應用於現代行動通訊之平衡式饋入寬頻圓盤天線

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摘 要

本?文提出?支應用在現代?動通訊的新型平面天線：圓盤開槽微帶天線與平衡式饋入圓盤開槽天線。在圓盤開槽微帶天線部分，由微帶線結構組成；在平衡式饋入圓盤開槽天線部分，由DCL (Defected-ground coupled microstrip lines) balun 取代微帶線結構饋入以取得平衡式訊號，其結構亦較前者微小，且擁有抵抗接地面大小變化的能?。

平衡式饋入圓盤開槽天線設計可分成三步驟：⑴首先設計一支以微帶線結構饋入，且應用在IMT-2000、WLAN (IEEE 802.11 b/g/n)、WiMAX頻帶的非平衡式圓盤開槽天線；⑵接著設計一個應用在與前者同一頻帶的DCL balun；⑶整合步驟一的天線與步驟二的balun，使其成為平衡式饋入天線。至此，建構出一支應用在上述的現代?動通訊頻帶天線，並以軟體模擬及儀器實際?測?探討天線的反射損耗、?射場形，其結果證實天線具有寬頻帶和全向性?射，足以涵蓋上述頻帶，在天線的?射效?及增?部分，亦有?好的結果。

關鍵詞 : 平面天線、圓盤天線、平衡式饋入天線、?動通訊、IMT-2000、WLAN、802.11 b/g/n、WiMAX

目錄

參考文獻

[1] 東名，“ ?動通訊發展?，文魁資訊股份有限公司，2002.

[2] Min Sze Yap, Lenna Ng, and Sheel Aditya,“ A Triple Band Antenna for GSM and GPS Application, ” IEEE vol. 2 pp. 1119-1123, December 2003.
[3] Hyronjin Lee, Hun Nam, Yeongseog Lim,“ A Design of Printed Square Loop Antenna for Omni-directional Radiation Patterns,“ IEEE Radio and Wireless Conference, pp. 253-256, August 2003.
[4] Sang-Gyu Kim, Kai Chang,“ Ultrawide-band Transitions and New Microwave Components Using Double-Sided Parallel-Strip Lines, ” IEEE Trans. Microwave Theory Tech., vol. 52, pp. 2148-2152, 2004.
[5] Mongia, R., Bahl, I., and Bhartia, P.“ RF and Microwave Coupled-Line Circuits, ” Artech House: Norwood, MA, 1999, Ch. 11.
[6] Steven Yu,“ 網?分析儀於平衡/非平衡/多埠/內箝元件的?測 ”，2005.
[7] Jong-Wook Lee, Kevin J. Webb,“ Analysis and design of low-loss planar microwave baluns having having three symmetric coupled lines, ” IEEE Microwave Symposium Digest, vol. 1, pp. 117-120, June 2002.
[8] Stephen H. Hall, Garrett W. Hall, James A. McCall,“ High-Speed Digital System Design, ” John Wiley & Sons, 2000, Ch. 3.
[9] M.A. Salah-Eddin and A.M.E Safwat,“ Defected-ground coupled microstrip lines and its application in baluns, ” IET Microw. Antennas Propag., 2007, 1, (4), pp. 893-899.
[10] Bockelman, D.E., and Eisenstadt, W.R.“ Combined differential and common-mode scattering parameters: theory and simulation, ” IEEE Trans. Microw. Theory Tech., 1993, 43 pp. 1530-1539.
[11] Leong, Y.C., Ang, K.S., and Lee,“ A derivation of a class of 3-port baluns from symmetrical 4-port networks, ” IEEE MTT-S Int. Microwave Symp. Digest, 2002, pp. 1165-1168.
[12]“ Agilent E5070A/E5071A ENA Series RF Network Analyzers User ’ s Guide, ” Second Edition, Agilent Part No. E5070-90010, Agilent Technologies, April 2002.
[13] Ang, K.S., Leong, Y.C., and Lee, C.H.,“ Multisection impedance-transforming coupled-line baluns, ” IEEE Trans, Microw. Theory Tech., 2003, 51, pp. 536-541.
[14] Ahn, D., Park, J., Kim, J., Qian, Y., and Itoh, T.,“ A design of the low-pass filter using the novel microstrip defected ground structure, ” IEEE Trans. Microw. Theory Tech., 2001, 49, (1), pp. 86-93.
[15] Hamad, E.K.I., Safwat, A.M.E., and Omar, A.,“ L-sharped defected ground structure for coplanar waveguide, ” IEEE AP-S Int. Symp. on Antennas and Propagation and USNC/URSI National Radio Science, Washington, DC, USA on July 2005.
[16] Hamad, E.K.I., Safwat, A.M.E., and Omar, A.,“ 2D periodic defected ground structure for coplanar waveguide, ” Germany Microwave Conf., GeMic 05, Ulm, Germany, April 2005.
[17] K.C. Gupta, Ramesh Garg, Inder Bahl, Prakash Bhartia,“ Microstrip Lines and Slotlines, ” Second Edition, Artech House, 1996.
[18] 鍾順時，“ 微帶天線??與應用 ”，西安出版社，1991.
[19] 張盛富、戴明鳳，“ 無線通信之射頻被動電?設計 ”，全華科技圖書股份有限公司，2003.
[20] Cheng-Nan Chiu and Wen-Chang Hsu,“ A balanced T-shaped antenna foe 3G mobile handsets foe WLAN, ” Microwave and Optical Technology Letters, vol. 48, pp. 131-133, January 2006.
[21] Constantine A. Balanis,“ Antenna Theory Analysis and Design, ” Third edition, John Wiley & Sons, Inc., 2005.
[22] David K. Cheng,“ Field and Wave Electromagnetics, ” Second edition, Addison-Wesley, 1989.
[23] J. Liang, C. C. Chiau, X. Chen, and C. G. Parini,“ Study of a printed circular disc monopole antenna for UWB systems, ” IEEE Trans. Antennas Propag., vol. 53, pp. 3500-3504, Nov. 2005.
[24] Yu-Cheng Kang, Cheng-Nan Chiu and Sheng-Ming Deng,“ A New planar Circular Disc-and-Ring Monopole Antenna for UMTS/UWB Dual-Network Applications,“ Microwave and Optical Technology Letters, vol. 48, No. 11, pp. 2396-2399, Dec. 2006.
[25] Chi-Sheng Liu, Cheng-Nan Chiu and Sheng-Ming Deng,“ A Compact Disc-Slit Monopole Antenna for Mobile Devices, ” IEEE Antenna and Wireless propagation Letters, vol. 7, 2008.
[26] C. N. Chiu and H. R. Chen,“ A new compact balance-fed t-monopole antenna for UMTS mobile applications, ” Microw. Opt. Tech. Lett., vol. 49, pp. 1904-1907, Aug. 2007.
[27] C. N. Chiu and H. R. Chen,“ A compact and wideband balance-fed triangular-monopole antenna for DCS/PCS/UMTS/WLAN/ WiMAX applications, ” Microw. Opt. Tech. Lett., vol. 50, pp. 971-974, Apr. 2008.