

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1340

## TRIPLE DC/DC CONVERTER

### LTC3569

## DESCRIPTION

Demonstration circuit 1340 is a triple output regulator consisting of three constant-frequency step-down converters integrated into LTC3569. DC1340 has an input voltage range of 2.5V to 5.5V, with regulators capable of delivering 1.2A or 600mA of load current on corresponding output. The three regulators operate independently with individual Enable pins and enter pulse skipping or burst mode at low loads for increasing efficiency. The DC1340 is a very efficient circuit with efficiency reading above 90%. The LTC3569 comes in a 20-pin QFN or 16-LEAD TSSOP 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 the small size, low profile surface mount components. These features plus internal compensation circuits and extremely low quiescent current make the DC1340 demo board an ideal circuit for use in battery-powered, hand-held applications. DC1340 supports reference voltage programming for each regulator. This value is programmed in -25mV steps by toggling the respective Enable pin.

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

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**Table 1.** Performance Summary ( $T_A = 25^\circ\text{C}$ )

PARAMETER	CONDITIONS	VALUE
Minimum Input Voltage		2.5V
Maximum Input Voltage		5.5V
Output Voltage Regulation VOUT1	$V_{IN} = 2.5\text{V to } 5.5\text{V}$ , $I_{OUT} = 0\text{A to } 1.2\text{A}$	$1.8\text{V} \pm 2\%$
Typical Output Ripple VOUT1	$V_{IN} = 4\text{V}$ , $I_{OUT} = 1.2\text{A}$ (20 MHz BW)	$<15\text{mV}_{P-P}$
Output Voltage Regulation VOUT2	$V_{IN} = 2.5\text{V to } 5.5\text{V}$ , $I_{OUT} = 0\text{A to } 600\text{mA}$	$1.2\text{V} \pm 2\%$
Typical Output Ripple VOUT2	$V_{IN} = 4\text{V}$ , $I_{OUT} = 600\text{mA}$ (20 MHz BW)	$<15\text{mV}_{P-P}$
Output Voltage Regulation VOUT3	$V_{IN} = 2.5\text{V to } 5.5\text{V}$ , $I_{OUT} = 0\text{A to } 600\text{mA}$	$1.5\text{V} \pm 2\%$
Typical Output Ripple VOUT3	$V_{IN} = 4\text{V}$ , $I_{OUT} = 600\text{mA}$ (20 MHz BW)	$<15\text{mV}_{P-P}$
Nominal Switching Frequency		2.25 MHz

### QUICK START PROCEDURE

Demonstration Circuit 1340 is easy to set up to evaluate the performance of the LTC3569. 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 VOUT 1 does not exceed 1.2A and VOUT2, VOUT3 do not exceed 600mA, on each output (all three outputs can be loaded at the same time)
2. Apply 5V at VIN and then insert RUN jumper shunts JP1 through JP3 into the ON positions.
3. Measure all three outputs VOUT1 through VOUT3; they should read 1.8V, 1.2V and 1.5V correspondingly. All output voltages should be within +/- 2% tolerance.
4. Vary the input voltage from 5.5V to 2.25V; all four output voltages should be within +/- 2% tolerance.
5. Vary the VOUT1 load current from 0 to 1.2A. Each output voltage should be within a tolerance of +/- 2%.
6. Vary the VOUT2 load currents from 0 to 600mA. Each output voltage should be within a tolerance of +/- 2%.

7. Vary the VOUT3 load current from 0 to 600mA. Each output voltage should be within a tolerance of +/- 2%.
8. To turn either output off set corresponding jumper into OFF position.

To synchronize converter to external clock move jumper J4 to **Sync** position (contacts 1 and 2) and apply synchronization pulses in 1MHz to 3MHz frequency range to SYNC pin, see datasheet LTC3569 for details. For converter to operate in Pulse skipping mode move jumper J4 to **Pulse Skip** position (contacts 2 and 3). For converter to operate in Burst mode move jumper J4 into **Burst** position (contacts 1 and 2).

For reference voltage programming apply toggling pulses on corresponding PRG\_VOUT terminals as it described in LTC3569 datasheet.

**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 converter. 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.

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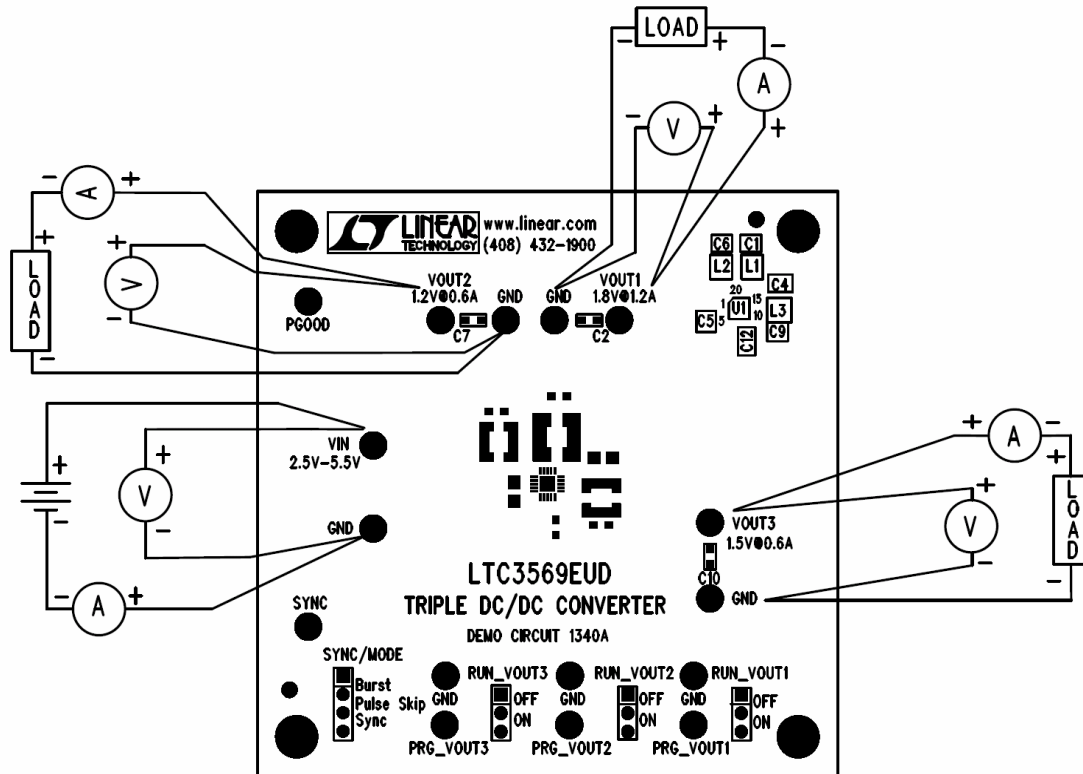


Figure 1. Proper Measurement Equipment Setup

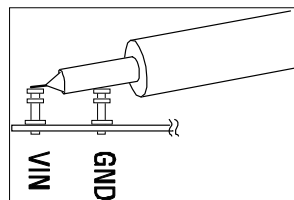
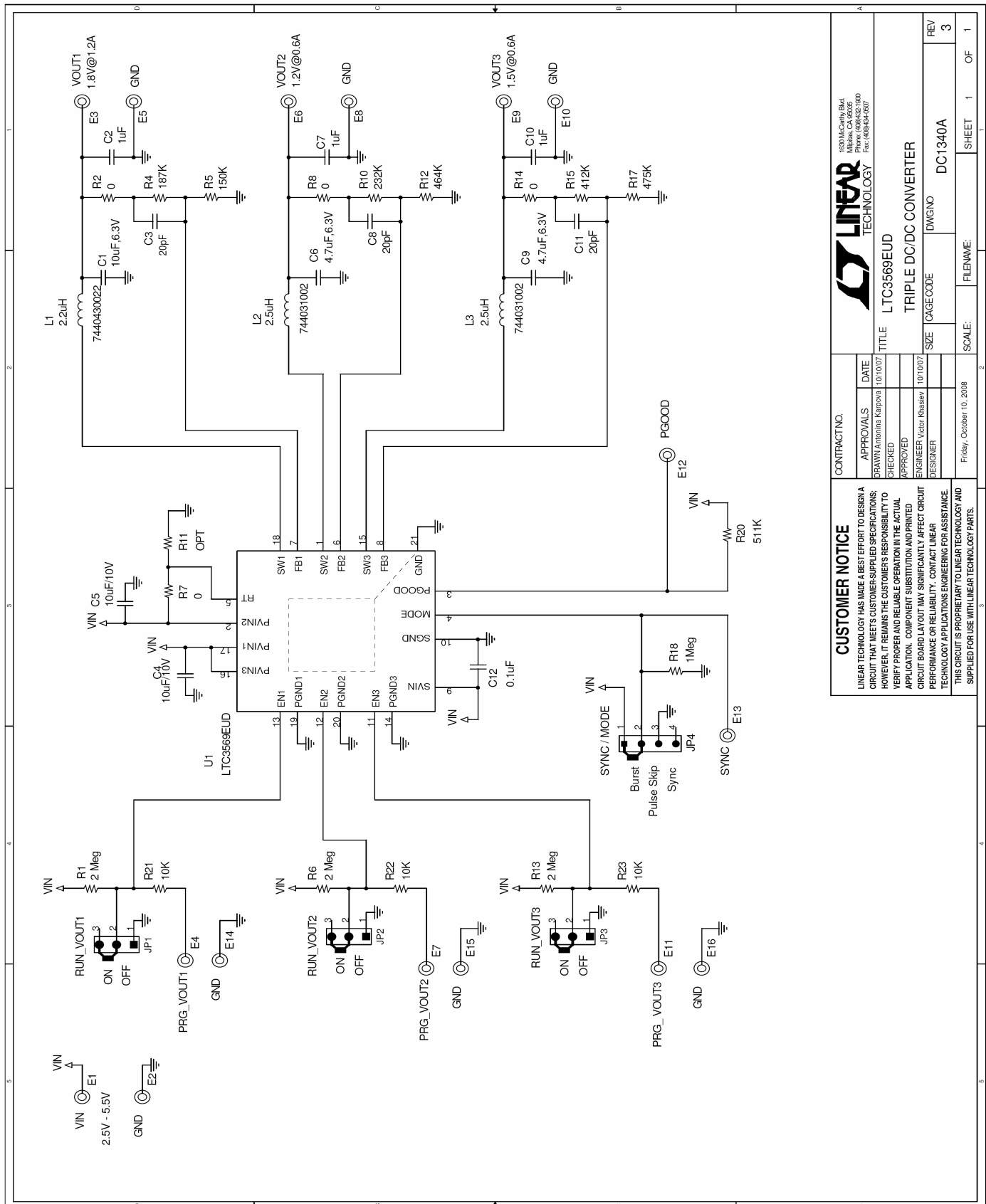


Figure 2. Measuring Input or Output Ripple

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<b>CUSTOMER NOTICE</b> 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. THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.		CONTRACT NO.	APPROVALS	DATE
			CHECKED	10/10/07
			APPROVED	
			ENGINEER Victor Khashev	10/10/07
			DESIGNER	
		Friday, October 10, 2008		
		SCALE:	FILENAME:	
		SHEET 1	OF 1	

<b>LINEAR TECHNOLOGY</b> 1630 McCarthy Blvd. Milpitas, CA 95035 Tel: 408/854-1000 Fax: 408/854-1007		TITLE	LTC3569EUD
		SIZE	CAGE CODE
		DWGNO	DC1340A
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