

Making boards in the eC-cloud

Your PCB right first time

D&E event 2015

DESIGN AUTOMATION & EMBEDDED SYSTEMS

SECURITY/FPGA - EMBEDDED - INTERNET OF THINGS - ELECTRONIC DESIGN/PRODUCTION - TESTING

4 NOV ←
1931 CONGRESCEENTRUM
BRABANTHALLEN
DEN BOSCH

D&E
event
2015

Virtual PCB production - Goals

- Help busy designers get boards “right first time”
 - on time
 - accurate to their intentions
 - at best total cost

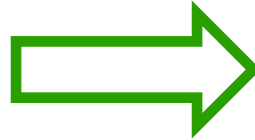
- Two inter-related topics
 - Design for Manufacturability (DFM)
 - What are the features that increase board costs?
 - What makes my board harder or impossible to make?

 - Clear data presentation and clear order details
 - How can I be sure the data transfer is accurate?
 - Are there any data issues that will delay delivery?

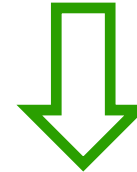
“Wonderful, but I barely have time to design the circuitry, let alone sort out fabrication.”

Virtual PCB production – How?

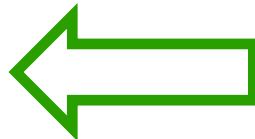
**Use eC Smart Menus
to optimise your
PCB design parameters**



**Layout your PCB
using these
PCB design parameters**



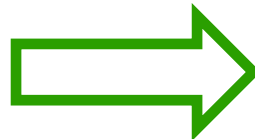
**Evaluate the results of the
automatic
PRE-CAM procedure**



**Check your PCB layout
using our
PCB visualisation tools**



**Make the appropriate choices
using "PCB Solver" to avoid
data anomalies later on.**



**Order your PCBs
with confidence
from Eurocircuits**

What you should know before you start to layout your board.

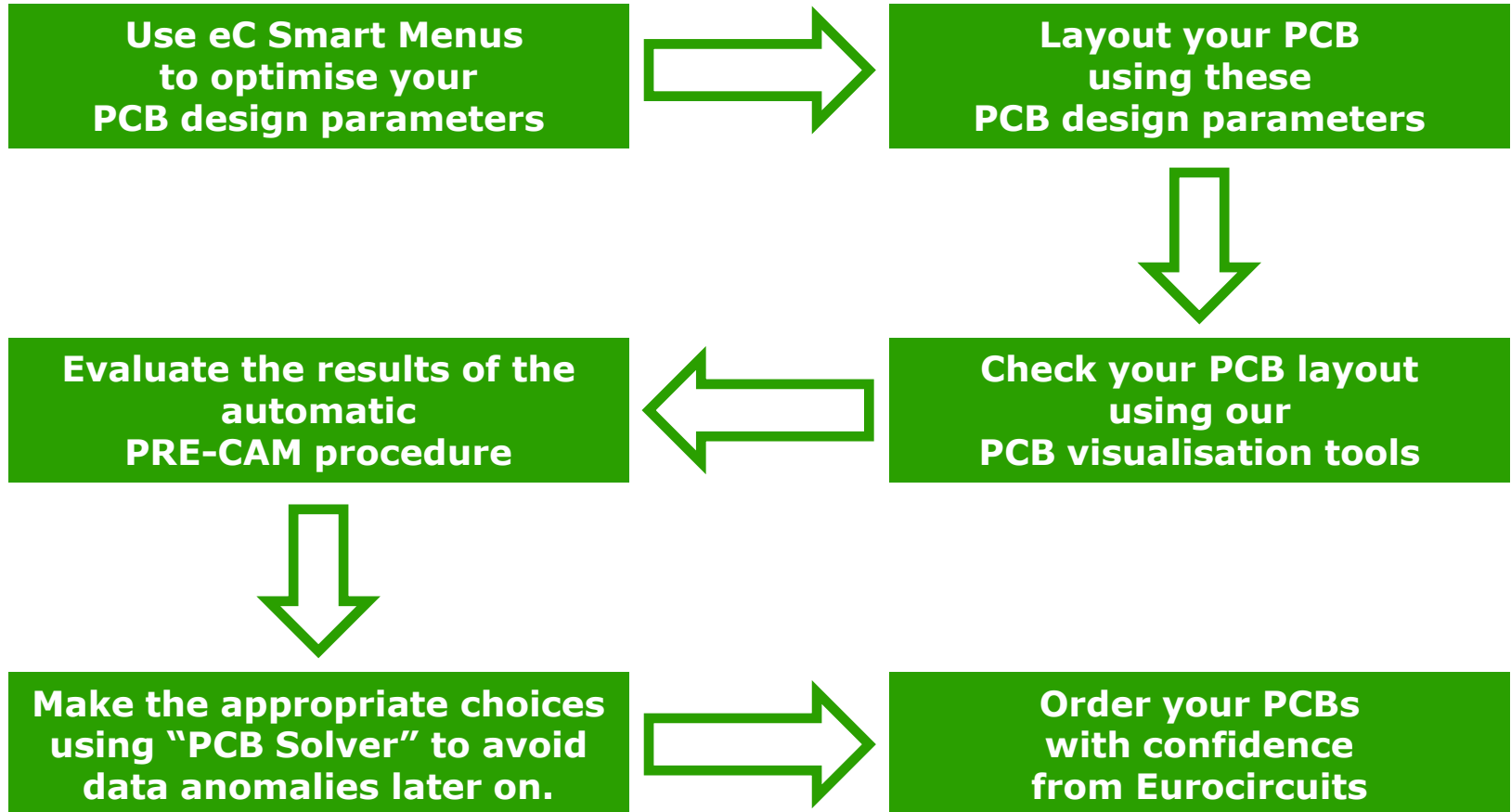
- What are the PCB cost drivers
 - Board size
 - Base material
 - Number of layers
 - Copper thickness
 - Special multilayer build
 - Blind and buried vias
 - Smallest hole size
 - Minimum track and gap
 - Surface finish
 - Soldermask colour
 - Legend colour
 -
- What makes a PCB harder/impossible to make?
 - Heavy copper + narrow tracks/gaps
 - Too small holes in too thick boards (aspect ratio)
 - Incompatible surface finishes
 - Blind/buried via combinations

“Stop! How can I take all this on board?”

What tools are available?

- Eurocircuits offers DFM:
 - smart menus that:
 - Are specific to the base material of your choice
 - Help you select the most effective build-up (+700 builds)
 - Help you select the technical classification of the board
 - Validate all chosen technical parameters (+300 rules)
 - Validate blind and buried via builds
 - Give price guidance on all chosen options
 - online help at any point in the flow
- => Help define the smartest design parameters for your PCB**
- Eurocircuits guarantees:
 - technology standards that any volume fabricator can make
 - Base materials that guarantee high reliability during assembly and afterwards during field operation

Virtual PCB production – How?



Your PCB is ready for viewing.

Customer R...

CALCULATE AND ORDER

Calculate a...

Order Stencils

Shopping basket 4

View runnin...

Order repe...

Pre-production a...

Exception o...

View shipm...

TEST-OK

OFF THE SHELF

FINANCIAL

MANAGE PROFILE

Demouser pwr_user1 | Democompany

(4 Total item(s)) | English | Home | Logout

Price calculator **Shopping basket** Checkout items

Shopping basket – To start the manufacturing process, select an item(s) and "Proceed to checkout" !

Factory closures: (1 day) in November - View

[Proceed to checkout](#)
[Modify](#)
[View details](#)
[Files](#)
[Delete](#)
[History](#)
[Download PDF offer](#)
[Edit administrative details](#)
[Ask a question](#)

Number	Item name	Service	Status	Created c	Search						
Items ready for checkout											
<input type="checkbox"/>	PCB Visualizer®	Offer	Number	Type	Status	Item name	Service	Quantity	Delivery days	Unit price	Net price
<input type="checkbox"/>	✓ PCB Visualizer®		B0248448	PCB	Ready to checkout	LSA-TST-1ltopcu	IMS pool	5	7 Working days		
<input type="checkbox"/>	! PCB Visualizer®		B0247891	PCB	Ready to checkout	WDG perf	STANDARD pool	10	7 Working days		
<input type="checkbox"/>	✓ PCB Visualizer®		B0244135	PCB	Ready to checkout	Isa-TST	STANDARD pool	10	7 Working days		
<p>You can order all jobs with status 'Ready for Checkout' immediately, even when the PCB Visualizer process is still running or failed.</p>											
Items in analysis											
<input type="checkbox"/>	PCB Visualizer®		Number	Type	Status	Item name	Service	Quantity	Delivery days	Unit price	Net price
<input type="checkbox"/>	✓ PCB Visualizer®		B0247255	Inquiry	Awaiting quotation	Isa-TST	STANDARD pool	10	7 Working days	-	-
<p>Visualizer link in [Visualizer] column lets you view PCB layers visually, during processing you will not be able to modify your data files.</p>											

Support is always just a click away.

These 3 items can be viewed by clicking the link.

When inquiries are launched, they will appear here while in process.

PCB Visualizer :

Your data interpreted & visualized

PCB Visualizer® v1.3-152-151013

PCB Configurator PCB Checker

Board name LSA-tstEagle (B0503230) Data set: Customer data

Customer data

Imported 21 layers

STANDARD pool

Delivery format: Single PCB PCB quantity: 10

Delivery term: 7 working days Number of layers: 6
Measured: 6

PCB width (X) (mm): 158.75 PCB height (Y) (mm): 69.85
Measured: 158.75 mm Measured: 69.85 mm

eC-registration compatible PCB ☐ Board name: LSA-tstEagle

Commercial details

Stencils

Material

Board thickness: 1.55 mm Material Tg: 145-150 °C

Outer layer copper foil: 18 µm (end +/-) Inner layer copper foil: 35 µm

Reversed buildup ☐ Special buildup ☐

Inner layer core thickness: Standard Blind/Buried via runs: 0
Measured: 0

Extra press cycles: 0

Technology

PCB definition

Top soldermask: Green Bottom soldermask: Green
Measured: Detected Measured: Detected

Top legend: White Bottom legend: None
Measured: Detected Measured: Not detected

Surface finish: Any lead free fi Milling: No

Bare Board Testing ☒

Advanced options

Board build

Top view

- Top solderpaste
- Top legend
- Top soldermask
- Top copper
- Inner copper 1
- Inner copper 2
- Inner copper 3
- Inner copper 4
- Bottom copper
- Bottom soldermask
- Plated drill
- Non Plated Through Hole (NPTH)
- Bottom view

Total material thickness: 1.56 mm

Bird's Eye View

Detailed View

Summary

Service	STANDARD pool
Delivery term	7 working days
Estimated shipment date	22-10-2015
Quantity	10 PCBs
Board surface / Order surface	1.11 dm² / 11.09 dm²
Prices	Net
Single PCB	€ 42.27
Total boards	€ 422.69
Express transport	€ 0.00
VAT 21.00%	€ 88.77
Total gross	€ 511.46

Save changes

Click the "Launch inquiry" button in case you are having troubles configuring your PCB. Our sales team will review your input and generate an offer.

Launch Inquiry

Remarks

- The measured value for Outer layer annular ring (OAR) (0.050 mm) does not match any of the available options. ☐ Ignore
- The measured value for Inner layer annular ring (IAR) (0.050 mm) does not match any of the available options. ☐ Ignore

Alternatives

Customized matrix

10 PCBs	20 PCBs	30 PCBs
7 working days	7 working days	7 working days
Net	Net	Net
€ 42.27	€ 27.92	€ 22.87
€ 422.69	€ 558.34	€ 686.09
Select	Select	Select
10 PCBs	20 PCBs	30 PCBs
6 working days	6 working days	6 working days
Net	Net	Net
€ 52.95	€ 34.97	€ 28.65
€ 529.50	€ 699.49	€ 859.58
Select	Select	Select

Contact support

PCB Configurator : Remove data ambiguities online

PCB Visualizer® v1.3-152-151013

PCB Configurator PCB Checker

Board name LSA-tstEagle (B0503230) Data set: Customer data

Customer data

Imported 21 layers

STANDARD pool

Delivery format: eC-panel by Eur Panel quantity: 10
 Delivery term: 7 working days Number of layers: 6
 PCB width (X) (mm): 158.75 Measured: 158.75 mm
 PCB height (Y) (mm): 69.85 Measured: 69.85 mm
 eC-registration compatible PCB: ☒ 0
 Commercial details

Stencils

Panel

Repeat in X: 2 Repeat in Y: 2
 Panel width (X) (mm): 333.50 Panel height (Y) (mm): 155.70
 PCBs per panel: 4 PCB separation method: Break routing
 Panel border: 5.00 mm PCB spacing: 2.00 mm
 Panel without cross outs: ☐ Panel outline: Routing

Material

Technology

PCB definition

Top soldermask: Green Bottom soldermask: Green
 Measured: Detected Measured: Detected
 Top legend: White Bottom legend: None
 Measured: Detected Measured: Not detected
 Surface finish: Any lead free fl Milling: No
 Bare Board Testing: ☒

Advanced options

Board buildup

1. Top view
 Top solderpaste
 Top legend
 Top soldermask
 Top copper
 2. Inner copper 1
 3. Inner copper 2
 4. Inner copper 3
 5. Inner copper 4
 6. Bottom copper
 Bottom soldermask
 Plated drill
 Non Plated Through Hole (NPTH)
 Bottom view
 Total material thickness: 1.56 mm

Detailed View

0. All Order details of your PCB.
 1. Imported layers and the Buildup editor.
 2. Graphical presentation of the Buildup.
 3. Panel editor to define customer panels.
 4. Classification wizard to determine the technology class of the PCB.
 5. PCB PIXtore editor to integrate graphics onto your PCB.
 6. Marking editor to manipulate all markings on the board.
 7. The Visualization of your data, your virtual PCB.
 8. The shown data set, customer data or production data.
 9. The PCB Visualizer help function.
 10. The price for your chosen combination of quantity and delivery term.
 11. Save all changes to the basket item.
 12. Launch an inquiry to be processed by our engineers and sales.
 13. Remarks on your data versus order details, actions required.
 14. Customized matrix to input your choice of quantities and delivery terms.
 15. Automatically Chosen alternatives for Quantities and delivery terms.
 16. On page online chat support.

Summary

Service: STANDARD pool
 Delivery term: 7 working days
 Estimated shipment date: 22-10-2015
 Quantity: 10 panels
 Board surface / Order surface: 5.19 dm² / 51.93 dm²
 Price: Net
 Single panel: € 113.62
 Total boards: € 1136.18
 Express transport: € 0.00
 VAT: 11 % € 238.60
 Total gross: € 1374.78
 Save changes
 Launch Inquiry

Remarks

1. The panel is marked as eC-registration compatible, but no stencils are ordered.
 2. The measured value for Outer layer annular ring (OAR) (0.050 mm) does not match any of the available options.
 3. The measured value for Inner layer annular ring (IAR) (0.050 mm) does not match any of the available options.

Alternatives

Customized matrix

10 panels	20 panels	30 panels
10 working days	10 working days	10 working days
Net	Net	Net
€ 98.29	€ 68.45	€ 56.29
Select	Select	Select
10 panels	20 panels	30 panels
8 working days	8 working days	8 working days
Net	Net	Net
€ 108.61	€ 75.41	€ 62.02

Contact support

PCB Configurator : **Fine-tune your data**

- Marking editor
 - Move the eC order number, UL-logo,
 - Add QR-code, production date code, text, custom logo
- Panel editor
 - Build a custom delivery panel to suit your particular assembly requirements
- PCB PIXture editor
 - Make your PCBs stand out from the crowd
 - Put a photograph or graphic on your PCB: Gold PIXture, Mask PIXture, Gold Logo
- => **all choice are validated on the fly**

PCB Checker : Evaluate possible DRC issues

PCB Visualizer® v1.3-152-151013

Board name LSA-tstEagle (B0503230) Data set: Customer data

DRC - DFM information

DRC Information

Layer	Required	Measured	Count	Severity
Outer layer trackwidth (OL-TW)				
Top copper	0.150 mm	0.150 mm		
Bottom copper	0.150 mm	0.150 mm		
Outer layer isolation distance (OL-TT-PP)				
Top copper	0.125 mm	0.141 mm		
Bottom copper	0.125 mm	0.150 mm		
Outer layer annular ring (OAR)				
Top copper	0.125 mm	0.050 mm	32	10
Bottom copper	0.125 mm	0.050 mm	32	10
Inner layer trackwidth (IL-TW)				
Inner copper 1	0.150 mm	0.150 mm		
Inner copper 2	0.150 mm	0.150 mm		
Inner copper 3	0.150 mm	0.150 mm		
Inner copper 4	0.150 mm	0.150 mm		
Inner layer isolation distance (IL-TT-PP)				

Current issue

Outer layer annular ring (OAR) - Top copper

Measured annular ring : 0.050 mm
Required annular ring : 0.125 mm
Tool diameter : 0.25 mm
Hole diameter : 0.15 mm
Calculated pad diameter : 0.350 mm

Annular ring
More information can be found [here](#).

Board buildup

Top view

Top solderpaste
Top legend
Top soldermask
Top copper
Inner copper 1
Inner copper 2
Inner copper 3
Inner copper 4
Bottom copper
Bottom soldermask
Plated drill
Non Plated Through Hole
Bottom view

Total material thickness: 1.56 mm

Detailed View

0. PCB Checker - DRC information
1. Detailed PCB parameter overview with fault indication
2. Detailed fault description
3. Bird eye view of all faults and repaired issues
4. Detailed zoom of the fault in the board
5. Remarks stay in sight
6. On page online chat support

Summary

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Single panel: € 113.62
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Express transport: € 0.00
VAT 21.00%: € 238.60
Total gross: € 1374.78

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Remarks

The panel is marked as eC-registration compatible, but no stencils are ordered.

The measured value for Outer layer annular ring (OAR) (0.050 mm) does not match any of the available options.

The measured value for Inner layer annular ring (OAR) (0.050 mm) does not match any of the available options.

Alternatives

Customized matrix

10 panels 10 working days Net € 98.59	20 panels 10 working days Net € 68.45	30 panels 10 working days Net € 56.29
Select	Select	Select

10 panels 8 working days Net € 108.61	20 panels 8 working days Net € 75.41	30 panels 8 working days Net € 62.02
Select	Select	Select

Contact support

PCB Checker : Evaluate possible DFM issues

PCB Visualizer® v1.3-152-151013

PCB Configurator

PCB Checker

Board name LSA-tstEagle (B0503230) Data set: Customer data

DRC - DFM Information

DRC information

DFM information

Layer	Values
Plating	
Top copper	0.80
Bottom copper	0.71
Solderpaste surface	
Top solderpaste	1335.75 mm ²
Not-connected soldermask-free pads - Potential fiducials	
Top copper	16
Bottom copper	0
Copper free of soldermask	
Top copper	14.80%
Bottom copper	3.04%

Plating

Top plating index 0.8

0. PCB Checker - DFM information

1. Plating index

2. Detailed info on the plating index of the chosen layer

3. Image of the plating index of the chosen layer

4. Calculated solder paste surface (SMD)

5. Potential fiducials

6. % Copper, free of soldermask against the board surface

7. On page online chat support

Fault view

Plating - Top copper

Current issue

Plating index : 0.80

The plating index measures the uniformity of copper density on the board. A completely uniform board has an index of 1 which means that no plating problems are expected. Lower values show less uniformity, highlighted on the visual image by the red and blue areas. If the index falls to 0.4 or less, then special attention is required.

More information can be found [here](#).

1702/1

Underplating Normal plating Overplating

Summary

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Launch Inquiry

Remarks

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Alternatives

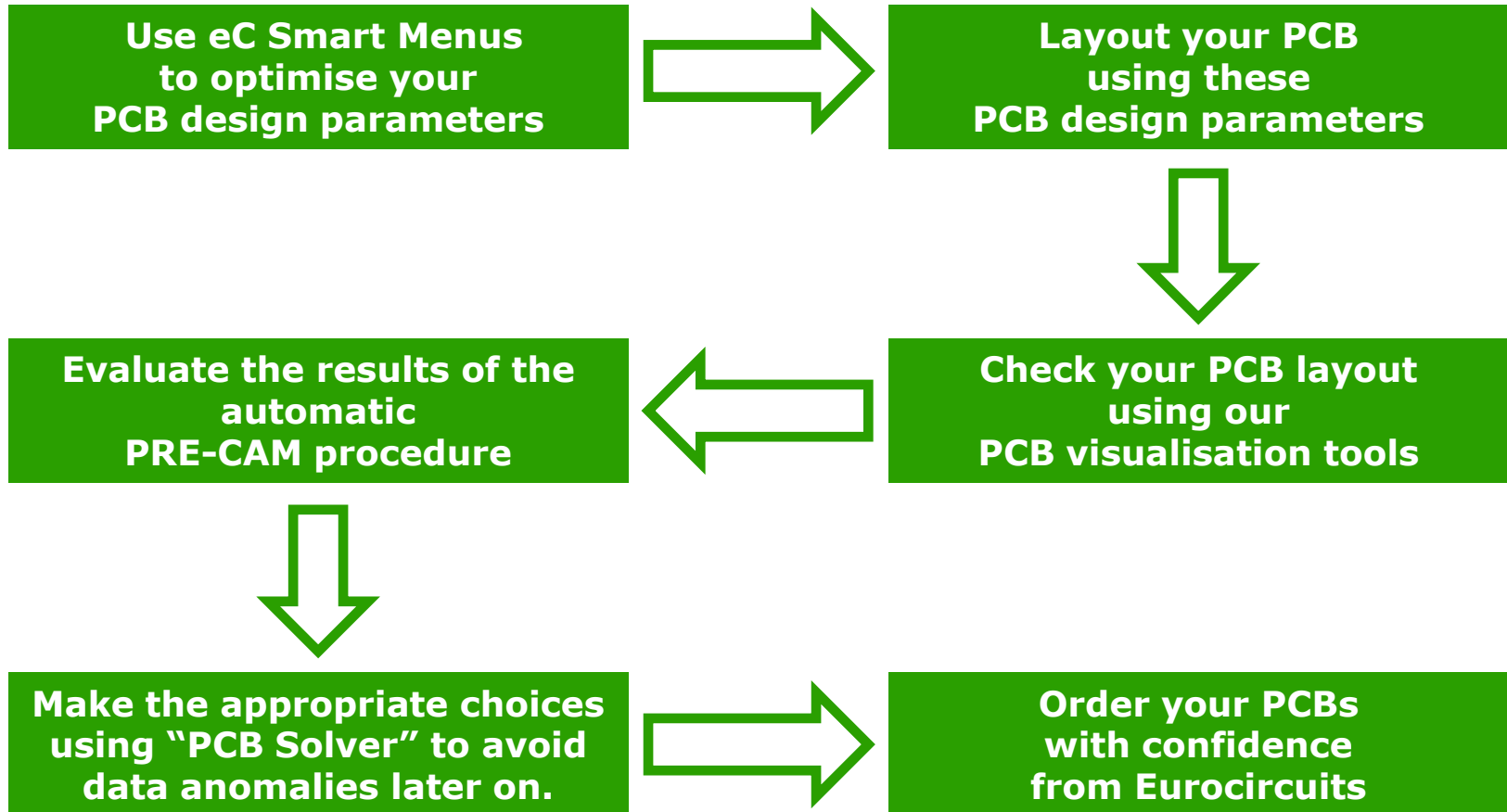
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6 working days	6 working days	6 working days
Net	Net	Net
€ 52.95	€ 34.97	€ 28.65
€ 529.50	€ 699.46	€ 859.58
Select	Select	Select

Your PCB in the eC-cloud so far.

- So far we have helped you to:
 - Define your optimum design parameters
 - Specify all non-Gerber PCB parameters
 - Check if your data is:
 - Readable
 - Complete
 - Understood
 - Visualize your data & optimize your data
 - Check for any DRC issues & repaired some issues
 - Check for any DFM issues
- Next we need to show you what we will do with your data to make them production ready.

Virtual PCB production – How?



Making your PCB data ready for production, all in the eC-cloud

- Process the customer data through our automated CAM routines and present the result as a second set of data:
 - Analyse all drill holes and adapt the production hole diameters
 - Clean and repair all copper layers
 - Adjust the solder mask to production values
 - Legend layer clipping and text width adjustment
 - Prepare a drill drawing indicating all slots and holes
 - Prepare the profiling layer for Single PCB and Customer Panel
 - Prepare the solder paste-layers
 - Prepare all additional layers
 - Gold fingers
 - Peel-off
 - Via-fill
 - Carbon contacts
 - Heat sink paste
- => Show PRE-CAM results and present any anomalies and possible solutions in PCB Solver, all in the eC-cloud

More information at
www.eurocircuits.com

PCB Solver : Auto repair Annular Ring issues

Board technology Select classification

Outer layer trackwidth (OL-TW)	0.150 mm	Outer layer isolation distance (OL-TT-TP-PP)	0.150 mm
Outer layer annular ring (OAR)	0.125 mm	Smallest final hole	0.25 mm
Hole density	< 1000/dm ²	Technology class	6C
Holes <= may be reduced	0.45 mm		

Fault view

Outer layer annular ring (OAR) - Top copper

☒ 0 ☒ 0 ☒ 22

Current issue



	specified	repaired
Measured annular ring:	0.025 mm	0.150 mm
Required annular ring :	0.125 mm	
Tool diameter:	0.60 mm	0.35 mm
Hole diameter:	0.50 mm	0.25 mm
Calculated pad diameter :	0.650 mm	

1/22

AR = (Pad D – Tool D) / 2 (Tool D = D drill bit)

Faulty AR = (0.650mm – 0.60mm) / 2 = **0.025mm**

Repaired AR = (0.650mm – 0.35mm) / 2 = **0.150mm**



PCB Solver : Outline Editor

Outline editor - WDG demo outline (B0221812)

Layer list

140009_arduino_course_GBL - Bottom cop
140009_arduino_course_GBS - Bottom solc
140009_arduino_course_GTL - Top copper
140009_arduino_course_GTO - Top legend
140009_arduino_course_GTS - Top solderm
140009_arduino_course_TXT_plated - Plate
140009_arduino_course_TXT_unplated - Nc

Board size

Measured: 58.57 x 117.29 mm
Required: 58.56 x 117.29 mm

Legend

- Board surface
- Board outline
- Object to pick
- Open chain end
- Small gap/Short chain
- Intersection

Layer image

Tools

- Undo last operation
- Redo last operation
- Reset
- Pick from selected layer
- Pick single line/arc
- Pick chain of lines/arcs
- Editing**
 - Draw line
 - Draw chain
 - Draw rectangle
 - Connect
 - Intersect
- Delete**
 - Delete single line/arc
 - Delete chain of lines/arcs
 - Delete selected lines/arcs
 - Delete selected chains
 - Delete all

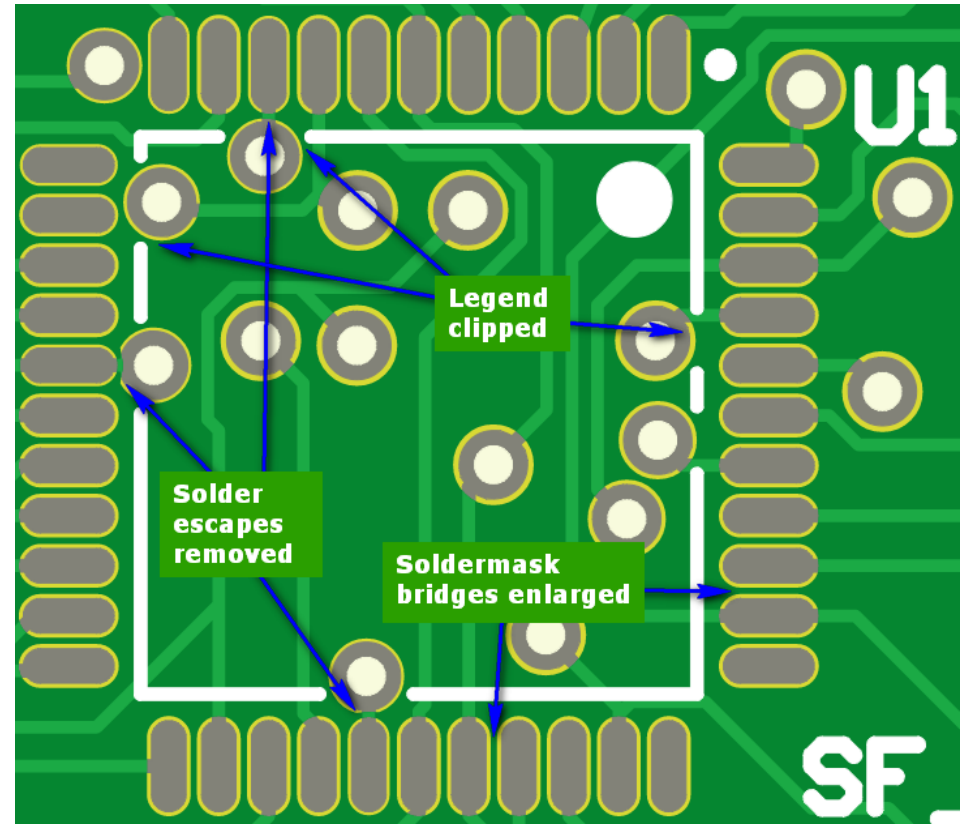
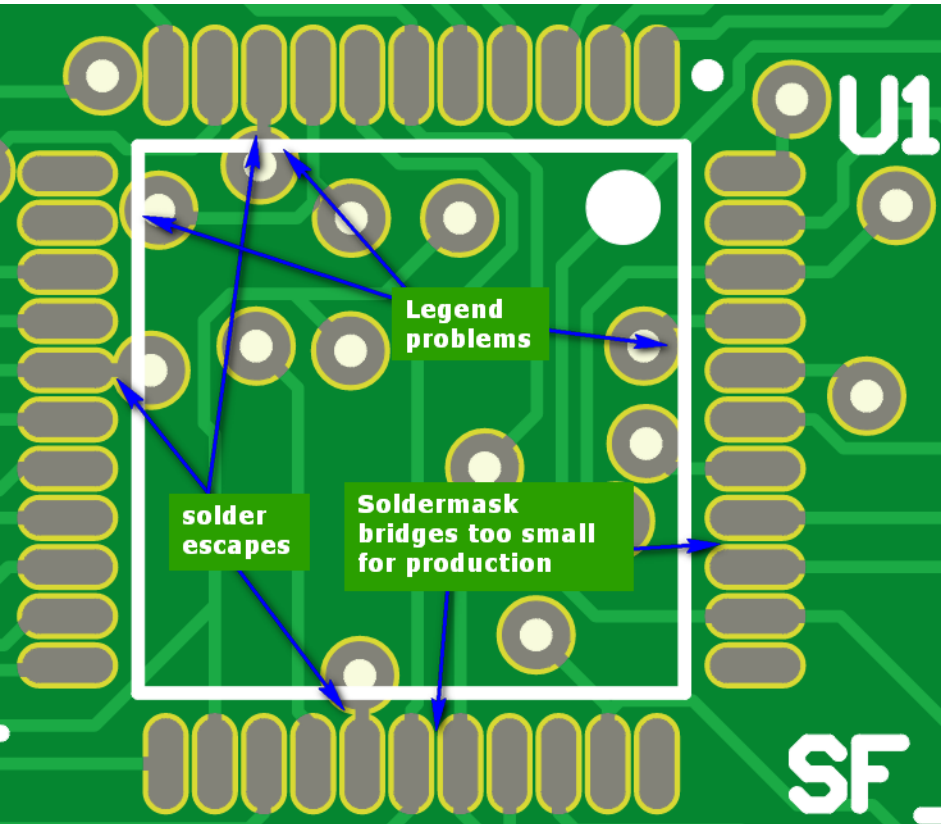
Select one of the tools to edit the outline.

mm 90 100 150

Select one of the tools to edit the outline.

Cancel Apply

PCB Solver : some more examples

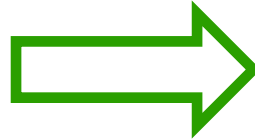


PCB Solver : **Fix it before it kicks you**

- Make decisions on PRE-CAM results:
 - Auto repair Annular Ring issues
 - Repair or construct the PCB outline
 - Repair or construct internal milling
 - Choose small soldermask webs at higher cost or no webs
 - Legend or not based on viewing the clipping result
 - ...
- Available:
 - YES
 - YES
 - Soon
 - 2015
 - Q1-2016
 - ...
- Avoid problems before you order !

Making PCBs in the eC-cloud

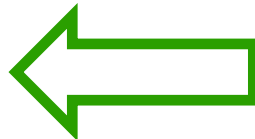
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to optimise your
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**Layout your PCB
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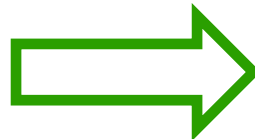
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EURO



CIRCUITS