

Narrow-Band, Markers And File Operations On A WSA-408/308

Sage Instruments - Application Note - 2026-04-20

Introduction

Sage WSA-408/308 was envisioned to be a broad-band FFT analyzer for 3GPP-OFDM signals from 4G to 5G and future 6G, hence the current span setting is limited to 100 kHz at the low end. However, there are still many narrow band signals over the air that a WSA-408/308 must accommodate. Starting with software version 20260420, WSA-408/308 offers a “Narrow-band operation mode”. In this mode, the span setting can be as low as 10 kHz, and the RBW can be as fine as 5 Hz.

Enter “Narrow-band operation”

On a running WSA-408, press the right-7 “MODE” button, you’ll see the menu dialog as shown in Figure 1.

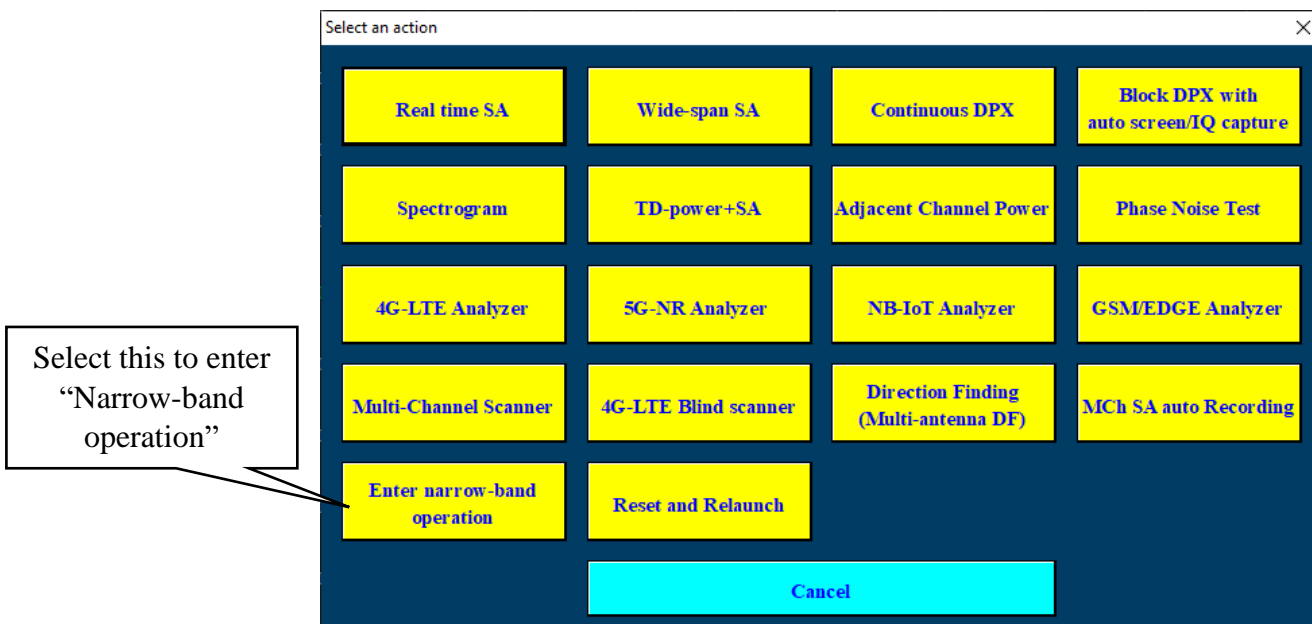


Figure 1 - “MODE” selection dialog

After selecting “Narrow-band operation”, the GUI will go dark momentarily and auto-resume. Within seconds, the GUI should restart to a default span and RBW settings as shown in Figure 2. Press right-2 “Span” button, you’ll see the pop-up dialog shown in Figure 2. The available span selections are 50, 40, 30 and 20 kHz.

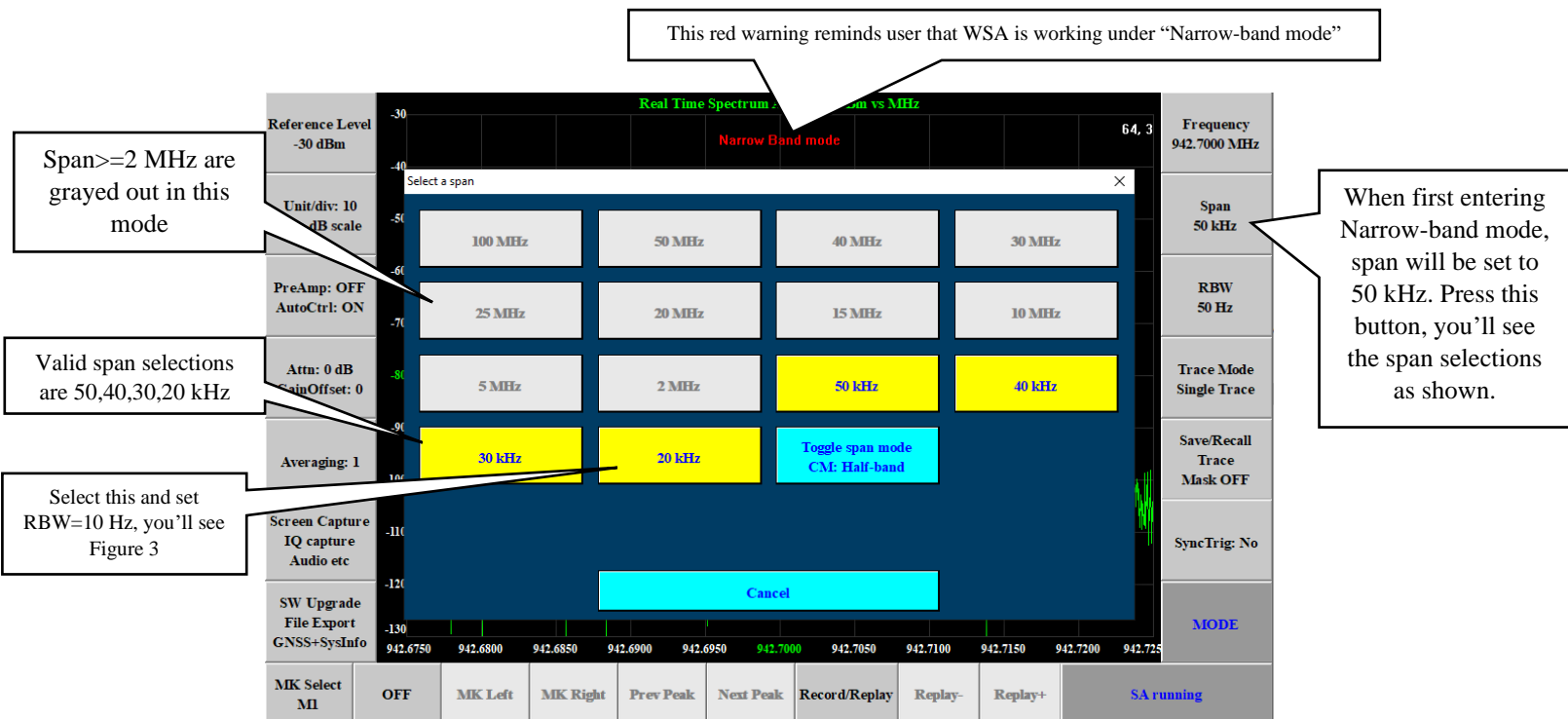


Figure 2 - Valid span selections under "Narrow-band operation mode"

Figure 3 below shows actual test results in narrow-band mode when span=20 kHz and RBW=10 Hz, for a tone signal input from a signal generator. The tone frequency was intentionally chosen to be a long "fractional" number to demonstrate WSA's fine frequency resolution ability on the spectral display and accurate marker value, as long as WSA is clock-synced to the generator (locked to the generator's 10 MHz reference output).

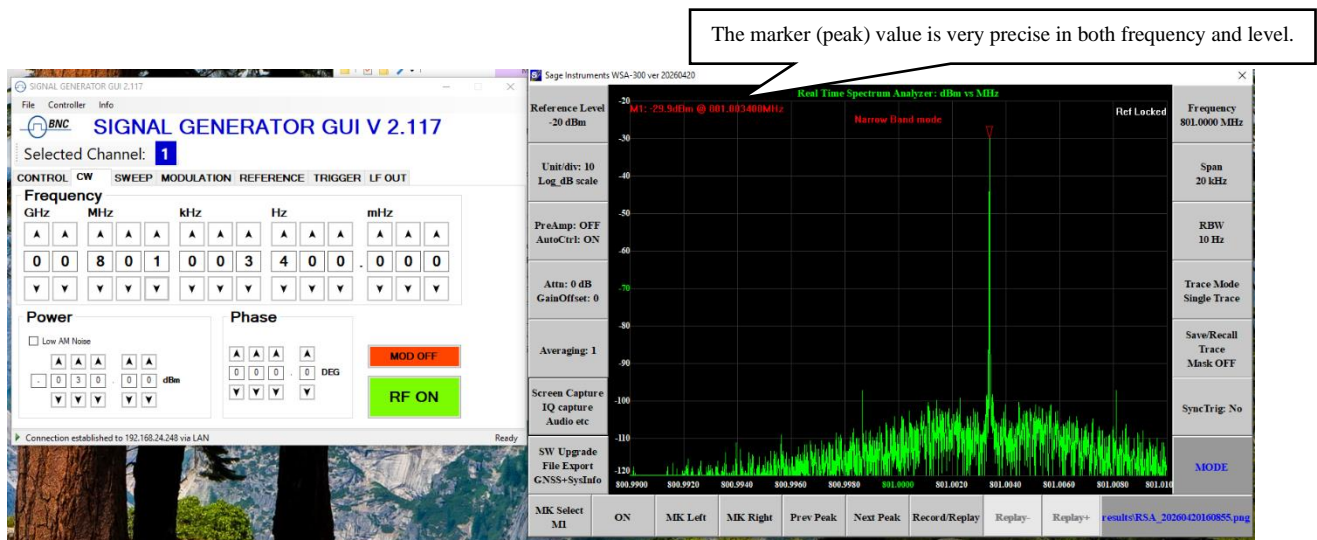


Figure 3 - Spectral display under narrow-band mode with span=20 kHz and RBW=10Hz

Return to “Normal wide-band operation mode”

To return to the normal wide-band mode, press the “MODE” button again, you’ll see a dialog as shown below in Figure 4.



Figure 4 - Dialog for going back to the normal wide-band operation mode

If the instrument is powered off while it’s in Narrow-band mode, when it’s powered ON again, it will enter the normal wide-band mode. However, for WSA-308, if the GUI is closed, but the unit is not powered-off, and if user starts the GUI again, the unit will stay in the “Narrow-band mode”.

Caution on the Narrow-band operation

The narrow-band spectral measurements, although offered in WSA, should only be used to analyze true narrow-band signals. For wide-band signals, one should always use the normal wide-band operation. Under the normal wide-band mode, WSA guarantees a out-of-band image suppression of over 90 dB, but in the narrow-band mode, the suppression capability is reduced to 60 dB. It’s good compared with most instruments in the market, but not good enough when comparing with its own optimal mode.

Spectral peak value and channel power subtlety

WSA is a broad-band FFT analyzer. For a narrow-band tone input, if the frequency does not fall exactly onto one of the discrete FFT bins, then the peak level may be inaccurate. This is not just a problem for WSA. It’s a problem for all FFT analyzers. To resolve the issue, one has to either use very fine RBW setting or use composite power measurement instead of just relying on spectral peak value. Even with channel power, the power-mode selection is important.

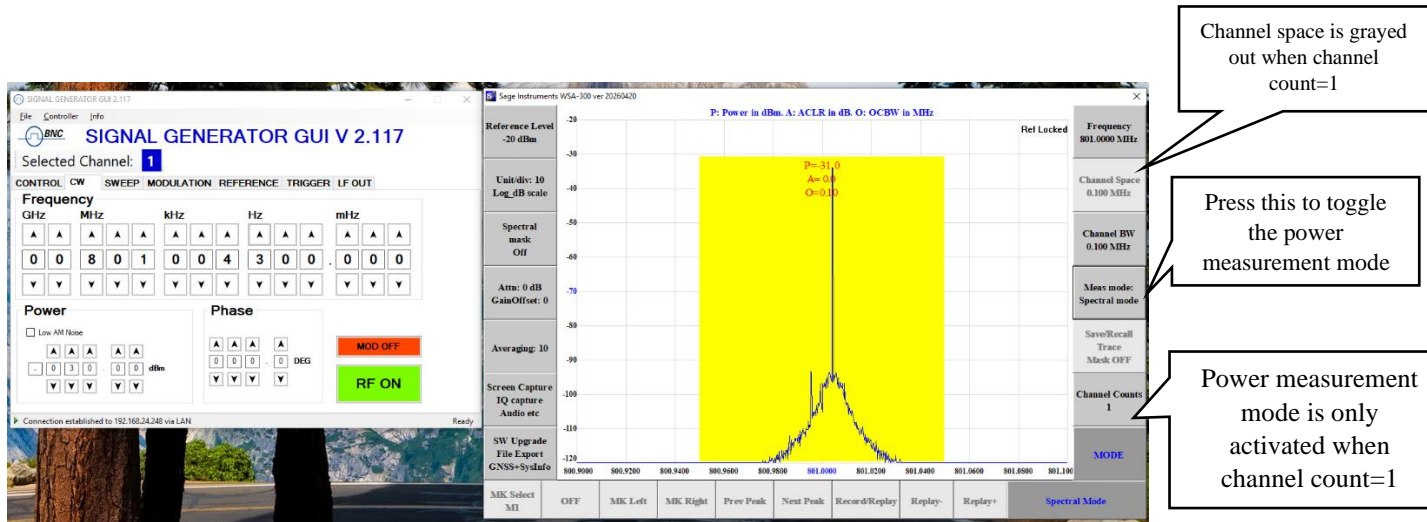


Figure 5 - Using WSA's "ACLR" feature to measure the channel power (with channel count=1)

In Figure 5, the signal generator's output frequency was intentionally chosen to be not aligned with the internal RBW resolution inside the ACLR feature, hence both the peak power and even integrated power are about 1 dB off. If RSSI mode is selected, then the power reading will be closer to the actual input level, regardless the frequency value, as shown in Figure 6.

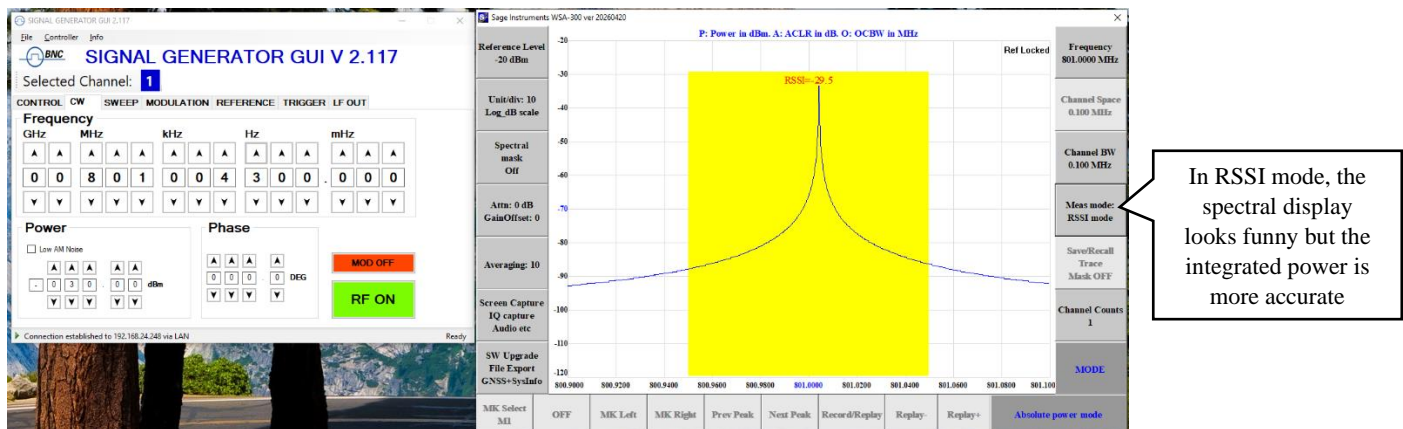


Figure 6 - In "RSSI mode" the spectral display looks funny because the tone frequency doesn't align with the RBW, but the integrated power reading (RSSI=-29.5 dBm) is more accurate.

Marker operations

On the WSA GUI, as shown in Figure 7, press the lower left button “MK Select”, you’ll see the marker selection dialog.

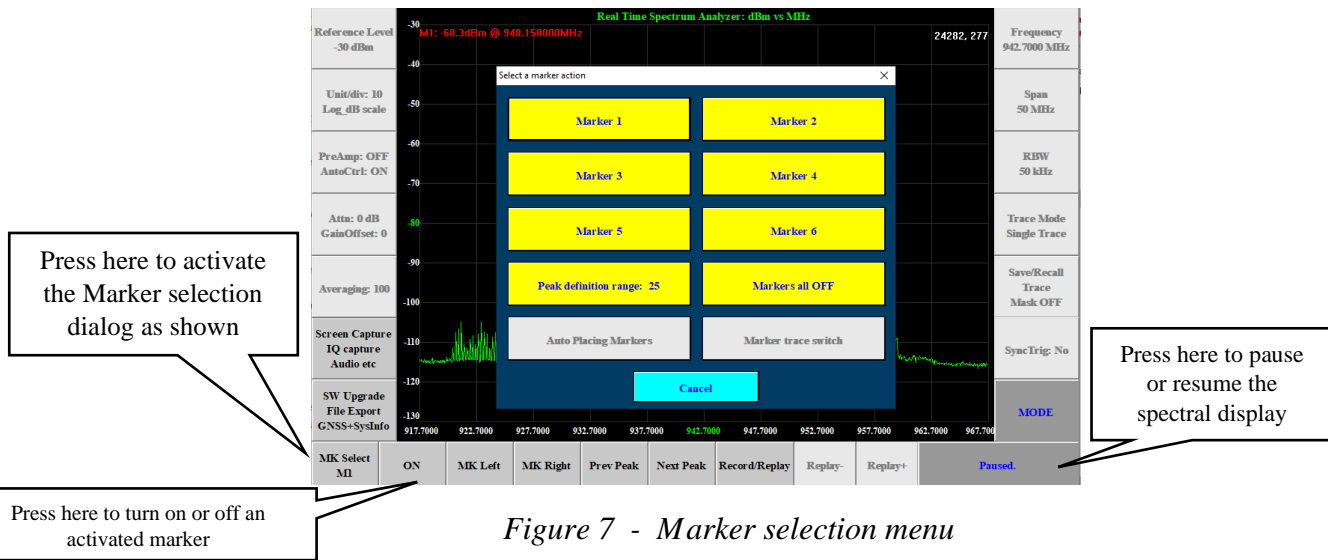


Figure 7 - Marker selection menu

To best use the marker utility, one should pause the display first by pressing the lower right button so that the markers won’t bounce around too fast. Figure 8 shows an example where all 6 markers are turned on.

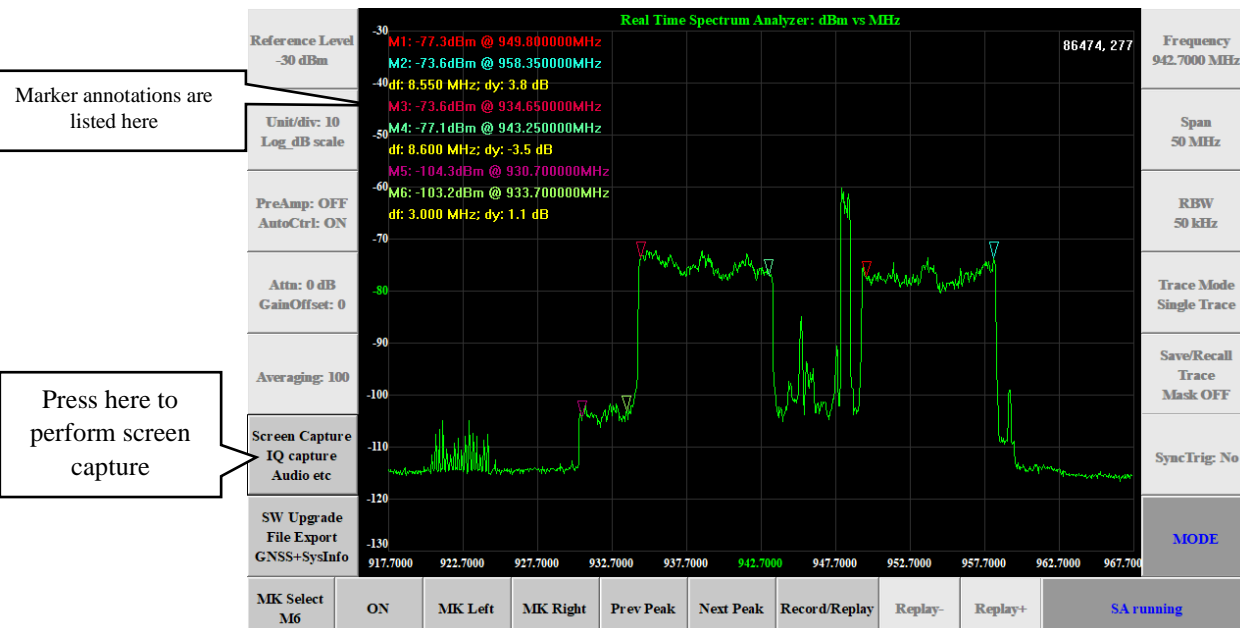


Figure 8 - A spectral display example where all 6 markers are turned on

For the marker operations, please pay attention to the following:

1. Whenever a marker is first turned on, it always lands on the global spectral peak location. You then click (or touch) at another location, the marker will move a local peak value near where you touched. The search range can be adjusted by setting the “Peak definition range” value in Figure 7. You can further move the marker left or right by either touch and then slide on the screen, or use the lower buttons labeled as “MK left”, “MK right”, “Prev Peak”, “Next Peak”.
2. The marker math (differences between markers) is only calculated between the default pairs and shown as “df” (frequency difference) and “dy” (dB value difference) on the marker annotation display area. Markers 1 and 2 are a pair, 3 and 4 are a pair and 5 and 6 are another pair.
3. Normally, by swiping your finger on the touch screen left or right, the center frequency will change accordingly. However, once the marker(s) are turned on, the swiping action will only affect the active marker movement, not the center frequency.

Screen capture and file export

The best way to save test results while working in the field is to use the “Screen capture” function. The screen capture not only records the results, it also keeps all the setting information. All the figures in this document come from screen captures. Screen capture is activated by pressing the left-6 button in Figure 8. After pressing the button, you’ll see a dialog as shown below in Figure 9.

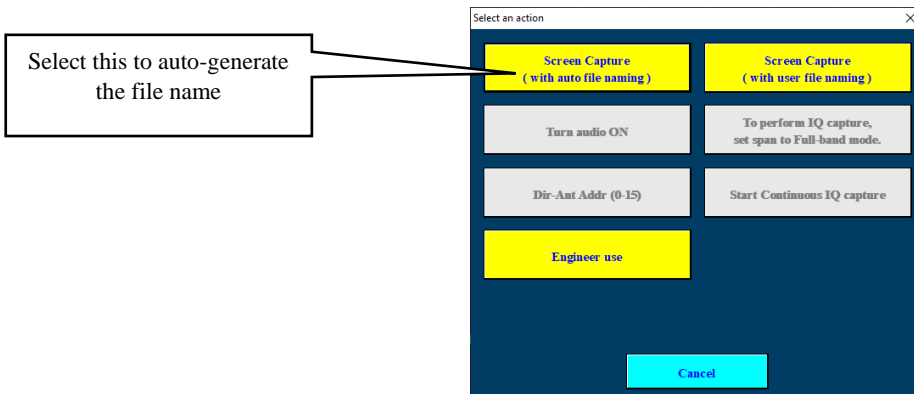


Figure 9 - Dialog pop-up after pressing the left-6 button in Figure 8

On the dialog in Figure 9, select the top left one will immediately trigger a screen capture and the resulting “.png” file will be named as “TestType_timestamp.png”, where “TestType” is “RSA” for the real-time spectrum analyzer test, and “timestamp” is “year-month-day-hour-minute-second”. An example file name is “RSA_20260420164959.png”, meaning this screen capture

comes from the Spectrum Analyzer test as shown in Figure 8 on year 2026, month 4, day 20, hour 16 (4 PM), minute 49 and second 59.

On a WSA-408, if a USB thumb-drive is plugged in the USB port, the “.png” file will automatically be saved into this USB drive. If the USB drive is not present, the “.png” file will be saved into the internal SBC’s (Single-Board-Computer) hard drive. This is generally the case as plugging a USB drive on a WSA-408 while working in the field creates unnecessary safety risk.

Once work is finished, and the WSA-408 is brought back to the office, you can export the save “.png” files out to a USB drive by the following steps.

First, turn on the WSA-408 again (if it’s turned off) and plug in a USB drive. Press the left-7 button on Figure 8, and you’ll see a dialog below shown in Figure 10.

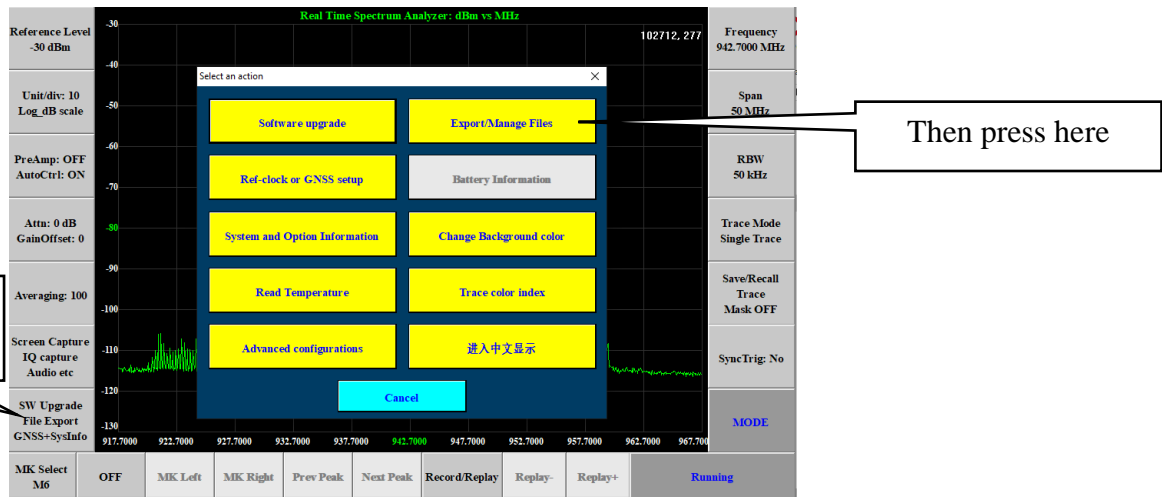


Figure 10 - Starting the file export process, after which you'll see three more dialogs shown below in Figure 11.



Figure 11 - Pop-up dialogs encountered when exporting PNG files

After all the selections in Figure 11, the saved PNG files will be copied to your USB drive and deleted from WSA-408’s internal hard drive. The PNG files can be viewed on either a PC or a phone and imported to a document.