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Jamming Jammers Jamming GSM Phones

Daniel Månsson^{1,2}

¹High Voltage Valley, Ludvika, Sweden, SE-771 28

²Royal Institute of Technology (KTH), Electromagnetic Engineering, Stockholm, Sweden, SE-100 44

E-mail: daniel.mansson@highvoltagevalley.org

Scientific research and investigations [1] have shown that our society is highly vulnerable to intentionally created electromagnetic interference (IEMI) that can be used to sabotage the normal operations of systems associated with critical infrastructure components. There are many system design factors contributing to this vulnerability, but the availability of commercial, inexpensive and easy-to-use electromagnetic sources that can be used as disturbance weapons is an aspect that cannot directly be controlled by engineers. This is important as in the process of creating electromagnetic compatibility between (and within) systems; limiting source emissions is one method of improving the compatibility (besides limiting the coupling paths between systems and hardening these).

In this paper, we have investigated three samples of a low-cost (≈ 160 USD) handheld GSM jammer, commercially available on the internet. These are isotropic frequency band specific noise emitters. The output spectra were examined by the use of a reverberation chamber and the interference ability was tested (successfully) against commercial GSM phones. However, note that, due to the frequency bands used, the normal operation of a 3G enabled phone was not affected by the jammers. The two possible output spectra, depending on power emission setting of the jammer, are shown in Fig. 1 below.

Also, the immunity of the jammers themselves against electromagnetic disturbances was tested also by the use of a reverberation chamber. It was found that the normal operation of the jammers could be interfered with both in-band as well as out-of-band of the operational frequencies. A range of different upset events (as defined in [2]) could be induced in the jammers (see Fig. 2, permanent damage level not shown).

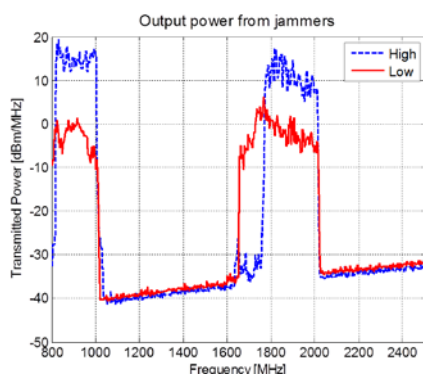


Figure 1: Output spectra of the jammers.

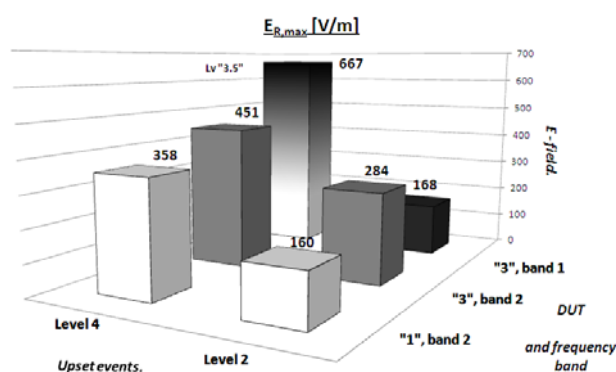


Figure 2: Susceptibility data of the jammers (maximum of a rectangular component of the electric field).

Similarly to the "Active Denial System" presented by, e.g., Raytheon, the knowledge of the electric field threshold levels can for upset events be used to disrupt the function of these isotropic jammers. An IEMI scenario that is often given is the use of balloons to lift a large number of jammers over a crowd in a city, making it very difficult for law enforcement to easily counteract the interference source. However, a high directivity (narrow main antenna lobe) HPEM source could disrupt the normal operation of the jammers by inducing a system crash or permanent damage to the jammers, without causing interference to surrounding systems. Thus, limiting source emissions and restoring electromagnetic compatibility.

It is clear that inexpensive jammers that can interfere with GSM systems can be acquired from easily available homepages on the internet and, according to statements there, jammers are frequently being used by people. However, these GSM jammers are themselves vulnerable to disturbances that can be used to counteract them.

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