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Dielectric Resonator Antenna Mounted on Cylindrical Ground Plane

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or Handheld RFID Reader at 5.8 GHz

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Abstract

Dielectric resonator antenna (DRA) mounted on cylindrical

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round plane is investigated for handheld RFID reader

applications at 5.8 GHz. The simplicity of the structure

makes it practical in terms of cost, space, and ease of

fabrication. The radiation characteristics of the antenna in

free space and in the presence of a proposed compact reader

device model and human hand are calculated. The antenna

is circularly polarized and exhibits peak gain of 7.62 dB at

5.8 GHz with high front to back ratio of 15.5 dB. Using the

same reader device model, a sequentially feeding 2×2 DRA

array mounted on the same cylindrical ground plane is used

for RFID reader antenna at 5.8 GHz. The array introduces

high gain of 9.36 dB at 5.8 GHz with high front to back

ratio of 10.48 dB. The 2×2 DRA array elements exhibit

circular polarization over a frequency band of 1.1 GHz. The

axial ratio is 1.1 dB at 5.8 GHz. The proposed reader model

is simple and has a small size compared with that in the

case of planar ground plane. The results are calculated using

the finite element method (FEM) and compared with that

calculated using the finite integral technique (FIT)