How to import GDS with ITF Technology File

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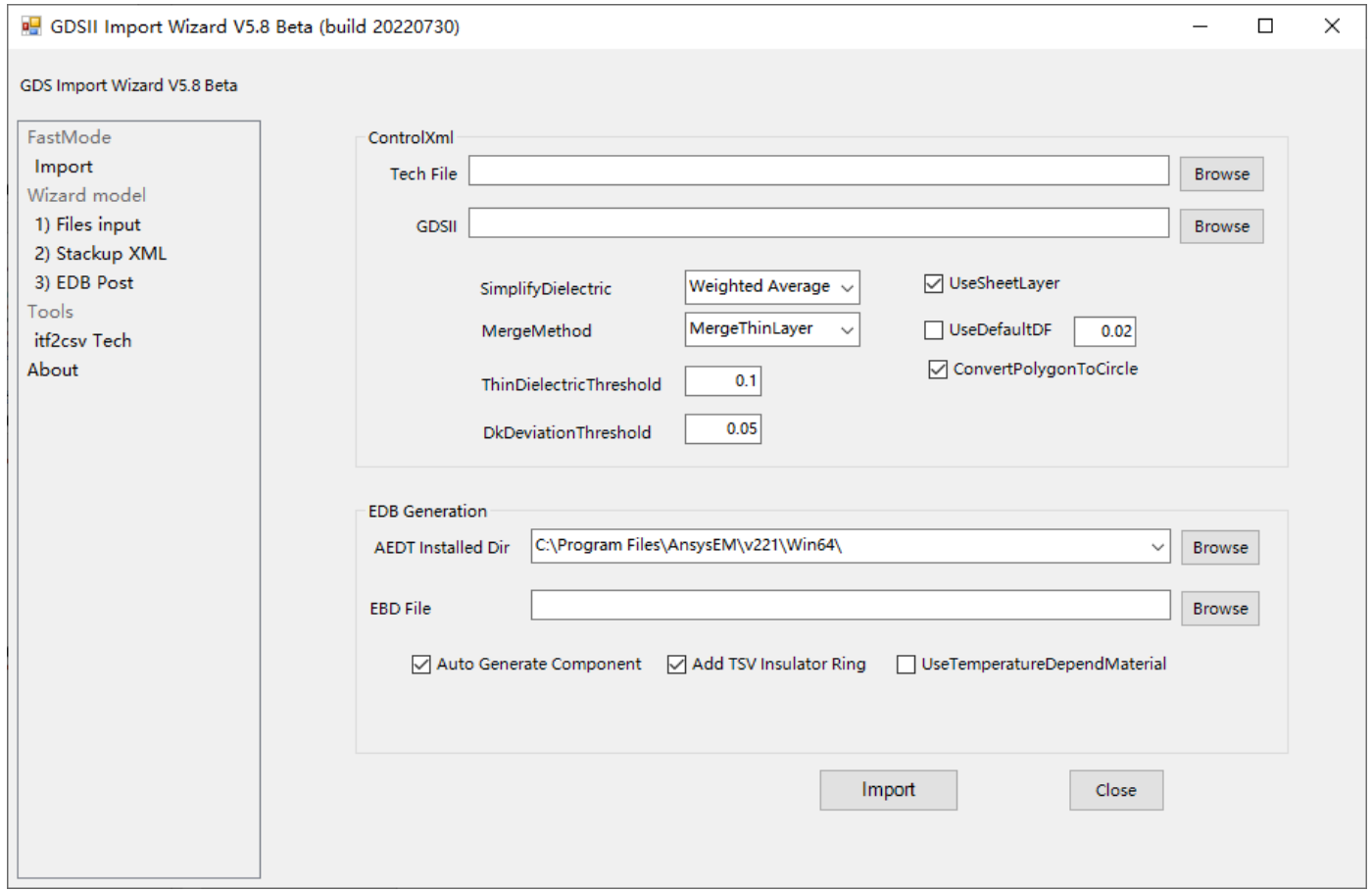
About ITF

- Synopsys' Interconnect Technology Format (ITF) provides detailed modeling of interconnect parasitic effects that enables designers to perform accurate parasitic extraction for timing, signal integrity, power and reliability signoff analysis. ITF offers a flexible and innovative format to accurately model the effects of increased process variation at advanced process technologies. ITF has been evolving for more than 10 years and is the semiconductor industry's most widely used interconnect modeling format. It is supported by leading semiconductor foundries and integrated device manufacturers and is proven on thousands of production designs.

https://news.synopsys.com/2016-09-06-Synopsys-Announces-Standards-Board-Ratification-of-Its-New-Parasitic-Models-for-Latest-FinFET-Process-Nodes

About GDS Import Wizard

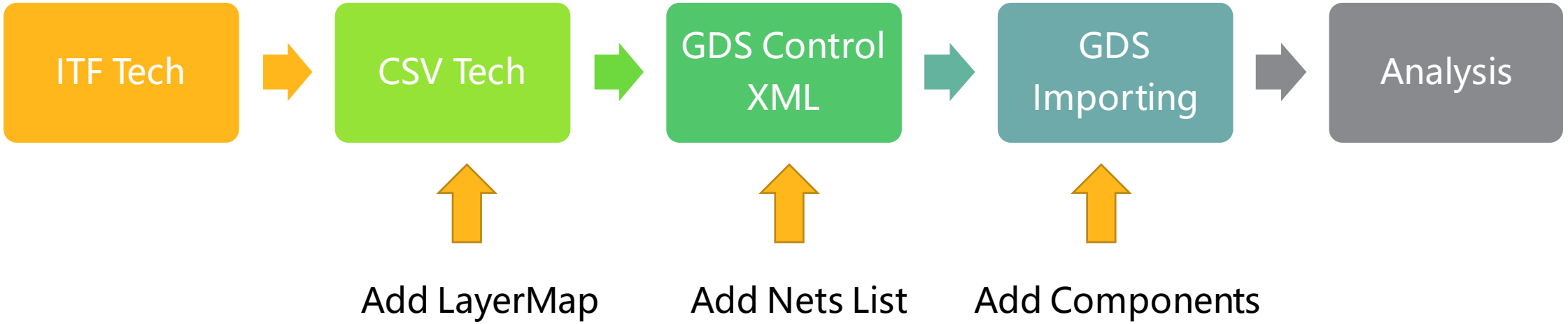


GDS Import Wizard is a free tool, which is used to easily import GDS into ANSYS HFSS 3D layout for high-precision full wave analysis.

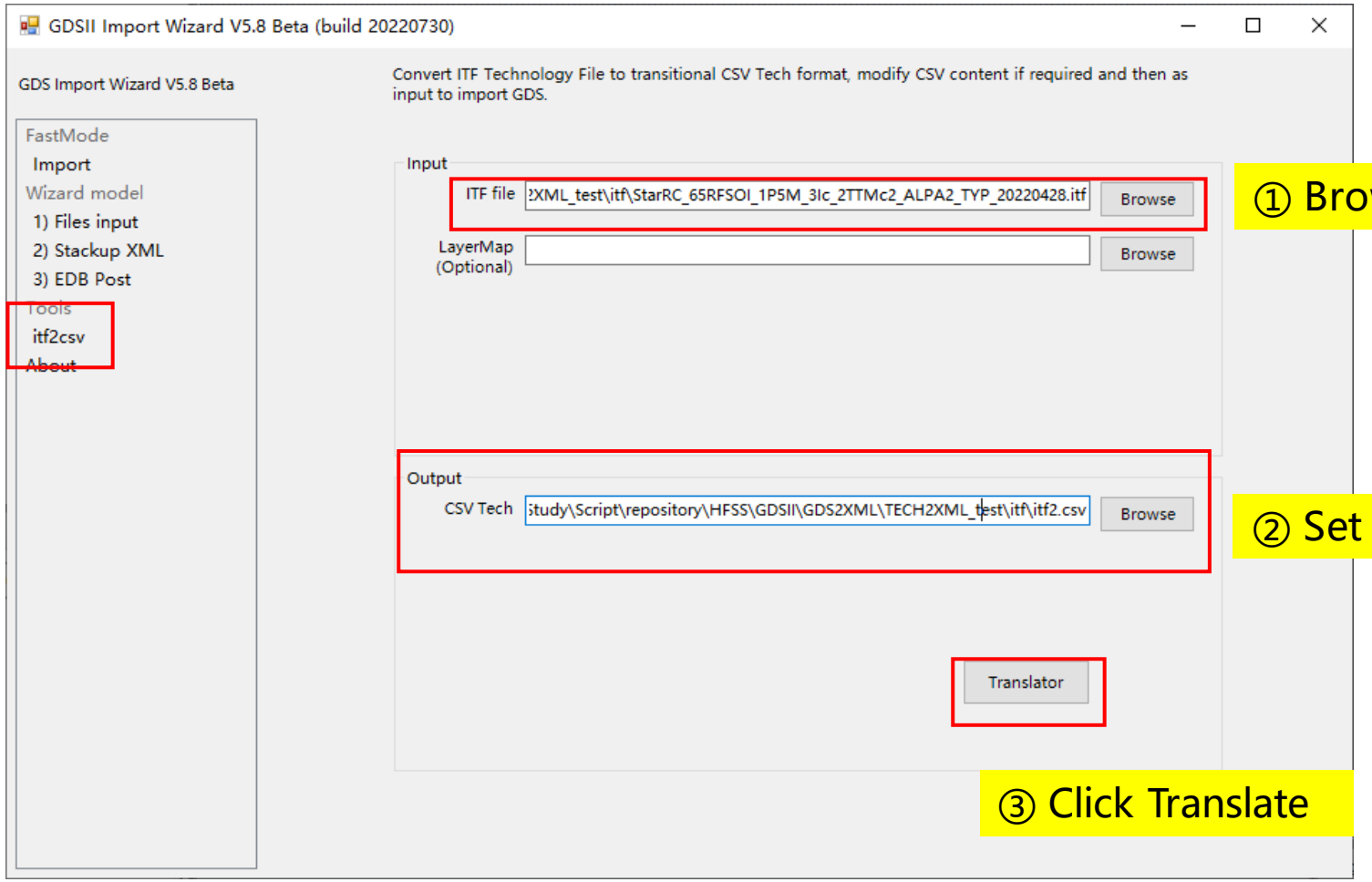
The latest tools is released at GitHub.

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

GDS Import Workflow for ITF Technology File



Step1. Translate ITF to CSV Tech



① Browse ITF file

② Set CSV output Path

③ Click Translate

About CSVTech

NO	LayerName	Type	LayerMap	TextLayerMap	Thickness	Height	LowerLayer	UpperLayer	DK	DF	Cond	TC1	TC2	Tref	
1	UF1	D			35	107.64			3.7						
19	IMD1a	D			0.05	100.75			8.1						
20	ILD	D			0.75	100			4						
21	substrate	D			100	0			11.9		10				
22	PASSB1	D			0.8	-0.8			6.7						
23	PASSB2b	D			2	-2.8			6.7						
24	PASSB2a	D			0.4	-3.2			6.7						
25	underFill_C	D			0.001	-3.201			6.7						
26	ubump	C	170;0 74;0	125;0	0.001	142.639					5.80E+07	0.00E+00	0.00E+00	25.00	
27	metal4	C	74;0		1.45	105.19					5.80E+07	3.89E-03	-1.50E-07	25.00	
28	metal3	C	33;40		0.85	103.565					5.80E+07	3.63E-03	-1.39E-06	25.00	
29	metal2	C	32;40		0.85	102.12					5.80E+07	3.63E-03	-1.39E-06	25.00	
30	ctm	C			0.08	101.793					5.80E+07	0.00E+00	0.00E+00	25.00	
31	cbm	C			0.2	101.575					5.80E+07	0.00E+00	0.00E+00	25.00	
32	metal1	C	31;40		0.85	100.675					5.80E+07	3.63E-03	-1.39E-06	25.00	
33	mb1	C	31;100		0.001	-0.801					5.80E+07	0.00E+00	0.00E+00	25.00	
34	ubmb	C	170;100	125;100	0.001	-3.201					5.80E+07	0.00E+00	0.00E+00	25.00	
36	via4	V	86;0				metal4	ubump			5.80E+07				
37	via3	V	85;0				metal3	metal4			5.80E+07				
38	via2	V	52;40				metal2	metal3			5.80E+07	3.63E-03	-1.39E-06		
39	ctm_via	V					ctm	metal2			5.80E+07	0.00E+00	0.00E+00		
40	cbm_via	V					cbm	metal2			5.80E+07	0.00E+00	0.00E+00		
41	via1	V	51;40				metal1	metal2			5.80E+07				
42	tsv	V	251;0 86;0				mb1	metal1			5.80E+07				
43	pmb	V	5;100				ubmb	mb1			5.80E+07				
44	tsv	I			0.15				4						

CSVTech_overlapping_template.csv is in the folder of the toolkit.

Column Definition - CSV Tech overlapping template

1. **LayerName** is the names will be uesd in 3D Layout stackup, should be present.
2. **Type**, C : Conductor/Metal layer, V : Via layer, D : Dielectric layer, I : Insulating layer
   - Via Group and SnapViaGroups will be implemented on all Via layers.
   - Insulating layer is designed to define TSV insulation thickness, it must have a LayerName that have defined in Via Layers, or will be ignore
3. **LayerMap** indicates the layer mapping in GDS file.
   - Conductor/Metal and Via layer must have LayerMap value or will be ignore.
   - Multiple layermap Mapping could set to one layer separated with space, e.g. 86;0 85;0
4. **TextLayerMap** indicates which layer used to extract net list in GDS,
   - the layermap in GDS should have net information.
5. **Thickness** is set for Dielectrics/ Metals/Vias layer thickness, the default unit is um.
6. **Height** indicates position of the layer in stackup
   - All Height define in the lower of the layer, dielectrics Layers or Metal/Vias layers will be reordered by Height value, respectively.
   - If dielectrics Height not give, the height will be obtained by accumulating the thickness of dielectrics layer (invert order)
   - If Metal and Vias Height not give, the height will be obtained by accumulating the thickness of Metal and Vias layer (invert order)
   - The last dielectric layer is the origin, all height (D/C/V) value refer to this value, negative value is accepted.

Column Definition - CSV Tech overlapping template

7. **LowerLayer**, **UpperLayer** defined the start and end layer of via layer
   - If LowerLayer, UpperLayer not give, the adjacent layers will set to LowerLayer, UpperLayer
   - LowerLayer, UpperLayer determines the thickness of the via layer, which have higher priority the via Thickness property
8. **DK, DF, Cond** is used to set Material properties of the layers
9. **TC1, TC2, Tref** is the temperature coefficient of conductivity, use for corner analysis
   - temperature-dependent material (conductivity) will be used if check UseTemperatureDependMaterial option in GUI
   - The formular is Cond/(1+(TC1*($Temp-Tref))+(TC2*($Temp-Tref)**2))
   - Tref is the base temperature, which defines the current conductivity

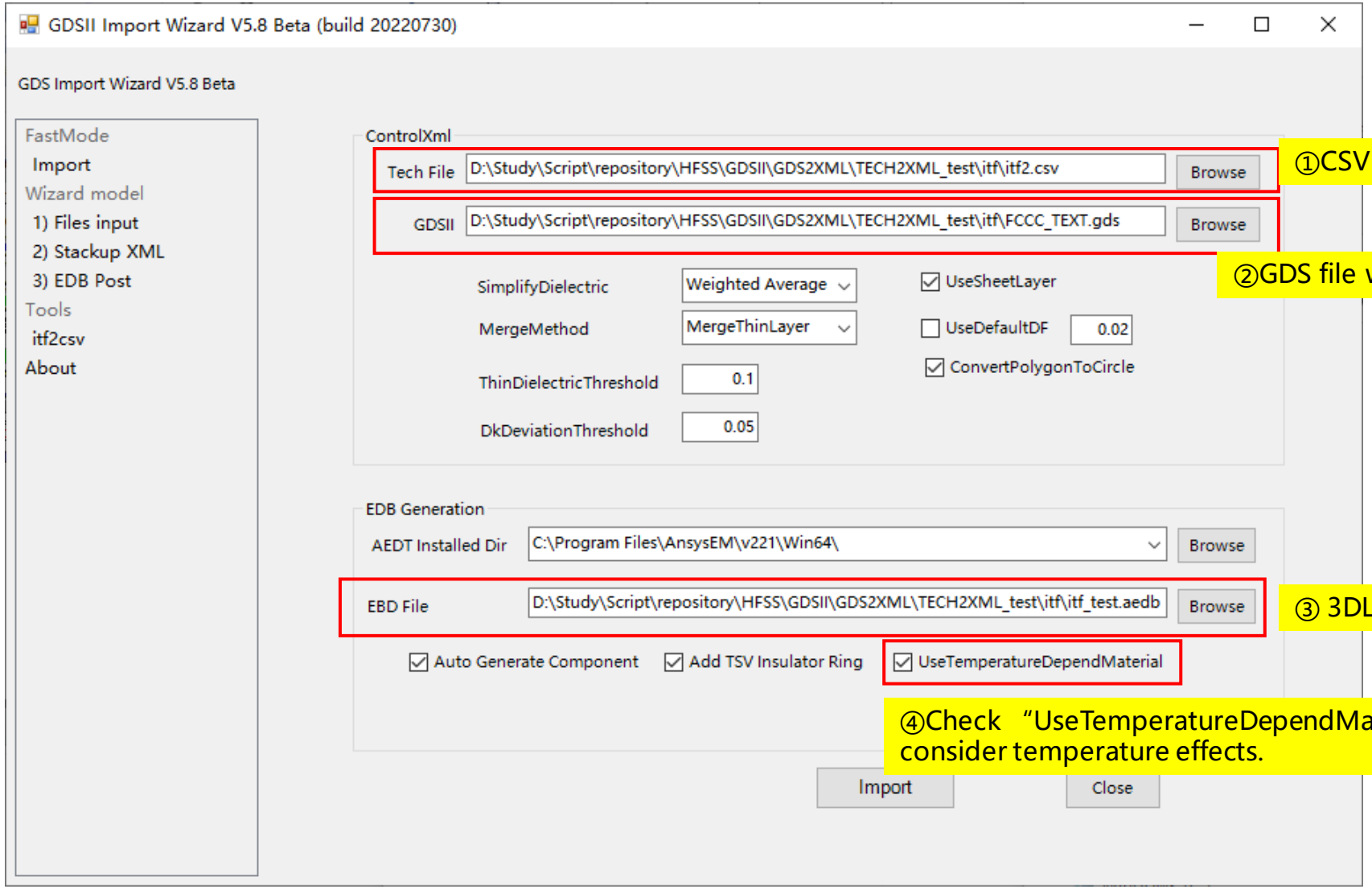
Step2: Add LayerMap

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	NO	LayerNam	Type	LayerMap	TextLayerMa	Thickness	Height	LowerLaye	UpperLaye	DK	DF	Cond	TC1	TC2	Tref
29	28	ILDb	D			4.02E-01	0.34			4					
30	29	ILDa	D			7.00E-02	0.27			7					
31	30	tox	D			2.48E-03	0.267525			4.2					
32	31	FOXB	D			6.75E-02	0.2			4					
33	32	FOXA	D			2.00E-01	0			4					
34	33	alpa	C			2.80E+00	12.67253					22841063	3.78E-03	-1.33E-07	25
35	34	metal5	C	170;0	125;0	3.30E+00	8.572525					49143768	3.85E-03	8.58E-07	25
36	35	metal4	C	74;0											
37	36	MIM	C												
38	37	MIM_P2	C												
39	38	metal3	C	33;40											
40	39	metal2	C	32;40											
41	40	metal1	C												
42	41	npoly	C												
43	42	ppoly	C			1.20E-01	0.27					1192606	2.47E-03	-9.28E-08	25
44	43	ndiff	C			7.50E-02	0.2					136962.8	2.00E-03	-3.43E-08	25
45	44	pdiff	C			7.50E-02	0.2					136892.5	3.49E-03	-7.60E-08	25
46	45	viapa	V					metal5	alpa			3703704			
47	46	via4	V	86;0				metal4	metal5			8585165			
48	47	via3b	V					MIM_P2	metal4			8585165			
49	48	via3a	V					MIM	metal4			8585165			
50	49	via3	V	85;0				metal3	metal4			8585165			
51	50	via2	V	52;40				metal2	metal3			68854875			
52	51	via1	V					metal1	metal2			71362306			
53	52	psubCont	V					SUBSTRAT	pdiff						
54	53	nsubCont	V					SUBSTRAT	ndiff						
55	54	pdfCont	V					pdiff	metal1			5611672			
56	55	ndfCont	V					ndiff	metal1			5367687			
57	56	ppolyCont	V					npoly	metal1			6497726			
58	57	npolyCont	V												
59															

Add Layermap for Layers you want import.
1) Layermap only added for Conductor and Via Layer.
2) Layers Without layermap will not import to 3D Layout
3) TextLayermap used to extract net information.
4) Make sure imported via layer lower/upper layer have valid layermap

Refer to GDS Import Wizard manual for more detail. (attached with the toolkit in Github.)

Step2: Import GDS



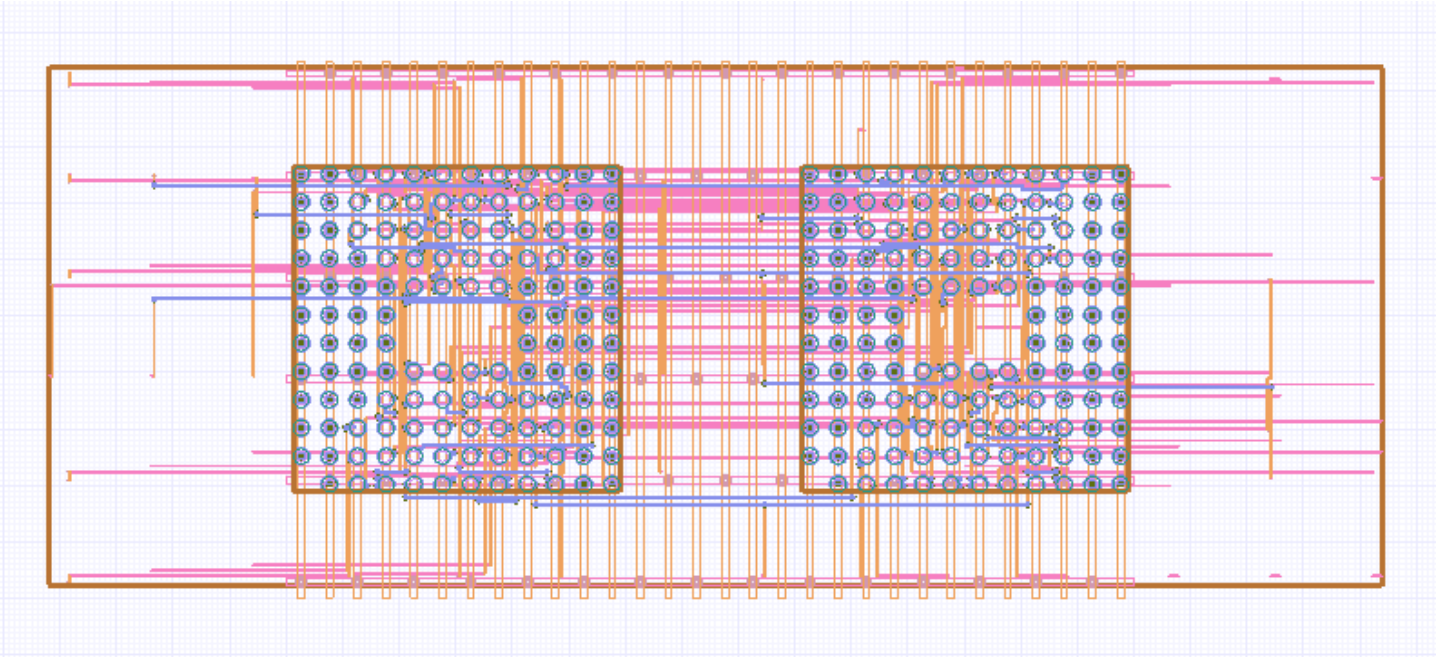
①CSV Tech which got from itf2csv with layermap

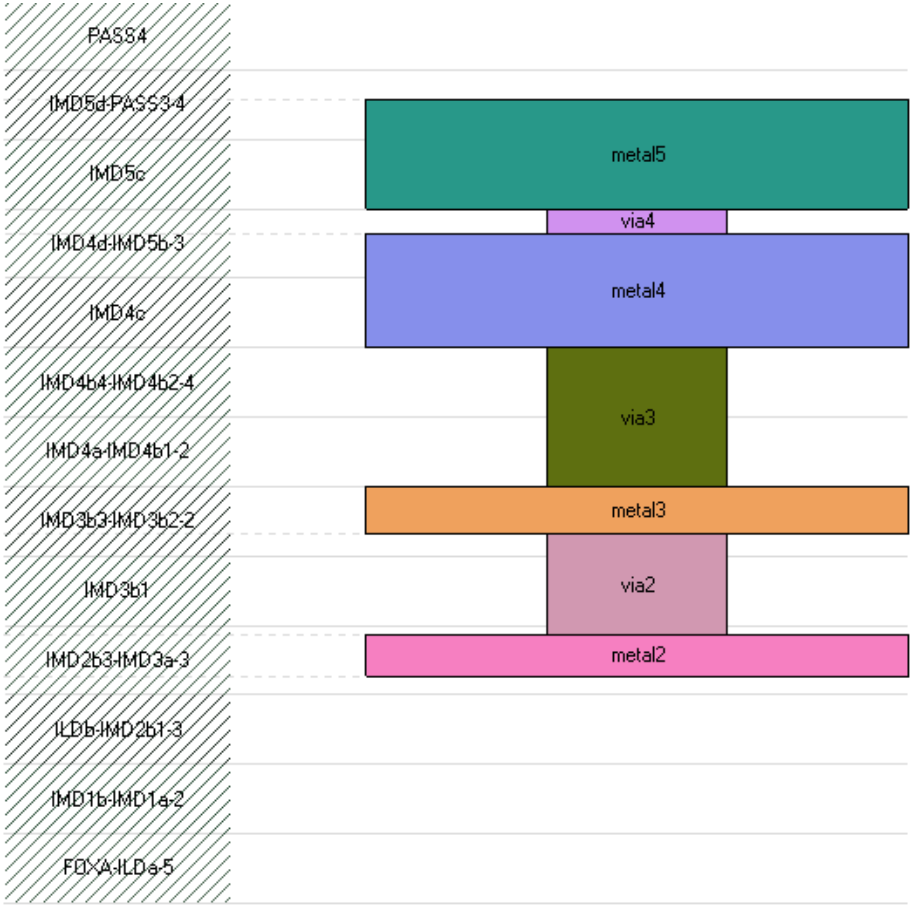
②GDS file will be imported to 3DL

③ 3DL save path

④Check “UseTemperatureDependMaterial” if you want consider temperature effects.

Next: please enjoy to setting solver option and analysis





End