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Design and Performance Evaluation of a 6×6 MIMO Array with Partial Ground Plane for Sub-6 GHz Mobile Applications

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Abstract

This article presents a 6×6 MIMO array optimized for sub-6 GHz mobile and wireless applications. Utilizing a partial ground plane (PGP), the array incorporates a single-element half-circle-slotted monopole antenna to achieve a wideband response. The compact design, measuring 75 × 150 mm² and only 0.508 mm thick, is engineered to fit 6.6-inch display smartphones. Operating between 2.82 and 5.95 GHz, the array offers a -10 dB bandwidth and a VSWR of less than 2. It also delivers port-to-port isolation less than -20 dB and a peak realized gain of 5.3 dBi, with an antenna efficiency of 71%. Comprehensive far-field radiation patterns are observed across all 6 ports. The array maintains an envelope correlation coefficient (ECC) under 0.004 and a diversity gain (DG) above 9.98, demonstrating robust performance. Specific absorption rate (SAR) results at 3.5 GHz confirms compliance with MIMO standards, with values as low as 0.13 W/kg. This high-performance MIMO array is a strong contender for sub-6 GHz 5G applications. © (2024) Intelligent Network and Systems Society.

Author Keywords

MIMO array; Partial ground plane (PGP); Smartphone integration; Sub-6 GHz; Wideband antenna

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