

Linear Products

DC-to-DC Converter Parallel Operation Using Droop Compensation of TPS5210

When a power supply is designed to produce a high output current, a distributed structure of power supplies is sometimes preferred over a single bulky power converter. Figure 1 shows the application circuit of the TPS5210 in parallel operation. To operate the paralleled-circuitry, the voltage reference (V_{ref}) of each module should be set to the same value with the voltage identification code (VID).

The TPS5210 has a droop-compensation feature, which can be easily implemented for parallel operation of dc-to-dc converters without any additional circuitry. The TPS5210 senses the load current using the internal on-resistance between the drain and source of the MOSFET such that the output voltage falls slightly as the load current increases (droop compensation). When one of the modules drives a higher output current (see Figure 1), the TPS5210 of that module produces a proportionally decreased output voltage, and the output voltages of the other modules increase. This results in balanced load sharing.

On-resistance current sensing will work when precision load sharing is not required. In order to obtain higher-accuracy load sharing, a precision resistor is inserted in series with the upper-side MOSFET as shown in Figure 2. The application circuit of each module is identical to Figure 18 in the TPS5210 data sheet (SLVS171), except for the extra resistor that is used for current sensing. A resistance value of 0.01Ω with tight tolerance is recommended for this application.

Usually $n+1$ modules are recommended for parallel operation of dc-to-dc converters, where n is the minimum number of modules required to deliver the load power. This redundancy is desirable for high-reliability applications.

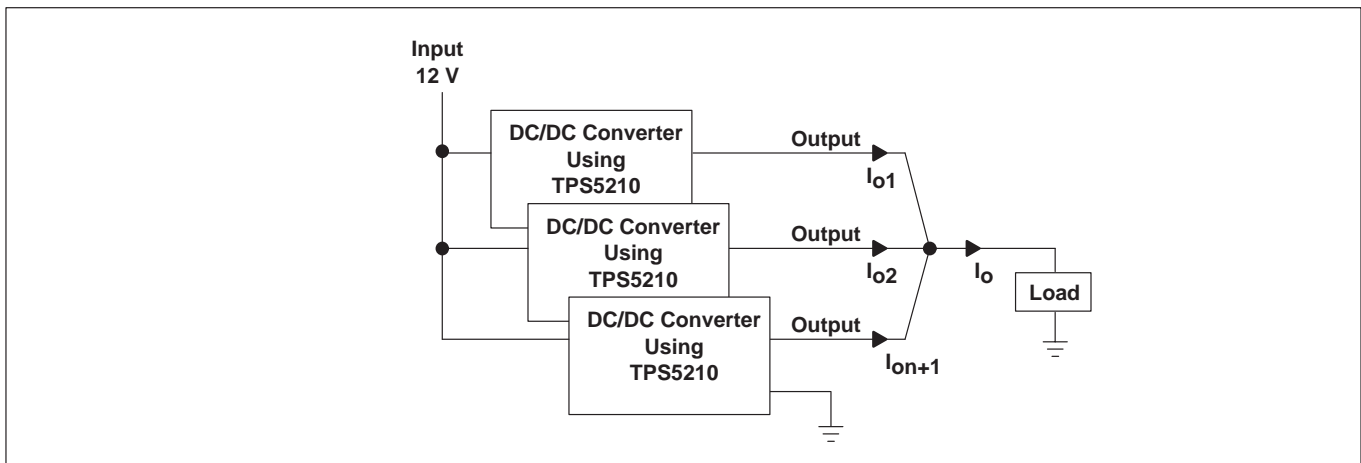


Figure 1. Application Circuit of TPS5210 in Parallel Operation

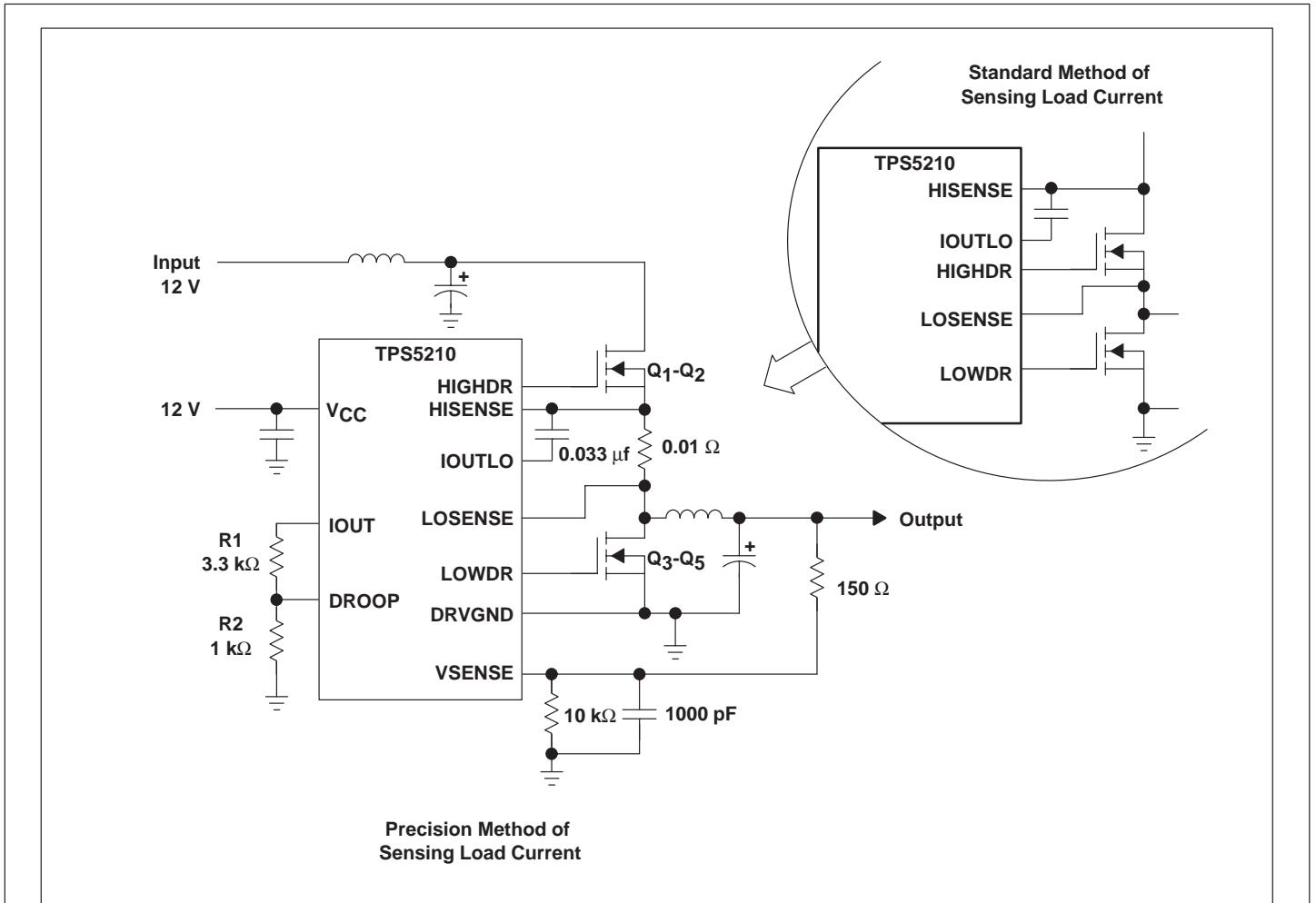


Figure 2. DC-to-DC Converter Using the TPS5210