

“A 10 watts, X band GaN HEMT three-way Doherty amplifier based on a new symmetrical topology”, pp. 260 - 267

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Abstract – This paper presents a new Doherty amplifier topology which consists in a novel combination of one main class AB carrier amplifier and two auxiliary class B peaking amplifiers. The proposed topology is fully symmetrical and has never been reported to our knowledge. It consists in a natural architecture to disassemble and then to reassemble the RF signal to permit an efficient amplification. It is here applied to the design of an X band power amplifier including three AlGaIn/GaN HEMTs from Thales Tiger foundry resulting in a total 2.7mm gate width. The designed power amplifier exhibits an output power of 10 Watts with 34% power added efficiency and 8.5dB power gain. Before the compression zone, the shape of the power gain presents a smooth expansion which is well suited for good linearity of the amplifier. During the design procedure, a specific attention has been carried out on non linear stability analysis and possible inband and out-band oscillations. Furthermore, the proposed topology enables the RF power flexibility required in modern satellite payloads. In the context of this work, a 3dB output power flexibility at a fixed input power is required. For that purpose, the drain biases of the three transistors are tuned.