Printed Dipole Antenna Designed with Microstrip Balun on V-shaped Ground Plane

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Based on improving the feeding structure of microstrip balun, a printed dipole antenna is designed with microstrip balun on V-shaped ground plane. Compared with the original microstrip balun feeding structure, such printed dipole antenna features a broader impedance bandwidth in excess of 33% (under VSWR < 2 and a center frequency of 2.4GHz), an increased gain by 2dB, a backward radiation suppression greater than 7dB and a good consistence of radiation pattern in the whole operating band. This antenna is therefore a good selection as a basic radiating element for a complex antenna system.

Figure 1 shows the structure of the dipole antenna . It is printed on both sides of a FR4-type PCB substrate with a thickness of 1.6mm and a relative dielectric constant of 4.6. In the figure, black color denotes one side of the PCB substrate and gray color denotes the other one. The RF signal is fed into the antenna by SMA interface. The dimensions of the antenna are designated as d, theta, L1, L2, L3, W1, W2 and W3. For the experimental setup we have d = 5mm, theta = 45°, L1 = 19.9mm, L2 = 16mm, L3 = 10mm, W1 = 6mm, W2 = 5mm and W3 = 15mm.

Figure 2 shows the results of the simulation and experiment. The impedance bandwidth is larger than 33% (under VSWR < 2 and a center frequency of 2.4GHz).

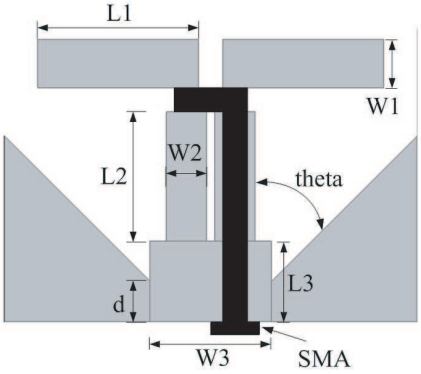

Figure 1: Structure of the antenna

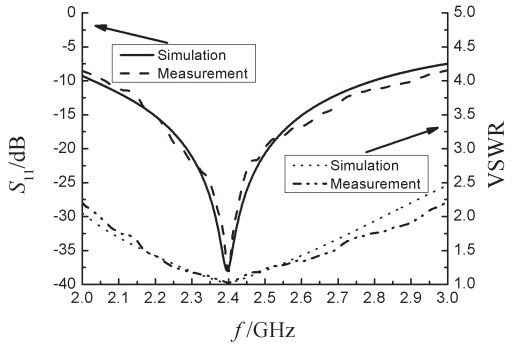

Figure 2: Results of the simulation and experiment