DEMO CIRCUIT 952
QUICK START GUIDE

LTC3810 Current Mode Synchronous Switching Regulator Controller

DESCRIPTION

Demonstration circuit 952 is a current mode synchronous switching regulator featuring the LTC3810. The circuit is configured as a synchronous step-down regulator operating at 230kHz switching frequency. Output voltage is 12V at 6A maximum load. The input voltage range is 13V – 80V.

The operating mode can be selected with jumper JP1. Depending on the position of this jumper, at low load the circuit will operate in forced continuous mode (for best load transient response at low current) or in pulse skip mode (for best efficiency at low current). With jumper JP1 in the mid position the circuit can synchronize to an external clock signal on the Mode/Sync pin.

A Power Good output is provided. The PGOOD output is normally high, with a pull up resistor to VLOGIC. If the output voltage is not within ± 10% of nominal value the PGOOD signal will go low.

The circuit can be synchronized to an external clock signal.

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

PERFORMANCE SUMMARY

Specifications are at TA = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range		13		80	V
V_{OUT}	Output Voltage	V_{IN} = 24V, I_{LOAD} = 100mA	11.8	12	12.2	V
I_{OUT}	Output Current	V_{IN} = 24V	0		6	A
I_Q	Input Current In Shutdown	V_{IN} = 24V, RUN/SS = 0V		288	648	µA
I_{IN}	V_{IN} Current In Pulse Skip Mode (No Load)	V_{IN} = 24V, V_{FCB} = INTVCC, No Load		3.5		mA
I_{IN}	V_{IN} Current In Forced Continuous Mode (No Load)	V_{IN} = 24V, V_{FCB} = 0V, No Load		26		mA
Efficiency	Efficiency	V_{IN} = 24V, I_{OUT} = 6A		96.4		%

OPERATING PRINCIPLES

The LTC3810 is a synchronous step-down switching regulator controller that can directly step down voltages from up to 100V input, making it ideal for telecom and automotive applications.

The LTC3810 uses a constant on-time valley current control architecture to deliver very low duty cycles with accurate cycle-by-cycle current limit without requiring a current sense resistor. The current limit is adjustable and the operating frequency is selected by an external resistor.

The LTC3810 has a precise (0.5%) internal reference, a 25MHz error amplifier, large gate drivers,

programmable softstart, a shutdown pin, a Sync input and a Power Good output.

The LTC3810 has a flexible bias regulator circuit that can be configured in many different ways to fit the application. The 10V bias regulator can control an external series transistor that allows the bias voltage to be generated from the input voltage. The demo board provides different footprints for this external series transistor.

An internal low dropout regulator can be used to provide the bias voltage if a 6.7V…15V voltage source is available. For example, in Demonstration Circuit 952 the bias voltage is generated from the input voltage during startup and from the output voltage during normal operation.

The demonstration circuit can be configured to use current sense resistor by moving a couple of zero ohm resistors to different locations.

EQUIPMENT

4 DMMs
1 DC Supply 0-80V capable of delivering at least 85W
1 Adjustable load 0-6A

QUICK START PROCEDURE

Demonstration circuit 952 is easy to set up to evaluate the performance of the LTC3810. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions:

JP1 Forced continuous mode operation

JP2 ON

2. With power off, connect the input power supply to Vin and GND.

3. Set the power supply to 24V and turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed 80V.

4. Check for the proper output voltage. Vout = 11.8V to 12.2V.

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 input voltage and load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

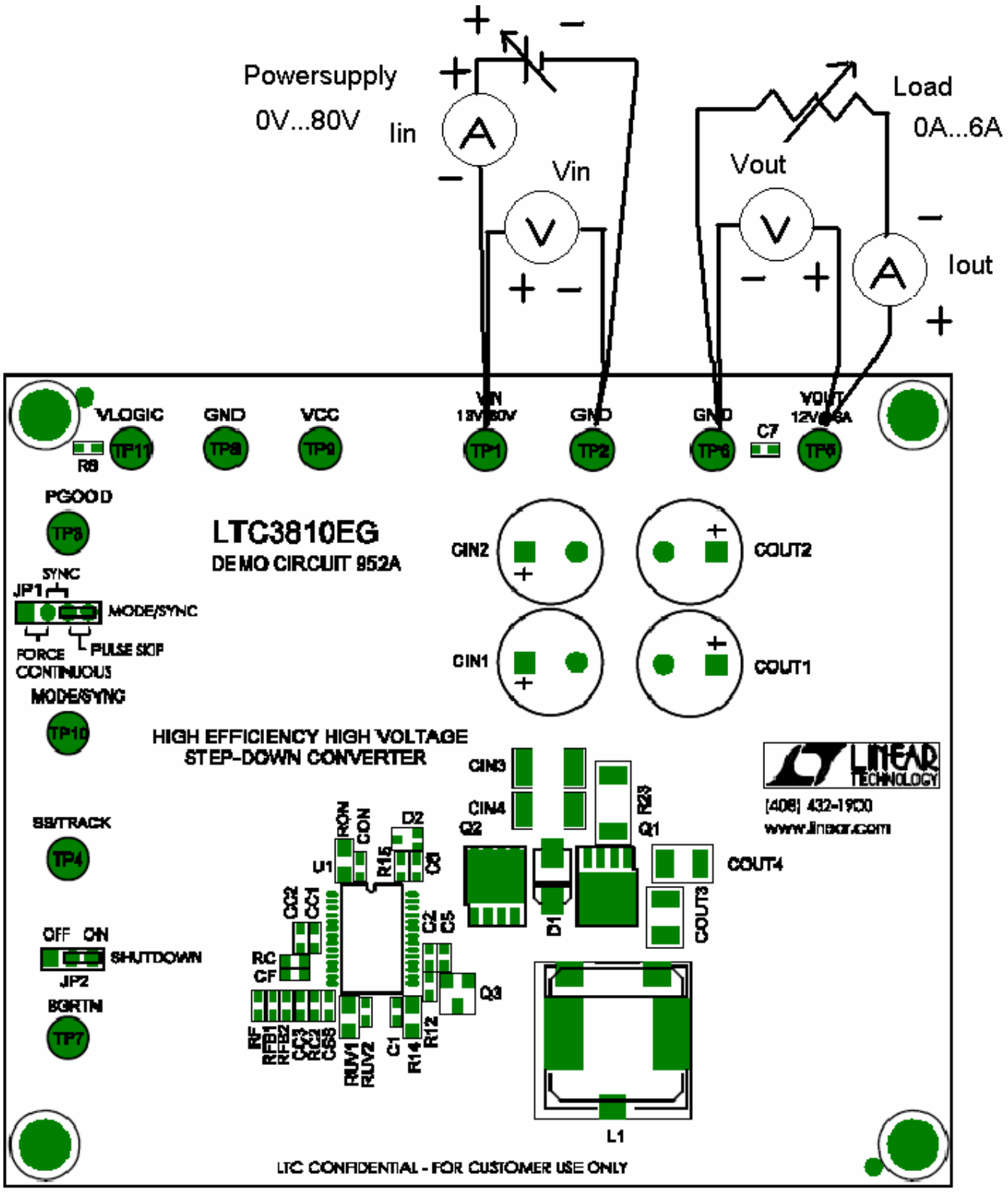
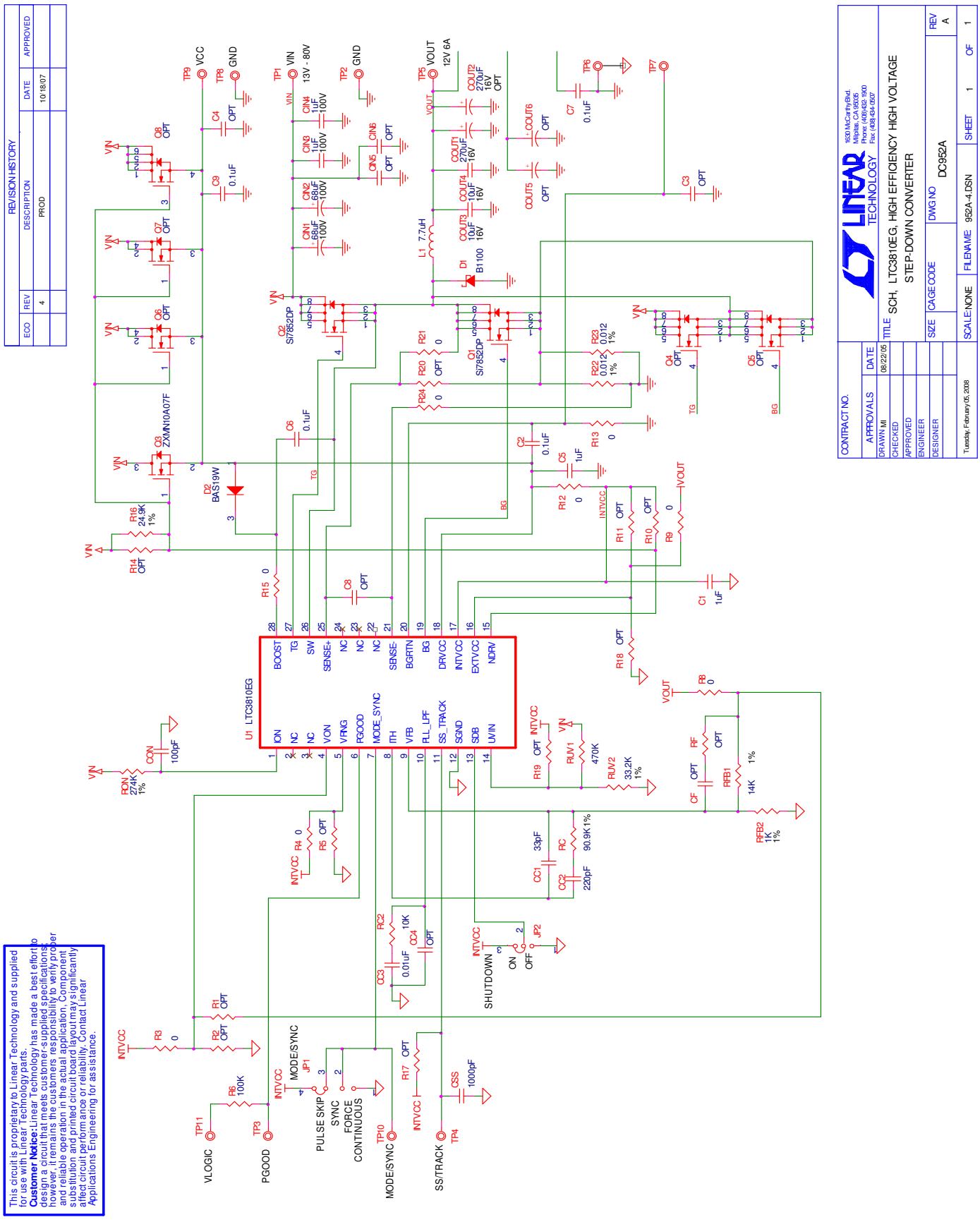


Figure 1. Proper Measurement Equipment Setup


REVISION HISTORY
ECO
REV
DESCRIPTION
DATE
APPROVED
4
PROD
10/18/07
This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.
Customer Notice: Linear Technology has made a best effort to design a circuit that meets customer-supplied specifications; however, it remains the customers 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 Applications Engineering for assistance.
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1630 McCarthy Blvd.
Milpitas, CA 95035
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APPROVALS
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Tuesday, February 05, 2008
TITLE
SCH, LTC3810EG, HIGH EFFICIENCY HIGH VOLTAGE STEP-DOWN CONVERTER
SIZE
CAGE CODE
DWG NO
DC952A
REV
A
SCALE NONE
FILENAME
952A-4.DSN
SHEET
1
OF
1
U1 LTC3810EG
BOOST
TG
SW
SENSE+
NC
NC
NC
SENSE-
BGRTN
BG
DRVCC
INTVCC
EXTVCC
NDRV
ION
NC
NC
VON
VFRNG
PGOOD
MODE_SYNC
ITH
VFB
RLL_LPF
SS_TRACK
SGND
SDB
UVIN
VIN
VOUT
12V 6A
VIN 13V - 80V
VCC
GND
INTVCC
SHUTDOWN
ON
OFF
MODE/SYNC
PULSE SKIP
SYNC
FORCE
CONTINUOUS
VLOGIC
PGOOD
SS/TRACK
L1 7.7uH
D1 B1100
D2 BAS19W
Q1 Si7852DP
Q2 Si7852DP
Q3 ZXMN10A07F
CIN1 68uF 100V
CIN2 68uF 100V
CIN3 1uF 100V
CIN4 1uF 100V
CIN5 OPT
CIN6 OPT
COUT1 270uF 16V
COUT2 270uF 16V OPT
COUT3 10uF 16V
COUT4 10uF 16V
COUT5 OPT
COUT6 OPT
RON 274K 1%
RFB1 14K 1%
RFB2 1K 1%
RF OPT
RUV1 470K
RUV2 33.2K 1%
R16 24.9K 1%
R22 0.012 1%
R23 0.012 1%
CCN 100pF
CSS 1000pF
CC1 33pF
CC2 220pF
RC 90.9K 1%
CC3 0.01uF
CC4 OPT
RC2 10K
JP1
JP2

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