



Banggood GS-320 6G Vector Network Analyzer device User Manual

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Banggood

Banggood GS-320 6G Vector Network Analyzer device



SUMMARY

introduction

Portable 1-port 6G Vector Network Analyzer (hereafter the reflectometer, the device) are designed to measure the matching characteristics of passive and active radio devices (antennas, cables, filters, attenuators, amplifiers, etc.). The device allows you to measure the parameters of the complex reflection coefficient, standing wave ratio (VSWR), impedance, admittance, magnitude, phase, loss and distance to fault in the cable.

application

The device is intended for amateur radio use, as it is not a professional measuring instrument. The presence of a built-in battery allows you to measure in laboratory and outside conditions.

working conditions

1. temperature **0°C +40°C**
2. humidity 0% 75%

DELIVERY LIST

Table 1

Name	Quantity
6G Vector Network Analyzer	1 pc
Connecting cable USB Type-C	1 pc
SOL Calibrator	1 pc
N/SMA-KJ	1 pc
Touch pen	1 pc

SPECIFICATIONS

Table 2

Parameter name		Value
Operating frequency range		23MHz-6200M Hz
Frequency resolution, for frequencies 100-6200 MHz		10KHz
Maximum number of scan points		1000
Scanning rate		1000 points/s
The direction of the bridge, uncorrected throughout the range		> 12 dB
Directivity effective (after full single-port calibration)		> 50 dB
Standing wave ratio at the input		< 2
Phase measurement precision		> 1,5°
Magnitude measurement precision		> 0,25 dB
Resolution determining the distance to fault		(CxVF)/2S m
The maximum length of the measured cable 4 , at VF=1		3000m
Maximum DC input voltage		25V
Displayed plots	■ the Smith chart; ■ polar chart; ■ the phase of the reflection coefficient; ■ magnitude; ■ logarithmic magnitude; ■ VSWR; ■ distance-to-fault; ■ cable loss	
Number of user settings to save		8
Operating temperature range		0-40°C
Screen diagonal		3.2"
Screen type		touch, resistive
Battery capacity		4000mAh
Overall dimensions (L×W×H)		145x75x24mm
Weight		350g

NOTICES

1. Please read the user manual before using the equipment. Please ask the agent for the detailed product manual.
2. It is strictly forbidden for the personnel using the equipment to dismantle and repair the equipment without permission. If the equipment is detected to be faulty, please stop the operation and shut down the equipment immediately and find the agent to repair it.

3. If you need to leave the workplace, disconnect the device and other devices. Do not leave the device running unattended!
4. Avoid working in open spaces during snow or rain. Increased humidity and all types of liquid, once inside the device, can damage it.
5. Do not use the device in areas with corrosive and explosive environments. Pairs of aggressive substances can destroy the insulation, which can lead to the failure of the device.
6. Do not carry the device by the cables and wires connected to it, do not unplug the connectors by pulling the cable or cord.
7. Do not apply excessive force to the control buttons and the device screen.
8. Avoid bumps and drops. If dropped, the device may be damaged.
9. Do not allow children to play with the device, as they could hurt or injure others, or disable the device.

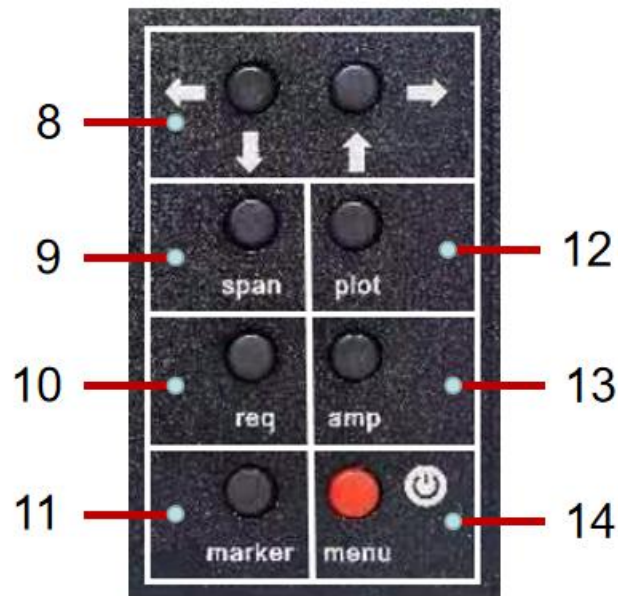
COMPOSITION OF THE DEVICE

The composition of the device is shown in Figure



1. RF test port;
2. Housing;
3. Colour resistive screen of 3.2" ;
4. Control buttons block;
5. Side switch button
6. Battery charge indicator charge;
7. Connector for transferring data and charging the battery of the device USB type C

The block of buttons for controlling the device is shown in Figure



8. <move>Buttons for moving markers, moving in frequency and amplitude, changing the scanning range.
9. switching buttons (8) to the mode for changing the scan range at a constant center frequency (widening and narrowing of the range).
10. <freq>switching buttons (8) to the center frequency change mode without changing the scan range (left / right shift of the range).
11. <marker>switch the marker number and set the button mode (8) to move the marker in frequency.
12. <plot>switching buttons (8) to the mode for changing the scan range at a constant center frequency (widening and narrowing of the range).
13. <ampl>switches the buttons (8) to the reference level change mode when some plots are displayed.
14. <menu>exit to the main menu. Turning the device on and off when pressed and held for more than 2 seconds.

TURNING ON/OFF

Turning on the device

Power on: when the device is off, turn on the side switch button, and then press the menu button for more than 2 seconds to turn on the device. The screen will display the results of the device self-test. Then, the device switches to normal operation.

Turning off the device

Power off: when the device is running, long press the menu button for more than 2 seconds. After the screen goes out, turn off the side switch button.

DEVICE SCREEN

The device displays the results of scanning the specified frequencies in the form of user-defined plots and charts. The current settings of the device, the scanning range, the type of displayed plot or chart and other important information for the user are located on the bottom line of the screen. Consider this information line from left to right.

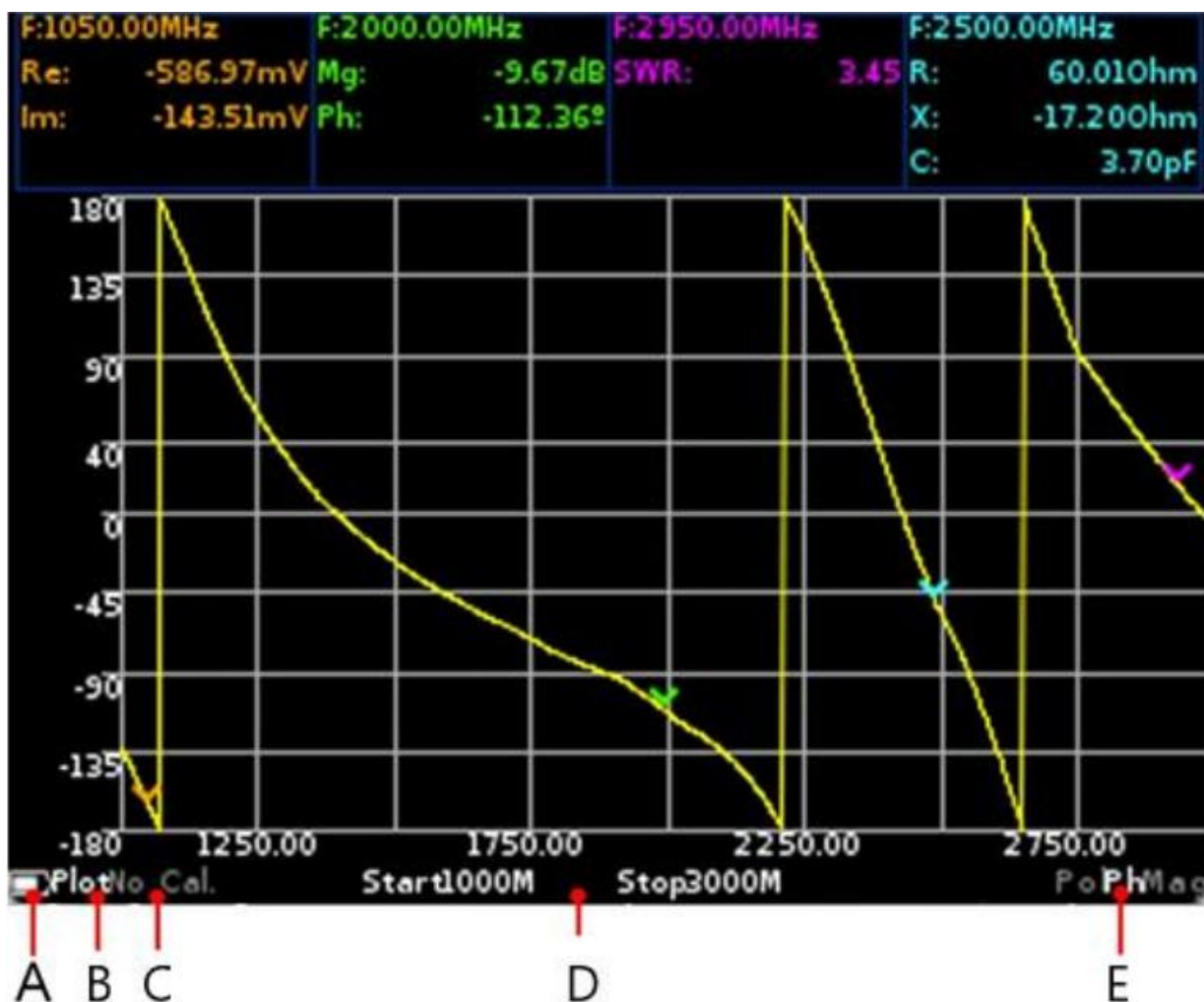


Figure 7.1 – Screen of the device

In Figure 7.1, in the lower left corner of the screen is placed the indicator (A) of the status of the internal battery, which, depending on the state of the battery, can be displayed as:

- indicator in the form of a spark (lightning) – battery is charging;
- the indicator symbol in the form of a battery is completely filled with white – the battery is fully charged;
- indicator symbol in the form of a white battery circuit – the battery is discharged, it is necessary to charge it;
- the device has displayed a message on the critical power level – the battery is completely discharged, the device will automatically turn off.

To the right, from the battery status indicator, the mode (B) is displayed, Figure 7.1, in which the navigation buttons are located:

- Plot – a mode in which the moving buttons switch charts and plots on the device screen;
- Span – using the moving buttons, the user can change the viewing range at a constant center frequency;
- Freq – use the moving buttons to change the initial and final frequencies without changing the width of the frequency plan (shifting the frequency plan);
- Mkr 1 ... Mkr 4 – an active marker that can be moved with the moving buttons. Switching between markers is done by pressing the button “marker”;
- Amp – mode in which the moving buttons change the reference level when outputting such plots as magnitude, logarithmic magnitude and VSWR.

Designation of the type of calibration (C) figure 7.1:

- No Cal – factory calibration;
- Cal – calibration corresponding to the frequency plan, displayed in green;
- Cal. Int – calibration interpolation, displayed in orange;
- Cal. Ext – extrapolation of calibration, displayed in red.

In the center of the bottom line, the frequency plan is displayed (D) Figure 7.1:

- Start – the initial frequency of the frequency plan;
- Stop- the final frequency of the frequency plan.

In the lower right corner of the screen, the type of the plot is displayed on the device screen (E) (Figure 7.1):

- Smh – Volpert-Smith chart allowing to display the complex reflection coefficient, relative to an impedance of 50 Ohms;
- Pol – polar chart for displaying the complex reflection coefficient;
- Ph – plot showing the phase of the reflection coefficient, reduced to degrees in the range from -180 to 180;
- Mag – plot showing the modulus of the reflection coefficient in a linear scale;
- LMag – plot representing the modulus of the reflection coefficient in a logarithmic scale (in dB);
- SWR – plot showing the standing wave voltage ratio;
- DTF – plot showing the distance to fault or discontinuity in the cable;
- Loss – plot showing cable loss.

Note – To the left and to the right of the designation displayed on the plot, the designations of the previous and next plot are displayed.

Note – Due to the characteristics of Smh and Pol charts on the device screen, the frequency plan is displayed in the lower right corner. For the DTF plot, the distance or time is displayed instead of the frequency setting, depending on the user settings.

Clicking on the screen with the displayed plot during the measurements puts the device in the pause mode (Figure 7.2). In this mode, the user can take a closer look at the plot. Device status information is displayed by a flashing PAUSE symbol next to the battery symbol.

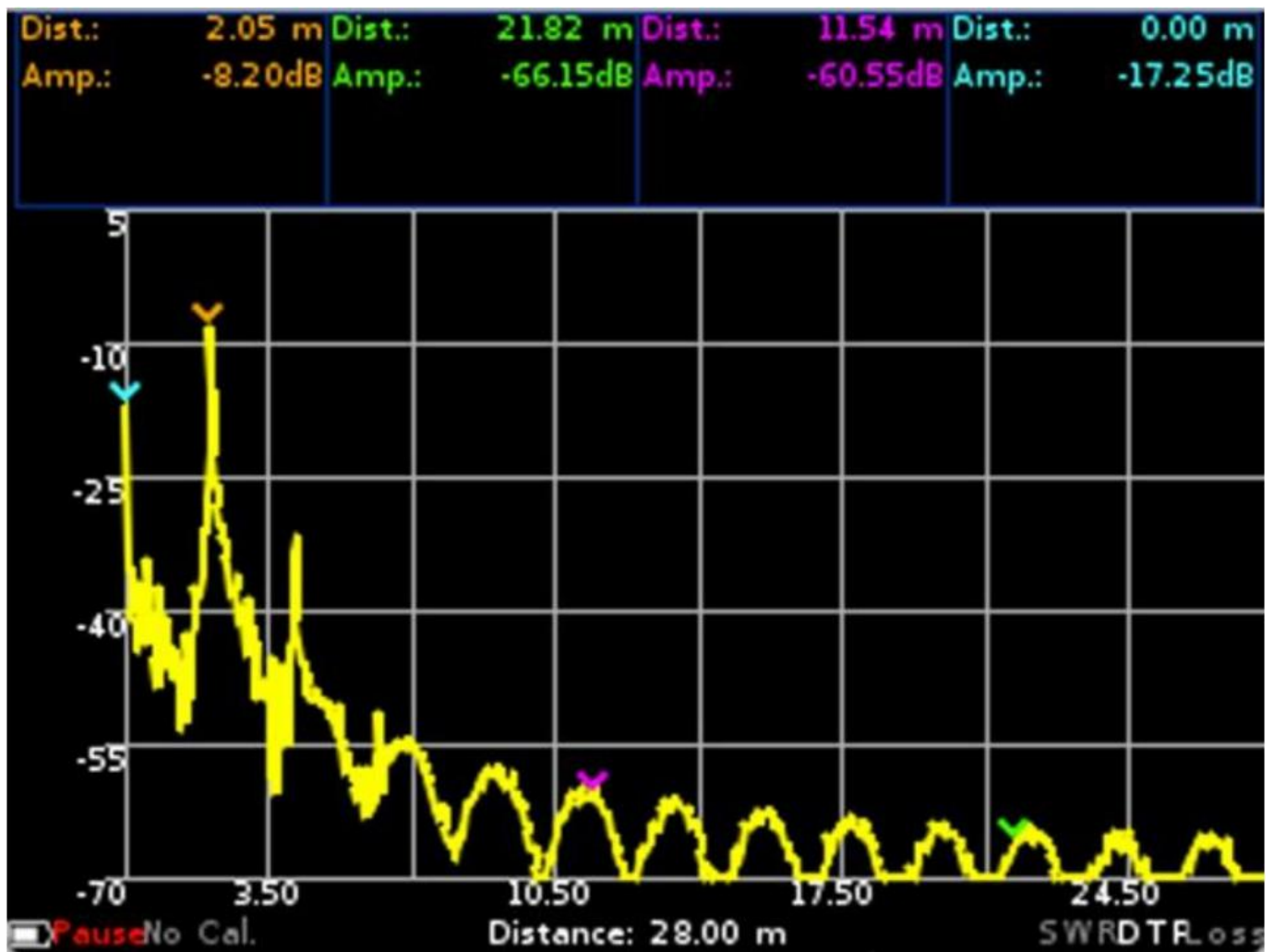


Figure 7.2 – Pause mode

To exit the pause mode, press the device screen again or press any of the buttons of the control unit.

DEVICE MENU

Main menu

Turn on the device in accordance with section 6 of this Manual. After switching on the device, press the “menu” button. The device will display the main menu as in Figure 8.1.

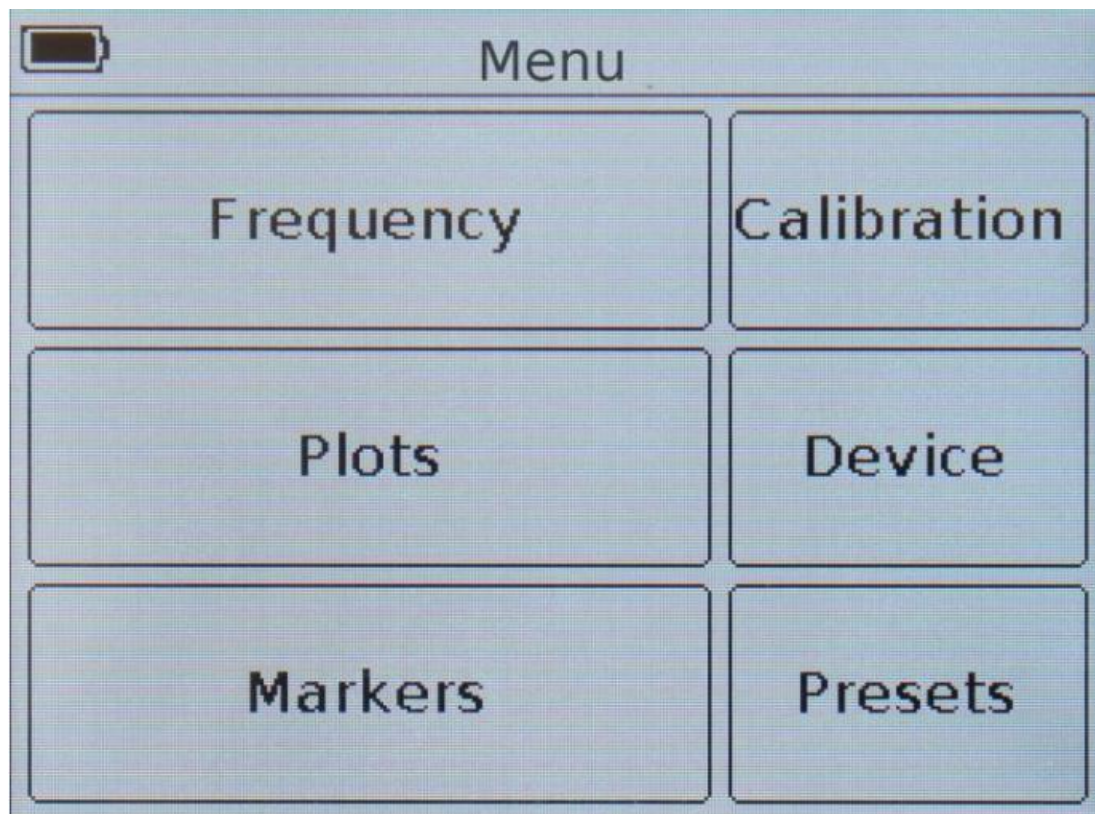


Figure 8.1 – Main menu of the device

Each section of the main menu has its own purpose:

- **Frequency** – menu section where the user sets the frequencies at which devices or loads are tested.
- **Plots** – the section of the main menu where you can select and configure the parameters of the charts and plots displayed on the screen.
- **Markers** – section for setting visual markers and setting parameters for their display during measurements.
- **Calibration** – menu for calibration of the device.
- **Device** – this section specifies the device serial number and the software version.
- **Presets** – section to save user settings.
- **Traces** – section to save the results of the current measurements (traces) with the subsequent possibility of loading and comparing them.

8.1.3. To exit the main menu, press the “menu” button. To quickly exit from any menu to the displayed plots, press the “plot” button.

Frequency setting menu

The frequency plan consists of the parameters by which the synthesizer sweeps and sets the measurement mode (frequency range, number of measurement points, digital filter bandwidth)

To set the frequency plan enter the main menu of the device (Figure 8.1) by pressing the “menu” button. Enter the Frequency section. A menu will appear on the screen, as in Figure 8.2.

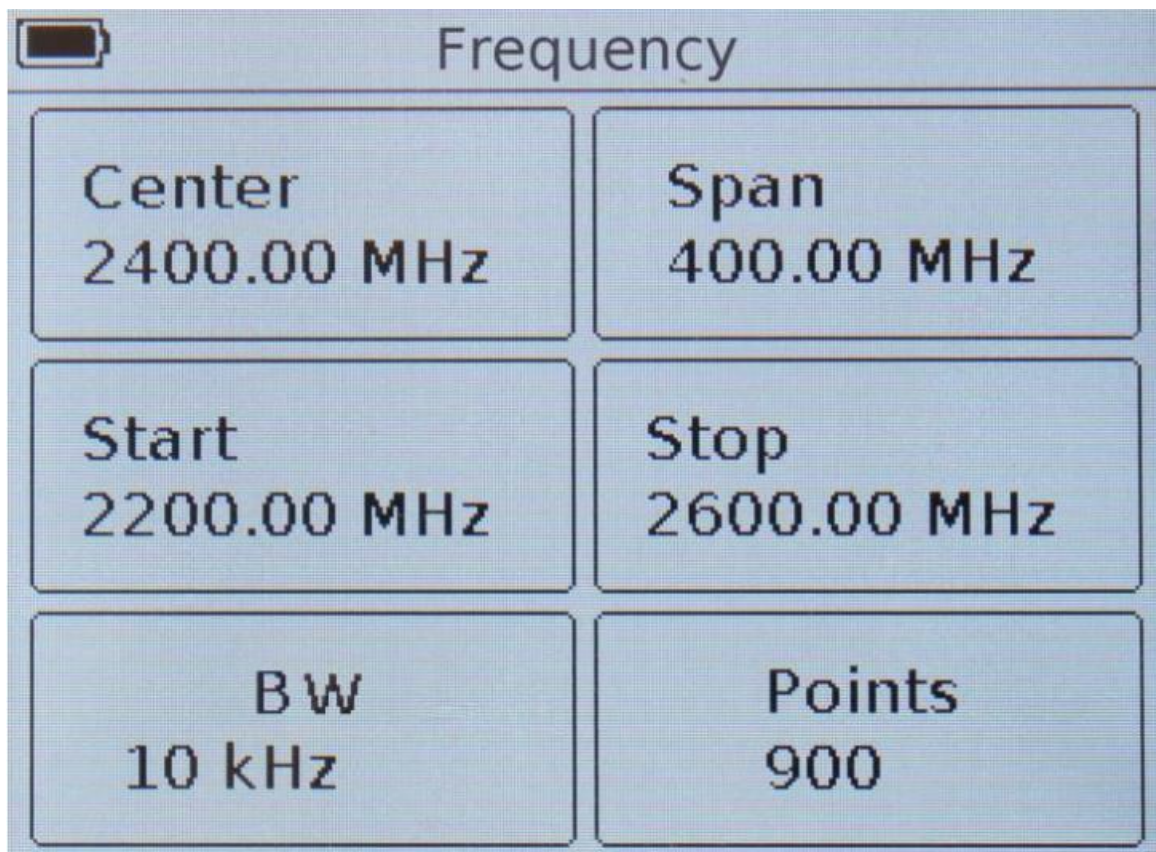


Figure 8.2 – Menu for setting scan parameters

Each of the options in the Frequency menu has its own purpose:

- **Center** – setting the center frequency of the scan range.
- **Span** – scanning band (range) of frequencies.
- **Start** – setting the initial frequency of the scanned frequency range.
- **Stop** – setting the final frequency of the scanned frequency range.
- **BW** – choice of bandwidth of the digital filter of the intermediate frequency (IF).
- **Points** – select the number of scan points.

Setting the frequency parameters (Center, Span, Start and Stop) is done by entering a numerical value in the opened submenu, as in Figure 8.3. Enter the numerical value of the frequencies and press TICK ICON or Enter. To delete erroneous or previously entered values, press × or Del. To refuse to enter a value, click ⏮ or Cancel. In our example, in figure 8.3, the initial frequency of 2200 MHz of the scanned frequency range is set.

Note – discreteness of frequency parameters is 10 kHz (0.01 MHz). In the case of entering an unacceptable value, a warning is displayed on the device that the input value is outside the allowable values.

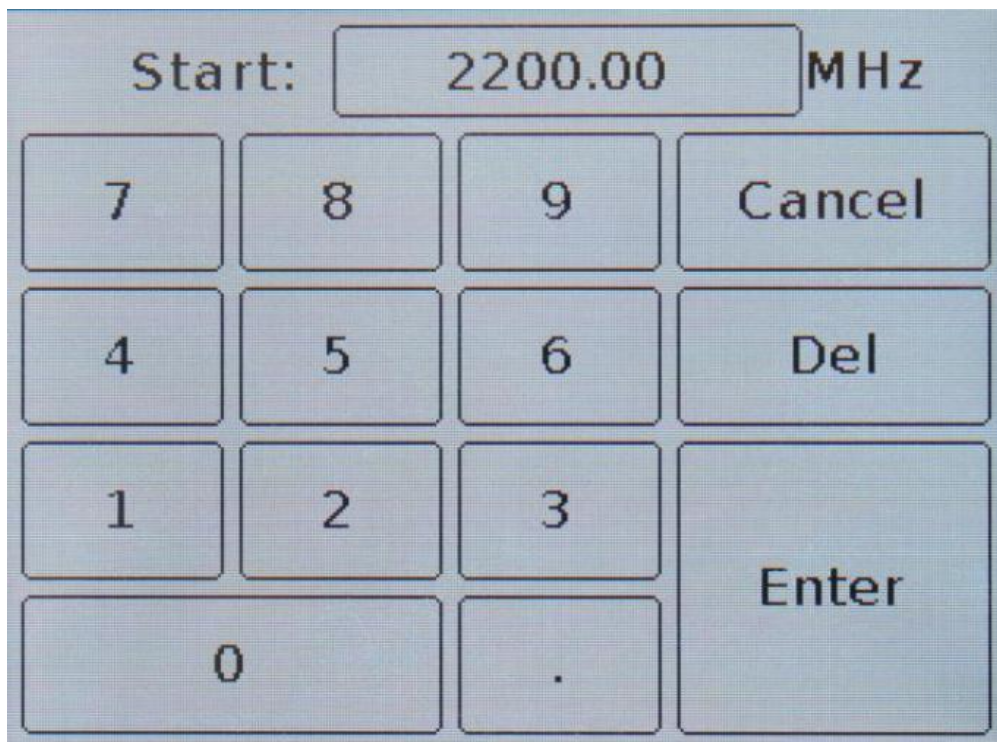


Figure 8.3 – Entering numerical values of frequency parameters of the device

Frequency parameters are set in three ways:

- By entering the initial Start and final Stop frequencies, while the center frequency Center is automatically assumed equal to their half-sum. The range of scanned frequencies Span is automatically taken equal to the difference between the final and initial frequencies.
- Setting the Center frequency and Span scan frequency range. In this case, the Start and Stop frequencies will be set automatically as $\text{Center} \pm \text{Span} / 2$.
- Loading custom settings from the Presets menu.

Note – If the frequency entered by the user is outside the working range, a corresponding warning is displayed on the device screen, as shown in Figure 8.4.

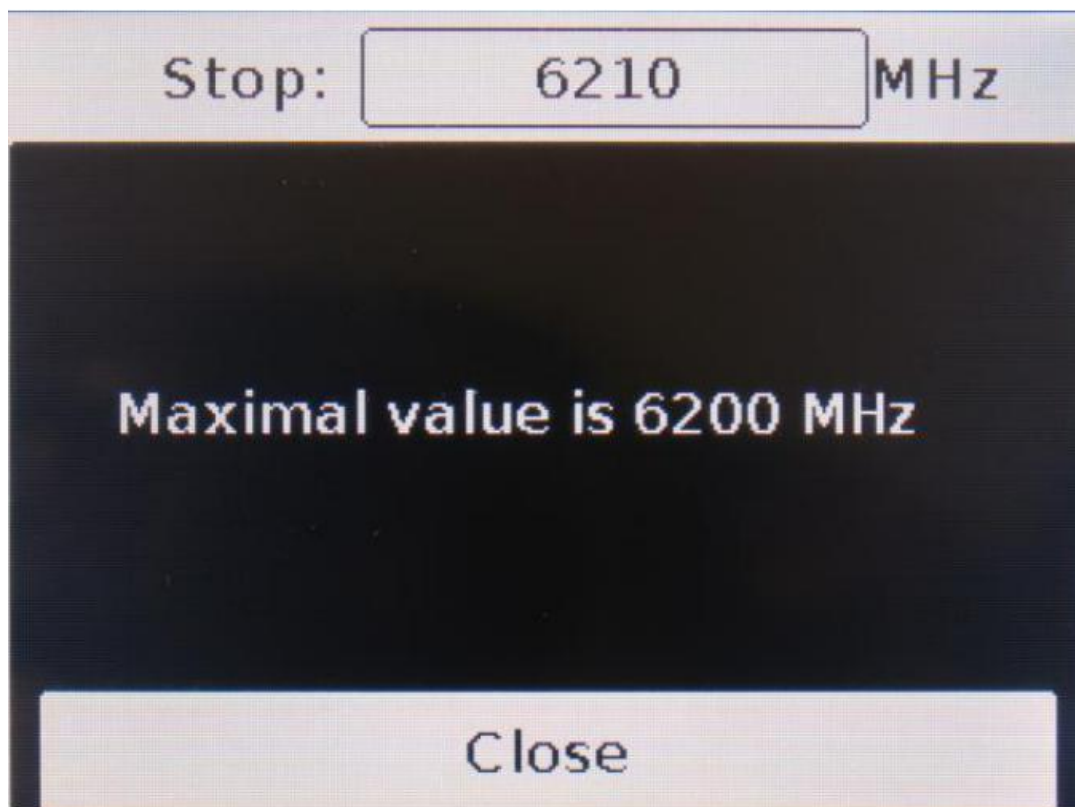


Figure 8.4 – Warning about exceeding the operating range of 6G Vector Network Analyzer

In the BW menu (Figure 8.5), the bandwidth of the digital filter is selected. The narrower the digital filter bandwidth, the higher the measurement precision and the signal-to-noise ratio. This increases the scan time.

Note – Decreasing the bandwidth 10 times will increase the signal-to-noise ratio of the voltage by 3 times (or 10 dB) while increasing the scan time by 10 times.

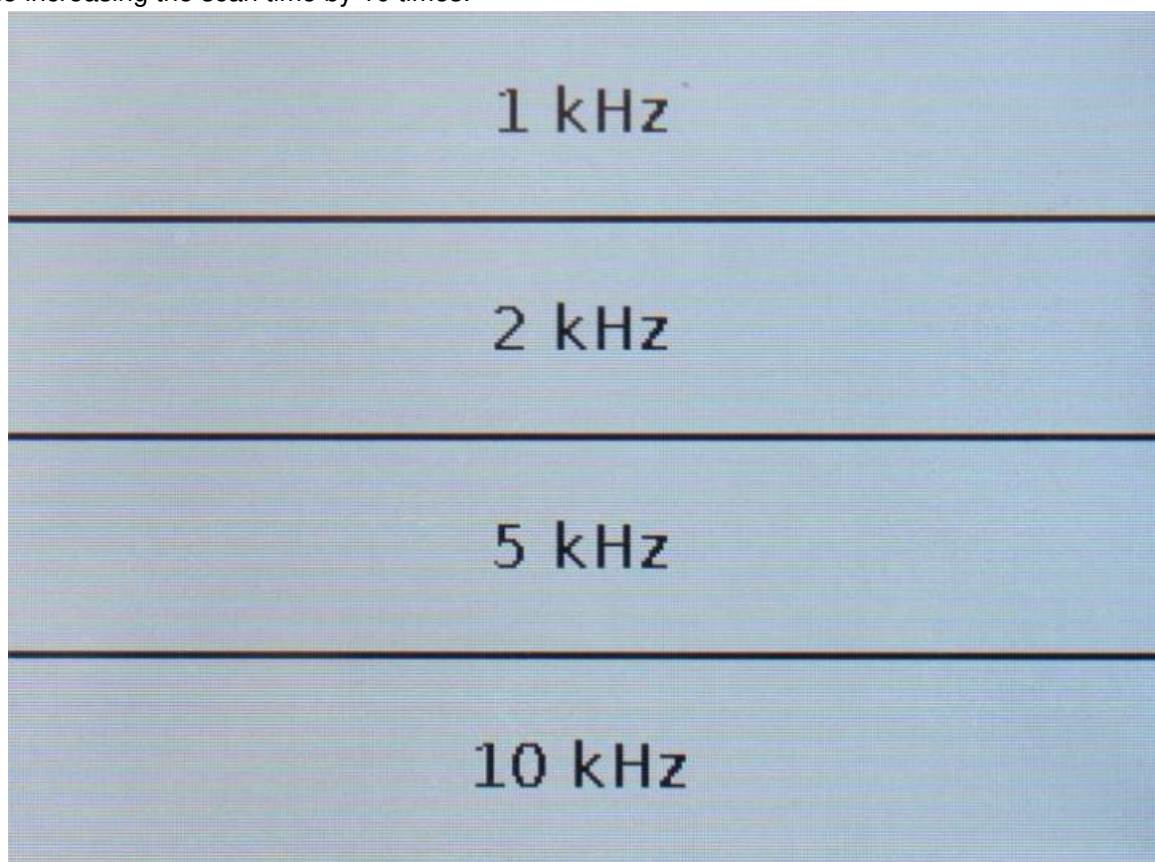


Figure 8.5 – Choosing the bandwidth in the BW menu

In the Points menu (Figure 8.6), the user sets the number of scan points. The scanning step in frequency and the scanning time depend on the specified number of points. The correct choice of the number of points and scanning range allows to improve the resolution at a number of measurements (DTF, Loss).

100	600
200	700
300	800
400	900
500	1000

Plots menu settings displayed on the screen plots

To select the plots displayed on the device screen and adjust the parameters displayed on these plots, enter the main menu of the device (Figure 8.1) by pressing the “menu” button. Enter to the Plots section. The menu appears as in Figure 8.7.



Figure 8.7 – The setup menu for the displayed plots

In the Plots menu, the plots displayed on the screen are selected and the parameters displayed are set. To display the plot on the device screen, you need to check the box next to the plot name, and to disable it, uncheck it. Clicking on the field with the name of the plot opens a menu of advanced settings for displaying the plot.

Note – In the case of setting the frequency plan, at which the maximum propagation time exceeds the value of

9999.99 ns, the DTF menu settings window will be blocked.

Markers menu

Enter the main menu of the device (Figure 8.1) by pressing the “menu” button . Enter the Markers section. A menu will appear on the screen, as in Figure 8.8.

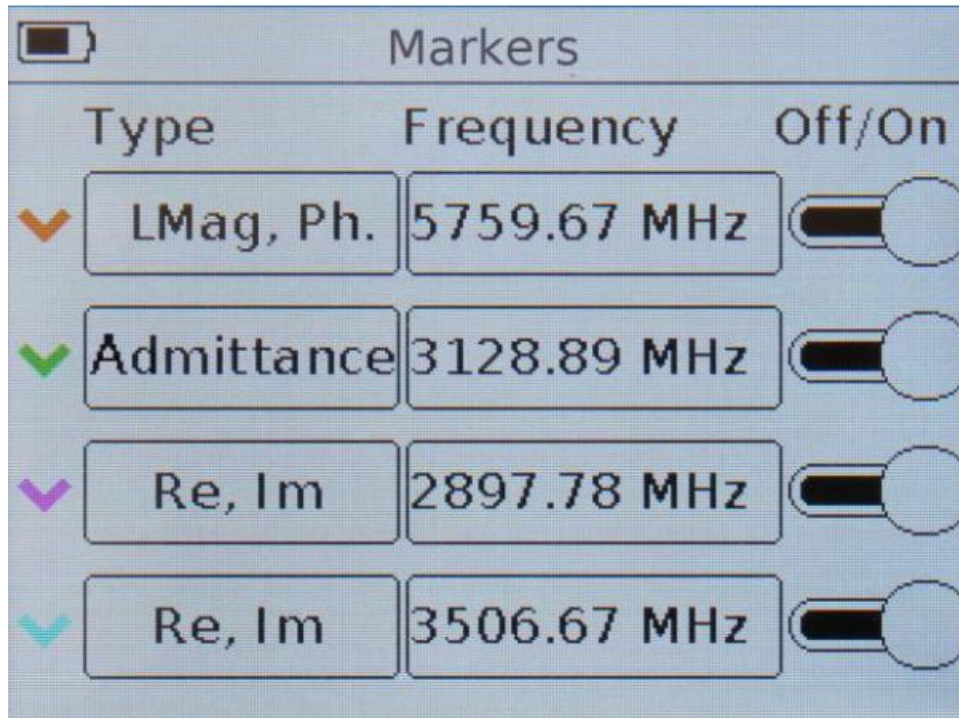


Figure 8.8 – Menu for setting parameters of markers displayed on plots

On all plots displayed on the device screen, except for DTF and Loss, you can display up to four multi-colored markers to display numerical measurement results. Switching off and on the marker is made by moving the corresponding slider against the selected marker to the Off / On position. Markers are completely independent of each other and can be tuned by the type of values displayed by the marker and by frequency. To adjust the marker by the type of displayed values, click on the corresponding marker in the Type column. The menu for selecting the type of values displayed by the marker will appear on the screen (Figure 8.9).

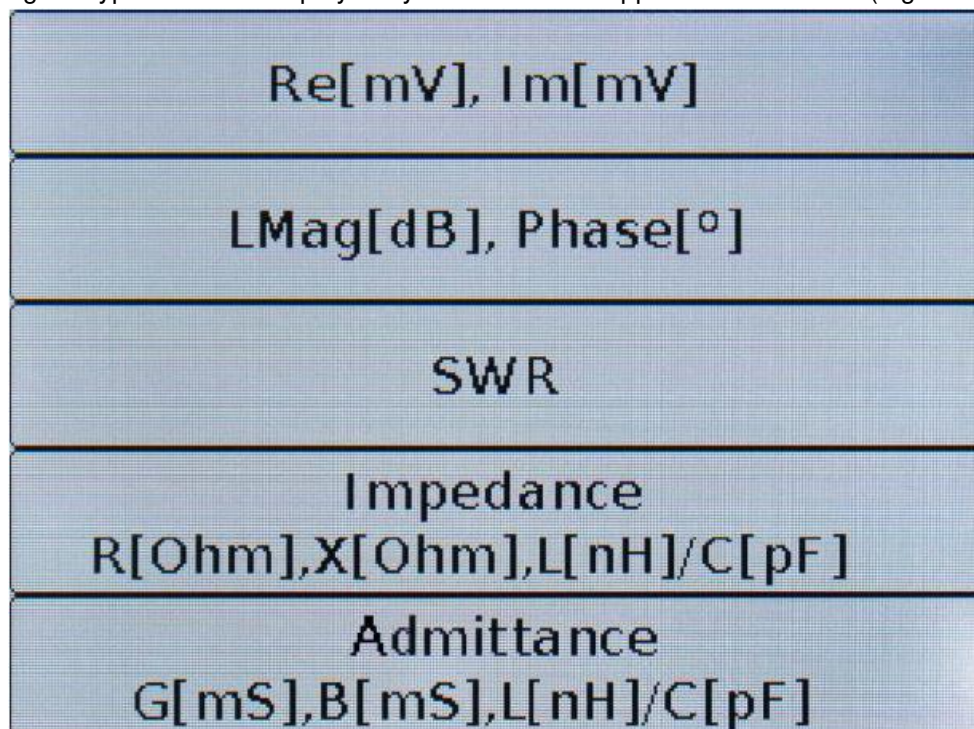


Figure 8.9 – Selecting the type of values displayed by the marker

Select the type of value displayed by the marker according to table 3. Table 3

Auto	The values of the complex reflection coefficient are displayed in the interpretation corresponding to the displayed graph. Switching the graph automatically changes the interpretation view.
Re[mV], Im[mV]	Displays the amplitude of the real and imaginary parts of the complex reflection coefficient in millivolts (mV). The total reflection corresponds to 1000 mV.
LMag [dB], Phase [°]	Displays magnitude at logarithmic scale and phase in degrees.
SWR	The standing wave ratio (VSWR).
Z=R+jX	Displays the active and reactive part of impedance in ohms (Ohm). Type of reactance - capacitance or inductance.
Impedance R[Ohm], X[Ohm], L[nH]/C[pF]	
Y=G+jB	Displays of the active and reactive parts of the admittance in millisiemens (mS). Type of reactivity - capacitance or inductance.
Admittance G[mS], B[mS], L[nH]/C[pF]	

To set the frequency on which the marker will be set, in the menu of markers (Figure 8.8) in the Frequency column, click on the corresponding marker. A submenu for entering numerical values will appear on the screen, as in Figure 8.10.

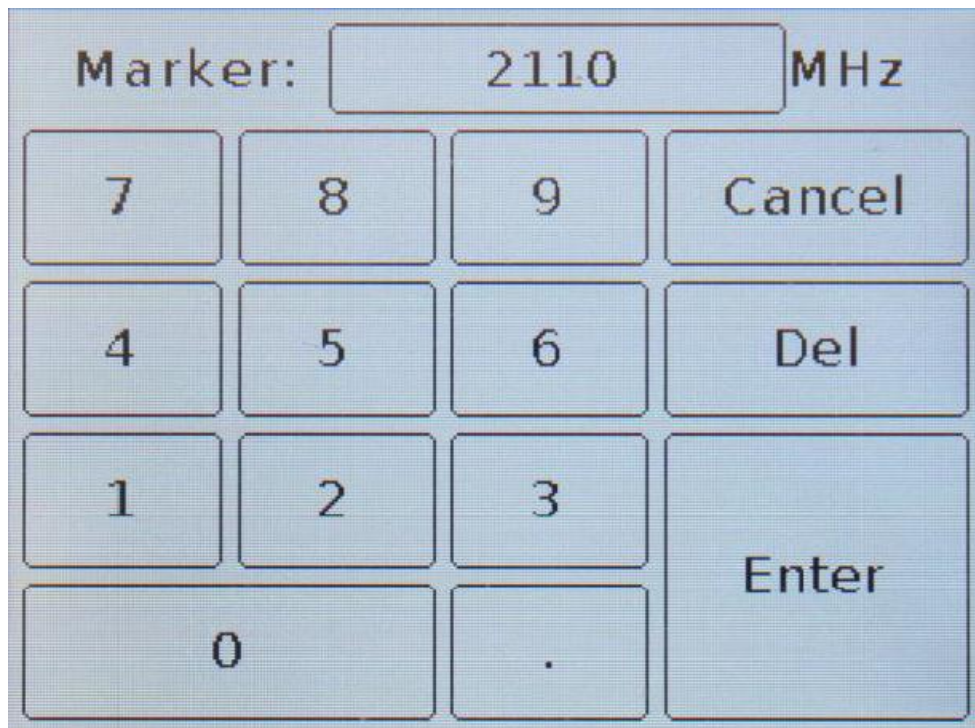


Figure 8.10 – Entering numerical values of the frequency to set the marker

Enter the numerical value of the frequencies and press TICK ICON or Enter. To delete erroneous or previously entered values, press \times or Del. To refuse to enter a value, click \leftarrow or Cancel.

In our example, in figure 8.10, the frequency of 2110 MHz is entered to set the marker to this frequency value on the plot.

The markers can be moved left-right along the plot using the navigation buttons and switching between the markers with the button “marker”. The marker will move in steps equal to:

$$Step = \frac{SPAN}{(N - 1)}$$

- **where Step** – marker movement step
- **SPAN** – scanning frequency range
- **N** – number of scan points.

The marker turned on and set to a user-defined frequency will be displayed on the measurement plot in the corresponding color. The parameters of the values displayed by the markers are displayed next to the measurement plot and change in real time (Figure 8.11).

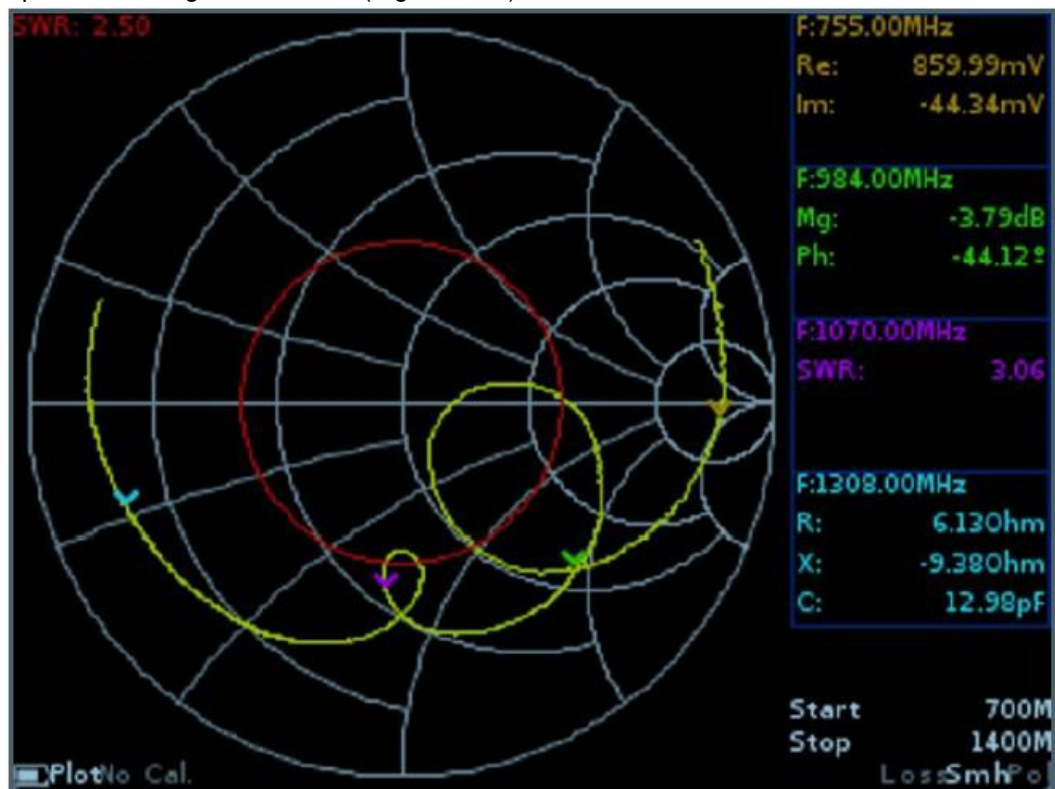


Figure 8.11 – Display of parameters measured by markers

To quickly change the displayed parameters or the frequency of one of the four markers displayed near the plot, click on the marker parameters area and go to the express settings menu of markers (Figure 8.12).

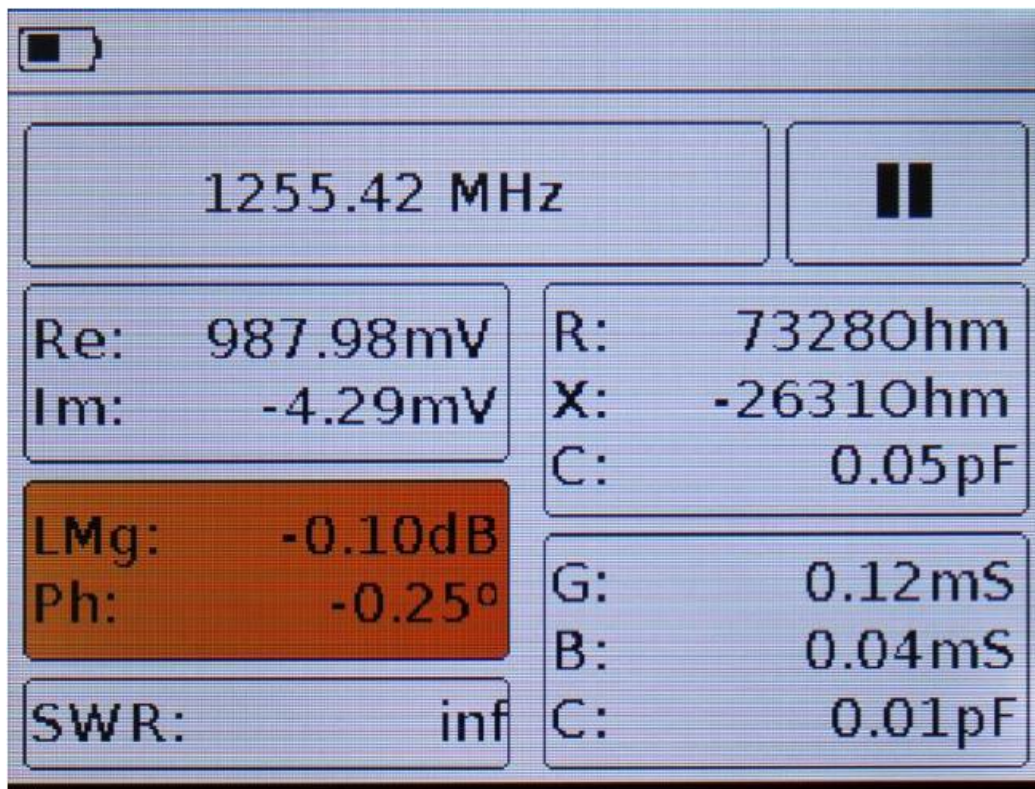


Figure 8.12 – Express menu for setting markers

Changing the frequency at which the marker is located is carried out in two ways:

- Pressing the block with the frequency display and then moving to the menu for entering numerical values, as in Figure 8.10.
- By pressing the navigation buttons . The frequency change will occur in increments of 0.1% of the current frequency.

he “start / pause” button allows you to fix the values of each of the parameters constantly changing in real time. The color highlights the parameters of the selected marker displayed on the plot. To change the display parameters of the selected marker, click on one of the four blocks with parameters without backlight. Clicking on the backlit block will result in the return of the display parameters. Pressing the “menu” button returns to the viewing plot.

Table 4 below shows the types of displayed parameters in the express menu.

Table 4 – The value of the parameters of the express menu of setting markers

Marker Frequency (MHz)		Start / Pause button	
Re:	Amplitude of the complex RC	R:	Impedance
Im:		X:	
Mg:	Magnitude and Phase	C:	Admittance
Ph:		G:	
SWR:	VSWR	B:	
		C:	

To quickly change the displayed parameters or the frequency of one of the four markers of the DTF plot, click on the area of the selected marker above the plot and go to the express menu (Figures 8.13 and 8.14). Press the button “menu” to return to the viewing plot.

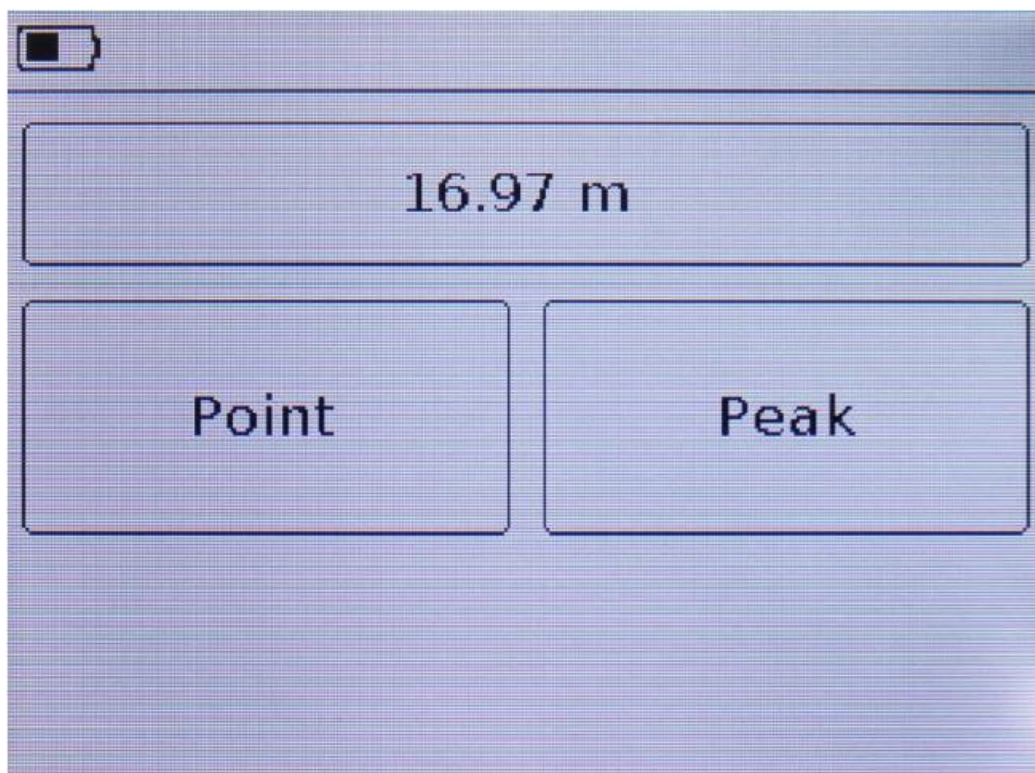


Figure 8.13 – Express menu for setting DTF plot distance parameters

Clicking on the top express-menu block, set the time (ns) or distance (m) from the reference point on the plot for measuring with the selected marker. Then, set the type of marker Point or Peak. By selecting Point, you place the marker at a plot point located at a specified distance or time from the start of the reference. Select the value of the Peak (maximum) will lead to the placement of the marker on the peak (maximum) of the plot corresponding marker sequence number. In this case, the entered time or distance value is ignored by the device.

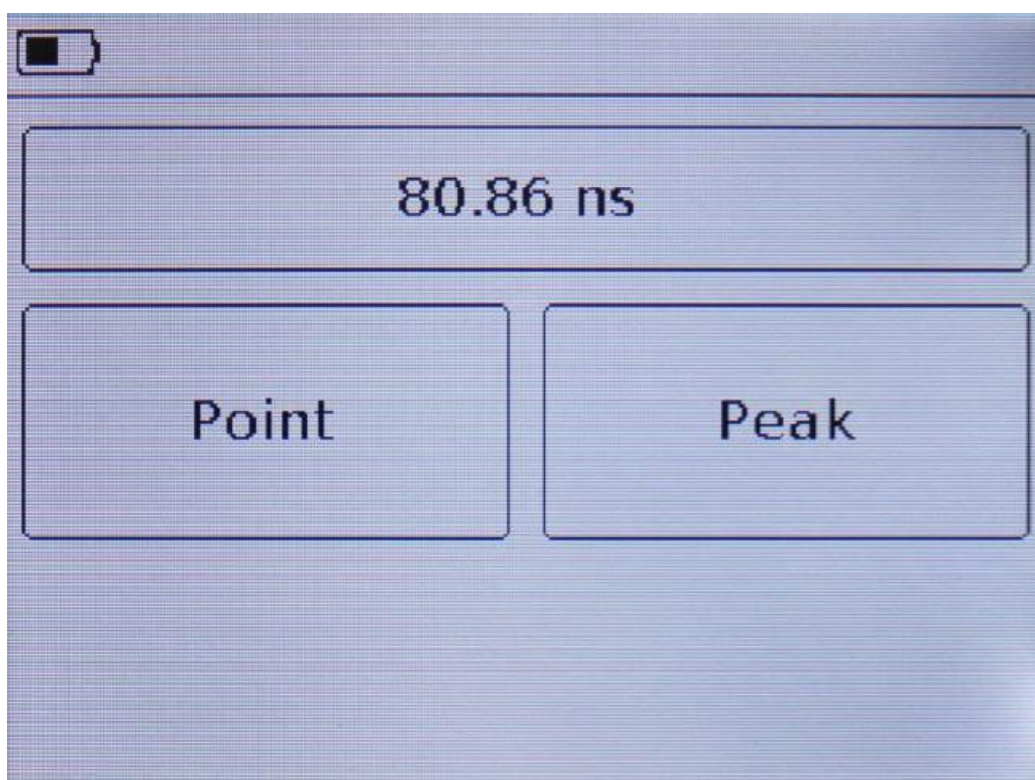


Figure 8.14 – Express menu for setting the time parameters of the DTF plot markers

Note – The parameters of the markers (time or distance) depend on the selected Scale units of measurement in the marker setting menu for the DTF plot.

In addition to entering numerical values, markers can be moved left-right along the plot using the navigation

buttons and switching between the markers with the button “marker”. The marker will be moved in increments of 1/1024 from the time or distance displayed on the plot.

Note – Moving with buttons is possible only for markers of the Point type. Peak (maximum) type markers do not move.

To quickly change the displayed parameters or the frequency of one of the four markers of the Loss plot, click on the area of the selected marker above the plot and go to the submenu for entering the numerical values of this marker as in Figure 8.10

In addition to entering numerical values, markers can be moved left-right along the plot using the navigation buttons and switching between the markers with the button “marker”. The movement of the marker will occur in steps equal to:

$$Step = \frac{SPAN}{(N - 1)}$$

- **where Step** – marker movement step
- **SPAN** – scanning frequency range
- **N** – number of scan points.

Device calibration menu

The device is initially factory calibrated, recorded in non-volatile memory, the relevant information (No Cal) is displayed in the lower information line of the screen. The calibration plane corresponds to the device port (1) for connecting the test devices and the load (TEST PORT). To increase the accuracy of measurements using additional adapters and cables, it is necessary to make a full single-port calibration using a set of calibration measures purchased separately.

To enter the calibration menu, enter the device main menu by pressing the “menu” button (Figure 8.1) and select the Calibration section. The screen will display the calibration menu as shown in figure 8.15.

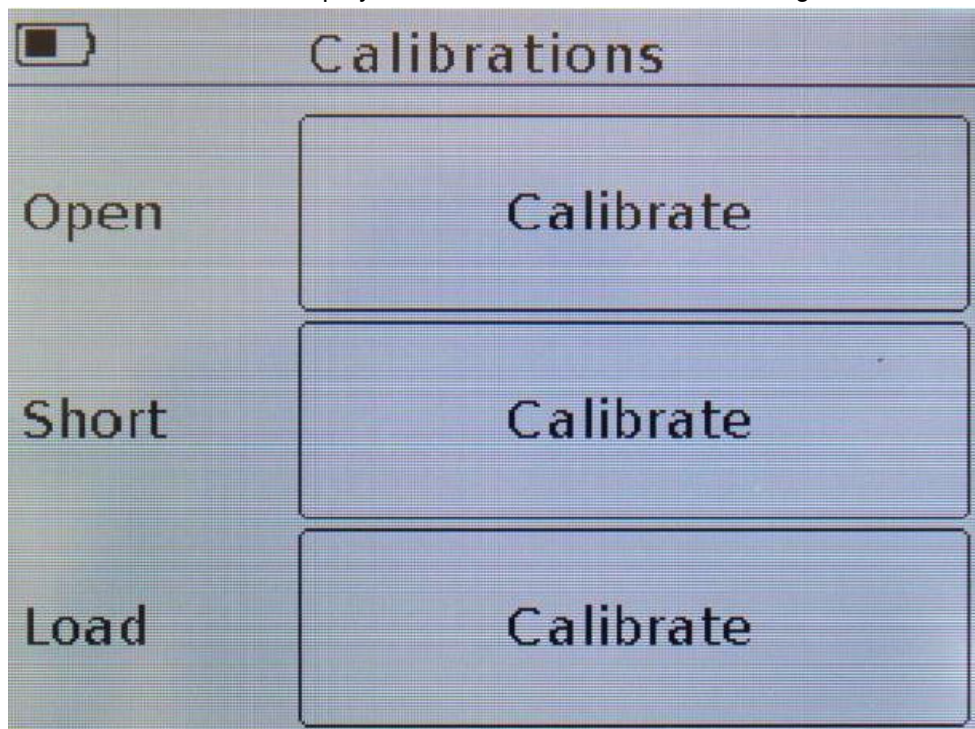


Figure 8.15 – Calibration Menu

To reduce the influence of connecting wires and connectors on the measurement results, it is necessary to calibrate.

Note – Calibration is performed after warming up the device for at least five minutes. The change in ambient

temperature from the time of calibration to measurements should not exceed $\pm 3\text{ }^{\circ}\text{C}$. Before carrying out critical measurements, always calibrate the device to eliminate the influence of the ambient temperature.

Connect the connectors, adapters and cables through which the device will be connected to the test device to the port (1) of the device (TEST PORT).

Note – Thus, the device calibration plane is transferred from the test port (1) of the device (TEST PORT) to the required cable or connector.

Then connect the loads from the standard set of calibration measures (not included) to the required cable or connector:

- Open standard and press the Open command on the screen
- Short standard and press the Short command on the screen;
- Load standard, and click Load command.

After calibration, the background of the commands on the screen will turn black or green (depending on the model of your device), as in Figure 8.16.

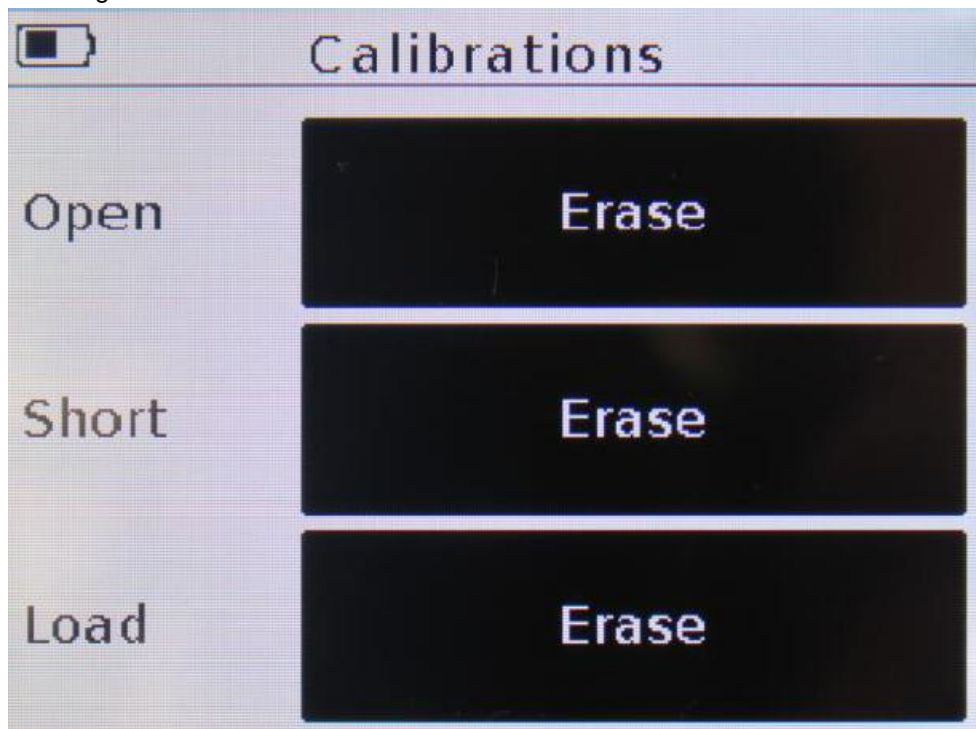


Figure 8.16 – Calibration of the device

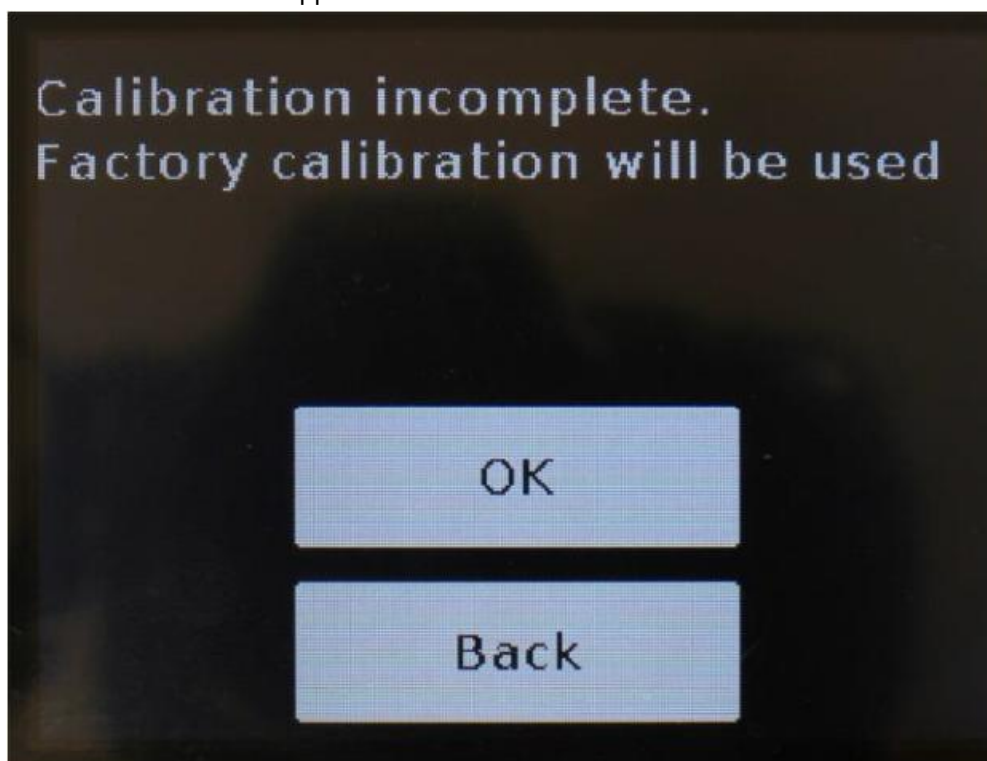
Note – To cancel (erase) this or that calibration, click on the Erase button, and reconnect the appropriate calibration measure, calibrate the device again.

On the screen in the plot display mode, the calibration information will appear in the lower information line:

- No Cal – custom calibration no. The device is factory calibrated.
- Cal – Calibrated by user. Calibration and frequency plan match. In this mode, the measurement results are the most accurate.
- Cal. Int – The frequency plan does not coincide with the reference at which calibration was performed, but the frequencies lie within the calibration range. The measurement accuracy is lower, since the device uses a mathematical method for calculating calibrations based on interpolation.
- Cal. Ext – The frequency plan does not coincide with the reference at which the calibration was performed, but

the frequencies are outside the calibration range. Measurement accuracy is the lowest since the device uses a mathematical method for calculating calibrations based on extrapolation.

Note – When you exit the Calibration menu until the full calibration process is completed, a warning will be displayed on the screen, as in Figure 8.17. You must either return to the menu by clicking Back and complete the calibration process, or exit the menu by clicking OK. In the latter case, when carrying out measurements, the factory calibration of the device will be applied.



Custom settings menu

To save custom settings (frequency setting, calibrations, types of displayed plots of marker settings), enter the main menu by pressing the “menu” button (Figure 8.1) and select the Presets section. A menu of user settings will appear on the screen, as in Figure 8.18.

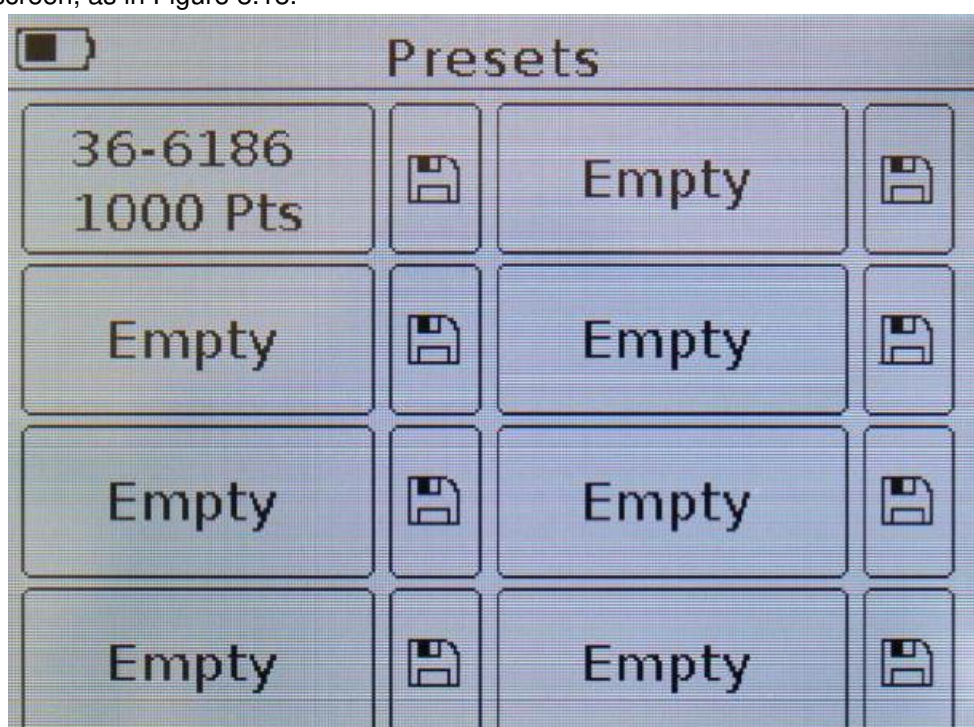


Figure 8.18 – Custom settings menu of device

The device allows you to save up to eight user settings in memory. To save the settings, click the floppy disk icon. The device will display a message about saving the settings. In the field to the left of the floppy icon, instead of the word Empty, the display of the user-configured frequency (frequency range and number of points) will appear.

To save the new settings, click on the floppy icon next to the field without settings. If all eight fields are occupied with user settings, overwrite them by clicking on the floppy icon next to outdated or unnecessary settings.

Note – Saving the user setting takes about 2 seconds, at this time the device does not respond to touching the screen and pressing buttons.

To load the saved settings, click on the field with the desired frequency plan. The device will load the saved data and go into the display mode of the plot that was displayed at the moment of saving the settings.

Device information

To enter the device information menu, enter the main menu of the device by pressing the “menu” button (Figure 8.1) and select the Device section. The screen will display information about the device, as in Figure 8.19.

- ID of the device;
- operating range;
- software version

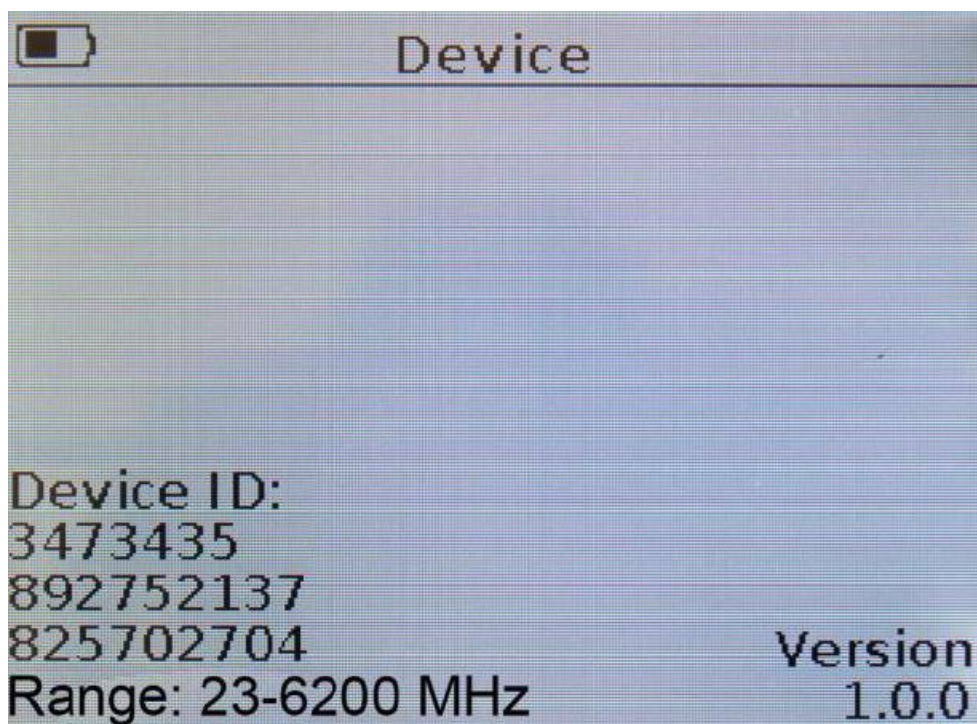


Figure 8.19 – Device Information in the Device menu

Displaying the VSWR limit line

When working with the Volpert-Smith chart, polar chart and VSWR plot, you can set the limit line of the voltage standing wave ratio or VSWR. This line will be displayed in red on Smh, Pol charts and SWR plot.

There are two ways to get to the menu of enabling the display of the limit line of the VSWR:

- Enter the Plots menu as indicated in section 8.3. and by clicking on the field with the designation of the chart Smh, Pol or SWR plot, go to the settings menu and display the VSWR limit line (Figure 8.20).

- In the Smh, Pol charts or SWR plot view mode, press and hold the button “plot” for about two seconds and go to the setup menu and display the VSWR limit line (Figure 8.20).

8.8.3. Turning off and on the display of the VSWR limit line on the plots is performed by moving the slider to the Off / On position (Figure 8.20).

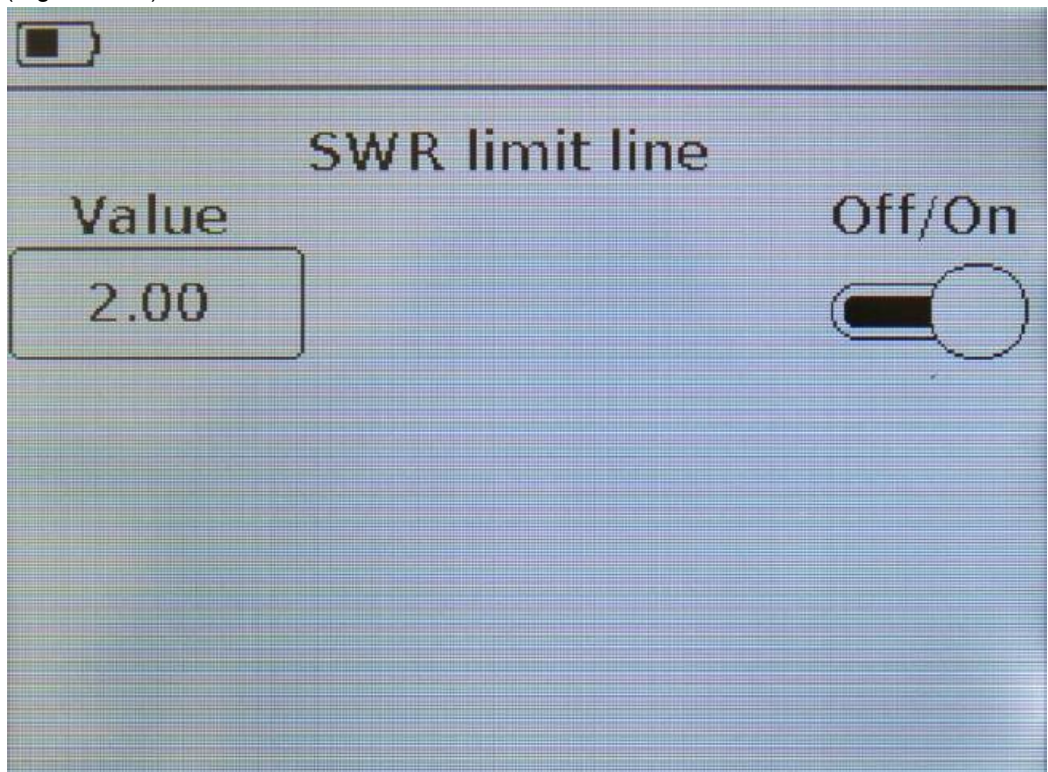


Figure 8.20 – Turning on the display of the VSWR limit line on the Smh, Pol charts and SWR plot

To change the display value of the level of the VSWR limit line, click on the numerical value Value, and in the appeared submenu (Figure 9.21), enter a numeric value in the range from 1.01 to 9.00.

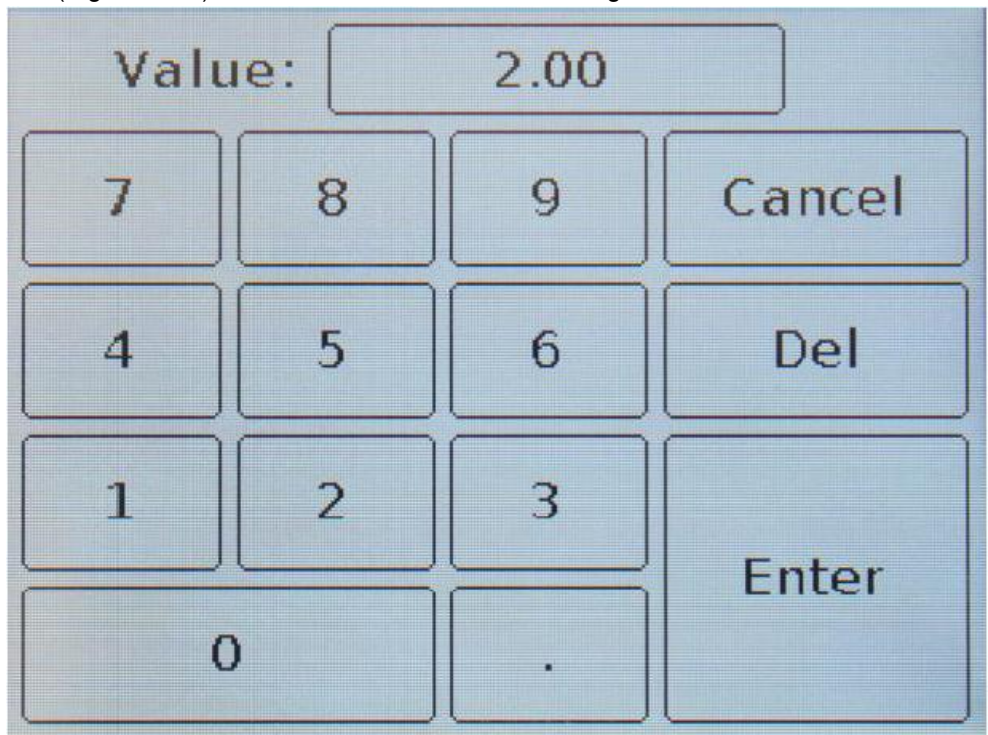



Figure 8.21 – Entering the numerical value of the displayed SWR limit line

Enter the numerical value of the coefficient and press TICK ICON or Enter. To delete erroneous or previously entered values, press \times or Del. To refuse to enter a value, click \leftarrow or Cancel. In our example, in figure 8.21, we enter the numerical value of the displayed VSWR limit line of the value on the charts.

Note – If the coefficient value entered by the user is outside the working range (1.01 – 9.00), a corresponding warning is displayed on the device screen.

Documents / Resources

	Banggood GS-320 6G Vector Network Analyzer device [pdf] User Manual GS-320, 6G Vector Network Analyzer device
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References

- [User Manual](#)

[Manuals+](#), [Privacy Policy](#)

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