

EMC PCB Design

Electronics

Who should attend:

The course *EMC PCB Design* is developed for professional designers of Electronic solutions and PCB layouts. It focus especially those who want to design from scratch for EMC and good Signal Integrity.

Prerequisites:

An EMC knowledge is recommended added with practical experience of electronics and PCB Design. The outset level corresponds to the content of our EMC course, the 2 day course in our EMC suite of three courses.

Contents:

The *EMC PCB Design* course open with a short summary of EMC terms and context. This make good conditions for the main subjects of the course that is directly related to the PCB Layout, connections and case. Theory for understanding is mixed with practical applications and layout solutions.

The documentation consists of InfoMap sheets, handouts and printed material. The course is delivered in English or Swedish.

Extract of content

Why an EMC view on PCB design?

- What is high speed?
- Trends in electronics and PCB implications
- Design to reduce project risk

Fundamentals of..

- Signal integrity
- EMC
 - Component characteristics at RF frequencies
 - E-/M-field components
- EMC suppression concepts
 - RF currents
 - Grounding methods

Segregation and interface suppression

- "Outside" and "Inside" world segregation
- Interface suppression
- Interconnections and shielding
- PCB-level filtering

PCB to chassis bonding

- Controlling resonances
- PCB ground plane, chassis and transfer impedance
- Common mode effects

Reference planes

- Dimensions, holes and gaps
- Connecting devices to planes
- Locating via holes for aggressive signals

Decoupling

- Discrete capacitors
- Ground and power plane pairs

Transmission Lines

- Matched lines on PCBs
- Terminations
- TL routing constraints
- Shielded PCB transmission lines

Routing and layer stacking

- Routing and layer stacking techniques
- Stack-ups
 - Multi-layer solutions
- Current capacity of traces
- Transient and surge voltage limitation of layouts

Heat sinks on PCB's

- EMC effects
- Combining shielding with heat sinking
- Heat sinks for power devices

Miscellaneous Design concepts

- Crystals and oscillators
- Unused I/O pins
- Location of terminations
- Test pads

Code: EMC-PCB
Length: 2 days
Fee: 1320 EUR + VAT or according to an offer for "In-house" delivery or a group attending a public event

The target group is professional designers of Electronics and PCB Layouts

Fundamental EMC theory and practical experience are recommended.

The course builds knowledge by a mix of theory and practical applications.
The InfoMap pedagogical concept is used.

**Next event
22nd-23rd
of October
in Linköping**

Special offer!

**3 for 2
or
20% discount
per seat
when order
training before
31st of Dec 2014**

**Reservation
Code:EMCE2014**

Our stance of policy regarding pricing and size of group

The Training is done towards a group of persons - and each one is expected to have benefits of the training in the daily work. It means that each participant invest in competence to be more efficient, increase quality and as a result be more comfortable to fulfil the projects.

This is reflected in our way of pricing and the group size of our training. The price for in-house training is consequently related to the number of participants and the upper limit is 12-16. An efficient training requires engaged participants and a continuing dialogue that can be hard to reach with a high number of participants.

Pricing and number of participants

Training methodology

This course is composed by our appreciated InfoMap methodology which requires a wide whiteboard. A screen not hiding the board give good conditions to expand subjects and illustrate on the screen at the same time as holding the main presentation on the board.

InfoMap

To keep in mind when to ask for an offer

For an efficient procedure of making an offer we need some information related to the questions below.

Keep in mind

If you have access to premises we ask for answers of the following questions.

Premises for training:

- Has the premises a whiteboard with minimum size of 2.5m x 1.2m (WxH)?
- Is a PC-projector and screen accessible for use?
- Does the screen hide the whiteboard? If not can the PC-projector still be directed to screen?
- Has the premises a flipchart?

Premises for training

It can be good to have the possibility to a more informal way of contact than the training conditions permits. One way to make this happen is during coffee breaks and lunch. We ask if coffee and/or lunch shall be included in the price or if it is handled by participants themselves.

Coffee & lunch

Coffee and lunch breaks:

- How is it expected to be arranged - individual or in common?
- How is the conditions to have coffee/lunch close by training premises?

**Pre-knowledge
Aim of training
Number of participants**

We appreciate if we can have information about the level pre-knowledge/experience and the aim of the training for the group and if it is individuals that want to reach further. Naturally we need to know the total number to be trained.

**Time and place of delivery
Daily time frame**

We try to meet Your need regarding time and place of delivery. We appreciate if You can give a couple of choices regarding time of delivery. If You do not have access to premises suitable for training we appreciate a recommendation of a hotel or conference centre.

We use to start our training 8:30 AM, 1 hour lunch at 12 and end up around 4:30 PM. If You have other wishes regarding scheduling tell us and we try to adapt.

Adaptation of EMC PCB Design to specific needs

If You have a need for an enhance of some part tell us and we try to adapt Your needs.

Adaptation

Frendus is a training company with focus in electronics, telecommunication and data communication. We offer our training services in our own premises in Sweden or internationally. We do high quality training and are open to adapt to the conditions of the group regarding level and content.

**EMC and ESD
Data Communication
Radio & Transmission
Mobile Systems
Wireless Access**

We also offer coaching to companies who want to support their employees in the role of trainer or to speak to a group.

Train the Trainer

Welcome to take contact for more information!