A Broadband Dual Circularly Polarized Compact Printed Monopole Antenna

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Research Article

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Abstract

A microstrip line –fed broadband dual circular polarized, two port printed monopole antenna is presented. The antenna consists of a ground plane with arrow shaped stub at the corner and a pair of inverted L-shaped feed lines. The 3dB axial ratio bandwidth of the antenna is about 58%(1.7GHz-3.1GHz) in which the return loss and isolation are better than 10dB and 12dB respectively. A parametric study of proposed antenna's geometric parameters is given for understanding of the antenna performance. The realize gain, reflection coefficient (S_{11}) and transmission coefficient (S_{21}) are higher than 1, 10 and 12dB respectively within the entire axial ratio bandwidth (ARBW).

Full Text

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Tables

TABLE I
3-dB AR BANDWIDTH, VOLUME, ELECTRICAL SIZE, TYPE and f_c OF SOME EXISTING DUAL CP ANTENNAS

Ref.	[20]	[21]	[22]	[23]	[24]	[25]	[26]	Proposed
AR BW(%)	4.7	12.85	16	7.25	20.8	59.65	80.7	58
Volume(mm ³)	-	60×60	76×76×0.726	252×252×1.6	83×83×1	60×60×1.6	32×32×1	60×60×0.8
Electrical Size (L×W)	-	0.69×0.69 λ_g^2	1.08×1.08 λ_g^2	1.187×1.187 λ_g^2	0.748×0.748 λ_g^2	0.657×0.657 λ_g^2	0.245×0.245 λ_g^2	0.558×0.558 λ_g^2
Type of Antenna	Annular Slot Antenna	CPW Slot antenna	Dual Substrate with back Cavity	Dual Substrate	Microstrip Slot antenna	CPW Slot antenna	Monopole Antenna	Monopole Antenna
f _c (GHz) of ARBW	2.46	2.45	3.7	0.9	2.6	2.85	6.27	2.4

Figures

Figure 1

Configuration of the proposed two port planar monopole antenna. ($L_{Sub} = 60$, L_{11} & $L_{21} = 38.2$, L_{12} & $L_{22} = 16.8$, W_{11} & $W_{21} = 1.6$, W_{12} & $W_{22} = 3.2$, $L_g = 40$, $L_{g1} = 9.62$, $L_{g2} = 18$, $W_{g2} = 3.2$, and $h = 0.8$) (Unit: millimeters).

Figure 2

Steps of improvement of the proposed antenna.

Figure 3

Simulated (a) $|S_{11}|$, (b) $|S_{21}|$ and (c) axial ratio of Ant 1–3.

Figure 4

Surface current distributions of proposed antenna at 2.4GHz when the signal is applied: (a) Port 1, and (b) Port 2.

Figure 5

Effect of L_{g2} on antenna characteristics (a) $|S_{11}|$, (b) $|S_{21}|$ and (c) axial ratio (axial ratio in +Z direction).

Figure 6

Effect of parameter L_{11} and L_{21} on antenna characteristics (a) $|S_{11}|$, (b) $|S_{21}|$ and (c) axial ratio (axial ratio in +Z direction).

Figure 7

Photograph of the fabricated antenna.

Figure 8

Measured and simulated return loss and isolation for the proposed antenna.

Figure 9

Measured and simulated axial ratio curves of the proposed antenna.

Figure 10

Measured and simulated gain of the proposed antenna.

Figure 11

Measured and simulated radiation patterns at 2.4 GHz of the proposed antenna. Excitation in (a) port 1 and (b) port 2.