Datasheet | SignalShark® 3320

SignalShark

Real-Time Remote Analyzer

Real-Time Remote Analyzer SignalShark® 3320, for the Detection, Analysis, Classification and Localization of RF Signals between 8 kHz and 8 GHz.

Supports automatic direction finding and TDOA.

Solves complex measurement and analysis tasks reliably and quickly with outstanding RF performance.

Windows 10-based open platform for third-party applications.

› 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
› Common used SCPI standard for remote control
› VITA 49 streaming (sample rate up to 25.6 MHz) allowing storage and post processing of the signal raw data.
› Modular design
› Stand-alone / brick unit and 19'' rack, 1HU single / dual devices available
› Third-party applications can additionally be hosted on the Windows 10 based device
› Can also be operated by an additional touch screen (USB + Display Port) or via Remote Desktop
› Can handle additional USB devices like mass storage, LTE-modem, printer or sensors and actors

Take up the frequency spectrum challenges of today and tomorrow

Seven Senses for Signals

Description

The SignalShark is available in different forms. The form factor of the remote analyzer version is ideal for remote control applications. It can be easily mounted in a 19" rack or even in a small custom housing or a tight corner of a vehicle, thanks to its compact size. The use of well-documented SCPI reference commands and VITA 49 compliant I/Q streaming allows easy integration into every software environment.

The SignalShark is equipped with an excellent RF front-end with outstanding sensitivity and dynamic range, and which also provides four switchable RF inputs. In Scan mode, it operates as a super-fast spectrum analyzer. It computes FFTs of up to 16,384 points with at least 75% overlap within its real-time bandwidth of 40 MHz. This means that every signal event can be detected reliably, even if it is extremely short and infrequent.

There is an independent receiver path in addition to the spectrum path. The center frequency and channel bandwidth of this path are freely selectable within the 40 MHz real-time bandwidth. The receiver path is equipped with functions for channel level measurements, modulation analysis, audio demodulation, and I/Q streaming.

The SignalShark supports the use of Narda automatic direction-finding antennas (ADFA). Bearing cycles as short as 1.2 ms can be achieved. The integrated map and localization software allows reliable homing-in on the signal, even in an urban environment.

The SignalShark is an excellent choice for every localization system based on TDOA, thanks to precise timestamp synchronization and Vita 49 I/Q streaming. The reference clock can be selected from the PPS signal of the internal GNSS receiver, or that of the ADFA's GNSS receiver, or from a dedicated PPS input.

The powerful CPU of the SignalShark can run third-party software and scripts, which makes it easy to extend the capabilities of the SignalShark or to build up a customized stand-alone system.

Applications

The SignalShark is ideal for applications requiring high sensitivity, high dynamic range, reliable detection of very short and infrequent signal events, and transmitter localization. These requirements are all essential for radio monitoring. Radio monitoring can take different forms, depending on the why it is needed. For example, regulators may monitor the spectrum to ensure that vital public safety and security services run reliably, and that licensed parts of the spectrum are used only by the license holders. The armed forces need to know the actual usage of the spectrum in order to gather tactical or strategic information about potential enemies. Police and intelligence agencies may be interested in the content or at least the meta-data of some signal transmissions, and may also need to locate transmitters used for eavesdropping. Cellular network providers need to be able to quickly trace the source of harmful interference.

The high sensitivity and high dynamic range of the SignalShark ensures that the signals of interest are not hidden in the noise floor and that signal artifacts due to intermodulation will not be confused with real signals. The extraordinarily high FFT overlap in real-time spectrum mode ensures reliable detection of extremely short and/or infrequent signal events. Modulation analysis and occupied bandwidth measurements help regulators to make sure that spectrum usage is as intended. The audio demodulator assists in the classification of analog modulated transmissions under investigation. I/Q streaming enables third-party software to also be used to classify and decode digital transmissions. The use of Narda automatic DF antennas with the integrated statistical localization algorithm allows localization of transmitters, based on AOA. The SignalShark has already been proven to be easily integrated into third-party TDOA systems. Its superior synchronization properties are essential for reliable TDOA-based localization.

Although the SignalShark is optimized for radio monitoring, it can certainly also be used in most applications where a general-purpose spectrum analyzer would normally be required, often providing better RF performance, higher speed, and ease of integration. Its open platform for third-party software and scripts allows fully customized stand-alone solutions that can replace the large, complicated systems that were previously necessary

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. For the SignalShark 3320 Remote Unit, it can be accessed with remote desktop software via a network and can also be run as a stand-alone system by means of 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.
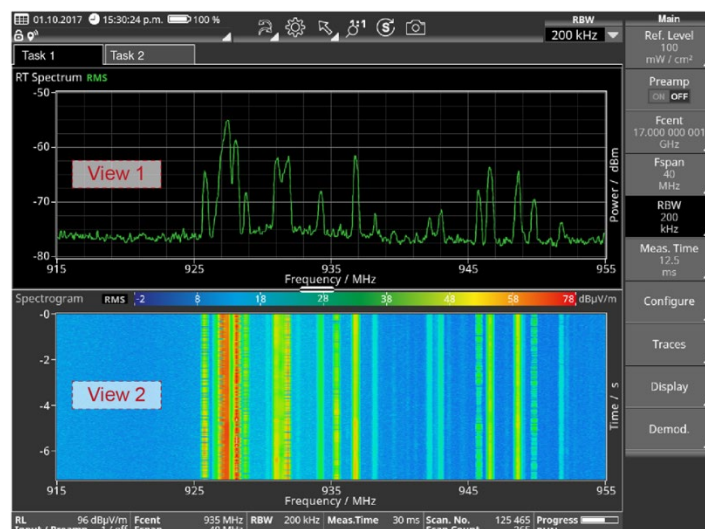

Fig. 1. RT Spectrum view (View 1) and Spectrogram view (View 2) in a task (Task 2)

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 3320

Frequency						
Frequency range	8 kHz to 8 GHz					
Scan rate (full span)	> 50 GHz/s @ RBW = 1.6 MHz > 32 GHz/s @ 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: Locking Power Plug S10KS17	
Dimensions (H × W × D) (without connectors)	43.5 mm × 220 mm × 204 mm (1.71" × 8.66" × 8.03")	
Weight	Approx. 2.1 kg / 4.63 lb (stand-alone unit)	
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)
Video	1 x Display Port
Audio	1 x 3.5 mm headphone jack
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 TDO applications.

Environmental Conditions

MIL-PRF-28800F Class 2	Operating temperature	
	Storage temperature	
	Operating humidity	
	Random vibration	
	Functional shock	
	Bench drop	
Operating temperature	- 20 °C to + 55 °C	
Humidity	< 29 g/m³ (< 93 % RH at +30°C), non-condensing	
Climatic	Storage	1K3 (IEC 60721-3) extended to - 40 °C to + 70 °C
	Transport	2K4 (IEC 60721-3) restricted to - 40 °C to + 70 °C
	Operating	7K2 (IEC 60721-3) extended to - 20 °C to + 55 °C
Mechanical	Storage	1M3 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operating	7M3 (IEC 60721-3)

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

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[d] Requires additional software

SignalShark 3320/101

H = 43.5 mm
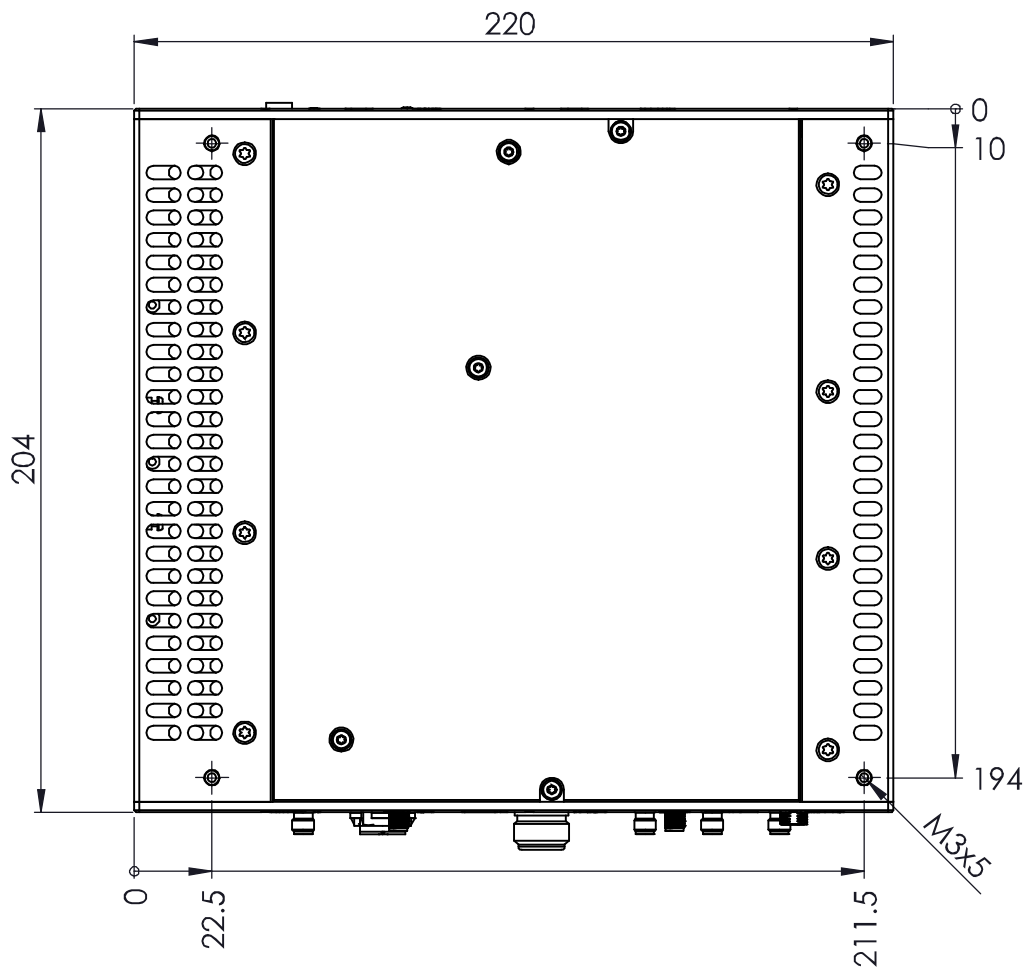
All dimensions in mm.

SignalShark 3320/102

SignalShark 3320/103

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 Remote Unit, built-in, single device	Part number
The Basic set contains the SignalShark Remote Unit, built-in, single device as well as basic accessories and supports 40 MHz real-time spectrum analysis, marker, peak table and SCPI remote control functions. **Includes:** › SignalShark 3320/01 Basic Unit › Power Supply 12VDC, 5.5A, 100V-240VAC* › Equipment feet set for desktop use › 40 MHz real-time Spectrum, Marker and Peak Table › Option, SCPI Remote Control › Electronic manual (English) › Safety Instructions › SignalShark 3320 - Quick Start Guide	**3320/101**

* Please choose Power Cord 2260/90.65 -.69

SignalShark Remote Unit 19" Basic Set, single	Part number
The Basic set contains the SignalShark Remote Unit, 19", 1 HU, single device as well as basic accessories and supports 40 MHz real-time spectrum analysis, marker, peak table and SCPI remote control functions. **Includes:** › SignalShark 3320/02 Basic Unit › Power Supply 12VDC, 5.5A, 100V-240VAC* › Equipment feet set for desktop use › 40 MHz real-time Spectrum, Marker and Peak Table › Option, SCPI Remote Control › Electronic manual (English) › Safety Instructions › SignalShark 3320 - Quick Start Guide	**3320/102**

* Please choose Power Cord 2260/90.65 -.69

SignalShark Remote Unit 19" Basic Set, dual	Part number
The Basic set contains the SignalShark Remote Unit, 19", 1 HU, dual device as well as basic accessories, and supports 40 MHz real-time spectrum analysis, marker, peak table and SCPI remote control functions. **Includes:** › SignalShark 3320/03 Basic Unit (two devices) › 2 x Power Supply 12VDC, 5.5A, 100V-240VAC* › Equipment feet set for desktop use › 40 MHz real-time Spectrum, Marker and Peak Table › Option, SCPI Remote Control › Electronic manual (English) › Safety Instructions › SignalShark 3320 - Quick Start Guide	**3320/103**

* Please choose Power Cord 2260/90.65 -.69

Software Options

Software options allows the adaption of the device feature set to your needs. Also in dual device sets (3320/103) each unit can be adapted individually.

Software Option Description	Part number
40 MHz real-time Spectrum, Marker and Peak Table (included in SignalShark Basic Set 3310/101)	**Basic Set**
Option, SCPI Remote Control (included in SignalShark 3320 Basic Set)	**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, VITA 49	**3310/95.014**
Option, Analog Demodulation	**3310/95.007**

Accessories

Accessory Description	Part number
Power Supply 12VDC, 5.5A, 100V-240VAC, Locking Power Plug S10KS17, choose Power Cord 2260/90.65 -.69 (included in SignalShark 3320 Basic Set)	**2259/92.10**
Power Supply DC Vehicle Adapter, screw plug	**2259/92.12**
External GNSS Antenna, active	**3300/90.05**
RF Adapter, N Male to SMA Female, 50 Ohm	**3300/90.13**
Headphone, 3.5mm Plug for SignalShark	**3300/90.14**
Recovery media for SignalShark	**3310/90.03**

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**

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). **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	**3310/94.05**

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

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[e] *Requires Option 3310/95.005 "Option, Automatic DF Antenna Control, Bearing View"*
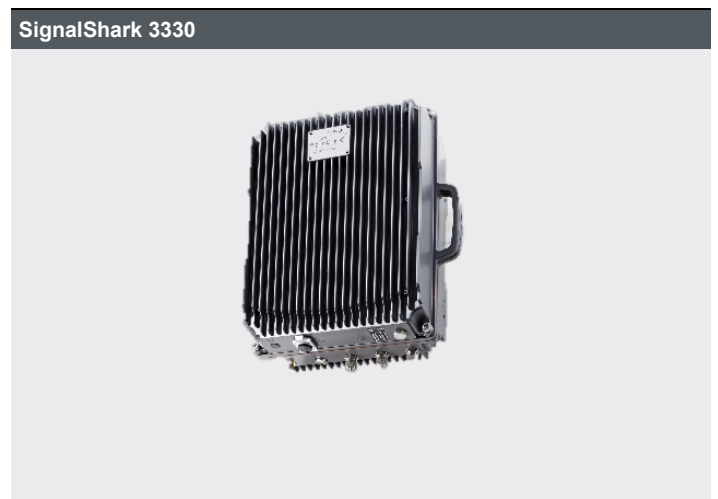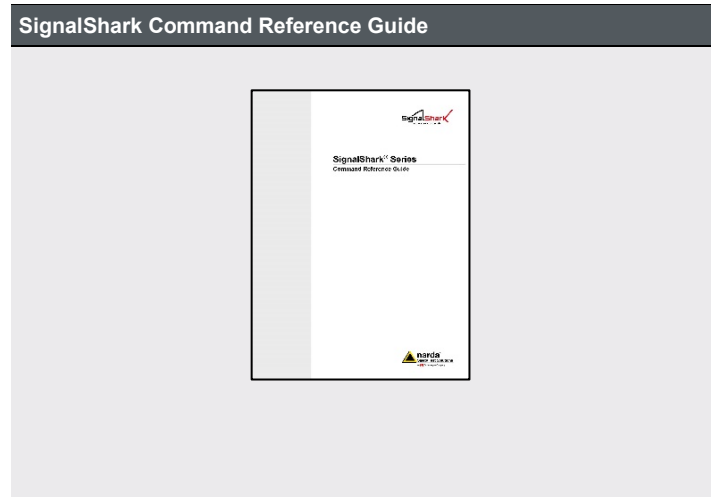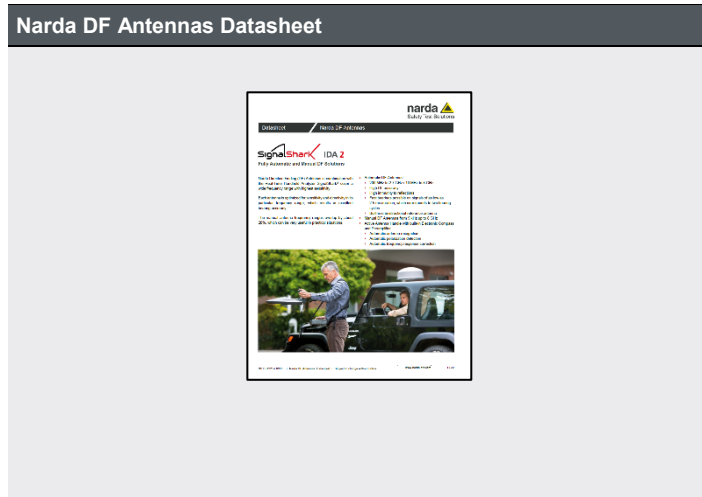
App. Package, Automatic DF 2, 10 MHz to 8 GHz *		Part number
This Application Package provides basic equipment and options for vehicle based, automatic direction finding (bearing).		**3310/94.06**
Includes:		
› 3361/01	Automatic DF-Antenna 2	
› 3300/90.19	Tool, Allen Wrench 3 mm	
› 3310/95.005	Option, 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

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

For more information, please visit our website www.narda-sts.com

Narda DF Antennas Datasheet

SignalShark Command Reference Guide

SignalShark 3310

SignalShark 3330