

RF Amplifier Susceptibility to HPM with Various Parameters

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It is well known electronics equipments are sensitive to electromagnetic irradiation. There are a lot of possible electromagnetic threats to electronics equipments (systems) such as NEMP (Nuclear Electromagnetic Pulse), UWB (Ultra Wide Bandwidth) and HPM (High Power Microwave). For next considerations HPM signal was chosen. HPM signals are considered as narrowband signals with high power in frequency range 100's MHz up to several GHz. HPM signals are usually pulse signals with pulse width typically 100's ns and with repetition rate 100's Hz up to few kHz.

The aim of this study is to analyse influence of HPM parameters on required electromagnetic strength threshold damage level for some widely used electronic equipment. As suitable sample for this experiment was chosen typical installation of RF amplifier connected with television aerial. First of all transfer function (television aerial antenna factor) will be measured with low-level technique in the whole considered HPM frequency range 300 MHz up to 10 GHz. After that television aerial linearity will be verified with expected electromagnetic field strength incidence on some frequencies (high power measurement). Next expected incident electromagnetic field in the whole considered HPM frequency range will be re-counted to aerial output voltage through relevant transfer function (antenna factor). Found output voltage will be directly applied to considered RF amplifier input. HPM parameters as carrier frequency, pulse width, repetition rate and number of pulses will be changed and threshold level for used RF amplifier will be found. Single shot signal as well as CW (Continuous Wave) signal will be included in experiment procedure. After that found threshold voltage levels will be re-counted to relevant incident electromagnetic field through transfer function (antenna factor). Finally comparisons of found applied voltage levels with various parameters as well as comparisons of re-counted relevant electromagnetic field strength levels will be carried out. Energy requirements and peak power requirements for relevant HPM sources of investigated parameters in connection with assessed threshold levels will be discussed too in this paper.

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