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Title:All active MMIC-based wireless communication at 220 GHz

Authors:Kallfass, Ingmar (1); Antes, Jochen (5); Schneider, Thomas (3); Kurz, Fabian (4); Lopez-Diaz, Daniel (1); Diebold, Sebastian (5); Massler, Hermann (1); Leuther, Arnulf (1); Tessmann, Axel (1)

Author affiliation:(1) Fraunhofer Institute for Applied Solid-State Physics (IAF), Freiburg D-79108, Germany; (2) Karlsruhe Institute of Technology, Karslruhe D-76131, Germany; (3) Institut für Hochfrequenztechnik, Hochschule für Telekommunikation, Leipzig D-04277, Germany; (4) Siemens CT, München D-80333, Germany; (5) Karlsruhe Institute of Technology, Institut für Hochfrequenztechnik und Elektronik, D-76131 Karlsruhe, Germany

Corresponding author:Kallfass, I.(ingmar.kallfass@iaf.fraunhofer.de)

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Abstract:A wireless data link operating at a carrier frequency of 220 GHz is supporting a data rate of up to 25 Gbit/s in on-off-keyed PRBS as well as complex 256-QAM (quadrature amplitude modulation) transmission. The millimeter-wave transmit and receive frontends consist of active multi-functional millimeter-wave microwave integrated circuits (MMICs), realized in 50 nm mHEMT technology and packaged into split-block waveguide modules. The paper presents system considerations for wireless links in the 200-300-GHz range, discusses the design and performance of dedicated broadband transmit and receive MMICs, and presents link experiments. With an RF transmit power of -3.4-1.4 dBm in the IF frequency range from 0 to 20 GHz , a receiver conversion gain of better than -4.8 dB up to 270 GHz and an estimated noise figure of less than 7.5 dB at 220 GHz, a 231-1 PRBS with a data rate of up to 25 Gbit/s is transmitted over 50 cm and received with an eye diagram quality factor >;3. At 10 Gbit/s, an uncorrected bit-error rate (BER) of $1.6 \cdot 10^{-9}$ is measured over a distance of 2 m. A 256-QAM signal with approx. 14 Mbit/s is received with an uncorrected BER of $9.1 \cdot 10^{-4}$.

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