

SignalShark[®]



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
- > Extremely fast Scan Rate of up to 40 GHz/s
- > 40 MHz Real-Time instantaneous bandwidth
- > Powerful, live persistence spectrum to find hidden signals
-) 100 % POI for signals longer than 3.125 µs
- > High Dynamic Range (HDR) Receiver
- High level accuracy





www.narda-sts.com/signalshark





Take on the frequency spectrum challenges of today and tomorrow

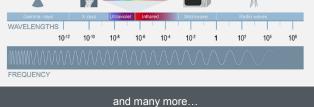






Area Protection Communication detection next to a border or a secret area

Carma rays Xrays Utax



ELECTROMAGNETIC SPECTRUM

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 > 3.125μ s 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

The design and GUI layout of SignalShark is based on customer applications. This can be seen most clearly in the concept of Tasks and Views.

Tasks

Often a real-live measurement is a workflow of several measurement steps, like finding a signal in the spectrum, measuring its level and analyzing its behavior. With typical analyzers, you have to switch between different measurement modes and settings within the modes.

With SignalShark you can handle a complete measurement workflow within one or several measurement task. Measurement tasks are represented by a tab on the screen, like a web site within a web browser. They encapsulate all measurement parameters and the underlying measurement engine mode. Within a task, all measurements can be performed at the same time. You can add up to six measurement visualizations (Views) to a task, to adapt it to your needs.

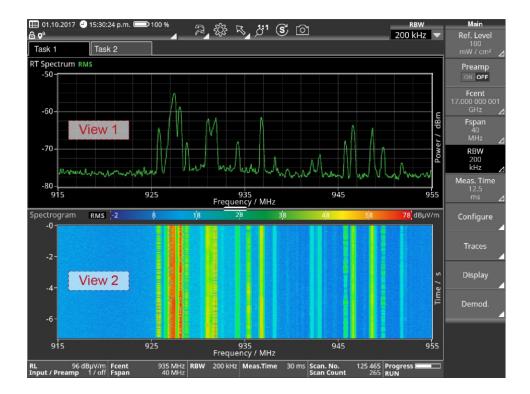
To support a wide variety of measurement applications, SignalShark provides several task modes.

Spectrum (Scan) Mode

This mode supports measuring the spectrum with full frequency span of 8 kHz up to 8 GHz within one measurement and a maximum measurement speed of 40 GHz/s.

Real-Time Spectrum Mode

The Real-Time Spectrum mode enables real-time spectrum measurements with a frequency span of up to 40 MHz. This frequency span will be acquired simultaneously in frequency and gapless in time with 75% of overlapping of the FFT frames. For frequency spans \leq 20 MHz the overlapping of the FFT frames increases to 87.5 %. At the same time a second digital down converter is used for analyzing and demodulating the I/Q data of a separate channel with selectable frequency and bandwidth within the 40 MHz real-time bandwidth.







Views

Measurements are visualized within different kind of views. You can look at the frequency domain and channel level 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 over frequency.
- **Peak Table** (of Spectrum)

List of relevant signal peaks in the measured spectrum.

> Spectrogram

Visual representation of recorded spectra over time. Colors represent the signal level. The smallest selectable time resolution is 31.25 µs. Detectors compress the high-speed real time spectra to the selected time resolution.

> Level Meter (& Compass)

Shows channel level as bar graph and the direction of the active antenna handle.

> Persistence (of real time Spectrum)

Displays spectra as level versus frequency.

Color indicates rate of occurrence. Sporadic signals can be detected easily.

		Measurement Engine or Task Mode			
		Spectrum (Scan)	RT (Real-Time) Spectrum		
	Spectrum	✓	RT		
View	Peak Table of Spectrum	1	RT		
	Spectrogram	1	RT		
	Persistence		RT		
	Level Meter and Compass		√		

Definitions and Conditions

Conditions

Specifications apply after 30 minutes warm-up time and an internal equalizer adjustment evoked by the user after the warm-up time. Unless otherwise noted specifications apply within the specified environmental conditions provided 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 <, \leq , >, \geq , \pm , 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 <, \leq , >, \geq , \pm , 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 measure and estimate 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 for the Expression of Uncertainty in Measurement" (GUM).





General Specifications ^a

Basic Unit SignalShark 3310/01

Frequency			
Frequency Range	8 kHz – 8 GHz		
Scan Rate	40 GHz/s (RBW ≥ 100 kHz)		
RBW (RT Spectrum)	1 Hz 800 kHz		
RBW (Scan Spectrum)	1 Hz 6.25 MHz		
CBW (Level Meter)	25 Hz 40 MHz		
EMC Filter BW (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 & Sample		
CISPR Detectors (Level Meter)	Cpeak, CRMS & CAvg (EMC Filter with CISPR BW 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 dB(1/Hz) < -130 dB(1/Hz) < -135 dB(1/Hz)		
	1 GHz < -90 dB(1/Hz) < -102 dB(1/Hz) < -102 dB(1/Hz) < -112 dB(1/Hz) < -1	132 dB(1/Hz)	
Internal reference frequency	Deviation: < 1 ppm		
	includes initial deviation, aging within first 2 years and temperature response		
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)	1 MHz \leq f \leq 44 MHz: < -160 dB(mW/Hz) (resultant noise figure < 14 d	В)	

	no preamp 2 nd order intercept point (IP2, 2 tones)	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)
		3 GHz < f ≤ 8 GHz:	< -152 dB(mW/Hz)	(resultant noise figure < 22 dB)
		3 MHz ≤ f ≤ 44 MHz	> 56 dBm	
		44 MHz < f ≤ 630 MHz 630 MHz <f 8="" ghz<="" td="" ≤=""><td>30 dBm (typ.) 40 dBm (typ.)</td><td></td></f>	30 dBm (typ.) 40 dBm (typ.)	
	3rd order intercept point	3 MHz < f ≤ 44 MHz	> 20 dBm	
	(IP3, 2 tones) @ attenuator = 0 dB, no preamp	44 MHz < f ≤ 8 GHz	12 dBm (typ.)	
		44 MHz < f ≤ 3 GHz	> 2 dBm	
		3 GHz < f ≤ 8 GHz	> 5 dBm	
Level uncertainty		9 kHz ≤ f ≤ 8 GHz	< +/- 2 dB	
Residual spurs		8 kHz ≤ f ≤ 44 MHz	< -120 dBm	exceptions < -100 dBm (frequency list t.b.d.)
@ attenuator = 0 dB		44 MHz < f ≤ 3 GHz	< -115 dBm	exceptions < -100 dBm (frequency list t.b.d.)
		3 GHz < f ≤ 6 GHz	< -110 dBm	exceptions < -95 dBm (frequency list t.b.d.)
		6 GHz < f ≤ 8 GHz	< -105 dBm	exceptions < -85 dBm (frequency list t.b.d.)
Input related spurs @ L = Ref. Level, df >			< -80 dBc	exceptions < -70 dBc (frequency list t.b.d.)

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





bjectrum Rate 1.6 million spectra / s (g) RBW = 800 kHz and 75 % FFT Overlap FFT Overlap Fspan > 20 MHz 75 % FFT Overlap Fspan > 20 MHz, RBW ≤ 400 kHz 75 % FF Daput 1 x N-connector, 50 Ω, female Se Haput 20 dBm Hast, nominal RF level 10 dBm datamum DC voltage 25 V Betaum Dos 24 kHz 5 f 3 GHz > 9.54 dB 3 GHz < f 5 G GHz 12 dB (typ.) 8 GHz < f 5 G GHz 10 dB (typ.) Betaum loss 26 Hz 5 f 5 GHz 10 dB (typ.) Betaum loss Enbedded frequer and antenna 10 dB (typ.) Betaur Societ 10 dB (typ.) 10 dB (typ.) Societ 15 Bl 10 dB (typ.) Socinos Enbedded frequer and antenna	Real-Time Spectrum			
FT Overlap Fspan > 20 MHz 75 % Fg Input 87.5 % Ft Input 1 × N-connector, 50 Ω, female 3 × SMA-connector, 50 Ω, female 3 × SMA-connector, 50 Ω, female FT destruction limit 20 dBm Aax. nominal RF level 10 dBm Jaammun DC voltage 25 V Veturi loss 12 kHz ≤ f s 3 GHz > 9.54 dB 3 GHz < f s 6 GHz	Probability of intercept – POI	100 % for signal	s longer than 3.125 µs	@ RBW = 800 kHz and 75 % FFT Overlap
Papen ≤ 20 HHz, RBW 5 400 kHz 87.5 % Ref prote Si × N-connector, 50 Ω, female Yage 3 × S/MA - connector, 50 Ω, female Si Kolashalo) 20 dBm Base connial RF level 0 dBm Aaxinum DC voltage 20 dBm Base connial RF level 10 dBm Base connial RF level 10 dBm Base connial RF level 10 dBm Base connial RF level 12 MHz ≤ f 53 GHz > 9.54 dB Base connial RF level 10 dBm 10 dBm Base connial RF level 10 dBm 10 dBm Base dovice D GHz < f 26 GHz	Spectrum Rate	1.6 million spect	ra / s	@ RBW = 800 kHz and 75 % FFT Overlap
Finput 1 x N-connector, 50 Ω, female Sype 3 x SNA-connector, 50 Ω, female St Gestruction limit 20 dBm faax.nominal RF level 10 dBm faar.ong 12 kHz s f s GHz > 9.54 dB Sonaral Specifications 6 GHz < f s G GHz	FFT Overlap	Fspan > 20 MHz	2	75 %
Synchabie) 1 x N-connector, 50 Ω, female Switchabie) 3 x SMA-connector, 50 Ω, female Switchabie) 3 x SMA-connector, 50 Ω, female Atax. nominal RF level 10 dBm Atax. nominal RF level 12 kHz ≤1 ≤3 GHz > 9.54 dB Ster <1 ≤ 6 GHz		Fspan ≤ 20 MHz	z, RBW ≤ 400 kHz	87.5 %
sixitchable) 3 x SMA-connector, 50 D, female RF destruction limit 20 dBm dax. nominal RF level 10 dBm faximum DC voltage 25 V seturn loss 12 kHz ≤ f ≤ 3 GHz > 9.54 dB 3 GHz < f ≤ 6 GHz	RF input			
tax. nominal RF level 10 dBm daximum DC voltage 25 V Stetum loss 12 kHz ≤ 1 ≤ 3 GHz > 9.54 dB 3 GHz < 1 ≤ 6 GHz	Type (switchable)			
Jaximum DC voltage 25 V Return loss 12 kHz ≤ f ≤ 3 GHz > 9.54 dB 3 GHz < f s 6 GHz	RF destruction limit		20 dBm	
Leturn loss12 kHz sf s G Hz> 9.54 dB3 GHz < f s G GHz	Max. nominal RF level		10 dBm	
3 GHz <f 6="" ghz<="" s="" td=""> 12 dB (typ.) 6 GHz <f 8="" ghz<="" s="" td=""> 10 dB (typ.) Seneral Specifications 0 25 dB (0.5 dB Steps) Attenuator 0 25 dB (0.5 dB Steps) Digitizer 16 Bit SNSS Embedded receiver and antenna Internal non removable Memory SD, mSATA Removable memory microSD (SDXC) / USB 2.0 / USB 3.0 Atternal power supply: Base device DC input: 10 to 48 VDC Adapter 12VDC, 5.5A, 100V-240VAC Adapter 12VDC, 5.5A, 100V-240VAC Sattery C. Lithium-ion rechargeable battery pack, hot-swappable during operation Operating time: approx. 3 hours (nominal, with both batteries) In many countries, the battery is available from everal public distributors. Charging time: approx. 3 hours (nominal, with both batteries) Charging time: approx. 3 hours (nominal, with both batteries) Charging time: approx. 4.1 kg / 9.04 lbs (with one battery) Country of origin Eermany Eermany Neight Approx. 4.1 kg / 9.04 lbs (with one battery) Country of origin Correct cons I x SMA-connector, 600 Ω, female Eermany NYS Antenna Input 1 x SMA-connector, 600 Ω, female Eermany D MHz Reference i</f></f>	Maximum DC voltage		25 V	
b GHz < f ≤ B GHz	Return loss		12 kHz ≤ f ≤ 3 GHz	> 9.54 dB
Several Specifications Vittenuator 0 25 dB (0.5 dB Steps) Digitizer 16 Bit SNSS Embedded receiver and antenna Internal non removable Memory SSD, mSATA Removable memory microSD (SDXC) / USB 2.0 / USB 3.0 Base device DC input: 10 to 48 VDC Adapter 12VDC, 5.5A, 100V-240VAC Sattery 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 external charger) Dimensions (H × W × D) 230 mm × 335 mm × 85 mm (9.06" × 13.19" × 3.35") Veight Approx. 4.1 kg / 9.04 lbs (with one battery) Country of origin Germany Ntorfaces (DC voltage for active antennas is supplied) SNSS Antenna Input 1 x SMA, 100 kΩ, female (DC voltage for active antennas is supplied) SNSS Antenna Input 1 x SMA, 50 Ω, female (DC voltage for active antennas is supplied) SNSS antenna Input 1 x SMA p0 Ω, female (DC voltage for active antennas is supplied) SNSS Antenna Input 1 x SMA p0 Ω, female (DC voltage for active antennas is supplied) Sieplay Size and Resolution: 1 / 24 × 768 pixels, Color Resistive touch Video 1 x Sig			3 GHz < f ≤ 6 GHz	12 dB (typ.)
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for additional, external GNSS antenna)(DC voltage for active antennas is supplied)Display Size and Resolution:10.4", 1024 x 768 pixels, Color Resistive touch//ideo1 x Display Port/udio1 x 3.5 mm headphone jack Built-in loudspeaker Built-in microphoneEthernet1 x GigE (10/100/1000Base-T), RJ45JSB (Host)1 x USB 3.0, 1 x USB 2.0	PPS/Trigger input		1 x SMA, 100 kΩ, femal	le
Resistive touch 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 JSB (Host) 1 x USB 3.0, 1 x USB.2.0	GNSS Antenna Input (for additional, external GNSS antern	nna)		ntennas is supplied)
Audio 1 x 3.5 mm headphone jack Built-in loudspeaker Built-in loudspeaker Built-in microphone 1 x GigE (10/100/1000Base-T), RJ45 JSB (Host) 1 x USB 3.0, 1 x USB.2.0	Display Size and Resolution:			s, Color
Built-in loudspeaker Built-in microphone Ithernet 1 x GigE (10/100/1000Base-T), RJ45 JSB (Host) 1 x USB 3.0, 1 x USB.2.0	Video		1 x Display Port	
JSB (Host) 1 x USB 3.0, 1 x USB.2.0	Audio		Built-in loudspeaker	jack
	Ethernet		1 x GigE (10/100/1000E	Base-T), RJ45
D card slot 1 x microSD-card (SDXC)	USB (Host)		1 x USB 3.0, 1 x USB.2	.0
	SD card slot		1 x microSD-card (SDX	C)





Remote control and stream	ning	
Remote Control Protocol		SCPI ^b
I/Q Streaming		VITA 49 ^b
PC Software		Configuration Software ^c
Environmental conditions		
MIL-PRF-28800F Class 2	Operating temperature	re
	Storage temperature	
	Operating humidity	
	Random vibration	
	Functional shock	
	Transit drop	
Temperature – operating	- 10 °C to + 55 °C wit	h battery
		h external power supply external power supply when charging batteries
Humidity	< 29 g/m³ (< 93 % Rł	H at +30°C), non-condensing
Climatic	Storage 1	K3 (IEC 60721-3) extended to - 20 °C to + 70 °C (batteries removed)
	Transport 2	K4 (IEC 60721-3) restricted - 20 °C to + 70 °C
	Operating 7	K2 (IEC 60721-3) extended to - 10 °C to + 55 °C
Mechanical	Storage 1	M3 (IEC 60721-3)
	Transport 2	M3 (IEC 60721-3)
	Operating 7	M3 (IEC 60721-3)
Ingress Protection	IP 52 (with antenna a IP 67 (stored in the h	ttached and interface protectors closed) ardcase)

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^b Available from April 2018

^c Available from July 2018





Ordering Information

Your local Narda representative will inform you of all possible options and will be pleased to provide you with advice.

SignalShark Basic Unit:

All configurations are based on the SignalShark Basic Set.

SignalShark Basic Set		Part number
The Basic Unit set contains the SignalShark as well a marker and peak table.	as some basic accessories and supports 40 MHz real-time spectrum analysis,	3310/101
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 	

Software Options

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, SCPI Remote Control ^d	3310/95.012
Option, VITA 49 I/Q Streaming ^a	3310/95.014
Option, Analog Demodulation ^e	3310/95.007

Accessories

Accessory Description	Part number
Power Supply 12VDC, 5.5A, 100V-240VAC, plug, Jack Plug S1017, choose Power Cord 2260/90.6569	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 2260/90.7074	2259/92.17
Vehicle power adapter for charger set 2259/92.17	2259/92.15
Additional GNSS Antenna, external, 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	3310/90.03
10.4" Screen Protector Film	3310/90.04

^d Available from April 2018

^e Available from July 2018





Accessory Description	Part number
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 / 8 GHz	3100/13
Loop Antenna, H-Field 9kHz-30MHz	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, 9kHz - 8GHz	3300/10

Datasheet Narda DF Antennas^f

An additional DF antenna datasheet provides detailed information about direction finding antennas available from Narda.

Application Packages

The application packages make it easy to adapt SignalShark to your needs. A package typically consists of application dependent hardware accessories and/or firmware options and has a discount compared to an individual purchase. If needed, additional packages can be purchased also at a later time. Your local Narda representative will be happy to help you select the right application packages for your application.

Receiver ^g		Part number
	plication Package guaranties situational awareness by providing gapless analysis of whole signal bands. It also lation of AM, FM, LSB, USB, and CW signals.	3310/94.01
Includes: 3310/95.002 3310/95.003 3310/95.007	Option, Spectrogram Option, Level Meter incl. Compass values Option, Analog Demodulation ^g	

Off-Site Extensio	n	Part number
A hard shell case The DC adapter e	ackage provides suitable accessories for applications that involve operation in vehicles or outdoors. with wheels and a retractable handle provides secure (IP 67) the transport of the SignalShark and all accessories. nables powering the device from a vehicle. An easily and quickly worn carry strap provides hands-free support for Shark allowing even long-term measurements to be made comfortably.	3310/94.07
Includes: 2259/92.12 2259/92.17 2259/92.15 3310/90.01 3300/90.14 3300/90.08 3310/90.04	Power Supply DC Vehicle Adapter, screw plug, Jack Plug S10KS17 Double Charger Set, External for 2259/92.13, choose Power Cord 2260/90.7074 Vehicle power adapter for charger set for 2259/92.14 Hardcase for SignalShark 3310 Headphone, 3.5mm Plug for SignalShark Carrying Strap for Basic Unit 10.4" Screen Protector Film	

^f Available from March 2018

g Available from July 2018







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