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Planar removable high voltage Vivaldi antenna

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The goal of this study is to design an Ultra-Wide Band (UWB) antenna for a High Power Microwaves (HPM) application. Classical antennas must be compatible with the bandwidth, the impedance of the system, and with the radiation characteristics (gain, directivity, and polarization). However, additional constraints such as high-voltage transient input signals have to be considered in the case of UWB HPM. A specific design has been established for this application considering a 100 kV peak bipolar signal. Furthermore, physical constraints have to be fulfilled as a high compactness (low thickness) is required in order to provide a good system packaging. The studied antenna has to be planar (2D) and its size must be lower than an A4 sheet of paper. A planar Vivaldi antenna design has been chosen as it's a travelling wave antenna allowing thus to limit the pulse dispersion and to reach a good directivity level. The antenna originality is related to its special high voltage feeding achieved through a THT20 coaxial connector. The THT20 connector is specifically designed in order to prevent electric disruptions, it has no balun and allows a fast and easy connection to the generator. This paper presents the design, the numerical simulation and a built antenna including high voltage parts. The measured parameters are compared to numerical simulations. Finally, experimentation with high voltage signal is showed.

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