بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / سامية زكى يوسف

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

MM-WAVE POWER AMPLIFIERS FOR 5G APPLICATIONS AND DIFFERENT POWER COMBINING TECHNIQUES

By

Mohamed Alaa Elgamal

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Electronics and Communications Engineering

FACULTY OF ENGINEERING ,CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:

mm-Wave Power Amplifiers for 5G Applications and Different Power Combining Techniques

Key Words:
Power Amplifiers; Power combining; 5G; Beamformers

Summary:
Design trade-offs and challenges facing 5G power amplifiers are presented in this work. Different power amplifier classes are compared for 5G applications. Stacking transistors and Combining multiple power cells are discussed as a solution to achieve higher power levels without sacrificing efficiency or over-stressing the amplifier. Various properties of different power combining techniques like efficiency and impedance transformation are analyzed in depth and proper design guidelines are provided. The design of a fully differential two-stage two-way current combining power amplifier with an integrated transformer-based balun fabricated using CMOS technology to cover both n260 39GHz 5G (37G to 40GHz) and n259 41GHz 5G (39.5G to 43.5GHz) bands is discussed and the measurement results are presented.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mohamed Alaa Abdelaziz Mejahed Elgamal Date: / / 2022

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List of Symbols and Abbreviations

Abbreviation	Description
5G	5th Generation
FM	Frequency Modulated
FDMA	Frequency Division Multiple Access
CDMA	Code Division Multiple Access
RF	Radio Frequency
TX	Transmitter
Rx	Receiver
PA	Power Amplifier
LNA	Low Noise Amplifier
VGA	Variable Gain Amplifier
VM	Vector Modulator
TL	Transmission Line
PS	Phase Shifter
IL	Insertion Loss
RL	Return Loss