



# A Dual-Band Active Frequency Selective Surface with Switchable Transmission and Reflection

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## CONTENT

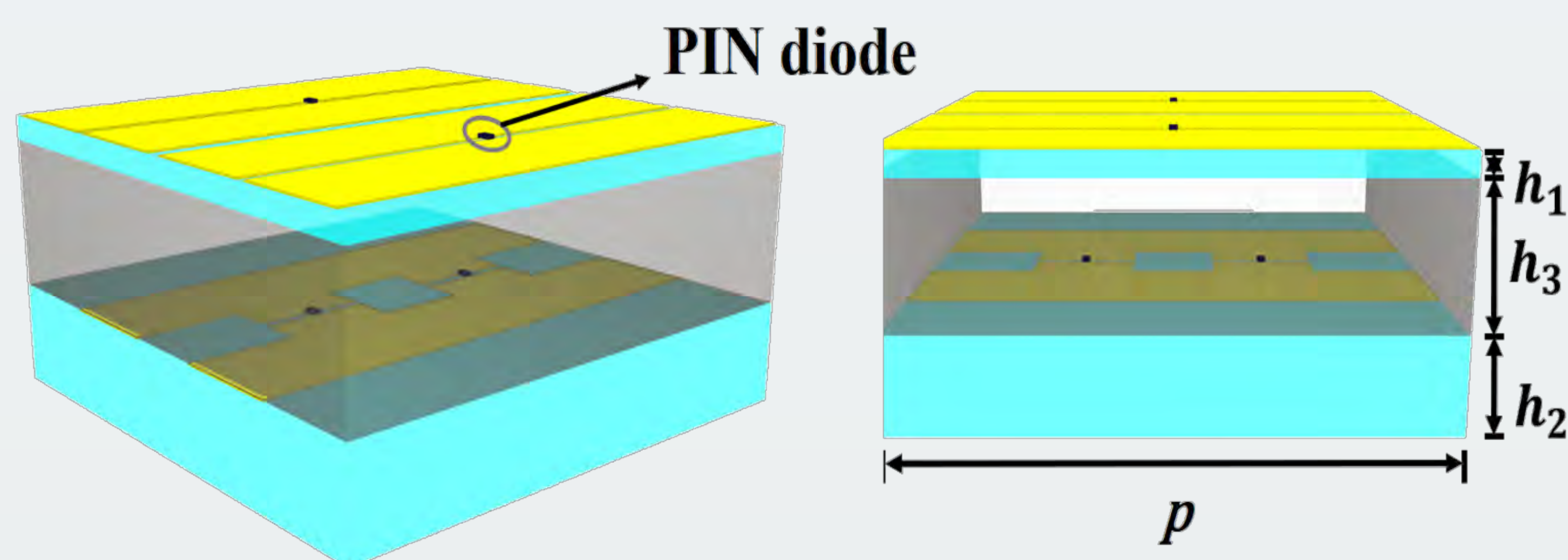
1. The Dual-Band Active Frequency Selective Surface.  
(The PIN diodes can be independently controlled )
2. The transmission line model of the AFSS.  
(The equivalent circuit models of the AFSS.)
3. The AFSS independently achieve transmission or reflection.

(By changing the states of PIN diodes can help to achieve the transition between transmission and reflection of the AFSS in C-band and X-band.)

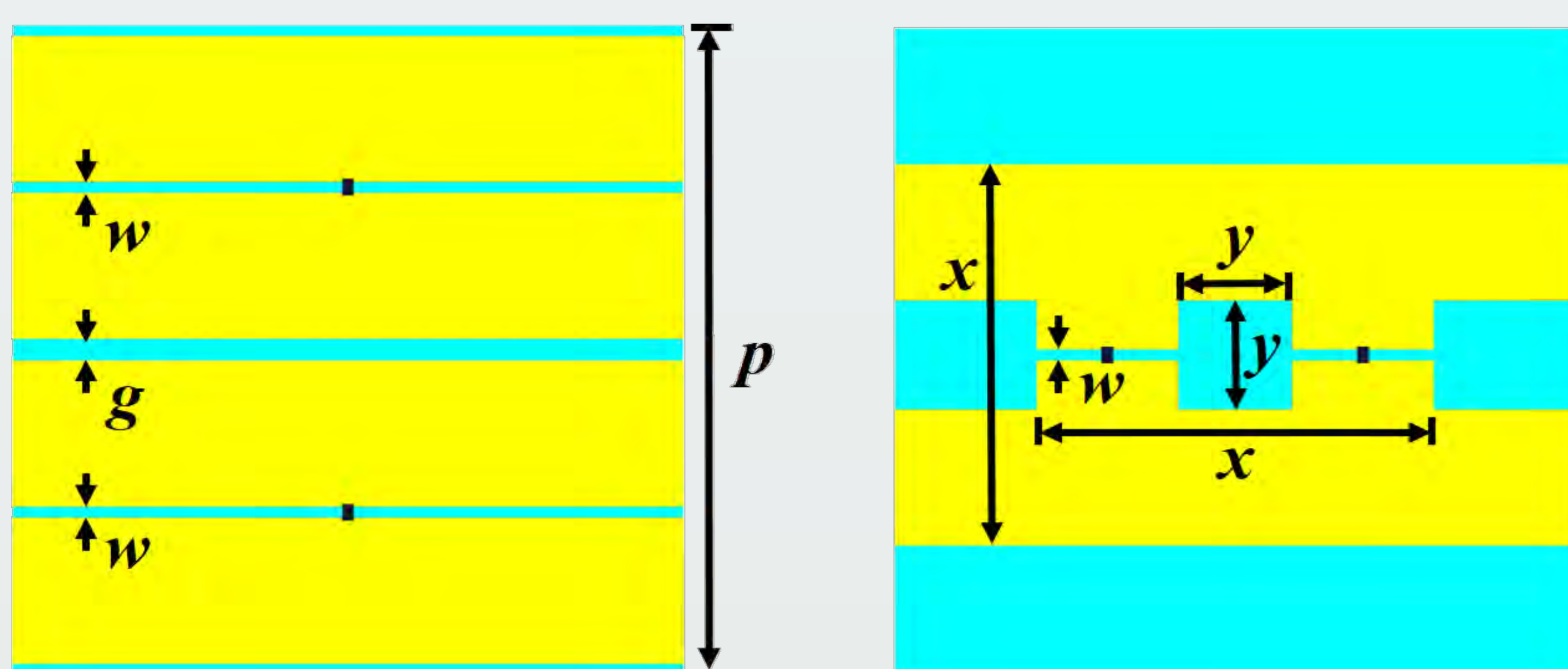
## DESIGN AND RESULTS

1. The Dual-Band Active Frequency Selective Surface.

Metallic layers + Dielectric layers + PIN diodes



Element dimension: 12mmX12mmX5mm

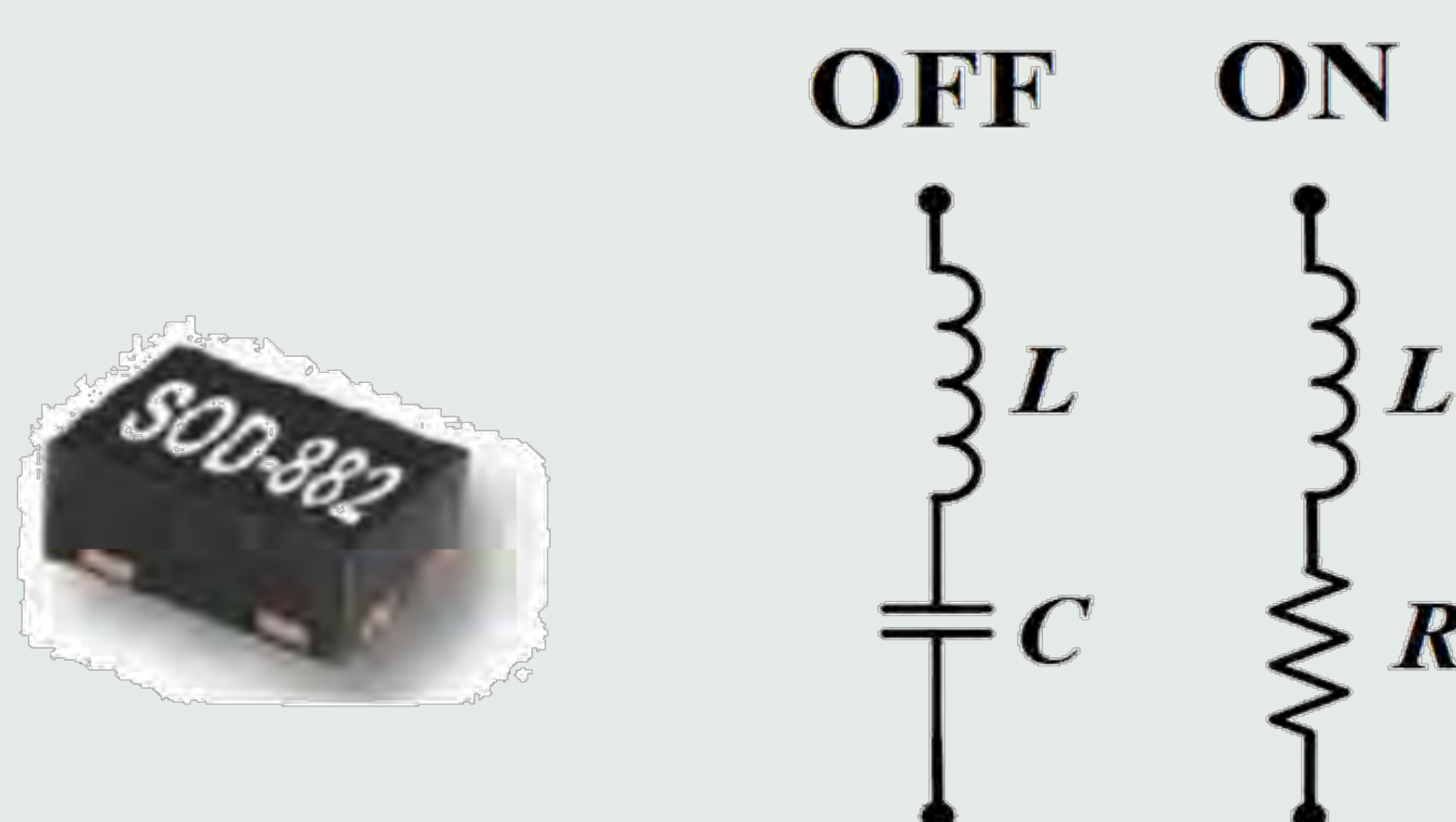


Two metal patch structures

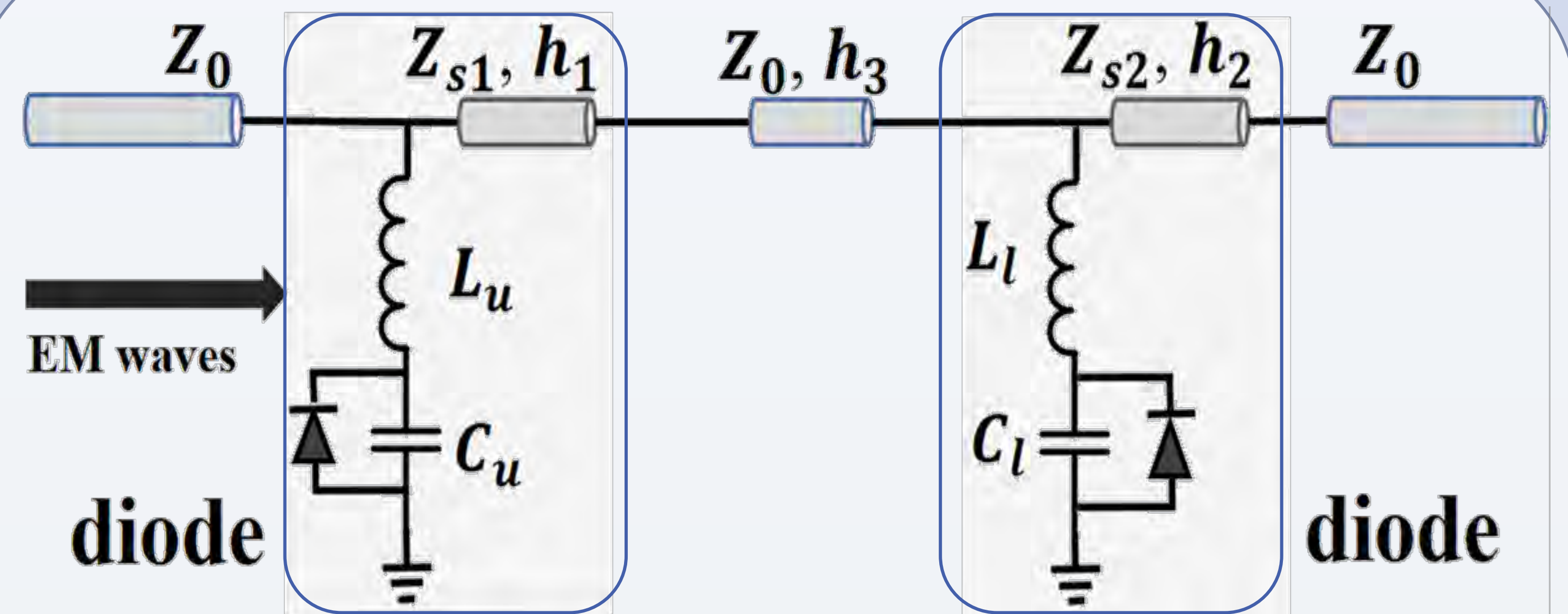
These patch structures have two different resonant points.

2. The transmission line model of the AFSS.

Get the equivalent according to the AFSS structure



Two Equivalent circuit models of the PIN diode



The equivalent circuit model of the AFSS.

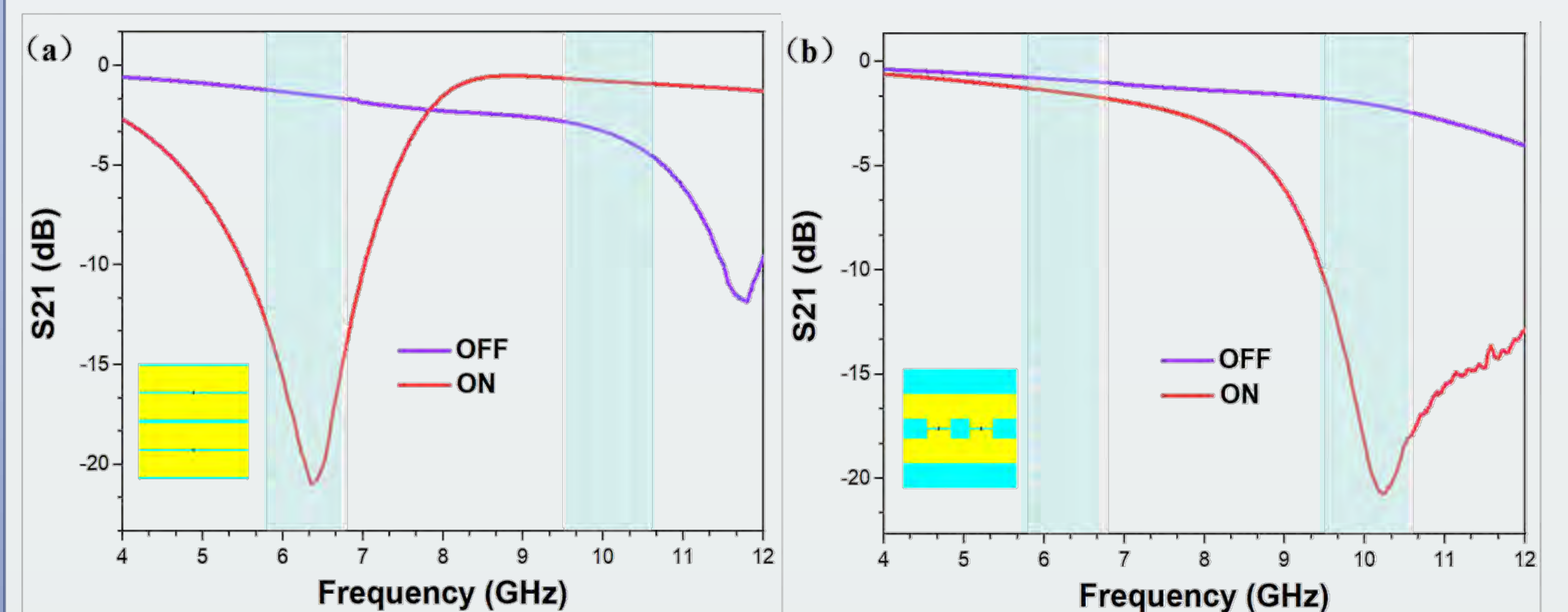
The two different resonant points of the AFSS, can be calculated as:

$$f_c = \frac{1}{2\pi\sqrt{LC}}$$

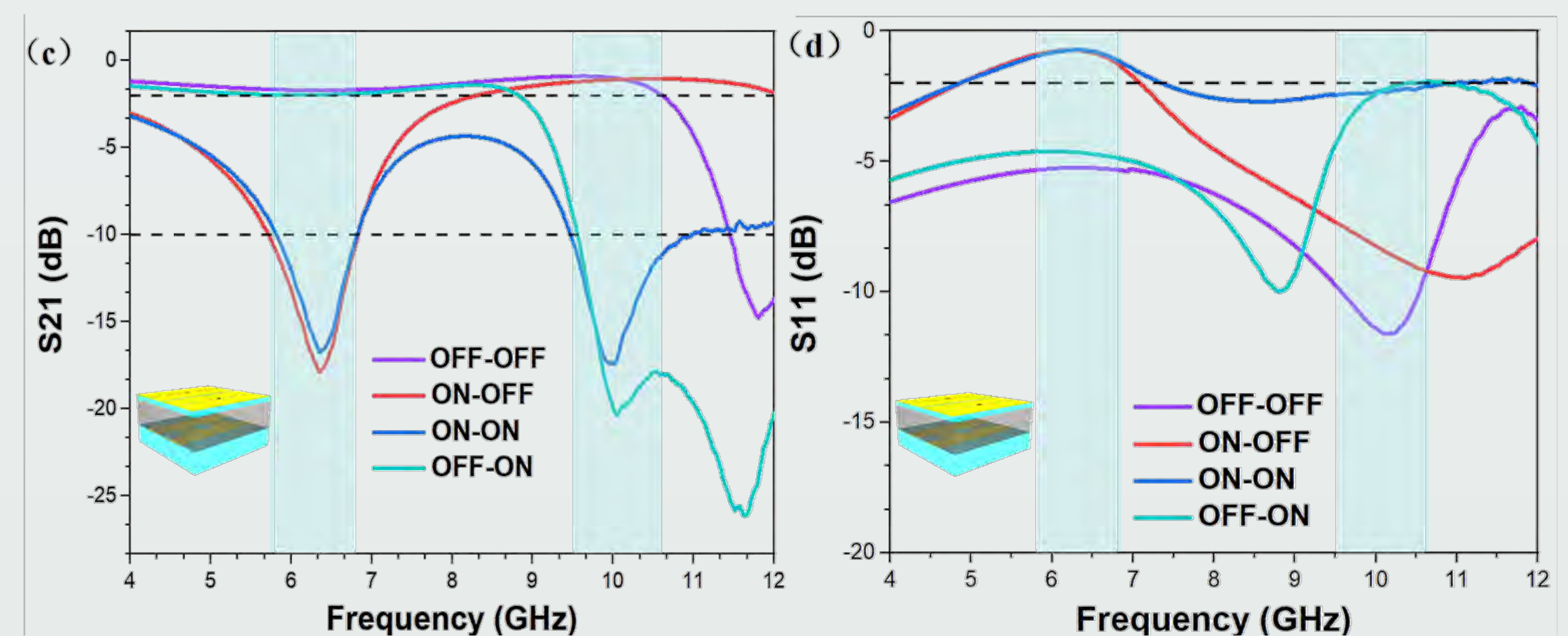
Then, we get the best unit parameters.

3. The AFSS independently achieve transmission or reflection.

Results of Numerical Simulation



The simulation of single patch structures



The simulation of the AFSS in the different diodes states

By assigning different switching states of the PIN diodes, the AFSS can realize either transmission or reflection with less than 2dB loss at 5.8 - 6.8 GHz and 9.5 - 10.6 GHz.

## CONCLUSION

The AFSS proposed can dynamically switch between transmission state and reflection state in C-band and X-band.