Dual-band Reconfigurable RF Transmitter for 5G/6G communications

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I . Introduction

- Meeting the requirements of both the commercialized 5G and the forthcoming 6G mobile communications necessitates transmitters that satisfy both the sub-6GHz and mid-band mmWave bands.
- This circuit is designed by integrating a variable gain amplifier(VGA), a switch, and a two-stage power amplifier(PA) to target the 3.6 GHz and 7.7 GHz bands.

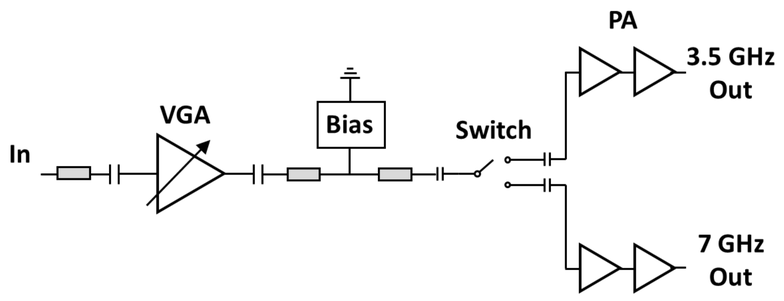

Fig. 1. Block diagram of the proposed dual-band reconfigurable transmitter.

- To implement reconfigurable operation, an SPDT switch is connected following the VGA. The bias operation of the switch ensures that it connects to the power amplifier optimized for either the 3.6 GHz or 7.7 GHz band. Each path is matched to its respective frequency band.
- The two-stage power amplifier is designed to achieve high gain in the first driver stage and high output power in the second main stage.

II . Measurement Result

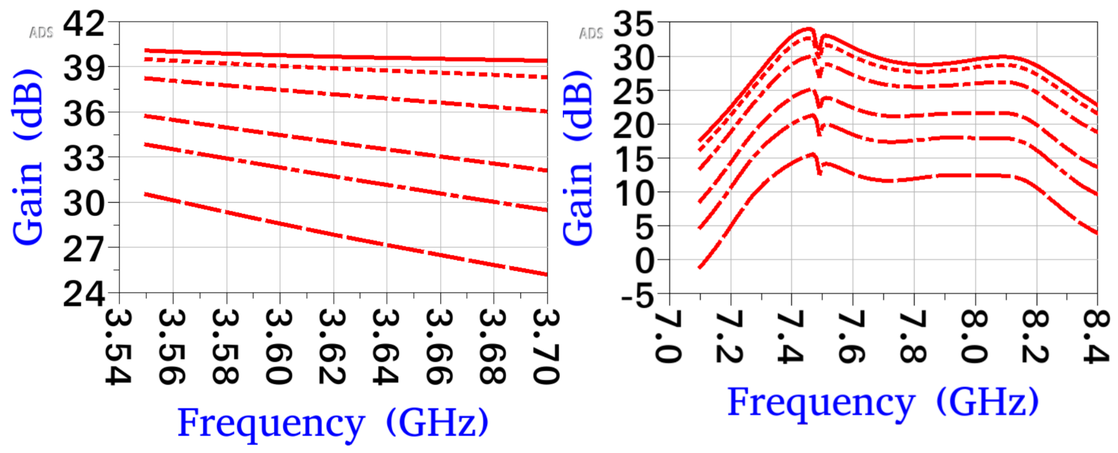

Fig. 2. 3.6 GHz and 7.7 GHz band Small Signal Gain response.

- The maximum gain in the 3GHz band is 40.1dB.
- The maximum gain in the 7GHz band is 34 dB.

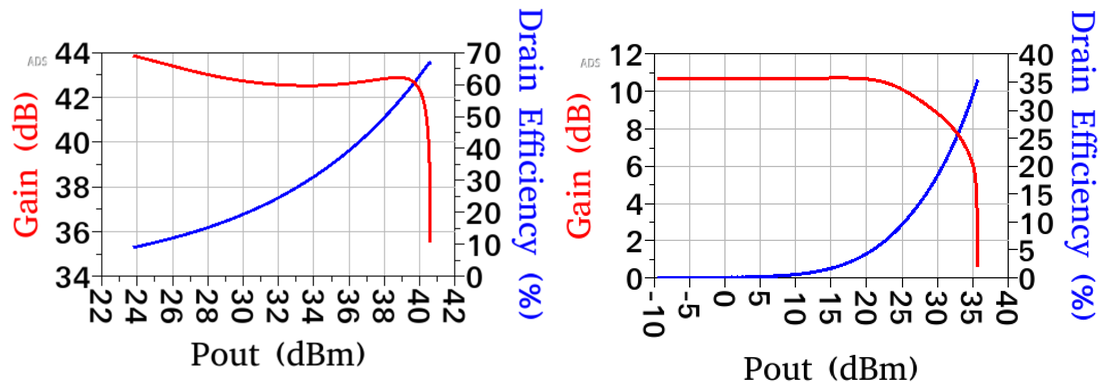

Fig. 3. 3.6 GHz and 7.7 GHz band Small Signal Gain vs Drain Efficiency.

- It shows Drain Efficiency 68.8 % at 3.6 GHz and 35.7 % at 7.7 GHz. It shows Gain Small Signal 40.0 dB at 3.55 GHz~3.7 GHz and 34 dB at 7.125 GHz~8.4 GHz.

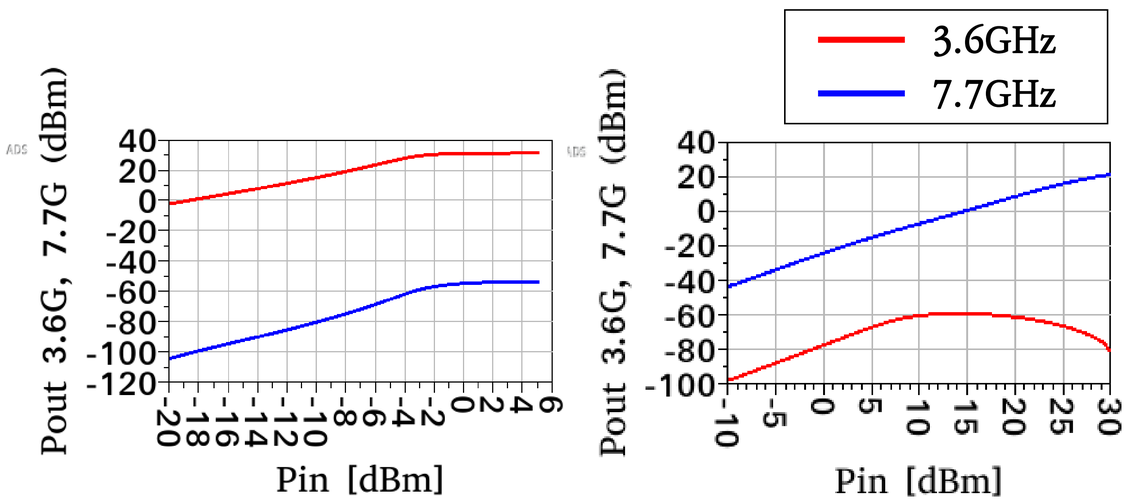

Fig. 4. 3.6 GHz and 7.7 GHz band Pin vs Pout.

- It shows a Pout difference of at least 60dBm at frequencies of 3.6GHz and 7.7GHZ.

III. Conclusion

	Small Signal Gain	Pout	Drain Efficiency	Gain Control
3.55 GHz~3.7 GHz	40.0 dB	40.6 dBm	68.8 % at 3.6 GHz	14.2 dB
7.125 GHz~8.4 GHz	34 dB	35.7 dBm	35.7 % at 7.7 GHz	18.4 dB

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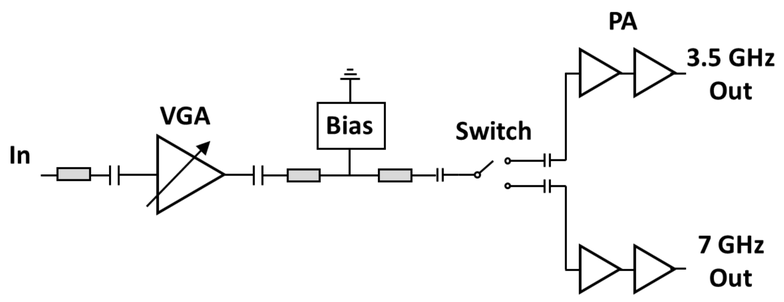

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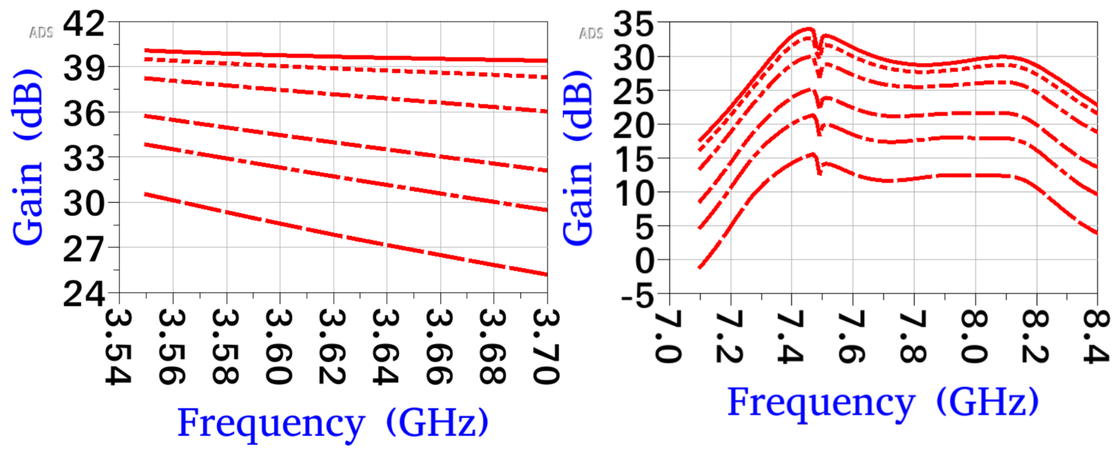

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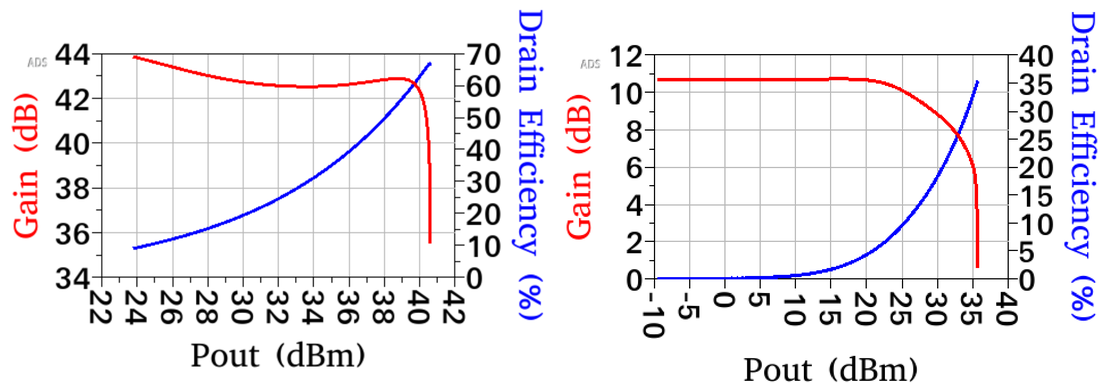

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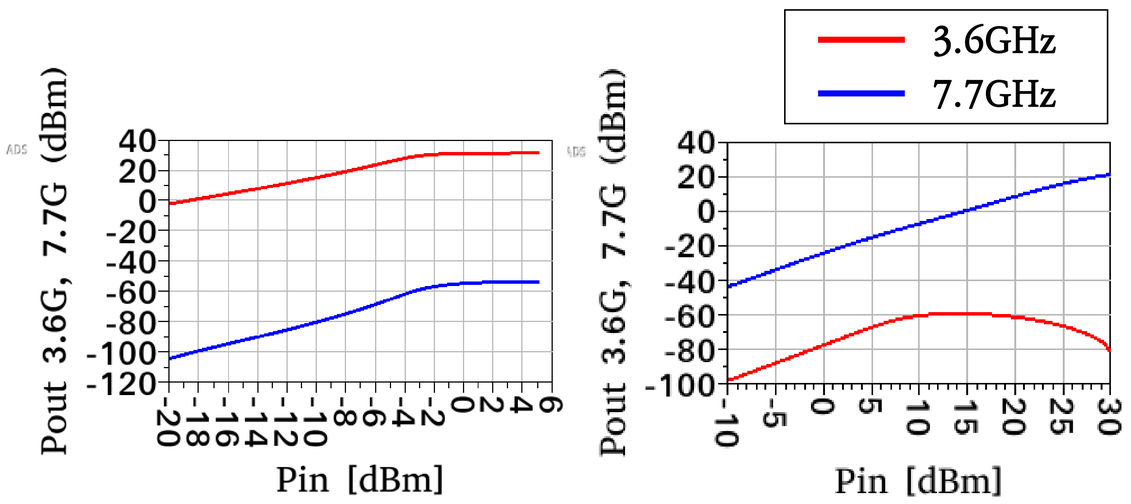

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