

Examples of High-Power Electromagnetic (HPEM) Environments

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It is well established that sufficiently high-power electromagnetic (EM) signals in the frequency range of 200 MHz to 5 GHz can cause upset or damage in electronic systems. Such environments can be natural (ex: lightning) and man made (high-power microwaves, nuclear electromagnetic pulse etc.) IEC 61000-2-13 Standard, entitled “EMC, High-power electromagnetic (HPEM) environments -- radiated and conducted” has formalized a bandwidth based classification of the HPEM signals into 4 bands. One can provide examples of HPEM generators that employ current and emerging technologies, for each category of the four-band classification. We may compare all the examples in terms of the electric field spectrum [V/ (m-Hz)]. We consider some HPEM environments such as:

- Examples of unclassified HEMP waveforms
- Electric field spectrum from a near-by lightning discharge
- A realistic e-field radiated from an HPM source (say at 1 GHz)
- Radiated field from a moderate band source such as MATRIX
- Radiated field from a hyperband source such as the Prototype IRA (3.6m reflector)
- Radiated field from a hyperband source such as JOLT
- Etc.

It is instructive to plot all of the above radiated field spectra in absolute terms [V/ (m-Hz)] vs. frequency. Such a plot highlights the relative spectral importance of each of these environments for researchers and engineers responsible for protection of complex electromagnetic systems.