# Patent Search

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**Abstract:**

The present disclosure relates to systems and methods, and provides an aperture coupled fractal slot rectangular DRA (100) configured to operate as an integrated a system for wireless communication, coupling electromagnetic energy from the microstrip feed line (108) through the Z-shaped Koch fractal slot (106) to excite the rec dielectric resonator (112) and radiate into free space. The aperture coupled fractal slot rectangular DRA (100) includes an FR4 substrate (102), a ground plane (104) hc shaped Koch fractal slot (106), and a rectangular dielectric resonator (112) of Aluminium Oxide placed above the slot. The aperture coupled fractal slot rectangular DF configured to couple electromagnetic energy through the fractal slot in response to an input signal applied to the microstrip feed line (108), thereby providing improv impedance matching, enhanced bandwidth, reduced return loss, and stable radiation characteristics for wireless applications.

Complete Specification

Description:TECHNICAL FIELD

[001] The present invention relates to microwave and wireless communication antennas, and more particularly to an Aperture Coupled Fractal Slot Rectangular DRA and Development integrating a Z-shaped Koch fractal slot with a rectangular dielectric resonator antenna for enhanced bandwidth, gain, impedance matching, and radiation performance.

BACKGROUND

[002] The field of microwave and wireless communication antennas has witnessed considerable advancement in recent years, driven by the rapid proliferation of w technologies such as Wi-Fi, Internet of Things platforms, and broadband communication networks. Modern wireless systems operating in frequency ranges around and 5 GHz impose stringent requirements on antenna performance, including compactness, high radiation efficiency, wide operational bandwidth, stable radiation patterns, and low return loss. Meeting these simultaneous requirements within a single compact antenna structure has remained a persistent engineering challeng

[003] Conventional microstrip patch antennas have been widely employed in wireless communication systems owing to their low profile and ease of fabrication. Ho such antennas typically exhibit narrow bandwidth, increased conductor losses at microwave frequencies, and reduced radiation efficiency. The inherent limitation o metallic radiating elements operating at elevated microwave frequencies is the dissipation of electromagnetic energy as heat, which may substantially reduce the ov efficiency of the antenna system. These characteristics make conventional patch antennas less suitable for applications demanding broad spectral coverage and hig efficiency.

[004] Dielectric Resonator Antennas, employing high-permittivity dielectric materials as the primary radiating element, have been introduced as an alternative to ad

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