DESCRIPTION

Demo circuit 1323 is a current-mode PWM step-down DC/DC regulator with an internal 1.2A power switch featuring the LT3686. The demo circuit is designed for 3.3V output from a 5V to 37V input. The wide input range of the LT3686 allows a variety of input sources. The typical sources are automotive batteries and industrial supplies. Its high maximum frequency allows the use of tiny inductors and capacitors. Operating frequency above the AM band avoids interfering with radio reception, making the LT3686 particularly suitable for automotive applications.

Cycle by cycle current limit and DA current sense provide the protection against shorted outputs. Soft-start and frequency foldback eliminate input current surge during startup. An optional internal regulated active load at the output via the BD pin keeps the LT3686 at full switching frequency at light loads, resulting in low, predictable output ripple above the audio and AM bands. Internal compensation and an internal boost diode reduce external component count.

The LT3686 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 1323.

LT3686 is available in 3mmx3mm DFN package.

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

Performance Summary ($T_A = 25^oC$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		5V
Maximum Input Voltage		37V
Output Voltage V_{OUT}		3.3V ±3%
Switching Frequency		1MHz
Maximum Output Current	V_{IN}=5~37V	1.2A
Efficiency	V_{IN}=12V, I_{OUT}=1.0A	80.7%
Voltage Ripple	V_{IN}=12V, I_{OUT}=1.0A	20mV

QUICK START PROCEDURE

Demonstration circuit 1323 is easy to set up to evaluate the performance of the LT3686. 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 Vin or Vout and GND terminals. See Figure 2 for proper scope probe technique.

1. Place JP1 on the ON position.

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

3. Turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed 55V.

4. Check for the proper output voltage.

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 voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
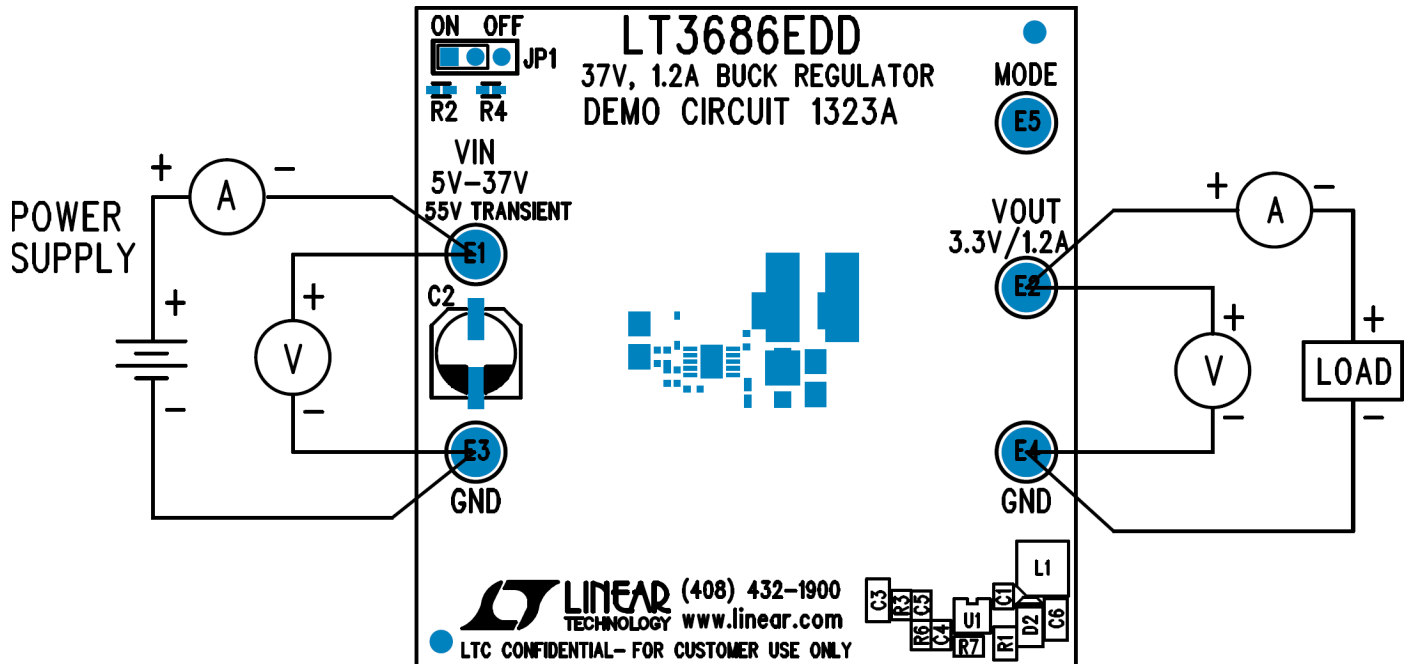
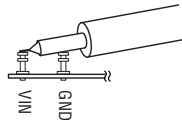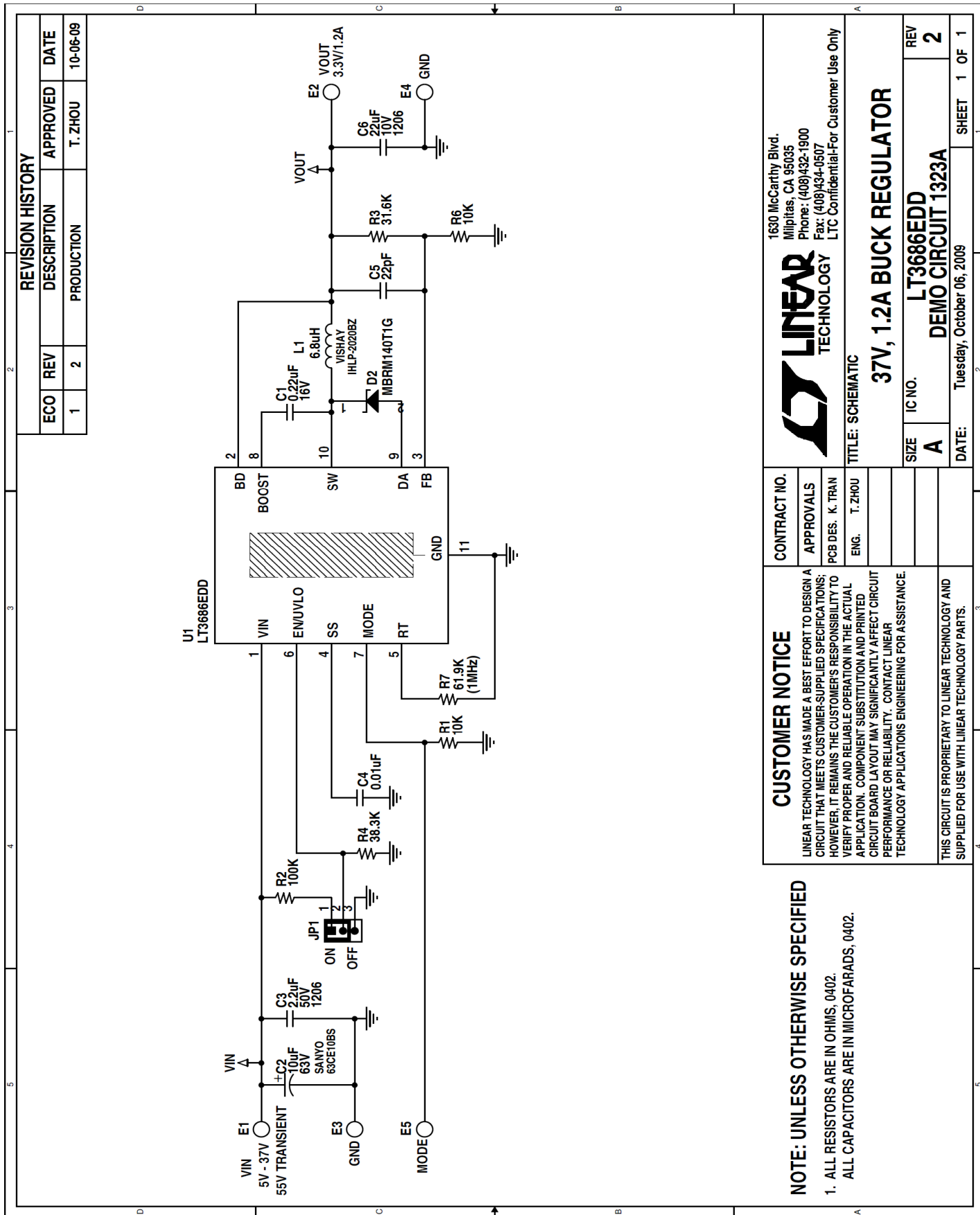**Figure 1. Proper Measurement Equipment Setup**

Figure 2. Measuring Input or Output Ripple

REVISION HISTORY

ECO	REV	DESCRIPTION	APPROVED	DATE
1	2	PRODUCTION	T. ZHOU	10-06-09

VIN
E1
VIN
5V - 37V
55V TRANSIENT

+C2
10uF
63V
SANYO
63CE10BS

C3
2.2uF
50V
1206

E3
GND

E5
MODE

R2
100K

R4
38.3K

JP1
1 ON
2
3 OFF

C4
0.01uF

U1
LT3686EDD

VIN 1

EN/UVLO 6

SS 4

MODE 7

RT 5

BD 2

BOOST 8

SW 10

DA 9

FB 3

GND 11

R7
61.9K
(1MHz)

R1
10K

C1
0.22uF
16V

L1
6.8uH
VISHAY
IHLP-2020BZ

D2
MBRM140T1G

C5
22pF

R3
31.6K

R6
10K

VOUT

E2
VOUT
3.3V/1.2A

C6
22uF
10V
1206

E4
GND

CUSTOMER NOTICE

NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE IN MICROFARADS, 0402.

CONTRACT NO.

APPROVALS
PCB DES. K. TRAN
ENG. T.ZHOU

TITLE: SCHEMATIC

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LTC Confidential-For Customer Use Only

LINEAR
TECHNOLOGY

37V, 1.2A BUCK REGULATOR
LT3686EDD
DEMO CIRCUIT 1323A

SIZE
A

IC NO.

REV
2

SHEET 1 OF 1

DATE: Tuesday, October 06, 2009