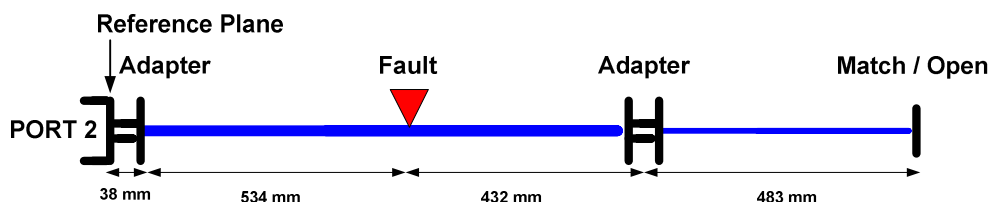


Distance-to-Fault Measurements

With option ZVL-K2, “Distance-to-Fault”, the analyzer can locate faults and discontinuities on cables and transmission lines. The faults produce spikes on the trace; the x-axis shows the distance from the calibrated reference plane. Most conveniently the reference plane is set to the analyzer test port PORT 2.

Preparing a Distance-to-Fault Measurement

Consider two RG141A cables of different length. The first cable can be connected to PORT 2 of the analyzer using a suitable adapter. The second cable is connected to the first cable using a second adapter and either left open or terminated with a matched load. The first cable contains a fault which is to be located by the network analyzer. The lengths of the cables and adapters are shown below.



To prepare the distance-to-fault measurement, first perform a full one-port calibration at PORT 2:

1. Press the “Preset” key to restore standard analyzer settings, in particular a linear frequency sweep with a relatively wide sweep range and a sufficiently large number of points.
2. Click “Trace – Meas – Distance-to-Fault” to switch on the distance-to-fault measurement, display the distance scale and select S22 as measured quantity.
3. Click “Trace – Meas – Distance-to-Fault – Full One-Port P2 Cal...” to open the calibration wizard and perform a full one-port calibration at the analyzer test port. Proceed as described in the analyzer’s help system, connecting the required Open, Short, and Match standards directly to PORT 2.
4. Click “Cable Type” to open the “Cable Type” dialog. In the list of cables, select your cable type (RG 141A). Press “OK” to close the dialog.
5. Adjust the “Stop Distance” to 3 m, according to the dimensions of your cables (approx. twice the total length in order to view multiple reflections).
6. Observe the measurement result in the diagram area (see “Analysis of Distance-to-Fault Results” below). If desired, vary the diagram scale (“Trace – Scale...”).

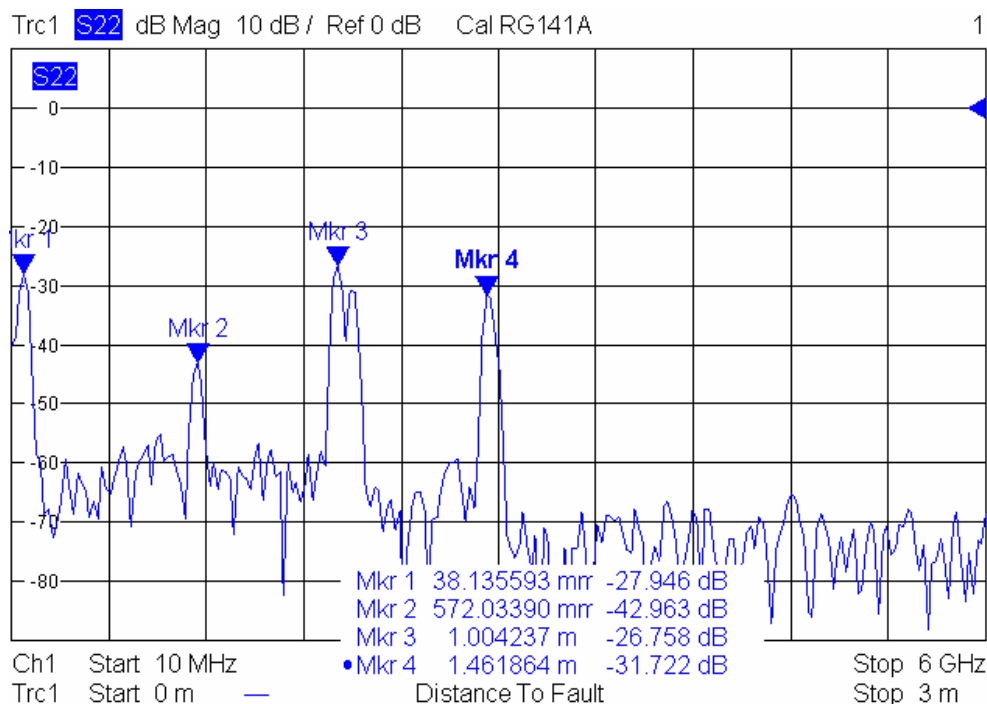


Different cable types

If the second cable is of different type, you can still correctly locate the fault on the first cable using the described settings. If your cable type is not in the list, you can easily add your own cable type with arbitrary properties.

Analysis of Distance-to-Fault Results

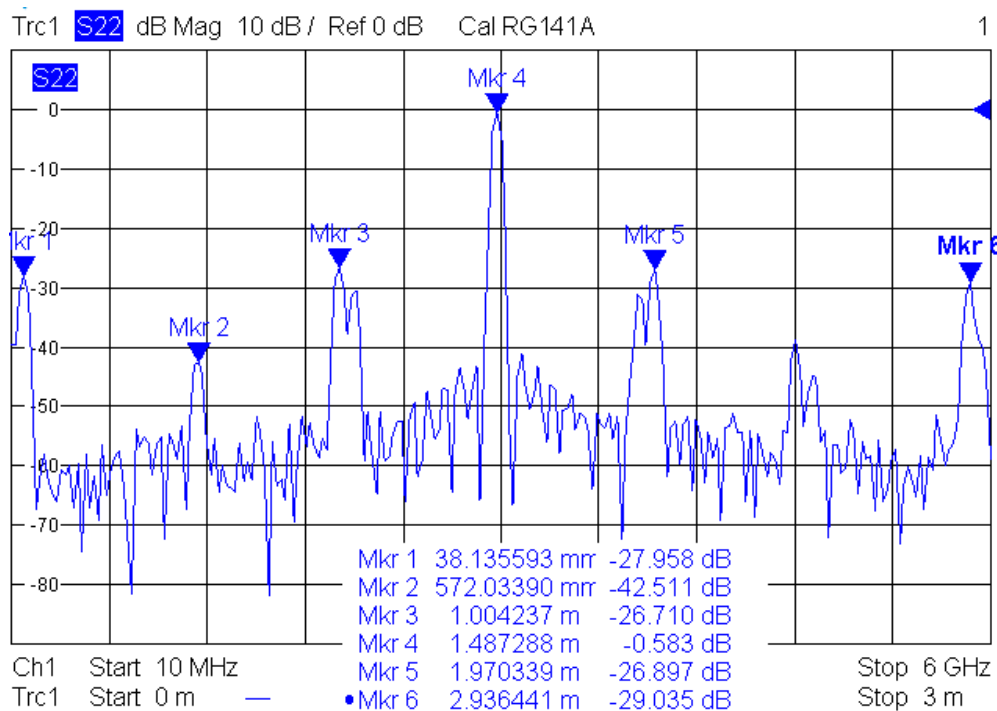
The position of the spikes indicating faults and discontinuities is most easily monitored using markers which are placed onto the peaks of the trace (“Trace – Marker – Marker Search – Peak Search >”). With a matched termination at the end of the second cable, the following result is obtained:



The spikes can be interpreted as follows:

- “Mkr 1” shows the position of the first adapter between the analyzer port and the first cable.
- “Mkr 2” shows the position of the fault in the first cable.
- “Mkr 3” shows the position of the second adapter between the first and the second cable, causing a reflection at either side. The distance between the two maxima of this spike corresponds to the length of the adapter.
- “Mkr 4” shows the reflection at the end of the second cable due to a small residual mismatch.

With an open second cable, the result looks a little more complex:



- Compared to the situation with matched termination, the spikes at the positions of “Mkr 1”, “Mkr 2”, and “Mkr 3” are virtually unchanged.
- “Mkr 4” shows the reflection at the end of the second cable. The open cable reflects almost the entire signal power; full one-port calibration normalizes the trace so that the maximum of the spike is close to 0 dB.
- The spikes beyond “Mkr 4” indicate multiple reflections. E.g. the double spike at the position of “Mkr 5” corresponds to a signal that has once traveled through the first cable (in both directions) and twice traveled through the second line due to bouncing between open end and adapter.

Equipment Required

Distance-to-fault measurements can be carried out with the following equipment:

- Vector network analyzer R&S ZVL (all models)
- ZVL-K2, “Distance-to-Fault”

Additional Information

For a comprehensive description of distance-to-fault measurements including remote control refer to the R&S ZVL online help system or to the printable operating manual, which is available for download at <http://www.rohde-schwarz.com/product/zvl>.