DESCRIPTION

Demonstration circuit 1040 is a quad output regulator consisting of four constant-frequency step-down converters integrated into the LTC3544. DC1040 has an input voltage range of 2.25V to 5.5V, with regulators capable of delivering 100mA, 200mA, 200mA and 300mA of output current. The four regulators operate independently with individual RUN pins and enter pulse skipping mode at low loads to reduce output ripple. In shutdown, the DC1040 draws less than 1uA total. The DC1040 is a very efficient circuit with efficiency greater than 90%. The LTC3544 comes in a 16-pin QFN package, which has an exposed pad on the bottom-side of the IC for better thermal performance. High operating frequency of 2.25MHz allows exclusive use of small size, low profile surface mount components. These features plus internal compensation circuits make the DC1040 demo board an ideal circuit for use in battery-powered, hand-held applications. The DC1040 design supports both versions of LTC3544: LTC3544EUD (burst mode of operation) and LTC3544BEUD (pulse skip mode of operation). The label on the PCB identifies which controller is installed.

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

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Table 1. Performance Summary (T_A = 25°C)

PARAMETER	CONDITIONS	VALUE
Minimum Input Voltage		2.25V
Maximum Input Voltage		5.5V
Output Voltage Regulation VOUT1	V_{IN} = 2.25V to 5.5V, I_{OUT} = 0A to 100mA	1.2V ±2%
Typical Output Ripple VOUT1	V_{IN} = 5V, I_{OUT} = 100mA (20 MHz BW)	<15mV_{P-P}
Output Voltage Regulation VOUT2	V_{IN} = 2.25V to 5.5V, I_{OUT} = 0A to 200mA	1.5V ±2%
Typical Output Ripple VOUT2	V_{IN} = 5V, I_{OUT} = 200mA (20 MHz BW)	<15mV_{P-P}
Output Voltage Regulation VOUT3	V_{IN} = 2.25V to 5.5V, I_{OUT} = 0A to 200mA	0.8V ±2%
Typical Output Ripple VOUT3	V_{IN} = 5V, I_{OUT} = 200mA (20 MHz BW)	<15mV_{P-P}
Output Voltage Regulation VOUT4	V_{IN} = 2.25V to 5.5V, I_{OUT} = 0A to 300mA	1.8V ±2%
Typical Output Ripple VOUT1	V_{IN} = 5V, I_{OUT} = 300mA (20 MHz BW)	<15mV_{P-P}
Nominal Switching Frequency		2.25 MHz

QUICK START PROCEDURE

Demonstration Circuit 1040 is easy to set up to evaluate the performance of the LTC3544. For proper measurement equipment configuration, set up the circuit according to the diagram in Figure 1.

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 the Measurement Equipment Set-up diagram in Figure 2 for proper scope probe technique.

1. Connect the input power supply to the VIN and GND terminals. Connect the loads between the matching VOUT and GND terminals. Refer to Figure 1 for the proper measurement equipment setup. Make sure that loads on outputs VOUT1 through VOUT4 do not exceed 100mA, 200mA, 200mA and 300mA respectively.
2. Apply 5V at VIN and place RUN jumper shunts JP1 through JP4 in the ON positions.
3. Measure all four outputs VOUT1 through VOUT4; they should read 1.2V, 1.5V, 0.8V, 1.8V respectively. All output voltages should be within +/- 2% tolerance.
4. Vary the input voltage from 5.5V to 2.5V, all four output voltages should be within +/- 2% tolerance.
5. Vary the VOUT1 load current from 0 to 100mA,. Each output voltage should be within a tolerance of +/- 2%.
6. Vary the VOUT2 and VOUT3 load currents from 0 to 200mA,. Each output voltage should be within a tolerance of +/- 2%.
7. Vary the VOUT4 load current from 0 to 300mA. Each output voltage should be within a tolerance of +/- 2%.
8. To turn either output off, place corresponding jumper in OFF position.

Warning - If the power for the demo board is carried in long leads, the input voltage at the part could “ring”, which could affect the operation of the circuit or even exceed the maximum voltage rating of the IC. To eliminate the ringing, insert a small tantalum capacitor (for instance, AVX part # TAJW686M010) on the pads between the input power and return terminals on the bottom of the demo board. The (greater) ESR of the tantalum will dampen the (possible) ringing voltage due to the use of long input leads. On a normal, typical PCB, with short traces, the capacitor is not needed.

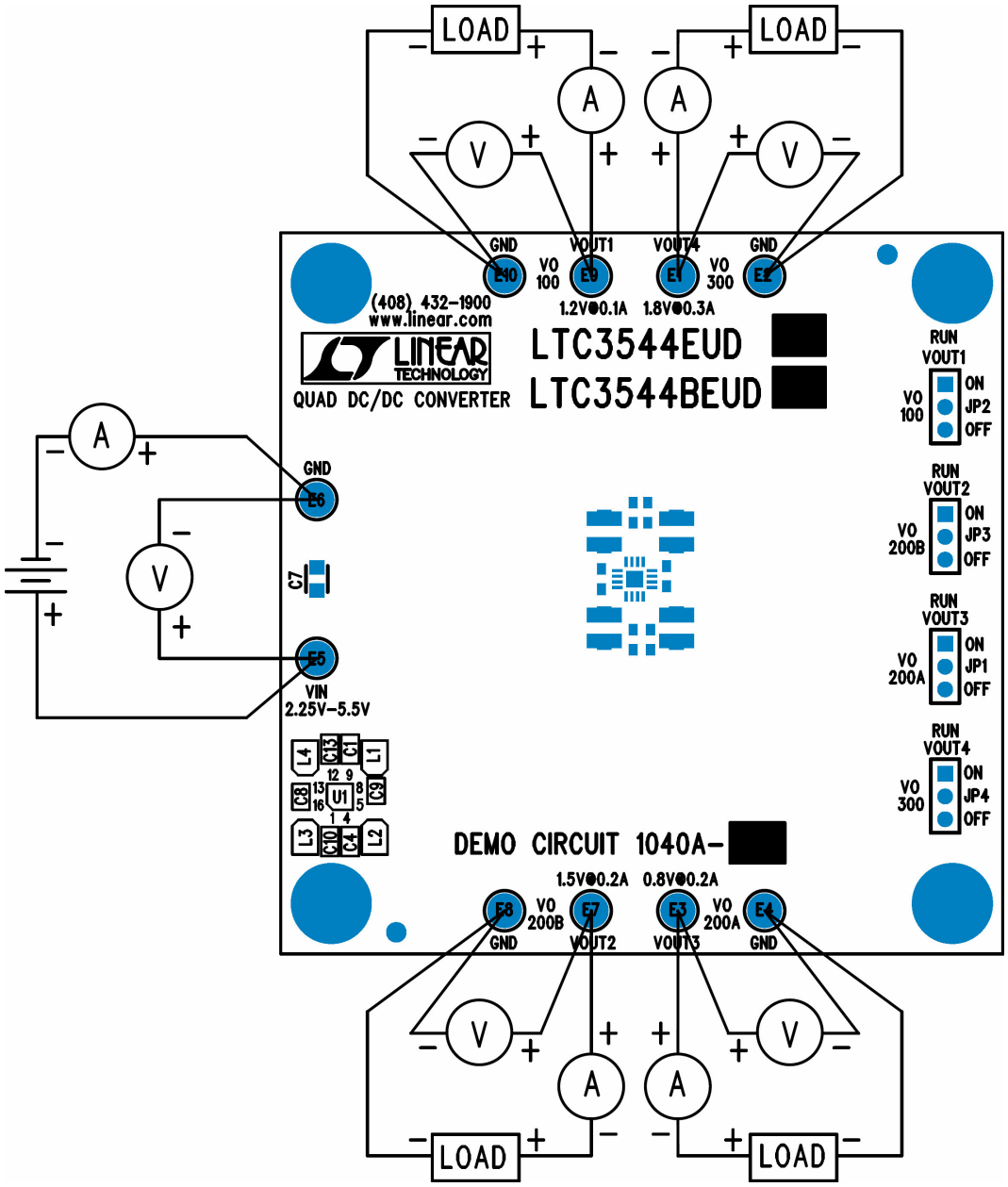


Figure 1. Proper Measurement Equipment Setup

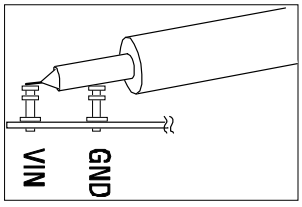
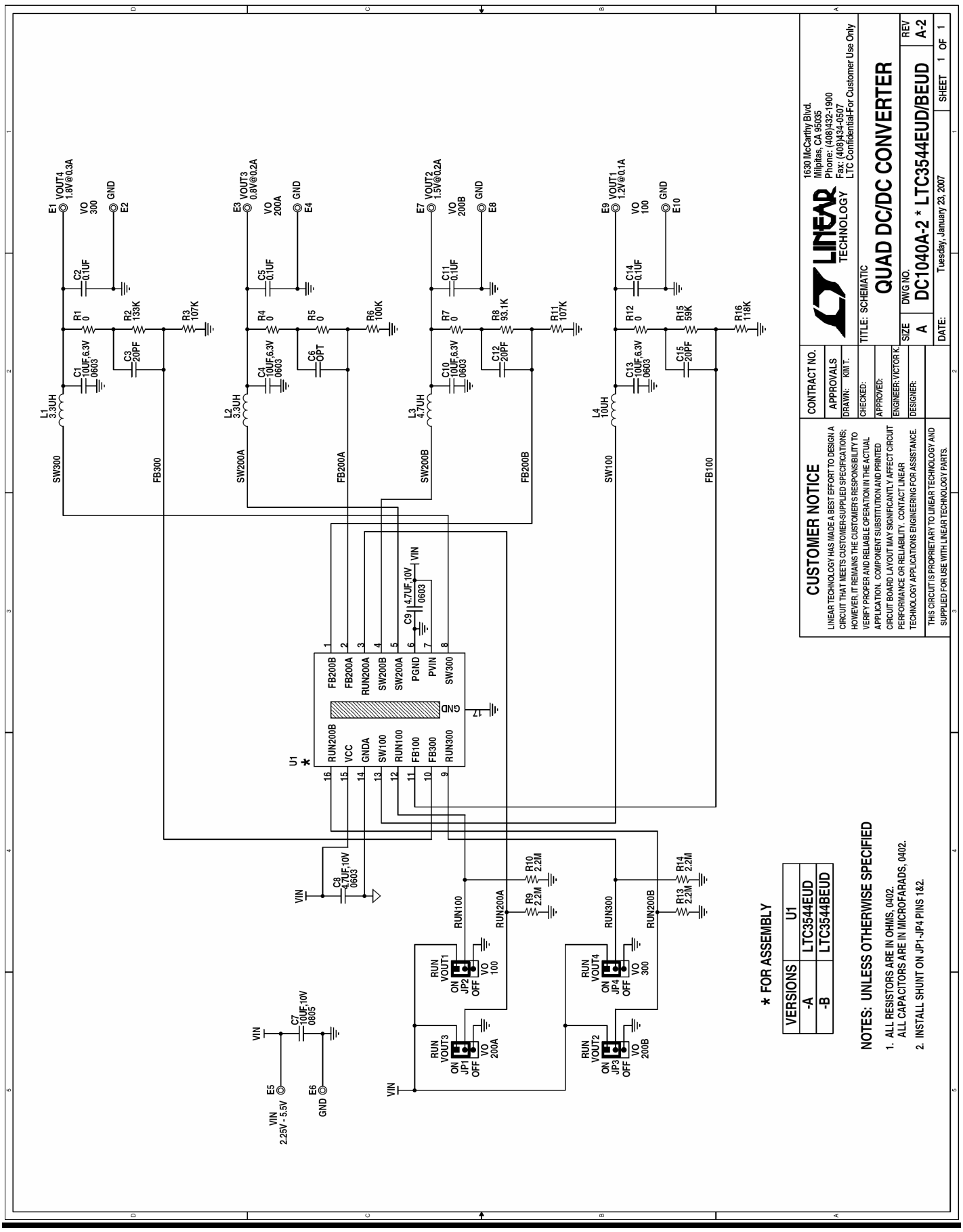


Figure 2. Measuring Input or Output Ripple


E1 VOUT4 1.8V@0.3A
E3 VOUT3 0.8V@0.2A
E7 VOUT2 1.5V@0.2A
E9 VOUT1 1.2V@0.1A
E2 GND
E4 GND
E8 GND
E10 GND
E5 VIN 2.25V - 5.5V
E6 GND
U1 *
RUN200B
VCC
GNDA
SW100
RUN100
FB100
FB300
RUN300
FB200B
FB200A
RUN200A
SW200B
SW200A
PGND
PVIN
SW300
GND
C1 10UF,6.3V 0603
C2 0.1UF
C3 20PF
C4 10UF,6.3V 0603
C5 0.1UF
C6 OPT
C7 10UF,10V 0805
C8 47UF,10V 0603
C9 4.7UF,10V 0603
C10 10UF,6.3V 0603
C11 0.1UF
C12 20PF
C13 10UF,6.3V 0603
C14 0.1UF
C15 20PF
R1 0
R2 133K
R3 107K
R4 0
R5 0
R6 100K
R7 0
R8 93.1K
R11 107K
R12 0
R15 59K
R16 118K
R9 2.2M
R10 2.2M
R13 2.2M
R14 2.2M
L1 3.3UH
L2 3.3UH
L3 4.7UH
L4 10UH
SW300
FB300
SW200A
FB200A
SW200B
FB200B
SW100
FB100
VIN
RUN VOUT1 ON JP2 OFF VO 100
RUN VOUT3 ON JP1 OFF VO 200A
RUN VOUT4 ON JP4 OFF VO 300
RUN VOUT2 ON JP3 OFF VO 200B
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APPROVED:
ENGINEER: VICTOR K.
DESIGNER:
LINEAR TECHNOLOGY
1630 McCarthy Blvd. Milpitas, CA 95035 Phone: (408)432-1900 Fax: (408)434-0507 LTC Confidential-For Customer Use Only
TITLE: SCHEMATIC
QUAD DC/DC CONVERTER
SIZE A
DWG NO. DC1040A-2 * LTC3544EUD/BEUD
REV A-2
DATE: Tuesday, January 23, 2007
SHEET 1 OF 1
* FOR ASSEMBLY
VERSIONS U1
-A LTC3544EUD
-B LTC3544BEUD
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE IN MICROFARADS, 0402.
2. INSTALL SHUNT ON JP1-JP4 PINS 1&2.

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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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