On the Variations of Shunt Characterization Technique of Decoupling Transmission Line for Millimeter-Wave CMOS Applications

Korkut Kaan Tokgoz, Kimmsrun Lim, Kenichi Okada, and Akira Matsuzawa

Matsuzawa & Okada Lab, Tokyo Institute of Technology

E-mail: korkut@ssc.pe.titech.ac.jp

1. Motivation

- 60-GHz wireless communication with 9 GHz unlicensed bandwidth
  - Wide bandwidth
  - Ultra high data rate: 64QAM → 10.56 Gbps/ch
  - 64QAM → 42.24 Gbps (4-ch bonding)

- Representation of a simple amplifier

- Decoupling of DC and RF:
  - Metal-Insulator-Metal TL
  - Lumped components lacks accuracy
  - More reliable in millimeter-wave

2. MIM Transmission Line

- Desired MIM TL characteristics:
  - Low characteristic impedance (1~3 Ω)
  - High RF loss

Issues:
- Direct measurement accuracy

3. Shunt Characterization

- Two characterization structures

4. Variations & Results

- Charac. structure
- Amplifier results

4. Conclusion

- Inaccuracy in direct measurements
- A shunt characterization method for increased accuracy
- S-parameters of Metal-insulator-metal TL calculated from reflections
- Variations from calculation procedure
- Effects on amplifier simulation results