JOURNAL OF SOUTHERN COMMUNICATION ENGINEERING
ISLAMIC AZAD UNIVERSITY BUSHEHR BRANCH

E-ISSN: 2980-9231
https://sanad.iau.ir/journal/jce

https://doi.org/...

Vol. x/ No. x/xxx

Research Article

High Efficiency X-band MMIC Power Amplifier for Remote Sensing Satellites

Razieh Narimani [1] | Vali Talebzadeh [2] | Ahad Farhadi [3]

[1]Satellite Research Institute, Iranian Space Research Center, Tehran, Iran.
r.narimani@isrc.ac.ir

[2] Satellite Research Institute, Iranian Space Research Center, Tehran, Iran.
v.talebzadeh@isrc.ac.ir

[3] Satellite Research Institute, Iranian Space Research Center, Tehran, Iran.
a.farhadi@isrc.ac.ir

Correspondence
Satellite Research Institute, Iranian Space Research Center, Tehran, Iran.
r.narimani@isrc.ac.ir

Main Subjects:
MMIC Power Amplifier

Paper History:
Received: 20 July 2024
Revised: 7 October 2024
Accepted: 15 October 2024

Abstract

The advancements in space telecommunication industry and the need to design transmitters with high transmission bit rate on the one hand and the limitation of the power consumption of satellite modules on the other hand, have made the importance of power amplifiers, as one of the main components of the transmitters with the highest power consumption, being highly efficient even more then before. Is. In this paper, we investigate a method to increase the efficiency and linearity of a two-stage class AB power amplifier using a 500nm GAN HEMT for the transmitter of a sensing satellite to send images obtained in the X frequency band. The designed amplifier has a saturation power of 49.84dBm, a gain of 23.9dB and an efficiency of 37% in the frequency range of 10.7-11.2GHz with a drain voltage of 40V, which has a higher output power and gain compared to other similar amplifiers in this band. The linearity characteristics of this amplifier are 1dB AM/AM, 4dB/dB AM/PM and 23dBc IM3 at the center frequency of 10.95GHz and it has a bandwidth of 36MHz.

Keywords: Power Amplifier, Satellite Transmitter, GaN HEMT Technology, Integrated Circuits.

Highlights

- High efficiency X-band MMIC power amplifier for remote sensing satellites.
- Using ALGaN/GaN Technology.
- The linearity characteristics of this amplifier are 1dB AM/AM, 4dB/dB AM/PM and 23dBc IM3 at the center frequency of 10.95GHz.

Citation: ... [in Persian].

1. Introduction