Design of Microstrip Meander Spurline Resonator for C-Band Satellite Application

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1. Introduction

A number of future satellite missions are planned to carry microwave radiometers of various designs and orbits. Therefore, satellite and their applications are used so many various type of field. Specially in this paper shows that designed spurline resonator is used C-Band satellite which target to frequency reign is 7.0 GHz [1]. A spurline is a simple defected structure which is realized by etching one slot on a microstrip line. It provides excellent bandgap characteristics and can be applied in antenna and resonator designs. Specially, proposed a compact meander spurline on a microstrip structure is derived based on equivalent circuit analysis theory and verified by SONNET Electromagnetic (EM) simulation

2. Results and Discussion

The resonant characteristics are modeled by one LC-resonator, and the radiation effect and loss are considered by including resistor, R. Based on the transmission line theory and the spectral domain approach, the circuit parameters can be extracted using the

following equations:
$$R = 2Z_0 \left(1/|S_{21}| - 1 \right)|_{f = f_0} \quad C = \frac{\sqrt{0.5(R + 2Z_0)^2 - 4Z_0^2}}{2.83\pi Z_0 R \triangle f} \quad L = \frac{1}{4(\pi f_0)^2 C} \quad \text{where} \quad Z_0 \quad \text{is the 50 } \Omega = \frac{1}{4(\pi f_0)^2 C} \quad \text{where} \quad Z_0 = \frac{1}$$

characteristic impedance of the transmission line, f_0 is the resonant frequency, S_{21} is the insertion loss, and Δf is the -3 dB bandwidth of S_{21} . According to this equation derived value of R,L,C we are able to compare a circuit simulation with EM simulation. The design of the spurline structure were meader T-spurlines structure which were effective inductance and capacitance of microstrip line. The performance of resonator are effected by width and length of slot gap. The dimensions of the spurline structure were 6.7×2.55 mm. The substrate on Teflon substrate with a relative dielectric constant of 2.54 and thickness of 0.54 mm was used for simulations and measurements. Simulation results figure 1. shows that the S_{21} is curve dramatically droped -46.32 dB, S_{11} is 0.06 dB and Q factor is 78 at 7.0 GHz. This proposed meander spurline can provide a lower resonant frequency and an improved performance and size reduction possible

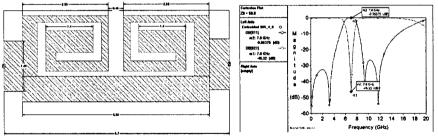


Fig 1. Design and simulation of meander T-spurline resonator

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