LT8300
100V_{IN} Micropower Isolated Flyback Converter with 150V/260mA Switch

DESCRIPTION

Demonstration circuit 1825A is an isolated flyback converter featuring the LT®8300. This demo circuit outputs 5.0V, and maintains tight regulation with a load current from ~1mA to 250mA and over an input from 22V to 75V, with a nominal 48V. The output current capability increases with the input voltage.

The DC1825A needs a very small minimum load (~1mA) to regulate the output voltage, thanks to the accurate current limit capability and ultra low switching frequency of the LT8300 at very light load. The standby input current of the demo circuit is less than 400µA (typical) because of the low quiescent current design of the IC and very small minimum load requirement.

The Performance Summary table summarizes the performance of the demo board at room temperature. The demo circuit can be easily modified for different applications with some pre-designed transformers.

The LT8300 is a simple-to-use high voltage monolithic isolated flyback converter. No third winding or opto-isolator is required for regulation. The part sets the isolated output voltage with a single external resistor and integrates compensation and soft start circuitry inside. Boundary mode operation provides a small magnetic solution with improved load regulation. Low ripple Burst Mode® operation maintains high efficiency at light loads while minimizing the output voltage ripple. A 260mA, 150V DMOS power switch is integrated along with all high voltage circuitry and control logic into a 5-lead ThinSOT™ package.

The LT8300 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for DC1825A.

Design files for this circuit board are available at http://www.linear.com/demo

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		22	48	75	V
V_{IN} Quiescent Current	I_{OUT} = 0mA, V_{IN} = 75V		400		µA
Output Voltage	V_{IN} = 22V – 75V I_{OUT} = 1mA – 250mA	4.75	5	5.25	V
Maximum Output Current	V_{IN} = 22V	250			mA
Output Voltage Ripple (Peak to Peak)	V_{IN} = 22V – 75V, I_{OUT} = 250mA		50		mV
Typical Switching Frequency	V_{IN} = 48V, I_{OUT} = 250mA		330		kHz
Minimum Switching Frequency	I_{OUT} = 0mA		8		kHz
Efficiency	V_{IN} = 48V, I_{OUT} = 250mA		80		%

QUICK START PROCEDURE

The DC1825A is easy to set up to evaluate the performance of the LT8300. Refer to Figure 1 for proper equipment setup and follow the procedure below.

1. With power off, connect the input power supply to the board through VIN (E1) and GND (E3) terminals. Connect the load to the terminals VOUT+ (E4) and VOUT– (E2) on the board.
2. Turn on the power at the input. Increase VIN slowly to 22V.

   NOTE: Make sure that the input voltage is always within spec. To operate the board with higher input/output voltage, input capacitor, output capacitor and output diode with higher voltage ratings are needed.

   NOTE: To run overload tests on the demo board with V_{IN} higher than 40V, a RC snubber (200Ω, 150pF) or Schottky plus Zener clamp circuit is recommended to make sure the voltage spike at the switching node is always less than 150V.
3. Check for the proper output voltages. The output should be regulated at 5.0V (±5%).

   NOTE: The LT8300 requires very small minimum load to maintain good output voltage regulation. A Zener diode is placed on the output to clamp the voltage to ~5.0V. This Zener is optional, and can be replaced with a 5.1k resistor.
4. Once the proper output voltage is established, adjust the input voltage and load current within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

   NOTE: When measuring the input or output voltage ripples, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the VIN (E1) and GND (E3), or VOUT+ (E4) and VOUT– (E2) terminals. See Figure 2 for proper scope probe technique.

QUICK START PROCEDURE

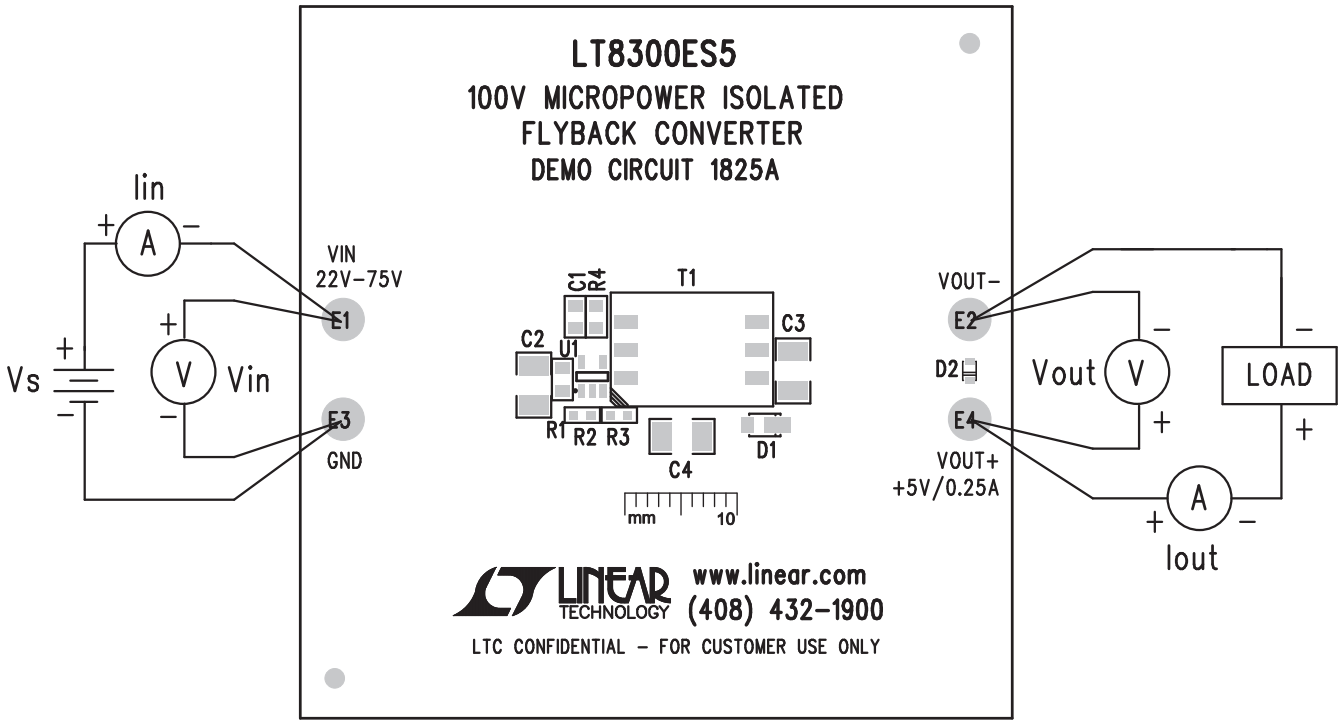


Figure 1. Proper Measurement Equipment Setup

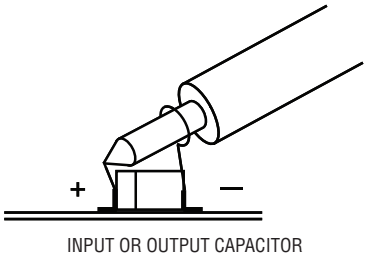


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

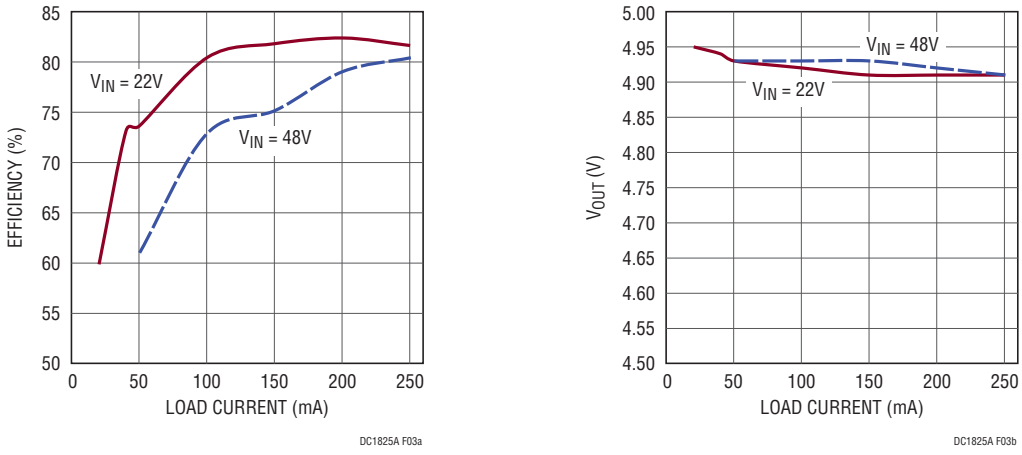
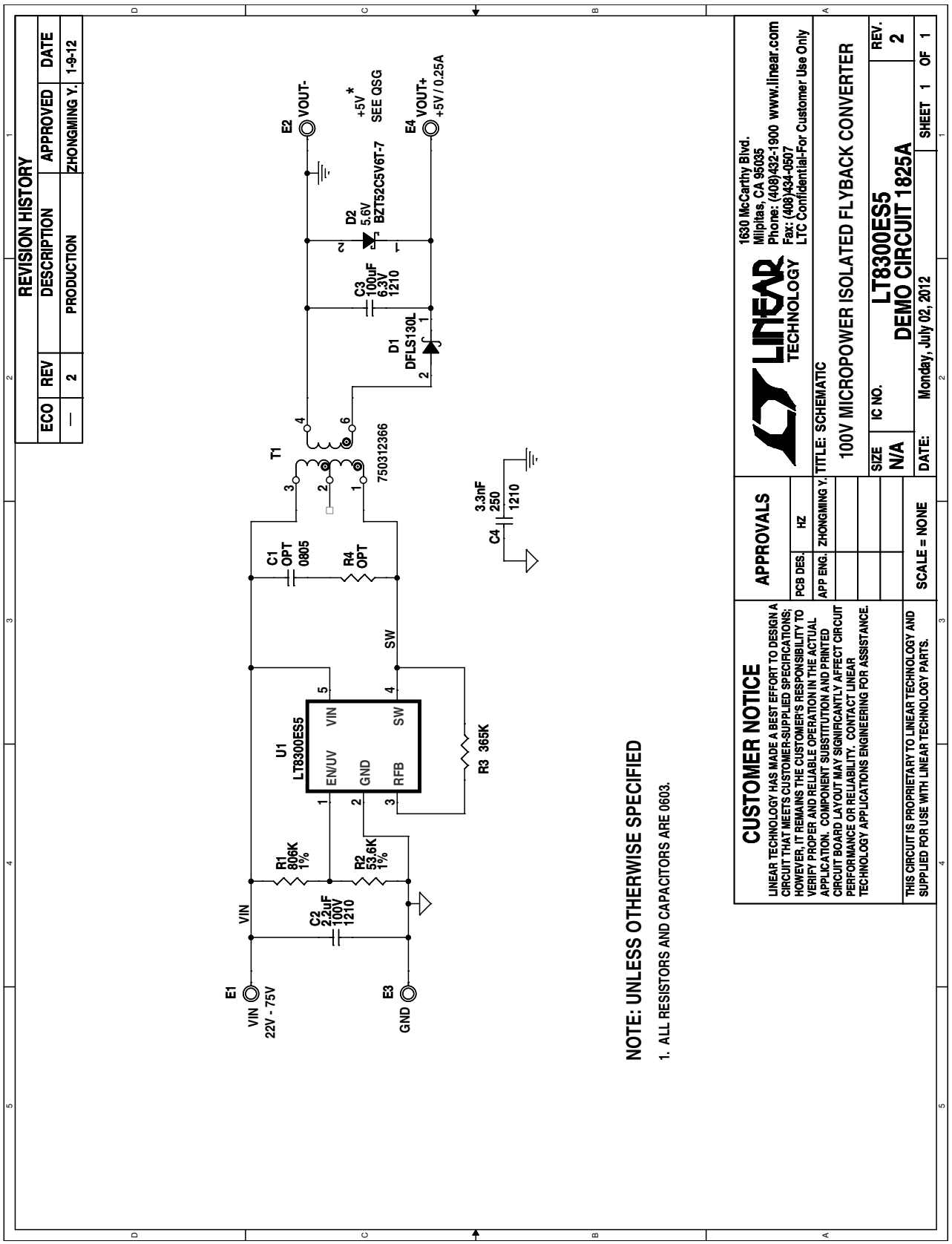


Figure 3. Typical Efficiency and Regulation Curves

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP., X7R, 2.2µF 100V, 10% 1210	MURATA, GRM32ER72A225KA35L
2	1	C3	CAP., X5R, 100µF 6.3V, 20% 1210	AVX, 12106D107MAT2A
3	1	C4	CAP., X7R, 4700pF 1000V, 10% 1210	VISHAY/VITRAMON, VJ1210Y472KXGAT5Z
4	1	D1	DIODE, SCHOTTKY, 30V 1A PWRDI123	DIODES INC., DFLS130-7
5	1	D2	SMT ZENER DIODE, 5.6V SOD-523	DIODES INC., BZT52C5V6T-7
6	1	R1	RES., CHIP, 806k, 1%, 0805	VISHAY, CRCW0805806KFKEA
7	1	R2	RES., CHIP, 53.6k, 1%, 0603	VISHAY, CRCW060353K6FKEA
8	1	R3	RES., CHIP, 365k, 1%, 0603	VISHAY, CRCW0603365KFKEA
9	1	T1	TRANSFORMER 7:1	WÜRTH ELECTONIK, 750312366
10	1	U1	I.C., LT8300ES5, TSOT-23	LINEAR TECH., LT8300ES5#PBF
Additional Demo Board Circuit Components				
1	0	C1	CAP., 0805	OPT
2	0	R4	RES., 0805	OPT

SCHEMATIC DIAGRAM



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