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2x2 MIMO antenna design for WiFi triple band antenna module applications

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The antenna module with a compact size of 30 mm x 30 mm, and the no ground portion is 30 mm x 10 mm, which material is FR4 glass epoxy substrate with the thickness of 1.6 mm, relative permittivity of 4.3 and loss tangent of 0.023, consists of two modified printed inverted F antenna (PIFA) elements is proposed for WiFi 6E applications, as shown in Fig. 1. Since a finite-sized ground-plane will impact the resonant frequency, impedance bandwidth and radiation pattern of the antenna, it is imperative to design the antenna combined with its finite-sized ground plane. The single PIFA antenna with a compact size of 16 mm x 9.5 mm jointly with open-stub, top-loading, tapered-shorted line and co-planar waveguide (CPW) feeding structure. The electrical-length of the radiating elements can be determined from the one quarter-wave length at the 2.45 GHz and 5.5 GHz, for covering 2400 MHz-2500 MHz (denoted as lower-operating band), 5150 MHz-5850 MHz (denoted as middle-operating band) and 5925 MHz-7125 MHz (denoted as upper-operating band). The function of top-loading and open-stub is increasing the operating bandwidth of lower- and middle band. The tapered-shorted line connected feed- and ground-line of PIFA is introduced to divide the surface current into three traces to increase operating band and bandwidth of antennas, the unwanted current that induced by the imperfect ground-plane is also decrease by this mechanism, to let the surface current concentrated on antenna itself to suppress the near-field coupling. Furthermore, the polarization diversity is be adopted to arrange the two antennas and its' feeding structure, more than 20 dB isolation can be achieved between each two polarization diversity triple-band PIFA elements. The features of the proposed antenna are shown in the Table I. Details of the design considerations of the proposed designs and the experimental results of constructed prototype are presented and discussed.

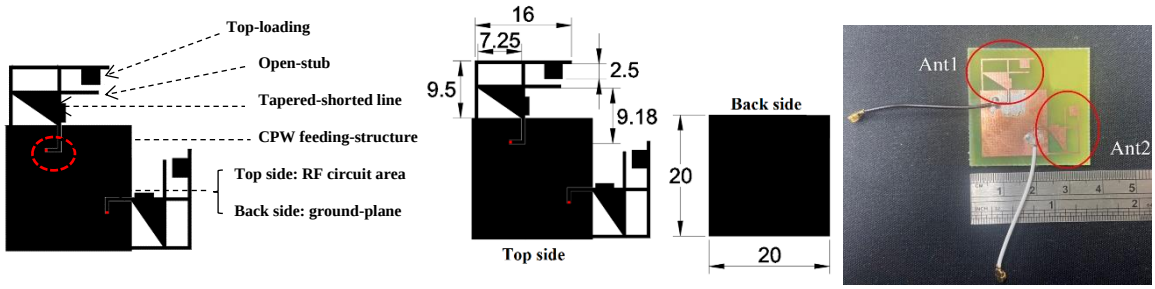

Figure 1. Geometry and dimensions of the proposed antenna module. (Unit: mm)

Table I. The features of the proposed antenna

Frequency【GHz】	2.4	2.5	5.15	7.125
S11(dB)	-8.4	-12.8	-17.4	-16.3
S22(dB)	-10	-10.7	-12.8	-13.6
S21(dB)	-14.5	-18.2	-16.9	-18.7

References

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