

EMERGING TECHNOLOGIES

A Presentation for MAJR Products
Corporation

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Emerging Technologies



Moller International
Davis, CA
www.moller.com

THE FUTURE IS HERE TODAY.

Emerging Technologies

- The Major Markets
 - Wireless
 - Automotive
 - Servers
 - Digital TV / iTV
 - Inflight Entertainment
 - ITE
 - Home Automation

Emerging Technologies

- Wireless
 - Continued, but slower growth rate anticipated
 - \$34 Billion worldwide by 2004 (Source: IDC)
 - WLAN
 - \$3.2 Billion by 2005 (Source: IDC)
 - Bluetooth vs. IEEE 802.11
 - 700 million devices by 2005 (Source: Cahners In-Stat Group)
 - Because of 2.4 GHz congestion, 5.8 GHz band will be next
 - Embedded antenna cannot be shielded
 - Components must be shielded or designed better

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- Wireless (cont.)
 - Mobile Office
 - Intranet access
 - Internet browsing
 - email access
 - Banking/finance
 - Information services
 - Instant messaging
 - Games, shopping, music, video, multimedia

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- Automotive
 - Satellite Radio (Broadband Services)
 - \$44.8 Billion (2 million terminals) by 2005 (Source: IDC)
 - Millimeter Wave
 - Anti-collision
 - 76-77 GHz today, but going up to 95 GHz and 125 GHz
 - Adaptive Cruise Control (ACC)
 - \$2 Billion in the next ten years (Source: IEEE Spectrum)
 - WLAN
 - “Speed pass”
 - Consumer Services
 - Buy music
 - Updated road conditions
 - Local maps

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- Servers
 - Slowdown in the market (Source: IDC)
 - United States -25%
 - Western Europe -8%
 - Japan -20%
 - Asia Pacific -3%
 - Canada -13%
 - Rest of the World -11%
 - However, companies are still continuing to develop 10, 40 Gigabyte interfaces as well as 100 Gigabyte

Emerging Technologies

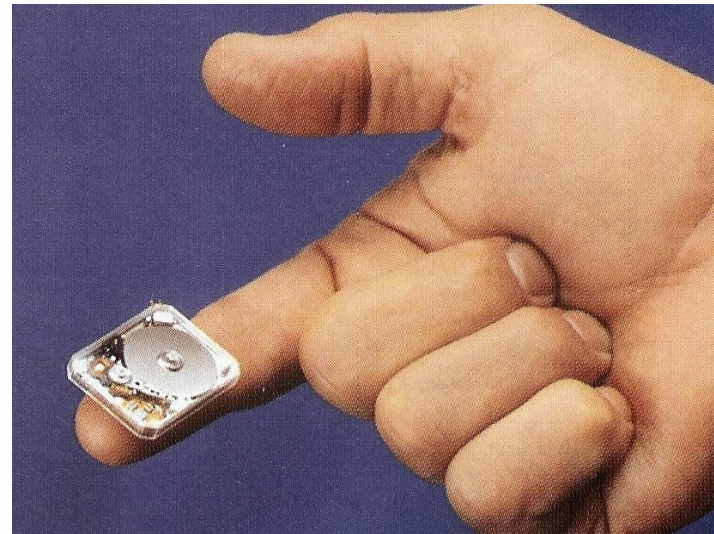
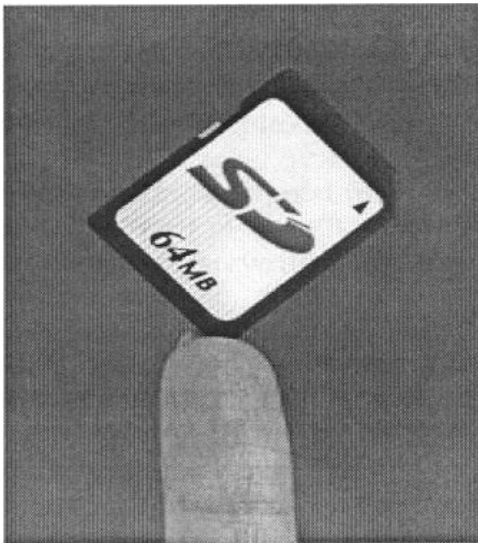
- Digital TV / iTV
 - Expect more and more convergence of broadcasting and communications
 - Consumer development to begin by 2003
 - MHP - Multimedia Home Platform
 - DVB - Digital Video Broadcasting
 - FCC is predicting transition to DTV by 2009

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- Inflight Entertainment
 - Now transforming into a security device
 - System is capable of transmitting not only flight data and conversation, but video as well
 - Internet
 - Satellite

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- ITE
 - Security products or devices
 - \$1.8 Billion in 2000 to \$6.2 Billion in 2005
 - Example: Smart cards
 - Memory Sticks
 - Secure Digital Memory - SD memory



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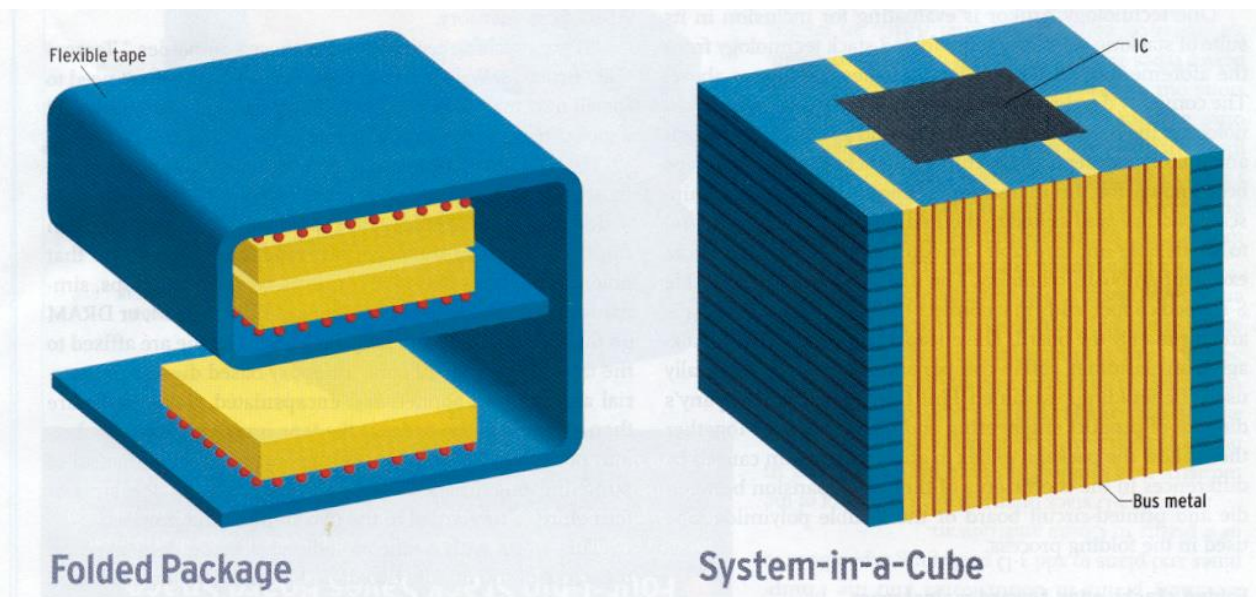
- ITE (cont.)
 - Applications will concentrate on cellular phones and wireless interfaces
 - Portable PC
 - Market will increase from \$8 Billion in 2000 to \$26.6 Billion in 2004 (Source: IDC)
 - “Pocket PC” by Microsoft
 - Blackberry
 - High speed processors running right next to sensitive receiver circuits (i.e. Bluetooth or WLAN)
 - Lower cost and more efficient EMI/EMC solutions will become even more critical

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- Home Automation
 - This will become the next big area within the next five years
 - Home gateways
 - Voice control
 - HAL : Home Automated Living
 - 3G cell phones
 - Portable PC's

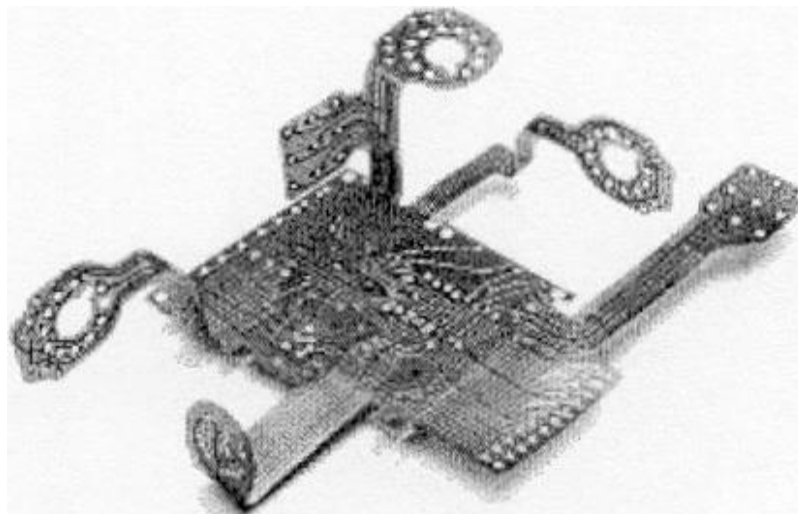
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- New Technologies
 - Nanotechnology & Quantum Computing
 - MEMS
 - As devices get smaller and smaller, packages will get smaller and smaller
 - Vertical stackup (i.e. “cube” packaging)



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- New Technologies (cont.)
 - Interconnectivity
 - High speed/density interconnect market will hit \$50 Billion by 2006
 - Vertical elastomer columns with compression contacts
 - Flexible Circuits
 - \$3 to \$3.3 Billion market in 2004
 - Elastomer and shielding technology



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- New Technologies (cont.)
 - Summary
 - Digital Conversion: VHS to DVD
Analog to HDTV
Radio to satellite
 - Portability
 - Balance of value with cost
 - Adaptability - Even the fashion world is adapting
 - Dockers
 - The Gap

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- Future of Shielding & Grounding
 - Portability
 - Smaller, thinner, and lighter (and cheaper!)
 - Higher frequency
 - RSFQ logic - 10 GHz to 800 GHz
 - Wavelength @ 100 GHz is 0.12 inches
 - “Rule of Thumb” is 1/20th to 1/50th : 3 to 6 mil
 - Rise/fall times of 10 picoseconds - f_C of 32 GHz
 - Resonance Effect
 - Reduce Q-factor of enclosures
 - Reduced radiated emission by 11 dB in a GBIC module
 - Skin Effect
 - Surface finish conductivity becomes critical
 - Minimum pressure

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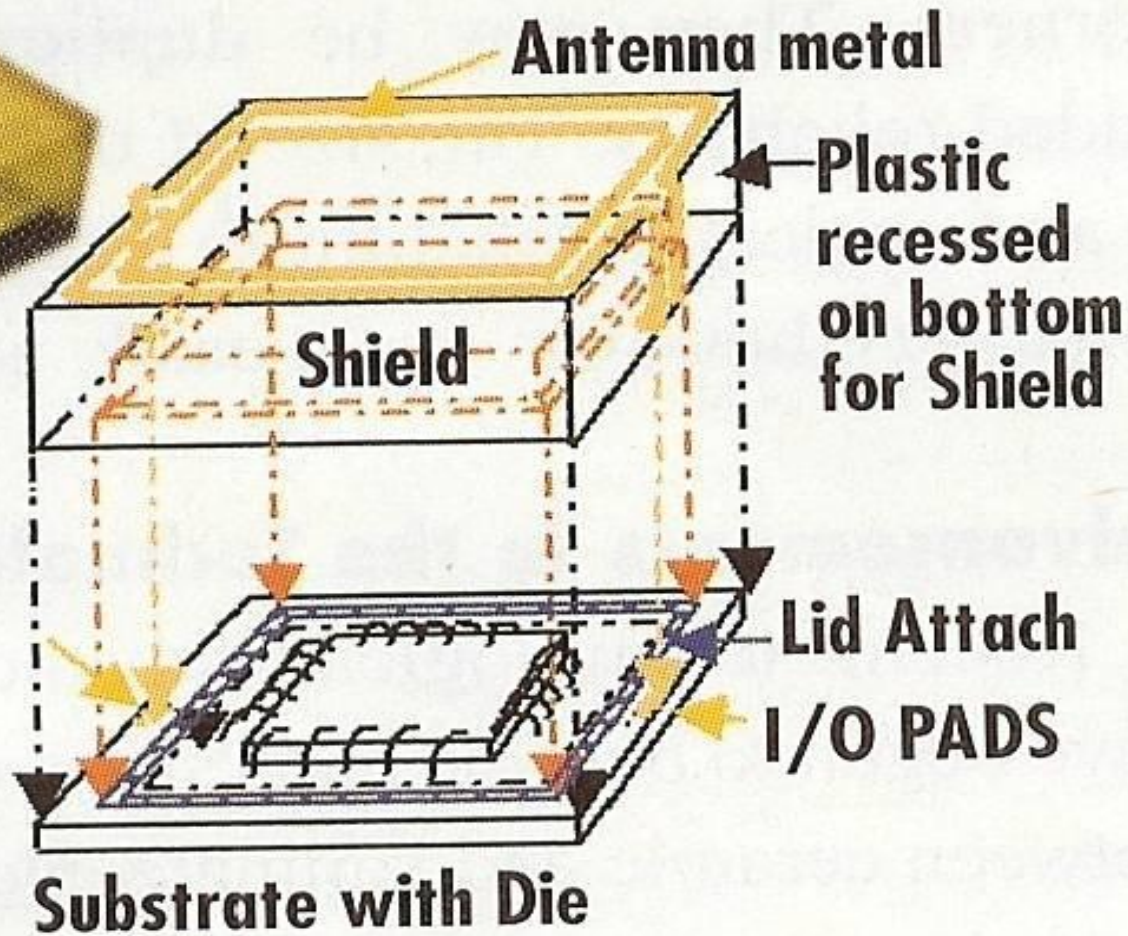
- Future of Shielding & Grounding (cont.)
 - Computer Simulation or Modeling
 - Merge with Thermal Management
 - Update design concepts
 - Alternative materials or approaches
 - Absorbers
 - Chiral
 - Multilayering techniques
 - Better conductive polymer or conductive plastic
 - Diffraction or scattering
 - Carbon Nanotube Technology

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- Ideas & Concepts
 - Innovative grounding techniques
 - Inexpensive card guide grounding
 - Grounding bars
 - Fiber transceivers
 - Heatsink grounding plate
 - Multilayer products
 - Absorber products
 - Flexible cable applications
 - Elastomer interconnects
 - Integrated shielding/thermal & case

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Bluetooth Module



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**DON'T TALK MACHINES,
TALK THE PROSPECT'S BUSINESS.**

-Thomas Watson Sr. 1914
IBM salesman

In other words, not what you can buy from me, but what
I can do to help you.

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INTELLIGENCE IS NOT TO MAKE NO MISTAKES.

BUT QUICKLY TO SEE HOW TO

MAKE THEM GOOD.

-Bertolt Brecht 1930

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**It's not how many ideas you
have, it's how many you make
happen.**