

Z-Axis Connector Company
Elastomeric Connector RF Performance

Introduction

This document summarizes RF performance testing performed on the Z-Wrap-110 elastomeric connector using calibrated vector network analyzer measurements and controlled test fixtures.

The testing was conducted to evaluate the impact of the connector on signal integrity, return loss, and insertion loss across a range of PCB materials and frequencies commonly encountered in RF and high-speed electronic systems.

Performance in any specific application will depend on PCB stackup, transmission line geometry, grounding strategy, via placement, operating frequency, and overall system architecture.

Executive Summary

Testing demonstrated that the Z-Wrap-110 elastomeric connector introduces minimal insertion loss across the measured frequency range and is suitable for RF and high-speed signal applications when implemented using proper transmission line design practices.

Key Findings

- Less than 0.1 dB insertion loss through approximately 2 GHz in optimized PCB configurations.
- Measured operation demonstrated through 3 GHz using available test equipment.
- RF performance was strongly influenced by PCB grounding, transmission line geometry, and via placement.
- High-frequency laminate materials such as Rogers Duroid exhibited the most predictable microwave performance.
- Modeling indicated that additional PCB compensation techniques could further improve high-frequency response.

Application Relevance

Z-Axis elastomeric connector technology has been successfully implemented in RF, microwave, shielding, grounding, and high-speed signal applications.

Customer implementations and application evaluations have demonstrated successful use of Z-Axis elastomeric connector technology in systems operating at frequencies up to 20 GHz. Performance at these frequencies is dependent on connector geometry, PCB design, grounding strategy, and overall system architecture.

Test Method

To accurately measure complex impedance, the network analyzer was calibrated to the phase plane of the unit under test (UUT). A full two-port calibration included:

- Open-circuit calibration
- Short-circuit calibration
- 50-ohm termination calibration
- Through-loss calibration

The calibration process was performed using specially prepared test boards designed to remove fixture effects from the measurements.

Test Configurations

The Z-Wrap-110 connector was evaluated using the following PCB materials:

- 0.060" FR-4
- 0.031" FR-4
- 0.031" Rogers RT/5500 Duroid

Measurements included:

- Return Loss (S11)
- Insertion Loss (S21)

Frequency sweeps were performed from 30 MHz through the maximum available measurement range.

Summary of Results

0.060" FR-4

Measured insertion loss remained below 0.1 dB through approximately 2 GHz and measured approximately 0.33 dB at 2.5 GHz.

0.031" FR-4

Measured insertion loss remained below 0.1 dB through approximately 2.5 GHz and measured approximately 0.22 dB at 3 GHz.

0.031" Rogers RT/5500 Duroid

Measured insertion loss remained below 0.1 dB through approximately 3 GHz, demonstrating the most consistent microwave performance of the materials evaluated.

Conclusions

The primary electrical contribution of the Z-Wrap-110 connector is a small series inductance introduced by the conductive element geometry. Testing demonstrated that this inductance produces minimal insertion loss within the measured frequency range and can be further mitigated through optimized PCB design techniques.

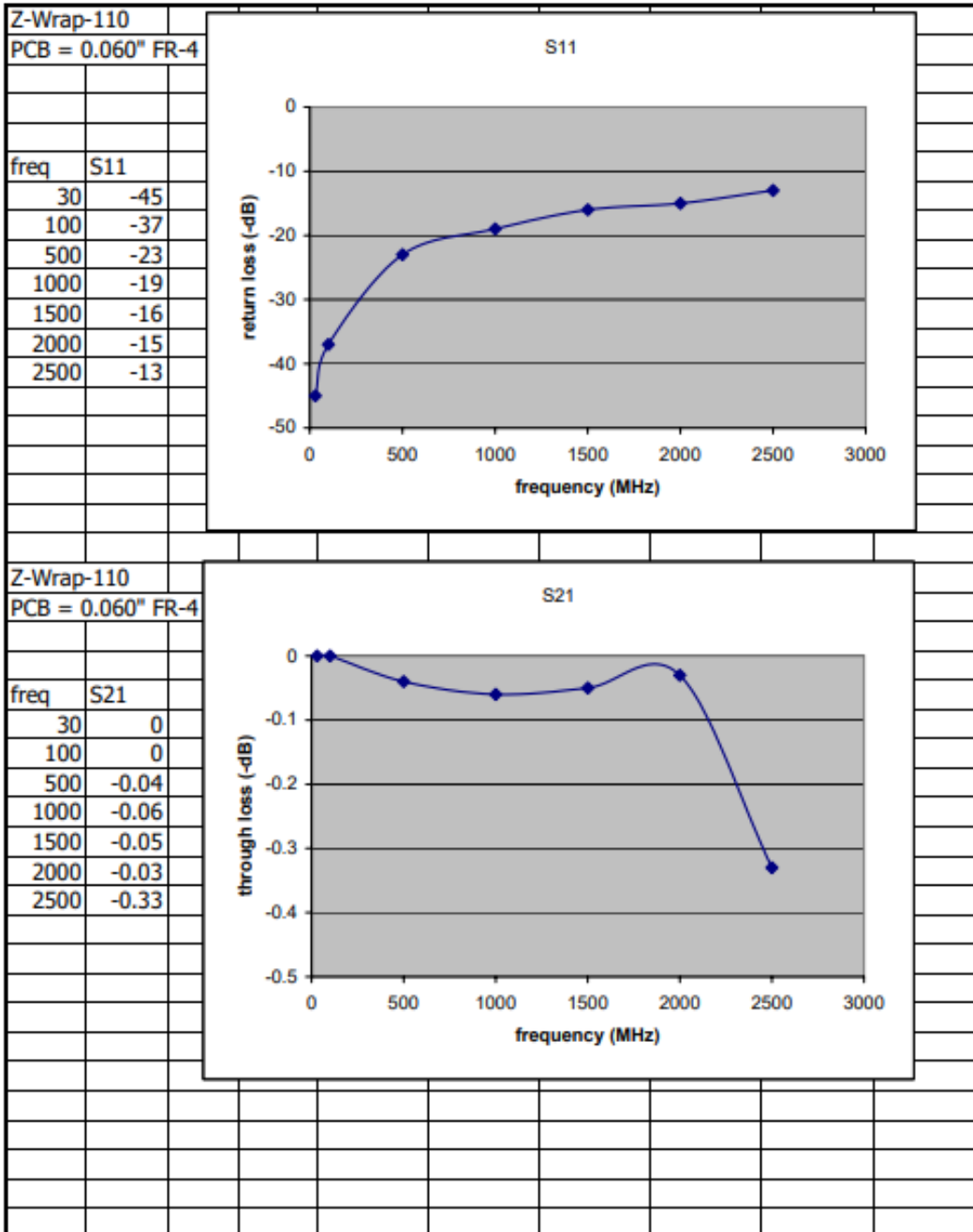
The results support the use of Z-Wrap technology in:

- RF interconnect applications
- Microwave systems
- High-speed digital interfaces
- Grounding and shielding structures
- Board-to-board interconnections

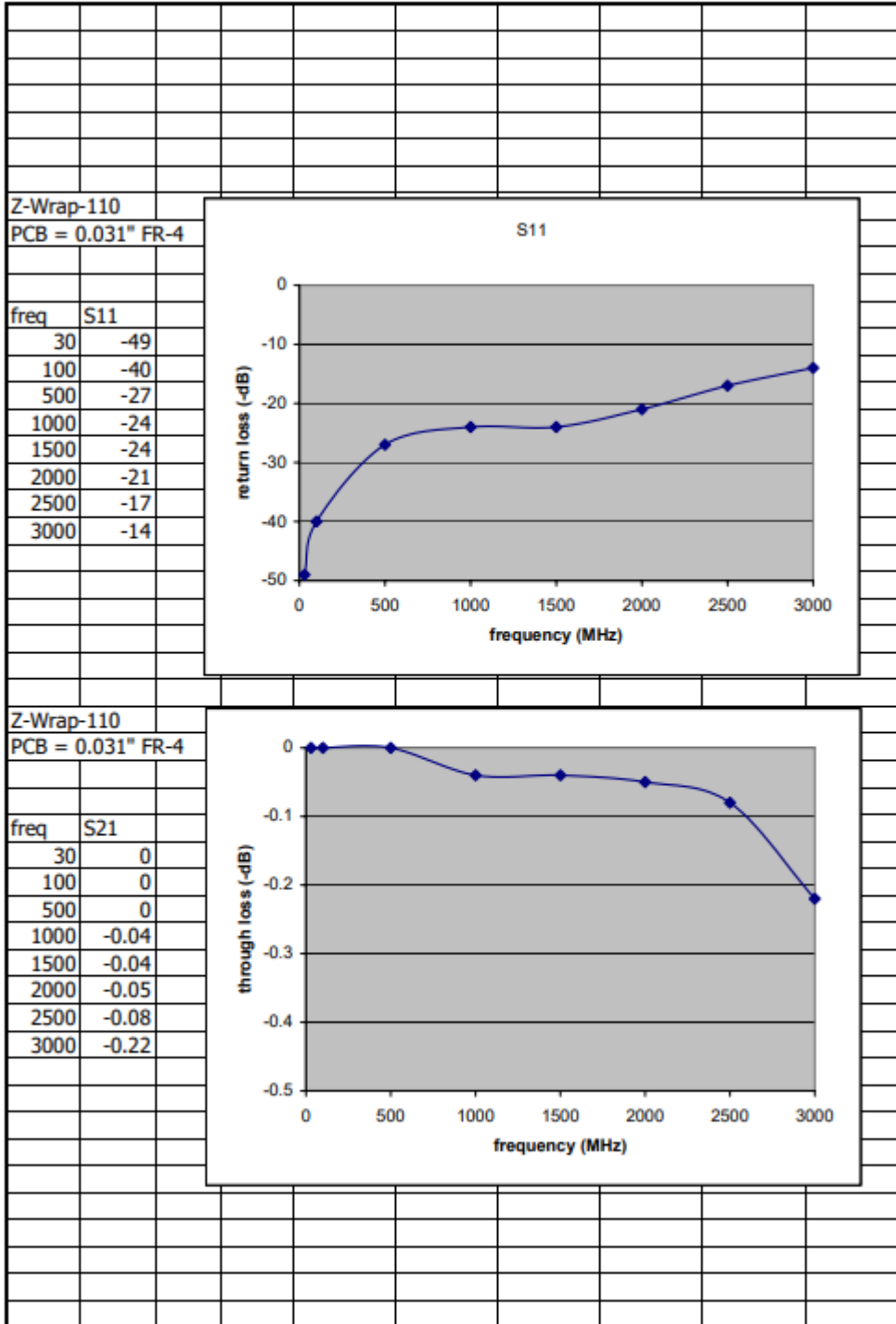
As with any RF design, overall system performance depends on transmission line design, grounding implementation, PCB material selection, and connector integration methods.

For assistance evaluating a specific RF application, contact Z-Axis Connector Company.

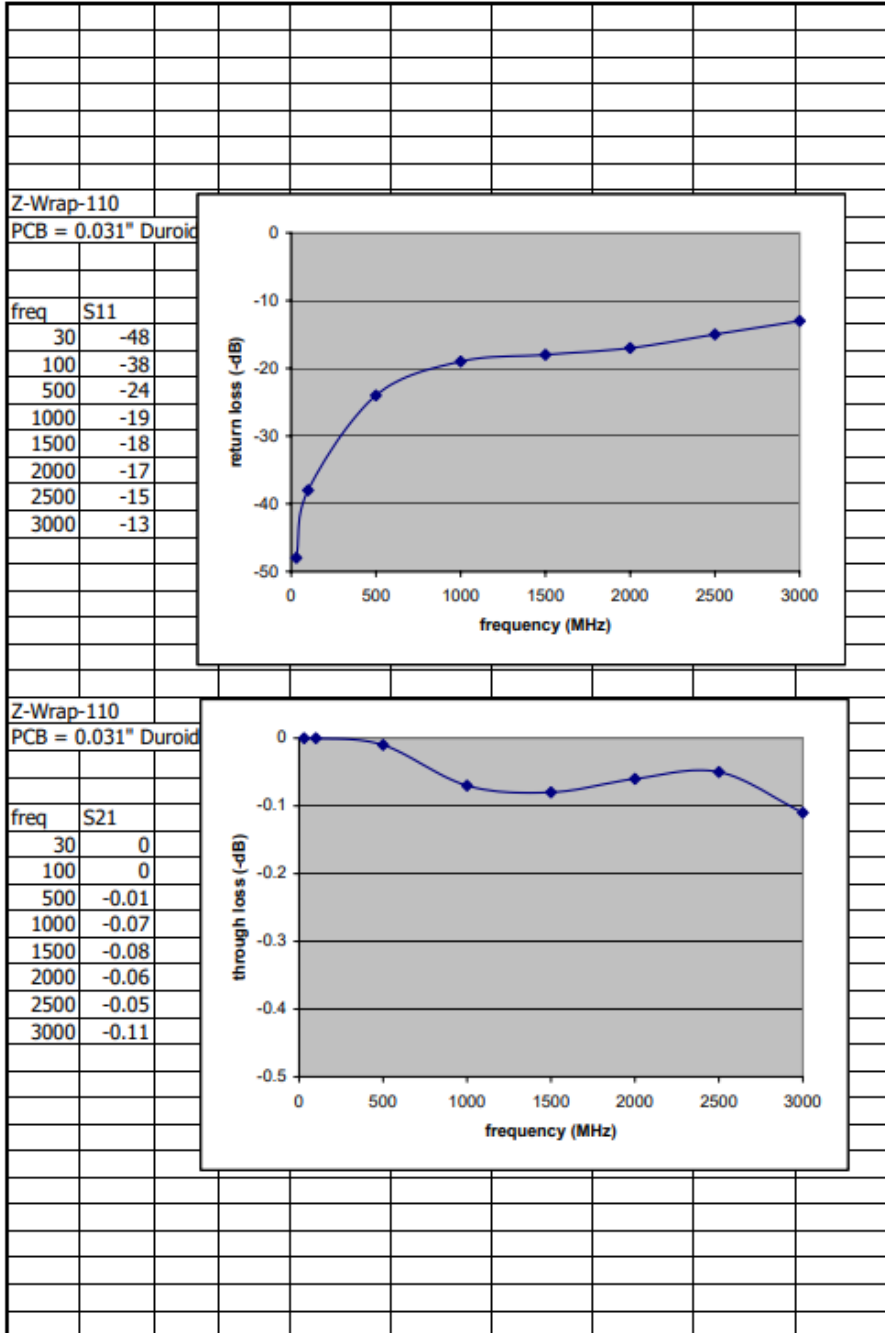
RF Performance on 0.060" FR-4



RF Performance on 0.031" FR-4



RF Performance on 0.031" Duroid





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