

A006 CPA封装参数提取

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China CPS Team

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AppBrief Requirements

封装参数提取挑战

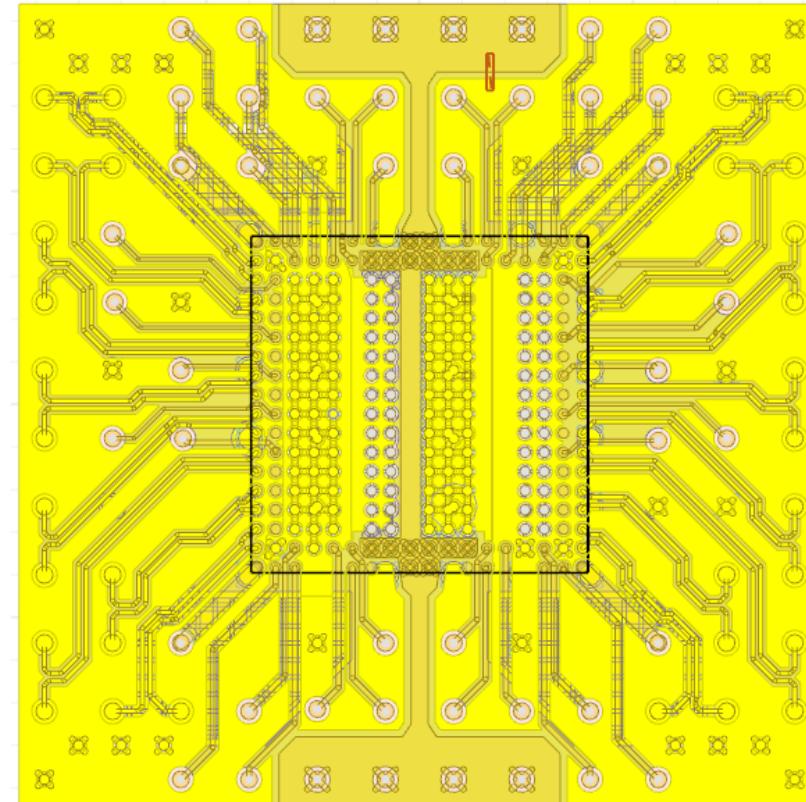
- 封装密度和集成度越来越高，传统的参数提取工具无法满足上百上千乃至上万**bump**参数提取的需求；
- 仿真时间随**bump**数量成倍增加；

ANSYS解决方案

- ANSYS Siwave CPA内嵌于Siwave中支持各类层叠结构RLC参数抽取，可直接导入各类封装设计文件；
- ANSYS Siwave CPA采用FEM Solver，对信号线以及source和sink的数量没有限制，可以提取成百上千乃至上万pin的封装参数；
- 包含MoM Q3D Solver，满足高精度参数提取的需求；

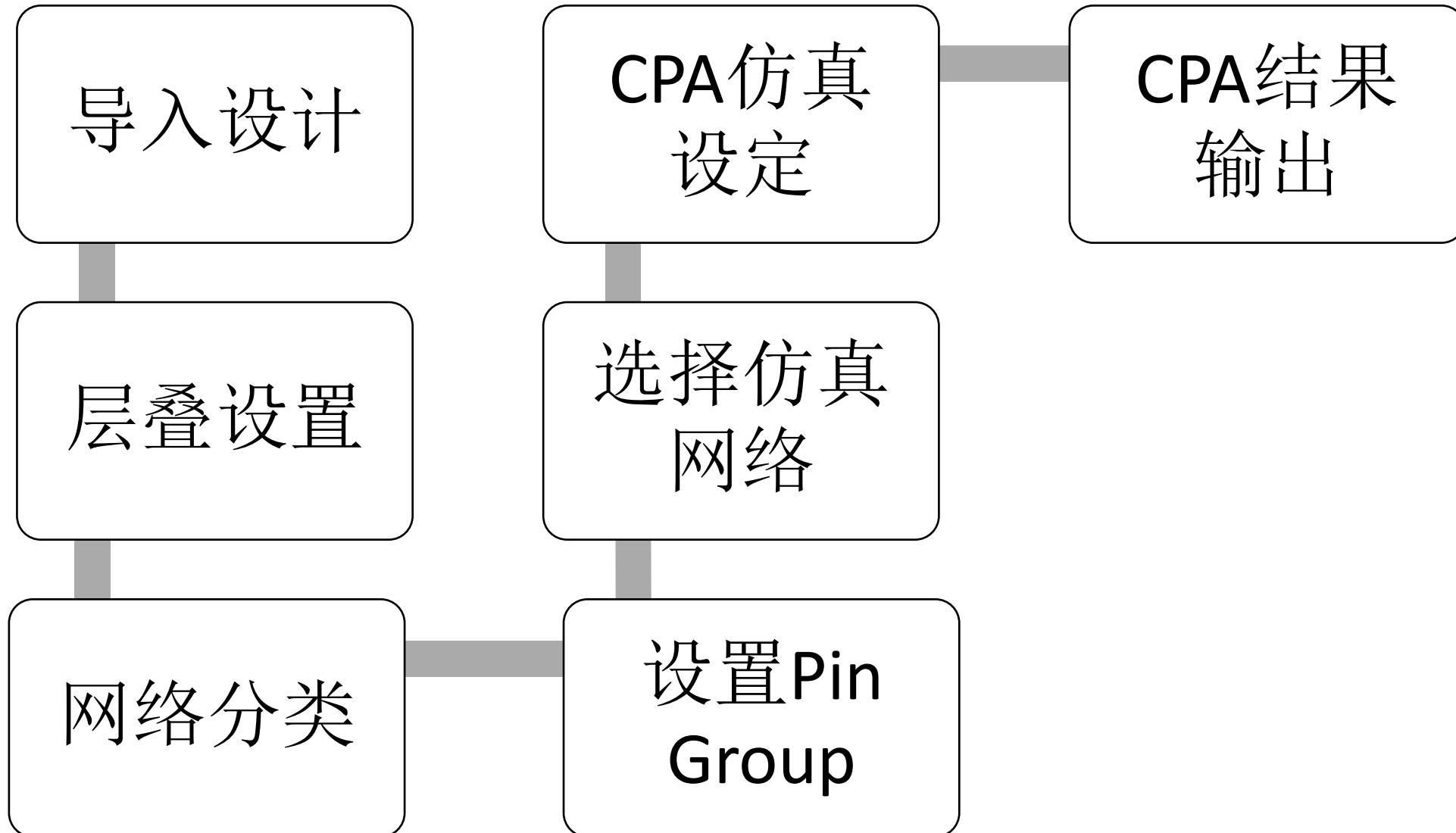
Benefits

- 非常高容量的FEM求解器-全尺寸封装结构-上万个source/sink;
- 快速提取（几分钟到几小时-即使拥有上万个**bump**的超大封装结构）；
- 适用任意封装层叠结构：Wire bonding, Flip chip等基板类封装；
- 可直接导入各类封装设计文件；

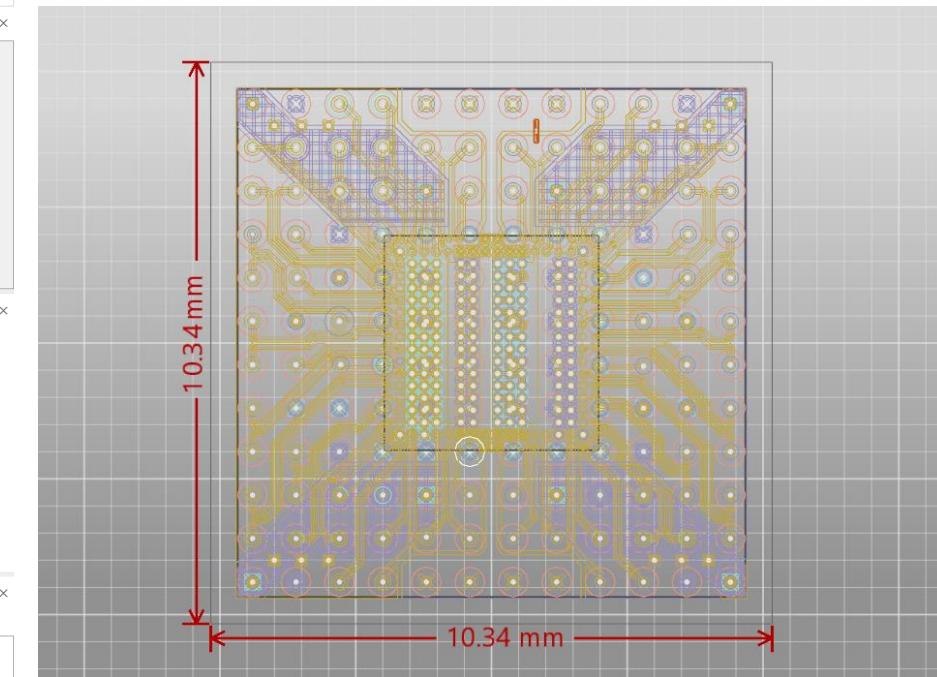
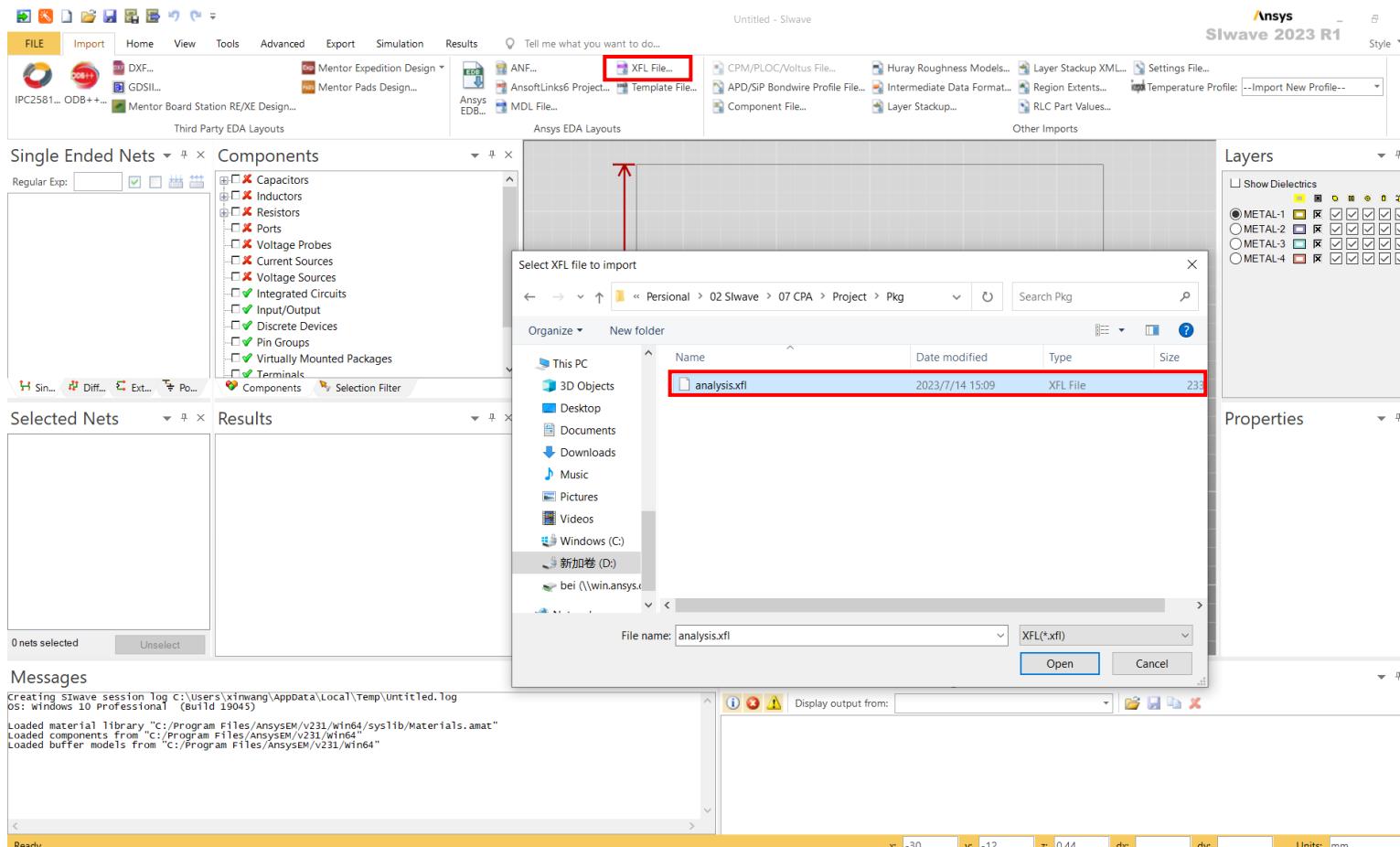


Siwave-CPA
Extract Package net
(RLC parameters)

CPA输出封装参数提取



导入设计



层叠设置

Slwave Workflow Wizard

- Import Component File...
- Import Stackup...
- Verify Stackup...**
- Verify Padstacks...
- Verify Circuit Element Parameters...
- Verify Power/Ground Net Classification...
- Sanitize Layout for Simulation
- Assign S-parameter Capacitor Mode...
- Assign SPICE Netlists...
- Configure DC IR Drop Analysis...
- Configure PI Analysis...
- Configure DDR Analysis...

Always show this dialog after project import

Layer Stackup Editor

C...	Name	Type	Thickness (mm)	Material	Conductivity (S/m)	Dielectric ...	Dielectric con...	Loss tan...	Translucen...	Elevation (mm)	Roughness (m...)	Trace Cross-s...
>	TOP	METAL	0.03048	COPPER	5.959E+07	AIR	1	0	65	0.70104	HJ: 0 , HJ: 0 , HJ: 0	Rectangle
	Diel_1	DIELECTRIC	0.2032	FR-4	0		4.5	0.035		0.49784		
	VDD_C1	METAL	0.03048	COPPER	5.959E+07	FR-4	4.5	0.035	65	0.46736	HJ: 0 , HJ: 0 , HJ: 0	Rectangle
	Diel_3	DIELECTRIC	0.2032	FR-4	0		4.5	0.035		0.26416		
	VSS_C1	METAL	0.03048	COPPER	5.959E+07	FR-4	4.5	0.035	65	0.23368	HJ: 0 , HJ: 0 , HJ: 0	Rectangle
	Diel_5	DIELECTRIC	0.2032	FR-4	0		4.5	0.035		0.03048		
	BOTTOM	METAL	0.03048	COPPER	5.959E+07	AIR	1	0	65	0	HJ: 0 , HJ: 0 , HJ: 0	Rectangle

Add / Delete / Move Layer(s)

- Add Above Selected Layer
- Add Below Selected Layer
- Delete Selected Layers
- Move Selected Layers Up
- Move Selected Layers Down

Edit Selected Layer(s)

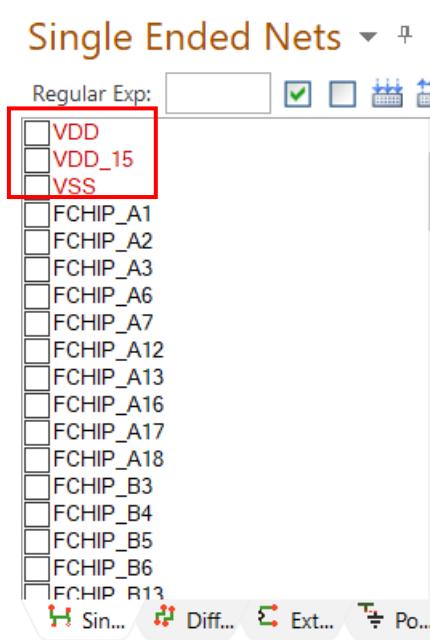
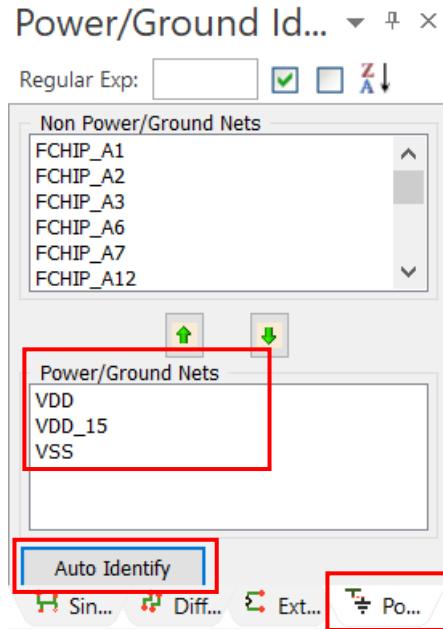
Color: c4ab1e Update
Name: TOP Update
Type: METAL Update
Material: COPPER Update
Dielectric Fill: AIR Update
Translucency: 65% Update
Thickness: 0.03048 mm Update
Roughness: HJ: 0 , HJ: 0 , HJ: 0 mm Update

Select all DIELECTRIC layers Scheme-1 Save Current Color Scheme Color scheme As Is Set as Default Default Scheme for new projects: Slwave

Thickness change affects die elevations Edit Material Properties Invert Stackup Conformal Coat Units mm Copper Weight

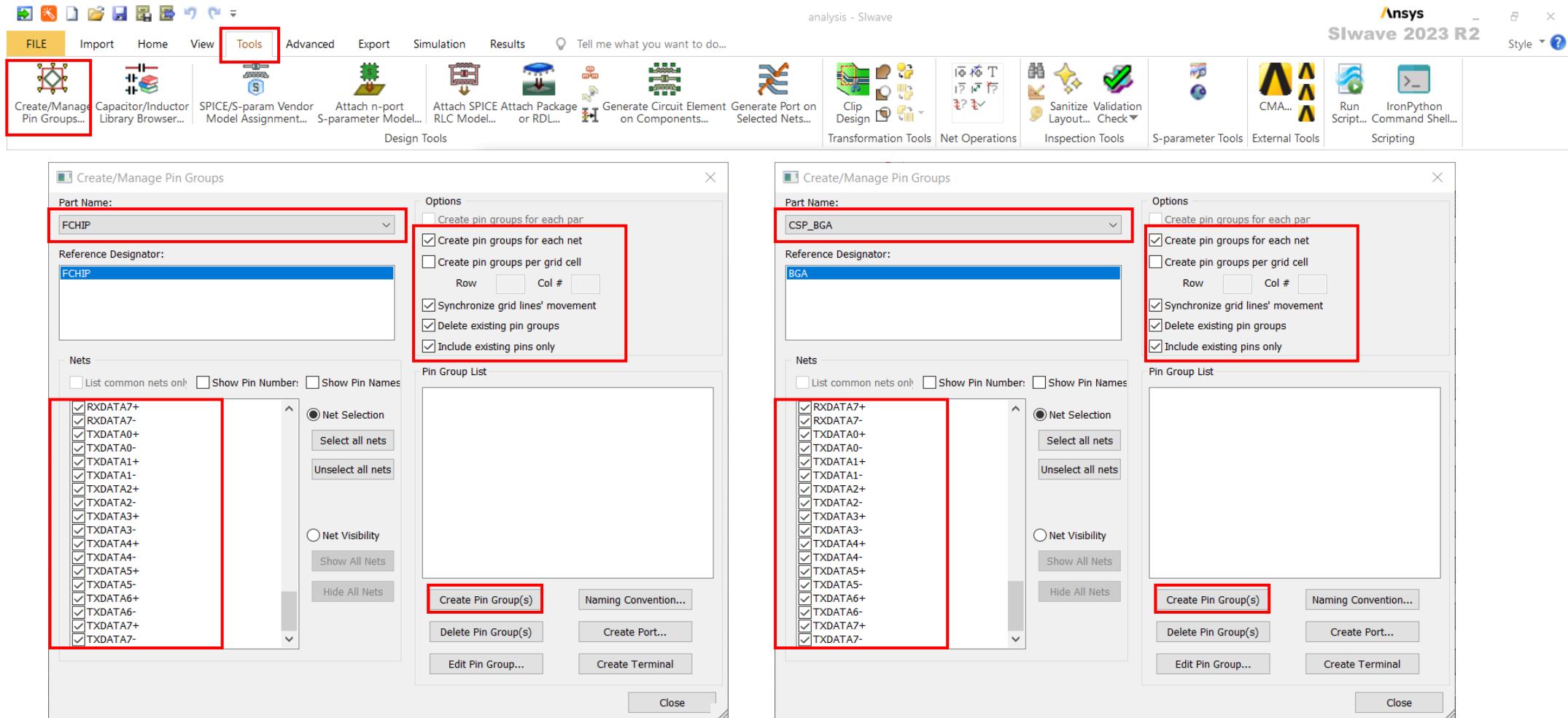
OK Cancel

网络分类



对电源和地网络进行分类

设置 Pin Group

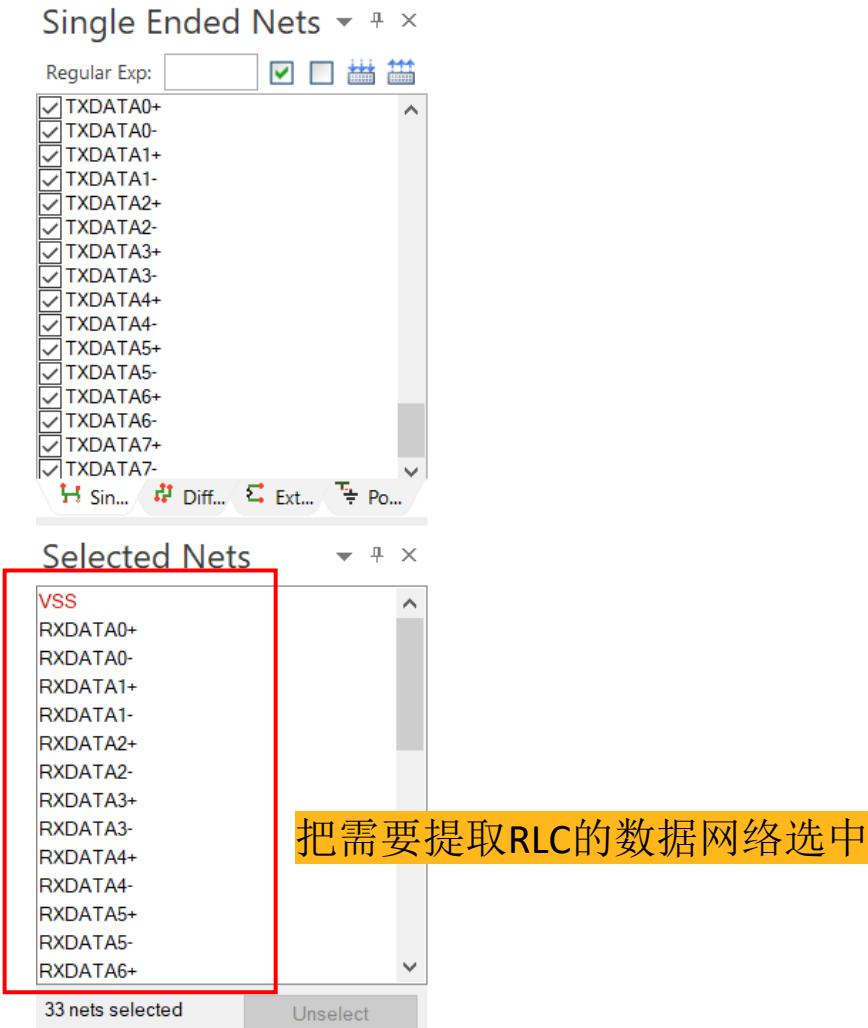


分别对Die和BGA两个器件上的数据Nets进行Pin Group

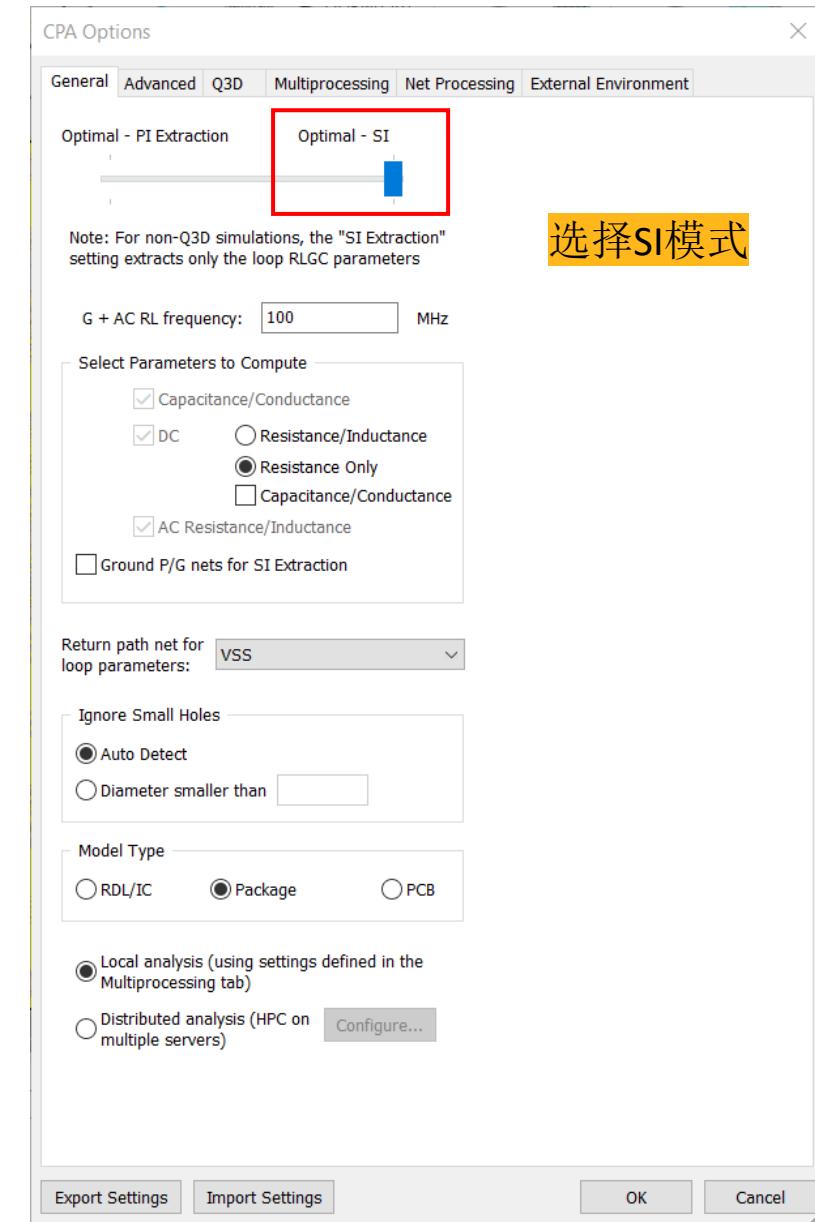
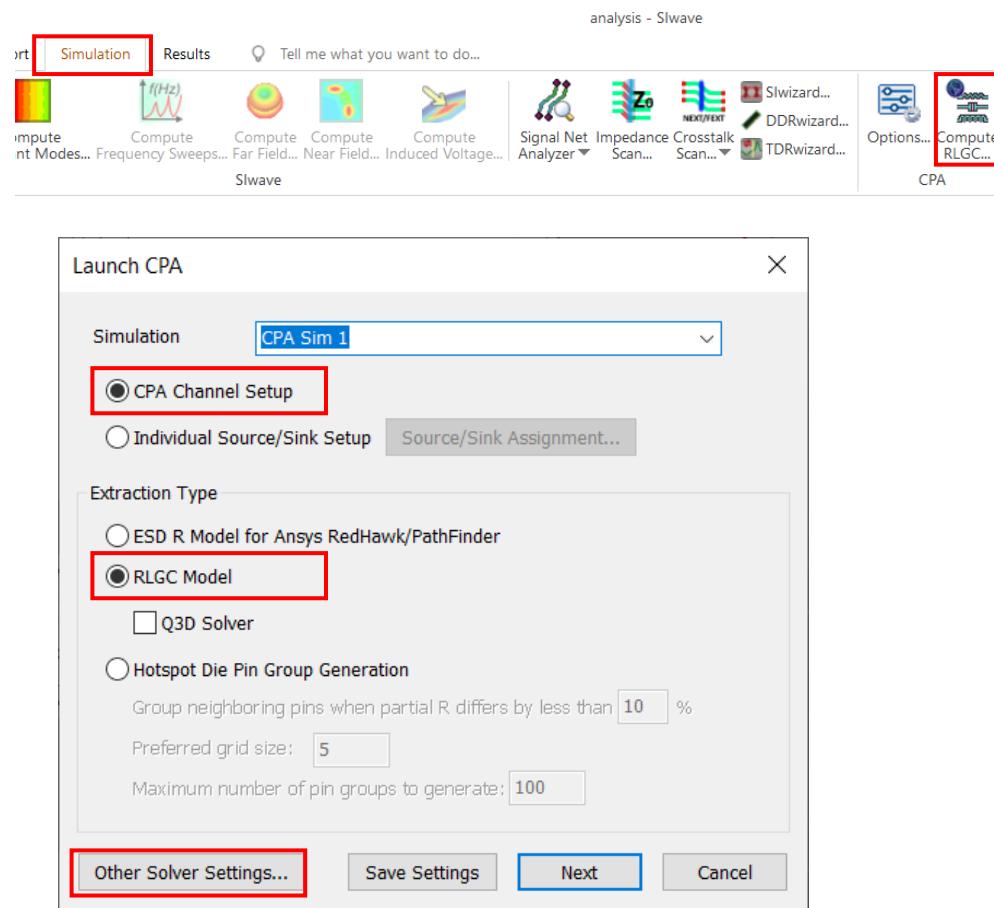
选择需要仿真的网络

在Net列表里面选择需要提取参数的网络

- 可以用鼠标批量选中后，按空格键进行选择
- 选择的网络必须在Die和BGA直接由路径和Pad定义
- 同一网络多个pin时，按照Group考虑为一条路径
- 必须包含GND网络，作为回流路径
- 提取选中网络的Loop参数作为IBIS Package参数



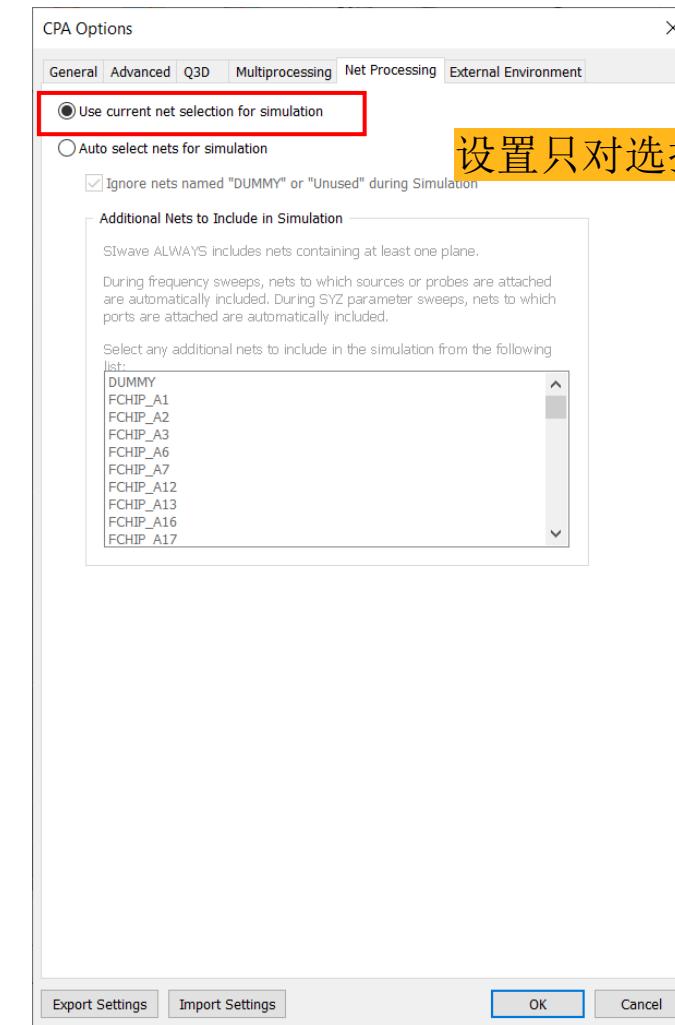
CPA仿真设定



CPA仿真设定

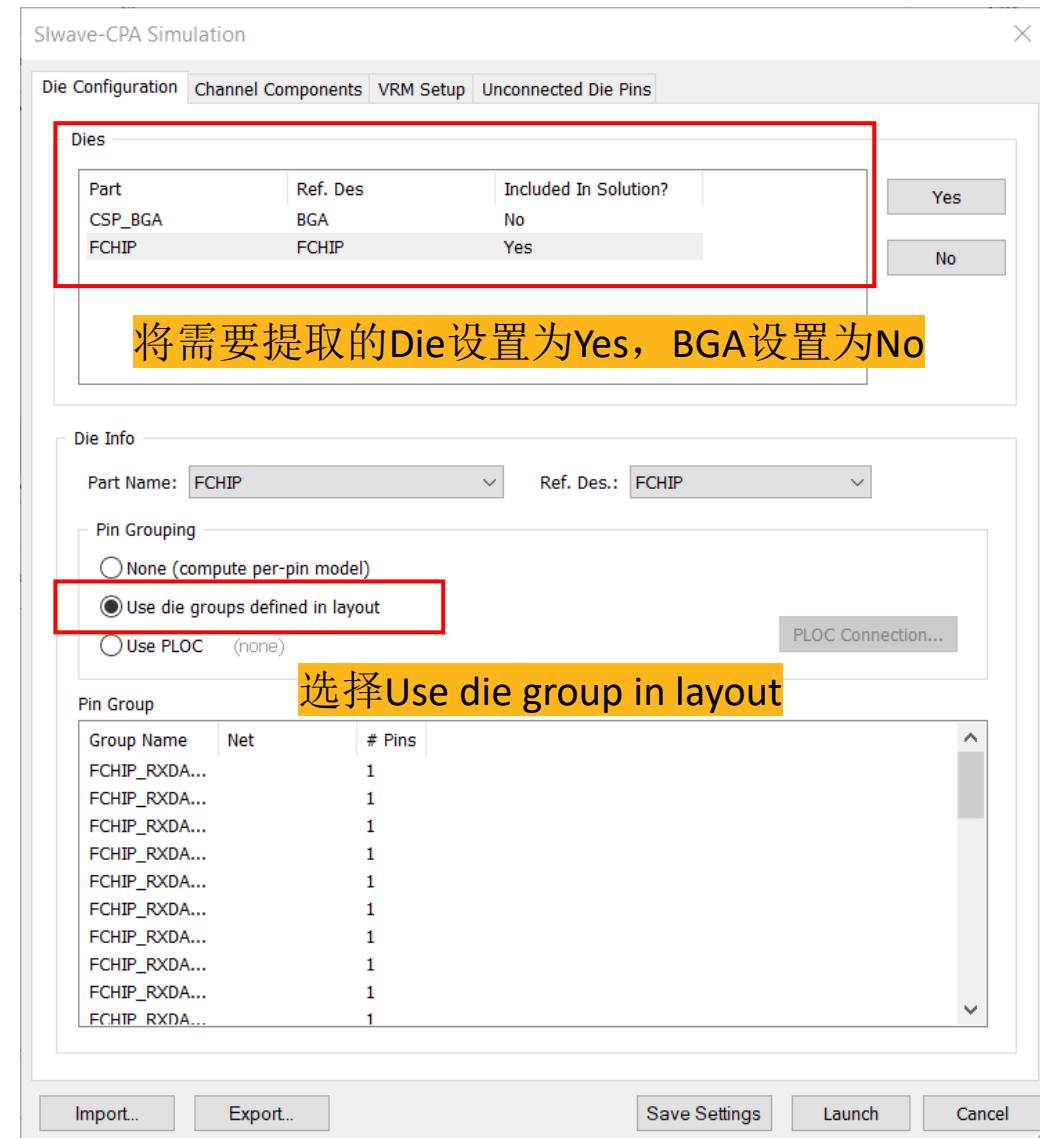
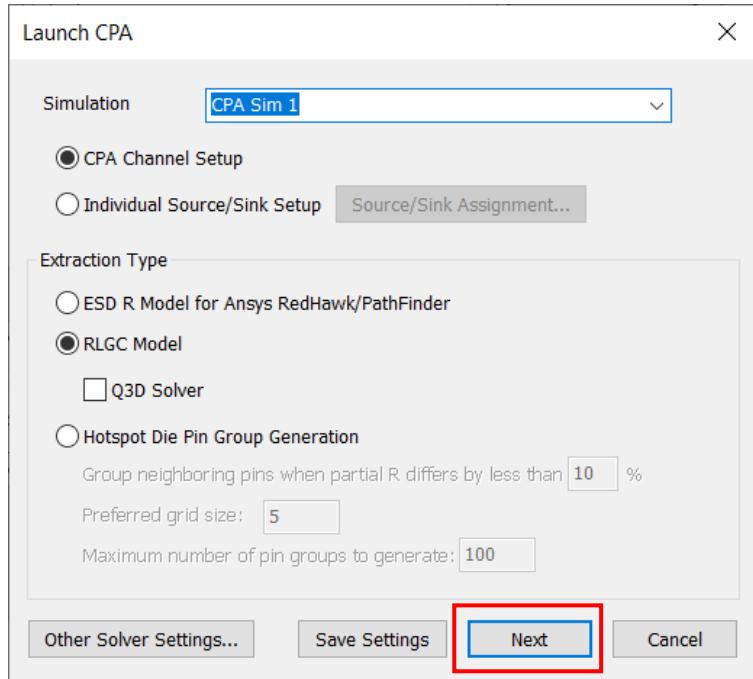


仿真使用核数设置

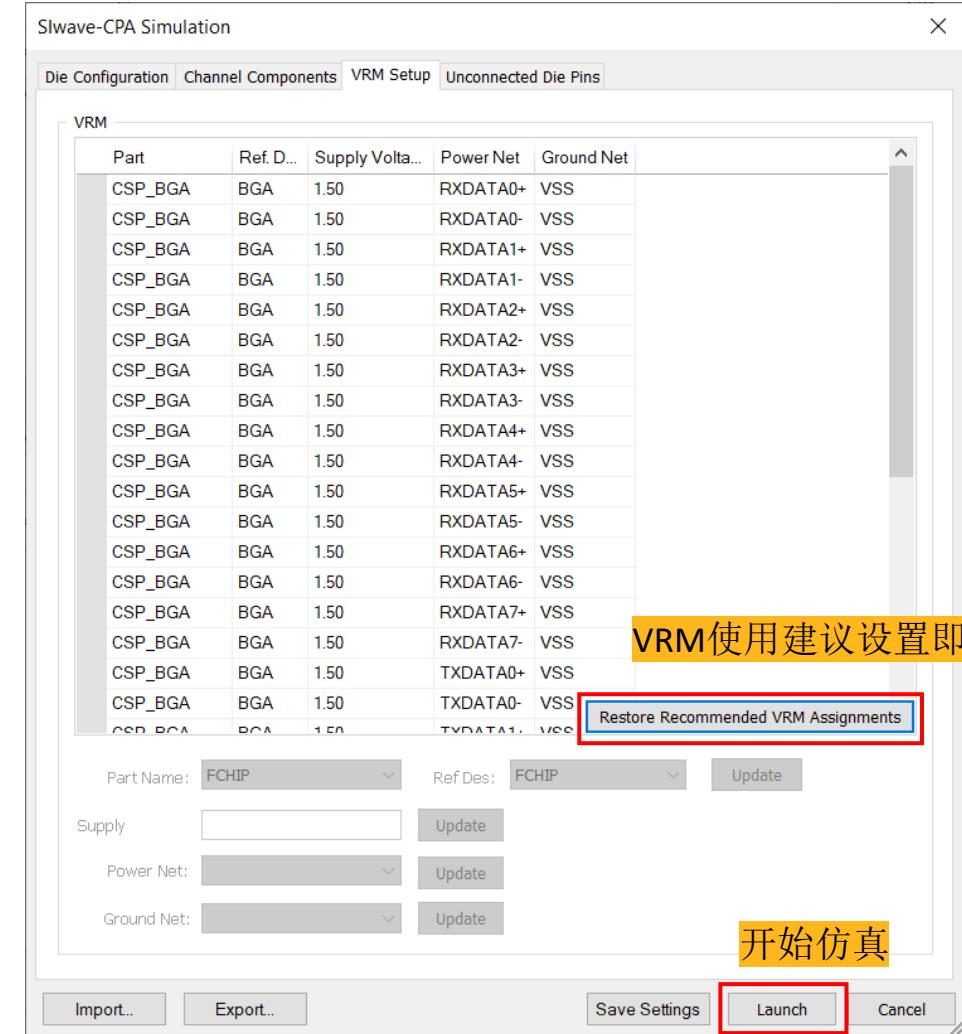
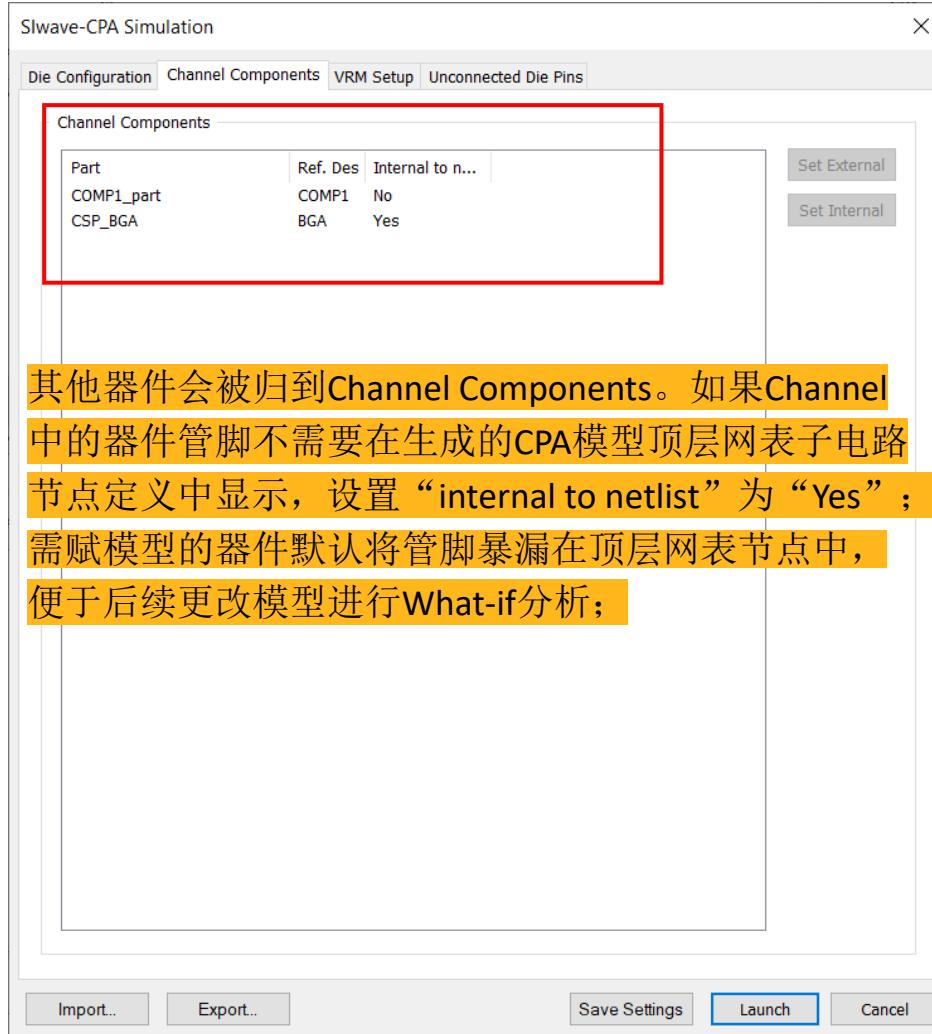


设置只对选择的网络进行仿真

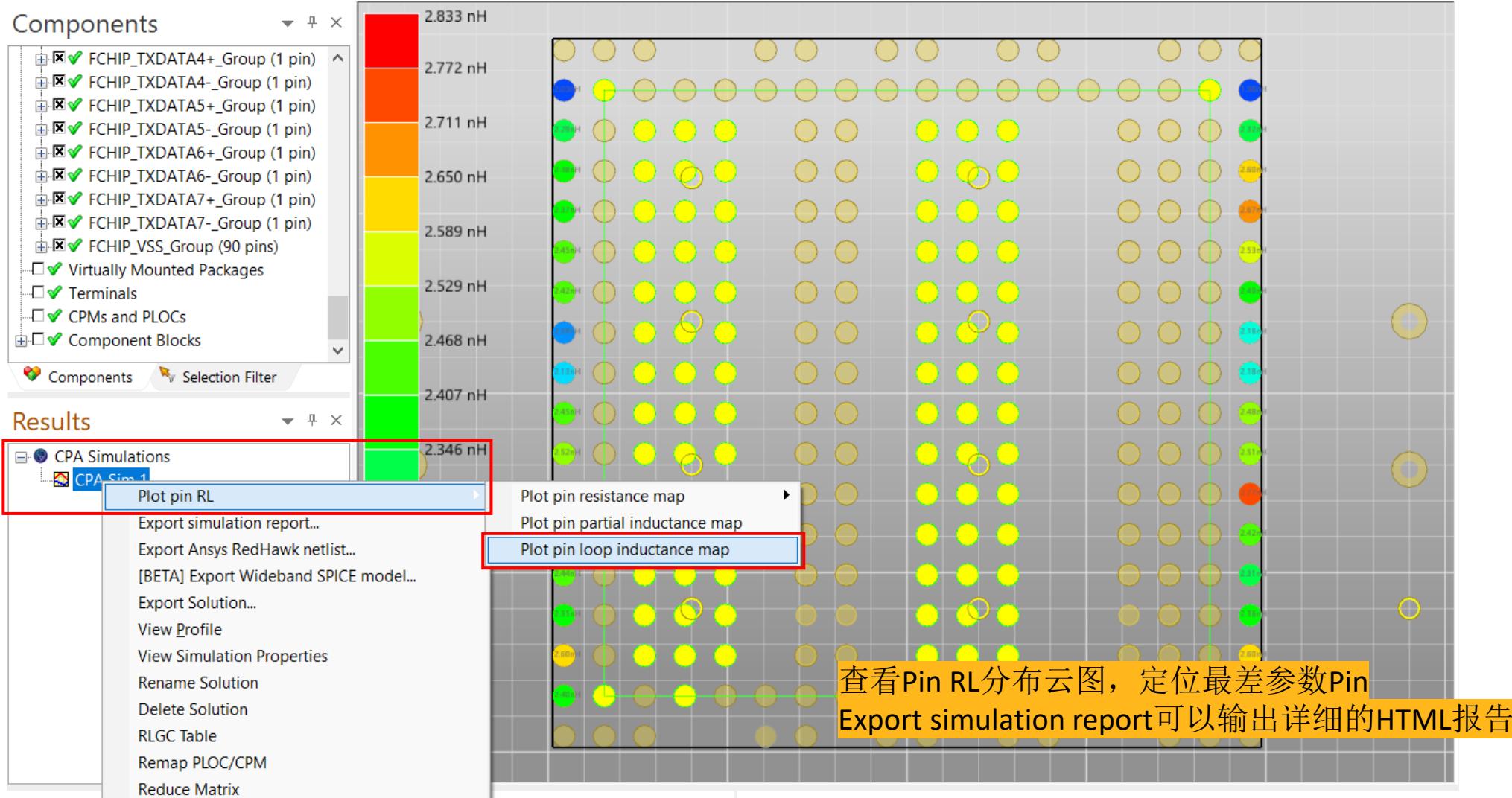
CPA仿真设定



CPA仿真设定



CPA结果输出



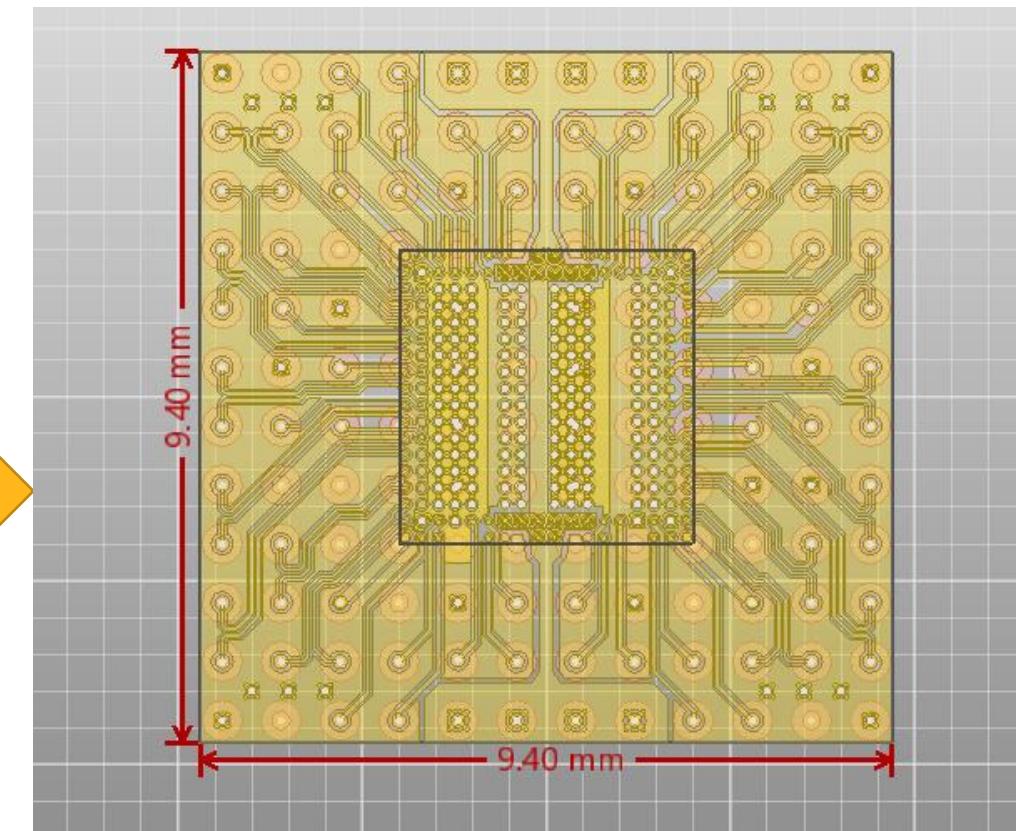
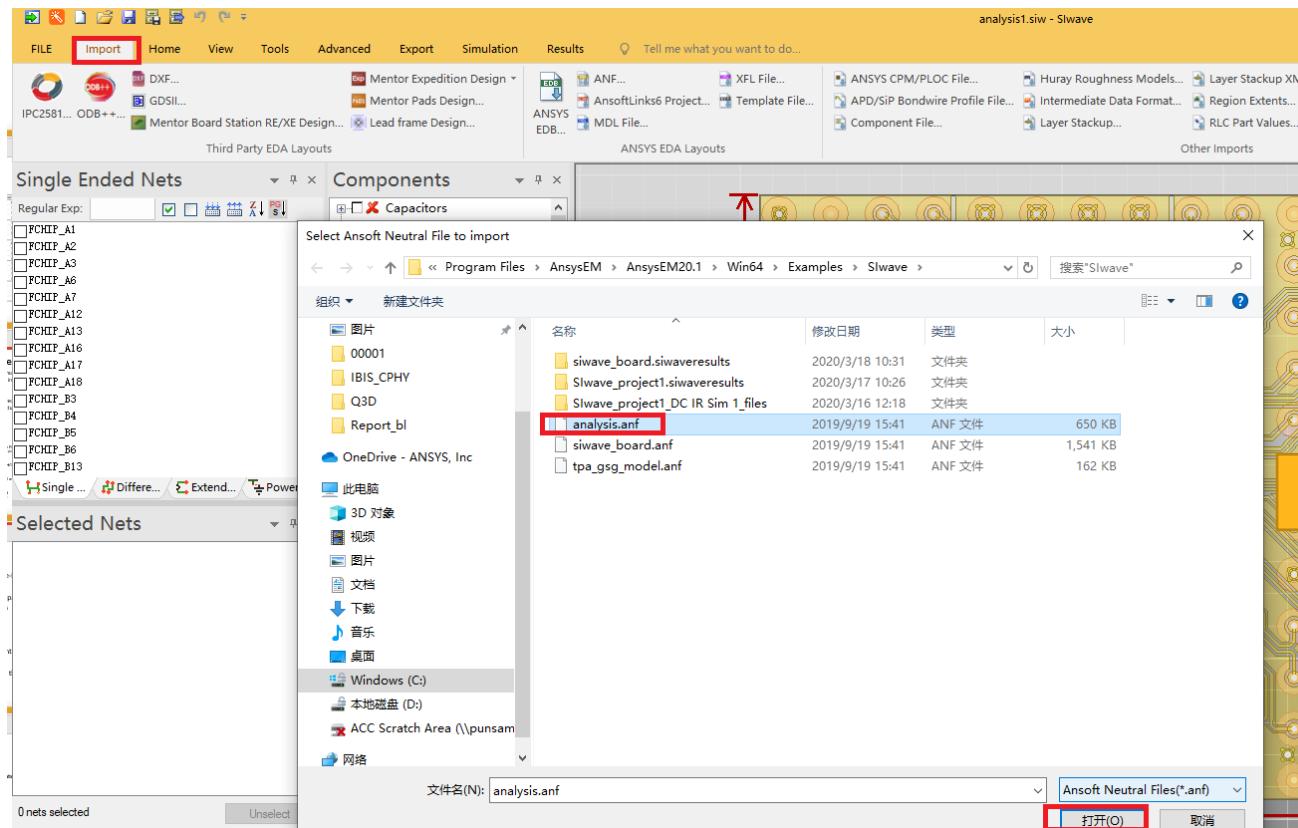
总结

- CPA FEM Solver可以求解上万bump封装，且求解速率快（几分钟-几小时）；

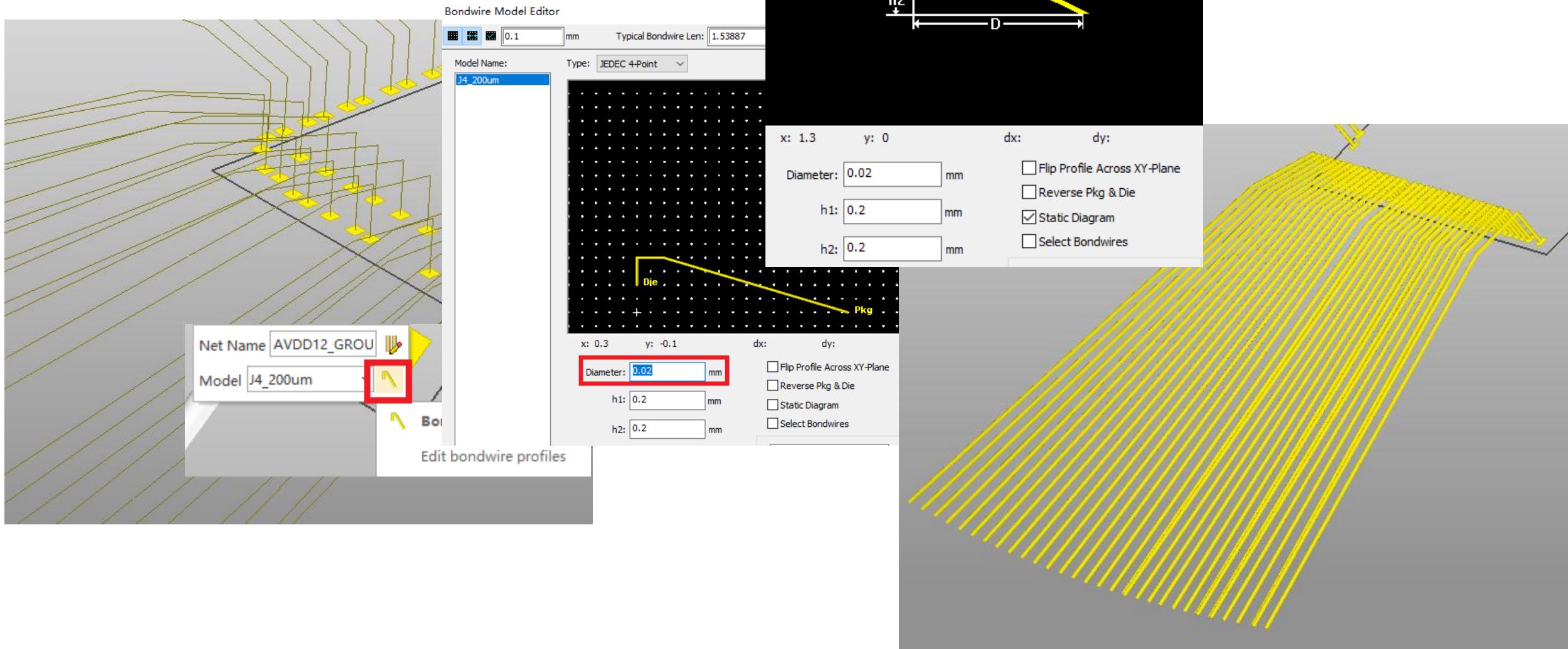
Appendix.1

Wire bonding 封装导入设置

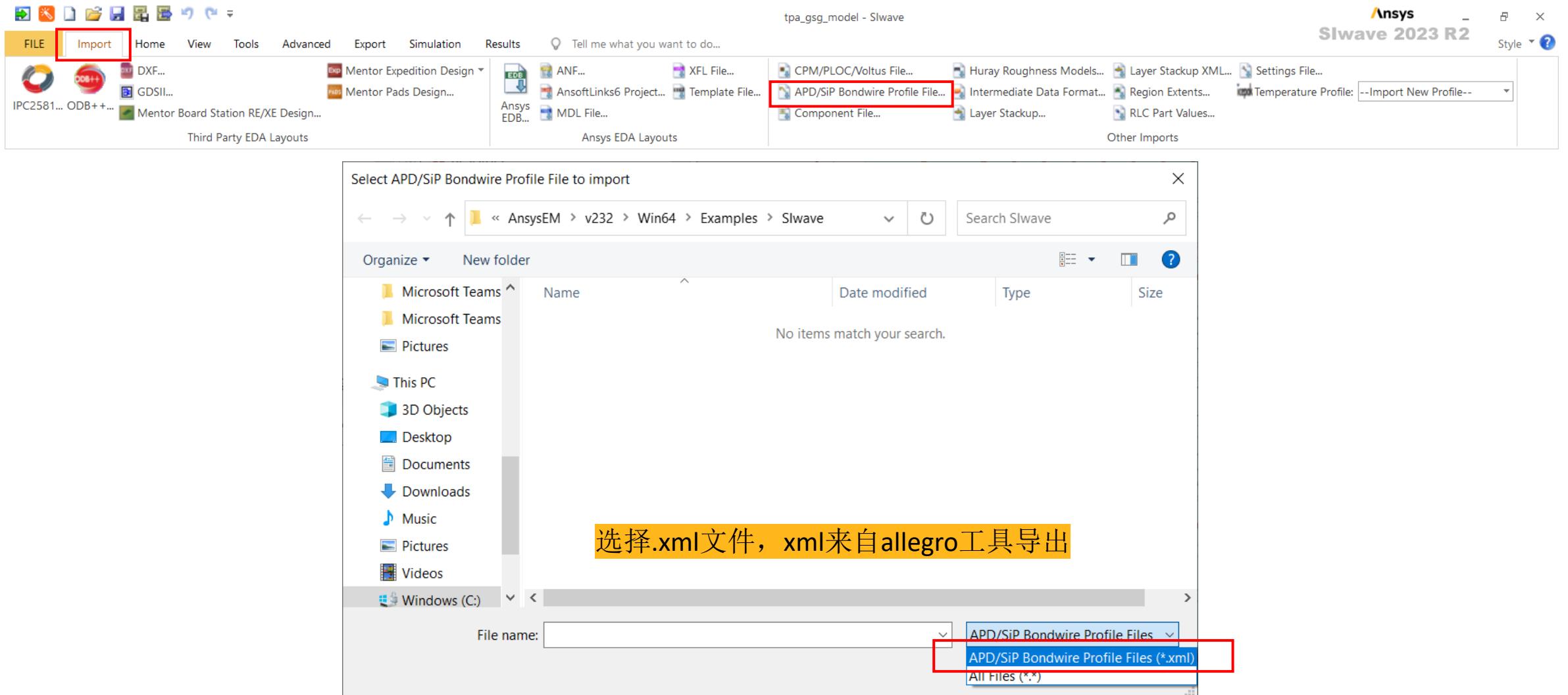
导入设计



Wire bonding模型处理



导入wire bonding线的profile文件



Appendix.2

ALH注册 CPS中文学习室



CPS中文学习室

适用人群: 先进封装和系统的SIPI、Thermal、Mechanical工程师。

设计目标: 让工程师快速获得最有用、最必要的相关知识（文档、录像、教程）。

主要架构

- **入门必读:** 包含软件基本功能。每个工程师全部下载并通学。
- **高级技巧:** 包含最新的高阶流程。需要的工程师专题学习。
- **标准教程:** ALH自带标准软件教程。学习软件操作时使用。

进入方式:

- **已有ALH帐号:** 点击以下链接：

https://jam8.sapjam.com/groups/oOWAdwLABmWAIBypw_wDR5uv/overview_page/SJgVYUCTz90LbjxUQLHMSH

- **没有ALH帐号:** 参考第二页注册ALH账号后进入。

- **联系人:** xiaoxia.zhou@ansys.com

The screenshot shows the homepage of the CPS Chinese Learning Room. At the top, there's a navigation bar with tabs for CPS, SIPI, Thermal, and Mechanical. Below the navigation is a search bar and a user profile icon. The main content area features a banner for the 'SIPI Learning Room' with various circuit board and connector diagrams. To the right of the banner is a section titled 'Main Features' with three items: 'Precision Priority', 'Efficiency Improvement', and 'Multi-physics Field'. Below this are two sections: '① Beginner Essential' and '② Advanced Techniques', each listing several PDF and procedure documents. At the bottom right is a 'Latest Version' section for '2023R1.1 Download' and a 'New Feature Highlight' section.

ALH注册方法

打开下面网址或扫描右边二维码进行注册：

https://www.ansys.com/alhactivation_cn

第13步“是否有激活码”，请选择“否”

第14步“请输入您的激活码”，请填写客户号。

客户号为一串6位或7位数字。

获取方法：

- 询问Ansys客户经理/技术。
- 启动软件，观察Help – About - Client License Settings - Customer Number。



Ansys

