# Making Fast Pass/Fail Testing
With BSA Spectrum Analyzers

Abstract

The fast Pass/Fail testing feature of the N9320B and N932xC BSA spectrum analyzers provides significant benefits to RF technicians by quickly telling them if measurement results meet the frequency and power criteria in their test plans. This application note describes the advanced window limit feature in the BSA spectrum analyzer and demonstrates how to use it to rapidly and easily make the Pass/Fail determination on measurement results.

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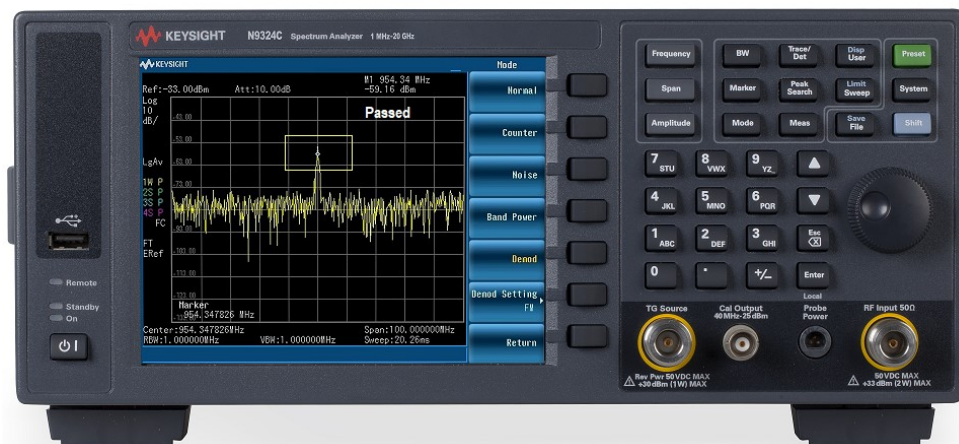
Window Limit – Improves Productivity for Manual Operators

Spectrum analyzers are commonly used to evaluate the transmission frequency and power, which are the most essential items to test for general purpose radio devices. In some workstations, such as RF module tuning stations or repair stations, an occasion usually arises that requires an engineer or technician to manually set up the parameters and limit conditions of the analyzer and implement tuning or troubleshooting. A traditional limit line and limit mask are frequently used, as shown in Figure 1 and Figure 2.
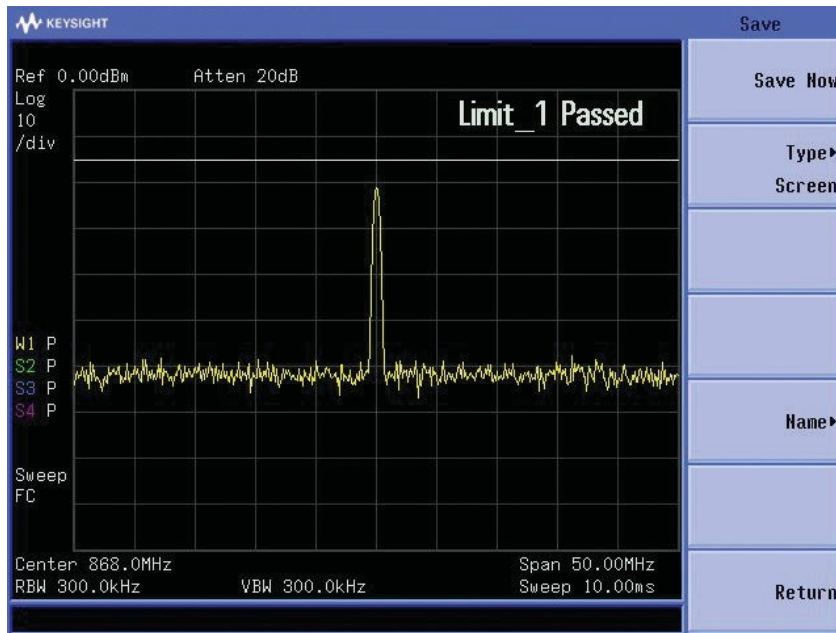

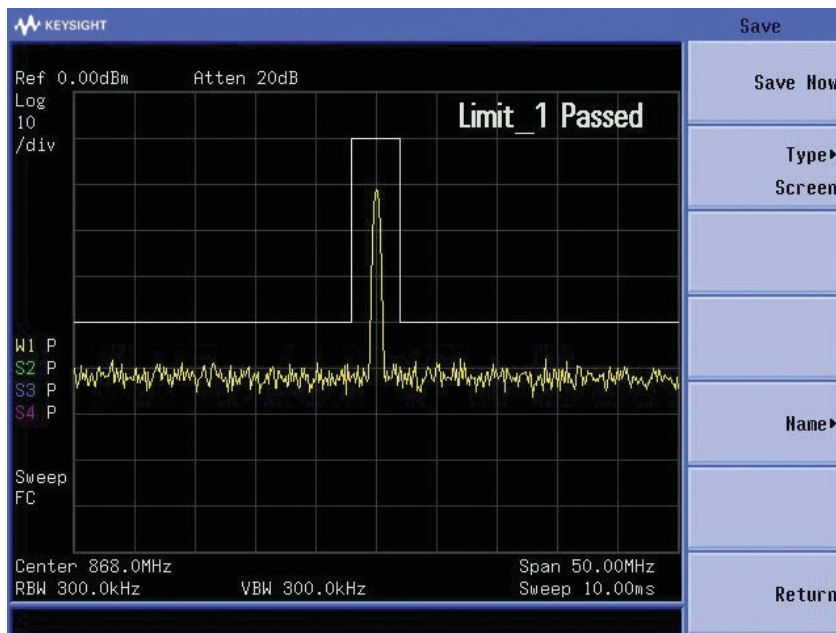Figure 1. Single limit line for transmission power determination.

Figure 2. Limit mask for transmission power determination.

The **advanced** window limit function of the N9320B, shown in Figure 3, provides a one-button Pass/Fail determination on the measurement result. It reduces the instrument setup complexity and improves the operators' productivity with its ability to:

- Locate the peak signal automatically with a peak marker
- Determine the frequency and power of the signal simultaneously
- Determine for "Pass" only when the upper and lower limits of the frequency and power are both met
- Send an audio alert when the measurement is determined as "Fail"

Figure 3. Window limit feature determines the measured frequency and power simultaneously.

Demonstration

In the following demonstration, a word in bold refers to the hard button on the instrument and a word in [ ] refers to a soft key on the N9320B spectrum analyzer. The N932xC has similar key menus and operations.

For demonstration purposes, the analyzer settings are as follows:

- Center frequency: 2.4 GHz
- Span: 5 MHz
- RBW/VBW: 30 kHz
- Power tolerance: –30 to 0 dBm
- Frequency tolerance: Center frequency ± 500 kHz

Step 1

Set up the primary parameters on the analyzer: Center frequency, reference level, and span.

- Press Frequency > 2.4 > [GHz]
- Press Span > 5 > [MHz]
- Press Amplitude > [Reference] > 10 > [dBm]
- Press BW/Avg > 30 > [kHz]

Step 2

Set up the window limit.

- Press Det/Display > [Limit] > [Window Limit]
- Press [Window Center] > 2.4 > [GHz] to set up the center frequency of the window
- Press [Window Width] > 1 > [MHz] to set up the frequency range of the window
- Press [Window Upper] > 0 > [dBm] to set up the upper power limit as 0 dBm
- Press [Window Lower] > −30 > [dBm] to set up the lower power limit as −30 dBm
- Press [More 1 of 2] > [Criteria In Out] to toggle the determination criteria to the In status. (Once the signal falls inside the window, the analyzer determines it as a Pass)
- Toggle the [Limit Beep] to On if you would like to be alerted when the measurement is determined as Failed
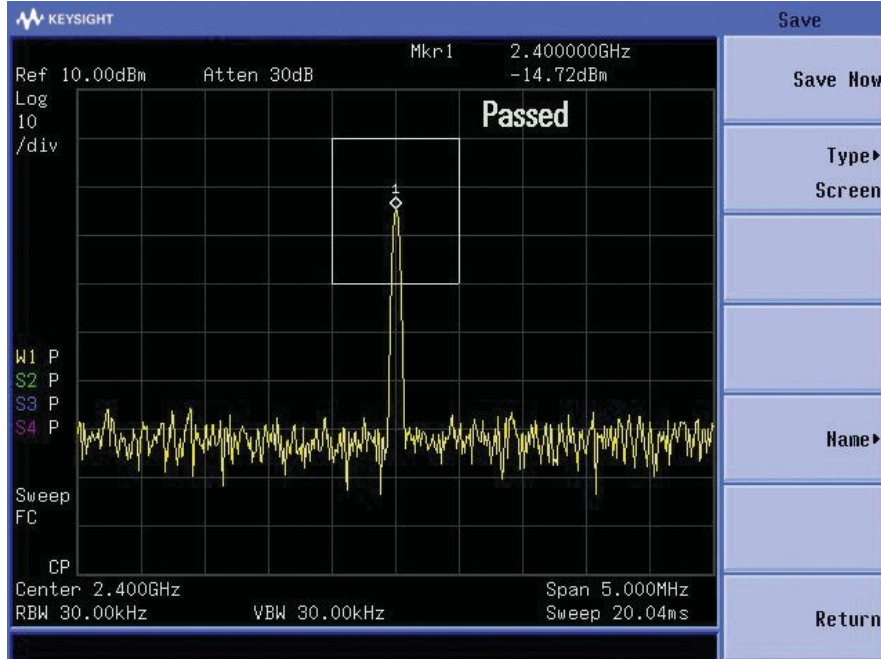

Figure 4. Measurement passed: Signal within the window.

Step 3

Obtain the measurement results.

If the signal falls into the window (refer to Figure 4), the N9320B spectrum analyzer determines the measurement result as Passed.

As shown in Figure 5 and Figure 6, if the signal does not fall into the window, or exceeds the frequency or power tolerance, the BSA spectrum analyzer determines the measurement as Failed.Set up the window limit.

- Press Det/Display > [Limit] > [Window Limit]
- Press [Window Center] > 2.4 > [GHz] to set up the center frequency of the window
- Press [Window Width] > 1 > [MHz] to set up the frequency range of the window
- Press [Window Upper] > 0 > [dBm] to set up the upper power limit as 0 dBm
- Press [Window Lower] > −30 > [dBm] to set up the lower power limit as −30 dBm
- Press [More 1 of 2] > [Criteria In Out] to toggle the determination criteria to the In status. (Once the signal falls inside the window, the analyzer determines it as a Pass)
- Toggle the [Limit Beep] to On if you would like to be alerted when the measurement is determined as Failed
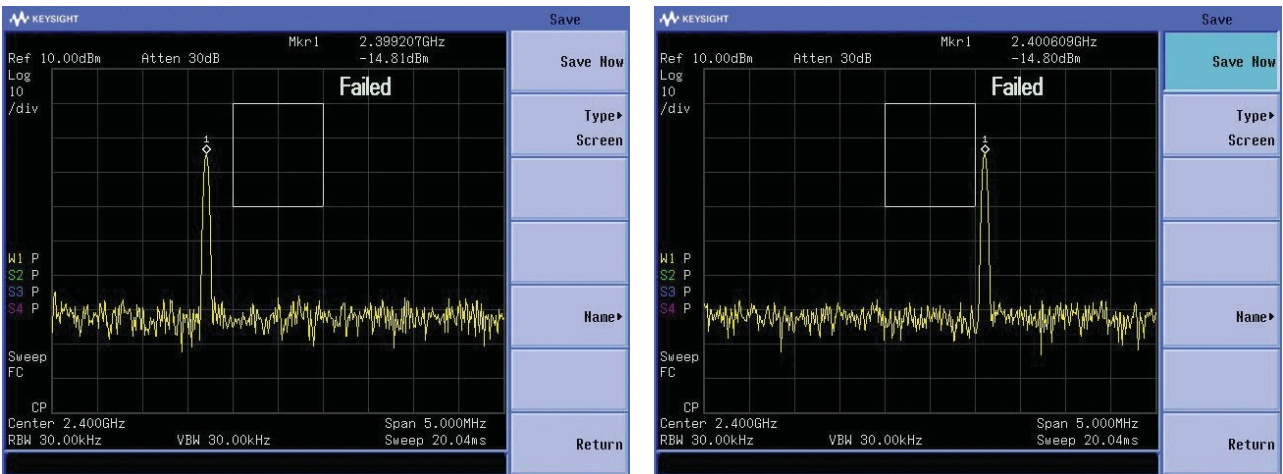

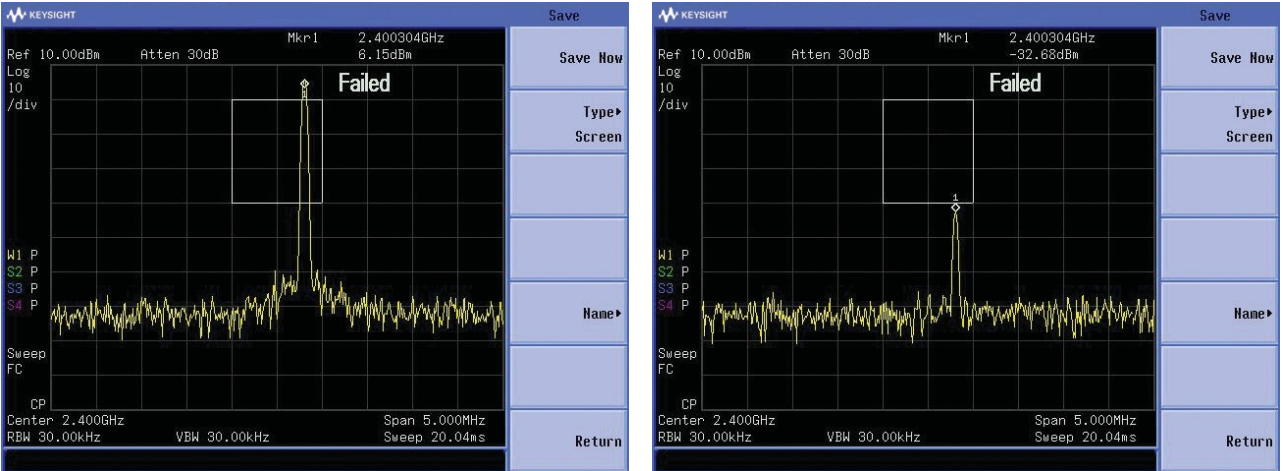Figure 5. Measurement failed: Signal exceeds the frequency tolerance of the window.

Figure 6. Measurement failed: Signal exceeds the power tolerance of the window.

Summary

The window limit feature in the BSA spectrum analyzers makes simultaneous determination on the frequency and power limits of a signal, making it easier and faster for RF technicians and engineers to perform manual testing and greatly improving testing efficiency.

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