User manual

VER 5.4

Spectrum Manager v1.8.18.0

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OVERVIEW

1.1 Features

Spectrum Manager is PC software designed for use with Spectrum Compact spectrum analyzers. Spectrum Manager allows working with saved Spectrum Compact Curves (files with the extension ".scc") and Spectrum Compact Curve Recordings (files with the extension ".rsc") and to use Spectrum Compact in online mode (i.e. control the device from PC).

The operation of Spectrum Manager is described in the chapter GRAPHICAL USER INTERFACE. For the Spectrum Compact operation instructions please refer to their respective user manuals.

1.2 System requirements

Operating System

- Windows 7/8/10

Processor

- Intel/AMD compatible

Screen resolution

- 1024 x 840 or higher

Hard disk space

- 3 MB (+ space for SCC files, images etc.)

RAM

- 512+ MB RAM recommended

Ports

- USB port for connecting Spectrum Compact

Other software

- Windows + .NET framework 4.0

Spectrum Compact firmware versions:

- SCv3.31 for 2-40 GHz SC (PNs: J0SSAP1(0/1/2/3/4))

- SCv4.10 for E-band and V-band SC (PNs: J0SSAP(60/80))

- SCv5.2.8.6 for 0.3-3 GHz SC v.2 (PN: J0SSAP33)

- SCv5.4.3.6 for 2-8, 6-20 GHz SC v.2 (PN: J0SSAP(55/52))

- SCv5.3.6.12 for 16-26.5, 24-40/43 GHz SC v.2 (PN: J0SSAP(53/54), J0SSAP(74/54), J0SSAH74)

⚠️ The firmware version can be checked in the ABOUT menu of the SC devices.

2 GRAPHICAL USER INTERFACE

2.1 Startup window

After launching the Spectrum Manager, a startup window is displayed.

The startup window with detected Spectrum Compact
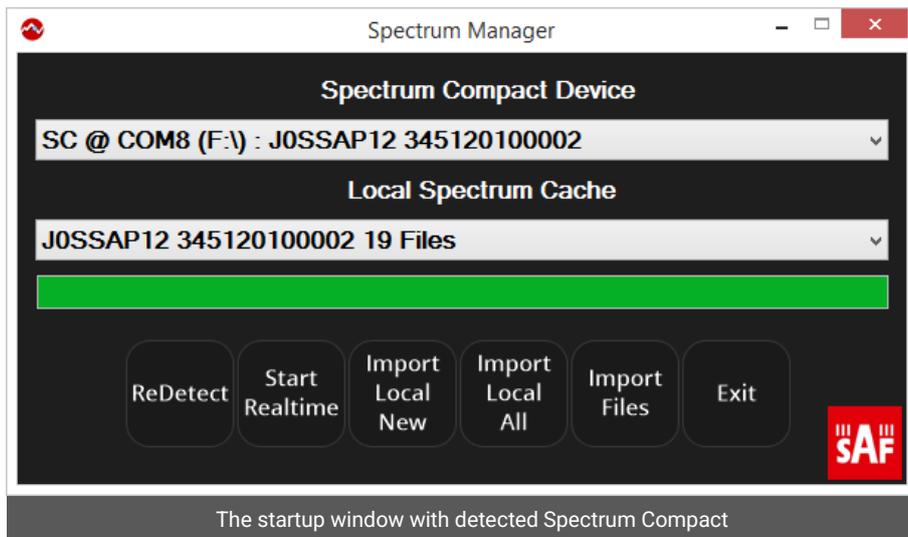
📝 Multiple Spectrum Manager program windows can be opened, each for different Spectrum Compact devices or files.

To open the main window of the program, select one of the options:

- *Start Realtime*

  Start Spectrum Manager in REALTIME mode. A turned on Spectrum Compact unit must be connected to the PC either via a USB cable or through Telnet and its USB mode must be VCP. For E-band, V-band, 0.3-3 GHz v.2, 2-8 GHz v.2, and 24-40 GHz v.2 models VCP mode must be manually selected at the TOOLS & SETTINGS → SERVICE MENU (see their respective user manuals for more information). For all the other models it is done automatically when the unit is connected to a computer.

  ⚠️ The COM port driver should be found and installed automatically by Windows when Spectrum Compact in VCP mode is connected to the PC. In case that fails, there are backup drivers and instructions included with the Spectrum Manager software bundle.

The unit should be automatically detected by Spectrum Manager and shown under "Spectrum Compact Device". If there is more than one Spectrum Compact unit detected, select the desired one from the drop-down menu.

- *ReDetect*

  Retry to connect to the Spectrum Compact, if it was not initially detected when the Spectrum Manager was launched.

  In case the Spectrum Compact is not detected with "ReDetect", try removing and attaching the USB cable and/ or rebooting the device. In the worst case scenario, it may be necessary to restore the device to factory defaults (TOOLS → PRESET).

- *Import Local All*

  Automatically open all Spectrum Compact Curves from a detected Spectrum Compact device. After the files are imported, the device is no longer required and the Spectrum Manager is started in OFFLINE mode.

- *Import Local New*

  Open only the file/-s from the selected Spectrum Compact device that was added after the "Import Local All" option was last used on this device. If there are no such files, an error will be returned.

- *Import Files*

  Open Spectrum Compact Curves by manually selecting them from a hard drive. Spectrum Manager is started in OFFLINE mode.

- *Exit*

  Close Spectrum Manager.

After starting the Spectrum Manager in either the REALTIME or the OFFLINE mode, the main window of the program is displayed. The functions accessible from the main window are described in detail in the following chapters. From the main window, the REALTIME mode can be enabled under <u>System Settings</u>. The OFFLINE mode is enabled also by opening an SCC or RSC file (e.g. with <u>IMPORT</u>).

In Spectrum Manager's main window hover the mouse over an option to get a short description.
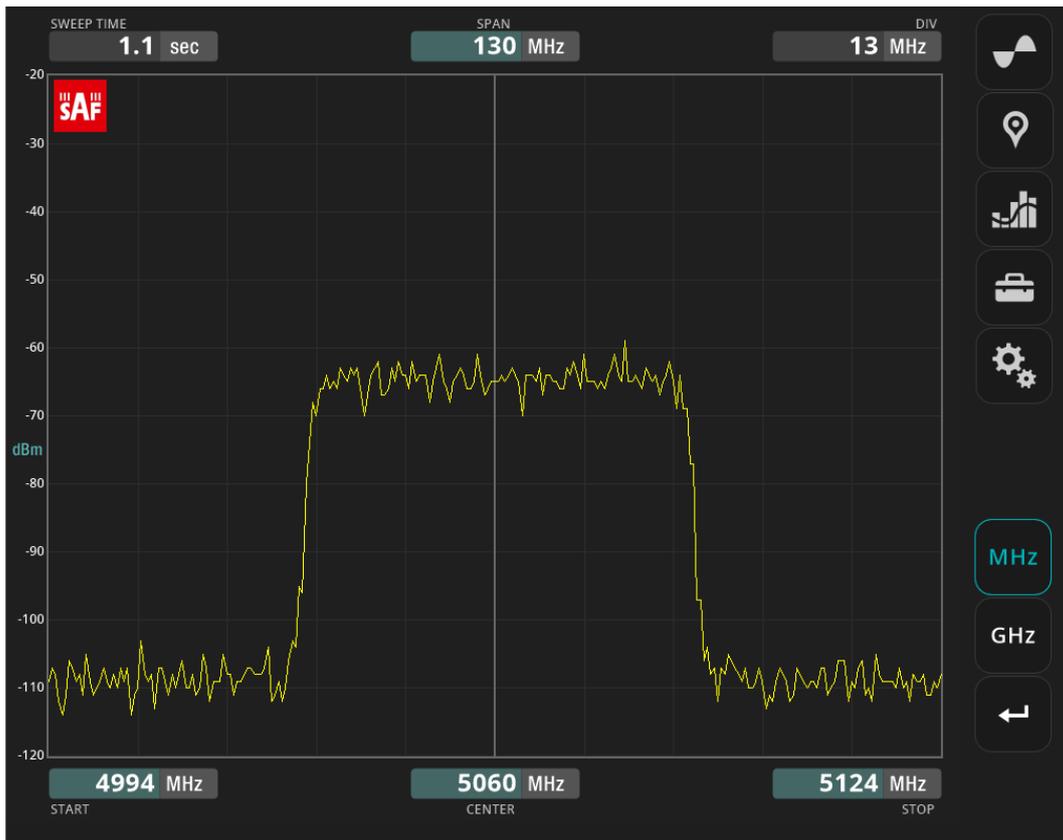
The main window of Spectrum Manager started in REALTIME mode.
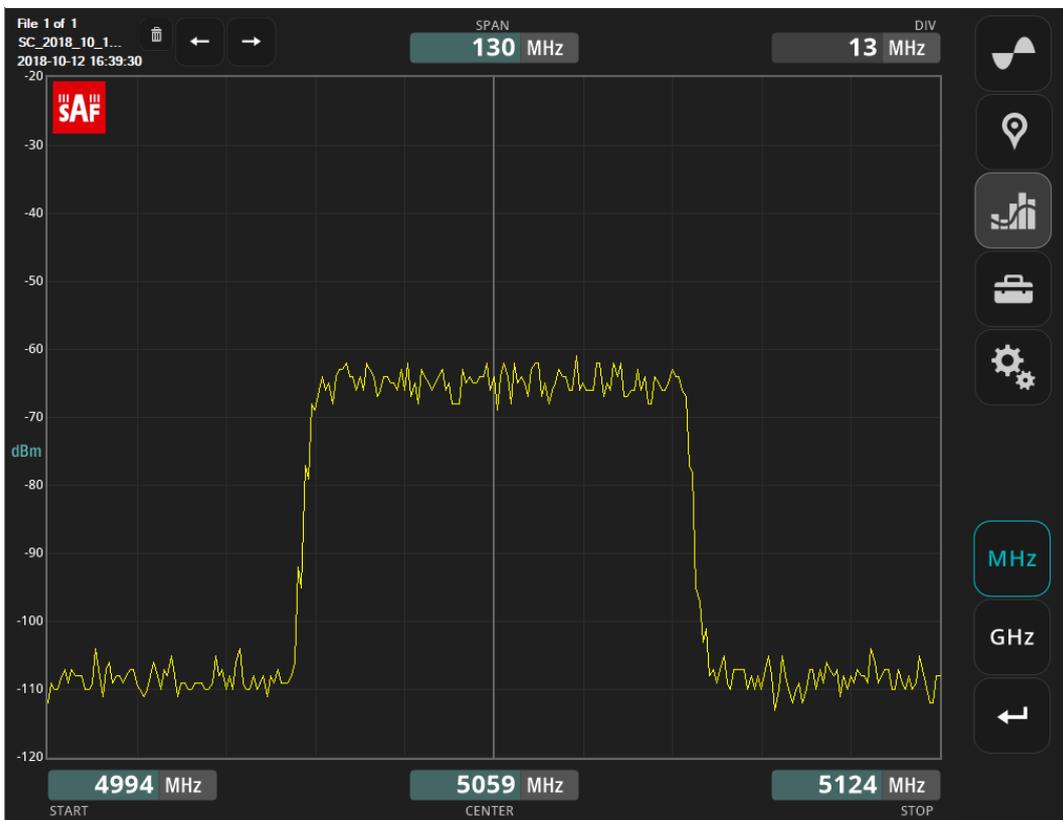
The main window of Spectrum Manager started in OFFLINE mode.

2.2 Frequency Controls

The Frequency Controls menu allows modifying the horizontal (frequency) range of the graph.

 The precision, with which the frequencies can be selected, depends on the model of the Spectrum Compact device.

The available options are:

- *CENTER*

    Select the center frequency of the spectrum graph in megahertz (MHz) or gigahertz (GHz).
    Modifying the CENTER frequency alters the START and the STOP frequencies, but keeps the SPAN (if possible).
    When selected, the value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered CENTER frequency value is valid, it is highlighted in green. If the value is valid but the frequency SPAN will be altered, it is highlighted in purple. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. The CENTER frequency also can be selected by clicking on the spectrum graph.

- *SPAN*

    Select the displayed frequency range (difference between the start and stop frequencies) of the spectrum graph in megahertz (MHz) or gigahertz (GHz).
    Modifying the frequency SPAN alters both the START and the STOP frequencies, but keeps the CENTER frequency (if possible).
    When selected, the value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered SPAN value is valid, it is highlighted in green. If the value is valid but the CENTER frequency will be altered, it is highlighted in purple. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. The SPAN also can be selected by clicking and dragging on the spectrum graph or with options:

    - *MIN SPAN*

        Set the minimum span value supported by the connected Spectrum Compact device. The minimums span value depends on the model and also on the actual resolution bandwidth RBW.

- *FULL SPAN*

  Set the maximum span value. In OFFLINE mode (when working with files) the maximum span is the span with which the spectrum curve was saved. In REALTIME mode the maximum span value is equal to the full supported frequency range of the connected Spectrum Compact device (depends on the model).

SPAN can be decreased or increased (zooming in or out can be done) by using the mouse wheel.

- ## *START/STOP*

  Select the right or left limit of the frequency axis in megahertz (MHz) or gigahertz (GHz).
  Modifying the START/ STOP frequency alters the CENTER frequency and the SPAN, but keeps the STOP/ START frequency (if possible).
  When selected, the value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered START/ STOP frequency value is valid, it is highlighted in green. If the START/ STOP value is valid but the STOP/ START frequency will be altered, it is highlighted in purple. If the START/ STOP value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen.

  CENTER/ SPAN/ START/ STOP can be selected also by clicking on the corresponding parameter above or under a graph.

Frequency Controls – CENTER selection with cursor (REALTIME mode)

Frequency Controls – SPAN selection with cursor (REALTIME mode)
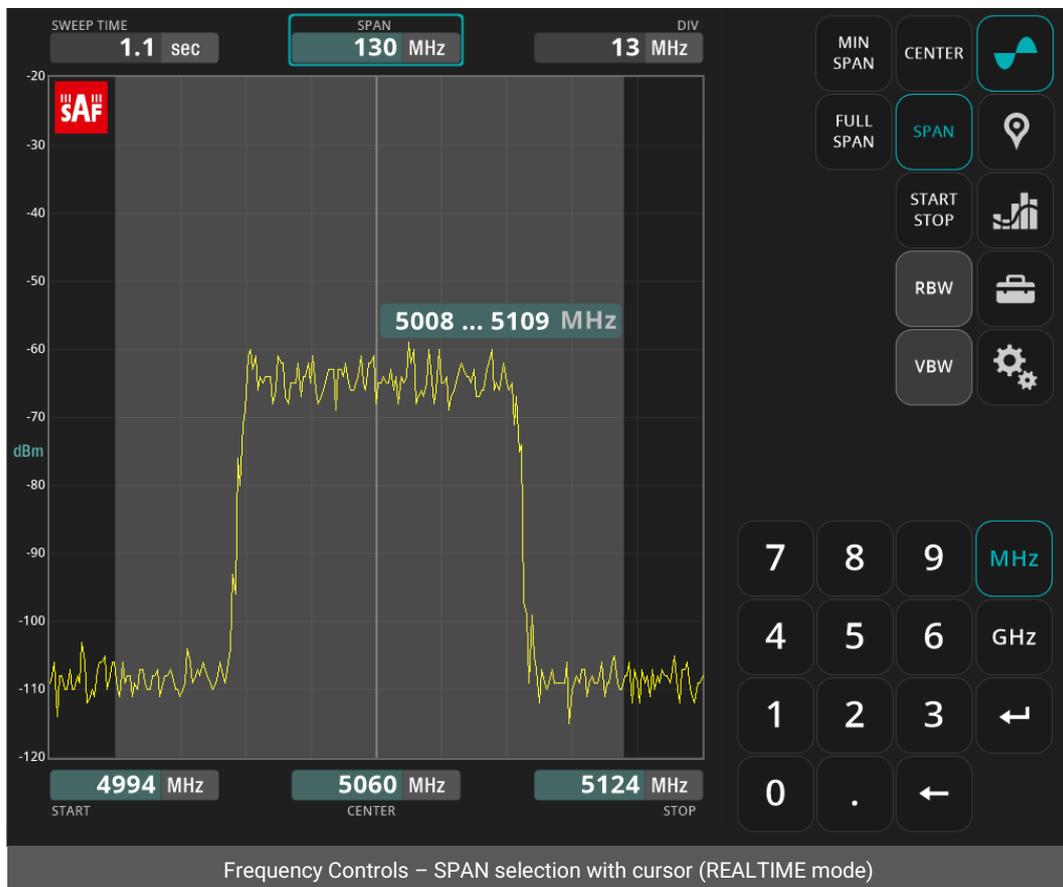
The availability of RBW and VBW options depends on the model of Spectrum Compact.

- *RBW*

    Select the resolution bandwidth RBW. AUTO automatically selects an optimum RBW for the current SPAN. The actual RBW is always displayed at the bottom left corner of the graph.

- *VBW*

    Select the video bandwidth VBW. AUTO automatically selects optimum VBW for the current RBW. The actual VBW is always displayed at the bottom left corner of the graph.

Frequency Controls – RBW selection (REALTIME mode)
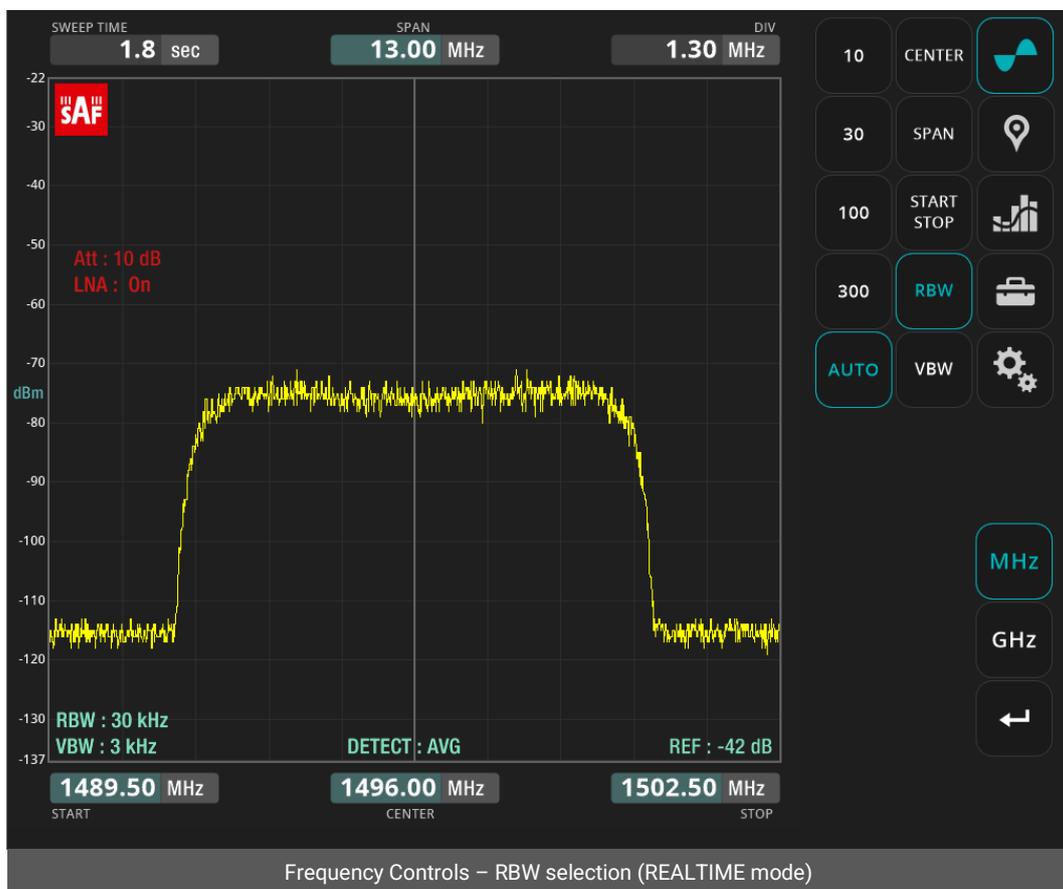
2.3 Marker Controls

A marker shows the input power level at a specified frequency in the currently displayed frequency range. Up to 10 markers can be placed simultaneously.

After selecting a marker (A, B, C, D, E, F, G, H, I, or K), the available options are:

- *MAX*

  Enable to automatically place the marker at the highest input power level.

- *MIN*

  Enable to automatically place the marker at the lowest input power level.

- *FREQ*

  Select the frequency of the marker in megahertz (MHz) or gigahertz (GHz). The selected marker frequency is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered MARKER frequency value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. The MARKER frequency also can be selected by clicking on the spectrum graph.

- *DELTA Δ*

  Enable/ disable the delta mode. In delta mode, the frequency difference (in MHz) and input power difference (in dB) between the selected marker and marker A is shown. The frequency difference can be determined with FREQ. Change the difference to positive or negative with the "+/-" button.

- *DELETE*

  Delete the currently selected marker.

Markers display the power values for HOLD lines on different backgrounds – on blue for MIN HOLD trace and on red for MAX HOLD trace.

Marker Controls – marker "B" in DELTA mode
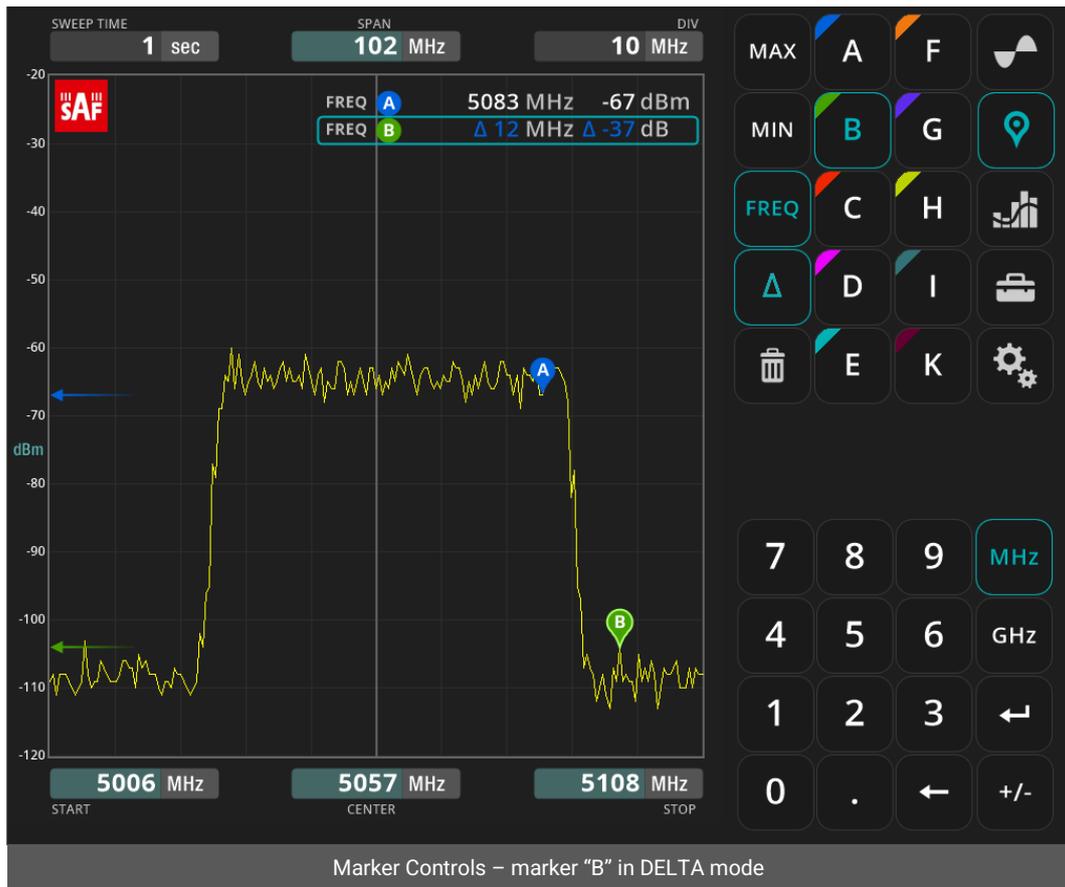
2.4 Trace Controls

Available in REALTIME mode. Trace Controls menu allows configuring options related to the online spectrum sweep.

2.4.1 AVG

Enable/ disable averaging. The displayed spectrum curve will be averaged over the last two, four, eight, or sixteen sweeps. To disable averaging, deselect the active option (2, 4, 8, or 16). The number on the left side of the graph shows how many sweeps the displayed trace is currently averaged. After selecting a different averaging option, the count (and averaging) is restarted.

AVG trace mode is used to smooth out the noise effects.

Trace Controls – spectrum curve with active averaging
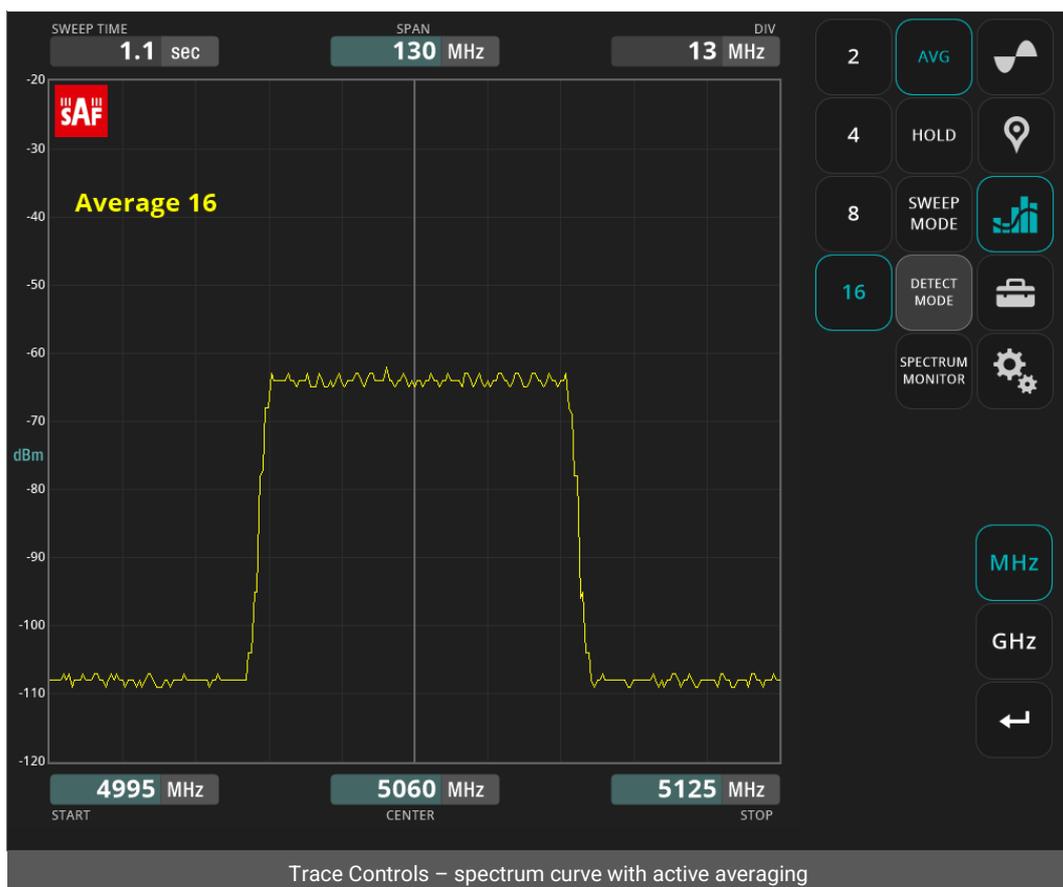
2.4.2 HOLD

HOLD keeps the highest and lowest detected input power levels and displays them together with the actual real-time trace. The number of sweeps done with HOLD is displayed on the left side of the graph.

The available options are:

- *MAX HOLD*

  Enable/ disable the MAX HOLD trace. The red MAX HOLD trace shows the highest detected input power levels since the sweeping with HOLD began. The number on the left side of the graph shows for how many sweeps the MAX HOLD is active. To disable HOLD, deselect MAX HOLD.

  MAX HOLD trace can be used to detect intermittent signals or to measure the maximum power of fluctuating signals.

- *MIN HOLD*

  Enable/ disable the MIN HOLD trace. The blue MIN HOLD trace shows the lowest detected input power levels since the sweeping with HOLD began. The number on the left side of the graph shows for how many sweeps the MIN HOLD is active. To disable HOLD, deselect MIN HOLD.

  MIN HOLD trace can be used to detect signal interruptions.

- *MIN MAX HOLD*

  Enable/ disable both the red MAX HOLD and blue MIN HOLD traces together. The number on the left side of the graph shows for how many sweeps the MIN MAX HOLD is active. To disable HOLD, deselect MIN MAX HOLD.

Trace Controls – the current sweep trace displayed together with MAX and MIN Hold traces
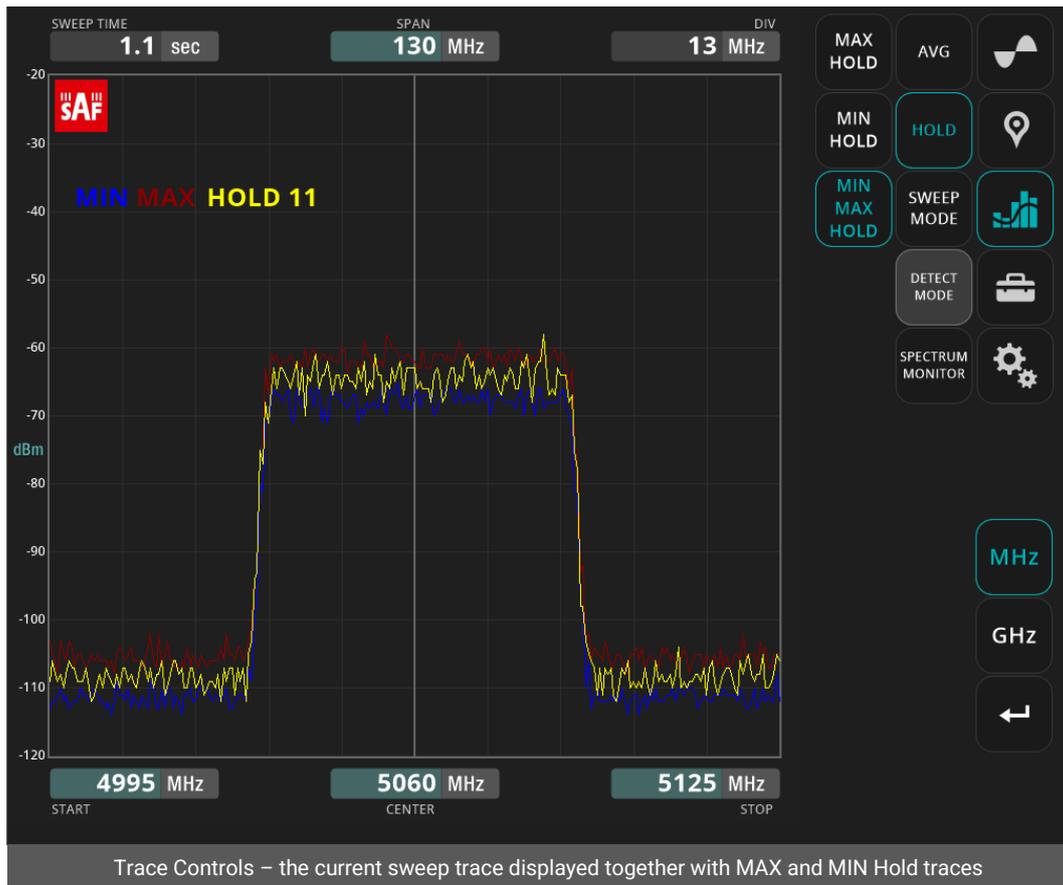
2.4.3 SWEEP MODE

Determine how many spectrum scans (sweeps) will be done.
The available options are:

- *CONT.*

  Enable to sweep the selected spectrum range continuously (on by default).

- *SINGLE START*

  Enable to sweep the selected spectrum range just once.

- *STOP SWEEP*

  Enable to stop the spectrum sweep completely on both the Spectrum Compact device and Spectrum Manager. To restart the sweep select either CONT. or SINGLE START.

2.4.4 DETECT MODE

Availability of DETECT MODE depends on the model of Spectrum Compact. Allows selecting the detector type. The actual DETECTOR is always displayed at the bottom center of the graph.

The available options are:

- *MAX*

    Enable to display only the highest input power values detected each sweep.

- *MIN*

    Enable to display only the lowest input power values detected each sweep.

- *AVG*

    Enable to display the averaged value over the input power values detected.

2.4.5 SIGNAL ID

SIGNAL ID is not available for 0.3-3GHz v.2 Spectrum Compact. Enable/ disable the SIGNAL ID algorithm that reduces the power levels of the harmonic signals. Enabling the SIGNAL ID slows down the sweeping.

2.4.6 SPECTRUM MONITOR

Allows observing the state of radio signals in the selected frequency range over time. If either a spectrum mask or a specified Power in Band value is exceeded during the monitoring session, it will be registered by saving the failed spectrum curve as an SCC file and, optionally, a screenshot. To start a monitoring session, select the frequency and input power level range, markers, mask, or Power in Band in Spectrum Manager (it can also be done with EDIT CFG) and select EDIT CFG → "Apply". A monitoring session is also automatically started when a previously saved configuration is opened with LOAD CFG. During a monitoring session, an indication "MON" is shown above the graph and the screen will flash when the spectrum curve is saved.

The available options are:

- *LOAD CFG*

    Load a previously saved Spectrum Manager Monitoring Configuration (with the file extension ".smmc"). The file contains parameters that define the Spectrum Manager's configuration during the monitoring session.

- *SAVE CFG*

    Save the current configuration. The file is saved in SMMC format.

- *EDIT CFG*

  Edit the current configuration. The "Monitoring Configuration Editor" window is displayed. The following parameters can be edited (a part of them are automatically defined by the current Spectrum Manager's configuration):

  - *Type of connection ("host", "serverport", "servertype", "user", "password", "comport")*

    Determine the connection. "host", "serverport", "servertype", "user" and "password" refer to the remote connection, "comport" refers to the local connection.

  - *Frequency range ("start", "stop")*

    Select the frequency range. "start" and "stop" refer to the left and right limits of the frequency axis, respectively.

  - *Input power level range ("minlevel", "maxlevel", "offset")*

    Select the level range. "minlevel", "maxlevel" and "offset" refer to the upper and lower limits of the power level axis and the attenuator value, respectively.

  - *Other sweep parameters – only for Spectrum Compact v.2 models ("rbw", "vbw", "att", "gain", "lna", "det"):*

    Specify other parameters that determine the detected input power values. *"rbw"* refers to the resolution bandwidth, *"vbw"* to the video bandwidth, *"att"* to the internal attenuation, *"gain"* to the reference level, *"lna"* to the low noise amplification and *"det"* to the detector. For more information on these parameters see the Spectrum Compact user manual.

  - *Marker positions ("M1" … "M10")*

    Define the positions for up to ten possible markers.

  - *Type of trace ("tracemode")*

    Determine whether any of the HOLD options ("minhold", "maxhold", "minmaxhold") or AVG options ("avg2", "avg4", "avg8", "avg16") are used. Leave empty to disable HOLD / AVG.

  - *Power in band ("pibfreq", "pibbw", "pibtarget", "pibdelta")*

    Specify the *Power in Band* parameters. "pibfreq" refers to the center frequency of the *Power in Band* function and "pibbw" to the bandwidth. "pibtarget" is the maximum allowed *Power in Band* value, but a spectrum is considered failed only when the actual *Power in Band* value exceeds the "pibtarget" by "pibdelta" value.

  - *Mask ("maskfile", "maskfreq", "masklevel")*

    Specify the mask. "maskfile" is the full name (with file extension) of the file to be used as a mask. The mask file must be located in the same directory as the current configuration file. "maskfreq" is the center frequency of the mask. Interpretation of "masklevel" parameter depends on whether the used mask is a "Relative" or an "Absolute" mask. For a "Relative mask" the "masklevel" is the absolute input power level at the

center frequency of the mask. For an "Absolute mask" the "masklevel" is the level offset from the levels with which the mask was created.

- *The spectrum fail condition ("savemode")*

Determine whether the SCC file will be saved when the mask ("savemode=mask") or the power in band value ("savemode=pib") is failed. With "savemode=all", all spectrum sweeps will be saved.

- *Timeout between saving files ("minsaveinterval")*

Determine the minimum time interval, in seconds, after which the next spectrum will be saved, if the fail condition is still met. The purpose of this parameter is to avoid generating redundant files if the state of the spectrum does not change. By default, the timeout is 60 seconds ("minsaveinterval=60").

- *Additional JPEG image ("saveimage")*

Save also a JPEG image of the spectrum graph in addition to the SCC file. Use "saveimage=1" to save an image and "saveimage=0" to do not.

> ⚠️ To get images with **OVERLAY** displayed, it has to be enabled separately in Spectrum Manager (no dedicated parameter in the monitoring configuration).

- *Additional SCC file ("saveonalertend")*

Save an additional SCC file, when the spectrum returns to normal conditions (mask is now passed or the Power in Band value is now within the allowed range). Use "saveonalertend=1" to save the additional file, and "saveonalerted=0" to do not. Useful for creating a timeline.

- *File path*

Determine the directory, where all the SCC and JPEG files will be saved. If left empty, the files will be saved in the same folder where the configuration file is stored.

> ⚠️ If an incorrect file path is given, no files will be saved and no report will be generated.

- *LCD screen ("lcdon")*

Available only for 2-40 GHz Spectrum Compact models. Turn off the LCD screen. "lcdon=0" turns off the LCD screen of the Spectrum Compact during the monitoring session, "lcdon=1" leaves it on. Useful to reduce the power consumption, especially for long monitoring sessions.

The available options are:

- *Apply*

Confirm the configuration (does not save any edits in the configuration file) and start the monitoring session.

- *Save*

Save the edited configuration.

- *Close*

   Close the "Monitoring Configuration Editor" (without confirming the configuration and saving any edits).

• *REPORT*

   Get a report on the current monitoring session. SUMMARY includes the uptime, number of sweeps done, number of files created, number of files created today, and how many times the mask or the Power in Band value failed. DETAILS show the number of the files created and how many of them were failed spectra, by date.


```
Monitoring Configuration Editor                              —    □    ×

# SC Server ip address or hostname
host=
# SC Server tcpip port
serverport=
# SC Server type Olimex, Mikrotik
servertype=
user=
password=
comport=COM13
start=4995 MHz
stop=5125 MHz
minlevel=-120
maxlevel=-20
offset=0
M1=5083 MHz
M2=5095 MHz
M3=
M4=
M5=
M6=
M7=
M8=
M9=
M10=
# minhold, maxhold, minmaxhold, avg2, avg4, avg8, avg16
tracemode=avg4
pibfreq=
pibbw=
pibtarget=
pibdelta=
# mask file should be located in the same directory as the .smmc file
maskfile=C:\Documents\Spectrum_Monitor\Mask_From_Trace.txt
maskfreq=5060 MHz
masklevel=-57
# determines when scc files are saved - pib (pib out of range), mask (spectrum exceeds mask), all (every sweep is saved)
savemode=mask
# scc file saves will not occur more often than this value (seconds) (Leave empty to disable interval)
minsaveinterval=60
# save scc file when spectrum returns to normal conditions (mask/pib passes)
saveonalertend=1
# Directory path were monitoring results will be saved (Leave empty to use .smmc file directory)
resultsdir=C:\Documents\Spectrum_Monitor
# save Spectrum Manager image file in addition to .scc file
saveimage=1
# keep SC LCD screen on during monitoring session
lcdon=0

              Apply      Save      Close
```

The Spectrum Manager Monitoring Configuration example

2.5 Tools

The POWER IN BAND function, OVERLAY display, MASK mode, EXPORT, and IMPORT options are located in the Tools menu.

2.5.1 POWER IN BAND

POWER IN BAND function measures the input power in a specified bandwidth BW i.e. over a range of frequencies with the center frequency on FREQ.

The available options are:

- *ON*

  Enable/ disable the POWER IN BAND function.

- *BW Auto*

  Enable to select the POWER IN BAND bandwidth BW automatically (e.g. for easily distinguishable signals).

- *BW Manual*

  Select the POWER IN BAND bandwidth BW in megahertz (MHz) or gigahertz (GHz).
  The POWER IN BAND bandwidth can be selected no greater than the currently selected SPAN (and not smaller than the resolution bandwidth).
  The current PiB values are highlighted in cyan. To enter a new BW value use the keyboard or the on-screen numpad. If the entered BW value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. The bandwidth also can be selected by clicking and dragging on the spectrum graph.

- *FREQ*

  Select the center frequency of the POWER IN BAND in megahertz (MHz) or gigahertz (GHz).
  The current PiB values are highlighted in cyan. To enter a new FREQ value use the keyboard or the on-screen numpad. If the entered center frequency value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. The POWER IN BAND center frequency can also be selected by clicking on the spectrum graph.

Tools – Power in Band – manual bandwidth selection
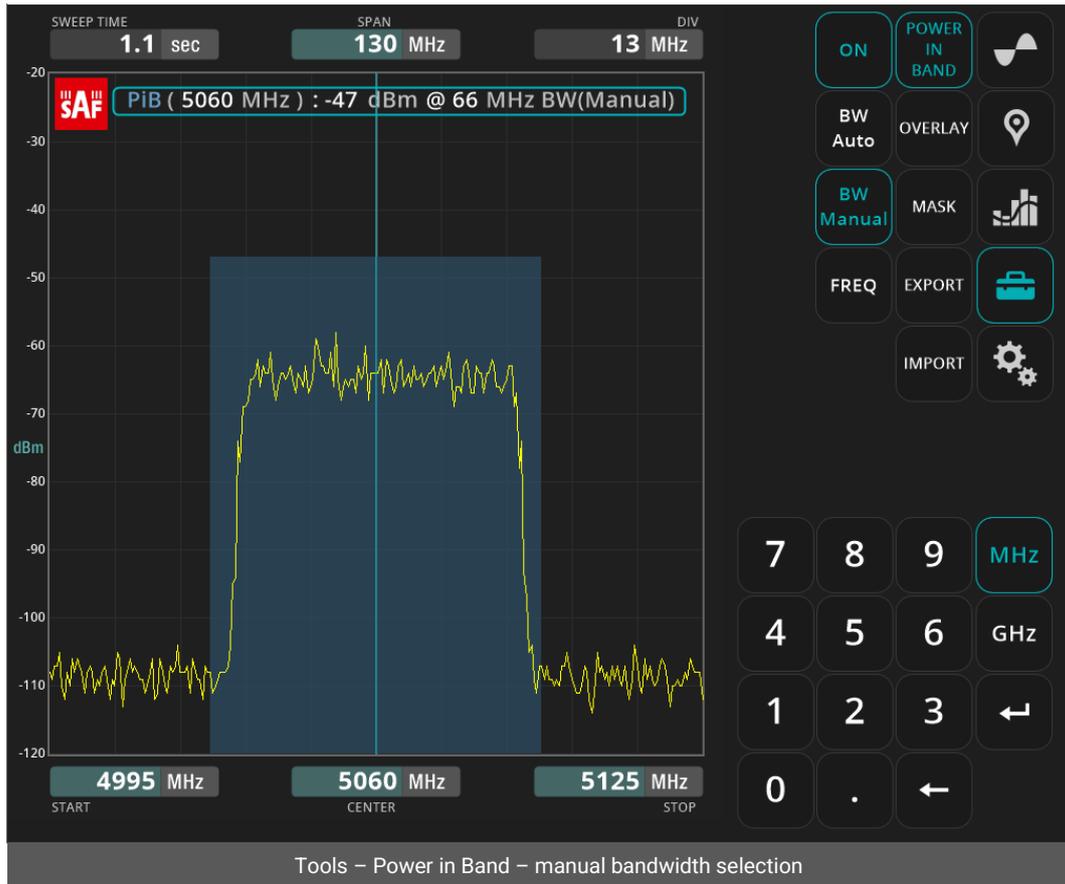
2.5.2 OVERLAY

Available in REALTIME mode or if multiple files are opened in OFFLINE mode - either separate Spectrum Compact Curves (with the extension ".scc") or a Spectrum Compact Curve Recording (with the extension ".rsc"). OVERLAY visualizes how many times an input power level has been reached using a color code. The color bar with the corresponding spectrum curve count is displayed between the START and CENTER frequencies under the graph.

Hover mouse over the OVERLAY graph to get details on a specific frequency/ input power level.

Tools – Overlay display

2.5.3 MASK

Select or create a reference curve, i.e., a mask to be displayed together and compared with the current spectrum curve.

The available options are:

- *ON*

  Enable/ disable the mask. When enabling the mask, the "Spectrum Mask Editor" window will be displayed (see SELECT MASK).

- *SELECT MASK*

  Select a file to be used as a mask or create a new mask by manually adding frequency-level points. The "Spectrum Mask Editor" window is displayed with available options:

  - *New Mask*

    Discard the mask in the "Spectrum Mask Editor" and start anew (the option to save the mask is given).

  - *Load Mask*

    Open either a text file (with extension .txt) or a Spectrum Compact Curve file (with extension ".scc") to be used as a mask.

    > To open the SCC files, in the Open dialog window change the file type from "Text Files (*.txt)" to "Spectrum Compact Curve (*.scc)" in the drop down menu.

  - *From Trace*

    Create a mask from the current spectrum trace.

  - *Flatten*

    Reduce the number of mask points i.e. smooth the line and also change the mask type to "Relative mask". All frequency and level values will be recalculated with respect to the center frequency and the maximum input power level. This option is intended for masks created with "From Trace".

  - *Save Mask*

    Save the mask points as a text file (with extension .txt).

  - *Enable Mask*

    Display or update the mask on the spectrum graph.

  - *Close*

    Close the Spectrum Mask Editor.

  - *Save SCC*

    Save the mask as an SCC file to be used on a Spectrum Compact device. For a mask file to be usable by a Spectrum Compact device it should be saved in the correct format, therefore the "Mask To SCC Setup" window is displayed. Here the frequency range of the target Spectrum Compact

device must be indicated. The center frequency and the absolute input power level for the highest mask point can be selected.

- *Delete Point*

  Delete selected frequency-level points from the list on the left. If the option "Mirror" is enabled, both points (on the opposite sides of the center frequency) will be deleted, see "Mirror".

- *Add Point*

  Add a point to the mask curve after filling the "Freq" (in MHz) and "Level" (in dBm) fields.

- *Apply Changes*

  Apply the change after modifying the frequency and/ or level of a point.

- *Mirror*

  Enable/ disable the symmetrical duplication of points. When adding a point with "Mirror" enabled, another point with the same level but a negative (opposite) frequency will be also automatically added. Useful to quickly create a symmetrical mask.

Masks created with Spectrum Mask Editor by default are "Relative masks". That means the point with "Freq"=0 is always situated at the center of the graph and all entered frequency values are positioned relative to it. Only masks created with the option "From trace" are "Absolute masks" i.e. the frequencies are the actual – absolute – values.

Spectrum Mask Editor – a symmetrical mask created using "Mirror"
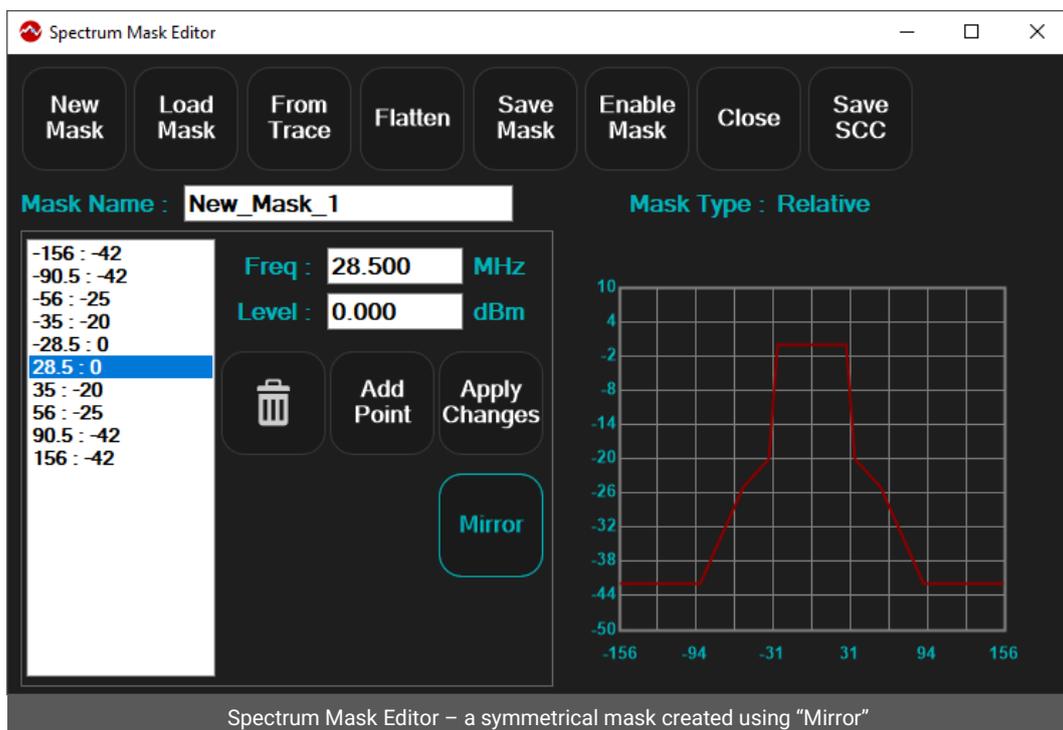
- *MASK CENTER*

  After enabling the mask, select the horizontal position of the mask i.e. the frequency on which the mask will be centered.

- *MASK LEVEL*

  After enabling the mask, select the vertical position of the mask. For a "Relative mask" the MASK LEVEL is the absolute input power level at the center frequency of the mask. For an "Absolute mask" the MASK LEVEL is the level offset from the levels with which the mask was created.

  > Use the mouse wheel to easily adjust the mask position while in the MASK CENTER and MASK LEVEL menus.

- *SHOW STATUS*

  Enable/ disable the mask status. If the spectrum curve is within the mask, the status will be "Pass" and it along with the name of the mask will be green. If the spectrum curve exceeds the mask at any point, the status of the mask will be "Fail" and it along with the name of the mask will be red. The level difference between the mask curve and the spectrum curve at the center frequency is given in the brackets.

2.5.4 EXPORT

The EXPORT menu allows the processing of the current spectrum curve.
The available options are:

- *SAVE IMAGE*

  Save an image of the current spectrum graph either in JPEG file format (with extension .jpg) or as Metafile (with the extension ".emf"). A default save image file path can be defined, see GENERAL OPTIONS.

- *SAVE SCC*

  Save the spectrum curve with the currently displayed frequency range, offset, mask, etc. as a Spectrum Compact Curve (an SCC file with the file extension ".scc") to be further opened with the Spectrum Manager or on Spectrum Compact devices.

  ⚠ To obtain the trace data points, select "SAVE SCC" and then in the "Save As" window under "Save as type:" select "Comma separated doc (*.csv)" from the drop down menu.

  ⚠ If the file is to be opened on a Spectrum Compact 2-40 GHz device, it should be named correctly. Use MASK → SELECT MASK → From Trace → Save SCC to do it.

  ⚠ When the SCC file is saved, only marker A or PiB is stored in the file.

Spectrum Manager can be used to create a report from the SCC files. By selecting the ADD TO REPORT option, an image of the currently displayed spectrum curve with a header (containing GPS coordinates, if they were attached to the SCC file, and other information) is added to the report. An image with a header is considered a site. If there already is a site created from an SCC file in the report, an option to update it or to create a new site with the prefix "(No.)" is given.

- *ADD TO REPORT*

  Available in OFFLINE mode. Add the image of the spectrum curve with a header to an automatically generated report. The report's sections can be customized and saved as a template for future use. If there are templates already stored in the Spectrum Manager's "Template" folder, the option to select a template will be given (to use a custom template, select "Open", to generate a report with the default sections, select "Cancel"). To view and edit the report, select SHOW REPORT.

  📝 There is no limit to how many spectrum graphs can be added to one report.

- *SHOW REPORT*

    Available in OFFLINE mode, if ADD TO REPORT was used at least once. Shows the automatically generated report.
    The "Report Preview" window is displayed with available options:

    - *Print*

        Print the report or create a PDF file using a beforehand installed PDF creator.

    - *Edit*

        The "Report Editor" window is displayed. The "Report Editor" is described in detail further below.

    - *Open in Browser*

        Open the report with a WEB browser. Allows previewing the report otherwise than in the "Report Editor" and also to print the report or create a PDF file.

    - *Maps Export*

        Show the site location on a map. If GPS coordinates from a GPX file are attached to the SCC file or the Latitude, Longitude, and Altitude sections were filled manually, the corresponding site location will be displayed in Google Maps. Use the "Place Site" option in the "Actions" section to click on the map and move the selected site there (the coordinates will be corrected). The "KML Export" in the "Action" section creates a file with the extension ".kml" for opening the site location in Google Earth. In the "Edit" section input the distance (in km), the azimuth, and the beamwidth (in deg) to display the antenna covered area and an elevation graph on the left. The elevation graph takes the data from Google Maps and it shows the land topography in the way of the radio beam.

    - *Close*

        Close the "Report Preview" window.

REPORT EDITOR

When "Edit" is selected in the "Report Preview", the "Report Editor" window is displayed with available options:

- *Contents*

    Show the contents of the report. On the left, the sites, created from the SCC files, are listed. On the right, there are 8 predefined content sections for each site – Title, Device, Notes, Latitude, Longitude, Altitude, Level, and MarkerFreq – with 2 fillable fields: "Name" and "Value". Some of these sections are automatically filled. The sections can be disabled (by deselecting "Enable"), the order can be changed with "↓"/"↑" and new custom sections can be added with "+".

- *Header*

    Show the header of the report. There are 6 predefined header sections – Title, Person, Email, Company, OfficePhone, and MobilePhone – with 2

fillable fields: "Name" and "Value". The sections can be disabled (by deselecting "Enable"), the order can be changed with "↓"/"↑" and new custom sections can be added with "+".

- *Image*

    View the image attached to the site in a separate window.

- *Set Logo*

    Select a PNG image file to be used as a logo.

- *Hide Logo*

    Enable/ disable the logo.

- *Remove Site*

    Remove the currently selected site.

- *Change Template*

    Load a previously prepared report template.

- *Save Template*

    Save the current report template. The customized sections and completed fields will be saved with the template.

The "Report Editor" window can be closed with "x".

- *NEW REPORT*

  Create a new report. The previous one will be discarded upon creating a new report.

Report Previw - Maps Export option

Report Preview – a report with GPS coordinates and customized fields

2.5.5 IMPORT

The Import menu allows opening SCC, RSC, and GPX (GPS coordinate) files.
The available options are:

- *OPEN SCC*

  Open Spectrum Compact Curves (files with the extension ".scc") and Spectrum Compact Curve Recordings (files with the extension ".rsc") from a location on the hard disk drive. Multiple files can be opened at once.

  > SCC files also can be opened by dragging & dropping them on the Spectrum Manager's program window.

  > To open the RSC files, in the "Open" window change the file type in the drop down menu from "Spectrum Compact Curve (*.scc)" to "Spectrum Compact Curve Recording (*.rsc)".

- *ADD GPS*

  Available in OFFLINE mode. Attach GPS coordinates to an SCC file - the coordinates can be added manually or by uploading a GPX file.

  > The GPS coordinates are associated with the SCC file only during the current session i.e. SCC files do not have a dedicated coordinate field. To forward an SCC file with coordinates, use EXPORT → ADD TO REPORT.

  The "SCC GPS Mapping" window is displayed with available options:

  - *GPS Time Offset*

    Select a time offset (-23 to 23 hours and -59 to 59 minutes), if there was a time difference between the logged GPX data and the Spectrum Compact device's time.

  - *Tag*

    Attach the GPS coordinates to the SCC file. Select the SCC file from the drop down list and the coordinates from "GPS coordinates", already existing "GPS Mappings" or manually input the coordinates by filling Latitude, Longitude & Altitude fields, then use "Tag". Also used to edit coordinates – select coordinates from the "GPS Coordinates" list, manually edit the corresponding fields, then use "Tag" to confirm changes. SCC files with GPS coordinates attached will have "(TAGGED)" next to their name in the drop down file list, the "SCC file-GPS coordinates" pair will be displayed under "GPS Mappings" and the indication "GPS" will be shown above the graph.

    > The GPS coordinates can also be selected by manually placing the site on a map. Use EXPORT → ADD TO REPORT, SHOW REPORT → Maps Export to do so.

- *Show On Map*

  Open Google Maps in a WEB browser with the selected GPS coordinates displayed.

- *Load GPX*

  Select a GPX file from which the coordinates will be read. The coordinates are added to the "GPS Coordinates" list.

  > It is possible to open a GPX file in Spectrum Manager by dragging and dropping it on the Spectrum Manager's program window. The "SCC GPS Mapping" window will be automatically displayed.

- *Auto Tag*

  Automatically attach GPS coordinates from the GPX file to SCC files, based on the time the SCC file was created and the GPX data. The allowed time difference is ± 1 minute.

  > Use GPS Time Offset to adjust the time of the GPX data.

- *Delete Mapping*

  Delete an "SCC file-GPS coordinates" pairing.

  The "SCC GPS Mapping" window can be closed with "x".

  > If the SCC file was added to a report during the Spectrum Manager's session and the Latitude, Longitude & Altitude sections were filled, these coordinates will be also displayed in the "SCC GPS Mapping" window.

Import – SCC GPS Mapping – a SCC file auto tagged with coordinates from GPX file based on time.

2.6 System Settings

2.6.1 OPTIONS

The available options are:

- *GENERAL*

  Configure general options:

  - *Image File Save Path*

    Define the default image file save path for the "Quick Save Image File" option.

  - *Quick Save Image File*

    Enable/ disable the default "Image File Save Path". When using the SAVE IMAGE option (under EXPORT) the file will be automatically saved in the location defined. Otherwise, a save dialog window will be displayed.

  - *Show sweep cursor*

    Enable/ disable the sweep cursor (the red vertical line) shown while sweeping the spectrum in REALTIME mode with greater spans.

- *CONNECTIONS*

  Configure REALTIME (the online mode) related options:

  - *Active Connection*

    Determine whether the Spectrum Manager will search for a Spectrum Compact device on the Local (COM) or Remote (SC Server – Telnet) connection.

  - *Local (COM)*

    Available if selected as the "Active connection". Define a default Spectrum Compact COM port or select "Autodetect Device". With the "Autodetect Device" option the Spectrum Manager will consecutively scan all active COM ports and will connect to the first found Spectrum Compact device.

  - *Remote (SC Server – Telnet)*

    Available if selected as the "Active connection". Define the SC Server IP or Hostname, the Telnet User, and Password.

- *ABOUT*

  Contains version and copyright information of the Spectrum Manager and the connected Spectrum Contact device.

2.6.2 UPDATE FW

Available in REALTIME mode. Update the firmware of a connected 2-40 GHz Spectrum Compact device. Follow the instructions displayed on the screen.

To update the firmware of E-band, V-band, 0.3-3 GHz v.2, 2-8 GHz v.2, or 24-40/43 GHz v.2 Spectrum Compact, refer to their respective user manuals.

2.6.3 LEVEL

The LEVEL menu allows modifying the vertical (input power level) range of the graph. The available options are:

- *OFFSET*

  Select an input power level offset value (e.g. if an attenuator was used for the measurements) in decibels (dB).
  The current OFFSET value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered OFFSET value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen. If a non-zero offset is selected, it is displayed at the left side of the graph.

- *MAX LEVEL*

  Select the upper limit of the input power level axis in decibels referenced to one milliwatt (dBm).
  The current MAX LEVEL value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered MAX LEVEL value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen.

- *MIN LEVEL*

  Select the lower limit of the input power level axis in decibels referenced to one milliwatt (dBm).
  The current MIN LEVEL value is highlighted in cyan. To enter a new value use the keyboard or the on-screen numpad. If the entered MIN LEVEL value is valid, it is highlighted in green. If the value is not valid, it is highlighted in red. To confirm a valid value, use the "Enter" on the keyboard or on the screen.
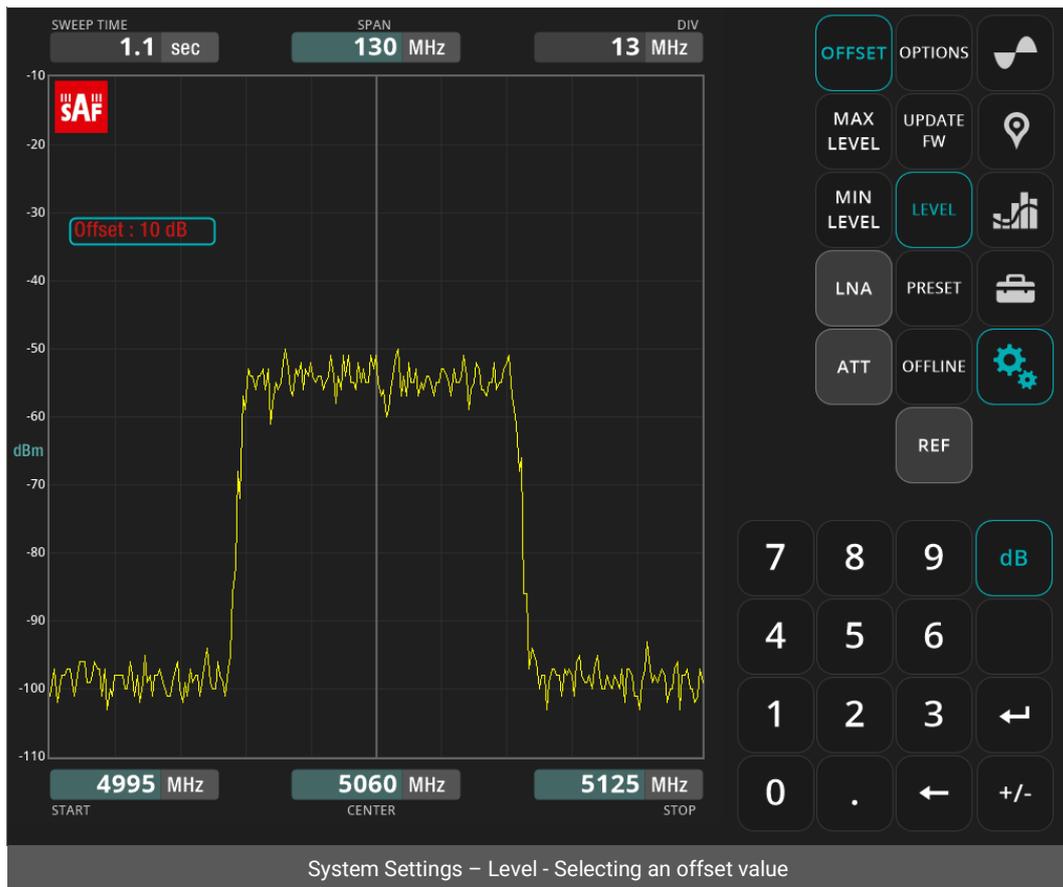
Available only for 0.3-3 GHz v. and 2-8 GHz v.2 Spectrum Compact model:

- *LNA*

  Enable/ disable the Low Noise Amplification. It lowers the noise floor but the overload level is also considerably lowered. If LNA is enabled, its state is displayed on the left side of the graph.

- *ATT*

  Select internal attenuation. Additional attenuation allows inputting stronger signals but also raises the noise floor by the same amount. If a non-zero internal attenuation is selected, it is displayed on the left side of the graph.

2.6.4 PRESET

Available in REALTIME mode. Resets the Spectrum Manager's REALTIME sweep to defaults – frequency span and input power range are set to maximum values of the connected Spectrum Compact device, markers and mask are removed, etc.

> PRESET <u>does not</u> reset the connected Spectrum Compact unit to the factory defaults.

2.6.5 REALTIME/ OFFLINE

Switch between the REALTIME and OFFLINE mode. REALTIME mode allows running the Spectrum Compact devices in online mode (i.e. control the device from Spectrum Manager) and requires a properly connected and turned on the device. OFFLINE mode is for working with saved files and a connected Spectrum Compact device is not mandatory. After selecting the OFFLINE mode, the "Open" dialog window is automatically displayed.

2.6.6 REF

Available only for 0.3-3 GHz v.2, 2-8 GHz v.2, and 6-20 GHz v.2 Spectrum Compact model. Allows lowering or rising the reference level, i.e. the overload level, and thus also the noise floor. The reference level is always displayed at the bottom right corner of the graph.

System Settings – Level - Selecting reference level
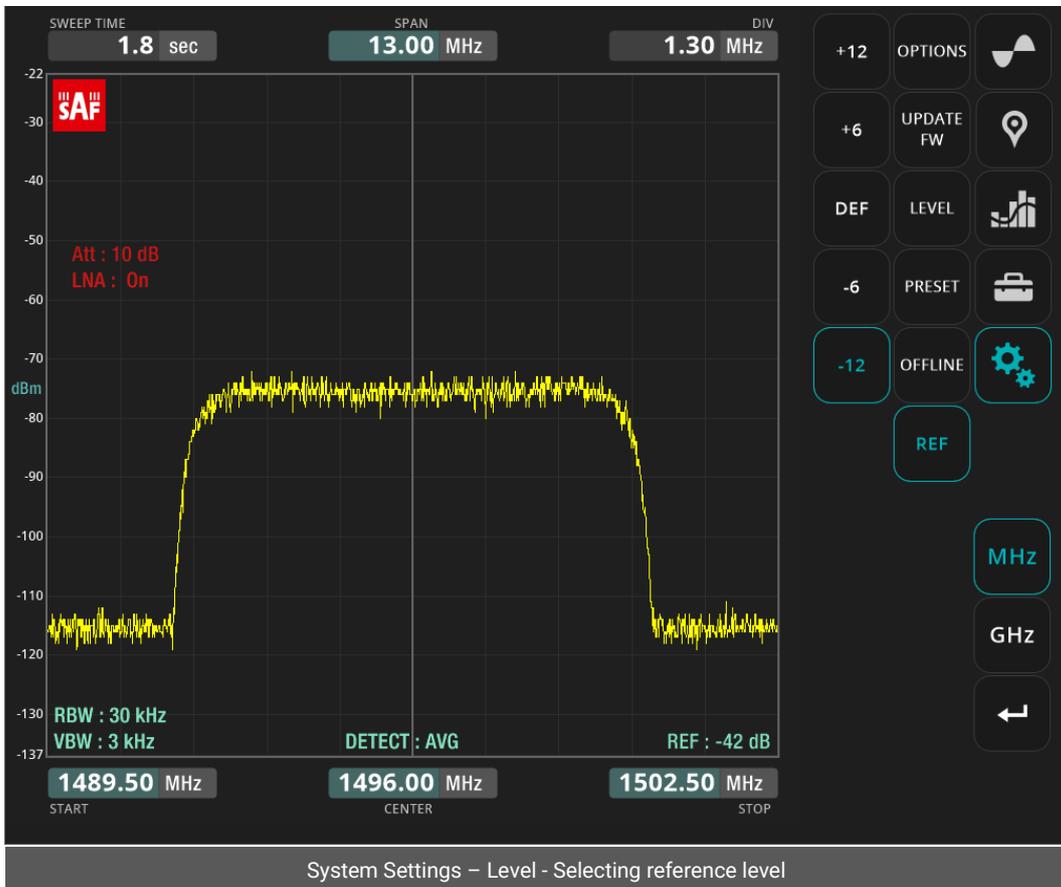
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