

Dual ISM Band Microstrip Antenna for Satellite Internet Service

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Abstract— In recent years, satellite internet has received much attention for wireless internet applications on high-speed trains. The Korean high-speed train (KTX) network requires antennas that operate at both the 2.4 GHz and 5.8 GHz industrial, scientific, and medical (ISM) bands for simultaneous transmission and receiving of data. Additionally, it should have nearly equal gain with similar radiation patterns in both bands for optimum communication. Microstrip patch antennas have been used in many applications due to their low cost, light weight, low profile, and ease of fabrication. Dual-frequency operation can be obtained by making slots on the microstrip patch, or by placing shorting pins at appropriate locations on the microstrip patch. However, when the higher frequency band is more than twice that of the lower frequency band, the radiation pattern of the higher resonant frequency becomes distorted due to the higher order resonant modes. In this paper, a dual-band microstrip antenna with nearly equal gain and similar radiation patterns at the 2.4 GHz and 5.8 GHz ISM bands is described. The proposed antenna, shown in Fig. 1, has two Y-shaped slots on the microstrip patch. It is fabricated on an RO4003 substrate, which has a dielectric constant of 3.38 and a thickness of 0.508 mm. The size of the antenna is $50 \times 47.5 \times 6.5 \text{ mm}^3$, and it is fed by a coaxial cable. The measured bandwidth of the antenna is 2.376–2.492 GHz and 5.425–6.055 GHz for $\text{VSWR} < 2$. The measured gain is 8.37 dB and 8.38 dB for the 2.4 GHz and 5.8 GHz ISM bands, respectively.

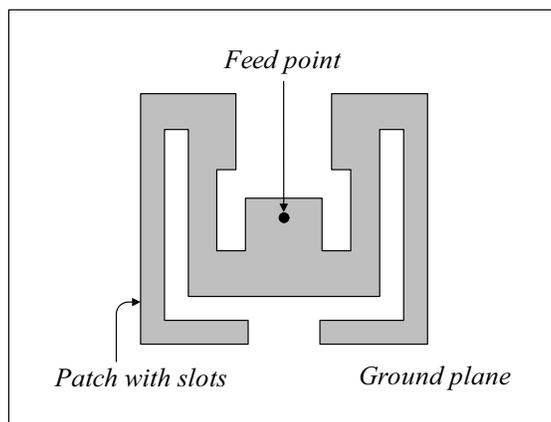


Figure 1: Antenna structure.