LN2 CALIBRATED
NOISE SOURCES

UP TO 220 GHz

ERAVANT
FORMERLY SAGE MILLIMETER

Noise sources have many uses in Test & Measurement applications. Most commonly, they provide reference signals for measuring internally generated noise levels in components and systems. They also provide wide-band stimulus signals for built-in test functions in radar and communication systems, or for testing the linearity and stability of high-power amplifiers.

Eravant's STZ series of noise sources provides users with many choices to meet their Test & Measurement needs in the frequency range of 0.1 to 220 GHz. The coax connector interfaced models cover the frequency range as wide as 0.1 to 67 GHz and waveguide interfaced models are for full waveguide band operation with Excess Noise Ratios (ENR) in the range of 12 to 20 dB. All models include either a Faraday isolator or an internal attenuator to minimize output impedance variations and achieve a flat ENR over frequency. Typical ENR flatness is ±2 dB over the entire operating bandwidth. The ENR calibration of the waveguide banded models is calibrated by using the Liquid Nitrogen (LN2) based true cold/hot termination method. All noise sources require a nominal supply voltage of 28 VDC. The models with TTL-level input for on/off control signals and up to 1 kHz modulation rate are supported.

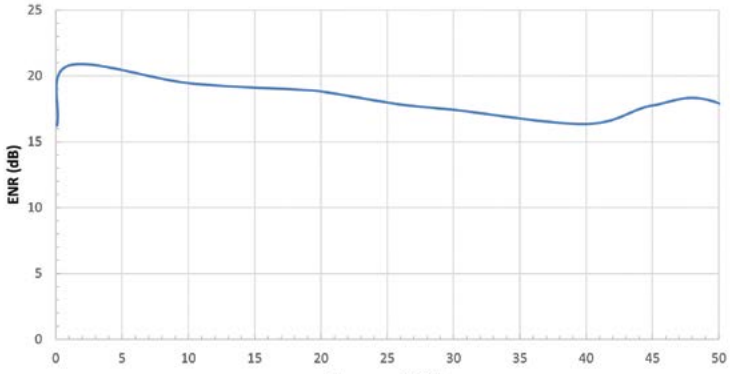
FEATURES

- Ultra Broadband Operation, 0.1 to 67 GHz
- Full Waveguide Operation
- Precision Calibrated and Flat ENR
- Excellent Return Loss

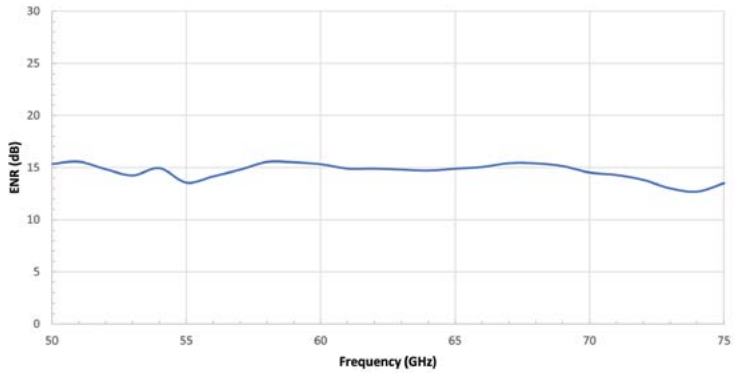
APPLICATIONS

- Test Lab
- Instrumentation

STZ-05250318-2M-0T2 - ENR vs. Frequency
Bias: +28 V_{DC}/18 mA



STZ-15-IT2 - ENR vs. Frequency
Bias: +28 V_{DC}/90 mA



NOISE SOURCE LN2 CALIBRATION SERVICES

UP TO 220 GHz

Eravant waveguide noise sources are calibrated in-house using a cold reference termination that is cooled with liquid nitrogen. A room-temperature or “hot” reference termination is also used. The effective noise temperatures of these terminations are regulated and measured to within a fraction of a degree. As a result, noise source calibrations are based on accurate and reliable references. Eravant offers calibration services for waveguide banded noise sources up to 220 GHz and recommends repeating calibrations annually.

When a noise source is calibrated, a Noise Figure Meter or a Signal Analyzer is powered up and allowed to reach thermal equilibrium in a controlled test environment. The instrument’s responses to the hot and cold reference terminations are then recorded. These measurements produce a Y-factor, Y_S , equal to the ratio between the noise power levels measured for the hot and cold reference terminations. To minimize the effects of temperature fluctuations in the instrument, a low-loss and highly repeatable switch alternates between the reference terminations while the noise levels are measured repeatedly.

After the instrument is calibrated using the hot and cold reference terminations, the uncalibrated noise source replaces the hot termination. The uncalibrated noise source is switched on and off to measure another Y-factor, Y_X , for the uncalibrated device. The “hot” noise temperature of the source, T_X , is found from the two Y-factors as well as the effective temperatures of the hot and cold reference terminations (T_H and T_C), and the “cold” (ambient) temperature of the uncalibrated source (T_A):

$$T_X = T_A + (Y_X - 1)\,[\,(T_A - T_C) + (T_H - T_C)/(Y_S - 1)\,]$$

Finally, the ENR of the newly calibrated noise source is calculated as $(T_X - T_0)/T_0$ where $T_0 = 290$ K.

Calibration uncertainties can arise from a number of possible causes such as impedance mismatches, insertion loss in connections, temperature drift, and measurement accuracy. All sources of error are minimized to the extent possible. When their effects are significant, they are measured and included in ENR computations, or they are considered when estimating calibration uncertainty.