AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Electronics Engineering and Electrical Communications Department

Satellite power amplifier design and implementation in the S-band used for jamming

A thesis submitted in partial fulfillment of the requirements of
a Master of Science in Electrical Engineering
Electronics Engineering and Electrical Communications Department

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Statement

This thesis is submitted as a partial fulfillment of Master of Science in Electrical Engineering, Faculty of Engineering, Ain Shams University.

The author carried out this work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Date: 28/7/2018

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Abstract

A power amplifier (PA) in S band as a main component of satellite jammer is presented. Amplifying a noise signal with high output power and efficiency was target irrespectively of linearity, signal distortion and conductivity.

A PA with GaN HEMT transistor operating in the beginning of saturation region was the optimum choice to get maximum out power and good efficiency with smallest power dissipation, the design of high S-band PA with two different approaches and implementation of one of them are carried out, in addition a Balanced PA using Microstrip line and using stripline couplers are designed.

Keywords: GaN HEMT transistor; harmonic termination; power; switched mode, power amplifier (PA), Efficiency, power added efficiency, satellite jamming, stability, Dissipated power, Gain.

Thesis Summary

This thesis is organized in six chapters. **Chapter one** introduces a brief background of the research and defines the thesis objective, research requirements, system block diagram which is the PA the key element of it and the research methodology. In **chapter two,** a brief review of the PA fundamentals is presented; followed by PA topologies, and PA design considerations. In addition, the classes of PAs (linear and switching-mode) are explained. Finally, brief discussion of linearity PA and the load pull concept technique are clarified. **Chapter three** shows techniques of the basic matching NWs. Furthermore, it discusses different transformations real to real and complex to real transformations TLs and power combiners. **Chapter four** satellite overview, calculations of link budget example and satellite jamming technique are presented. **Chapter five** design then implement of high S-band PA with two different approaches and design of balanced PA of this PA with Microstrip line and stripline TLs. Finally, **Chapter six** concludes the work and suggests some topics for future work.

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