QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1293A

MONOLITHIC STEP-DOWN SWITCHING REGULATOR WITH LDO

LT1939

DESCRIPTION

Demo circuit 1293A is a monolithic step-down switching regulator with LDO featuring LT1939. The demo circuit is designed for 5.0V and 3.3V outputs from a 7V to 25V input. The LDO output is configured as a post-regulator of the switching regulator output. The total current capability is up to 2A.

The switching regulator can be synchronized to an external clock input or be resistor-programmed to a 250kHz to 2.2MHz internal oscillator. Programmable frequency allows for optimization between efficiency and external component size. Cycle-by-cycle current limit, frequency foldback and thermal shutdown provide protections against a shorted output. The soft-start feature controls the ramp rate of the output voltage, eliminates input current surge during startup, and also provides output tracking.

The LT1939's low current shutdown mode (<12uA) enables easy power management in battery-powered systems.

The LT1939 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for demo circuit 1293A.

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

Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		7V
Maximum Input Voltage		25V
Output Voltage V_{OUT1}		5.0V ±4%
Output Voltage V_{OUT2}		3.3V ±4%
Switching Frequency		800kHz
Maximum Total Output Current (I_{OUT1} +I_{OUT2})		2.0A
Voltage Ripple V_{OUT1}	V_{IN}=12V, I_{OUT1}=1.5A	10mV
Voltage Ripple V_{OUT2}	V_{IN}=12V, I_{OUT2}=0.5A	5mV

QUICK START PROCEDURE

Demo circuit 1293A is easy to set up to evaluate the performance of the LT1939. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, 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 V_{IN} or V_{OUT} and GND terminals. See Figure 2 for proper scope probe technique.

1. Place JP1 on the RUN position.
2. With power off, connect the input power supply to V_{IN} and GND.
3. Turn on the power at the input.

   NOTE. **Make sure that the input voltage does not exceed 25V.**
4. Check for the proper output voltages.

   NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
5. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

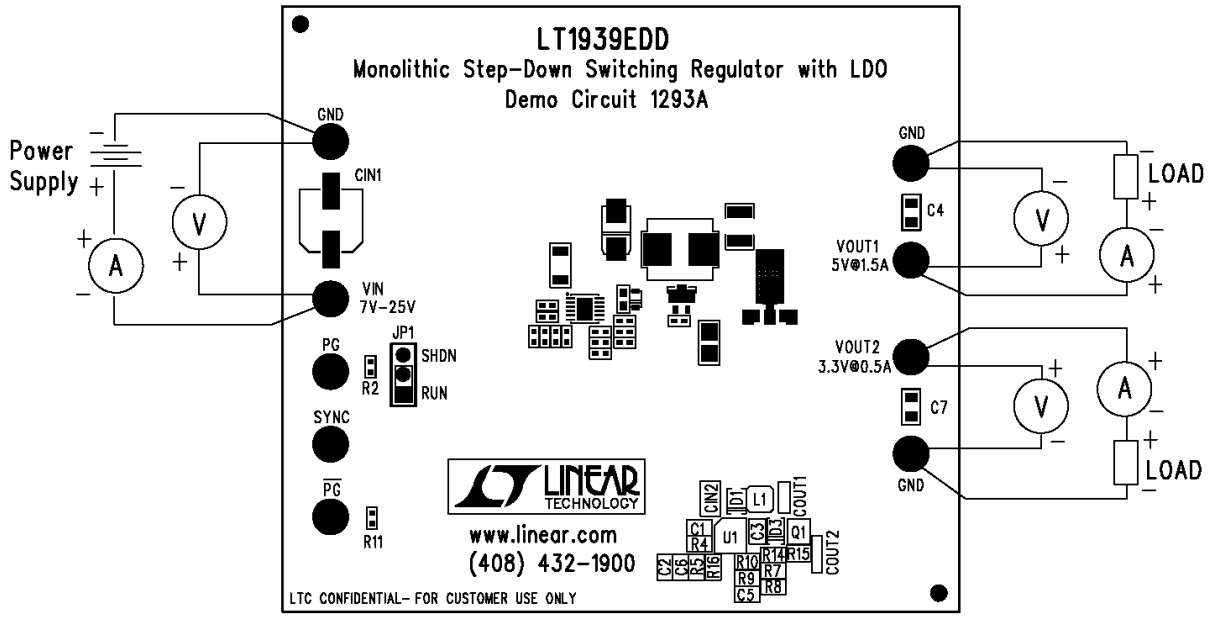


Figure 1. Proper Measurement Equipment Setup

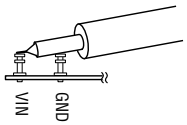


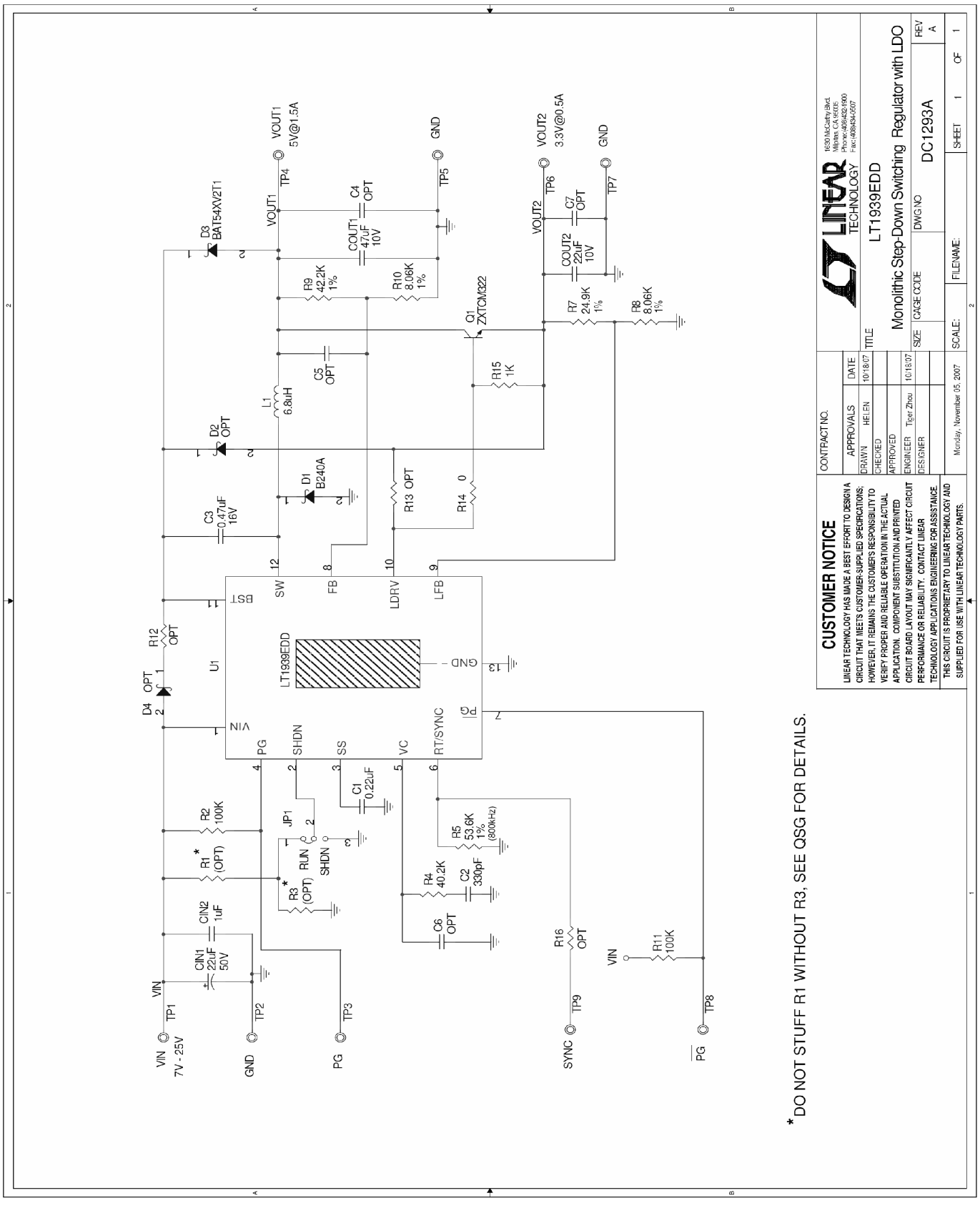
Figure 2. Measuring Input or Output Ripple

SYNC FUNCTION

Install a 20K resistor at R16 to enable SYNC function.

UVLO FUNCTION

Install both R1 and R3 for the UVLO function, otherwise, let SHDN pin float for normal operation. See datasheet "Shutdown and Undervoltage Lockout" for resistor calculation.


VIN
7V - 25V
GND
PG
SYNC
PG
TP1
TP2
TP3
TP9
TP8
CIN1 22uF 50V
CIN2 1uF
R1 * (OPT)
R2 100K
R3 * (OPT)
JP1
RUN
SHDN
C1 0.22uF
R4 40.2K
C2 330pF
R5 53.6K 1% (800kHz)
C6 OPT
R16 OPT
R11 100K
D4 OPT
R12 OPT
U1
LT1939EDD
BST
VIN
PG
SHDN
SS
VC
RT/SYNC
PG
GND
SW
FB
LDRV
LFB
C3 0.47uF 16V
D2 OPT
L1 6.8uH
D1 B240A
R13 OPT
R14 0
D3 BAT54XV2T1
VOUT1
5V@1.5A
TP4
TP5
C4 OPT
COUT1 47uF 10V
R9 42.2K 1%
R10 8.06K 1%
C5 OPT
R15 1K
Q1 ZXTCM322
VOUT2
3.3V@0.5A
TP6
TP7
C7 OPT
COUT2 22uF 10V
R7 24.9K 1%
R8 8.06K 1%
* DO NOT STUFF R1 WITHOUT R3, SEE QSG FOR DETAILS.
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LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.
THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
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TITLE
LT1939EDD
Monolithic Step-Down Switching Regulator with LDO
SIZE CAGE CODE DWG NO DC1293A REV A
SCALE: FILENAME: SHEET 1 OF 1