



Industrial Consultancy & Sponsored Research (IC&SR)

DEVICE AND METHOD FOR OBTAINING PROGRAMMABLE OUTPUT VOLTAGE

IITM Technology Available for Licensing

Problem Statement

- Bidirectional fly-back converters may be used in switched mode charging circuits for high voltage charging of capacitive loads.
- The current state of art involves several methods for **controlling bidirectional fly-back converters**, but the required output voltage may not be obtained **programmable, for capacitive loads** in minimum time and high efficiency.

TRL (Technology Readiness Level)

TRL-3/4 Technology Validated in the Lab

Intellectual Property

- IITM IDF Ref.1554
- IN 428960 (Granted)

Research Lab

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Dept. of Electrical Engineering

Technology Category/ Market

Category: Electronics and Circuits

Applications: Power conversion systems, Robotics, Sensors, Medical imaging

Industry: Manufacturing, Automotive, Healthcare

Market Global Power Conversion System market size is estimated to be USD 28 Billion in 2021 and is forecast to a readjusted size of USD 36 Billion by 2028 with a CAGR of 3.6%.

Technology

The invention discloses a **device and a method for controlling a bidirectional fly-back converter to achieve a programmable high output voltage for capacitive loads.**

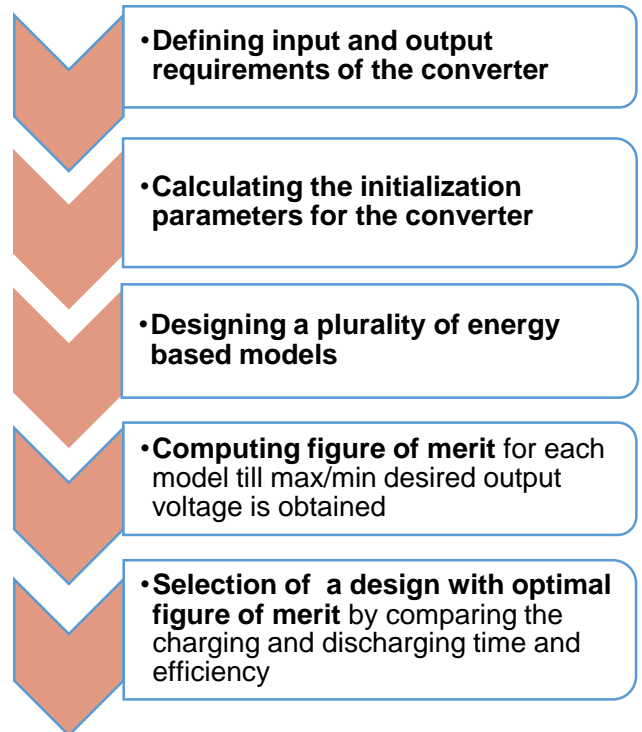
- The device includes a bidirectional flyback converter, high **bandwidth comparators**, **isolated feedback sensing circuit**, a **digital to analog converter**, a **low pass filter** and a **complex programmable logic device.**

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Method:

- Determining difference between magnitude of the **actual output voltage (V_o)** and **required reference output voltage (V_{ref})** of the converter.
- **Dynamic modulation of energy per charge pulse or energy per discharge pulse** based on variation in demand energy determined.

The method of optimizing design is given by the following steps:



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Image

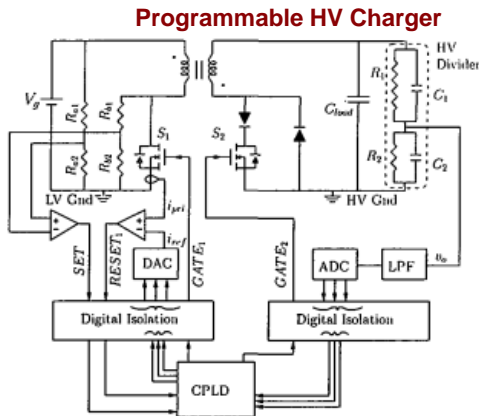


Fig. 1 illustrates a device for generating a programmable output

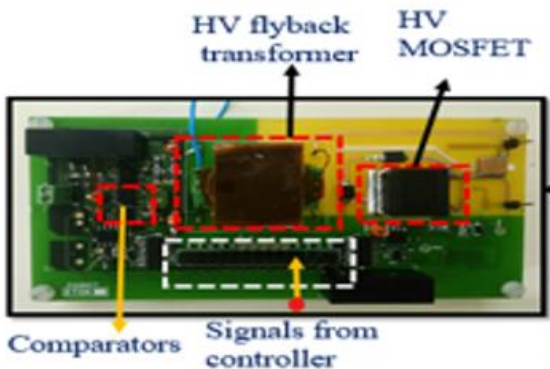


Fig 2. represents an image of bidirectional HV fly-back converter

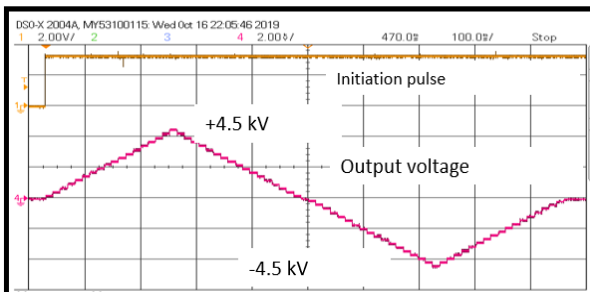


Fig. 3 -5 kV to 5 kV Programmable Output voltage

Key Features / Value Proposition

Technology Perspective:

- Revisited power stage decision optimization
- Low ripple voltage regulation under light load conditions.
- Adaptive control action for meeting sweeping reference voltage in minimum time.

User Perspective:

- Device is small in size and portable
- Reduction in charging/discharging time as well as maximizes charging and discharging efficiency.
- Triangular output voltages are required for rudder control of autonomous underwater vehicles and deflection plates of ion analyzer equipment.

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