

# A DUAL BAND DOUBLE LAYER PRINTED QUADRIFILAR HELIX ANTENNA FOR GPS, GLONASS AND GALILEO APPLICATIONS.

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In the last few years, the printed quadrifilar helix antenna (PQHA) has become an attractive candidate for use in mobile communication systems due to its features of circular polarisation, good axial ratio and low cost. However, the bandwidth of a conventional PQHA is typically equal to 5 to 8% and could be insufficient for such applications.

This article introduces a low cost dual band Double Layer Printed Quadrifilar Helix Antenna (DL-PQHA) for GPS, GLONASS and GALILEO applications. The dual frequency band behaviour is obtained by using the mutual coupling effect between the two PQHAs fitted into each other. This structure give a good impedance match in both GPS and GLONASS operating frequency bands.

This antenna is used for equipments of ground fixed station world-wide and is realised by MBDA Missile Systems. The antenna department of MBD.A performs research, design, and manufacturing in the field of communication antenna systems. In house production facilities are available for high quality production using advanced materials and processes. MBD.A is certified ISO 9001.

Typical products are Telemetry, Tracking, Control (TTC) and GPS antennae for satellites and launchers, data link, telemetry and GPS antennae for military applications, TTC and GPS antennae for the equipment of ground fixed stations.

The Antenna design : The DL-PQHA is composed of two PQHA where the four arms of each is printed on a thin dielectric substrate. The inner PQHA is wrapped around a cylindrical dielectric foam ( $\epsilon_r \cong 1$ ) surrounded by a cylindrical spacer foam. This way, we obtain the first antenna which will be the cylindrical support of the outer PQHA wrapped around it. This structure is supplied with the same feeding network.

The Analysis : The antenna was modelled and optimised using moment-method formulation for arbitrary-shaped coated wire antenna. The computer modelling include the dielectric loading by transforming the printed antenna into an equivalent dielectric coated wire structure using quasi-static approximation.

Conclusion : A DL-PQHA for GPS and GLONASS was realised. The experimental results illustrated a good VSWR and an hemispherical radiation in the two receiving bands. The structure can also cover the GALILEO frequency band. This new low cost antenna is a promising candidate for GPS and GLONASS and all dual band applications.

