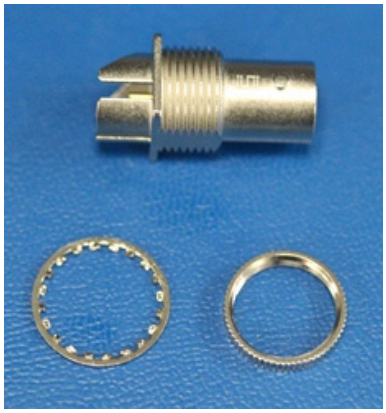
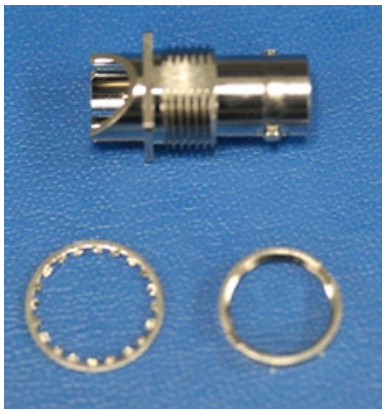
# RF Characterization Report

## BNC7T-J-P-HN-ST-EM1D



## BNC7T-J-P-HN-ST-EM1



## Description:
## 75 Ohm BNC Edge Mount Jack, Die Cast
## 75 Ohm BNC Edge Mount Jack, Screw Machine

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Report Revision: 1/31/2018

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## Test Setup Information

### Introduction:

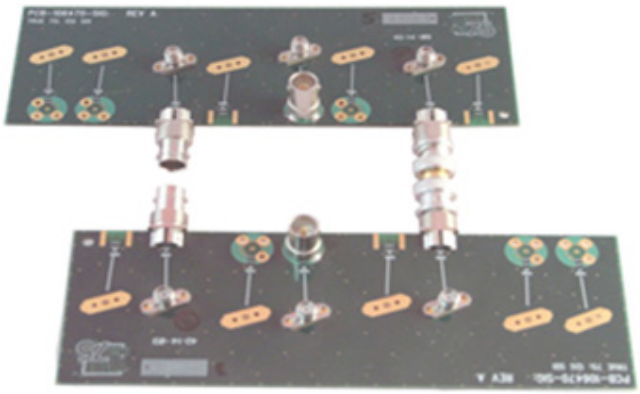
Testing performed evaluates the electrical performance of non-standard impedance products to 12 GHz. Evaluated are two 75 Ω PCB BNC7T Edge Mount Series connector types, die cast and screw machine. Measurements evaluate mated pair connector performance over a frequency range from 300 KHz to 20 GHz. All measurements conducted utilize specifically designed test boards (PCB-106470-SIG: Rev A, Figure 1) and Keysight Technologies Automated Fixture Removal (AFR) software tool for the project. AFR methods will de-embed mixed impedance fixturing effects followed by a bifurcation process, splitting dual mated pair performance into separate, single mated pair performance results.

### Product Description:

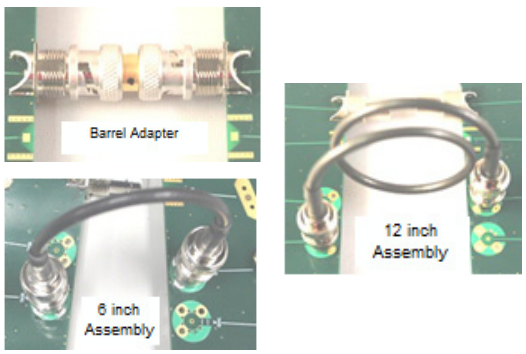
BNC7T-J-P-HN-ST-EM1D, Die Cast
BNC7T-J-P-HN-ST-EM1, Screw Machine

### Measurement Conditions:

| Test Sample Conditions | Mating Plug Pairs | | | | | |
|---|---|---|---|---|---|---|
| | End A | End B | End A | End B | End A | End B |
| | Radiall 75Ω Barrel Adapter BNC Plug to Plug (2) | | Amphenol 75Ω 6 inch Assembly BNC Plug to Plug (2) | | Amphenol 75Ω 12 inch Assembly BNC Plug to Plug (2) | |
| **Samtec BNC7T-J-P-HN-ST-EM1D Die Cast** | H-MM-1A | H-MM-2B | H-6in-1A | H-6in-2B | H-12in-1A | H-12in-2B |
| | H-MM-3A | H-MM-4B | H-6in-3A | H-6in-4B | H-12in-3A | H-12in-4B |
| **Samtec BNC7T-J-P-HN-ST-EM1 Screw Machine** | H-MM-5A | H-MM-6B | H-6in-5A | H-6in-6B | H-12in-5A | H-12in-6B |
| | H-MM-7A | H-MM-8B | H-6in-7A | H-6in-8B | H-12in-7A | H-12in-8B |



PCB FIXTURE/DUT




THREE CONDITIONS

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## Procedures

### Calibration for Fixture/DUT and 2X Thru Measurements:

Calibration is performed using the 50Ω Agilent mechanical calibration kit, PN 85052D, DC to 26.5 GHz; or an equivalent E-Cal module can be utilized. Performed at the male ends of each test port cable is an unknown thru SOLT type calibration (Figure 1). Standards used are the female open, female short and a female broadband load. The unknown thru standard is a Pasternack PE9331 3.5mm (f) to 3.5mm (f) precision adapter. NIST traceable open, short, and load standards establish the calibrated reflective reference points for all Fixture/DUT measurements. The unknown thru establishes transmission connection and its effects are determined negligible *(Two Port Network Analyzer Calibration Using an Unknown "Thru", Andrea Ferrero, Member, IEEE and Umberto Pisani, IEEE Microwave and Guided Wave Letters, Vol. 2, No.12, December 1992)*. The 50Ω standard impedance calibration provides a 20 GHz working bandwidth in which to operate. The unique 2X thru of non-standard 75Ω impedance product determines the bandwidth that can be measured effectively. The unique 2X Thru (Figure 3) standard is a one-time critical measurement applicable to all Fixture/DUT measurements**.** Fixture/DUT measurements total twelve, six die-cast and six screw machine, utilizing the 3-75Ω BNC plug conditions. The AFR bifurcation process generates two mated pair results for each measurement condition totaling twenty-four mated pair results.

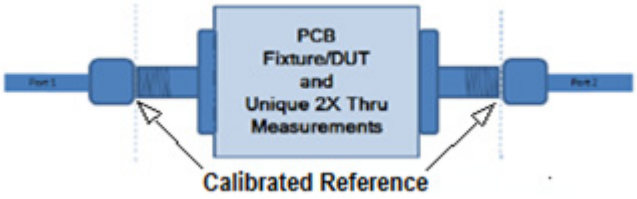


**Figure 1 – Standard 50Ω Impedance Calibration**

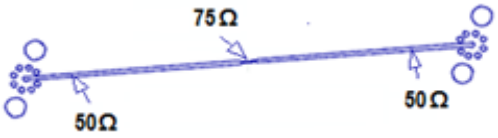


**Figure 2 – Unique 2X Thru**

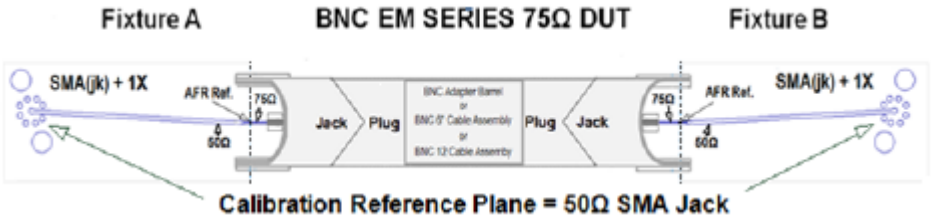


**Figure 3 – Fixtures De-embedded**

### AFR[1]

AFR is a module embedded into Keysight Technologies PLTS simulation and de-embedding software. Correctly implemented, AFR mathematical routines effectively apply the 2X Thru standard s-parameter characteristics to each of the Fixture/DUT s-parameter measurement characteristics that de-embeds all the unwanted PCB fixture

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effects. Non-shaded areas of Figure 3 depict fixtures “A and B” as de-embedded. Of interest are the shaded areas of the 75Ω BNC DUT that contain SI characteristics from two mated pairs of 75Ω BNC connectors, along with induced termination and cable effects from three conditional effects monitored. Final procedure is to employ a method called bifurcation (AFR$^2$) to extract single mated pair results.

**AFR$^2$**

The definition of bifurcation means to divide into two separate branches, which, when AFR is employed a second time, will occur. By dividing the dual mated pair file result from above against itself, using AFR, the equivalent files are extracted as fixtures, ”A” and “B” creating the equivalent mated pair result sought.

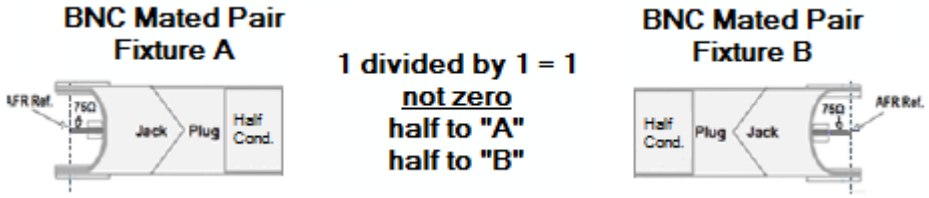


**Figure 4 – Two Mated Pair Results Extracted**

**Instrument Setup:**

| | |
|---|---|
| Network Analyzer | Agilent N5230C PNA-L Series (300 KHz -20GHz)<br>2-Port Configuration |
| Mechanical Calibration Kit | 85052D |
| Averaging Factor | 0 |
| Smoothing | Off |
| IF Bandwidth | 1 KHz |
| Sweep Start | 10 MHz |
| Sweep End | 20.0 GHz |
| Points | 1601 |
| Calibration File | 2015-01-02_2Port_Mech_CER |
| Test Cables | Huber-Suhner Sucoflex 104PEA |

**Simulation, Modeling and Analysis Tools:**

| | |
|---|---|
| Physical Layer Test System (PLTS), 2014 | Keysight Technologies |
| Automated Fixture Removal (AFR) | Keysight Technologies |
| AFR (Bifurcation) | Keysight Technologies |
| AFR$^1$ / AFR$^2$ Methods Reference | Non-Standard Impedance Testing |

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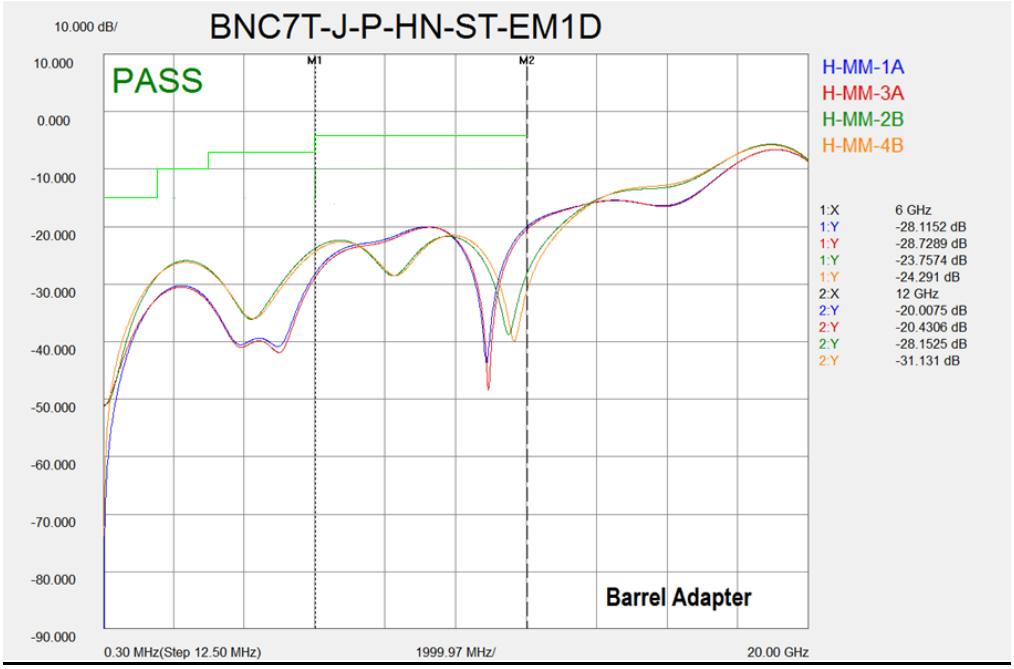
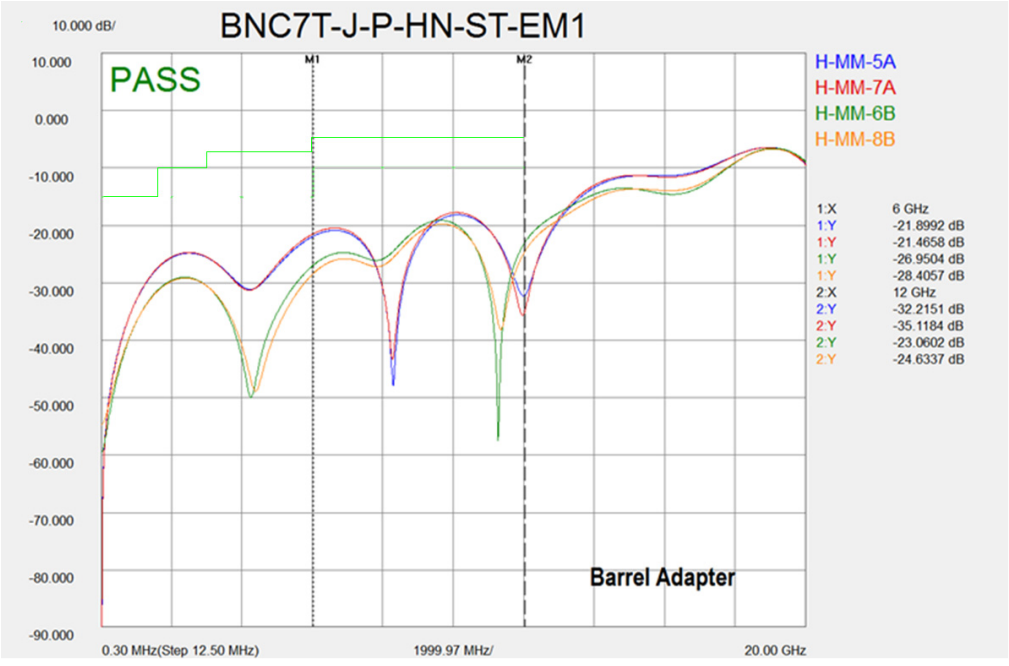
## Return Loss Results

### Samtec Die Cast Jack Mated to Radiall Plug Barrel Adapter




### Samtec Screw Machine Jack Mated to Radiall Plug Barrel Adapter



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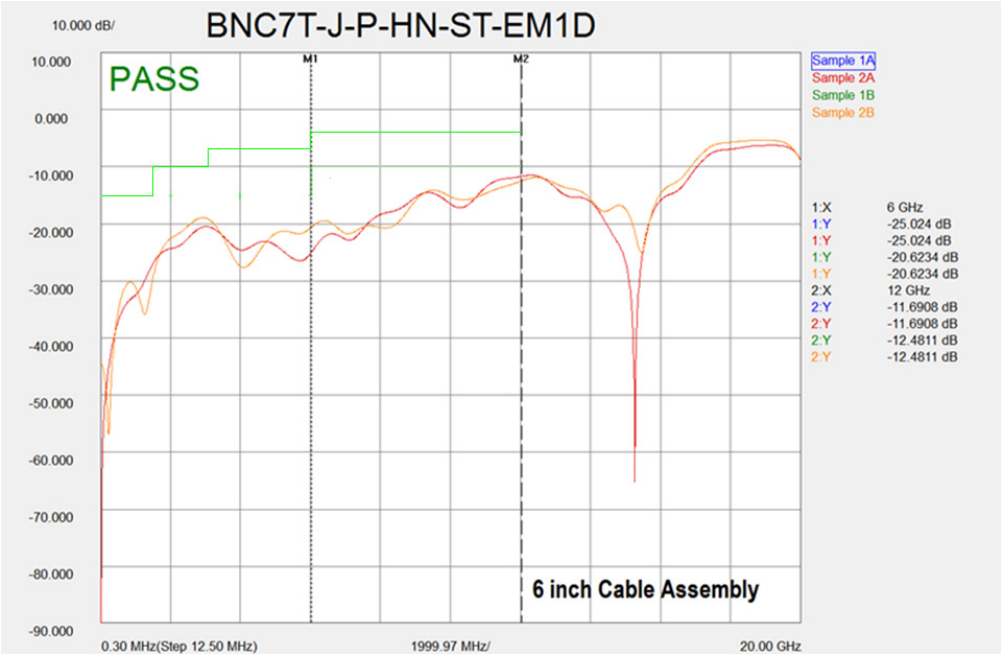
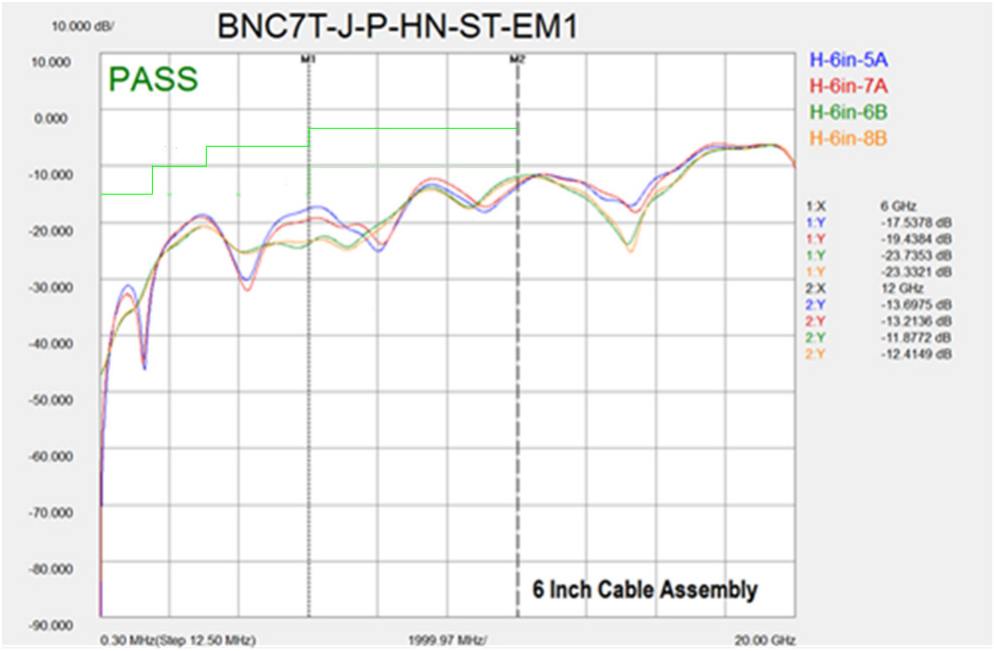
## Return Loss

### Samtec Die Cast BNC-EM Jack Mated to Amphenol 6” BNC Plug Cable Assembly




### Samtec Screw Machine Jack Mated to Amphenol 6” BNC Plug Cable Assembly



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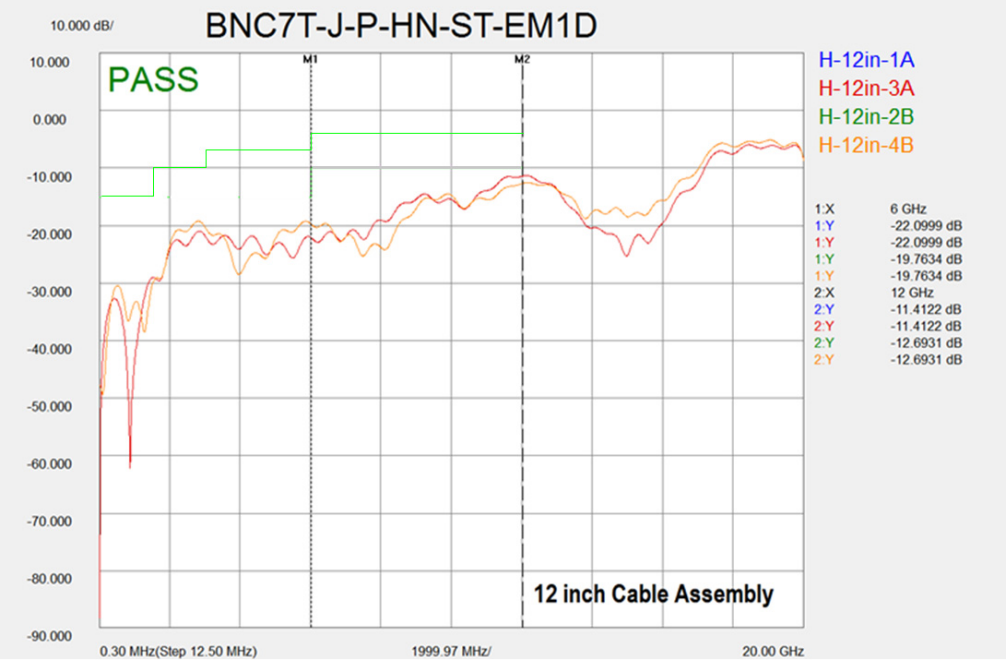
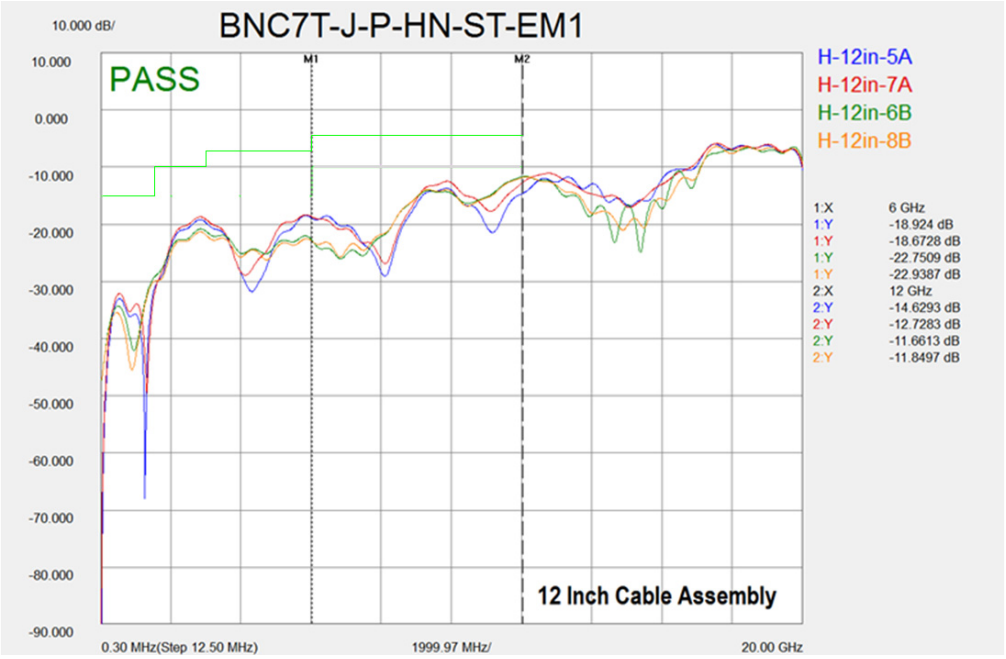
## Return Loss

### Samtec Die Cast BNC-EM Jack Mated to Amphenol 12” BNC Plug Cable Assembly




### Samtec Screw Machine Jack Mated to Amphenol 12” BNC Plug Cable Assembly



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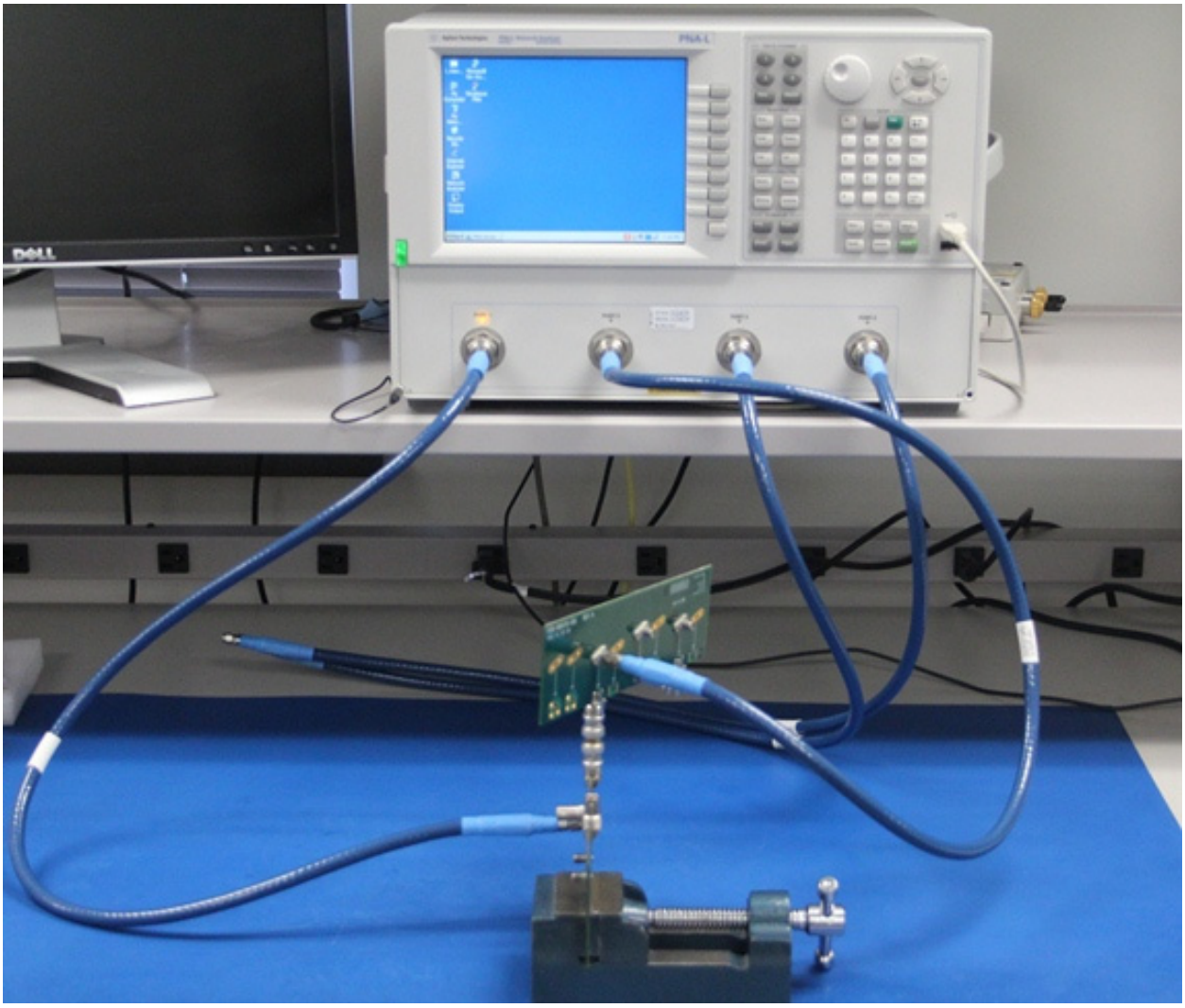
## Test Environment:




(A Typical set-up, actual part depicted.)