



# A Miniaturized Broadband Bow-Tie Antenna with Improved Cross-Polarization Performance

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## Abstract

In this paper, a modified broadband bow-tie antenna with low cross-polarization level and miniaturization is presented. The cross-polarization in both E- and H-planes are suppressed by defecting the antenna flares using rectangular slots. The proposed modified antenna demonstrated a cross-polarization improvement over  $\pm 120^\circ$  around the boresight from 2 to 5 GHz. In addition, an overall 23.5% of miniaturization compared to conventional bow-tie antenna is achieved. A tapered feed transition between microstrip-to-parallel stripline is designed to match 50 ohm SMA connector to the antenna flares. A prototype of the modified antenna is fabricated on RO4003 substrate ( $\epsilon_r = 3.38$ ,  $\tan\delta = 0.0027$ ,  $h = 0.813$  mm), and its performance is experimentally studied. The antenna characteristics including return loss, gain and radiation pattern are measured, along with the time domain characteristics, and showed reasonable agreement with the simulated results.

*Keywords:* Bow-tie antenna, cross-polarization, miniaturization

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## 1. Introduction

In recent years, near-field ultra-wideband (UWB) radar imaging systems have attracted attention from both industry and academia for their advantages,

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