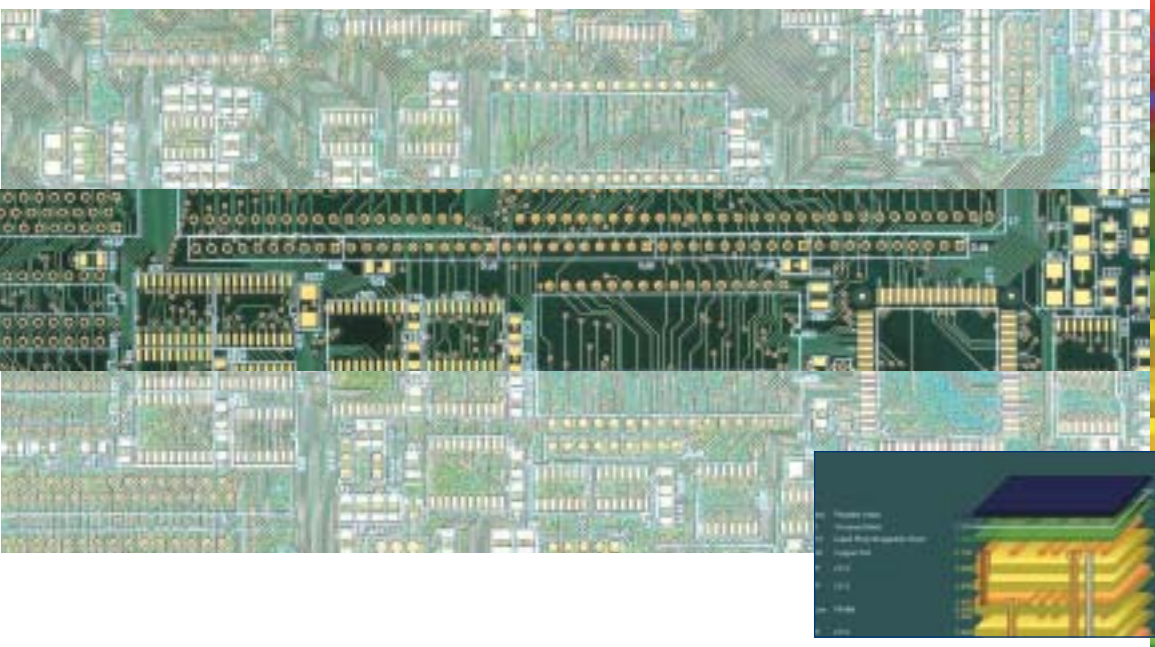
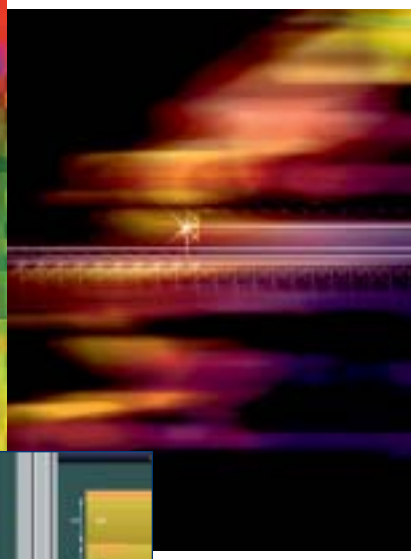
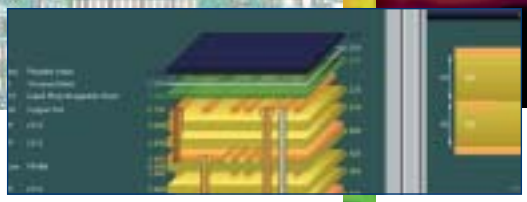
Automatic controlled impedance stackup design system for electronics designers and PCB fabricators







Speedstack PCB
Speedstack Si
Speedstack

Automatic layer stackup

Professional documentation

Supply chain management

Graphical editor

Impedance control

Transmission line modelling

Polar

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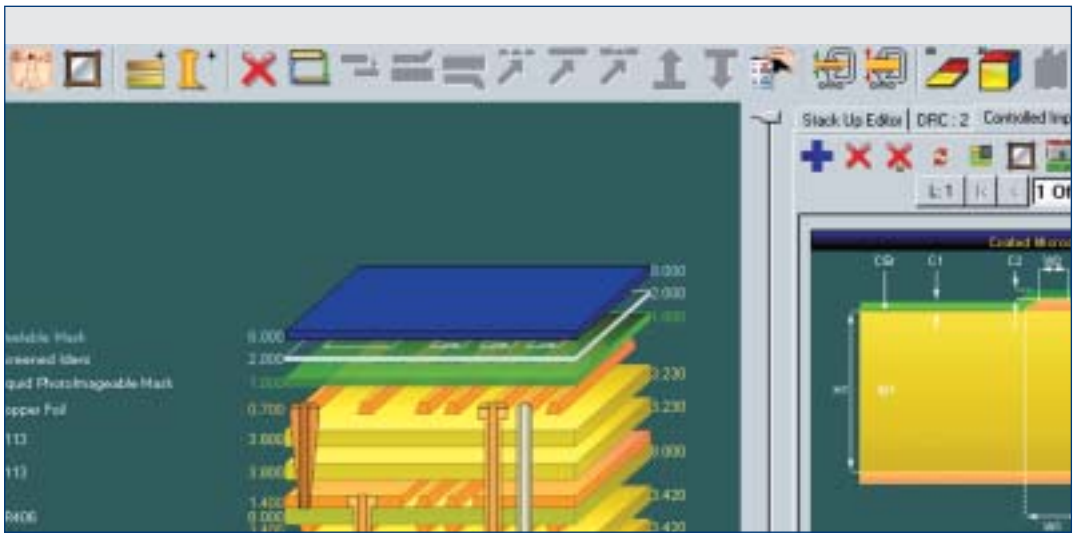
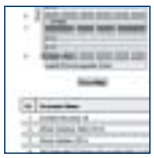


Automatic layer stackup and PCB transmission line design



Designed to automate the PCB stack design process and reduce drastically the time taken to create layer stackups, the Speedstack family of PCB layer stackup design systems simplifies stack creation/documentation and information sharing for both electronic designer and PCB fabricator.

Speedstack

Speedstack is a powerful PCB layer stackup design tool featuring both automatic layer stackup generation and powerful stackup editing capabilities. For PCB fabricators Speedstack PCB interfaces with the industry standard Polar Si8000m controlled impedance design system. For electronic engineers involved in stackup design Speedstack Si interfaces with the Polar Si9000e transmission line design system.

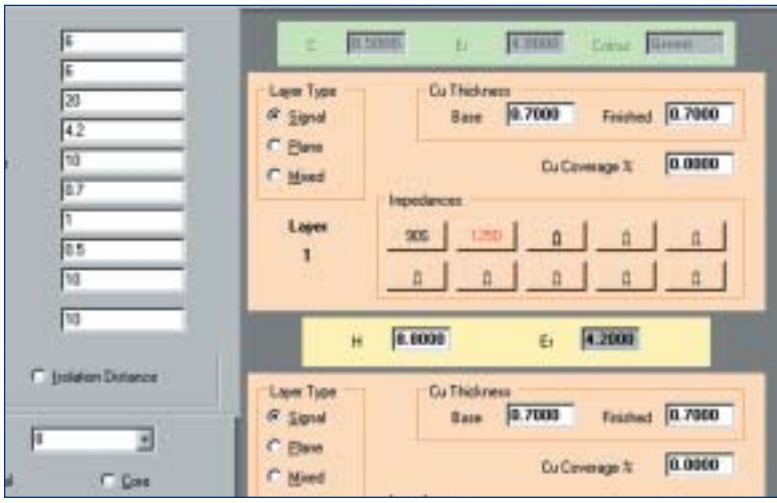
Features

- Automatic stackup
- Professional documentation
- Powerful stack editing tools
- Share builds between design and fabrication
- Specify impedance test along with a stackup design
- Create and document high layer count builds with ease.

Speedstack:	Straightforward automatic stack creation
Speedstack PCB:	Controlled impedance stackup design for fabricators
Speedstack Si:	High speed transmission line design for pre-layout engineering

3 routes to stackup creation

Polar's Speedstack can provide automatically built stacks with its autostackup facility but users who require more control over the stack creation process may specify the stackup semiautomatically with the powerful Stackup Wizard or alternatively build the stack manually layer by layer. Speedstack is flexible and allows full manual editing of stacks created under autostackup or the Stackup Wizard.



Materials library

Speedstack supports 3 types of library – your own custom library of materials, a generic designer library of materials of set dielectric thicknesses and a comprehensive set of materials libraries from PCB base material suppliers who are members of the Polar Speedstack material partner program.

Automatic controlled impedance test program generation

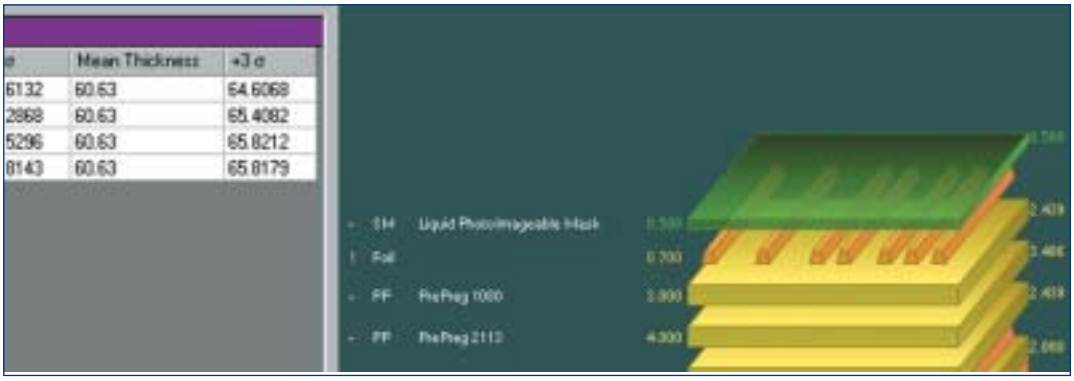
Both Speedstack Si and Speedstack PCB are able to directly output controlled impedance test files associated with each stackup. For the fabricator this is an ideal way to link the impedance test requirements to a particular job. For the OEM this offers a clear method of sending impedance test specifications out to suppliers or brokers.

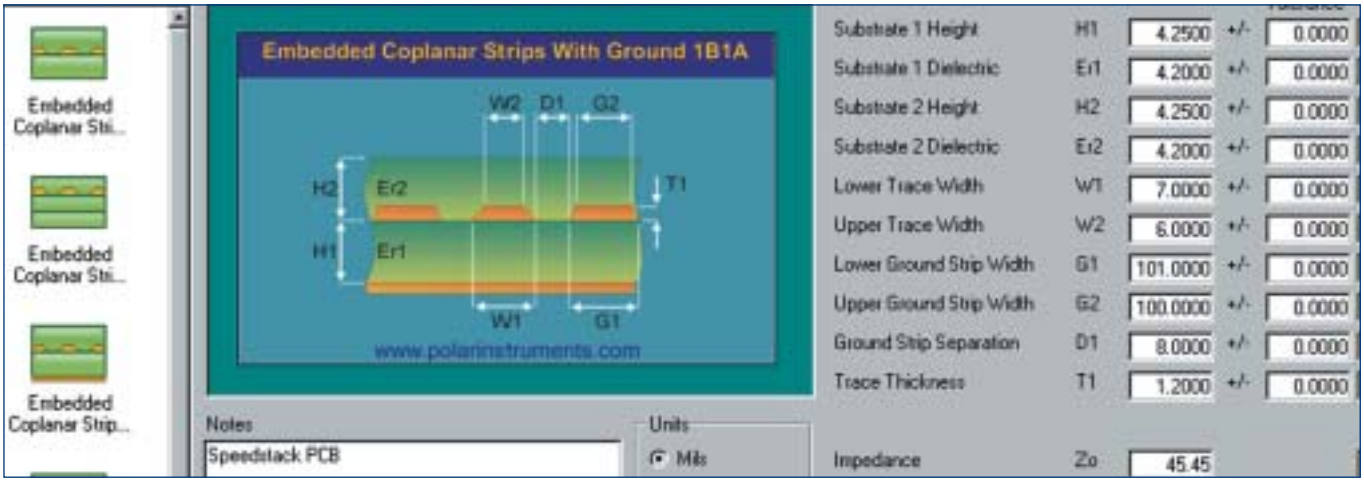
Graphical interface

Completed stackups are graphically presented and material data along with drill details and impedance control requirements are clearly documented. The stack graphics may be exported in a variety of formats, including Gerber and Jpeg for inclusion in your documentation packages.

Do you need to control your material costs?

Designers and fabricators can work together and select best material combinations for minimising build costs. Fabricators can share their in house material libraries with OEMs and ensure the most effective material choice is employed in the build.





Speedstack PCB

Speedstack PCB is Speedstack tailored for PCB fabricators and PCB brokers – any one with a need to design or communicate controlled impedance PCB stackups. Speedstack PCB includes a link and licence for Polar Si8000m controlled impedance design system. Speedstack PCB customers are able to share stackups and read impedance requirements from designers who are using Speedstack Si.

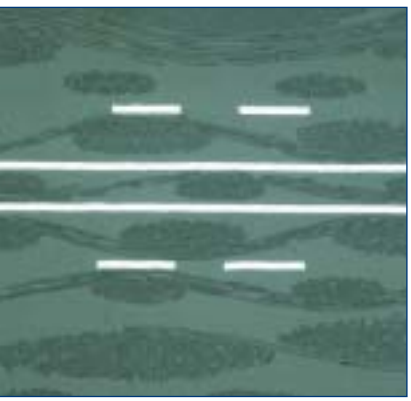
Who should use Speedstack PCB?

Supplier management

When multiple sourcing PCBs or when moving from prototype to volume production, the stack and fabrication design rules checks ensure that you do not overlook the manufacturing capabilities of your chosen suppliers. In addition the professional documentation output from Speedstack ensures that layer stack information is accurately conveyed from your team to your PCB suppliers.

PCB fabrication

Applications engineers, front end and production engineers benefit by receiving stack information in an easy to understand format. The Speedstack .sci file contains everything you need to know about the layer stackup of a particular job. If you need to make changes or share preferred stacks with your customers, Speedstack cuts the time for documentation and information sharing to a fraction of the time taken when employing traditional methods that use Excel, Word or PowerPoint.



This photograph illustrates a polished microsection of a typical glass resin composite structure. This is FR4 but could equally be any woven glass reinforced composite. Glass has a dielectric constant of 6, the resin around 3. With high frequency base materials the resin Er can be even lower. On fine geometry boards with differential traces you need to take into account local variations in the material Er in order to obtain the most accurate prediction of impedance.

When the differential pair or coplanar waveguide is designed with very close spacings, almost all the electric field occurs in the horizontal gap between the traces. This is often resin filled (as shown). A number of structures in the Si8000m allow you to define the local Er between the traces. Make sure you consider this in order to maximise your first time yields.

Speedstack PCB is a licence package designed especially for fabricators who need to manage controlled impedance builds. Speedstack PCB uses the proven Polar Si8000m multiple dielectric boundary element field solver to provide the impedance data for the stack. In addition Speedstack PCB licence holders have full access to the stand alone Si8000m Quicksolver licence.

More about the Si8000m

Designed especially for extracting controlled impedance parameters on multiple dielectric builds, the Si8000m employs Polar's proven boundary element field-solving engine. The Si8000m is able to model a wide range of single and multiple dielectric structures. In demanding applications and high volume environments where you need to extract the highest yields from your production process the Si8000 can even model resin rich areas between differential traces. The Si8000m Quicksolver supports goalseeking, and impedance extraction at the click of a mouse. The Si8000m Quicksolver is able to calculate minimum and maximum process parameters. This lets you calculate "what if" and worst case scenarios, without the need to use Excel spreadsheets.

Enhanced Quicksolver speeds design
Powerful impedance design system
Boundary element field solver
Sensitivity Analysis increases yields
Ideal for PCB design and front end
Easy graphing and sharing of data
Predict impedance tolerance
Account for local variations in dielectric constant

If you want to learn more about how to improve your PCB production process, you can take test results and physical microsection data and by feeding this information back into the Si8000m discover which production process has most effect on impedance values. With experience you will be able to alter production processes to suit incoming material variation. Imagine as a PCB fabricator you receive a batch of core material that is all at or around its upper thickness limit. You can use the Si8000m to investigate whether by altering trace dimensions (within their specified range) you can still meet spec. If more adjustment is required the Si8000m gives you the information you need to go back to the original designer to seek permission to alter traces further.

Differential Impedance PCB Structures
Differential Coplanar Impedance Structures
Single Ended Impedance Modelling
Microstrip and Stripline Constructions
Field Solving by Boundary Element Method - BEM
Extraction of odd, even and common mode impedance

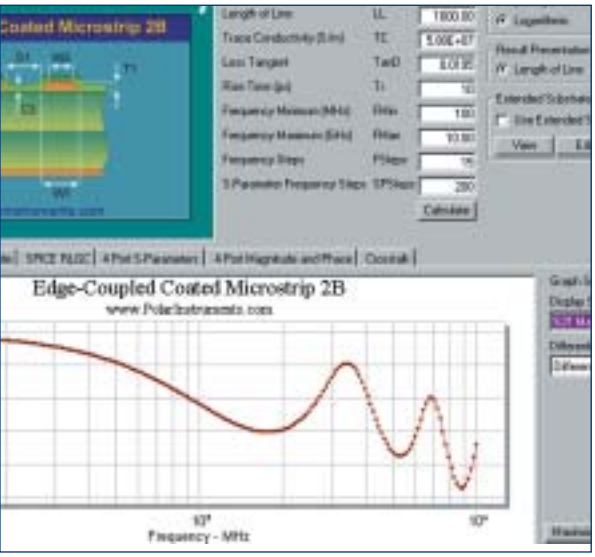
Speedstack Si

Speedstack Si is tailored for design engineers, especially designers working on stackups prior to layout. Speedstack Si includes a link and licence for the Polar Si9000e PCB transmission line design system. Stackups created under Speedstack Si may be easily communicated with PCB fabricators. A designer also has the ability to add Polar CITS controlled impedance test requirements to the stackup specification. Speedstack can directly export a Polar CITS test file for a given controlled impedance stackup.

Who should use Speedstack Si?

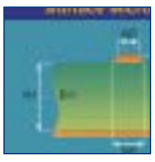
Electronic designers – especially pre layout design

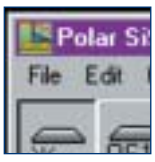
If you are responsible for electronic design the Speedstack Si can assist with choice of materials and layer stackup before design is complete. By using the Speedstack Si, layer stackup can be discussed and optimised for cost / signal integrity / manufacturability and reliability with your fabricator before going to production. Alternatively you can use Speedstack Si to design with generic materials and hand over the final material selection to your fabricator.

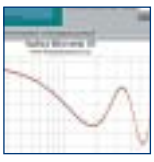


Interconnect design

Interconnect designers should use the Speedstack Si to share layer stackup and ensure the PCB build complies with the intentions of the electronic designers and the fabricators applications team. The .sci (Stackup Controlled Impedance) file provides a format convenient for communicating all the material and transmission line geometries in one simple package.
In addition, the correct Gerber file names can be included in the .sci to ensure the Gerber files are attached to the correct physical layer.





Speedstack Si

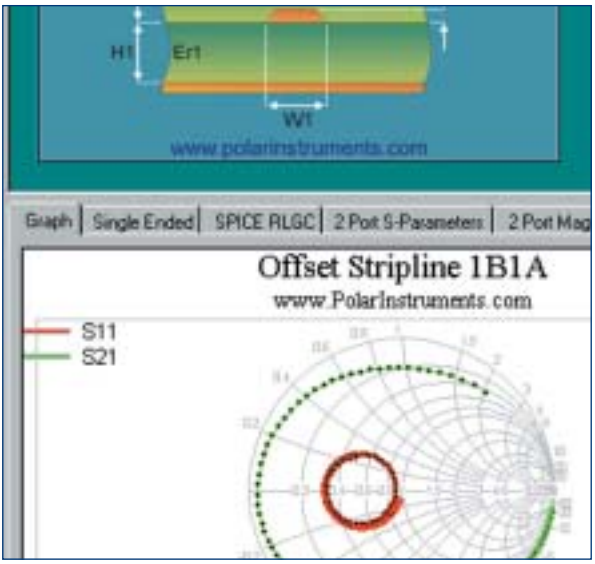
Speedstack Si is delivered with a licence and link to the Polar Si9000e PCB transmission line design system.

More about Si9000e:

PCB transmission line design system extracts full transmission line parameters - especially suitable for modelling of transmission line loss.

With its fast, accurate, frequency-dependent transmission line modelling, the Si9000e is designed to model loss and extract full transmission line parameters over a wide range of popular PCB transmission lines (over 80 structures). Employing boundary element method field solving the Si9000e extracts RLGC matrices and rapidly plots a range of transmission line information for the structure you are designing. Loss is graphed three ways with clear indication of dielectric, copper and total loss. S-parameter extraction is fast and S-parameters may be displayed graphically or output in Touchstone ™ format.

The Si9000e boundary element field solver also communicates with Speedstack for consistent layer stackup creation and documentation



Single and multiple dielectric builds are catered for, along with the ability to take into account solder mask performance. Mask coverage can be set adjacent, between and above traces.

Si9000e

Extracts frequency dependent impedance

Accurate BEM impedance field solver

Model odd, even, differential and common mode impedance

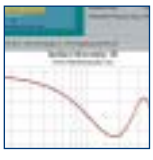
Manufacturing tolerance prediction.

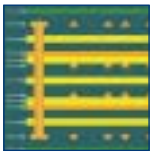
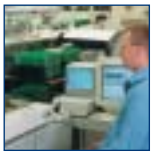
Graph copper / dielectric and total loss

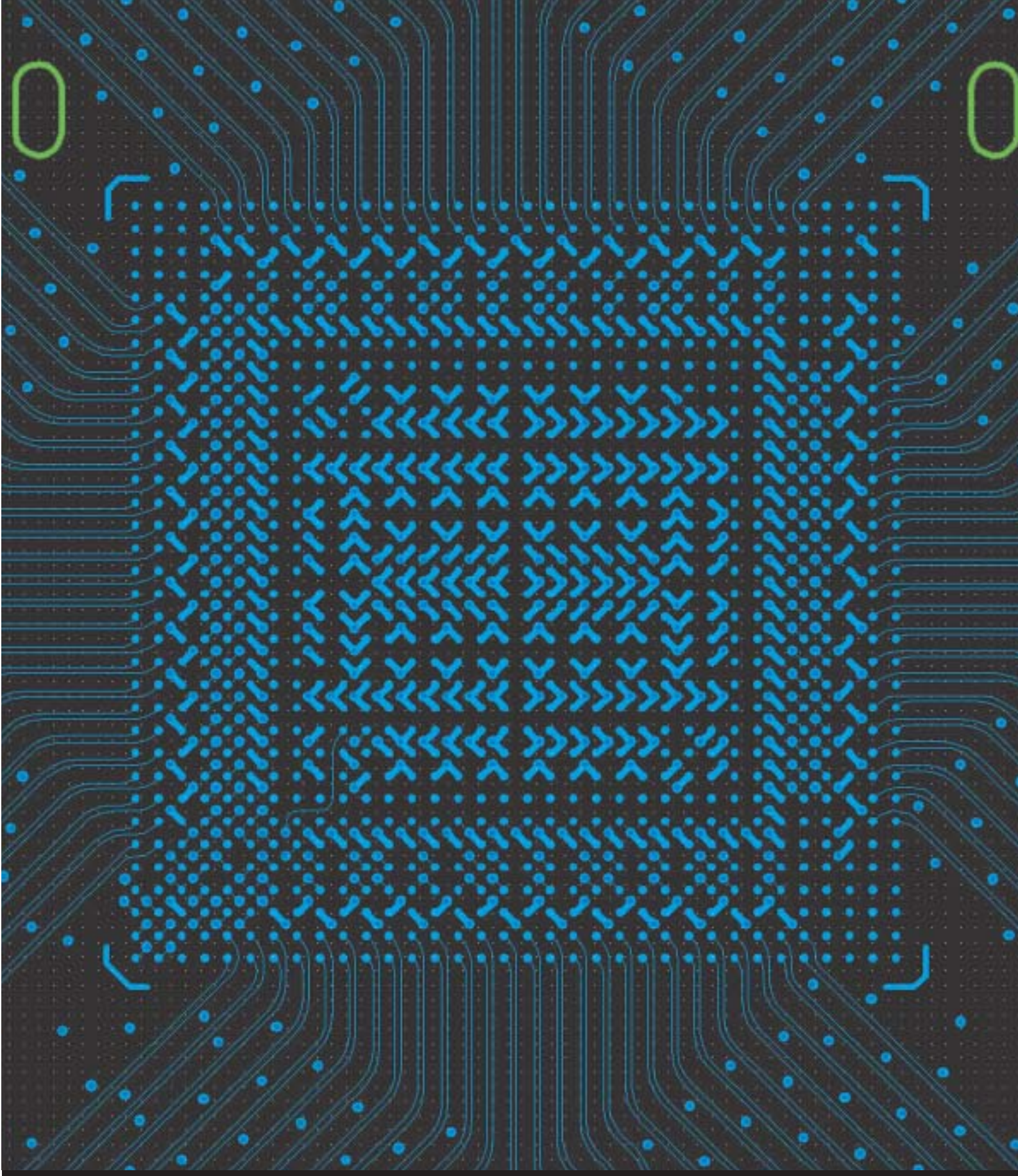
S-parameter graphs

Touchstone outputs





Speedstack material partner program

ARLON LG Chem isola GORE nelco MGC

Automatic controlled impedance stackup design system for electronics designers and PCB fabricators

Disk missing?

If your evaluation disk is missing please contact your local Polar office or representative for a replacement.

Alternatively you can download a copy from www.polarinstruments.com

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LIT:218

Specifications

Speedstack professional stackup design system

	Speedstack	**SpeedStack PCB**	**SpeedStack Si**
Autostackup	Yes	Yes	Yes
Max layer count	64+	64+	64+
Materials library	yes	yes	yes
Build height Monte Carlo simulation	10 000 builds	10 000 builds	10 000 builds
Finished thickness compensation	Yes	Yes	Yes
User library	Yes	yes	yes
CITS Test file generation	No	Yes	Yes
Impedance support	No	Yes	Yes
Impedance goal seek	No	Yes	Yes
Stack documentation	Technical report Gerber .dxf .csv .jpeg	Technical report Gerber .dxf .csv .jpeg	Technical report Gerber .dxf .csv .jpeg
Impedance structures	No	90+	90+
Single ended impedance	No	Yes	Yes
Differential	No	Yes	Yes
Odd mode / even mode	No	Yes	Yes
Frequency dependent impedance	No	Yes	Yes
Skin depth	No	No	Yes
Copper losses	No	No	Yes
Dielectric losses	No	No	Yes
S-Parameter plots	No	No	Yes
Touchstone™ export	No	No	Yes
Smith chart plots	No	No	Yes

About Polar Instruments

Polar provides innovative and easy to use measurement, test, design tools and utilities for the PCB fabrication industry and related disciplines. Polar is best known for CITS and RITS controlled impedance test systems and professional impedance calculation tools.

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