Practical Approach to EMI/EMC Troubleshooting

Training Programme
by
Dream Catcher Consulting Sdn Bhd

24 - 26 Jun 19
Dream Catcher Consulting Sdn Bhd, Penang

303-4-5 & 303-4-6 Block B, Krystal Point
Jln Sultan Azlan Shah 11900 Sg Nibong Penang, Malaysia
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enquiry@dreamcatcher.asia
+604 640 7111 / 7112
+604 640 7110
**Synopsis**

**SBL-Khas 909**

The widespread use of small, high-speed electronic devices, which are often operated near other electrical systems, as well as the explosion in the number and variety of wireless communication devices available, has resulted in concern about electromagnetic interference effects. Faster and more complex circuits are being crowded into ever smaller space, increasing the likelihood that devices operating in such systems will adversely affect one another. Modern electronic devices must therefore be able to function properly in an increasingly cluttered electromagnetic environment.

The course is designed to provide participants with practical trouble shooting methodologies to assess the emission and susceptibility characteristics of their products and relevant basic knowledge to understand the principles of electromagnetic compatibility (EMC) and electromagnetic interference (EMI). This course is valuable for all engineers who work in a cross-functional product development project team.

**Course Highlights**

The instructor will enhance students' appreciation of EMI theory through a series of case studies and demonstration as follows:

- Spectrum of a noise source
- Measurement of Conducted & Radiated emissions
- Stray inductance and capacitance
- Effect of bypass capacitors
- Noise on supply and ground tracks
- Transfer impedance of cables
- Magnetic and capacitive coupling and mitigation
- Application of magnetic pickup loops and current probes
- Use of ferrites for EMI control
- EM shielding and grounding
- ESD protective materials

This is achieved through the use of time-domain and frequency-domain measurement equipments, standard PCI card as sample, and other specially designed demonstration kits (see pictures below)

**What You Will Learn**

- Knowledge necessary to design electronic equipment which is compatible with the electromagnetic environment
- Practical design aspects of EMC/EMI control in the design of electronic products
- Practical EMC/EMI trouble-shooting and measurement techniques

**Who Should Attend**

- Electrical/electronic design engineers
- reliability and quality engineers
- system engineers
- regulatory and safety engineers
- technical managers
- others who need a working knowledge of EMC/EMI principles

**Prerequisite**

Technical background or working experience in the field of electronic product manufacturing, testing or development.

**Course Methodology**

This course is presented classroom style, with practical demonstration to illustrate the concepts taught. Practical demonstration will be carried out throughout the 3-day course, usually at the end of a related topic. Approximately 10 topics will be demonstrated, depending on availability of equipment and time.

**Course Duration**

3 day(s), 9am - 5pm

**Course Structure**

**Day 1**

1) INTRODUCTION

- EMC Examples
- EMC Definition
- EMI Scenario
- EMI Mitigation Methods
- EMC Terms & Acronyms

2) BASIC EMC/EMI THEORIES

- Source Characteristics - spectrum and bandwidth
- Common-mode and differential-mode signals
- Creation of common-mode signals
- High-frequency effects
- Effects of stray L and C
- Conducted Coupling mechanisms
- Radiated Coupling mechanisms
- Antennas and antenna factor
- Transmission line effects

**Day 2**

3) EMC CONTROL & DESIGN TECHNIQUES
Day 3
4) EMC/EMI TROUBLE SHOOTING TECHNIQUES

- Review of EMC measurement methods
- EMC/EMI trouble shooting tools
- EMC/EMI trouble shooting methods
- Practical examples of EMI identification and mitigation
- Spectrum of a noise source
- Measurement of Conducted & Radiated emissions
- Stray inductance and capacitance
- Effect of bypass capacitors
- Noise on supply and ground tracks
- Transfer impedance of cables
- Magnetic and capacitive coupling and mitigation
- Application of magnetic pickup loops and current probes
- Use of ferrites for EMI control
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- ESD protective materials

Course Instructor(s)

Dr Tee Tang

Dr T Tang graduated with a BE (Electrical) degree with First Class Honours in Electrical Engineering at the University of Queensland, Australia. He was subsequently awarded a postgraduate scholarship and obtained a PhD degree in Electrical Engineering at the same university in 1985.

Dr Tang worked six years as a professional engineer with the Department of Main Roads, Queensland, performing design, specification, implementation and supervision of the operation of data communications system of the Brisbane arterial and regional traffic control system. He designed, developed and commissioned a real-time clock with watchdog facility for the area-node traffic controller mini-computers to provide fail-safe operation to overcome poor power supply quality. He was also responsible for the testing of traffic control software integrity.

He joined the Queensland University of Technology (QUT) in 1987, specialising in electromagnetic field theory, antennas, RF and microprocessor-based applications and
electromagnetic compatibility. Under a government grant, he established the QUT EMC Laboratory in early 1990 to assist local industry in pre-compliance testing. He has been consultant to many companies in the areas of EMC/EMI, antennas, electromagnetic fields, energy management and industrial controllers.

In mid-1990, he was invited by the Australian Government to establish the EMC Awareness course to coincide with the launch of the Australian EMC Framework. He has conducted in-house training and public EMC short-courses in Australia and New Zealand. He is currently a Technical Assessor for the National Association of Testing Authorities, Australia (NATA).

Dr Tang is a senior lecturer at QUT and lectures in circuits and measurements, signals and systems, RF communications technology, microwave and antennas, electromagnetic fields and electromagnetic compatibility. His research interests include active antennas, antenna modeling, scattering inversion, RF applications, electromagnetic emissions and measurement, and microprocessor applications. He has published 9 refereed journal articles, 55 conference papers and numerous technical reports.

Research Papers Published


**Administrative Details**

**Programme Logistics**

**Duration:** 3 day(s), 9am - 5pm  
**Date:** 24 - 26 Jun 19  
**Venue:** Dream Catcher Consulting Sdn Bhd, Penang

Morning break, lunch and tea break will be provided throughout the course duration. Course Manual and Certificate of Attendance will be provided.

**Your Investment**

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<th>Condition</th>
<th>Price per Pax</th>
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<td>Regular fee</td>
<td>RM3,640.00</td>
<td>RM218.40</td>
<td>RM3,858.40</td>
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<tr>
<td>Early bird discount for registration before 27-May-2019. N/A for SBL KHAS</td>
<td>RM3,310.00</td>
<td>RM198.60</td>
<td>RM3,508.60</td>
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<td>Group discount for every 3 pax registered, receive 1 complimentary seat</td>
<td>RM3,640.00</td>
<td>RM218.40</td>
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Additional cost may incur for customization or extra material request. Course fee is 100% claimable from PSMB (SBL scheme) in accordance to PSMB guidelines.

**3 Easy Steps to Register**

- **Phone** +604 640 7111 / 7112  
- **Fax registration form** to +604 640 7110  
- **Email registration form** to register@dreamcatcher.asia
Method of Payment

Crossed cheque / bank draft made in favour of DREAM CATCHER CONSULTING SDN BHD.
Registration form
together with payment to be couriered to :

Dream Catcher Consulting Sdn Bhd
303-4-5 & 303-4-6
Block B, Krystal Point
Jln Sultan Azlan Shah
11900 Sg Nibong
Penang, Malaysia

Payment must be received no later than 10 working days before the course commences. An
undertaking may be accepted in cases where payment is delayed. However all payments must
be made before the course commences.

Closing registration date is 10-Jun-2019.

Refund and Cancellation

Fees will only be refunded in full for cancellation received in writing more than 10 working days
prior to the commencement date. Substitute attendee(s) will be accepted at no extra charge.

Disclaimer

Dream Catcher Consulting Sdn Bhd reserves the right to change the instructors, date and to
vary/cancel the programme should unavoidable circumstances arise. All effort will be taken to
inform participants of the changes. Upon sending the registration form, you are deemed to
have read and accepted the terms.

Enquiries

call us at +604 640 7111 / 7112 or email us at enquiry@dreamcatcher.asia
## Registration Form

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<tr>
<th>No.</th>
<th>Name</th>
<th>Job Title</th>
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**Total Amount**

(Emails are required to ensure notification of any changes reach the participant)

### Submitted by:

- **Company Name:**
- **Company Address:**
- **Contact Person:**
- **Designation:**
- **Dept:**
- **Phone:**
- **Email:**

*Please complete this form with an authorised signature below and fax to fax registration form to +604 640 7110 or email to email registration form to register@dreamcatcher.asia. Call us at phone +604 640 7111 / 7112 for any enquiry*

**Authorised Signature:**

*Please print full name (authorised signature) if you submit via email*

- **Name:**
- **Designation:**
- **Dept:**
- **Date:**

*This registration is invalid without a signature. Payment must be made no later than 10 working days before the course commences. An undertaking may be accepted in cases where payment is delayed. However all payment must be made before the course commences. Participants who registered but did not attend will be invoiced accordingly. Fees will only be refunded in full for cancellation received in writing more than 10 working days prior to the commencement date. Substitute attendee(s) will be accepted at no extra charge.*

*Please send payment with this form to*

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Enclosed cheque/bank draft no ______________________ made in favour of DREAM CATCHER CONSULTING SDN BHD