A NOVEL H-SHAPED PATCH ANTENNA

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ABSTRACT: *A novel H-shaped patch antenna suitable for wireless and satellite communications is presented. The new antenna has some advantages compared to conventional microstrip patch antennas, such as small size, a fewer number of modes, no harmonic resonance, and the provision of pure reactive impedances at its harmonics that can result in increasing the transmitter efficiency. The basic principles and design procedure are introduced. Two antennas at two different frequencies, 4 and 10 GHz, are designed, fabricated, and measured. The measured results show a good agreement with the predicted ones.* © 2001 John Wiley & Sons, Inc. Microwave Opt Technol Lett 29: 62–66, 2001.

Key words: *microstrip antennas; miniature antennas; AIA*

1. INTRODUCTION

Advanced wireless communication systems require small-size, low-cost, and high-performance transceiver systems. Crucial factors for wireless transmitters include efficiency, size, and bandwidth. Transmitter efficiency is mainly determined by the efficiency of the power amplifier (PA). Much effort has been done to increase the PA efficiency [1–8]. The maximum efficiency of a power amplifier can be obtained experimentally [6] at the fundamental frequency f_o. It has been noted that the efficiency can be increased further by finding the appropriate load impedances at $2f_o$ and $3f_o$ [7, 8]. Generally speaking, providing a short circuit at $2f_o$ and an open circuit at $3f_o$ increases the power-aided efficiency by approximately 5%. Such a harmonic tuning technique is called a class-*F* operation of a power amplifier. Resonant higher order modes of the rectangular patch antenna roughly occur at multiples of the fundamental resonance. Unless modified, this antenna is not particularly suited for harmonic tuning. A modified rectangular patch antenna [9] has been used at 2 GHz for harmonic tuning. This has been done by inserting a row of shorting pins along the center line. The technique increases