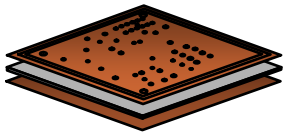


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Embedded Decoupling Capacitance: Final Report



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Final Report of NCMS Project No. 160213

Recognizing the value of a collective solution, a consortium of more than a dozen partners organized a collaborative effort to advance the use of embedded capacitance technology for power supply decoupling. The deliverables consisted of materials development and characterization and board fabrication process development. The processes enabled board manufacturers to fabricate the copper–dielectric–copper core and to embed it into an FR-4-type circuit board. The two copper layers were patterned as needed to form the power and ground planes. The dielectric layer, by a combination of high dielectric constant and low thickness, provides more capacitance between the power and ground planes than does FR-4. Materials characterization included capacitance as a function of temperature and frequency as well as electric field dependence, leakage current, and breakdown voltage. Noise suppression measurements included differential mode voltage measurement, common mode measurement of EMI field strength, and shoot-through current. The reliability of the board construction compared to FR-4 was also evaluated under exposure to a suite of environmental stresses. The final report presents the results of the tests to evaluate newly developed planar capacitance materials and fabrication processes; with numerous charts, tables, and photographs, many in color.

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