



射頻產品實用天線設計課程

Practical Antenna Design for Advanced Radio Frequency (RF) Products

15-16 April 2011

Course Code: 40136299

• 簡介 •

今天，無線通信產品極速發展，無線通信產品必須在短時間內推出市場，才能維持競爭力。對於射頻產品，天線設計影響產品的通信範圍及質素，故成為成功推出新產品的重要因素。優良先進的天線設計，能為射頻產品設計或製造商，創造競爭優勢。

• 課程宗旨 •

本課程為期兩天，旨在提升參加者的天線設計技術，在實用及工業層面，了解切實可行的天線設計技術元素。

課程涵蓋基本天線概念和定義，以及常用的先進射頻產品天線之特色、規格及性能、實用的產品設計之元素等。課程還會教授務實可行的策略，讓產品天線達致最佳性能。課程另設討論環節，以加深參加者對實用天線測量和測試的認識。Agilent Technologies Hong Kong Ltd.亦會示範阻抗測量及天線匹配。

本課程由經驗豐富的射頻專家教授，透過本課程參加者可提升射頻產品設計技術，設計出高性能之產品，並能把設計疊代次數減至最少。

• 課程對象 •

射頻設計師、無線產品設計師、應用工程師、設計經理、業務發展工程師及經理，以及相關行業專家。

• 課程資料 •

上課日期及時間

2011年4月15-16日 09:30-17:00

授課語言

廣東話輔以英文詞彙 (英文講義)

證書頒發

完成課程之學員可獲發出席證書

上課地點

九龍達之路78號生產力大樓一樓

課程費用

港幣\$2,700

提早報名優惠：港幣\$2,430 (於2011年3月25日或之前報名)

• Introduction •

To ensure competitiveness in today's fast evolving business environment, faster time to market is necessary for wireless communication products. Playing a critical role in determining the communication range of products, RF design, antennas in particular, becomes crucial to the success of the introduction of new RF products. Competence in advanced antenna design definitely can strengthen the competitive edge of RF product design or manufacturing companies.

• Course Objectives •

This 2-day course aims to provide participants with technical insights on the vital aspects of antenna design from a practical and industrial perspective. The course covers the fundamental antenna concepts and definitions, introduction of features, specifications and performance of different types of commonly-used and advanced antennas in RF products and practical product design elements. Practical implementation strategies in RF products for optimum antenna performance will also be presented. To enhance participants' knowledge in practical antenna measurement and testing, a discussion session will be included. Impedance measurement and matching of antennas will also be demonstrated by Agilent Technologies Hong Kong Ltd.

Conducted by RF experts with a wealth of local and international industrial experience, the course will provide participants with information to develop top-performance RF products with the minimal number of design iterations.

• Who Should Attend •

RF designers, wireless product designers, field application engineers, design managers, business development engineers and managers, and related professionals

• Course Information •

Date & Time

15-16 April 2011 09:30-17:00

Medium of Instruction

Cantonese with English terminology (English handout)

Award of Certificate

A Certificate of Completion will be awarded to participants who have completed the course

Venue

1/F., HKPC Building, 78 Tat Chee Avenue, Kowloon

Course Fee

HK\$2,700

Early Bird Registration: HK\$2,430 (Enrol on or before **25 March 2011**)

主辦機構 Organizer



協辦機構 Co-organizer



支持機構 Supported by



• 課程內容 •

第一日 (4月15日)

基礎理論

1. 天線基本理論
 - 天線類型
 - 磁單極天線、螺旋狀天線、環狀天線、電路板
 - 輻射機制
 - 輻射的來源
 - 輻射的特徵
2. 規格和性能
 - 輻射模式
 - 天線的效率及孔徑
 - 阻抗及線路匹配
 - 方向性及增益
 - 弗里斯 (Friis) 傳輸公式
3. 選擇天線
 - 磁單極天線
 - 橡膠迷你天線
 - 金屬片專用天線
 - 微型晶片型的天線
 - 環形天線

Day 1 (15 April 2011)

Fundamental Concepts

1. Antenna Fundamentals
 - Types of Antenna
 - Monopole, helical, loop, printed PCB
 - Radiation Mechanism
 - Source of radiation
 - Characteristics of radiation
2. Specification and Performance
 - Radiation pattern
 - Antenna efficiency, aperture
 - Impedance and circuit matching
 - Directivity, gain
 - Friis Transmission Equation
3. Selection of Antenna
 - Monopole antenna
 - Rubber ducky antenna
 - Case-fit metal plate antenna
 - Miniature chip type antenna
 - Loop antenna

第二日 (4月16日)

先進天線設計元素

4. 便携式電子產品的微型天線
 - 平板天線、倒L天線、倒F天線
 - 曲折型天線、碎型天線

可行的天線裝嵌策略

5. 優良天線設計要點
 - 天線大小和厚度
 - 安裝和銲接
 - 預防靜電損害
6. 天線設計之工作環境
 - 最佳的地點
 - 到線路版的距離、電池和金屬部件
 - 手效應及頭效應
 - 射頻線纜和連接器
7. 與產品設計師、電子工程師及機械工程師的配合工作
 - 合作之重要性
 - 天線設計實踐

測量

8. 使用網路分析儀測量天線參數
 - 2D天線增益/樣式測量
 - 3D天線增益/樣式測量
 - RFID 13.56MHz/UHF天線阻抗/增益測量
9. 測量示範
 - VHF/UHF天線
 - UWB天線

Day 2 (16 April 2011)

Advanced Antenna Elements

4. Miniature antenna for portable electronics
 - Patch, inverted-L, inverted-F
 - Meandered line, fractal

Practical implementation strategies

5. What Makes a Good Antenna
 - Antenna size and thickness
 - Mounting and soldering
 - Electrostatic damage prevention
6. Working Environment
 - Best location
 - Distance to PCB, battery and metal object
 - Hand effect and head effect
 - RF cables and connectors
7. Working together with product designers, electronic engineers and mechanical engineers
 - Why it matter
 - Practice on designing a good antenna

Measurements

8. Antenna Parameter Measurements with Network Analyzer
 - 2D Antenna Gain/Pattern Measurement
 - 3D Antenna Gain/Pattern Measurement
 - RFID 13.56MHz/UHF Antenna Impedance/Gain Measurement
9. Measurement Demonstration
 - VHF/UHF Antennas
 - UWB Antenna

• 講者簡介 •

袁仲明博士在香港城市大學獲得電子工程學學士及博士學位，主要研究範疇為低電壓及低功耗無線系統的射頻和微波電路設計。他在香港和中國內地的射頻產品設計和生產行業擁有二十多年經驗。袁博士現任HDTV和IPTV領域之顧問工程師。

劉善啟先生先後於英國及美國取得電子工程學碩士及工商管理碩士學位。他在香港及美國有超過二十年射頻系統、產品設計和RFIC的經驗。他曾在美國Motorola和Conexant任職主任工程師多年，主要從事手機的RFIC和矽材料調頻器開發。劉先生擁有五個美國專利，並有一個專利在審理中。現時他在香港開設了無晶圓半導體公司——「立聲威科技(香港)有限公司」，主要業務為RFIC設計及銷售。

• 報名方法 •

1. 請填妥報名表格，電郵 (hollyip@hkpc.org) 或傳真 (2788 5350) 致香港生產力促進局留位。
2. 請以「付款方法」中任何一種方法繳交學費。

付款方法

1. **支票繳費**：支票寄送致：九龍達之路78號生產力大樓3樓生產力培訓學院葉小姐收
*支票請劃線，抬頭為「香港生產力促進局」
2. **現金 / 信用卡繳費**：請親身到生產力大樓一樓生產力培訓學院報名處刷卡繳費
*星期一至五：09:00-21:00 | 星期六：09:00-17:00
3. **網上繳費**：詳情請瀏覽
www.hktrainingonline.com

• 查詢 •

香港生產力促進局

葉小姐
電話：2788 6366 電郵：hollyip@hkpc.org
楊小姐
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網址：www.hktrainingonline.com

Lexiwave Technology (Hong Kong) Ltd.

林先生
電話：2144 2592
電郵：edward.lam@lexiwave.com
網址：www.lexiwave.com

• About the Instructors •

Dr. C.M. Yuen received his B.Eng. and Ph.D degrees in Electronic Engineering from the City University of Hong Kong. His research interest mainly lies in RF and Microwave circuits design for low voltage and low power consumption wireless systems. He has twenty-year experience in RF product design and manufacturing in Hong Kong and Mainland China. Dr Yuen is currently an advisory engineer in the field of HDTV and IPTV.

Mr. Henry Lau received his M.Sc. and MBA degrees from the UK and USA respectively. He has more than 20 years of experience in designing RF systems, products and RFICs in both Hong Kong and the USA. He worked for Motorola and Conexant in the USA as Principal Engineer on developing RFICs for cellular phone and silicon tuner applications. Mr Lau holds five US patents and has one patent pending. He is currently running Lexiwave Technology Ltd., a fabless semiconductor company in Hong Kong and the USA designing and selling RFICs.

• Application Procedure •

1. Please complete the enrolment form and send by email to hollyip@hkpc.org or fax to 2788 5350 for seat reservation.
2. Please pay the course fee via one of the methods listed in "Payment Methods".

Payment Methods

1. **Cheque**: please send the cheque to:
Holly Ip, PTI 3702, 3/F, HKPC Building, 78 Tat Chee Avenue, Kowloon
*All cheques should be crossed and made payable to "Hong Kong Productivity Council"
2. **Visa / Master**: please pay at the enrolment counter located at 1/F, HKPC Building
*Mon – Fri: 09:00-21:00 | Sat: 09:00-17:00
3. **Online Payment**: for details, please refer to
www.hktrainingonline.com

• Enquiry •

Hong Kong Productivity Council

Miss Holly Ip
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Lexiwave Technology (Hong Kong) Ltd.

Mr. Edward Lam
Tel: 2144 2592 Email: edward.lam@lexiwave.com
Website: www.lexiwave.com

Enrolment Form

Please complete this form in BLOCK LETTERS

Programme Code: 40136299

Programme Title: Practical Antenna Design for Advanced Radio Frequency Products

Programme Fee: HK\$2,700 HK\$2,430 (for enrolment on or before 25 March 2011)

Applicant Information

Name in English				*as on HKID		
Chinese Name		Title	<input type="checkbox"/> Mr	<input type="checkbox"/> Miss	<input type="checkbox"/> Mrs.	<input type="checkbox"/> Ms
Company Name						
Position						
Telephone No.		Mobile				
Email Address						
Address						

Payment Method

by cheque (cheque no. _____) by Cash / Visa / Master Online payment

Where did you learn about this training programme?

HKPC's Website Newspaper Advertisement Email Marketing Referral by Friends / Company

HKPC's Display at HKPC Building Others: _____

I do not want to receive promotion materials from HKPC

Declaration :

I declare that all information provided in this enrolment form and the attached documents are, to the best of my knowledge, accurate and complete.

I consent that if admitted, I will comply with all the Rules and Regulations stipulated by the Institute.

I have read and understood the "Important Note" in this enrolment form is subject to revisions in the course pamphlets and the latest updates in the Institute's website.

Enrolment Procedure :

Please complete and send the enrolment form with required documents and fee to the Institute in person / by mail.

Mailing Address: Productivity Training Institute, Hong Kong Productivity Council, HKPC Building, 78 Tat Chee Avenue, Kowloon. (Please mark the programme title and programme code on the envelope.)

IMPORTANT NOTE:

1. Course fee must be accompanied with this form (or photocopy) before course commence, otherwise enrolment would be rejected.
2. HKPC has adopted a Personal Data (Privacy) Policy. Information about the policy is available at HKPC enrolment counters for collection. You may also contact our Personal Data Controlling Officer for further details.
3. Applicants are encouraged to pay by credit cards, EPS or cheques, if possible. Amount received will be imprinted. Cheques are subject to bank clearance.
4. Enrolment fee is not refundable unless HKPC is notified in writing of your withdrawal **at least 5 working days** before the course commences. A handling charge of HK\$200 will also be levied.
5. An applicant may, subject to approval from HKPC, nominate a person to attend the course on his/her behalf.
6. HKPC reserves the right to reject any application in any circumstances and for whatever reasons. Payment of fees should only be construed as conditional acceptance of application.
7. HKPC reserves the right to change the contents, venue and / or time as necessary.
8. Classes will be cancelled if typhoon signal No. 8 or above OR black rainstorm warning is still hoisted after (or is announced by the Hong Kong Observatory to be hoisted at/after) 6:00 a.m. Participants will be notified when the class will be made up as soon as possible.

Applicant's Signature _____

Date _____