Available online at www.sciencedirect.com

ScienceDirect

Energy Procedia 117 (2017) 11–18

Energy Procedia

www.elsevier.com/locate/procedia

1st International Conference on Power Engineering, Computing and CONtrol, PECCON-2017, 2-4 March 2017, VIT University, Chennai Campus

A Family of Quasi Switched Capacitor (QSC) Circuit for Half Bridge DC–DC Converter for Energy Storage Applications

Sidra Begum, S.L.V Sravan Kumar ,k. lokeshwar rao*

PG student ,GNITS, shaikpet, Hyderabad, 500008,India
Asst Prof, GNITS, Shaikpet, Hyderabad, 500008, India, Asst Prof , gitam university, banglore, india

Abstract

This paper presents an efficient bidirectional Half Bridge Dc-Dc converter in combination with Quasi Switched capacitor converter for low power applications .Dc source and a battery are used as input sources for this converter and it utilizes transformer to isolate half bridge and quasi switched converter. Hence half bridge is connected on primary side and QSC is connected on secondary side of transformer. Compared to general SMPS Half bridge circuit, QSC Half Bridge has good efficiency, low switching stress, soft switching is obtained. A 200W bidirectional half bridge circuit is modeled and simulations are done in MATLAB and obtained results are verified with theoretical calculations.

Peer-review under responsibility of the scientific committee of the 1st International Conference on Power Engineering, Computing and CONtrol.

Keywords: DC-DC Converter,Energy storage system,DC voltage source, quasi switched capacitor

1. Introduction

From recent studies it has shown that DC/DC conversion devices are designed in excess when compared to other conversion devices [1]. Because of availability of abundant amount of DC current from renewable energy resources ex: solar. According to studies it is also revealed that more than 700 DC/DC conversion topologies are present now.

* Corresponding author. Tel.: +0-000-000-0000 ; fax: +0-000-000-0000 .
*E-mail address:*author@institute.xxx

1876-6102
Peer-review under responsibility of the scientific committee of the 1st International Conference on Power Engineering, Computing and CONtrol.
10.1016/j.egypro.2017.05.101

Nomenclature

A	Vin	= Input voltage
B	Vp	= Transformer primary voltage
C	Vs	= Transformer secondary voltage
D	$V_{c1'}$	= Capacitor C_1' voltage
E	V_{c2}'	= Capacitor C_2' voltage
F	V_{c1}	= Capacitor C_1 voltage
G	V_{c2}	= Capacitor C_2 voltage
H	V_{c3}	= Capacitor C_3 voltage
I	R_l	= Load resistance
J	V_{batt}	= Battery voltage
K	V_{sw1}	= Switch S_1 voltage
L	V_{sw2}	= Switch S_2 voltage
M	V_{sw3}	= Switch S_3 voltage
N	V_{sw4}	= Switch S_4 voltage
O	V_{sw5}	= Switch S_5 voltage
P	V_{D1}	= Diode 1 voltage
Q	V_{D2}	= Diode 2 voltage

Based on this the converters are classified in to six generations to made useful for further studies. In this paper circuit modeling is done by combining converters of first and fourth generation which is nothing but half bridge quasi switches capacitor converter [2]. Because of presence of transformer high transferring of voltage is done and also high insulation between primary and secondary is maintained and low power consumption is also becoming one of the main criteria now-a-days for this reason half bridge is modeled and designed as it is efficient for low power application.

Instead of using different input for two different converters a dual input converter is used to reduce the severity of the system and fig. (b) is shown below. From dc source dc current is converted to dc of different voltage the ripple content is reduced by capacitor and this dc is now taken as input by inverter where dc to ac conversion is done and send it to grid to avoid reverse flow of current inductor is used and the same process repeats with the battery input hence two inputs are given to dc-dc converter shown in fig.(b) [3]

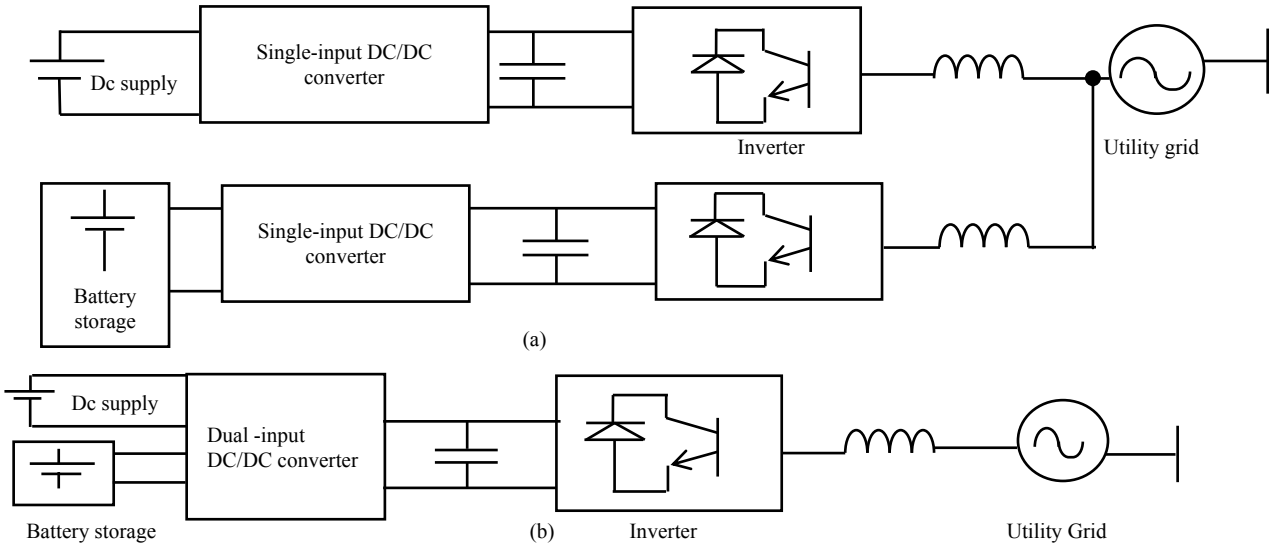

Fig.1: (a) Block diagram of two separate inputs to DC-DC converter (b) Block diagram of dual input DC-DC converter