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Design of Miniaturized Antennas for GNSS Applications Using a High DK Dielectric Material — •Stefano Caizzone — Institute of Communications and Navigation, German Aerospace Center (DLR), Wessling, Germany

The use of high dielectric constant (high DK) materials is particularly appealing for a vast number of Radio Frequency (RF) applications, including antenna design. In this field, in fact, high DK low-loss dielectric materials could enable consistent improvements in antenna miniaturization. To the present day, however, common high-DK materials suffer from relatively large manufacturing tolerances, implying remarkable frequency shifts in the antenna radiation and need for retuning. This work, on the other hand, shows the use of a new dielectric material with diminished tolerances for antenna design purposes, both through preliminary tests with a simple antenna structure and through the enhanced design of a miniaturized antenna for GNSS applications. The initial tests were performed in order to validate the usability of the material in the RF area: it was used as a substrate for a microstrip patch antenna. The results show a good behavior of the high DK material and its aptitude for RF antenna design. As a consequence, a Dielectric Resonator Antenna (DRA), fully exploiting the dielectric properties of the material, was designed for use in the lower L-Band of the Global Navigation Systems, allowing for good performance over a wide bandwidth, covering E5, L2 and E6 bands.

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