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Introduction

GDSII is a database file format which is the de facto industry standard for data exchange of integrated circuit or IC layout artwork.

In ANSYS Chip Signal Modeling (CSM), especially RH based die extraction and interposer extraction flow, the import data format is def/lef. CSM provides a GDS conversion toolkit to import a physical design. This toolkit converts a GDS design or cell to def/lef format.

This application note describes the GDS conversion toolkit usage.

GUI Overview

Open GDS conversion toolkit

To start the process, click Tools and then click GDS Conversion in the drop-down menu. In the Configuration tab of the dialog box that appears, specify the information needed for the conversion. When ready, click **Save** to preserve the configuration information in the output folder and then click **Convert** to run the conversion. To see a report as the conversion progresses, click the **Message** tab.

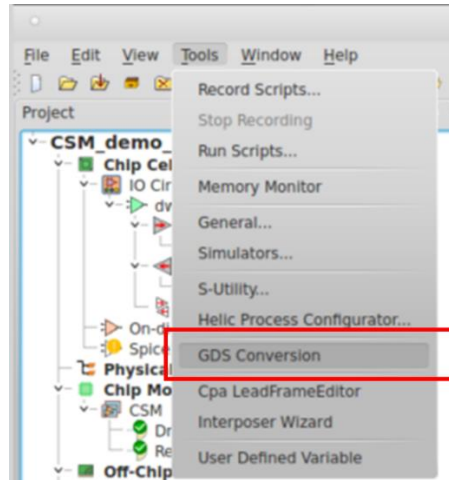


Figure 1– Open GDS Conversion from Tools Menu

GDS conversion GUI

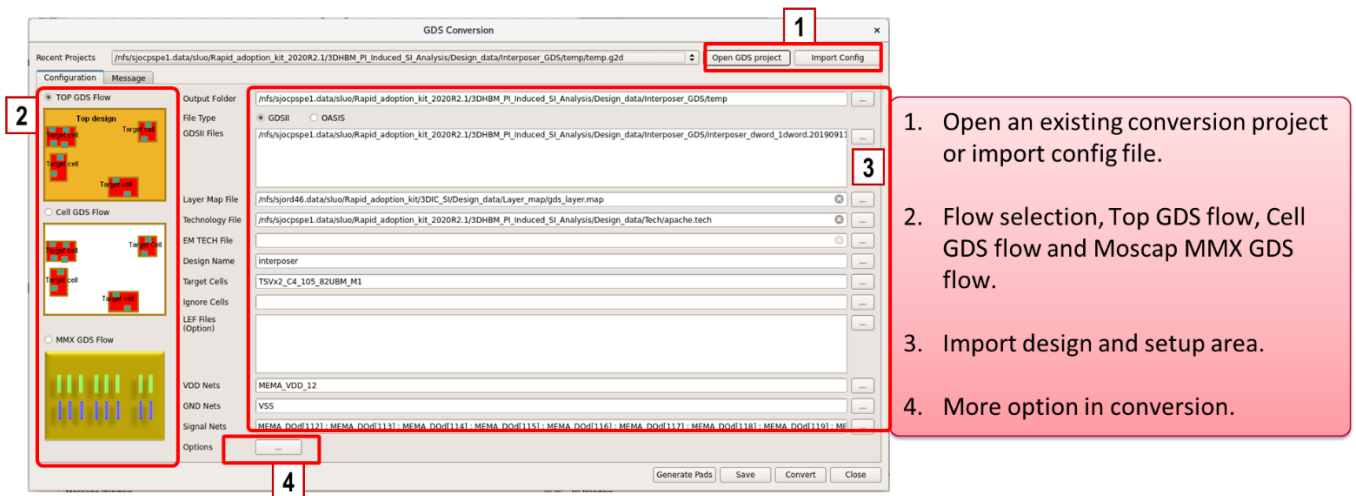


Figure 2– GDS Conversion GUI

Conversion Engine

Top GDS flow and **Cell GDS** flow will use **GDS2RH** as main engine, for some special options, will call GDS2DB or GDS2DEF engine.

MMX GDS flow will call **GDS2DB** as default engine.

TOP GDS Flow

Flow introduction

TOP GDS Flow is for the design lacks a top DEF but has a GDS file for the top design. Top GDS flow will use **GDS2RH** as default engine.

1. Give a “output folder” for conversion def/lef.
2. Import the GDS file need to be converted.
3. Import the layer map file.
4. Import the Apache tech file.

5. Optional, import EM tech file to define cap density if it is iCAP case.
6. Select the Top cell name as the design name.
7. Select the target cell from the cell list, the list is parsing from GDS file. Optional to ignore cell from the list, optional to import lef file.
8. Select the nets, PG nets and signal nets. i.e., in VDD net selection, in the left side of open dialog, double click to input the VDD net name. Similar flow for VSS net selection.
9. More advance GDS2RH options settings.
10. Conversion result will be in <Output folder>/lefdef/.

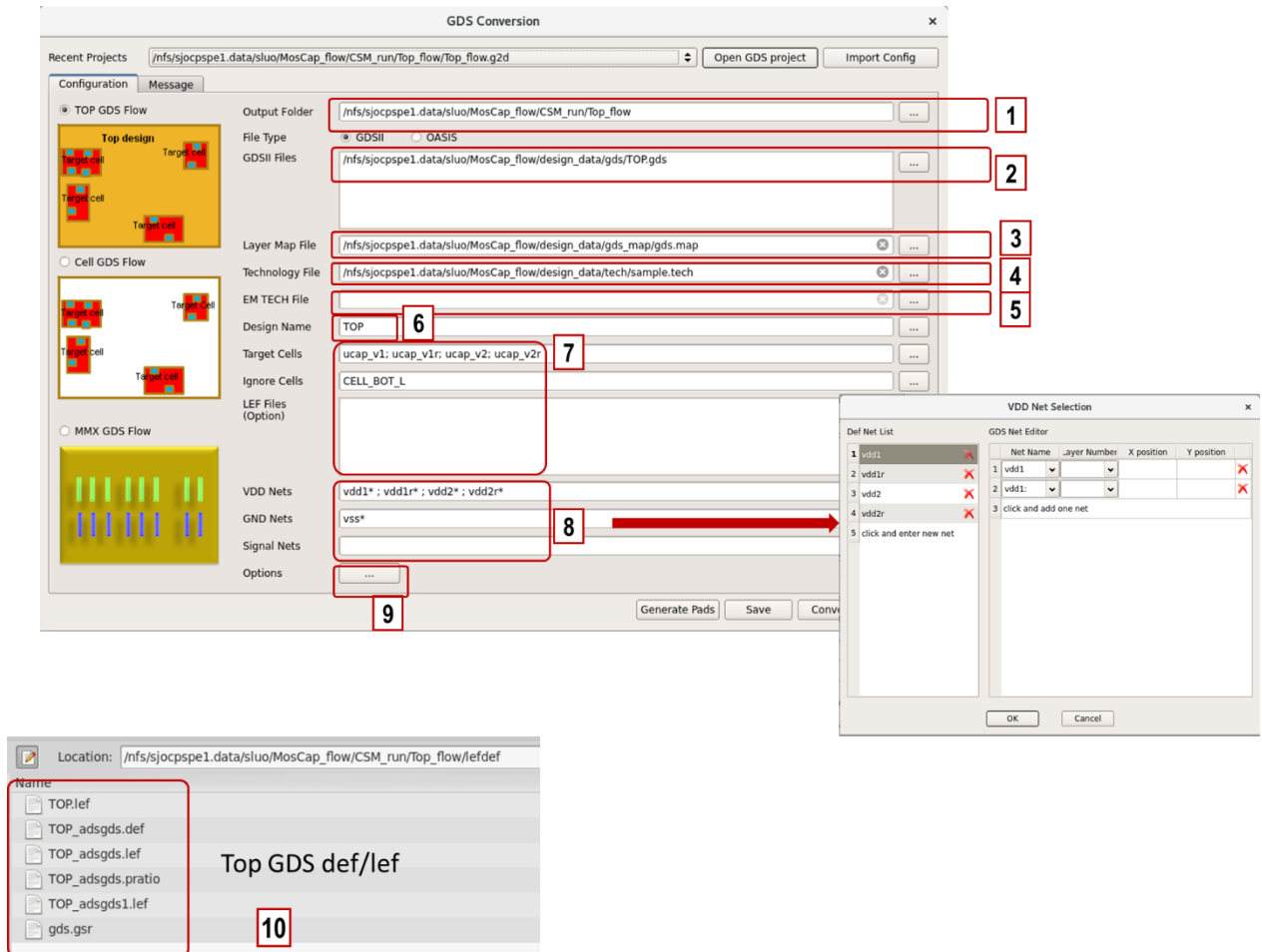


Figure 3– TOP GDS Flow GUI Settings

Special options

If the design has TSV, user can enable the TSV option in the **GDS Advance Option** dialog. When enable TSV, conversion engine will use **GDS2DB**.

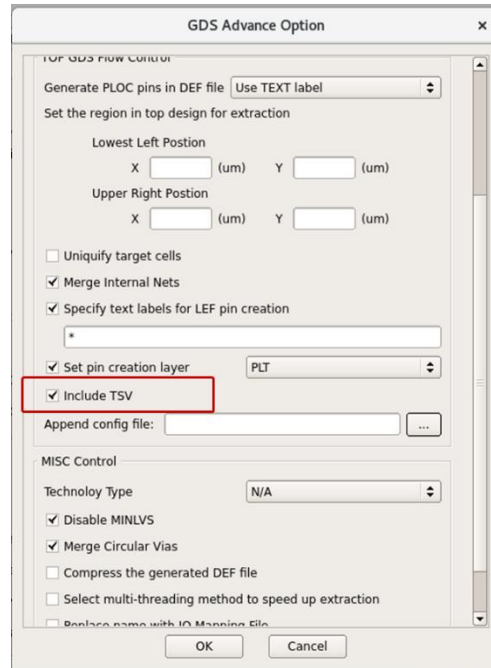


Figure 4 – TOP GDS Flow Special Setting for TSV

Cell GDS Flow

Flow introduction

Cell GDS Flow is for the design has a top DEF, but lacks internal geometry of some cells in the top DEF. This case requires GDS files of the cells. **Cell GDS** flow will use **GDS2RH** as default engine.

1. Give a “output folder” for conversion def/lef.
2. Import the GDS file need to be converted.
3. Import the layer map file.
4. Select the target cell from the cell list, the list is parsing from GDS file. Optional to ignore cell from the list, optional to import lef file.
5. Select the nets, PG nets and signal nets. i.e., in VDD net selection, in the left side of open dialog, double click to input the VDD net name. Similar flow for VSS net selection.
6. More advance GDS2RH options settings.
7. Conversion result will be in <Output folder>/lefdef/. Each target cell will have a corresponding def/lef files.

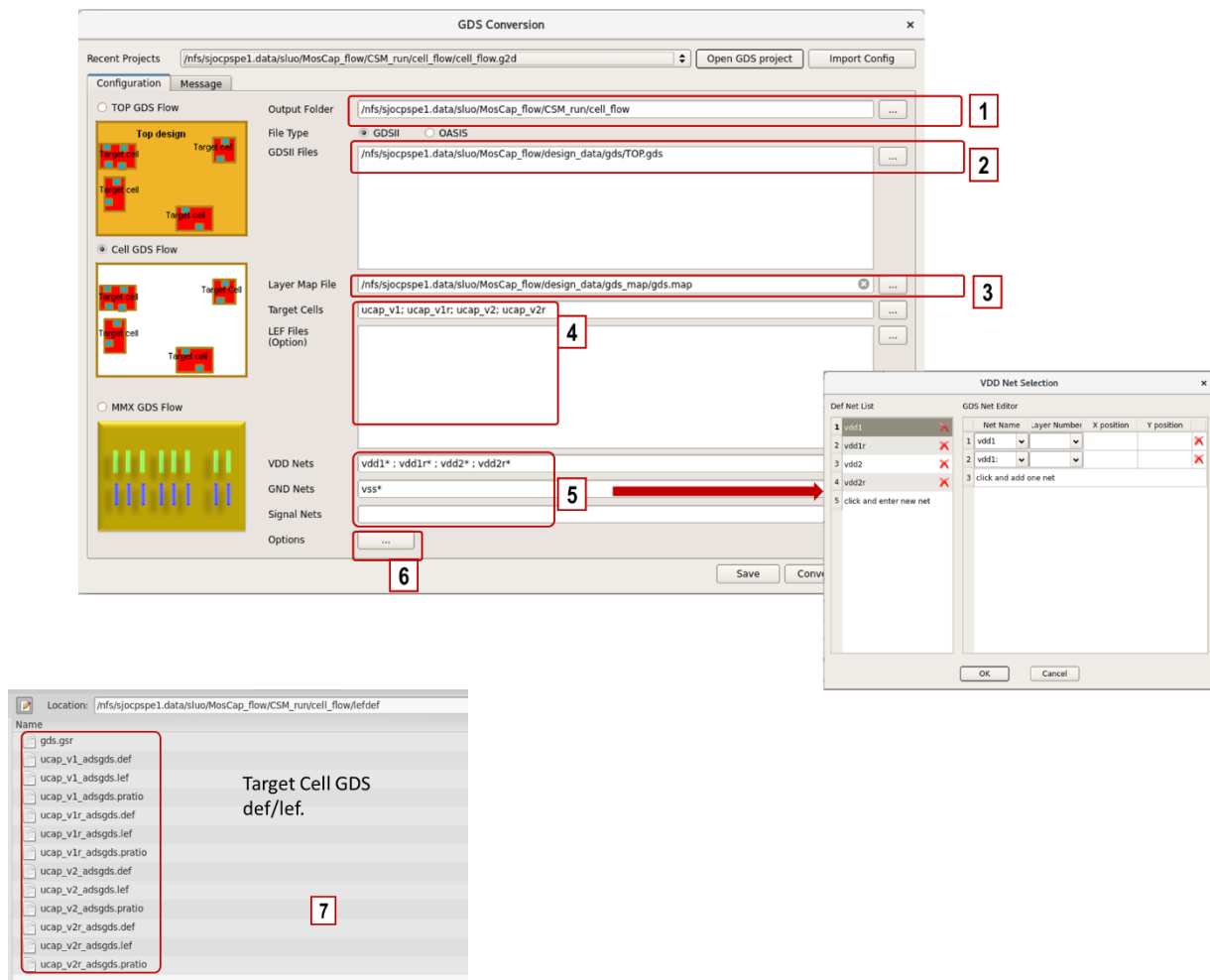


Figure 5 – Cell GDS Flow GUI Settings

Special options

In **GDS Advance Option** dialog, “**Set APM Layer**” option is default enabled. If disable this option, conversion engine will use **GDS2DEF**.

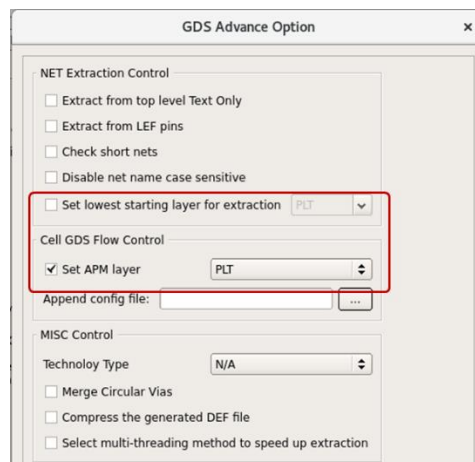


Figure 6 – Cell GDS Flow Special Option

MMX GDS Flow

Flow introduction

MMX GDS conversion flow GUI setting is similar to **Top GDS Flow**, it's for user want to analyze MosCap in on-die PDN. MMX GDS conversion flow will use **GDS2DB** as default engine.

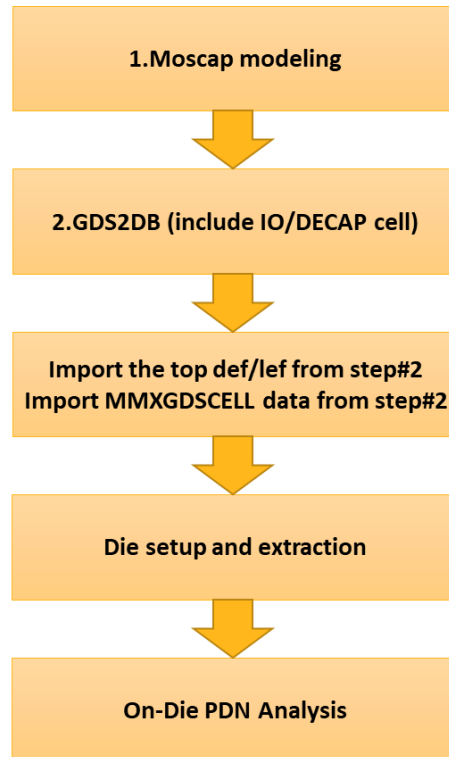
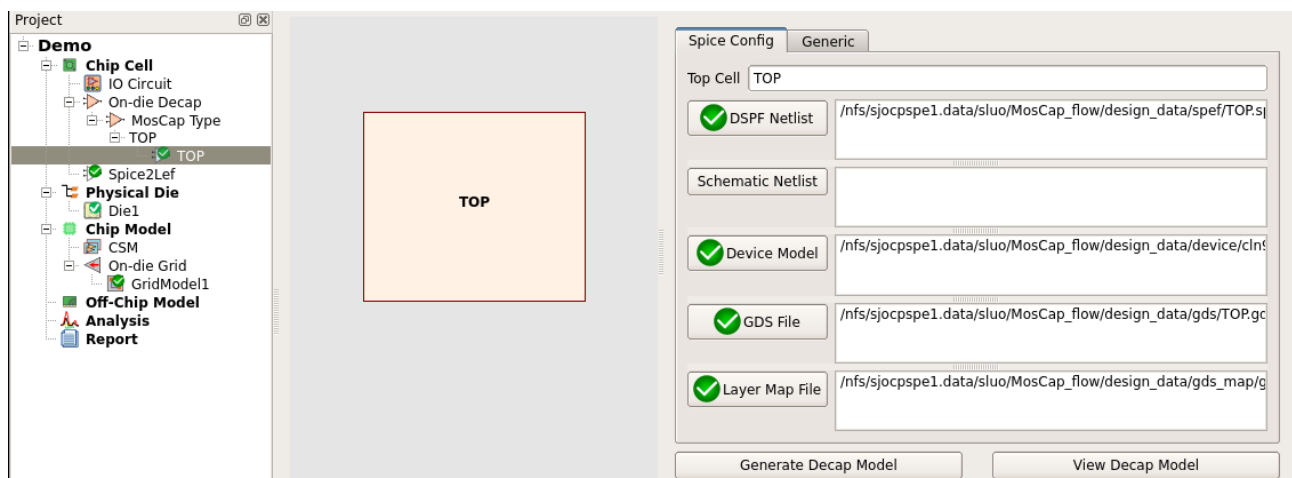


Figure 7 – MosCap Handling Main Flow in CSM

MosCap modeling

In CSM main GUI, On-die Decap cell menu, insert a MosCap type of decap, import related design data. CSM will call **APLMMX** for Moscap (.cdev file) generation.



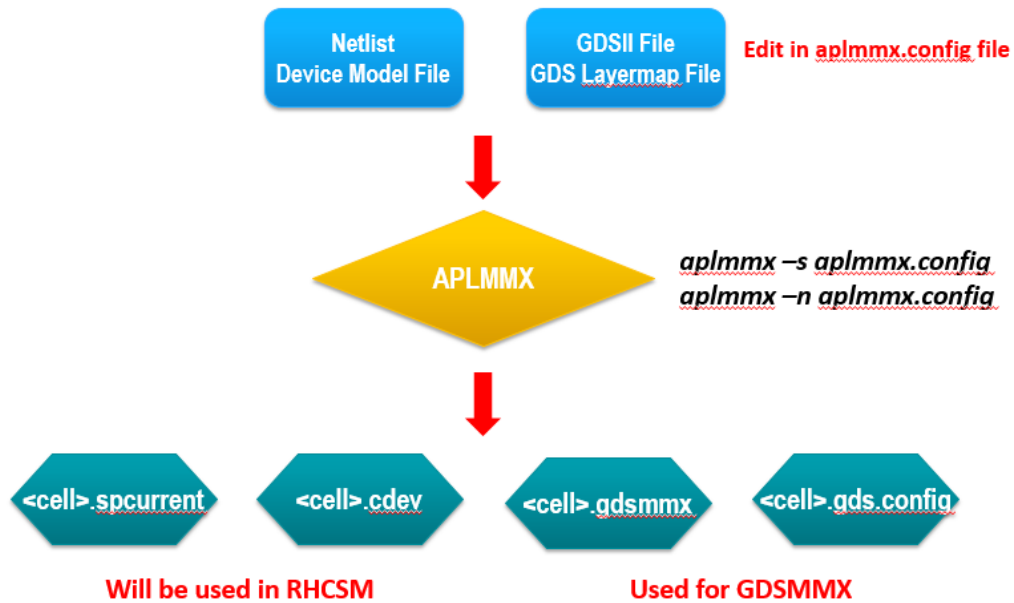


Figure 8 – MosCap Modeling GUI and Engine Behavior

GDS Conversion MMX Flow

From CSM menu bar **Tools** → **GDS conversion**, open the GDS conversion toolkit, it will call GDS2DB for conversion.

1. Give a “output folder” for conversion def/lef.
2. Import the GDS file need to be converted.
3. Import the layer map file.
4. Import the MosCap Xtor map file (xxx.gdsmmx) from “MosCap Modeling” step;
5. Import the Apache tech file.
6. Select the Top cell name as the design name.
7. Select the target cell from the cell list, the list is parsing from GDS file.
8. Select the nets, PG nets and signal nets. i.e., in VDD net selection, in the left side of open dialog, double click to input the VDD net name. Similar flow for VSS net selection.
9. More advance GDS2DB options settings.
10. Conversion result will be in <Output folder>/lefdef/.

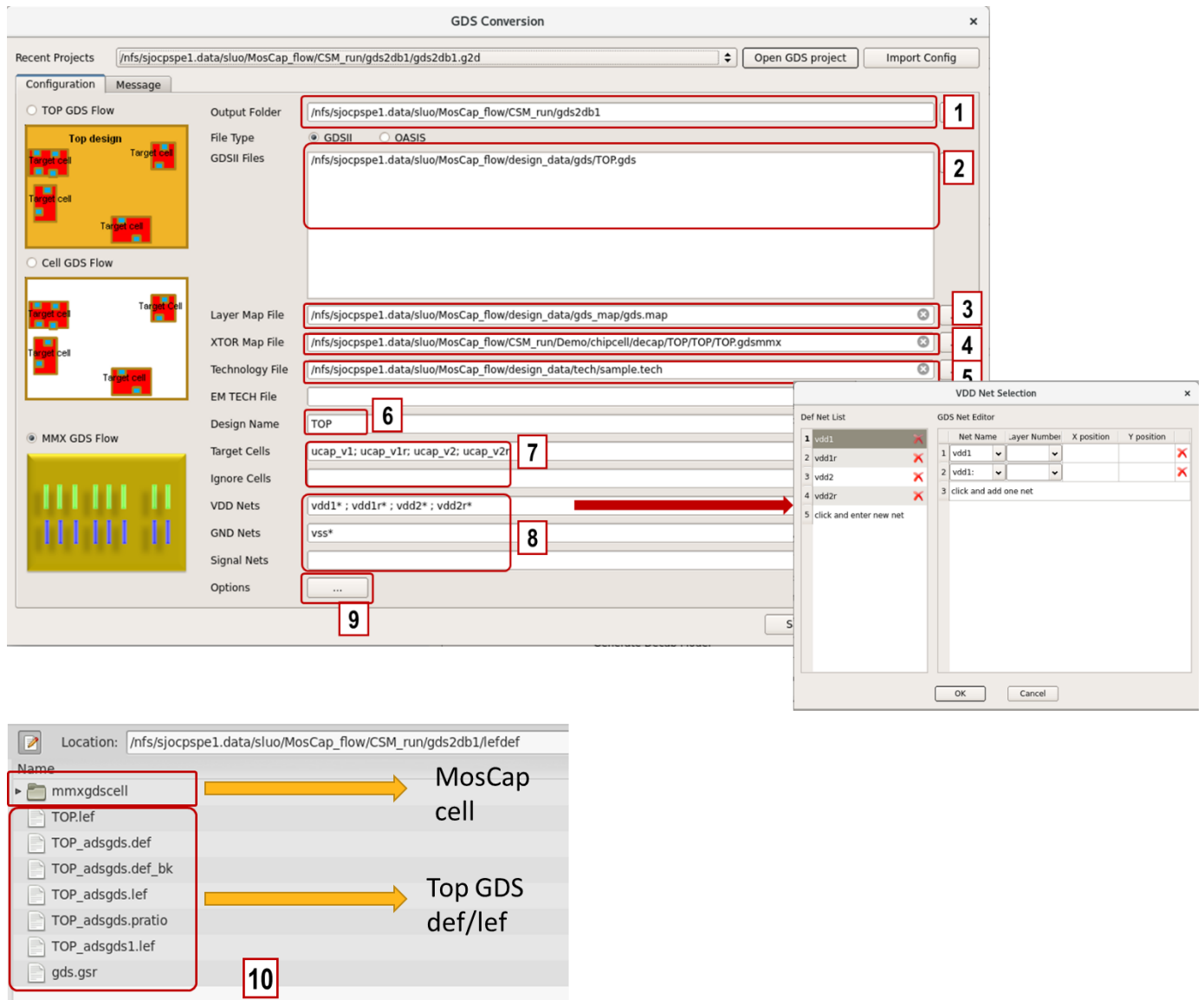


Figure 9 – MMX GDS Flow GUI Settings

Import Conversion Result for Extraction

In CSM physical die module,

1. Import Top gds def/lef and other design data.

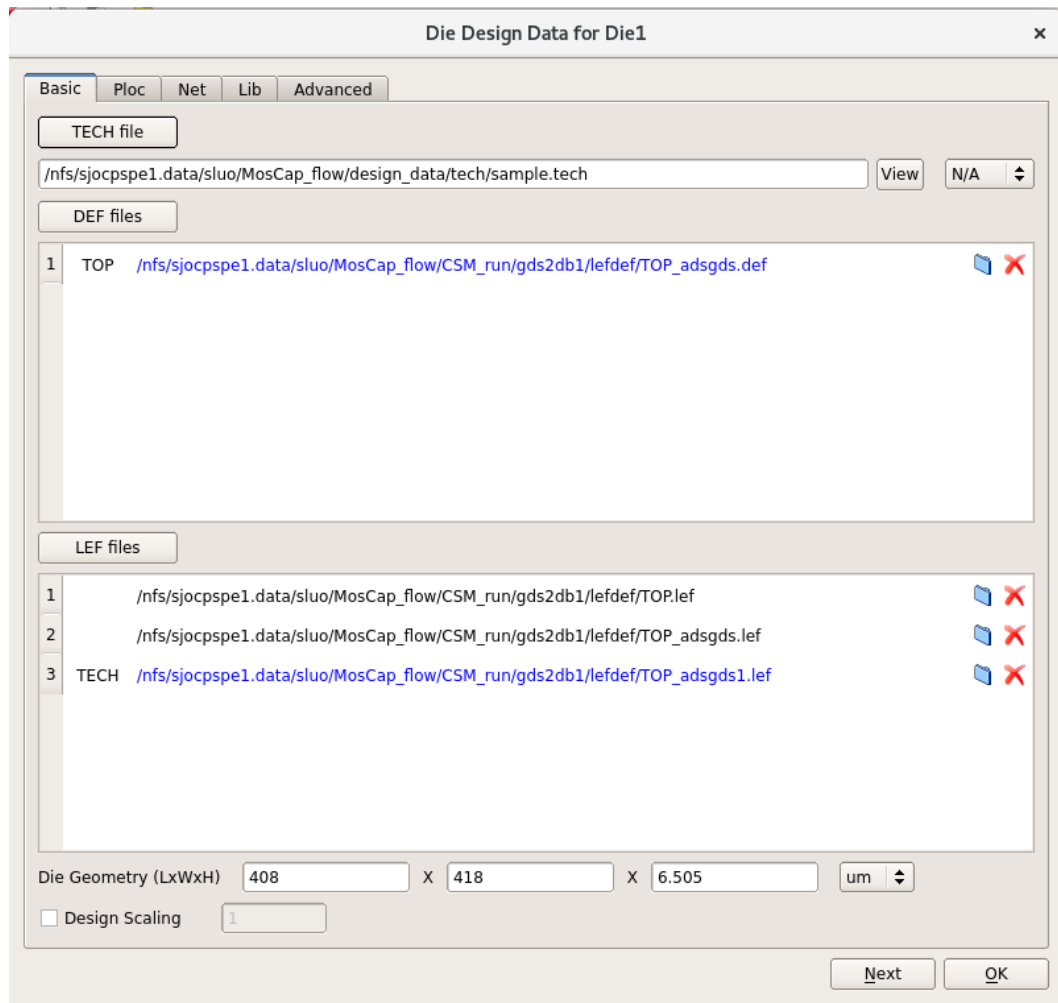


Figure 9 – MosCap Handling Flow Importing Top def/lef

Import the MosCap cell def/lef folder into “**GDS Cell**” and enable MMX option.

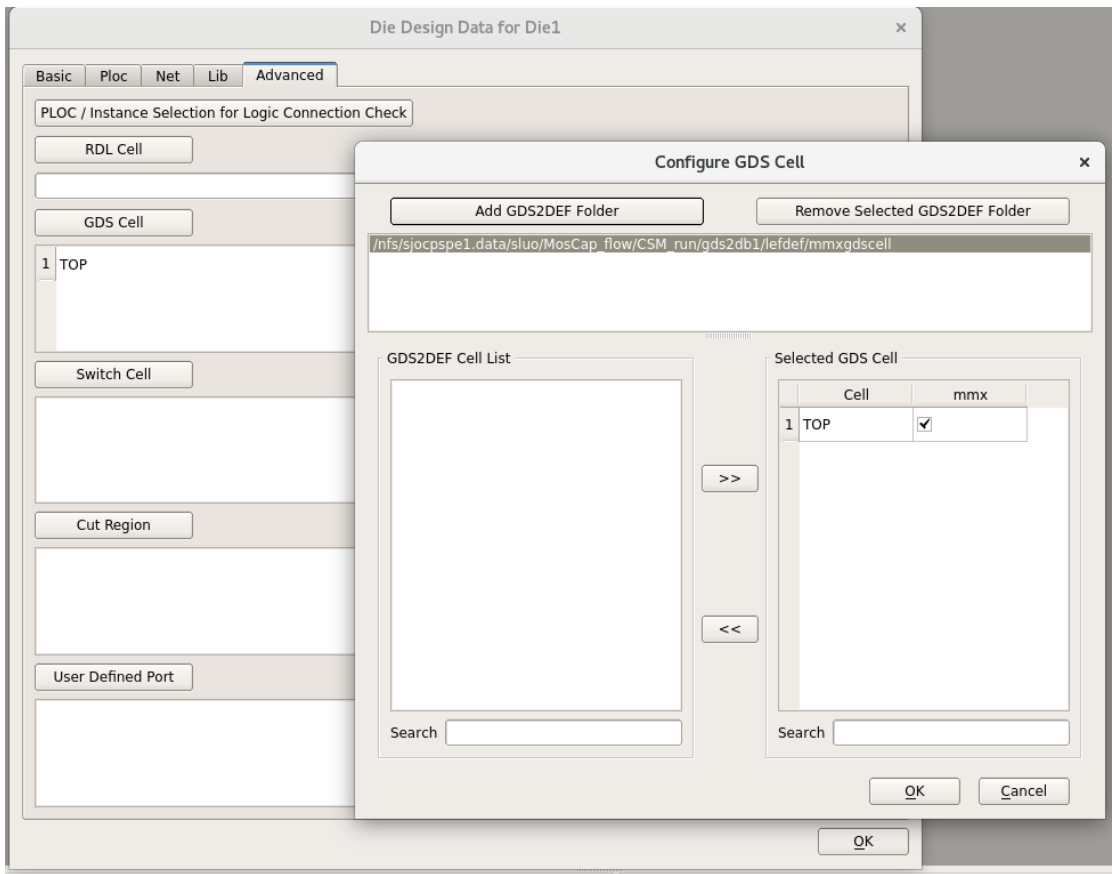


Figure 10 – MosCap Handling Flow Importing MosCap Cell def/lef

On-die PDN analysis include MosCap.

After [on-die PDN](#) generation, user can check total moscap value for each net.

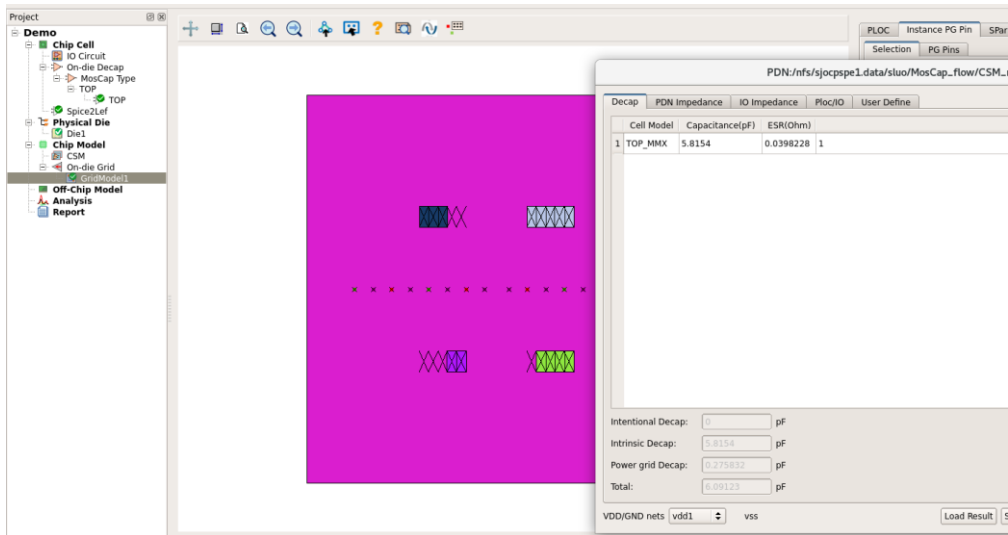


Figure 11 – On-die PDN Analysis Including MosCap

After die extraction, all the moscap info will be saved in apache.pwr file.

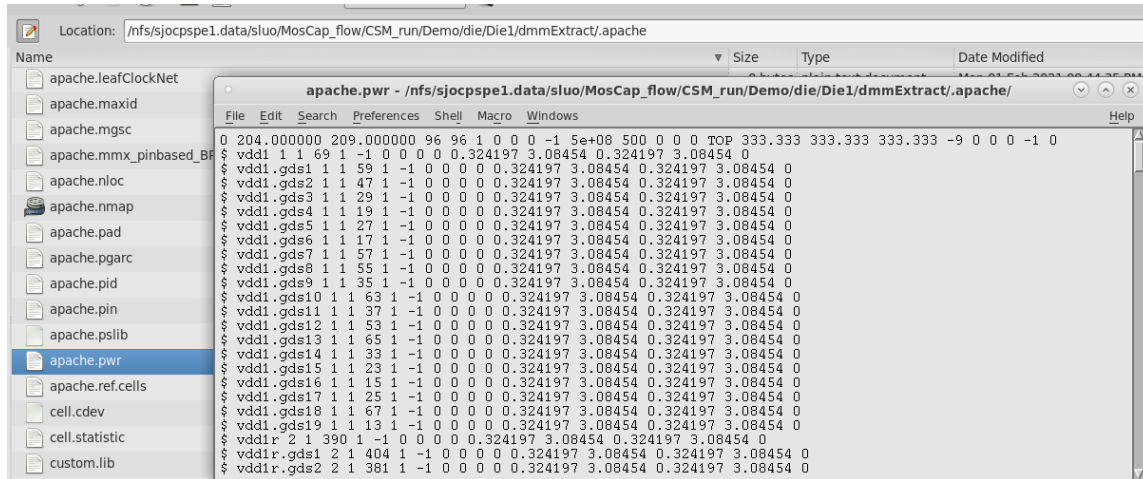


Figure 12 – MosCap Info in apache.pwr file

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