Design and development of a low-cost digital magnetic field meter with wide dynamic range for EMC precompliance measurements and other applications

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Abstract: The design and development of a low-cost, portable, and easy-to-operate instrument that can measure static and time-varying magnetic fields for electromagnetic-compatibility (EMC) precompliance and other applications are presented in this paper. The basic sensor used is a Hall-effect element. The instrument has an accuracy of 0.5% and a wide bandwidth of 30 kHz. The resolution of the meter is 12.5 mG, enabling accurate measurement of small fields, such as the geomagnetic field. Isotropic and linear detection of magnetic fields is possible with true root-mean-square (RMS) measurement. Other desirable features, such as maximum hold, data logging, and computer interface, are also incorporated. A graphical user interface (GUI) has been developed for computer interface and data presentation. A Helmholtz coil and a Zero-Gauss chamber have been used for design validation. A low-cost EMC precompliance test setup, based on the proposed work, is also presented. All the design details and measurement results are presented. Apart from being low cost and accurate, the proposed meter has a lower part count and involves a simple design-and-fabrication process. © 2009 IEEE.

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