Noise Mitigation Techniques to Minimize Electromagnetic Interference/Electrostatic Discharge Effects for the Lunar Mission Spacecraft

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Abstract : TeamIndus is the only Indian team competing for the Google Lunar XPRIZE(GLXP). The GLXP is a global competition to challenge the private entities to soft land a rover on the moon, travel minimum 500 meters and transmit high definition images and videos to Earth. Towards this goal, the TeamIndus strategy is to design and developed lunar lander that will deliver a rover onto the surface of the moon which will accomplish GLXP mission objectives. This paper showcases the various system level noise control techniques adopted by Electrical Distribution System (EDS), to achieve the required Electromagnetic Compatibility (EMC) of the spacecraft. The design guidelines followed to control Electromagnetic Interference by proper electronic package design, grounding, shielding, filtering, and cable routing within the stipulated mass budget, are explained. The paper also deals with the challenges of achieving Electromagnetic Cleanliness in presence of various Commercial Off-The-Shelf (COTS) and In-House developed components. The methods of minimizing Electrostatic Discharge (ESD) by identifying the potential noise sources, susceptible areas for charge accumulation and the methodology to prevent arcing inside spacecraft are explained. The paper then provides the EMC requirements matrix derived from the mission requirements to meet the overall Electromagnetic compatibility of the Spacecraft.