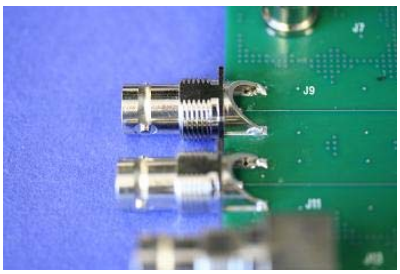
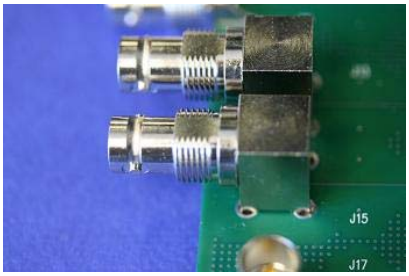
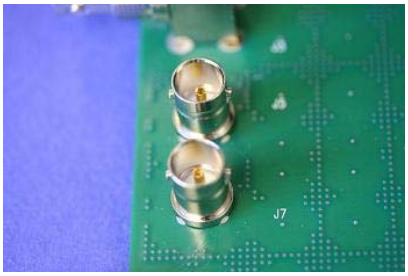
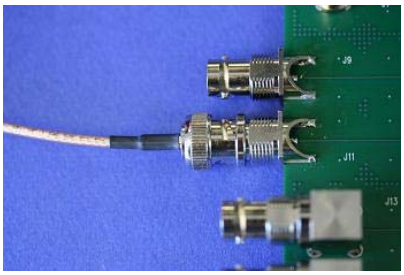
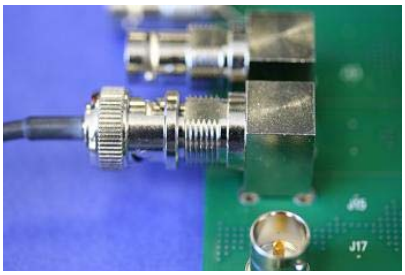
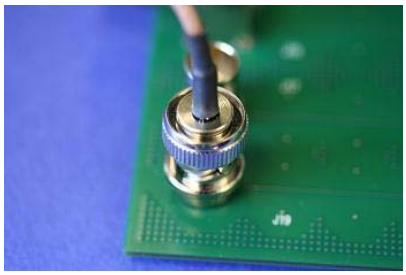
RF Characterization Report

BNC7T-J-P-xx-ST-EMI
BNC7T-J-P-xx-RD-BH1
BNC7T-J-P-xx-ST-TH1
BNC7T-J-P-xx-ST-TH2D
BNC7T-J-P-xx-RA-BH2D

Mated with:
RF179-79SP1-74BJ1-0300

Description:
75 Ohm BNC Board Mount Jacks

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Report Revision: 12/29/2011

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

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Introduction

This testing was performed to evaluate the electrical performance of the BNC7T series 75-Ohm BNC Board Mount Connectors. VSWR measurements were made over the frequency range from 130 MHz to 6 GHz for mated pairs of connectors. All measurements were made utilizing test boards specifically designed for this project and are referred to as "test board" in this report. The test boards were identified as PCB-101565-TST-01, PCB-102852-TST and PCB-102900-TST. The measured results include not only the mated connectors but also the termination effects of each.

Product Description

Each test sample is mounted to a test board, which is a 62-mil thick 4-layer stackup with microstrip traces having a nominal impedance of 75 Ohms. Each connector type has an optimized footprint (compensation) incorporated into the PCB design to facilitate improved impedance match over the frequency range of interest. The test board traces were located either on the top or the bottom of the PCB.

Each BNC7T connector was tested by mating to a 75-Ohm BNC male connector, which was part of either a RF179-79SP1-74BJ1-0300 or RF179-74BJ3-74Sp3-0100 test cable assembly. Either one or four samples of each connector type were tested. The actual part numbers that were tested are shown in Table 1. A representative sample picture is shown in Figure 1.

Part Number	Board Mount Connector Type	Compensation	PCB Trace Location
BNC7T-J-P-XX-RD-BH1	Right Angle	Gen 2	Bottom
BNC7T-J-P-XX-ST-TH1	Vertical Mount	Gen 2	Bottom
BNC7T-J-P-XX-ST-EM1	End Launch	Gen 2	Top
BNC7T-J-P-XX-RD-BH1	Right Angle	Gen 1	Top
BNC7T-J-P-XX-ST-TH1	Vertical Mount	Gen 1	Top
BNC7T-J-P-XX-ST-TH2	Vertical Mount	Gen 3	Top
BNC7T-J-P-XX-ST-TH2	Vertical Mount	Gen 3	Bottom
BNC7T-J-P-XX-RA-BH2D	Right Angle	Gen 3	Bottom
BNC7T-J-P-XX-RA-BH2D	Right Angle	Gen 3	Top

Table 1: Sample Descriptions

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

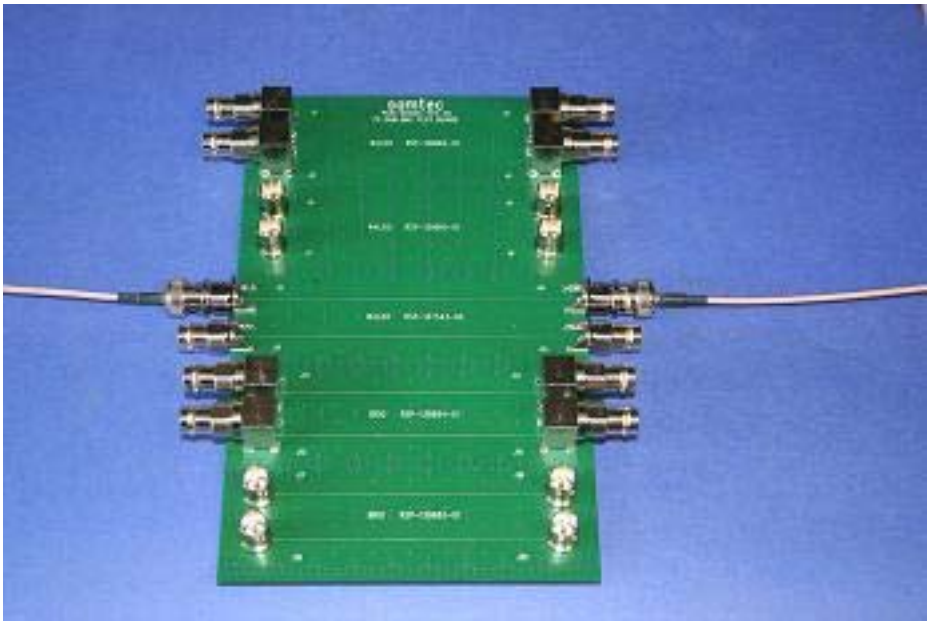

Figure 1: Test Sample Configuration

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

Results Summary

VSWR Data

VSWR measurements were performed over the frequency range from 130 MHz to 6 GHz. All measurements were performed with the board mount jack mated to a 75-Ohm BNC male connector that was part of a 75-Ohm flexible cable assembly. The table below lists the maximum VSWR of each mated pair measured over the frequency range tested.

	Compensation					
	Gen 3		Gen 2		Gen 1	
Board Mount Connector	**Sample**	**Max VSWR**	**Sample**	**Max VSWR**	**Sample**	**Max VSWR**
BNC7T-J-P-XX-RD-BH1 Right Angle			J1	1.37	J13	1.34
			J2	1.35	J14	1.37
			J3	1.38	J15	1.34
			J4	1.32	J16	1.37
BNC7T-J-P-XX-ST-TH1 Vertical Mount			J5	1.13	J17	1.43
			J6	1.24	J18	1.44
			J7	1.15	J19	1.40
			J8	1.22	J20	1.42
BNC7-J-P-XX-ST-EM1 End Launch			J9	1.18		
			J10	1.16		
			J11	1.18		
			J12	1.17		
BNC7T-J-P-XX-ST-TH2D Vertical Mount	J1	1.95				
	J5	1.37				
BNC7T-J-P-XX-RA-BH2D Right Angle	J5	1.55				
	J1	1.24				

Table 2: VSWR Data

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

VSWR Data Plots

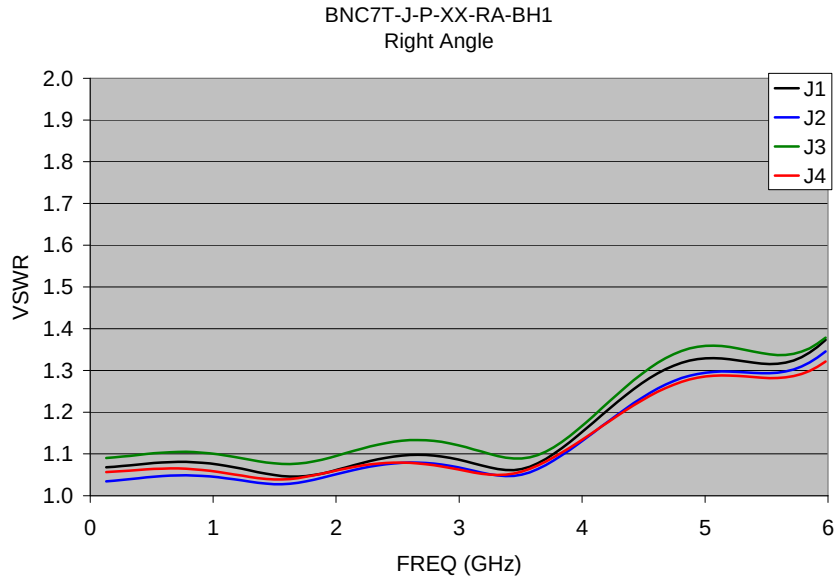

Figure 2: Gen 2 BNC7T-J-P-XX-RD-BH1 VSWR

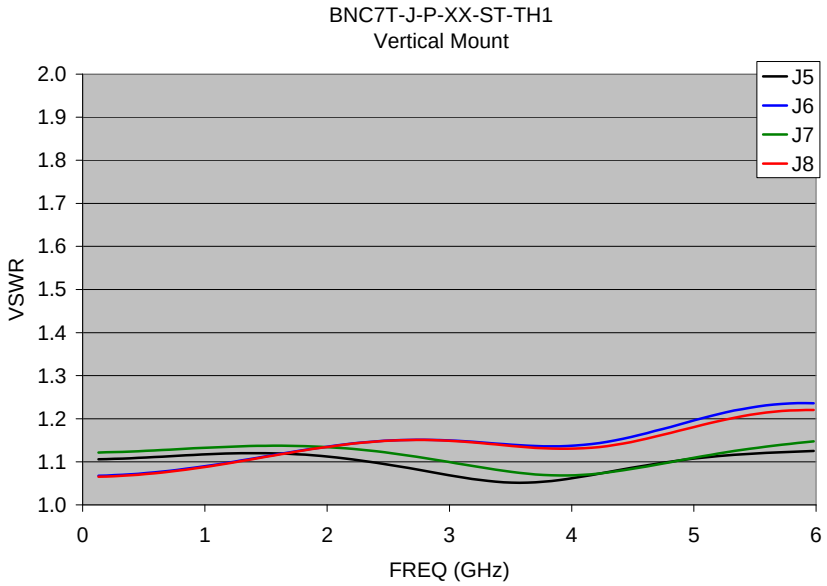

Figure 3: Gen 2 BNC7T-J-P-XX-ST-TH1 VSWR

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

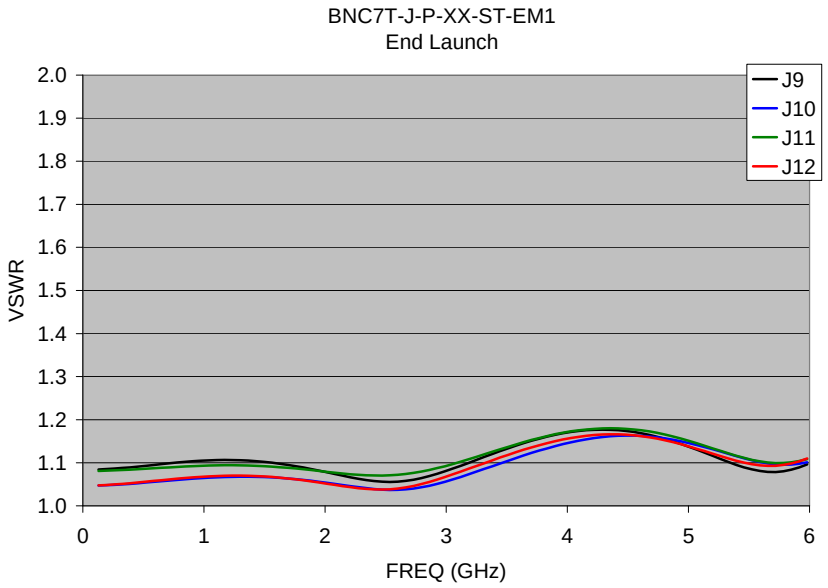

Figure 4: Gen 2 BNC7T-J-P-XX-ST-EM1 VSWR

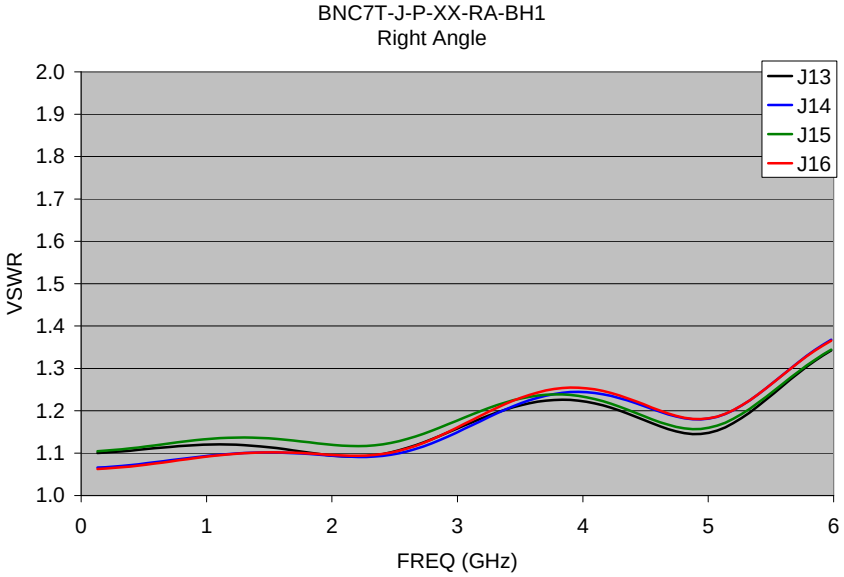

Figure 5: Gen 1 BNC7T-J-P-XX-RA-BH1 VSWR

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

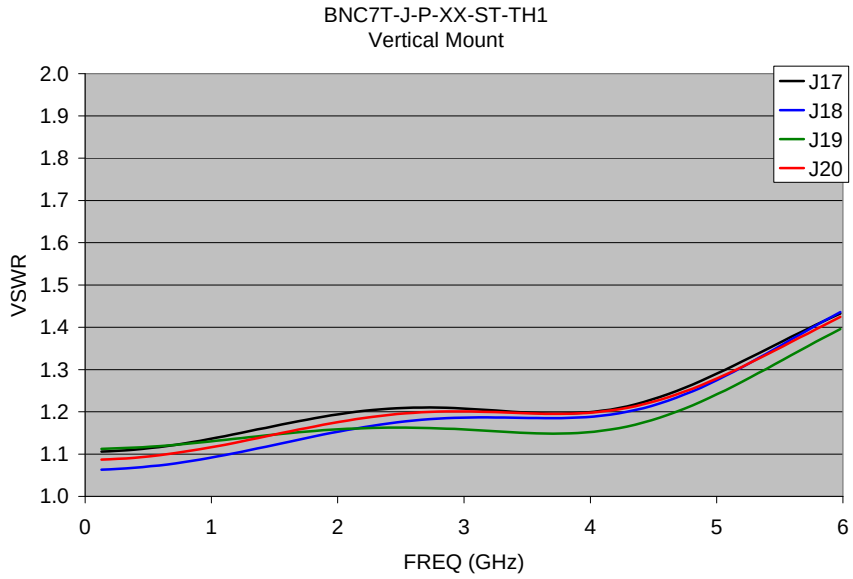

Figure 6: Gen 1 BNC7T-J-P-XX-ST-TH1 VSWR

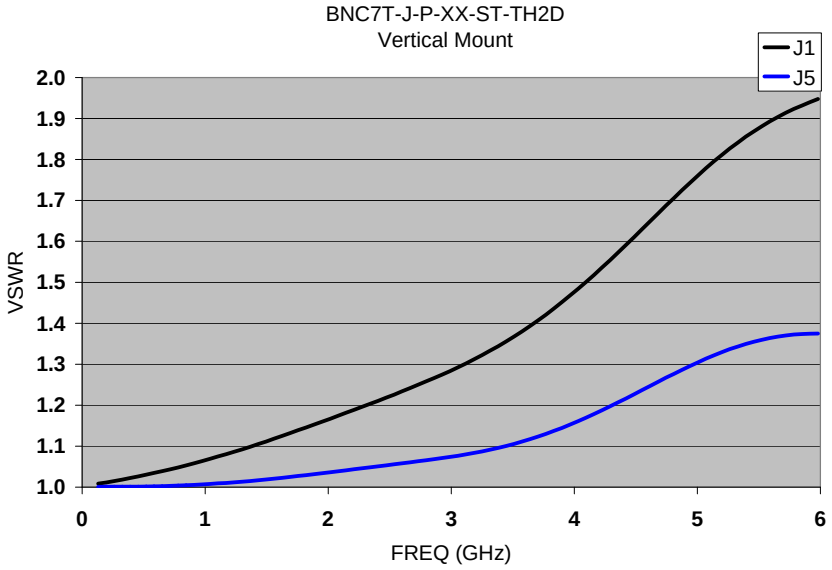

Figure 7: Gen 3 BNC7T-J-P-XX-ST-TH2D VSWR

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

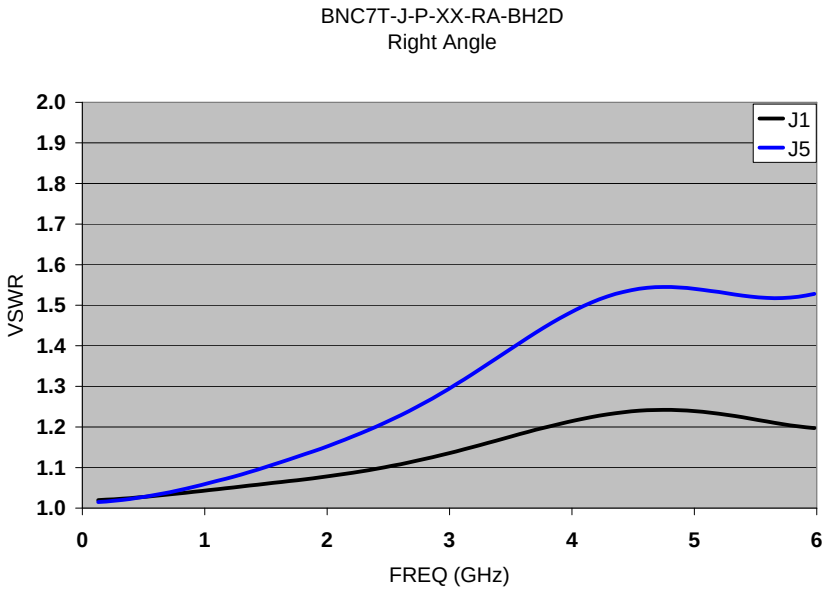

Figure 8: Gen 3 BNC7T-J-P-XX-RA-BH2D VSWR

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

Return Loss Data

Return Loss measurements were performed over the frequency range from 130 MHz to 6 GHz. All measurements were performed with the board mount jack mated to a 75-Ohm BNC male connector that was part of a 75-Ohm flexible cable assembly. Figure 9 - 15 shows the measured return loss data for board mount BNC connectors.

Figures 9 through 15 also include the SMPTE 424M-2006 limit line for reference. SMPTE 424M-2006 is a specification for 3 Gb/s serial data used for digital video transmission. All the BNC7T coaxial connectors combined with their optimized footprints easily met the requirements of this digital video transmission specification.

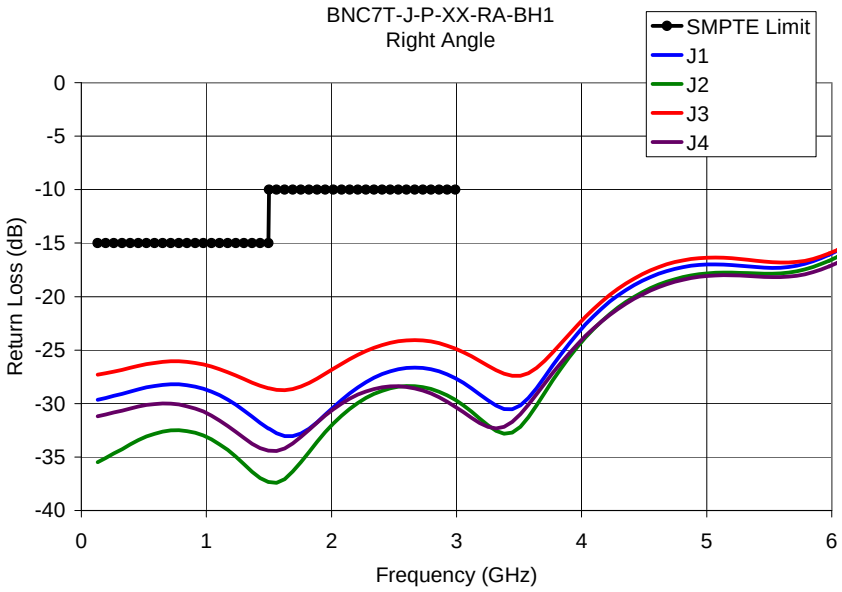

Figure 9: Gen 2 BNC7T-J-P-XX-RA-BH1 Return Loss

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

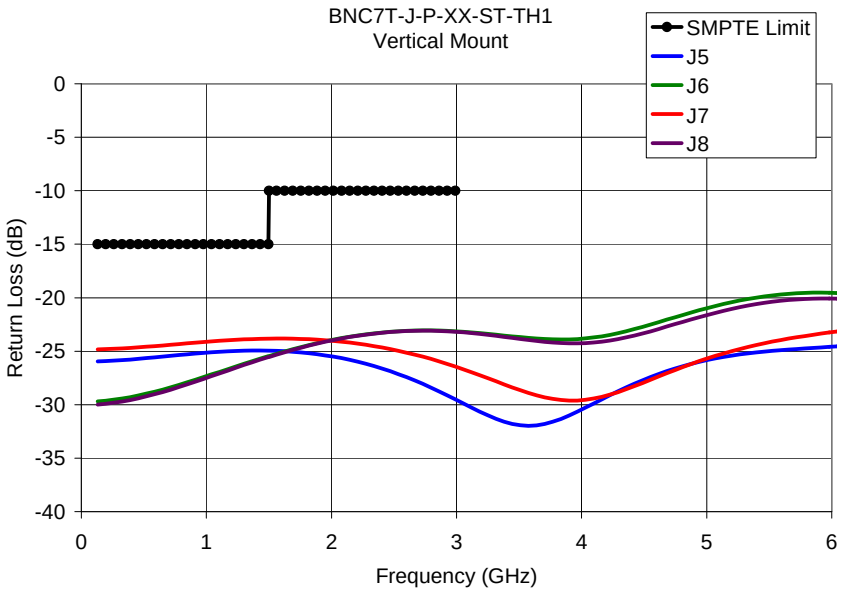

Figure 10: Gen 2 BNC7T-J-P-XX-ST-TH1 Return Loss

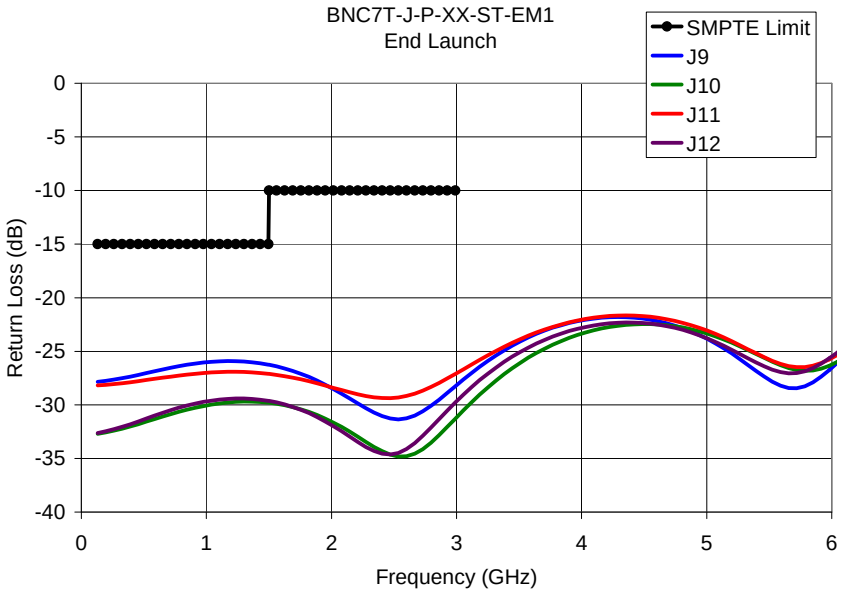

Figure 11: Gen 2 BNC7T-J-P-XX-ST-EM1 Return Loss

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

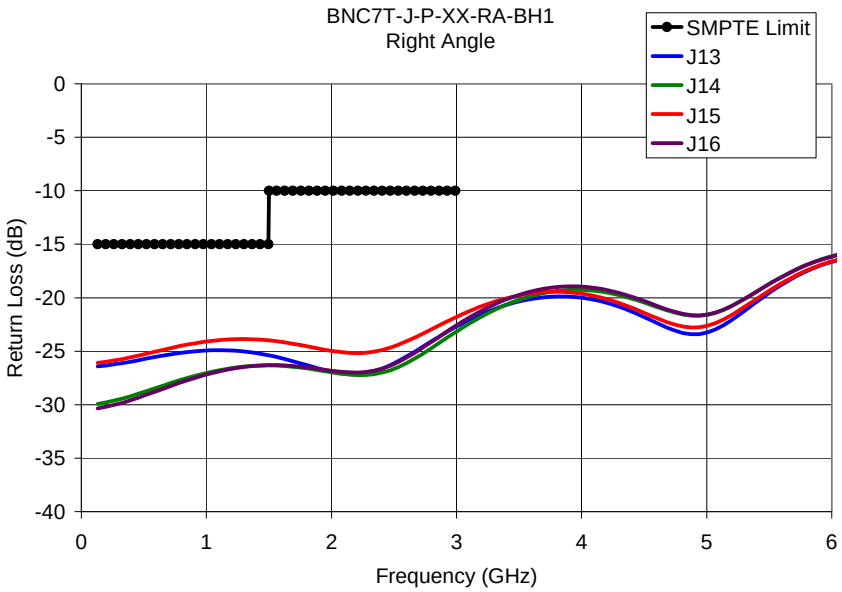

Figure 12: Gen 1 BNC7T-J-P-XX-RA-BH1 Return Loss

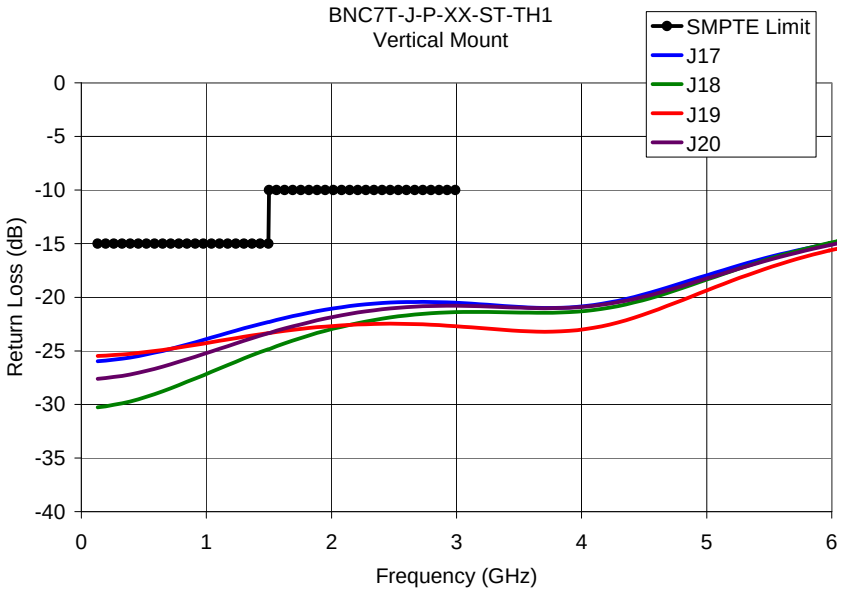

Figure 13: Gen 1 BNC7T-J-P-XX-ST-TH1 Return Loss

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

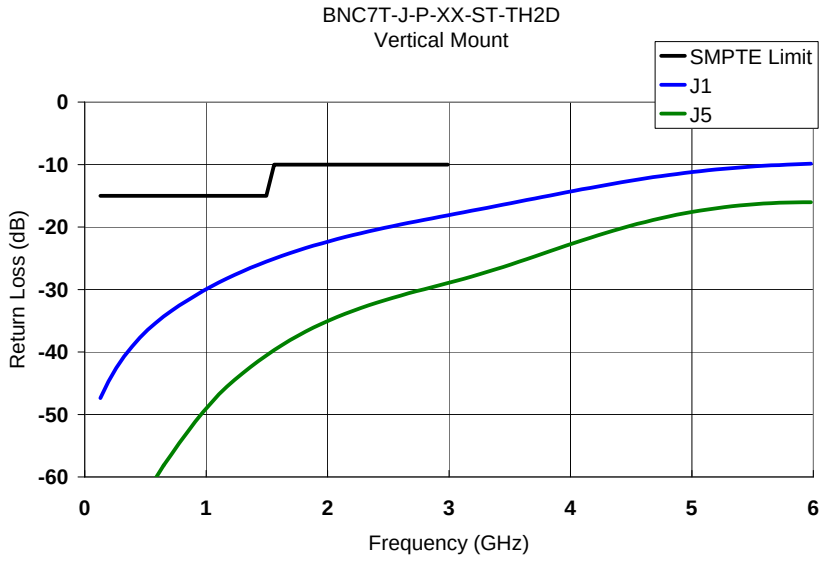

Figure 14: Gen 3 BNC7T-J-P-XX-ST-TH2D Return Loss

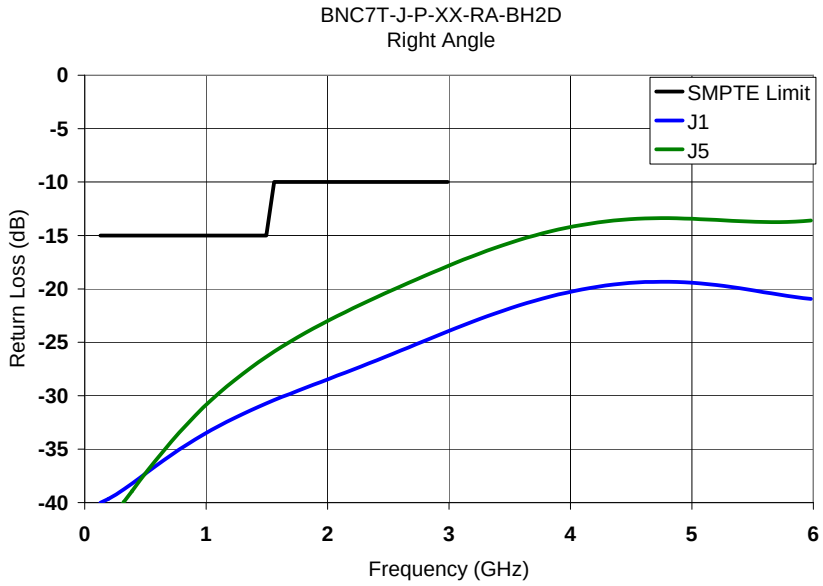

Figure 15: Gen 3 BNC7T-J-P-XX-RA-BH2D Return Loss

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

Test Procedure

Fixturing:

All measurements were performed using a test board, which has 75-Ω microstrip traces (nominal impedance). There is a connector at each end of the trace. During an actual measurement one connector of a trace serves as part of the mated pair device under test (DUT) and the other connector provides a means of terminating the far end.

A vector network analyzer is used to perform the measurements and is connected to the DUT as follows. One end of a 30-inch long 50-Ω SMA (m/m) test cable is attached to the network analyzer. The second end of the SMA test cable attaches to a SMA (f) to N (m) adapter. The adapter attaches to a 50-Ω N (f) to 75-Ω N (m) matching pad. The matching pad attaches to a 75--Ω N (f) to BNC (m) adapter. The adapter attaches to the first BNC end of a RF179 75-Ω test cable. The BNC (m) end of the 75-Ω test cable attaches to the DUT. The far end of the microstrip line of the DUT is terminated in a 75-Ω load. The 75-Ω cable BNC (m) connector and the board mount jack comprise the mated pair under test.

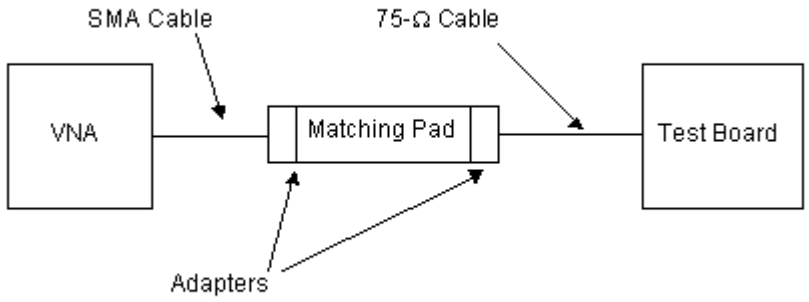

Figure 16: Test Setup for VSWR Measurement

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

VSWR Testing

All VSWR measurements were made using an HP 8720A vector network analyzer. It was set for a 201-point measurement response over the frequency range from 130 MHz to 13.1 GHz to allow use of the low-pass step response time domain transform capability. Response averaging was turned on and set to 8. An S11 1-port measurement calibration was performed at the end of the SMA test cable. The SMA cable was attached to the type N 50-Ω to 75-Ω matching pad, which attached to the DUT by means of a 75-Ω test cable as described previously. The far end of the test board is terminated in a 75-Ω load.

The measured response is viewed in the time domain using the low-pass step transform and the real data format. Gating is turned on. The Gate Start and Stop flags are set around the response of the mated pair of interest. See Figure 17 below. The response format is set to linear magnitude (reflection coefficient), and the time domain transform is turned off (but the gate remains on). In converting back to the frequency domain, the effects of the response outside the Gate are removed. The reflection coefficient data are read by a computer over the GPIB and mathematically corrected (multiplied by a factor of 3.72) to account for the two-way attenuation of the matching pad. The data is written in ASCII format to a data file. Data above 6 GHz is not used.

Note that the attenuation effects of the 75-Ω test cable are not taken into account and are a source of error. Based on published nominal attenuation values for RG-179 coaxial cable, it is estimated that the error in return loss at 5 GHz is about 1 dB. This is equivalent to an error of 0.05 for a VSWR of 1.3 or an error of 0.08 for a VSWR of 1.5. The errors are negative, which means the measured results are lower than the actual values.

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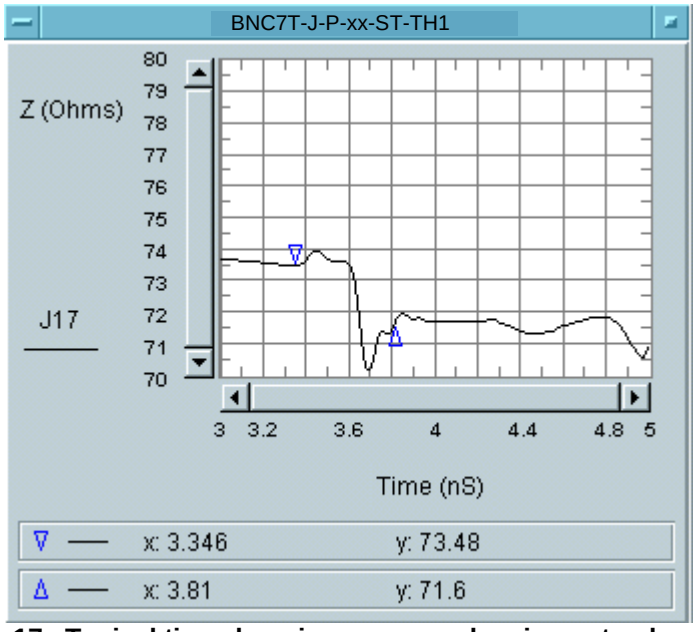

Figure 17. Typical time domain response showing gate placement.

Series: BNC7T
Description: 75 Ohm BNC Board Mount Jacks

Equipment

HP 8720A Network Analyzer
Pasternak PE7083 50-Ω N(f) to 75-Ω N (m) Matching Pad