

STUDY ON THE MAGNETIC CORE FOR HIGH FREQUENCY APPLICATION

This thesis is presented in partial fulfillment for the award of the Bachelor of the
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ABSTRACT

This paper presents the study of electronic transformer core for application at power distribution system. Testing has been done to an electronic transformer of ETD/31/22 type core from Ferroxcube Company to find the characteristic of magnetic core. The core is suitable for power application where a high operating flux density and low total core-loss is required. The materials of the core which has been tested along this project is ferrite 3C90 which is a low loss, and medium operating frequency for applications up to 200kHz, such as switched mode power supplies and inverters. Two cores, one bobbin and two stainless steel clips are required to make up a transformer. The transformer coils of primary and secondary windings have been design to operate with rated current of 1.3A. At the end of the project, it was found out that the tested ferrite core operates at relevant frequency range from 1kHz to 100kHz with 0.5778 VA rating and 82.80% of efficiency.

Keyword: Electronic Transformer, Ferrite Core, Operating Frequency, Transformer Coils.

TABLE OF CONTENT

CHAPTER	CONTENT	PAGE
	Declaration	iii
	Acknowledgement	iv
	Abstract	v
	Table of Contents	vi
	List of Figures	x
	List of Tables	xii
	List of Abbreviation	xiii
CHAPTER 1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Objective	2
	1.3 Problem Statement	2
	1.4 Scope of Work	2
	1.5 Organization of Report	2

CHAPTER 1

INTRODUCTION

1.1 Introduction

A transformer is a very useful device that is widely used in the electrical power system [1]. It may be used to supply power, transmit signals, establish voltage isolation between circuits, modify voltage and current levels, sense voltage and current levels, provide impedance matching, and filtering [2].

Nowadays, the technology of transformer design is toward the minimization of the core size, increase the operating frequency and also efficiency, reduce the losses, and has better voltage regulation [3]. A good transformer can be determined by its high efficiency, high maximum power transfer, low amount of losses, light, and small in size. The higher the efficiency means the higher power being transferred from the primary side to the secondary side of transformer [4]. In order to reduce the size of the core, a high frequency range must be applied to the core [5]. But, the problem of high core losses exists regarding to this action. In order to design a high frequency transformer, the B-H characteristic of core material must be considered. The material being used as a core must be able to operate well at high frequency with low loss [6].

The project focus on the study of magnetic core characteristic when operates at high frequencies ranging from 50Hz to 200kHz. Accomplishing this, an electronic transformer has been design by using ETD59/31/22 3C90 ferrite core. The coils were designed by using American Wire Gauge (AWG) 24 which can carry 1.3A rated current. The primary and secondary turn was set to, $N=136:68$ which means step down transformer is being design. Test has been done to the transformer by measuring the value of coils inductance, coils resistance, input/output voltage, and input/output current of the transformer. Moreover, simulation has been done by software (Matlab7).