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A Low-Profile Planar MIMO Array on Flexible Substrate for Mid-Band 5G

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Abstract
Here, a low-profile planar microstrip feed 6 × 6 MIMO array on flexible substrate is designed and realized. This proposed design works with a wideband of 3.75 GHz covering all mid-band 5G frequency ranges from 2.95 GHz to 6.70 GHz. This 6-element MIMO demonstrates a good isolation between the ports with as low as -17.7dB and as high as above -40dB. The combined MIMO far-field radiation patterns yield an ability to radiate almost all directions in both phi = 0 and phi = 90 planes. The realized gain (RG) of the proposed MIMO array achieved is as high as 7.35dBi and never goes below 5dBi in the working band. Whereby, the total efficiency (TE) remains above 90% in the band. The MIMO performance parameters such as Envelop Correlation Coefficient (ECC) and Diversity Gain (DG) values achieving remarkably good as low as 0.001 and close to 10, respectively, exhibiting the quality and robustness of the proposed design. This design will motivate the antenna designer to design a relatively high performing MIMO array on a thin flexible substrate for 5G smartphones. © 2024 IEEE.

Author Keywords
isolation; MIMO; planar microstrip; realized gain efficiency

Index Keywords
Directional patterns (antenna), Integrated circuit design, Microstrip antennas, Microwave antennas, MIM devices, Structural dynamics, Surface discharges; Design work, Flexible substrate, Frequency ranges, Gain efficiency, Isolation, Low-profile, Microstrip fed, Planar microstrip, Realized gain efficiency, Wide-band; 5G mobile communication systems

References

- Pant, A., Singh, M., Parihar, M.S.
  A frequency reconfigurable/switchable MIMO antenna for LTE and early 5G applications
  (2021) *AEU-Int. J. Electron. Commun*, 131.
  no. February
- Guo, J., Cui, L., Li, C., Sun, B.
  Side-Edge Frame Printed Eight-Port Dual-Band Antenna Array for 5G Smartphone Applications
  (2018) *IEEE Trans. Antennas Propag*, 66 (12), pp. 7412-7417.
  Dec
- Kumar, N., Khanna, R.
  A two element MIMO antenna for sub-6 GHz and mmWave 5G systems using characteristics mode analysis
  (2021) *Microw. Opt. Technol. Lett*, 63 (2), pp. 587-595.
- Megahed, A.A., Abdelhay, E.H., Abdelazim, M., Soliman, H.Y.M.
  5G millimeter wave wideband MIMO antenna arrays with high isolation
  (2023) *Eurasip J. Wirel. Commun. Netw*, 2023 (1).
- Hossain, A.K.M.Z., Bin Hassim, N., Hassan, W.H.W., Indra, W.A., Herawan, S.G., Aziz, M.Z.A.B.A.
  A Planar 2×2 MIMO Antenna Array for 5G Smartphones
  (2021) *Int. J. Adv. Comput. Sci. Appl*, 12 (7), pp. 710-717.

- Ren, Z., Zhao, A.
Dual-Band MIMO Antenna with Compact Self-Decoupled Antenna Pairs for 5G Mobile Applications
(2019) *IEEE Access*, 7, pp. 82288-82296.

- Yadav, V., Yadav, R.S., Yadav, P., Mishra, B., Kumar, A.
Dual and wideband 6-port MIMO antenna for WiFi, LTE and carrier aggregation systems applications
(2023) *AEU-Int. J. Electron. Commun*, 162.
no. December 2022

- Morsy, M.M.
Compact eight-element MIMO antenna array for sub 6 GHz Mobile applications
(2023) *SN Appl. Sci*, 5 (10).

- Zakir Hossain, A.K.M., Bin Hassim, N., Alsayaydeh, J.A.J., Hasan, M.K., Islam, M.R.
A Tree-profile Shape Ultra Wide Band Antenna for Chipless RFID Tags
(2021) *Int. J. Adv. Comput. Sci. Appl*, 12 (4), pp. 546-550.

- Zahid, M., Khalid, A., Moazzam, H., Sadaqat, H., Shoaib, S., Amin, Y.
Ten-Port MIMO Inverted-F Antenna for LTE Bands 43/48/49 Bands Smartphone Applications
(2023) *Electron*, 12 (19), pp. 1-14.

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