DEMO CIRCUIT 1566
QUICK START GUIDE

LT3970

40V, 350mA Step-Down Regulator with 2.5µA Quiescent Current and Integrated Diodes

DESCRIPTION

Demonstration circuit 1566 is a monolithic step-down DC/DC switching regulator featuring the LT3970. The switching frequency is adjustable up to 2MHz. The demo circuit is designed for 5V, 350mA output from a 6V to 40V input. The wide input range of the LT3970 allows a variety of input sources including automotive batteries and 24V industrial supplies. Low ripple Burst Mode increases the efficiency at the light load while keeping the output ripple below 15mV. The part is in shutdown when the EN pin is low and active when the pin is high. The threshold of the EN pin is accurate at 1V when Vin is above 4.2V. Adding a resistor divider from Vin to EN can program the LT3970 to regulate the output only when Vin is above a desired voltage.

The catch diode and boost diode are integrated to reduce the components count and solution size. The circuit consumes only 2µA of quiescent current. The current mode control scheme creates fast transient response and good loop stability. The catch diode current is limited to protect the part under short circuit and overvoltage conditions.

The LT3970 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 1566.

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

Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		6V
Maximum Input Voltage		40V
Output Voltage V_{OUT}		5.04V ±3%
Typical switching Frequency		600kHz
Maximum Output Current		350mA
Typical efficiency	V_{IN}=12V, I_{out}=350mA	84.5%
Typical output voltage Ripple	V_{IN}=12V, I_{out}=350mA	10mV

QUICK START PROCEDURE

Demonstration circuit 1566 is easy to set up to evaluate the performance of the LT3970. 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 40V.

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.

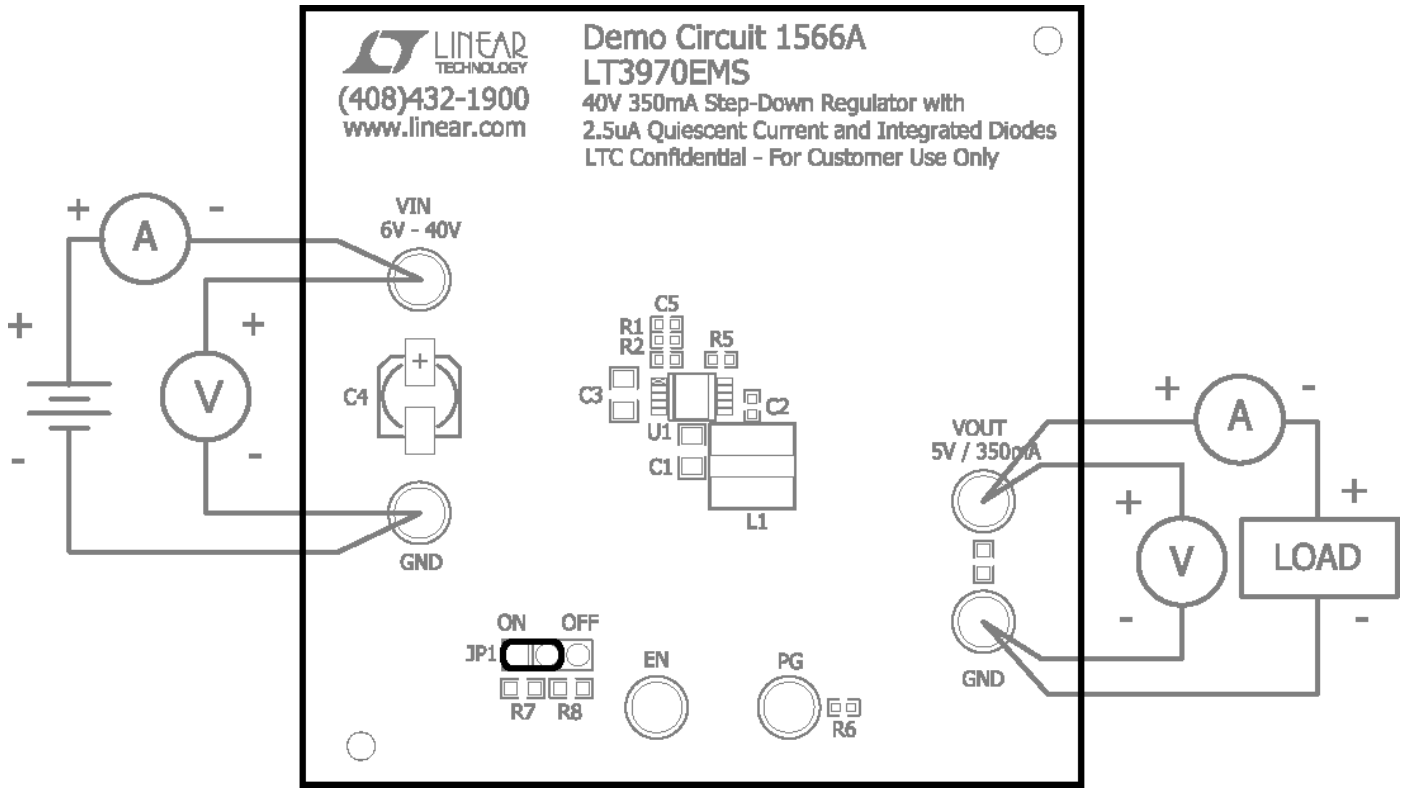


Figure 1. Proper Measurement Equipment Setup

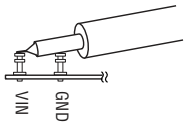
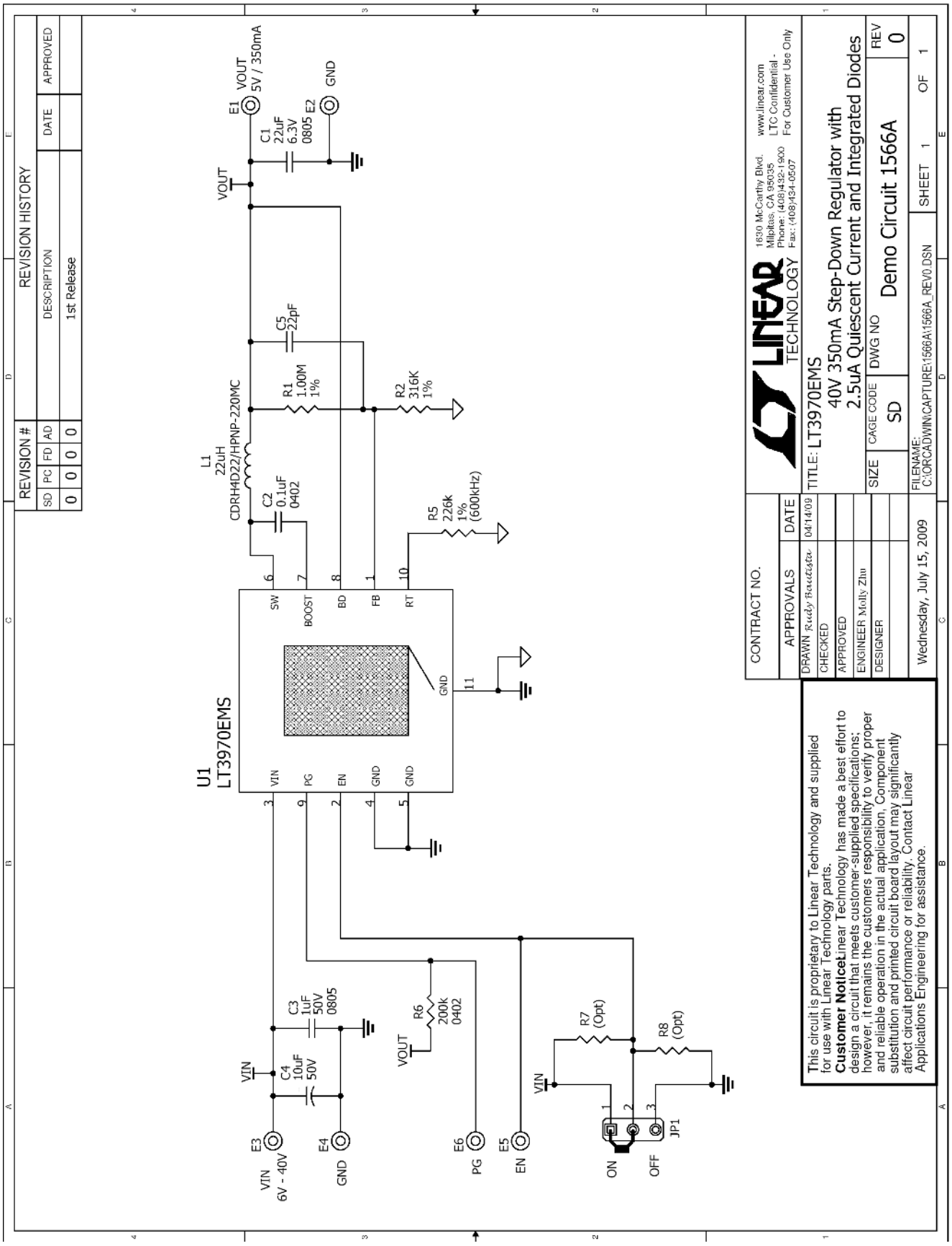


Figure 2. Measuring Input or Output Ripple


REVISION HISTORY
REVISION #
SD PC FD AD
0 0 0 0
DESCRIPTION
1st Release
DATE
APPROVED
U1
LT3970EMS
VIN
PG
EN
GND
GND
SW
BOOST
BD
FB
RT
GND
L1
22uH
CDRH4D22/HPNP-220MC
C1
22uF
6.3V
0805
C2
0.1uF
0402
C3
1uF
50V
0805
C4
10uF
50V
C5
22pF
R1
1.00M
1%
R2
316K
1%
R5
226k
1%
(600kHz)
R6
200k
0402
R7
(Opt)
R8
(Opt)
JP1
E1 VOUT
5V / 350mA
E2 GND
E3 VIN
6V - 40V
E4 GND
E6 PG
E5 EN
ON
OFF
CONTRACT NO.
APPROVALS
DATE
DRAWN Rudy Bautista
04/14/09
CHECKED
APPROVED
ENGINEER Molly Zhu
DESIGNER
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
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www.linear.com
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TITLE: LT3970EMS
40V 350mA Step-Down Regulator with
2.5uA Quiescent Current and Integrated Diodes
SIZE
CAGE CODE
SD
DWG NO
Demo Circuit 1566A
REV
0
Wednesday, July 15, 2009
FILENAME:
C:\ORCADWIN\CAPTURE\1566A\1566A_REV0.DSN
SHEET 1 OF 1
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.