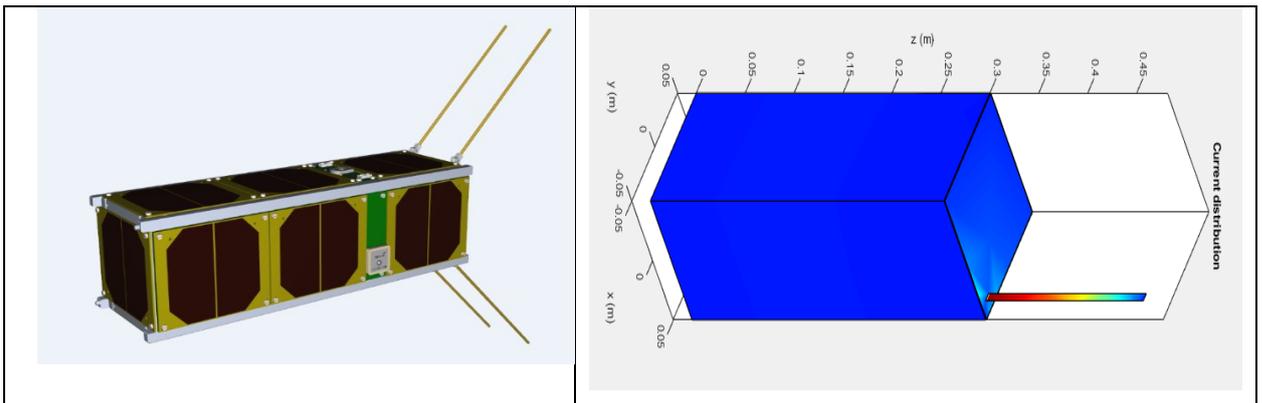


## Radiation pattern of onboard UHF-Antennas.

There are two UHF-band transmitters (nominal frequency 433.99 MHz, transmission rate: 9600 bit/s, GMSK) on the satellite board (main and reserved) and 4 UHF-antennas ( $\frac{1}{4}$  wavelength monopole) with perpendicular to the ground plane of 3U-CubeSat structure.

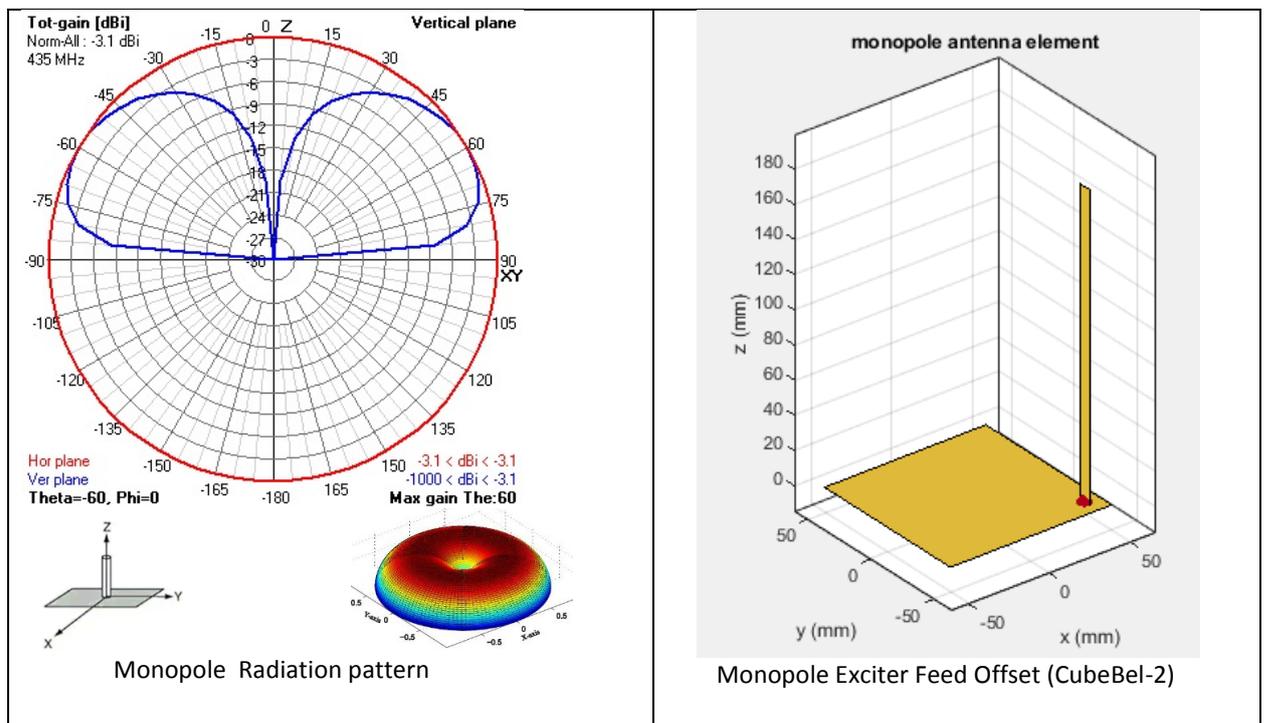
Only one of two transmitters is active at the same time during orbital operation. Maximal RF-output power level of transmitters is 30 dBm (reconfiguration is available on request). Each UHF-transmitter serves independent pair of monopoles, but only one of the monopoles is active at the same time.

*Simplified CubeBel-2 (BSUSat-2) structure is presented below.*

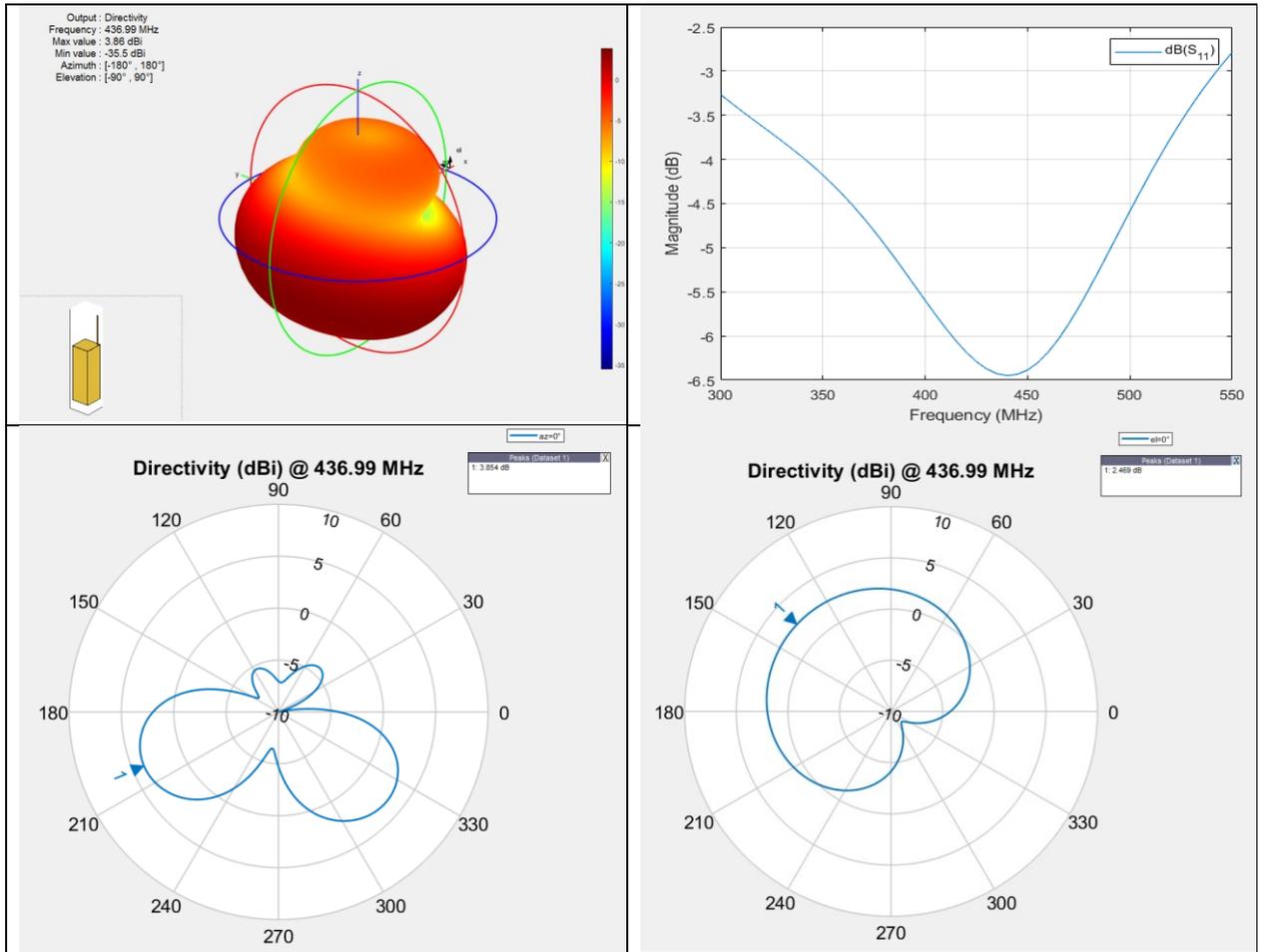


Due to the complicity and cost of detailed pattern measurements, only simulation was performed for CubeBel-2 mission. The simulation was made in MATLAB software and some real experiments was performed also. The radiation pattern of the monopole has been proven to be a good and valid approximation of the CubeBel-2 UHF-transmitters system.

*Monopole Radiation pattern and monopole Exciter Feed Offset for CubeBel-2 (BSUSat-2).*

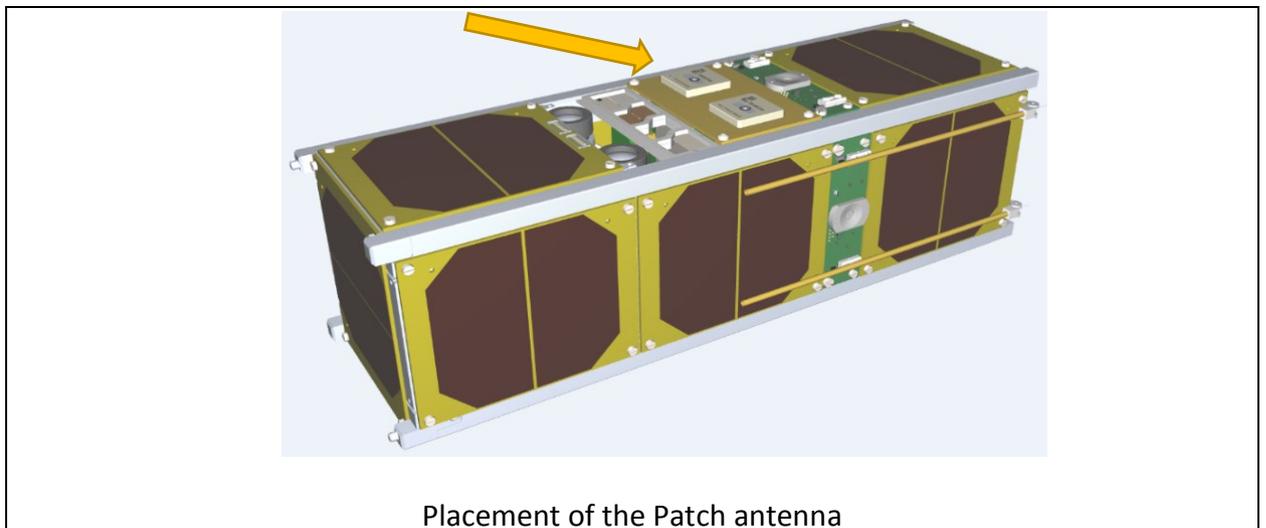


**Radiation pattern of one Monopole Exciter on the top panel of CubeBel-2 (BSUSat-2).**



**Radiation pattern of onboard S-band Patch-Antenna.**

There is one S-band transmitter on the board (nominal frequency 2400 MHz, transmission rate: 1 Mbit/s, DBPSK). Maximal RF-output power level of transmitter is 30 dBm (reconfiguration is available on request). High efficiency embedded ceramic patch antenna (7 dBi at 2.45 GHz) is placed over ground panel on one side of CubeBel-2 (BSUSat-2).



The antenna's radiation pattern measurement setup

