

SignalShark

› User Interface Manual

2022-06



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SignalShark 3310 Handheld Device Overview

Handheld Unit



Rugged design for mobile use, even in harsh environments MIL-PRF-28800F class 2

- › 2 x smart technology lithium-ion internal and external rechargeable battery packs
- › Hot-swappable for interruption-free long-term measurements
- › Batteries commercially available, Type: RRC2057, Li-ion, 48 Wh
- › Internal and external charging
- › Car-charger available
- › Operating time: approx. 3 hours



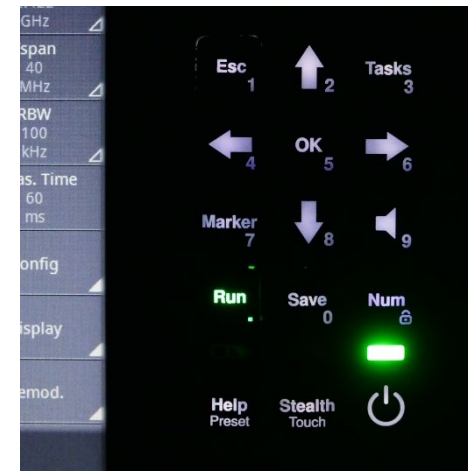


Microphone to record voice comments

Scroll wheel and keyboard for

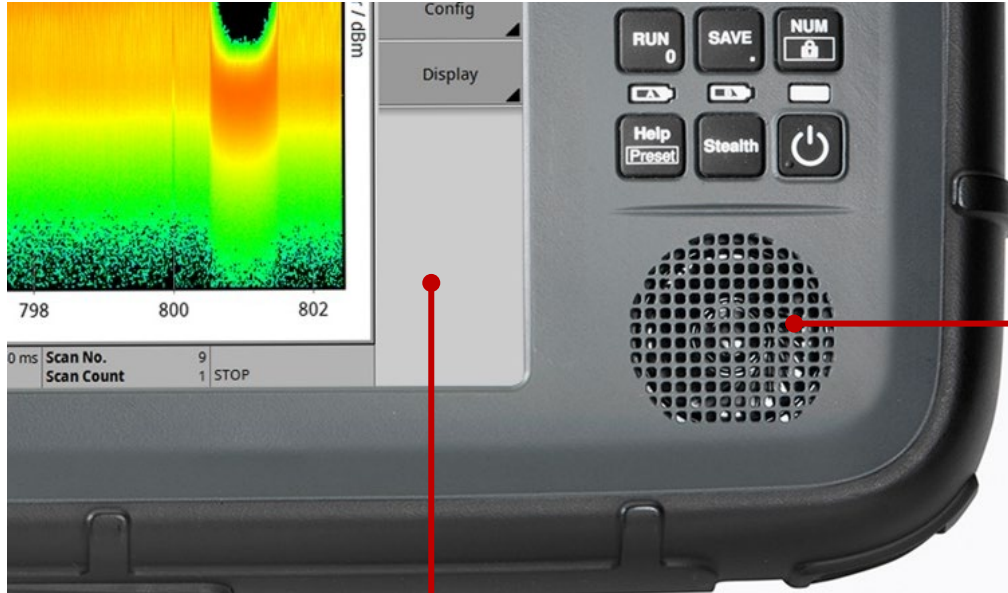
- › Navigating
- › Changing settings
- › Entering values
- › Confirming/deleting inputs

Illuminated keyboard for working in dark environments



LEDs to indicate the operating status separately for batteries as well as for the operating status of the device.

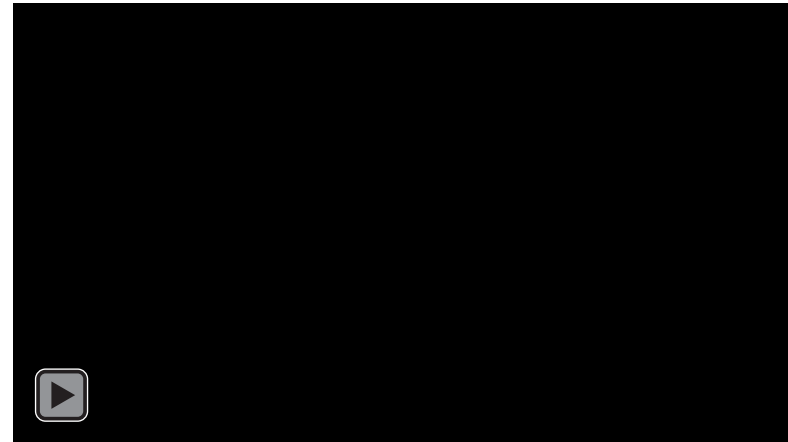
Built-in help function, Stealth mode, keyboard and touch lock



Built-in weather sealed loudspeaker gives clear, loud sound reproduction, even in noisy environments

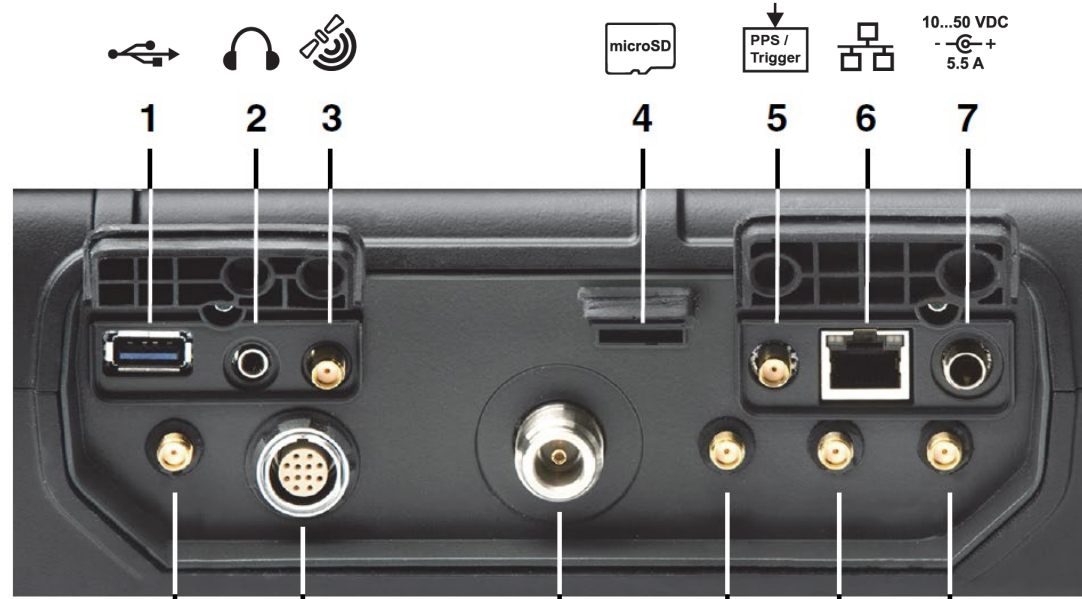
10.4" resistive touch screen

- › Intuitive operation, even when wearing gloves
- › Shielded for extreme EMC immunity



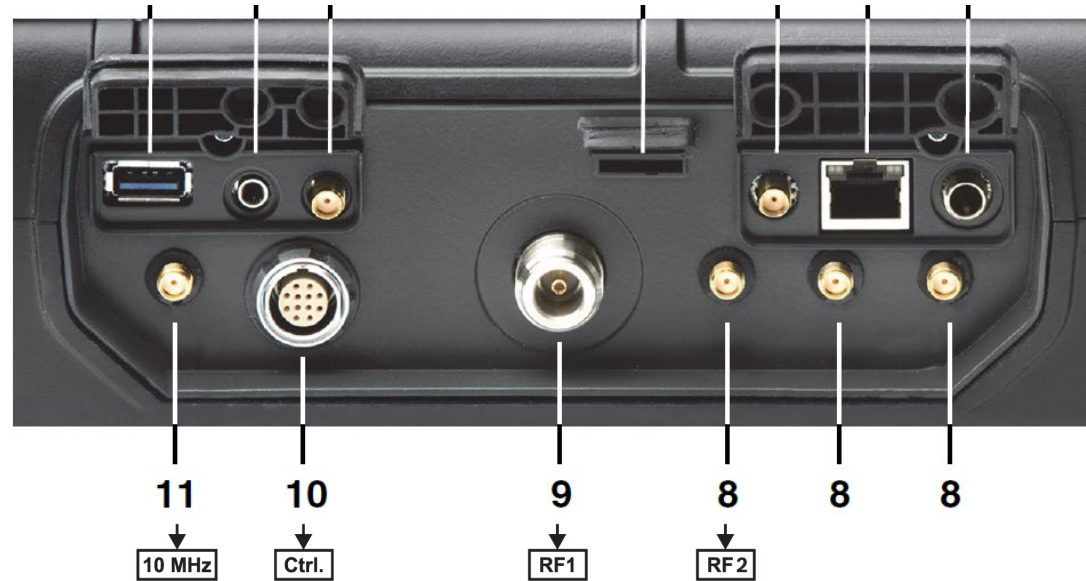
Connector Panel

- 1) USB 3.0 connection
- 2) 3.5mm headphone jack
- 3) External GNSS SMA(f) input, 50 Ohm
 - › DC voltage for active antenna is supplied
- 4) Micro SD card slot (microSDXC)
- 5) PPS/trigger SMA(f) input
- 6) 1 GigE connector for remote control and I/Q streaming
- 7) DC input / charging jack



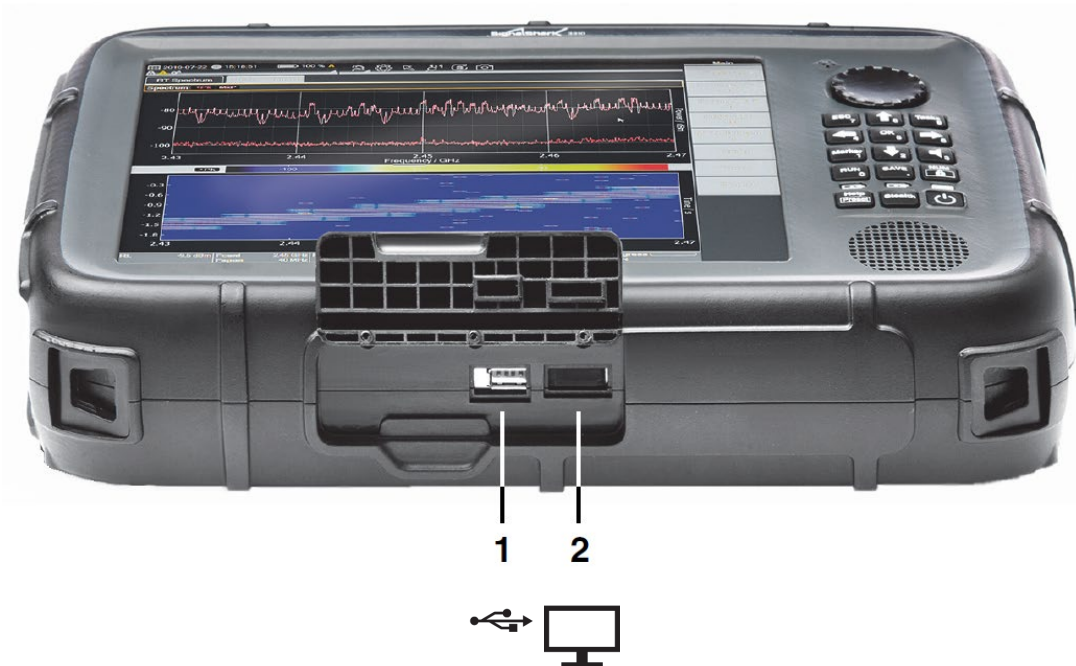
Connector Panel

- 8) 3 x RF SMA(f) input
- 9) RF N(f) input for connecting the antenna
- 10) 12-pin jack for connecting the antenna control cable
- 11) 10 MHz Ref SMA(f) input



Bottom View

- 1) USB 2.0 connection
- 2) Display Port



Note:

Display Port and USB connector can be used to connect an external touch screen.

Battery Operation

› Battery Operating Status

The operating status of the batteries is separately displayed for each battery with 2 LEDs in the keyboard area

Indicator	Significance
LED lights up red	Battery is charging.
LED lights up green	Charging is completed or charger/power supply is still connected to the charging jack of the unit.
LED is off	No battery is inserted or no charging/power supply is connected.

› Charging the Batteries

› Charging times for a complete charging cycle are as follows:

› When both batteries are charged in the device: approx. 4.2 hours (nom.)

› When charged in external charger: approx. 3 hours (nom.)



Starting Up

- › **Switching the Device on and off**
 - › Push the power key for about 2 seconds and release it again to switch the device on.
 - › Push the power key for about 3 seconds and release it again to switch the device off.
 - › Pressing the power button for about 10 seconds is basically like cutting the power to the system.
WARNING: This can lead to loss of data!
- › **Device Operating Status LED**
 - › LED lights up **red**: Device is in initialization phase or an error occurred
 - › LED lights up **green**: Device is operational
 - › LED flashes **green**: Device is in stealth mode



Special Hard Keys

› Stealth/Touch

- › A short press on the Stealth/Touch button will start the stealth mode.
Stealth mode allows you to quickly deactivate/reactivate the display and audio playback. **The device will switch off completely after 10 minutes in stealth mode to save battery power.**
- › A long press on the Stealth/Touch button will toggle the touch lock.
- › Mouse Emulation
In touch lock you can operate the device via a mouse emulation. The mouse pointer can be controlled by the arrow keys. A short press on the OK button will emulate a mouse left click.



Special Hard Keys

- › **Integrated Help / Preset**
 - › A short press on the Help/Preset button opens the integrated help documentation.
 - › It can take some seconds until the Help has started up because it is displayed in a separate web browser.
- › A long press on the Help/Preset button will load and apply the default task.

Warning:

All existing Tasks will be removed when applying the default setup!



Special Hard Keys

› Run/Single Run

- › A short press on the Run/Single Run button will stop or hold the current measurement acquisition depending on the actual “Stop Mode” setting.
- › Button Bar → Config → Stop Mode → Hold/Stop
- › **Stop:** Display update and measurement acquisition is stopped.
- › **Hold:** Display update is on hold, but measurement acquisition still runs in the background (trace data will be collected).

Note:

Spectrogram marker can only be used, if measurement is on hold or stopped.



Special Hard Keys

› Run/Single Run

- › A long press on the Run/Single Run button will start a single run measurement.
- › In single run, the device will run a special amount of measurement cycles (“Scan Count”) and then stop/hold the measurement acquisition.

Note:

Single Run can be used to measure a defined number of measurement cycles or over a specified period of time (e.g. for Spectrum AVG trace, RMS channel power).



Special Hard Keys

- › **Volume/Mute**
 - › A short press on the Volume/Mute button opens the volume settings menu.
 - › A long press on the Volume/Mute button switches system sound on/off.



SignalShark 3320 Remote Unit Device Overview

Remote Unit

Front Panel

- 1) ON/OFF button
- 2) Device Status LED
 - › Green: Device is operational
 - › Red: Device is in initialization phase or an error occurred
- 3) Stereo jack, 3.5 mm headphone jack
- 4) Ethernet Connection Status LED
 - › LED LINK lights up orange: 100 Mbit
 - › LED LINK lights up green: 1 Gbit
 - › LED ACT lights green: Traffic



Note:

The device starts automatically when connected to the power supply.

The device can also be started via WakeOnLan (WOL).

Front Panel

- 5) Product description on the top of the device
 - › QR codes including P/N, S/N, Mac address, etc.
- 6) Display port
- 7) USB 2.0 connection



Note:

Display Port and USB connector can be used to connect an external touch screen

Back Panel

- 1) 3 x RF SMA(f) input
- 2) RF N(f) input
- 3) 12-pin jack for connecting the antenna control cable
- 4) 10 MHz Ref SMA(f) input, 600 Ohm



Back Panel

- 5) USB 3.0 connection
- 6) External GNSS SMA(f) input, 50 Ohm
 - › DC voltage for active antenna is supplied
- 7) Product description including P/N, S/N, Mac address
- 8) Micro SD card slot (microSDXC)
- 9) PPS / trigger SMA(f) input, 100 kOhm
- 10) 1 GigE connector
 - › For remote control, I/Q streaming, and network connection, e.g. the Internet access for Win10
- 11) DC input



Starting Up

- › Switching the Device on and off
 - › Push the power key for about 2 seconds and release it again to switch the device on.
 - › Push the power key for about 3 seconds and release it again to switch the device off.
 - › Pressing the power button for about 10 seconds is basically like cutting the power to the system.
WARNING: This can lead to loss of data!
- › Device Operating Status LED
 - › LED lights up red: Device is in initialization phase or an error occurred
 - › LED lights up green: Device is operational

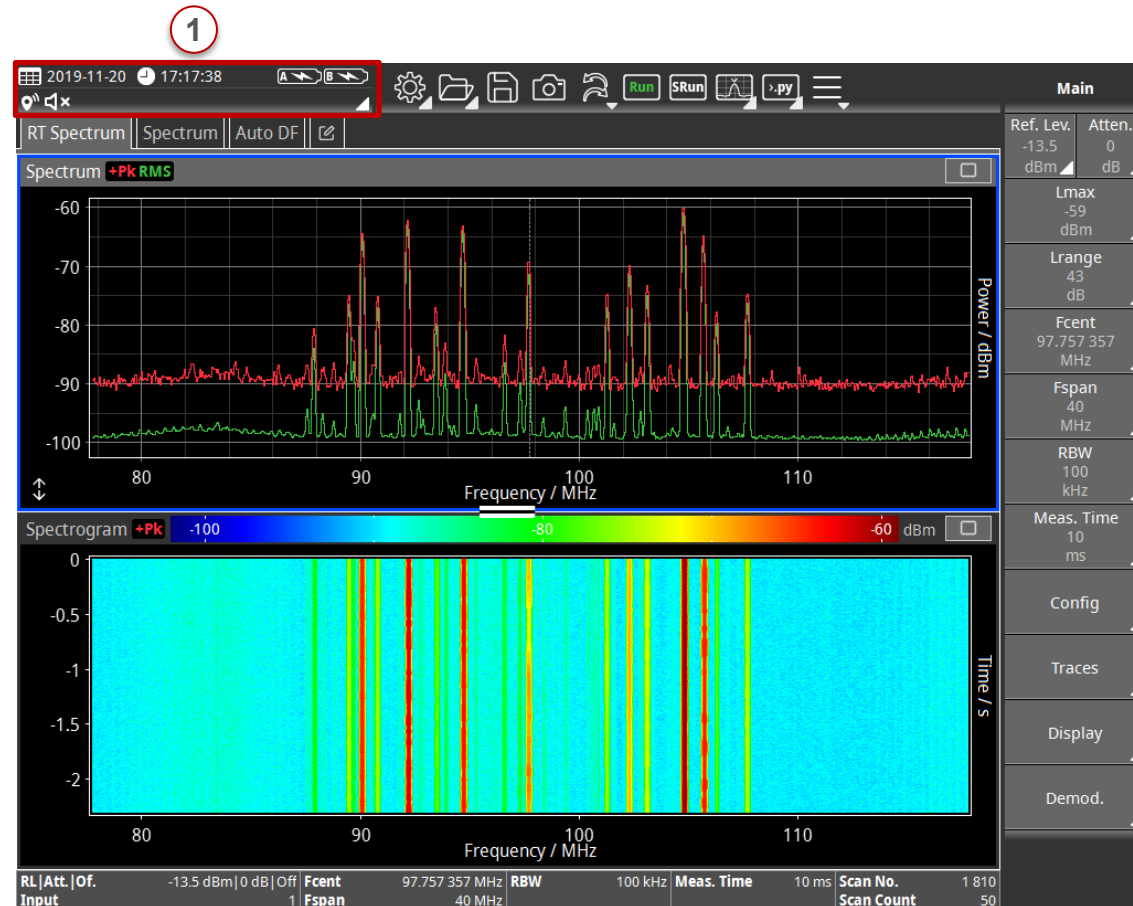


Screen Layout

Brief introduction to the most important GUI components

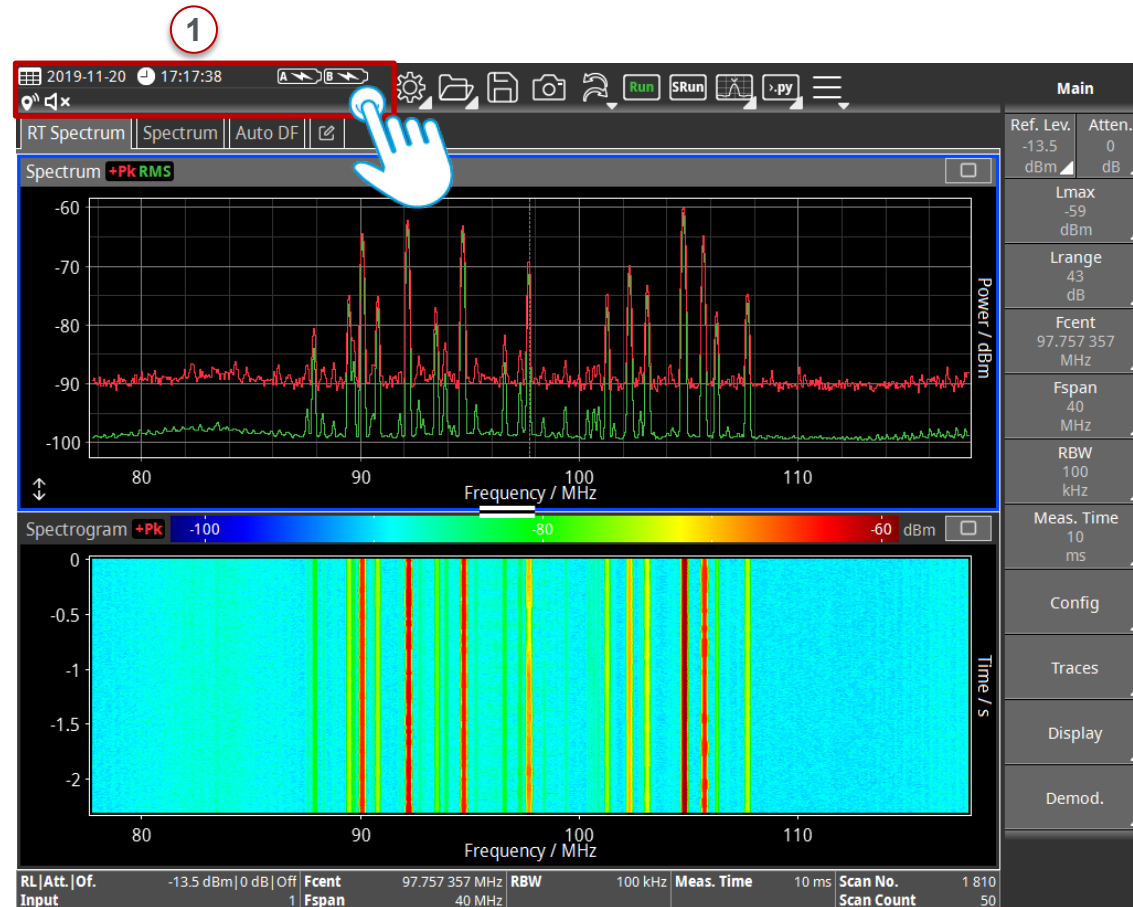
1) System Information Area

- › Briefly displays the most important system information like
 - › Date/Time
 - › Battery status
 - › GNSS status
 - › Mute / Touch lock



1) System Information Area

- › A tap on the dropdown icon opens the system information menu



System Information Menu

- › The system information menu provides status information about several system parameters.

Note:

This menu is only for displaying information!
Please use the System Settings menu to change system settings.

- › You can leave the menu by
 - › Pressing the Esc. hard key or
 - › A short tap on the Button Bar Header








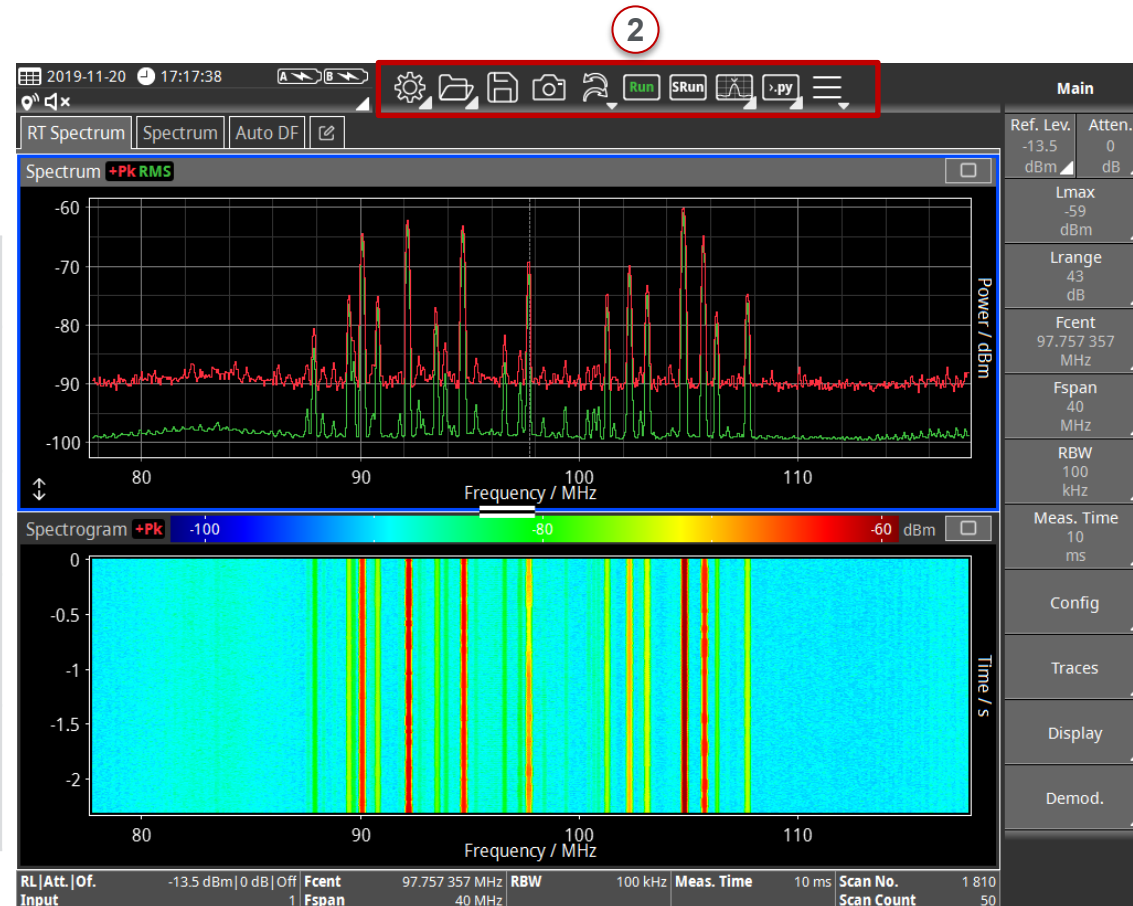
The screenshot shows the SignalShark user interface. At the top, there is a status bar with the date '2019-07-12', time '11:14:30', and battery level 'A 80% B 80%'. Below this is a navigation bar with icons for settings, file management, camera, and execution. The main menu has tabs: 'Device' (selected), 'Options', 'Batteries', 'GNSS', 'Antenna', 'Antenna Handle', 'External Device', 'Cable', and 'Service'. The 'Device' tab displays a table of system parameters and their values. On the right side, there is a vertical bar with a 'Device' button and a 'Tab Device' label. A hand icon is pointing at the 'Device' button.

Parameter	Value
Product Name (P/N)	SignalShark Basic Unit
Part Number	3310/01
Serial Number (S/N)	A-0055
Application Version	V1.4.0 beta4
Application Date	2019-06-05
FPGA Bitstream Version	528
FPGA µBlaze Version	28
Board Controller Bootloader Version	V0.9.3
Board Controller Firmware Version	V1.1.0
BIOS Version	TQMxE38M.5.4.48.28.19
Operation System Version	V2.0.6
Customizing Version	02.00.00.08
Driver Installation Version	02.00.00.04
FPGA PCIe Driver Version	1.8.0.0
FPGA Manager Version	1.30
Manufacturer Calibration Date	2001-01-01

2) Toolbar






- Contains tool buttons that provide quick and easy access to the most important device functions

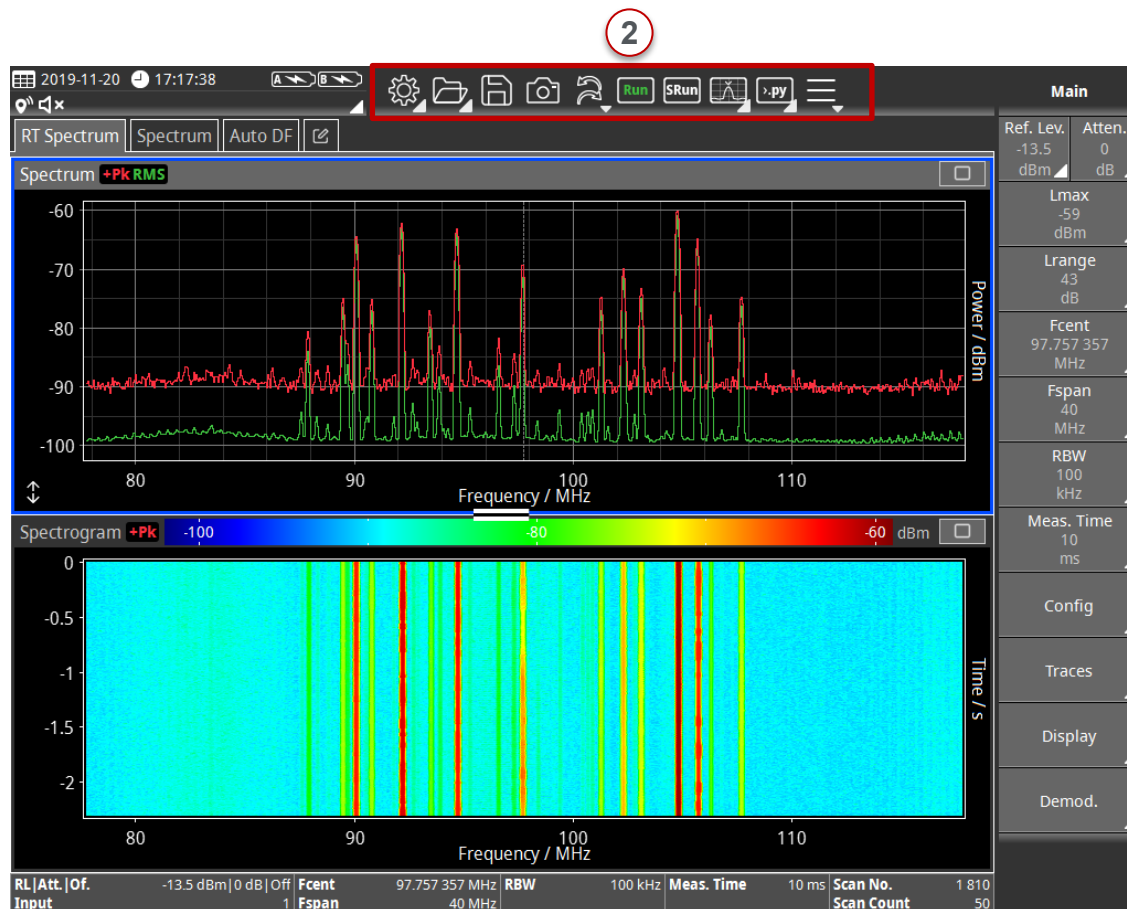
	General Settings Tap to open the general settings menu
	Data Logger Tap to manage stored data sets, demodulation records and screenshots.
	Save Measurement Tap to save the current measurement.
	Screenshot Tap to store a screenshot from the current display.
	Undo/Redo Tap the dropdown icon to open the action history.



2) Toolbar

- Contains tool buttons that provide quick and easy access to the most important device functions

	Run Tap to start or stop/hold a measurement.
	SRun Tap to start a single measurement run according to the Scan Count parameter.
	Marker Tap to open the Marker menu.
	Scripting (if installed) Tap to start NardaScriptLauncher
	Additional Functions Menu Tap to open a dropdown window with additional functions like: Volume/Mute, Configure Views, Preset or Help



Tasks and Views

The goal of the design and GUI layout of SignalShark was to support a fast and easy way to do measurements in real live applications.

- › Often an application consists of several measurements like finding a signal in the spectrum, measuring its level and locate it.
 - › On many sites, several kinds of signals in different frequency bands have to be analyzed.
- That's why SignalShark replaces the conventional concept of measurement modes by the Tasks and Views concept.

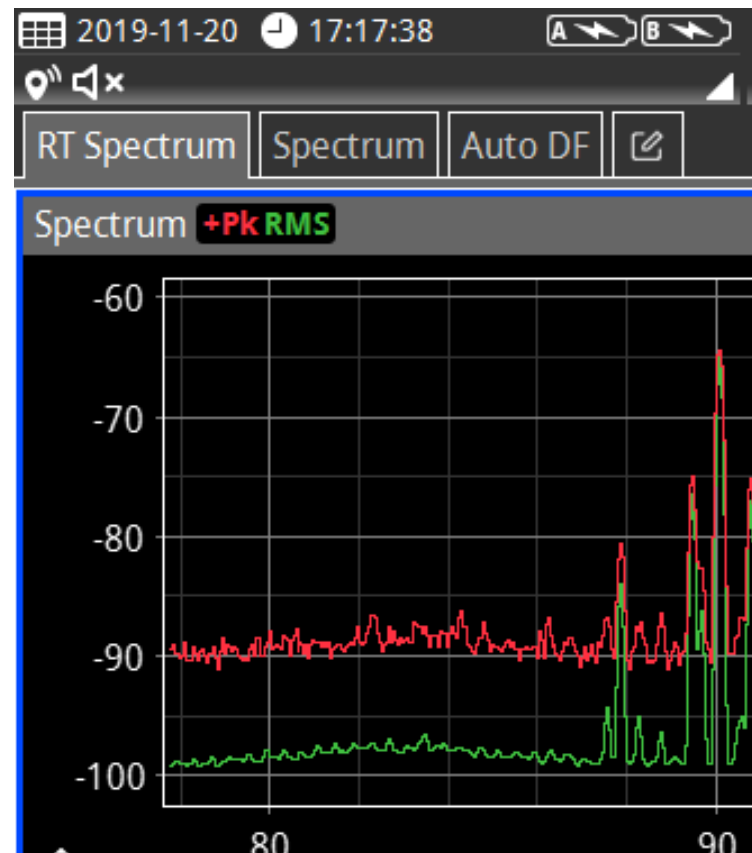


Tasks

- › Tasks are represented by a tab on the screen, like a web site within a web browser.
- › Tasks encapsulate all measurement parameters and the underlying measurement acquisition.
- › Within a task, all measurements are performed at the same time.

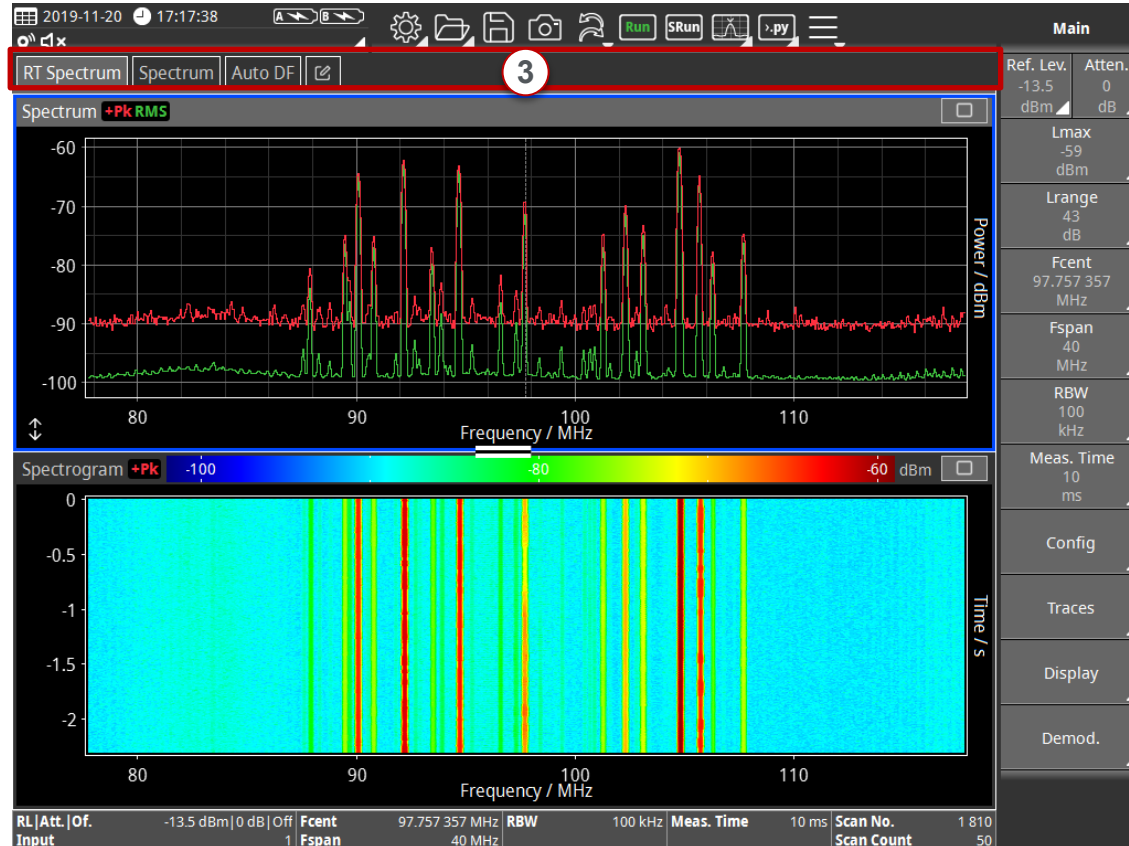
Note:

Only one task can be active and doing measurement at a time.



3) Task Bar

- › Browser like tap bar, that enables quick switching between measurement settings and different task types.



Task Types

To support a wide variety of measurement applications, SignalShark provides several types of tasks:

(Scan) Spectrum Mode

- › This task type 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.

RT Spectrum Mode

- › The Real-Time Spectrum task type enables real-time spectrum measurements with a frequency span of up to 40 MHz. This frequency span will be acquired simultaneously in frequency and also gapless in time with 3.125 μ s POI.

Auto DF Mode

- › The Auto Direction Finding task type supports control of the automatic DF antennas and handles the calculation of bearings out of the DF data.

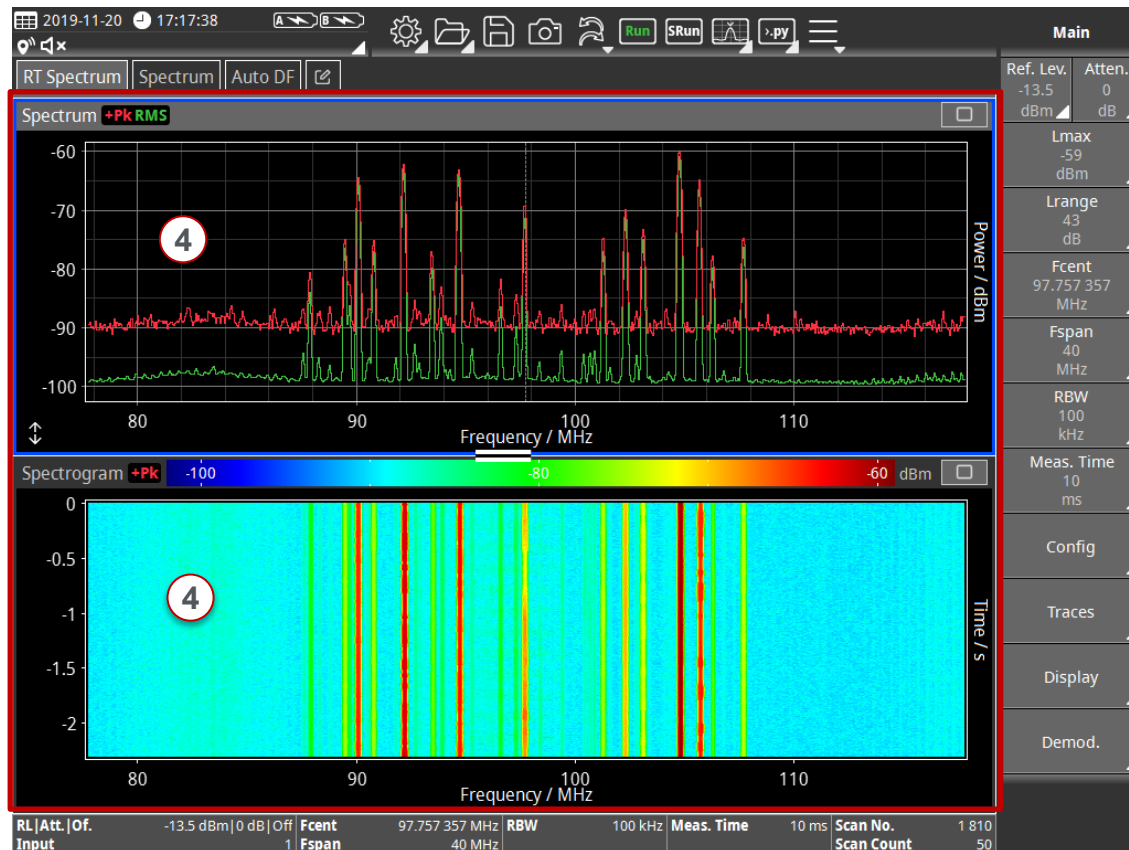
4) Views

A view is a window containing a specific visual representation of measurement data.

- › The currently selected View is marked by a blue border.
- › The type, arrangement and size of a View can be adapted by the user.

Note:

It is possible to save the current configuration and arrangement of Tasks and Views into setup files.



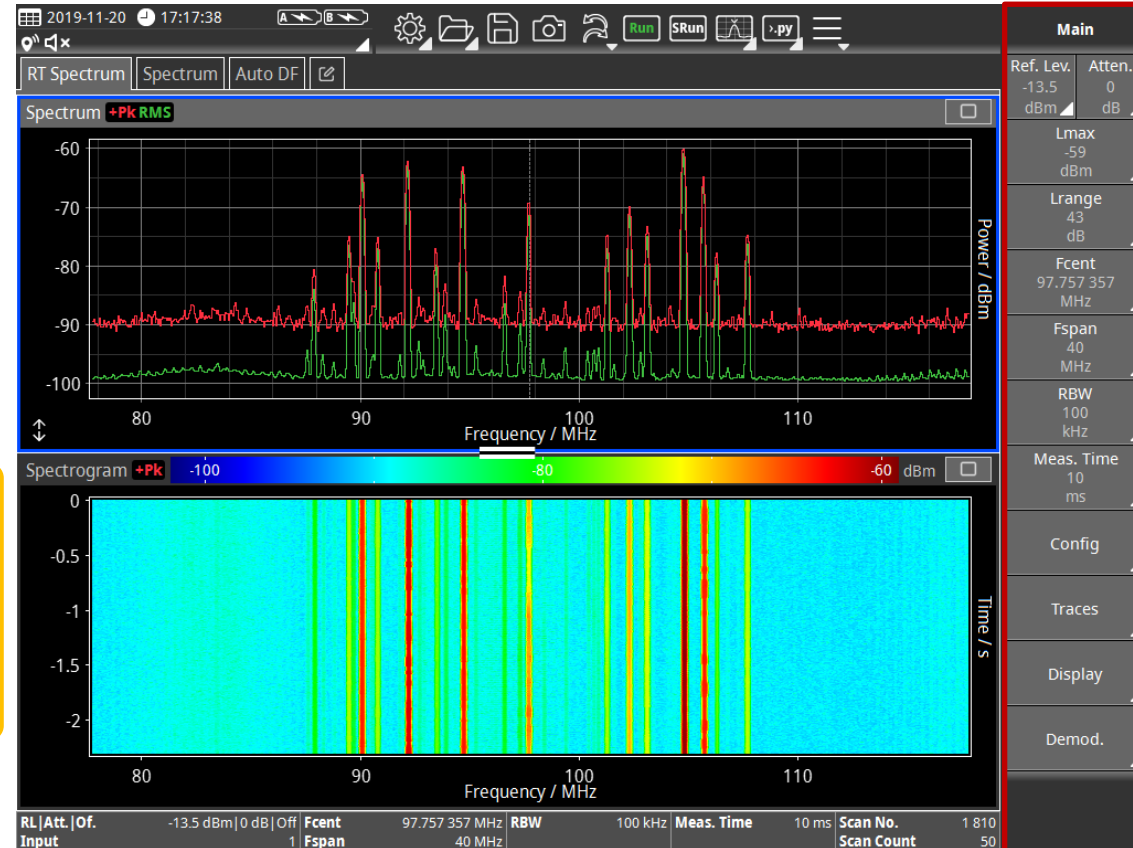
Screen Overview

5) Button Bar

- › Provides access to the measurement and display settings of the currently selected View.

Note:

The content and layout of the “Button Bar” depends on the currently selected View.

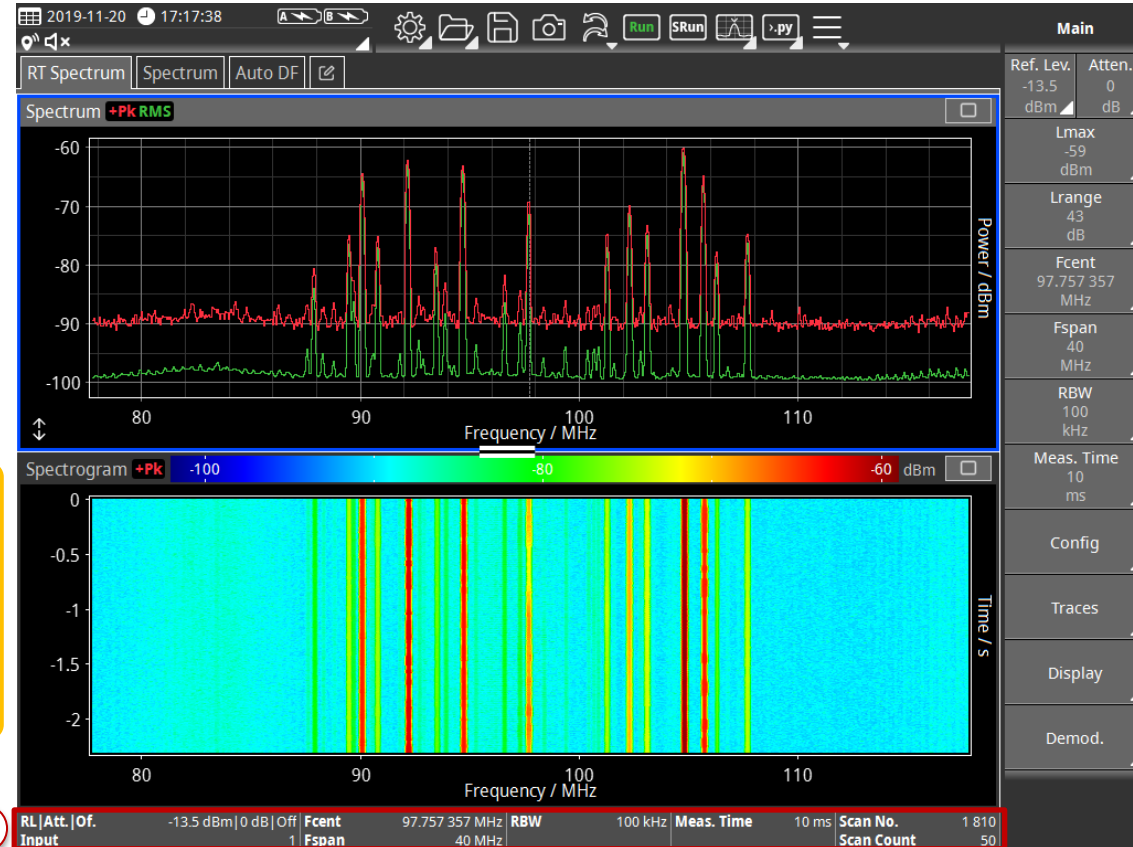


Screen Overview

- 6) Measurement Information Bar
- › Displays the most relevant settings of the currently selected View.

Note:

The content and layout of the “Measurement Information Bar” depends on the currently selected View.



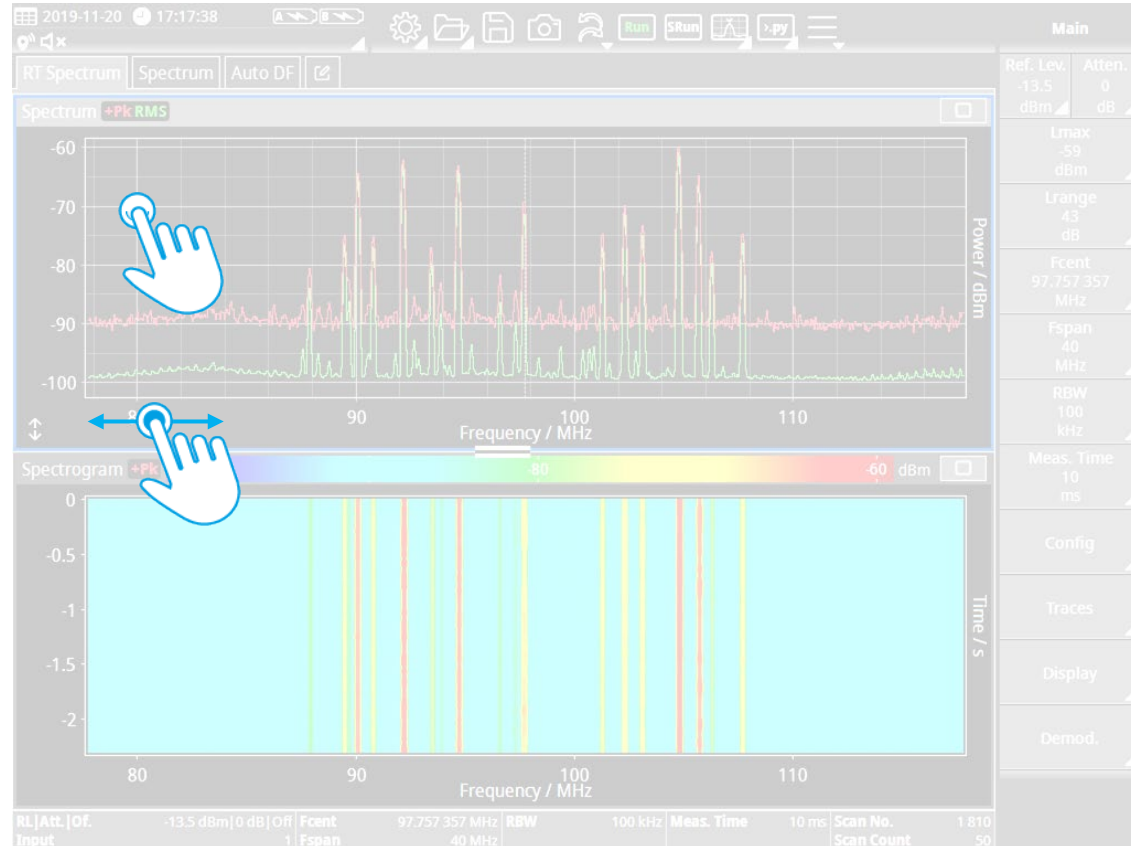
Basic Operation

The basic operating steps

Touch Screen Control

SignalShark uses two basic touch gestures

- › **Single Tap**
- › **Swipe**

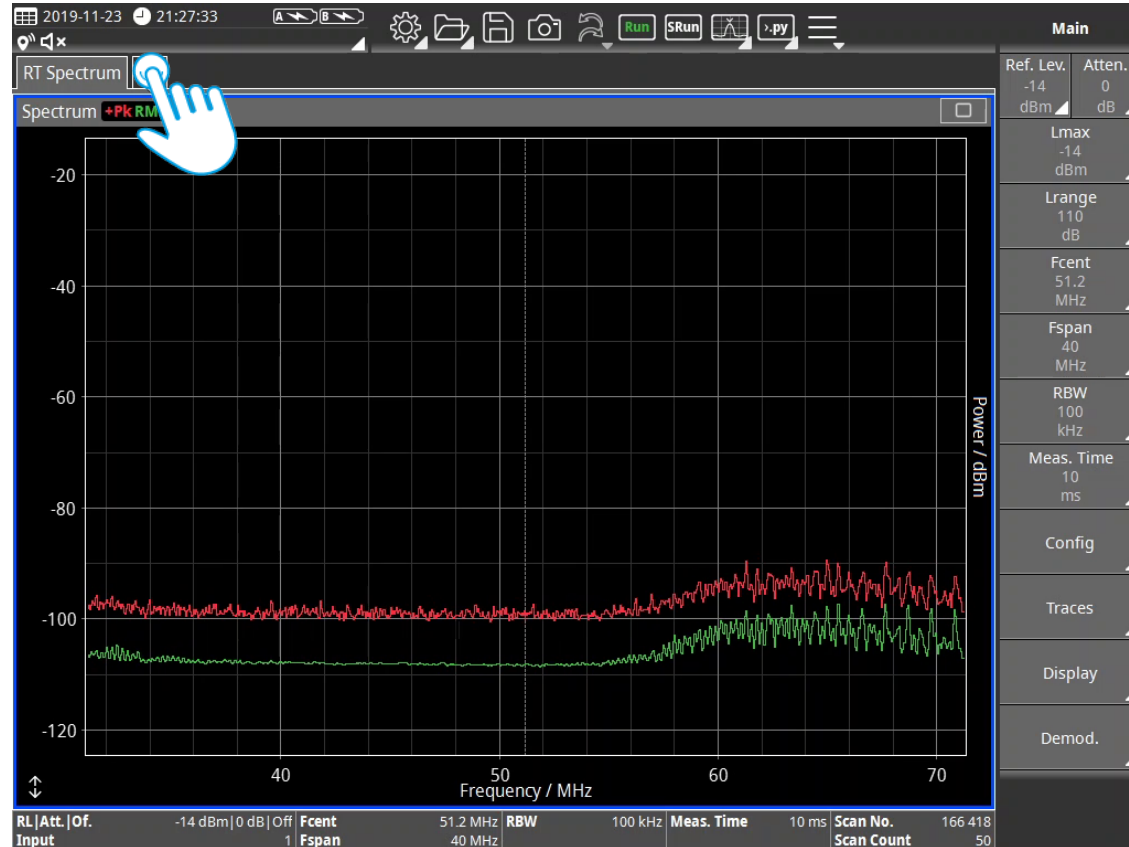


Add new Task Step 1

The creation of a measurement task is the prerequisite for being able to perform a measurement at all.

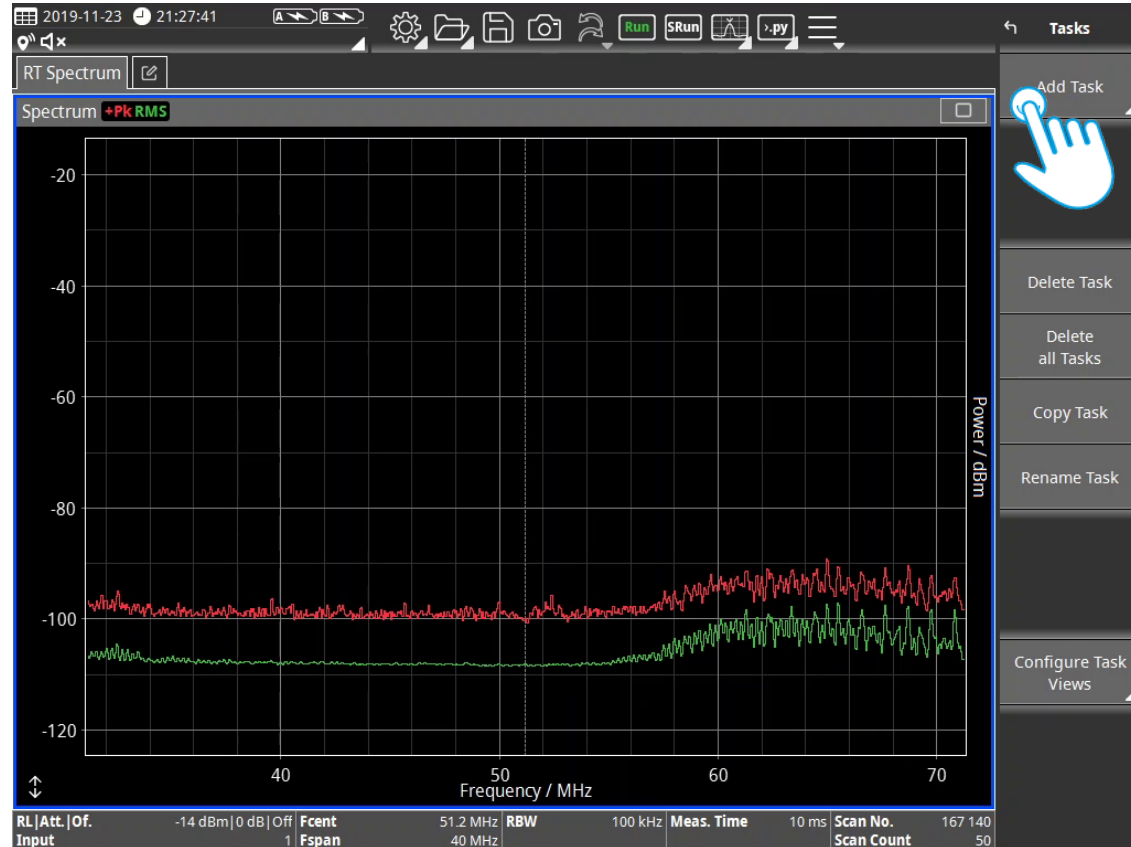
To add a new measurement task:

- › Tap on the Edit Task icon in the Task Bar or
- › Press the “Task” hard key



Add new Task Step 2

- › Tap on the “Add Task” button in the “Tasks” Button Bar.



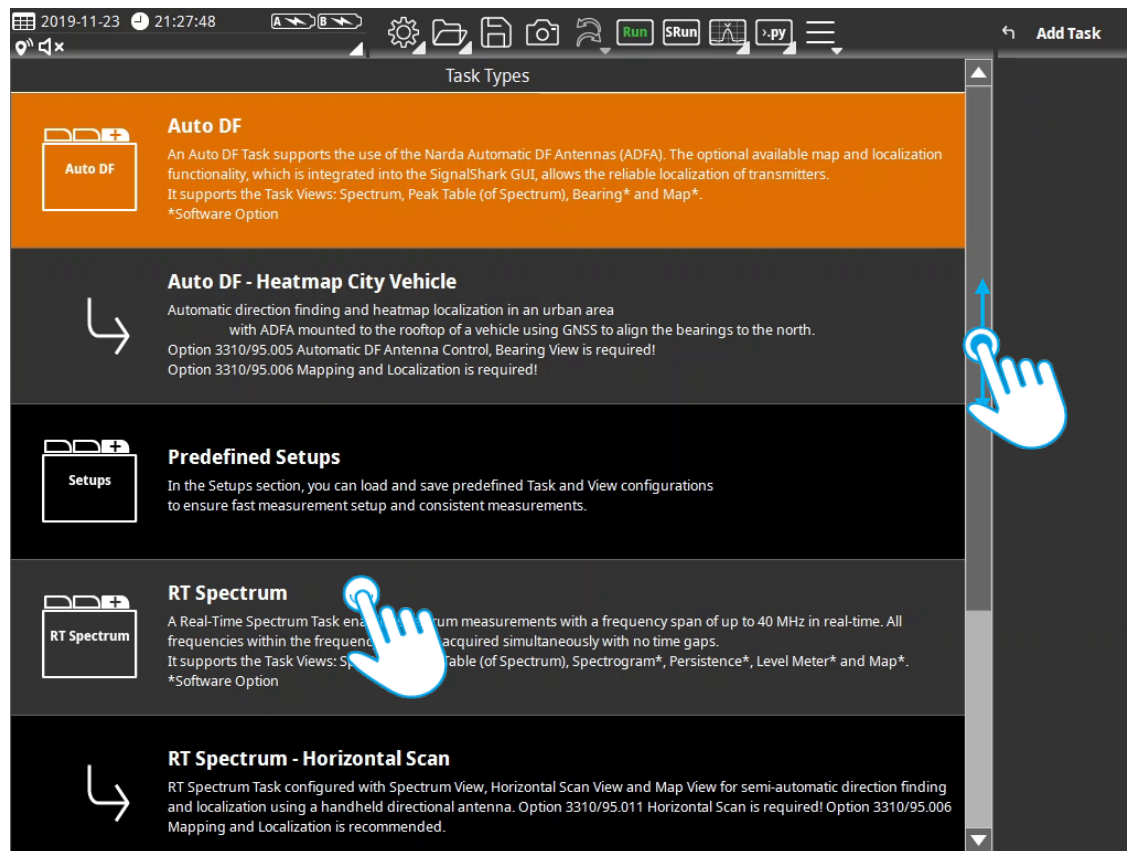
Add new Task Step 3

- › Browse the “Task Types” list.
- › Tap on the desired task type.

Note:


It is possible to save user defined task configurations as setups.

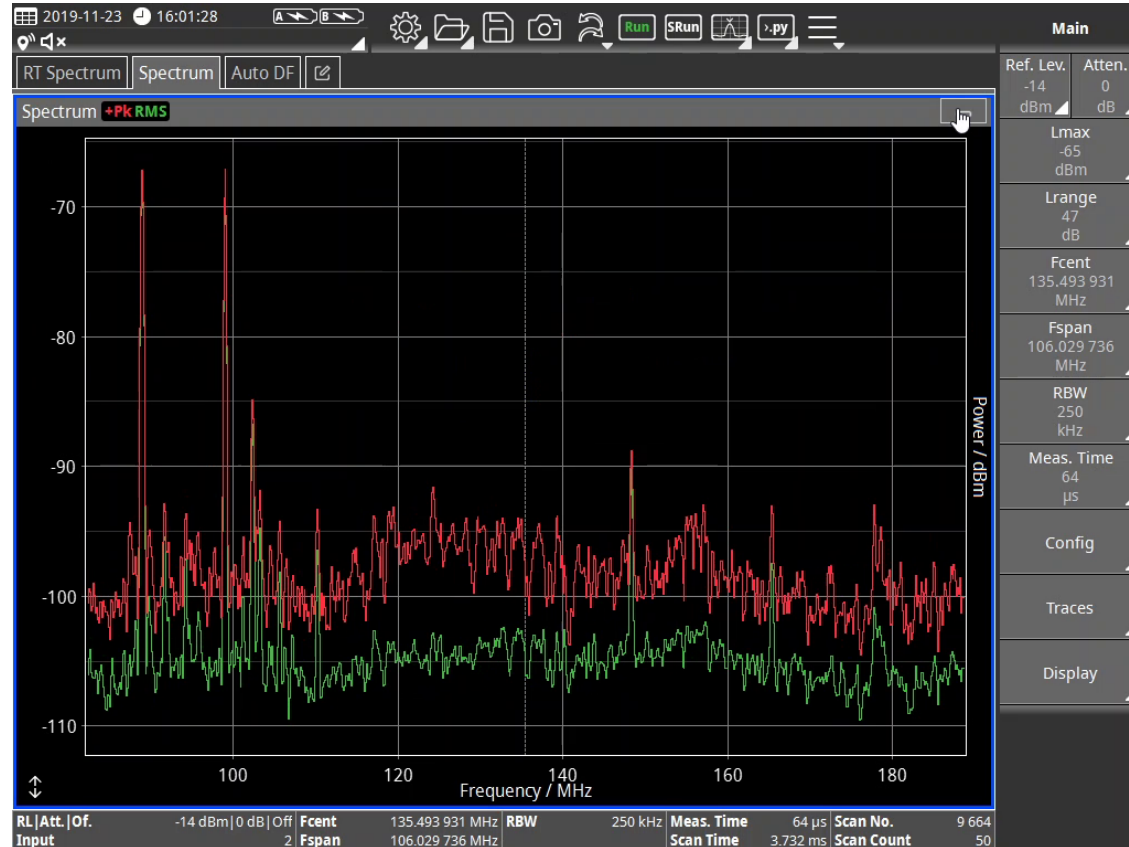
A tap on the Predefined Setups item will open the setup menu from where a predefined setup can be loaded.



Maximizing a View

A View can be maximized by a single tap on the maximize Icon

- › 
- › Tapping again on the button will resize the View.

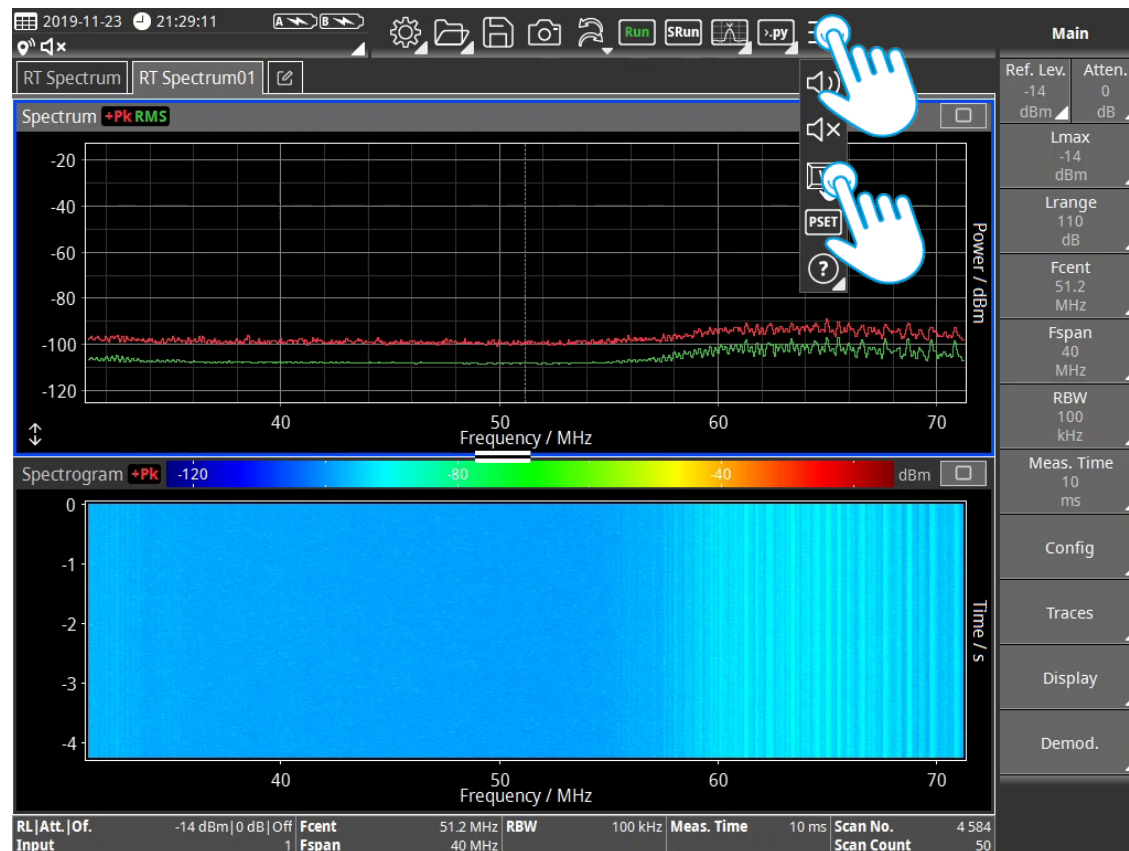


Change View Arrangement

To change the arrangement of the Views:

- › Tap on the Menu Tool button
- › Tap on the Configure Task Views button.

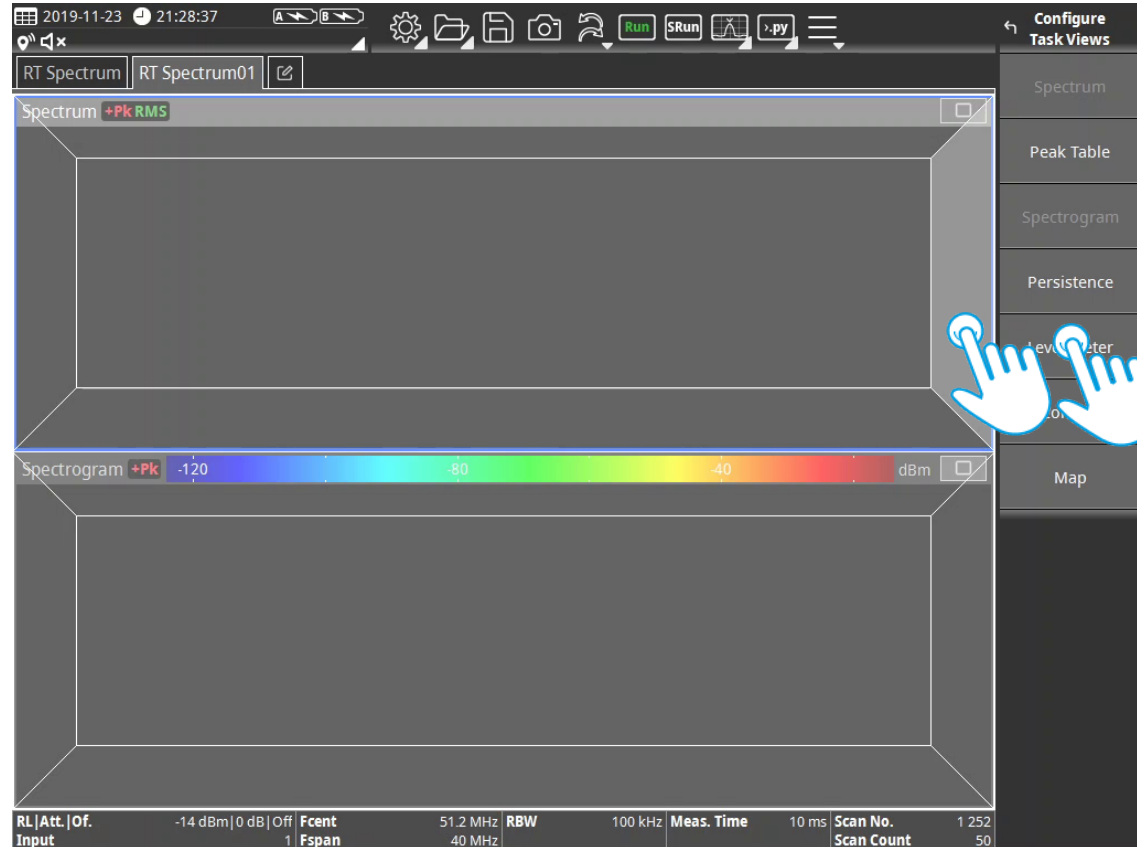
→ The “Configure Task Views” submenu opens



Add View

To add a View to the Task:

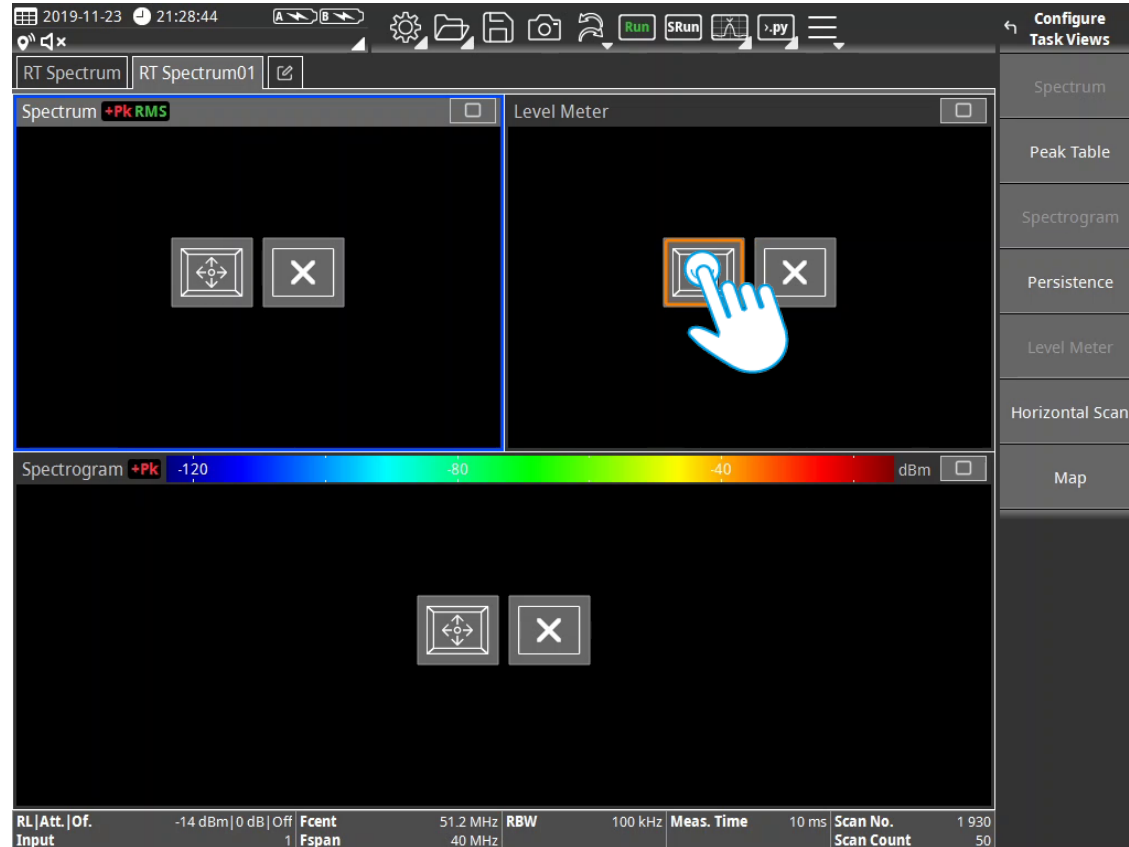
- › Tap on the desired View Type in the “Configure Task Views” Button Bar
- › Tap on the desired position of the new View.



Change View Position Step 1

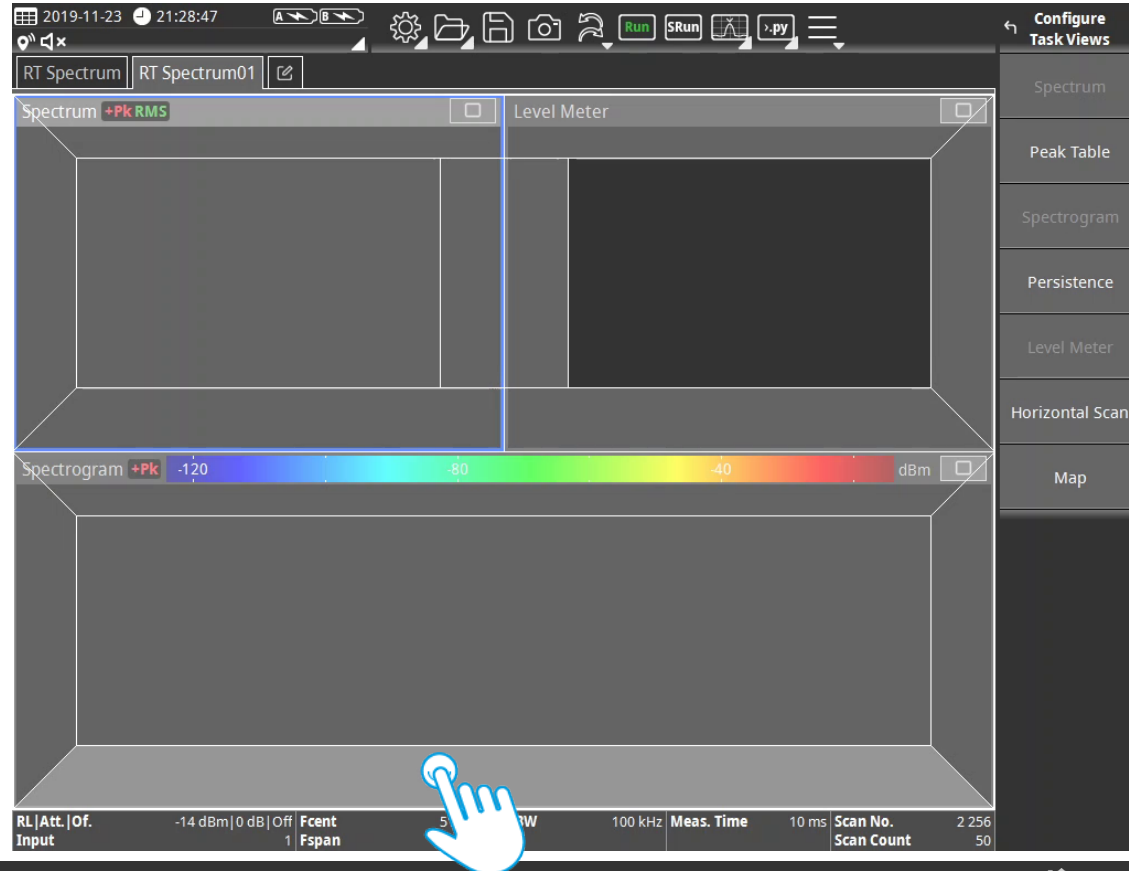
To change the position of a View:

- › Tap on the Move Button



Change View Position Step 2

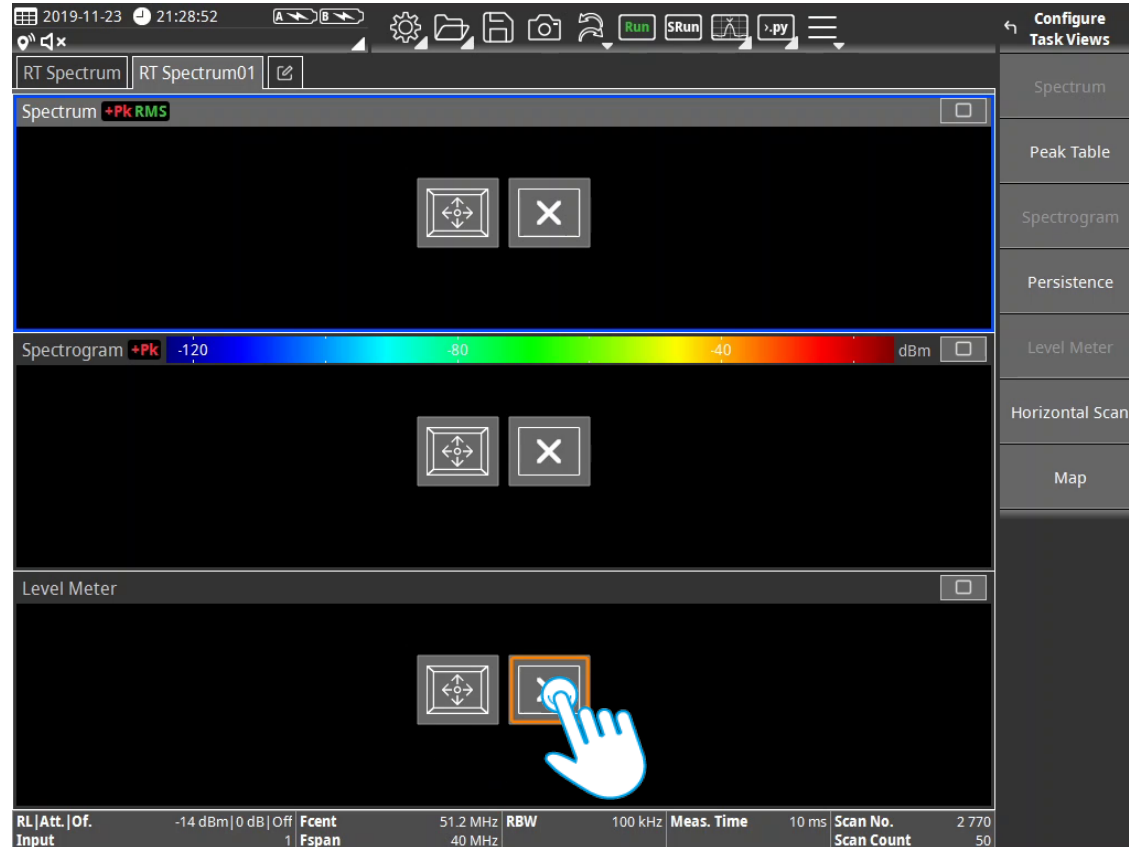
- › Tap on the desired position.



Delete View

To delete a View from the Task:

- › Tap on the Delete Button



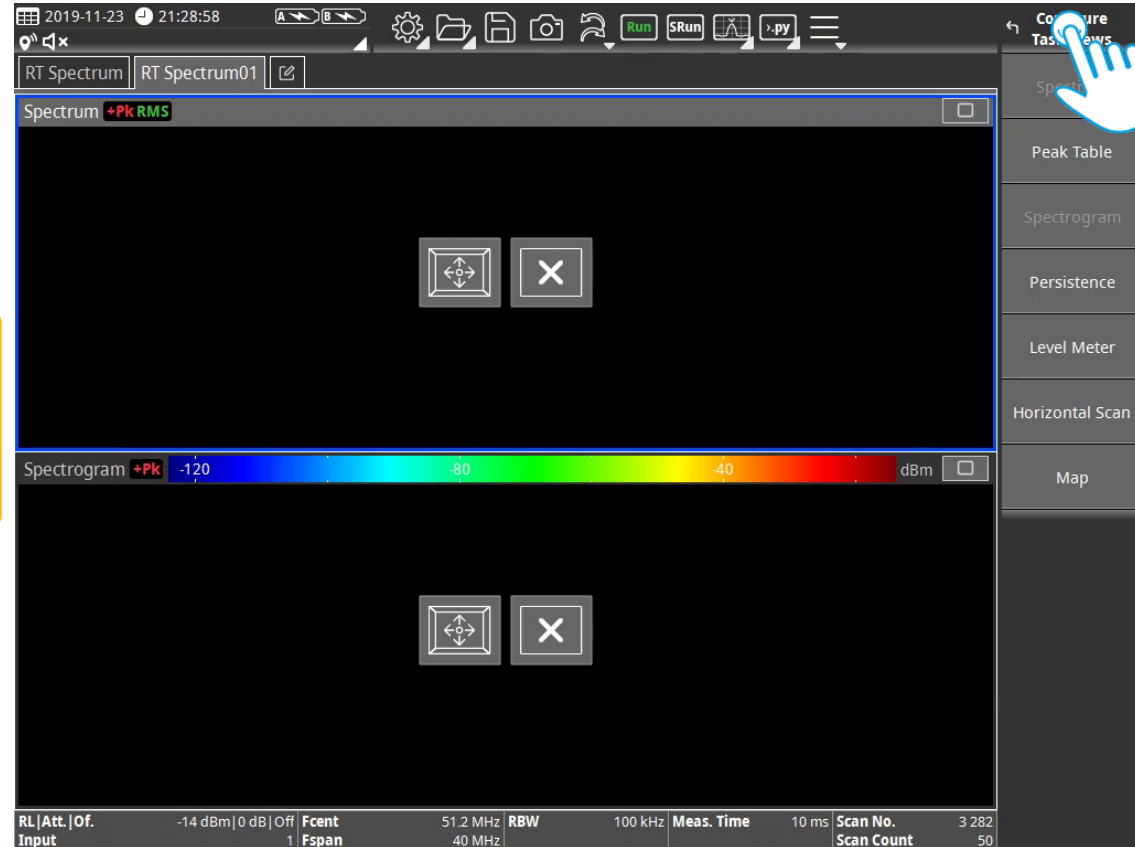
Back to the Main Menu

To get back to the main menu:

- › Tap on the header button of the “Configure Task Views” Button Bar or
- › Press the “Esc/Back” hard key

Note:

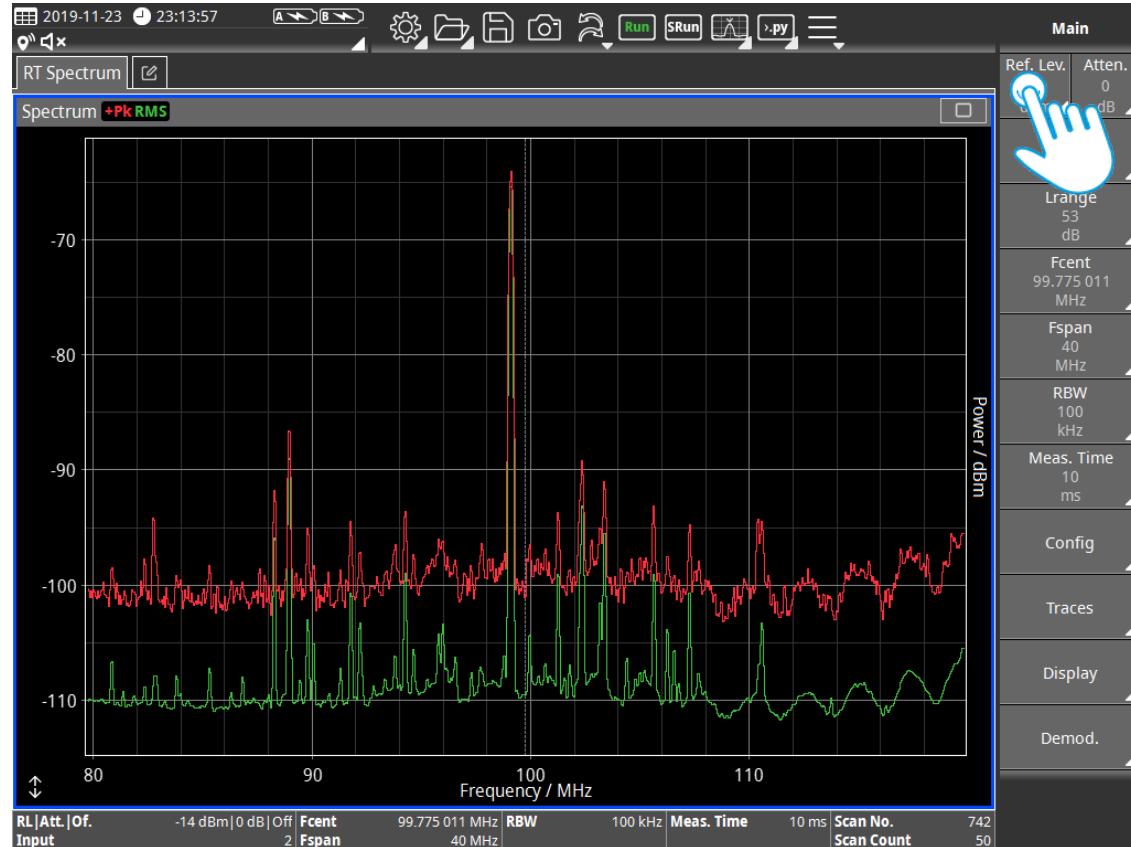
This is the default way to leave a submenu.



Show the Amplitude Menu

To display the Amplitude Menu:

- › Tap on the Parameter Split Button
 - › **Ref. Lev. | Atten.**

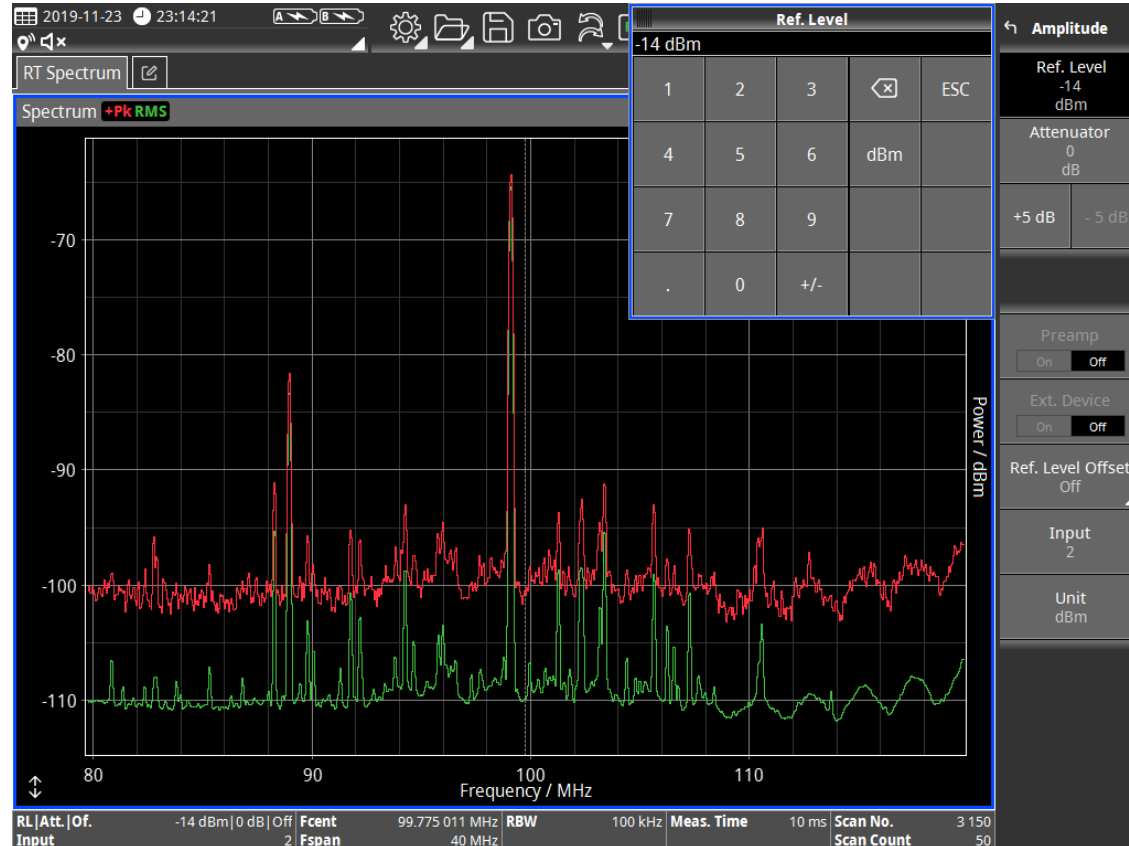


Amplitude Menu

The Amplitude Menu contains mainly settings to adapt the measurement to the current signal level like:

- › Reference Level
- › Attenuator

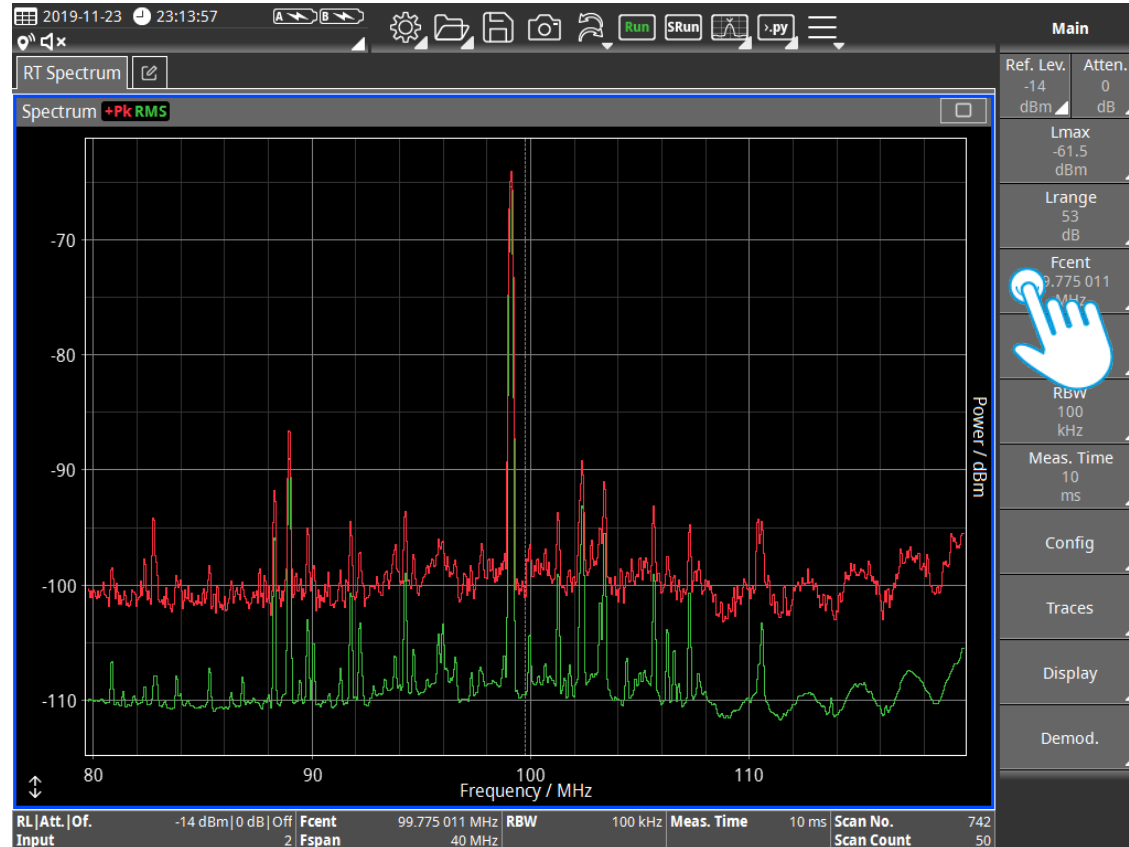
It contains also the RF input selection



Show the Frequency Menu

To display the Frequency Menu:

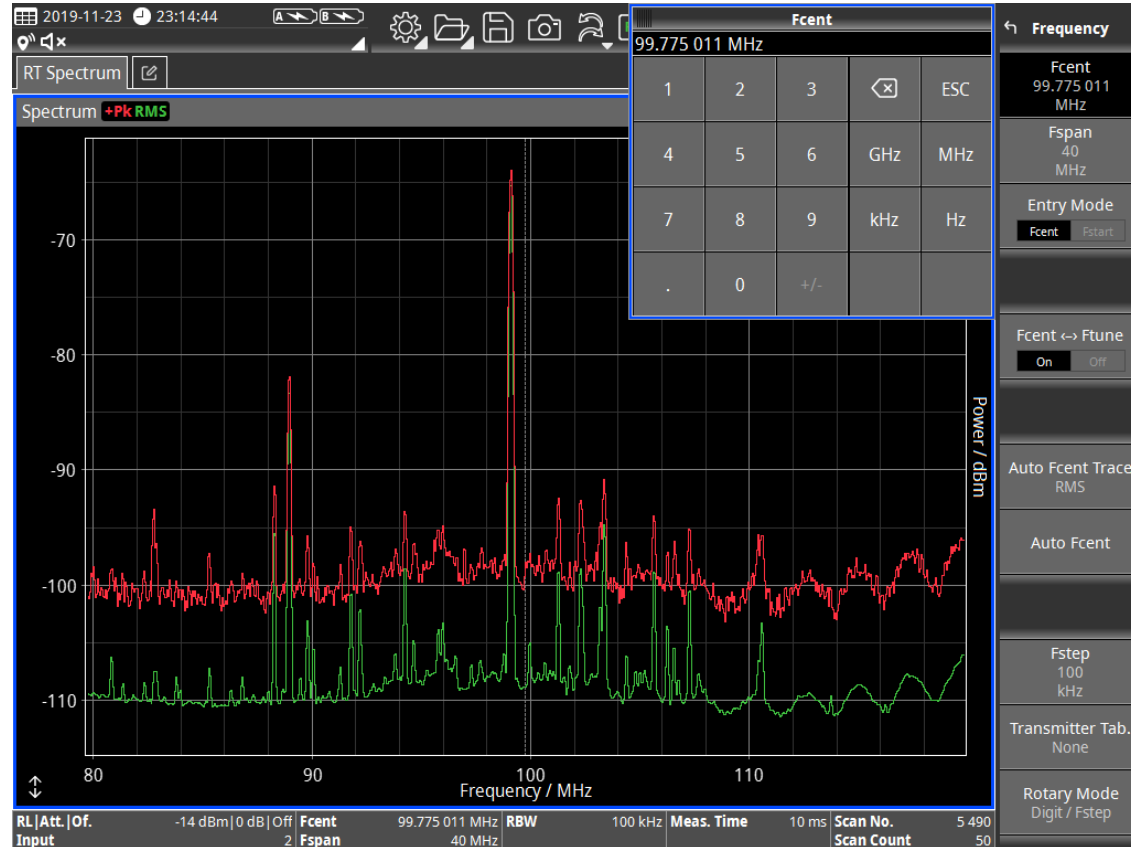
- › Tap on the Parameter Button
 - › **Fcent/Fstart** or
 - › **Fspan/Fstop**



Frequency Menu

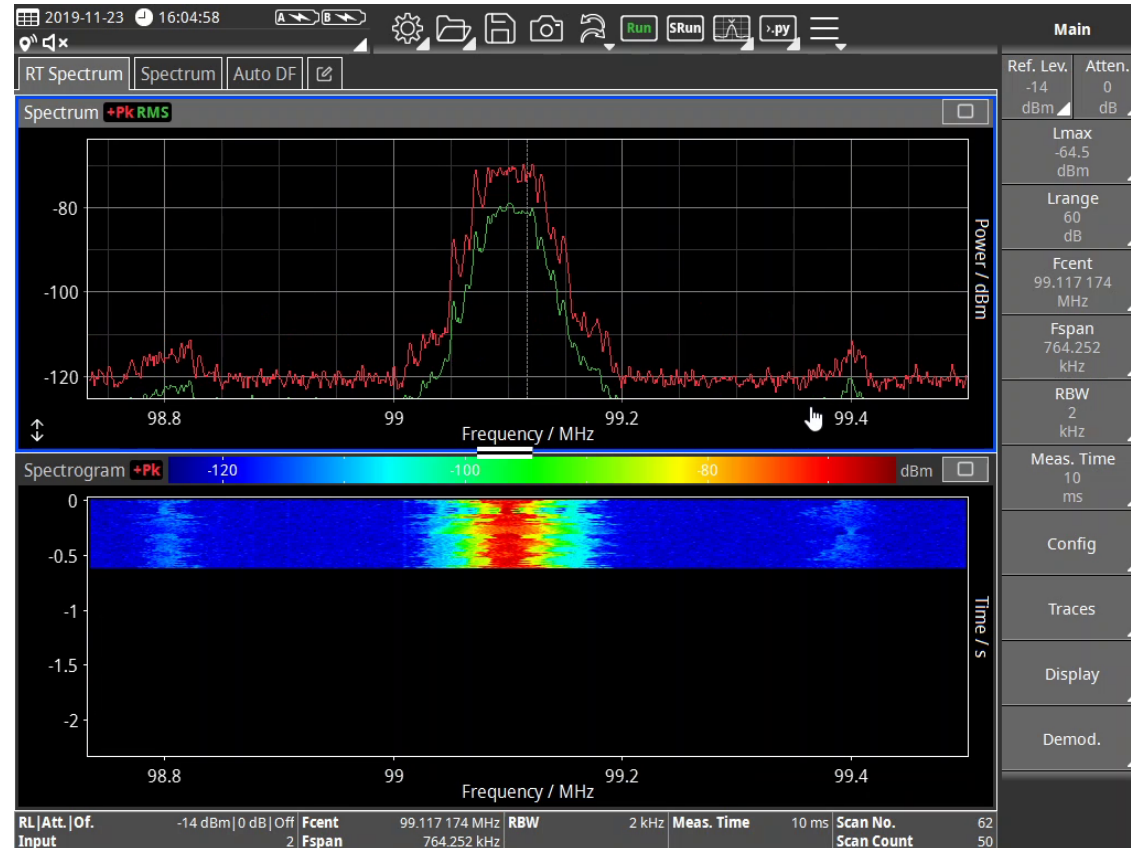
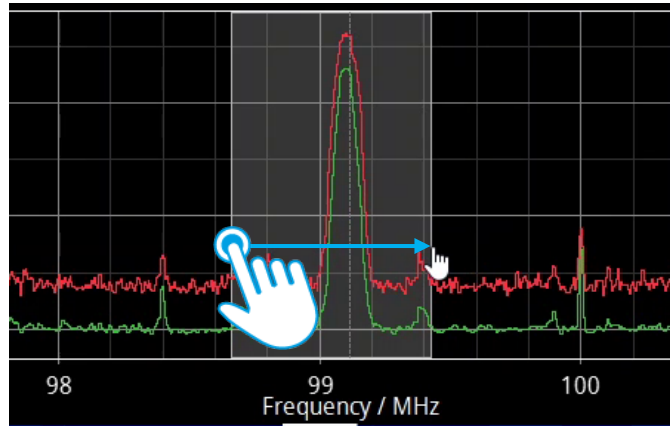
The Frequency Menu displays all frequency related parameters:

It contains also the selection of the Rotary Knob input mode.



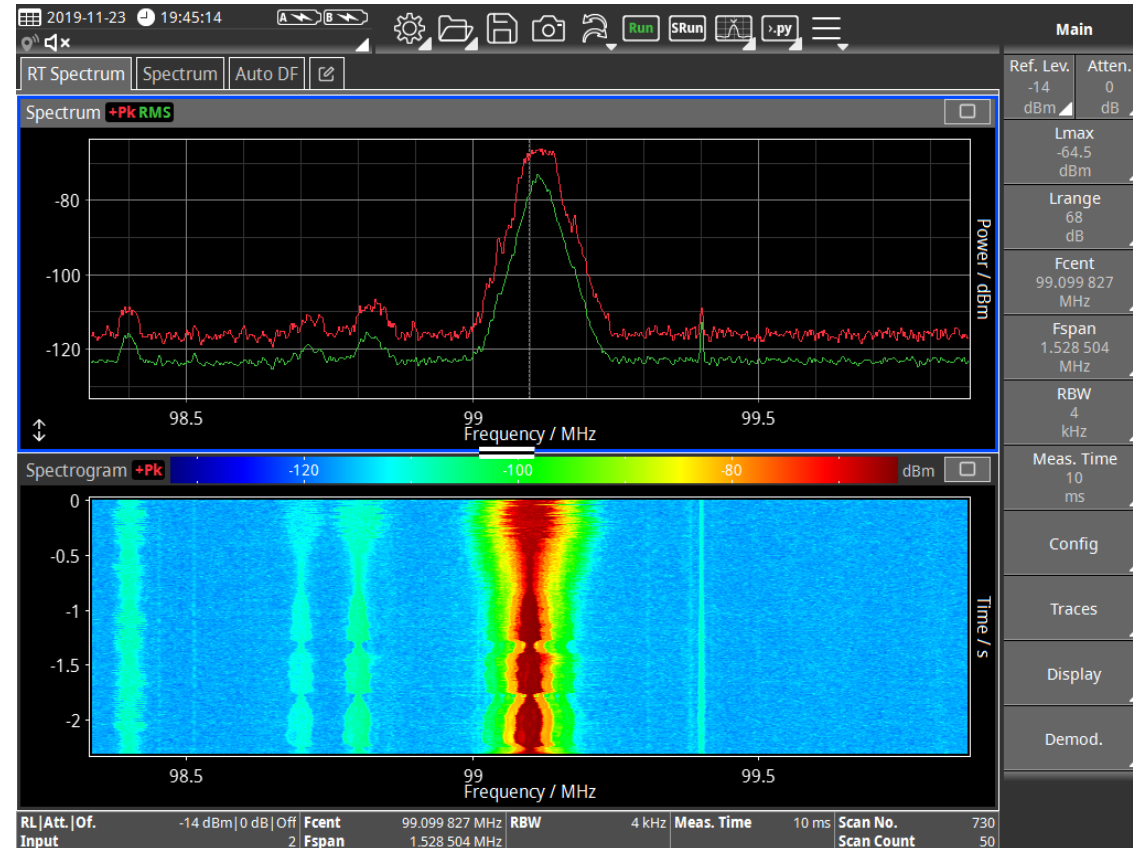
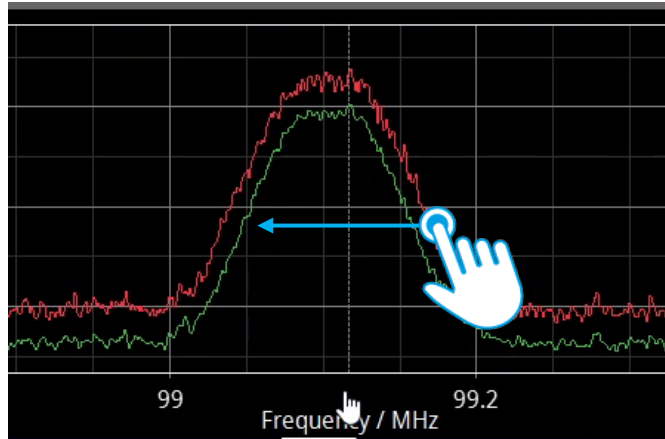
Set Frequency Span by Touch

The frequency span can be set by selecting/drawing a horizontal range inside the graph from the left to the right.



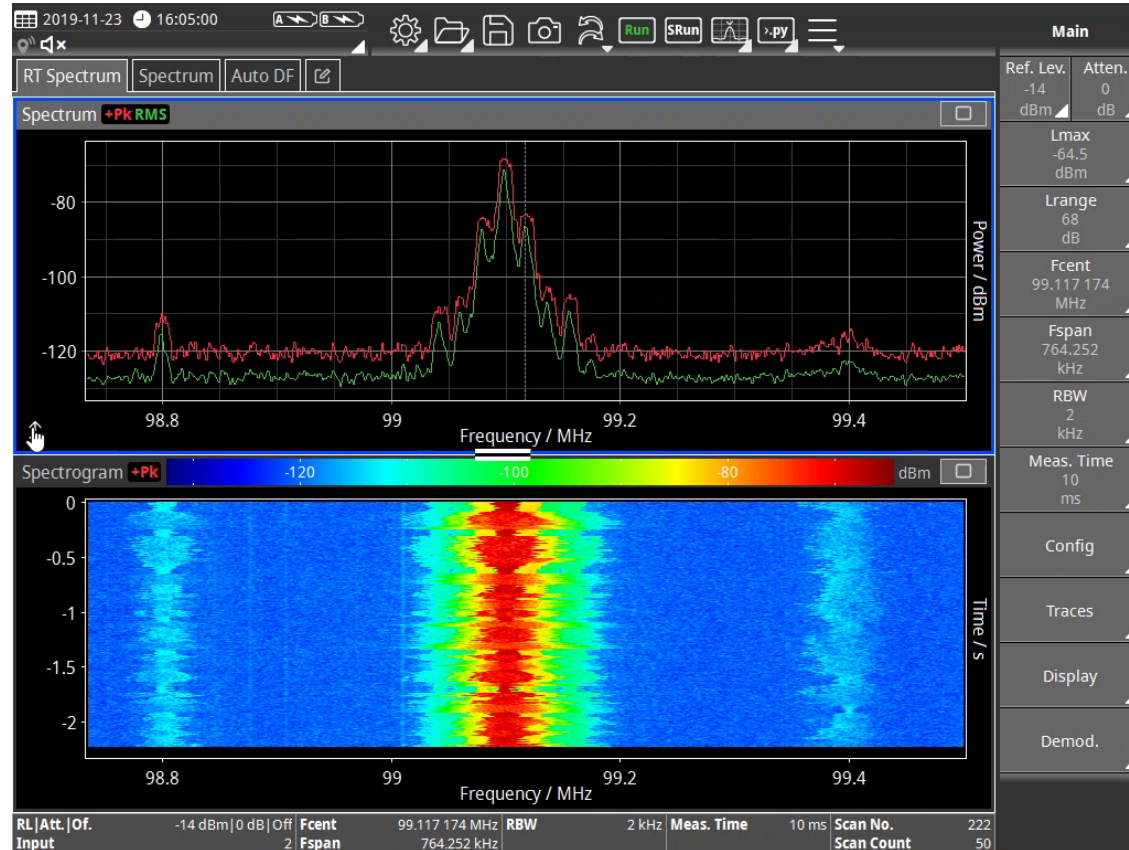
Set Frequency Span by Touch

Dragging from right to the left within the graph area will double the span.



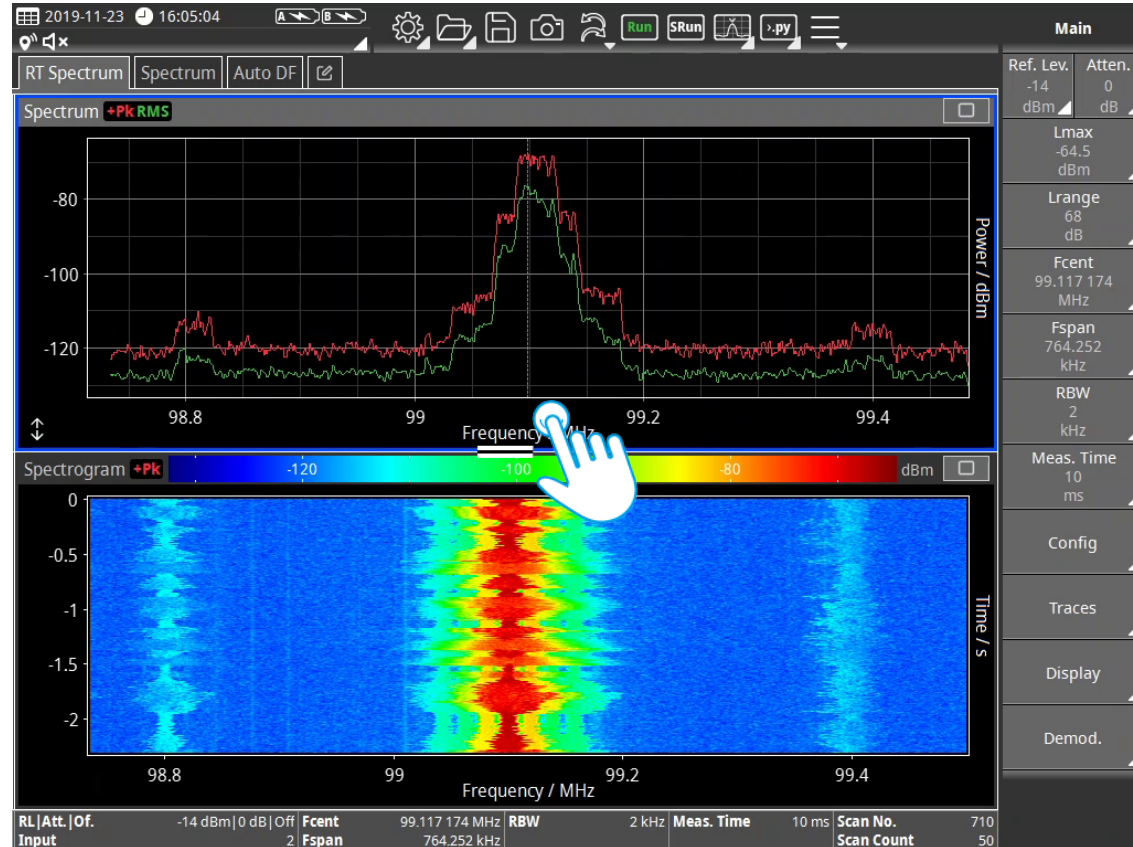
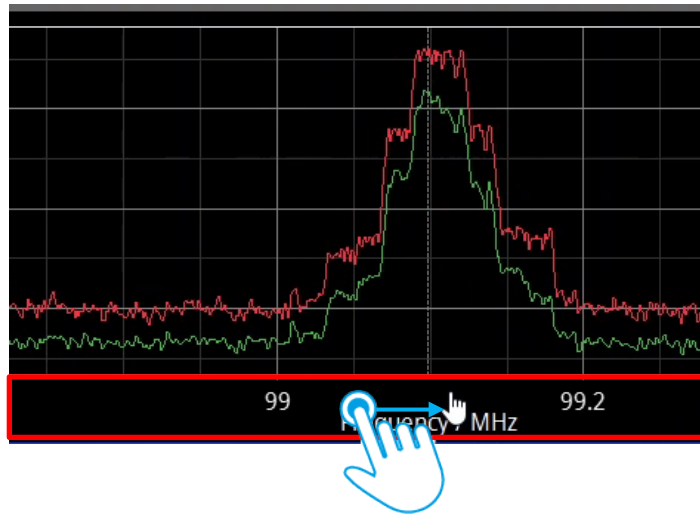
Y-Axis Auto Range

The display range of the y-axis can be automatically adapted by a tap on the Auto Range button.



Set Center Frequency by Touch

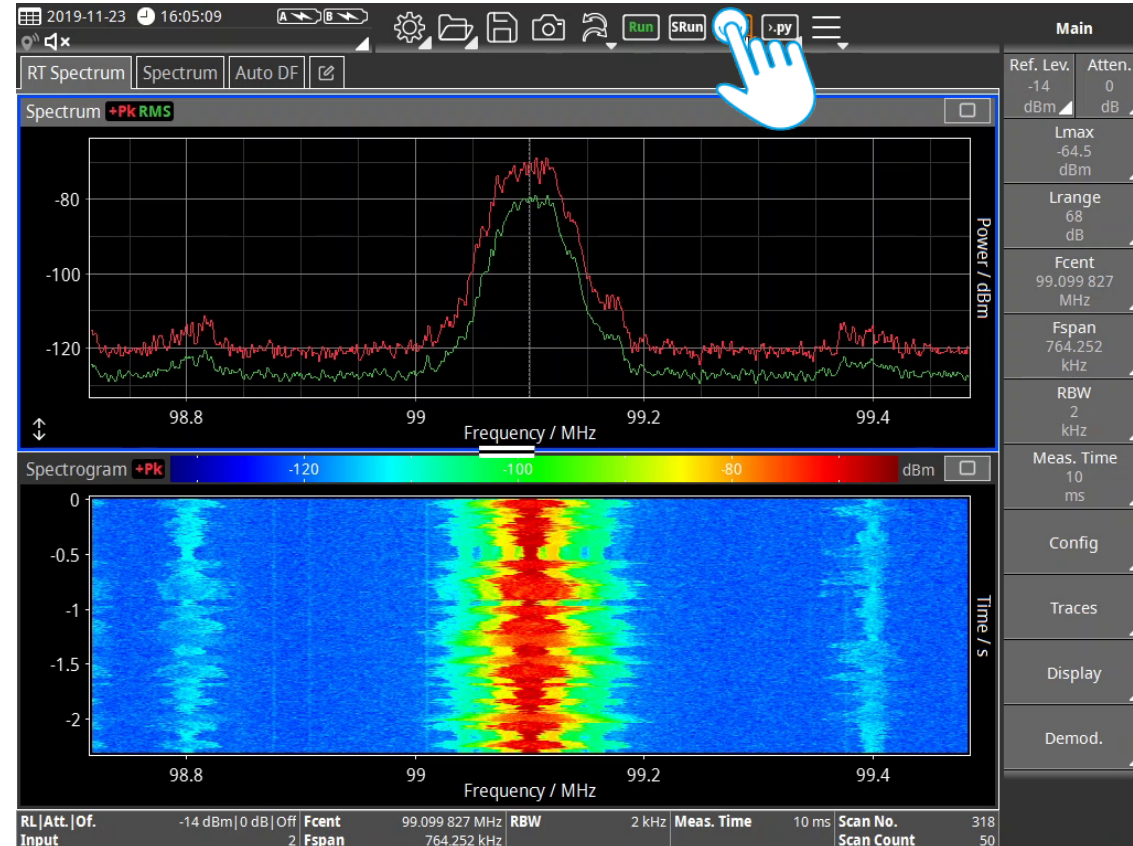
The center frequency can be set by dragging the frequency axis to the left or to the right.



Marker Menu

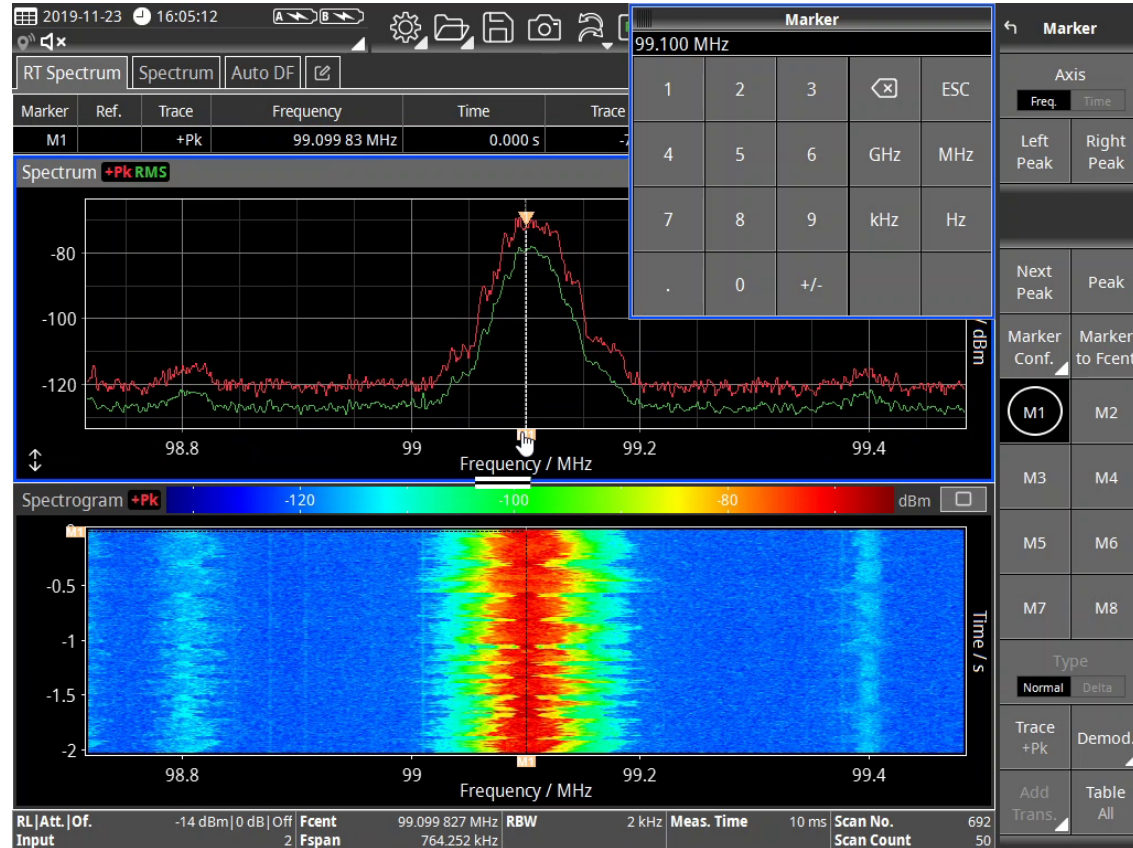
To open the Marker Menu

- › Tap on the Marker Menu Tool Button or
- › Press the hard key “Marker”



Add Marker

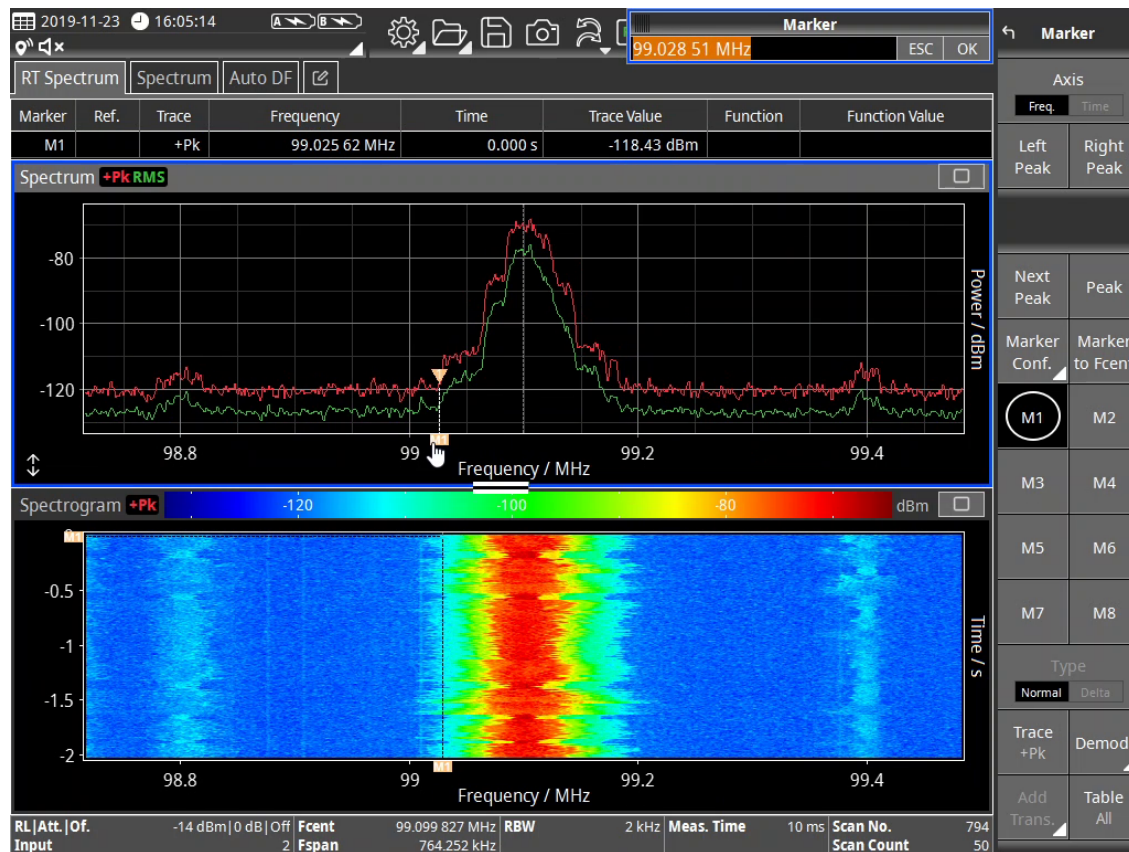
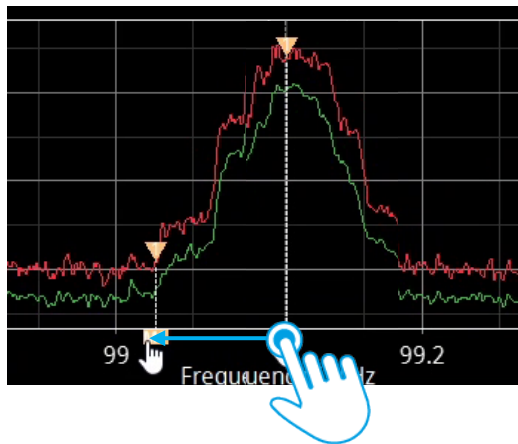
Select one to eight markers in the marker menu to add a marker.



Change Marker Position by Touch

To change the marker position

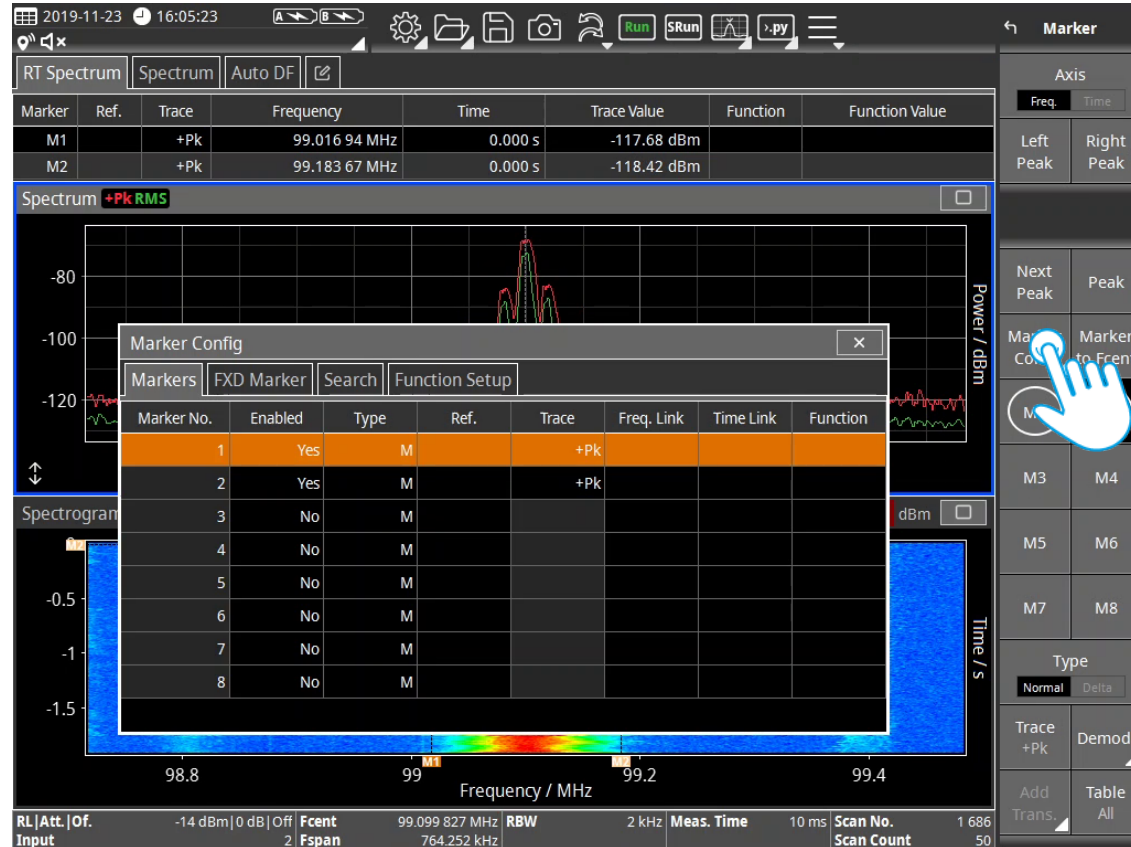
- 1) Tap on the marker label to select it
- 2) Then drag the marker by it's label to the desired position.



Change Marker Settings Step 1

To change marker settings

- › Tap on the Marker Config. button in the “Marker” Button Bar



Change Marker Settings Step 2

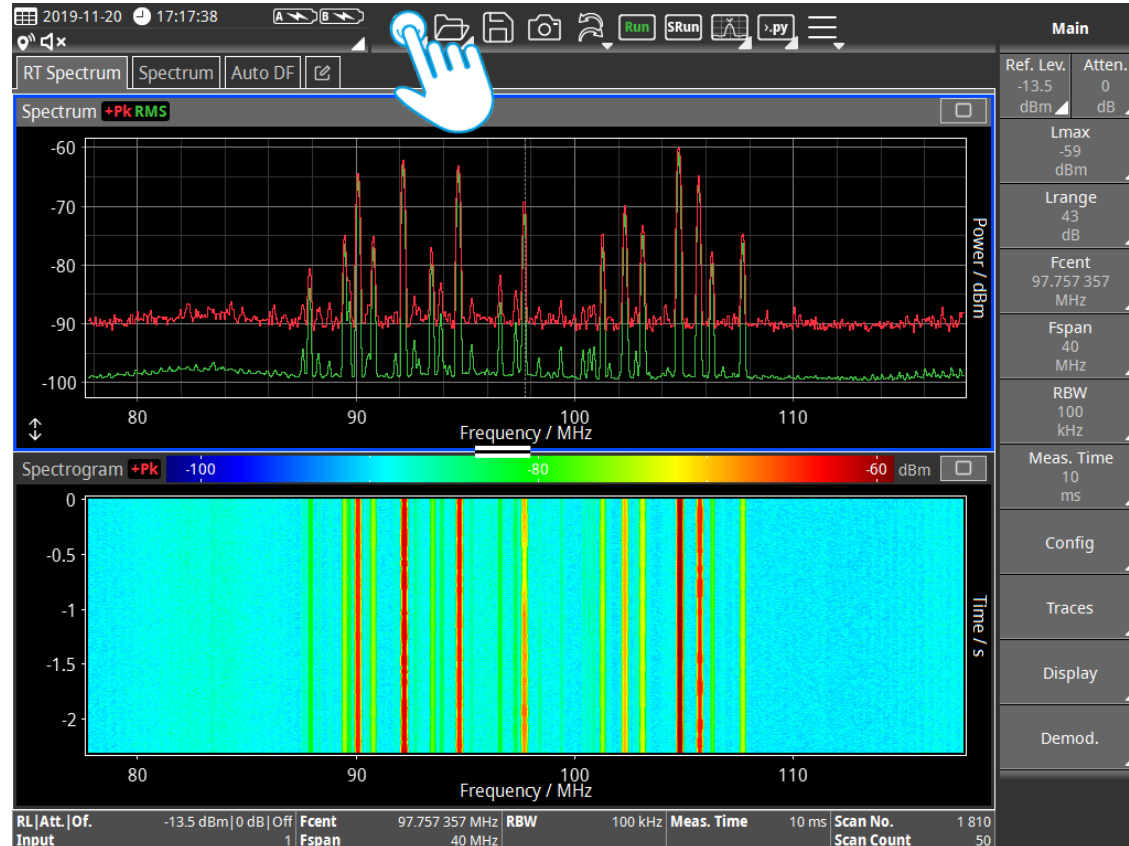
- › Select a category tap in the “Marker Config” menu.
- › Tap in the table cell you want to change.
- › I.e. a tap in the cell “Type” toggles the marker type from normal marker to delta marker.



Change Device Settings Step 1

To change a device setting like the display brightness:

- › Tap on the Device Settings Tool Button
- The Device Settings menu will appear.



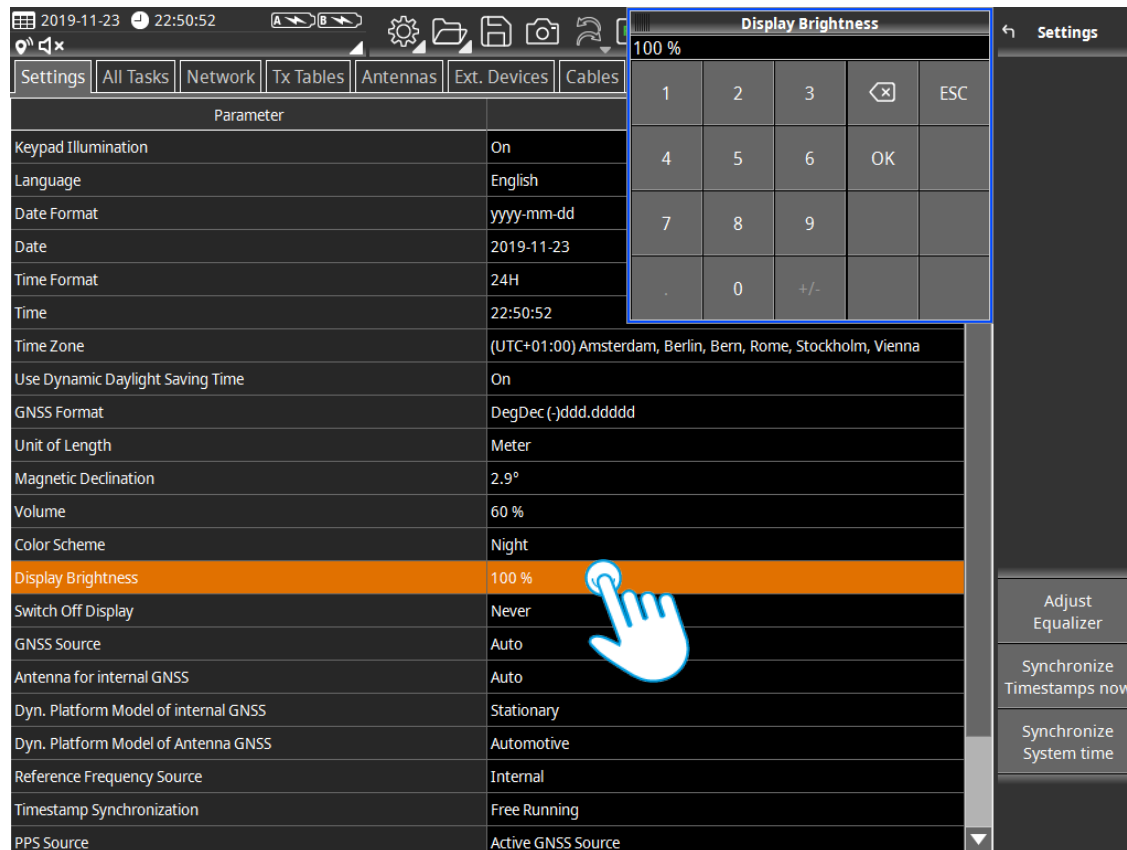
Change Device Settings Step 2

- › Tap into the table cell of the setting you want to change

→ A Parameter Edit Window will appear where the new setting can be entered.

Note:

Editable table cells have a different color than headlines or table cells containing a description.



The screenshot shows the SignalShark Settings application. At the top, there's a status bar with the date '2019-11-23' and time '22:50:52'. Below it is a navigation bar with tabs: 'Settings', 'All Tasks', 'Network', 'Tx Tables', 'Antennas', 'Ext. Devices', and 'Cables'. The 'Settings' tab is active. A table lists various parameters and their current values. The 'Display Brightness' row is highlighted in orange, and a hand icon is pointing at the '100 %' value. To the right of the main table, a 'Display Brightness' dialog box is open, showing a numeric keypad with digits 1-9, 0, and a decimal point, along with an 'ESC' button. The dialog also shows the current brightness level as '100 %'. On the far right, there's a 'Settings' sidebar with buttons for 'Adjust Equalizer', 'Synchronize Timestamps now', and 'Synchronize System time'.

Parameter	
Keypad Illumination	On
Language	English
Date Format	yyyy-mm-dd
Date	2019-11-23
Time Format	24H
Time	22:50:52
Time Zone	(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
Use Dynamic Daylight Saving Time	On
GNSS Format	DegDec (-)ddd.ddddd
Unit of Length	Meter
Magnetic Declination	2.9°
Volume	60 %
Color Scheme	Night
Display Brightness	100 %
Switch Off Display	Never
GNSS Source	Auto
Antenna for internal GNSS	Auto
Dyn. Platform Model of internal GNSS	Stationary
Dyn. Platform Model of Antenna GNSS	Automotive
Reference Frequency Source	Internal
Timestamp Synchronization	Free Running
PPS Source	Active GNSS Source

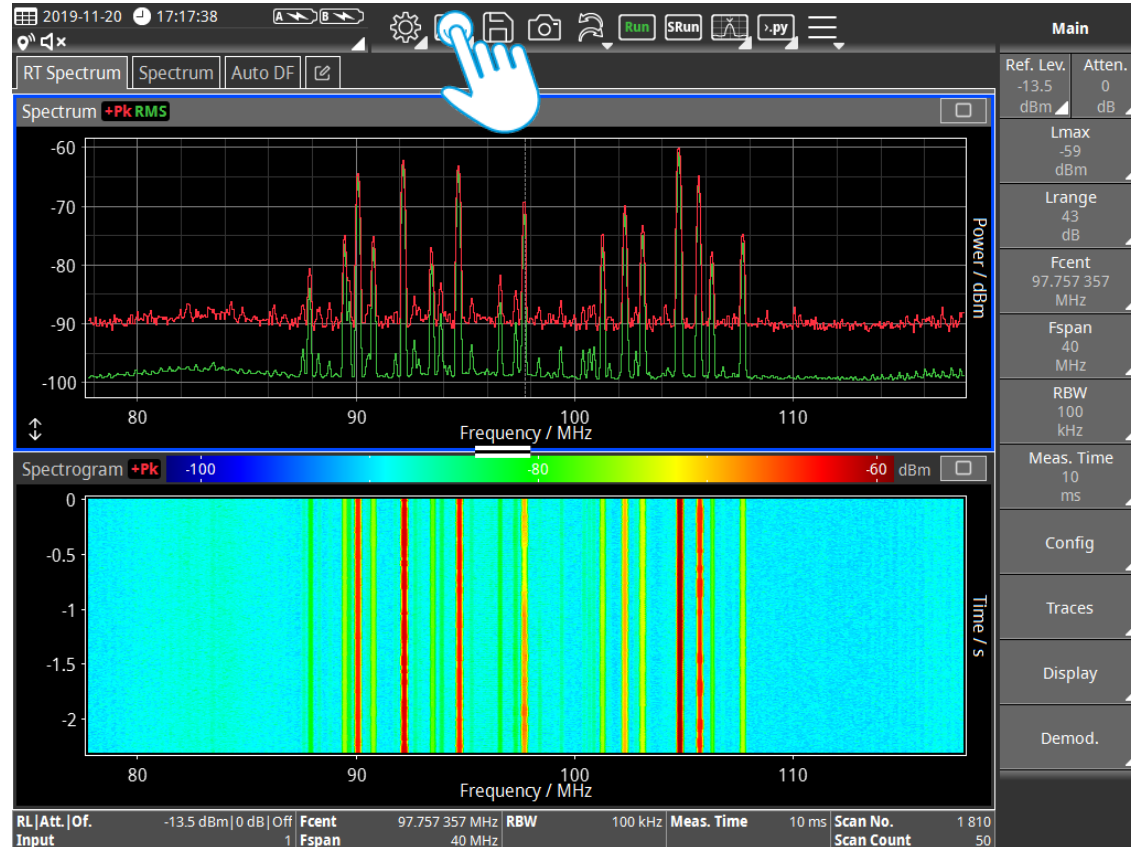
Select Working Directory Step 1

The Working Directory defines the place (drive and folder) where data is saved to.

To change the current Working Directory:

› Tap on the Data Logger Tool Button

→ The Data Logger menu will appear.

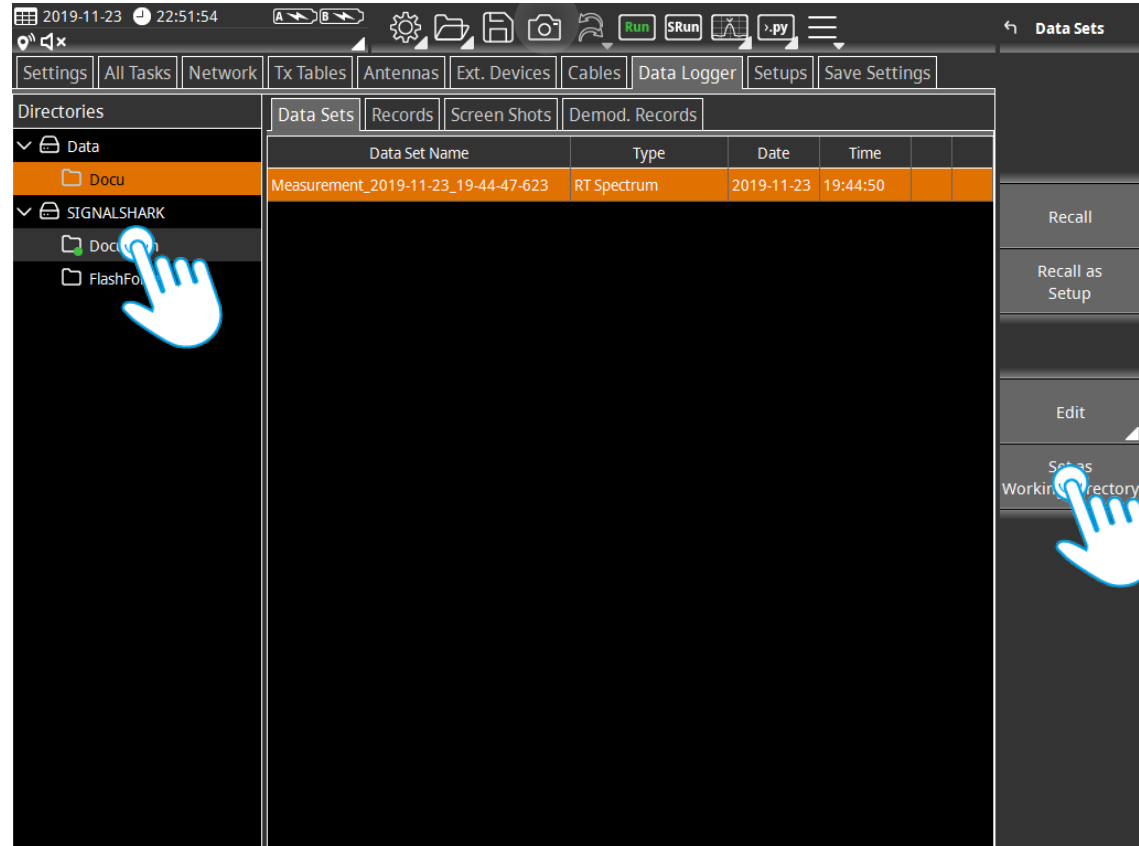
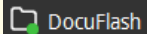


Select Working Directory Step 1

- › Select the drive/folder that should be set as Working Directory
- › Tap on “Set as Working Directory”

Note:

The actual Working Directory is marked with a green dot.

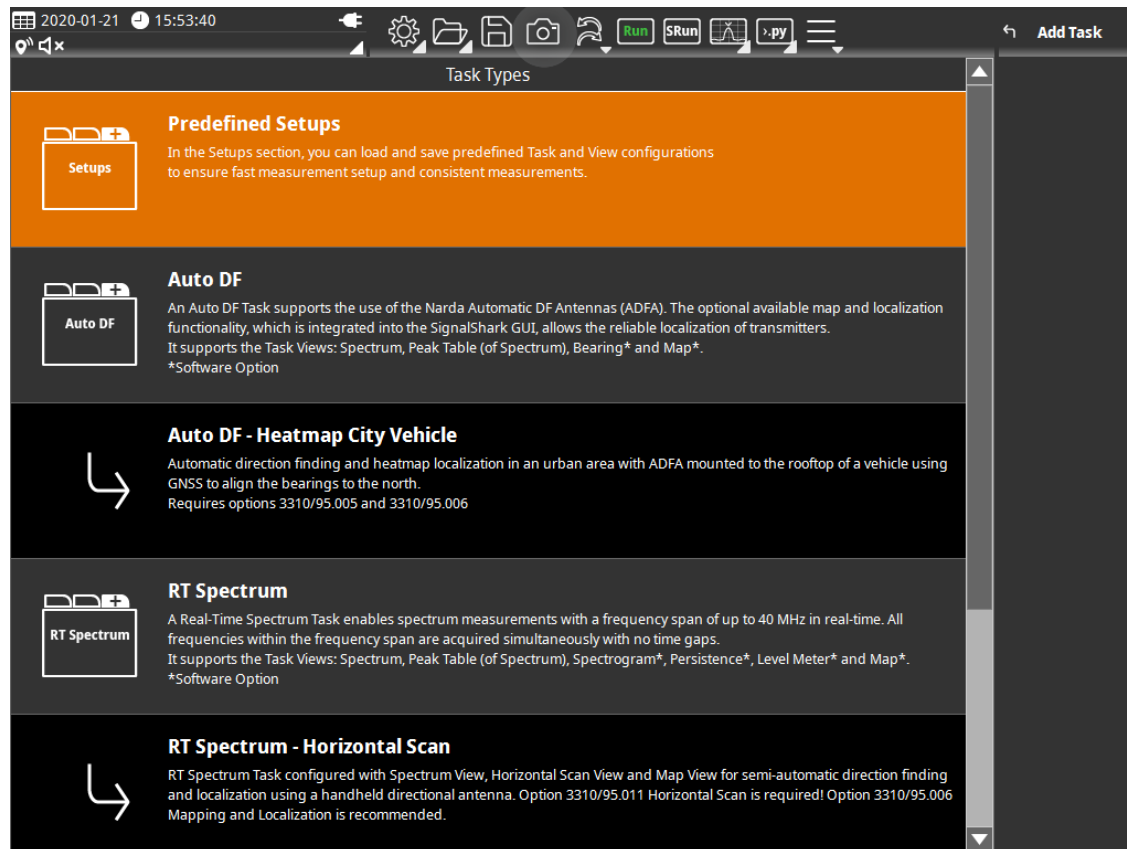


Localization in three Steps with AutoDF

Using AutoDF Task

1) Load a Predefined Setup

- › Open the “Add Task” menu
- › Select the “Predefined Setups” item



1) Load Predefined Setup

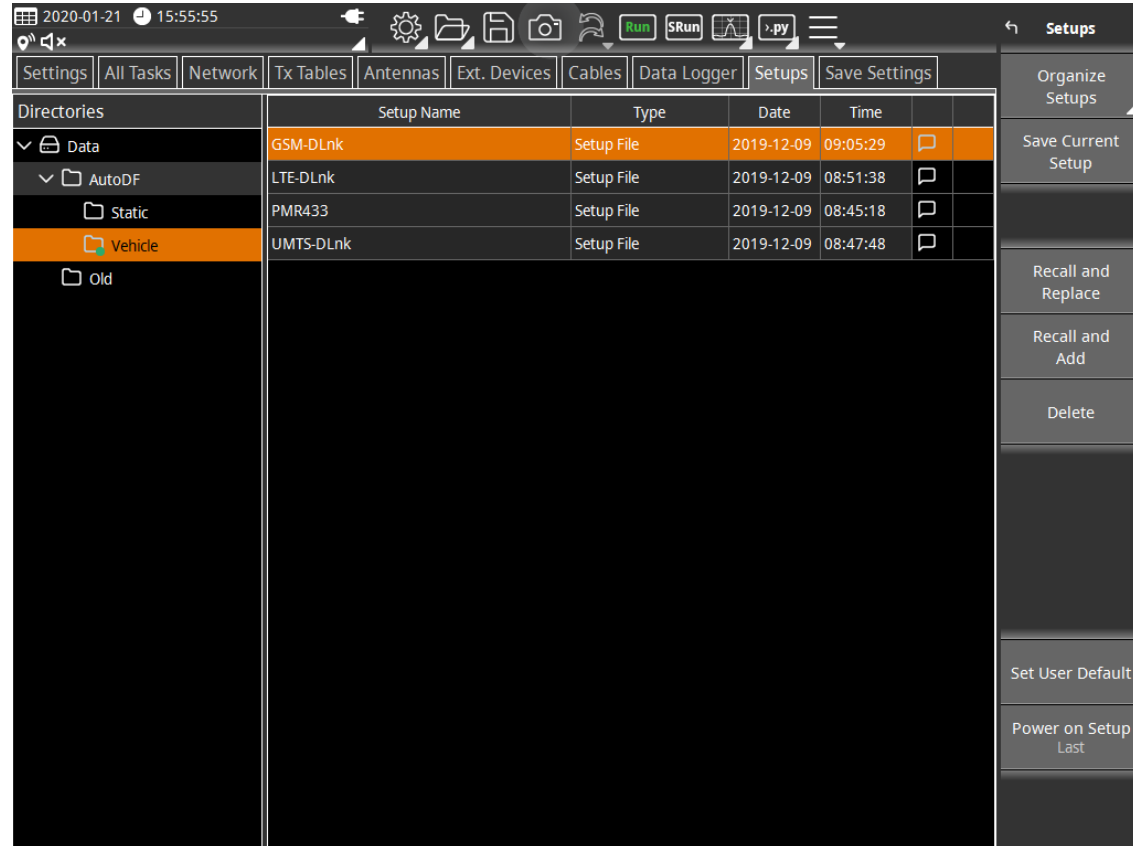
- › Select a predefined setup from the AutoDF folder that fits best to your signal

Static:

- › The antenna is installed on a tripod or a mast
- › Map. Mode is “Disc. Localization”
(Tap on “Save” to store a bearing)

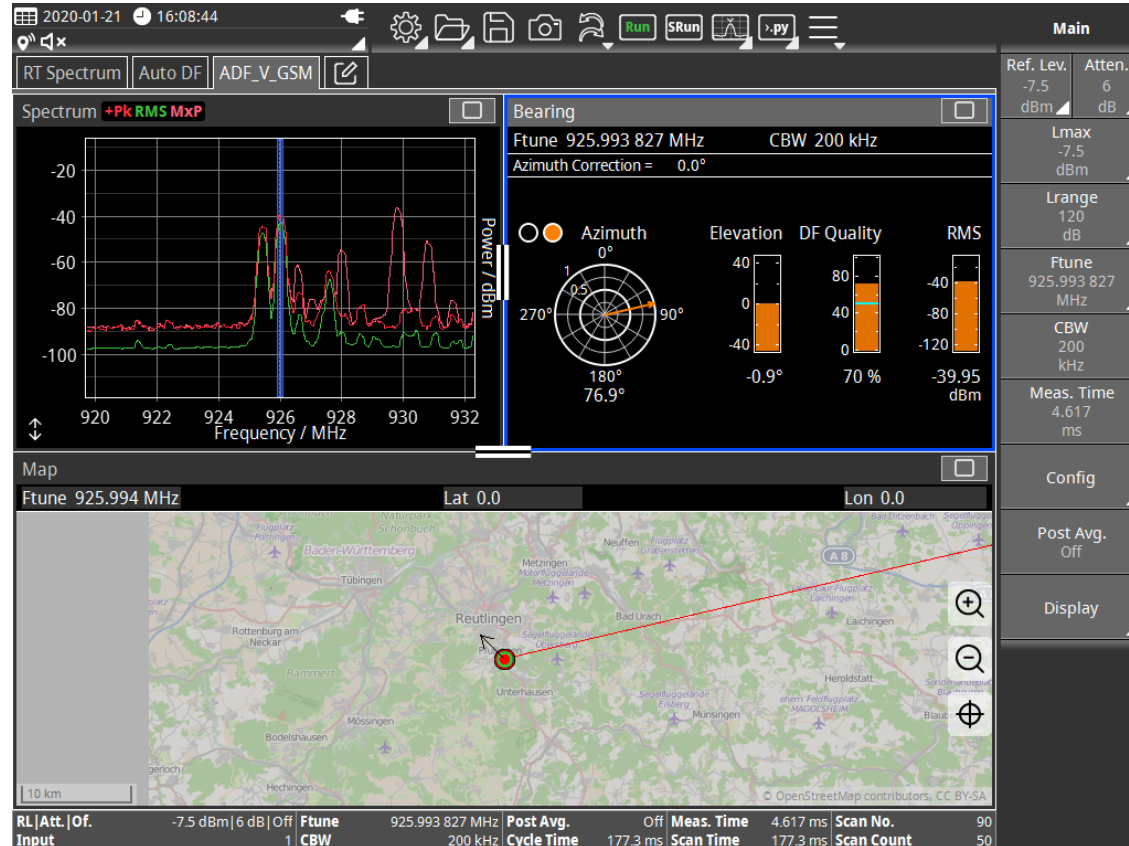
Vehicle:

- › The antenna is mounted on a vehicle
- › Map. Mode is “Cont. Localization”
(Bearings are recorded into a file)



2) Adjust Settings

- › Adjust the bearing settings according to your signal
 - › Ftune
 - › CBW
 - › Attenuation
- › Adjust the bearing configuration settings according to your signal conditions
 - › DF Squelch
 - › Min. DF Quality

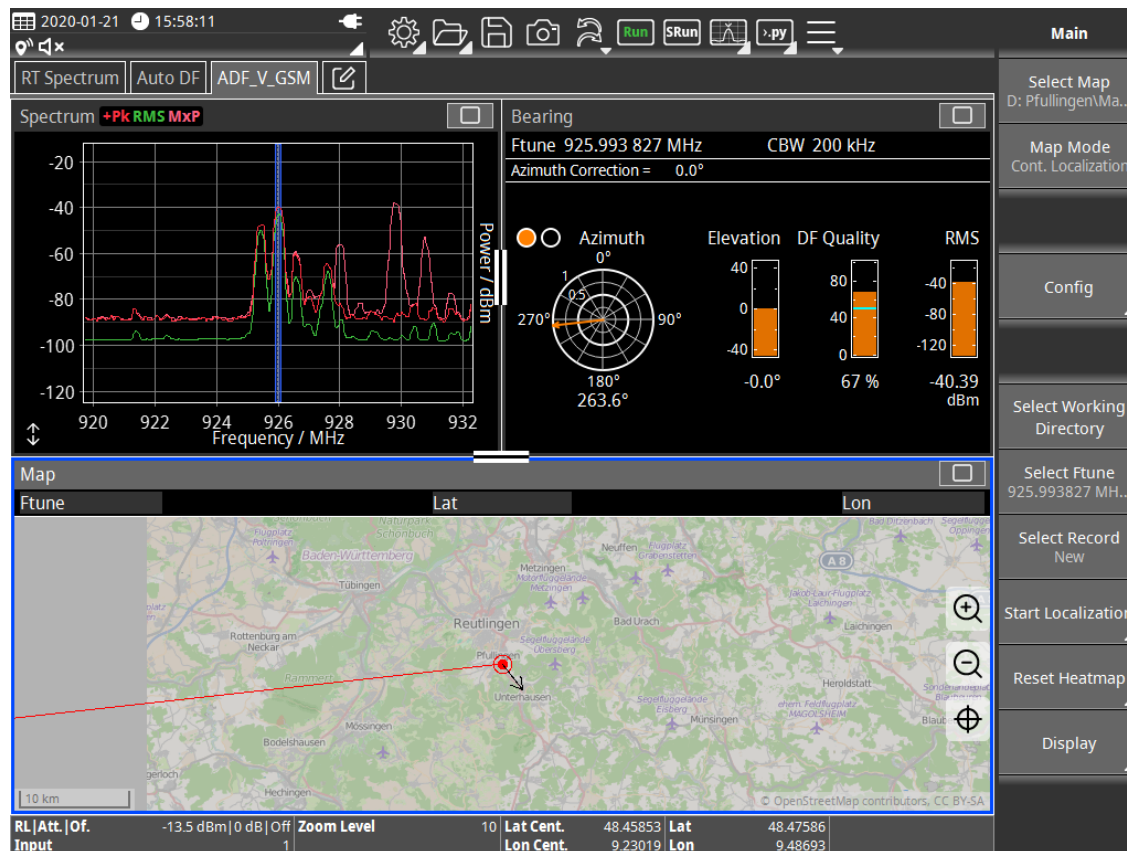


3) Start Localization

- › Select the Map View (optional)
- › Tap on “Start Localization”

Note:

The default “Localization Area” is 50 km x 50 km around your current GNSS position.



3) Start Localization – Drive an “L” Pattern

To get the fastest and most reliable localization result possible, the most practical approach has proven to be as follows:

- › Drive 3 to 4 kilometers straight ahead in one direction
- › Then look at the heat map and turn left or right depending on the result and drive again some kilometers

Note:

An ideal localization is the result of ideal bearings intersecting at right angles as in an “L” pattern.

