



**STUDY OF DYNAMIC CHARACTERISTICS OF CEM-1 SINGLE-LAYER  
PRINTED CIRCUIT BOARD USING FINITE ELEMENT METHOD AND  
EXPERIMENTAL MODAL ANALYSIS**

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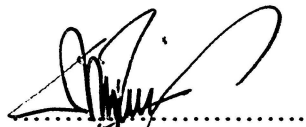
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## AUTHOR DECLARATION

“I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree.”

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*“Life is 10% what happens and 90% how we react to it.”*

*Charles Swindoll*

## ABSTRACT

The demand for structurally reliable Printed Circuit Boards (PCB) has increased as more functions are required from electronic products along with less weight and smaller size. This imposes certain limitations and critical requirements. The purpose of this paper is to study the dynamic characteristics of CEM-1 Single-layer PCB. The dynamic characteristics are extracted for free-free end condition. Analytical model is developed in Finite Element Method (FEM) using ANSYS 5.7, from which the theoretical natural frequencies and mode shapes are obtained. In Experimental Modal Analysis (EMA), a model is developed using ME'Scope and modal testing is carried out using dbFA Suite 4.9 to obtain the experimental natural frequencies and mode shapes. The theoretical and experimental natural frequencies and mode shapes are then compared to validate both approaches and evaluate how close the theoretical model agrees with the experimental model. The understanding on dynamic behavior of this structure provides valuable insight into the nature of the response and remarkable enhancement of its model, strength and vibration.

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