Patent Search

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Abstract:

The invention provides a compact, power-efficient Printed Circuit Board (PCB) design framework for Internet of Things (IoT)-enabled payment devices using Altium Designer. The PCB integrates Near Field Communication (NFC), microcontroller, and sensor modules within a four-layer high-density interconnect structure featuring controlled impedance routing and advanced grounding for electromagnetic compatibility. Through 3D simulation, thermal analysis, and design rule verification, the invention achieves optimal signal integrity, low latency, and stable power distribution. This design enhances transaction security, minimizes interference, and ensures manufacturability and scalability for compact payment systems. The invention thereby offers a reliable, cost-effective solution for modern IoT-based financial hardware and portable contactless payment applications.

Complete Specification

Description:FIELD OF THE INVENTION

[001] The present invention relates generally to the field of electronic circuit and hardware design, and more particularly to a compact, power-efficient, and high-performance Printed Circuit Board (PCB) architecture developed for Internet of Things (IoT)-enabled payment devices. The invention specifically concerns the integration of Near Field Communication (NFC), microcontroller, and sensor modules into a single multi-layer PCB structure optimized using Altium Designer. It further pertains to methods and systems for achieving electromagnetic compatibility, controlled impedance signal routing, and enhanced power management to facilitate secure, low-latency wireless payment operations in portable and embedded IoT applications.

BACKGROUND OF THE INVENTION

[002] In recent years, the proliferation of Internet of Things (IoT) devices and the rapid shift toward digital and contactless payments have necessitated the development of compact, reliable, and energy-efficient hardware architectures. Payment systems increasingly rely on miniature embedded devices capable of performing secure transactions through wireless communication technologies such as Near Field Communication (NFC) and Bluetooth Low Energy (BLE). However, conventional Printed Circuit Board (PCB) layouts used in payment terminals and IoT modules suffer from several technical limitations, including poor electromagnetic compatibility (EMC), inefficient power routing, and inadequate signal integrity between high-frequency communication lines and microcontroller units.

View Application Status

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