



PCB-Investigator Physics

07/2015

Schindler & Schill GmbH

Bruderwöhrdstr. 15b 93055 Regensburg Deutschland Tel: Email: Web: +49 941 604 889 719 info@easyLogix.de www.easyLogix.de



Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

Why do I need PCBi - Physics?

PCB-Investigator Physics is the perfect tool to simulate the **physical behaviour** of your Printed Circuit Boards during development phase.

It enables you to find **thermal hotspots**, critical trace **resistances** and **voltage drops** that are too high, even before prototyping begins!

With the built-in editing functions of PCB-Investigator Physics it's even possible to **optimize the layout** and stack-up to achieve the best possible physical behaviour with only a few clicks!

Save valuable time and prototype costs with the simulations of PCBi-Physics!







Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

Why do I need PCBi - Physics?

To get information about the physical behaviour of your Printed Circuit Board during operation, PCB-Investigator Physics enables you to simulate the following physical properties:

• The **Temperature** raise at each location of the PCB caused by power loss of components or by high currents



The **Current Density**, e.g. at copper bottlenecks or in drills



• The Voltage Drop and Copper Resistance between any pins on any layer







Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

ASYLOGIX.DE

As input data you can select any CAD format supported by PCB-Investigator.

Supported formats are:

Which data is needed?

- ODB++٠
- GenCAD ٠
- IPC2581 ٠
- IDF 2.0 / 3 •
- Gerber274 ٠
- ٠ ...

	🚞 Open Design	
	<u>↓</u>	Browse for a design:
	Envorten	Folder History: D:\Designs
2 0	Tavoites	Desktop
5.0	1	Dieser PC
	\bigcirc	Downl
X	Recent	🔍 🔍 🗄 🖓 Musik

\checkmark	Drowse for a design:			
	Folder History: D:\Designs			~
Favorites	Desktop Name	Size	Modified	^
Recent	Image: Deser PC IPC Graphikkate Image: Deser PC ODB_EasyPCB Image: Deser PCB ODB_EasyPCB Image: Deser PCB ODB_EasyPCB			
	Image: Basy PCB_del Image: Basy PCB_del <	15 00 115		
Browse	Bing Data (D:)	15.88 MB 15.88 MB	2014.11.07 13:58:45 2014 11 07 13:58:45	
	L Austausch Compare 2 (2) zip	608.34 KB	2014.10.23 13:54:01	
	GenCad Grove_2CMotordriverodb.zip	43.09 MB	2015.08.09 10:33:47	
ODB++ Server	Barting genoer Barti	1.18 MB	2013.08.30 18:16:38	~
	IPC Graphikkarte Filter: reportable files ("zip, "tgz, "cvg, "ipc;	*xml; *.cad; *.gcd; *.	pnl; *.emp; *.idl; *.brd; *.d)] ~
	Selected Path/File: D:\Desians\Grove 2CMotordriverodb.zip			
₽ ×	Design Information Width: 56.00 mm Copper Layers: 2 Laser Drills: No		😂 Accept Directory	
× Clean Image Cache	Height: 36.14 mm Component Layers: 1 Step Count: 1		 Accept File 	

×



How to run the Simulation?

1) Enter general Project parameters

	Z PCBI-Physics - Simulation						-	- 🗆	×	
Which data is needed?	U Project	Board	- 📛 Current	Powe	r 🌍	Environment	Simulate			
	Settings:									
		Project Settings			-Calculation Se	ttings				
How to run the		Projectname: CAD Data Step:	New Simulation	~	Tasks:	☑ Voltage D ☑ Temperatu	op re			
Simulation?		Standard Color Setting	8		Area:	 Complete Area of us 	Board ed Nets			
		Color of Source Pins: Color of Sink Pins: Color of Power Dissip	ation Components:		Accuracy:	 Standard Fine 	 Very Fine User 75 ‡ μ 	1 n		
What does the result look like?										
We piqued your interest?	🛃 Save Setting	🗳 Import Se	etting 🔿 Export Se	tting				×	Close	





2) Enter Stack-Up information (Copper foils, Prepregs)

Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

Z PCBI-Physics - Simulation \times Simulate Project Board - Current Power Environment Board Info: c:\users\easylogix\appdata\local\temp\grove_2cmotordriverodb File Tools Edit 1 TOP Drill Layer Context Layername Type PREPREG_1 Start Layer Via I Via I TOP Board Signal 2 BOTTOM End Layer ~ Via i DRILL Polarity Positive Add Type Unknown v Layer Height 35.00 Layer um 25.00 Plating um COMP_+_TOP Component 1 Solderpaste 0.00 µm SOLDERPASTE_TOP SOLDERMASK TOP other .layermateria 1 TOP 35.00 + 25.00 µm Copper;35 .copperweight 1308.00 µm PREPREG 1 other ectric ayerdielectric 35.00 + 25.00 µm 2 BOTTOM Copper;35 .copperweight SOLDERMASK BOTTOM other layermaterial P Solderpaste 0.00 µm SOLDERPASTE_BOTTOM 对 Impo Save Setting Drill DRILL





Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

2 PCBI-Physics - Simulation Simulate Project Board - Current Power - by Net 🐡 by Component S Current - Nets Net Components Source/Sink 🔻 Net Sources In (A) Sinks ^ Component Net Ampere ^ Add Source. OUT1 🖮 🔽 📥 OUT1 🍸 Ge... 🍸 G... 🍸 Ge.. ⊕~ 🗢 D1 Geben Sie T. OUT1 Source 🗄 -- 🗫 D8 ...per Component - N\$3 . 🗄 - 🖘 J1 OUT1 🗄 🖓 🖘 U1 0,7 - NS4 🛓 🖚 J3 UT1 🖂 😑 Sink ...per Pin - N\$5 🛓 🖘 U1 OI 🗄 🗹 🗢 D1 0.1 - N\$7 🔿 Auto 💿 Fix - 🗹 🦘 D8 0.1 🖥 🗹 🗢 J3 0,5 - N\$9 Ampere: 0,100 🚔 - OUT1 0,7 3 => 🗄 🔽 🔂 Source - OUT2 0,7 3 1 🗄 🔽 🗢 U1 0,7 OUT3 1 0.7 3 Sink 3 OUT4 1 0.7 😑 Add Sink . 🗄 🗹 👁 D2 0,1 - RST ..per Component 🗄 🔽 🐡 D7 0,1 - SCK 0,5 🗄 🖂 🖘 J3 - SCL ...per Pin 🔶 SDA

3) Enter Current Sources / Sinks for each important net

 \times

Source

0,7

×

>

Close



Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

How to run the Simulation?

4) Enter Power Dissipation for each Component







Why do I need PCBi-Physics? Which data is needed? How to run the Simulation? What does the result look like? We piqued your interest?

5) Enter environmental Temperatures and Heat Exchange values

		⇔ Current	Mar Power	Environm	ient 🌮 Sin	nulate
Environment	Info:					
	Top Side:		Bot	: Side:		
	Ambient Temperature:	20,0	°C Ar	mbient Temperature:	20,0	≎°
	Heat exchange:	14.0	W/m ² K H	eat exchange:	14.0	₩/m²K
			Heat exchange calcu	lator		
		Curr	rent Power Dissipation:	5,300 W		
		Cur	rent Power Dissipation:	5,300 W		





Why do I need PCBi-Physics?

Which data is

needed?

Simulation?

What does the

interest?







Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

What does the result look like?

The simulation result can be evaluated in the "Result Viewer" by a graphical overlay on the CAD data or with the help of a report.

For documentation issues it is possible to add Notes showing the simulated values at important locations.

imulation Result: Simulation	~	🕏 Load	Impa impa	rt / Export
🕃 Overlay 📳 Report 📃 Notes				
Layer	Overlay data	Value range	Color range	Opacity
comp_+_top	None		100,0	100%
☑ top	None		100,0 · · · > . · · · · · · · · ·	100%
prepreg_1	None 🧯 🕅		100,0	100%
D bottom	None 🧯 🦚		100,0 	80 🗘 %
Select affected Net:		~	Ove	rlay only selected Object

The following slides will give a few examples...





What does the result look like?

Example 1: Temperature Overlay with Notes

Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

144,6 °C 136,2 °C 85.3 °C 76.4 °C 127,8 °C 110.7 °C 119,4 °C 142.9 °C Import / Export ✓ ∠ Load Simulation Result: Simulation 🚰 Import 🛃 Export 121.1 °C 😚 Overlay 📓 Report 🔜 Notes Overlay data Color range Layer Value range Opacity 4 4 * 🖨 ال comp_+_top 144,6°C 80 🜲 % 🗹 top 60 6*0 ↓ 144,6°C ↓ 20,0°C -> 80 🔹 % prepreg_1 None 144,6°C 100% None R. D bottom

Temperature on the top signal layer (Filter: Temperature > 60°C)

Select affected Net:



Overlay only selected Objects



Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

What does the result look like?

Example 2: Current Density in the net "OUT1"



Current Density in the net "OUT1" over all layers





Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

What does the result look like?

Example 3: Voltage Drop in the net "OUT3"

Image: Cell-Physics - Result Viewer (Simulation - Step: cad-step)								
3.0 mV	U1	Simulation Result: Simulat	iion	∨ 📿 Load		Import / Export		
		ID Component G Image: Component 3 U1 13 J3 14 D3 15 D6	Pin Index Pin Label Geb Geb	Input Parameter Net Geben Sie T Image: OUT3 0.7 A OUT3 -0.5 A OUT3 -0.1 A OUT3 -0.1 A OUT3	Temperature (°C) Current (Image: Constraint of the state o	A) Potential (mV) ie Y Geben Sie Y 4 -3 1 2		

Voltage Drop in the net "OUT3" (Graphically and as Report) With this information the Resistance between e.g. U1 and J3 can be calculated (R = U/I)





Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?

What does the result look like?

Example 4: 3D Views with Temperature Overlay



3D Views with Temperature Overlay





Which data is

needed?

How to run the

Simulation?

What does the

result look like?

We piqued your interest?

What does the result look like?

Example 5: PDF Documentation



PDF Document with Temperature for each layer





We piqued your interest?

Why do I need PCBi-Physics?

Which data is needed?

How to run the Simulation?

What does the result look like?

We piqued your interest?



Get in touch!

<u>info@easylogix.de</u> Günther Schindler Tel. +49 941 604 889 719

or find more information here: <u>www.PCBi-Physics.com</u>





www.easyLogix.de

Useful Links:

PCBi-Physics www.PCBi-Physics.com

PCB-Investigator www.pcb-investigator.com

Native Board Import (3D Interface to CATIA, SiemensNX, SolidWorks, SolidEdge) <u>www.sts-development.biz</u>

GerberLogix www.gerberLogix.com

Online Gerber Viewer www.Gerber-Viewer.com

Software Development, CAD Converter, data connection <u>www.easyLogix.de</u>

