

# **Embedded System Based Ac-Dc Converter with High Power Factor & High Power Efficiency**

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**ABSTRACT:** The objective of this paper is to propose in recent years, power converter is used to get high power factor. This paper presents an integrated converter topology for driving HB LEDs which provides high power factor. The integrated buck flyback converter (IBFC) is a single stage, low cost, high power factor AC-DC converter with fast output regulation. The converter is used to provide power factor correction. To obtain high power factor, the buck stage and flyback stage are operated in discontinuous mode. Dimming operation of HB LED is also described. A closed loop is used for enabling the PWM dimming. The simulation studies using MATLAB/simulink is also presented. Hardware setup of open loop is described. The proposed topology reduces significantly the number of devices and complexity, thus the efficiency is increased and cost-effective.

## **I.INTRODUCTION**

In single output can be connected to the converter. A single stage power conversion (AC-DC converter) is implemented. This may decrease the power density and efficiency is also reduced.

If more than one load is to be connected to the system, it requires separate converter for each load. Due to this the number of switching device used is increased, thus the system design is complex and the efficiency is reduced.

In the present work, in the carrier-based implementation the phase disposition PWM scheme is used. Figure demonstrates the sine-triangle method for a three-level inverter. Therein, the a-phase modulation signal is compared with two (n-1 in general) triangle waveforms.

The rules for the phase disposition method, when the number of level  $N = 3$ , are the  $N - 1 = 2$  carrier waveforms are arranged so that every carrier is in phase. The converter is switched to  $+ V_{dc} / 2$  when the reference is greater than both carrier Wave forms. The converter is switched to zero when the reference is greater than the lower carrier waveform but less than the upper carrier waveform. The converter is switched to  $- V_{dc} / 2$  when the reference is less than both carrier waveforms. In the carrier-base implementation at every instant of time the modulation signals are compared with the carrier and depending on which is greater, the definition of the switching pulses is generated

As seen from Figure, the figure illustrates the switching pattern produced by the carrier-based PWM scheme. In the PWM scheme there are two triangles, the upper triangle ranges from 1 to 0 and the lower triangle ranges from 0 to -1. In the similar way for an N-level inverter, the (N-1) triangles are used and each has a peak-to-peak value of  $2/(N-1)$ .

It is clear from the figure that during the positive cycle of the modulation signal, when the modulation is greater than Triangle 1 and Triangle 2, then S1ap and S2ap are turned on and also during the positive cycle S2ap is completely turned on.

When S1ap and S2ap are turned on the converter switches to the  $+ V_{dc} / 2$  and when S1an and S2ap are on, the converter switches to zero and hence during the positive cycle S2ap is completely turned on and S1ap and S1an will be turning on and off and hence the converter switches from  $+ V_{dc} / 2$  to 0. During the negative half cycle of the modulation signal the converter switches from 0 to  $-V_{dc} /$

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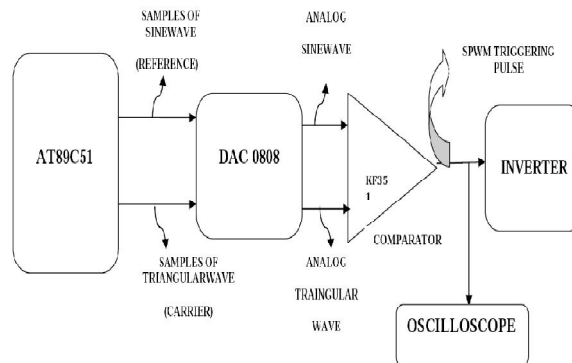


Fig.1. Block diagram for embedded system based AC-DC converter

## 1. LITERATURE REVIEW

During last decade, substantial research has been carried out in innovating different new configurations for harmonic mitigation in Dc-Ac inverter with R-L load. There have been a number of developments in control techniques used in power system.

The literature survey carried out in this research work has been divided into three main categories with further classification. K. V. Kumar [1], have been presented the performance comparison of Shunt Active Power Filter (SAPF) and Hybrid Active Power Filter (HAPF) with three different non linear loads. Two different PI controllers based on average load active power and synchronous reference frame theory are employed in this simulation study. MATLAB/SIMULINK is used for the simulation of SAPF and HAPF. B. Singh, K. Al-Haddad [2], he presents a comprehensive review of active filter (AF) configurations, control strategies, selection of components, other related economic and technical considerations, and their selection for specific applications. J. W. Dixon [3], he has been studied analytically and tested using computer simulations and experiments. In the experiments, it has been verified that the filter keeps the line current almost sinusoidal and in phase with the line voltage supply. It also responds very fast under sudden changes in the load conditions, reaching its steady state in about two cycles of the fundamental.

National Institute of Technology, Rourkela L. A. Morán[4], describes different power quality problems in distribution systems and their solutions with power electronics based equipment. Shunt, hybrid and series active power filters are described showing their compensation characteristics and principles of operation.

### EXISTING SYSTEM:

The EMC (Electro Magnetic Compatibility) filter is used before the AC-AC converter to prevent the device from inserting interference and provides immunity to voltage terminal.

Electromagnetic Compatibility (EMC) requires that systems/equipment be able to tolerate a specified degree of interference and not generate more than a specified amount of interference.

It is becoming more important because there are so many more opportunities today for EMC issues. Increase use of electronic devices (Automotive applications, Personal computing/entertainment/communication) and Increased potential for susceptibility/emissions (Lower supply voltages, Increasing clock frequencies, faster slew rates, Increasing packaging density, Demand for smaller, lighter, cheaper, lower-power devices).

### PROPOSED SYSTEM

Simulink is a tool for simulating dynamic systems with a graphical interface specially developed for this purpose. Within the MATLAB environment, Simulink is a MATLAB toolbox that differs from the other toolboxes, both in this special interface and in the special "programming technique" associated with it.

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Another common way of describing dynamic systems is with block diagrams. This is an attempt to understand the behaviour of the system by means of a graphical representation, which essentially consists of representations of individual components of the system together with the signal flow between these components. A graphical interface is used to convert a block diagram directly into Simulink and simulate the operation of the system. We note that a well-grounded use of Simulink requires some knowledge of control technology and systems theory.

## SIMULATION RESULTS

The output voltage waveform across the high side load and the low side load is shown in the Fig.2. The converter operates at a switching frequency of 85 kHz. Voltage waveform obtained from the output is a square wave. Below diagram represents the output voltage waveform with respect to the change in time. Load used here is a series RLC branch.

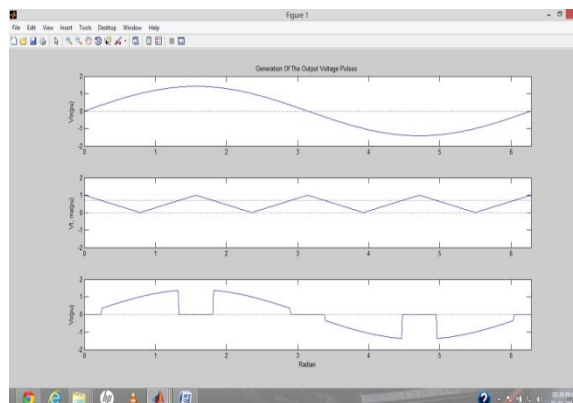


Fig.2. output voltage waveform

## II. CONCLUSION

The series-resonant active-clamp dc–dc converter is based on a flyback converter that employs the active-clamp at the transformer primary side and the voltage doublers at the transformer secondary side to reduce the switching losses and the voltage stress of the main switch suffered from the transformer leakage inductance.

Also, the proposed converter provides a simple structure, a low cost, and low voltage stresses by the AC-DC-conversion with a PFC circuit. Therefore, the proposed converter is suitable for low-power Applications.

The proposed micro control can be used to the buck type PFC ac–dc converters since it is based on the PFC boost converter in the continuous conduction mode.

The proposed converter provides the high efficiency of 96.1% at the full load by the single power-processing, the turn-on ZVS mechanism of the switches by the active-clamp circuit, and the turn-off ZCS mechanism of the output diodes by the series resonance.

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