DEMO CIRCUIT 1089
QUICK START GUIDE

LT3502A
2.2MHz, 500mA, Step-down Regulator in 2mm × 2mm DFN

DESCRIPTION

Demonstration circuit 1089 is a monolithic step-down DC/DC switching regulator featuring the LT3502A. The demo circuit is designed for 5V output from a 7V to 40V input. The wide input range of the LT3502A allows a variety of input sources including automotive batteries and 24V industrial supplies. The high switching frequency allows the use of tiny, low cost external components. Constant switching frequency above the AM band avoids interfering with radio reception. The current mode control scheme creates fast transient response and good loop stability. The boost diode is internal to reduce component count. The $\overline{SHDN}$ pin can also be used to program soft start. In this mode, the $\overline{SHDN}$ pin is driven through an external RC filter to create a voltage ramp on this pin. The soft start function reduces the input current surge during start-up. Cycle by cycle current limit and frequency foldback provide the protection against shorted outputs. DA pin can further protect the silicon under fault conditions by sensing the diode current.

The LT3502A 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 1089.

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

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Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		7V
Maximum Input Voltage		40V
Output Voltage V_{OUT}		4.98V ±3%
Switching Frequency		2.25MHz
Maximum Output Current		500mA
Efficiency	V_{IN} = 12V, I_{OUT} = 500mA	84%
Voltage Ripple	V_{IN} = 12V, I_{OUT} = 500mA	10mV

QUICK START PROCEDURE

Demonstration circuit 1089 is easy to set up to evaluate the performance of the LT3502A. 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 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 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 voltage is established, adjust the load within the operating range and observe the

output voltage regulation, ripple voltage, efficiency and other parameters.

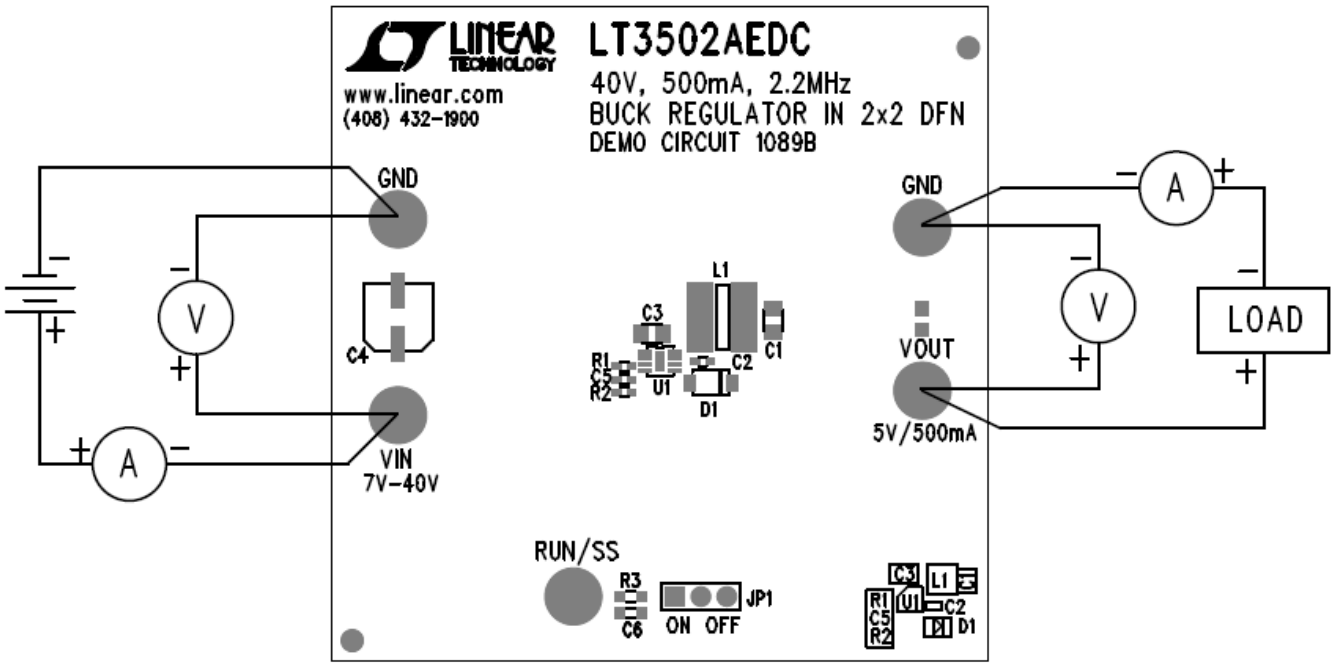


Figure 1. Proper Measurement Equipment Setup

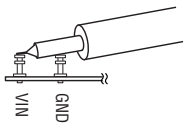
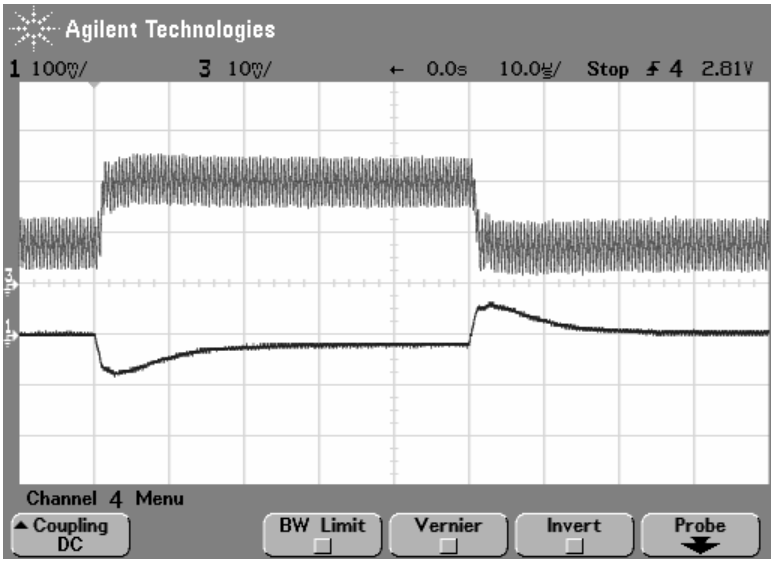


Figure 2. Measuring Input or Output Ripple

TRANSIENT RESPONSE

The demo board 1089 is optimized for size. A feedforward capacitor is used to ensure the good transient performance. Figure 3 shows the transient response of the demo board. The input voltage is 12V. The output voltage is 5V and the load current is stepped from 150mA to 400mA.

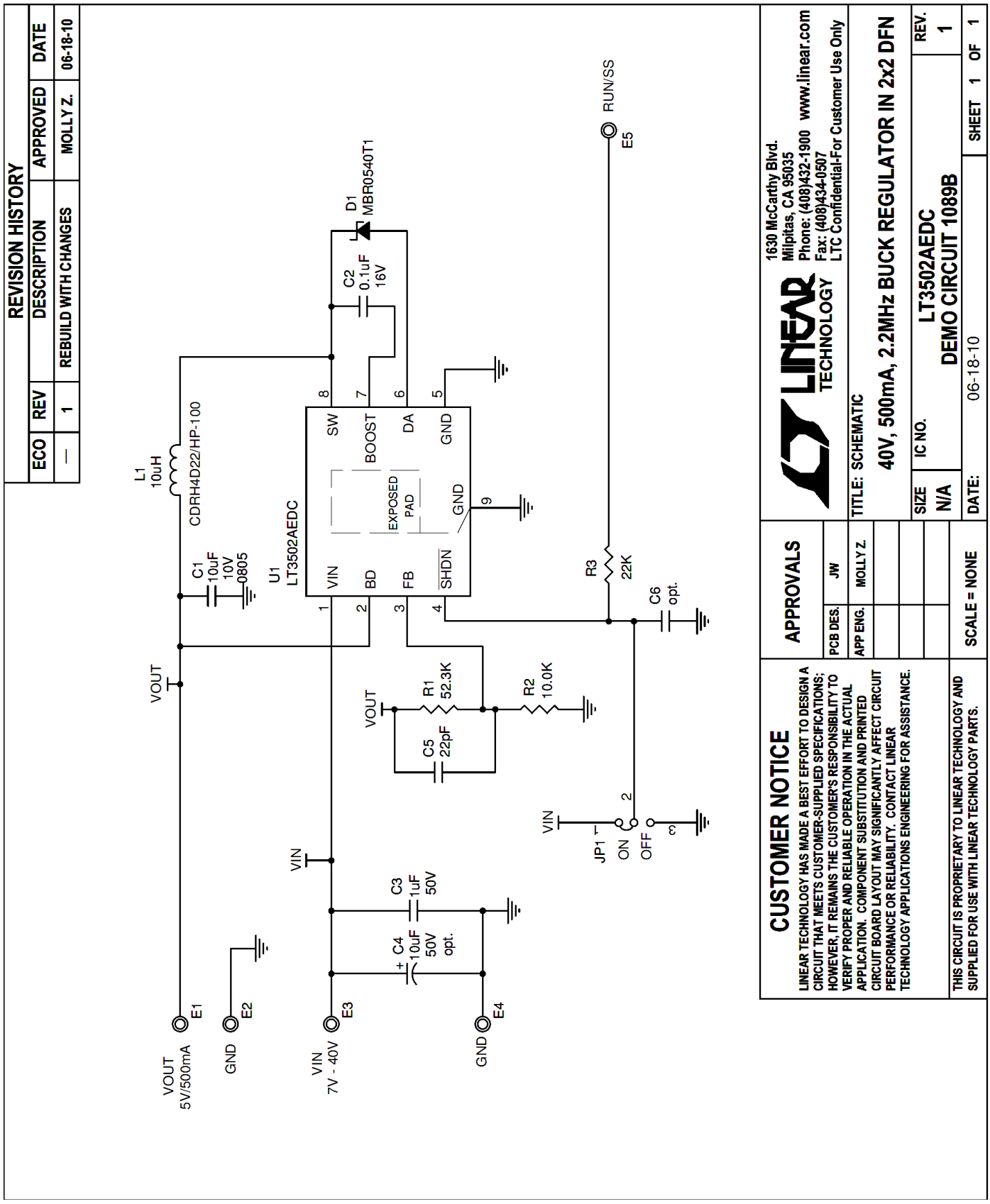


I_L
200mA/DIV

V_{out}
100mV/DIV
AC coupled

10µs/DIV

Figure 3. Transient Response


REVISION HISTORY
ECO
REV
DESCRIPTION
APPROVED
DATE
—
1
REBUILD WITH CHANGES
MOLLY Z.
06-18-10
L1
10uH
CDRH4D22/HP-100
C1
10uF
10V
0805
U1
LT3502AEDC
VIN
BD
FB
SHDN
SW
BOOST
DA
GND
EXPOSED
PAD
GND
C2
0.1uF
16V
D1
MBR0540T1
R3
22K
RUN/SS
E5
C6
opt.
R1
52.3K
C5
22pF
R2
10.0K
VOUT
C3
1uF
50V
C4
10uF
50V
opt.
JP1
ON
OFF
VOUT
5V/500mA
GND
VIN
7V - 40V
GND
E1
E2
E3
E4
CUSTOMER NOTICE
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.
APPROVALS
PCB DES.
JW
APP ENG.
MOLLY Z.
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900 www.linear.com
Fax: (408)434-0507
LTC Confidential-For Customer Use Only
TITLE: SCHEMATIC
40V, 500mA, 2.2MHz BUCK REGULATOR IN 2x2 DFN
SIZE
N/A
IC NO.
LT3502AEDC
DEMO CIRCUIT 1089B
REV.
1
THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
SCALE = NONE
DATE:
06-18-10
SHEET 1 OF 1