

Noise Test Extension (NTX) Modules for Keysight SSA-X Operational Manual



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General Operating Practices and Recommendations

General Guidelines

- Read all instructions and information in this manual before connecting an Extension Module to its power supply or to the compatible Phase Noise Analyzer. Operational procedures must be followed for proper function. If you have questions, contact VDI before supplying power to or otherwise operate any VDI Extension Module.
- VDI assumes the customer is familiar with microwave, millimeter wave and VDI products in general. The user is expected to understand all safety guidelines, health hazards and general advisories that may exist and are associated with the use of this product. VDI is not responsible for any human hazards that may exist or may occur while using this device.

Safety Guidelines

- VDI accepts no liability for damage or injury resulting from or caused by
 - Improper use, disassembly or use for other purposes than for which the product was designed.
 - Use outside common safety, health or general advisories pertaining to microwave, millimeter-wave and VDI products.
 - Repairs carried out by individuals other than VDI or its assigned agents.
 - Tampering with or altering power cords or other cabling
- Use of any attachments and accessories not authorized by VDI or that do not meet VDI's specifications may void the NTX Module's limited warranty and could pose a hazard to the operator or cause lasting damage to the device.
- DC bias cables provided by VDI must be used. Alternative or replacement cables cannot be used unless the DC cables are adequately rated, properly grounded and authorized for use by VDI.
- Disassembling an NTX Module can cause lasting damage to components and pose a hazard to the operator.
- An NTX Module is intended for use only with a power supply module or AC/DC converter supplied with the device by VDI. Use of other power supplies or converters could damage the device or injure the operator.
- Applying liquids (other than the TexWipe wipes / cloths used for cleaning) can cause lasting damage to the module.
- Power inputs to the RF Input and LO Input ports of Extension Modules are noted on labels on every Extension Module These values provide optimal performance. Irreversible damage can result if input power exceeds stated damage threshold.

Waveguide Test Port and RF Cable Care

- Do not remove the test ports; test ports must be connected with care for optimal RF calibration results.
- Replace dust caps when the system is idle.
- Use a torque of 90 cNm when making coaxial connections. Avoid sharp bends in cables (RF, IF, LO, etc).
- Inspect waveguide flanges prior to making connections.
- Extension module waveguide screws should be torqued in the range 20-50 cNm, greater torque can damage the interface.
- Making a connection with metal debris between the waveguide flanges can damage the waveguide interface and prevent repeatable connections.
- If debris is present, clean the flange with pre-dampened TexWipe wipes or swabs (e.g. Part Number TX1065).
- If these are not available, TexWipe cloths lightly dampened with ethanol may be used (e.g. Part Number TX604).
- Cover test ports with dust caps when the system is idle.

General Operating Practices and Recommendations

- VDI NTX Modules are intended to be used in typical laboratory conditions.
- Check with VDI before any measurement connection is attempted beyond those described in this manual or if it may exceed commonly accepted standards of practice.
- Do not connect or disconnect power cables while the Extender Module is switched on.



Noise Test Extension Modules

VDI NTX Modules from Virginia Diodes are used to extend the performance of modern absolute phase noise test solutions in the frequency range of 50 GHz up to 330 GHz, in the frequency bands from WR-15 (50-75 GHz) to WR-3.4 (220-330 GHz) with additional bands under development. VDI NTX Modules include a waveguide splitter with two down-converter mixer chains that can be used for cross-correlation test setups. These modules use VDI's proprietary mixer technology, which achieves low-conversion loss and exceptional sensitivity.

Setup Procedure: Cross Correlation, External Mixer Setup

The following procedure will set up the Keysight SSA-X to work with VDI NTX Modules in using the External Mixer Mode. Input power limitations, safety guidelines, general operating practices and recommendations for the NTX Module are provided in the NTX Datasheet. Please review the datasheet before reading this document.

Phase Noise Analyzer Compatibility

For compatibility, verify that the NTX Module is configured with an LO harmonic factor such that the LO input frequency requirement falls within the 3-20 GHz of the Keysight SSA-X External Mixer LO Output Port. Please review the Keysight SSA-X datasheet for more information on the External Mixer specifications.

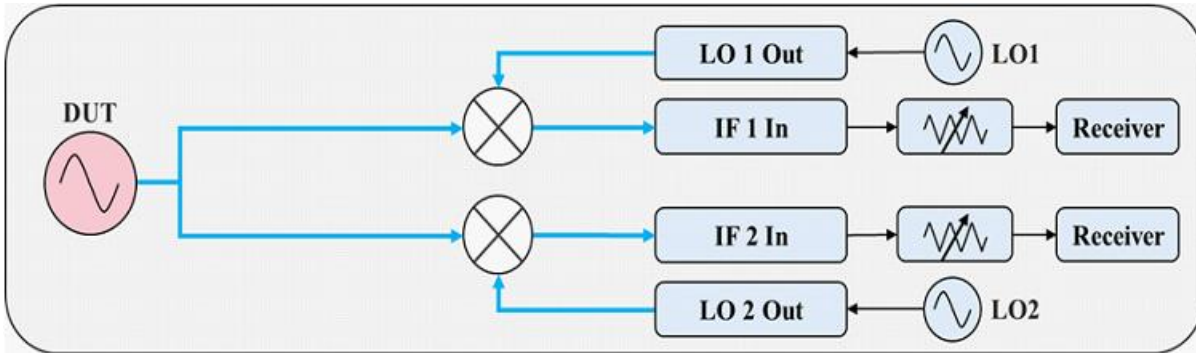
The 401 (400) Option is required for compatible analyzers. Per Keysight's E505xA SSA-X Signal Source Analyzer Configuration Guide, this adds a pair of LO out/IF in connectors to support and measure the RF signal higher than 54GHz.

The screenshots in this document were taken on a Keysight SSA-X E5058A, using a WR6.5 NTX module. Other Phase Noise Analyzers may have slightly different menu layout and options, but setup instructions may be similar.



Hardware Configuration

The Hardware Configuration can be found in the [Phase Noise Setup...] menu, which will be discussed in the next section.



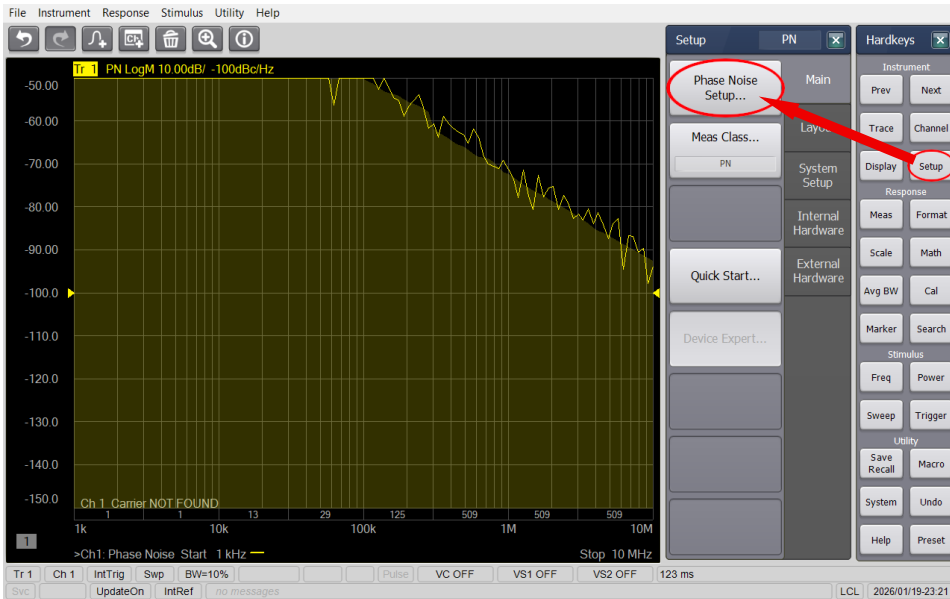
Phase Noise Measurement Mode Setup

The Keysight SSA-X defaults to the Phase Noise Measurement Mode. Some setup will be needed in order to properly use the analyzer.



- Press the [Preset] Hardkey, then the [Preset] softkey to reset the system.



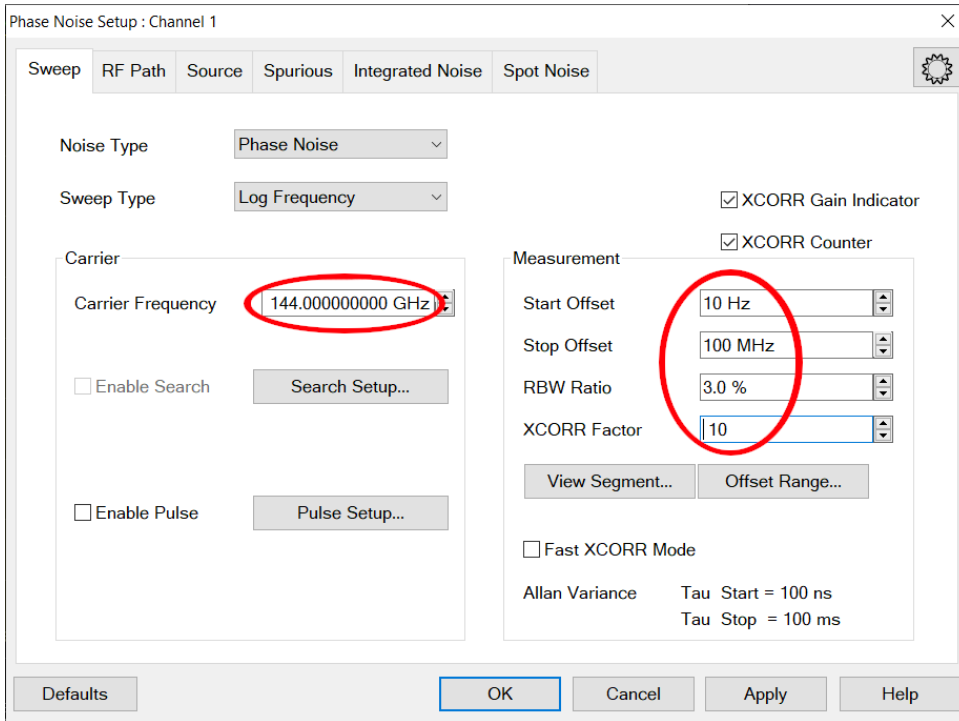


- Select [Setup], then select [Phase Noise Setup...]

- Select the RF Path tab and change the External Mixer State to [On].
- Select [External Mixer Setup...]
- Under the Model drop-down, select [VDI NTX (E5051AW)], the select the appropriate band under the Band drop-down.
- Enable both the LO outputs, and set their levels to an appropriate level that takes into consideration any cable loss



The receiver sensitivity is optimized at 0 dBm input. The IF Gain should be adjusted such that the IF power into the SSA-X is close to 0dBm. VDI provides a Conversion Loss csv file for each module.



- Change the carrier frequency to a frequency within the band of the NTX module.
- Change the Measurement setting values as desired.

Using the setting shown in the above screenshots results in the following plot for the module used for this document.

