



Design of mm-wave matrix distributed amplifier using 65nm CMOS technology

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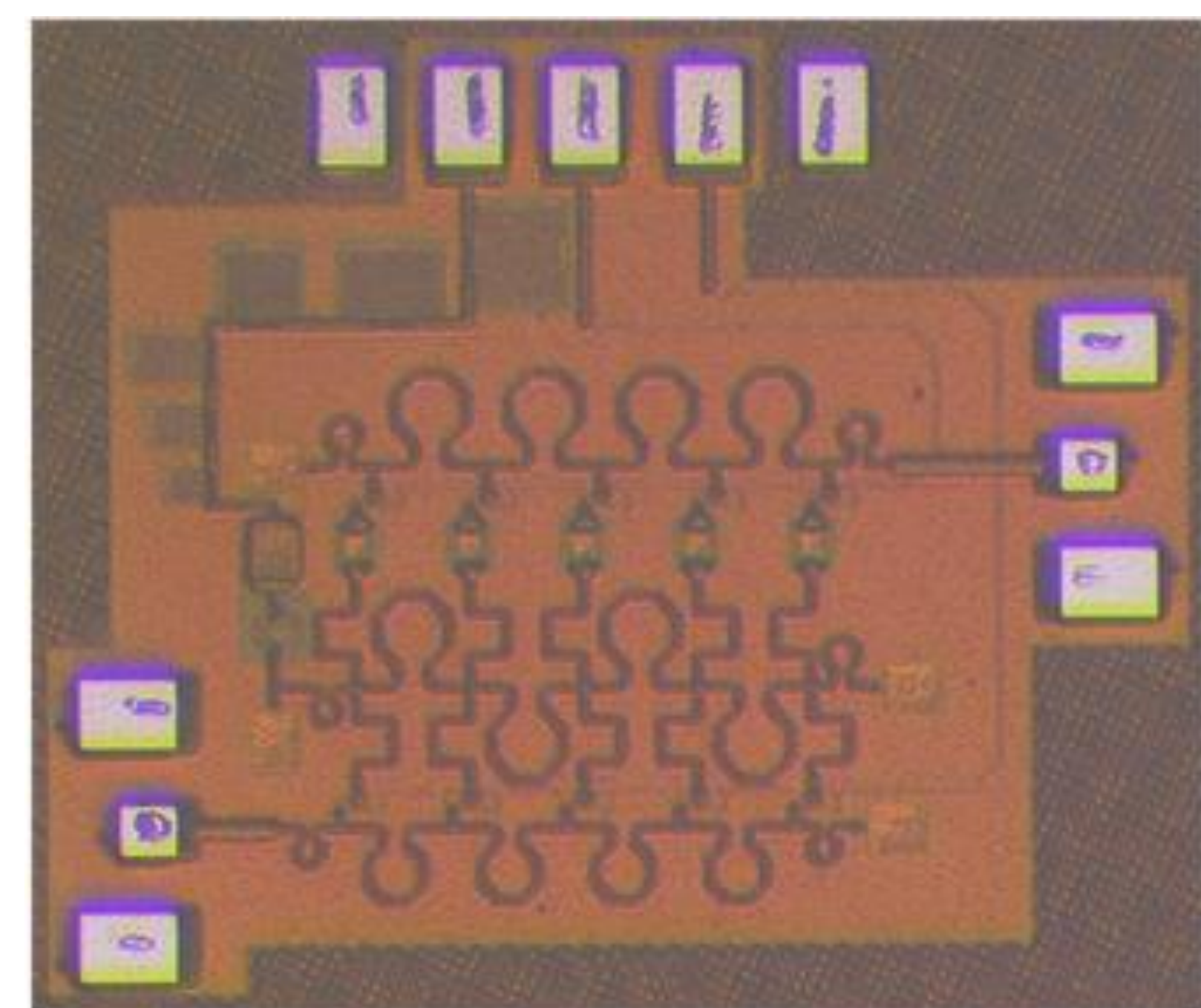
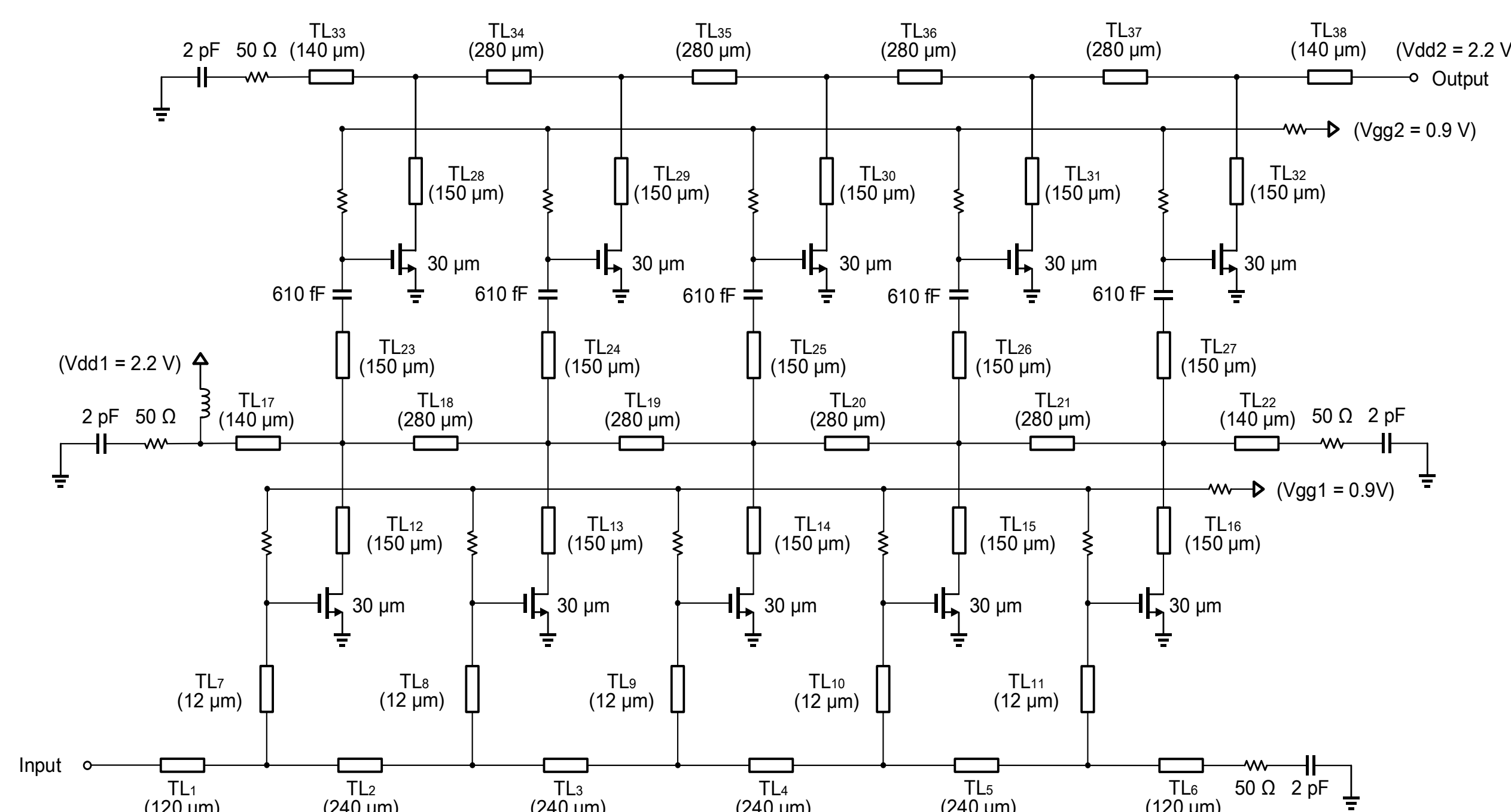
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Introduction

- **Necessity of wide band distributed amplifier**
 - It can find its applications in ultra-wide band high speed communication.
 - It has wide input, output matching.
- **Advantage of matrix distributed amplifier**
 - High gain than conventional cascaded distributed amplifier.
 - Small chip size compared with cascaded distributed amplifier.

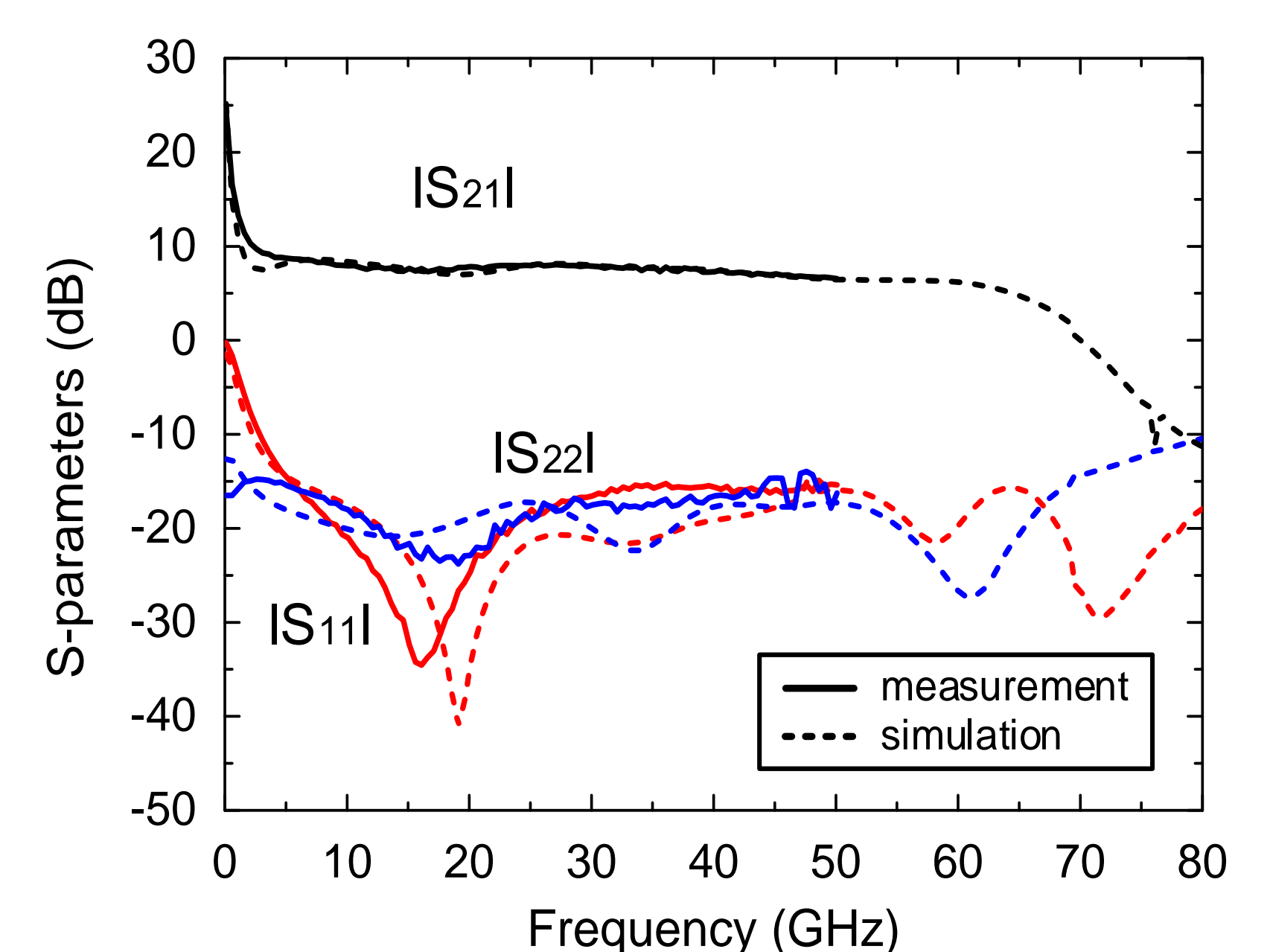
Design

- Matrix distributed amplifier that has additional middle artificial line is designed to get high gain performance.
- The delay occurred in the output artificial line must be equaled with that in the input artificial line for in-phase signal growing.
- The gate width of the transistor (wg) was determined by considering the DC power consumption rather than GBW.
- On-chip bias-tee is used at middle artificial line and off-chip at output.



Results

- Matrix distributed amplifier is designed using 65-nm CMOS technology.
- Measured nominal gain is 8.0 dB and simulated 3dB bandwidth is 60 GHz (5 – 65 GHz)
- Return losses at input, output port are less than 10 dB
- Chip size is 970 x 840 μm^2 including DC & RF probing pads.
- DC power consumption of matrix distributed amplifier is 172 mW.



Conclusion

- Mm-wave matrix distributed amplifier is designed using 65-nm CMOS technology.
- Designed matrix distributed amplifier has 8.0 dB nominal gain and wide bandwidth matching with 172 mW DC power consumption.

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