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User Manual for:

VEC-109 & VEC-109EX

Email version

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UNLESS OTHERWISE NOTED ALL PAGES ARE OF ORIGINAL ISSUE

REV.	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
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Contents:

1. General Information

Real Probe Overview

The Real Probe VEC-109&VEC-109EX is used for in-circuit RF & Microwave signal measurements as a unique testing and troubleshooting tool. The RealProbe features unprecedented performance in a compact size, it's a passive device which enables fast and convenient in-circuit measurements and debugging.

VEC-109&VEC-109EX does not require special feeding and can be connected via a proper SMA cable to any relevant measurements equipment such as spectrum analyzer, network analyzer, power meter, frequency counter, etc.

VEC109&VEC-109EX Kit Contents

- RealProbe tool.
- RealProbe pocket package: a special pocket package used for carrying and protecting the probe.

Available Optional Accessories

There are several optional accessories available for the VEC-109&VEC-109EX.

- VEC-104A – Calibration jig for best absolute measurements accuracy.
- VEC-105A – 1meter Real Probe low loss RF cable for accurate and reliable absolute high frequency measurements.

Preventive Maintenance

The best techniques for maintaining the integrity of the Product includes:

- Always store the RealProbe tool in its original pocket package when not in use.
- Never store the Real Probe loose in box, in a desk, or in a bench drawer.
- Keep the Real Probe clean. Use fine duster and alcohol to clean the probe body and its connectors if required.
- Prevent wetness, dust and dirt.
- Prevent accidental downfall.
- In order to prevent damage to the bottom pins, do not activate perpendicular force on them.

Electrostatic Discharge

Protection against ESD is recommended while probing circuits with sensitive components. To prevent damage to the probed circuits:

- Wear a grounded wrist strap.
- Use a grounded, conductive table mat.

2. Specifications

Electrical specification

	VEC-109	VEC-109EX
Frequency Range	10MHz – 12GHz	10MHz – 18GHz
Max average input (probed) power	2 watt	2 watt
Max Peak (probed) power	25 watt	25 watt
Max Input Voltage	35V DC max	35V DC max
Residual Insertion Loss on probed line	1dB max	1dB max
Residual Return Loss on probed line	14dBr min	14dBr min
Probing factor (Coupling)	25dB (±1dB)	25dB (±1dB)
Coupling output VSWR	2:1 min	2:1 min
Equipment output Impedance	50 ohm	50 ohm
Input/Output DC blocked	yes	yes

Notes:

All Electrical performances are related to 50ohm microstrip or back grounded coplanar, with proper side grounds and matched source/load impedance.

Residual and coupling parameters relates to the band 10MHz-12GHz for VEC-109 and 10MHz-18GHz for VEC-109EX.

Operating Temperature +5˚C to +40˚C

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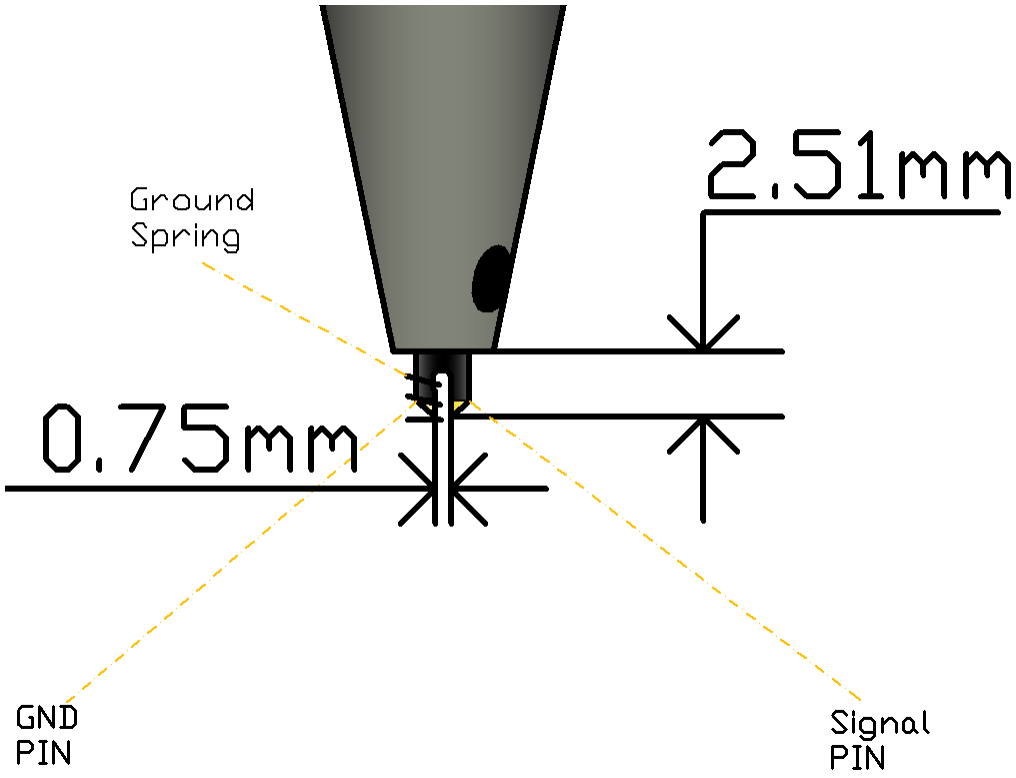
Mechanical specification:

VEC-109/109EX	
Diameter	12.1mm
Length	110mm
Spacing between pins	0.75mm
Ground pin spring	1.2mm(diameter)
Pin length	2.51mm



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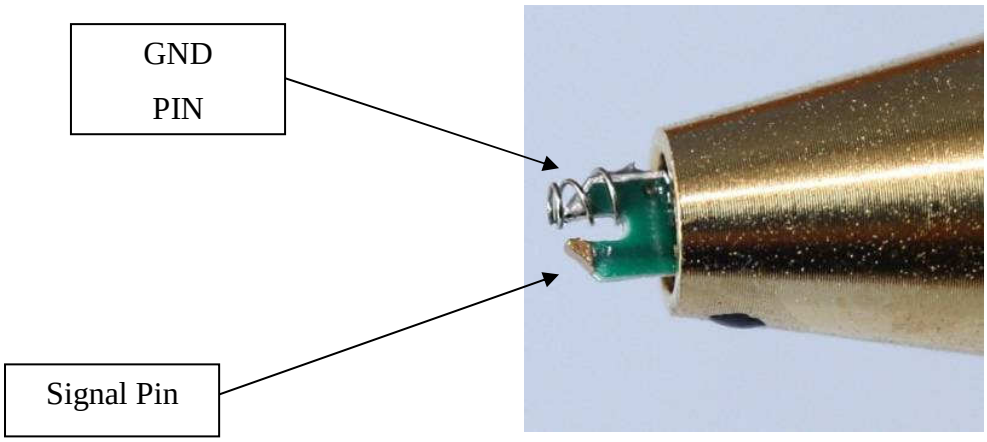
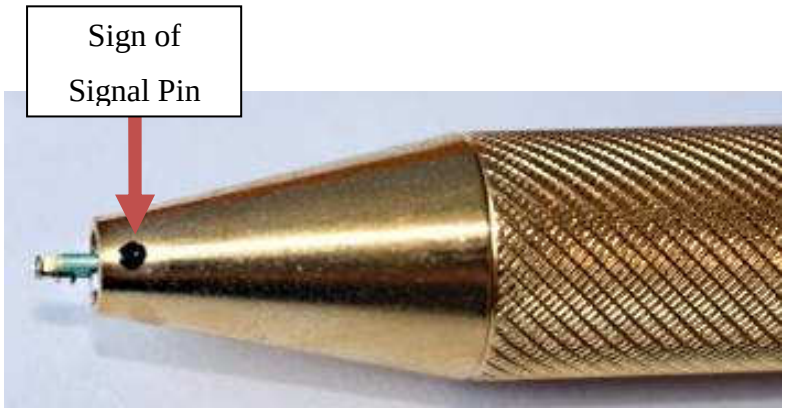
Drawing N1

Illustration of the Probe.





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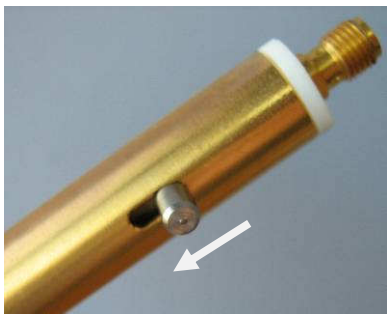
How to use Vectria's RealProbe

Basic Measurements (According to drawing N2)

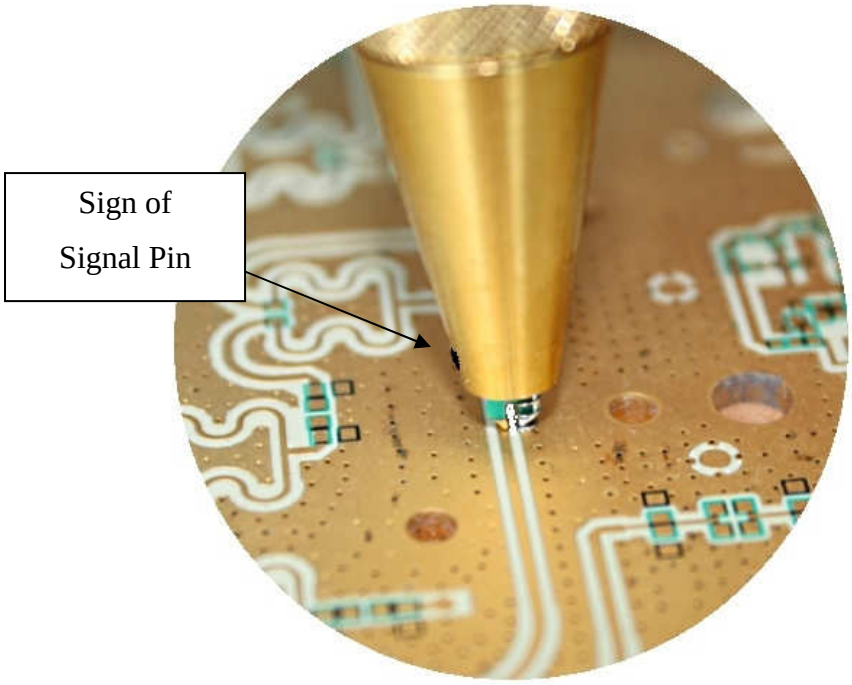
1. Carefully connect the probe's SMA connector to an RF cable.

2. Connect the other side of the RF cable to the measurement Instrument, such as, spectrum analyzer, network analyzer, power meter etc.

3. In order to start measurement, push down the button. Keep pressing the button while performing the measurements.

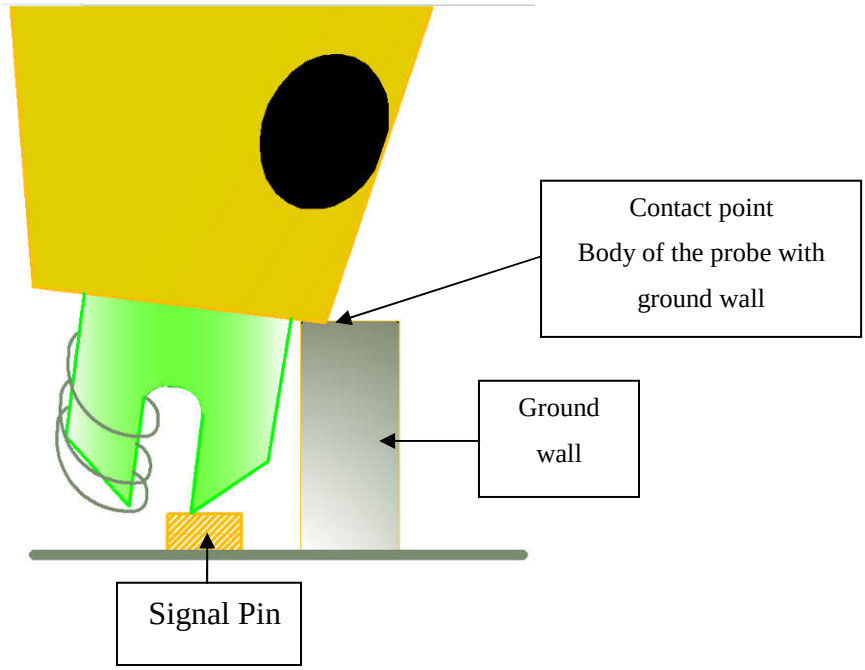


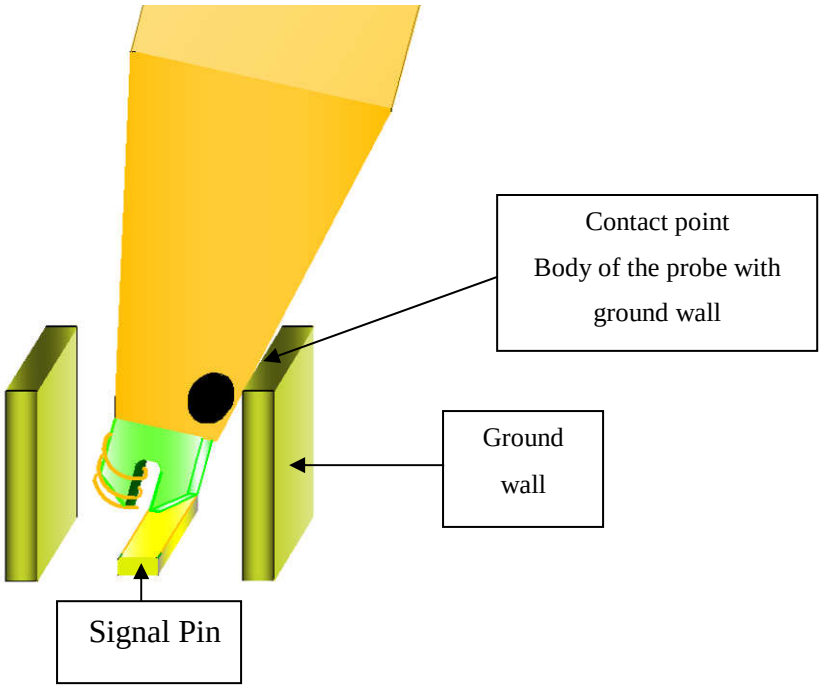
4. Use light force to make contact between the pins to the probed line and its side grounds.



5. In order to hold the Probe, use the illustration below.

6. You can use the body of the probe to make contact with ground walls in order to reach ground. Two options for your choice.





7. In case of absolute power measurements add 25dB to the measurement (the coupling factor of the probe).

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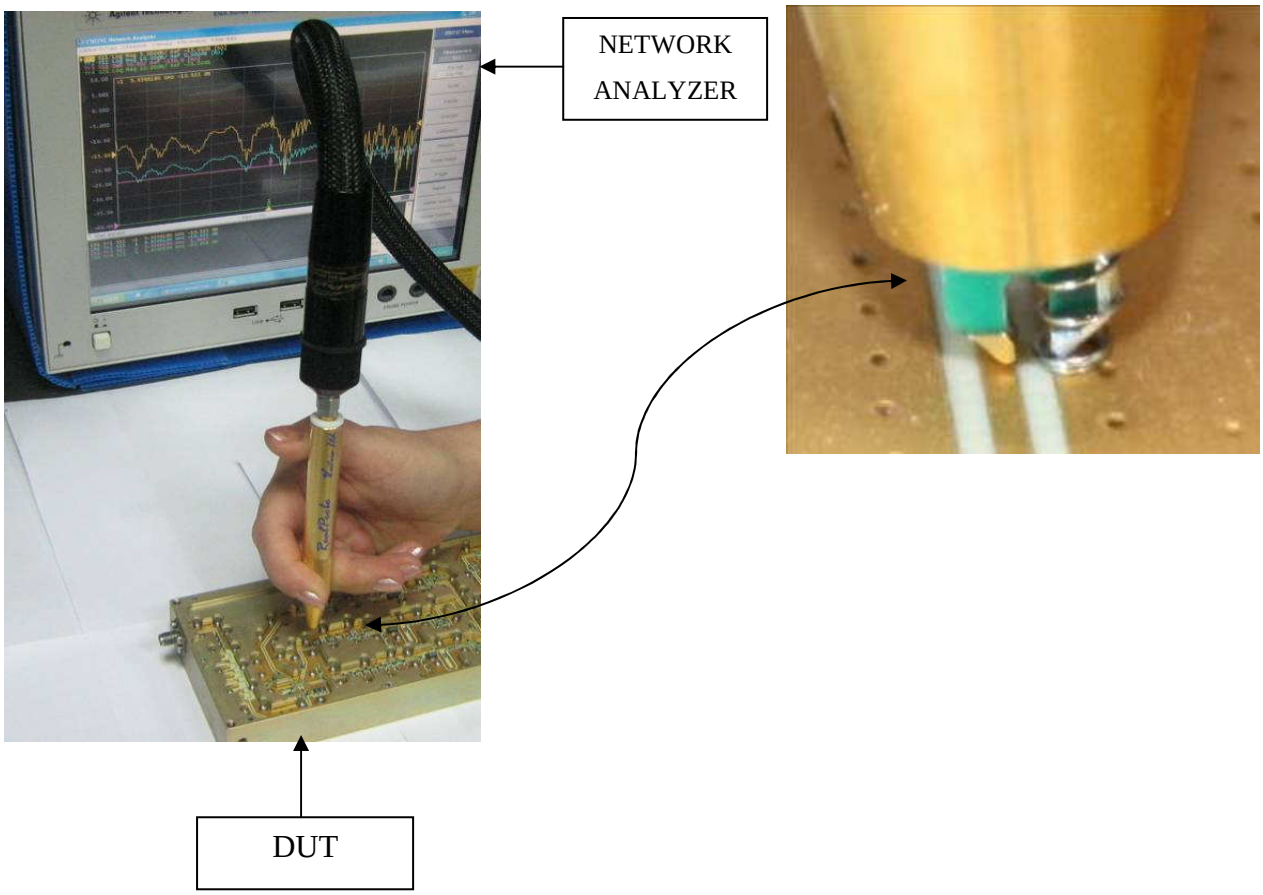
Drawing N2



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Best Power Measurements Accuracy With calibration jig VEC-104A
(Use Calibration Drawing N3)

1. Connect port 1 of calibration jig VEC-104A to a signal source.
   P (input) = Output power of the signal source after the RF cable (point no. 1 at the Drawing).
2. Connect the other side of the calibration jig VEC-104A to a broadband 50 ohm load (point
3. Carefully connect the SMA connector of the probe to a proper RF cable, preferably VEC-105A (point no. 3 at the Drawing).
4. Connect the other side of the RF cable to a power meter PORT 2, which is calibrated to the relevant frequency (point no. 4 at the Drawing).
5. Use light force to make contact between the bottom pins to the probed line and its side grounds .
6. Place the probing pin of the RealProbe between the markers on the calibration jig .
7. Hold the probe above the probed transmission line, which is under test, and perform set of measurements in the relevant frequencies that are of interest = P (measured).
8. Prepare a table with accurate probing factor=CF (Calibration Factor).
   Use the following equation to calculate CF: **CF = Pin – Pmeasured + HWJL.**
   HWJL = Half way Jig Loss, see attached data.

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HWJL Data table

Insertion Loss

Freq [GHz]	0.01	0.5	0.8	1	2	3	4	5	6	7	8
Loss [db]	0.00005	0.02	0.027	0.03	0.057	0.06	0.086	0.094	0.111	0.192	0.225

Freq [GHz]	9	10	11	12	13	14	15	16	17	18
Loss [db]	0.17	0.14	0.17	0.25	0.13	0.22	0.32	0.3	0.26	0.3

9. Determine the accurate absolute power at the point of probing using:
   Pprobed = Pmeasured + CF.

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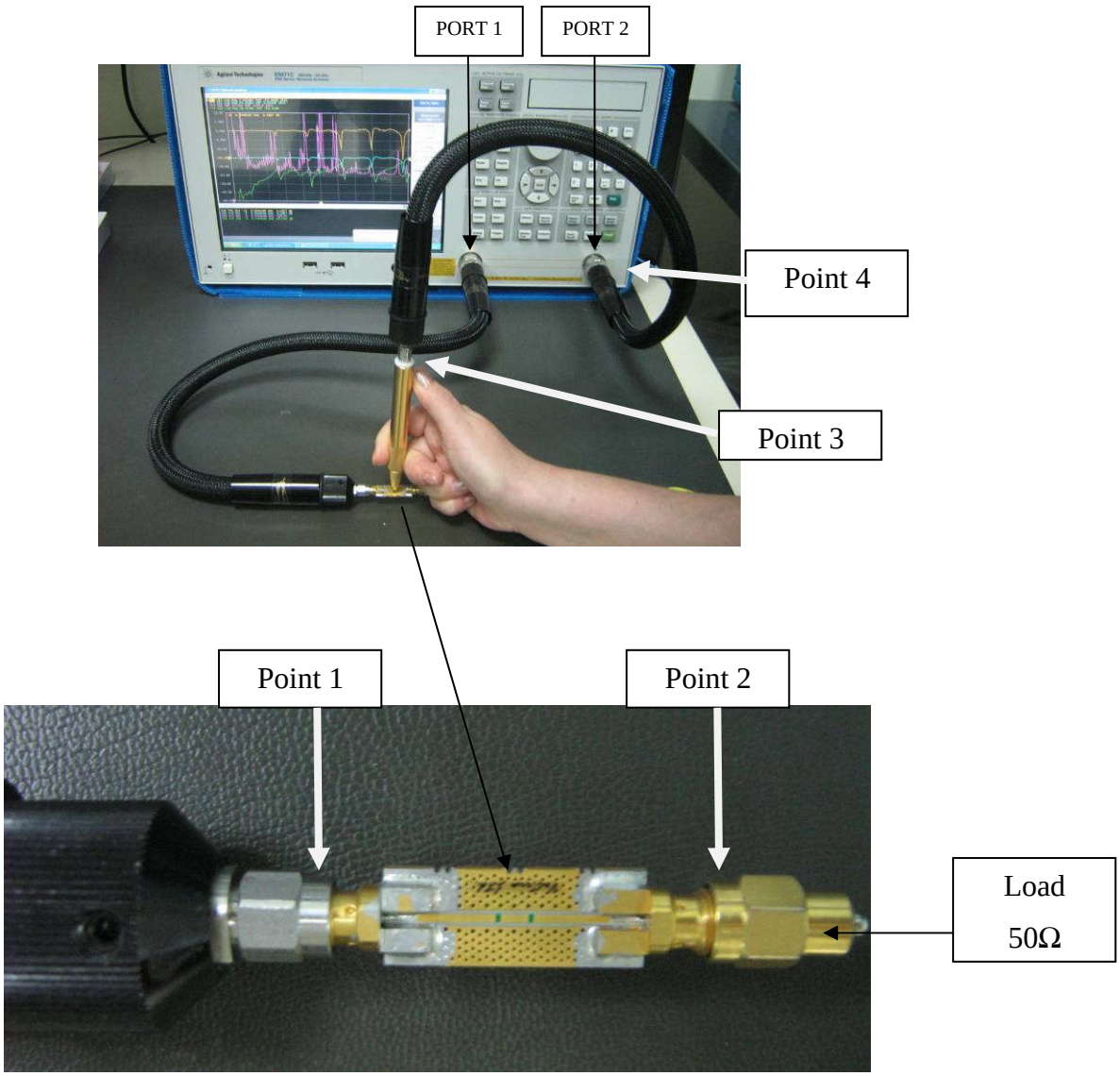
Calibration setup Drawing N3



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Gain Measurements using a Network Analyzer:

1. Use existing network calibration for the required frequency band or perform a normal new calibration.
2. Connect the Calibration jig VEC-104A to network port 1. output (or signal generator output for SNA, at output of the cable used for the network calibration). Connect 50ohm termination to the other side of the VEC-104A.
3. Connect the probe output to the network port 2. input (or detector input for SMA) directly, or preferably through the flexible cable VEC-105A.
4. Place the probing pin of the RealProbe between the markers on the calibration jig for sampling the RF signal on the VEC-104A calibration jig.
5. Use averaging factor of 100, Save S21 or transmission data to memory, display DATA/MEMORY, Check for transmission S21 ~0db using the marker readout across the band.
6. Disconnect network port 1. from the calibration Jig VEC-104A, connect the network port 1 to your device under test input and use the RealProbe to measure the gain from input to the each sampled point along the circuit.

Notes : 1. Use terminations at the DUT outputs.

2. If VEC-104A calibration jig was not purchased, use the above procedure on a reference point at the circuit's input.

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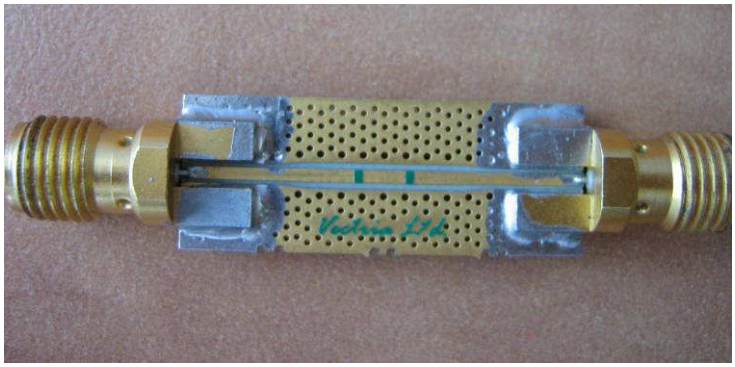
2. Real Probe Accessories Performance

VEC-104A Calibration Jig : Return Loss 10MHz – 18GHz : 15 dBr nom.



Insertion Loss

Freq [GHz]	0.01	0.5	0.8	1	2	3	4	5	6	7	8
Loss [dB]	0.0001	0.043	0.0552	0.0606	0.1151	0.1204	0.173	0.188	0.222	0.385	0.449

Freq [GHz]	9	10	11	12	13	14	15	16	17	18
Loss [dB]	0.34	0.293	0.35	0.488	0.2744	0.442	0.65	0.6	0.527	0.62

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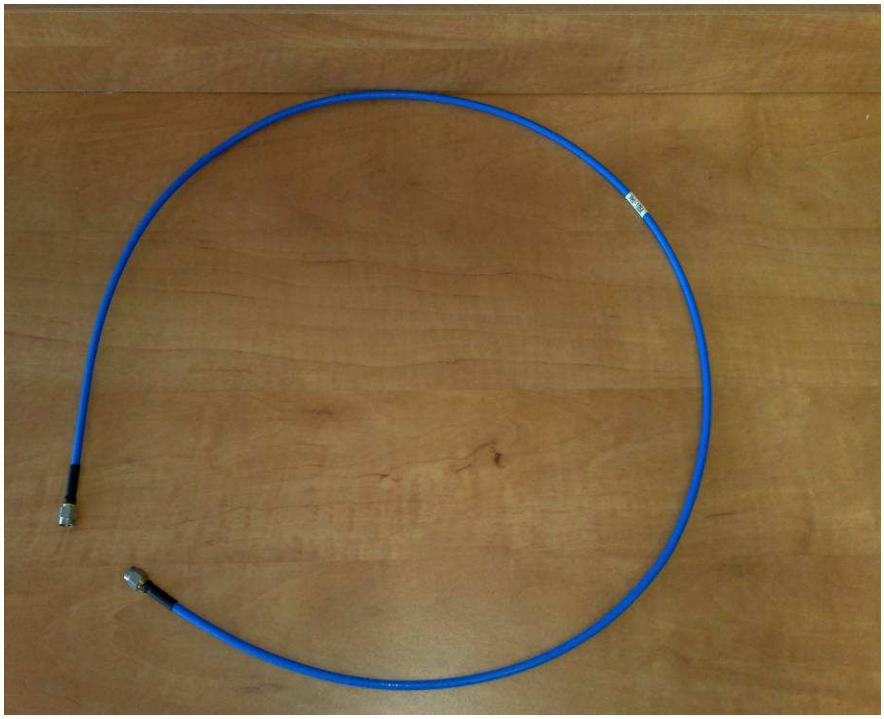
VEC-105A Flexible Cable:



Return Loss 10MHz – 18GHz : 20 dBr min.

Insertion Loss 10MHz – 18GHz : 2.6 dB max.