A COMPACT MICROSTRIP NARROW BAND ANTENNA FOR UPPER IoT APPLICATION

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Abstract - A compact micro strip narrow band antenna to be designed for the wireless communication. The designed antenna operating frequency range is 5.6 to 5.9 GHz. The design can be used as filter and an antenna (Cumulative design). A compact two pole filtering antenna is designed. The designed antenna achieves a 50Ω impedance matching. Compared to the traditional antenna, the filtering antenna obtains the flatter gain response within the passband, good selectivity at the passband edge, and the wider bandwidth. Both the simulated result and measured result can operate at 5.6 to 5.9GHz.

Key Words: Filtering antenna, Passband, Flatter Gain

1. INTRODUCTION

By the rapid development in wireless communication technology, focusing issue is to integrate multiple function circuits in one device. The antenna and filter are two independent components in most of the RF front end. The antenna is used to receive and transmit signal, and the filter is cascade right after the antenna for filtering the spurious signals. These two components are designed separately and connected by a 50Ω transmission line. This transmission line not only degrades the performance of the system, but also occupies the additional circuit area. For minimizing the circuit size, a predesigned bandpass filter was embedded in the feedline of a patch antenna.

The filter and the antenna were together so that they shared the same ground plane. By minimizing the impedance at the interfaces of the filter and the antenna, the impedance bandwidth was improved. In these designs, the last resonator and the load impedance of bandpass filter were substituted by the Γ–shaped antenna and the rectangle patch antenna, whose dimensions are in the order of a half-wavelength. a compact two-pole filtering antenna is presented. First, a two-pole Butterworth band pass filter is designed. Then, the second port and the second resonator of the filter are replaced by a fan-shaped patch antenna with DGS, and a filtering antenna is formed. The fan-shaped patch antenna with DGS acts as a radiator as well as the second resonator of the filter.By adopting the defected ground structure, the size of the filtering antenna is minimized. Moreover, the filtering antenna obtains the flatter gain response with in the passband, with good selectivity at the passband edge. The measured result shows good agreement with the simulated one.

2. DESIGN OF FILTER AND ANTENNA

The fan-shaped patch antenna can be modeled by parallel inductance, capacitance, and resistance, and the DGS creates the additional effective inductance and capacitance. Thus, the proposed fan-shaped patch antenna with DGS is modeled by parallel LA CA RA

circuit, and port characteristic of the equivalent circuit agrees with the electromagnetic (EM) simulation result.

Admittance inverter ,JA , represents the coupling between the feed line and the patch. The simulated|s11|from the EM structure and the equivalent circuit . It can be seen that both the EM structure and the equivalent circuit resonate at 2.4 GHz and have the same bandwidth (from 2.3 to 2.5 GHz).

In addition, the effect of DGS on antenna performance is investigated in case r4 that keeps constant. shows the|s11| for different s5 It can be seen that with the increasing of ,the resonant frequency decreases from 3.34 to 2.4 GHz, and the relative bandwidth is widened from 2.9% to 8.3%.

Table 1 Parameters of design Antenna

Parameter	R1	R2=R4	R5	W1
Units(mm)	15.5	14.4	13	3
Parameters	W2	L1	Lg1	Wg1
Unit(mm)	0.5	4	47	35

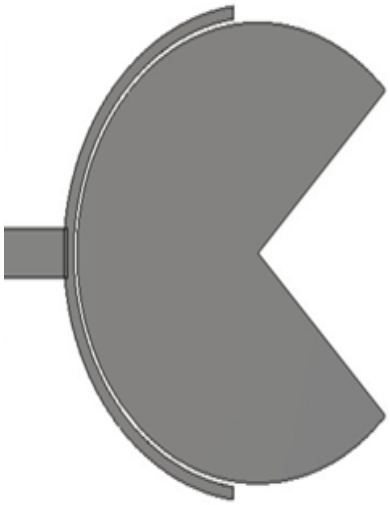

Fig 1 – Design antenna

2.1 SYNTHESIS OF FILTERING ANTENNA

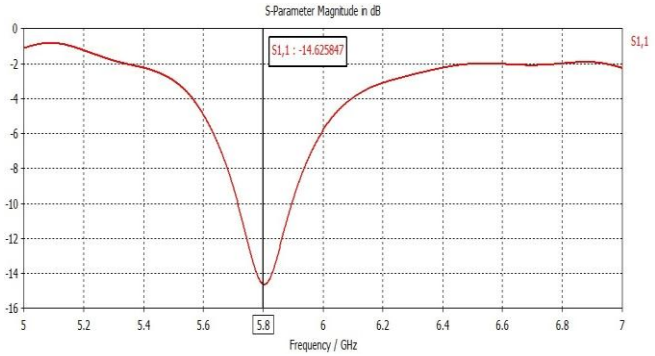

Fig – 2: Return loss output

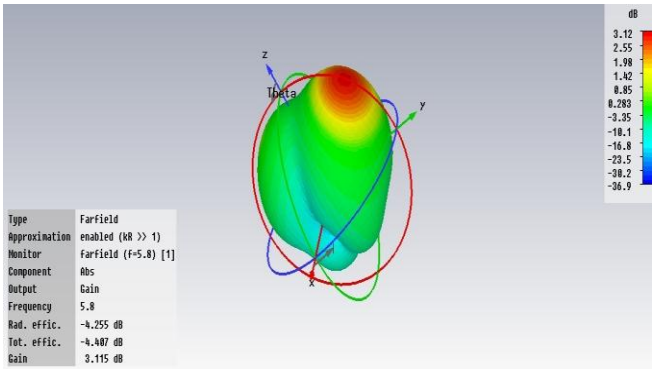

Fig – 3: Gain Response

Fig – 4: Fabricated Antenna Design

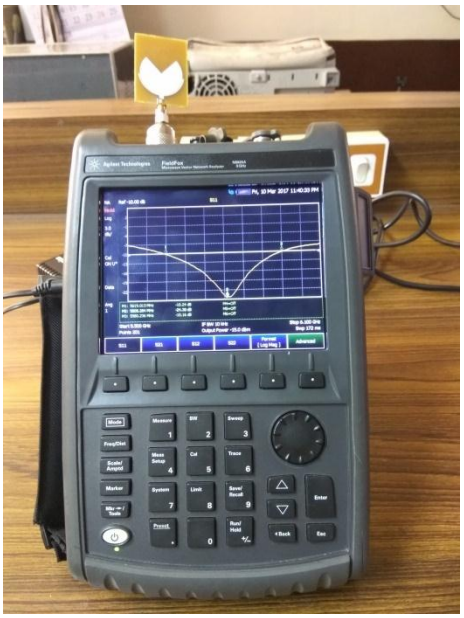

Fig – 5: Fabricated Design Output

3. CONCLUSION

The microstrip patch elliptical-slot antenna with fed ground was designed for the internet of things(IoT),application. The performance of the antenna was studied in terms the antenna parameters and the -14.62 db return loss achieved in the operating frequency range of 5.6 to 5.9 GHz

The obtained results were in accordance with the simulated results showing that the antenna is well performing at the required range with considerable slot dimensions.

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