**Lab 10’：Dual Band Antennas**

|  |  |
| --- | --- |
| **Author** | Name：曹子惠 Student ID:12112441 |
| **Introduction**  Dual Band Antennas, as the name suggests, are antennas capable of operating across two distinct frequency bands simultaneously. This feature is particularly advantageous in modern wireless technologies like Wi-Fi, where devices need to support multiple frequency bands to ensure optimal performance and compatibility.  The fundamental principle behind Dual Band Antennas lies in their ability to resonate at different frequencies. By carefully designing the antenna's structure and dimensions, engineers can create a device that efficiently radiates and receives electromagnetic waves within two specific frequency ranges. Typically, these frequency bands include the widely used 2.45GHz and 5.5GHz bands in Wi-Fi networks.  The versatility of Dual Band Antennas stems from their ability to adapt to the requirements of various wireless communication standards and protocols. Whether it's streaming high-definition video, conducting voice calls, or transmitting data over long distances, Dual Band Antennas offer a flexible solution to meet the diverse needs of modern communication systems.  **Lab results & Analysis**：    Modeling using the above parameters leads to:  (1) S11    Low reflection loss is observed at two frequency points (2.45 GHz and 5.5 GHz). This indicates that the antenna is able to receive and transmit signals efficiently at these frequencies without any signal loss due to reflection loss.  (2) Radiation pattern  a. 2.45GHz    b. 5.5GHz    It can be observed that the appearance of subflaps is more significant at 5.5 GHz than at 2.45 GHz.  (3) Adjust the parameters using the following list and show the influence on antenna bandwidth  a. l21=l22=0    The coupling between the two resonant modes is minimal, which could lead to a narrower bandwidth compared to cases where coupling is present.  b. w1=w2=wm=3.5mm, l21=6.3mm, l22=8.3mm    By adjusting the widths and lengths of the microstrip lines, we can influence the impedance matching and coupling between the resonant modes. A balanced configuration leads to a broader bandwidth.  c. w1=w2=wm=1.5mm, l21=l22=7.3mm, h1=16.5mm    Decreasing the width of the microstrip lines increases the impedance, which can affect the bandwidth. Additionally, changing the height alter the characteristic impedance of the transmission line influences the overall bandwidth.  d. w1=1.5mm, w2=wm=3.5mm, l21=l22=7.3mm    In this case, we have a mismatch in the widths of the microstrip lines. This asymmetry leads to impedance mismatch and affect the overall bandwidth of the antenna.  Of the above four cases, case b has the largest bandwidth at -10 dB. | |
|  | |
| **Score** | 95 |