DC205 Quick Start Guide

Description

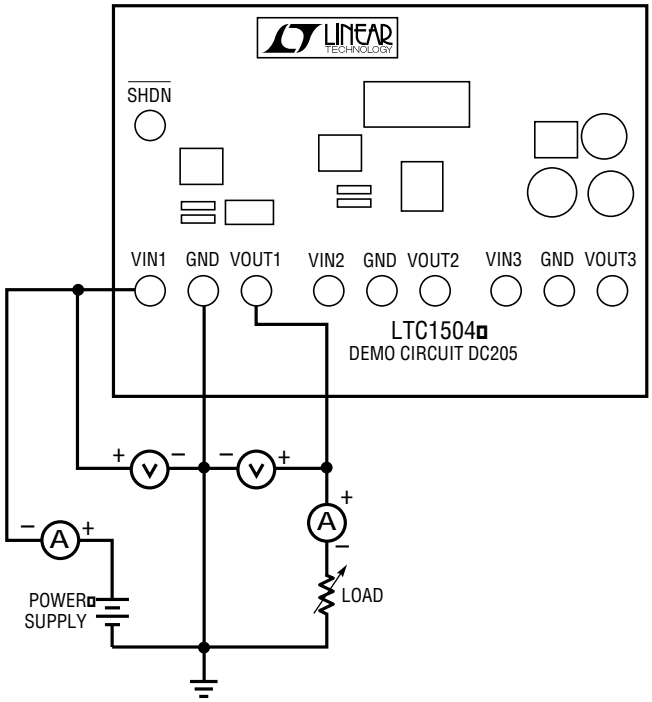
Demonstration board DC205 is a multipurpose 500mA synchronous DC/DC step-down switching regulator. The demo board uses the LTC1504 self-contained, high efficiency synchronous buck switching converter in the 8-pin plastic SO package. The board offers three separate DC/DC converters for different application needs. The "high performance" version is designed to demonstrate fast load-transient response, high efficiency, adjustable current limit, shutdown, external clock synchronization and soft start. The output voltage is set to 2.85V, typically used for SCSI-II active termination. The "low profile" version offers high performance step-down conversion at under 2mm height (on the top side of the PC board only, add 2mm on bottom side of the PC board for total inductor height) using a planar inductor and low profile tantalum capacitors. This circuit was designed to satisfy applications requiring low profile and high performance. The "low cost" version demonstrates minimum external part count and lowest cost. This circuit uses a fixed output voltage part having an internal resistor divider preset to a 3.3V output and a high ESR output capacitor to minimize the compensation network requirements (see LTC1504 data sheet for more information). The result is a circuit having only four external components, capable of producing 3.3V at 500mA.

Quick Start

Refer to Figure 1 for proper measurement equipment setup and follow the procedure outlined below:

The equipment setup for the three circuits is very similar. They all have three pins marked "VIN," "GND," and "VOUT" and only the "high performance" circuit has an extra pin for testing shutdown and external clock synchronization. For the most part, the test procedures are the same for all three circuits. Only the "high performance" circuit will have additional tests for the current limit, shutdown and external clock synchronization. The following is the test procedure for the "high performance" circuit. Both the "low profile" and "low cost" circuits should be tested with the same method except for the steps 3 , 4, and 5, which are omitted.

1. Before turning on the power, connect a 5V, 1A bench supply to the +VIN and GND terminals and connect the output voltage loads (up to 500mA), oscilloscope and meters to the VOUT and GND terminals, as shown in Figure 1. For the best accuracy, it is important to connect true RMS reading voltmeters directly to the PCB terminals where the input and output voltage are connected. True RMS reading ammeters should be used for current measurements.



2. Turn on the input power supply and observe the output. The DC205 “high performance” circuit is programmed to generate 2.85V from a 5V input (for the “low profile” and “low cost” circuits, the output is set to 3.3V). The circuit will deliver up to 500mA at 2.85V (500mA at 3.3V for the “low profile” and “low cost” circuits).

3. The current limit is tested by increasing the load past 530mA. The current limit is programmed to take effect when the output current becomes higher than 530mA. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by reducing the load current.

4. The shutdown function (turning off the output) is tested by shorting the $\overline{\text{SHDN}}$ pin to ground. Opening the $\overline{\text{SHDN}}$ pin connection will return the circuit to normal operation.

5. The external clock synchronization is tested by applying a clock signal directly to the SHDN pin. This forces the LTC1504 internal oscillator to lock its frequency to the external clock as long as the external clock runs faster than the internal oscillator frequency, nominally 200kHz. 500kHz is the maximum recommended synchronization frequency.

6. When measuring efficiency, be careful to arrange the circuit as shown in Figure 1. In particular, the input and output voltages should be measured at the pins of the DC205,

not at the input power source or the load. This eliminates the voltage drop across the ammeters from the efficiency calculation.