Using Spectrum Analyzer and Noise Source For Noise Figure Testing, STZ Series

STZ with ISOLATOR VERSION

STZ without ISOLATOR VERSION

DESCRIPTION:

STZ series full band noise sources are silicon IMPATT diode-based, solid-state noise sources. These noise sources implement a high performance diode and propriety circuit design to offer high ENR with extreme flatness across the entire waveguide bandwidth. The below standard models cover the frequency range of 26.5 to 170 GHz and feature an integrated Faraday isolator to improve the port VSWR for a more reliable noise figure measurement. The operating voltage of the standard models is +28 VDC via a female BNC connector, which is compatible with industry standard noise meters, such as Keysight models. In addition, these noise sources can work in either a CW or pulse AM operation mode. The AM modulation mode is triggered by a TTL control signal via a female SMA connector. While standard models are equipped with a waveguide interface, other interfaces are available as custom models.

When Using with Spectrum Analyzer

It is recommended to use SAGE Millimeter STZ series noise source with Keysight N8975A Noise Figure Meter or R&S FPL1000 Spectrum Analyzer with the noise figure utility for noise figure measurement. However, you may use the spectrum analyzer and simple “Y” factor to perform the system noise figure measurement.

The following is an example of the step to step process to measure the noise figure and Keysight Spectrum Analyzer by using “Y” factor method.

1. Set up the test system as shown above. Set the spectrum analyzer RBW at 300 Hz, VWB at 1 Hz and SPAN at 10 kHz. You shall see the system noise floor around -95 dBm as shown in Figure 1.
2. Turn on the DUT (DC Power Supply 1). You shall see the system noise floor increase. In this case, the noise floor is increased to –75 dBm as shown in Figure 2.

3. Then turn on the Noise Source (DC Power Supply 2). You shall see the system noise floor increase to –68 dBm as shown in Figure 3. The transient display between the Noise Source “on” and “off” are also show in Figure 4. From the figure 3 and 4, we can obtain the Y factor as 7 dB.

4. Then, we can use the formula \( NF = ENR - 10 \log (Y - 1) \) to obtain the NF. In this case, the Y factor is 5 and the DUT’s Noise Figure is 6 dB (NF = 12 - 10 \log 4 = 6 dB).

**Note:** The above method may not be accurate, but can demonstrate if the noise source is working or not and obtain a ballpark noise figure for system analysis. The more accurate test method recommended is to use SAGE Millimeter’s Full Band Noise Figure and Gain Test Extenders (https://www.sagemillimeter.com/test-equipment/full-band-noise-figure-and-gain-test-extenders/) or other manufacturer’s extenders with noise figure meters to perform the testing. Also, using the noise figure module or utility designed for the spectrum analyzer will increase the accuracy.