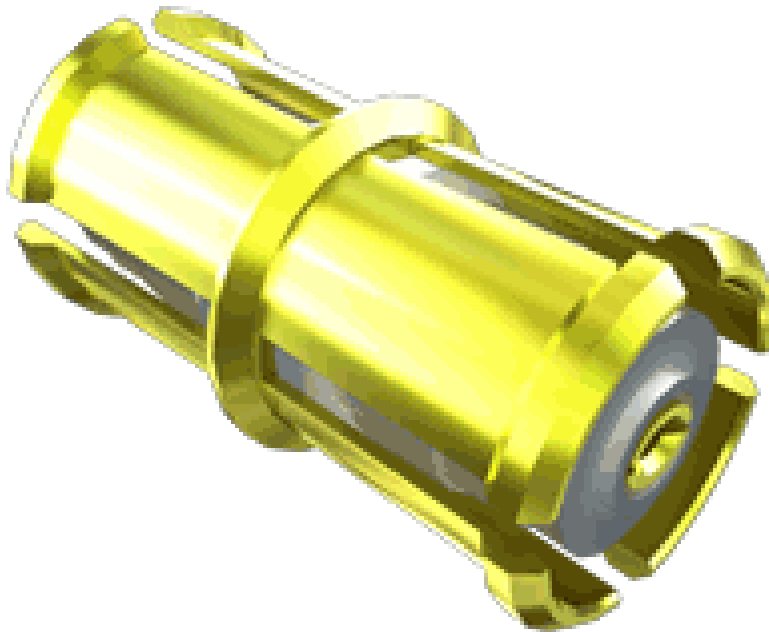




RF Characterization Report

SMP Bullet



Description:
50 Ω SMP Female to Female “Bullet” Adapter

Series: SMP

Description: 50Ω SMP “Bullet” Female to Female Adapter

Table of Contents

INTRODUCTION	3
PRODUCT DESCRIPTION	3
RESULTS SUMMARY	5
DATA	5
DATA PLOTS.....	5
MISALIGNMENT TESTING	7
INTRODUCTION.....	7
MISALIGNMENT RESULTS SUMMARY	7
DATA	7
DATA PLOTS.....	8
APPENDIX A: CHARACTERIZATION DETAILS	10
FIXTURING	10
FREQUENCY (S-PARAMETER) DOMAIN PROCEDURES.....	10
ISOLATION TESTING.....	11
EQUIPMENT	13

Series: SMP**Description:** 50Ω SMP “Bullet” Female to Female Adapter

Introduction

This testing was performed to evaluate the electrical performance of the SMP Female to Female “Bullet” Adapter. Samtec’s SMP is a 50Ω connector that compensates for misalignment in X & Y directions with performance up to 40GHz. It can be used with SMP board mount plugs in a board to board configuration.

Return Loss and VSWR measurements were made over the frequency range from 10MHz to 40GHz. The measured results include the mating interfaces, the board mount connectors, a short section of adapter, and a short length of PCB trace. Most of the adapters and board effects were calibrated out using gating. See Appendix A.

Product Description

The female to female floating plug bullet adapter was tested by mating it to an SMP (m) board mount plug and to an SMP (m) to 2.4mm (f) adapter. This allowed for connection to the test equipment by means of a 2.4mm test cable assembly. The actual part number that was tested is shown in Table 1. A representative sample picture is shown in Figure 1.

The test sample was mated to a SM1 series Samtec surface mount SMP plug mounted to the test board. The SM1 connector has an optimized launch (compensation) incorporated into the PCB design to facilitate improved impedance match over the frequency range of interest.

Part Number	Connector Type
SMP-J-B-GF-ST-0645	Bullet Adapter
SMP-PL-P-HG-ST-SM1	Surface mount SMP plug

Table 1: Sample Description

Series: SMP

Description: 50 Ω SMP "Bullet" Female to Female Adapter

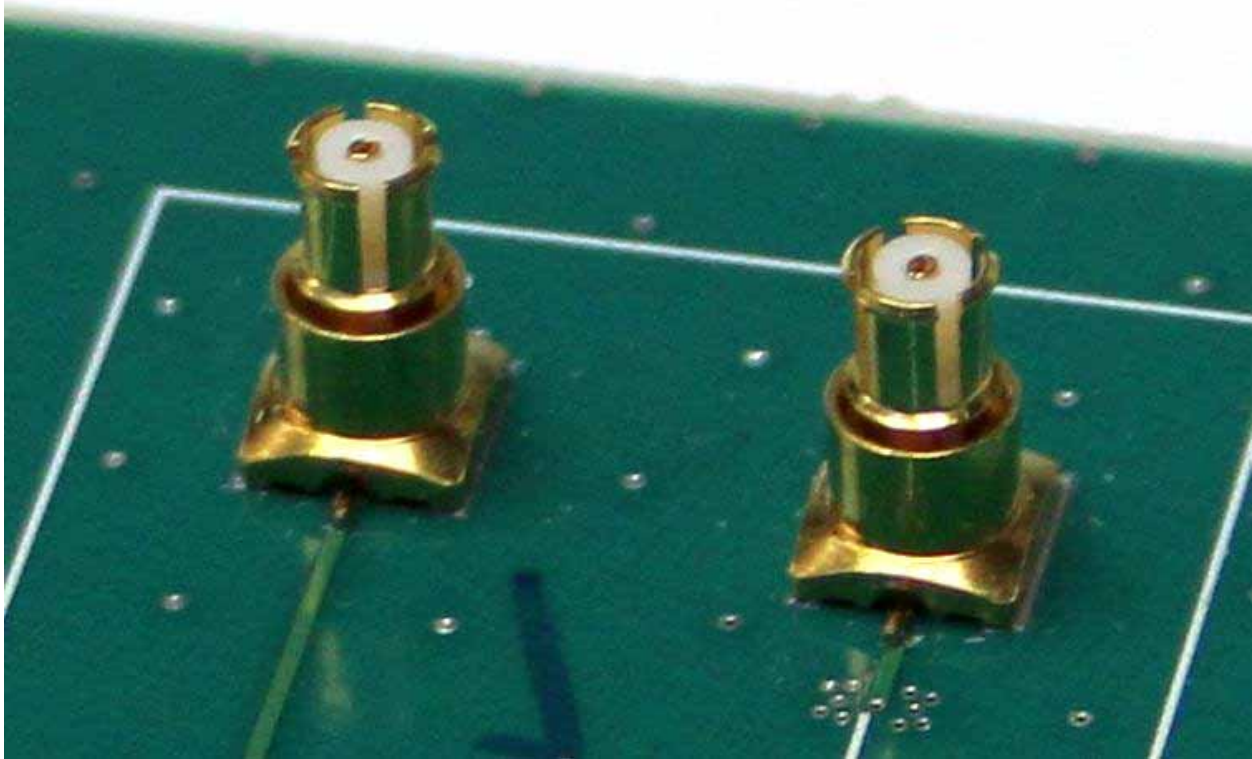


Figure 1: Test Samples mated to Samtec SMP SM1 board mount plugs

Series: SMP
Description: 50Ω SMP “Bullet” Female to Female Adapter

Results Summary

Data

Return Loss, VSWR and Isolation measurements were performed over the frequency range from 10 MHz to 40 GHz. All measurements were performed with the SMP bullet mated to a board mount SMP jack and an SMP (m) to 2.4mm (f) adapter, which connected to a 50Ω 2.4mm test cable. The table below lists the worst case Return Loss, VSWR and Isolation of the connectors over the frequency range tested.

Board Mount Connector	Return Loss	VSWR	Isolation
SMP-PL-P-HG-ST-SM1	-14.0 dB @ 35 GHz	1.5 @ 35 GHz	-37.6 dB @ 36 GHz

Table 2: Return Loss, VSWR & Isolation Worst Case Data

Data Plots

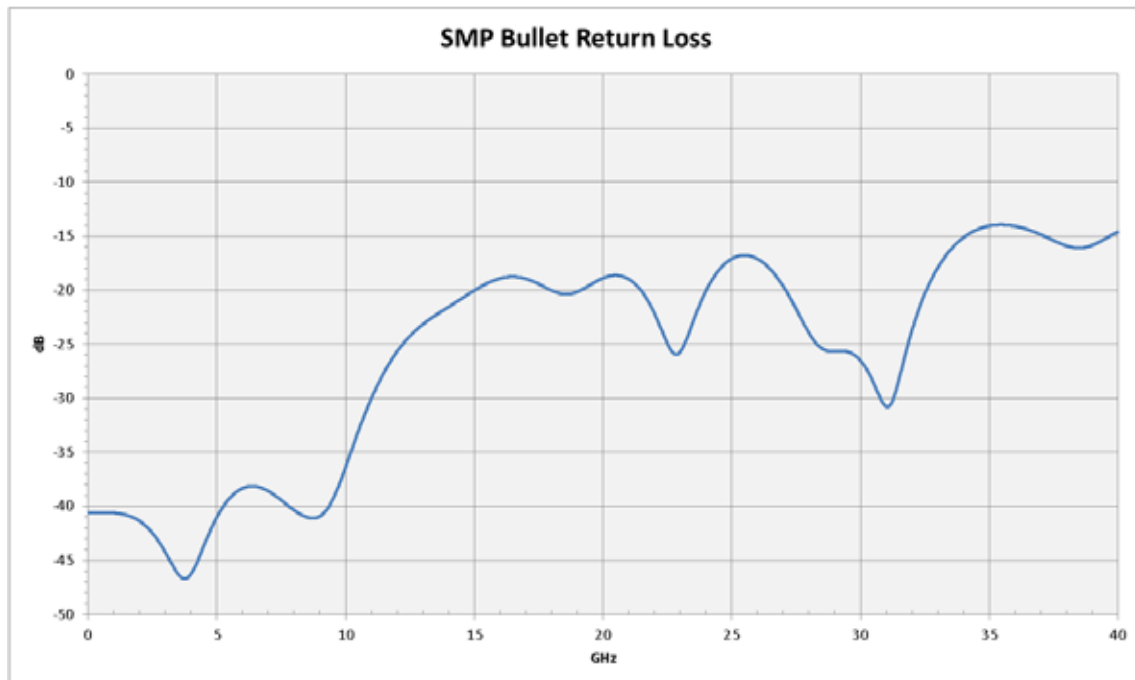


Figure 2: SMP 50Ω Bullet Return Loss

Series: SMP

Description: 50Ω SMP "Bullet" Female to Female Adapter

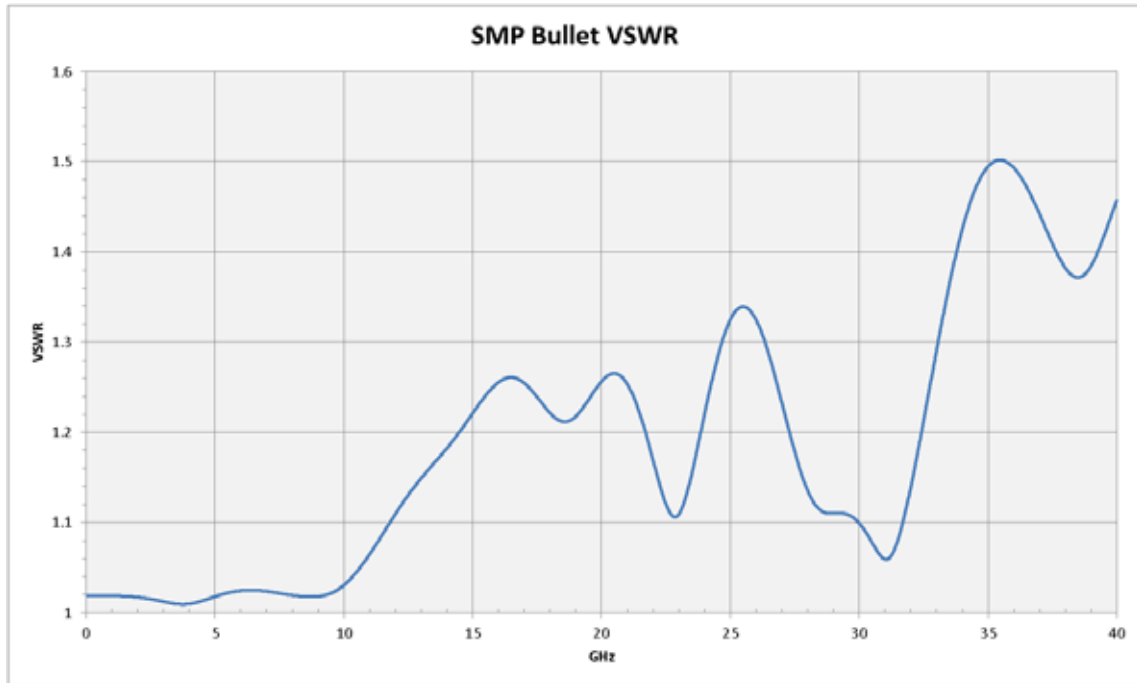


Figure 3: SMP 50Ω Bullet VSWR

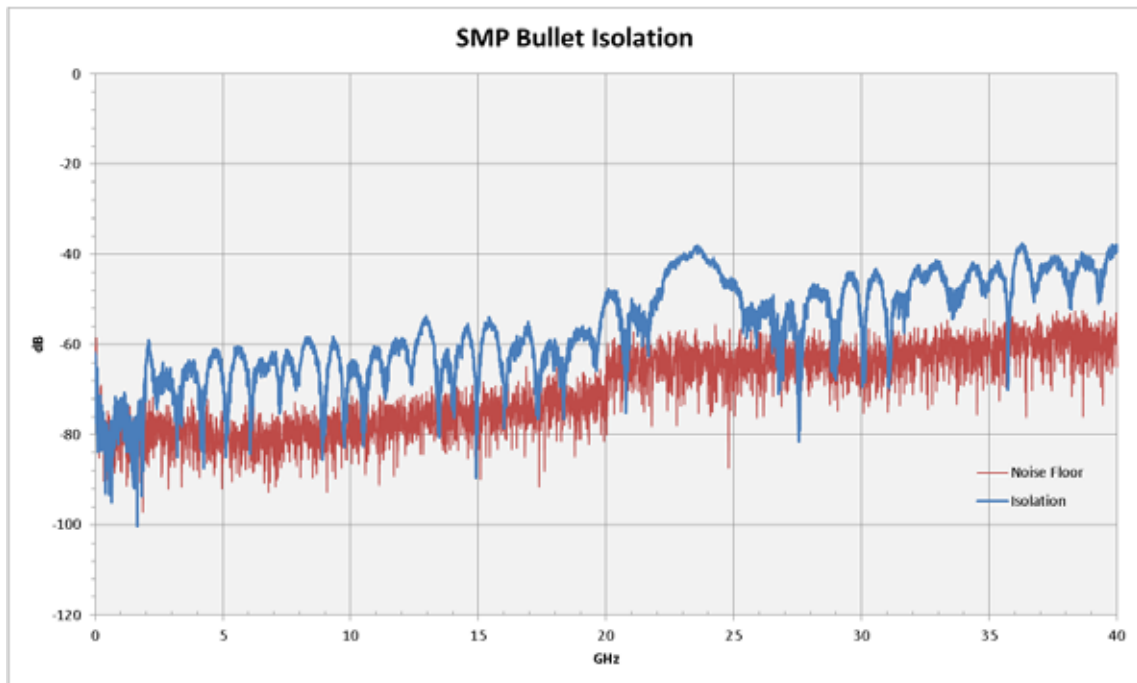


Figure 4: SMP 50Ω Bullet Isolation (0.5" separation)

Series: SMP

Description: 50Ω SMP “Bullet” Female to Female Adapter

Misalignment Testing

Introduction

The SMP 50Ω Bullet can tolerate up to 40 mils (1.00mm) of misalignment. This testing was performed to evaluate the electrical performance of the SMP Bullet when suitably misaligned.

The test samples were configured as in the tests above. The test samples were misaligned by pressing them to their maximum horizontal extent while keeping them at right angles to the PCB. New Return Loss, VSWR and Isolation measurements were made over the frequency range from 10 MHz to 40 GHz for mated pairs of connectors.

Misalignment Results Summary

Data

Return Loss, VSWR and Isolation measurements were performed over the frequency range from 10 MHz to 40 GHz. All measurements were performed with the SMP bullet mated to an SM1 series board mount SMP jack and an SMP (m) to 2.4mm (f) adapter, which connected to a 50Ω 2.4mm test cable. The table below lists the worst case Return Loss, VSWR and Isolation of the connectors over the frequency range tested.

Board Mount Connector	Return Loss	VSWR	Isolation
SMP-PL-P-HG-ST-SM1	-11.6 Db @ 35 GHz	1.7 @ 35 GHz	-39.0 dB @ 36 GHz

Table 3: Return Loss, VSWR & Isolation Worst Case Data when misaligned

Series: SMP**Description:** 50Ω SMP “Bullet” Female to Female Adapter

Data Plots

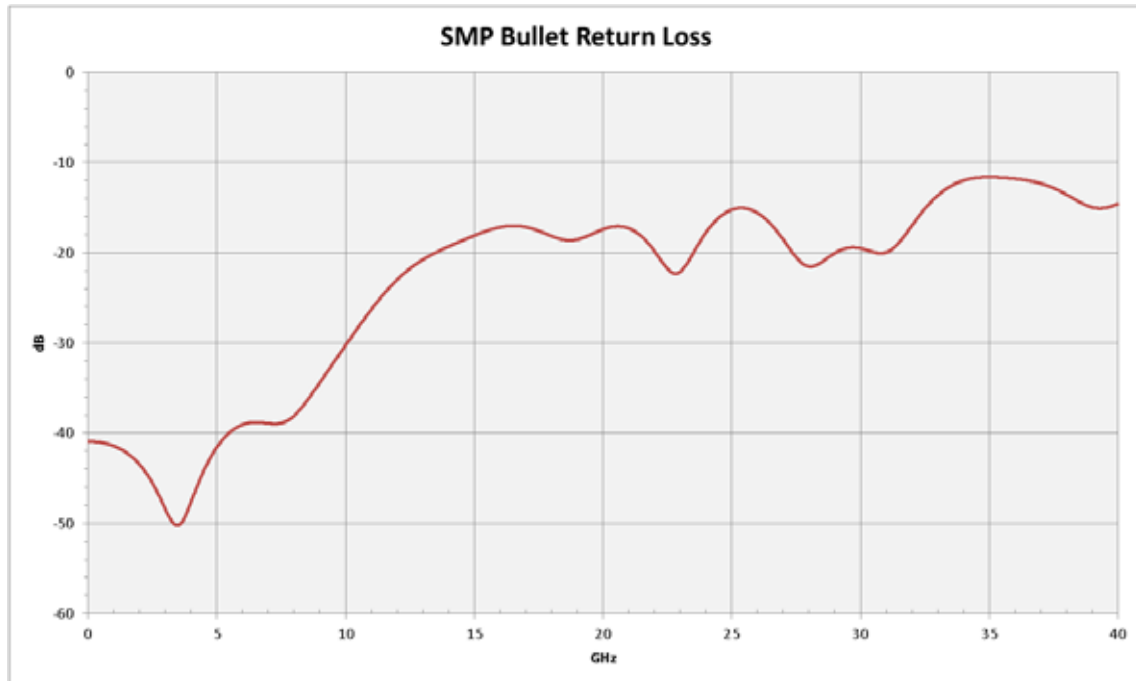


Figure 5: SMP 50Ω Bullet Return Loss after misalignment

Series: SMP

Description: 50Ω SMP "Bullet" Female to Female Adapter

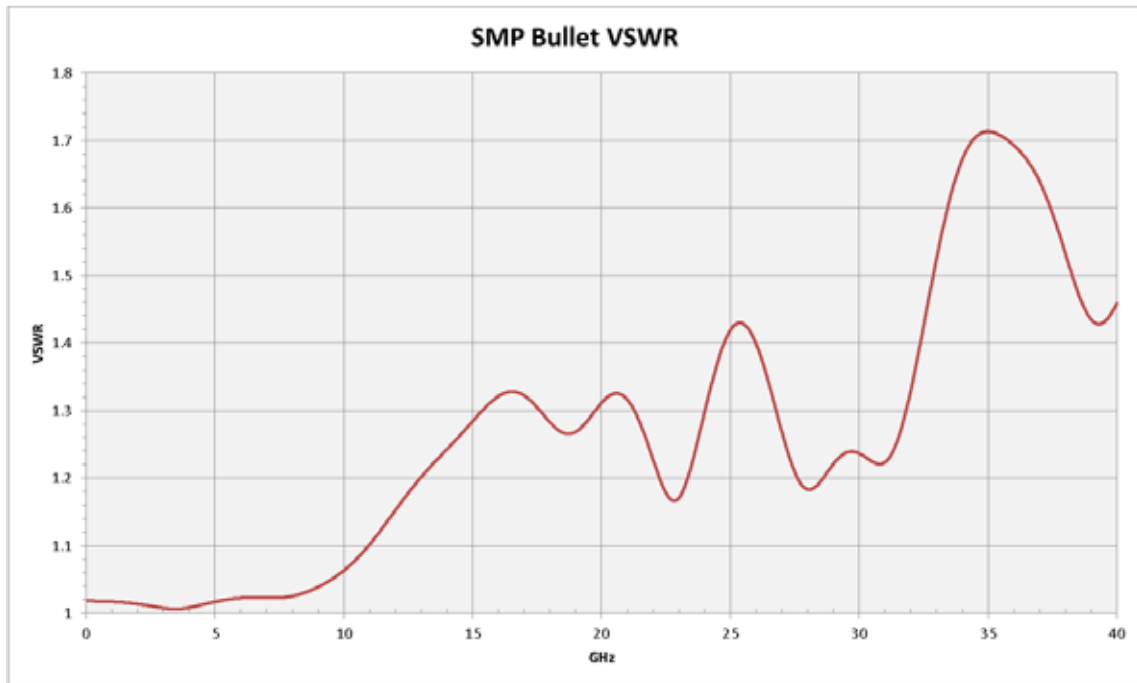


Figure 6: SMP 50Ω Bullet VSWR delta after misalignment

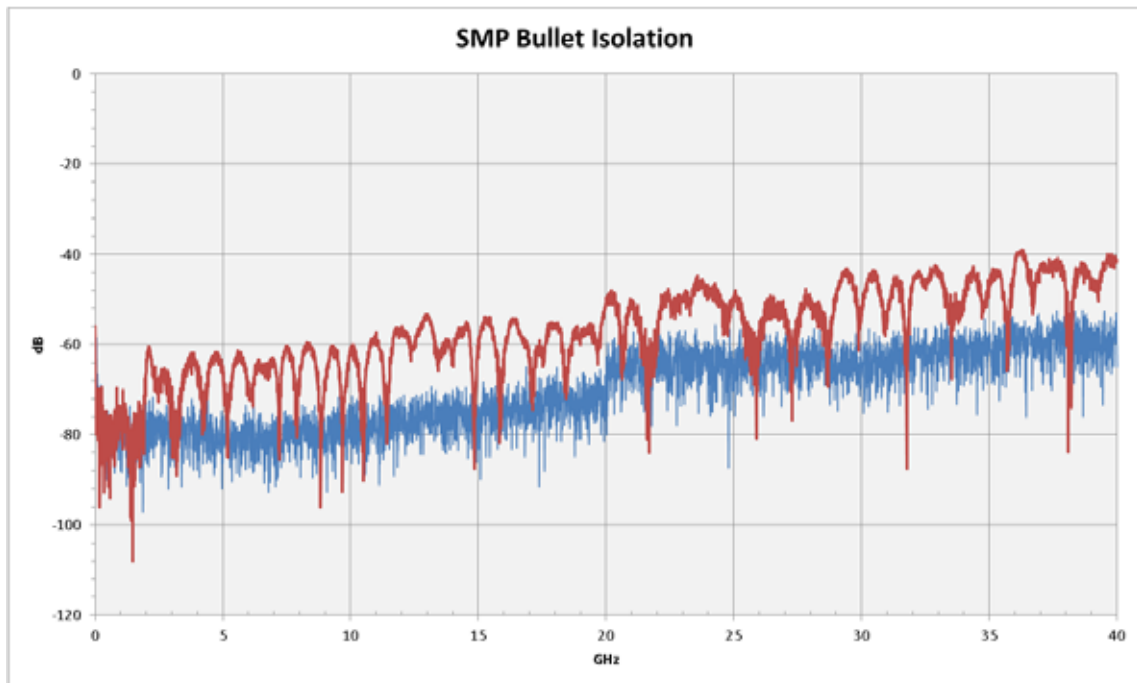


Figure 7: SMP 50Ω Bullet Isolation delta after misalignment (0.5" separation)

Series: SMP

Description: 50Ω SMP "Bullet" Female to Female Adapter

Appendix A: Characterization Details

Fixturing

Samples were tested mated to Samtec PCB mount SMP plugs (SM1 series) soldered to test board PCB-106389-SIG. The test board set has 50Ω traces (nominal impedance).

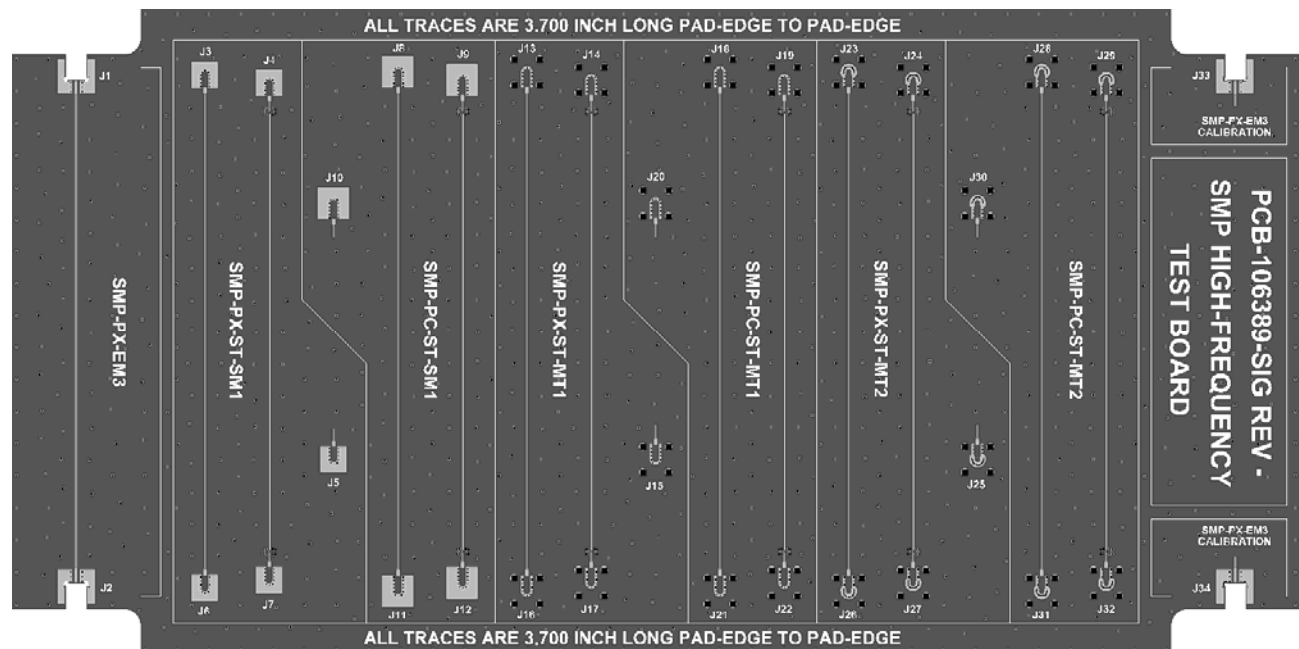


Figure 8: Test Board PCB-106389-SIG

Frequency (S-Parameter) Domain Procedures

All measurements were made using an Agilent PNA E8364B network analyzer. It was set for a 5000-point measurement response over the frequency range from 10MHz to 50GHz. Response averaging was turned off. The IF bandwidth was set to 1 KHz. A full 2-port calibration was performed at the end of the 2.4mm test cables with a Maury 85056D calibration kit.

The bullets were connected to the 2.4mm test cables with Fairview Microwave SM8863 adapters.

Series: SMP

Description: 50Ω SMP “Bullet” Female to Female Adapter

The test fixture response was removed in Keysight (nee Agilent) PLTS 2014U1 using gating.

- The near end reference plane was set at 0.5ns, which places it inside the middle of the SMP adapter.
- The far end reference plane was set at 0.4ns. This includes approximately 0.2ns of trace in the measurement.

The gated data was exported from 10MHz to 40GHz.

The effects of placing the reference plane inside the SMP adapters are not accounted for and are a small source of error.

Isolation Testing

The Isolation measurement was made using an Agilent PNA E8364B network analyzer. It was set up the same as for Return Loss and VSWR measurements. The DUTs were attached to two adjacent jacks, which were terminated to 50Ω SMA loads at the far ends of their test board traces.

The measured response was viewed in log magnitude format. The attenuation effects of the adapters, the SM1 jacks, and the PCB were not accounted for and are a small source of error. Note that coupling effects associated with the test board were included in the measurement.

The test system isolation measurement noise floor was measured by terminating each 30-inch long test cable in a 50Ω SMA load. The cables were kept apart for this measurement.

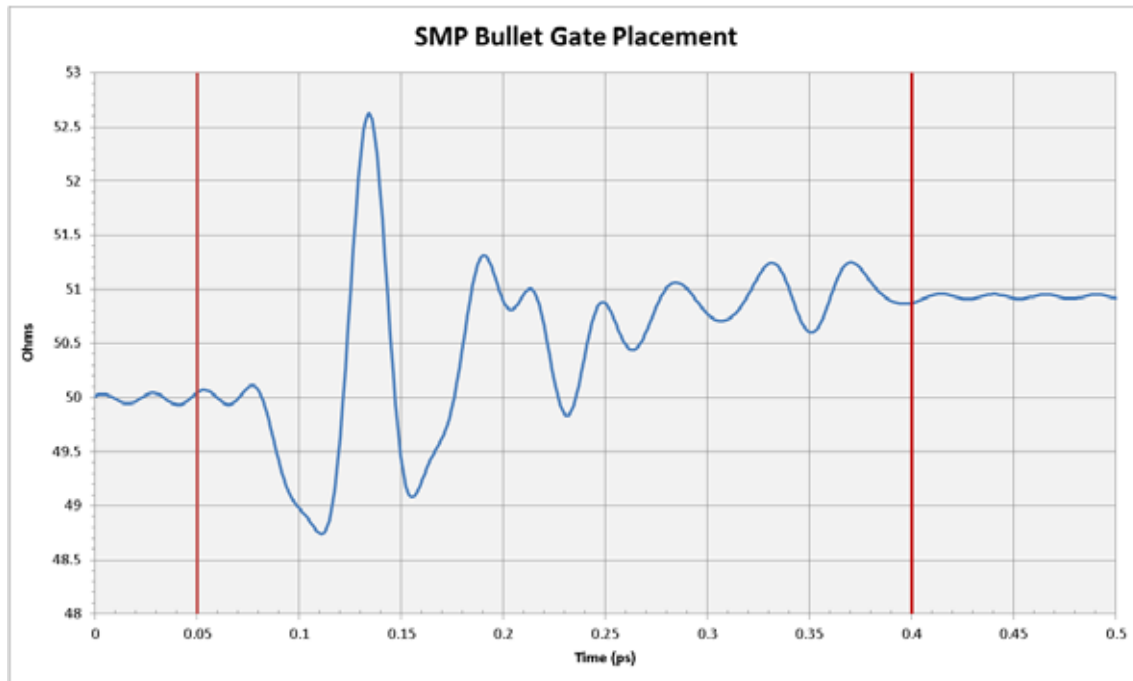
Series: SMP**Description:** 50Ω SMP “Bullet” Female to Female Adapter

Figure 9: VNA time domain response showing gate placement.

Series: SMP

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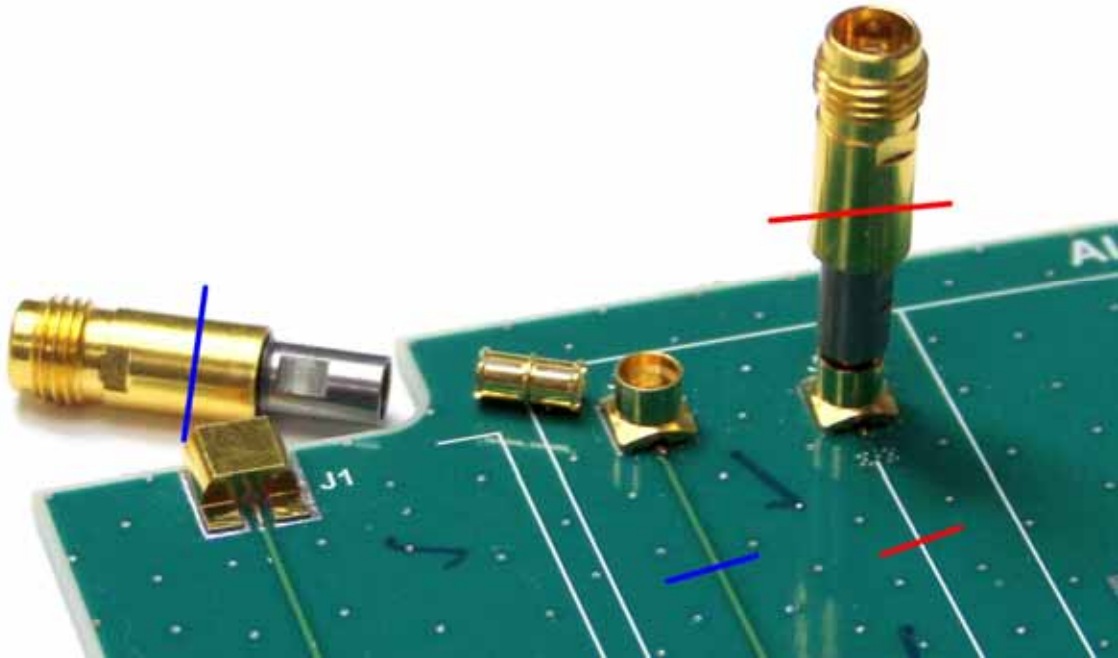


Figure 10: Approximate gate placement on samples

Equipment

Agilent PNA E8364B Network Analyzer