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***A Comparative Study of RF Power Meters for Digitally Modulated Signals in Military Applications***

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Abstract:

Modern military communication systems increasingly rely on digitally modulated signals, necessitating accurate RF power measurements to ensure operational efficiency and regulatory compliance. Traditional RF power meters like the Bird 4410A, designed for continuous wave (CW) and frequency-modulated (FM) signals, exhibit significant inaccuracies when measuring complex digital modulation schemes due to their reliance on conventional diode detector technology. This paper presents a comprehensive comparison between the legacy Bird 4410A and the advanced Bird 4480A digital power meter, which employs Schottky diodes operating in the square law region to provide accurate average power measurements independent of modulation format. Through rigorous testing, including side-by-side measurements with a thermal power meter as a reference, we demonstrate the limitations of the 4410A and the superior performance of the 4480A across multiple modulation types, including amplitude modulation (AM) and quadrature amplitude modulation (QAM). Our findings underscore the critical need for military systems to adopt modern power meters capable of accurately handling digitally modulated signals, thereby enhancing communication reliability and system integrity.