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Power Electronics

Sessional Assignment

Total

Marks=20

There are different types of Power Electronics Converters used in industries. In this assignment you are required to search the industrial applications and catalogues of these converters and write on any of the following converters, your assignment should cover the following topics;

- i) Block Diagram
- ii) Circuit Diagram
- iii) Waveforms
- iv) Equations
- v) Specifications
- vi) Application in Industries
- vii) Converter Design

Types of Power Electronic Converters:

- a) Controlled Rectifier
- b) DC Converter (Buck, Boost and Buck-Boost)
- c) AC converters (Cycloconverters, Phase Converter, Triacs, Diacs)
- d) Inverters
- e) VFDs and VSD

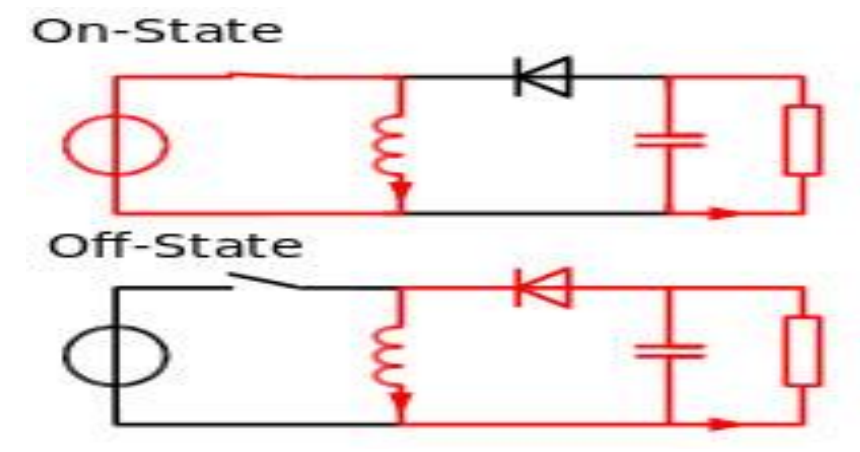
Helpful Links:

- 1) <http://dir.indiamart.com/impact/industrial-rectifier.html>
- 2) <http://www.industry.siemens.com/verticals/global/en/mining-industry/heavy-duty-rectifier-applications/pages/default.aspx>
- 3) <http://www.ni.com/manuals/>
- 4) <https://www.industry.siemens.com/drives/global/en/pages/drive-technology.aspx>

DC Converter (Buck, Boost and Buck-Boost) :

The buck boost converter is a DC to DC converter. The output voltage of the DC to DC converter is less than or greater than the input voltage. The output voltage of the magnitude depends on the duty cycle. These converters are also known as the step up and step down transformers and these names are coming from the analogous step up and step down transformer. The input voltages are step-up/down to some level of more than or less than the input voltage. By using the low conversion energy, the input power is equal to the output power. The following expression shows the low of a conversion.

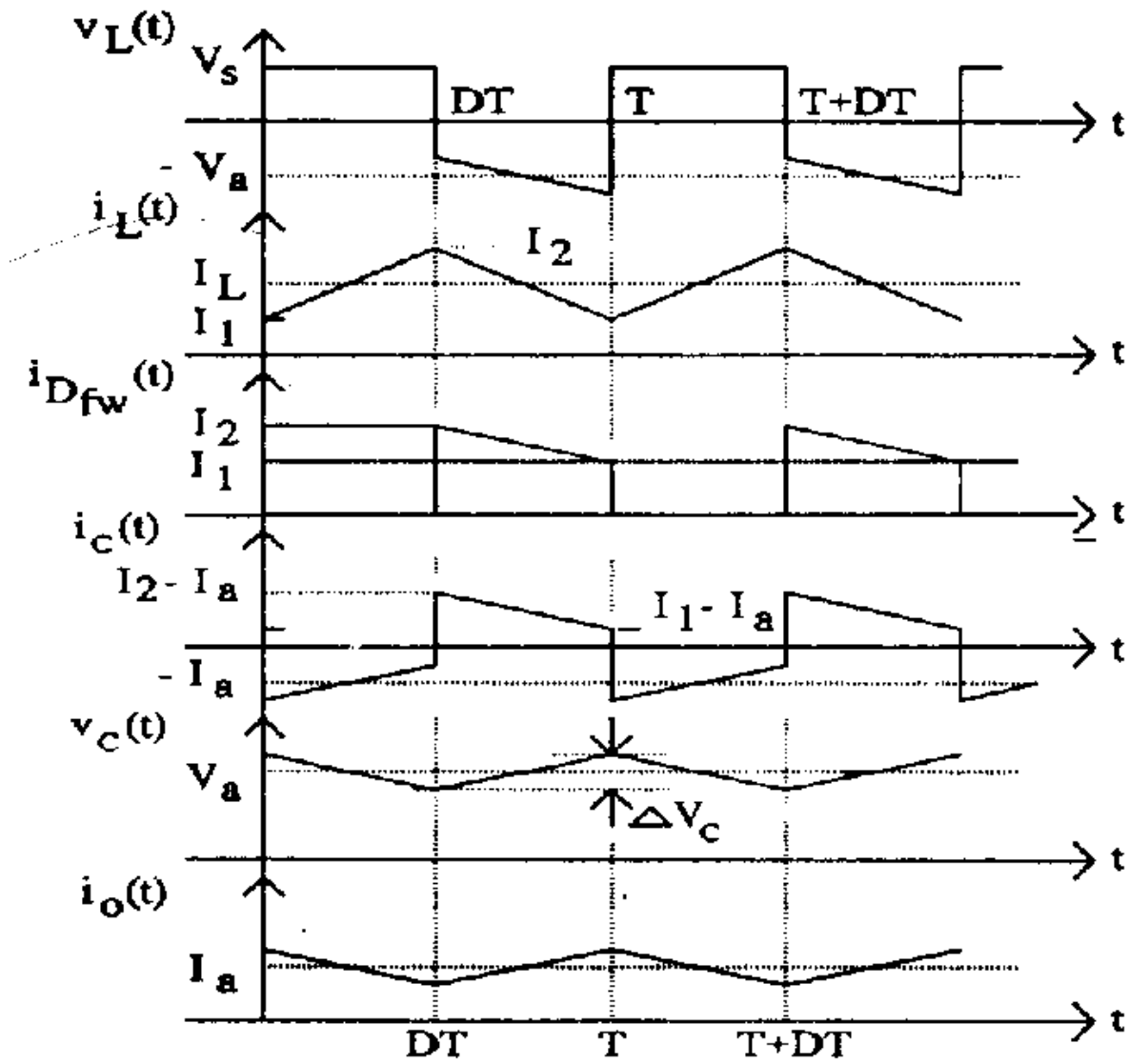
CIRCUIT DIAGRAM:



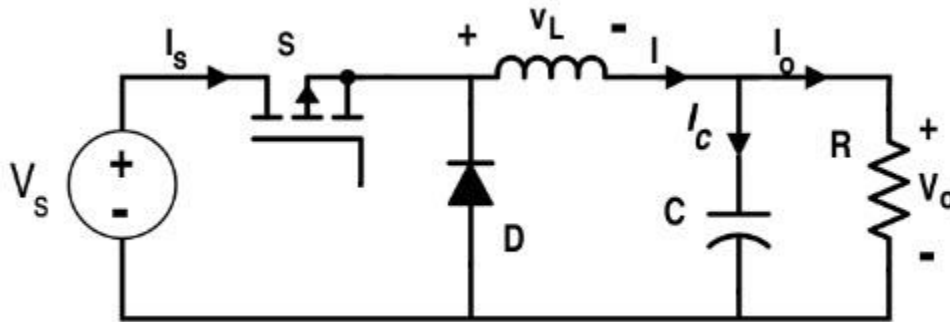
Applications of Buck boost converter

- It is used in the self regulating power supplies.
- It has consumer electronics.
- It is used in the Battery power systems.
- Adaptive control applications.
- Power amplifier applications.

WAVE FORM:



BLOCK DIAGRAM:



EQUATION:

When selecting an inductor for a buck converter the following parameters need to be defined:

1. Maximum input voltage = $V_{in \max}$.
2. Minimum input voltage = $V_{in \min}$.
3. Maximum output current = $I_{out \max}$.
4. Operating frequency = f .
5. Output voltage = V_{out} .
6. Minimum output current = $I_{out \min}$

SPECIFICATION:

Features and specification of XL6009 DC-DC Power module

- Input voltage: 3 - 32V.
- Output voltage: 5 - 35V (adjustable)
- Output current: Maximum output current 4A.
- Note: The higher the voltage, the load current increases.
- Efficiency of this regulator upto <94%
- Load regulation: 0.5%
- Voltage regulation: 0.5%

CONVERTER DESIGNIN