Linear Products

DC-to-DC Converter Derives 1.2 V From 12 V

The TPS5210 can generate a regulated 1.2-V output from a 12-V input. The application circuit is identical to the Application shown in the TPS5210 data sheet (SLVS171, Figure 18), except for the modified droop circuit shown in Figure 1. To operate the circuit, voltage reference (V_{REF}) should be set to 2.2 V using the voltage identification code (VID). Since the droop voltage at pin 2 causes the output voltage to be adjusted, the droop compensation circuit is modified so that the TPS5210 produces a regulated 1.2-V output.

The output is programmed to a voltage greater than V_{REF} by an external resistor divider from V_{out} to V_{sense}. The level that the output voltage is increased from V_{REF} is given by,

$$V_{OUT(NoLoad)} = V_{REF}\left(\frac{R_{12} + R_9}{R_{12}}\right) = 2.2\left(\frac{10\ k\Omega + 150\ \Omega}{10\ k\Omega}\right) = 2.233\ V$$

The actual output voltage is calculated and the droop voltage to generate 1.2-V output is derived with the following equation.

$$V_{OUT(NoLoad)} - V_{Droop} = 2.233 - V_{Droop} = 1.2\ V,\ \text{therefore,}\ V_{Droop} = 1.033\ V$$

A 1.2-V output is generated using a simple voltage-divider that is added to the DROOP pin, as shown in Figure 1. Precise resistors are recommended for this application.

Select a suitable value for R2 (in this case 2.5 kΩ) and calculate R1 using:

$$R1 = \frac{R2 \times 5V}{V_{Droop}} - R2 = \frac{2500 \times 5}{1.033} - 2500 = 9.6\ k\Omega$$

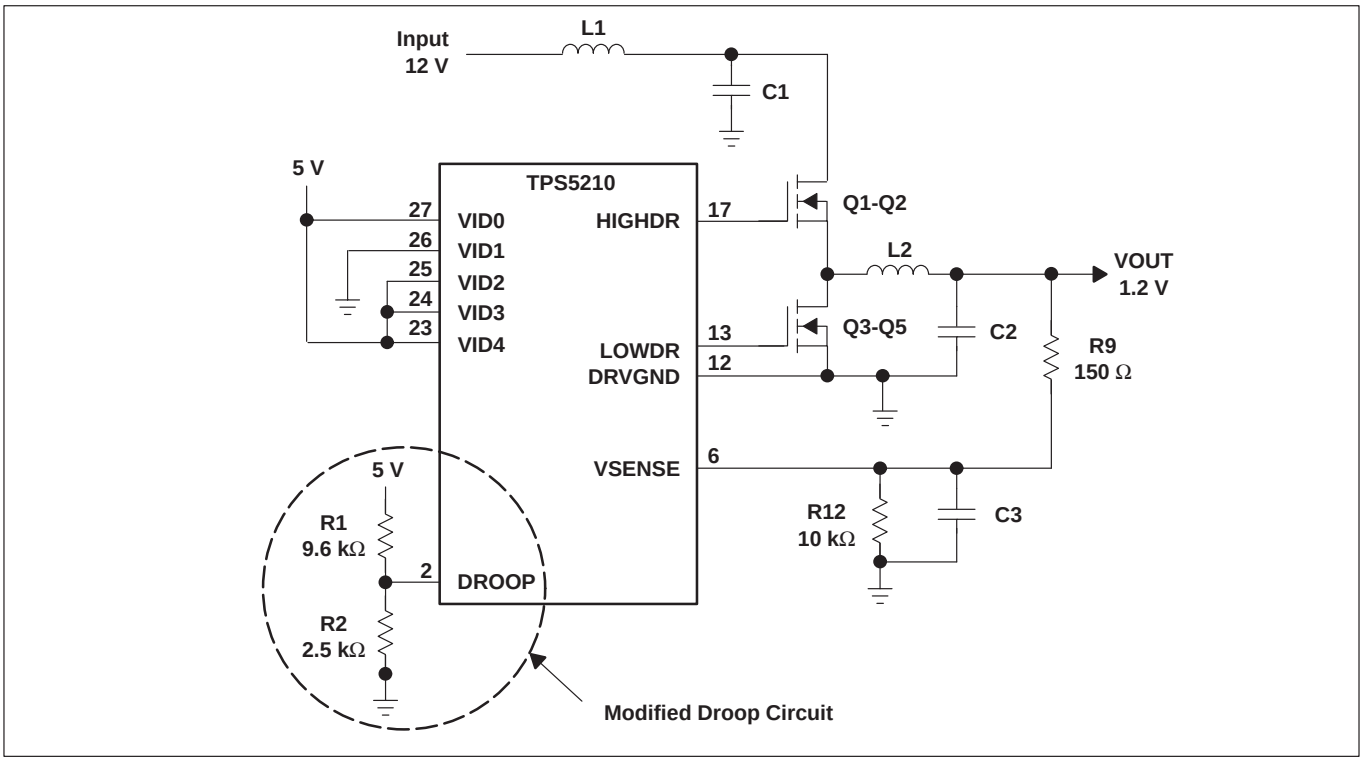

Figure 1. TPS5210 Application Circuit for 1.2-V Output