DECLARATION

I, VANDANA ARORA (2K13/PSY/23) hereby declare that the work, which is being presented in the project report entitled, **"INTEGRATED HIGH GAIN BOOST CONVERTER FOR PHOTOVOLTAIC SYSTEMS"** submitted for partial fulfillment of the requirements for the award of the degree of Master of Technology (Power System) is an authentic record of my own work carried out under the able guidance of Dr. VISHAL VERMA, Professor, EED, DTU. The matter embodied in the dissertation work has not been plagiarized from anywhere and the same has not been submitted for the award of any other degree or diploma in full or in part.

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CERTIFICATE

This is to certify that the thesis entitled, "**INTEGRATED HIGH GAIN BOOST CONVERTER FOR PHOTOVOLTAIC SYSTEM**", submitted by Ms. **VANDANA ARORA**, Roll No. 2K13/PSY/23, student of Master of Technology (Power System) in Electrical Engineering department from Delhi Technological University (Formerly Delhi College of Engineering), is a dissertation work carried out by her under my guidance during session 2014-2015 towards the partial fulfillment of the requirements for the award of degree of Master of Technology in Power System.

The uniqueness of the thesis pertains to Converter System for Photovoltaic Applications, which has not been reported elsewhere.

I wish her all the best in her endeavors.

(Dr. VISHAL VERMA)
Professor, EED, DTU
SUPERVISOR

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ABSTRACT

Solar photovoltaic power generation system is one of the latest research fields these days, even governments are also making plans toward increasing the power generation from non-fossil fuel renewable energy sources because in future, fossil fuel will deplete and thereby escalating the crisis for operation of conventional energy sources will increase. Further government policies on liberalisation and technical developments encourage the use of renewable sources for power generation in terms of distributed generation system. Exponentially rising electricity prices makes PV system an attractive option for substantiate residential applications such as rooftop photovoltaic generating system. As PV system suffers from insolation variation, temperature variation and partial shading problems, it needs a control scheme which makes the PV panel to operate with maximum efficiency. PV system often generates a low DC voltage and higher current, so an interfacing circuit to generate usable power is requisite, which may be produced by DC-DC converter with high step-up voltage gain for various residential applications. Such converter can be integrated with panel itself forming a micro-inverter to cater to such needs.

In this thesis, a topology is discussed which can provide high gain with lesser duty ratio thus reducing stress on devices and produce higher output with reduced current and voltage ripples. From Conventional DC-DC boost converter a high voltage gain is achieved through operation with high duty ratio, but the step-up voltage gain is limited due to effect of power switches, rectifier diodes and equivalent series resistance of inductors and capacitors and poses a serious reverse recovery problem. The topology dealt in the thesis capable of getting integrated with PV Panel in dual-stage and single stage configuration. The topology is favorable for DC home application with or without battery support and for AC grid application under varying insolation and perturbed loading conditions. Thus performance is evaluated and verified with simulated results under the MATLAB/Simulink environment. The results demonstrated that the conversion is highly efficient and is operated with ease of control.

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ABBREVIATIONS

DER	Distributed Energy Resources
PV	Photovoltaic
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
DC	Direct Current
AC	Alternating Current
VMPP	Voltage Maximum Power Point
CMPP	Current Maximum Power Point
HGBC	High Gain Boost Converter
CHGBC	Cascaded High Gain Boost Converter
InC	Incremental Conductance
ZVS	Zero Voltage Switching
ZCS	Zero Current Switching