Paricon Technologies

Coaxial contact

Measurement Results

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Objective

The objective of these measurements is to determine the RF performance of a Paricon coaxial contact. Measurements in both frequency and time domain form the basis for the evaluation.

Methodology

Frequency domain measurements were acquired with a network analyzer (HP8722C). The instrument was calibrated up to the end of coax probes with the same diameter as the connector. The device under test (DUT) was then mounted to the fixture and the response measured.

Time domain measurements are obtained via Fourier transform from VNA tests. These measurements reveal the type of discontinuities at the interfaces plus contacts.

Test procedures

To test for insertion properties the analyzer is calibrated through the coax cables without any material present. 1 piece of interconnect material or an additional section of transmission line with 2 pieces of material is then inserted and the measurement repeated.

Setup

Testing was performed with a test setup that consists of a brass plate that contains the coaxial probes. The material or additional section is inserted between the two ends with coaxial connectors.

Fig. 1 shows a sketch of the setup:

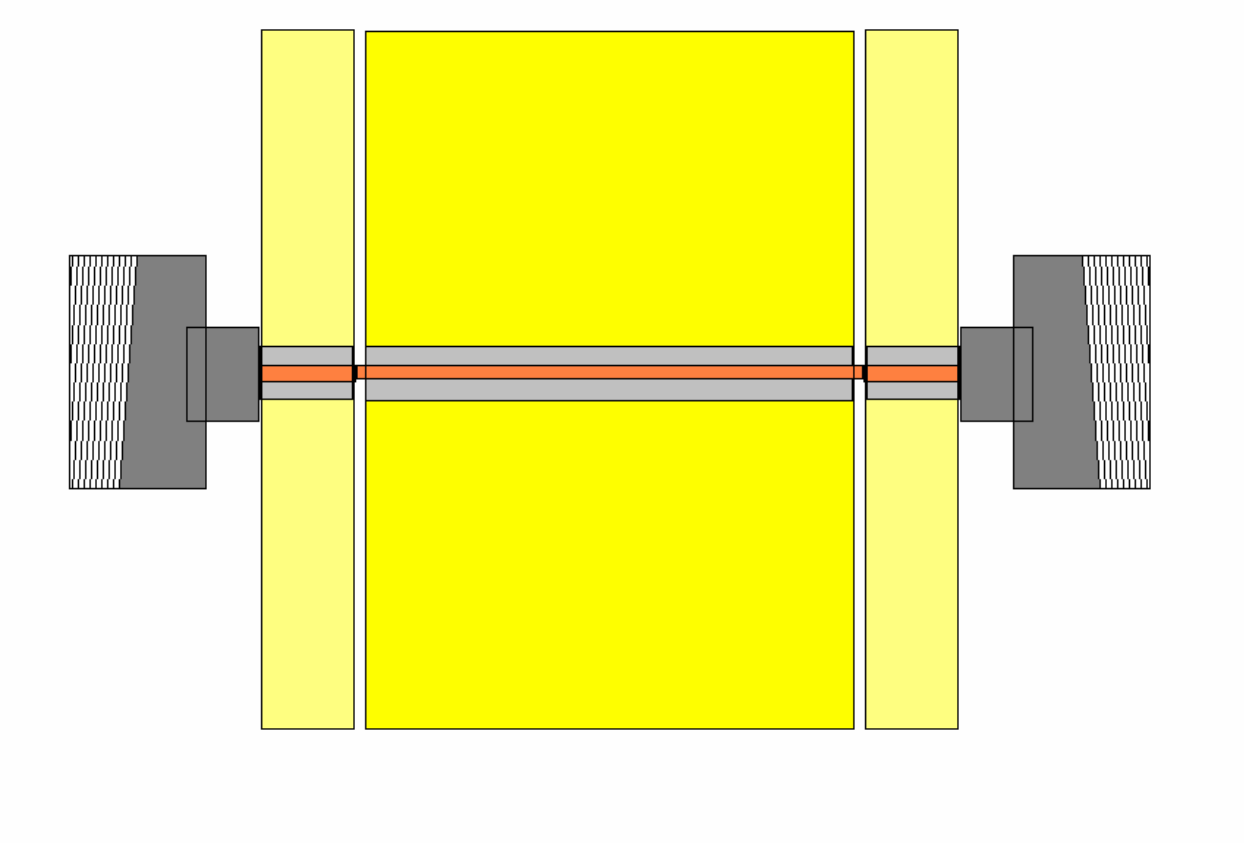

Figure 1 coaxial contact setup sketch

The coaxial line has a diameter of 0.25”. The inserted section is 4 mm long, the Pariposer material is 0.25 mm thick in the uncompressed state.

Connections to the VNA are made with high quality coaxial cables with K connectors.

Measurements

Time domain

The time domain measurements will be presented first. TDR reflection measurements are shown below. The first graph shows the TDR response with and without one piece of Pariposer material inserted:

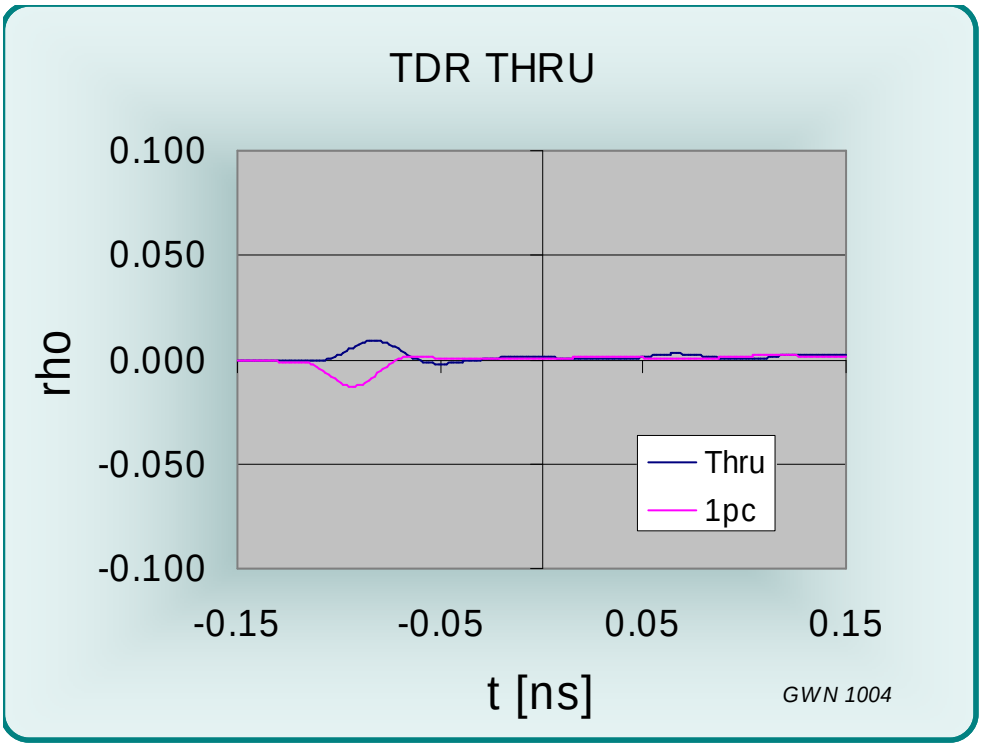

Figure 2 TDR measurement

The thru TDR response shows no significant perturbation of the 50 Ohm impedance level. The peak corresponds to an impedance of 50.9 Ohms. The dip below the 0 line goes to 49.8 Ohms.

The second TDR measurement indicates the response for the case of a 4 mm long transmission line section plus 2 pieces of Pariposer material inserted:

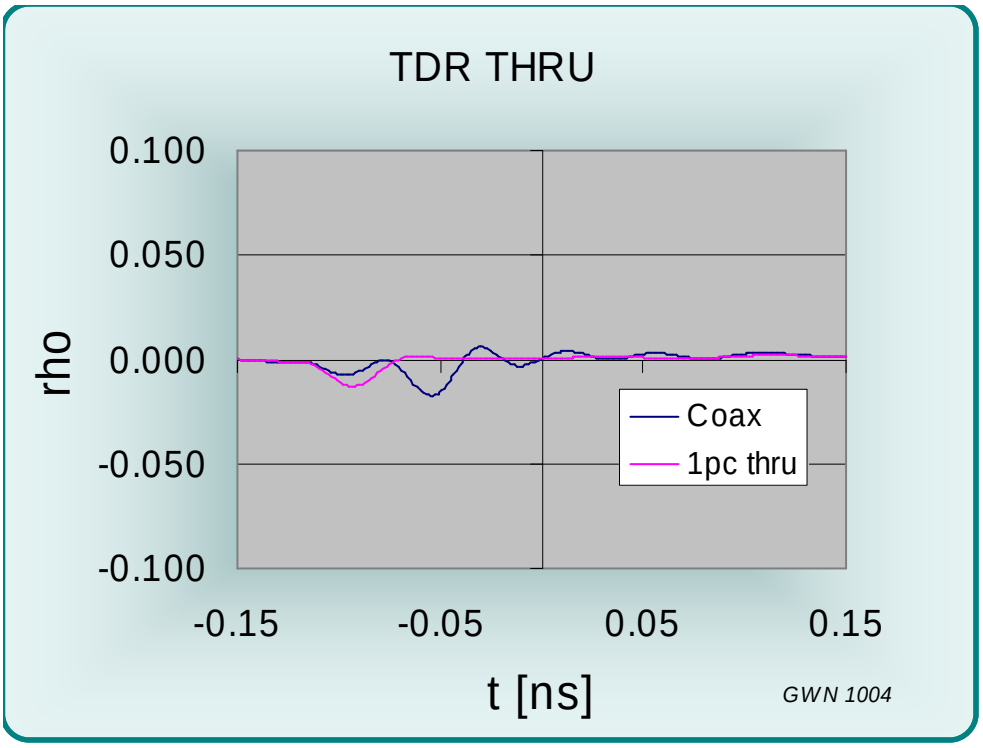

Figure 3 TDR measurement

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Again, there is hardly any perturbation of the 50 Ohm environment. Here the peak corresponds to an impedance of 50.6 Ohms. The dip below the 0 line goes to 48.3 and 48.8 Ohms for the 1pc vs. 2pc with coax connection.

The TDT performance for a step propagating through the 1 piece Pariposer material was also recorded:

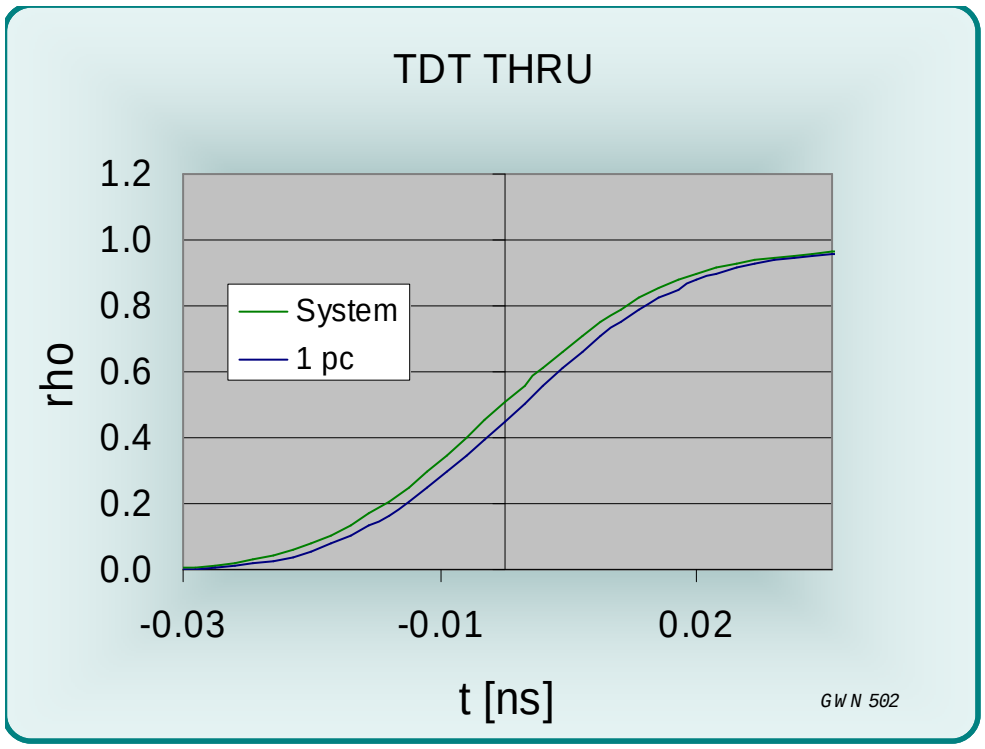

Figure 4 TDT measurement

The TDT measurements for transmission show an identical risetime through the connection (10-90% RT = 28.5 ps, the system risetime is 28.5 ps). The added delay at the 50% point is 1.5 ps and is at the resolution limit. If the 20%-80% values are extracted, the risetime is only 19.5 ps vs. 19.5 ps system risetime.

The measurement was then repeated for the case of the inserted 4 mm long coax line plus 2 pieces of Pariposer material:

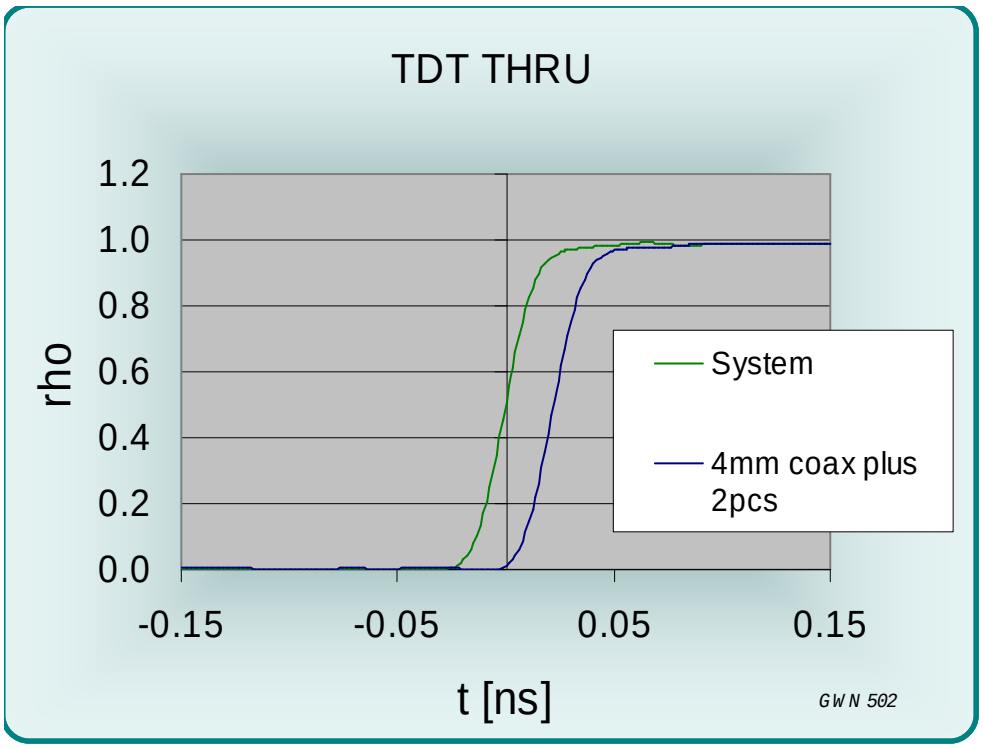

Figure 5 TDT measurement

Risetime through the connection is again unaffected by the DUT insertion (10-90% RT = 28.5 ps, the system risetime is 28.5 ps). The added delay at the 50% point is 22.5 ps. If the 20%-80% values are extracted, the risetime is only 18.0 ps vs. 18.0 ps system risetime.

Frequency domain

An insertion loss measurement is shown below for the case of one inserted piece of Pariposer material in the frequency range of 50 MHz to 10 GHz.

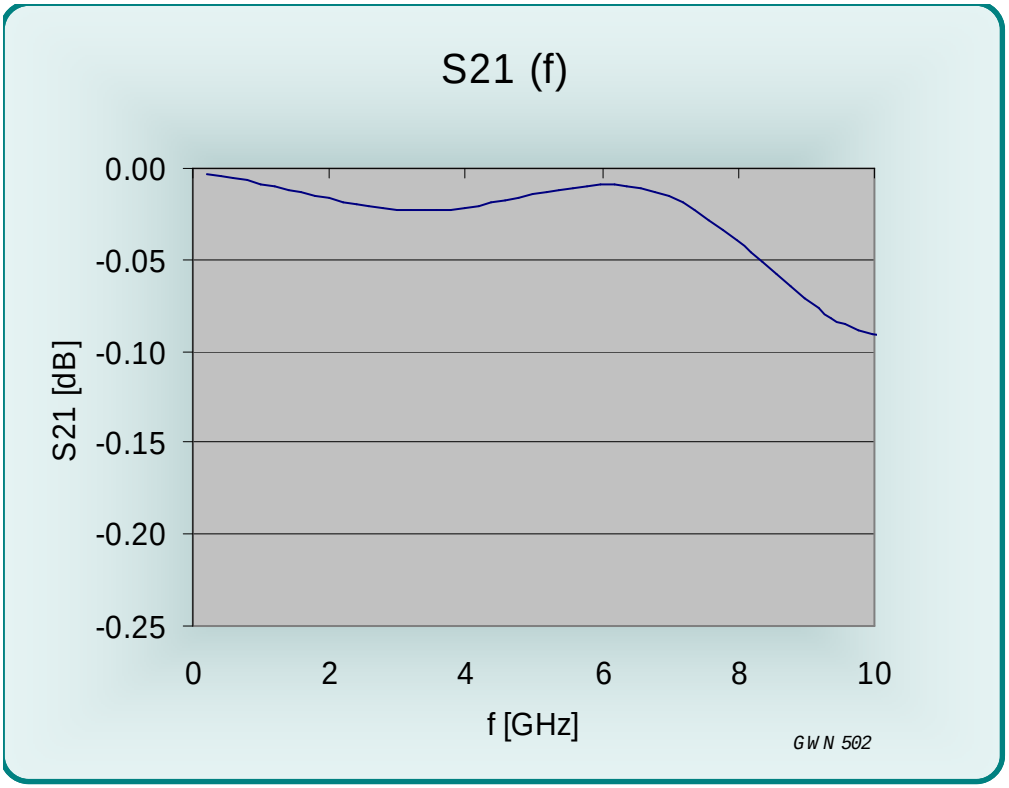

Figure 6 Insertion loss S21 (f)

Insertion loss is less than 0.1 dB to 10 GHz. It should be kept in mind that the coaxial cable has its first higher order mode around 10 GHz. The Pariposer material itself is well capable of exceeding this frequency limit.

Again, the measurement is repeated with the 4mm coaxial line section plus 2 pieces of Pariposer material inserted. The insertion loss observed in that case is shown below:

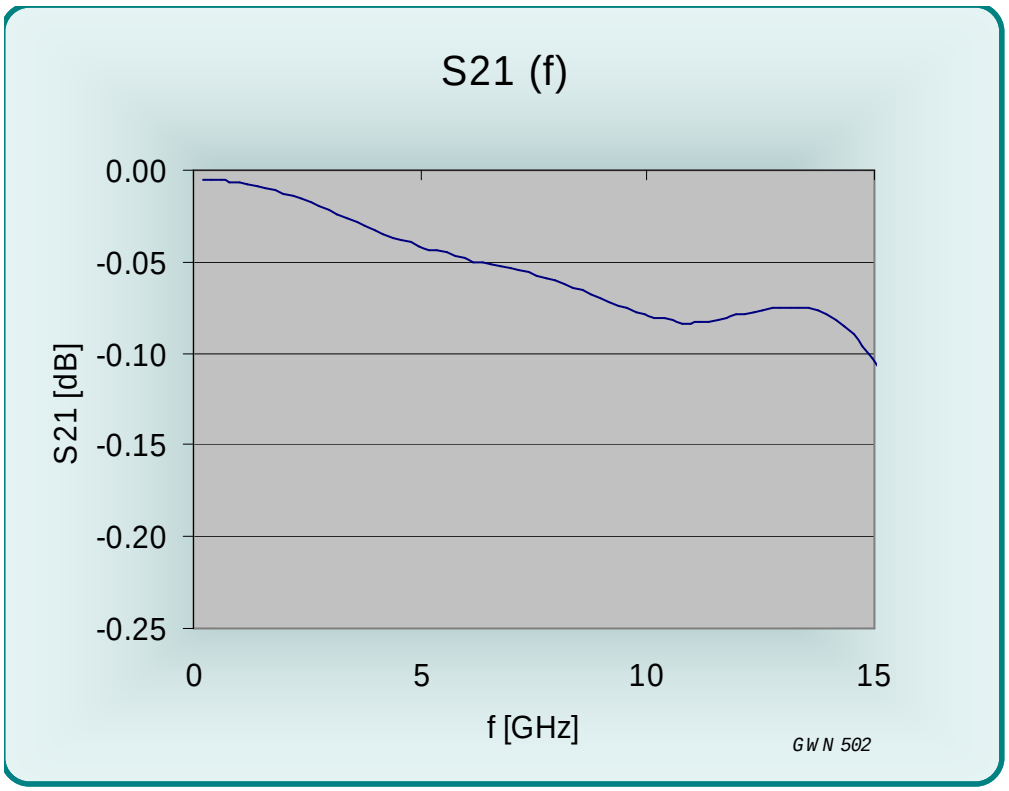

Figure 7 Insertion loss S21 (f)

Insertion loss is less than 0.1 dB to 15 GHz. Here, too, the coaxial cable has its first higher order mode around 10 GHz. The Pariposer material itself is capable of exceeding this frequency limit.

Return loss for both cases was also recorded. A comparison between only a coaxial cable to coaxial cable connection plus the same connection with one piece of Pariposer material inserted is shown in the first graph:

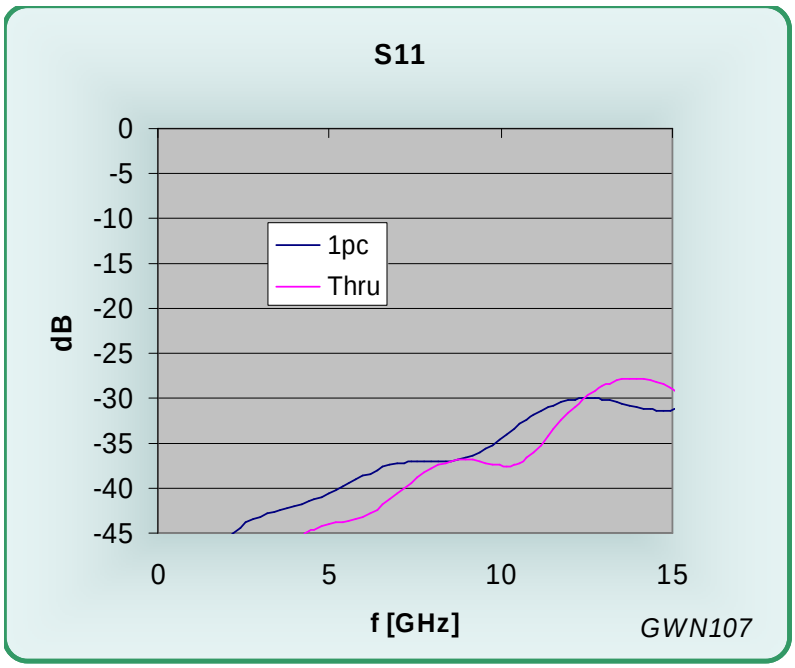

Figure 8 S11 magnitudes (f) for the thru measurement into a 50 Ohm load

Return loss values are very low. The same graph is also shown for the case of the inserted 4 mm coax section with 2 Pariposer material pieces:

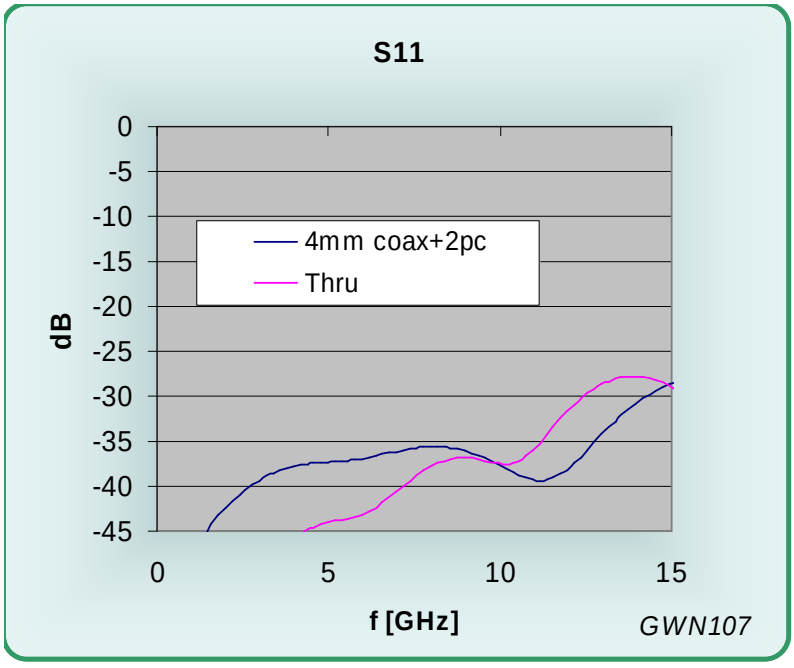

Figure 9 S11 magnitudes (f) for the thru measurement into a 50 Ohm load

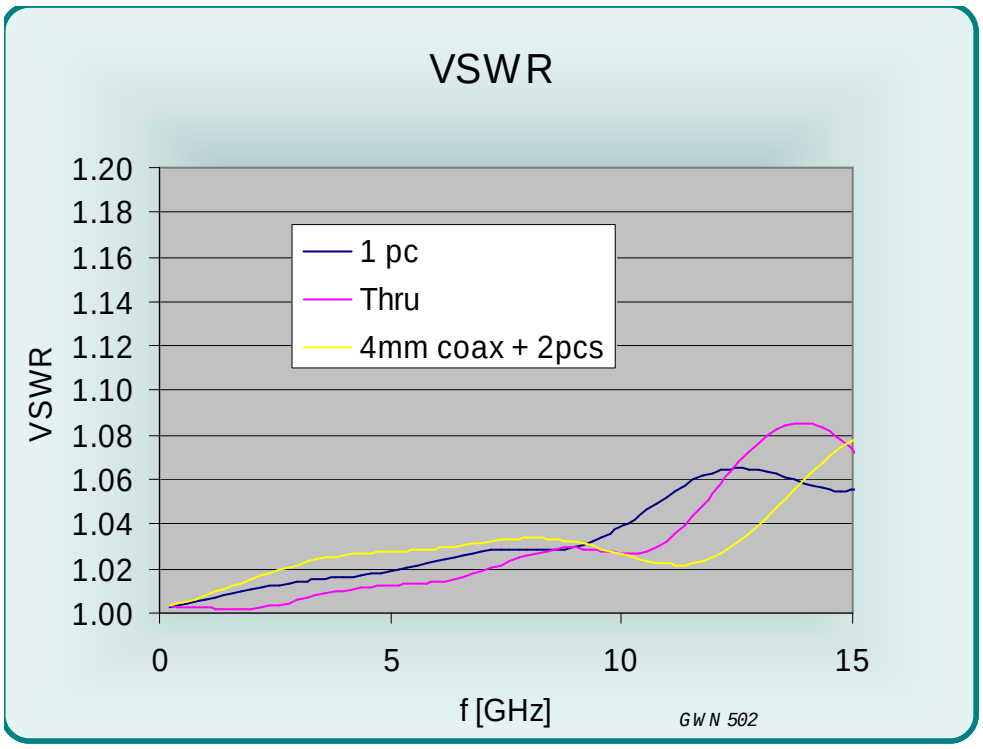

Figure 10 Standing wave ratio VSWR (f) [1 / div.]

The VSWR is very low in all cases.