

High speed interconnects in Printed Wiring Board technology

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Abstract

The continuing developments in the electronics technology towards higher data transmission speeds imposes ever increasing demand on the interconnection technology. As the processor speeds increase well into the 3 GHz range for standard PCs they are approaching the limits of current PWB technology. While PWBs have already shown data transmission rates >10 GHz over short lengths the challenge of designing in high speed circuits with other electrical features remains to be solved for every interconnection solution. Several options exist for increasing the speeds and reducing losses at high frequencies. This paper discusses the opportunities arising from embedding active and passive components within the PWB, and optical data transmission within the PWB.

Embedded passives are slowly making their way into the PWB, although some factors for a widespread use are still missing. Success factors for embedded components are described, in particular for driving the use of R's and C's within high performance and miniaturized circuits, and embedded IC's, and their influence on high-frequency applications will be shown.

Integrated optical transmission lines have been under investigation by many groups for almost 2 decades, and solutions have been demonstrated yet never applied in large volume. Recent advances, including the use of state-of-the-art interconnection technology, embedding technologies and the opportunities for PWB design are highlighted. An outlook for the feasibility of advancing integrated optical technologies will be given from the view of a PWB manufacturer, in particular considering the quest for upscaling to volume production.

CV of Markus Riester

Markus Riester currently serves as Head of Research at AT&S, Austria, driving the technology development of Printed Wiring Boards, with the focus on topics like Embedded Passives, Integrated Optical Interconnects and Flexible Interconnect Solutions. Before joining AT&S he worked at Motorola Labs for 5 years, where lead applied R&D projects with the focus on micro-integration technologies, in particular PWB based micro systems, integrated optical devices and printed electronics. Prior to that he worked at IBM SSD Magnetic Head Division in the field of precision cleaning. Markus Riester earned his doctoral degree at the University of Osnabrück in 1998, with the work being carried out at the IBM Storage Systems Division Materials Lab Mainz, Germany. He investigated TiNxOy thin film coatings deposited on thermoplastic substrates. Markus Riester graduated in physical chemistry from the University of Osnabrück in 1995, working on the physics of soluble polymer systems. He earned an engineering degree in technical chemistry from FH Darmstadt in 1989 working on lubricating grease rheology. He holds 1 patents and 2 patents pending. He has published 20 over papers, he is a member of ACS, VDI and EOS, SPIE.