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A New SMPS with improved Power Quality using Bridgeless Converter

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ABSTRACT
Switched Mode Power Supplies have moved toward becoming progressively well known for effective techniques for conveying energy to an arrangement of electronic gadgets. This postulation proposes a strategy for utilizing a present encouraged push pull converter to give dynamic power figure redress and amendment a solitary stage. While most AC-DC converters use an extension rectifier to change over Air conditioning DC and after that perform DC-DC transformation, the proposed circuit will use its yield diodes to perform amendment, subsequently dispensing with the requirement for an extension rectifier. This circuit will likewise inalienably give control factor remedy in light of the fact that the information current has a persistent way for current stream because of the current bolstered topology where no time exists for both changes to be off. Through simple hardware for the controller, different techniques for Air conditioning fundamental exchanging are tried, including disconnection procedures utilizing pick couplers, to demonstrate the most proficient approach to control a bidirectional switch. Reproductions comes about with MATLAB has been appeared.
Keywords: PFC, PI controller, Bridgeless rectifier, THD, DCM.

I. INTRODUCTION

SMPS with dynamic power factor redress are important for numerous kinds of electric hardware to change over line recurrence air conditioning to dc yield voltage from a noteworthy piece of load on the utility. Power factor revision is basic necessity to decrease in SMPS the voltage and current mutilation and misfortunes. The power quality prompting low power factor control factor around 0.48, the aggregate music Distortion (THD) of info current is 83.5%.the aggregate symphonious bending is high and the info control factor is poor. Due to issues related with low Power factor and sounds. There is converter for advance up/advance down application such as buck converter, help converter, buck-support converter also, Cuk converter .a buck converter is a stage up help converter it is a SMPS that utilizations two switches an inductor also, capacitor [11]. The bridgeless converter is proposed and this sort of DC-DC converter. The nonisolated PFC converter. At the front end of these power supplies is a regularly utilized. The bridgeless rectifier decreases the exchanging misfortunes and conduction misfortune on the grounds that of having decreased number of exchanging. Another bridgeless single-stage AC-DC control factor rectification rectifier in view of SEPIC and cuk topologies was portrayed in the topologies were intended to work in irregular conduction mode to chronicle nearly solidarity control factor in a straightforward and viable way. Different bridgeless SEPIC also, cuk converter are proposed in the writing which result in low voltage push, enhanced warm administration also, low conduction misfortunes, which are not reasonable for low control SMPS application the yield voltage go is decently extensive. A SEPIC and cuk converters functioning as power factor pre-controllers in broken conduction mode exhibited the attractive c/s, for example, the

converter function as a voltage supporter, control factor is solidarity, the yield current swell was guard at the outline arrange. A basic single phase bridgeless SEPIC rectifier with low input current distortion and low conduction losses' bridgeless buckboost converter that uses there switches in the conduction

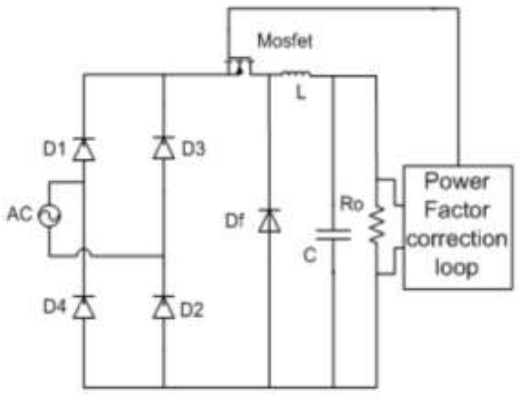

Figure 1. Two Stage AC-DC PFC Converter

II. PROPOSED SMPS CIRCUIT CONFIGURATION AND OPERATION.

A proposed SMPS of configuration based multiple output bridgeless converter using single-phase ac supply uncontrolled diode bridge rectifier that convert ac voltage to dc voltage. The diode rectifier output is connected to bridgeless buck-boost converter. The working of the proposed SMPS configuration are divided into two subsections and presented as follow

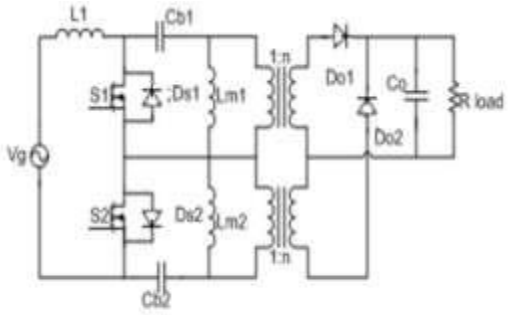

Figure 2. The Proposed Converter circuit

A. Buck-Boost converter of operation

The buck-boost converters a type of DC to DC converter that has output voltage magnitude that is either greater than or less than the input voltage magnitude thermal management and low conduction losses, which are not suitable for low power SMPS application the output voltage range is fairly large. A SEPIC and cuk convert working as power factor pre-regulators in discontinuous loss. A half-bridge voltage source inverter is used at the output for high frequency isolation and multiple dc output voltage in computer power supplies. conduction mode presented the desirable c/s such as the converter work as a voltage follower, power factors is unity, the output current ripple was defined at the design stage. A simple single-phase bridgeless SEPIC rectifier with low input current distortion and low conduction losses. Bridgeless buck-boost converters that use three switch in the conduction path which increases the conduction loss. A half-bridge voltage source inverter is used at the output for high frequency isolation and multiple power supplies and it is cast effective compared to pushpull and full-bridge converter the upper and lower buckboost converter are switched on and off the positive and negative half cycle of the ac volt. The upper buck-boost converter operation of the positive half cycle of the ac input voltage. The lower buck-boost converter operation of the negative half cycle [5].

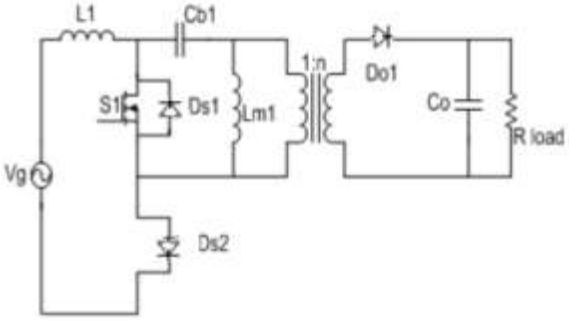

Figure 3. The proposed operated at positive half cycle

B. Half-bridge VSI operation

The half bridge VSI are high frequency isolation the DC output voltage of buck-boost converter. The DC to AC power conversion is the power switching devise. It is first start the upper switch s1 is turned on, diode D1, D3, D5, D7 start conducting the isolated SEPIC dc-dc converter the four secondary wounding frequency transformer high frequency diode D1, D2, D3, D4, D5, D6, D7, D8 and output filter capacitors

C01, C02, C03, C04 respectively. A SEPIC stores the energy in an inductor and transformer that energy to the output storage capacitor. When the energy stored in the inductor their maximum values. The same operating states respect in each switching cycle. The values of c1 and c2 connected in series. The proposed SMPS are different component are used in modeling.

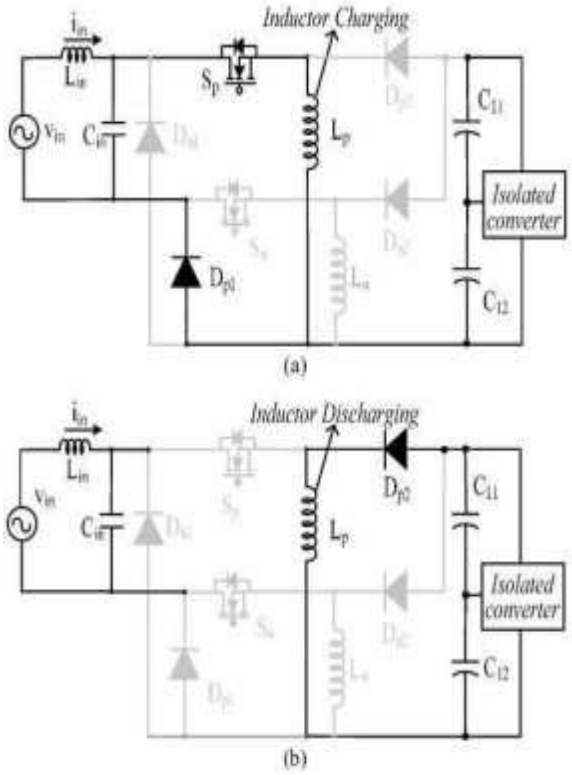

Figure 4. Bridgeless converter based multiple output SMPS

III. DESIGN OF PROPOSED BRIDGELESS CONVERTER BASED

SMPS using AC-DC converter

The proposed PFC based SMPS are presented the design of switching frequency is very high compared with the frequency line. The steady state analysis of the two stage AC-DC converter based SMPS.A non-isolated AC-DC buck-boost converter is isolated SEPIC.

converter

The design of a non-isolated back-boost converter is discontinuous conduction mode (DCM) to input current and voltage to reduce. A half-bridge DC-DC converter is designed in SMPS and the calculating different component values is out for the highest rated output [2]. When both high frequency switches (s2 and s3) are off. Lo1=Vo1 (0.5 – D n)/ fh× Δ iL01

Where TN=1/fn is the switching time for one PWM cycle, Vdc capacitor value is calculated
C=Idc/2WΔVdC

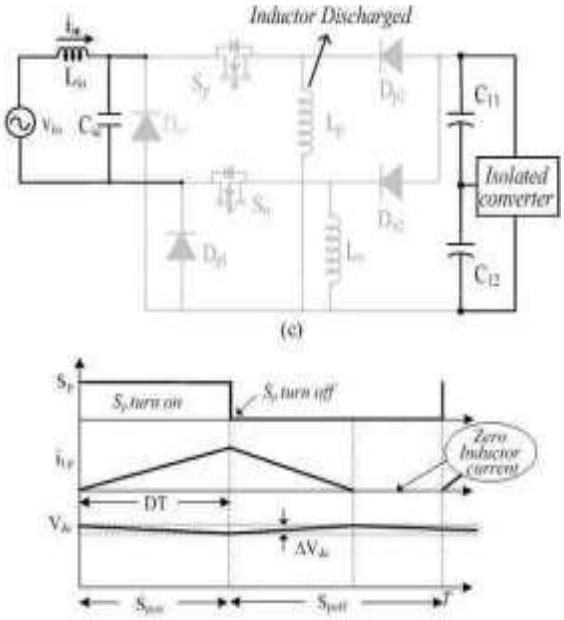

Figure 5. Operating modes for under (a)upper switch Sp is on,(b)upper switch Sp is off,(c)both switch and diode are off, (d)wave forms in one switching cycle

B. Design of input filter

The higher order harmonics in the proposed SMPS, it is use of filter to reduce the harmonic distortion of the ac supply.

Cmax= Im tanθ/2 ×p × f × Vm
Where Im and Vm are the input ac current and ac voltage. The low harmonic distortion at input ac-

$$Ld= 1/4 \times \pi^2 \times f^2{}_c \times C_d$$

A. Design of non-isolated DC-DC

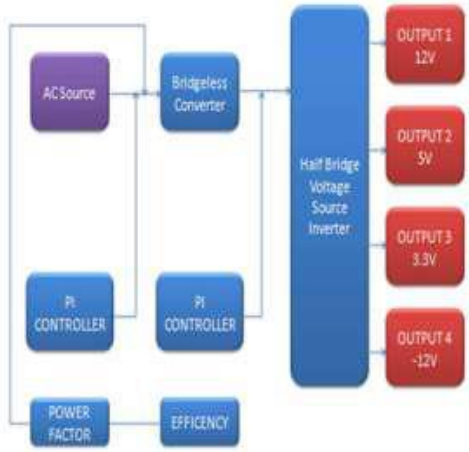

Figure 6. Block diagram implementing PI Controller

IV. CONTROL OF PROPOSED BRIDGELESS CONVERTER

based multiple output SMPS

1. Pulse generator PWM

The PWM pulse generator the output of PI controller the fixed high frequencies saw-tooth ramp is the output of the PI controller saw tooth ramp is less than the switch turn on, it is off.

2. Isolated SEPIC for control

The output voltage as input voltage to the SEPIC is DC voltage. The control of SEPIC is carried out in continuous conduction mode (CCM) to reduce. The consist of one PI controller and PWM pulse generator [13].

3. Non-isolated buck-boost converter for control

The non-isolated buck-boost converter is designed in DCM. The sensor to sense input current and voltage to regulate the output voltage of the converter. The PWM generator to obtain the ON/OFF control pulse [12].

V. MODELING AND SIMULATION

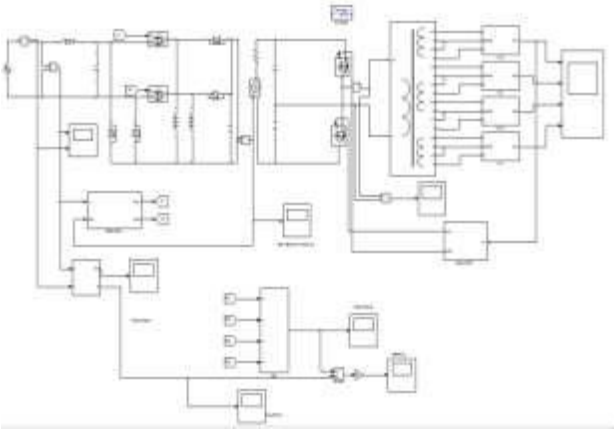

Figure 7. MATLAB/Simulation of improved bridgeless converter based multiple output SMPS

Advantages

1. It will minimize the maximum overshoot
2. Improve Power quality
3. Increased Efficiency

Applications

1. Computer & other similar Appliance's.
2. Mobile phone charge.

VI. RESULT AND DISCUSSIONS

This section, simulation results of an improved power quality SMPS using bridgeless converter and discussed in details. To study the performance of the SMPS and if various power quality with specified limits. The simulated waveform of the SMPS, a step change in loads id applied simultaneously on +12V and +5 output. The load on +12V output is varied from 100% to 20%.at 0.15 and simultaneously in +5V, it is varied from 100% to 70% at 0.25s. The output voltage of the buck-boost converter is maintained constant with a small overshoot. Multttipul output dc voltage remain constant. THD of the input ac mains current is observed as 5.14% the input current harmonics content is within international standard limits with unity PF at the utility interface.

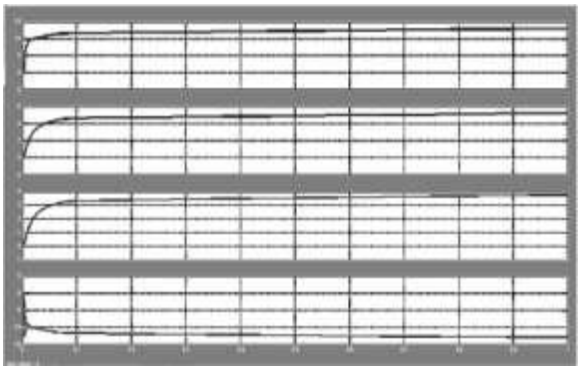

Figure 9. Input voltage, current, bridgeless buck-boost converter output voltage half bridge VSI output voltage.

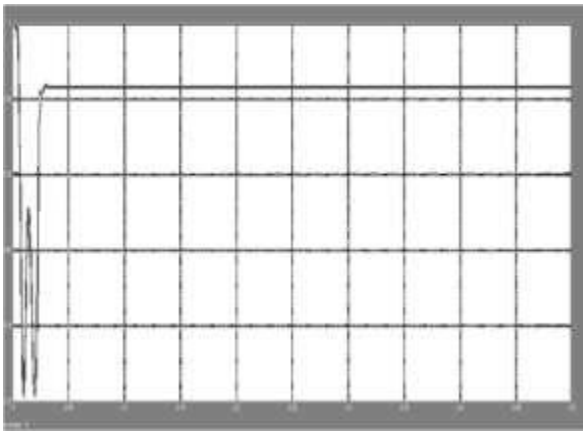

Figure 11. Output Efficiency of the implemented Circuit

The experimentally obtained efficiency of the implemented circuit, as function of the output power, whose minimum value is greater than 80%. The efficiency can be improved by the employment of a soft commutation technique.

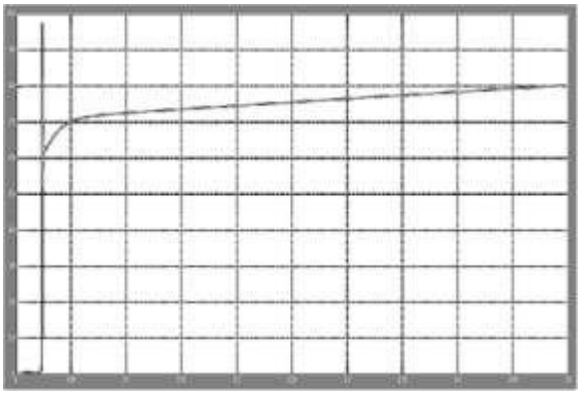

Figure 12. Power factor output

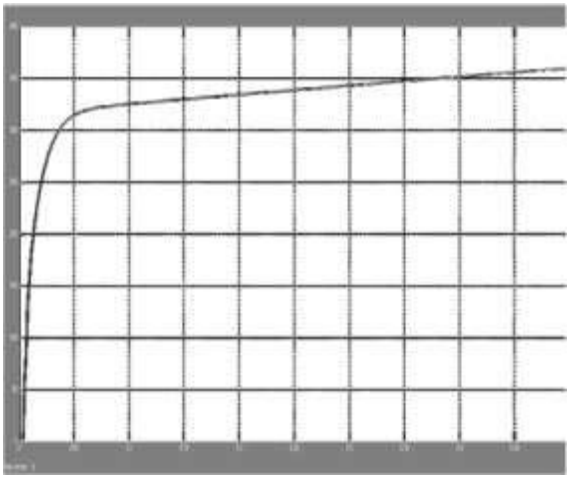

Figure 13. Output voltage of the converter

VII. CONCLUSION AND FUTURE SCOPE

An enhanced power quality SMPS for PC application. The info current THD of more than 83.5% and PF of under 16.5 at the utility interface under fluctuating info voltage. It is utilized to DC-DC converter has been composed what's more, displayed. The principal organize DC voltage of the buck-support converter has been looked after consistent, autonomous of the input voltage is changes. Half-connect DC-DC converter is utilized for got different DC yield at the second stage. In Future, a similar outline can be executed utilizing Neural Network for more proficient yield comes about.

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