



Organizer:



S-Parameters for Signal Integrity (SPSI)

February 20th 2012.

& Transparent Via Design (TVD)

February 21st 2012

**Intensive Workshops by Dr. Eric Bogatin of Bogatin Enterprises and beTheSignal.com
We are bringing the expert to your doorstep!**

Polar Instruments (Asia Pacific) Pte Ltd has partnered with Dr. Eric Bogatin, world's leading trainer and Signal Integrity Evangelist for High Speed PCB Design, Signal Integrity, Testing, Characterization and verification and to bring his expertise to Asia for the benefit of the PCB Design and Manufacturing industry in the region.

Now with hands on labs!

New in 2012 classes, we show you how to use a very easy to use simulation tool, QUCS, and how you can quickly answer common signal integrity problems. This tool runs on any laptop with a Windows OS. We provide you a copy of the tool and all the circuits used in the labs. These are yours to take back.

No previous experience is necessary. Even if you have never done any simulation before, you will find this an incredibly easy tool to use. If you are familiar with SPICE, you will find QUCS to be far easier and more versatile.

To participate in the hands on labs, you must bring your own laptop to the class.

**Ideal for Design and Fab Engineers!
REGISTER NOW!**

polarinstruments.asia

Email or Fax the completed form to
training@polarinstruments.asia or +65 68737471

OR

mims@shrdc.org.my

Tel: 03-5513 3560

Fax: 03-5513 3490

Partner:



February 20-21st, 2012

9.00am – 5.00 pm

Eastin Hotel, Penang Malaysia



Dr. Eric Bogatin - President, Bogatin Enterprises, LLC

Dr. Bogatin received his BS degree in physics from MIT, and MS and PhD degrees in physics from the University of Arizona in Tucson. He has written five books on signal integrity and interconnects design, over 300 papers and articles and has taught over 4,000 engineers in the last 25 years. He is a distinguished lecturer for the IEEE EMC society and lectures worldwide on signal integrity topics.

DO NOT MISS THESE VALUABLE CLASSES!

Registration Fee
per Class:

RM 1850*

PLUS: upto 5%
group discounts

Special
Early Bird Fee:
RM 1650*
(before January 31st
2012)

**SHRDC Member Price per class RM 1750

*Price incl. tax, course
materials, lunch & 2 tea breaks.

Registration Closes 10th February, 2012

SPSI: S-parameters for Signal Integrity

Unlock the secrets of S-Parameters for Signal Integrity Applications

This one-day class, designed and offered by Signal Integrity Evangelist Dr. Eric Bogatin, shows you how to unlock the power of S-Parameters for signal integrity applications. In a 4 port measurement, there are more than 400 different S-Parameter terms, including single ended, differential, frequency domain and time domain formats, either as step response or impulse response. Each term tells another piece of the interconnect's story.

This class enables you to tap into the secrets locked inside S-Parameters and walks through the details of interpreting the measured or simulated results of 1-port, 2-port, or 4-port S-Parameters as single ended, differential in the frequency domain and the time domain. Topics include:

- The value of Insertion and return loss
- Single ended and differential S-parameters
- How to extract characteristic impedance and differential impedance
- Identifying mode conversion problems and solutions
- The ten item check list to evaluate all S-parameters
- The four most important patterns you will see

Outline

Principles of S-parameters for SI Applications <ul style="list-style-type: none">• The secret to understanding S-parameters• S-parameters and touchstone files• Common Applications• Return loss, ports and the time domain response• Return loss and characteristic impedance	1	Insertion and Return Loss <ul style="list-style-type: none">• Ripples in return and insertion loss• Stub resonances and insertion loss• Attenuation and insertion loss• Hi Q Resonances and insertion loss• Hands-on-lab	2
Differential S-parameters <ul style="list-style-type: none">• The secret to minimize confusion• Converting from single ended to differential S-parameters• Differential impedance from return loss• Mode conversion• Hands-on-lab	3	Data mining S-parameters <ul style="list-style-type: none">• Channel to channel cross talk• Channel behavioural models• The top ten check list• Time domain vs. frequency domain, Single-ended vs. differential• Hands-on-lab: 12 channel S-parameters	4

Visit bethesignal.com or polarinstruments.asia for more details

TVD: Transparent Via Design

Making all Discontinuities Disappear

This one-day class, designed and offered by Signal Integrity Evangelist Dr. Eric Bogatin, shows you how to make discontinuities transparent and enable system operation into the 10 Gbps regime and higher in this class. To minimize signal quality problems all interconnects should be designed as controlled impedance transmission lines. But, discontinuities at transitions are unavoidable. As rise times drop below 1 nsec, these discontinuities are not transparent and are often the reason systems do not work. Learn how to make them disappear.

This class enables you to how to translate physical structures into a circuit model to enable simulation to give insight into their impact by using rules of thumb, approximations and numerical simulation tools. When they are identified as a problem we show three general techniques to optimize the design to make the structures more transparent. Topics include:

- A general approach to evaluate discontinuities
- Interpreting S-parameter models
- Impact from design features
- Techniques to make discontinuities disappear
- Multiple vias and the effect of terminations
- Impact of non-ideal terminating resistors

Outline

1 A General Approach to Evaluate Discontinuities <ul style="list-style-type: none">• 3D modelling tools• Transmission line approx. and the bandwidth of the model• Time and frequency domain simulation• Role of stubs	2 Designing transparent vias <ul style="list-style-type: none">• Interpreting S-parameter models• At what bandwidth are vias a problem• Impact from design features: stubs, clearance holes, NFPs, pitch, length• An analytical model of differential vias• Exploring design space to make vias transparent
3 Discontinuities in the signal path <ul style="list-style-type: none">• Three techniques to make discontinuities disappear• Evaluating measured S-parameter files of discontinuities• Analysing connectors• Analysing traces through via hole fields• Analysing DC blocking capacitors	4 Designing transparent differential vias <ul style="list-style-type: none">• Interpreting S-parameter models• Impact from design features: stubs, clearance holes, NFPs, pitch, length• An analytical model for a differential via• Mode conversion• Exploring design space to make differential vias transparent

Visit bethesignal.com or polarinstruments.asia for more details

Recharge your Engineering Skills for SI Design, Test & Verification.

Also Available:

PUBLIC / IN-HOUSE CLASSES (2-Days) & BOOT CAMPS (1 Day)

Courses on High Speed Signal Integrity Design, Principals, Testing, Characterization and Validation techniques. Intensive one day boot camps on designing for high-speed serial links like PCIe, SATA, SAS, XAUI, GigE, USB or LVDS or designing, controlling, and characterizing transmission line losses.

ONLINE CERTIFICATION / CONTINUING EDUCATION COURSES / TRAINING – WEBINARS / LECTURES / RESOURCES

Online Certification courses on topics like essential Principals of Signal Integrity, Continuing Education Courses (CEC) and other training courses through "Design Excellence Curricula" webinars and lectures at www.printedcircuituniversity.com

CORPORATE / INDIVIDUAL – ANNUAL or QUARTERLY SUBSCRIPTIONS

Time limited – annual, quarterly and soon to be offered monthly - Corporate / Individual subscriptions are available to access a wealth of resources related to SI design, test, characterization and validation at www.printedcircuituniversity.com

Other Courses from Bogatin Enterprises LLC., USA:

PDN : Power Delivery networks

Topics covered include:

- How do you select capacitors? How many, what value?
- Where should they be placed?
- When does location matter?
- How will you know if you got it right?
- What's important in the stack up design?
- When is it worth it to use ultra thin laminates?
- What are good habits every layout designer should know?

EPSI: Essential Principles of Signal Integrity

Topics covered include:

- The value of Insertion and return loss
- Single ended and Differential parameters
- How to extract characteristic impedance and differential impedance
- Identifying mode conversion problems and solutions
- The ten item check list to evaluate all S-parameters
- The four most important patterns you will see and what they tell you

DPD: Differential Pair Design

Topics covered include:

- The four multi gigabit problems
- Losses and jitter
- SDD21 and attenuation
- Simulating differential pairs
- Mode conversion and asymmetry
- Impact from vias and discontinuities
- Impact from connectors

For more details visit: www.bethesignal.com and www.polarinstruments.asia

About Polar Instruments, Asia Pac

www.polarinstruments.asia

Headquartered in Singapore and with offices in Japan, Polar Instruments (Asia Pacific) Pte Ltd was established in 1999, as a wholly owned subsidiary of Polar Instruments Ltd, Guernsey, UK to provide sales, marketing and after sales support to customers in the then emerging Asia Pacific region. Now an independent company, Polar Asia Pac provides a range of value added services that include market research and development, product sales, marketing, and after sales support for our principals in the Asia Pacific region covering Australasia, Japan, to the Middle East. Our services include application support, repair & calibration, on-site/off-site maintenance services, and a range of professional consulting services for training, design, test, failure/data analysis and co-relation studies related to our current market space.

About Selangor Human Resource Development Centre (SHRDC)

www.shrdc.org.my

SHRDC is public-private partnership set up with the objective of developing world class talent in Malaysia. Awarded the ISO 9001:2008, it is benchmarked as Malaysia's premier center for competency based learning. It offers a wide range of high quality courses and certifications in Essential Skills, Electronics and Electrical, Information and Communications Technology, Microsystems and Plastics Technology., SHRDC is headquartered in Shah Alam where it also has a learning Centre with state-of-the-art facilities designed for provision of high quality training.

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