



**ADVANCED EMBEDDED PASSIVES TECHNOLOGY
AEPT PROJECT REPORT**

The National Center for Manufacturing Sciences' AEPT Consortium has developed the ideal model for combining materials, design and processing technologies for embedding passive devices (capacitors and resistors) into large format circuit board substrates. These advanced embedded passives technologies will enable microelectronics manufacturers to economically attain significant performance improvements, reductions in space requirements, and reliability improvement in circuit boards. The breakthrough findings are the result of a collaborative research project spearheaded by NCMS and co-funded by the industry partners along with National Institute of Standards and Technology, Advanced Technology Program (NIST ATP).

The scope of the AEPT Program focused on developing the materials, design, and processing technology for embedding passive devices into circuit board substrates. Current passive device technology supports a signal of 1 GHz. This program targeted frequencies of 1–10 GHz by using embedded passives to maintain signal integrity, enabling significant improvement in data transmission rates. Key innovations include new materials that better fit the application domain along with the process and design accommodations needed to use these materials.

Embedded passives are seen as a key enabling technology in the National Electronics Manufacturing Initiative (NEMI) Roadmap. The technology developed in this program will translate to a variety of other applications because of the expanded performance at high speed, improved reliability, reduced area requirements, and potential for lower system cost.

The 329-page final report presents the newly developed materials, design, and processing technology for embedding passive devices into circuit board substrates. The document includes many charts, tables, and photographs, many in color.

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