Limitations of Electric Field Probes and Sensors: Updating Current Calibration Methods

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With communication protocols increasing in complexity and more advanced modulation schemes, measuring the power or corresponding field strength transmitted becomes an ever-increasing challenge. One method of measuring the electric field strength is by use of a 3-axis probe. For example, with a commercially available field probe/detector one may monitor the 3.5 GHz Citizens Broadband Radio Service Band. In this band, LTE and other types of devices (e.g., Wi-Fi) may need to vacate the frequency band when fast pulsing radar is present. The field probe may be able to detect emissions from LTE, Wi-Fi, and radar, but may not be able to correctly determine the amplitude of the signal. This is a result of the fact that the field probe has not been properly calibrated to non-continuous wave waveforms. The IEEE 1309 standard outlines the agreed upon calibration technique for calibrating electromagnetic field sensors and probes.

A proposed method to determine the appropriate calibration waveforms based on the probes response time of less than 20 μs is implemented. While the IEEE 1309 standard provides a guide for calibration it does not consider the effects of modulated or pulsed waveforms. With a slow response time curve of a field senor/probe it is likely that the power measured will be lower than the actual transmitted power. Currently there is no calibration method to address this issue. As technology in field detectors and sensors have improved to provide greater dynamic range, sensitivity, and response time, the issue of calibrating to a modulated or a pulsed signal have not been addressed. It is possible to perform a calibration of the probe for modulations that are faster than the rise time of the device, this must be looked at and addressed in the next revision of the IEEE 1309 standard.