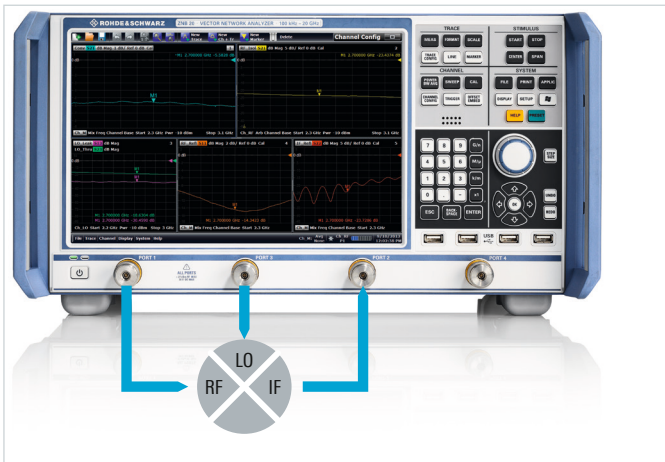


Simplifying mixer measurements with the R&S®ZNB

The R&S®ZNB vector network analyzer simplifies instrument configuration and calibration using the mixer measurement wizard and SMARTerCal.

The four-port R&S®ZNB vector network analyzer simplifies mixer measurements.



Your task

Mixers play a key role in many RF and microwave systems. Their primary function is to upconvert or downconvert signals to a desired frequency. Knowledge of a mixer's performance is essential during the design of RF systems and when testing system level compliance.

Scalar measurement of mixer conversion loss traditionally requires multiple instruments: two signal generators, a spectrum analyzer, and a power meter to calibrate the two sources, plus attenuators to reduce the effects of impedance mismatch at the mixer ports. Considerable time is required to calibrate the test setup for cable losses and to perform measurements. Moreover, multiple RF connec-

tions need to be made, increasing the risk of error. Swept-frequency or swept-power measurements require synchronized operation of the test equipment using a control computer and software, which further adds to complexity and cost.

T & M solution

The versatile design of the R&S®ZNB vector network analyzer, in conjunction with the mixer measurement wizard and SMARTerCal, offers capabilities that go beyond conventional vector error corrected S-parameter measurements.

Measurement speed improves by a factor of ten for a four-port R&S®ZNB vector network analyzer with a second internal generator (option), delivering an all-encompassing tool for efficient and accurate measurement of mixer conversion loss, RF input and IF output port return loss and LO isolation at the RF and IF ports. Plus, the R&S®ZNB vector network analyzer's highly linear receivers and wide swept output power range are ideal for precise mixer compression point measurements.

The mixer measurement wizard is an intuitive tool to guide the user efficiently through three simple steps to configure the instrument for making measurements and displaying results:

- Step one: defining frequencies and power levels, allocating source and receiver ports

Mixer measurement wizard screen.



- Step two: selecting measurement parameters for the mixer from a predefined list
- Step three: option to proceed with uncalibrated mixer measurements or with calibration

SMARTerCal efficiently handles power calibration as well as full n-port system error correction. It scans all instrument settings and measurement channels to yield an optimized calibration process that reduces required port connections to a minimum. SMARTerCal is well suited to mixer measurements and has a separate wizard to guide users through calibration, producing highly accurate vector error corrected wave quantities across all frequencies.

Power calibration is performed using an external power sensor that is connected to one port only. Vector error corrected wave quantities for the other ports are derived from system error correction. This approach delivers calibrated power measurements on all ports and considerably reduces calibration time when using multiple ports. Use of an automatic calibration unit further reduces the required time and number of connections in a multipoint calibration. In summary, SMARTerCal manages and simplifies calibration, affording a considerable time advantage without compromising accuracy.

Optionally, source power flatness calibration can be carried out on all mixer ports. Combined with the analyzer's excellent port impedance, this eliminates the need for extra attenuators to reduce the effects of impedance mismatch, thus further enhancing measurement accuracy.

The R&S®ZNB also supports more complex frequency-converting measurement applications, including:

- Two sequential mixer stages
- Harmonic mixers
- Frequency multipliers
- External source control via USB, LAN or IEC bus

Summary

The versatile R&S®ZNB vector network analyzer with a second internal generator (four-port model), in conjunction with the mixer measurement wizard and SMARTerCal, yields an efficient single-instrument solution for characterizing frequency-converting devices quickly and accurately.

See also

www.rohde-schwarz.com/product/ZNB

Application notes

R&S®ZNB vector network analyzer – mixer measurement wizard and SMARTerCal

www.rohde-schwarz.com/appnote/1EZ66

Simplifying mixer measurements with the R&S®ZNB vector network analyzer

The four-port R&S®ZNB vector network analyzer fitted with a second internal generator, together with the mixer measurement wizard and SMARTerCal, measures important mixer parameters up to ten times faster and more accurately, such parameters including conversion loss (top) as well as RF input (S11) and IF output (S22) return loss (bottom left and right respectively).

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 3606.9191.92 | Version 01.00 | September 2013 (as)
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3606919192