2002 NEMI Roadmap
Industry Trends & Implications

Trend	Implications
"System in package" (SiP) has emerged as the fastest growing packaging technology (although it still represents a relatively small percentage of unit volume). Modules such as Bluetooth, WiFi (wireless fidelity) and GSM (global system for mobile communication) are increasingly used in portable and office system products.	Shortens design cycle and increases flexibility. Reduces risk to OEM and system manufacturer. Allows flexible integration of features and functions; helps achieve size/weight reduction goals. Reduces barriers to market entry for start-up firms. Allows modular testing (rather than system testing).
Wireless networking is a primary volume driver.	Creates a business need for SiP. Makes SiP modules for RF a high-growth market.
Automotive electronics are also driving volume.	Creates new market opportunities. More emphasis on unique automotive requirements (environmental, reliability).
There is increasing convergence of broadband communication and digital technology (MP3, DVD, storage and digital cameras).	Increases product opportunities — can combine modules (cell phone, GPS unit and camera) to create new products. Creates marketing uncertainty — don't know what people want and what they will pay. Significant impact in hand-held products — can transmit and store a great deal of information.
Cost-effective broadband transmission is now the gating technology for the introduction of new products and solutions.	Where will wireless, optoelectronics, copper be used? People want *cost-effective* broadband capabilities. Creative solutions will impact trade-offs and change competitive landscape rapidly.
Implementation of optoelectronics has been stalled by the market downturn of the past two years.	Assembly processes and equipment are needed to support integration of electronics and optics into single packages. Improved optoelectronic subcomponents and materials that reduce cost will be key to expanding the market. Low-cost, high-volume optical connectors are needed to expand optical broadband communications to boards and components.
Environmental regulations will require manufacturers to track and share detailed material content data for all products and components.	Must develop and implement efficient methods for data exchange of environmental attributes. Development of standards for data format and transfer methods is critical. Requirements are not limited to electronic assemblies, but include cables and accessories as well.

continued

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Manufacturers are facing new end-of-life responsibilities.	Develop cost-effective infrastructure to recycle and reuse electronic equipment. Increase/improve DfE capabilities in order to eliminate additional costs at end of life. Develop lifecycle analysis tools to understand complex design trade-offs for creating products with minimal environmental impact (and associated cost).
Supply chain management continues to be the primary means for improving productivity.	Standards needed to improve integration of supply chain partners. Existing standards are not widely adopted. Augment data exchange standards to facilitate configure-to-order and design-for-postponement.
EMS providers are expanding capabilities to provide “cradle-to-grave” design, sourcing, manufacturing, fulfillment, repair and take-back services.	Offers opportunities for further supply chain efficiency. Shifts more R&D responsibilities to the EMS and their supply base.
New products and distributed design functions demand new design tools/capabilities.	DfX areas need greater attention. Co-design of mechanical, thermal, RF and electrical performance of entire chip, package and system is a key cross-cutting need. Increased capability to handle technologies such as microvia and embedded passives required. Improved communication between CAD designers and CAM users needed in distributed manufacturing and design environment. Simulation tools needed by 2005 for optoelectronics and nano-electronics.
Market downturn of past two years impacting expenditures for 3G cell phone implementation.	Multichip RF modules will be replaced by integrated RFICs in many portable communication products. Commoditizing RF functions will attract new entrants into the cell phone supplier market.
Organic LEDs (OLEDs) are emerging as alternatives for LCDs.	Allows potential for flexible displays and reel-to-reel processing. Potential for North American manufacturers to get a foothold in the display market.
The pace at which silicon technology generations are introduced has decelerated.	Fewer breakthrough products. Gives manufacturers the opportunity to wring cost from existing products, improve profitability (as seen in the mass data storage industry).
Demand for fuel cells and higher power batteries for hybrid vehicles is increasing.	May present an opportunity for North American manufacturing.
The extension of Moore’s Law beyond 2004 will require new packaging technologies to reduce cost.	Need more cost-effective packaging technology. Packaging can add value by taking on functionality (power distribution, power conditioning, signal integrity, etc.).