

Up to 3 W solar and USB battery charger for single-cell Li-Ion and Li-Po batteries based on the SPV1040, STBC21 and STC3100

Data brief

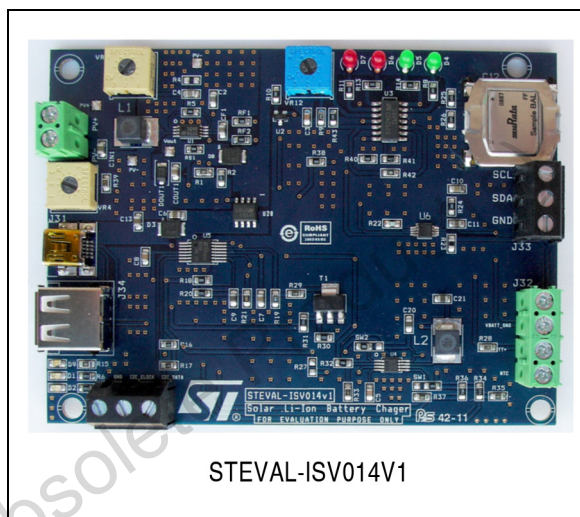
Features

- Solar section
 - Solar energy harvester with proprietary “Perturb and Observe” embedded MPPT algorithm
 - Reverse polarity protection for solar panel connection
- Battery charging section
 - Both linear and quasi-pulse operation, with programmable charge current (up to 1 A) in both fast charge and pre-charge mode
 - Selectable 4.1 V and 4.2 V output voltage ($\pm 1\%$ accuracy)
 - Programmable termination current, pre-charge mode voltage threshold and charge time setting by I²C
 - Coulomb counter available via I²C
 - Status outputs to drive LEDs or host processor interface
 - Charge status LED indicator
- Battery protection section
 - Battery absence detection
 - Battery thermal control (monitoring and protection) by NTC or PTC thermistor interface
- 5 V USB supply output from external battery
- RoHS compliant

Description

The STEVAL-ISV014V1 demonstration board provides a very high level of integration being based on the ST devices SPV1040 (solar energy harvester and power optimizer), STBC21 (single cell Li-Ion battery charger) and STC3100 (gas gauge).

The STEVAL-ISV014V1 controls the single-cell Li-Ion battery charging thanks to the STBC21, which can be supplied by a solar panel or by an



USB (type-A connector) compatible supply. The battery charging status set by STBC21 can be controlled via I²C. Safety during the battery charge process is guaranteed by the gas-gauge controller device STC3100.

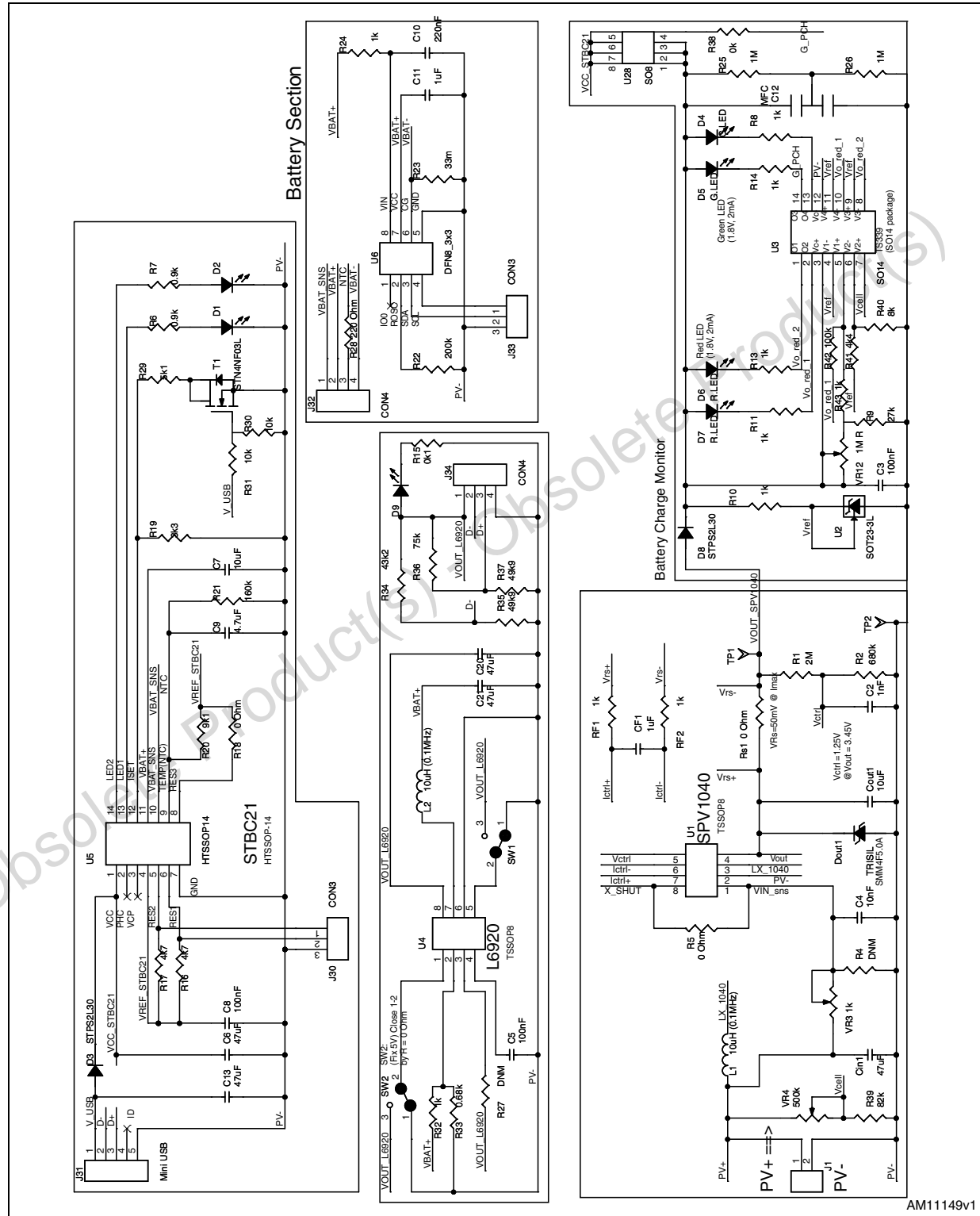
When the energy is provided by the solar panel, the SPV1040 optimizes the power extracted from the source and boosts the voltage, charging a 440mF super-capacitor, which is connected to the input stage of the STBC21 by a STS5PF30L P-channel power MOSFET.

Furthermore, the STEVAL-ISV014V1 can be used to supply a type-B USB compatible load by an external Li-Ion battery. In this case, the L6920 voltage boost controller will regulate the battery voltage up to the 5 V required by the USB standard.

Finally, the STEVAL-ISV014V1 has a dedicated charging monitor circuitry implemented by 4 LEDs and by the TS339 quad comparator.

1 Circuit schematic

Figure 1. Circuit schematic



AM11149v1

2 Revision history

Table 1. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 19-Jul-2012 | 1 | Initial release. |
| 28-Aug-2012 | 2 | Updated part number on the cover page from STPS5PF30L to STS5PF30L |

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