ADVANCED PACKAGING

YOUR GO TO PARTNER FOR COMPLEX CO-DEVELOPMENT

PACKAGING THE FUTURE TODAY

www.ibm.com/assembly
COMPLETE DESIGN FOR SYSTEM OPTIMISATION, MANUFACTURING, DIAGNOSTICS AND TESTS

- Design for test
- Enhanced wafer test coverage
- Test in assembly flow
- On demand rework capability
- Yield management

LAMINATE DESIGN FOR SPECIALITY APPLICATIONS
FORM FACTOR FLEXIBILITY

- High performance computing
- Networking (satellite, antenna, optical, RF, 5G)
- ASICs

Advanced ground rules
- Chip to capacitor < 1 mm
- Chip to laminate edge 0.7 mm
- Chip to chip 0.2 mm
- Capacitor to capacitor 0.16 mm (0201)

MATERIAL SET AND DESIGN

- High power and high performance
- Assembly approach supporting but not limited to 400A-400W
- Ground rules for proven reliability

Comparative signal losses at 28 GHz

<table>
<thead>
<tr>
<th></th>
<th>Losses (dB/mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial High End</td>
<td>-0.15</td>
</tr>
<tr>
<td>IBM Current Node</td>
<td>-0.10</td>
</tr>
<tr>
<td>IBM Advanced Solution</td>
<td>-0.08</td>
</tr>
</tbody>
</table>

* Best practice and roadmap (40% improvement)

HETEROGENEOUS INTEGRATION

- High complexity SiP
- Varied and very densely mounted components
- Modularity for cost saving
- Chip partitioning
- All chips nodes from any foundries

MONTHLY BONDLINE DATA

EFFECTIVE THERMAL AND WARPAGE SOLUTION