

# Ka-Band Reconfigurable 4-Way Active Power Divider for Phased Array Signal Distribution Networks

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## Introduction

- An optimal circuit for phased array signal distribution networks
- Ultra-compact and low-power consumption
- 28-nm CMOS FDSOI

## Main Subject

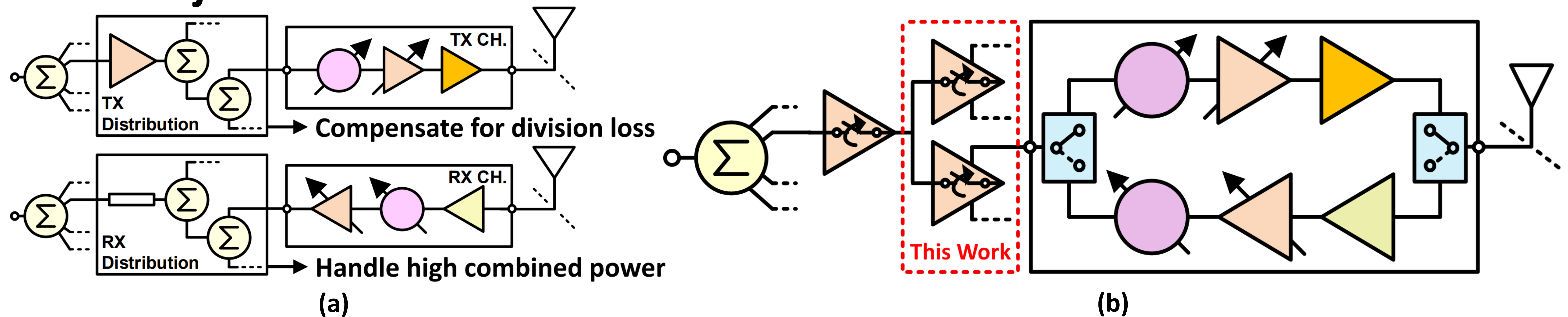


Fig 1. Signal distribution in (a) TX and RX arrays and (b) TRX arrays with proposed reconfigurable 4-way active power divider.

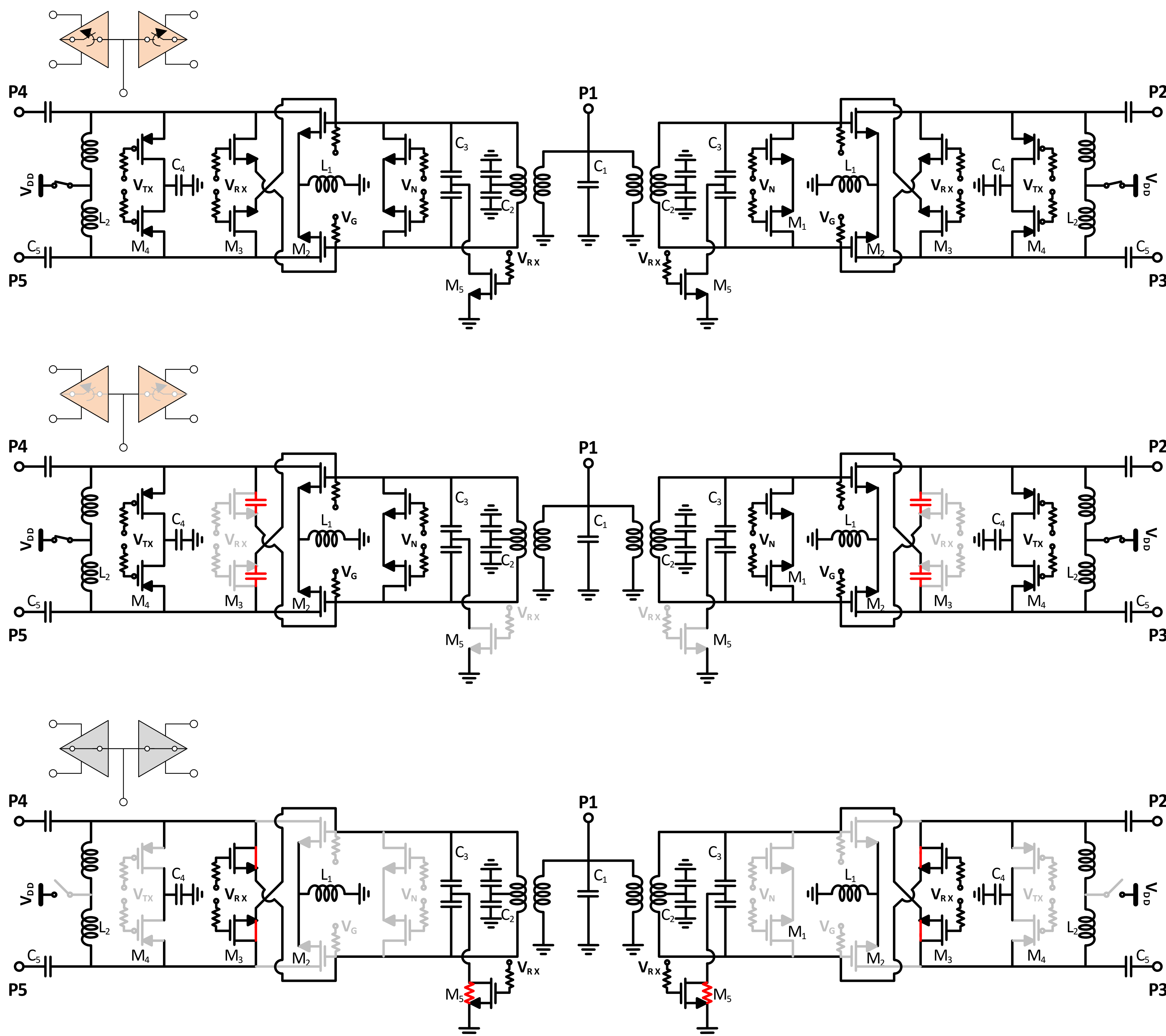


Fig 2. (a) Schematic, and configuration in (b) TX and (c) RX modes.

## Conclusion

- Signal distribution with the optimal TRX performance by using the proposed circuit.
- TX mode : division loss compensation, RX mode : high power handling capability.

## Reference

- [1] Y. Lee et al., "A Ka-band low-power ultra-compact reconfigurable amplifier with reverse bypass mode for multi-element phased array transceivers," *IEEE MTT-S. Int. Microw. Symp. (IMS)*, Washington, DC, USA, 2024, pp. 247-250..

- In TX mode, the amplifier compensates for power division loss and provides sufficient TX drive power at low input levels.
- In RX mode, the circuit operates in bypass mode, combining RX channel signals for high dynamic range.
- The off-state parasitic capacitance of the series transistor is utilized for capacitive cross-coupling neutralization, while the switch is turned on in RX mode for bypass operation.

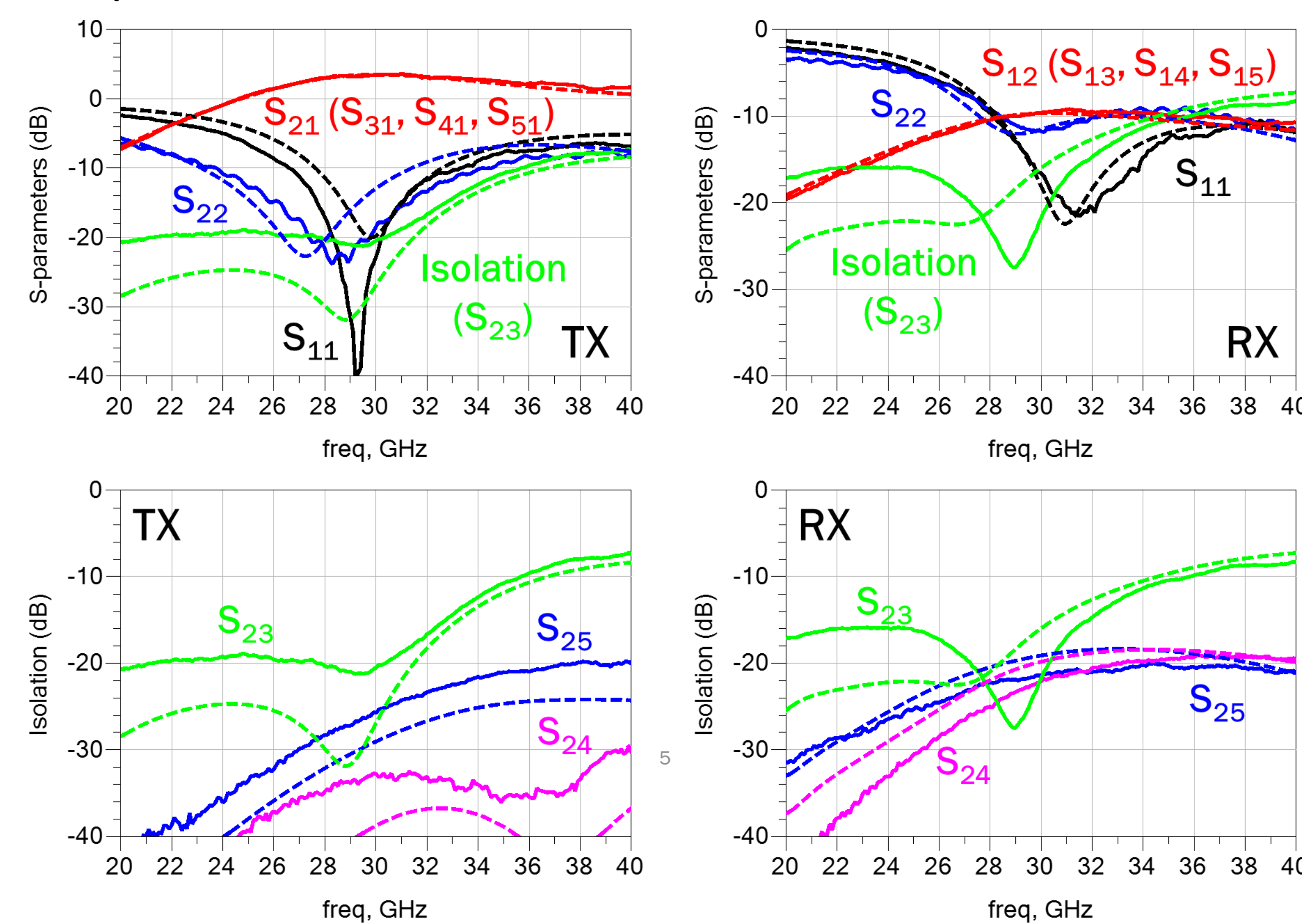


Fig 3. Measured S-parameters in TRX modes

- TX mode: 3.5 dB gain / 1.5 dBm OP1dB @ 30 GHz
- RX mode: -3.6 dB gain / 8.7 dBm IP1dB @ 30 GHz
- $P_{DC}$  (TX / RX) = 39 / 0 mW

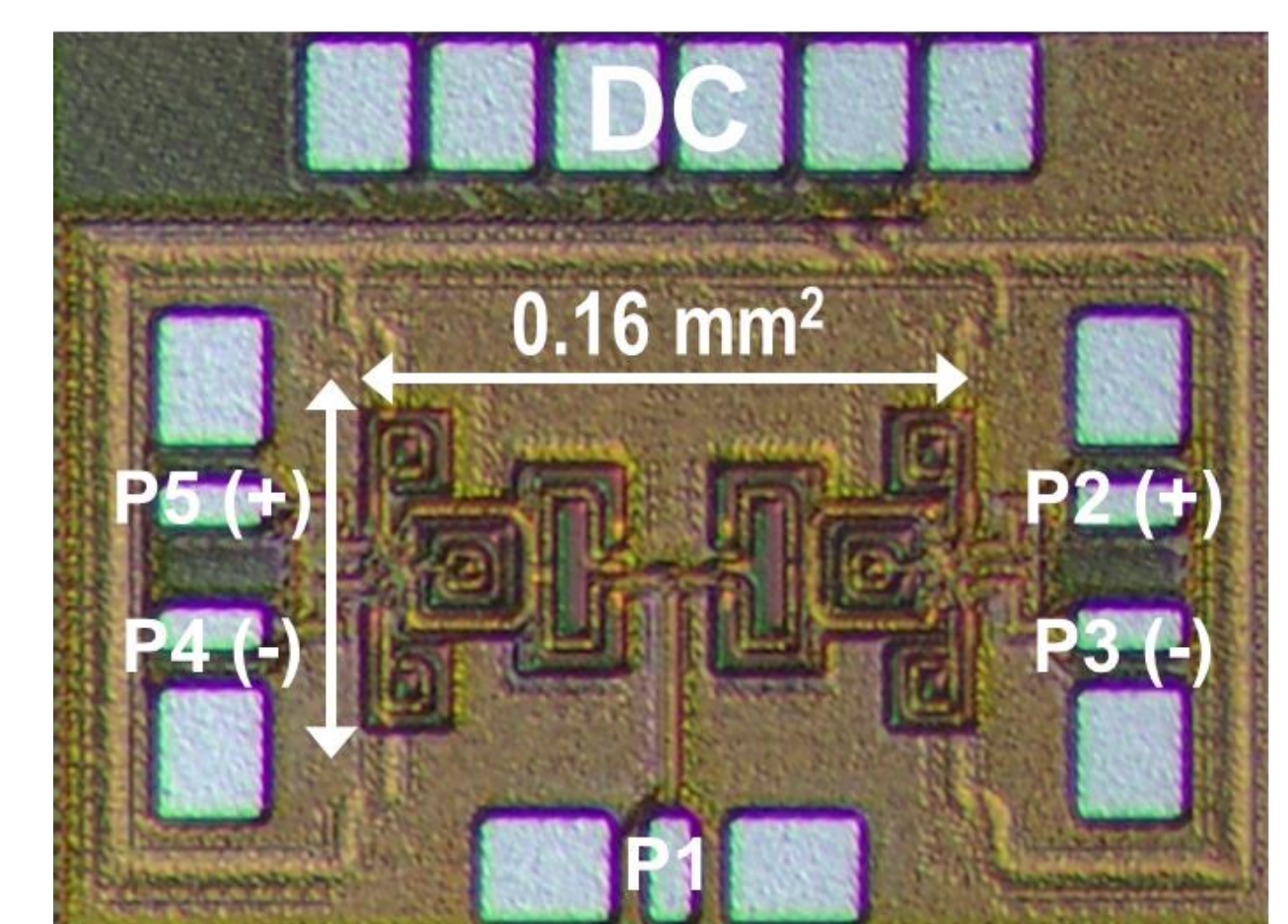


Fig 4. Chip photograph