

A Practical Approach to Teaching the Propagation of Electromagnetic Interference in Printed Circuit Boards

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Abstract – In last years, teachers of the EMC subject in Electronic Engineering and Technology in Electronic Systems courses of the Department of Electronics of the Federal Institute of Santa Catarina have developed experiments that allow the study of EMC/EMI using simulator software packages and usual bench equipment as oscilloscopes and signal generators.

Index Terms— Undergraduate teaching, electromagnetic compatibility, electromagnetic interference.

I. INTRODUCTION

This paper was elaborated from practical experiments developed in Electronic Engineering and Technology in Electronic Systems courses of the Department of Electronics of the Federal Institute of Santa Catarina. In these courses, subjects of electromagnetic compatibility were included, with the aim to initiate the students in understanding the phenomena associated to EMI and EMC. This work does not tackle precise measurements of this phenomena, but to allow students to perceive how these phenomena occur.

II. DESCRIPTION OF THE WORK

This work intend to present a set of experiments that allow the teaching of electromagnetic compatibility using relatively low cost equipment that are usually present in laboratories of electronics in educational institutions. Experiments and the respective results obtained by the students are presented. The measurements made in printed circuit boards aim to show the propagation of harmonic components between tracks in a printed circuit board (PCB).

III. RESULTS AND PROBLEMS

The students make measurements using oscilloscopes, in time domain as in frequency domain, using the feature of Fast Fourier transform (FFT). As a problem to be tackled is the observation that the results are obtained in laboratory benches without control of other forms of interference that exist in the environment. The measures are preeminently conceptual, and with them one cannot quantify the phenomena, but only to show them.

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