

Seminar 11 Sunday June 17, 2001

ELECTROMAGNETIC COMPATIBILITY WITHIN POWER ELECTRONICS. Part 1: FUNDAMENTALS 9:00am – 6:00pm

Instructor: Jacques Laeuffer, PSA Peugeot Citroën, France

ABOUT THE INSTRUCTOR

Jacques Laeuffer has a 20 years experience in the field of Power Electronics for different applications including inverters for radar servo controls, high frequency resonant converters and high voltage transformers for X-Ray generators, and automotive drive systems for hybrid vehicles. He has written 40 technical papers, and is inventor of 14 patents. Together with his activity for PSA Peugeot Citroën, he is a teacher of E.M.C. at Conservatoire des Arts et Métiers, an Engineering University in Paris.

SCOPE AND BENEFITS

Power Electronics are hundred times more powerful sources of electromagnetic interferences (E.M.I.) than digital control electronics.

The scope of this seminar is to focus on what is specific with Power Electronics for E.M.C., to avoid uncontrolled extra costs and delays during converters developments and in the field. Seminar's benefits include:

- Physical understanding of how interferences occur.
- Developed calculations from the origin of perturbations to the effect, according regulations.
- Calculation of optimized and cost effective power designs and protections.

CONTENTS

INTRODUCTION

- Issues take source in power transistors and diodes sudden commutations
- Differential Mode interferences occurs when perturbation flows through active circuits, while Common Mode occurs when perturbation flows through parasitic capacitors, cases, grounds, etc.

DIFFERENTIAL MODE CONDUCTED DISTURBANCES

- Switching supply operating sequence
- Input filtering capacitor resistance
- Disturbance calculation
- Disturbance measurement according regulations
- Line diodes recovery. Line inductance effect
- Differential mode filter components calculation

COMMON MODE CONDUCTED DISTURBANCES

- Parasitic capacitance through heatsinks
- Disturbance calculation
- Disturbance measurement according regulations
- Parasitic capacitance through transformers; screens
- Parasitic capacitance through electric machines
- Common mode filter components calculation

GATE DRIVE THROUGH GALVANIC BARRIER

- Optocouplers and optic fibers receptors susceptibility
- Pulse transformer resonances

WHO SHOULD ATTEND

- Engineers intended to minimize the global cost, and to increase the reliability of the EMC compliant power electronics, whatever the power (from 100W up to 100KW), the frequency and the topology (forward, half bridge, resonance, inverter for drive) by a quantitative calculation in the 10KHz – 1 MHz range, by a physical understanding of the energy emission, from conduction to radiation, in the 1 MHz – 2 GHz range, and by a lot of practical techniques consequences of it.
- Intelligent motion, systems integration, field service, and E.M.C. specialists engineers who need to understand major power electronics issues. Technical managers interested in major trends of power electronics.