



GDS Import Wizard V5.0 Manual

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A smart tool to translate GDSII to 3DLayout EDB quickly:

- Extract nets from GDS and import to EDB
- Extract accurate material property from IRCX
- Extract accurate layer thickness and stackup from IRCX
- Automatic generate control xml for AEDT GDSII Importing
- Automatic create Via Group and SnapViaGroups
- Automatic generate components on top and bottom layer for easier port setup
- Automatic generate TSV Insulation coating
- Synchronous import to AEDT when EDB prepared
- Automatic detect and fix of small gaps between layers to avoid mesh Issue (New in V4.0)
- Support sheet layers to simplify thinner metal layer mesh e.g. 0.001um (New in V4.0)
- support to generate temperature dependent material (New in V5.0)
- Add CSV input template to provide more flexible input for other Technology File (New in V5.0)
- Support New TSV Layer feature in 3D Layout 2022R1 (New in V5.0)
- Support ConvertPolygonToCircle Feature to reduce mesh(New in V5.0)
- More flexible setting options and enhanced command line(No-GUI) support(windows and Linux)

/ ANSYS workflow for 2.5D/3D SI Interpower Simulation

Integrated with ANSYS AEDT



Get the latest GDSImportWizard Tool

Return

<https://github.com/YongshengGuo/GDSImportWizard/releases/latest>

YongshengGuo / GDSImportWizard

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

Releases Tags

Click Releases to download earlier version

Latest release

55fcee7 Verified Compare

GDSImportWizard Verxx

YongshengGuo released this 1 hour ago

Auto UnitScale

Assets 2

Source code (zip)

Source code (tar.gz)

Getting From here!

Add GDS Import Wizard to AEDT

ANSYS Electronics Desktop 2020 R2 - Project40

File Edit View Project Tools Window Help

Tools menu options:

- Edit Libraries
- Library Tools
- Project Tools
- Run Script...
- Pause Script
- Record Script To File...
- Record Script to Project...
- Open Command Window
- Password Manager...
- Debug Logging...
- Stop Debug Logging
- Options
- Keyboard Shortcuts...
- External Tools... (1)
- Show Queued Simulations
- Edit Active Analysis Configuration...
- Import Array from Table...
- Job Management
- Calibration Wizard
- Chip Model Analyzer (CMA)
- Layout Links...
- Network Data Explorer
- PEmag...
- GDSImportWizard (5)

Select Program dialog:

- Path: << Release > GDS2XML_V1.03
- File Name: GDSImportWizard.py (4)

Customize User Tools Menu dialog:

- Menu Contents: GDSImportWizard, HBM Workflow
- Menu Text: GDSImportWizard
- Command: 2XML_V 3\GDSImportWizard.py ... (3)
- Buttons: Add (2), Remove, Move Up, Move Down

5 Open GDSImportWizard from here!

GDS Import Wizard V5.0

GDSII Import Wizard V5.0 (build 20220217)

GDS Import Wizard V5.0

FastMode
Import
Wizard model
1) Files input
2) Stackup XML
3) EDB Post
About

Function List

Work Area

ControlXml

Tech File Browse

GDSII Browse

SimplifyDielectric ☒ UseSheetLayer

MergeMethod ☐ UseDefaultDF

ThinDielectricThreshold

DkDeviationThreshold

EDB Generation

AEDT Installed Dir Browse

EBD File Browse

☒ Auto Generate Component ☒ Add TSV Insulator Ring ☐ UseTemperatureDependMaterial

☒ ConvertPolygonToCircle

Import Close

Running in Fast Mode

Fast Mode

Fast mode provides a way of one click to Import all. Compared with Wizard mode, fast mode provides faster setting, but it cannot edit the intermediate files and fewer options.

GDSII Import Wizard V5.0 (build 20220217)

GDS Import Wizard V5.0

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Select FastMode

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Import Close

Fast Mode

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GDS Import Wizard V5.0

FastMode

Import

Wizard model

1) Files input

2) Stackup XML

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About

ControlXml

Tech File D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx Browse

GDSII D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds Browse

SimplifyDielectric Weighted Average UseSheetLayer ☒

MergeMethod MergeThinLayer UseDefaultDF ☐ 0.02

ThinDielectricThreshold 0.1

DkDeviationThreshold 0.05

EDB Generation

AEDT Installed Dir C:\Program Files\AnsysEM\v221\Win64\ Browse

EBD File D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\test.aedb Browse

☒ Auto Generate Component ☒ Add TSV Insulator Ring ☐ UseTemperatureDependMaterial

☒ ConvertPolygonToCircle

Import Close

Set IRCX and GDS files

Control XML Option

AEDT Version and Project path

EDB post-processing

Click Import to import GDS to 3DL at once

Running in Wizard Mode

Fast Mode

GDSII Import Wizard V5.0 (build 20220217)

GDS Import Wizard V5.0

FastMode

Import

Wizard model

1) Files input

2) Stackup XML

3) EDB Post

About

Select WizardMode

Files Input

TechFile (ircx, csv) D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_ Browse

LayerMap Browse

GDSII D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gc Browse

NetLayerMap metal3:133:0 metal4:126:0 ubmb:125:100 metal1:131:0 mb1:131:100 metal2: AutoSet

Test Extracta Nets

Next Close

Wizard Mode provides more detailed setting and control.
Wizard Mode and Fast Mode share the same setting and options.

Fast Mode – 1) Files input

GDSII Import Wizard V5.0 (build 20220217)

GDS Import Wizard V5.0

FastMode

Import

Wizard model

- 1) Files input
- 2) Stackup XML
- 3) EDB Post

About

Files Input

TechFile (ircx, csv) D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_ Browse

LayerMap Browse

GDSII D:\Study\Script\repository\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gc Browse

NetLayerMap metal3:133:0 metal4:126:0 ubmb:125:100 metal1:131:0 mb1:131:100 metal2: AutoSet

Test Extracta Nets

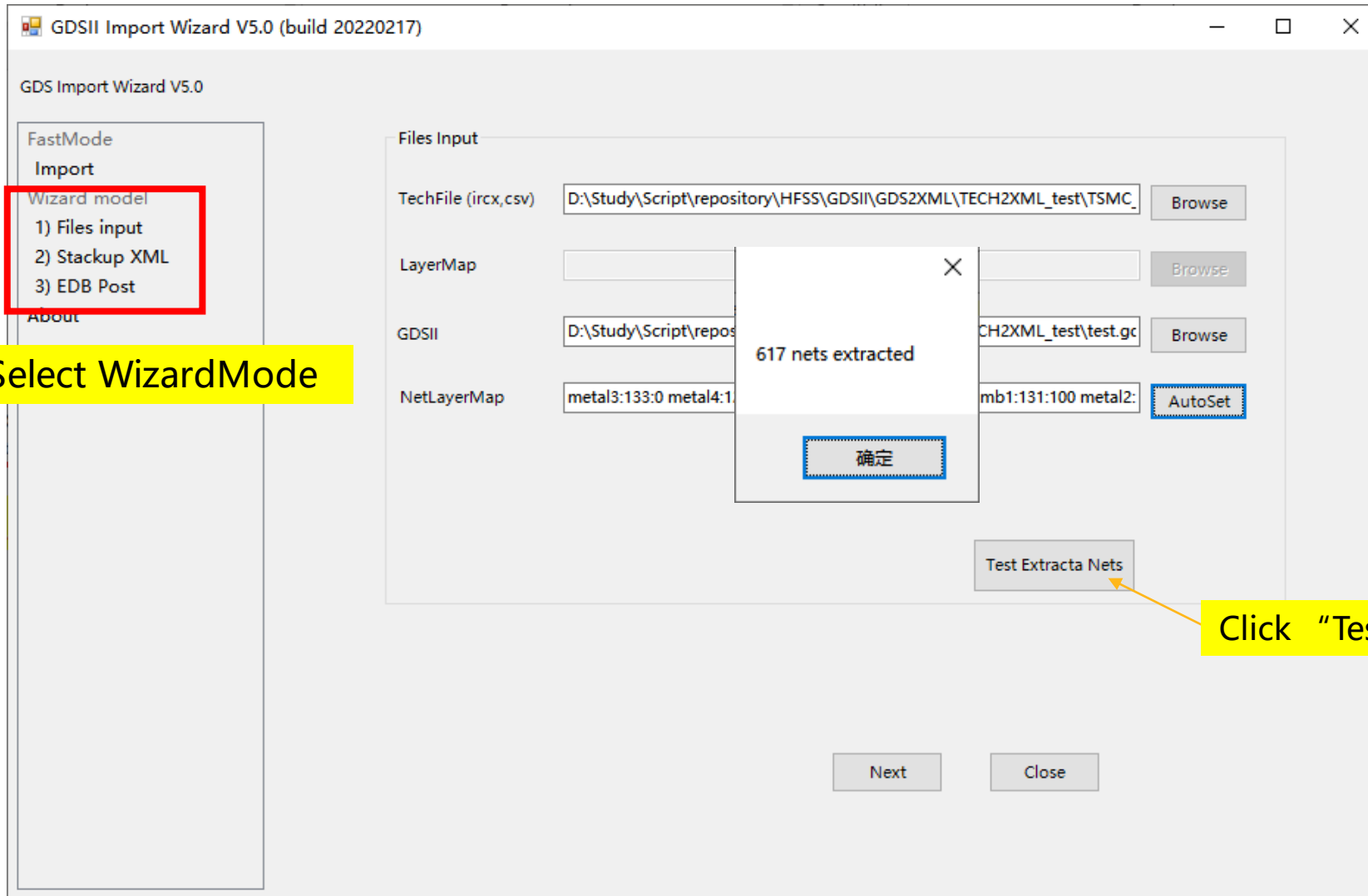
Next Close

Select WizardMode

Set IRCX and GDS files

NetLayerMap: Indicates which layers of GDS are used to extract Nets information. Click "AutoSet" to extract all net layer map in IRCX.

Fast Mode – 1) Files input



Click "Test Extracta Nets" for nets test.

Fast Mode – 2) Stackup XML

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GDS Import Wizard V5.0

FastMode

Import

Wizard model

1) Files input

2) Stackup XML

3) EDB Post

About

Control XML

Stackup XML

SimplifyDielectric

MergeMethod

ThinDielectricThreshold

DkDeviationThreshold

☐ UseDefaultDF

☒ CreateViaGroups

☒ UseSheetLayer

☒ Add TSV Insulator Ring

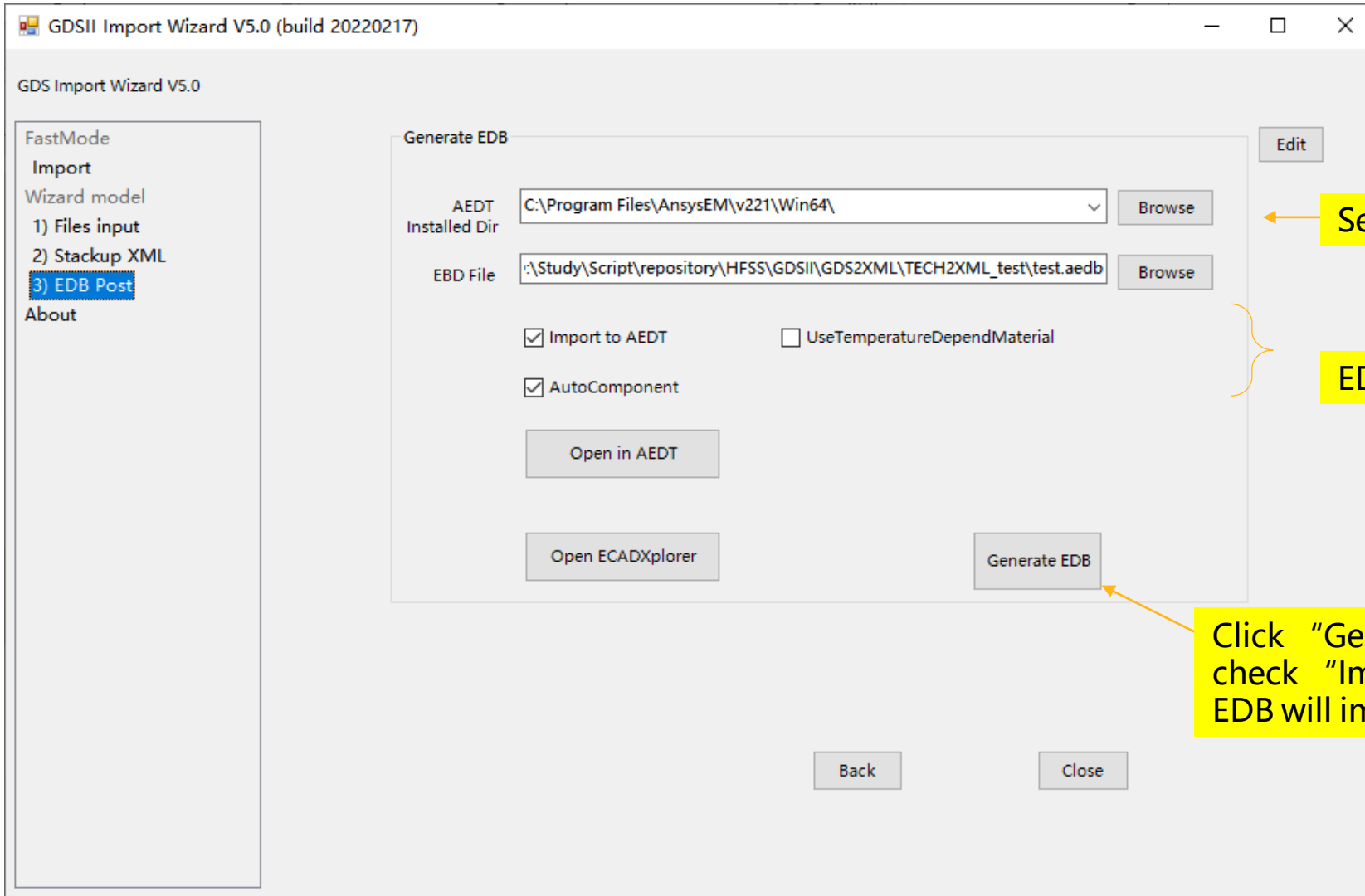
☒ ConvertPolygonToCircle

Set Stackup XML Save path

Control XML Option

Click "Generate Control XML" to generate Control XML

Fast Mode – 3) EDB Post



Set AEDT Path (Version)

EDB post Option

Click "Generate EDB" to generate EDB, if check "Import to AEDT", the generated EDB will import to 3DL.

Running in windows command line

Running in batch mode - Windows

Eg1. Configure from system environment:

- set AedtInstallDir=C:\Program Files\AnsysEM\AnsysEM21.1\Win64
- set GdsFile=D:\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds
- set TechFile=D:\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx
- set path=% AedtInstallDir %\common\IronPython;%path%
- ipy64 GDSImportWizard.py -batch

Eg2. Configure from command arguments:

- set AedtInstallDir=C:\Program Files\AnsysEM\AnsysEM21.1\Win64
- set path=% AedtInstallDir %\common\IronPython;%path%
- ipy64 GDSImportWizard.py -GdsFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds" -TechFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx"

Note: system environment and command arguments could be mixed.

Running in batch mode - Windows

- A short command is supported:
 - ipy64 GDSImportWizard.py gdspath
 - ipy64 GDSImportWizard.py gdspath edbpath
- Eg3. short command
 - ipy64 GDSImportWizard.py "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds" -TechFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx"

Running in Linux terminal command

Running in batch mode - Linux

Eg1. Configure from system environment:

- export AedtInstallDir='/home/ansys/app/AnsysEM20.1/Linux64'
- export GdsFile=/home/ansys/yguo/test/test.gds
- export TechFile=/home/ansys/yguo/test/TSMC_INTERPOSER.ircx
- export ipy64="\$AedtInstallDir /common/mono/Linux64/bin/mono \$AedtInstallDir /common/IronPython/ipy64.exe"
- \$ipy64 GDSImportWizard.py

Eg2. Configure from command arguments:

- export AedtInstallDir='/home/ansys/app/AnsysEM20.1/Linux64'
- export ipy64="\$AedtInstallDir /common/mono/Linux64/bin/mono \$AedtInstallDir /common/IronPython/ipy64.exe"
- \$ipy64 GDSImportWizard.py -GdsFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds" - TechFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx"

Note: system environment and command arguments could be mixed.

Running in batch mode - Linux

- A short command is supported:
 - `ipy64 GDSImportWizard.py gdspath`
 - `ipy64 GDSImportWizard.py gdspath edbpath`
- Eg3. short command
 - `export AedtInstallDir='/home/ansys/app/AnsysEM20.1/Linux64'`
 - `export ipy64="$aedtInstallPath/common/mono/Linux64/bin/mono $aedtInstallPath/common/IronPython/ipy64.exe"`
 - `$ipy64 GDSImportWizard.py "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\test.gds" – TechFile "D:\HFSS\GDSII\GDS2XML\TECH2XML_test\TSMC_INTERPOSER.ircx"`

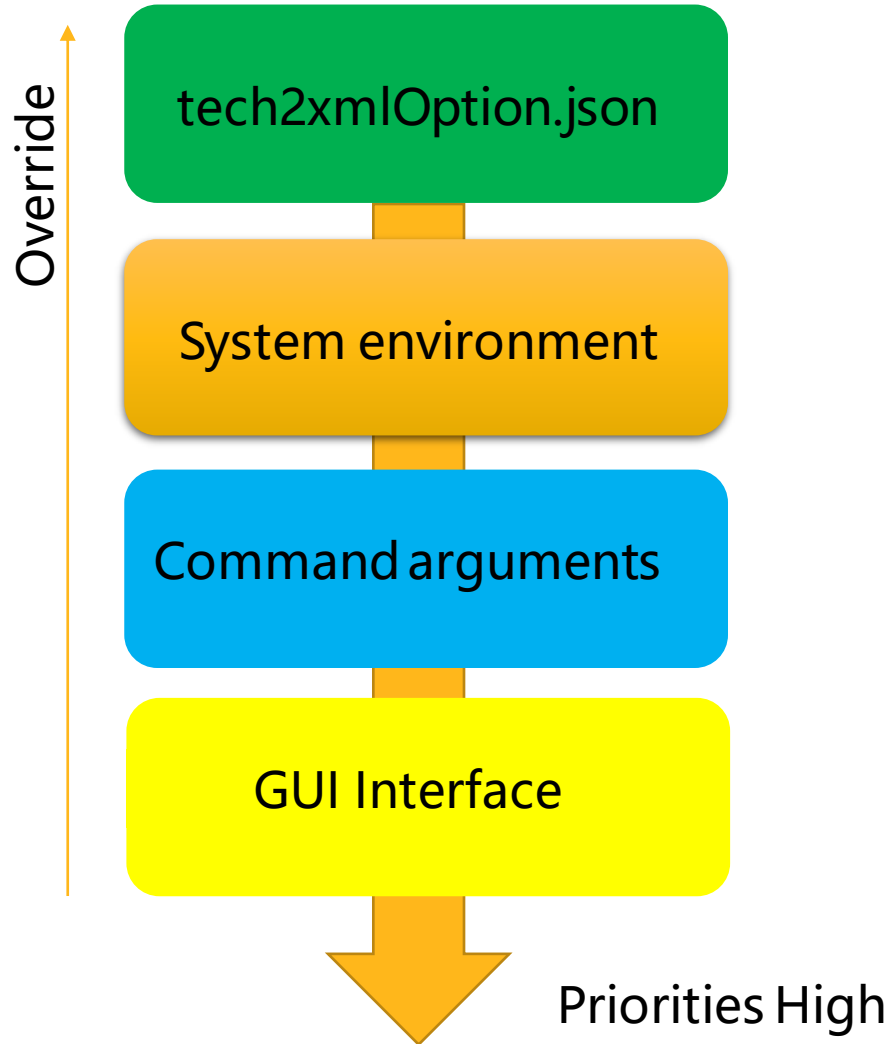
Options Setting

Options Parameters in GDS Import Wizard

- There are Four ways to set the options for GDS Import Wizard
 - 1) By configure file: tech2xmlOption.json (in same directory with toolkit)
 - 2) By system environment variables
 - 3) Set the parameters in command arguments.
 - 4) Set in GUI.

These three methods will achieve the same effect, but with different priorities.

Options Priorities



If the same parameter given in multiple places, the higher priority parameter will take precedence.

As one example, if one parameter is given in System environment and tech2xmlOption.json at the same time, System environment value will have high priorities and take precedence.

GUI Interface have the highest priority, Command arguments System environment and tech2xmlOption.json setting will be used as initial values of GUI input elements.

Options

Options		Defalut Value	Description
Stackup XML Parameters			
InputType	0	0: Ircx, others: not define	
UseShortMergeLayerName	True	changing is not recommended	
SimplifyDieletricMethod	1,	0: NoSimplify, No Merge on Dielectric, exact layers in IRCX 1 : MergeThinLayer, Merge layer thinner than a specific value 2:BlockMerge, use average DK on all layers except substrate	
MergeDielectricMethod	0	0: Weighted Average 1: Weighted Average 2: Kraszewski equation 3: Landau equation 4: Lichtenecker equation	
ThinDielectricThreshold	0.1	0.1: Merge layer when layer thickness<0.1um, default unit um	
DkDeviationThreshold	0.05 or 5%	0.05: Merge layers when dk difference less then 10%	
FixedSmallLayerGap	0.005	0.005: Fix small air gap between layers less then 0.005um, default unit um	
UseDefaultDF	True	True: If not hav df value in technology, a default df value will be used false: If not hav df value in technology, will set df =0	
DefaultDF	0.02	set for default df value	
NotUseDfonSubstrate	True	True: default df value will never used on Substrate layer(Silicon material), it is recommended to set as True.	
UseSheetLayer	True	True: set the layers as 0um when it small then "SheetLayerThreshold", which will avoid to generatelarge number of tiny meshes	
SheetLayerThreshold	0.0015	0.0015: if "UseSheetLayer" is True, layers which < 0.0015um will set to zero thickness(treat as 2D sheet object)	
CreatViaGroups	True	True: ViaGroups will be implemented on via layers	
IgnoreLayersReg	"air,ctm.*,cbm.*"dtce.*"	layers will not import into 3D Layout. Regular expressions are used, and ignoreLayerNames are seprate with comma or space	
TextLayermap	None	Text layers indicate for net extraction, None will use all text layer in technolo yg files. User could set it accrond the rule: "ubmb:125:100, "ubump:125:0"	
ConvertPolygonToCircle	True	True: will convert all polygons on a layer to circles, only support from AEDT 2022R1	
ConvertPolygonToCircleRatio	0.9	polygons with Circle Ratio0.9 will convert to circles, valid when ConvertPolygonToCircle as True	

/ Options

Path Parameters		
TechFile	None	input: techFile path (Absolute), must set
LayerMapFile	None	input: layerMapFile path (Absolute), not used
GdsFile	None	input: gdsFile path (Absolute), must set
AedtInstallDir	None	input: AEDT installation path (Absolute), must set to do edb post
ControlXmlPath	None	output: controlXmlPath (Absolute), optional
edbPath	None	output: edbPath (Absolute), optional
Gds post Parameters		
OpenInAedt	True	true: will open EDB when the conversion is completed
AutoComps	True	true: will automatic generation device, easy port creation
CompLayerList	1,-1	index for which layers will generate components, 1 indicate top layer, -1 indicate bottom layer, and so on.
ComponentPinsTolerance	10	Pins spacing less than 10 times pad diameter with each other will be considered as a component
AutoTSVCoat	True	true: will automatic generation tsv insulator
DissolveViaGroup	True	true: dissolve all groups or component before doing edb post processing
UseTemperatureDependMaterial	True	true: will generate temperature dependence material if TC1/TC2 given in material definition

Custom Technology File (CSV)

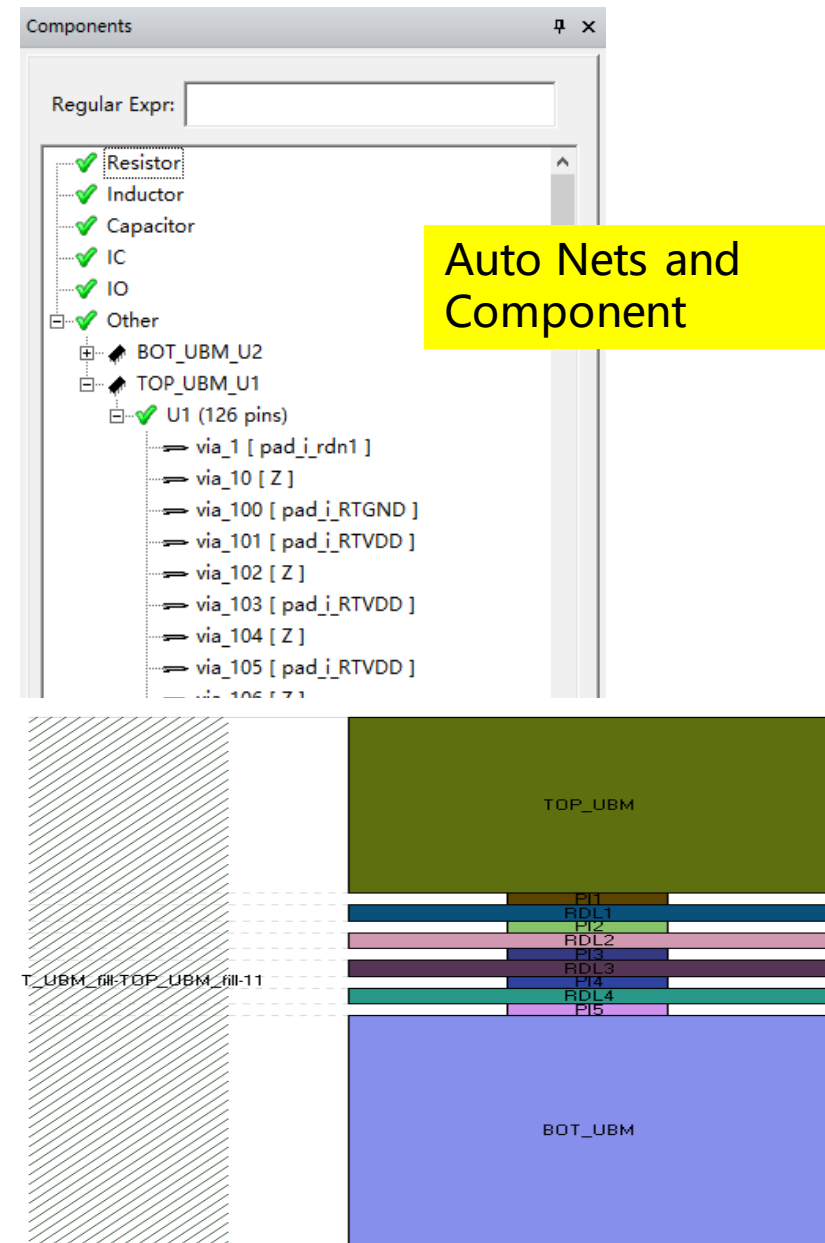
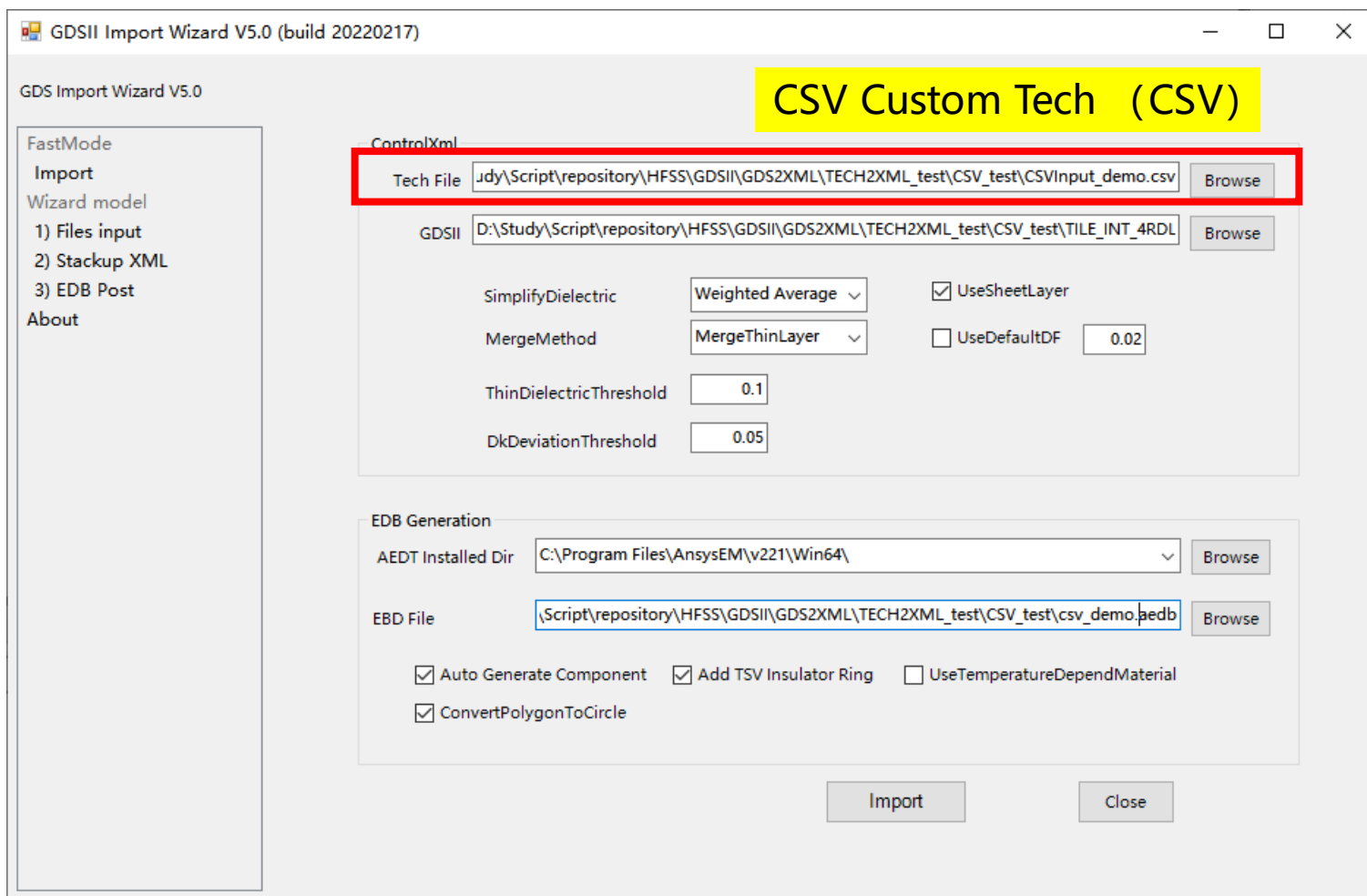
/ CSV Format

CSVInput_demo.csv

NO	LayerName	Type	LayerMap	TextLayerMap	Thickness	Height	LowerLayer	UpperLayer	DK	DF	Cond	TC1	TC2
1	TOP_UBM	C	214;0	214;0	44.5				4	0.02	5.80E+07		
2	PI1	V	11;0		3				4	0.02	5.80E+07		
3	RDL1	C	1;0		4				4	0.02	5.80E+07		
4	PI2	V	12;0		3				4	0.02	5.80E+07		
5	RDL2	C	2;0		4				4	0.02	5.80E+07		
6	PI3	V	13;0		3				4	0.02	5.80E+07		
7	RDL3	C	3;0		4				4	0.02	5.80E+07		
8	PI4	V	14;0		3				4	0.02	5.80E+07		
9	RDL4	C	4;0		4				4	0.02	5.80E+07		
10	PI5	V	15;0		3				4	0.02	5.80E+07		
11	BOT_UBM	C	215;0	215;0	58				4	0.02	5.80E+07		

1. The highlighted column must be given.
2. Type: "C" indicate conductor, "V" indicate Via.
3. TextLayerMap used to trace nets information.
4. The default unit is um.
5. If setting DK/DF/Cond, accurate material will add to stackup
6. Via layer could be described using Thickness or LowerLayer/UpperLayer





CSV Custom Tech Import Demo



Additional remarks

/ Restore default settings

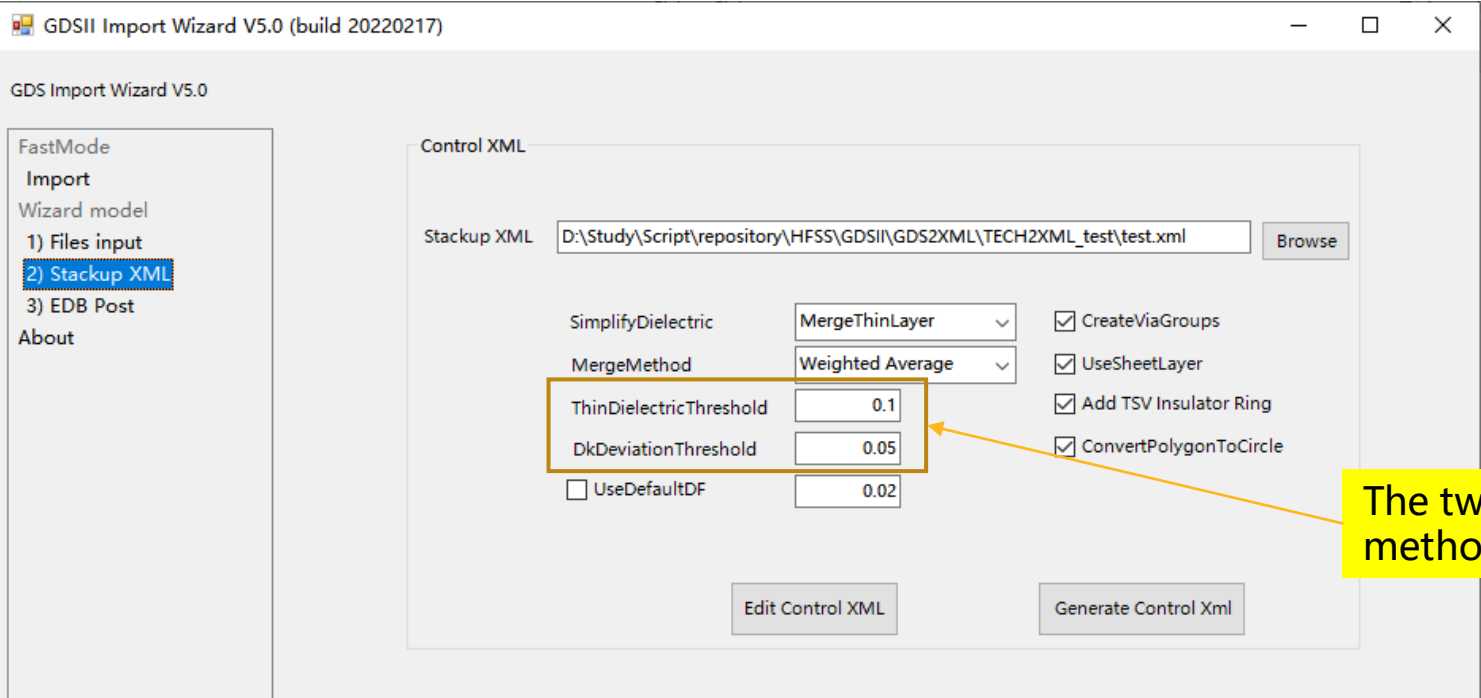
- If you have modified the configuration in tech2xmlOption.json and then want to restore to the default options. Just delete the file and run the toolkit again, tech2xmlOption.json will be made with default options.
- Don't forget that environment variables have higher priority. You need to check the settings in environment variables to make sure it is in purposeful.

名称	修改日期	类型	大小
 GDS Import Wizard V5.0 Manual-202...	2/21/2022 12:19 PM	Foxit Reader PD...	848 KB
 GDSImportWizard.py	2/18/2022 9:14 AM	Python File	2 KB
 gdslib.dll	3/6/2022 4:20 PM	应用程序扩展	1,334 KB
 <u>tech2xmlOption.json</u>	3/6/2022 4:24 PM	JSON File	2 KB

About Stack simplification

Return

Stack simplification can effectively reduce the complexity of the model and improve efficiency

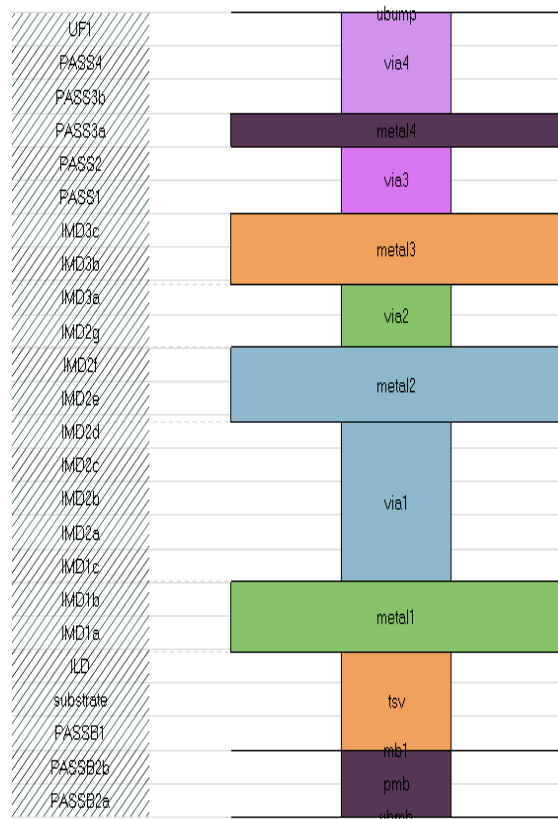


The two options only available on MergeThinLayer method, they control how the thin layers be merged.

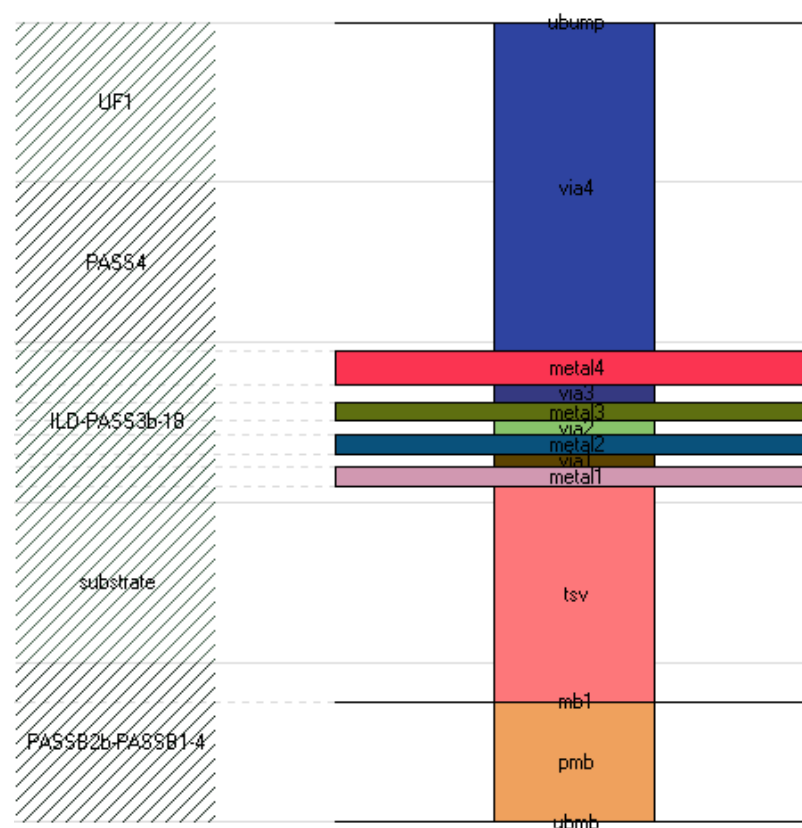
e.g.	ThinDielectricThreshold	DkDeviationThreshold	Note
1	0.1	0.1	Merge when layer thickness<0.1um, or 2 layers dk difference less than 10%
2	0.05	-1	Only merge when layer thickness<0.05um
3	-1	0.05	Only merge when 2 layers dk difference less than 5%

About Stack simplification

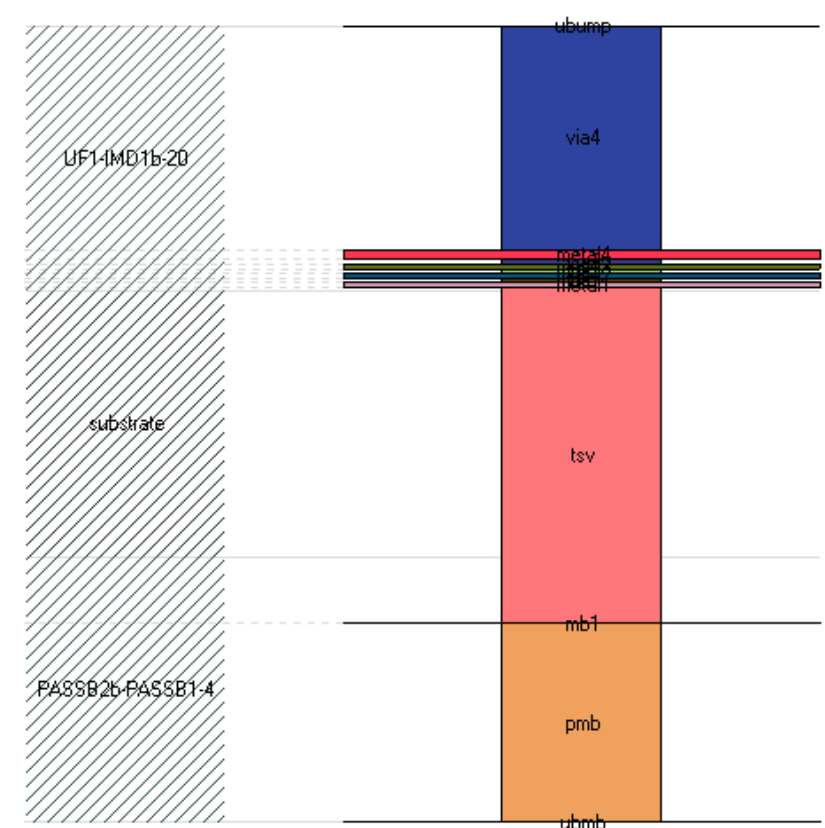
- Merge Method Compare



NoSimplify



MergeThinLayer



BlockMerge

Use Sheet Layer

Return

Sheet layer will reduce the number of meshes

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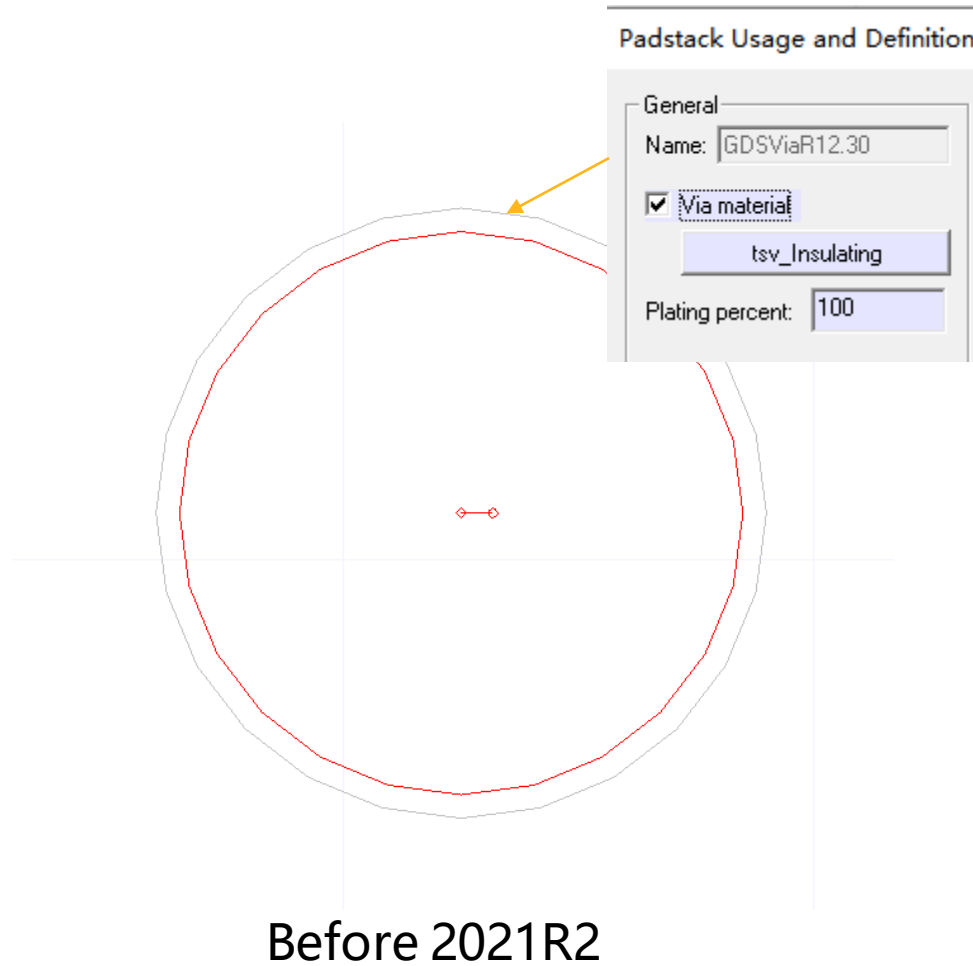
Control XML

Stackup XML

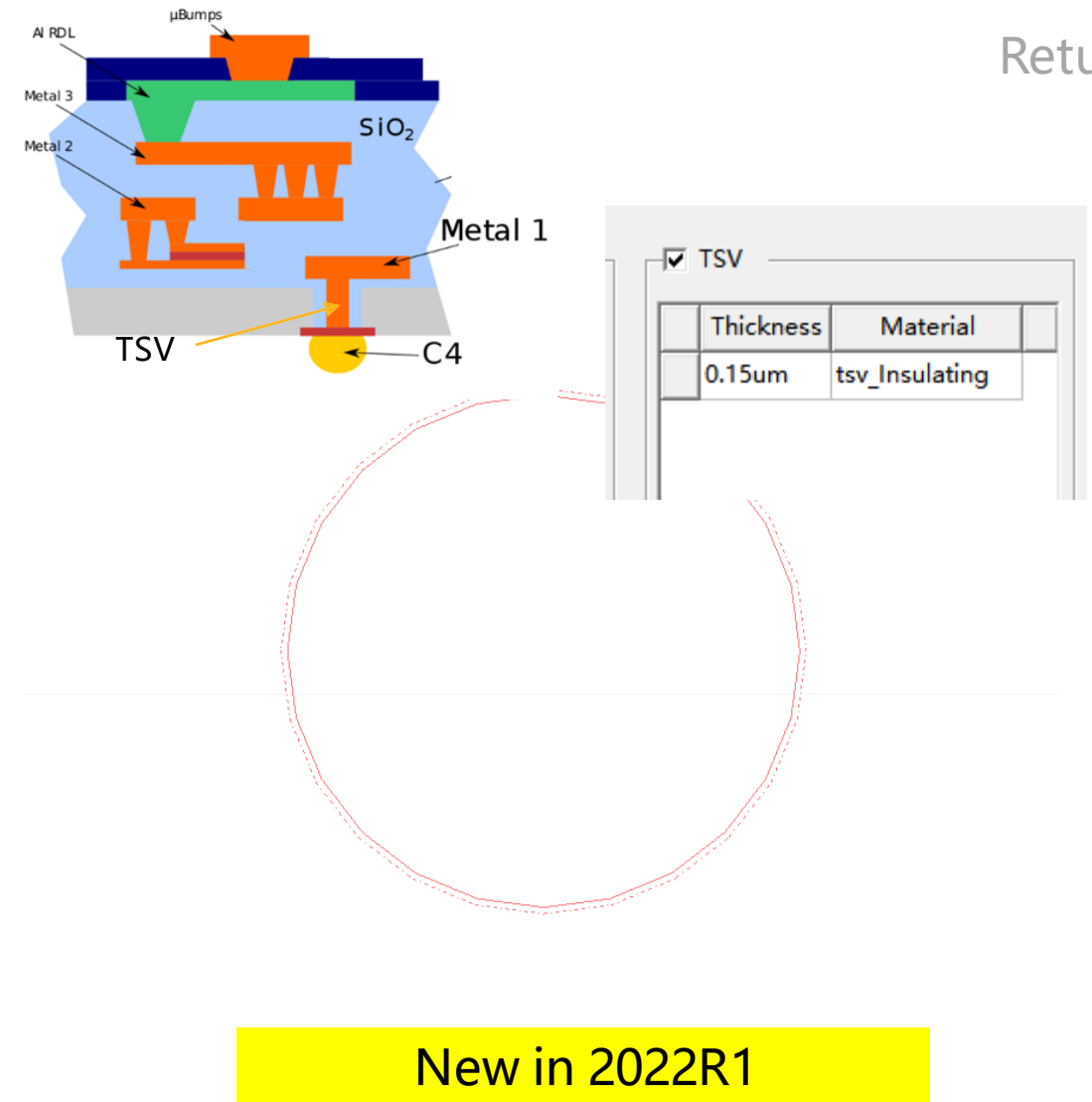
SimplifyDielectric ☒ CreateViaGroups
MergeMethod ☒ UseSheetLayer
 ☒ Add TSV Insulator Ring
 ☒ ConvertPolygonToCircle
☐ UseDefaultDF

material	signal	material_cond	thickness
ILD_PASS3b_18	dielectric	ILD_PASS3b_18	7.04um
substrate	dielectric	substrate	100um
tsv	via	tsv_cond	101.476um
mb1	signal	mb1_cond	0um
PASSB2b_PASSB1_4	dielectric	PASSB2b_PASSB1_4	3.201um
pmb	via	pmb_cond	2.4um
ubmb	signal	ubmb_cond	0um

Layer with thin thickness tool will convert to sheet (0um).
thin thickness is controlled by option SheetLayerThreshold



TSV insulation is realized using 2 overlapping vias

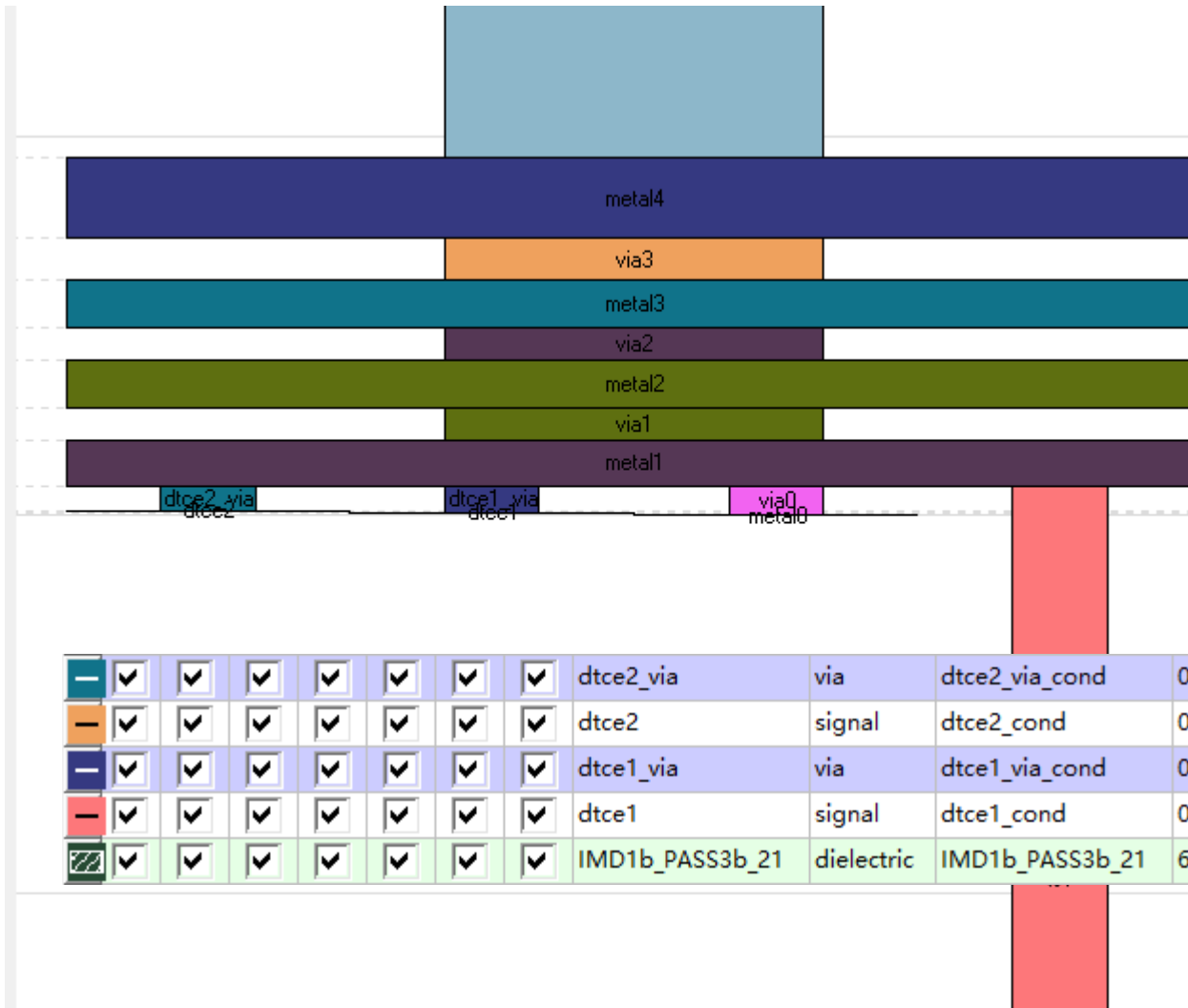


TSV insulation is realized using layer TSV new property

GDS Import Wizard V5.0 will automatically choose the best way according to which AEDT version you run it.

/ ICap (integrated capacitors)

Return



ICAP layers are ignored by default because it is thin and not have effect most of the time.

ICAP layers could be imported by setting IgnoreLayersReg to "air"

Temperature dependent material

137

138

139

140

141

142

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145

146

147

148

149

150

151

152

* CONDUCTOR 10 15 (NAME:V, TYPE:V, HEIGHT:V, THICKNESS:V, WIDTH:V, SPACE:V, B_BIAS:V, T_BIAS:V, BIAS:V, RESIST:V, ABOVE_IMD:V, ABOVE_IMD_DIFF:V, TC1:V, TC2:V, INDIE_TABLE:P)

FIELD TYPE HEIGHT THICKNESS WIDTH SPACE B_BIAS T_BIAS BIAS RESIST ABOVE_IMD ABOVE_IMD_DIFF TC1 TC2 INDIE_TABLE

NAME

ubump C 142.639000 0.001000 22.000000 18.000000 0.0000 0.0000 0.0000 0.00010 UF1 -0.0010 0.00000e+00 0.00000e+00 N/A

metal4 C 105.190000 1.450000 3.000000 2.000000 0.3890 -0.0340 0.1775 0.02100 PASS2 0.0000 3.89000e-03 -1.50000e-07 INDIE_TABLE[metal4]

metal3 C 103.565000 0.850000 0.400000 0.400000 0.0000 0.1000 0.0500 0.02200 IMD3a -0.0750 3.63100e-03 -1.39200e-06 INDIE_TABLE[metal3]

metal2 C 103.565000 0.850000 0.400000 0.400000 0.0000 0.1000 0.0500 0.02200 IMD2d -0.0750 3.63100e-03 -1.39200e-06 INDIE_TABLE[metal2]

ctm 0.0000 0.00000e+00 0.00000e+00 INDIE_TABLE[ctm]

cbm 0.0000 0.00000e+00 0.00000e+00 INDIE_TABLE[cbm]

metal1 0.0000 0.00000e+00 0.00000e+00 INDIE_TABLE[metal1]

ILD -0.0750 3.63100e-03 -1.39200e-06

PASSB2b -0.0010 0.00000e+00 0.00000e+00 N/A

N/A 0.0000 0.00000e+00 0.00000e+00 N/A

PASSB1 N/A N/A N/A N/A

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MergeMethod MergeThinLayer ☐ UseDefaultDF 0.02

ThinDielectricThreshold 0.1

DkDeviationThreshold 0.05

EDB Generation

AEDT Installed Dir C:\Program Files\AnsysEM\v221\Win64\

EBD File Browse

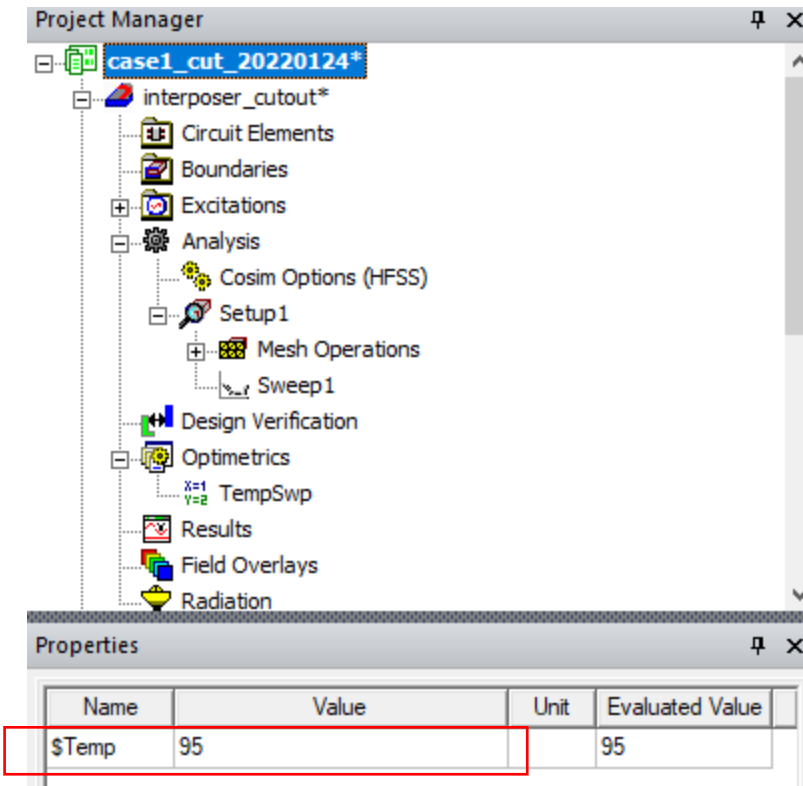
☒ Auto Generate Component ☒ Add TSV Insulator Ring ☒ UseTemperatureDependMaterial

☒ ConvertPolygonToCircle

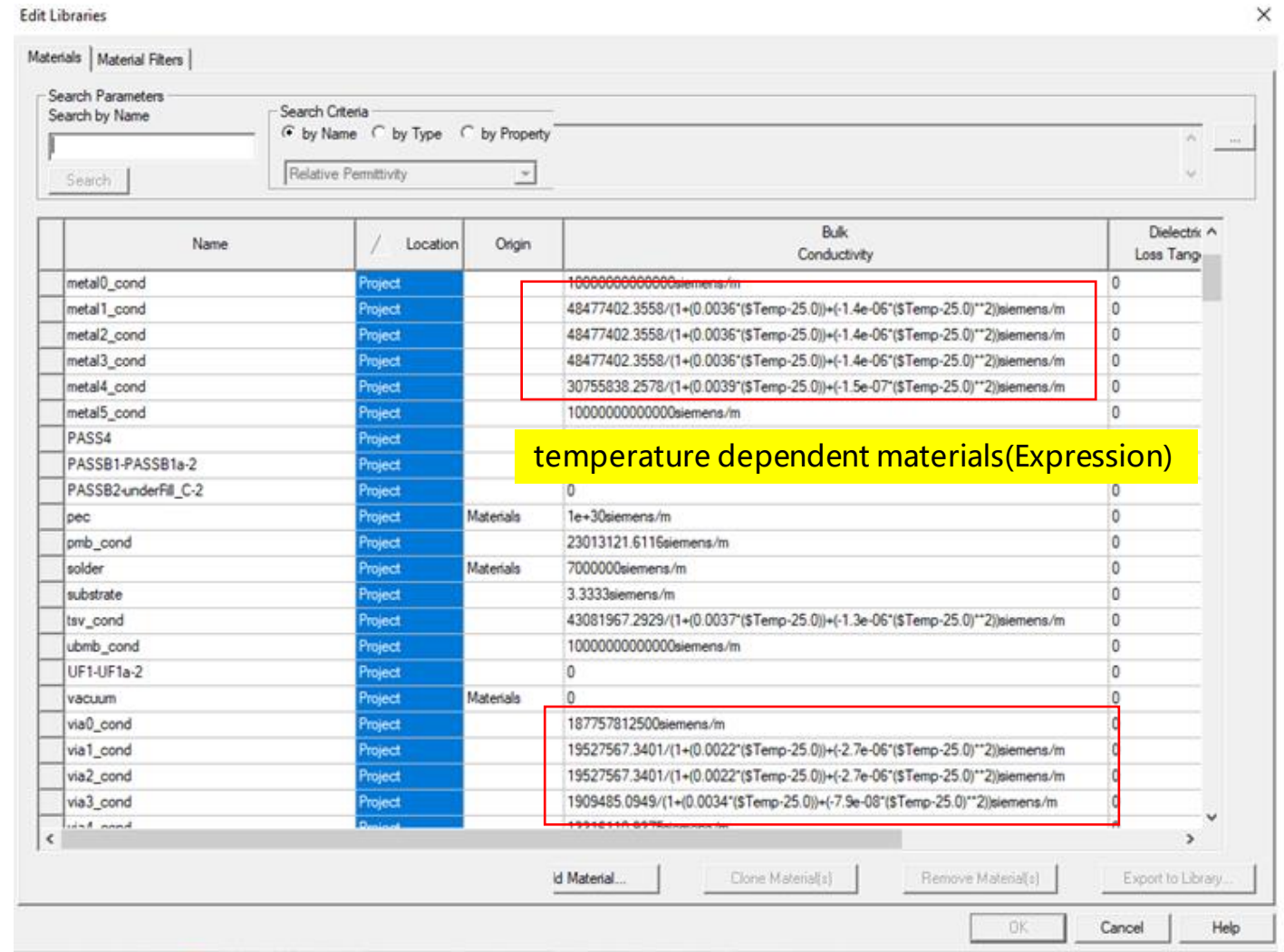
Import Close

Temperature will affect the conductivity of metal and increase the resistance. If Tc1 and TC2 are given and **UseTemperatureDependMaterial** is checked, temperature dependent materials will be generated

Temperature dependent material



Sweep the \$Temp variable will get the corner results at different temperatures



 **Ansys**

