Abstracts

A Large-Signal Theory for Broad-Band Frequency Converters Using Abrupt Junction Varactor Diodes

F. Abdullah and F.M. Clayton. "A Large-Signal Theory for Broad-Band Frequency Converters Using Abrupt Junction Varactor Diodes." 1977 Transactions on Microwave Theory and Techniques 25.2 (Feb. 1977 [T-MTT]): 127-136.

A multicurrent design theory is developed for square law varactor frequency converters having a pump freqnency much greater than the input signal frequency. Efficiency limits are derived for upconverter operation, showing in particular that any broad-band mixer, where all sideband currents around the pump frequency are allowed to flow, must involve a conversion loss of at least 4.4 dB. Consideration of circuit interactions and their effect on upconverter responses leads to a design suitable for systems use in the 5.9-6.4 GHz communication band. Experimental studies of a microstrip realization of this mixer show close agreement with theoretical predictions of its behavior, including a conversion loss less than 7.5 dB over an operating range of 1.3 GHz.

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