This paper presents the design of a transition at D-band (110–170 GHz) between rectangular waveguide and coplanar waveguide (CPW) using wideband patch antenna. With the rectangular ring structure, the proposed patch antenna is specialized for high gain and large bandwidth which can be used for wireless chip-to-chip communication or implemented as a rectangular waveguide-to-CPW transition. A simulated gain of 7.4 dBi with 36% bandwidth centered at 140 GHz is achieved.

The fabricated rectangular waveguide-to-CPW transition in a back-to-back configuration exhibits a bandwidth of 42.2 GHz at D-band. From 118.8 GHz to 161 GHz, the return loss is better than 10 dB and each fabricated rectangular waveguide-to-CPW transition introduces less than 2 dB insertion loss.