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Broadband SIW Cavity-Backed Triangular-Ring-Slotted Antenna for K_u-Band Applications

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ABSTRACT–In this letter, a broadband substrate integrated waveguide (SIW) cavity-backed triangular-ring-slotted antenna is demonstrated for planar integration. Instead, using a conventional triangular-ring-slot, a modified triangular-ring-slot is employed to achieve a broader bandwidth response. The conventional triangular-ring-slot generates two hybrid-modes in the vicinity of TE_{110} and TE_{120} cavity modes owing to strong loading effect in the SIW cavity resonator. The modified-slot helps to tune the individual resonant frequency of these hybrid modes below -10 dB, which leads broadband impedance bandwidth. The antenna is fabricated and tested, and the experimental results show a bandwidth of 2.09 GHz (13.53%) and a gain of 4 dBi over the entire bandwidth. Moreover, antenna exhibits unidirectional radiation characteristics with uniform gain.

Keywords: *hybrid-modes; planar cavity-backed antenna; slot antenna; substrate integrated waveguide (SIW); wideband*

1. INTRODUCTION

State-of-the-art substrate integrate waveguide (SIW), which was firstly developed in [1] as a transmission line, has emerged as a promising technology due to its advantages such as low-cost, low-loss, and easy fabrication using PCB (printed-circuit-board) process. In addition, it can be easily integrated with planar circuits. Since then, SIW has been widely implemented in planar cavity-backed antenna designs. The SIW-based slotted cavity-backed antennas have drawn much attention due to their many advantages over conventional bulky metallic counterparts. In general, SIW based antennas are compact in size, low