Student Design Competition

IEEE IMS 2024 Washington, DC

mmWave Dual-Band 3D-Printed Antenna Design

TC16 – Microwave and Millimeter-Wave Packaging, Interconnect and Integration Committee

Milliwave Silicon Solutions

Introduction:

This competition will require students to design and manufacture a dual-band linearly-polarized mmwave antenna using additive manufacturing/3D-printing techniques, with maximum gain in the bands n257 (26.5-29.5GHz) and n260 (37-40GHz). The designs will be judged based on the gain performance of the antennas.

Design Specification and Rules:

Participants must design a dual-band linearly-polarized passive antenna with maximum gain in both the n257 (26.5-29.5GHz) and n260 (37-40GHz) bands. The antenna must be manufactured as a single body using only 3D printing/additive manufacturing techniques and include a 2.92mm coaxial female/jack connector to perform measurements. There is no material set restriction (metal, plastic or ceramic materials are all acceptable). Metal coating of the antenna is allowed. The antenna maximum dimensions and weight will be constrained by the antenna test chamber and positioner system (Maximum DUT size: 40mm x 200mm x 110mm, Maximum DUT weight 3kg). The maximum aperture size must be 83mm.

Participants may fulfill the 2.92mm coaxial connector requirement by means of a passive commercial waveguide-to-coaxial adapter. The 3D-printed antenna, including the coaxial adapter provided by the participant, must incorporate all necessary features to mount it into the Millibox antenna test system. A standard CAD file for the Millibox mount will be provided. Participants are required to contact the organizers (information below) to receive this and other relevant data.

Evaluation Process:

Each participating design will be assembled into the Millibox anechoic chamber. The boresight gain of the antenna will be measured in both bands, n257 (26.5-29.5GHz) and n260 (37-40GHz). These measurements will be summarized in a total score, as described below:

Gain will be measured in both bands in 1GHz intervals and rounded to the nearest 0.1dB. Gain values at the 8 frequencies will be added together, forming the gain score. The design with the highest total score will win the competition.

An example of scoring for a representative antenna is included below:

Example measured values:

26.5GHz: Gain=11.5dB 37 GHz: Gain=13dB

27.5GHz: Gain=11.8dB 38GHz: Gain=13.3dB

28.5GHz: Gain=12.2dB 39GHz: Gain= 13.6dB

29.5GHz: Gain=12.6dB 40GHz: Gain= 13.8dB

Total Score = 101.8 = (11.5+11.8+12.2+12.6+13+13.3+13.6+13.8)

How to Participate:

Competing teams will be required to register to the IMS Student Design Competition according to the rules posted on the IMS-2024 homepage.

Participants are required to contact the organizing team to get information on the Millibox mount and other relevant information once signing up.

Contact Information:

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