Design of Dual-band Microwave Components

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ABSTRACT

n this thesis, a quasi-RH/LH dual-band 3-dB branch-line coupler (BLC) constructed in microstrip form is proposed. The designed BLC circuit replaces conventional chip inductors in the coupler arms with microstrip stubs for easier circuit integration and lower fabrication cost. All microscripline sections in the coupler arms made meandered to reduce the circuit size is implemented on a RT/Duroid 6010 substrate. Next, proposed in this thesis is a dual band bandpass filter(BPF) made of quarter-weavelength steeped-impedance resonators(SIRs), which are coupled to the input and output ports through parallel coupling transmission lines. The direct coupling between the input and output ports makes the whole structure a cross-coupled filter,thus create zeros near the passband skirts.

Keywords : microstrip stub、steeped-impedance resonator(SIR)

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REFERENCES

[1] Wu, S., and Razavi, R.“ A 900-MHz/1.8-GHz CMOS receiver for dual-band applications, ” IEEE J. Solid-State Circuits, 1998, 33, pp.2178-2185 [2]Ryynanen,J.,Kivekas,K.,Jussila,J.,Parssinen,A.,and Halonen,K.A.I.“ A dual-band RF front-end for WCDMA and GSM applications, ” IEEE J. Solid-State Circuits, 2001,36,(8),pp.1198-1204 [3] H. Miyake, S. Kitazawa, T. Ishizaki, T. Yamada, and Y. Nagatomi,“ A miniaturized monolithic dual band filter using ceramic lamination technique for dual mode portable telephones, ” IEEE MTT-S Digest, WE3F-10, pp. 789-792, 1997.
[4] H. M. Lee, C.R. Chen, C.C. Tsai, C.M. Tsai,“ Dual-band coupling and structure for microstrip filter design, ” IEEE MTT-S Digest, THIF-36, pp. 1971-1974, 2004.
[5] J.-T. Kuo and H.-S. Cheng,“ Design of quasi-elliptic function filters with a dual-passband response, ” IEEE Microwave & Wireless Components Lett., vol. 14, no. 10, pp. 472-474, Oct. 2004.
[6] J.-T. Kuo, T.-H. Yeh, and Chun-Cheng Yeh,“ Design of Microstrip bandpass filters with a dual-passband response, ” IEEE Trans. Microwave Theory Tech., vol. 53, no. 4, pp. 1331-1337, Apr. 2005.
[7] S. F. Chang, Y.H. Jeng; J.L. Chen,“ Dual-band step-impedance bandpass filter for multimode wireless LANs, ” IEEE Electronics Lett., vol. 40, no. 1, pp. 38-39, Jan. 2004.
[8] S. Sun, L. Zhu,“ Compact dual-band microstrip bandpass filter without external feeds, ” IEEE Microwave & Wireless Components Lett., vol. 15, no. 10, pp. 644-646, Oct. 2005.
[9] S. Sun, L. Zhu,“ Coupling dispersion of parallel-coupled microstrip lines for dualband filters with controllable fractional pass bandwidths, ” IEEE MTT-S Digest, pp. 2195-2198. June 2005.
[10] V.G. Veselago,“ The Electrodynamics of Substances with Simultaneously Negative Values of and , ” Sov.Phys. Usp. 10, 509-514(1968) [11] J. B. Pendry, A. J. Holden, W. J. Swewart, and I. Youngs,“ Extremely Low Frequency Plasmons in Metallic Mesostructures, ” Phys.Rev.Lett. 76, 4773-4776 (1996) [12] J. B. Pendry, A. J. Holden, D. J. Robbins, and W. J. Swewart,“ Magnetism from Conductors and Enhanced Nonlinear Phenomena, ” IEEE Trans. Microwave Theory Tech. 47, 2075-2084 (1999) [13] R. A. Shelby, D. R. Smith, S. C. Nemat-Nasser, and S. Schultz,“ Microwave Transmission Through a Two-Dimensional, Isotropic, Left-Handed Metamaterial,“ Appl. Phys. Lett. 78, 489-491 (2001) [14] R. A. Shelby, D. R. Smith, and S. Schultz,“ Experimental Verification of a Negative Index of Refraction, ” Science 292, 77-79 (2001) [15] B. Mayer,“ Planar broadband image rejection mixer, ” Electron. Lett., vol. 27 no. 23 , pp. 2128-2130, Nov. 1991.
[16] N.C. Karmakar and M.E. Bialkowski,“ Circularly polarized aperture-coupled circular microstrip patch antennas for L-band applications, ” IEEE Trans. Antennas Propagat., vol. 47, no. 5, pp. 933-940, May. 1999.
[17] D.M. Pozar, Microwave engineering, 2nd ed. New York: Wiley, 1998.
[18] C.-T. Lin, C-L Liao, and C-H Chen,“ Finite-ground coplanar-waveguide branch-line couplers, ” IEEE Microwave Wireless Comp. Lett., vol.11, pp. 127-129, Mar. 2001.
[19] K.-K. M. Cheng and F-L Wong,“ A novel approach to the design and implementation of dual-band compact planar 90 ° branch-line coupler, ” IEEE Trans. Microwave Theory Tech., vol. 52, pp. 2458-2463, Nov. 2004.
[20] M.-J. Park and B. Lee,“ Dual-band, cross coupled branch line coupler, ” IEEE Microwave Wireless Comp. Lett., vol. 15, pp. 655-657, Oct. 2005.
[21] I.-H. Lin, M. DeVincents, C. Caloz, and T. Itoh,“ Arbitrary dual-band components using composite right/left-handed transmission lines, ” IEEE Trans. Microwave Theory Tech., vol. 52, pp. 1142-1149, Apr. 2004.
[22] J.-S. Hong and M. J. Lancaster, Microstrip filters for RF/Microwave Application, John Wiley and Sons, pp. 78-79, 2001.
[23] Chi-Hsueh Wang, Yo-Shen Lin, Chun Hsiung Chen,“ Novel Inductance-Incorporated Microstrip Coupled-Line Bandpass Filters with Two Attenuation Poles ” IEEE Trans. Microwave Theory Tech., vol. 3, pp. 1979-1982, June. 2004.