Panel Fan-Out Manufacturing: Why, When and How

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Goals to Reach

● System Integration KPIs

- Performance
  - BW, Fmax
  - Functionality

- Cost
  - Material, flow
  - Overall Yield

- Power
  - Efficiency
  - Thermal, $T_j$

- Reliability
  - EM, SM, TDDB
  - CPI, CPBI

- Profile
  - Footprint
  - Thickness

● Mutual leverage of company core business
Cost and Target Market

● **Target products:**
  ✓ Low-end, low pin-count and small size products. PLP can leverage PCB/LCD tool/capacity. TBD. WLP HVM proven. Tools/capacity being depreciated.
  ✓ High performance, high density applications PLP need both new tool and new tech. TBD. WLP HVM proven. Leverage front-end infrastructures

● **Cost:**
  ✓ Size dependency of tools and materials
  ✓ Total Yield more critical (expensive KGD/KGP)
  ✓ Economics of scale: manufacturing vs. market size
  ✓ Return of Invested Capex (ROIC). Risk management
  ✓ FO-PLP a new, potentially lower cost solution
System Scaling Needs

- More functions, higher packing densities...
- Opportunities and challenges for post Moore's era.

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<thead>
<tr>
<th>Year</th>
<th>Functions</th>
<th>Size, Cost</th>
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<tbody>
<tr>
<td>2017</td>
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<td>2018</td>
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<td>2019</td>
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... and beyond
Wafer Level and Panel Level

Big Sales
HVM, Wide Adoption
High Performance, Low Power

Big Sizes
HVM to be Proven
High Risk, High Potential

6”
8”
12” 300 mm

24” x 18”
610 x 457 mm²