Abstracts

Class-F power amplifiers with maximally flat waveforms

F.H. Raab. "Class-F power amplifiers with maximally flat waveforms." 1997 Transactions on Microwave Theory and Techniques 45.11 (Nov. 1997 [T-MTT]): 2007-2012.

Class-F power amplifiers (PA's) employ harmonic-frequency resonators to shape their drain or collector waveforms to improve efficiency. Generally, the output network must present the drain with either an open or short circuit at the harmonic frequencies. At VHF and higher frequencies, the drain capacitance, lead inductance, lead length, and dispersion make implementation of reasonably ideal tuned circuits difficult. However it is possible to control the impedances at a finite number of harmonics. This note first derives the basic relationships among the Fourier coefficients of the waveforms and the performance of the amplifier. Fourier coefficients for maximally flat waveforms are then derived for inclusion of up to the fifth harmonic. Amplifier performance is then tabulated as a function of which harmonics are included in the voltage and current waveforms. Efficiency increases from 50% of class A toward 100% as harmonics are added. Power-output capability increases by up to 27%.

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