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Re Test limits for peak to average ratio

1 We wish to propose that the limits for the proposed 20dB peak to average ratio be deleted for the following reasons.

2 It is not clear why the parameters of an average value measured in a 1MHz bandwidth and a peak value measured in a 50MHz bandwidth have been selected.

3 Normally the spectrum of an UWB GPR will be measured over a bandwidth corresponding to that in which the majority of the radiated energy will be found. For example this may be from 500MHz to 2GHz. For a time domain impulse radar, the resultant instantaneous spectrum will consist of a sequence of spectral lines whose frequency interval is related to the repetition rate of the impulses and whose overall envelope is related to the time signature of the impulse.

4 For illustration consider an UWB GPR operating at a 1-microsecond repetition rate. This will only transmit energy at frequencies separated by 1MHz. A receiving antenna and spectrum analyser is used to measure the energy radiated by the UWB GPR. The output of the measuring system becomes the convolution of the bandwidth of the measurement system and the spectrum of the UWB GPR. However the amplitude of the envelope of the latter changes over its nominal transmission band of 500MHz to 2GHz.

5 If a measuring system bandwidth of 1MHz is selected at a centre frequency of 2GHz, its output will not necessarily be the mean value of the radiated energy of the device under test (DUT). If a bandwidth of 50MHz is selected at a centre frequency of 2GHz, its output will not be the peak value of the radiated energy of the DUT. It is not clear what a peak level over a 50MHz bandwidth really signifies. Consideration of the integration time of the measurement in relation to the bandwidths of receiver vulnerable to interference needs to be made.

6 Some GPR systems produce spectra separated by several hundred kHz. In which case the two measurements will simply result (in the case of flat envelopes and identical measurement detection processes) in a 50:1 ratio, which corresponds to 33.9dB. In the case of a noise modulated radar the measurements will result in a ratio of unity. A stepped frequency radar only transmits sequential frequencies so the measure of peak to average is again not relevant unless more criteria relating to integration time are specified

7 What is important, in terms of the capability for interference, is the magnitude of the envelope of the radiated spectrum in terms of microvolts per metre, at a specified distance from the radiating source, over the frequency band of interest.

8 Setting a limit of a 20dB peak to average ratio will perhaps cause an increase the mean power per unit bandwidth, whereas surely the objective is to reduce the mean power per unit bandwidth.

9 We propose that this measure is deleted.

Regards,

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