

Cavity Backed Patch-Slot Antenna for Lower Band 5G Communication

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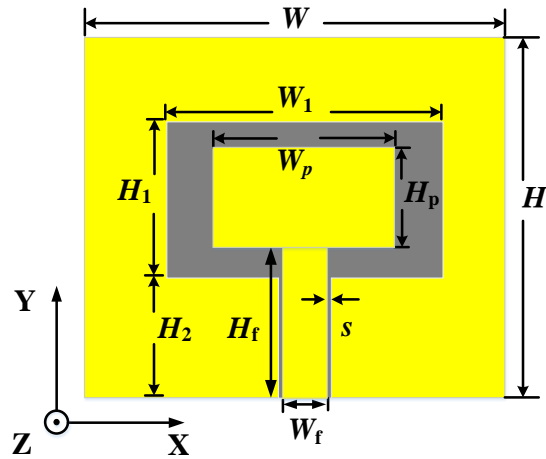
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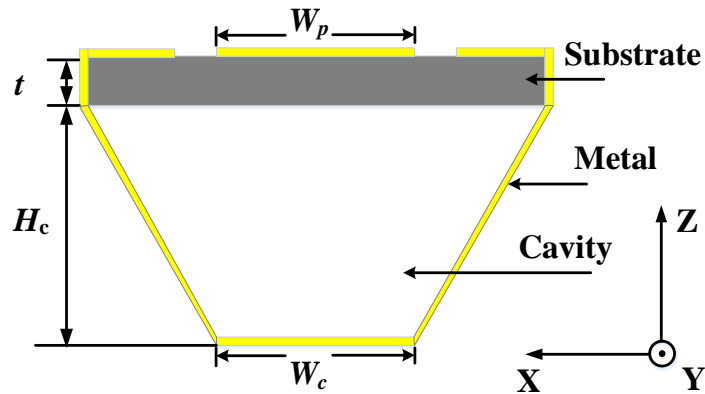
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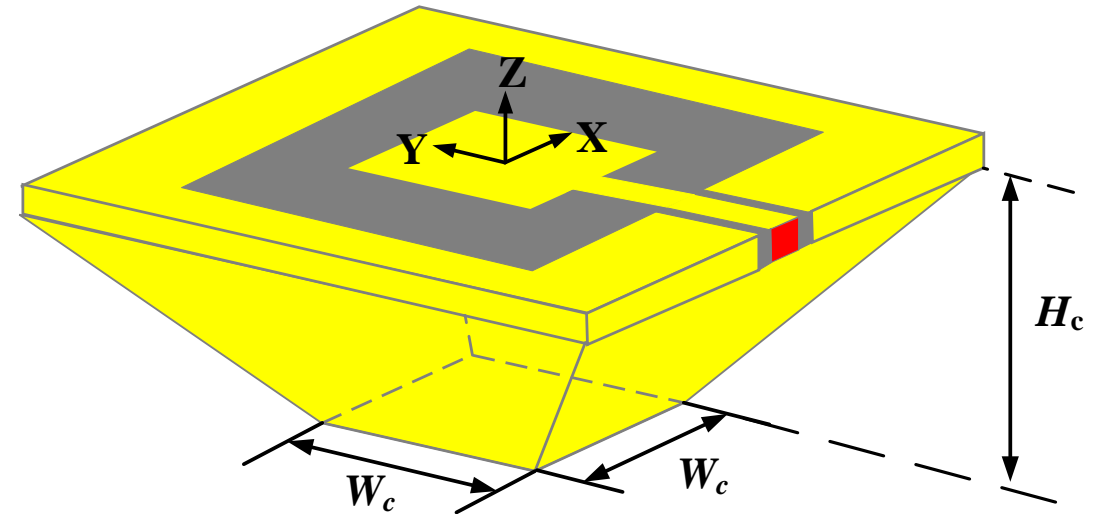
Single Antenna Element Structure



▪ (a) Top view



▪ (c) Cross section in xz plane

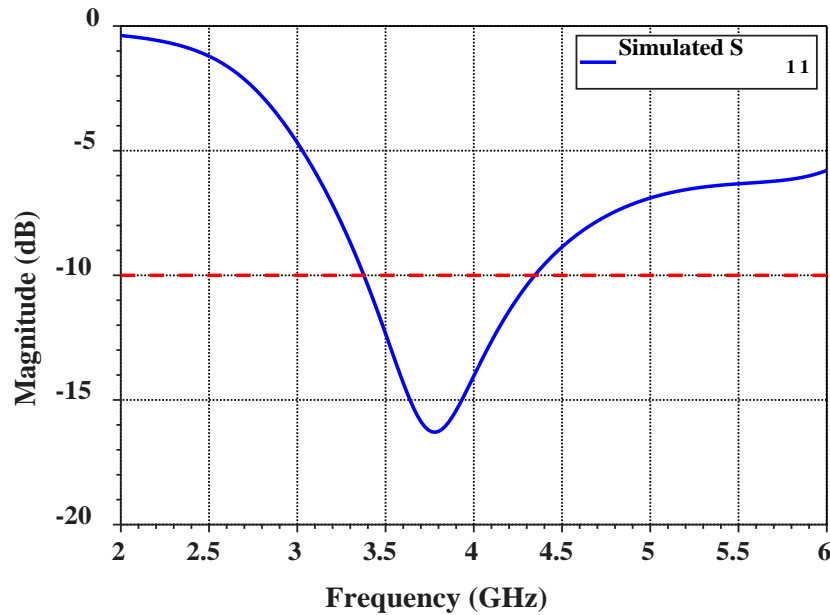


▪ (b) Side view

- The frequency range of the proposed antenna covers two 5G band: 3.55-3.7 GHz (unlicensed band) and 3.7-4.2 GHz (licensed band).
- These bands are announced by Federal Communications Commission (FCC) in 2018 as the 5G commercial bands for US.

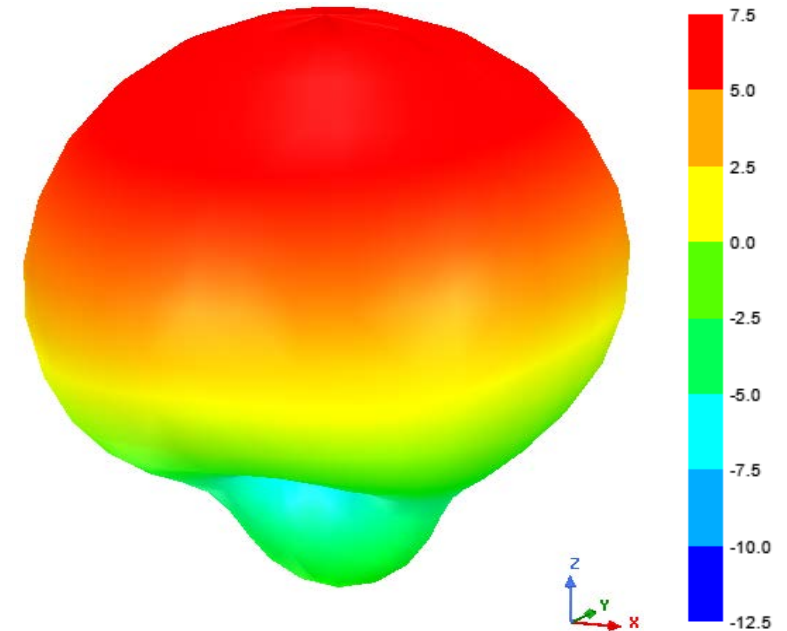
Simulated Results

Reflection coefficient



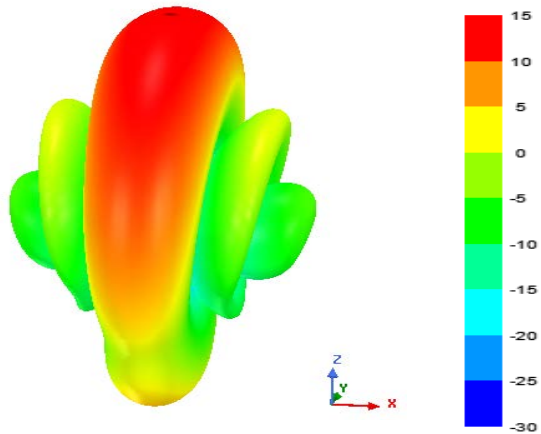
- -10 dB bandwidth: 3.38 GHz to 4.35 GHz

3D far-field gain pattern at 3.95 GHz

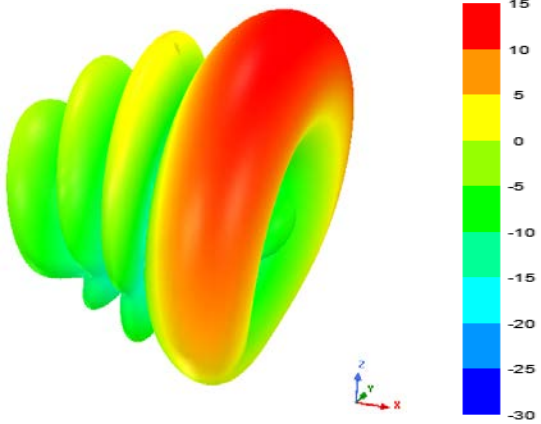


- Main beam: 5.68 dB
- Back beam: -4.27 dB

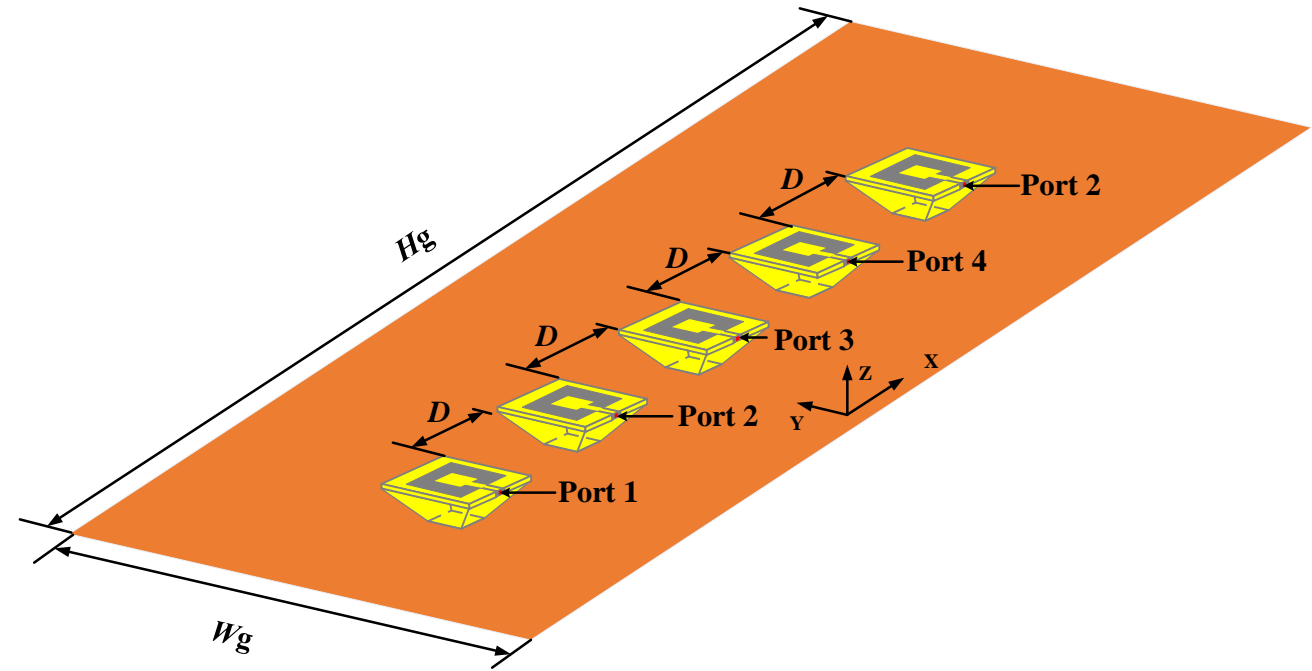
1×5 Linear array



(a)



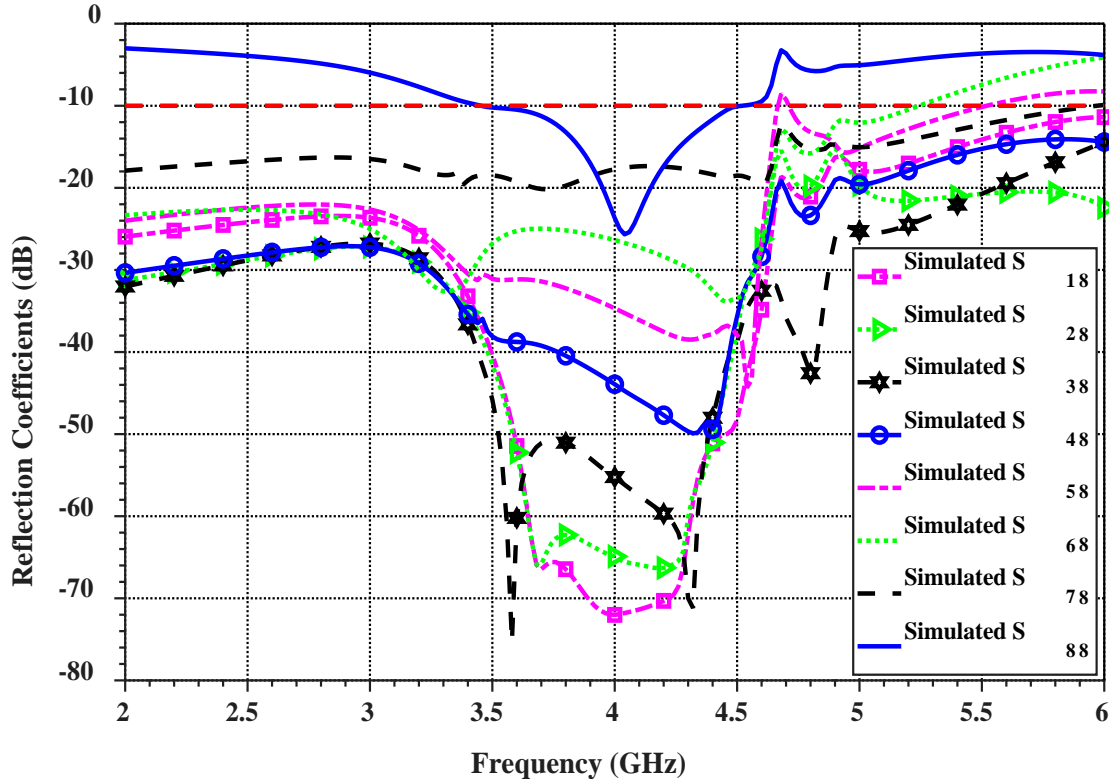
(b)



(c) A linear array of 1 × 5 elements with a metal ground.

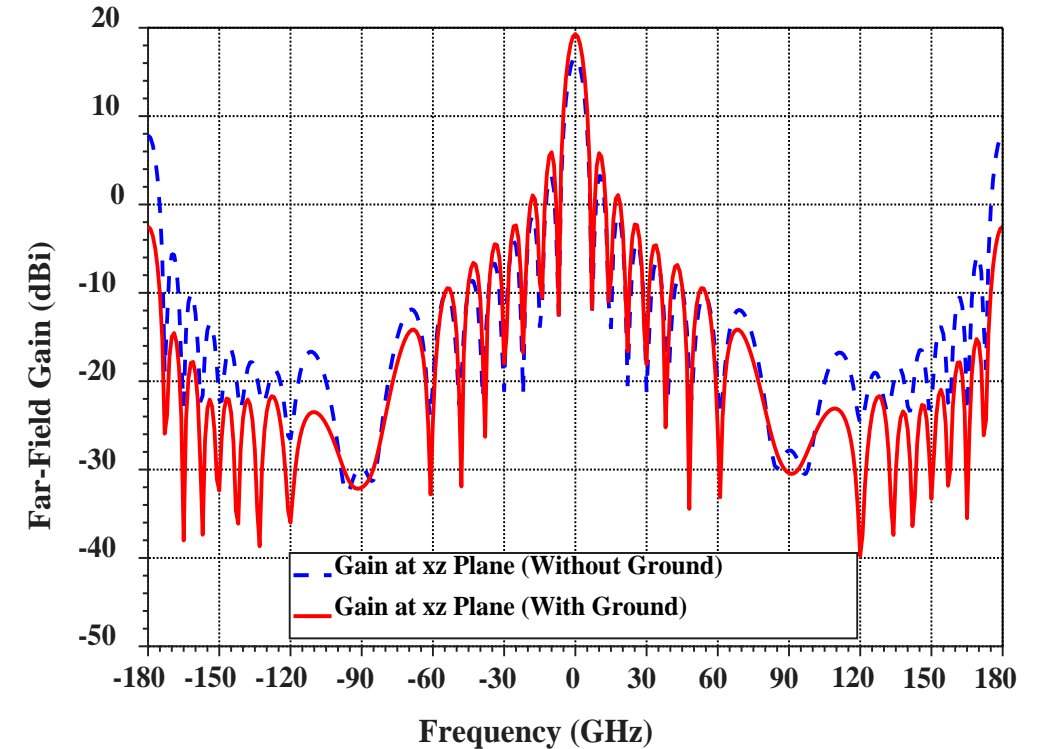
1×15 Linear Array Simulated Results

Reflection coefficient



The -10 dB bandwidth: 3.46 GHz to 4.51 GHz

3D far-field gain pattern at 3.95 GHz



- **With ground:**
 - Main beam (19.28 dB); Back beam (-2.51 dB)
- **Without ground:**
 - Main beam (16.69 dB); Back beam (8.87 dB)

Further Work

- Good radiation performance with 1x15 linear array with additional ground.
- Fabrication and chamber measurement will be our next task.
- Two dimensional planar array will be used to generate pencil shaped beam.
- Phase optimized excitation will be investigated for beam scanning.