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Functional Magnetic-Field Microsensors: An Overview

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The present review is the first comprehensive consideration of the application of the functional approach to magnetic-field microsensors. It has been shown that some galvanomagnetic phenomena recently discovered in solid-state devices allow the simultaneous and successive measurement of the magnetic vector components and their gradients, as well as the temperature and the radiant flux of light. A detailed analysis of the operation of multisensors for magnetic field, light and temperature, high-resolution galvanomagnetic gradiometers and other devices has been suggested.

1. Introduction

Device integration by means of proper processing techniques is the basic principle in the construction of both conventional IC's and integrated magnetosensors. It imposes the necessity of miniaturization of individual active and passive elements. Regions with transistors, diodes, resistors, Hall devices or other types of transducers, capacitors, and inductance elements can be identified in such an integrated circuit. The number of devices and connections between them grows as the complexity of the functions performed is increased. If a multisensor IC for the registration of more than one nonelectric quantity is to be manufactured, individual sensor regions for the measurement of such parameters as magnetic fields, temperature, and chemical composition must be formed in the substrate. The integration of several hundred thousand elements on a single chip is a very serious design and