SiP and Module Definitions
SiP is an assembly of 2 or more semiconductor devices (IC and or Discrete chips or packaged devices) with passive components or integrated passive devices (IPD) into a standard package format to complete a sub-system functional block. A SiP is typically surface mounted onto system printed circuit board assemblies in an LGA, BGA or leadless chip carrier format.

Modules or MCM also contain a mix of semiconductor and passive devices, both in standard (card) or custom formats, often including a card edge or mounted connector. Memory cards and USB drives are examples of standard modules UTAC assembles and tests.

Note: UTAC offers many standard packages (leadframe, laminate and ceramic based) that contain multiple chips either side by side or stacked but do not require the level of co-design, assembly and test typical in a SiP or module. Examples of these multi-chip package (MCP) solutions include: stacked memory die in a FBGA, analog / mixed signal die in a SOIC, QFP or QFN, MEMS / MCU in a QFN.

Advantages
• System miniaturization through package sub-system integration form factor benefits.
• Electrical performance optimization through short interconnects and well characterized component integration that facilitate system design.
  • EMI / RFI shielding is an option for SiP or modules which can include isolation between RF and digital sections of a SiP or module.
• Thermal performance optimization through integration of established package design, assembly and materials technologies that can provide 2 sided chip cooling and engineered management of die hot spots.
• Mechanical performance optimization leveraging established package thermal cycle and shock data, material properties and finite element modeling simulation capabilities.
• System design optimization and time to market benefits through well characterized SiP or module performance data that enable plug / play and bill of material reduction / management.

UTAC SiP / Module Solutions
• Laminate based LGA or BGA
• Leadless leadframe TLA, QFN or GQFN (array options)
• Power management solutions
• Memory, Multimedia cards and USB drive
• Smart / IC cards including security for payment or ID
• Touch chip fingerprint sensors

UTAC Capabilities Summary
• Wirebond (Au, PdCu, AuPdCu, Ag), flip chip and SMT assembly
• EMI / RFI shielding
• Extremely thin configurations and mold caps
• Thick mold caps for large components (inductors)
• Film assist molding for exposed die (thermal management or sensor solutions)
• Connector and coin battery integration
• Co-design and simulation
• Turnkey assembly and test services
SiP and Module Design to Qualification Flow

1. Package Design
   - Design from customer netlist and eBOM
   - Package stackup
   - Design Tool (UPD, APD, CAM 350, AutoCAD...etc)
   - Customer requirements to design rule check

2. Design Feasibility Study (DFS) & Simulation
   - DFS report + Risk assessment
   - Package Simulations (Thermal/Electrical/Mechanical)
   - DFMEA

3. Process Characterization
   - Process flow characterization
   - Parameter Characterization
   - DOE optimization
   - Failure Analysis

4. Validation
   - Process and parameter ready
   - Confirmation Run
   - Pre-Qual lot
   - Reliability Study
   - Failure Analysis

5. Qualification
   - Assembly Report
   - Reliability Report
   - MSL test, Stress test

Note:
UTAC SiP and Module solutions are constructed with standard or customer specified materials. www.utacgroup.com
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