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Bandwidth and Pattern Reconfigurable Antenna

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ABSTRACT

This paper presents a reconfigurable antenna (RA) capable of varying its impedance bandwidth between 3.4–3.6 GHz and 3.1–3.9 GHz frequency bands and steering its main beam into three different directions pertaining to $\theta \in \{-30^\circ, 0^\circ, 30^\circ\}$, $\varphi \in \{0^\circ\}$ for each band. The RA employs a multilayer structure, where two parasitically coupled reconfigurable layers using PIN diode switches enable generating the modes of operation. A fully functional RA has been fabricated and characterized. The characterizations involved impedance, radiation, error vector magnitude (EVM), and inter modulation (IM) measurements. An average realized gain of 9 dB has been achieved for all modes of operation. EVM measurements indicate less than -25dB EVM for input powers up to 30dBm. IM test results have revealed that the passive factors such as loose solder joints and electro-thermal effects are the main factors resulting in passive IM products.

Keywords: Aperture coupling, Yagi-Uda arrays, Reconfigurable antennas, Microstrip antennas, Multifrequency antennas, Frequency control