Application Note No. 030

A 1.9 GHz Low Noise Amplifier board using Si-MMIC BGA427

RF & Protection Devices

Never stop thinking

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Revision History: 2007-01-09, Rev. 2.0

Previous Version: 2000-07-28

Page	Subjects (major changes since last revision)

1 A 1.9 GHz Low Noise Amplifier board using Si-MMIC BGA427

This application note provides general information PCB layout and list of components, circuit diagram and measured data of a BGA427-amplifier board.

Data at 1.9 GHz

Biasing	**3 V (9.5 mA)**	**5 V (18 mA)**
Gain $\|S_{21}\|^2$ [dB]	18	19.5
Noise Figure NF [dB]	2.25	2.45
Intercept point output IP3out [dBm]	7	15
Return loss in/out	>10	>10
Reverse isolation [dB]	22	22

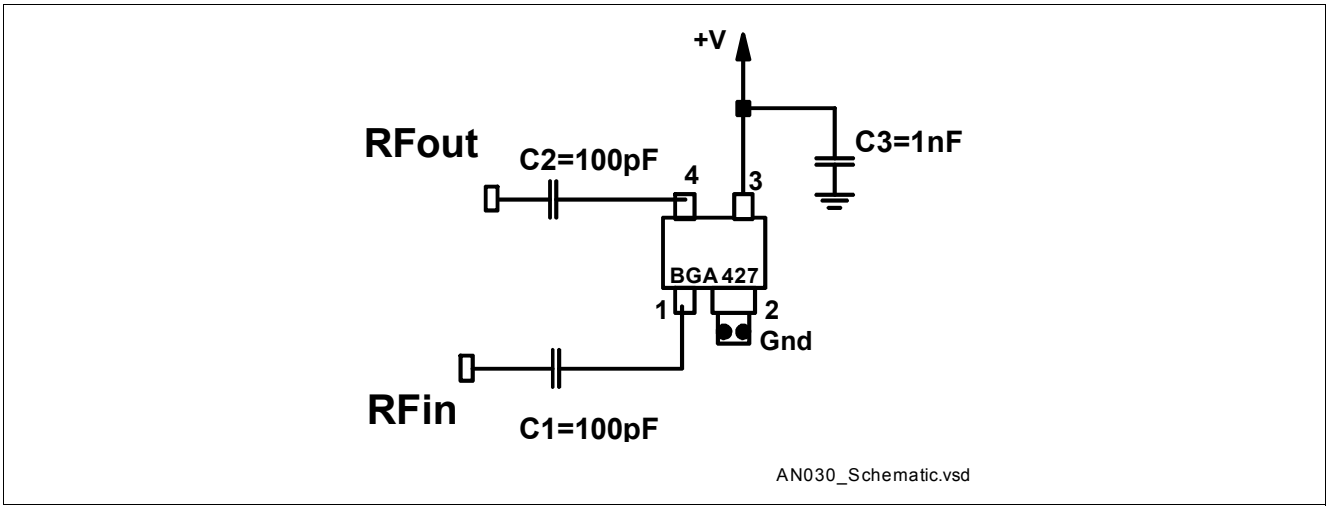

Figure 1 Schematic Diagram

- The measured data and diagrams include losses of SMA-connectors and the relatively high loss of the microstrip lines on the epoxy-board.
- The use of plated through holes right at the device (Gnd) is essential. Thin PC-boards are recommended to minimize the parasitic inductance to ground.
- An RF decoupling capacitor e.g. 100 pF (size 0603 or 0805) should be mounted as close as possible to the device (pin 3) for optimum performance. In addition, a larger value capacitor should be connected from Pin 3 to ground to provide a low impedance path for lower frequencies. The use of good quality dielectric capacitors is recommended (e.g. COG types) to ensure stable operation.

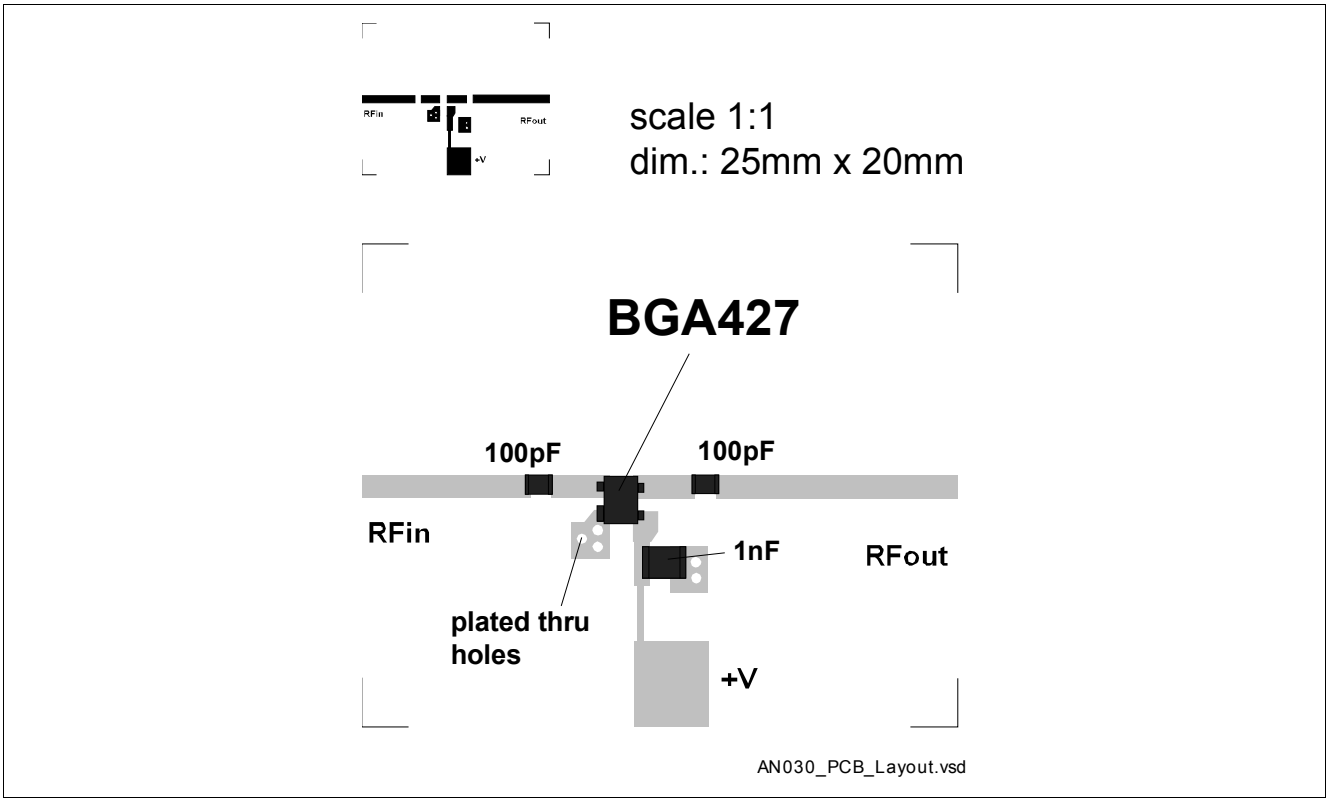

Figure 2 PCB Layout and Component Placement

Table 1 Bill of Material

Component	Value	Unit	Size	Comment
C1	100	pF	0603/0805	DC-block
C2	100	pF	0603/0805	DC-block
C3	1	nF	0603/0805	RF-short
Si-MMIC				Si_MMIC BGA427
Substrate	FR4			h = 0.5 mm, e_r = 4.5

Measured data

+V = 3 Vdc / I = 9.5 mA

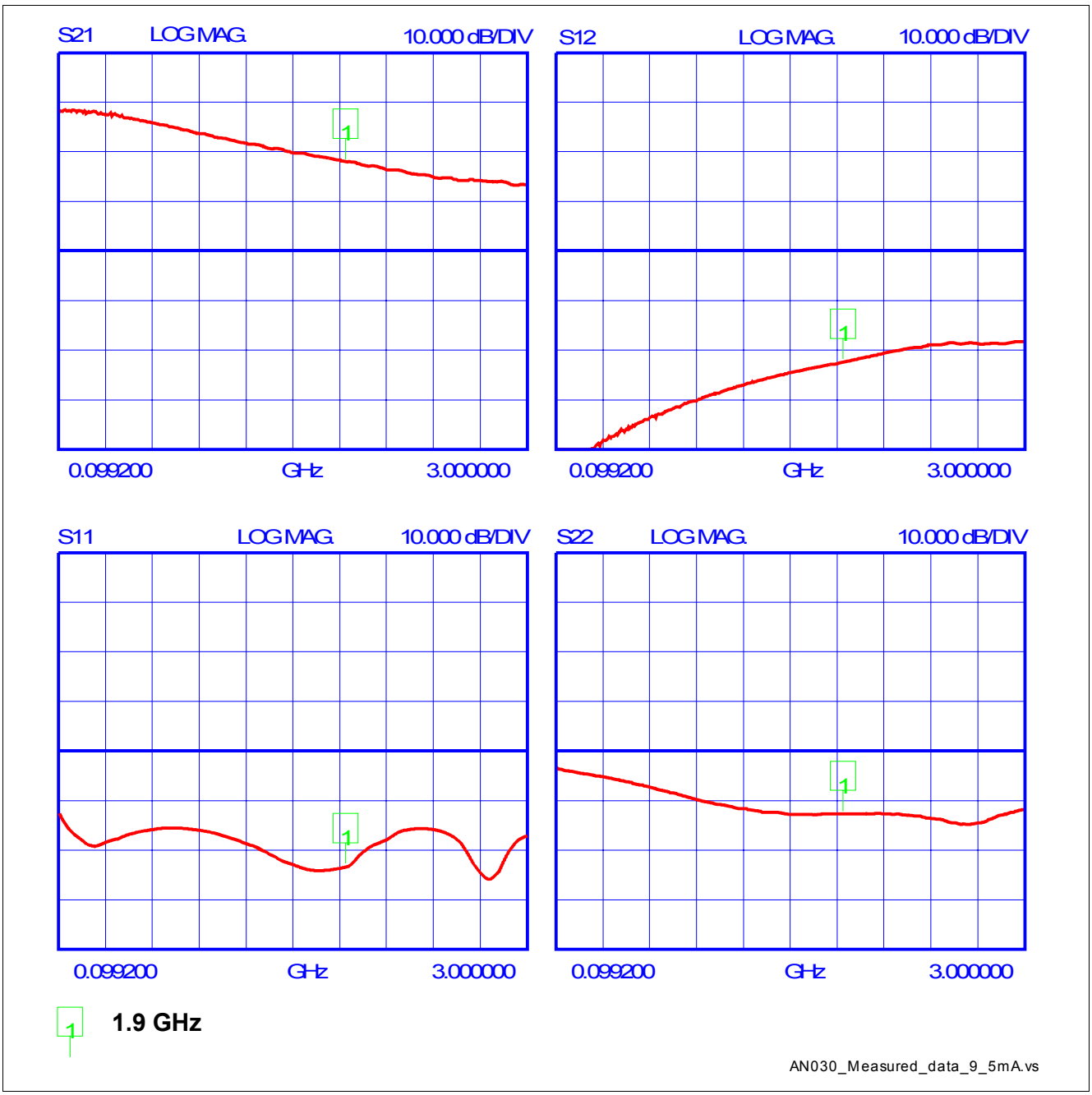

Figure 3 Measured data

Measured data

+V = 3 Vdc (I = typ. 18 mA)

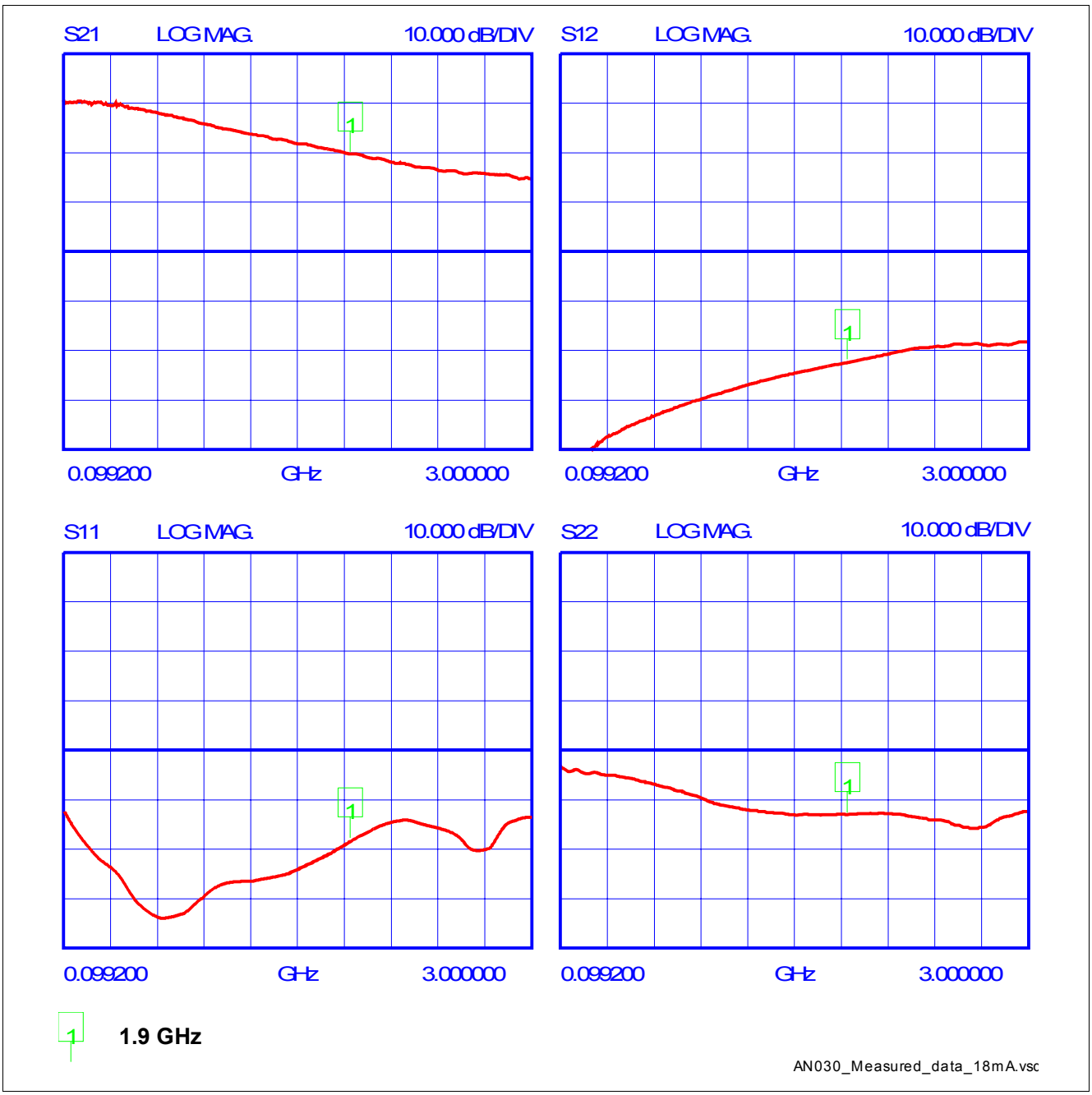

Figure 4 Measured data