DESIGN OF PRINTED DIPOLE ARRAY WITH REFLECTOR

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- Array with reflector
- 4 element dipole array with reflector and one director
- 2 x 4 array
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Goals

- Dipole array with high gain
- Simple feeding structure
- Compact structure
- Limitation of the backside radiation without metallic reflector
- Increase the gain
- Have the capability to have special current distribution with simple feeding
- Have the capability to integrate the antenna on the PCB
Single Dipole

Measurement and Simulation
Gain at 0° and 180° (2.54 dBi and 2.4 dBi)
Single Dipole (3D)
Single Dipole with reflector

Measurement and Simulation
Increase the gain at 0° and decrease at 180°
(5.4 dBi and -1.7 dBi)
Single Dipole with reflector (3D)
Single Dipole with reflector et director

Measurement and Simulation
Increase the gain at 0° and decrease at 180°
(7.4 dBi and -5dBi)
Single Dipole with reflector et director (3D)
Dipole with multi directors

Simulated gain vs. Number of directors

Measured gain vs. Number of directors
Example of 8 director antenna

Simulated and measured Reflection coefficient
Antenna with 8 directors

Simulated and measured radiation pattern of the antenna with 8 directors at 3 GHz in E and H plan.
Antenna with 8 directors (3D)
Dipole array without reflector

Simulated radiation pattern of the array without reflectors at 3 GHz in E and H plan.

Gain in bore side = 8dBi
Gain in back side = 2.5 dBi
Dipole array with reflector

Simulated radiation pattern of the array with reflectors at 3 GHz in E and H plan.

Gain in bore side = 10 dBi
Gain in back side = -5 dBi

Measured radiation pattern of the array with reflectors

Back side of the micro strip line and the reflectors.
4 element dipole array with reflector and one director

Current distribution: 0.5  1  1  0.5

First side lobe at -23 dB
Beamwidth 20.5° (simulation)

Frequency in GHz
Simulated (----) and measured (——) reflection coefficient of the 4 element array with reflectors and directors.
4 element dipole array with reflector and one director

Simulated radiation pattern of the array with reflectors at 3 GHz in E and H plan.

Measured radiation pattern of the array

Measured gain 11.7 dBi
Simulated gain 12.2 dBi

Backside radiation
-5 dBi in simulation
-9 dBi in measurements
4 element dipole array with reflector and one director

Measured Gain in dBi versus the frequency in MHz

The maximum gain 11.7 dBi is obtained at 3Ghz
4 element dipole array with reflector and one director

Measured radiation pattern in E plan and H plan co and cross polarisation at 3 GHz

The first side lobe level is – 18 dB under the maximum
Beamwidth 19.5°
4 element dipole array with reflector and one director (3D)
2 x 4 dipole array

Measured reflection coefficient of the 2x4 dipole array with reflectors and directors.
2 x 4 dipole array Simulation

Simulation at 3 GHz
The maximum gain is 15 dBi at 3 GHz
2 x 4 dipole array

Measured radiation pattern of the 2x4 dipole array with reflectors and directors at 3 GHz.

The maximum gain is 15.12 dBi at 3 GHz.

Measured gain of the 2x4 dipole array
4 x 4 dipole array
Current distribution: 0.5  1  1  0.5
In the power divider

Measured reflection coefficient of the 4x4 dipole array
4 x 4 dipole array

Measured radiation pattern of the 4x4 dipole array with reflectors and directors at 3.125 GHz.

The maximum gain is 17.68 dBi at 3.125 GHz with and without compensation of the matching.
• we propose a technique to reduce the back side radiation of printed antenna.
• This new structure is compact and has a very simple feeding network.
• The technique has been simulated and measured with different structure.
• Finally we obtain a 2 x 4 array with a measured maximum gain around 15.1 dBi (3 GHz)
• And 17.7 dBi with 4 x 4 array (3.1 GHz)
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