Influence of Metallic Enclosures on Monopole-like Planar Antennas

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ABSTRACT

Abstract-This paper investigates in detail the influence of neighboring conductive objects on the performance of planar monopole-like antennas for modern electronic devices. These objects influence not only the antenna radiating structures but also the antenna feeds, resulting in apparent degradation in antenna performance and device electromagnetic compatibility (EMC). For this investigation, four representatives of antenna feeds (single-ended microstrip-line, single-ended strip-line, balanced microstrip-line, and balanced strip-line) and two typical monopole-like antennas (monopole and T-monopole) are created; eight combinations are presented. According to their experimental results obtained, the influence of neighboring conductive objects is compared and the best combination with the highest immunity is highlighted.

Keywords : Wireless communications、Monopole Antennas、Planar Antennas、Electromagnetic Compatibility (EMC)

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REFERENCES

參考文獻 [1] J.Toftagrd, S. N. Hornsleth, and J. B. Andersen, "Effects on portable antennas of the presence of a person," IEEE Trans. Antennas Propagat., vol. 41, no. 6, pp. 739-746, Jun. 1993.

[2] M. A. Jensen and Y. Rahmat-samii, "EM interaction of handset antennas and a human in personal communications," Proceedings IEEE, vol. 83,no. 1,pp. 7-17,Jan. 1995.

[3] Steven Yu, "網路分析儀於平衡/非平衡/多埠/內箝元件的量測" ,2005 [4] D . Ahn, J. S. Park, C.S, Kim, J. Kim, Y. Qian, and T. Itoh, "A design of the low-pass filter using the novel microstrip defected ground structure, "IEEE Trans. Microwave Theory Tech., vol. 49, no. 1, pp. 86-93, Jan. 2001.

[5] Stephen H. Hall, Garrett W. Hall, James A. McCall, "High-Speed Digital System Design, " John Wiley & Sons,2002,Ch. 3.

[6] M. A. Salah-Eddin and A. M. E. Safwat, Defected-ground coupled microstrip lines and its application in wideband baluns, IET Microwave Antennas Propagat., vol. 1, no.4, pp. 893-899, Aug. 2007.

[7] T. Chen, K. W. Chang, S. B. Bui, H. Wang, G. Samuel, L. C. T. Lui, T. S. Lin, and W. S. Titus, " Broad-band monolithic passive baluns and monolithic double-balanced mixer, " IEEE Trans. Microwave Theory Tech., vol. 39, December 1991.

[8] T. Gokdemir, S. B. Economides, A. Khalid, A. A. Rezazadeh, and I. D. Robertson, " Design and performance of GaAs MMIC CPW baluns using over-laid and spiral couplers, " in IEEE MTT-S Microwave Symp. Dig., 1997, pp. 401-404.

[9] C. Cho, and K. C. Gupta, " A new design procedure for single-layer and two-layer three-line baluns, " IEEE Trans. Microwave Theory Tech., vol. 46, December 1998.

[10] K. Nishikawa, I. Toyoda and, T. Tokumitsu, " Compact and broadband three-dimensional MMIC balun, " IEEE Trans. Microwave Theory Tech., vol. 47, January 1999.

[11] C-W. Tang, J-W. Sheen, and C-Y. Chang, " Chip-type LTCC-MLC baluns using the stepped impedance method, " IEEE Trans. Microwave Theory Tech., vol. 49, December 2001.

[12] B. Bhat and S. K. Koul, Stripline Like Transmission Lines for Microwave Integrated Circuits. New York, NY: John Wiley Sons, 1989.

[13] R. k S ettaluri and A. Weisshaar, A broadside-edge-coupled vialess balun, in IEEE MTT-S Int. Microwave Symp. Dig., vol. 2, pp. 1251-1254, Jun. 2003.

[14] Stephen H. Hall and Garrett W. Hall and James A. McCall, High-speed Digital System Design. New York, John Wiley Sons, 2000.

[15] N. Marchand, "Transmission line conversion transformers" Electronics, vol. 17, no. 12, pp. 142-145,Dec. 1944.

[16] E. Lee, P. S. Hall, and P. Gardner, "Compact wideband planar monopole antenna," Electron. Lett., vol. 35, no. 25, pp. 2157-2158, Dec. 1999.

[17] K. L. Wong, G. Y. Lee, and T. W. Chiou, "A low-profile planar monopole antenna for multiband operation of mobile handsets, " IEEE Trans. Antennas Propagat., vol. 51, no. 1, pp. 121-125, Jan. 2003.

[18] C. S. Liu, C. N. Chiu, and S. M. Deng, "A compact disc-slit monopole antenna for mobile devices," IEEE Antennas Wireless Propagat. Lett., vol. 7, pp. 251-254, 2008.

[19] Y. L. Kuo and K. L. Wong, " Printed double-T monopole antenna for 2.4/5.2 GHz dual-band WLAN operations, " IEEE Trans. Antennas and Propagation, vol. 51, September 2003.

[20] G. Zheng, A. A. Kishk, A. W. Glisson, and A. B. Yakovlev, " A broadband printed bow-tie antenna with a simplified balanced feed, "

Microwave and Optical Technology Letters, vol. 47, December 2005.
[21] C. C. Lin, Y. C. Kan, L. C. Kuo, H. R. Chuang, " A planar triangular monopole antenna for UWB communication, " IEEE Microwave and Wireless Components Letters, vol. 15, October 2005.