

# Mutual Coupling Reduction In Microstrip Patch Antenna Arrays Using Simple Microstrip Resonator

Saeed Roshani (✉ [s\\_roshany@yahoo.com](mailto:s_roshany@yahoo.com))

Islamic Azad University Branch of Kermanshah <https://orcid.org/0000-0002-4024-2755>

Haniaisieh Shahv

Islamic Azad University Branch of Kermanshah

---

## Research Article

**Keywords:** microstrip antennas, resonators, mutual coupling reduction

**Posted Date:** June 2nd, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-456147/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

In this paper a novel ladder resonator is introduced to decrease mutual coupling effect between two microstrip patch antennas. Applied patch antennas are operating at 2.45 GHz frequency (ISM band), which specially used for multiple-input–multiple-output (MIMO) systems. The edge-to-edge distance between two microstrip patch antennas is  $0.05 \lambda$ . The proposed ladder resonator impressively blocks the surface current between two patch antennas at the operating frequency, which results in mutual effect reduction. The proposed configuration has been fabricated and tested. Scattering parameters with and without of proposed resonator has been investigated. The results show that, the proposed configuration increases isolation between two microstrip patch antennas about 42dB.

## Full Text

This preprint is available for [download as a PDF](#).

## Figures

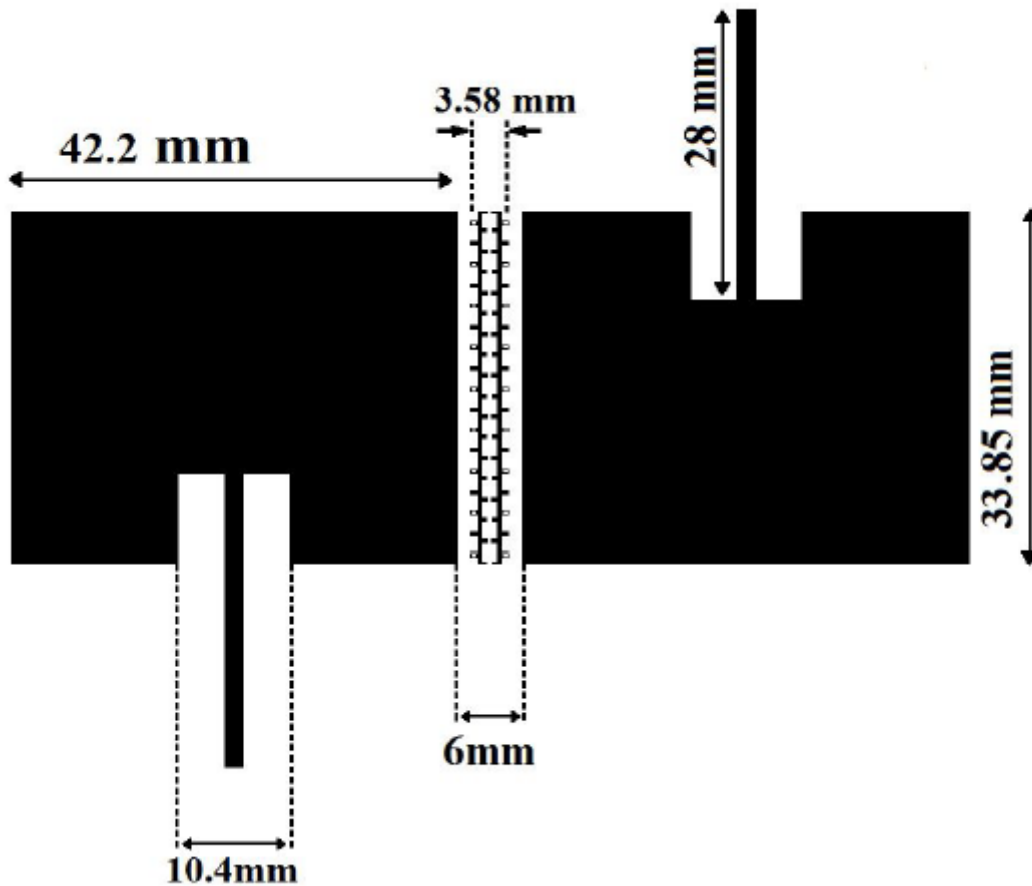


Figure 1

The layout of two patch antennas with proposed resonator.

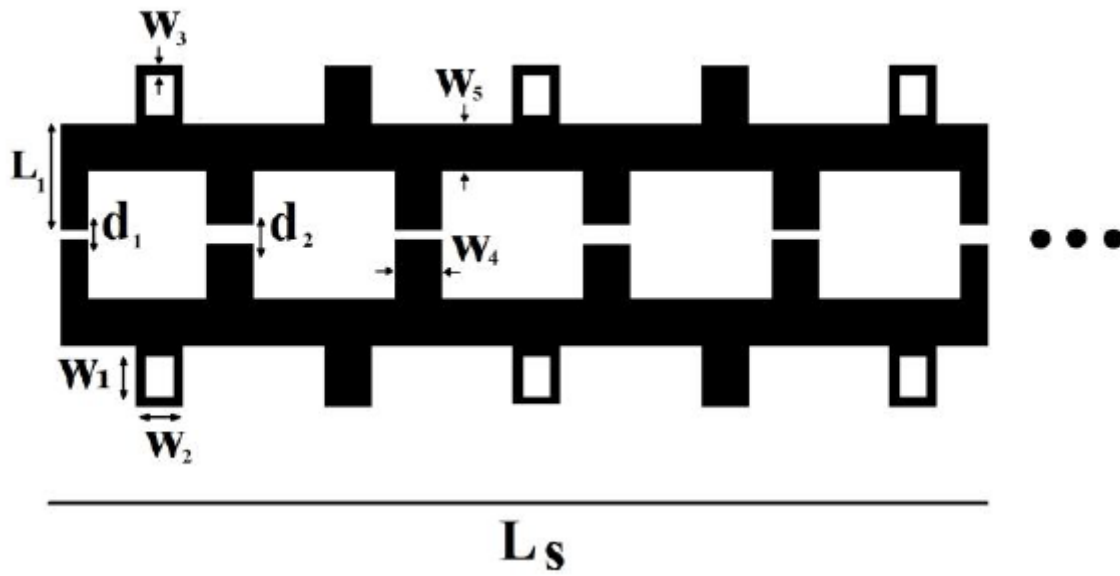


Figure 2

The layout of two patch antennas with proposed resonator.

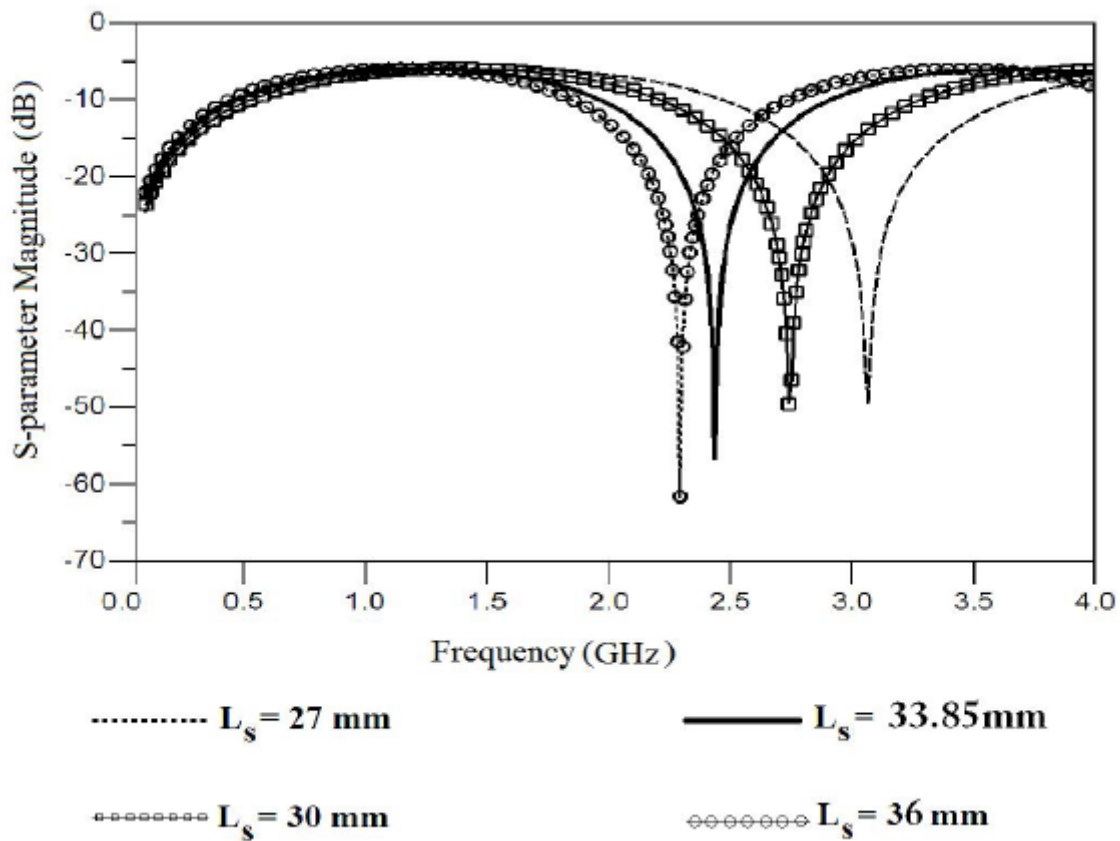
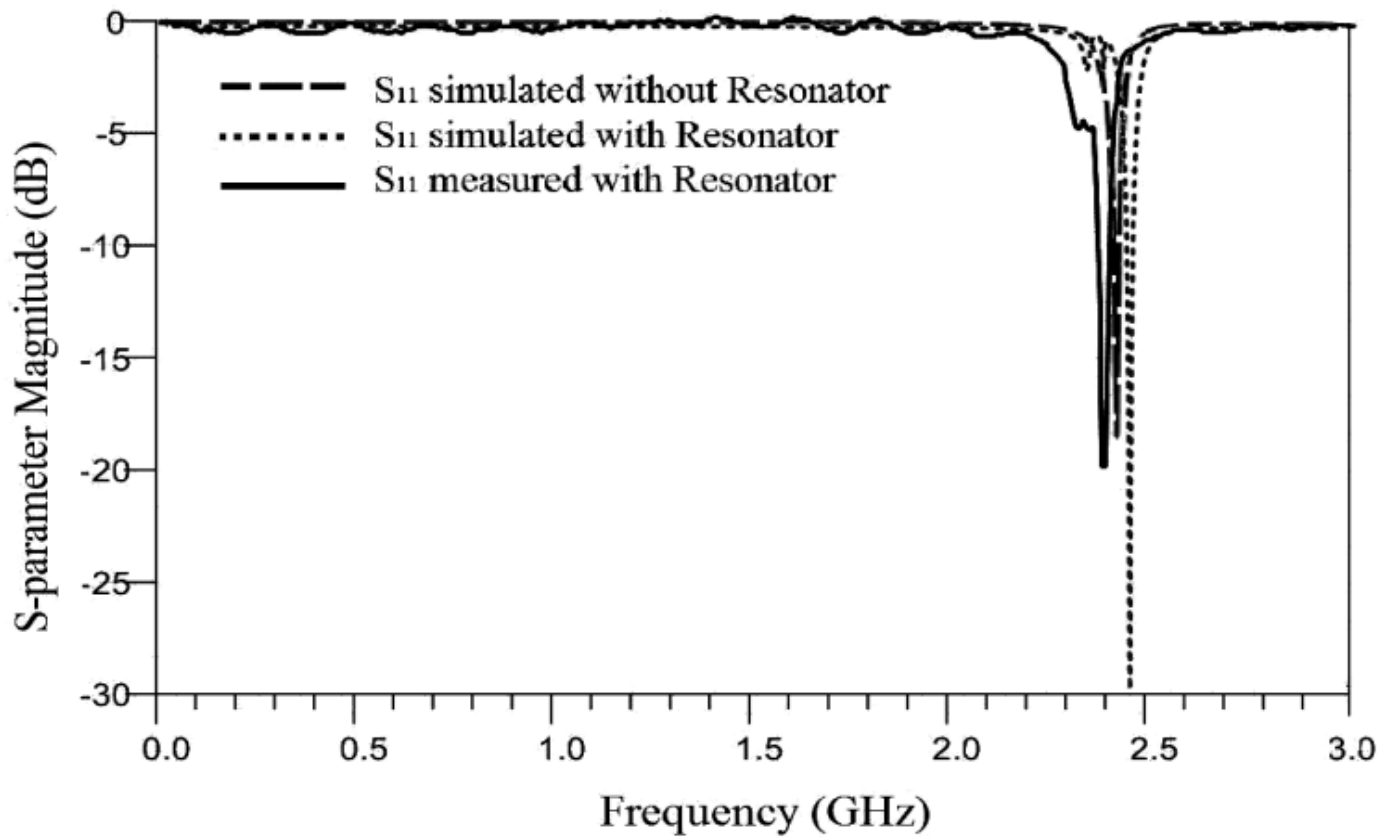


Figure 3

S-parameter characteristics of the proposed ladder resonator for varied length of  $L_s$  ranging from 27 to 36 mm.



**Figure 4**

Measured and Simulated S<sub>11</sub> parameter of two patch antennas array without and with proposed ladder resonator.

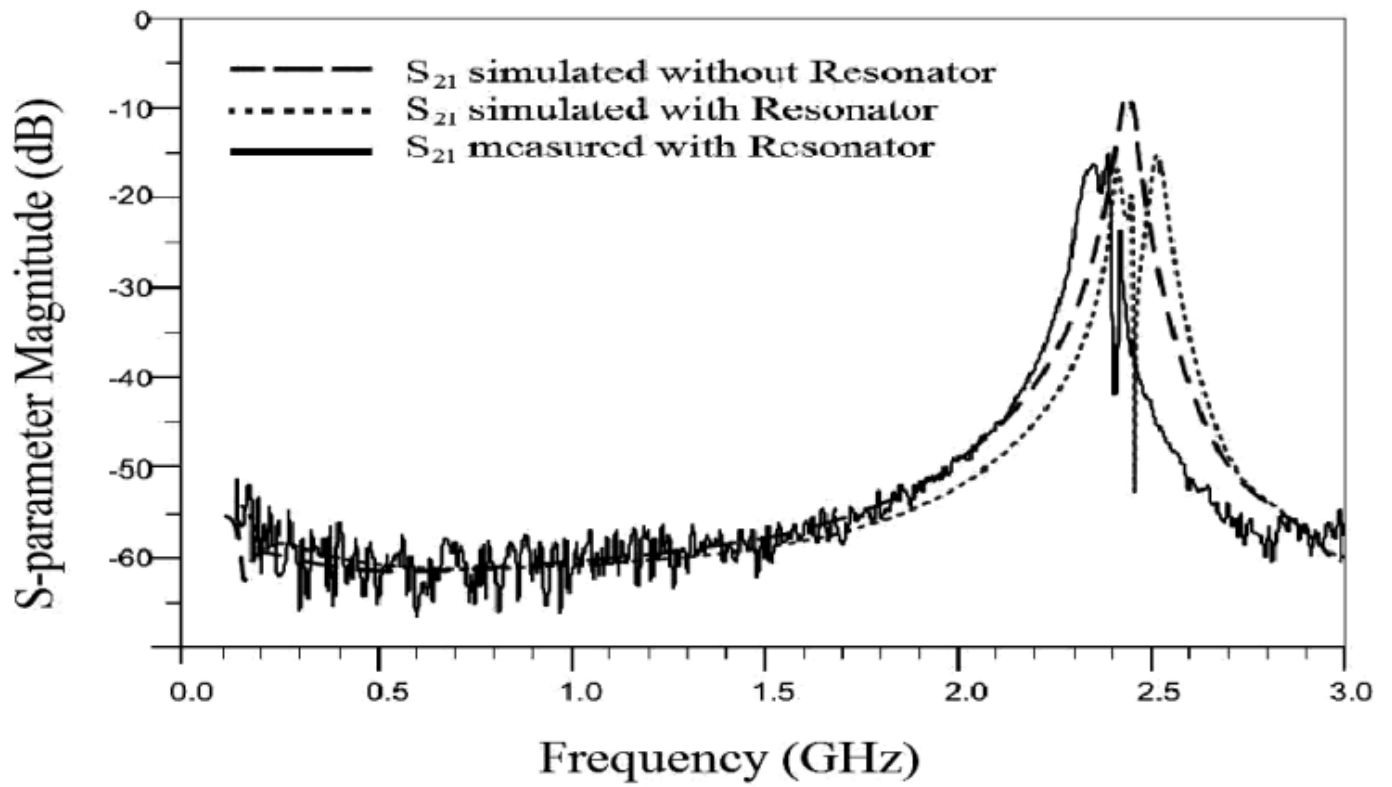


Figure 5

Measured and Simulated S21 parameter of two patch antennas array without and with proposed ladder resonator.

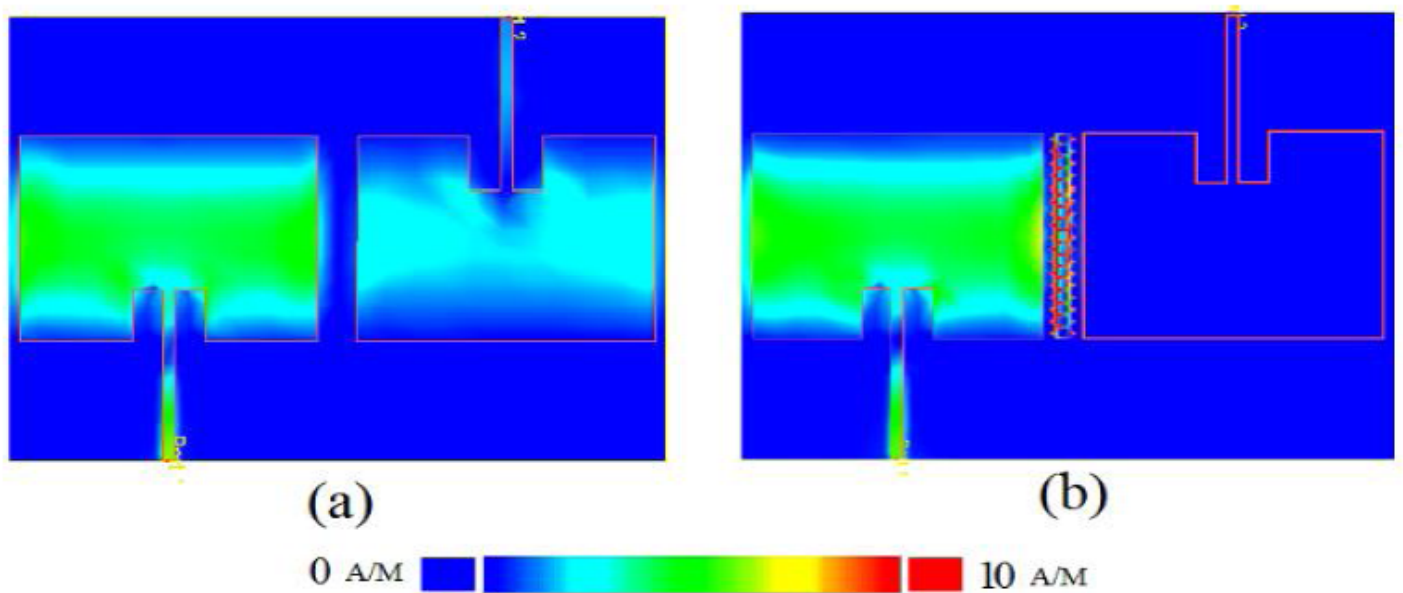
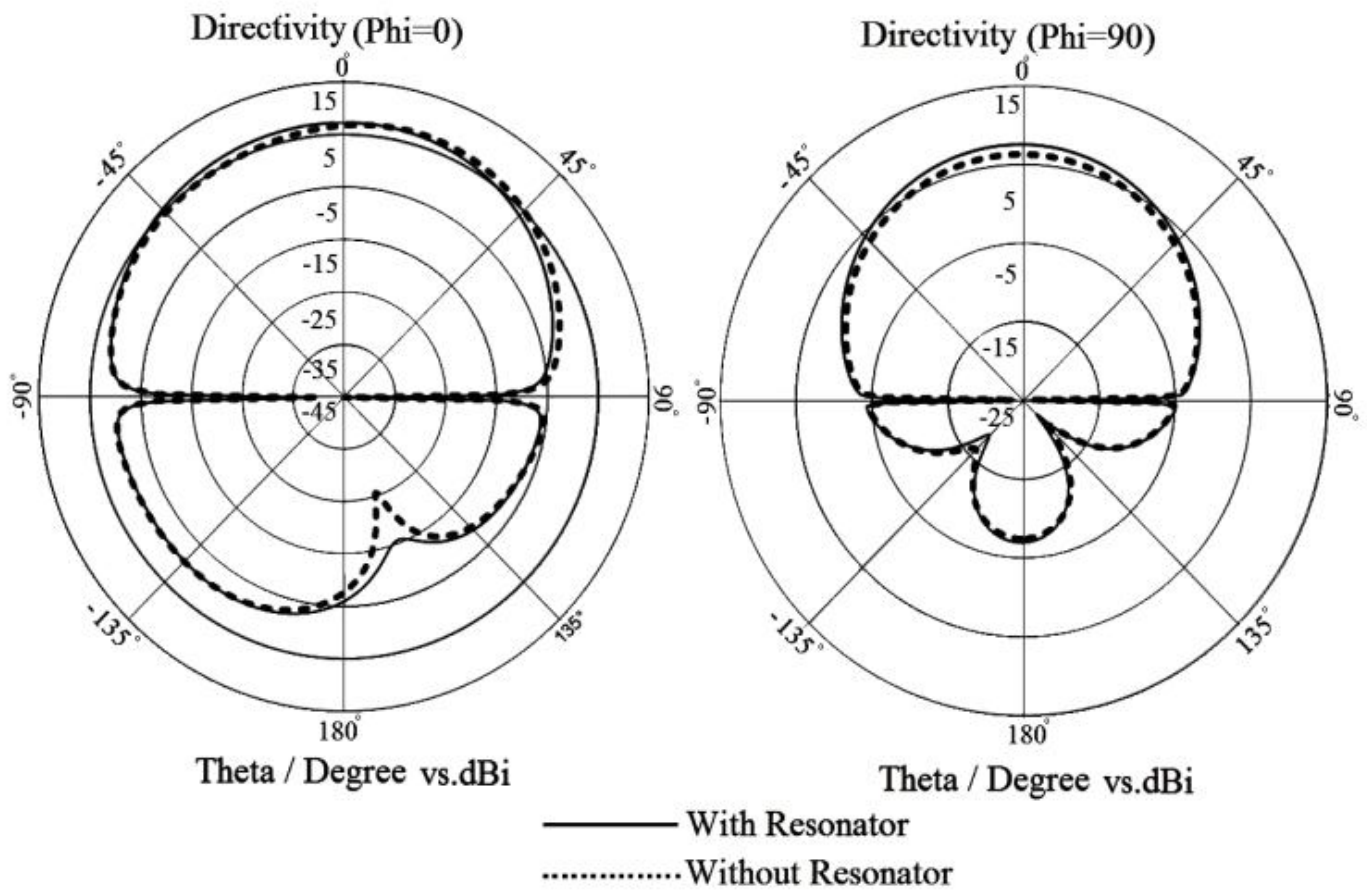


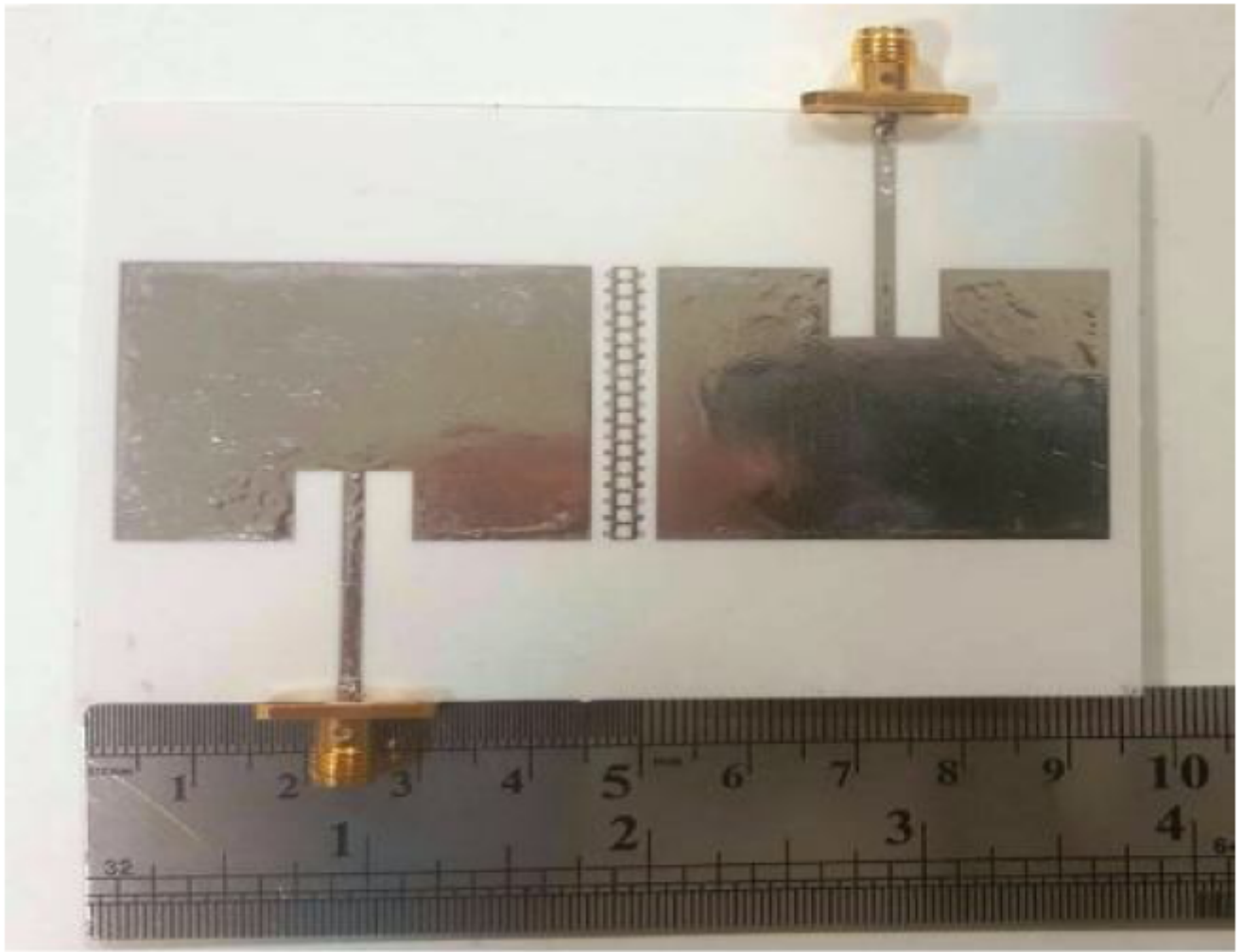
Figure 6

Surface current distribution in entire configuration (a) without and (b) with proposed ladder resonator.



**Figure 7**

Radiation characteristics of the proposed structure with and without ladder resonator.



**Figure 8**

Fabricated prototype.