

A SYSTEM AND METHOD FOR OBTAINING BIPOLAR VOLTAGE OUTPUT

IITM Technology Available for Licensing

Problem Statement

- Conventional power supplies and methods for achieving bipolar high voltage output are inadequate for applications requiring controlled, continuous bipolar voltage with lower dv/dt rates and reduced peak power.
- Complexity and Inefficiency: Existing solutions, involving series configurations of boost stages and output stages, are complex, inefficient, and primarily designed for pulsed load applications, making them unsuitable for steady-state bipolar HV requirements.

Intellectual Property

- IITM IDF Ref. 1780
- IN 479043 - Patent Granted

Technology Category/ Market

Category - Power Electronics, Electronics & Circuits

Applications- Ion Analyzers and Spectrometers, Smart Material Actuators, Pulsed Electric Field (PEF) Applications

Industry- Renewable Energy and Smart Grids

Market - Power Electronics Market Size is projected to grow from USD 46.2 Billion in 2023 to USD 61.0 Billion by 2028,; at a **CAGR of 5.7%**.

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

Prof. Lakshminarasamma,
Dept. of Electrical Engineering

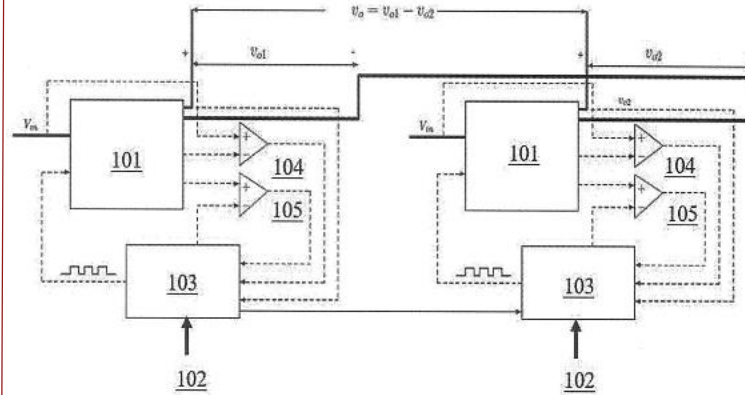


FIG 1. illustrates a block diagram of a system for obtaining bipolar voltage Output.

Technology

- The present invention relates to a system and a method for obtaining bipolar voltage output.

The system uses first and second bidirectional converter modules, each featuring a bidirectional flyback converter and comparators, to achieve precise control of bipolar voltage output.

A controller, executing instructions from memory, assigns positive and negative values to the respective converter modules based on a predefined reference voltage, ensuring accurate voltage output by operating in charge, refresh, or discharge modes.

The method involves selecting and comparing present output voltage against the reference voltage for each converter module, dynamically adjusting operation modes to maintain desired bipolar voltage profiles.

CONTACT US

Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpiis.iitm.ac.in
sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719



IIT MADRAS

Indian Institute of Technology Madras

Technology Transfer Office
TTO - IPM Cell



Industrial Consultancy & Sponsored Research (IC&SR)

Key Features / Value Proposition

1. Precise Voltage Control:

- Provides accurate bipolar voltage output through dynamic management of bidirectional converter modules, ensuring reliable performance for advanced applications.

2. Enhanced Efficiency:

- Reduces energy losses by dynamically adjusting the operation modes (charge, refresh, discharge) based on real-time voltage comparisons, optimizing power usage.

3. Versatile Application Compatibility

- Supports diverse high voltage applications like ion analyzers, smart material actuators, and pulsed electric field processes, enhancing its market appeal.

4. Simplified System Architecture

- Integrates bidirectional flyback converters and comparators within each module, streamlining the system design and reducing complexity.

5. Improved Operational Flexibility

- Assigns and manages positive and negative voltage profiles independently, offering greater flexibility in meeting specific operational requirements.

6. Autonomous Operation Capability:

- Incorporates smart control circuitry for autonomous voltage regulation, minimizing the need for external intervention and maintenance.

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IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in

sm-marketing@iimail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719