applications have formed the basis for the design of the SignalShark family and the layout of the graphical user interface (GUI). This is most clearly seen in the concept of Tasks and Views.

All SignalShark devices are supporting the same GUI. It can also be accessed with remote desktop software via network as well as with an external monitor, keyboard and mouse.

Tasks

Measurements often consist of a workflow of several steps, such as locating a signal in the spectrum, measuring its level and analyzing its behavior. This involves switching between different measurement modes and settings in each mode when a general-purpose analyzer is used.

However, with the SignalShark, the entire measurement workflow is handled by one or more measurement tasks. These tasks are shown as screen tabs, just like the web pages displayed by a web browser. Each task encapsulates all the measurement parameters and the underlying measurement engine mode. All the measurements in a task are performed at the same time. Up to six measurement visualizations (Views) can be added to adapt a task as required.

The SignalShark provides several task modes to support a wide variety of measurement applications.

Spectrum (Scan) Mode

This mode supports measurement of the spectrum over the full frequency span of 8 kHz to 8 GHz in a single measurement at a maximum measurement speed of 50 GHz/s.

Real-Time Spectrum Mode

Real-Time Spectrum mode enables spectrum measurements with a frequency span of up to 40 MHz in real-time. All frequencies within the frequency span are acquired simultaneously with no time gaps and with a FFT frame overlap of 75%. The FFT frame overlap increases to 87.5% for frequency spans of 20 MHz or less. A second digital down converter is used at the same time for analyzing and demodulating the I/Q data of a separate channel within the 40 MHz real-time bandwidth. The frequency and bandwidth of this channel are selectable.
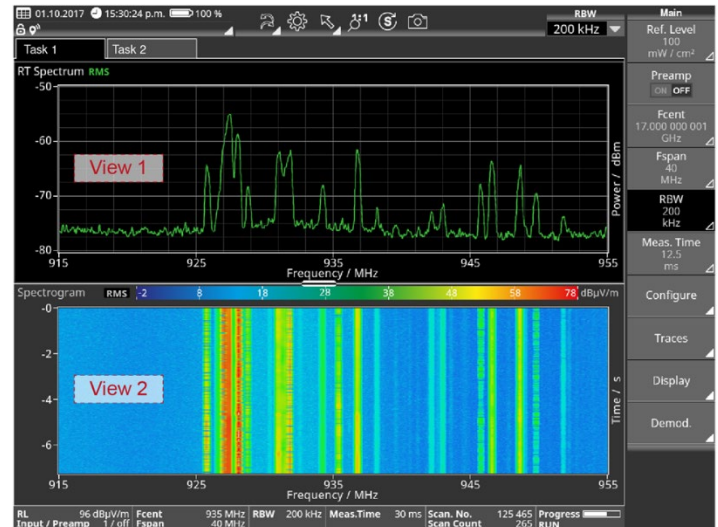
Auto DF Mode

This mode supports the use of the Narda Automatic DF Antenna (ADFA). Each bearing cycle can be as short as 1.2 ms and even the bearings of pulsed signals can be reliably determined as long as the minimum pulse and gap durations are somewhat longer than 2 cycle times. The optional available map and localization functionality, which is integrated into the SignalShark GUI, allows the reliable localization of transmitters even in an urban environment by driving a vehicle equipped with an ADFA through the area of interest. The sophisticated state of the art algorithm based on the bearing statistics reliably eliminates the influence of false bearings on the localization result, as long as there are enough line of sight bearings available from enough locations.

Real-Time Streaming Mode

The I/Q data can be streamed at sample rates of up to 25.6 MHz using the VITA 49 protocol (option). The stream sink can be an external device connected via the LAN interface or a third party application running on the SignalShark itself.

Views

Measurements are visualized by means of different views. The frequency domain and channel level can be viewed at the same time, for example, by adding a spectrum view and a level meter view to a measurement task.

› **Spectrum** (scanned or real-time)
  Shows level versus frequency
  › Up to **eight** different **traces** based on the +Pk, RMS, Avg, -Pk, or Sample detectors and the maximum, average, or minimum long-term trace functions.
  › Up to **eight** spectrum **markers** are available.
  › Each marker supports one of the following **additional measurement functions according to ITU**:
    ▪ noise power density

- channel power
- occupied bandwidth, with additional automatic center frequency and channel power measurement.

› **Peak Table** (of Spectrum)
A list of relevant signal peaks in the measured spectrum.

› **Spectrogram** [Option]
Visual representation of the recorded spectrums versus time. Colors represent the signal level. The smallest selectable time resolution is 31.25 μs. Detectors compress the high-speed real-time spectrums down to the selected time resolution. Up to three spectrograms with different detectors are available concurrently.

› **Persistence** (of real-time Spectrum) [Option]
Displays the spectrums as level versus frequency. Color indicates rate of occurrence. Sporadic signals can be detected easily.

› **Level Meter** [Option]
Shows the results from an independent receiver path with channel filters:
› Channel levels measured using up to three different detectors are available simultaneously.
› Filters and detectors for EMC measurements are MIL and CISPR compliant.
› Tone Search: The level of one of the detectors modulates the pitch of an audible tone. This is useful for manual direction finding using a handheld directional antenna, and for PIM hunting.

› Modulation detectors for AM, FM and PM. Up to 4 different detectors are available simultaneously.
› Frequency offset
› AFC
› Azimuth direction of the external antenna handle with integrated compass.
› Audio demodulator [Option] for AM, Pulse, CW, ISB, USB, LSB, FM, PM, or I/Q with squelch and AGC function. The demodulator and its menu is also available in other views.

› **Map** [Option]
Visualization of the current position and measurement results on a map:
› Labels for each stored data set
› Bearings
› Localization based on statistical evaluation of the bearings and displayed as a transparent heatmap overlay and an ellipse indicating the uncertainty.
› Multiple localization results

› **Bearing** [Option]
Shows azimuth, elevation, DF quality, and omnidirectional RMS level derived from the Narda automatic DF antenna (ADFA).

› **VITA 49 IQ Streaming and FFT Streaming** [Option]
Shows the basic measurement parameter settings while streaming I/Q data according to the Vita 49 standard.

Tasks and Views

		Measurement Engine or Task Mode			
		Spectrum (Scan)	**RT (Real-Time) Spectrum**	**Auto DF**	**RT Streaming**
Views	*Spectrum*	✓	RT	✓	
	Peak Table (of Spectrum)	✓	RT	✓	
	Spectrogram	✓	RT		
	Persistence		RT		
	Level Meter		✓		
	Map	✓	✓	✓	
	Bearing			✓	
	Vita 49 FFT Streaming				✓
	Vita 49 IQ Streaming				✓

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 (shown as <, ≤, >, ≥, ±, max., min.) apply under the given conditions for the product and are tested during production, considering measurement uncertainty.

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 (shown 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 the dispersion of the values attributed to the measurands with an estimated confidence level of approximately 95%. 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 to the Expression of Uncertainty in Measurement" (GUM).

Specifications [a]

Basic Unit SignalShark 3310/01

Frequency					
Frequency range	8 kHz to 8 GHz				
Scan rate (basic unit, full span)	> 50 GHz/s @ RBW = 1.6 MHz 30 GHz/s (typ.) @ RBW = 100 kHz				
RBW (RT Spectrum)	1 Hz to 800 kHz				
RBW (Scan Spectrum)	1 Hz to 6.25 MHz				
CBW (Level Meter)	25 Hz to 40 MHz				
EMC filter bandwidth (Spectrum and Level Meter)	10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz & 1 MHz				
Detectors (Spectrum and Level Meter)	+Pk, RMS, -Pk, Avg and Sample				
CISPR Detectors (Level Meter)	Cpeak (quasi-peak), CRMS & CAvg (EMC filter with CISPR bandwidth must be selected)				
SSB phase noise	f_C	df = 1 kHz	df = 10 kHz	df = 100 kHz	df = 1 MHz	df = 10 MHz
	10 MHz	< -120 dBc (1/Hz)	< -130 dBc (1/Hz)	< -135 dBc (1/Hz)		
	1 GHz	< -90 dBc (1/Hz)	< -101 dBc (1/Hz)	< -101 dBc (1/Hz)	< -112 dBc (1/Hz)	< -132 dBc (1/Hz)
Internal reference frequency	Deviation: < 1 ppm				
	(includes initial deviation, aging within the first 2 years, and temperature response)				

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

Amplitude

HDR (High Dynamic Range)		SignalShark can detect low level signals even in the presence of very strong signals. It does this by combining high sensitivity with a wide intermodulation-free dynamic range. The DANL and IP2 / IP3 values stated below are valid at the same setting.		
	DANL (Noise Figure) @ attenuator = 0 dB, no preamp	1 MHz ≤ f ≤ 44 MHz	< -160 dB (mW/Hz)	(resultant noise figure < 14 dB)
		44 MHz < f ≤ 3 GHz	< -159 dB (mW/Hz)	(resultant noise figure < 15 dB)
		44 MHz < f ≤ 3 GHz	-162 dB (mW/Hz) (typ.)	(resultant noise figure 12 dB)
		3 GHz < f ≤ 8 GHz	< -152 dB (mW/Hz)	(resultant noise figure < 22 dB)
	2nd order intercept point (IP2, 2 tones) @ attenuator = 0 dB, no preamp	4 MHz ≤ f < 42 MHz [b]	> 60 dBm	
		42 MHz ≤ f ≤ 8 GHz	40 dBm (typ.)	
	3rd order intercept point (IP3, 2 tones) @ attenuator = 0 dB, no preamp	3 MHz < f ≤ 44 MHz	> 20 dBm	
		3 MHz < f ≤ 44 MHz	26 dBm (typ.)	
		44 MHz < f ≤ 630 MHz	> 4 dBm	
		630 MHz < f ≤ 3 GHz	> 6 dBm	
		44 MHz < f ≤ 3 GHz	14 dBm (typ.)	
		3 GHz < f ≤ 8 GHz	> 5 dBm	
		3 GHz < f ≤ 8 GHz	12 dBm (typ.)	
Level uncertainty		9 kHz ≤ f ≤ 8 GHz	< ± 2 dB	
Residual spurs [c] @ attenuator = 0 dB		8 kHz ≤ f ≤ 44 MHz	< -120 dBm	exceptions < -100 dBm
		44 MHz < f ≤ 3 GHz	< -115 dBm	exceptions < -100 dBm
		3 GHz < f ≤ 6 GHz	< -110 dBm	exceptions < -95 dBm
		6 GHz < f ≤ 8 GHz	< -105 dBm	exceptions < -85 dBm
IF rejection		> 80 dB		
Image rejection		> 80 dB		

Real-Time Spectrum

Signal duration for 100 % POI	@ RBW = 800 kHz	> 3.125 μs without attenuation and spectral growth
		> 2 ns with attenuation proportional to the spectral growth
Spectrum rate	1.6 million spectra / s	@ RBW = 800 kHz and 75 % FFT Overlap
FFT overlap	Fspan > 20 MHz	75 %
	Fspan ≤ 20 MHz, RBW ≤ 400 kHz	87.5 %

[b] *Component at f1 + f2 is measured in the direct band (Fcent ≤ 64 MHz in real-time mode)*

[c] *Typically with only few exceptions. These are documented in the calibration certificate*

RF Input	
Type (switchable)	1 x N-connector, 50 Ω (female) 3 x SMA-connector, 50 Ω (female)
RF destruction limit	20 dBm
Max. nominal RF level	15 dBm
Maximum DC voltage	25 V
Return loss	12 kHz ≤ f ≤ 3 GHz > 9.54 dB
	3 GHz < f ≤ 6 GHz 12 dB (typ.)
	6 GHz < f ≤ 8 GHz 10 dB (typ.)
Isolation between used and unused inputs	8 kHz ≤ f ≤ 1 GHz 60 dB (nom.)
	3 GHz 50 dB (nom.)
	8 GHz 35 dB (nom.)

General Specification	
Attenuator	0 to 30 dB (0.5 dB steps)
Digitizer	16 Bit
GNSS	Embedded receiver and antenna (GPS/QZSS, GLONASS, BeiDou, Galileo)
Internal non removable Memory	SSD, mSATA 30 GB system partition 28 GB configuration, settings and user data
Removable memory	microSD (SDXC) / USB 2.0 / USB 3.0
External power supply:	Basic unit, DC input: 10 to 48 VDC AC adapter, input: 100V-240VAC, output: 12VDC, 5.5A

Plug type: Non-Locking Power Plug S1017 |
| Battery

In many countries, the battery is available from several public distributors. | 2 x Lithium-ion rechargeable battery pack, hot-swappable during operation Operating time: approx. 3 hours (typical, with both batteries) Charging time: approx. 4.2 hours (nominal, with both batteries charging in base device) Charging time: approx. 3 hours (nominal, with external charger) |
Dimensions (H × W × D)	230 mm × 335 mm × 85 mm (9.06" × 13.19" × 3.35")
Weight	Approx. 4.1 kg / 9.04 lbs (with one battery)
Country of origin	Germany
Recommended calibration interval	24 months

Interfaces	
10 MHz Reference input	1 x SMA-connector, 600 Ω (female)
PPS/Trigger input	1 x SMA, 100 kΩ (female)
GNSS Antenna Input *(for additional, external GNSS antenna)*	1 x SMA, 50 Ω, female (DC voltage for active antennas is supplied)
Display Size and Resolution:	10.4", 1024 x 768 pixels, Color Resistive touch
Video	1 x Display Port
Audio	1 x 3.5 mm headphone jack Built-in loudspeaker Built-in microphone
Ethernet	1 x GigE (10/100/1000Base-T), RJ45
USB (Host)	1 x USB 3.0, 1 x USB.2.0
SD card slot	1 x microSD-card (SDXC)

Remote Control and Streaming	
Remote control protocol	SCPI
FFT streaming	VITA49 compliant
I/Q streaming	VITA 49 IQ-Streaming, sample rate up to 25.6 MHz
Remote Software	Remote Desktop for PC, Tablet and Smartphone (Windows, Android, IOS)

Additional Functions	
Noise power density measurement	Can be measured with up to eight markers at a time.
Channel power measurement	Can be measured with up to eight markers at a time.
Occupied bandwidth measurement	According to ITU-R SM.443-4, with additional automatic center frequency and channel power measurement. Can be measured with up to eight markers at a time.
Field strength measurement	According to ITU-R SM.378-7
CISPR Detectors	Cpeak (quasi-peak), CRMS & CAvg (EMC filter with CISPR bandwidth must be selected)
Modulation detectors	AM, FM and PM. Up to 4 different detectors are available simultaneously
Frequency offset measurement	For CBW ≤ 1 MHz (using modulation detectors)
Analog demodulation and recording	AM, Pulse, CW, ISB, USB, LSB, FM, PM, or I/Q signals can be demodulated with squelch and AGC function. The demodulated signal can be stored as WAV-file.
Tone Search	For PIM and interference hunting. The level of one of the detectors modulates the pitch of an audible tone.
Automatic DF	Automatic bearing of transmitters using a Narda Automatic DF Antenna.
Automatic transmitter localization (Heatmap)	Automatic calculation of the transmitter location.
TDOA localization[d]	Integrated GPS with high-accuracy timestamp for TDOA applications.

Environmental Conditions		
MIL-PRF-28800F Class 2	Operating temperature	
	Storage temperature	
	Operating humidity	
	Random vibration	
	Functional shock	
	Transit drop	
Operating temperature	- 10 °C to + 55 °C with battery	
	- 10 °C to + 55 °C with external power supply 0 °C to + 40 °C with external power supply when charging batteries	
Humidity	< 29 g/m³ (< 93 % RH at +30°C), non-condensing	
IP class	IP 54 (with antenna attached and interface protectors closed) IP 67 (stored in the hardcase)	
Climatic	Storage	1K3 (IEC 60721-3) extended to - 20 °C to + 70 °C (batteries removed)
	Transport	2K4 (IEC 60721-3) restricted to - 20 °C to + 70 °C
	Operating	7K2 (IEC 60721-3) extended to - 10 °C to + 55 °C
Mechanical	Storage	1M3 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operating	7M3 (IEC 60721-3)

[d] Requires additional software

Compliance		
EMC	European Union	Complies with EMC Directive 2014/30/EU and IEC/EN 61326 -1: 2013
	Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11
	Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
Safety		Complies with European Low Voltage Directive 2014/35/EU and IEC/EN 61010-1:2010
Material		Complies with European RoHS Directive 2011/65/EU

Ordering Information

The SignalShark Basic Unit is included in the Basic Set. Application Packages as well as Software Options and Accessories that provide additional signal analysis capabilities are also available.

Your local Narda sales representative can provide information about all the possible options and will be pleased to offer advice.

SignalShark Basic Unit:

SignalShark Basic Set	Part number
The Basic set contains the SignalShark as well as basic accessories and supports 40 MHz real-time spectrum analysis, marker and peak table. **Includes:** › SignalShark 3310/01 Basic Unit › 2x Battery Pack, Rechargeable › Power Supply 12VDC, 5.5A, 100V-240VAC, plug * › Touch pen for resistive touch screen › 40 MHz real-time Spectrum, Marker and Peak Table › Electronic manual (English) › Safety Instructions › SignalShark 3310 - Quick Start Guide	**3310/101**

* Please choose Power Cord 2260/90.65 -.69

Software Options

Software options allows the adaption of the device feature set to your needs.

Software Option Description	Part number
40 MHz real-time Spectrum, Marker and Peak Table (included in SignalShark Basic Set 3310/101)	**Basic Set**
Option, Spectrogram	**3310/95.002**
Option, Level Meter incl. Compass values	**3310/95.003**
Option, Persistence (of real-time Spectrum)	**3310/95.004**
Option, Automatic DF Antenna Control, Bearing View	**3310/95.005**
Option, Mapping and Localization	**3310/95.006**
Option, Horizontal Scan	**3310/95.011**
Option, SCPI Remote Control	**3310/95.012**
Option, VITA 49	**3310/95.014**
Option, Analog Demodulation	**3310/95.007**

Accessories

Accessory Description	Part number
Power Supply 12VDC, 5.5A, 100V-240VAC, Non-Locking Power Plug S1017, choose Power Cord 2260/90.65 -.69	**2259/92.09**
Power Supply DC Vehicle Adapter, screw plug	**2259/92.12**
Battery Pack Set, rechargeable, Li-Ion, 2 x RRC2057, Li-Ion, 7V5 , 6.4Ah	**2259/92.16**
Double Charger Set, external, for 2259/92.16, choose Power Cord 2260/90.70 -.74	**2259/92.17**
Vehicle power adapter for charger set 2259/92.17	**2259/92.15**
External GNSS Antenna, active	**3300/90.05**
Touch pen for resistive touch screen	**3300/90.07**
Carrying Strap for Basic Unit	**3300/90.08**
RF Adapter, N Male to SMA Female, 50 Ohm	**3300/90.13**
Headphone, 3.5mm Plug for SignalShark	**3300/90.14**
Hardcase for SignalShark 3310	**3310/90.01**
Recovery media for SignalShark	**3310/90.03**
10.4" Screen Protector Film	**3310/90.04**
Tripod, Non-Conductive, 1.65m, reinforced, 3/8"-16 UNC	**3300/90.16**
Tripod Quick-Release Coupling, 3/8"-16 UNC	**3300/90.17**

Antennas	Part number
Directional Antenna 1, 20 MHz to 250 MHz	**3100/11**
Directional Antenna 2, 200 MHz to 500 MHz	**3100/12**
Directional Antenna 3, 400 MHz to 8 GHz	**3100/13**
Loop Antenna, H-Field, 9 kHz to 30 MHz	**3100/14**
Antenna Adapter, N Male for Handle 3100/10 and 3300/10	**3100/15**
Arm Support for Active Antenna Handle	**3100/90.10**
Active Antenna Handle for SignalShark, 9 kHz to 8 GHz	**3300/10**
Automatic DF-Antenna 1 Basic Set, 200 MHz to 2.7 GHz [e]	**3360/101**
Automatic DF-Antenna 2 Basic Set, 10 MHz to 8 GHz [e]	**3361/101**

There is a separate DF antenna datasheet, which provides detailed information about the direction-finding antennas available from Narda.

Application Packages

The application packages make it easy to adapt SignalShark to your requirements. Each package typically consists of application-dependent hardware accessories and/or firmware options, and costs less than purchasing the items individually. Additional packages can be purchased as and when required. Your local Narda sales representative will be happy to assist you in the selection of the right packages for your applications.

App. Package, Receiver	Part number
The Receiver Application Package guaranties situational awareness by providing gapless analysis of entire signal bands. It also enables demodulation of AM, FM, LSB, USB, and CW signals. **Includes:** › 3310/95.002 Option, Spectrogram › 3310/95.003 Option, Level Meter incl. Compass values › 3310/95.007 Option, Analog Demodulation	**3310/94.01**

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[e] *Requires Option 3310/95.005 "Option, Automatic DF Antenna Control, Bearing View"*

App. Package, Remote Control	Part number
Option VITA 49 requires option SCPI Remote Control for device setup and streaming control. This application package makes it easy to obtain the greatest benefits of SignalShark's remote control functionality. **Includes:** › 3310/95.012 Option, SCPI Remote Control › 3310/95.014 Option, VITA 49	**3310/94.10**

App. Package, Off-Site Extension	Part number
This Application Package provides suitable accessories for applications that involve operation in vehicles or outdoors. A hard shell case with wheels and a retractable handle provides secure (IP 67) the transport of the SignalShark and all accessories. The DC adapter enables powering the device from a vehicle. An easily and quickly worn carry strap provides hands-free support for viewing the SignalShark allowing even long-term measurements to be made comfortably. **Includes:** › 2259/92.12 Power Supply DC Vehicle Adapter, screw plug › 2259/92.17 Double Charger Set, External for 2259/92.16, choose Power Cord 2260/90.70 -.74 › 2259/92.15 Vehicle power adapter for charger set 2259/92.17 › 3310/90.01 Hardcase for SignalShark 3310 › 3300/90.14 Headphone, 3.5mm Plug for SignalShark › 3300/90.08 Carrying Strap for Basic Unit › 3310/90.04 10.4" Screen Protector Film	**3310/94.07**

App. Package, Direction Finding Basic	Part number
This Application Package provides comprehensive functions to support hunting of interference signals and hidden transmitters. The device based GPS and the antenna handle with built-in electronic compass makes it possible to conveniently take bearings on a transmitter from various locations. **Includes:** › 3310/95.011 Option, Horizontal Scan › 3310/95.006 Option, Mapping and Localization (SCPI currently not supported) › 3300/10 Active Antenna Handle 9 kHz - 8 GHz › 3100/90.10 Arm Support for Active Antenna Handle	**3310/94.02**

App. Package, Antenna Basic Kit (Mobile Operators)	Part number
This Application Package provides you with a lightweight yet robust directional antenna for the frequency range from 400 MHz to 8 GHz and covers cellular communication as well as other service bands. The Package also includes an antenna adapter that allows you to use your own antennas together with the Antenna Handle. This enables you to benefit from the integrated compass, low noise amplifier, and automatic polarization detector in the handle when using your own antennas. **Includes:** › 3100/13 Directional Antenna 3, 400 MHz to 8 GHz › 3100/10 Antenna Adapter, N Male for Handle	**3310/92.03**

App. Package, Antenna Extension Kit	Part number
This Application Package complements and completes the Antenna Basic Kit Application Package so that you can make the best use of the entire frequency range from 9 kHz to 8 GHz. **Includes:** › 3100/11 Directional Antenna 1, 20 MHz to 250 MHz › 3100/12 Directional Antenna 2, 200 MHz to 500 MHz › 3100/14 Loop Antenna, H-Field, 9 kHz to 30 MHz	**3310/92.04**

App. Package, Automatic DF 1, 200 MHz to 2.7 GHz *		Part number
This Application Package provides basic equipment and options for vehicle based, automatic direction finding (bearing).		**3310/94.05**
Includes:		
› 3360/01	Automatic DF-Antenna 1	
› 3300/90.19	Tool, Allen Wrench 3 mm	
› 3310/95.005	Option, Automatic DF Antenna Control, Bearing View	
› 3300/90.04	ADFA Vehicle Mounting Kit for autom. DF Antenna	
› 3603/02	RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m	
› 3360/98.12	Automatic DF-Antenna Handling and Safety Instructions multilingual	

*Additional option 3310/95.006 "Mapping and Localization" is recommended for Open Street Map based visualization and heatmap localization.

App. Package, Automatic DF 2, 10 MHz to 8 GHz *		Part number
This Application Package provides basic equipment and options for vehicle based, automatic direction finding (bearing).		**3310/94.06**
Includes:		
› 3361/01	Automatic DF-Antenna 2	
› 3300/90.19	Tool, Allen Wrench 3 mm	
› 3310/95.005	Option, Automatic DF Antenna Control, Bearing View	
› 3300/90.04	ADFA Vehicle Mounting Kit for autom. DF Antenna	
› 3603/02	RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m	
› 3360/98.12	Automatic DF-Antenna Handling and Safety Instructions multilingual	

*Additional option 3310/95.006 "Mapping and Localization" is recommended for Open Street Map based visualization and heatmap localization.

Narda DF Antennas Datasheet

SignalShark Command Reference Guide

SignalShark 3320

SignalShark 3330

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