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Project Title: Study of Indirect Electromagnetic Interference (EMI) Effect to Instability Test Parameters of Heat Assisted Magnetic Recording Heads

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Abstract:

Electrostatic discharge (ESD) has been a significant problem in the manufacturing processes of the magnetic recording head technologies for many years. Besides direct discharge damage, ESD can also generate electromagnetic interference (EMI) which could possibly cause failure in magnetic read heads. The aims of this work are to measure the EMI from ESD simulator based on the standard IEC 61000-4-2 and to investigate the effects of EMI on tunneling magnetoresistive (TMR) read heads using the heat assisted magnetic recording. The discharge current and the EMI generated by ESD simulator are measured in the experiment. Also, the EMI is applied to the TMR read heads at various amplitudes and distances in order to evaluate the changes of read head parameters including the bit error rate, head resistance, read back signal amplitude, asymmetry, normalized noise, baseline noise, writer width, and overwrite of the head. The results show that the discharge current wave form is consistent with the IEC standard current waveform. In addition, it is found that the EMI is insufficient to cause a permanent change of the read head parameters at distances above 2 cm indicating the minimal impact on the head performance. Further experiments are proposed to carry out more detailed studies of the EMI effects on head parameters in order to improve the measurement methodologies to prevent the degradation of the heads performance which can be a latent failure in the magnetic read heads and to increase the robustness of the heads.

Keywords: Electrostatic Discharge (ESD), Electromagnetic Interference (EMI), tunneling magnetic recording head (TMR) and electrical test parameters of the head