

How to Use a High-Precision Benchtop Insertion Loss Analyzer



AI Overview

Using a high-precision benchtop insertion loss analyzer involves proper setup, calibration, and measurement with software like Atlas SI and VNAs to obtain accurate, repeatable PCB transmission line loss data.

Equipment and Software Setup

Select the appropriate VNA: Use a 4-port performance VNA such as the Anritsu ShockLine MS46524B (up to 43.5 GHz) or VectorStar MS4647B (up to 70 GHz) for high-frequency PCB testing.

Install Atlas SI software: This software interfaces with the VNA and simplifies insertion loss measurements, even for operators with minimal VNA experience.

Connect test coupons: Prepare PCB test coupons with differential pairs or transmission lines. Connect them to the VNA using high-quality probes or connectors to minimize measurement errors.

Calibration

Perform VNA calibration: Use the Atlas SI software to guide a step-by-step calibration process. This ensures the VNA accurately measures S-parameters and insertion loss.

Delta-L de-embedding: Apply the Delta-L 4.0 algorithm to remove via and fixture effects from differential measurements. This isolates the true insertion loss of the PCB traces.

Measurement Procedure

Select measurement type: Choose differential or single-ended insertion loss depending on your PCB design. Atlas SI supports both modes.

Run the test: Click the measurement button in Atlas SI. The software automatically collects frequency-dependent S-parameters and calculates insertion loss using Delta-L processing.

Review results: Atlas SI provides a pass/fail indication based on predefined limits and can export results to Excel for further analysis.

Best Practices

Use clean, smooth copper surfaces: Dielectric loss and copper roughness significantly affect high-frequency insertion loss.

Minimize operator error: Atlas SI is designed for ease of use, allowing nonskilled operators to perform accurate measurements quickly.

Frequency considerations: Lo...

Article Content

A method for improving high-insertion-loss measurements with a

We present a method for improving high-insertion-loss measurements with a calibrated vector network analyzer (VNA) requiring only two additional pieces of hardware. By utilizing an amplifier and an

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GitHub Gist: star and fork AshwinD24's gists by creating an account on GitHub.

maltego/top100Kenglishwords.txt at master

Custom Maltego transforms. Contribute to michenriksen/maltego development by creating an account on GitHub.

INSERTION LOSS MEASUREMENT

The insertion loss is frequency dependent, it increases with operating frequency. Hence, insertion loss of Circulator / Isolator becomes more significant at higher frequencies due to more power being

Insertion Loss Measurement Methods | Anritsu America

Insertion loss measurement is one of the critical measurements used to analyze transmission feed line installation and performance quality. This application note explains how Site Master is used to

zxcvbn-rs/src/frequency_lists.rs at master

Port of Dropbox's zxcvbn password strength library for Rust - shssoichiro/zxcvbn-rs

Balun Measurements with a 2-Port Vector Network Analyzer

Introduction measurements are necessary for a number of applications. High-speed digital transmission lines are often employed on printed circuit boards (PCBs) to transport signals with extremely high

How do I measure insertion loss using my vector network analyzer?

Lower insertion loss values indicate better device performance, as the device minimally affects the signal amplitude. Note that your best measurements always start with a calibration.

Understanding VSWR and Insertion Loss Plots

Low insertion loss does not guarantee low loss through a system, to get good performance users need both repeatable insertion loss and good VSWR as will

Comprehensive Guide on How to Measure Insertion Loss for Signal ...

Learn the importance, equipment, procedures, and best practices for measuring insertion loss to ensure optimal performance in electronic and communication systems.

Testing insertion loss of PCB signal structures with

Delta L 4.0 has been developed for use up to 40 GHz and provides a simple and tailored method to obtain the insertion loss per inch of a trace section on a

Insertion loss and polarization-dependent loss measurement

We propose a measurement system that enables the rapid measurement of insertion loss and polarization-dependent loss using a parallel test setup with a fiber array, and the calibration

How to Measure Insertion Loss: Formula and Methods

Learn how to measure insertion loss using the core formula, plus practical methods for fiber optics, RF systems, and sound barriers.

How to measure cable loss

R& S® ESSENTIALS | Spectrum analyzers fundamentals How to measure cable loss
Paul Denisowski, Product Management Engineer Coaxial cables are essential

PCB INSERTION LOSS MEASUREMENT SYSTEM

Atlas for Anritsu VNA is compliant with IPC TM650 2.5.5.12 (Test Methods to Determine the Amount of Signal Loss on Printed Boards) and supports the Delta-L 4.0 test method for ex-traction of differential

A method that can perform insertion loss testing using only a spectrum ...

The insertion loss test system only includes a spectrum analyzer with a tracking source, two fixtures, and the required coaxial cables. The actual configuration is shown in the figure below.

Technique for Improving Low Insertion Loss VNA Measurements

Vector network analyzers (VNAs) are used to measure the performance of a wide variety of passive and active RF and microwave devices. Passive devices can be less demanding to test than active

S-parameters Measurement Using VNA | Sierra Circuits

They support high-speed design by identifying loss, reflections, impedance issues, and crosstalk. In this article, you will learn how S-parameters

How to Measure Insertion Loss – A Complete Guide by BitWise ...

To measure insertion loss effectively, the first step is to use a calibrated signal generator and a reliable power meter or network analyzer. Begin by measuring the signal power without the

How to Measure Insertion Loss: Formula & Methods [Pro Guide]

Master insertion loss measurement with our guide on the core formula and laboratory methods. Learn to use VNAs and power meters for accurate data. Read now.

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Attenuation (Insertion Loss) Troubleshooting and Testing

Learn about insertion loss failure, causes, measurement, troubleshooting and testing . Insertion Loss Vs Attenuation, attenuation is now replaced with term “insertion loss”.

How to Measure Return Loss With a Spectrum Analyzer

Spectrum analyzers are a great testing tool suitable for various applications. Read on to learn how to use them to take a return loss measurement.

PCB insertion loss test system

Atlas uses powerful mathematical processing techniques to allow nonskilled operators to measure differential frequency-dependent losses from a test coupon quickly and easily. The system is easy to

Insertion Loss Measurement Methods | Anritsu America

This application note explains how Site Master is used to measure cable insertion loss with different test methods and how to predict the maximum allowable cable insertion loss through manual calculations.

14 Best RF Spectrum Analyzers for Electronics Labs (June 2026)

Explore best rf spectrum analyzers for electronics labs to measure signals, analyze frequencies, and improve testing accuracy with reliable tools.

A New Calibration Method for Achieving High Insertion-Loss ...

Abstract — We present a new calibration method for achieving high insertion-loss measurements with a vector network analyzer (VNA). The method requires a characterized attenuator and other additional

Network Analyzers | Keysight

Network analyzers come in handheld, benchtop, and modular form factors, including 2-port, 4-port, and 8-port options. Keysight offers five different types of vector

Insertion Loss Measurement Methods Application Note

Insertion loss measurement is one of the critical measurements used to analyze transmission feed line installation and performance quality. This application note explains how Site Master is used to

Vector Network Analyzers

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Insertion Loss Measurement Methods Application Note

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What Is Delta-L Testing? A Complete Guide to PCB Insertion Loss ...

Learn what Delta-L testing is, how it measures PCB insertion loss, how it works, Delta-L 3.0 vs 4.0, coupon design, and high-speed PCB applications.

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://sphplantsales.co.za>

Email: info@sphplantsales.co.za

Phone: +27 64 827 3915

Address: Unit 9, Highveld Technopark, 43 Atlas Road, Johannesburg, 2196, South Africa

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