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Beyond Measure

Rigol DSA1000
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DSA1000 Tutorial Intro

DSA1000 is Rigol's line of spectrum analyzers. Throughout this tutorial we will attempt to introduce some of the significant capabilities of the DSA1000 family in addition to demonstrating the ease of use of its interface.

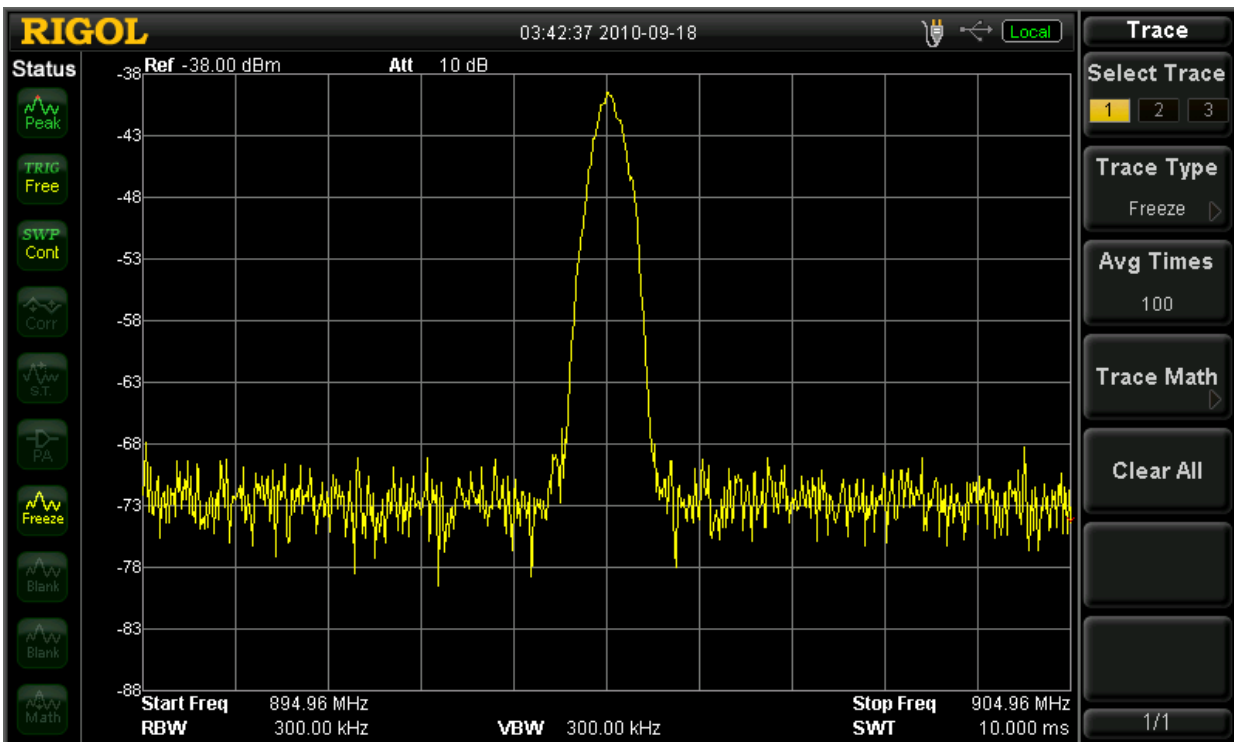## Displaying the spectrum of a signal:

For this experiment, the following equipment will be needed:
- Function Generator
- Coaxial cable connector N-Type connector to BNC connector

Set the function generator to output a 100 mVpp sine wave at 100MHz. Then connect the function generator to the RF input of the DSA1000 series analyzer. After connecting the function generator to the spectrum analyzer, you should observe a spectrum graph as observed below.

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Now, press the Auto-Tune button (under Sweep Control). You should know observe the following spectrum graph as below:
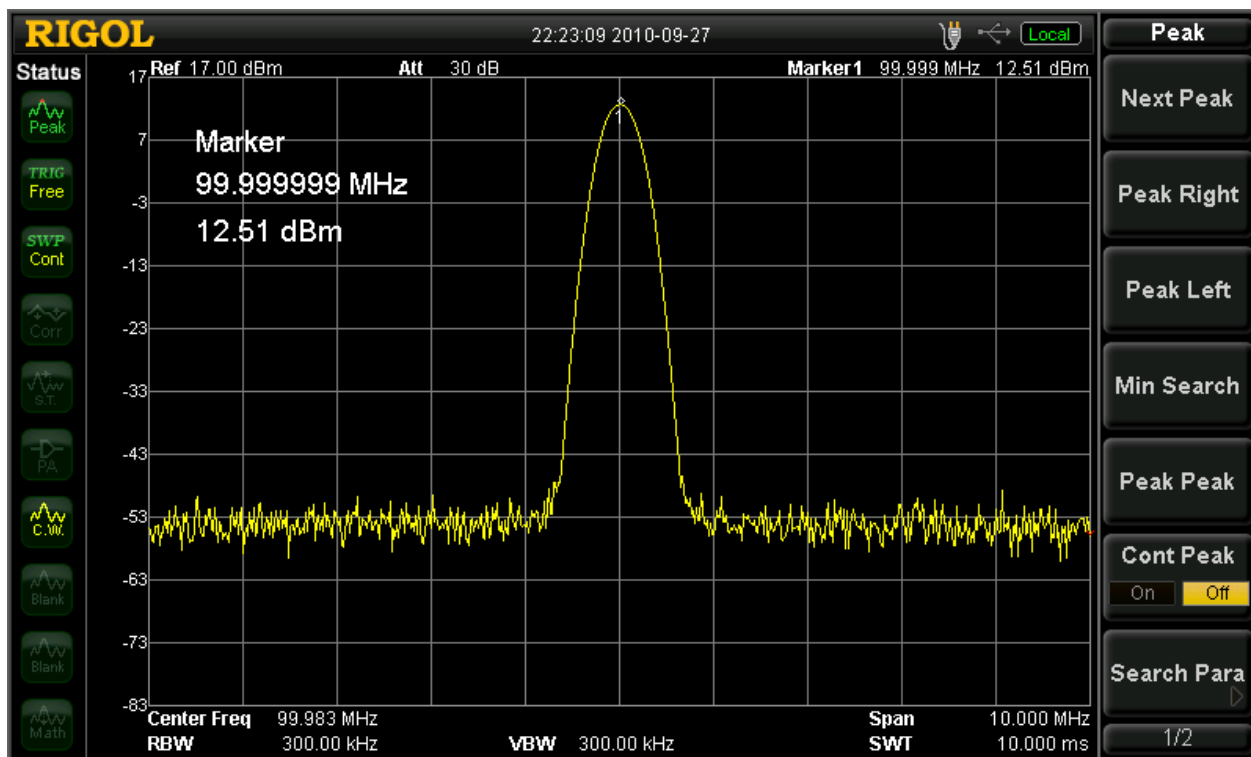

The Auto-Tune feature is a very useful and time saving feature to use. Whenever faced with uncertainty about the position of the center frequency on the spectrum graph, the Auto-Tune feature will assist the user center the display at the highest peak in the input signal.

Markers:

Markers are used for the purpose of obtaining accurate information about a specific data point on the spectrum graph. For demonstration purposes, with the DSA1000 in the same state as the figure above, press the "Peak" key.

As observed a marker will be placed at the center of the display. The peak button is used for the purpose of placing a marker at the highest point amplitude wise of on the spectrum graph as in the picture below:

Similarly, if another peak exists to the left or the right of the current peak, using the "L-Peak" and "R-Peak" buttons allows us to navigate amongst signal peaks. In the above case, only one real peak exists, as this is a pure sine wave. Alternatively, the peak menu on the left can be used to navigate through the signal's peak. It appears when the "Peak" button is pressed.
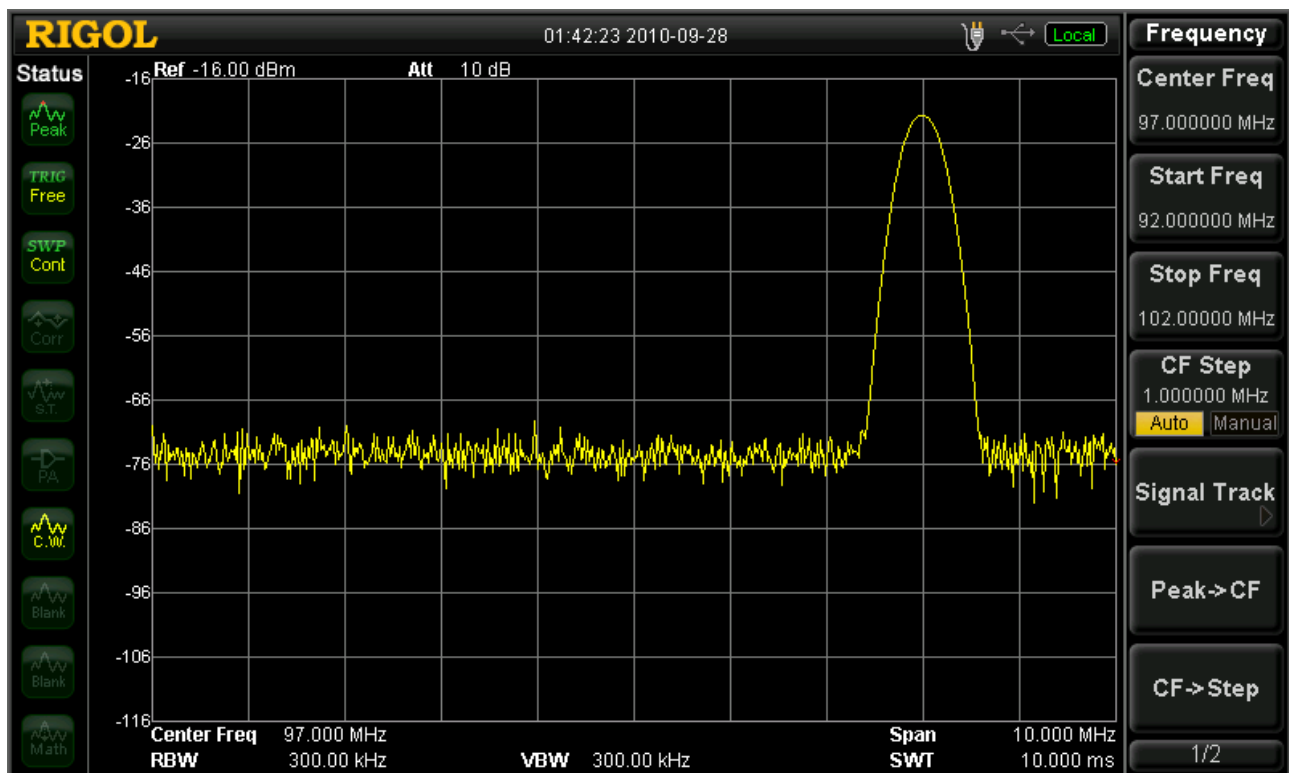
Frequency Controls:

Pressing the black "FREQ" button, will expose the Frequency menu on the right hand side of the screen.

We can see that the frequency is centered at 100 MHz, which is the frequency of the sine wave being inputted into the system.

Push the "Center Frequency" soft button; this will highlight the center frequency value selection and using the numeric pad change the center frequency to a different value. With a new center frequency, we can now observe a shift in the peak location on the display as below:
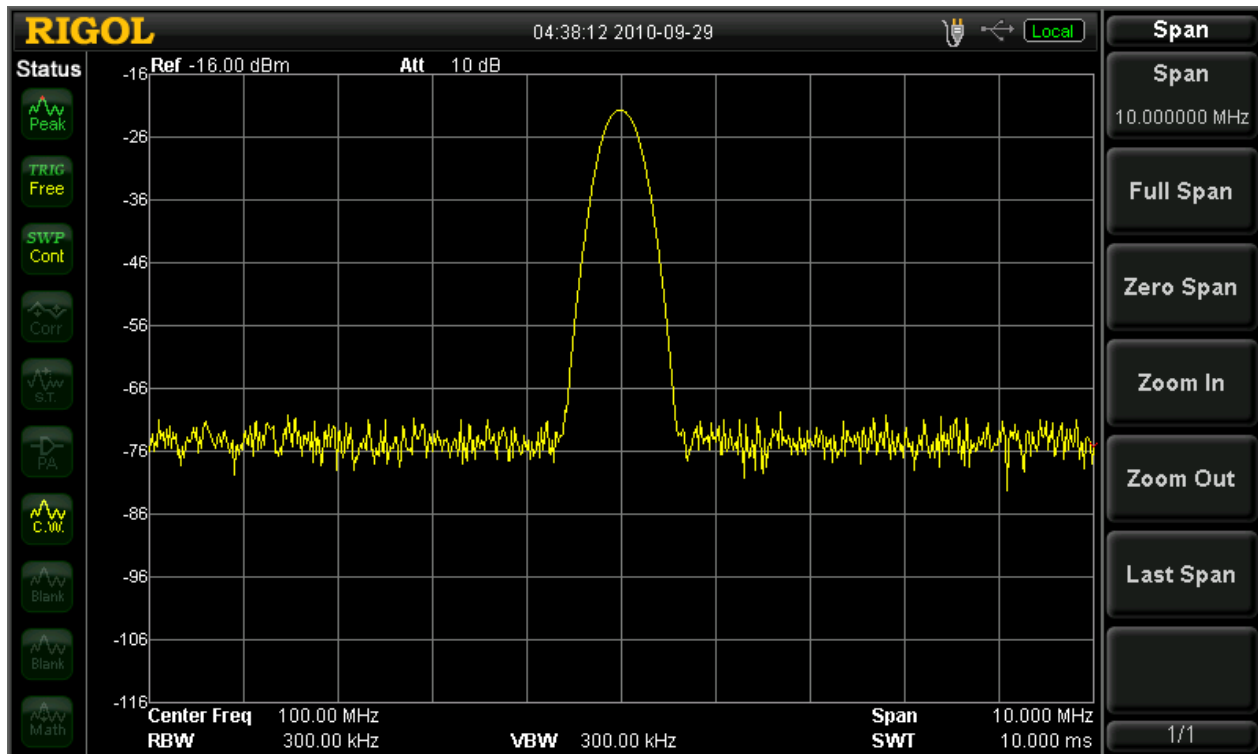
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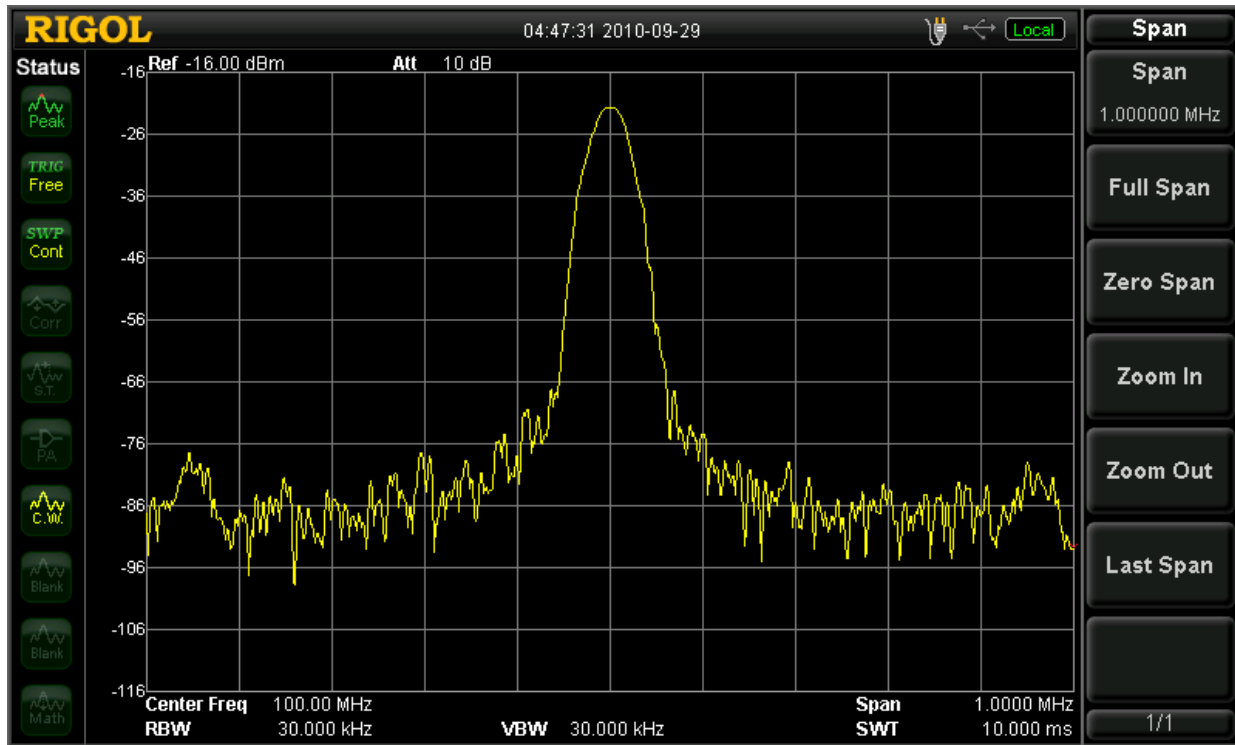Beyond Measure

Span Adjustment:

In this section we explore the span adjustment capability. First, press the "Auto tune" button, the peak of the waveform goes back to the center of the screen.

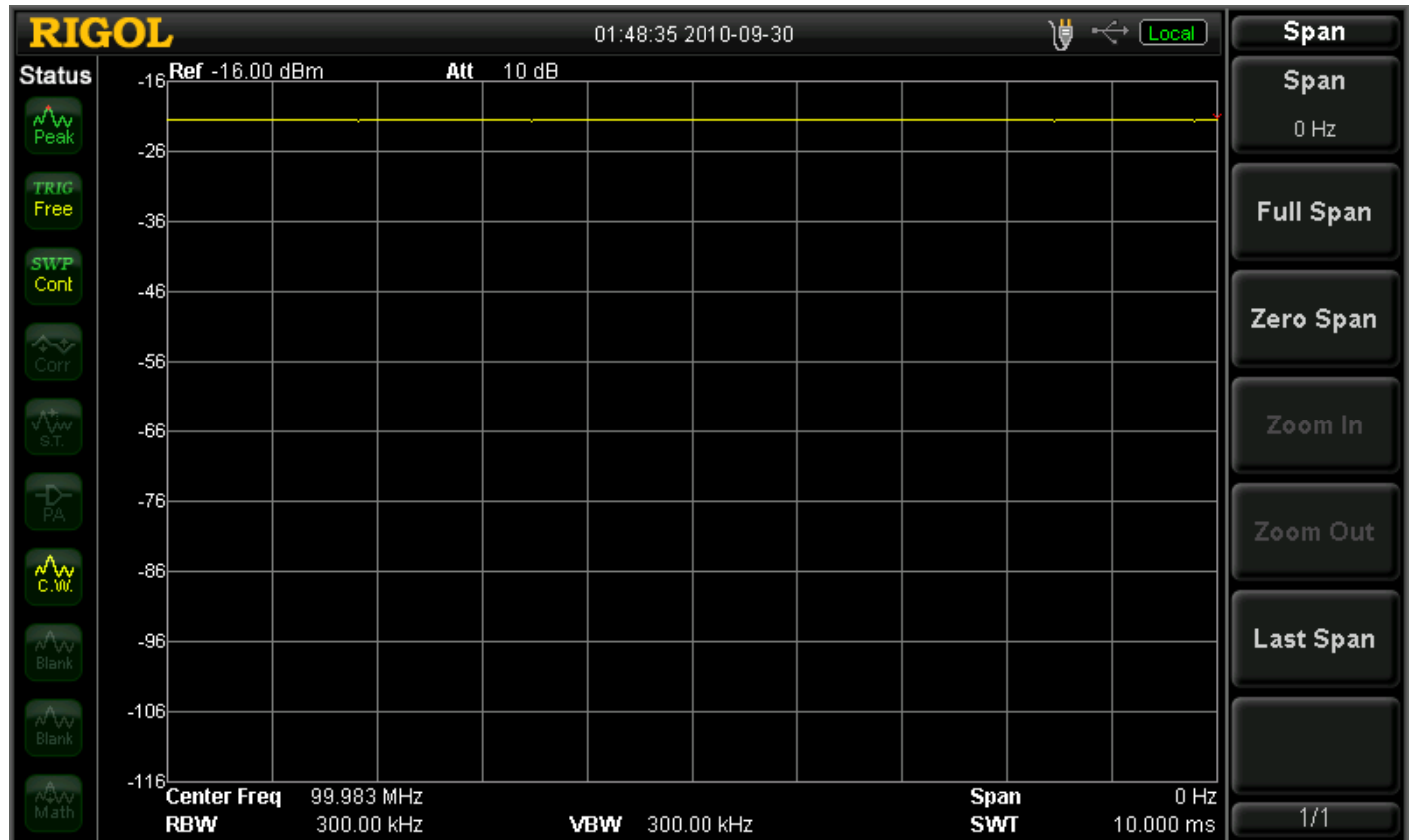Press the "SPAN" button, the span side menu will appear on the right hand side of the screen.

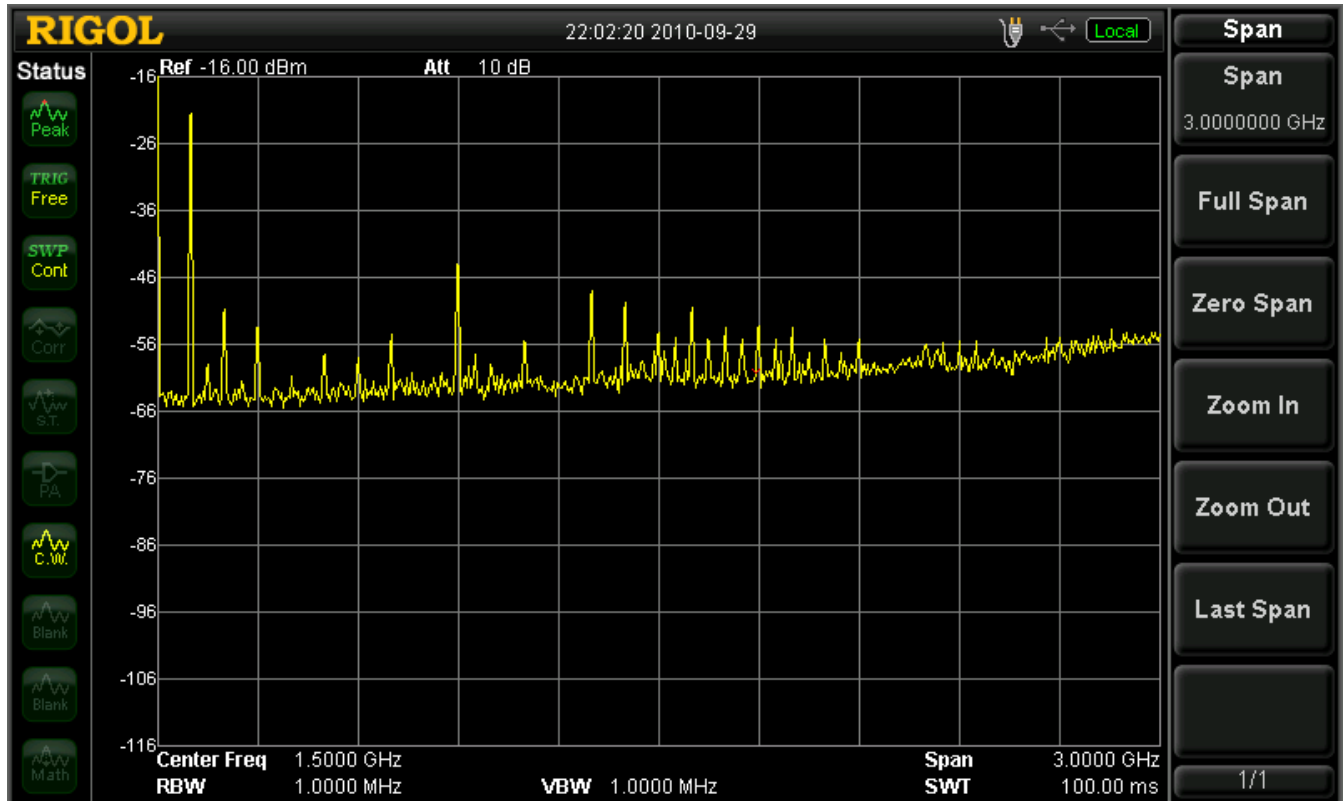Press the "Span" soft button, using the numeric keypad, enter 10 MHz

Press the **"Zero Span"** soft button; you will observe the time domain characteristics of the signal at the center frequency specified, however it's worth noting, this option is more useful for observing the envelope of a modulated wave rather than that of a carrier, though the amplitude of a carrier wave can be observed:
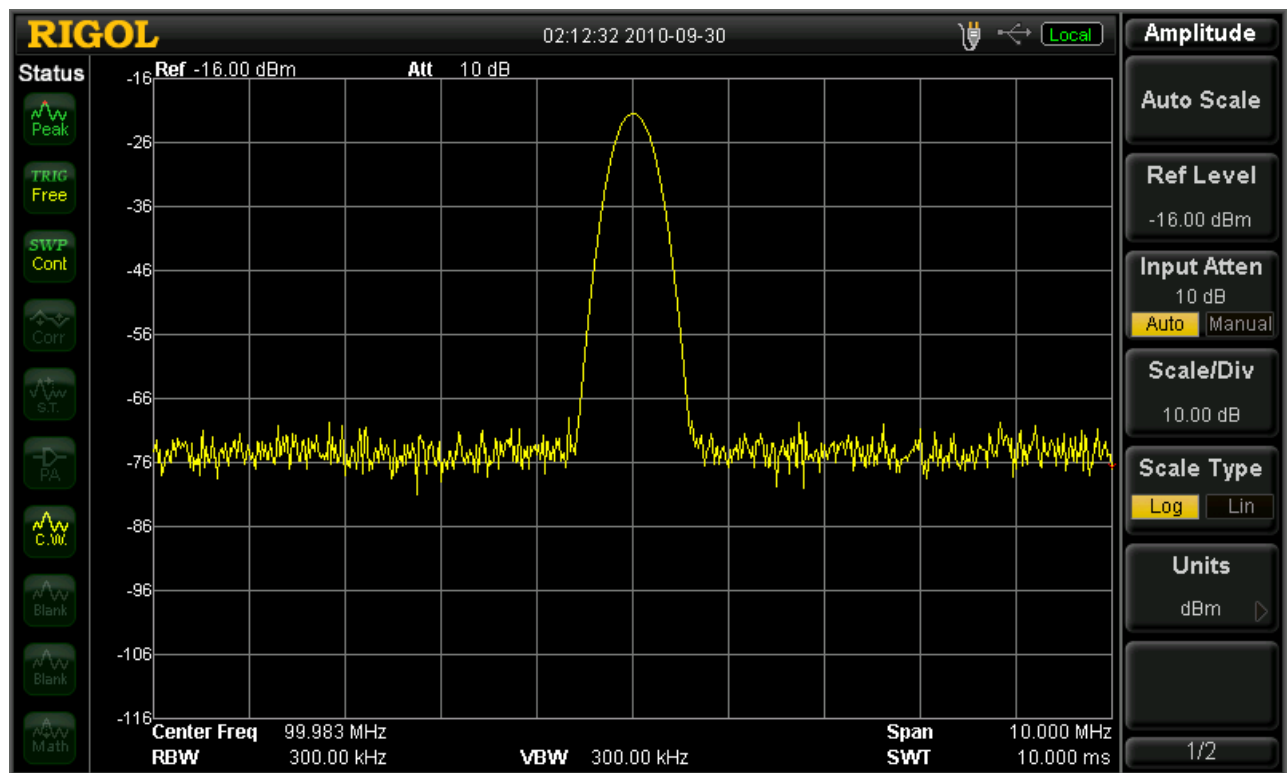
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Press the **"Full Span"** button; you will observe the characteristics of the entire visible spectrum to the analyzer, as seen below.

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Amplitude Adjustment:

Press the black **"AMPT"** button; you will observe the amplitude menu on the right hand side as below:

Press the **"Ref Level"** soft button; you will observe the amplitude drop down as below:

Press the **"Auto Scale"** soft button; you will observe the amplitude return back to an optimal position on the screen.

Track Generator Usage:

Some DSA units come standard with a Track Generator (TG). A Track Generator outputs signals at the same frequency as the current sweep frequency of the RF Input. This can be used for the purpose of characterizing components and cabling.

Press the "Source" button; the TG side menu will appear on the right hand side as seen below:

If the TG indicator at the top of the menu is set to off, then press the "TG" soft button to enable the Track Generator

What we can notice right now is the output of the Track Generator going through a connecting cable into the RF input of the DSA1000. The graph above is the characteristic graph of the cable. This is its response to across the spectrum visible to the DSA1000. In an ideal situation, the cable would have a flat response across the entire span of the DSA1000. However, due to noise, interference, imperfections in the cable, we can see slight dips in amplitude at certain frequencies.

However, in cases where a certain component or device needs to be tested
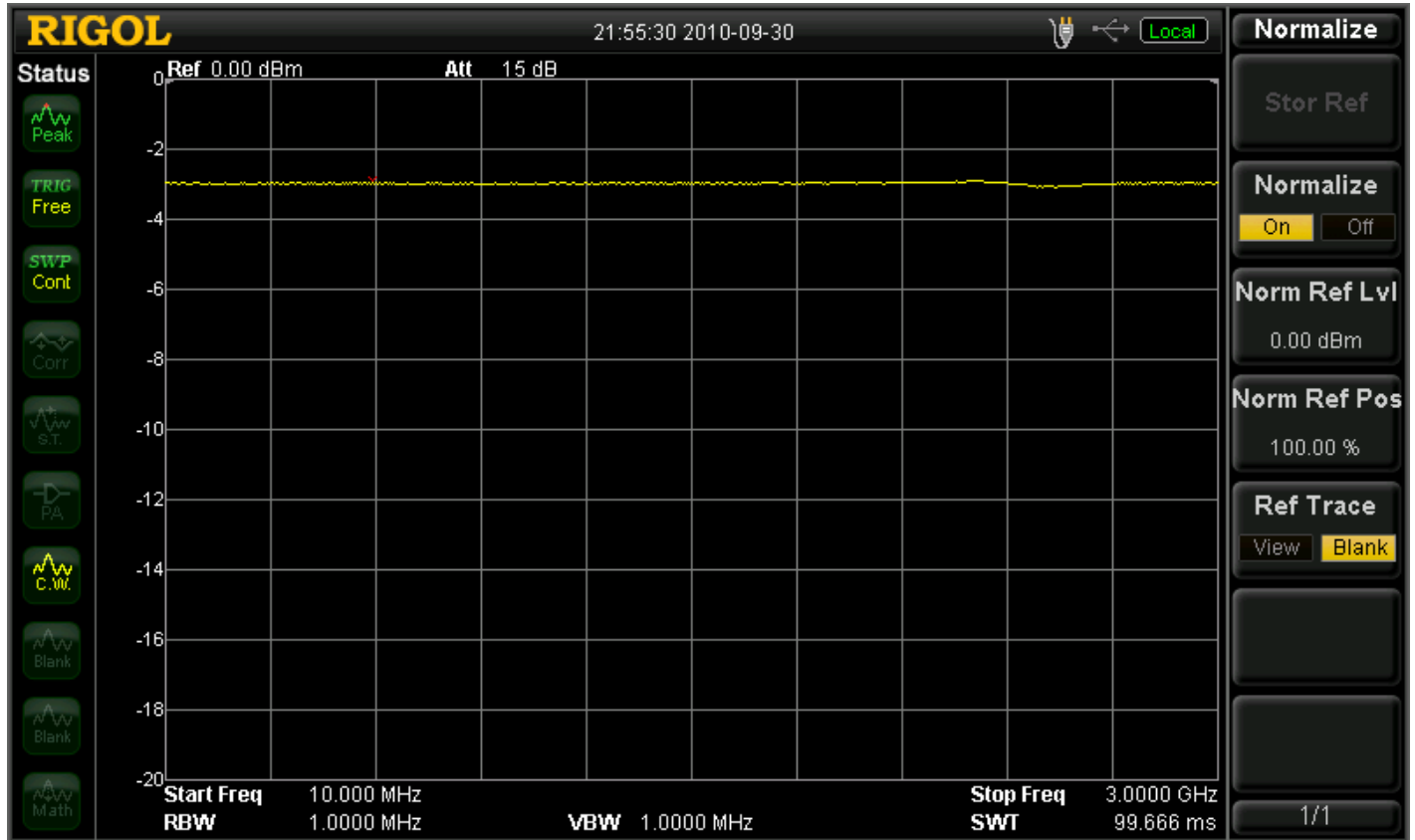
for its response, it becomes necessary to adjust the TG so that the cables response is compensated for and we can see a flat response curve.

To accomplish that, we take advantage of the Normalization feature in the TG. Press the "Normalize" soft button to enter the Normalization menu as seen below:

To adjust the response, press the "Normalize" soft button. The result is observed below:

After normalizing the cable, one can now use it to test components or device response.

For more information or questions contact us directly at:

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