Problems
using
VNA HP 8753 E
for
S-Parameter-Measurements

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1 High Leakage Current at HP8753E DC-Ports

1.1 Problem

At the Dc-ports the VNA HP8753E an illegal high leakage current in the order of 10 to 100 µA was observed. This value was measured under the following conditions:

- Software: HP-ICCAP 5.30 530.800 Jun 9 2000
- DC-measurement device: HP4142
- AC ports 1 and port 2: open, no DUT connected

Obviously the current is created by oscillations (sign changes). Because of this high leakage current at the DC inputs am measurement of the collector current of a bjt during the s-parameter measurement is impossible.
Note: using the older VNA versions HP8753C and D and the appropriate testsets the leakage current was constant 1µA at 1V, created by the 1MEG shunt resistor in the testset. At the DC inputs of the HP8753E however it is not possible to measure a constant value.

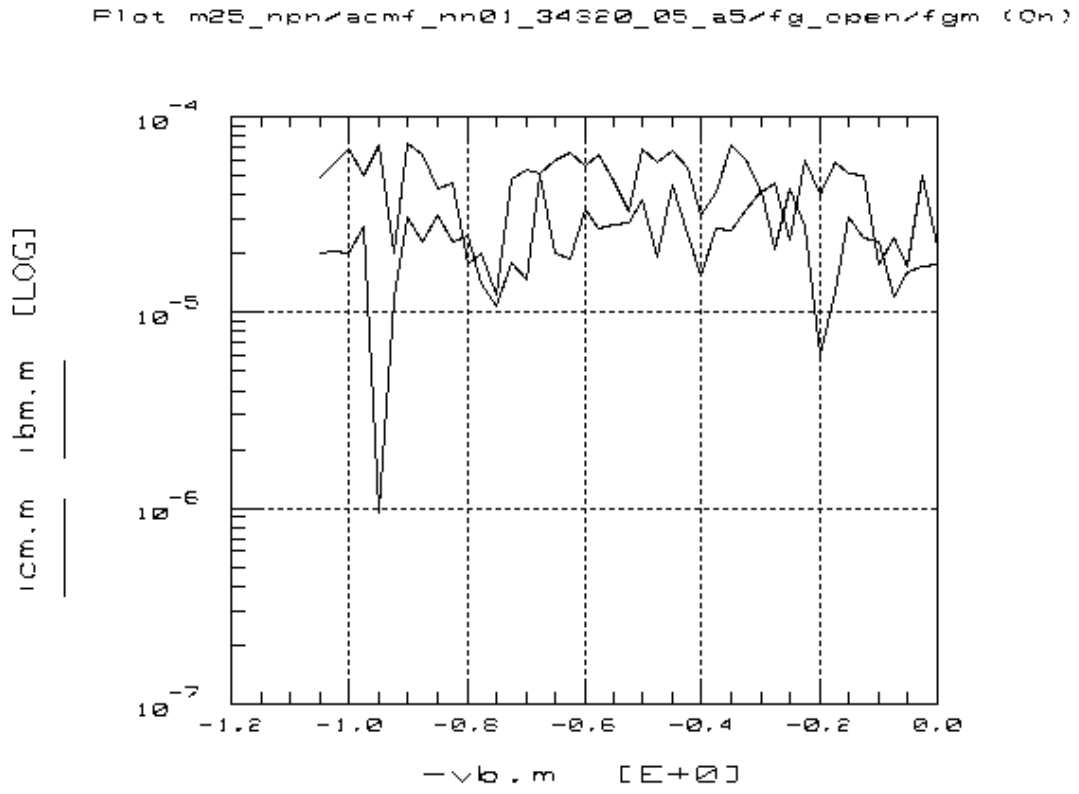

Fig 1: Leakage current at the DC-ports of the HP8753E

1.2 Reason

The reason for the leakage current seems to be a ground loop problem between hp4142 and HP8753E.
Note, that this problem did not appear using the older versions C and D of the VNA HP8753.
Obviously the ground design for the new HP8753E is changed against the older versions, because now test set and VNA are in a common case. The ground of the DC-BNC-inputs and the ground of the housing are now identical.

1.3 Work Around

- Open the bridge between circuit common and ground at the front side of the HP4142.
- Use only 1A units in the HP4142, because the 0.1 A units are much more sensitive against oscillations
- Use a medium integration time for the HP4142 1A units (to be defined in the ICCAP instrument option table)

All this results in an reduced value of the oscillation current lower than 1 µA measured by the HP4142. Note: additional connections between HP4142 ground and HP8753E ground or HP4142 circuit common an HP8753E ground gives no further improvement.

2 Pitfall: DUT Overdrive using VNA HP8753E

2.1 Problem

During S-Parameter-Measurements the right source power choice is important to avoid an overdrive of the DUT. The new VNA HP8753 E includes the test set in one device, contrary to the older versions HP8753 A,B,C,D , where the test set was an separate device. Moreover, the instrument option table in ICCAP does not contain no longer the input fields for the separate testfield

- attenuation1 and
- attenuation 2

with it's defaults 20dB. On the other hand, the default for the source power was left on the value of –10dBm. The result is a measurement of the device using –10 dBm instead of –30 dBm at the input (overdrive), if you use the ICCAP default values.

2.2 Solution

Change in each case the source power default value in the instrument option table in ICCAP from –10dBm to –30 dBm to avoid overdrive.

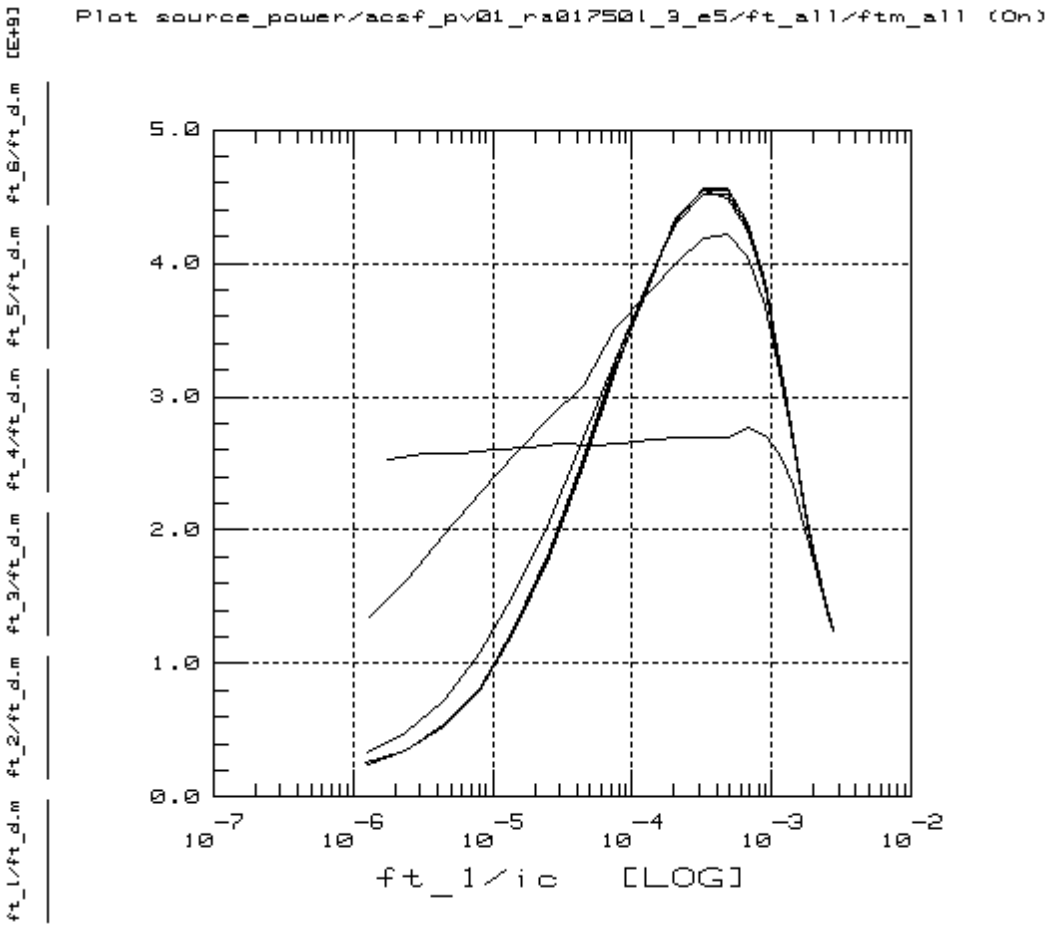

Fig 2: Effect of source power on f_T –characteristics, source power at port1=- 0, -10, -20, -30, -40, -50dBm, and for all curves source power at port2=- 30 dBm

3 References

[1] Berkner, J.: " Richtige Source Power bei Transistor-S-Parametermessungen ", Infineon Technologies AG, HF SI CDB, Laborbericht LB164 vom 30.6.2000

[2] Berkner, J.: „Leakage Current Problem using HP8753E and HP4142"., Infineon Technologies AG, HF SI CDB, Laborbericht LB174, vom 5.1.2001