

**SINGLE PHASE AC TO DC CONVERTER WITH POWER FACTOR  
CORRECTION USING PIC CONTROLLER**

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**UNIVERSITI TEKNOLOGI MARA**

**MALAYSIA**



**SHARIF MUHAMMAD REDWAN BIN SHARIF ALI**  
Faculty of Electrical Engineering  
**UNIVERSITI TEKNOLOGI MARA**  
40450 Shah Alam  
Selangor Darul Ehsan  
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*Sharif Muhammad Redwan Bin Sharif Ali*  
*Faculty of Electrical Engineering,*  
*Universiti Teknologi Mara (UiTM),*  
*40450 Shah Alam, Selangor.*

## **ABSTRACT**

This paper present circuit for providing power factor correction comprises an active power factor correction (PFC) and controller circuit using peripheral interface controller (PIC). In the purposed work only one power switch is employed to minimize cost, reduce switching stress and losses. By designing the necessary techniques and methodology, the overall power factor and total harmonic distortion (THD) would be improved to the expectation. Method of re-shaping the input current waveform to be similar pattern as the sinusoidal input voltage is done by the boost technique and the related controls that using the PIC controller. The PIC controller circuit is the main part of this project which provides a several combination techniques to gain the unity power factor by sensing supply current and resolve the error created using programming and generate the desire pulse signal to drive the switch of IGBT toward controlling the charging and discharging time for boost inductor.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Nowadays, power electronics circuit has become one of the most important design part in most commonly used electrical equipments namely the computers, televisions, motor drives, electronics ballast and power amplifiers. It is a well known fact that most of the equipments require AC to DC conversions from the AC mains. AC to DC converters usually has a full wave bridge rectifier with a buffer capacitor to reduce output voltage ripple and to increase the holdup time of DC supply [1]. The DC voltage from the conversion must contain low ripple voltage and thus a bulk capacitor is used as a filter. As consequently, the input current waveform from the mains is non-sinusoidal with high peak pulsating current and contains low order harmonic currents [2]. That is known as a harmonic pollution and reflects in a voltage distortion, heating and reduced transmission capability of the line.

To cope with these problem the most suitable and reliable solutions for low power applications is the active PFC circuit [3]. The boost type PFC performs much better than other circuits in terms of efficiency, power factor and the simplicity of gate drive circuit. Besides that, the inductor that is located at the front of the circuit would give a smooth input current [4]. This form of active PFC circuit reduces the harmonic contents to very low values and gives a power factor correction near to unity.

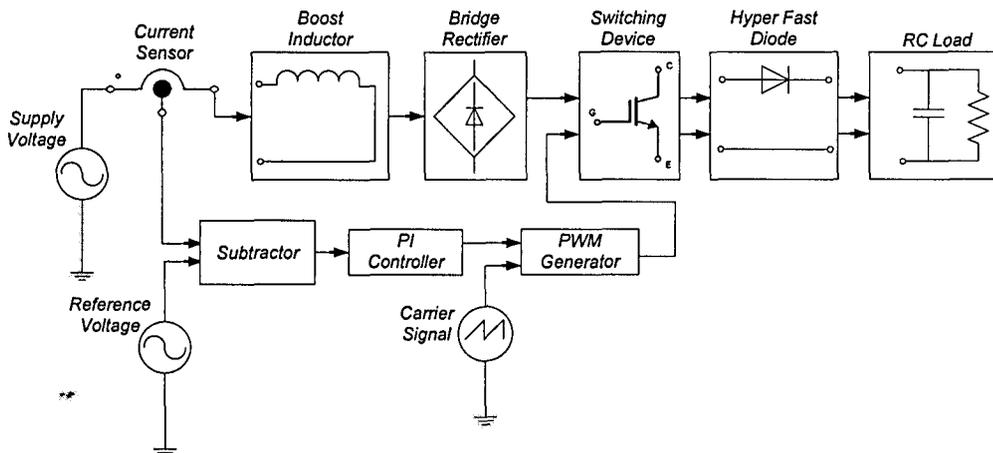


Figure 1.1: AC to DC converter with PIC controller