Vectria Technologies

User and Service Manual

RealProbe

VEC-102

Vectria Technologies

Contents:

Vectria Technologies

RealProbe

The Ultimate RF & Microwave In-Circuit Testing Tool

1. General Information

Real Probe Overview

The RealProbe VEC-102 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-102 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.

VEC-102 Kit Contents

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

Available Optional Accessories

There are several options available for the RealProbe.

- VEC-104 – RealProbe calibration jig for best power measurements accuracy.
- VEC-105 – 1meter RealProbe adapted flexible RF cable for accurate, reliable and convenient relative measurements.
- VEC-105A – 1meter RealProbe 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 RealProbe loose in box, in a desk, or in a bench drawer.
- Keep the RealProbe 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 spring connectors, 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

Frequency Range:	10MHz – 7GHz
Max average input (probed) power:	2 watt
Max Peak (probed) power:	25 watt
Max Input Voltage:	30V DC
Residual Insertion Loss on probed line:	0.6dB nom.*
Residual Return Loss on probed line:	16dBr nom.*
Probing factor (Coupling):	25dB (±1dB) nom. *
Typical 1dB Probing factor:	7GHz
Coupling output Return Loss:	18dBr nom.*
Equipment output Impedance:	50 ohm
Input/output DC blocked	

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 - 6GHz.

Operating Temperature

$+5^{\circ}$ C to $+40^{\circ}$ C

Mechanical specification:

Center spring probe

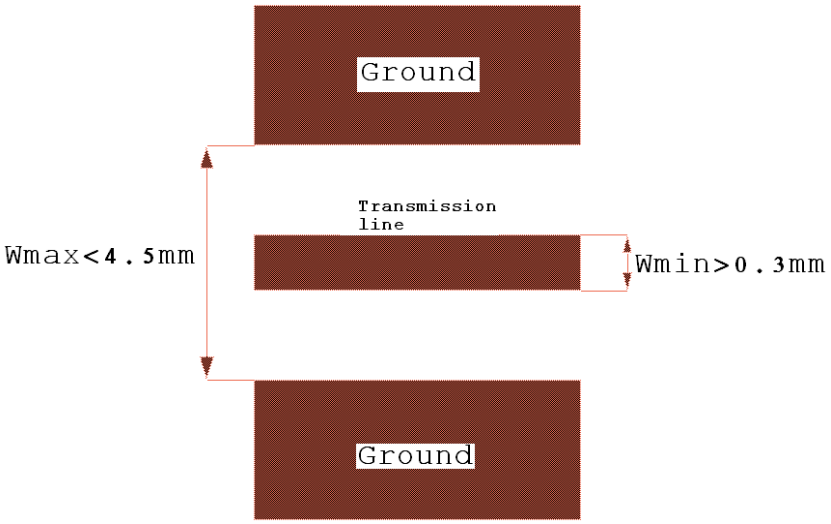
- diameter 0.4mm
- max travel 0.5mm

Side spring (ground) probe

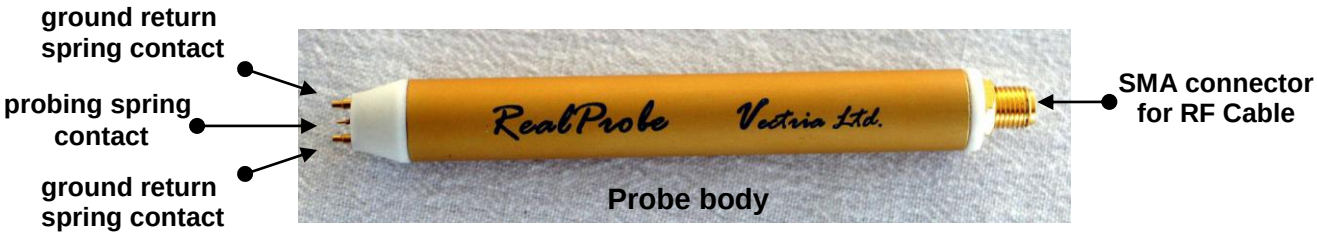
- diameter 1mm
- max travel 1.4mm

Spacing between center and side spring 2.5mm

Layout Recommendations



3. How to use Vectria's RealProbe



Basic Measurements

1. Carefully connect the SMA connector of the probe 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. Use light force to make gentle contact at all points of the bottom pins to the probed line and its side grounds.
4. Hold the probe above the probed transmission which is under test and perform the measurement.
5. In case of absolute power measurements add 25dB to the measurement (the coupling factor of the probe).

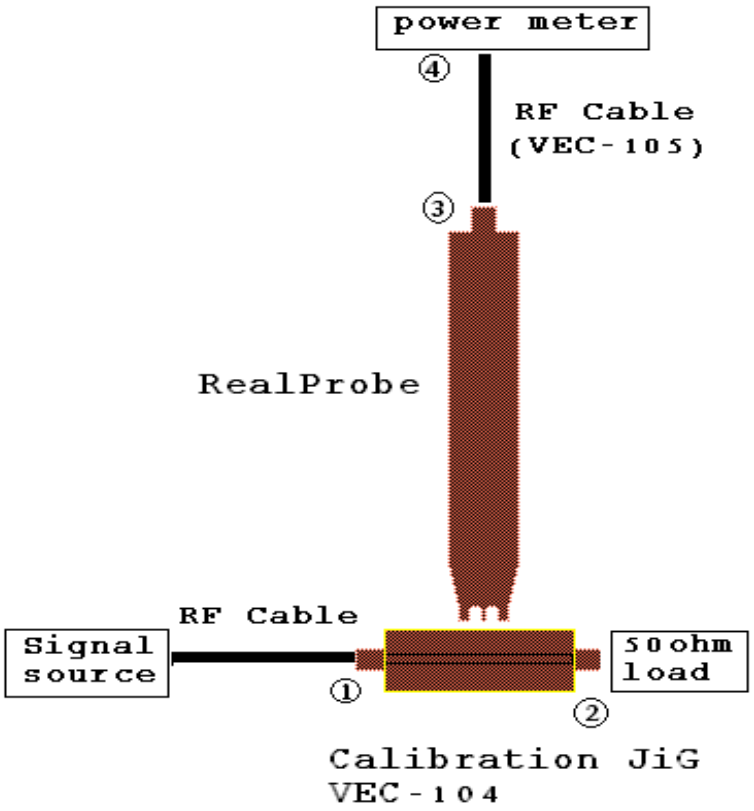
Best Power Measurements Accuracy With calibration jig VEC-104
(Use Calibration Setup Drawing in the next page)

1. Connect one port of calibration jig VEC-104 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-104 to a broadband 50 ohm load (point no. 2 at the Drawing).
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, 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)**.

Continued on the next page…

Vectria Technologies

Calibration Setup Drawing



8. Prepare a table with accurate probing factor =CF (Calibration Factor)
   Use the following equation to calculate CF.
   CF = P in – Pmeasured + HWJL
   HWJL = Half way Jig Loss, see attached data.

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

HWJL Data table:

Freq [MHz]	Loss [db]
10	0.01
1000	0.05
2000	0.07
3000	0.08
4000	0.09
5000	0.11
6000	0.13
7000	0.15

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-104 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-104.
3. Connect the probe output to the network port 2. input (or detector input for SNA) directly, or preferably through the flexible cable VEC-105/105A.
4. Place the probing pin of the RealProbe between the markers on the calibration jig for sampling the RF signal on the VEC-104 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-104, 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-104 calibration jig was not purchased, use the above procedure on a reference point at the circuit's input.

4. RealProbe Accessories Performance

VEC-104 Calibration Jig : Return Loss 10MHz – 7GHz : 20 dbr nom.
Insertion Loss @ 10MHz : 0.02 db
500MHz : 0.046 db
800MHz : 0.068 db
1GHz : 0.1 db
2GHz : 0.14 db
3GHz : 0.16 db
4GHz : 0.18 db
5GHz : 0.22 db
6GHz : 0.26 db
7GHz : 0.30 db

VEC-105 Flexible Cable : (Highly flexible) Return Loss 10MHz – 6Hz : 20 dbr nom.
Insertion Loss @ 10MHz : 0.25 db
500MHz : 0.60 db
800MHz : 0.75 db
1GHz : 0.85 db
2GHz : 1.20 db
3GHz : 1.50 db
4GHz : 1.75 db
5GHz : 2.05 db
6GHz : 2.30 db

VEC-105A Flexible Cable :	Return Loss 10MHz – 7GHz	:	20 dbr nom.
(Low Loss)	Insertion Loss @ 10MHz	:	0.04db
	500MHz	:	0.34db
	800MHz	:	0.42db
	1GHz	:	0.47db
	2GHz	:	0.67db
	3GHz	:	0.85db
	4GHz	:	1.00db
	5GHz	:	1.10db
	6GHz	:	1.22db
	7GHz	:	1.31db