On-chip patch antenna on InP substrate for short-range wireless communication at 140 GHz - DTU Orbit (22/04/2019)

On-chip patch antenna on InP substrate for short-range wireless communication at 140 GHz
This paper presents the design of an on-chip patch antenna on indium phosphide (InP) substrate for short-range wireless communication at 140 GHz. The antenna shows a simulated gain of 5.3 dBi with 23% bandwidth at 140 GHz and it can be used for either direct chip-to-chip communication or chip-level integration and packaging. In the transmission frequency band from 130 GHz to 150 GHz the estimated in-band gain variation is 0.5 dBi which guarantees gain uniformity. The antenna with optimized dimension is implemented for a transition between elevated coplanar waveguide (ECPW) and rectangular waveguide. The chip-to-waveguide transition in back-to-back configuration exhibits a simulated return loss of 10 dB and insertion loss of 3 dB from 128 GHz to 153 GHz. For higher directivity, a horn antenna is used together with the chip-to-waveguide transition forming an extended packaging structure that is suitable for the transceiver (Tx and Rx) chips. The simulated gain of the extended packaging structure is 11.9 dBi with 23% bandwidth at 140 GHz and the in-band gain variation is 2 dBi.

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