cādence[®]

Export DIE abstract (XDA) from Virtuoso for use with SiP Layout and OrbitIO

Application Note

Product Version IC6.1.7 October 2018

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Purpose

After going through this application note you will be able to export DIE data from IC(Virtuoso) to Cadence Chip packaging tool (SiP and OrbitIO).

This also covers what are the associated files generated and use of them in exporting the DIE data.

Audience

Virtuoso Layout Engineers

IC packaging engineers

Chip Leads

Product Engineers

Terms

| OA | Open Access | | | |
|---------------------------|---------------------------------|--|--|--|
| VLS Virtuoso Layout Suite | | | | |
| VLE | Virtuoso Layout Editor | | | |
| РСВ | Printer Circuit Board | | | |
| PKG IC Package Substrate | | | | |
| RMB | Right Mouse Button | | | |
| XDA | Die Abstract File in XML Format | | | |
| RDL | Redistribution Layer | | | |
| VSDP | Virtuoso System Design Packager | | | |
| SiP | System in Package | | | |

Overview

Virtuoso has ability to export the DIE data generated in a single file. This file is known as **DIE abstract** with file extension .XDA (XML DIE Abstract).

Cadence PACKAGING tools has now ability to import this file which brings the complete DIE data. This eliminates the need for own developed automation methods of exchanging die data.

VSDP license feature number 95441 is required for exporting the DIE information.

NOTE: The scope of this document is to cover the views which are generated for Cadence packaging Tool. When you export DIE, there are other views generated for package schematic.

Read Application Note on https://support.cadence.com VSE Views overview

What is **DIE Abstract**

Cadence has developed die abstract to simplify the exchange of die information between Virtuoso and Cadence packager tool like Sip and OrbitIO. The intent of the die abstract is to contain in a single file the basic information to describe a die when it is referenced in the context of another die or package.

DIE abstract contains the following information

- Basic Layer information
- Library information
- Netlist
- Floorplan

Read Application Note on <u>https://support.cadence.com</u> that covers in detail about what all information goes in above heads

Die Abstract: Exchanging Die Information

How to generate DIE Data

Open Virtuoso with the help of below command from UNIX shell terminal.

UNIX> virtuoso -sdp

To generate the DIE data, we need to enable the SDP menu in Virtuoso menu bar.

Click on Launch > SDP. It adds the SDP menu toolbar



Fig1

Watch Video on <u>https://support.cadence.com</u> that demostrates the detail steps of exporting the DIE data from Virtuoso.

Export DIE Abstract from Virtuoso

Views and files are generated for Cadence packaging tools

Suppose you are generating DIE data from layout view as shown.

| Library Manager: Directory/IC617_DIE_abstract_generation _ D x | | | | | |
|--|--------------------|---|----------------|--|--|
| <u>File Edit View D</u> esign Manager <u>H</u> elp | | | cādence | | |
| Show Categories Show Files | | | | | |
| Library | Cell | | View | | |
| 7 | ▼ ▼ ▼ | | 7 | | |
| Ba MACROUB | ▼ b A_flipchip_VFP | - | layout 🗸 | | |
| MACROUB | A_flipchip_VFP | | View Lock Size | | |
| | | | layout 123k | | |
| | | | | | |
| Fig2 | | | | | |

Open "Export Die" form (SDP > Export Die). "Footprint Symbol" of "Export Die" form tab generates the required files for packaging tools.

| | Export D | ie | | ; |
|--|----------------------|------------------|-------------------|-------------------|
| Die Configuration Pin Configurat | ion Footprint Symbol | Schematic Symbol | CDF Parameters | 1 |
| 🗹 Create Output Files | | | | ~ |
| 1 | | Generates outp | out files for Sip | 4 |
| Footprint Symbol Name | a_flipchip_vfp | | | |
| Footprint Symbol Location | ./symbols | 2 | Browse | |
| 3 Die Text File Name | ./sip_A_flipchip_ | VFP.txt | Browse | |
| Die Abstract View Name | die_abstract | 4 | | |
| Library For New Macros | coDesign_Lib | | | |
| Area Transfer | | | | |
| Package Substrate File | | | Browse | |
| Area Transfer Rules File | | | Browse | |
| Rules Editor | | | | |
| Pad Use Existing Library Pad Create/Use Automatically F Create New Name Assign Pads | rom Pin Shapes 5 | oldiga_500x630 - | | |
| Use Virtuoso Roor Plan Setting | Use F | reserved Data | Show Preview | ≥ <u>t</u> elp |
| | Fia3 | | | |

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| S.No. | | Form Fields |
|-------|---------------------------|---|
| 1 | Footprint Symbol Name | Specifies footprint symbol to be generated- |
| | | "a_flipchip_vfp.dra" and "a_flipchip_vfp.psm" |
| 2 | Footprint Symbol location | *.dra and *.psm generated at ./symbol directory as |
| | | marked above |
| 3 | File Text File Name | File "sip_A_flipchip_vfp.txt" captures pin name, |
| | | number, XY location netname, Padstack, Rotation. |
| 4 | Die Abstract View Name | File "A_flipchip_VFP.xda" is generated which can be |
| | | imported by packager tools. |
| 5 | Pad | It dumps the pad information from pin shapes. |

Exporting the DIE data, generates views (see **Fig4**) and filed under directories (see **Fig5** to **Fig8**).

| 😡 Library Manago | er: Directory/IC617_DIE_abstract_generation | | | _ = × |
|--|---|-----|-------------------|---------|
| <u>File E</u> dit <u>V</u> iew <u>D</u> esign Manager <u>H</u> elp | | | | cādence |
| Show Categories Show Files | | | | |
| Library | Cell | Vi | ew | |
| ۲ . | · 🛛 - | · 🛛 | 7 | |
| MACROUB | ▼ 🗟 A_flipchip_VFP | · B | 8 | • |
| MACROUB | A_flipchip_VFP | | View 🗠 | Lock |
| | | II- | abstract | |
| | | II: | die_footprint | |
| | | | footprint_preview | |
| | | 1 | ayout | |
| | | | symbol | |

Cadence default view-name generated (with Export Die form default option)

| View | Files | Available at |
|--------------------|--------------------|--|
| Abstract layout.oa | | <working_directoy>/MACROLB/A_flipchip_VFP/abstract</working_directoy> |
| die_abstract | A_flipchip_VFP.xda | <working_directoy>/MACROLB/A_flipchip_VFP/die_abstract</working_directoy> |
| die_footprint | Netlist.oa | <working_directoy>/MACROLB/ A_flipchip_VFP/die_footprint</working_directoy> |
| footprint_preview | a_flipchip_VFP.dra | <working_directoy>/MACROLB/A_flipchip_VFP/footprint_preview</working_directoy> |
| symbol | Symbol.oa | <working_directoy>/MACROLB/A_flipchip_VFP/symbol</working_directoy> |

Abstract:

An abstract is a high-level representation of a layout view and it contains information about the type, size and position of pins or terminals. Generated files under abstract view

noi-ankgupta:[/export/home/ankgupta/DIE_Export/MACROLIB/A_flipchip_VFP/abstract]% ls -la total 180 drwxr-xr-x 2 ankgupta cadence1 4096 Sep 18 20:23 ./ drwxr-xr-x 7 ankgupta cadence1 4096 Sep 18 20:23 ../ -rw-r--r-- 1 ankgupta cadence1 167052 Sep 18 20:23 layout.oa -rw-r--r-- 1 ankgupta cadence1 38 Sep 18 20:23 master.tag -rw-r--r-- 1 ankgupta cadence1 1807 Sep 18 20:23 thumbnail_128x128.png noi-ankgupta:[/export/home/ankgupta/DIE_Export/MACROLIB/A_flipchip_VFP/abstract]% [

Fig5

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die_abstract:

An XML version of DIE detailed data.

| [] /export/home/ankgupta/backup/Video_Project/VSDP_Die_eXPORT/IC617_DIE_abstract_g |
|--|
| File <u>H</u> elp |
| |
| xml version="1.0" encoding="UTF-8" ? |
| <pre><dieabstract <="" pre="" xmlns="http://www.cadence.com/dieAbs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"></dieabstract></pre> |
| <schemaversion>4.0</schemaversion> |
| <date>Wed Sep 19 20:35:39 2018</date> |
| <application>virtuoso</application> |
| <user>ankgupta</user> |
| <dbunits>2000</dbunits> |
| <celllibrary></celllibrary> |
| <layer>METAL6</layer> |
| <r0side>R0</r0side> |
| <sites></sites> |
| <site></site> |
| <name> pad</name> |
| <size>40 492000</size> |
| <symmetry>X Y R90</symmetry> |
| |
| <site></site> |
| <name>corner</name> |
| <st7f>492000 492000</st7f> |
| <pre>SYMPTRY>X Y R96</pre> /SYMPTRY> |
| |

Fig6

DIE abstract file is generated with *.xda name like A_flipchip_VFP.xda

noi-ankgupta:[/export/home/ankgupta/DIE_Export/MACROLIB/A_flipchip_VFP/die_abstract]% ls -la total 1168 drwxr-xr-x 2 ankgupta cadencel 4096 Sep 18 20:23 ./ drwxr-xr-x 7 ankgupta cadencel 4096 Sep 18 20:23 ../ -rw-r--r- 1 ankgupta cadencel 1182479 Sep 18 20:23 A_flipchip_VFP.xda -rw-r--r- 1 ankgupta cadencel 18 Sep 18 20:23 master.tag

die_footprint:

This information is used for creating the physical layout for SiP, in SiP Layout

noi-ankgupta:[/export/home/ankgupta/DIE_Export/MACROLIB/A_flipchip_VFP/die_footprint]% ls -la total 72 drwxr-xr-x 2 ankgupta cadencel 4096 Sep 18 20:23 ./ drwxr-xr-x 7 ankgupta cadencel 4096 Sep 18 20:23 ../ -rw-r--r- 1 ankgupta cadencel 39 Sep 18 20:23 master.tag -rw-r--r- 1 ankgupta cadencel 60644 Sep 18 20:23 netlist.oa

Fig8



Fig9

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footprint_preview:

SiP reads the .dra file which generates during exporting DIE data.

noi-ankgupta:[/export/home/ankgupta/DIE_Export/MACROLIB/A_flipchip_VFP/footprint_preview]% ls -la total 20 drwxr-xr-x 2 ankgupta cadencel 4096 Sep 19 16:04 ./ drwxr-xr-x 8 ankgupta cadencel 4096 Sep 19 16:04 ./ lrwxrwxrwx 1 ankgupta cadencel 115 Sep 19 16:04 a_flipchip_vfp.dra -rw-r--r-- 1 ankgupta cadencel 18 Sep 19 16:04 thumbnail 128x128.png

Fig10

To view the footprint, it needs the cdnsip editor.



symbols:

A symbol view generated from Die Layout or Schematic depending upon the option during Export -Die

| | QUESTION(SIP-1067) | × |
|----------------|--|-----|
| Schematic view | is not present for creating symbol. Do you want to create the symbol from the layout instead? \odot Yes \bigcirc No | |
| | <u>O</u> K <u>C</u> ancel <u>H</u> e | alp |

Fig12

| noi-ankgupta:[| /export/ | /home/ankg | upta/D | DIE_E | Ехро | ort/MACROLIB/A_flipchip_VFP/symbol]% ls -la |
|----------------|----------|------------|--------|-------|------|---|
| total 104 | | | | | | |
| drwxr-xr-x 2 a | ankgupta | cadence1 | 4096 | Sep | 18 | 20:23 ./ |
| drwxr-xr-x 7 a | ankgupta | cadence1 | 4096 | Sep | 18 | 20:23/ |
| -rw-rr 1 a | ankgupta | cadence1 | 38 | Sep | 18 | 20:23 master.tag |
| -rw-rr 1 a | ankgupta | cadence1 | 87852 | Sep | 18 | 20:23 symbol.oa |
| -rw-rr 1 a | ankgupta | cadence1 | 612 | Sep | 18 | 20:23 thumbnail 128x128.png |

Summary

DIE abstract is the common DIE data file which virtuoso can export, and packager tool can read in. It improves the design chain communication and verification of DIE in design and DIE on Package.

References

Exporting a DIE abstract from Virtuoso IC617

Virtuoso System Design Platform User Guide

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