Chiplet Design Exchange

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1- Chiplet Machine Readable Description Standard Generation
2- Chiplet Catalog
3- Pchipllet-based SDV to Chiplet-based package conversion flow

CDX Subgroup Charter

Software Dev Vehicle (SDV) PCB

CDX Chiplet Catalog

CDX Inputs & Flow

Packaged Part
Outline

Background: The Case for Chiplet Design Exchange (CDX)

Survey Results

Proposed CDX Spec/Whitepaper Overview

ZEF Extension

How to Participate.

Call to Action
Chiplet Selection

Designer need a number of design collaterals to make a choice of components for a given application and to complete a design. These include at minimum:
- Product Briefs
- Data Sheets
- PCB/Substrate Design Resources

With complicated chips, traditional PCB type design flows are limiting and will not easily scale. Also there are too many ways to describe chiplets.

Chiplet Design Data Exchange

There is no one standard way to express basic information: A standard format should be simple and usable across different tools
• Design Entry tools
• Layout tools
• Simulators (PI/SI, Thermal, Behavioral)
• Test

BUT There is a question of what info people are willing to share. Hence we did a survey.
Survey Question Overview

1. I can share what my chiplet’s function is (i.e. a high-level description of what the chip does):
2. I can share the number and value of voltage rails:
3. I can share pin-by-pin functional information (i.e. EC table / AbsMax):
4. I can share the size (X and Y dimensions) of my chiplet:
5. I can share bump physicals (pitch, location, thickness, and tolerances) of my chiplet:
6. I can share height (Z dimension) of my chiplet:
7. I can share a heat map of my chiplet:
8. I can share what mechanisms I provide to test for chip functionality prior to assembly:
9. I can share what mechanisms I provide to test for chip functionality post assembly:
10. I can share my business model (wafer with known good die map vs. individual die or other):

   a) As public information
   b) Through a tool with a standard agreement in place
   c) Directly with an interested company with a two-way NDA in place
   d) I cannot share this information
Survey Respondents: An Overview

- 25 responses
- 20 familiar with ODSA or chiplets, 4 familiar with chips, 1 not familiar
- 11 chiplet vendors
- 9 chiplet purchasers
- Job functions:

<table>
<thead>
<tr>
<th>Job Function</th>
<th>Count</th>
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<tbody>
<tr>
<td>Architect</td>
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<td>Executive Management</td>
<td>5</td>
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<td>Business Development and Marketing</td>
<td>3</td>
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<td>Hardware Engineer</td>
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<tr>
<td>Mechanical Engineer</td>
<td>2</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>2</td>
</tr>
</tbody>
</table>

- "Architects"
- "Exec Mgmt, BD, & Mktg"
- "Engineers"
Survey Results: An Overview

ODSA Survey Response Overview

- Green: As public information
- Blue: Through a tool with a standard agreement in place
- Orange: Directly with an interested company with a two-way NDA in place
- Red: I cannot share this information

Question

- Chipset function
- Voltage rails
- Pin functional info
- X and Y dimensions
- Bump physicals
- Z dimension
- Heat map
- Pre-assembly test function
- Post assembly test function
- Business model

Number of responses
Survey Results: Engineers

ODSA Survey Responses - from Engineers

- Green: As public information
- Blue: Through a tool with a standard agreement in place
- Orange: Directly with an interested company with a two-way NDA in place
- Red: I cannot share this information

Questions include:
- Object function
- Voltage rails
- Pin functional info
- X and Y dimensions
- Run-up physicals
- Z dimension
- Heat map
- Pre-assembly test function
- Post-assembly test function
- Business model

Number of responses
Survey Results: Architects

ODSA Survey Responses - from Architects

- As public information
- Through a tool with a standard agreement in place
- Directly with an interested company with a two-way NDA in place
- I cannot share this information

Number of responses

- Chiplet function
- Voltage rails
- Pin functional info
- X and Y dimensions
- Bump physics
- Z dimension
- Heat map
- Pre-assembly test function
- Post-assembly test function
- Business model

Question
Survey Results: Execs, BD & Mktg

ODSA Survey Responses - from Execs, BD & Marketing

- Green: As public information
- Blue: Through a tool with a standard agreement in place
- Orange: Directly with an interested company with a two-way NDA in place
- Red: I cannot share this information

Questions and Number of Responses:
- Chip set function
- Voltage rails
- Pin functional info
- X and Y dimensions
- Bump physicals
- Z dimension
- Heat map
- Pre-assembly test functional
- Post-assembly test functional
- Business model

Open. Together.
Conclusions from the Survey

Executives and Business Developers indicate the need for Chiplet sharing mechanism.

Architects are willing to share information under NDAs.

We believe the opinion of the segment coded in red will transition to blue or green as business thinking develops and business need arises. CDX effort will help with that transition.
Chiplet Design Exchange Design Process
Chiplet Data Exchange Service

Chiplet ZEF Library

- Chiplet A ZEF Files
  - Mechanical Data
  - IO and Bump Map Data
  - Electrical Data
  - Architectural Data

- Chiplet N ZEF Files
  - Mechanical Data
  - IO and Bump Map Data
  - Electrical Data
  - Architectural Data

- Through a tool with a standard agreement in place
- Directly with an interested company with a two-way NDA in place
The Data to be provided in a CSV format with a number of standardized variable names;

For Example Try Reading the following Chiplet

\[
x \quad y \quad z \\
1280 \quad 1790 \quad 520
\]

A More Complete Mechanical:
Reference, Part_value, MPN, Order_Number, Container, Pieces_per_unit, Name, Pkg_type, Pkg_IPC_code, SMT_compatible, Width_x, Width_tolerance, Length_y, Length_tolerance, Thickness_z, Thickness_tolerance, Count_IO, Bump_pitch, Bump_pitch_tol, Bump_dia, Bump_dia_tol, Bump_thickness, Bump_thickness_tol, Bump_material, Mold Material, Reflow Profile

More details at https://github.com/zglue/ZEF
A specification and white paper for CDX effort is being worked on.

Draft 0.1 has been published to the group member.

Trying to ratify access control mechanism for data sharing

Once a week online meeting of participants

Current participants include zGlue, Ayar Labs, Sarcina, Cadence, AveraSemi, ASE, Netronome

Looking for Volunteers
Send an email to jawad@zglue.com for participation
https://www.opencompute.org/wiki/Server/ODSA
Next Steps and Call to Action

• Join Us. Looking for EDA, OSAT, Design Service, Chiplet Vendor, Distributor participation.
• Define a flow for PCB to Package conversion
• Setup a CDX service of your own
• List your Chiplets
• Share your requirements and wishlist for Chiplets

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Backup
Open. Together.

OCP Regional Summit
26–27, September, 2019