

Fully Metallic Slot Array Using a Groove Gap Waveguide Feeding Network for Multibeam Applications in the E-Band

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Advanced Driver Assistance Systems (ADAS) heavily rely on radar technology, particularly within the 76-81 GHz band, for precise obstacle detection and enhanced road safety. This paper introduces a novel metal-only antenna designed using gap waveguide technology. The antenna, featuring a scalable 1×8 slotted array fed through groove gap waveguide technology, offers multi-channel and multibeam operation, making it adaptable to various traffic scenarios.

Key features of the antenna include low transmission losses and robust obstacle detection capabilities within the 76-81 GHz band, crucial for ADAS applications. Its metal-only construction allows for integration into vehicle chassis, optimizing performance within automotive frequency bands.

Validation through simulations using CST Microwave Studio confirms the behavior and performance of the antenna. Results suggest potential as a candidate for antennas capable of multibeam performance in the E-band, underscoring its suitability for radar-based ADAS applications.

This work introduces a metal-only slot array built upon groove gap waveguide technology. This metal-only design facilitates seamless integration into vehicle chassis and ensures minimal losses within the automotive frequency bands. The fully integrated feeding network, featuring a -3dB power splitter, offers the flexibility of multi-port feeding. This adaptability has proven particularly valuable in achieving beam scanning, as changing the feeding port enables this capability. Furthermore, the multiport configuration has the potential to support multiple input/output channels, enhancing the extraction of additional angular information for a wide range of applications.

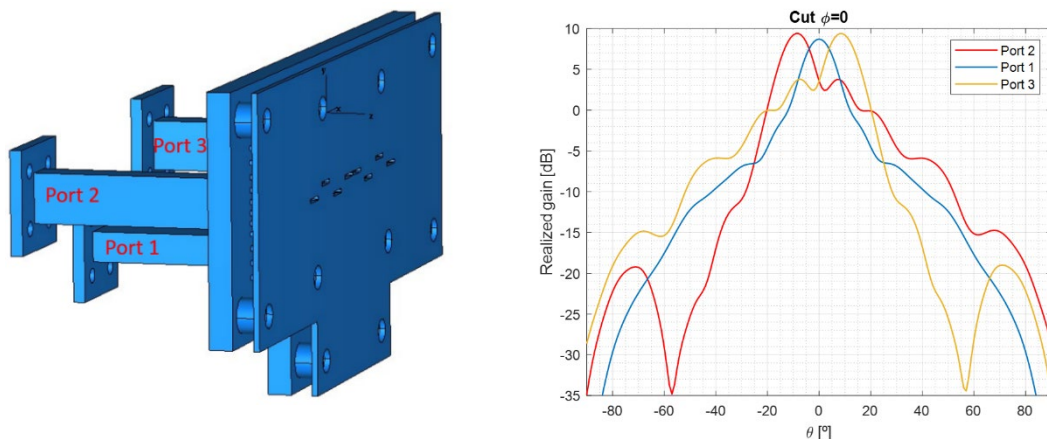


Fig.1 Left side shows the full structure of the antenna simulated. Right side shows Realized gain pattern of the structure as a function of the theta angle (θ) when fed through ports 1, 2, and 3 at 79 GHz.