DESCRIPTION

Demonstration circuit 397 is a multipurpose DC/DC switching regulator using the LT1930A and LT1931A, the industry's fastest and highest power voltage regulator in a SOT-23 package. The demo board offers three separate DC/DC converters for different applications needs. The *boost circuit* is designed to convert a 5V input to 12V output at 250mA maximum load. The *SEPIC circuit* generates a constant 12V/250mA (max load) output with a 10V~16V variable input. The *inverter circuit* is designed for applications requiring negative 12V/250mA (max load) from a positive 12V input. All three circuits are designed to demonstrate fast switching frequency (2.2Mhz), an internal 36V/1A switch, wide input range, and small circuit size. These circuits are designed for space-conscious low profile applications such as cellular phones, palm top computers, digital cameras, and LCD displays. The 2.2MHz switching frequency, 1A integrated switch, small circuit size, and low component count makes the LT1930A and LT1931A also suitable for PC cards, miniature disk drives, xDSL power supplies, flash memory products, and local 5V or 12V supplies.

Design files for this circuit board are available. Call the LTC factory.

QUICK START PROCEDURE

Demonstration circuit 397 is easy to set up to evaluate the performance of the LT1930A and LT1931A. Refer to Figure 1, Figure 2 and Figure 3 for proper measurement equipment setup and follow the procedures below:

NOTE: When measuring the output ripple, see Figure 4 for proper scope probe technique.

The equipment setup for the three circuits is very similar. They all have three pins marked "Vin," "Gnd", "Vout" and a jumper marked "on" and "off" for demonstrating the shutdown function.

BOOST CIRCUIT (LEFT SIDE OF BOARD)

1. Before turning on the power, connect a 5V, 1A bench supply to the Vin and Gnd terminals and connect the output loads (up to 250mA).

   When an electronic load is used, connect the load AFTER turning on the input supply and the output voltage has stabilized.

   Connect the 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 DC397 boost circuit is programmed to generate 12V from a 5V input. The circuit will deliver up to 250mA at 12V.

3. With the 250mA load at the output observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 2.2MHz. See Figure 4 for proper measurement technique.

4. The current limit is tested by increasing the load past 300mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

5. The SHUTDOWN function is tested by placing the jumper in the off position. This will short the shutdown pin to ground and turn off the internal switch of the LT1930A. Placing the jumper in the on position will return the circuit to normal operation.

SEPIC CIRCUIT (MIDDLE OF BOARD)

1. Before turning on the power, connect a 16V, 1A bench supply to the Vin and Gnd terminals and connect the output load (up to 250mA).

When an electronic load is used, connect the load AFTER turning on the input supply and the output voltage has stabilized.

Connect the oscilloscope and meters to the Vout and Gnd terminals, as shown in Figure 2. 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 DC397 SEPIC Circuit is programmed to generate 12V from a 10V~16V input. Vary the input voltage to test the line regulation. The circuit is design to deliver up to 250mA at the 12V output.

3. With the 250mA load at the output, observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 2.2Mhz. See Figure 4 for proper measurement technique.

4. The current limit is tested by increasing the load past 300mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

5. The SHUTDOWN function is tested by placing the jumper in the off position. This will short the shutdown pin to ground and turn off the internal switch of the LT1930A. Placing the jumper in the on position will return the circuit to normal operation.

INVERTER CIRCUIT (RIGHT SIDE OF BOARD)

1. Before turning on the power, connect a 12V, 1A bench supply to the Vin and Gnd terminals and connect the output load (up to 250mA).

   When an electronic load is used, connect the load AFTER turning on the input supply and the output voltage has stabilized.

   Connect the oscilloscope and meters to the Vout and Gnd terminals, as shown in Figure 3. 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 DC397 inverter circuit is programmed to generate –12V from a +12V input. The circuit will deliver up to 250mA at –12V.

3. With the 250mA load at the output, observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 1.2MHz. See Figure 4 for proper measurement technique.

4. The current limit is tested by increasing the load past 300mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

5. The SHUTDOWN function is tested by placing the jumper in the off position. This will short the shutdown pin to ground and turn off the internal switch of the LT1931A. Placing the jumper in the on position will return the circuit to normal operation.

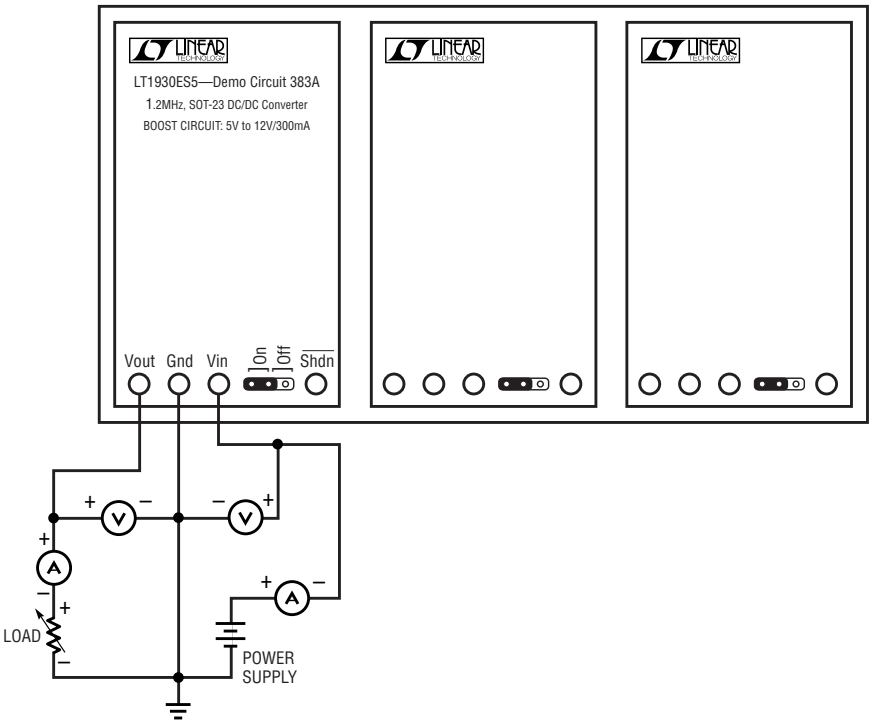

Figure 1. Proper Measurement Equipment Setup for Boost Circuit

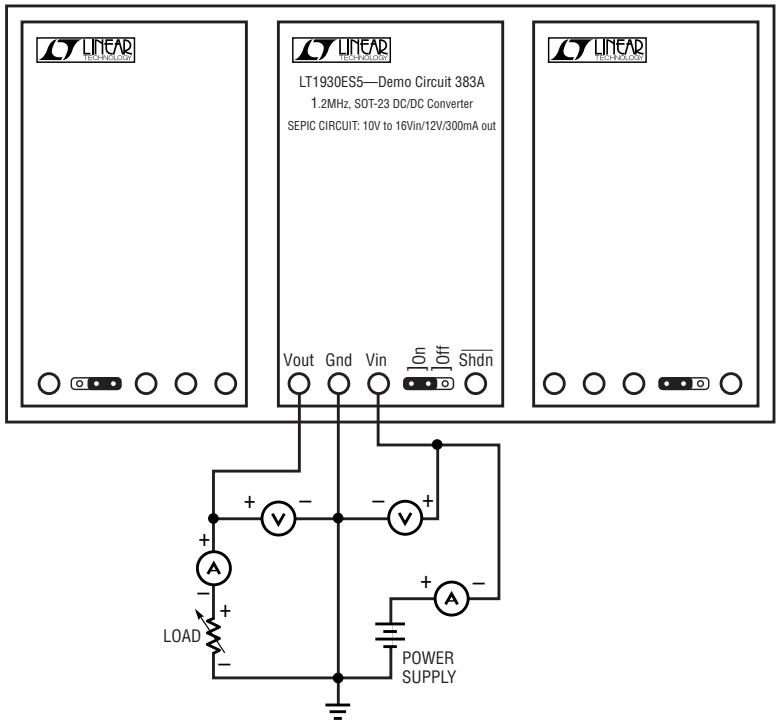

Figure 2. Proper Measurement Equipment Setup for SEPIC Circuit

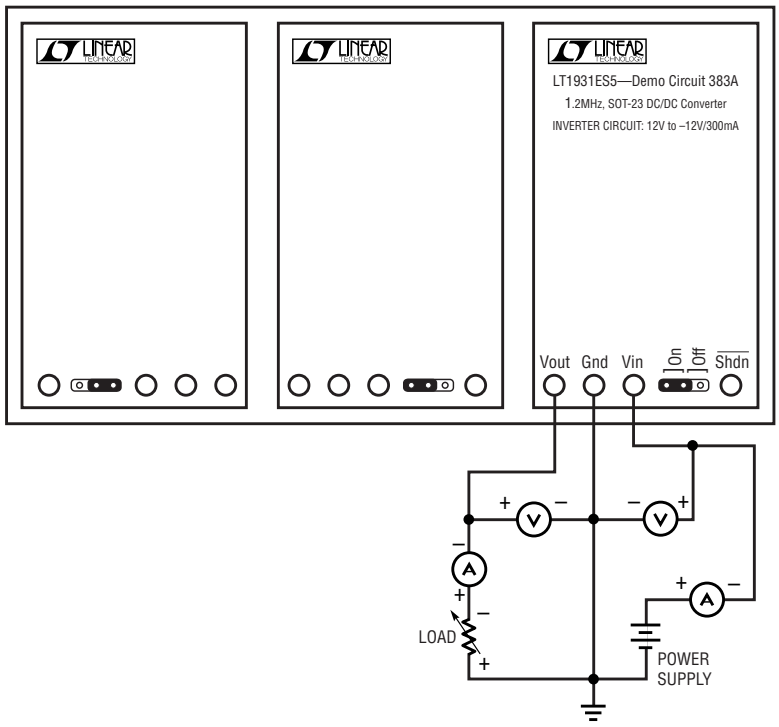

Figure 3. Proper Measurement Equipment Setup for Inverter Circuit

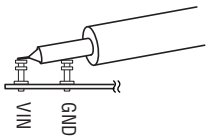

Figure 4. Scope Probe Placement for Measuring Output Ripple