

STUDY OF BATTERY CHARGER'S EFFECIENCY AND ITS IMPROVEMENT

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ABSTRACT

This paper presents an analysis of different battery chargers or power supplies in the market and its efficiencies. The study involves the usage of power supplies from different companies that exists in Malaysia either from the phone's manufacturer or fake charger that is sold in market. This analysis is to determine the reliability and the effectiveness of the normal type of power supply AC adapter used in daily life in Malaysia. Since most of the power supply is a switched mode power supply, the second part of this paper will illustrate on how to improve its efficiency (power factor and harmonic distortion). Efficiencies here are related to voltage, current, power factor, and total harmonic distortion. However, this paper is only specified in the study of active power filter to minimize the harmonic distortion and its power factor. Active filter is famous in harmonics mitigation as well as reactive power compensation, voltage regulation, load-balancing and load balancing. The results of Total Harmonic Distortion and Power Factor and its operation were examined with MATLAB.

Keywords-component; Switched-Mode Power Supply (SMPS); Efficiencies; Power Factor Correction; Total Harmonic Distortion (THD)

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Switched Mode Power Supply (SMPS) is used in many types of electronics' application. Since there are many types of SMPS in Malaysia, the efficiencies of the product also could vary based on the components in each SMPS. The manufacturers in Malaysia for SMPS are such as NOKIA, Sony Ericsson, and SAMSUNG while the fake SMPSs are excessively plentiful in the market. There are several types of SMPS battery charger such as travel adapter and Multicharger. Generally the output voltage of the chargers is in the range of 5 to 12 Volts DC. But some local-made chargers or fake chargers give an output voltage beyond this level. Most people do not bother much about these technical details and just connect the phone to the supply without knowing whether the cellphone is getting exposed to conditions which are beyond the permissible limits. This might actually reduce the life of the cellphone or the battery.

SMPS function is to rectify the AC line to convert to DC line before transformer stepping down the voltage to the acquired voltage[1]. SMPS in battery charger is an AC-DC converter which converts single phase ac voltage from supply to dc voltage output. The rectifiers convert the AC sinusoidal voltage to DC voltage and a non-sinusoidal line current because of interruptions of non-linear input characteristic. The characteristic behavior of non-linear loads is that they draw a distorted current waveform even though the supply voltage is sinusoidal. Most equipment only produces odd harmonics but some devices have a fluctuating power consumption, from half cycle to half cycle or shorter, which then generates odd, even and