



Low-power FOCV MPPT controller with automatic adjustment of the sampling time and period

A new simple control scheme for dynamically adjusting the sampling time and period of a Fractional Open Circuit Voltage (FOCV) MPPT controller has been developed and patented. Partners to further develop the system and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

Maximum Power Point Trackers (MPPTs) have been widely used in high power applications to achieve maximum power from photovoltaic (PV) panels. In low power applications, such as autonomous sensor nodes and traffic lights and signals, simple MPPT controllers are required to be economically feasible. Fractional Open Circuit Voltage (FOCV) controllers are an alternative. These type of controllers periodically disconnect the PV panel and sample its open circuit voltage (VOC). Then, the voltage at the maximum power point (VMPP) is determined from an empirical linear relationship with VOC. Unfortunately, the momentary disconnection of the PV panel implies a power loss that must be minimized to achieve maximum power efficiency. The required sampling time of VOC inversely depends on the irradiance over the PV panel and so, it is not optimized by commercial FOCV controllers in which a fixed sampling time and period are used.

The Technology

The novel controller solution determines the sampling time and period by using a digital counter, an Op-amp integrator circuit and a comparator. A commercial Pulse Frequency Modulation (PFM) switching regulator IC is used as power conditioner to bias the PV panel. The counter counts the PFM cycles and initiates a sampling state when a limit number is reached. A proportional sampling time is achieved using the integrator and the comparator. As the time length of the PFM cycles are inversely proportional to the PV current (and thus to the irradiance), the resulting sampling time and period are properly adjusted according to the irradiance conditions.

Innovative advantages

- Minimum time disconnection of the PV panel.
- Variable tracking speed of the MPPT. The sampling frequency is decreased in low irradiance conditions to reduce the power consumption.
- Low-cost control circuit.
- Low-power consumption.

Current stage of development

The controller was successfully tested in a laboratory prototype with 20 mW PV panels.

Applications and Target Market

The technology was developed for low-power PV systems in which FOCV is the best choice to implement an MPPT controller. This technology could be of interest for companies that develop low-power energy PV devices.

Reference number

MKT2012/0138_I

New solution to achieve maximum power efficiency from PV panels



Power consumption reduction with low-cost control circuit

Useful for low power PV applications such as traffic lights and signals

Business Opportunity

Technology available for licensing with technical cooperation

Patent Status

Priority application

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