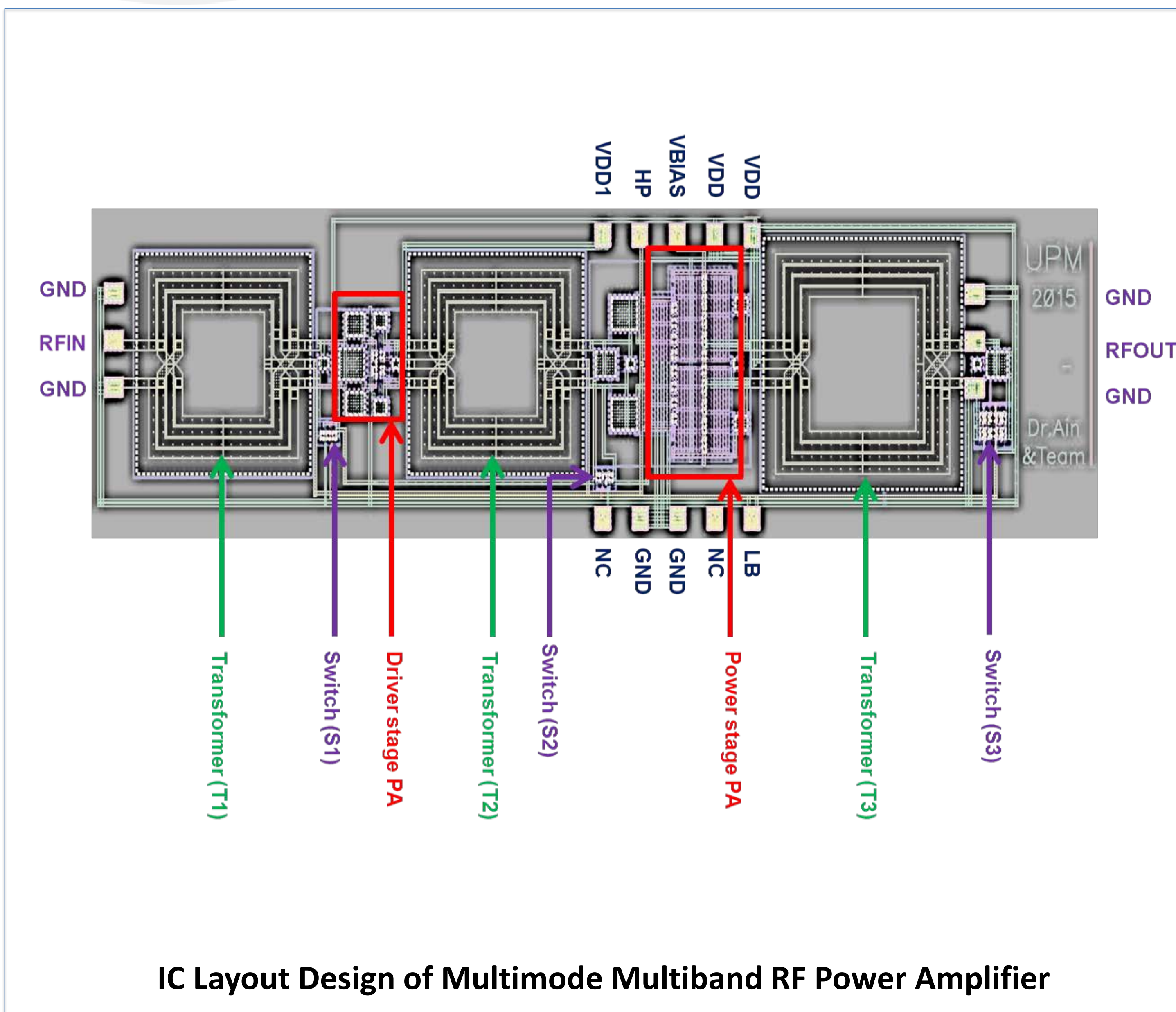
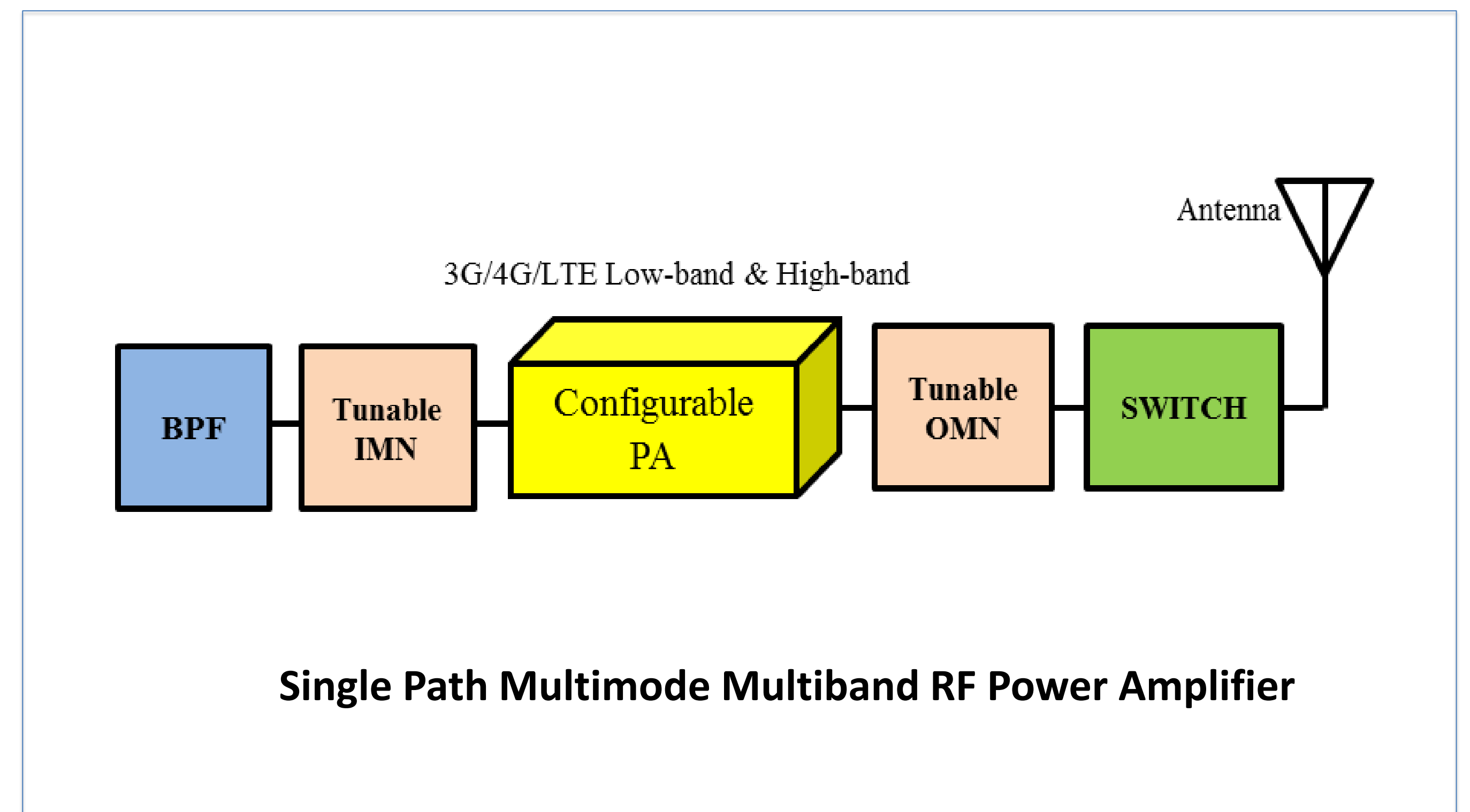


MULTIMODE MULTIBAND RF POWER AMPLIFIER

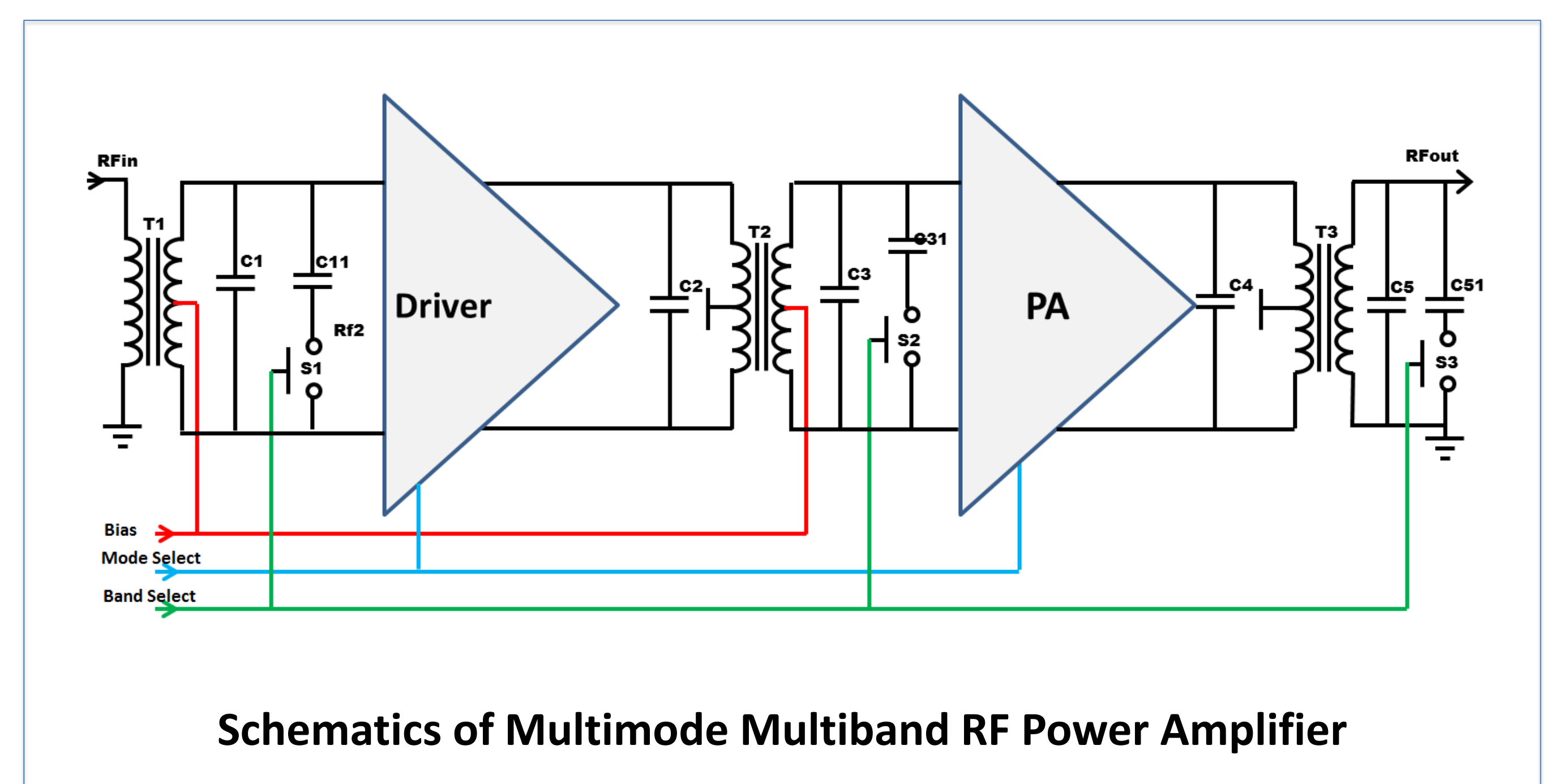
IPR (ICLD) NO. 201612270512



IC Layout Design of Multimode Multiband RF Power Amplifier



Single Path Multimode Multiband RF Power Amplifier



Schematics of Multimode Multiband RF Power Amplifier

INTRODUCTION OF TECHNOLOGY

Driven by ever-increasing consumer demand for wireless devices capable of supporting multiple air standards and applications, the implementation of multi-mode multi-band (MMMB) power amplifier (PA) has been steadily increasing. The MMMB PA based on an industry-standard 130nm process technology, capable of operating in dual power modes and both at 900MHz and 1900MHz bands. Unlike other published architectures, the proposed PA uses a single PA path where the size of the PA transistor is externally controlled to achieve dual power options; while the matching networks are tunable to multiple bands. In the 1900MHz high band region, the PA has 1400MHz bandwidth starting from the frequency of 1.2GHz up to 2.6GHz, covering the LTE bands 1, 2 and 3, with peak output power of 27.4dBm and 1-dB power of 26dBm. In the 900MHz low band region, the PA offers 190MHz of operating bandwidth starting from the frequency of 800MHz up to 990MHz, covering the LTE bands 5 and 8, with peak output power of 27.5dBm and 1-dB power of 26dBm. The achieved ACLR is -33dBc and -36dBc in the high band and low band, respectively, which are well within the 3G/4G linearity specifications.

INVENTION

A design of MMMB PA based on an industry-standard 130nm CMOS process technology, capable of operating in two power modes and five different bands. Unlike other published architectures, the proposed design uses a single PA where the drive strength of the PA cascode transistor is externally controlled to achieve multiple power options; while the matching networks are tuned to achieve multiband options.

ADVANTAGES

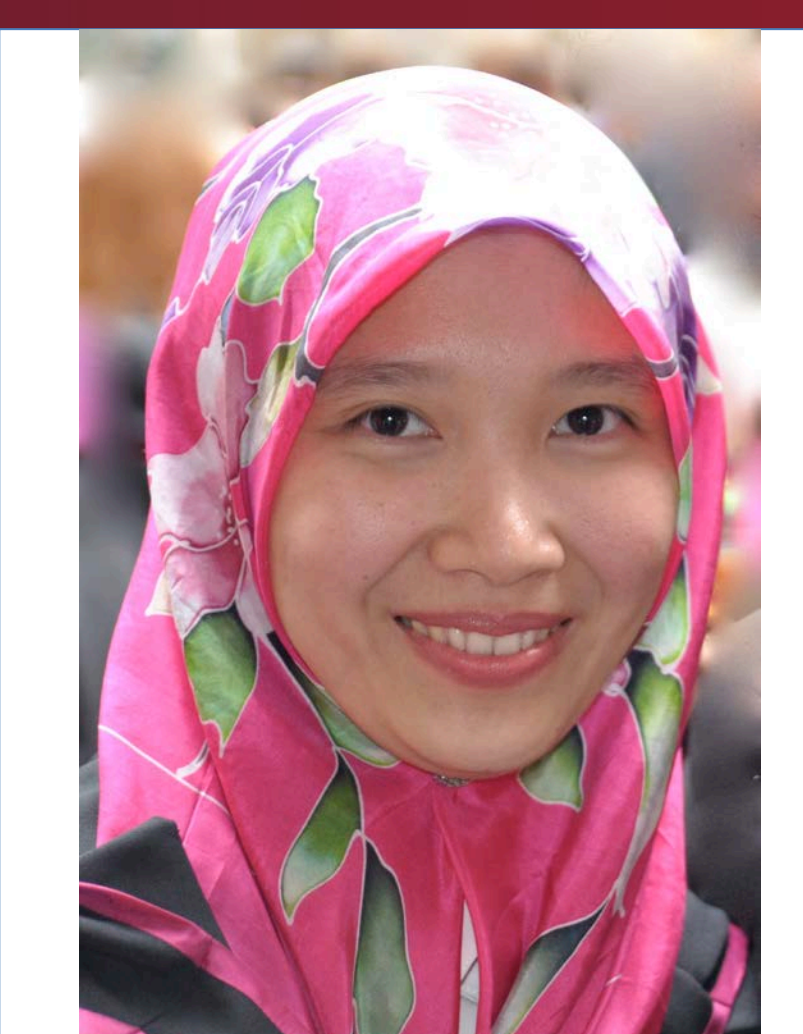
- The use of **single PA** for both low-band and high-band operation and thus requiring smaller form-factor and reduced dynamic power consumption
- The use of transformer based **tunable matching network** that is controllable from external digital logic
- The use of **multiple gated transistor (MGTR)** technique to operate the PA in two output power modes from external digital logic control
- The use of **CMOS** technology which will make the transceiver cost cheaper with high integration possibilities.

MARKET POTENTIAL

The MMMB PA design was layout, post-simulated and fabricated in the 130nm Silterra CMOS process and measured. It offers a greater solution for next-generation wireless handsets by providing small form factor, low cost and high integration capability with digital signal processors in the wireless RF front-ends.

Consumer/End User

- Smart phone applications operate with multimode multiband feature



Project Leader : Dr. Noor Ain Kamsani
 Dept./Faculty : Department of Electrical & Electronic Engineering
 Email : nkamsani@upm.edu.my
 Phone : 03-8946 4366
 Expertise : IC Design & Test