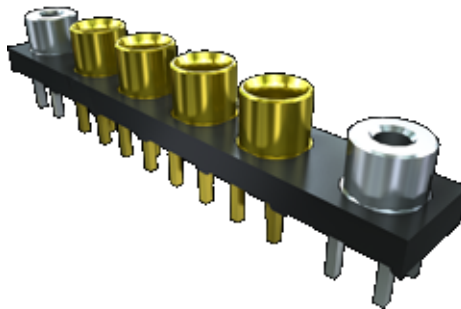


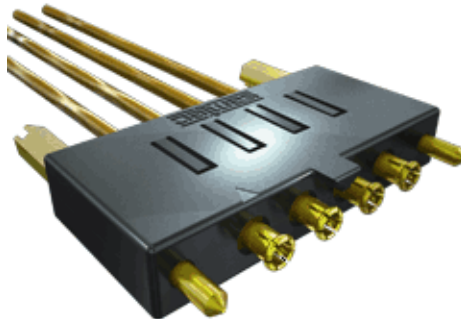


## RF Characterization Report

### GRF7, GRF7V Vertical and Right-Angle



**Mated with:  
GRF7-P-C**



**Description:  
75Ω GRF7 Ganged Board Mount Micro Miniature RF Connectors**

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

## Table of Contents

<i>Introduction</i> .....	3
<i>Product Description</i> .....	3
<i>Results Summary</i> .....	5
Data .....	5
GRF7-ST Data Plots .....	6
GRF7V-ST Data Plots .....	7
GRF7-RA Data Plots .....	9
GRF7V-RA Data Plots .....	10
<i>Test Procedures</i> .....	12
Fixturing: .....	12
Return Loss and VSWR Testing .....	12
Isolation Testing .....	13
Equipment .....	13

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

## Introduction

This testing was performed to evaluate the electrical performance of the GRF7 75Ω Ganged Micro miniature Jack.

Return Loss, VSWR and Isolation measurements were made over the frequency range from 12.5 MHz to 6 GHz for mated pairs of connectors. All measurements were made utilizing a 4-layer test board specifically designed for this project and it is referred to as “test board” in this report. The test board was identified as PCB-104224-TST. It had a GRF7 through-hole jack on 196.9 mil (5mm) pitch on both ends. The ganged GRF7 ports were arranged as adjacent pairs. One pair had Layer 1 signal launches. A second pair had Layer 4 launches. The measured results include not only the mated connectors but also the termination and board effects.

## Product Description

The test sample was mounted to the test board, which has 75Ω impedance traces. The connector has an optimized launch (compensation) incorporated into the PCB design to facilitate improved impedance match over the frequency range of interest. The test board traces are three inches long and run to the far end GRF7 connectors, which provide a means of terminating the lines.

The GRF7 jack was tested by mating it to a GRF7-P-C to 75Ω BNC test cable. This allowed for connection to the test equipment by means of a 50Ω BNC to 50Ω SMA adapter.

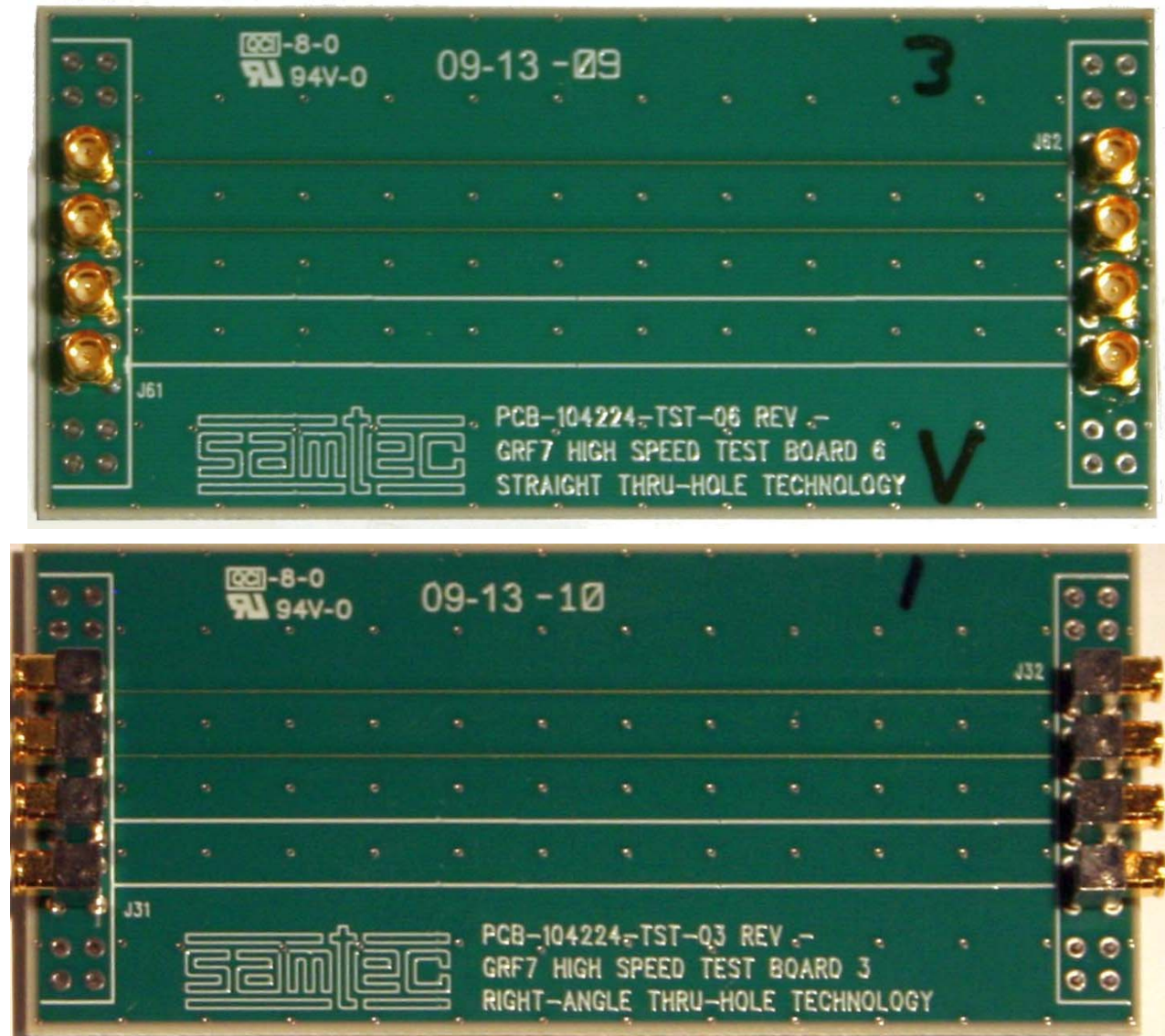
Sixteen (16) GRF7 jacks were tested. The actual part numbers that were tested is shown in Table 1. A representative sample picture is shown in Figure 1.

<b>Part Number</b>	<b>Board Mount Connector Type</b>
GRF7-J-P-04-GF-ST-TH1	Straight jack
GRF7V-J-P-04-GF-ST-TH1	Straight high-vibration jack
GRF7-J-P-04-GF-RA-TH1	Right-angle jack
GRF7V-J-P-04-GF-RA-TH1	Right-angle high-vibration jack

**Table 1: Sample Description**

**Series:** GRF7, GRF7V Vertical and Right-Angle

**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack



**Figure 1: Test Sample Configuration**

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

## Results Summary

### Data

Return Loss, VSWR and Isolation measurements were performed over the frequency range from 12.5 MHz to 6 GHz. All measurements were performed with the board mount jack mated to a 75Ω GRF7 to 75Ω BNC cable, which connected to a 50Ω BNC to SMA test adapter. The table below lists the worst case Return Loss, VSWR and Isolation of the connectors over the frequency range tested. Isolation was measured both within the same layer and between adjacent layers having different launch levels.

Board Mount Connector	Launch	Return Loss	Isolation	
			VSWR	Isolation
GRF7-J-P-GF-ST-TH1	Layer 1	-11.6 dB	1.7	-48.0 dB
	Layer 1 - 4	----	----	-53.5 dB
	Layer 4	-15.0 dB	1.4	-40.1 dB
GRF7V-J-P-GF-ST-TH1	Layer 1	-10.3 dB	1.9	-46.7 dB
	Layer 1 - 4	----	----	-48.8 dB
	Layer 4	-13.2 dB	1.6	-39.7 dB
GRF7-J-P-GF-RA-TH1	Layer 1	-11.3 dB	1.7	-41.4 dB
	Layer 1 - 4	----	----	-55.0 dB
	Layer 4	-15.1 dB	1.4	-34.8 dB
GRF7V-J-P-GF-RA-TH1	Layer 1	-11.3 dB	1.7	-39.1 dB
	Layer 1 - 4	----	----	-54.8 dB
	Layer 4	-16.1 dB	1.4	-33.2 dB

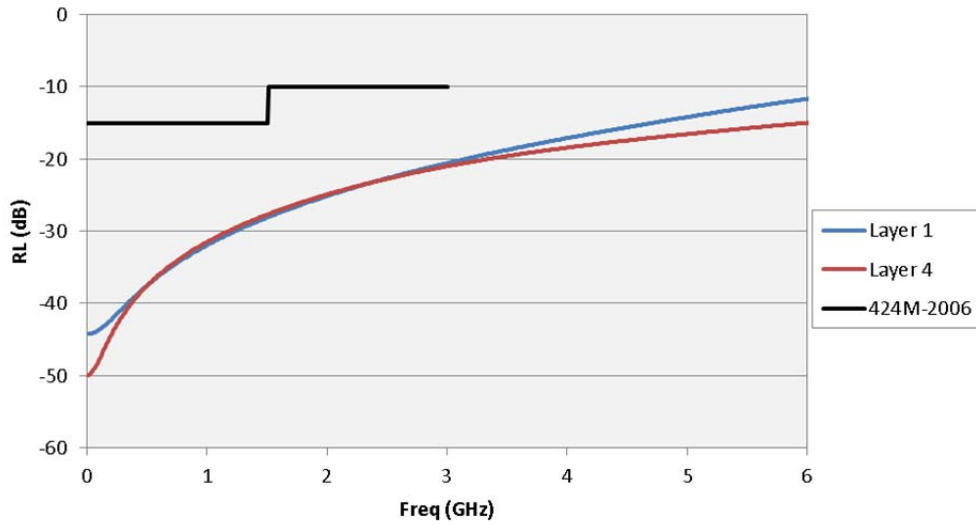
**Table 2: Return Loss, VSWR & Isolation Worst Case Data**

Return Loss plots include a SMPTE 424M-2006 limit line for reference. SMPTE 424M-2006 is a specification for 3 Gb/s serial data used for digital video transmission.

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

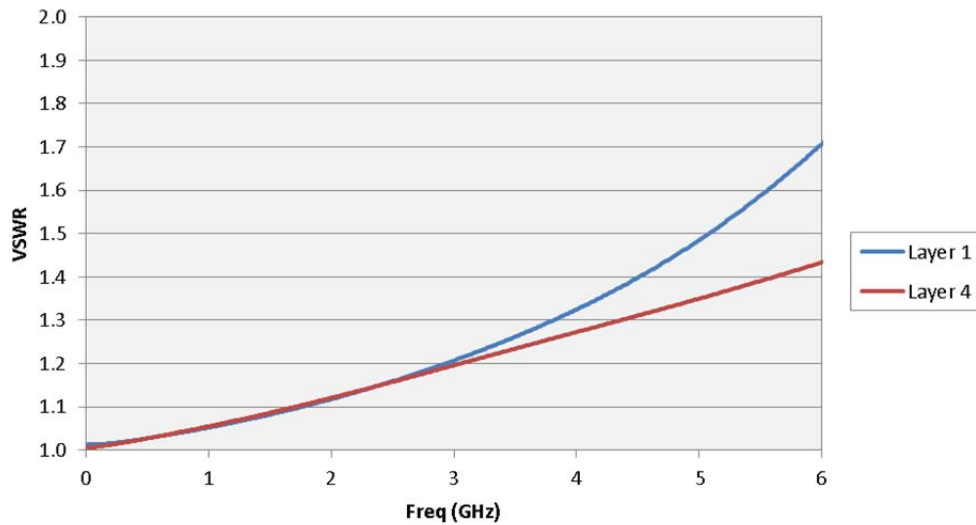
**GRF7-ST Data Plots**

**GRF7-ST Return Loss**



**Figure 2: GRF7-ST Return Loss**

**GRF7-ST VSWR**



**Figure 3: GRF7-ST VSWR**

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### GRF7-ST Isolation

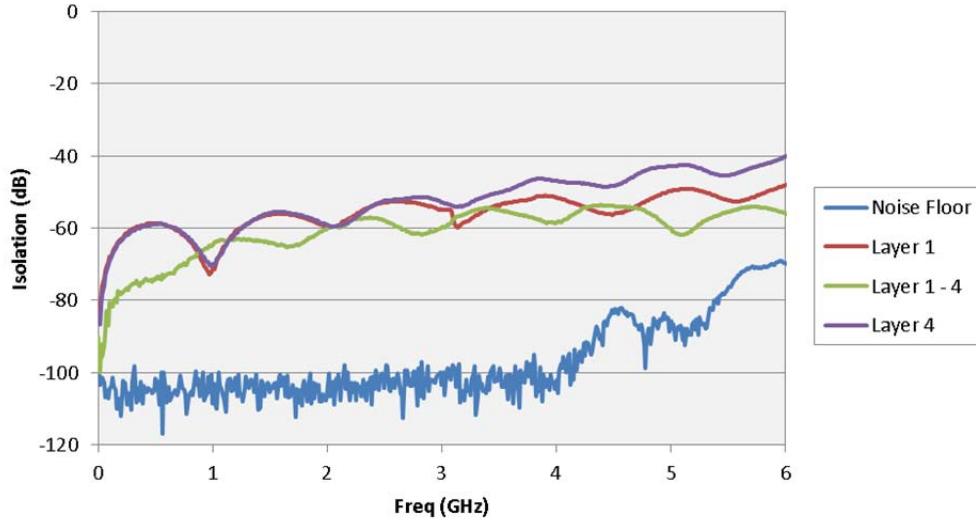


Figure 4: GRF7-ST Isolation

### GRF7V-ST Data Plots

#### GRF7V-ST Return Loss

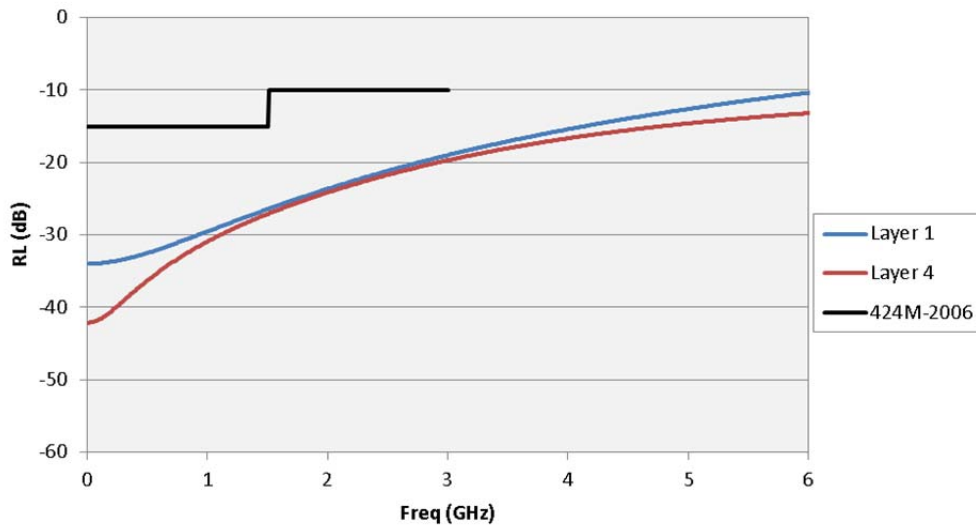


Figure 5: GRF7V-ST Return Loss

**Series:** GRF7, GRF7V Vertical and Right-Angle

**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### GRF7V-ST VSWR

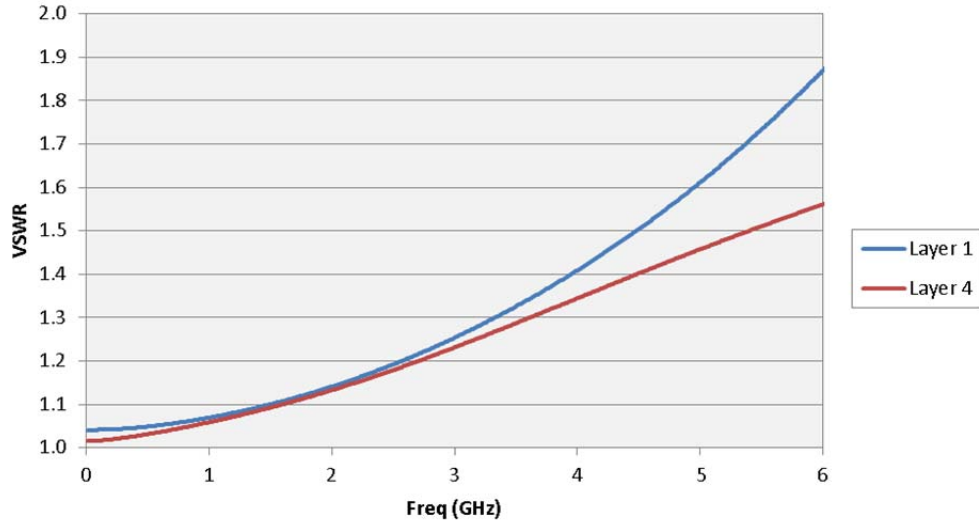


Figure 6: GRF7V-ST VSWR

### GRF7V-ST Isolation

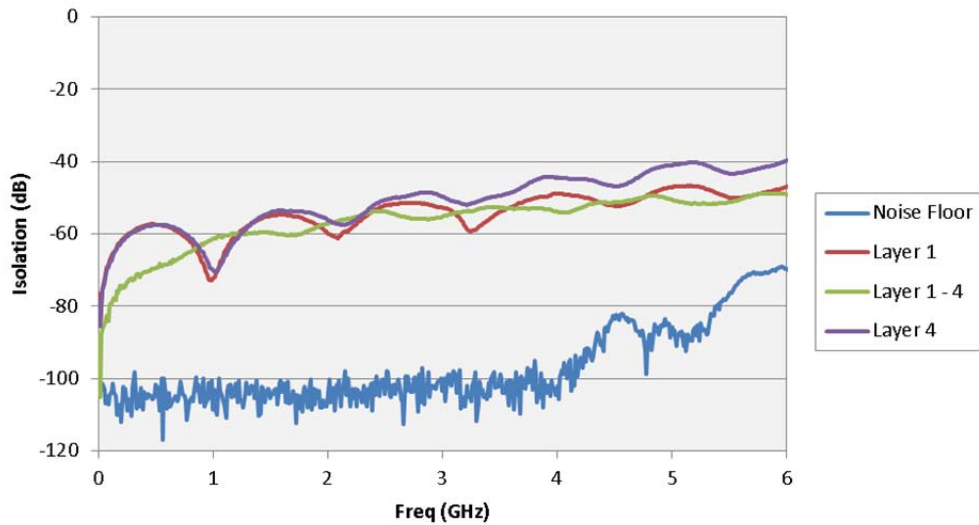


Figure 7: GRF7V-ST Isolation

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### GRF7-RA Data Plots

#### GRF7-RA Return Loss

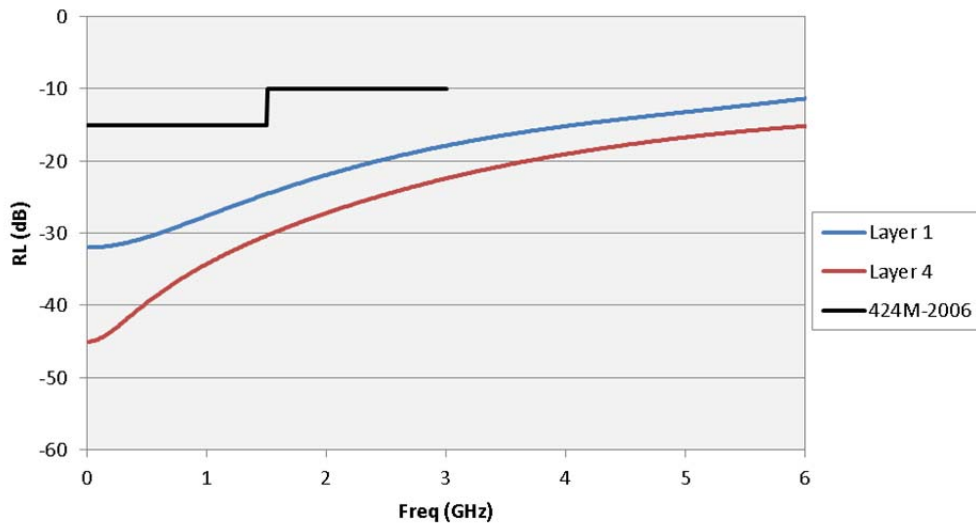


Figure 8: GRF7-RA Return Loss

#### GRF7-RA VSWR

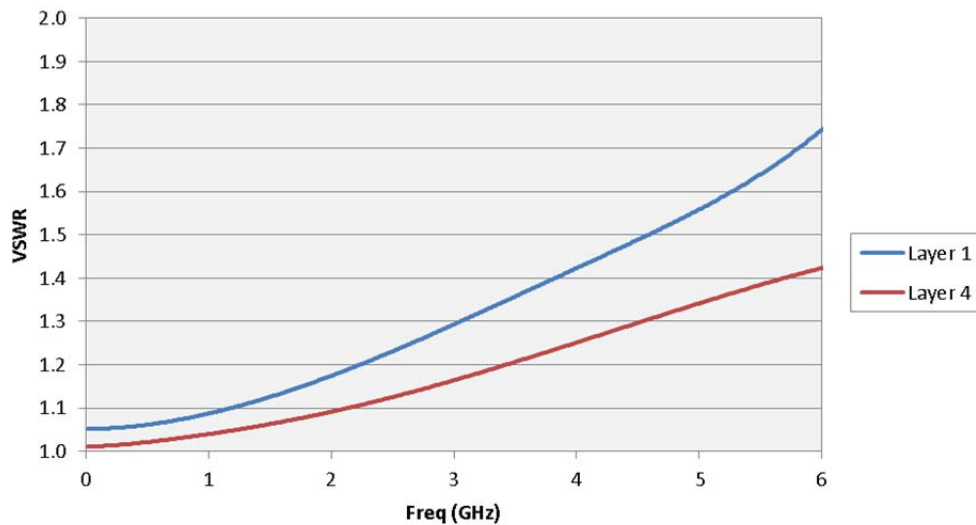


Figure 9: GRF7-RA VSWR

**Series:** GRF7, GRF7V Vertical and Right-Angle  
**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### GRF7-RA Isolation

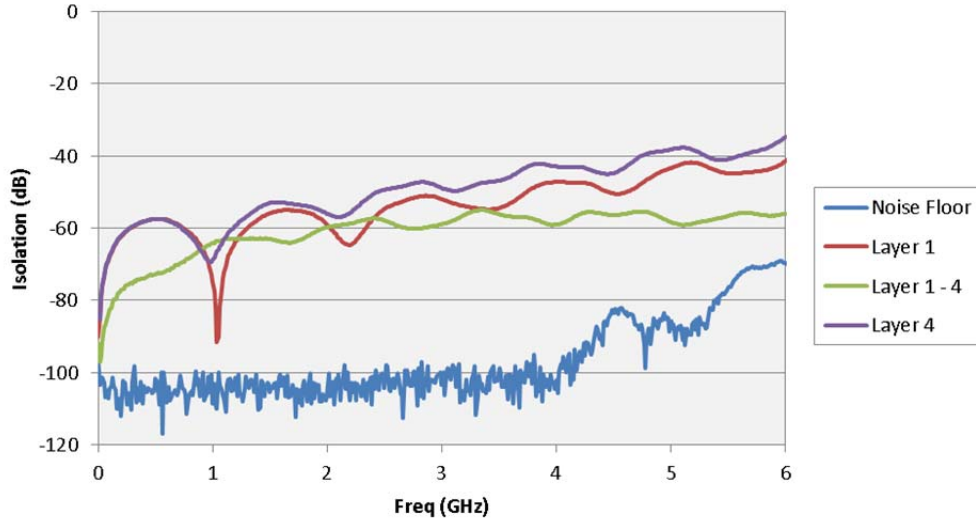


Figure 10: GRF7-RA Isolation

### GRF7V-RA Data Plots

#### GRF7V-RA Return Loss

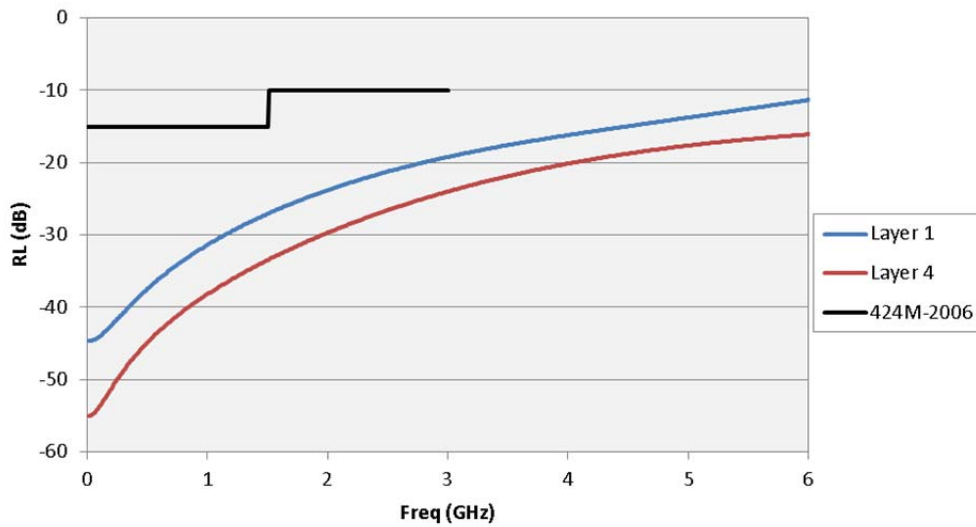


Figure 11: GRF7V-RA Return Loss

**Series:** GRF7, GRF7V Vertical and Right-Angle

**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### GRF7V-RA VSWR

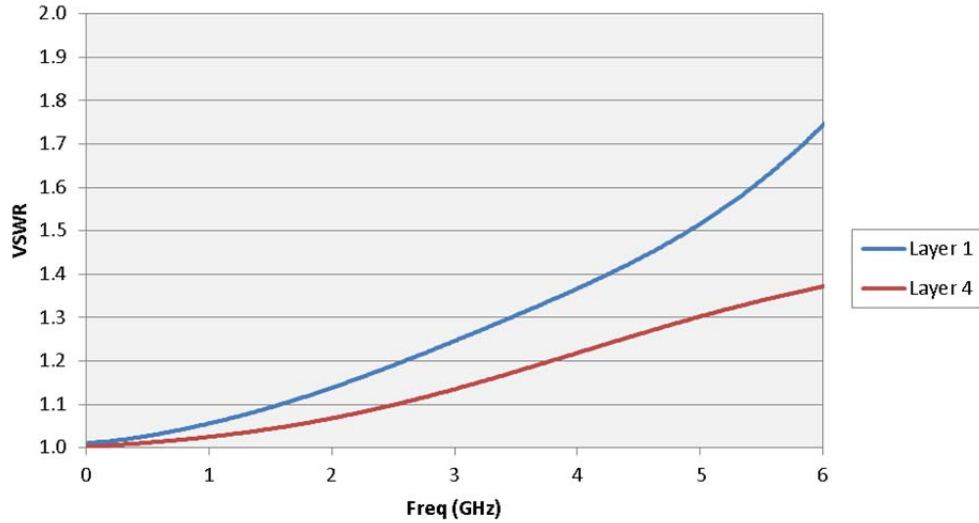


Figure 12: GRF7V-RA VSWR

### GRF7V-RA Isolation

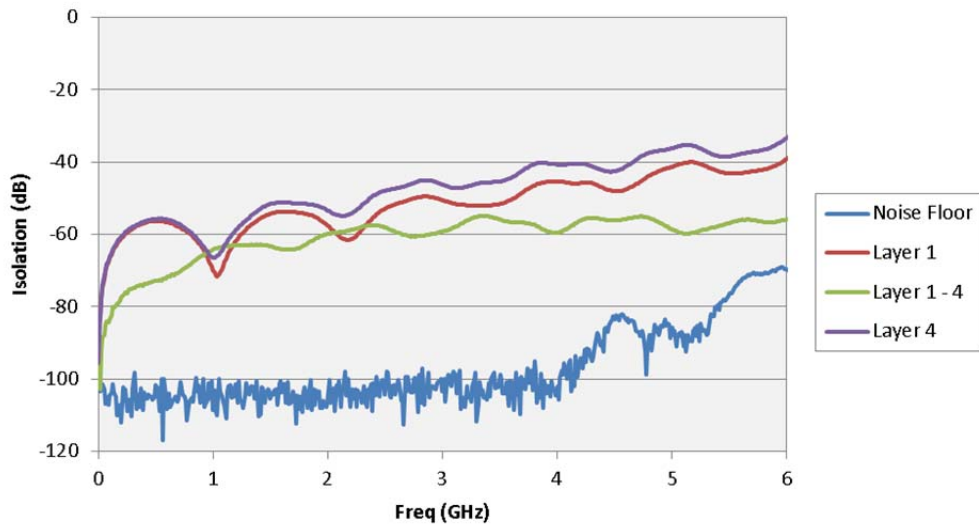


Figure 13: GRF7V-RA Isolation

**Series:** GRF7, GRF7V Vertical and Right-Angle

**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

## Test Procedures

### *Fixturing:*

All measurements were performed using the test board, which has 75Ω traces (nominal impedance) that connect the GRF7 jacks. During an actual Return Loss or VSWR measurement the GRF7 jack was mated to a 75Ω GRF7-P-C (f) to 75Ω BNC (m) cable, which connected to a 50Ω BNC (f) to 50Ω SMA (f) adapter and a 50Ω SMA test cable. The test board trace was terminated in a 75Ω resistor load at its other end.

A vector network analyzer was used to perform the measurements and was connected to the SMA (f) to BNC (f) cable through a 1 meter long 50Ω SMA (f/m) test cable. The GRF7 (f) portion of the BNC to GRF7 cable and the board mount jack comprised the mated connector pair under test.

For the Isolation measurement four 1 meter long 50Ω SMA (f/m) test cables attached to adjacent GRF7 jacks through 50Ω SMA (f) to 50Ω BNC (f) adapters and 75Ω BNC (m) to 75Ω GRF7-P-C (f) cable. The corresponding test board traces were terminated at the far end in 75Ω resistive loads.

### *Return Loss and VSWR Testing*

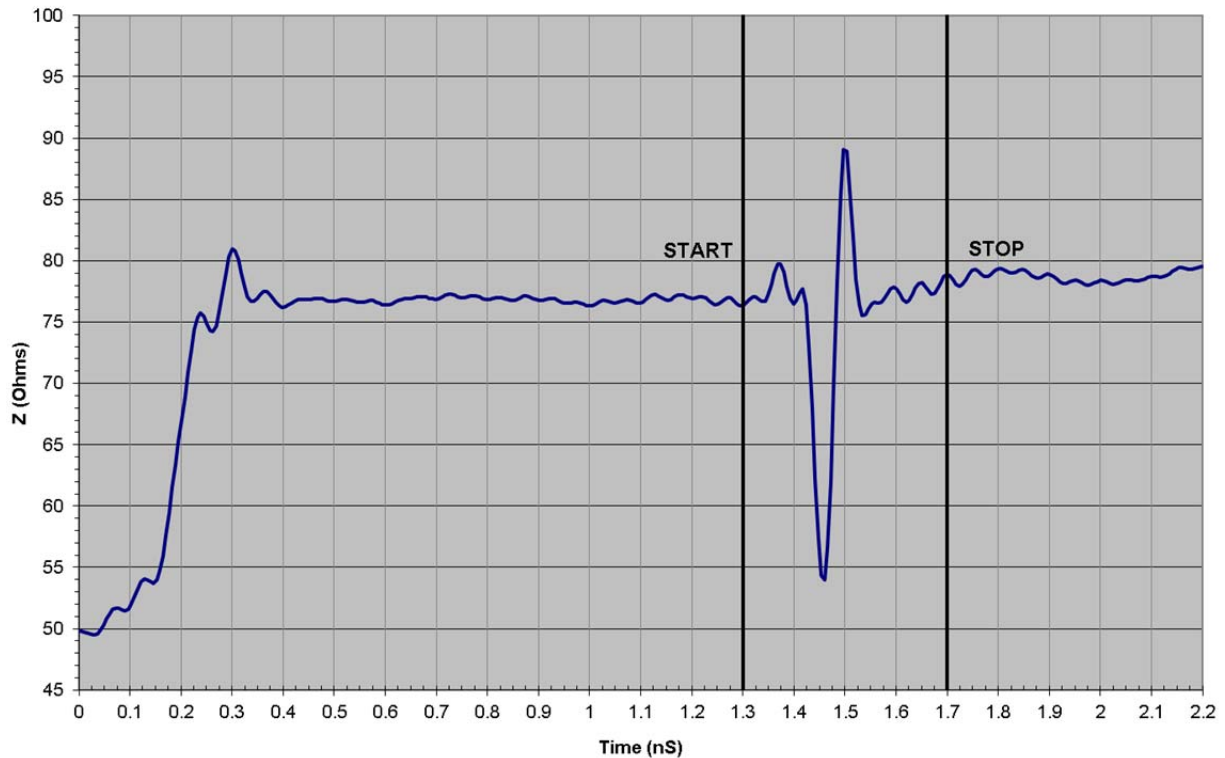
All Return Loss and VSWR measurements were made using an Agilent PNA-L N5230C vector network analyzer. It was set for a 1601-point measurement response over the frequency range from 300 KHz to 20 GHz. Response averaging was turned off. The IF bandwidth was set to 1 KHz. A full 4-port calibration was performed at the end of the SMA test cables with an N4433A E-Cal module.

The measured response was viewed in Agilent PLTS in the time domain using the low-pass step transform and the real data format. Gating was turned on. The Gate Start and Stop flags were set around the response of the mated pair of interest. See Figure 14 below. The response format was then set to linear magnitude (reflection coefficient), and the time domain transform was turned off (but gating remained on). In converting back to the frequency domain, the effects of the response outside the Gate are removed. The data was written in Step format to a data file.

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**Description:** 75Ω GRF7 Ganged Board Mount Micro-Miniature Jack

### VNA TDR



**Figure 14: VNA time domain response showing gate placement**

## ***Isolation Testing***

The Isolation measurement was made using an Agilent PNA-L N5230C vector network analyzer. It was set up the same as for Return Loss and VSWR measurements. The measured response was viewed in log magnitude format. There was no gating. The data was written in Step format to a data file.

## ***Equipment***

Agilent PNA-L N5230C Network Analyzer