

Capacitor Charger Controller with Regulation

DESCRIPTION

Demonstration circuit 1322 is a high current capacitive charging circuit featuring the LT3751EUFD. It is a DC/DC flyback converter used to charge large capacitors to high voltages. The circuit implemented on the board is a simple example of how to charge a 400 μ F capacitor to 300V in approximately one second at 8Vin and 400ms at 40Vin. An output capacitor discharge circuit is included on the board for the convenience of the user. This discharge circuit can be disabled by the user or permanently enabled at the expense of a minor degradation in the charging profile.


The LT3751 is a current-mode flyback controller optimized for charging large value capacitors to a predetermined target voltage. This target voltage is set by the turns ratio of the flyback transformer and just three resistors in a simple, low voltage network, so there is no need to connect components to the high voltage output.

The charging current is set by an external sense resistor and is monitored on a cycle-by-cycle basis.

The LT3751 datasheet gives a complete description of the parts, operation and application information. The datasheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 1322.

WARNING! LETHAL VOLTAGES ARE PRESENT ON THE DC1322 CIRCUIT BOARD. DO NOT OPERATE THE ASSEMBLY UNLESS YOU ARE TRAINED TO HANDLE HIGH VOLTAGE CIRCUITS.

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

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PERFORMANCE SUMMARY

Specifications are at TA = 25°C

PARAMETER	CONDITION	VALUE
Input Voltage Range	Vout = 0 to 320V	8-40VDC
Output Target Voltage	Vin = 8 to 40VDC	300 \pm 5%VDC

QUICK START PROCEDURE

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Demonstration circuit 1322 is easy to set up to evaluate the performance of the LT3751. For proper equipment setup, follow the procedure below, referring to figure 1:

1. With the power source turned off, connect the input power supply to the board through the VIN (E1) and GND (E2) terminals.
2. Connect the load to the VOUT (E3) and GND (E4) terminals.
3. Set the CHARGE jumper at JP1 to the STOP position.
4. Position the OUTPUT BLEEDER jumper at JP2 to the NORMAL OPERATION position for initial testing. The user can also leave the jumper set to DISCHARGE, but there will be a minor degradation to the operation of the charge time.
5. Set the VCC jumper at JP3 to the INT position.
6. Turn on the input power source to at least 8V, but below 40V.
7. Change the CHARGE jumper at JP2 to the GO position. If a signal source is used, apply an active transition.
8. The output should start charging towards 300V.

OPERATION

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Demonstration circuit 1322, featuring the LT3751, is a DC/DC Flyback converter used to charge large valued

capacitors to a predetermined voltage. The charging current is set by the current sense resistor R16. For a complete description of the operation of the LT3751 integrated circuit, please refer to the data sheet.

The DC1322 demo board is equipped with two physical interfaces to control the charge cycle. One is a simple solder terminal at location E6. The other is 2mm header at location JP1. For the convenience of the user, a high impedance 100K pull up resistor is connected between the CHARGE pin and the VIN power input. A jumper has been installed between CHARGE and GND. The data sheet defines a signal profile that must be used to properly activate the CHARGE input, so it is recommended that the user employ a suitable signal source to control the charge cycle.

The DONE bit is pulled up to VIN through a high impedance 100K resistor. This may not be compatible with all electrical systems.

DC1322 is equipped with a safety circuit that drains the output capacitor of charge when the controller is not deliver energy to the load. When JP2 is set to NORMAL OPERATION, this safety circuit is disabled and the output capacitor will bleed down from its own leakage current. If JP2 is set to DISCHARGE, the output capacitor will be discharge through the combined parallel resistance of R13, R14 and R15.

Due to the high charging currents made possible by the LT3751, it is possible to simply engage the safety circuit all the time by leaving JP2 in the DISCHARGE position. This will result in only a minor degradation in the charging profile.

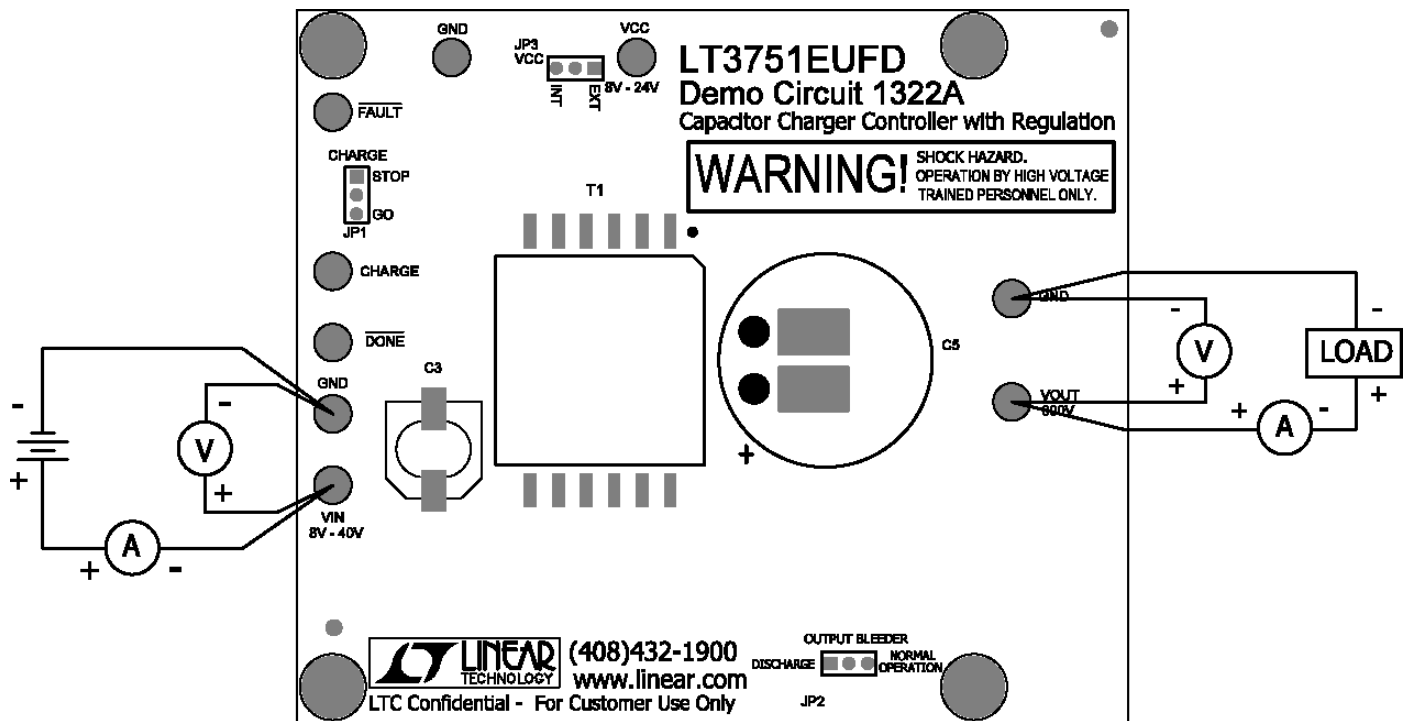


Figure 1. Proper Measurement Equipment Setup

