

## Registration (Fax Reply)

To: ECPE e.V.  
Att.: Ingrid Bollens

Fax: +49 (0)911 / 81 02 88 – 28

Register before **2 June 2008**

### Participation fee:

.. €680,-\* for industry

.. €480,-\* for universities

The fee includes the seminar dinner, lunch,  
coffee/soft drinks and seminar handouts.

With the confirmation of tutorial registration you will receive the invoice. (\* plus 19 % VAT); 50 % discount for ECPE Member Companies. In case of cancellation after 2 June 2008 or non-attendance 50 % of the participation fee are payable.

The Tutorial/Training is limited to 25 participants to allow practical work on the Leadfree Training Line. In case of less than 10 registrations by 2 June 2008 the Tutorial/ Training will be cancelled.

Sender:

---

title, given name, name

---

company, department

---

full address

---

phone, fax

---

e-mail

---

date, signature

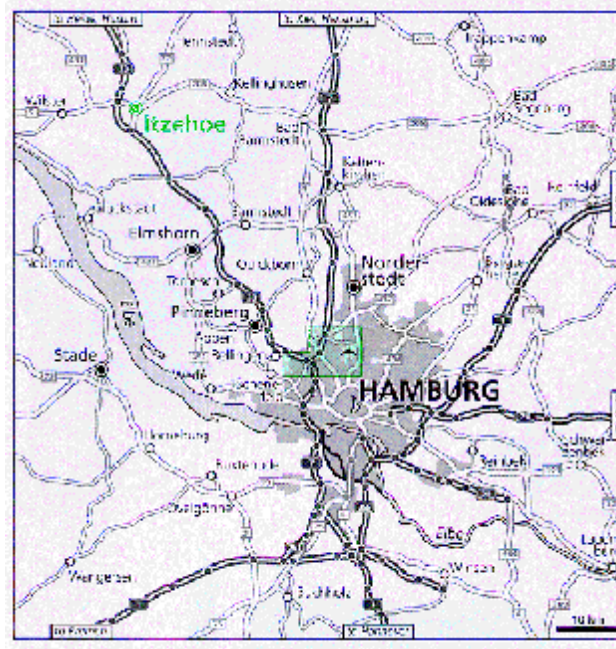
## Organisational information

Organiser: ECPE e.V.  
90443 Nuremberg, Germany  
[www.ecpe.org](http://www.ecpe.org)

Chair of seminar: Dr. T. Ahrens, Dr. M.H. Poech  
Fraunhofer ISIT, Germany  
Thomas Harder, ECPE e.V.

Organisation: Ingrid Bollens, ECPE e.V.  
+49 (0)911 / 81 02 88 – 10  
[ingrid.bollens@ecpe.org](mailto:ingrid.bollens@ecpe.org)

Place of seminar: Fraunhofer Institute, ISIT,  
Itzehoe, Germany



Further information (hotel list and maps) will be provided after registration.



**ECPE European Center for  
Power Electronics e.V.**

## ECPE Tutorial and Training

# Reliable Soldering for Power Electronics Manufacturing

**18 – 19 June 2008  
Fraunhofer Institute,  
ISIT,  
Itzehoe, Germany**

in cooperation with



**Fraunhofer** Institut  
Siliziumtechnologie

## Introduction

---

### Tutorial and Training “Reliable Soldering for Power Electronics Manufacturing”

18 - 19 June 2008  
Itzehoe, Germany

This two-day tutorial presents state-of-the-art lead-free soldering technology, addressing materials and design requirements with focus on high thermal demand assemblies as used in power applications of printed circuit board assemblies. The focus is laid on design for manufacturing and reliability of European environmental legislation (e.g. RoHS) compliant products. The interaction of design and process, heat transfer and temperature distribution must be accounted for with challenging new materials such as thick copper PCB. Thermal simulation helps to find out limits for the combination of PCB technology and solder process. Whereas the simulation always complements the time/temperature measurement for soldering applications, it helps to shorten the time to optimise profiling on reflow ovens, and enables restrictions for wave, and even more selective soldering with massive copper inlays or heat spreader already in the design phase.

Participants will practice temperature measurements and reflow simulation, production steps of reflow and wave soldering of SMD and Through-Hole test board assemblies on the LEADFREE training line at Fraunhofer ISIT. Basic simulation models will be shown useful in studies of voiding in solder joints in power modules in comparison to SMD power components. Finally, quality inspection by optical, x-ray, and acoustic microscopy equipment will be mediated to the participants on standard and high power designs.

Dr. Thomas Ahrens and Dr. Max Poech (Fraunhofer Institute ISIT) will chair the tutorial together with Mr. Thomas Harder (ECPE). All presentations and discussions will be in English.

The seminar aims on engineering level design, production, quality, and procurement personnel to give the materials and process background for a high quality and cost optimised view on power electronics production.

## Programme

---

### Wednesday, 18 June 2008

#### 09:00 Beginning of Registration

09:30 Opening/Welcome address  
ISIT/ECPE

Introduction - ISIT mainstream activities;  
safety instructions for the training line

#### 10:00 – 13:00: Theory

##### **Lead-Free Process Requirements**

Material Specifications; Component Heat Resistance;  
Harsh Environment / High Application Temperatures

##### **Principles of Reflow and Wave Soldering**

Fluxing, Heating, Wetting, Solidification;  
Target Parameters and Machine Settings

##### **Matching Solder Method and Thermal Design:**

Thermal Mass, Heat Conduction, Thick Copper PCB

#### 13:00 Lunch

#### 14:00– 17:00: Practical Demonstrations on the LEADFREE Training Line

##### **Reflow Soldering:**

Temperature Profile & Atmosphere

##### **Wave Soldering, Selective Wave Soldering:**

An Impressive Number of Parameters

#### 17:00 End

*Coffee breaks in the morning and afternoon sessions*

#### 19:00 Dinner at Hotel Mercure Klosterforst,

Hanseatenplatz 2, D-25524 Itzehoe  
phone: +49 (0) 4821 15 20 0

## Programme

---

### Thursday, 19 June 2008

#### 08:30 – 12:00: Theory

##### **Solder Alloys, Solderability and Flux**

Metallurgical Reactions on Base Metals; tin-copper,  
tin-nickel, tin-silver, tin-gold; Flux Formulations

##### **Principles of Large Area Soldering**

##### **Process Development for Power Modules**

Base Plate Heat Management yields Solder Problems  
Inline Test Strategy, Vacuum Soldering

##### **Solder Joint Reliability**

under Leadfree Aspects; Effects of Voiding,  
Temperature Cycles, Impact of Substrates

#### 12:00 Lunch

#### 13:00 – 16:30: Practical Demonstrations on the LEADFREE Training Line

##### **Electronic Assembly Quality:**

Inspection Criteria, Design, X-Ray, Scanning Acoustic  
Microscopy

##### **Manual Soldering & Repair**

Solder Iron, Inert Gas and Preheating; Hot Gas and  
Infrared Equipment

##### **Closure**

Lessons learned; transfer to own applications

#### 16:30 End of Seminar

##### **Instructors:**

Theory:

Dr. T. Ahrens, Dr. M.H. Poech (Fraunhofer ISIT)  
Prof. Dr. R. Eisele (Kiel Univ. of Applied Sciences)

Practice:

T. Kraft, J. Lähn, H. Schimanski, R. Siegmund  
(Fraunhofer ISIT)