

240 W photovoltaic battery charger based on the SPV1020

Data brief

Features

- PWM mode DC-DC boost converter
- Duty cycle controlled by MPPT algorithm with 0.2% accuracy
- Operating voltage range 0-40 V
- Overvoltage, overcurrent, overtemperature protections
- Built in soft-start
- Up to 98% efficiency
- Automatic transition to burst mode for improved efficiency at low solar radiation
- SPI interface
- Output current limitation
- RoHS compliant

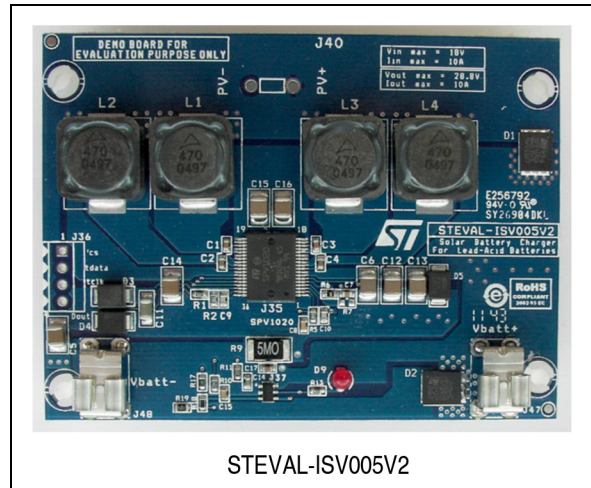
Description

The STEVAL-ISV005V2 demonstration board is mainly based on the SPV1020 device, a monolithic DC-DC boost converter designed to maximize the power generated by photovoltaic panels independently of temperature and amount of solar radiation.

The optimization of the power conversion is obtained with an embedded logic which performs the MPPT (max power point tracking) algorithm on the PV cells connected to the converter.

One or more converters can be housed in the connection box of the PV panels, replacing the bypass diodes. Since the maximum power point is locally computed, the efficiency at system level will be higher than that of conventional topologies, where the MPP is computed in the main centralized inverter.

For a cost-effective application solution and miniaturization requirements, the SPV1020 embeds the power MOSFETs for active switches and synchronous rectification, minimizing the number of external devices. Furthermore, the



4-phase interleaved topology of the DC-DC converter renders unnecessary the use of electrolytic capacitors, which would severely limit the lifetime.

The SPV1020 works at fixed frequency in PWM mode, where the duty cycle is controlled by the embedded logic running a “Perturb & Observe” MPPT algorithm. The switching frequency, internally generated and set by default at 100 kHz, can be tuned externally, while the duty cycle ranges from 5% to 90% with a step of 0.2%.

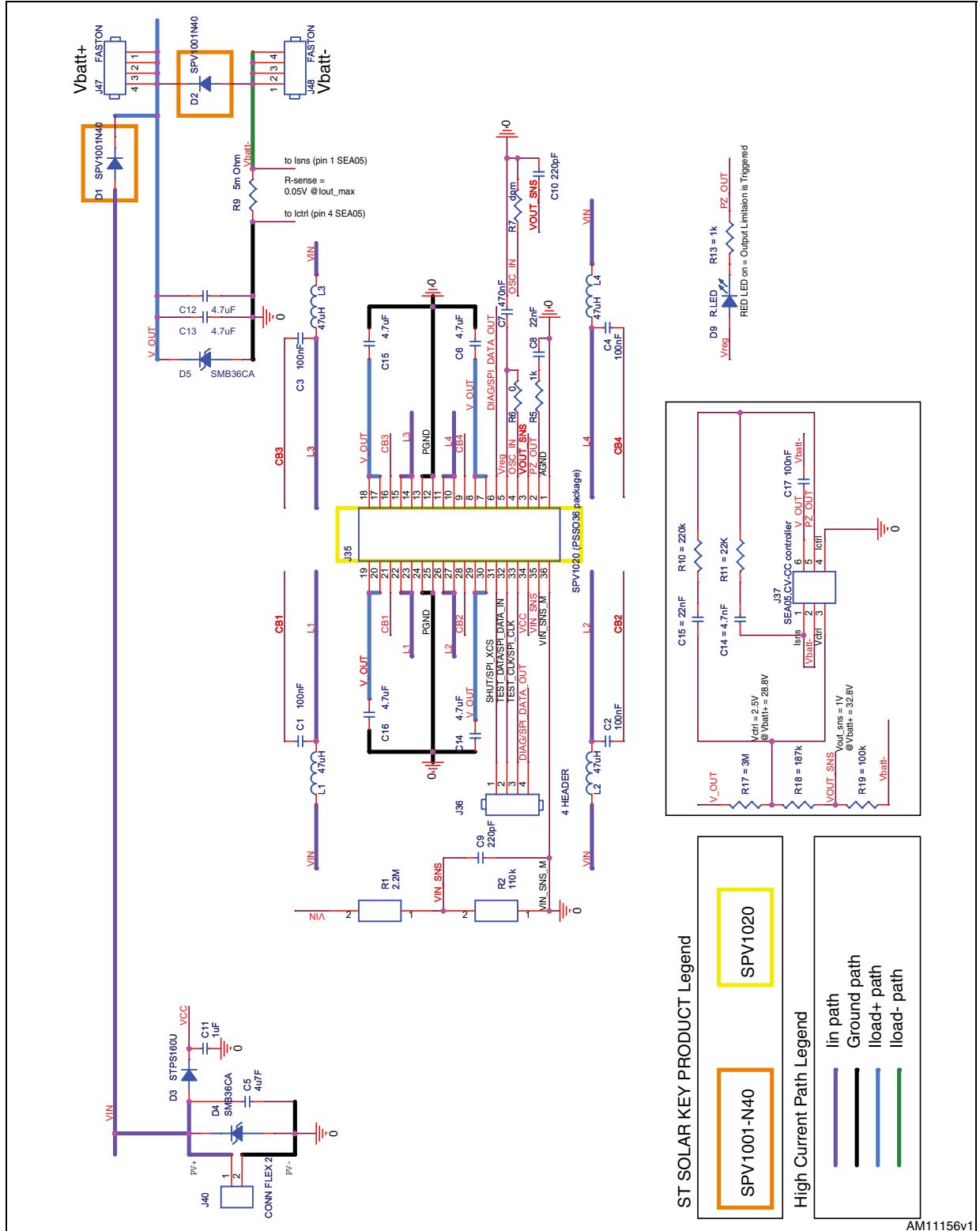
Safety of the application is guaranteed by stopping the drivers in case of output overvoltage or overtemperature.

The bypass diodes SPV1001N40 guarantee very high application efficiency even when the PV panel voltage is lower than the UVLO threshold of the SPV1020 (6.5 V) and the connection is in series consisting of two or more PV panels.

The SEA05 is connected to the output stage of the application and is used to implement the output current limitation (not available with the SPV1020 alone) through the current sensing resistors R9 and R10.

1 Circuit schematic

Figure 1. STEVAL-ISV005V2 circuit schematic



AM11156v1



2 Revision history

Table 1. Document revision history

Date	Revision	Changes
03-Feb-2012	1	Initial release.

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