

A MUST ATTEND  
FOR ALL PRACTICING ELECTRONICS  
PROFESSIONAL

# ACE'11

8th Annual Series

ASIAN CONVERGENCE FOR ELECTRONICS

## Workshop Series

13 - 15 JUNE 2011 . VISTANA HOTEL, PENANG

### 3 STATE-OF-THE-ART TECHNOLOGY WORKSHOPS

#### WORKSHOP 1: 13 JUNE 2011

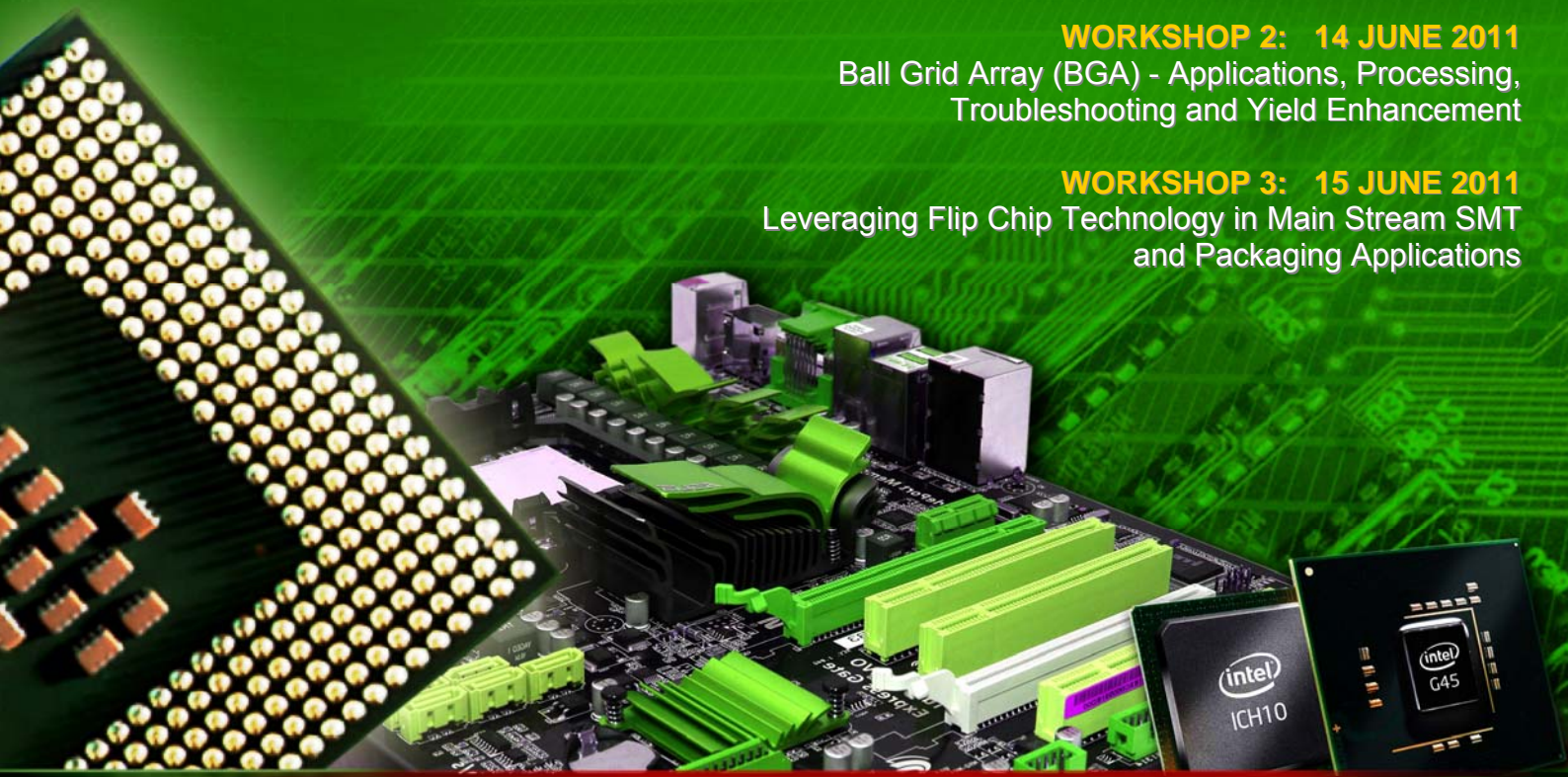
Exploring the Latest and Hottest SMT Trends and Issues  
– What You Need To Know Today to Survive Tomorrow

#### WORKSHOP 2: 14 JUNE 2011

Ball Grid Array (BGA) - Applications, Processing,  
Troubleshooting and Yield Enhancement

#### WORKSHOP 3: 15 JUNE 2011

Leveraging Flip Chip Technology in Main Stream SMT  
and Packaging Applications



Researched & Developed By:

**IBN** INTERNATIONAL™

In Association With:



Dear Participant (s),

The Packaging and SMT fields are poised on a new era of convergence. The ability to place multiple dies from different sources and of different technologies to achieve complete functional blocks all within a package itself is a novel approach towards higher integration. The combination of traditional Packaging Technologies and SMT are key distinguishing milestones differentiating this approach and requires both Packaging and SMT professionals to come together to learn from each other.

It is said that man's mind when enlarged with new ideas never shrinks back to its old dimensions. Join me in this series of workshops as we explore and examine solutions that will keep you ahead. Regardless of whether you are a packaging or SMT professional it is my assurance that you will return to your workplace recharged and refreshed with ideas, thinking and knowledge that will bring value to you and above all to your organisation. And the workshops are only the beginning of our relationship. You will be able to get support by email or phone from me even afterwards. 100's of my past attendees have benefited and their testimonies are evidence - so will you that is my commitment to you.

See you in June!

Mukul Luthra

## THE MAESTRO

### CLIENTS LIST...

- . ACT Thailand
- . AMD International
- . Asahi
- . Canon-Opto Electronics
- . Celestica International
- . Contraves-Oerlikon International
- . Cubic Electronics
- . Carsem
- . Dek Asia-Pacific
- . Escatec Mechatronics
- . Flextronics International
- . Fairchild
- . GN Resound Denmark
- . Hewlett-Packard
- . Hitachi Electronics
- . Innovex Thailand
- . Infineon Technologies
- . Intel
- . International Rectifier
- . Indium Corporation
- . Jabil Electronics
- . JVC Electronics
- . KESM Industries
- . Microcircuit Technology
- . Micron Semiconductor
- . Mitsubishi Electric
- . Mitsumi Corporation
- . Molex
- . Motorola
- . Natingate Technology
- . National Semiconductor
- . NCR Canada
- . NEC Semiconductor
- . Omega Semiconductor
- . Optillion A.B.
- . Pacific Insight Electronics Corp.
- . Panasonic Electronics
- . Pepperl + Fuchs
- . Philips Semiconductor
- . Polar Twin Advance
- . PT Satnusa Electronics
- . Robert Bosch
- . Samsung Electronics
- . Solectron International
- . Sony Electronics
- . Sapura
- . Siemens
- . TransTechnology
- . Valtronic S.A.
- . Vishay Semiconductor
- . VistaPoint Technologies
- . Western Digital



### MUKUL LUTHRA BUSINESS DIRECTOR & FOUNDER . WATERFALL TECHNOLOGIES

Mukul Luthra graduated with a Degree in Electrical Engineering and has extensive experience in the electronics industry. With over 35 years of High Tech experience, in Singapore, the US and Canada, he is a leading Professional Trainer and Consultant known for his process expertise - high volume manufacturing, quality & process engineering in the PCBA, Disk Drive and Semiconductor industries. He wrote the *Rim Watch* column on SMT issues for several years in *Circuits Assembly Magazine* and continues as a technical writer. To-date, Mukul has consulted 40% of the world's leading electronics manufacturers.

He has over 40 papers, articles and features published, has chaired and presented at numerous international conferences and conducted workshops at the IPC/Apex, SMTA International, Nepcon & GlobalTronics events.

Mukul is currently the Business Director of Waterfall Technologies. Amongst the previous positions he has held include Marketing Director, ST Microelectronics and Director, Seagate Technology. Waterfall Technologies has trained hundreds of professionals over the years in almost every major Multinational and Small and Medium Enterprises involved with PCB Assembly. Developing SMT professionals through training, hands-on problem solving and process improvement is their core competence and primary mission. The training program and services offered are world class and on the leading edge of technology.

### 12 COMPELLING REASONS WHY YOU SHOULD ATTEND...

- **Get** on-the-spot answers to your technical questions
- **Keep Abreast** with the latest manufacturing developments
- **Discover** innovative solutions to your toughest challenges
- **Ascertain** how to increase productivity and reduce costs
- **Gain** key insights to new skills and update your technical knowledge
- **Comprehend** the essential tools and knowledge that will have an immediate impact in the organisation
- **Grasp** the knowledge on manufacturing-related issues and reduce the reliability risk
- **Be Aware** of the key problems of the electronics manufacturing and assembly lines
- **Identify** key parameters that impact the reliability failures of manufacturing and assembly line
- **Avoid** potential reliability problems due to manufacturing and assembly challenges
- **Expand** your company business competitiveness and business efficiency
- **Improve** yield, reduce assembly defects and gain confident foothold into process development techniques

### CLIENTS TESTIMONIALS...

"Good knowledge and lots of idea on how to enhance SMT processes."  
- Flextronics

"Instructor demonstrates deep technical knowledge and excellent technical capability. One of the most convincing technical training I have attended."  
- International Rectifier

"Very informative, very detailed explanation and practical to apply what has been taught at work."  
- Pepperl + Fuchs

"Solid presentation and excellent technical know-how."  
- Dominant Semiconductor

"Overall is beyond my expectation. A really good workshop."  
- KESM Industries

"Interactive presentation with good sample of packages to share with the class."  
- Speedy-Tech Electronics

"Very informative, well-planned and presented! Any eye-opener to me."  
- VistaPoint Technologies

# Exploring The Latest and Hottest SMT Trends and Issues - What You Need To Know Today To Survive Tomorrow



## ABOUT THE WORKSHOP

This workshop features many diverse but individually complete modules. In the area of packaging evolution it reviews the fast transforming field of Electronics Packaging and the factors that are driving it from traditional to the latest approaches going vertical with 3D stacking of both Chips and packages and its implication to both SMT and Packaging. Leading edge assembly areas include 01005 assembly, plasma etching and cleaning applications, and conformal coatings - practices, materials, equipment and processes. Recent and newly emerging issues are covered such as Tin Whiskers, Creep Corrosion, PCB Pad cratering, and latent ESD damage – what it is, how to recognise it, impact and mitigation practices. The program further provides an update and comparison of the latest lead free finishes, their properties, standards and compatibility. Lastly it also examines the futuristic and much talked about field of Embedded Passives.

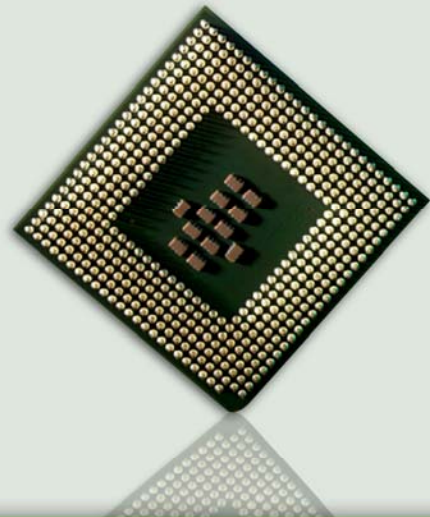
## WORKSHOP OVERVIEW

With Moore's law running out, the industry is turning towards many novel approaches to creating higher level of integration demanded by today's small but powerful products. Much research is ongoing to open new frontiers in materials and assembly technology. Until radical change occurs many parallel technologies will coexist to make things smaller, faster, environmentally friendly yet low cost.

Each approach poses unique spin-offs in issues and assembly challenges.

At this time numerous and diverse 'Hot Issues' and 'Challenges' are the focus and centre of attention of the Micro Electronics Industry.

This program brings together in one forum what these issues and challenges are and examines each, providing current state-of-the-art industry practices to keep the attendees in the forefront of their profession. The topics are compiled based on real life feedback expressed by preceding workshop attendees.



WORKSHOP AGENDA

### MODULE 1 INTERCONNECTION TRENDS

- Packaging Evolution
- Approaches Towards Higher Levels of Integration
- 3D with and without TSV.
- Die and Package Stacking
- Applications and Examples

### MODULE 2 ASSEMBLY

- 01005
  - Sizing, Specs and Tolerances
  - DOE – Variables Matrix and Results
  - Filtering Results and Assembly Recommendations
- Plasma Stripping and Cleaning
  - Principles and Application Scope
  - Stripping & Etching Applications
  - Equipment & Configuration
  - Measuring and Improving Cleaning Efficacy
- Conformal Coatings
  - Science and Application
  - Material properties and Selection
  - Process and Equipment Set Up
  - Results

### MODULE 3 ISSUES

- Creep Corrosion
  - What Is It and Causes
  - Appearance Examples
  - How it Differs from EM
  - Impact – How, Where and Who
  - Mitigation Practices
  - Design Recommendations
- Tin Whiskers
  - Impacts
  - Cause Hypothesis

- Assessing Risk
  - Current Mitigation Practices
- PCB Pad Cratering
  - What It Is and Its Causes
  - How Serious and Why it Impacts
  - Assessment Methods
  - Findings and Recommendations
- Latent ESD Damage
  - Manifestation
  - How it Differs
  - Appearance
  - Impacts
  - Control

### MODULE 4 MATERIALS

- Latest LF Finishes – comparison, issues, LF and Sn/Pb compatibility and Applicable Standards
  - ENEPIG
  - DIG
  - Selective ENIG OSP
  - ENIG
  - I Ag
  - I Sn
  - EPNi and ENI
  - OSP
  - LF HAL
- Embedded Passives
  - Function and Scope
  - Process Options
  - Impacts – Limitations and Cost
  - Is There a Future?

### MODULE 5 CONCLUSION

- Summary
- Future Reading and Helpful Resources
- Reference Materials

## TARGET AUDIENCE

This is a high level program designed to meet the requests of topics of interest expressed by leading edge SMT related professionals eager to stay ahead.

The target audience would comprise Engineering, Process Planning and development, Failure Analysis, and 'industry watch' personnel.



# Ball Grid Array (BGA) - Applications, Processing, Troubleshooting and Yield Enhancement

## WORKSHOP OVERVIEW

Array Packaging such as Ball Grid Arrays (BGAs) and their smaller counterparts Chip Scale Packages (CSPs) and Wafer Level Packages (WLPs) are increasingly fulfilling needs that were traditionally the domain of peripheral packages. They have become defacto standards particularly in handheld and mobility products that require small form factors, high-density and light weight. A vast variety of array devices- BGAs, CSPs and Wafer Scale CSPs - have proliferated the market place with many different form factors.

Assembling BGAs and CSPs requires specialised understanding of their unique issues. Metallurgical interactions in the case of BGAs & CSPs specially with multiple LF solder formulations and Lead Free finishes available today are complex. Choice of metallization plays a significant role in yield and reliability. An understanding of the complexities involved is therefore essential to meet the challenges and stay competitive.

## TARGET AUDIENCE

This Advanced Level Workshop requires a pre-understanding of SMT concepts. Target audience should primarily comprise engineering level personnel from Manufacturing, Assembly, Equipment, Maintenance and Failure Analysis disciplines.

However the scope of the workshop will also benefit Technicians or Supervisory levels with adequate grasp of SMT concepts and experience as well as related functions such as Vendor Quality or Incoming Quality, staff responsible for material quality and those who have to deal with components, materials and vendor quality issues.

## WORKSHOP AGENDA

### MODULE 1 OVERVIEW AND SCOPE

- Area Array Concept Vs. Peripheral
- Array device Families and Variants
  - BGA
  - CSPs
  - WCSP
  - Flip Chips
- Foot Print Performance
- Features & Advantages

### MODULE 2 BGA & CSP ASSEMBLY CONSIDERATIONS

- Merging into Mainstream SMT Processes
- Optional Process Flows
- Key Process Control Points
- Metallization suited for Array Assembly
- Compatibility with Latest Surface Finishes
- LF and SnPb – Forward & Backward Issues
- Moisture Uptake – Classification, Concerns

### MODULE 3 IMAGING TECHNIQUES

- Tomography & Laminography
- Optical Probes & Endoscopy
- Interpreting Images & Correlation with AOI

### MODULE 4 ENHANCING YIELD AND ADDRESSING PROCESS ISSUES

- Voids
- Bridging
- Warpage
- Stretching
- Opens
- Non Wetting
- 'Head-In-Pillow' Effects
- 'Black Pad' Issues
- Ball Shear
- 'Dropped' Balls
- Delamination
- CSP , LGA and QFN issues

### MODULE 5 SUMMARY & APPENDIX

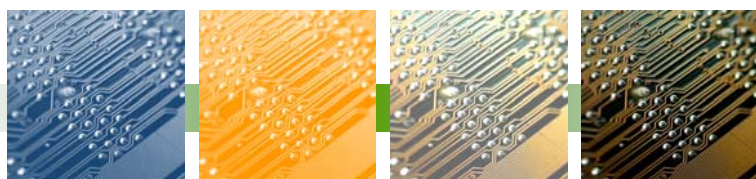
- Reference Materials
- Useful Websites
- Alloy Data

## ABOUT THE WORKSHOP

The objective of this workshop is to lay a foundation of BGA/CSP assembly with focus on the variables that impacts yield and reliable attachment including an understanding of the collapse mechanism, joint formation and metallurgical interactions taking place considering the vast variety of materials and metallizations encountered.

This workshop will cover in-depth processing of BGAs/CSPs, including their families, advantages, features and their assembly on the PCB. It will provide a detailed analysis of many process issues, steps, practical and analytical techniques that will help the participants in refining the assembly process. Key elements of the program include coverage of Non-destructive imaging techniques and their interpretation as well as metallurgical aspects relating to the solder joint and its interaction with different pad finishes. It will examine key issues such as voids, warpage, thermal stress, lead-free impacts, forward and backward compatibility and many more.

Studies will be reviewed in the class to enhance participants understanding of industry practices and approaches. At the end of this workshop, participants will acquire an excellent understanding of the variables, assembly requirements and yield improvement techniques by learning how to address and correct a variety of related process issues.



# Leveraging Flip Chip Technology in Main Stream SMT and Packaging Applications

## WORKSHOP OVERVIEW

Consumer, portable and mobile communication applications are amongst the main driving engines demanding constantly higher levels of integration. With Moore's law running out, the current trend is towards 3D approaches with and without TSVs.

Package stacking approaches such as PoP and Die stacking approaches within a package provide capability of creating complete circuit functions within a CSP like footprint thus significantly reducing the burden of interconnecting separate single die packages in a SMT PCB assembly. Flip Chip Technology is one of the principle enablers whether embedded in an SMT board or within a package.

Application specific variations such as Flip Chip On Glass (FCOG) have enormous potential given the explosive growth of LCD panels and other display applications. This workshop is designed to give an understanding of the core technologies of Flip Chip, Flip Chip on Glass (FCOG) or Flex.

Understanding Flip Chip processes, issues and considerations are an important step towards sustaining growth in a rapidly transforming environment, impacting both mainstream SMT Assembly and Packaging segments.

## WORKSHOP AGENDA

### MODULE 1 FLIP CHIP SCOPE AND OVERVIEW

- Driving Factors - Products and Applications
- 3D Packaging with and without TSV
- Die and Package Stacking
- Flip Chip Versus Other Approaches
- Flip Application

### MODULE 2 FLIP CHIP CONSIDERATIONS

- Selection and Specifications
- Quality Considerations
- Known Good Die (KGD) & Unknown Bad Die (UBD)
- Key Specifications
- Procurement Standards

### MODULE 3 FLIP CHIP DESIGN GUIDELINES

- Bump Pitches
- Bump Heights
- Array Vs. Peripherals
- Under Bump Metallization (UBMs) and Design Rules
- UBM Parameters

- Bumping Processes
- Bump Shear Strengths

### MODULE 4 FLIP CHIP ATTACHMENT

- Merging with SMT Process
- Process Flow
- Attachment Methods Options
- Flip Chip on Glass Technology
- Underfilling - Trends in Materials and Processes
- Developing & Qualifying FC Process

### MODULE 5 FLIP CHIP RELIABILITY & FAILURE ANALYSIS

- Reliability Factors
- Failure Mechanisms & Modes
- Electro-migration & Current Crowding
- Shear vs. Ball Pluck Testing
- Micro-sectioning – How To's

### MODULE 6 CONCLUSION

- Summary of Key Factors
- Further Sources of Information & References

## TARGET AUDIENCE

This high level workshop is designed to greatly benefit areas that deploy or planning to deploy Flip Chip Technology in SMT assembly or in back-end/packaging areas of advanced packages. The target audience would comprise experienced personnel from Engineering, Process, Manufacturing, Assembly, Failure Analysis and Quality disciplines.

## ABOUT THE WORKSHOP

The workshop provides an in-depth coverage of Flip Chip technology and its role as an enabler attaining higher levels of integration, the driving factors, pros and cons and comparisons of the approaches and where Flip Chip is best positioned. The selection criterion, applicable standards and adaptability to Flip Chip specific design are reviewed in terms of impact to both manufacturers and producers.

The Flip Chip assembly process covers Design Guidelines, Options, Underfilling Considerations, Calculations & Advances and Flip Chip Reliability. Details cover a complete review of the many different types of Underbump Metallization (UBM) and Bumping processes together with Applicable design rules. The many options of FC Attachment and specific variants such as Flip Chip on Glass (FCOG), and Flip Chip on Flex (FCOF) are covered. Advances in underfilling and its impact on reliability and important failure modes such as Electromigration, Current Crowding and Diffusion Failures are explained along with techniques for Failure Analysis.



To help participants understand the concepts, the content is rich in micro-graphs, cross sections, videos and engineering studies. An in-class microscope is used for on-screen displaying of samples. A CD ROM containing many of the pictures and references used in the program is included.



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## Workshop Series

13 - 15 JUNE 2011 . VISTANA HOTEL, PENANG

## REGISTRATION

### PAYMENT

A confirmation letter and invoice will be sent upon receipt of your registration. Please note that full payment must be received prior to the event. Two easy way to pay:

- **Telegraphic Transfer / Cheque**

Bank : Maybank Berhad  
 Branch : Desa Pandan, Kuala Lumpur Malaysia  
 A/C No : 514543111415  
 Swift Code : MBB EMY KL

- **Foreign Demand Draft** in USD to be drawn in a MALAYSIAN Bank

**Intelligence Business Networks (M) Sdn. Bhd.**  
 152-4-14, Kompleks Maluri,  
 Jalan Jejaka, Taman Maluri,  
 55100 Kuala Lumpur

*Note: Payments must be received within 7 days upon issuance of invoice.*

### CANCELLATION POLICY

Due to contractual obligations, cancellation charges are as follow:

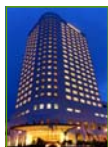
- \*30 to 10 days notice : 50% of the workshop fee
  - \*9 to 3 days notice : 70% of the workshop fee
  - \*2 days or less notice : 100% of the workshop fee
- (\*Based on working days only)

However, complete sets of documentation will be sent to you. Substitutions are welcomed at any time. All cancellations of registration must be made in writing.

*Note: It may be necessary for reasons beyond control, to change the content and timing of the event, speaker(s) or venue, every effort will be made to inform the participants of the change.*

### HOTEL DETAILS

**Vistana Hotel Penang**  
 213 Jalan Bukit Gambir,  
 Bukit Jambul, 11950 Penang  
 Malaysia  
 Tel : 604 6468000  
 Fax : 604 6468343



Room Reservation can be made by delegates directly with the hotel. To enjoy privileged room rates, please state you're attending an event organised by IBN International. Please call Ms. Lisa Oon at 604 6468000 or email at lisa\_oon@ytlhotels.com.my

### CERTIFICATE

Delegates who successfully complete this course will receive the prestigious IBN's Certificate of Achievement; a statement of Intelligence endorsed by world renowned subject matter expert.



### VISA REQUIREMENT

Delegates requiring visas should contact the respective Embassies or High Commissions in their country of residence as soon as possible.

PLEASE COMPLETE THIS FORM IMMEDIATELY AND FAX TO 603 - 9200 7946

### PARTICIPANT DETAILS

(Please tick (✓) on the applicable box)

<b>Name 1</b>	<b>Job Title</b>
<i>I would like to register for</i>	<input type="checkbox"/> Premium Plus <input type="checkbox"/> W1 <input type="checkbox"/> W2 <input type="checkbox"/> W3
<b>Name 2</b>	<b>Job Title</b>
<i>I would like to register for</i>	<input type="checkbox"/> Premium Plus <input type="checkbox"/> W1 <input type="checkbox"/> W2 <input type="checkbox"/> W3
<b>Name 3</b>	<b>Job Title</b>
<i>I would like to register for</i>	<input type="checkbox"/> Premium Plus <input type="checkbox"/> W1 <input type="checkbox"/> W2 <input type="checkbox"/> W3
<b>Name 4</b>	<b>Job Title</b>
<i>I would like to register for</i>	<input type="checkbox"/> Premium Plus <input type="checkbox"/> W1 <input type="checkbox"/> W2 <input type="checkbox"/> W3
<b>Name 5</b>	<b>Job Title</b>
<i>I would like to register for</i>	<input type="checkbox"/> Premium Plus <input type="checkbox"/> W1 <input type="checkbox"/> W2 <input type="checkbox"/> W3

(name in full)

### INVOICE SHOULD BE DIRECTED TO

Company \_\_\_\_\_

Business Address \_\_\_\_\_

Name	Job title	Dept
Email	Tel No	Fax No
Name of Authorising Manager	Job title	
Signature	Date	

This Booking Is Invalid Without A Signature

<b>WORKSHOP SCHEDULE</b>	<b>INFORMATION</b>	Registration	0830
	For further information on this event, please contact our Program Managers at 603 9206 5800 or email: <a href="mailto:ibn@intel-biznet.com">ibn@intel-biznet.com</a>	Course begins	0900
		Morning Refreshment	1030
		Luncheon	1300
		Afternoon Refreshment	1530
		End of the day	1700



**SAVE RM 550 WHEN YOU REGISTER FOR ALL THREE WORKSHOPS!!!**

*\*You may register different participant for different workshop under the Premium Plus package*

WORKSHOP SERIES	WORKSHOP FEE
<b>WORKSHOP 1: 13 June 2011</b> Exploring the Latest and Hottest SMT Trends and Issues – What You Need To Know Today to Survive Tomorrow	<b>RM 1990</b>
<b>WORKSHOP 2: 14 June 2011</b> Ball Grid Array (BGA) - Applications, Processing, Troubleshooting and Yield Enhancement	<b>RM 1990</b>
<b>WORKSHOP 3: 15 June 2011</b> Leveraging Flip Chip Technology in Main Stream SMT and Packaging Applications	<b>RM 1990</b>