GDS Import Wizard V5.0 Manual

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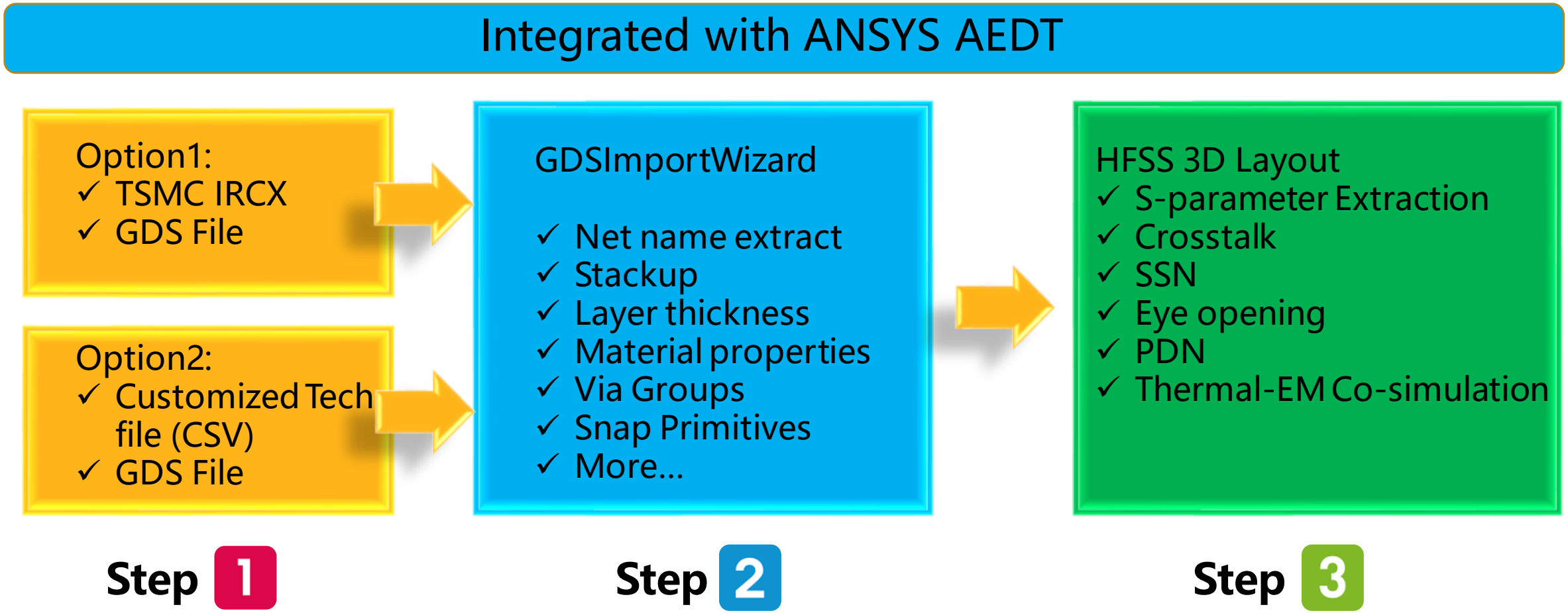
About GDS Import Wizard

Return

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)

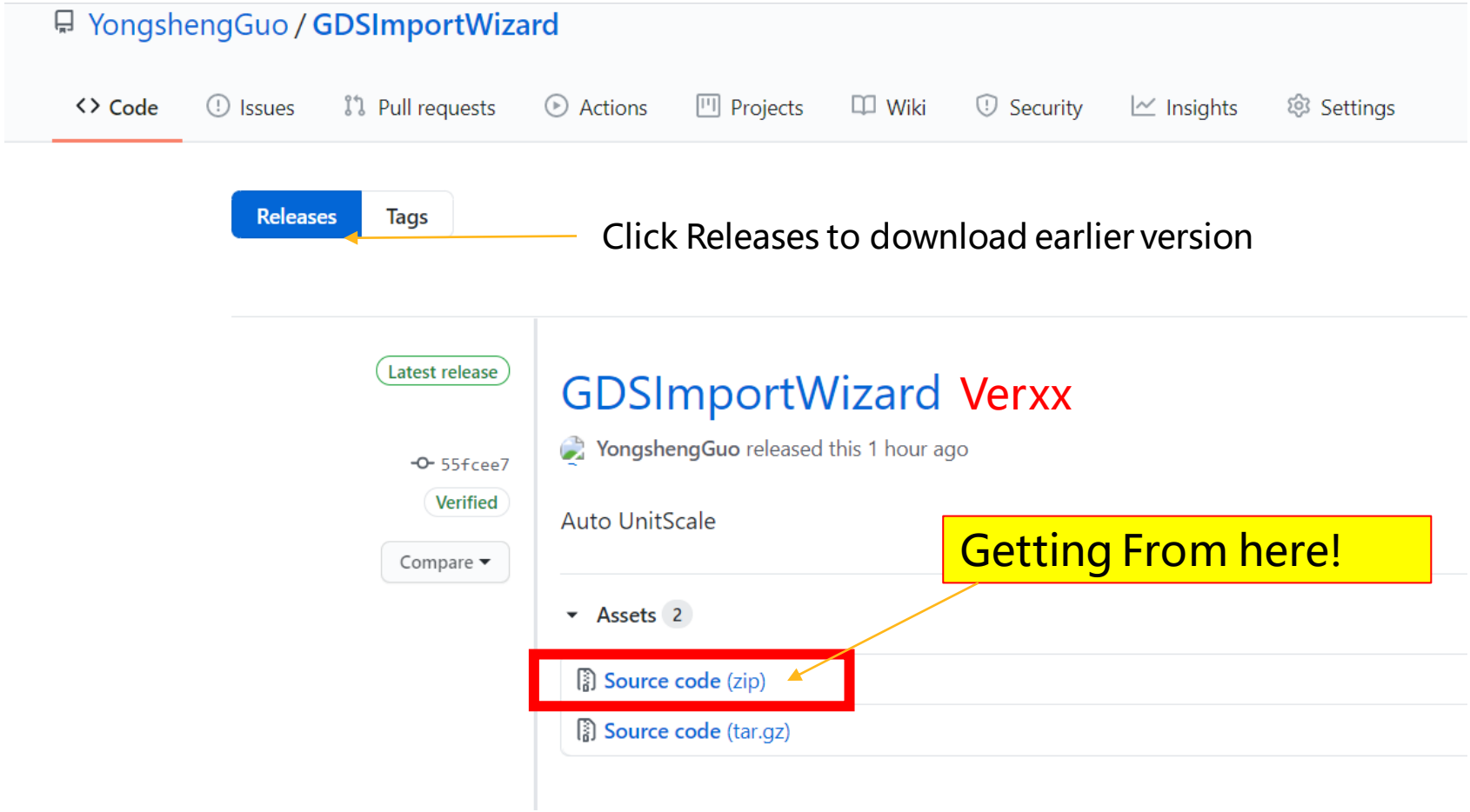
ANSYS workflow for 2.5D/3D SI Interpower Simulation



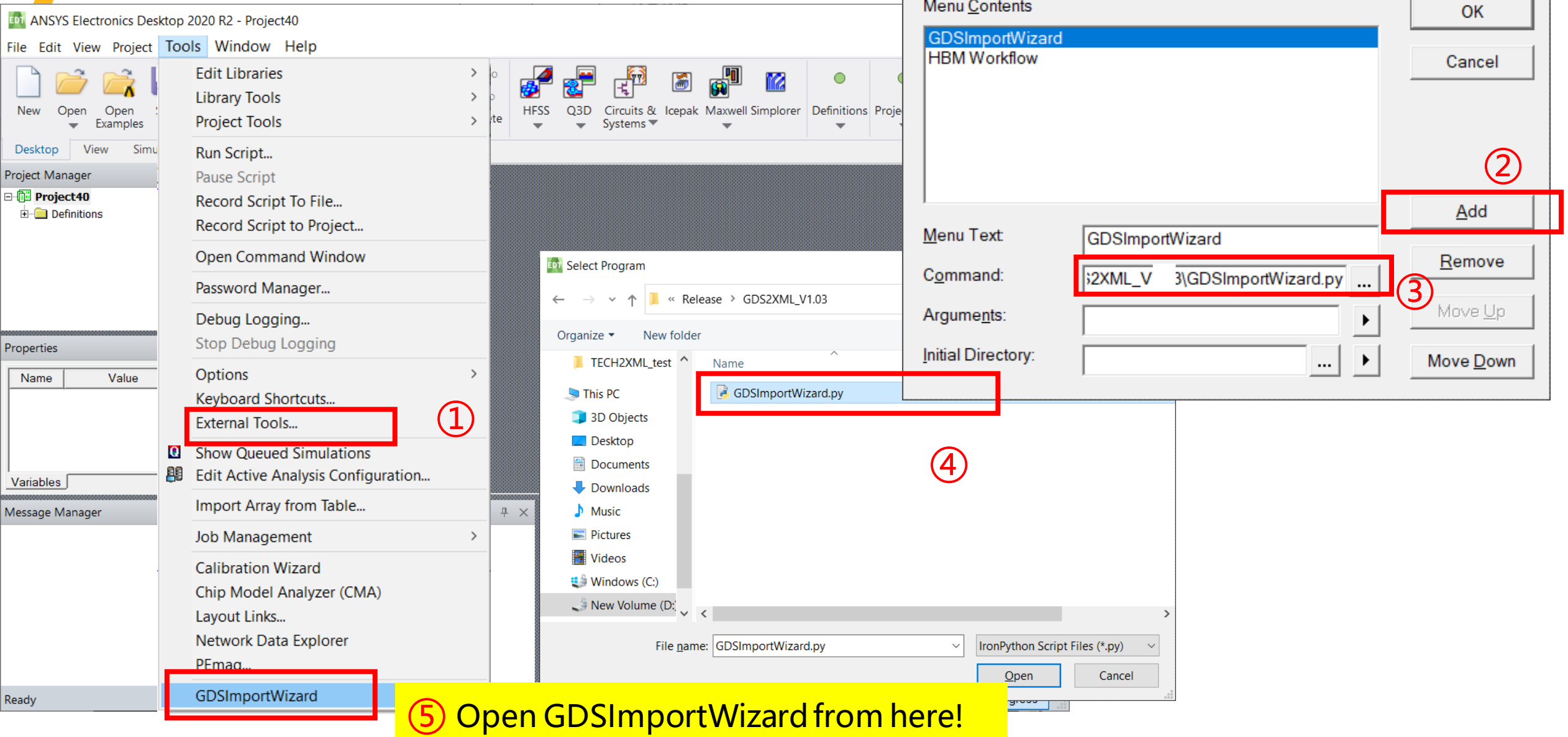
Get the latest GDSImportWizard Tool

Return

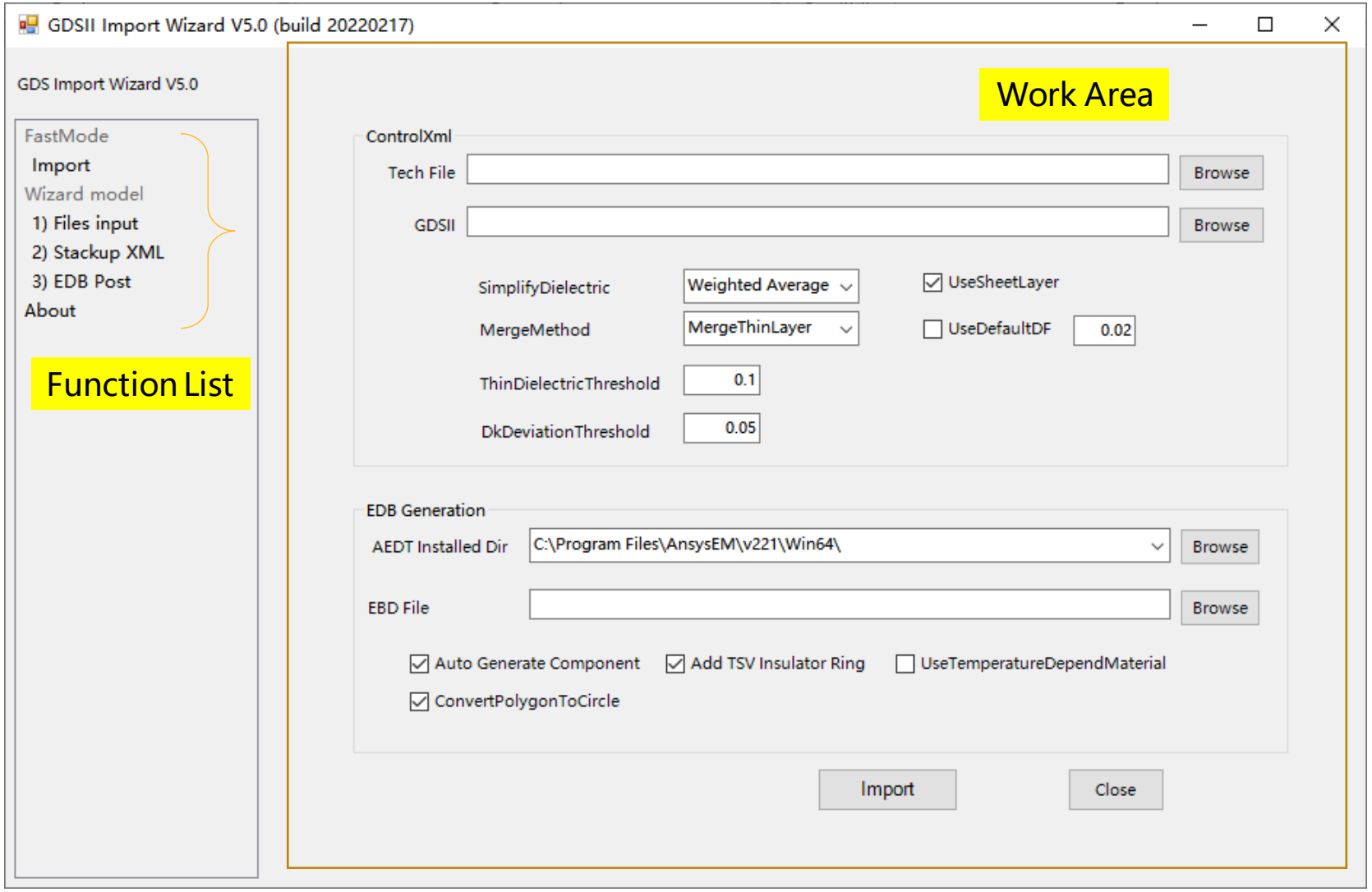
https://github.com/YongshengGuo/GDSImportWizard/releases/latest



Add GDS Import Wizard to AEDT



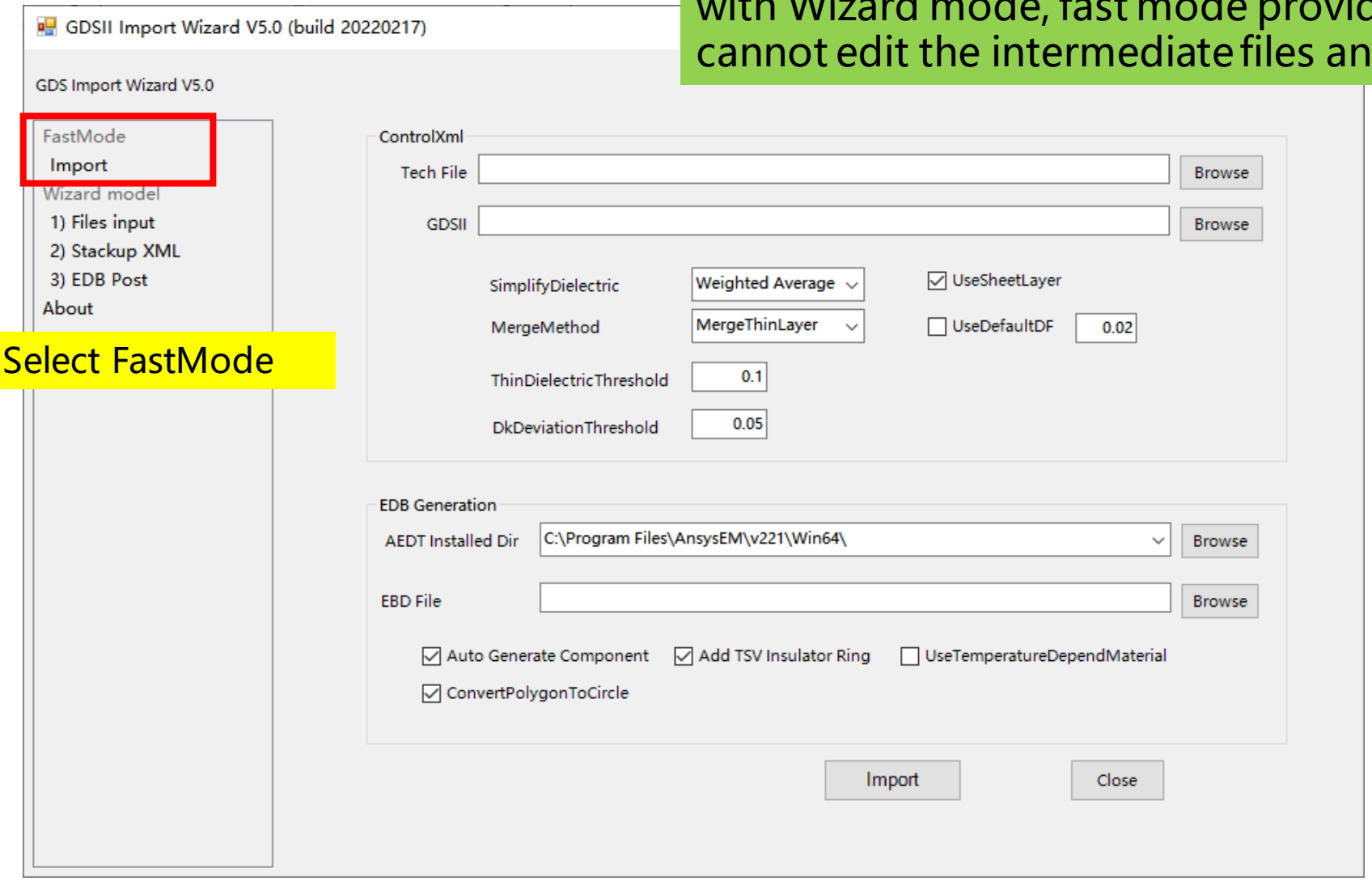
GDS Import Wizard V5.0



Running in Fast Mode

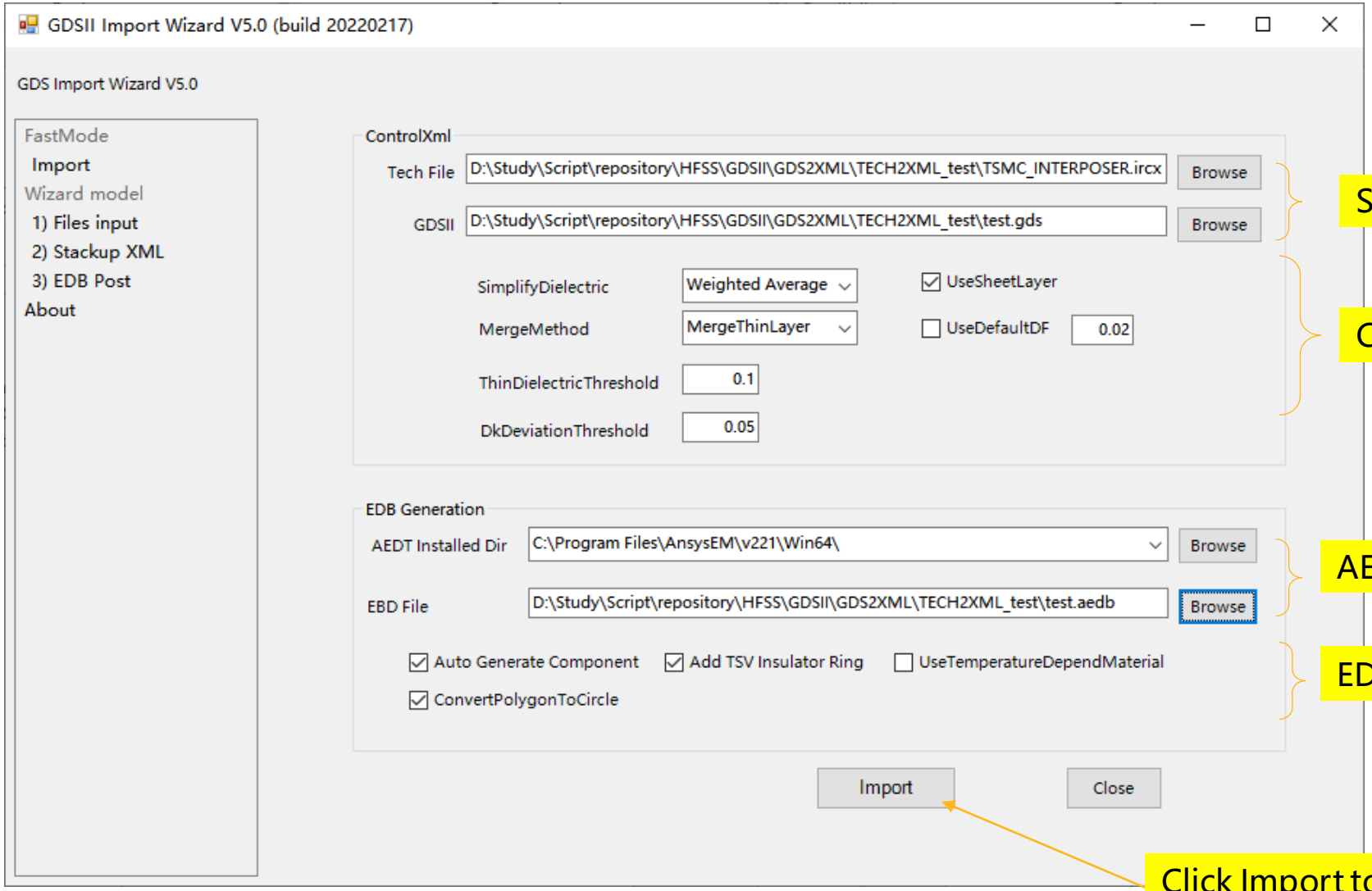
Fast Mode

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 .



Select FastMode

Fast Mode



Set IRCX and GDS files

Control XML Option

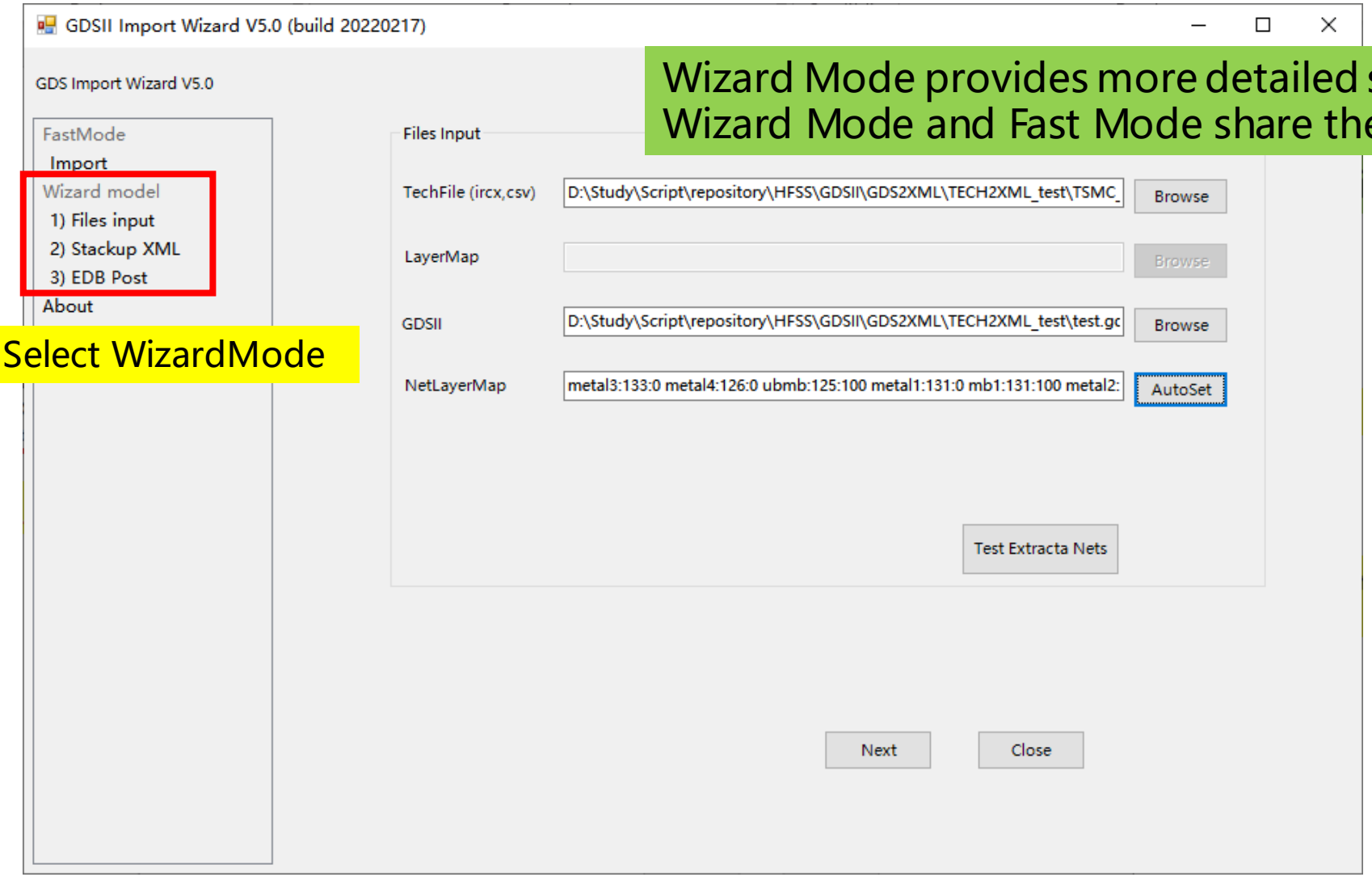
AEDT Version and Project path

EDB post-processing

Click Import to import GDS to 3DL at once

Running in Wizard Mode

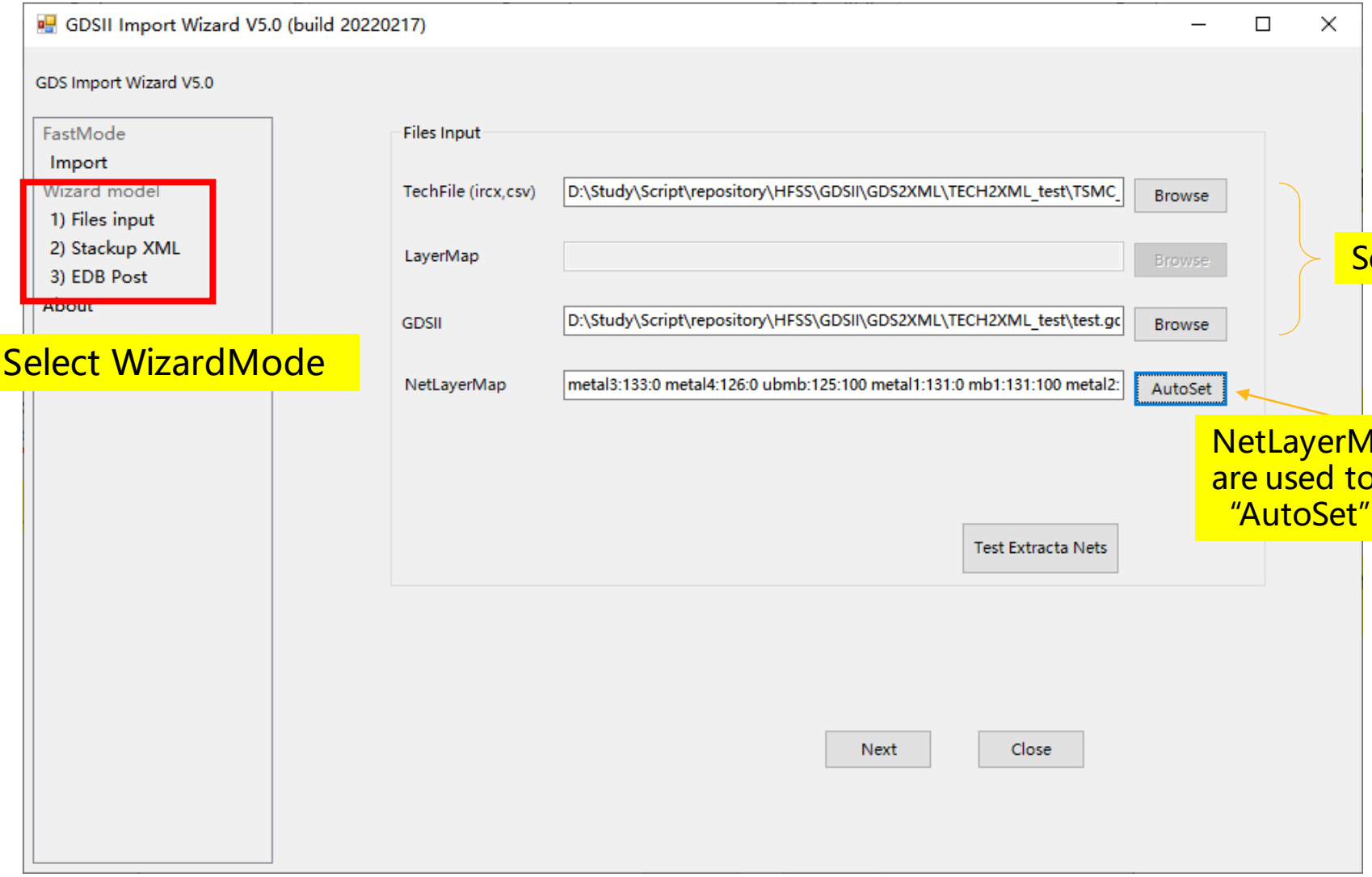
Fast Mode



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

Select WizardMode

Fast Mode – 1) Files input

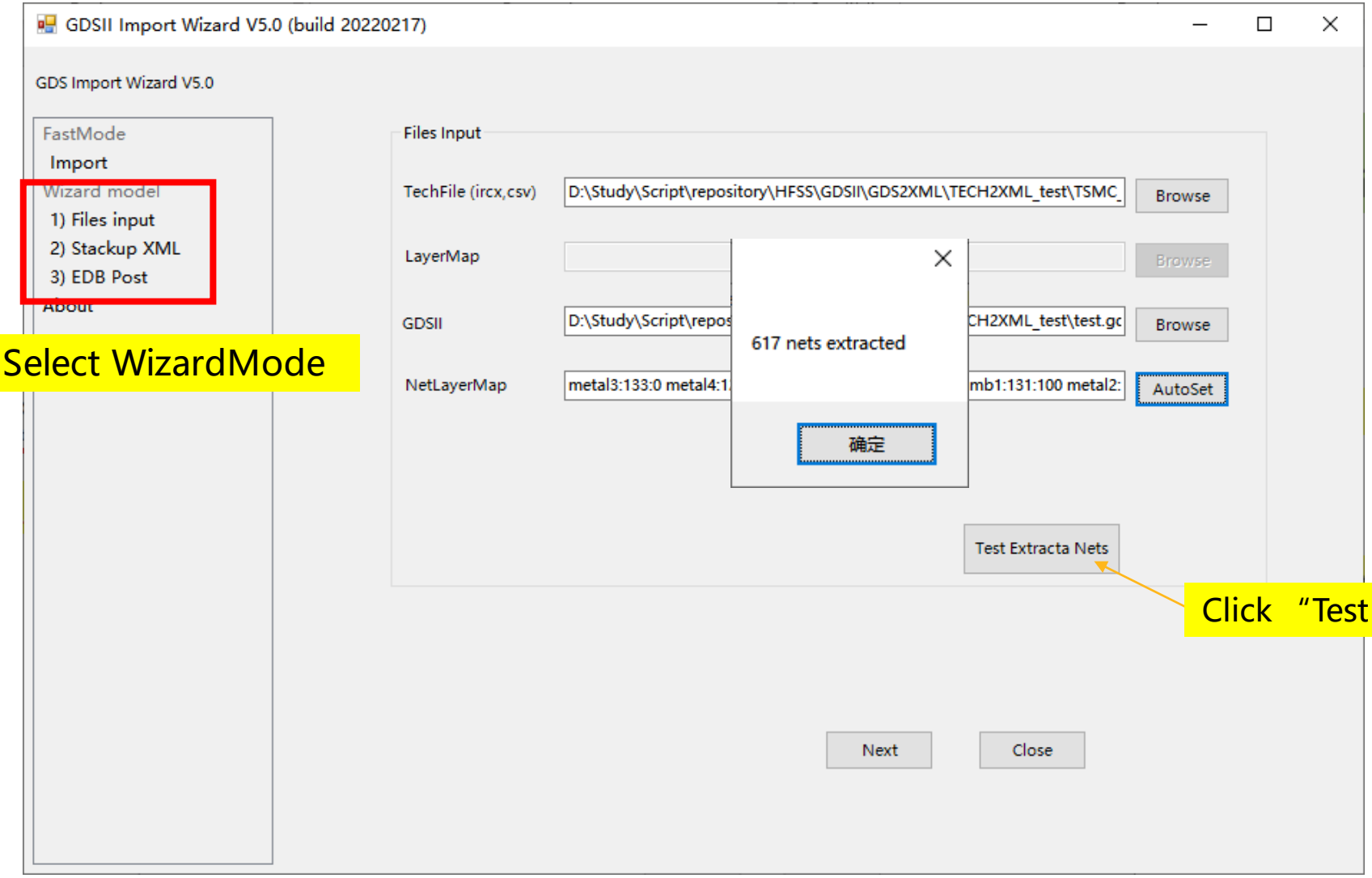


Select WizardMode

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.

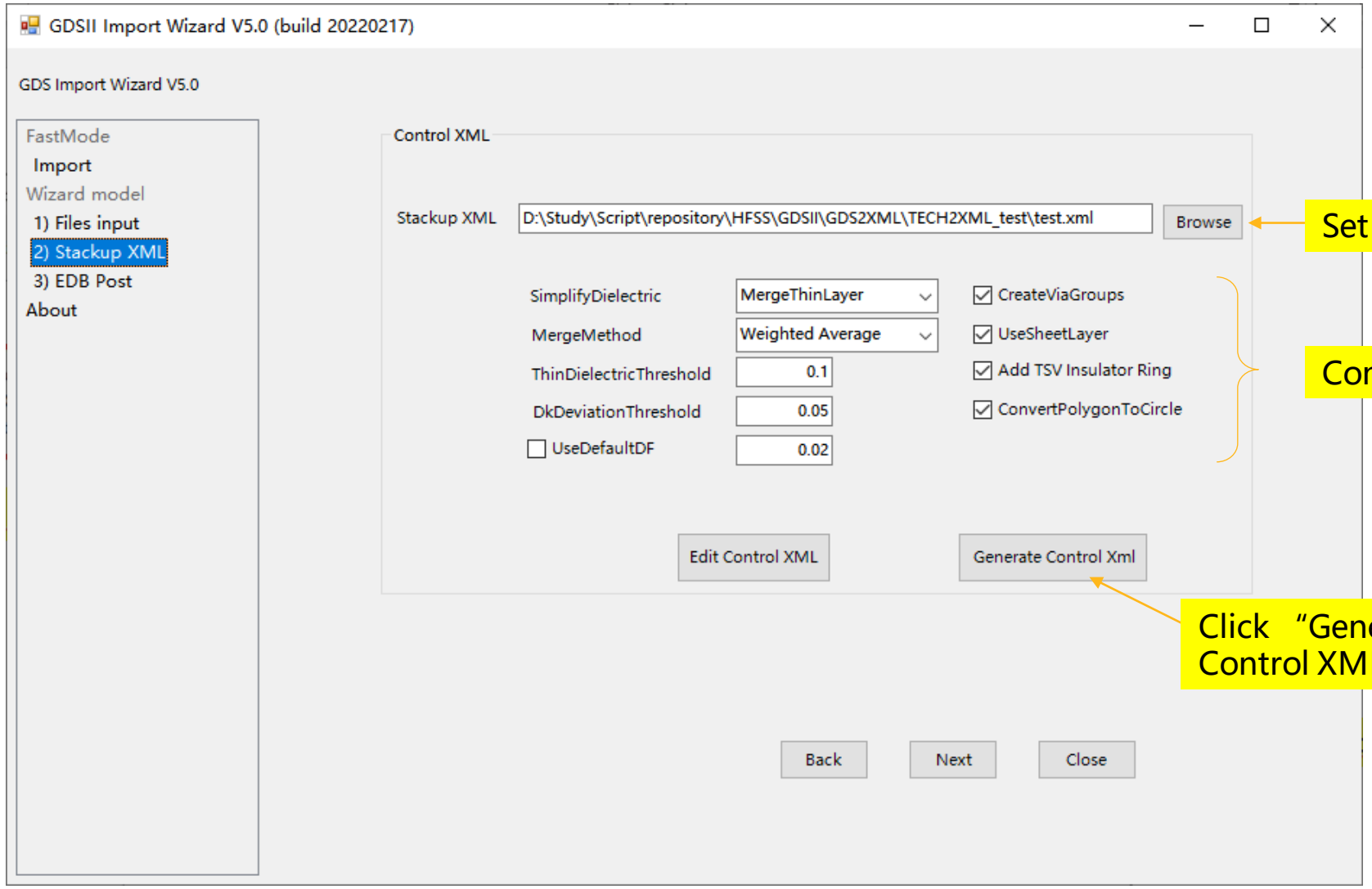
Fast Mode – 1) Files input



Select WizardMode

Click “Test Extracta Nets” for nets test.

Fast Mode – 2) Stackup XML

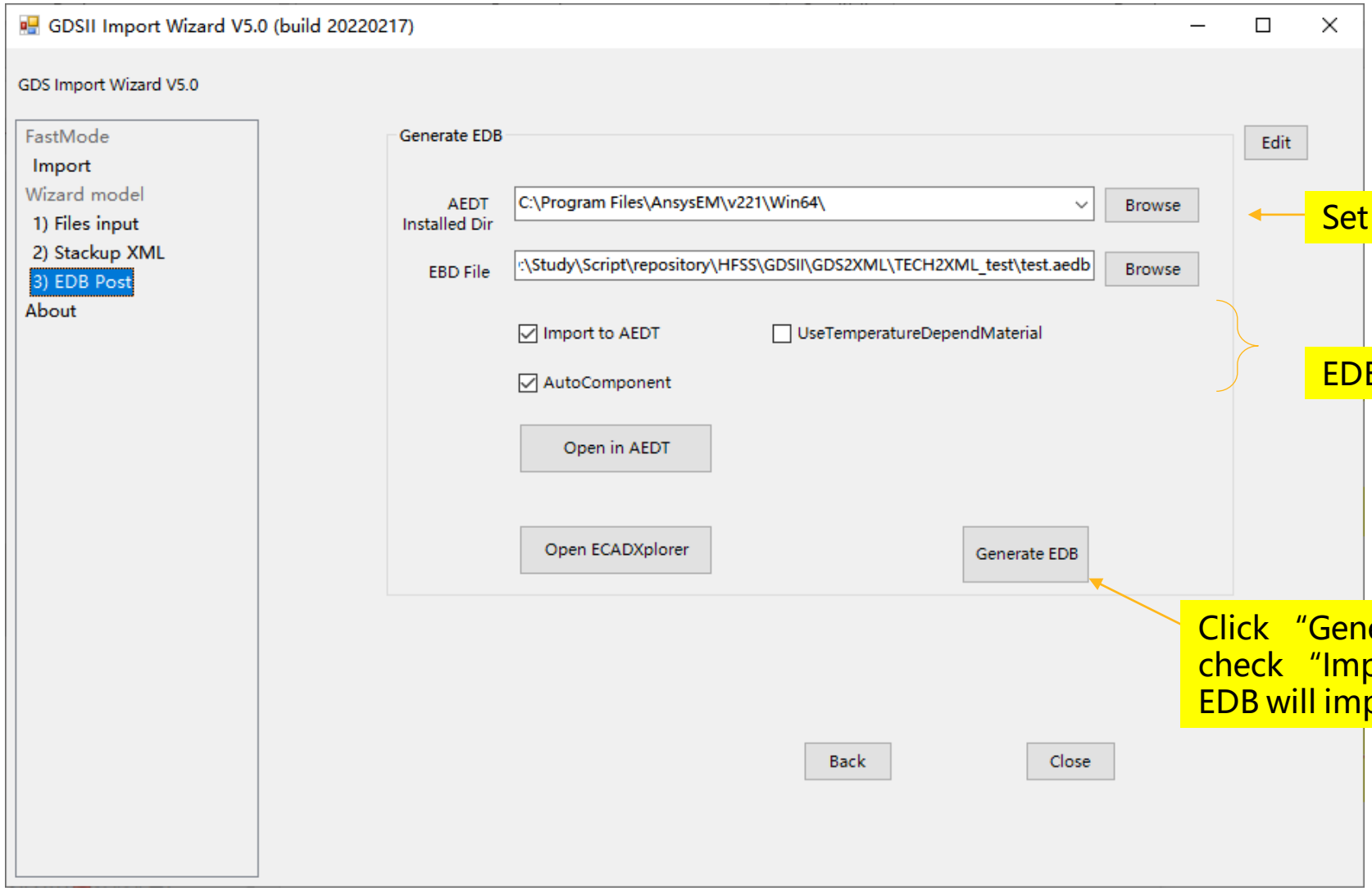


Set Stackup XML Save path

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"

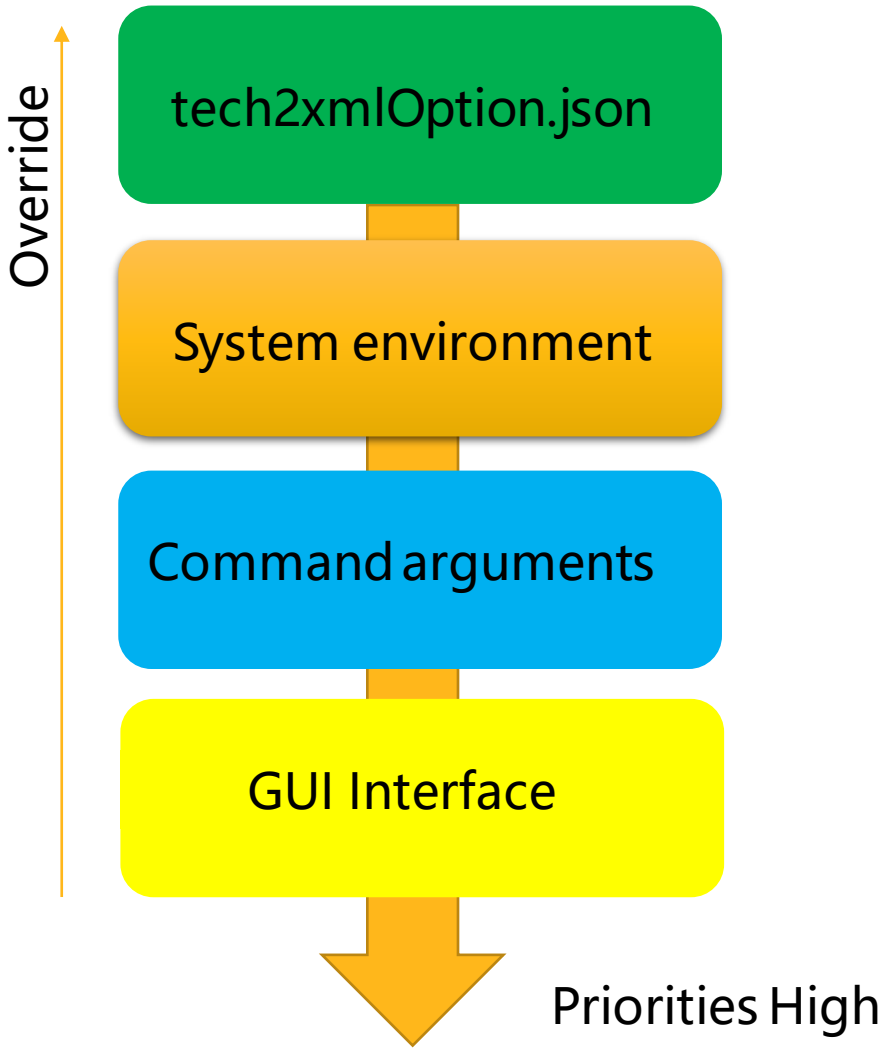
Options Setting

Options Parameters in GDS Import Wizard

- There are Four ways to set the options forGDS Import Wizard
  1) By configure file: tech2xmlOption.json
  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 technoloyg 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 Ratio 0.9 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 installtion 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: dussikve all groups or component before doing edb post processing
UseTemperatureDependMaterial	True	true: will generate temperature dependance material if TC1/TC2 given in material defintion

Custom Technology File (CSV)

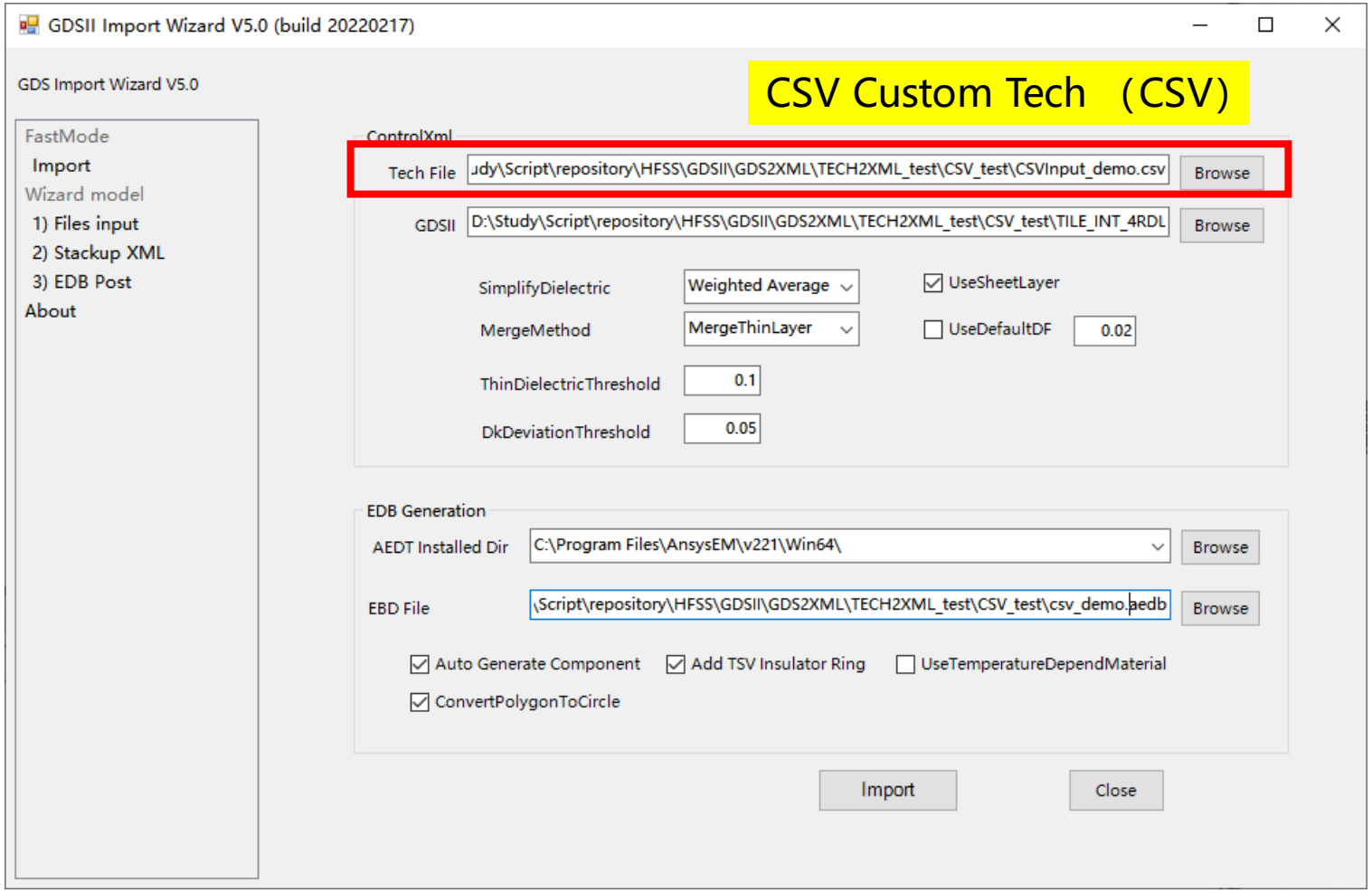
CSV Format

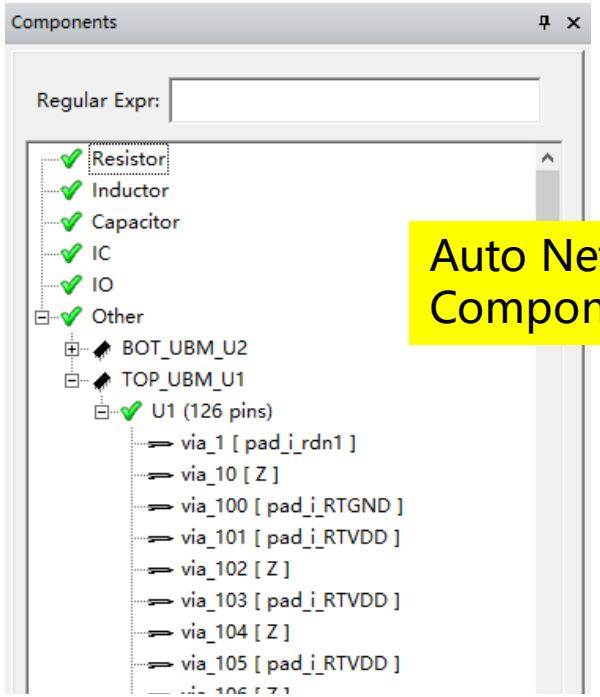
CSVInput_demo.csv

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		

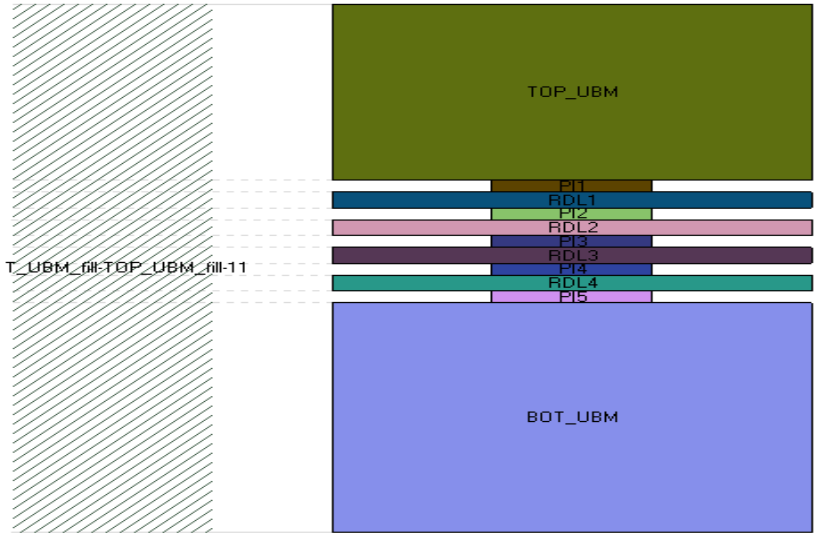
1. The highlighted column must be given.
2. Type: “C” indicate conductor, “V” indicate Via.
3. TextLayerMap used to trace nets information.
4. The default unit is um.
5. If setting DK/DF/Cond, accurate material will add to stackup
6. Via layer could be described using Thickness or LowerLayer/UpperLayer

CSV Custom Tech Import Demo





Auto Nets and Component

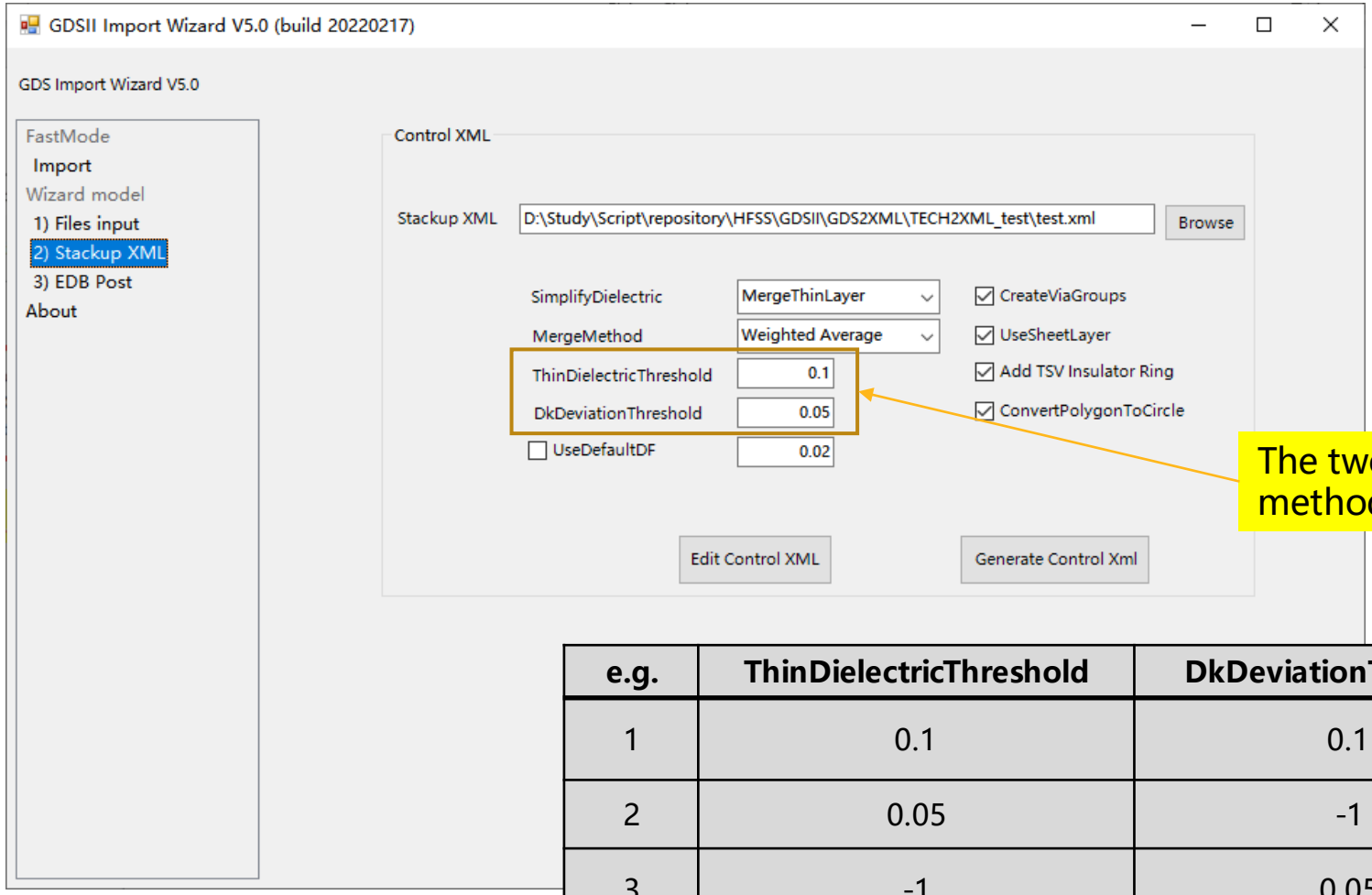


Additional remarks

About Stack simplification

Return

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



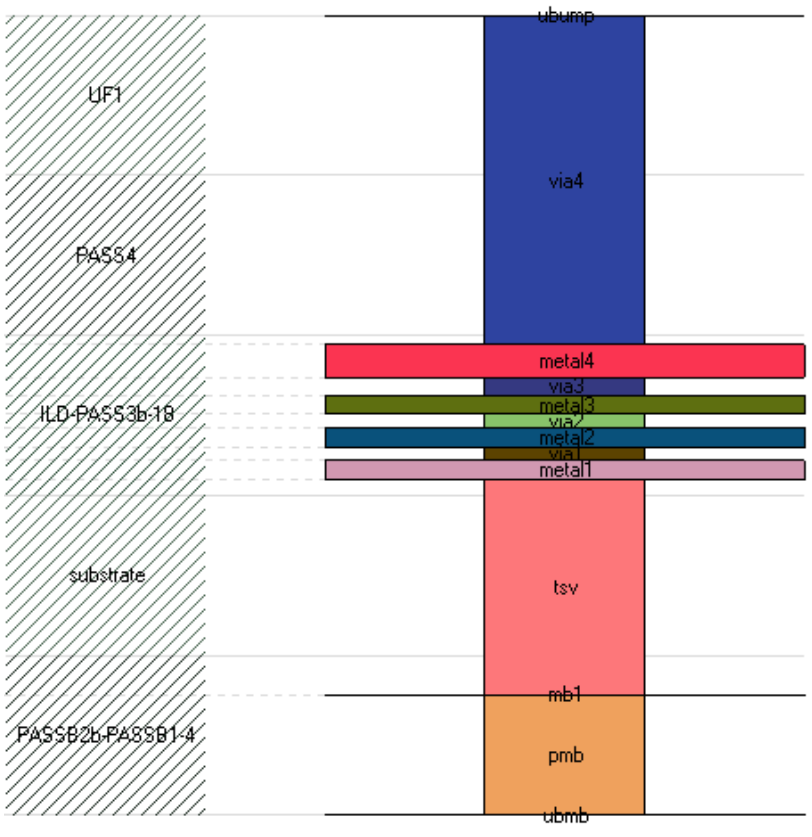
The two options only available on MergeThinLayer method, they control how the thin layers be merged.

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%

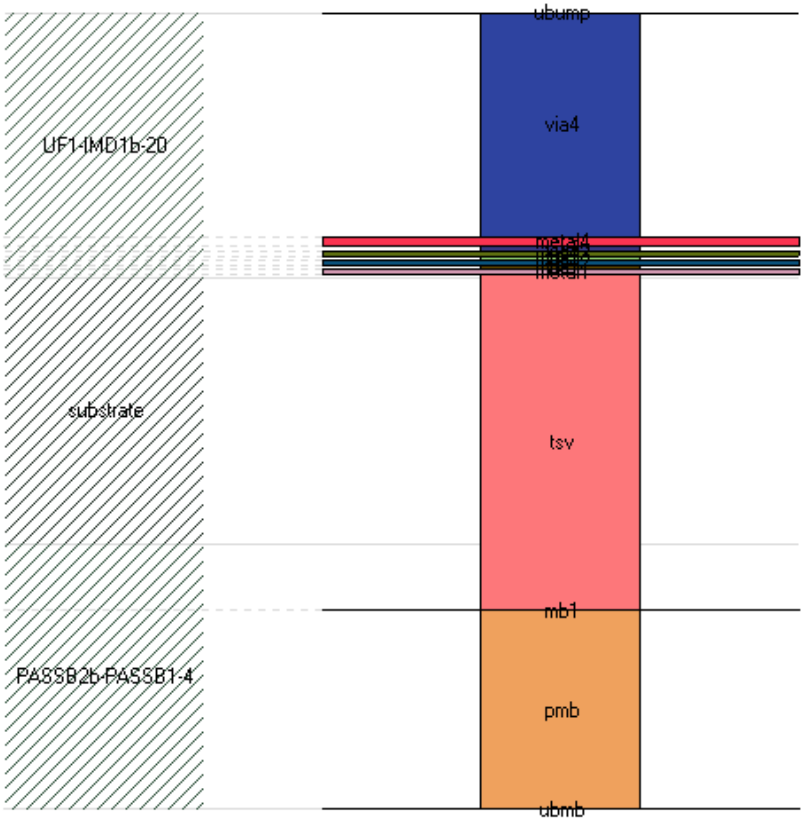
About Stack simplification

- Merge Method Compare

NoSimplify



MergeThinLayer

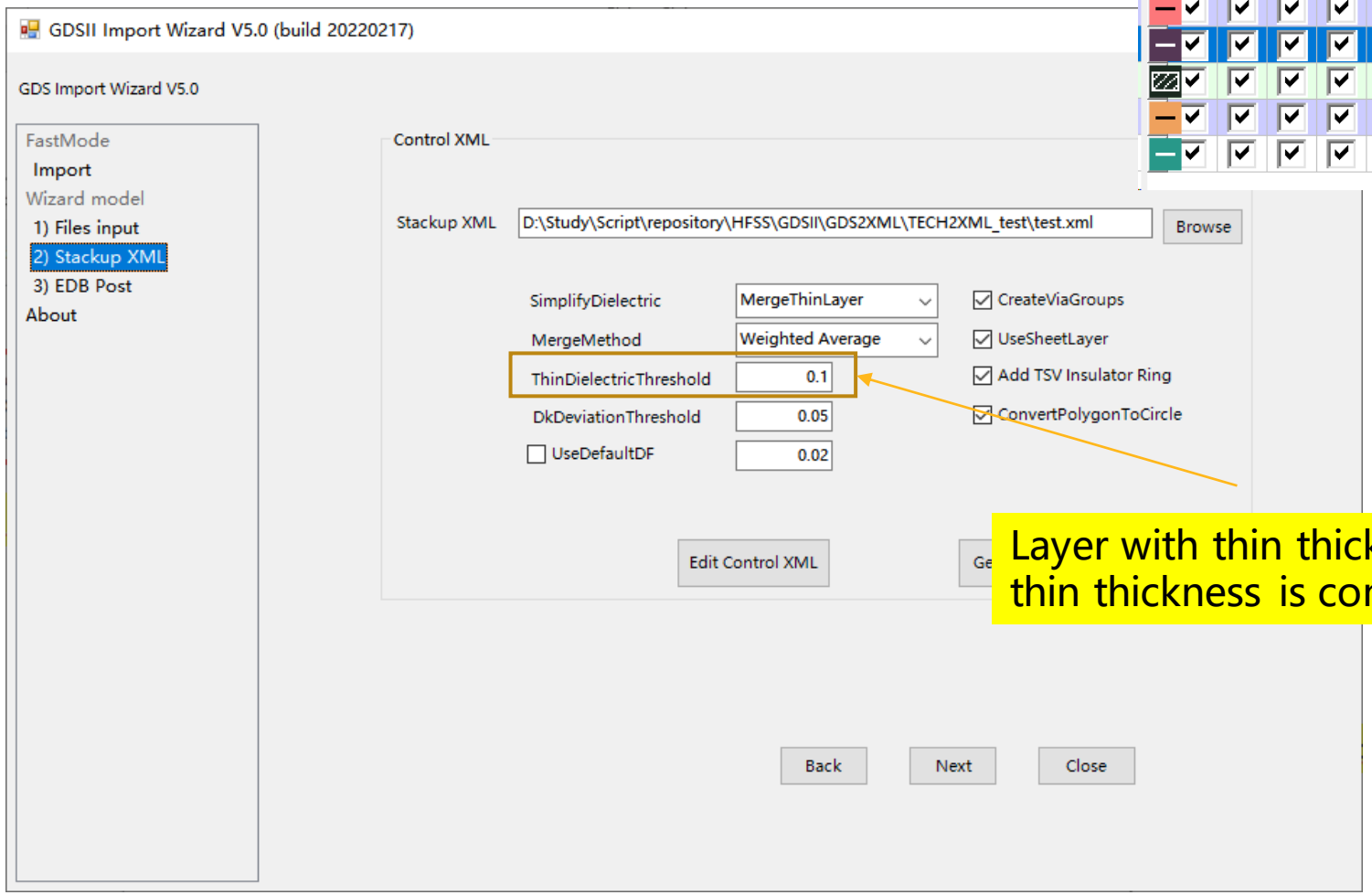


BlockMerge

Use Sheet Layer

Return

Sheet layer will reduce the number of meshes

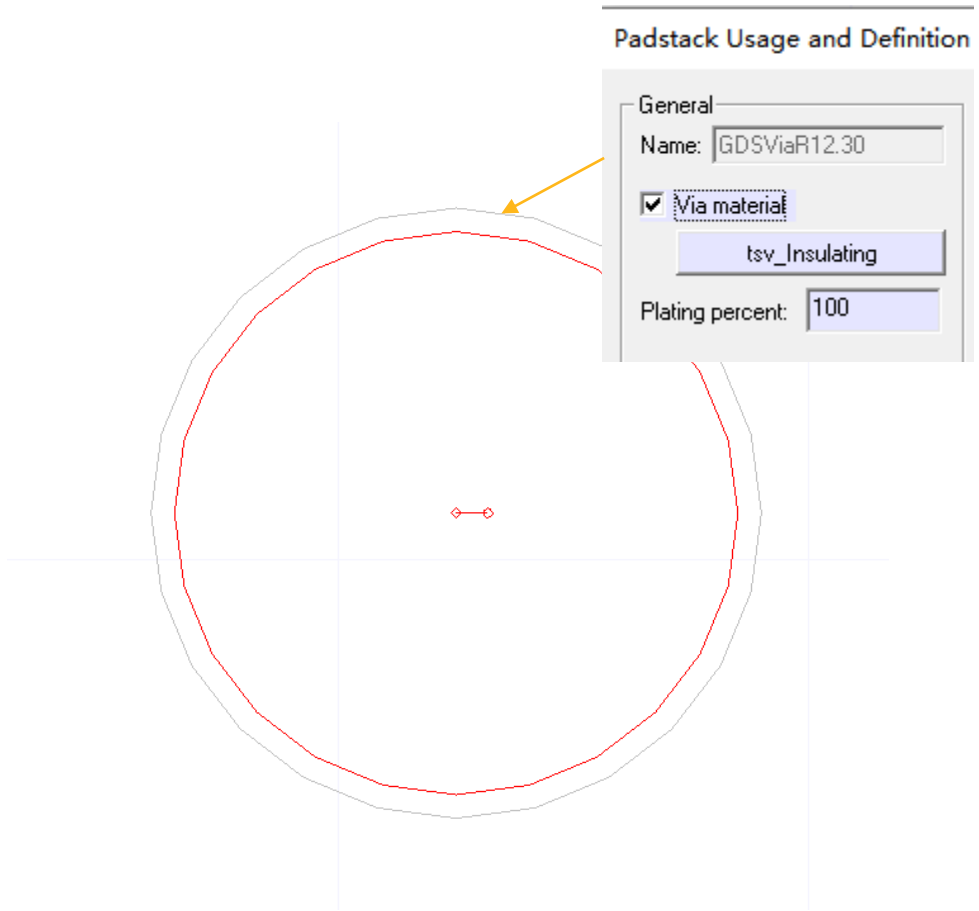


✓	✓	✓	✓	✓	✓	✓	ILD_PASS3b_18	dielectric	ILD_PASS3b_18	7.04um
✓	✓	✓	✓	✓	✓	✓	substrate	dielectric	substrate	100um
✓	✓	✓	✓	✓	✓	✓	tsv	via	tsv_cond	101.476um
✓	✓	✓	✓	✓	✓	✓	mb1	signal	mb1_cond	0um
✓	✓	✓	✓	✓	✓	✓	PASSB2b_PASSB1_4	dielectric	PASSB2b_PASSB1_4	3.201um
✓	✓	✓	✓	✓	✓	✓	pmb	via	pmb_cond	2.4um
✓	✓	✓	✓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

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

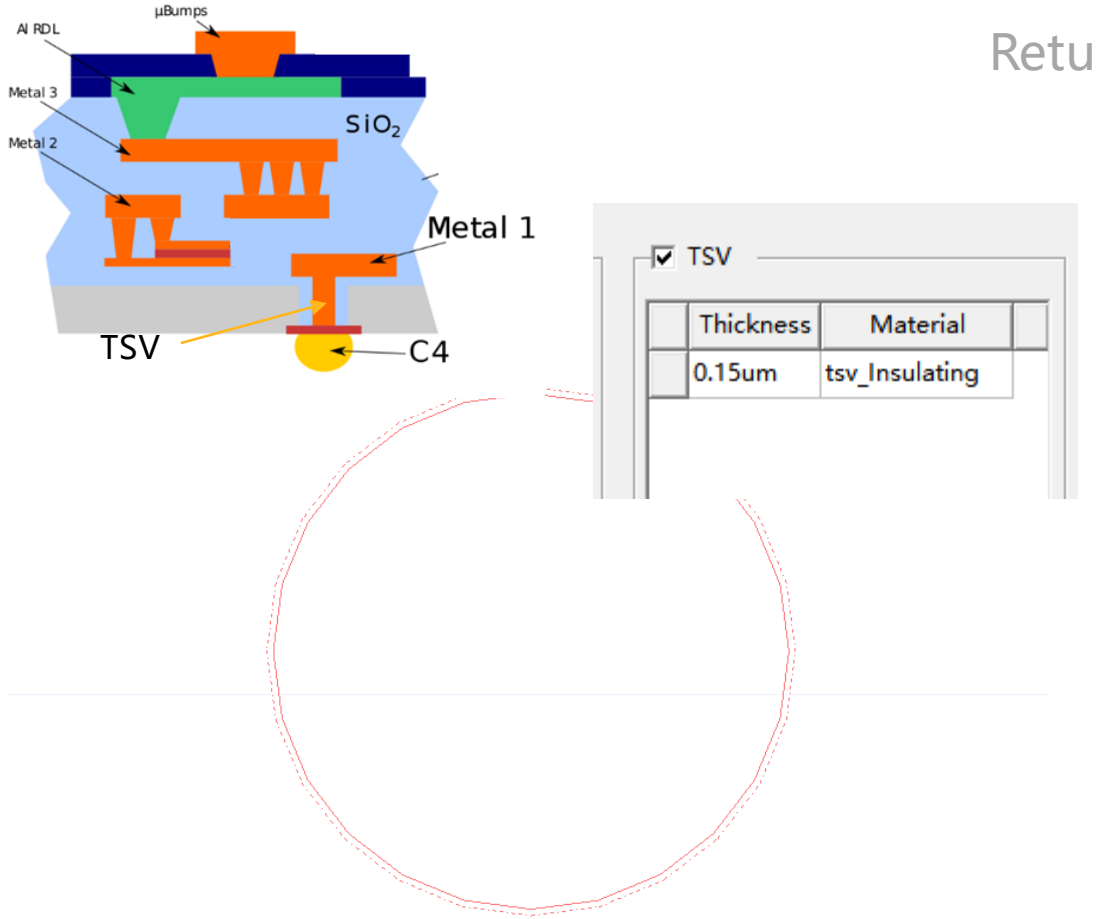
TSV

Return



Before 2021R2

TSV insulation is realized using 2 overlapping vias



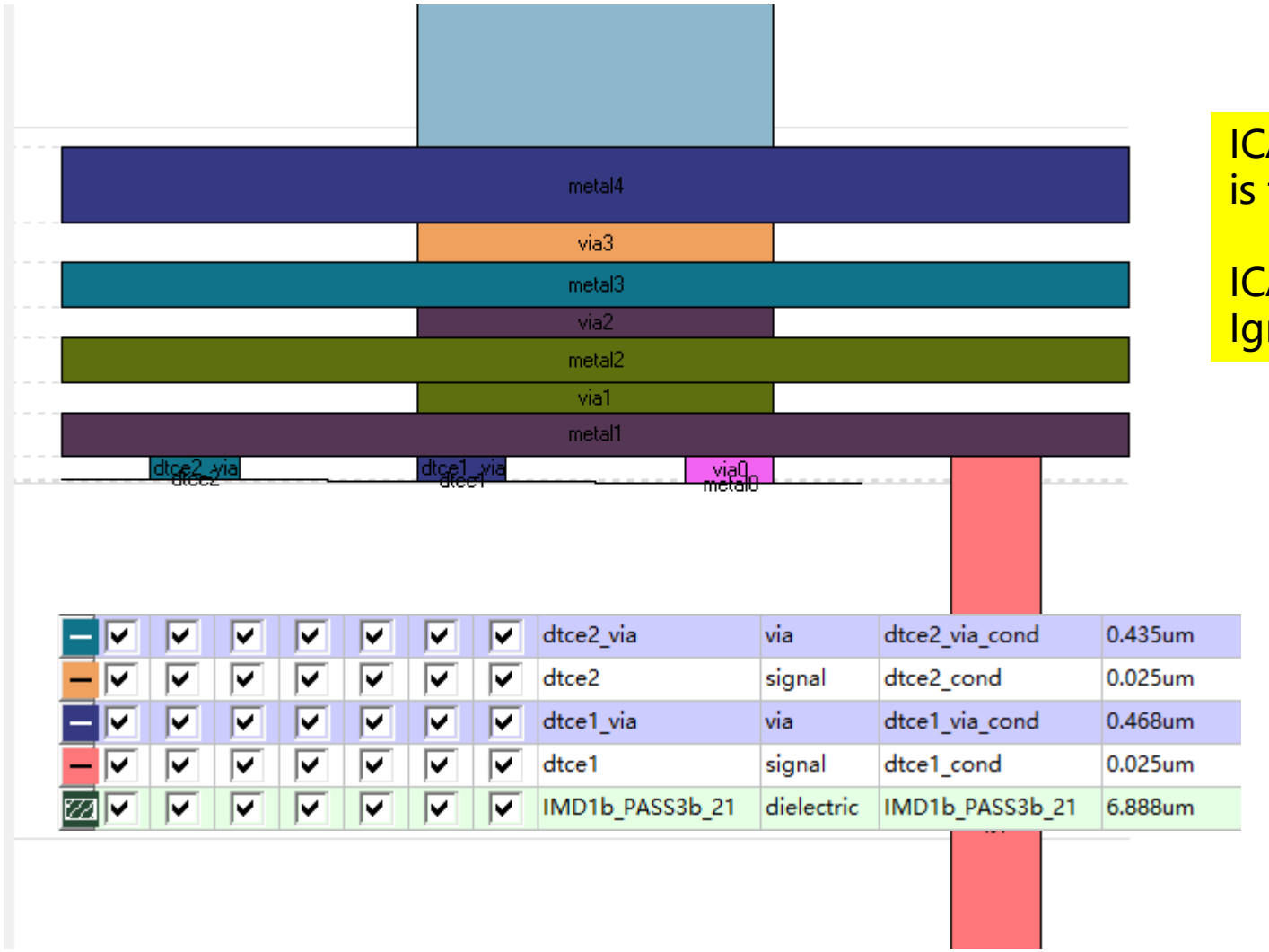
New in 2022R1

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



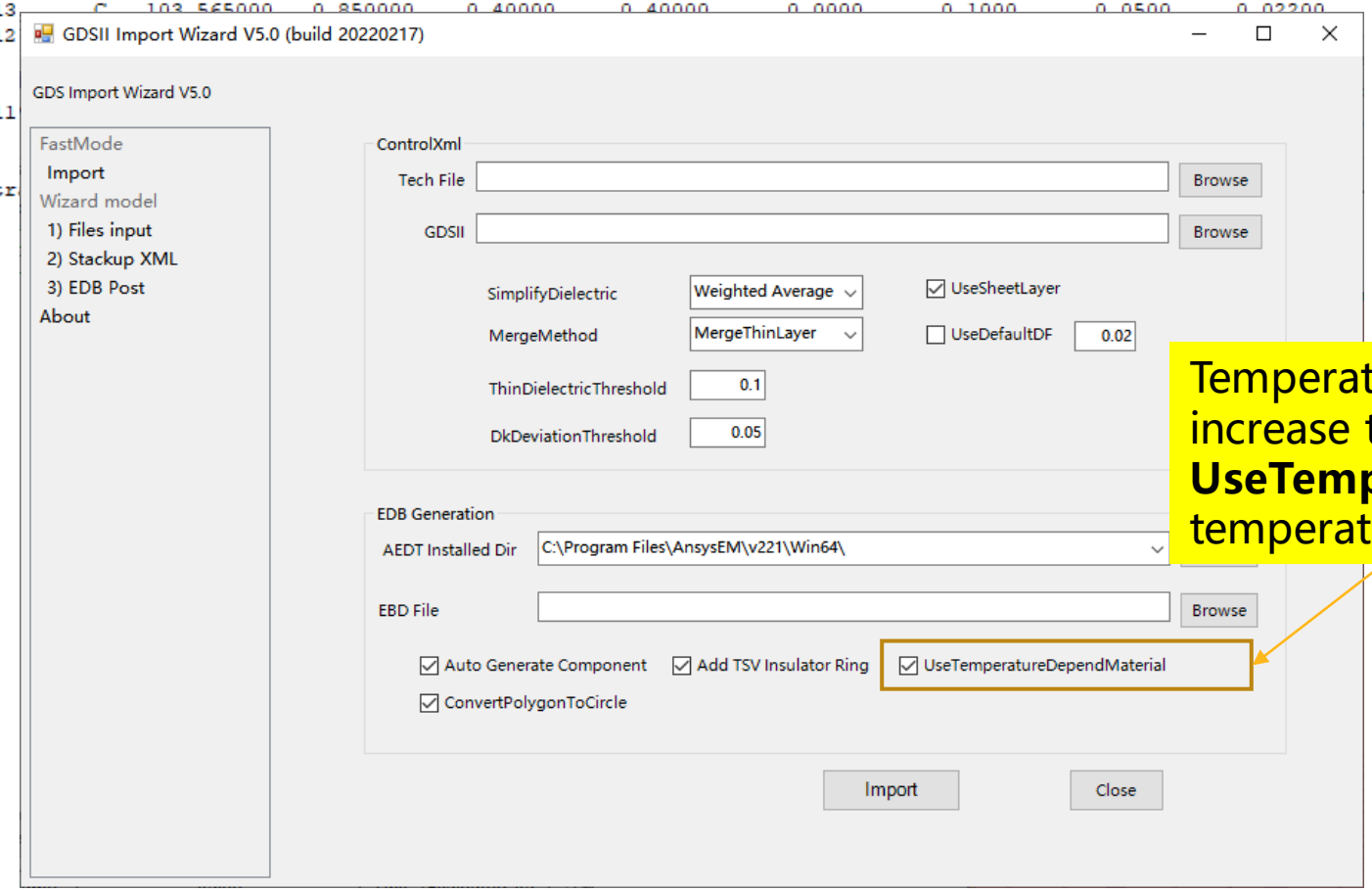
☑	☑	☑	☑	☑	☑	☑	dtce2_via	via	dtce2_via_cond	0.435um
☑	☑	☑	☑	☑	☑	☑	dtce2	signal	dtce2_cond	0.025um
☑	☑	☑	☑	☑	☑	☑	dtce1_via	via	dtce1_via_cond	0.468um
☑	☑	☑	☑	☑	☑	☑	dtce1	signal	dtce1_cond	0.025um
☑	☑	☑	☑	☑	☑	☑	IMD1b_PASS3b_21	dielectric	IMD1b_PASS3b_21	6.888um

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"

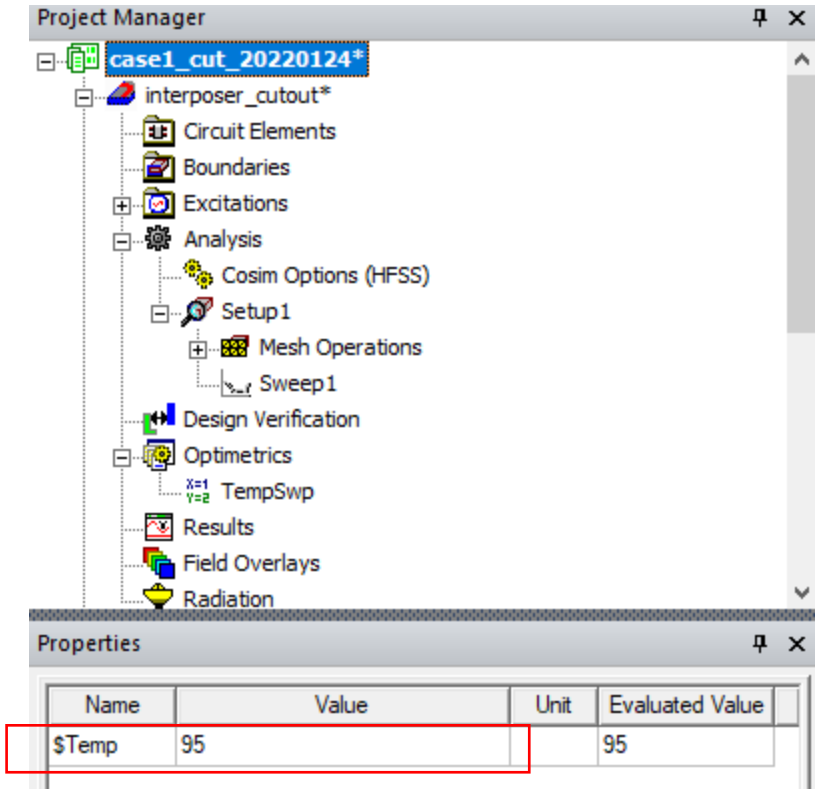
Temperature dependent material

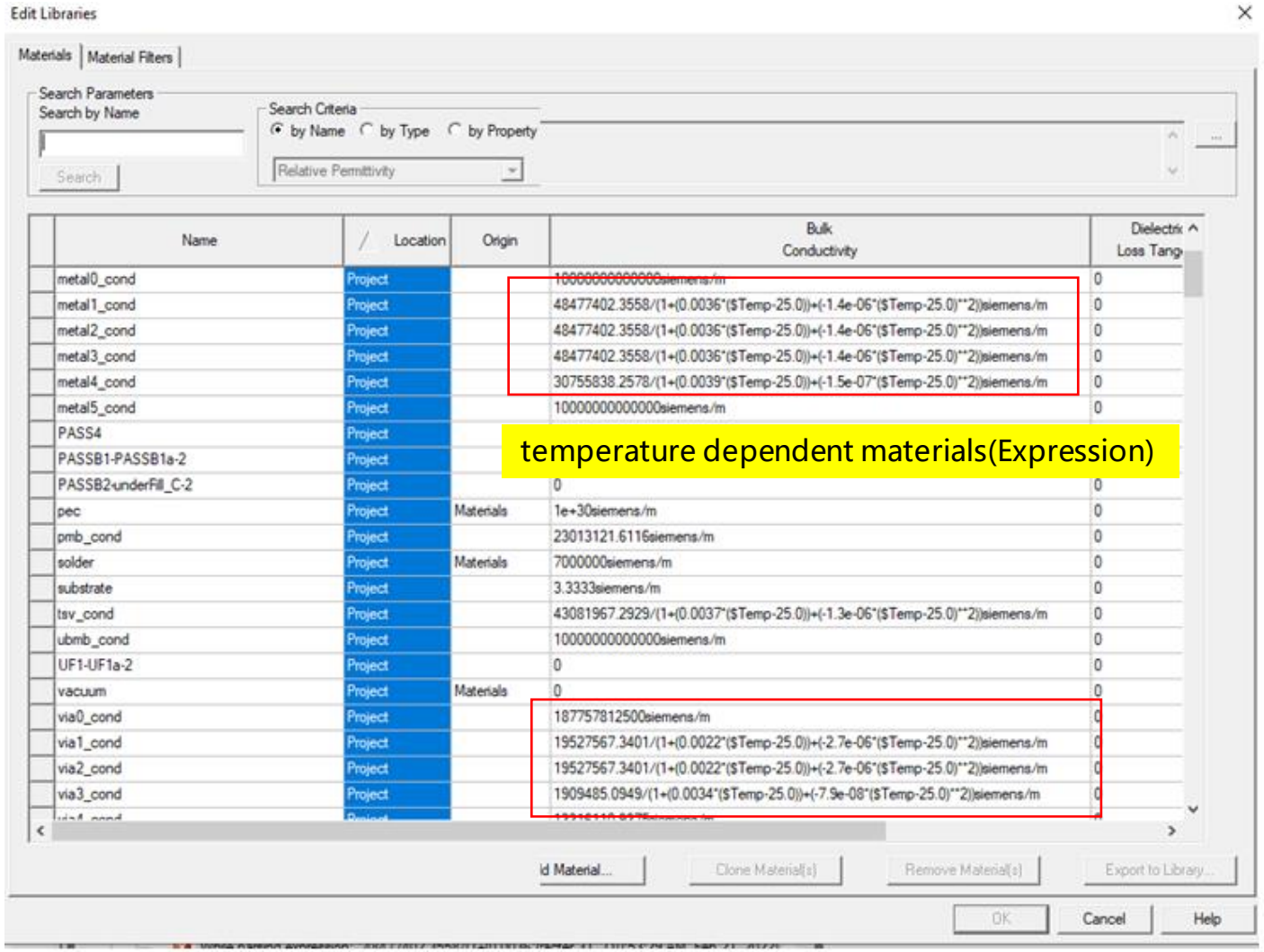
```
* CONDUCTOR 10 15 (NAME:V, TYPE:V, HEIGHT:V, THICKNESS:V, WIDTH:V, SPACE:V, B_BIAS:V, T_BIAS:V, BIAS:V, RESIST:V, ABOVE_IMD:V, ABOVE_IMD_DIFF:V, TC1:V, TC2:V, INDIE_TABLE:P)
FIELD       TYPE    HEIGHT          THICKNESS      WIDTH       SPACE      B_BIAS      T_BIAS        BIAS      RESIST    ABOVE_IMD   ABOVE_IMD_DIFF  TC1         TC2         INDIE_TABLE
NAME
ubump       C   142.639000   0.001000   22.00000    18.00000      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    3.00000     2.00000      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    0.40000     0.40000      0.0000      0.1000      0.0500     0.02200    IMD3a             -0.0750  3.63100e-03 -1.39200e-06    INDIE_TABLE[metal3]
metal2                                                                                                          IMD2d             -0.0750  3.63100e-03 -1.39200e-06    INDIE_TABLE[metal2]
ctm                                                                                                             IMD2b              0.0000  0.00000e+00 0.00000e+00 INDIE_TABLE[ctm]
cbm                                                                                                             IMD1c              0.0000  0.00000e+00 0.00000e+00 INDIE_TABLE[cbm]
metal1                                                                                                          ILD               -0.0750  3.63100e-03 -1.39200e-06    INDIE_TABLE[metal1]
mb1                                                                                                             PASSB2b           -0.0010  0.00000e+00 0.00000e+00 N/A
ubmb                                                                                                            N/A                0.0000  0.00000e+00 0.00000e+00 N/A
substr                                                                                                          PASSB1                N/A        N/A         N/A   N/A
```



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





temperature dependent materials(Expression)

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

Ansys