HR-E 40-1 set

E-Field Probe up to 40 GHz

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Short Description

The HR-E 40-1 is a passive near-field probe for measuring electric fields up to 40 GHz. The probe is placed vertically and centrally on the RF trace for measurement. By placing the probe directly on the RF trace, a defined distance (0.5 mm) between RF trace and measuring electrode is achieved.
The measuring tip is decoupled from the cable shield by special damping systems. In addition, the probe contains a current attenuator.
The probe is designed for manual operation. To reproduce measurements the HR-E 40-1 should be used in conjunction with a positioning system, for example ICS 105.
For measurements in the range up to 40 GHz, a suitable microwave cable is required. It is not included in the scope of delivery but can be ordered optionally.
Either spectrum analyzers or oscilloscopes can be used for signal evaluation.

Technical Parameters HR-E 40-1	
Upper cutoff frequency	40 GHz
Lower cutoff frequency	depending on measuring device (see frequency response)
Size of measuring electrode	Ø 0.25 mm
Resolution	0.2 mm
Inner distance of the measuring electrode to the measuring tip	0.5 mm
Connector	2.92 mm (K) (SMA compatible)
Weight	15 g
Sizes (L x W x H)	(9 x 9 x 140) mm

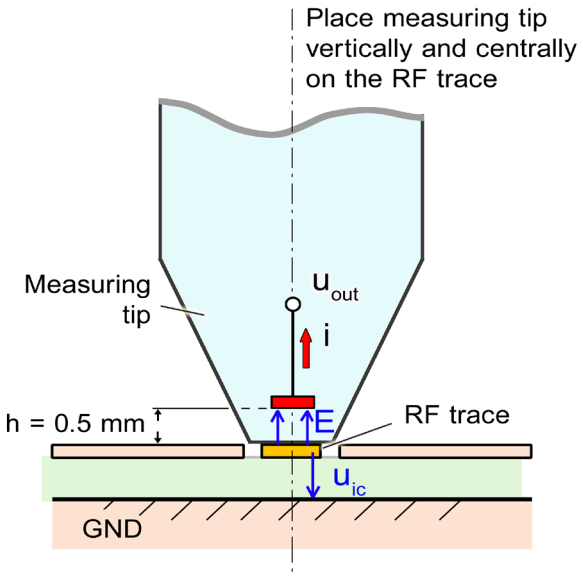

Figure 1

The measuring tip is placed on the RF line.
Output voltage of the probe is designated as u_{out}.

The electrical quantities (Figure 1) can be calculated with corresponding correction functions.

E: Electrical field between probe tip and RF trace

u_{ic}: Voltage of the RF trace

i: Current coupling into the measuring tip of the probe from the RF trace

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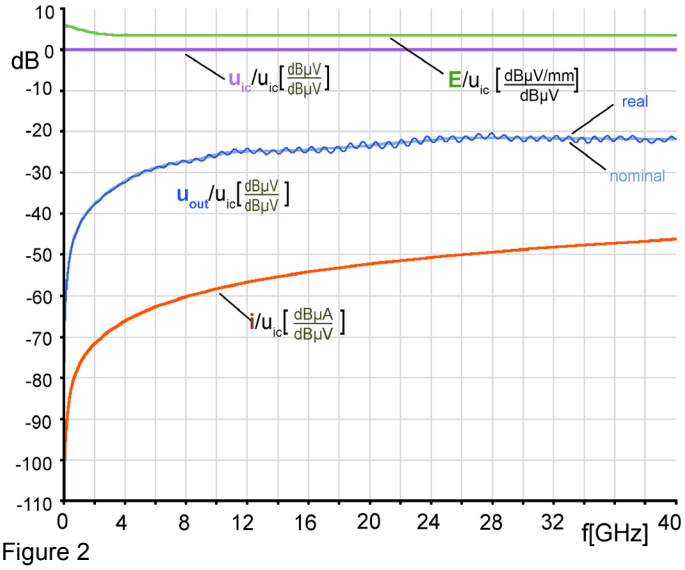

Figure 2

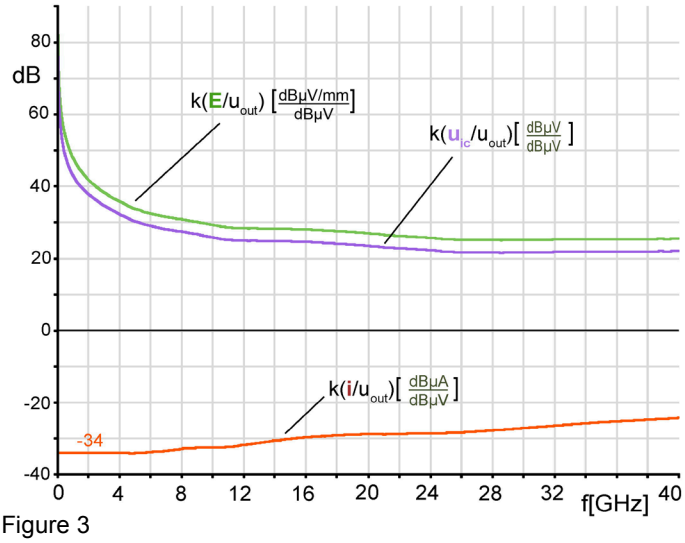

Figure 3

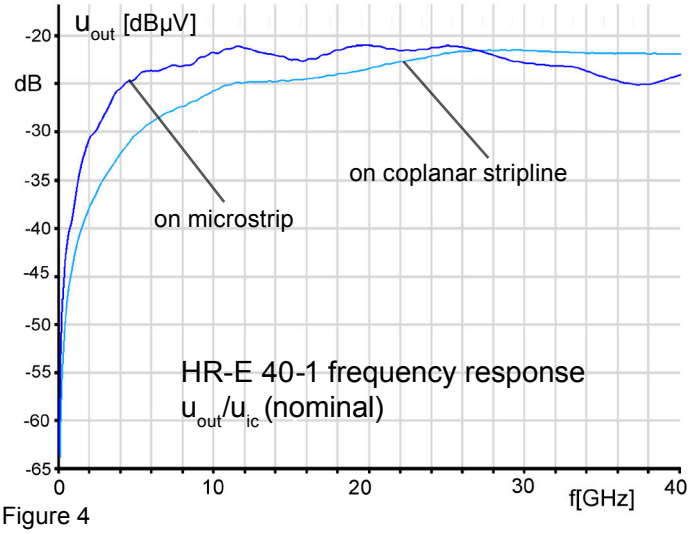

Figure 4

The frequency response of the output voltage and other quantities (Fig. 2) are normalized to the RF trace voltage u_{ic}.
The real curve of the output voltage u_{ic} has a ripple of 1.2 dB. From the real curve a nominal curve was derived (by using moving averages), in which the ripple was eliminated.

In addition to the output voltage u_{out}, other electrical quantities are effective in the test set-up at the measuring tip and RF line (Fig. 1).
The frequency responses of these electrical quantities are shown in Figure 2 as nominal curves.

The probe has two working ranges according to the frequency response u_{out}/u_{ic} (Figure 2):

1. in the lower range with a slope of 20 dB/dec
2. in the upper range the output voltage is nearly constant

The output voltage u_{out} of the probe can be converted with correction functions (Fig. 3) into the following electrical quantities:

Electrical Field E between measuring tip and RF trace
Voltage u_{ic} of the RF trace
Current coupling i into the measuring tip of the probe from the RF trace

The correction functions are nominal curves. The real curves have a ripple of 1.2 dB (see frequency response u_{out} real curve, Fig. 2).

The frequency response and correction curves were determined on a coplanar stripline.
If the design of the DUT differs from the design of the coplanar stripline, deviations are to be expected in the measurement result.

Figure 4 shows the nominal frequency response u_{out}/u_{ic} determined on the stripline compared to the nominal frequency response u_{out}/u_{ic} determined on the microstrip.