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3.4 Transducer Technologies3.4.1 Introduction; 3.4.2 Generic Nonsilicon Technologies; 3.4.3 Silicon; 3.5 Examples of Silicon Sensors; 3.5.1 Radiation Domain; 3.5.2 Mechanical Domain; 3.5.3 Thermal Domain; 3.5.4 Magnetic Domain; 3.5.5 Chemical Domain; 3.6 Summary and Future Trends; 3.6.1 Summary; 3.6.2 Future Trends; References; 4 Optical Sensors Based on Photon Detection; 4.1 Introduction; 4.2 Photon Absorption in Silicon; 4.3 The Interface: Photon Transmission Into Silicon; 4.4 Photon Detection in Silicon Photoconductors; 4.4.1 Photoconductors in Silicon: Operation and Static Performance
4.4.2 Photoconductors in Silicon: Dynamic Performance4.5 Photon Detection in Silicon pn Junctions; 4.5.1 Defining the Depletion Layer at a pn Junction; 4.5.2 Electron-hole Collection in the Depletion Layer; 4.5.3 Electron-hole Collection in the Substrate; 4.5.4 Electron-hole Collection Close to the Surface; 4.5.5 Backside-illuminated Pin Photodiode; 4.5.6 Electron-hole Collection in Two Stacked pn Junctions; 4.6 Detection Limit; 4.6.1 Noise in the Optical Signal; 4.6.2 Photon Detector Noise; 4.6.3 Photon Detector Readout; 4.7 Photon Detectors with Gain; 4.7.1 The Phototransistor
4.7.2 The Avalanche Photodiode

Sommario/riassunto

Information processing systems need sensors to acquire the physical, mechanical and chemical information to be able to function. For extended use of sensors in industrial production tools and consumer components, such as smart cars and smart homes, the reliability of the sensors should be improved and the cost dramatically reduced. The improvement of reliability, together with a reduction of cost, can only be achieved with smart sensor systems. These systems combine the functions of sensors and interfaces, including sensors, signal conditioning A-D (analog to digital) conversion, and bus int

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