SWAN
SECURE WIRELESS AGILE NETWORKS

Modular Design and Characterization of a Reconfigurable Sequential Power Amplifier

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Aim: To support transmitting signals with high peak-to-average power ratio by implementing an efficient wideband power amplifier with a high output power back-off (OPBO).

Introduction

- Power amplifiers (PAs) with single transistor have their peak efficiency at the maximum output power.

- Doherty PAs achieve peak efficiency at the OPBO but employ load modulation with impedance transformer.

- Sequential PAs achieve high efficiency at high OPBO while working in 50Ω environment.
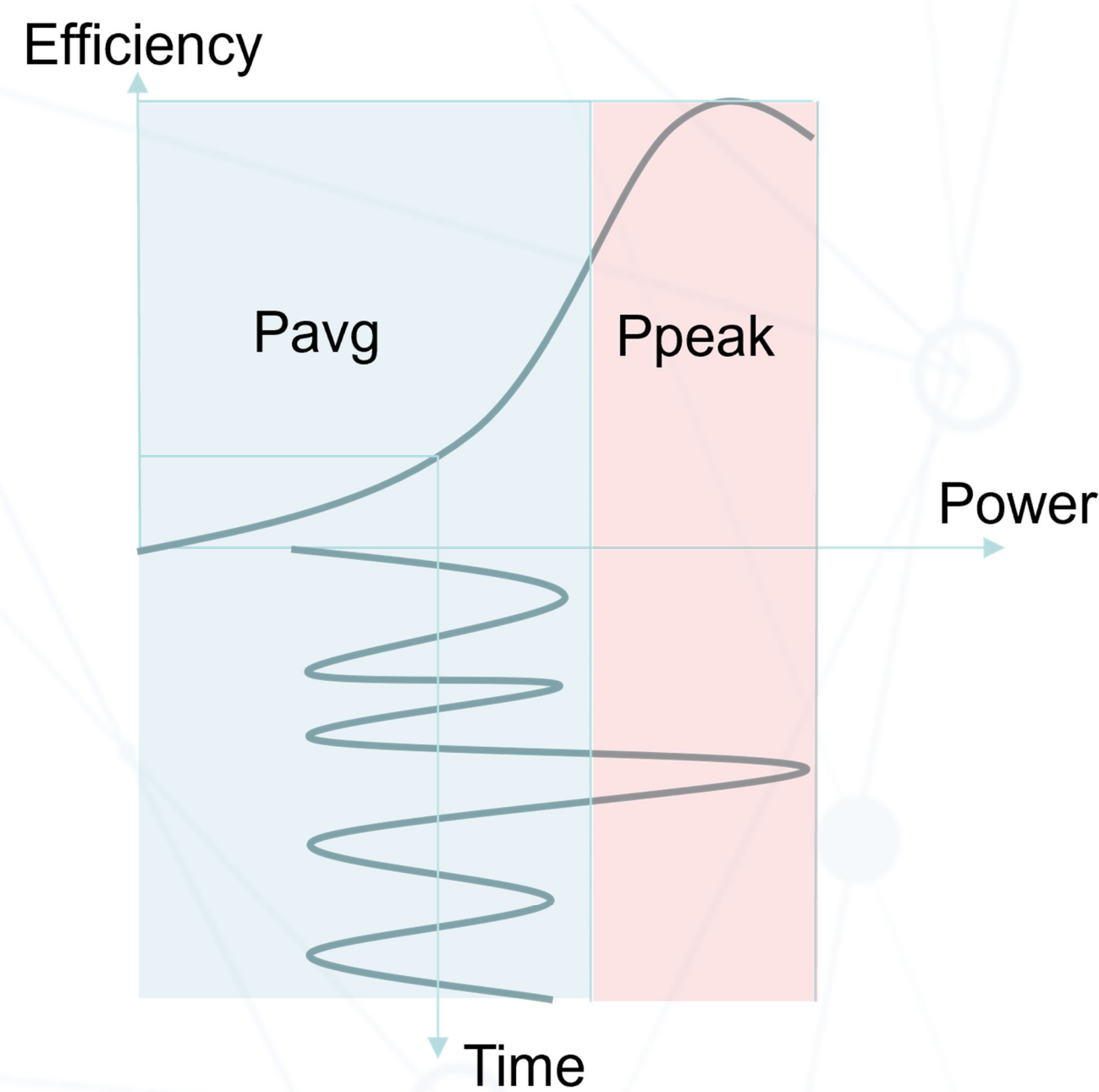
- Main PA biased as class-AB to amplify low power input signals.

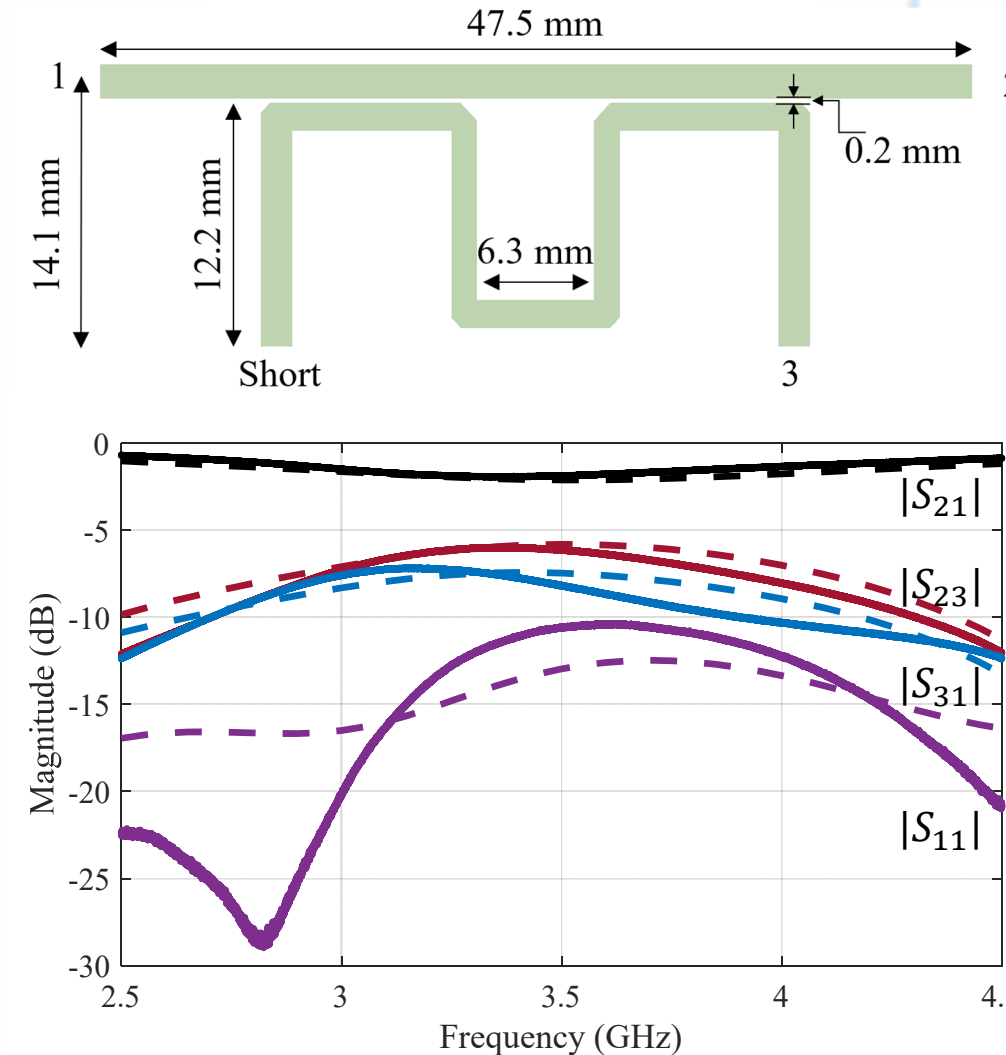- Peaking PA biased as class-C to handle high power input signals.
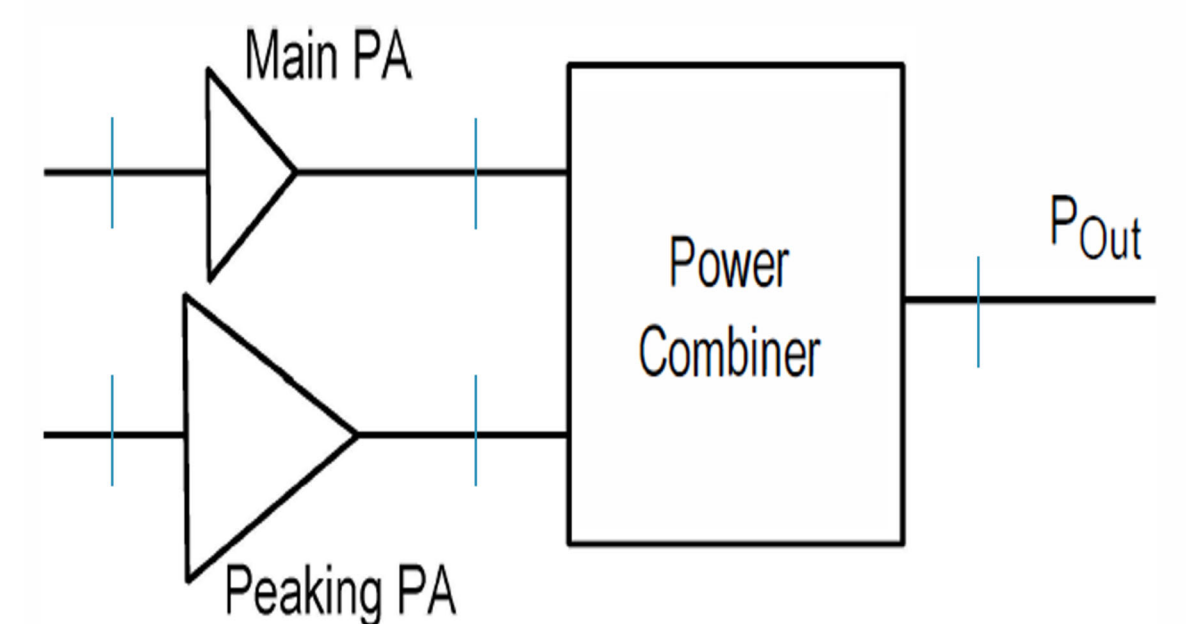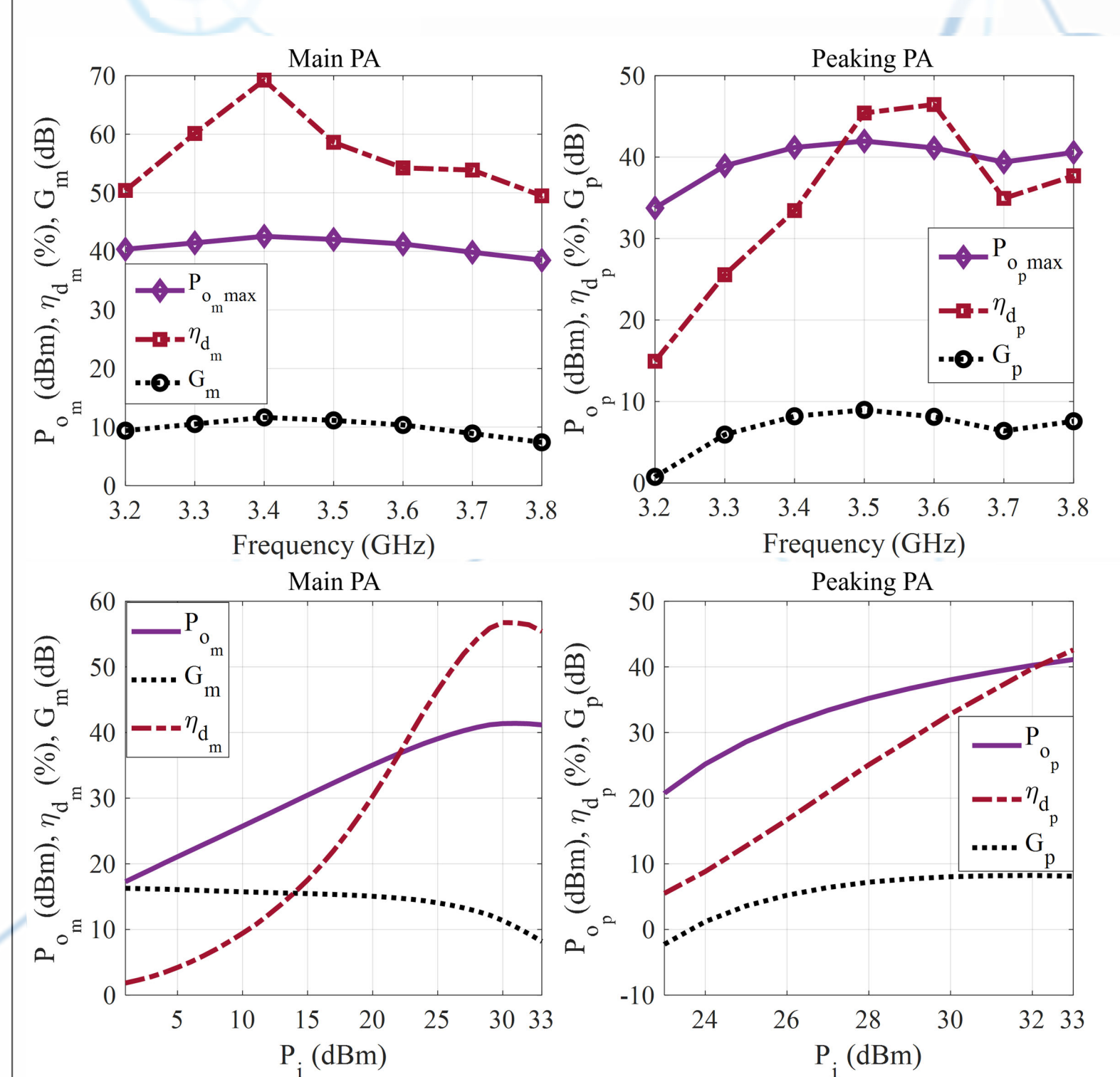

SPA Measurement Setup
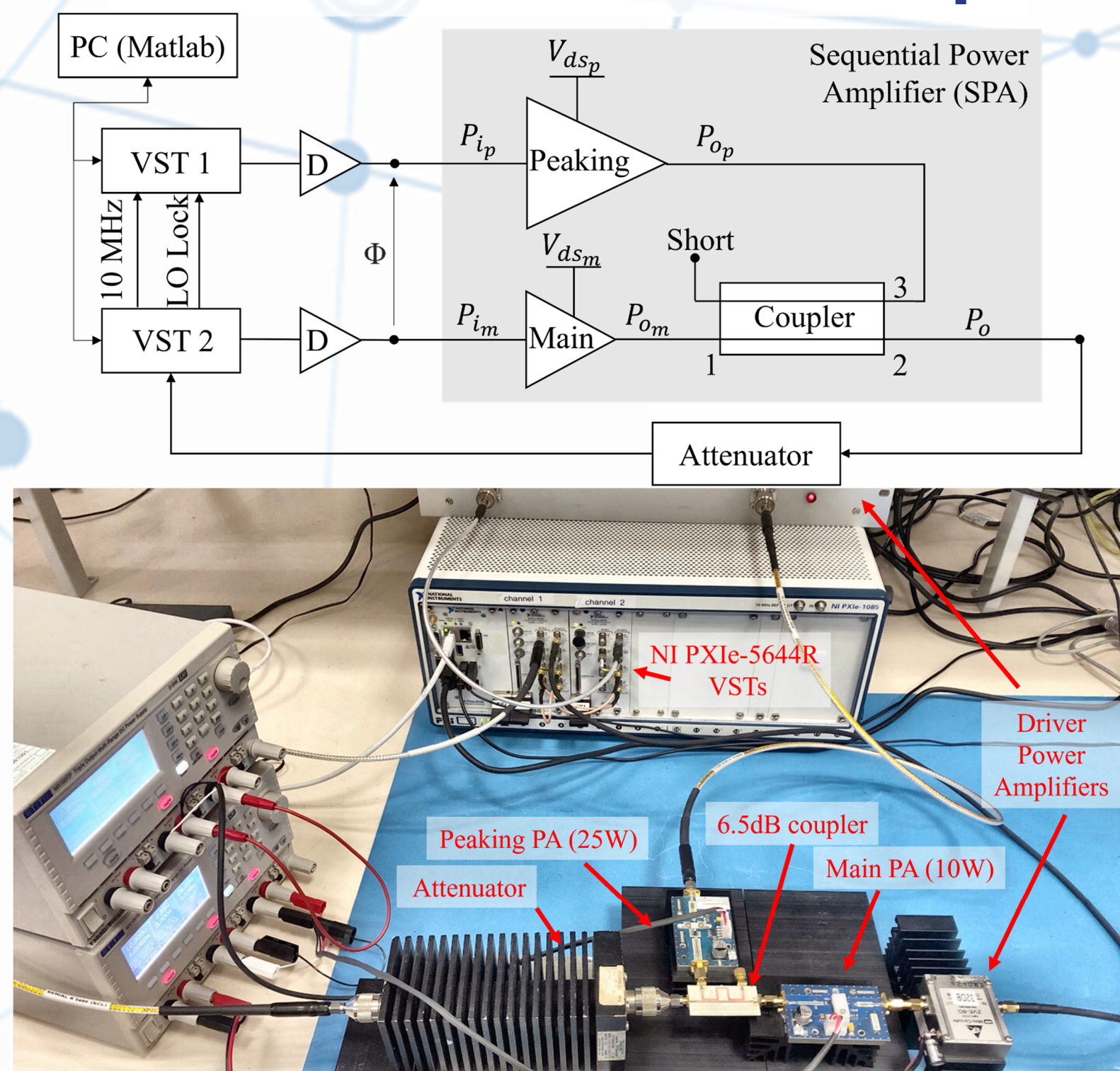
Coupler Design

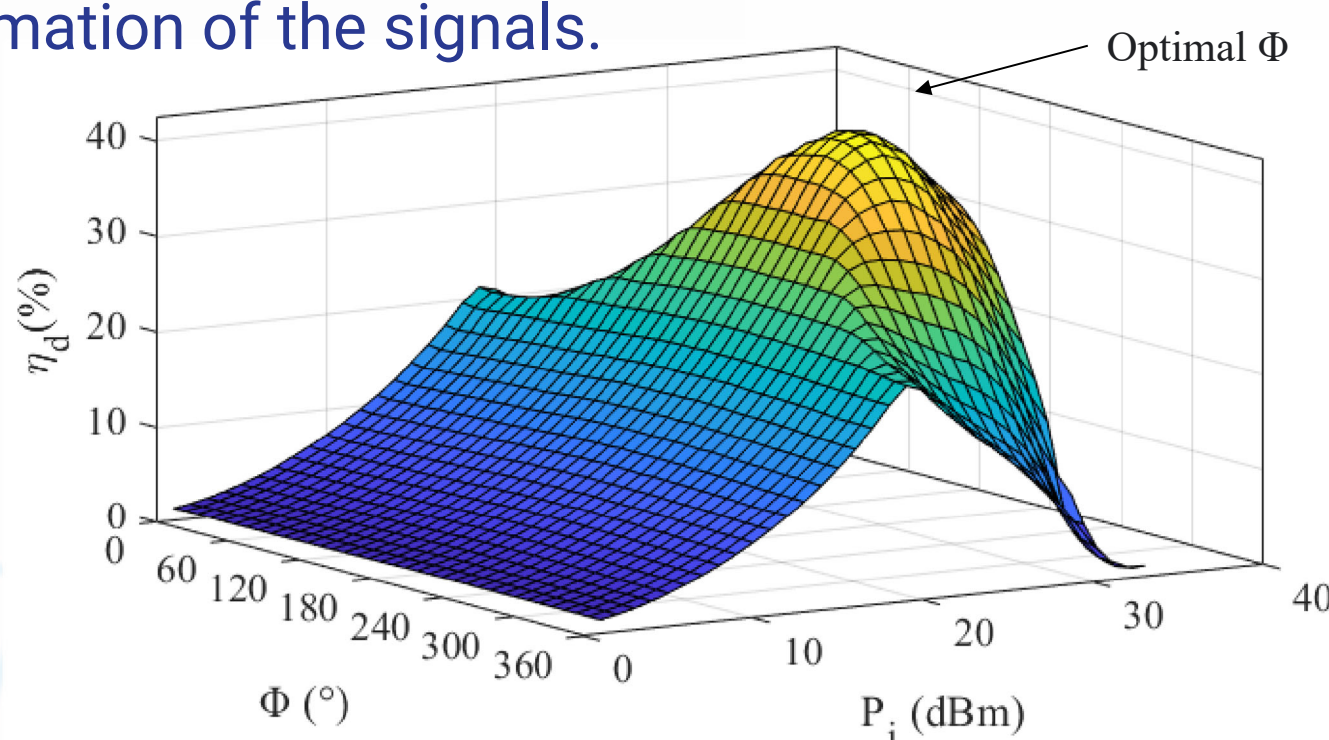Designed coupler to achieve the 6.5 dB coupling ratio between 3 to 4 GHz [1].
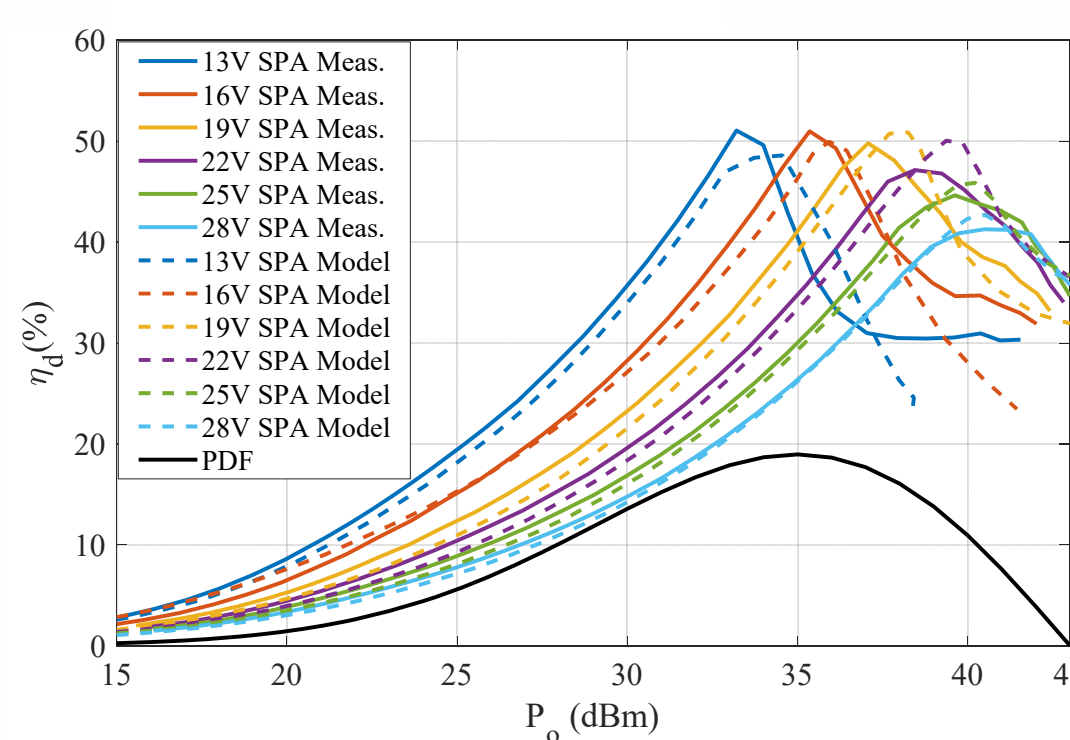

Characterisation of PAs

Results

The optimal relative phase is important for a constructive summation of the signals.

DE at 3.5GHz with sweeping VDS of the main PA.

Conclusions

Modularity has been proven by combining two off-the-shelf PAs and a coupler.

Reconfigurability was established by varying the OPBO as a function of the main-PA bias.

References

[1] S Ozan, M Nair, MA Beach, T Cappello, "Modular Design and Characterization of a Reconfigurable Sequential Power Amplifier," IEEE WAMICON, 2022 [in press].

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