

SPPL12420EVK Evaluation Kit

2 A, 24 V Synchronous Rectified Step-Down Converter

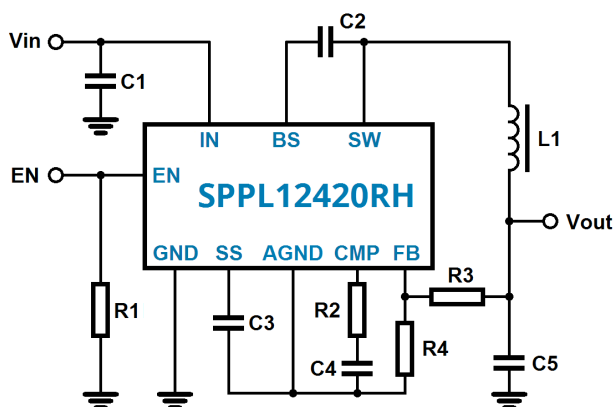
ADD-ON TO EVK MANUAL: BUCK-BOOST OPERATION

The SPPL12420EVK is an evaluation board designed to demonstrate all of the features and performance of the SPPL12420RH. The SPPL12420RH is a radiation hardened monolithic synchronous buck regulator featuring integrated 130 mΩ MOSFETs that provide continuous 2 A output load current.

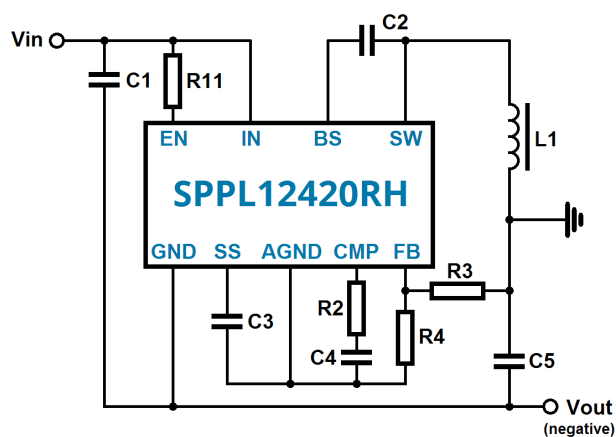
In the factory-set state the board operates in buck mode. Over a wide 4.5 V to 24 V input voltage range it provides 3.3 V fixed output voltage with very low output ripple. It features an optional EMC input filter (C10, L2) which can be bypassed. For details refer to the SPPL12420EVK Evaluation Kit User Manual.

By changing the external circuitry the SPPL12420RH can be configured for buck-boost operation. In buck-boost mode the SPPL12420RH can generate a negative output voltage from a positive input voltage. This document details how to modify the SPPL12420EVK Evaluation Kit for buck-boost operation.

BUCK CONFIGURATION



BUCK-BOOST CONFIGURATION



INSTRUCTIONS

In the buck-boost application the output terminals are interchanged and thus the output voltage is negative. To prepare the SPPL12420EVK evaluation board for the buck-boost application:

1. Declare the terminal "Gnd" as the new "Vout" terminal.
2. Declare the old terminal "Vout" as the new "Gnd" terminal.
3. Connect the negative pole of the input voltage source to the new "Gnd" terminal.

INSTRUCTIONS (CONTINUED)

4. Activate EN by removing R1 and assemble R11 (100 kOhm), which is a pull-up for permanently active circuit. Alternatively the terminal EN can be controlled by a voltage source with serial resistor (100 kOhm or higher) or a voltage divider. To disable the circuit a voltage of ≤ 2 V is needed between the SPPL12420RH component terminals EN and GND.
(If the circuit is configured for an output voltage between 0 V and -2 V, then a 3.3 V TTL signal can be used to control the terminal EN without any changes on the circuit.)

Please note for this application:

The SPPL12420RH maximum recommended input voltage V_{IN} of 24 V is related to the sum of the input and output voltage absolute values: $|V(Vin)| + |V(Vout)| \leq 24$ V. E.g. if $V(Vout) = -5$ V, then $V(Vin) \leq 19$ V.

The output voltage value is only limited by the 24 V maximum recommended input voltage V_{IN} of the SPPL12420RH – not by the input voltage $V(Vin)$. E.g. if $V(Vin) \leq 6$ V, then $V(Vout)$ can be set to any value between -0.923 V and -18 V.

NOTE Please consider also the maximum recommended input voltage V_{IN} with respect to Single-Event Effects.

For meaningful voltage measurements at the PCB test points EN, BS, SW, SS, CMP and FB connect the voltmeter common terminal to Vout (component GND terminal). Also for applying voltages use an isolated voltage source and connect its negative pole to Vout.

If the EN pull-up resistor is connected to Vin, then the measured input current values always include the additional current through the pull-up resistor.

For test purposes only, the easiest way to enable and disable the circuit is to control EN by an isolated voltage source with its negative pole connected to Vout.

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