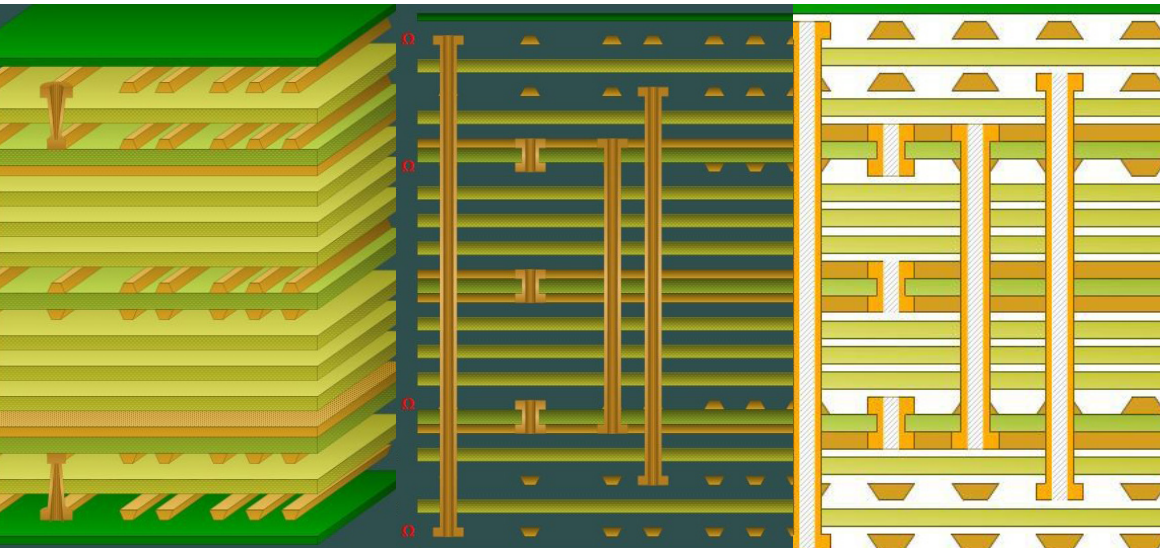


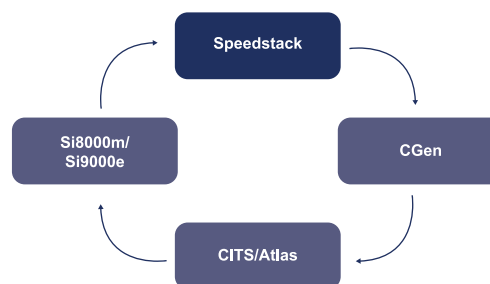
Professional HDI and flex-rigid PCB stackup design & documentation for PCB fabricators & designers



Speedstack

Speedstack HDI

Speedstack Flex



Professional HDI and flex-rigid stack documentation

Transmission line modeling

Model/document mesh/crosshatch ground planes

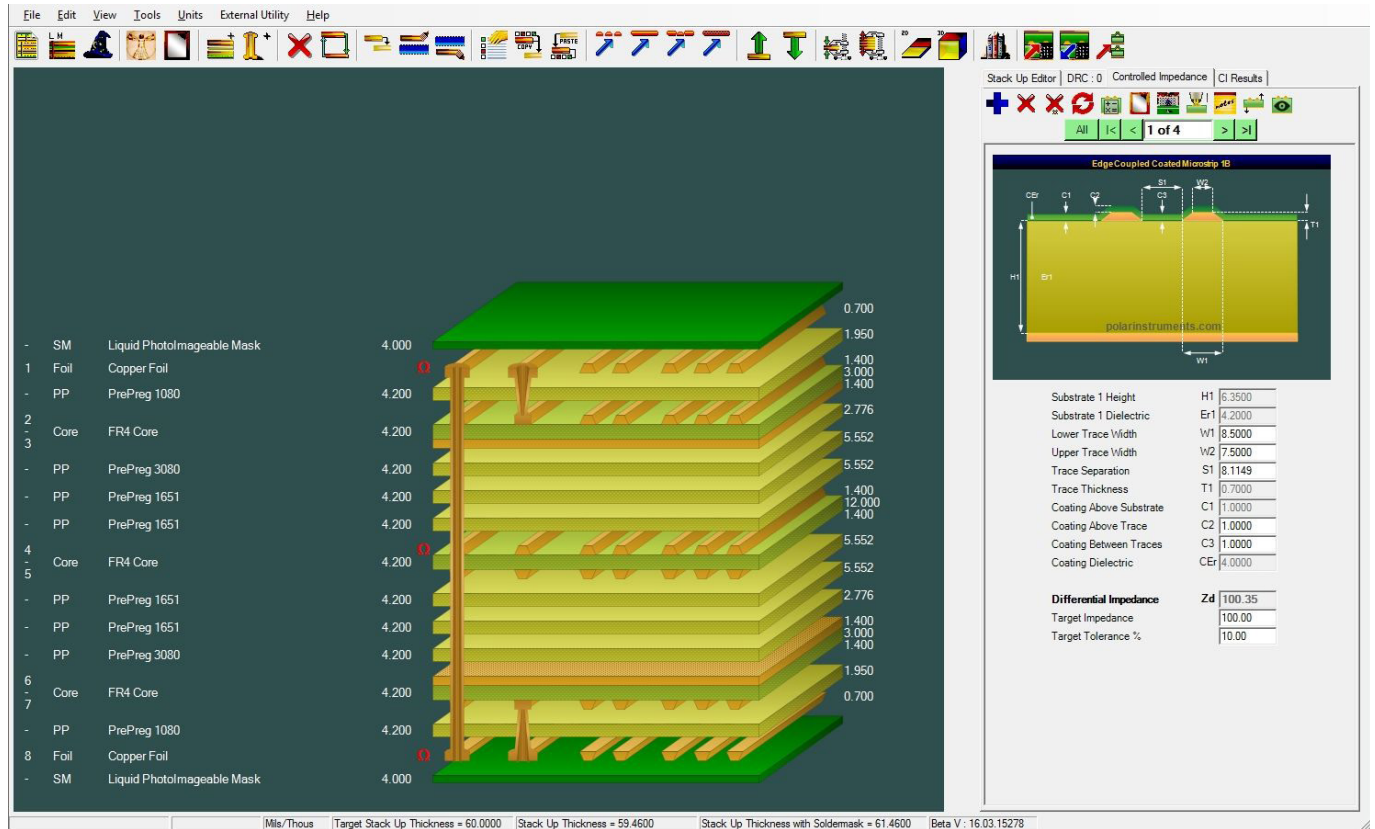
Impedance control

Supply-chain management & cost control

Compatibility with third-party stackup tools



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PCB Stackup design & documentation

Stackup design environment

Speedstack is a comprehensive stackup design environment for PCB fabricators, pre-layout engineers and value-add PCB brokers allowing easy collation of libraries of materials, costs and suppliers with design data, such as insertion loss or impedance control requirements. Speedstack lets you produce documents for every stage of the PCB supply chain and reduces the time needed to create PCB layer stackups.

Why use Polar's Speedstack?

Versatile stack creation

Speedstack gives you two key methods for stackup creation: manual layer-by-layer design and a Virtual Material Mode (VMM) to document generic stackups and explore design options before committing to real materials.

What does Speedstack bring you?

Supply chain control

Speedstack combines a generic library of materials of set dielectric thicknesses with the material libraries from PCB basematerial suppliers in the Material Partner Program. You can replace hours of calculations and estimates with accurate data on how different materials will affect your board's final performance.

Cost control

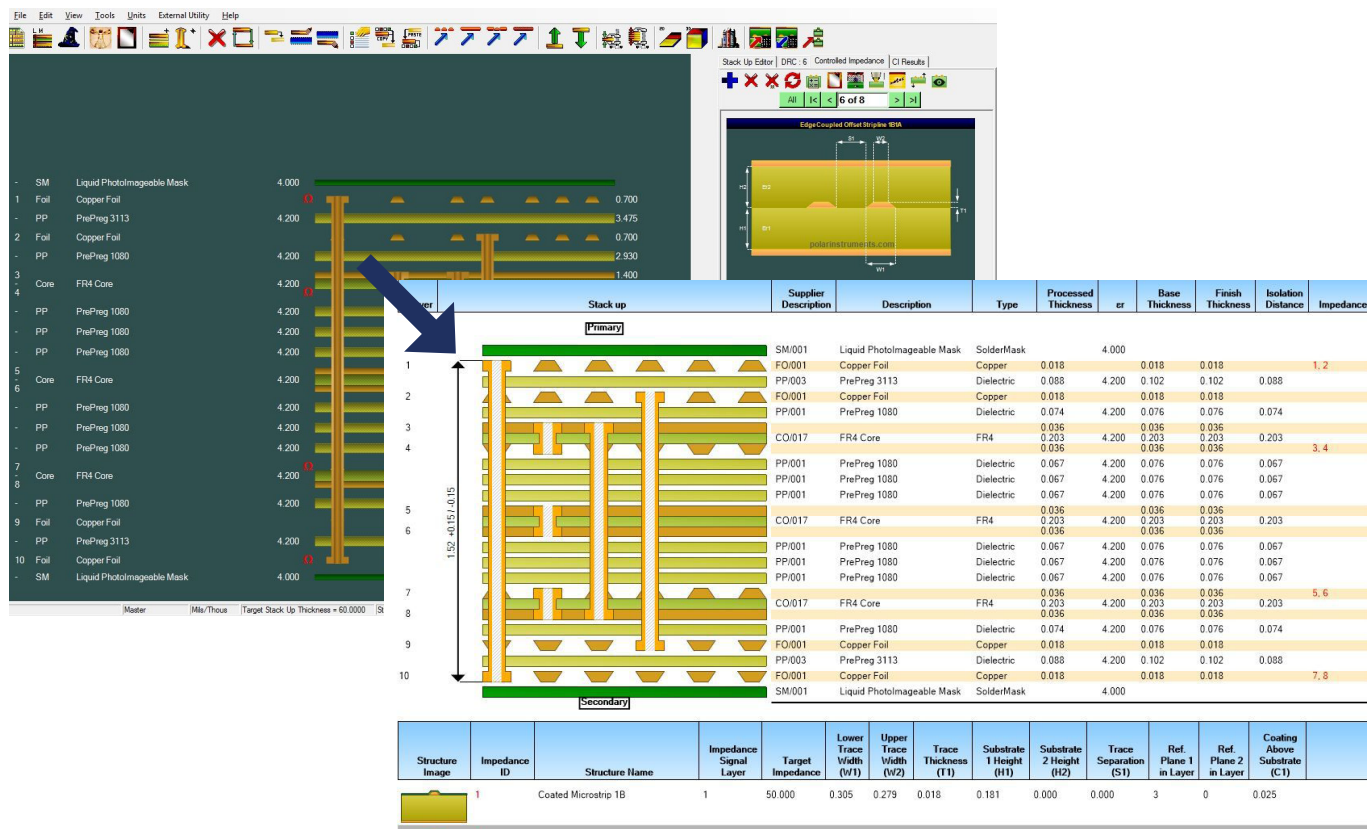
Speedstack helps define the optimum combination of materials to minimise your build costs. OEMs can tightly specify critical parameters, while fabricators can share material recommendations with OEMs to ensure that the most cost-effective materials are used.

Clear & accurate documentation

Your completed stackups are presented in a report and can be exported in a choice of formats, including Gerber, JPEG and PDF. This makes it easier for you and your fabricator to visualise and replicate the stackup design. Speedstack links with most professional CAD and CAM systems.

Speedstack features

- Enhances supplier management and cost control
- Comprehensive stackup editing tools
- Flexible report generator allows you to tailor your printouts
- Easy error-free documentation & communication
- Impedance control & Insertion loss control (Speedstack PCB or Si)
- VMM – Virtual Material Mode – library-free stack specification



Who should use Speedstack?

Pre-layout designers and supply chain managers

A checklist of design rules for stackup and fabrication helps you ensure each supplier's capabilities are factored into the stackup process. When sourcing PCBs or moving from prototype to volume, you can make the most effective choice of supplier and ensure that build requirements are met. At the pre-layout stage the stack can be imported into your CAD system constraints tool – this is the most cost effective time to lock down the stackup design.

PCB fabricators

Documentation on preferred stackups is fast and easy, this greatly reduces your engineering time. The Speedstack .sci file contains detailed information on the layer stackup, including drills and impedance control. Speedstack presents your customers with easy to read professional reports.

Impedance control on lossless PCBs

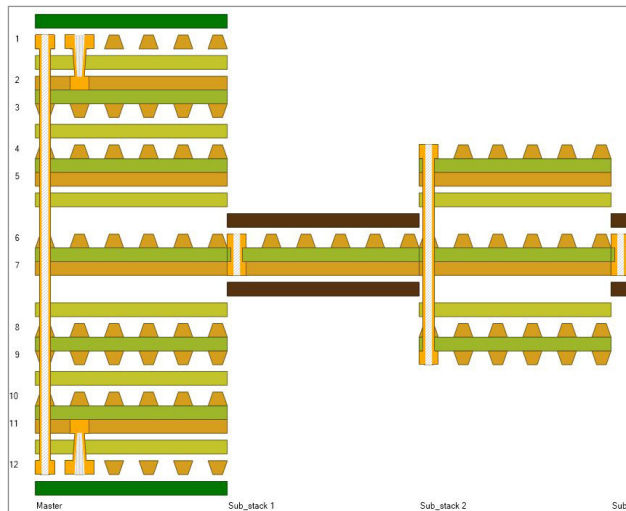
With a link into Polar Si8000m controlled impedance field solver, Speedstack makes it easy to add impedance to stackups. You'll experience closer collaboration between fabricators, OEMs and brokers and resolve potential issues early in the process.

Test data for controlled impedance

With Speedstack you can output test files for Polar CITS controlled impedance test systems for each stackup. As an OEM, you can specify impedance tests to suppliers or brokers; fabricators can link the required impedance test to each build.

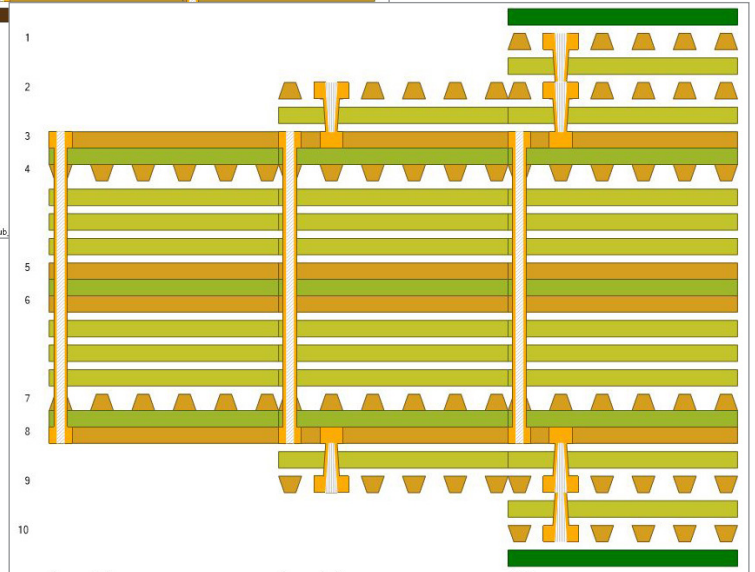
Speedstack material partner program





Expose press cycles with Speedstack HDI

Visualize cross sections in Speedstack Flex



Speedstack Flex

Flex-rigid stackup documentation with Speedstack Flex

With Speedstack Flex navigator you can link multiple cross sections to fully document your flex-rigid build up. Speedstack Flex supports common flex-rigid constructions, including doublets and bikini builds. The navigator displays each cross section with as many “substacks” and layers as you need. A range of materials including flexible adhesives, bondply and flexi core can be used, impedance can be added to each substack.

Mesh / crosshatch ground planes

Used in conjunction with Si8000m and Si9000e field solvers to model and document mesh / crosshatch ground.

Controlling impedance & transmission line losses

For PCBs with the latest ultra-high-speed chipsets, managing insertion loss is as critical as controlling impedance. Speedstack PCB allows you to manage impedance control and Speedstack Si enables both impedance and insertion loss modeling.

Speedstack HDI

Press cycle documentation with Speedstack HDI

The Speedstack navigator enables you to link and document the multiple stages in HDI buildups stage by stage as well as the final product.

Pre-layout design with Speedstack HDI Si

Speedstack HDI Si quickly guides you through the complex decisions required to create efficient stackups prior to layout. With Speedstack HDI Si's documentation designers can discuss material selections with fabricators prior to production and optimise materials for cost, signal integrity, manufacturability and reliability. Alternatively, you can use generic materials to create your stackup and allow your fabricator to fine tune using different materials to improve manufacturing cost and yield.

| Layer | Stack up | Supplier Description | Description | Type | Processed Thickness | ϵ_r | Base Thickness | Finish Thickness | Isolation Distance | Impedance |
|------------------|----------|----------------------|----------------------------|------------|---------------------|--------------|----------------|------------------|--------------------|-----------|
| Primary | | | | | | | | | | |
| 1 | | SM/001 | Liquid PhotoImageable Mask | SolderMask | 4.000 | | | | | |
| 2 | | FO/001 | Copper Foil | Copper | 0.018 | 0.018 | 0.018 | 0.018 | 1, 2 | |
| 3 | | PP/003 | PrePreg 3113 | Dielectric | 0.088 | 4.200 | 0.102 | 0.102 | 0.088 | |
| 4 | | FO/001 | Copper Foil | Copper | 0.018 | 0.018 | 0.018 | 0.018 | | |
| 5 | | PP/001 | PrePreg 1080 | Dielectric | 0.074 | 4.200 | 0.076 | 0.076 | 0.074 | |
| 6 | | CO/017 | FR4 Core | FR4 | 0.036 | 0.036 | 0.036 | 0.036 | 3, 4 | |
| 7 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 8 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 9 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 10 | | CO/017 | FR4 Core | FR4 | 0.036 | 0.036 | 0.036 | 0.036 | 5, 6 | |
| 11 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 12 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 13 | | PP/001 | PrePreg 1080 | Dielectric | 0.067 | 4.200 | 0.076 | 0.076 | 0.067 | |
| 14 | | CO/017 | FR4 Core | FR4 | 0.036 | 0.036 | 0.036 | 0.036 | 7, 8 | |
| 15 | | FO/001 | Copper Foil | Copper | 0.018 | 0.018 | 0.018 | 0.018 | | |
| 16 | | PP/003 | PrePreg 3113 | Dielectric | 0.088 | 4.200 | 0.102 | 0.102 | 0.088 | |
| 17 | | FO/001 | Copper Foil | Copper | 0.018 | 0.018 | 0.018 | 0.018 | | |
| Secondary | | | | | | | | | | |
| 18 | | SM/001 | Liquid PhotoImageable Mask | SolderMask | 4.000 | | | | | |

| Structure Image | Impedance ID | Structure Name | Impedance Signal Layer | Target Impedance | Lower Trace Width (W1) | Upper Trace Width (W2) | Trace Thickness (T1) | Substrate 1 Height (H1) | Substrate 2 Height (H2) | Trace Separation (S1) | Ref. Plane 1 in Layer | Ref. Plane 2 in Layer | Coating Above Substrate (C1) |
|-----------------|--------------|-----------------------------------|------------------------|------------------|------------------------|------------------------|----------------------|-------------------------|-------------------------|-----------------------|-----------------------|-----------------------|------------------------------|
| | 1 | Coated Microstrip 1B | 1 | 50.000 | 0.305 | 0.279 | 0.018 | 0.181 | 0.000 | 0.000 | 3 | 0 | 0.025 |
| | 2 | Edge Coupled Coated Microstrip 1B | 1 | 100.000 | 0.203 | 0.178 | 0.018 | 0.181 | 0.000 | 0.178 | 3 | 0 | 0.025 |

Interconnected tools for impedance & loss

Please refer to the brochures below for Polar's suites of tools for impedance modelling and testing for applications up to 3GHz and tools for modelling and testing insertion loss for applications over 3GHz.

Interconnected impedance tools work seamlessly

- ✓ Improve communication efficiency
- ✓ Resolve problems quickly
- ✓ Support throughout supply chain

Speedstack PCB
Si8000m
CGen PCB impedance coupon generator
CITS controlled impedance test system
Polarcare

Polar
polarinstruments.com

LIT 252

Interconnected tools for PCB insertion loss

- ✓ Improve communication efficiency
- ✓ Resolve problems quickly
- ✓ Support throughout supply chain

Speedstack Si
Si9000e
CGen Si insertion loss coupon generator
Atlas Insertion loss test system

Polar
polarinstruments.com

LIT 253



USA / CANADA / MEXICO
Polar Instruments Inc
T: (503) 356 5270
E: ken.taylor@polarinstruments.com

ASIA / PACIFIC / SINGAPORE
* Polar Instruments (Asia Pacific) Pte Ltd
T: +65 6873 7470
E: terence.chew@polarinstruments.asia

CHINA
* Polar Instruments (China) Ltd
East China - Shanghai
T: +86 21 3530 7470
E: jonson.jiang@polarinstruments.asia
South China - Zhuhai
T: +86 756 336 7470
E: simon.chan@polarinstruments.asia

INDIA
* Polar Instruments (India) Pvt Ltd
T: +91 80 4911 6666
E: india@polarinstruments.asia

JAPAN
* Polar Instruments (Asia Pacific) Pte Ltd
T: +65 6873 7470
E: terence.chew@polarinstruments.asia

KOREA
* Polar Instruments Korea Corp
T: +82 2 2644 2493 / 4
E: jsbae@polarinstruments.asia

TAIWAN
* Polar Instruments Taiwan
T: +886 2 2991 7470
E: rick.chang@polarinstruments.asia

GERMANY, AUSTRIA, SWITZERLAND
* Polar Instruments GmbH
T: +43 7666 20041-0
E: hermann.reischer@polarinstruments.eu

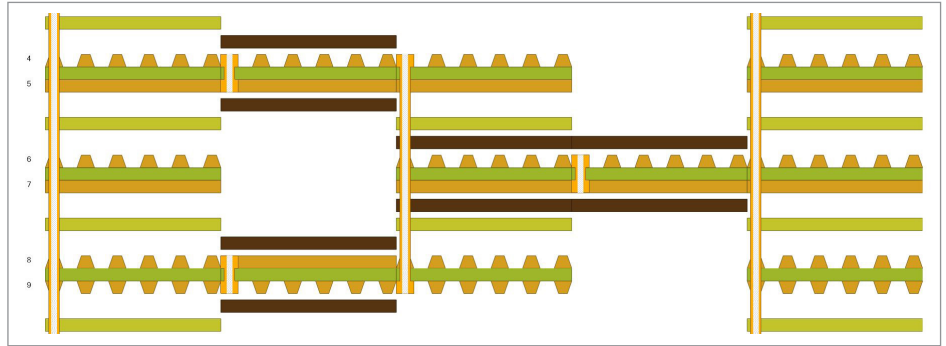
UNITED KINGDOM / EUROPE
Polar Instruments (Europe) Ltd
T: +44 23 9226 9113
E: neil.chamberlain@polarinstruments.com

REST OF WORLD
Polar Instruments Ltd
(Head Office)
T: +44 23 9226 9113
E: martyn.gaudion@polarinstruments.com

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LIT238: 2017



Speedstack Product Matrix:

| | Editor | HDI Navigator Editor | XFE (Crosshatch) | Signal Integrity |
|---------------------|--------|-------------------------|---------------------|---------------------|
| Speedstack PCB | X | | | Impedance |
| Speedstack HDI PCB | X | X | | Impedance |
| Speedstack Flex PCB | X | X | X | Impedance |
| Speedstack Si | X | | | Insertion loss |
| Speedstack HDI Si | X | X | | Insertion loss |
| Speedstack Flex Si | X | X | X | Insertion loss |

Options:

| Export stackup: | Target system |
|-------------------------|--------------------------------|
| Cadence Design Systems | Allegro |
| Mentor Graphics | Xpedition, Constraints Manager |
| Ucamco | Integr8tor, UcamX |
| Zuken | CR-8000, DFM Center |
| IPC | IPC-2581-B |
| Batch Export Impedance: | |
| Si Projects | Si8000m, Si9000e |

Ordering information:

| | |
|---------------------|---|
| Speedstack PCB | Rigid controlled impedance PCB stackup design |
| Speedstack HDI PCB | As above plus HDI & Sequential lamination support |
| Speedstack Flex PCB | As above plus Flexrigid capability |
| Speedstack Si | Rigid impedance & insertion loss PCB stackup design |
| Speedstack HDI Si | As above plus HDI & Sequential lamination support |
| Speedstack Flex Si | As above plus Flexrigid capability |

About Polar Instruments

Polar Instruments is a market leader in designing and manufacturing tools to simplify and enhance the design, fabrication and testing of printed circuit boards (PCBs). Their innovative tools include the industry-standard Controlled Impedance Test System (CITS) which provides the global PCB industry with an easy-to-use test system for high-speed digital and RF boards, as well as class-leading tools for fast and accurate design and testing of controlled impedance in PCBs. Polar also leads the industry in tools for automated PCB layer stackup design and documentation. Polar Instruments was established in 1976 and has operations and channel partners in the US, UK, Europe and Asia Pacific. The Polar logo and pixelated strip are copyright Polar Instruments Ltd.

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