

Linear Products

Extended Output Voltage Adjustment (0 V to 3.5 V) Using the TPS5210

The TPS5210 can generate a regulated 1-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 auxiliary circuit shown in Figure 1. To operate the circuit, the voltage reference (V_{ref}) should be set to 1.3 V using the Voltage Identification Code (VID).

By means of a resistor voltage divider (R_1 – R_4), the V_{sense} can be adjusted to produce a demand output voltage. The internal hysteresis comparator in the TPS5210 regulates the output voltage to 1.3 V, comparing V_{ref} (1.3V) with the output feed back voltage, V_{sense} . However, since the output voltage feedback signal, V_{sense} , is scaled to 1.3 V/1 V (V_{sense}/V_{output}), the output voltage is now regulated at 1 V. This scheme can also be applied to any output voltage ranging between 0 to 3.5 V. The application has the following specifications.

- $\pm 1\%$ Reference Over Full Operating Temperature Range
- Programmable Output Voltage Range of 0 to 3.5 V
- Fixed Frequency (100 kHz to 150 kHz)
- Remote Shutdown
- Droop Compensation for Improved Load Transient Regulation
- User Selectable Hysteretic Type Control
- Adjustable Overcurrent Protection
- Programmable Softstart
- Overvoltage Protection
- Active Deadtime Control
- Power Good Output
- Internal Bootstrap Schottky Diode
- Low Supply Current (3 mA)

The demand resistor value of R3 is calculated with the following equation.

$$R3 = \frac{V_{DZ} - V_{SENSE}}{\frac{V_{SENSE} - V_{OUT}}{R1} + \frac{V_{SENSE}}{R2}} = \frac{6.2 - 1.3}{\frac{1.3 - 1.0}{150} + \frac{1.3}{10k}} = 2.3k$$

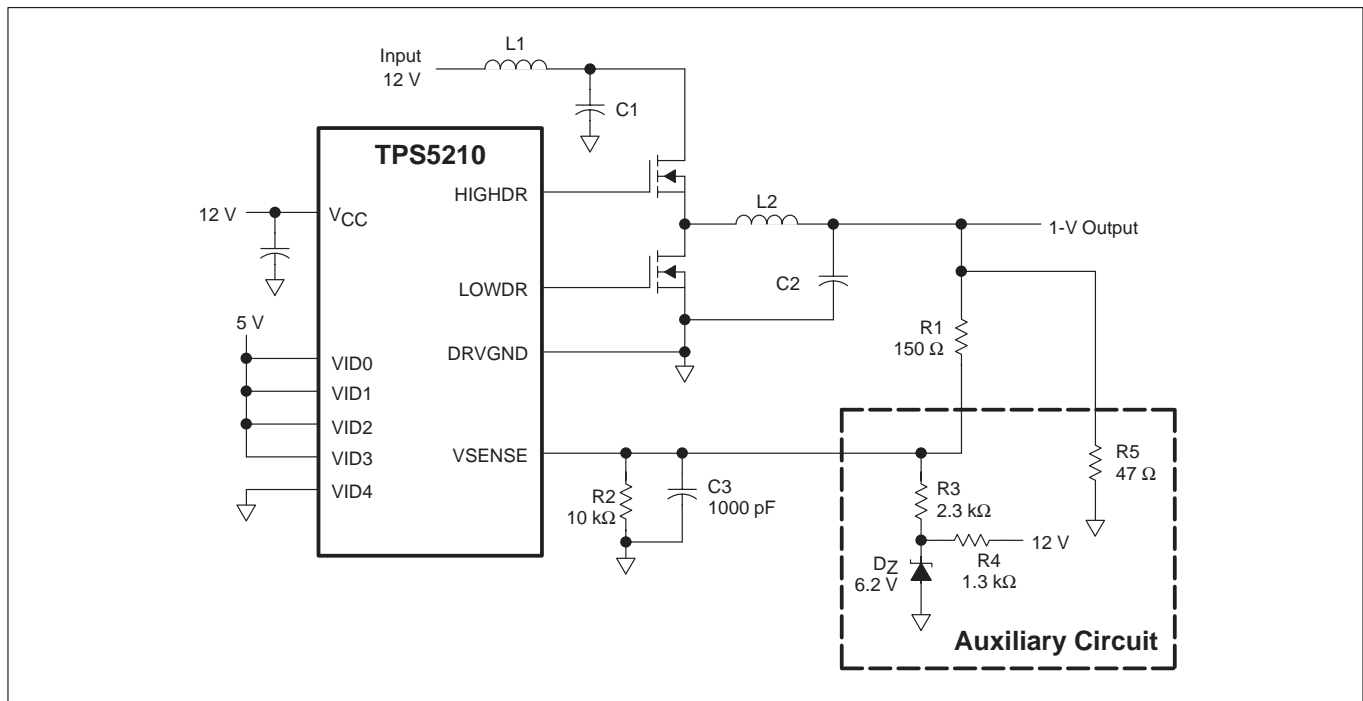


Figure 1. TPS5210 Application Circuit