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(57) Abstract :
To meet the demands of 5G communications, this study carefully designs and characterizes a rectangular microstrip patch antenna that operates in the dual frequency band. Numerous antenna parameters, such as gain, bandwidth, S-parameters, azimuthal and elevation half-power beam width, and directivity efficiency, are thoroughly examined in this research. Employing a substrate with a thickness of 1.5 mm crafted from RT Duroid 5880, renowned for its advantageous properties in high-frequency applications, the antenna design exemplifies precision engineering. The antenna resonates at 38 GHz & 50 GHz Frequency, strategically positioned to cater to the evolving needs of cutting-edge communication architectures. Noteworthy among its performance metrics is the directive gain of -5.82 dBi & 6.69 dBi, signifying its ability to focus radiation efficiently, while the exceptional return loss of -43.192 dB & -21.523 dB underscores the antenna's impeccable impedance matching. Furthermore, the antenna showcases a notable bandwidth spanning 3.43 GHz & 6.908 GHz, a testament to its capacity for facilitating robust data transmission and expanding network capabilities within the millimeter-wave landscape. The antenna's dimensions, substrate characteristics, and feed configuration are carefully adjusted through CST simulation to achieve the best possible performance characteristics.

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