

A new design method for Doherty-Chireix combined operation is proposed. Only one of the two amplifiers operates at the low power region like a Doherty amplifier, while both amplifiers are operating as a Chireix outphasing amplifier at the high power region, taking advantage of the high efficiency region of each operating mode. Quasi-envelope efficiency of both amplifier efficiency curves is extracted in a systematic way using only analog circuit design methods. The output combiner is used as an input splitter for the radio frequency input Chireix outphasing without using any digital signal processing. Input signal phase control versus power for outphasing operation is obtained by using only a linear circuit, exploiting the input impedance variation of nonideal devices. A 52.4-dBm peak output power, 6.6-dB back-off Doherty-Chireix combined amplifier, is built operating at 2.17 GHz. A 50% average power added efficiency was measured using 6-dB peak-to-average power ratio, 3.84 MHz modulated test signals. Class-B like efficiency behavior is obtained at the low power region without compromising the peak back-off efficiency.