Abstracts

The Measurement of Noise in Microwave Transmitters

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A tutorial review of the basis for transmitter noise measurements shows that noise is best described and measured as AM and FM noise. The determination of RF spectrum is done by calculation after the AM and FM noise are known. The contribution of AM noise to RF spectrum shape is determined by the power spectral density shape of the AM noise. The contribution of FM noise to RF spectrum is to make the shape that of an RLC circuit resonant response rather than a delta function with a sideband structure. The measurement of AM noise is done with a direct detector diode. The measurement of FM noise for frequencies above 5 GHz is done with a discriminator based on a one-port cavity resonator. The measurement of FM noise below 5 GHz is done with an improved transmission line discriminator which is described in detail. Measurement of low-power low-noise signal sources is made posbible with an injection-locked oscillator for a preamplifier to the discriminator. The most widely used baseband analyzer is the constant bandwidth superhetdrodyne wave or spectrum analyzer. Most differences in measurement results are resolved by understanding the baseband analyzers. At least the baseband spectrum analysis of transmitter noise measurements can be automated with worthwhile savings in time and improvement of documentation.

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