

SINGLE PHASE AC-DC MATRIX CONVERTER USING PIC

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**UNIVERSITI TEKNOLOGI MARA
MALAYSIA**



NOR AZLIN BINTI MOHD ZAKI
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 Shah Alam
Selangor Darul Ehsan

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*Nor Azlin Bind Mohd Zaki,
Faculty of Electrical Engineering,
Universal Teknologi MARA (UiTM),
40450 Shah Alam, SELANGOR DARUL EHSAN.*

ABSTRACT

This thesis presents the implementation of single-phase matrix converter (SPMC) as an AC-DC converter. A Peripheral Interface Controller (PIC) was used at the heart of the control electronics to synthesize the required output.

The multiple-PWM technique was used to synthesize the output. A simulation model was developed using PSpice technique prior to practical realization.

Basic load represented by R are used for practical realizations. Resistive load was used to reduce the complexities of the circuit. Further investigations were carried-out on the use of RL circuit.

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CHAPTER 1

INTRODUCTION

1.1 Power Electronics

Power electronics may define as the applications of solid-state electronics for the control and conversion of electric power. Power electronics are based primarily on the switching of the power semiconductor devices. With the development of power semiconductor technology, the power-handling capabilities and the switching speed of the power devices have improved tremendously. The development of microprocessors and microcomputer technology has in recent years greatly influence in control and synthesis on the output to the various power electronic converters.

Power electronic has applications that span the whole field of electrical power systems, with the power range of applications extending from a few VA/Watts to several MVA/MW. The main task of power electronics is to control and convert electrical energy from one form to another. The four main forms of conversion are:-

- i. DC-to-AC Conversion (Inverter)
- ii. AC-to-DC Conversion (Rectifier)
- iii. DC-to-DC Conversion (Chopper)
- iv. AC-to-AC Conversion (Cycloconverter)

1.1 Basic Theory of Matrix Converter

Matrix converter is an advanced circuit topology where it's capable of converting AC/AC, AC/DC, DC/AC, and DC/DC. Matrix converter has been developed