

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1013

DUAL MONOLITHIC SYNCHRONOUS, 300mA, 2.25 MHz BUCK REGULATORS

LTC3547

DESCRIPTION

Demonstration circuit 1013 is a dual output regulator consisting of two constant-frequency step-down converters, based on the LTC3547 monolithic dual synchronous buck regulator IC. The DC1013 has an input voltage range of 2.5V to 5.5V, and both outputs are capable of delivering up to 300 mA of output current at a minimum input voltage of 3V. In Burst Mode™ operation, which is the mode of the LTC3547 during light load current operation, the DC supply current of the DC1013 is typically only 40 uA (per channel) at no load, and less than 1 uA in shutdown. The DC1013 is a very efficient circuit: over 95% for either circuit. The LTC3547 comes in a tiny 8-lead 3x2 mm DFN package, which has an ex-

posed pad on the bottom-side of the IC for better thermal performance. These features, plus the nominal operating frequency of 2.25 MHz (allowing the exclusive use of low profile surface mount components), make the DC1013 demo board an ideal circuit for use in battery-powered, hand-held applications.

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

™ - Burst Mode is a trademark of Linear Technology Corporation

Table 1.

Performance Summary ($T_A = 25^\circ\text{C}$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		2.5V
Maximum Input Voltage		5.5V
Output Voltage V_{OUT1}	$V_{IN} = 2.5\text{V to } 5.5\text{V}, I_{OUT1} = 0\text{A to } 300\text{ mA}$	1.2V $\pm 4\%$ (1.152V – 1.248V) 1.5V $\pm 4\%$ (1.44V – 1.56V) 1.8V $\pm 4\%$ (1.728V – 1.872V)
Typical Output Ripple V_{OUT1}	$V_{IN} = 5\text{V}, I_{OUT1} = 300\text{ mA}$ (20 MHz BW)	< 20mV _{p-p}
Output Regulation	Line	$\pm 1\%$
	Load	$\pm 1\%$
Output Voltage V_{OUT2}	$V_{IN} = 2.5\text{V to } 5.5\text{V}, I_{OUT2} = 0\text{A to } 300\text{ mA}$	2.5V $\pm 4\%$ (2.4V – 2.6V) 3.3V $\pm 4\%$ (3.168V – 3.432V)
Typical Output Ripple V_{OUT2}	$V_{IN} = 5\text{V}, I_{OUT2} = 300\text{ mA}$ (20 MHz BW)	< 20mV _{p-p}
Output Regulation	Line	$\pm 1\%$
	Load	$\pm 1\%$
Nominal Switching Frequency		2.25 MHz

QUICK START PROCEDURE

The DC1013 is easy to set up to evaluate the performance of the LTC3547. For a 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 probe measurement diagram in Figure 2 for proper scope probe technique.

Please follow the procedure outlined below for proper operation.

1. Connect the input power supply to the Vin and GND terminals. Connect the loads between the Vout and GND terminals. Refer to Figure 1 for the proper measurement equipment setup.
2. Before proceeding to operation, insert shunts JP1 and JP2 into the OFF positions. Also inserts shunts into JP5, the 1.8V Vout1 voltage option, and into JP7, the 3.3V Vout2 voltage option.
3. Apply 5V at Vin, and turn on Vout1 and Vout2 by changing shunts JP1 and JP2 from the OFF positions to the ON positions. Both output voltages should be within a tolerance of +/- 2%.
4. Vary the input voltage from 5V to 0.5V above the output voltage (If Vout2 is off, then the minimum input voltage limit is 2.5V.). Both output voltages should be within +/- 3% tolerance.
5. Vary the load current, of each output, from 0 to 300mA. Each output voltage should be within a tolerance of +/- 4%.

6. Set the load current of both outputs at 300 mA and measure the output ripple voltage of each regulator (Refer to Figure 2 for proper measurement technique); they should measure less than 20 mVAC each. Also, observe the voltage waveform at either switch node (pins 4 – reg.1 and 6 – reg.2) of each regulator. The switching frequencies should be between 1.8 MHz and 2.7 MHz (T = 555 ns and 370 ns).
7. When finished, insert shunts into the OFF position(s) of JP1 and JP2. To test and evaluate the other voltage options, move the shunts in JP5 and JP7 into any of the remaining output voltage options – 1.2V (JP3) or 1.5V (JP4) for Vout1 and 2.5V (JP6) for Vout2. Just as in the 1.8V, Vout1, or 3.3V, Vout2, voltage options, the new output voltages should measure +/- 2% tolerance for static line and load conditions and +/- 2% tolerance under dynamic line and load conditions (4% total).

When finished, turn off the circuits by inserting shunts JP1 and JP2 into the OFF positions, and disconnect the power.

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 (which, of course, may damage the IC). To eliminate the ringing, a small tantalum capacitor (AVX part # TAJW476M010) has been inserted on the pads between the input power and return terminals on the bottom of the demo board. The (greater) ESR of the tantalum capacitor 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.

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1013 DUAL MONOLITHIC SYNCHRONOUS, 300mA, 2.25 MHz BUCK REGULATORS

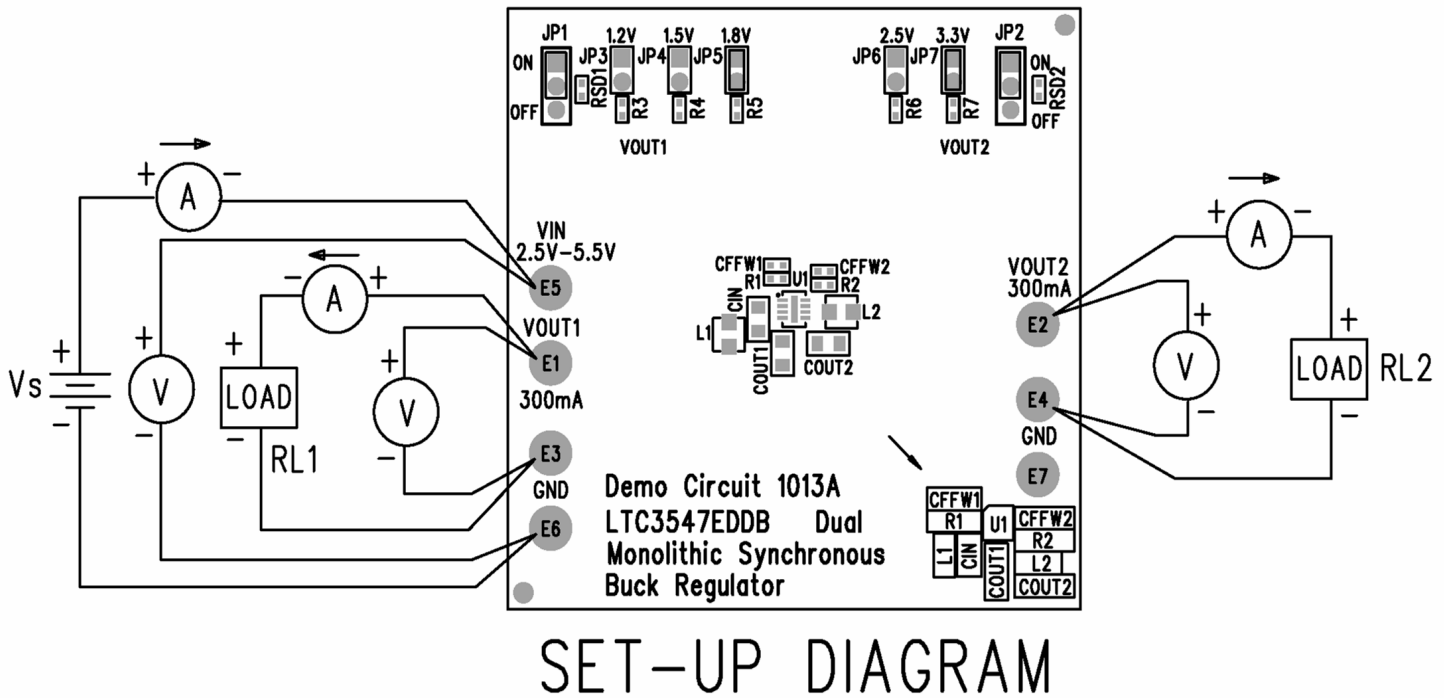


Figure 1. Proper Measurement Equipment Setup

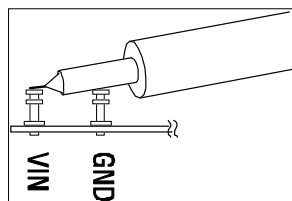
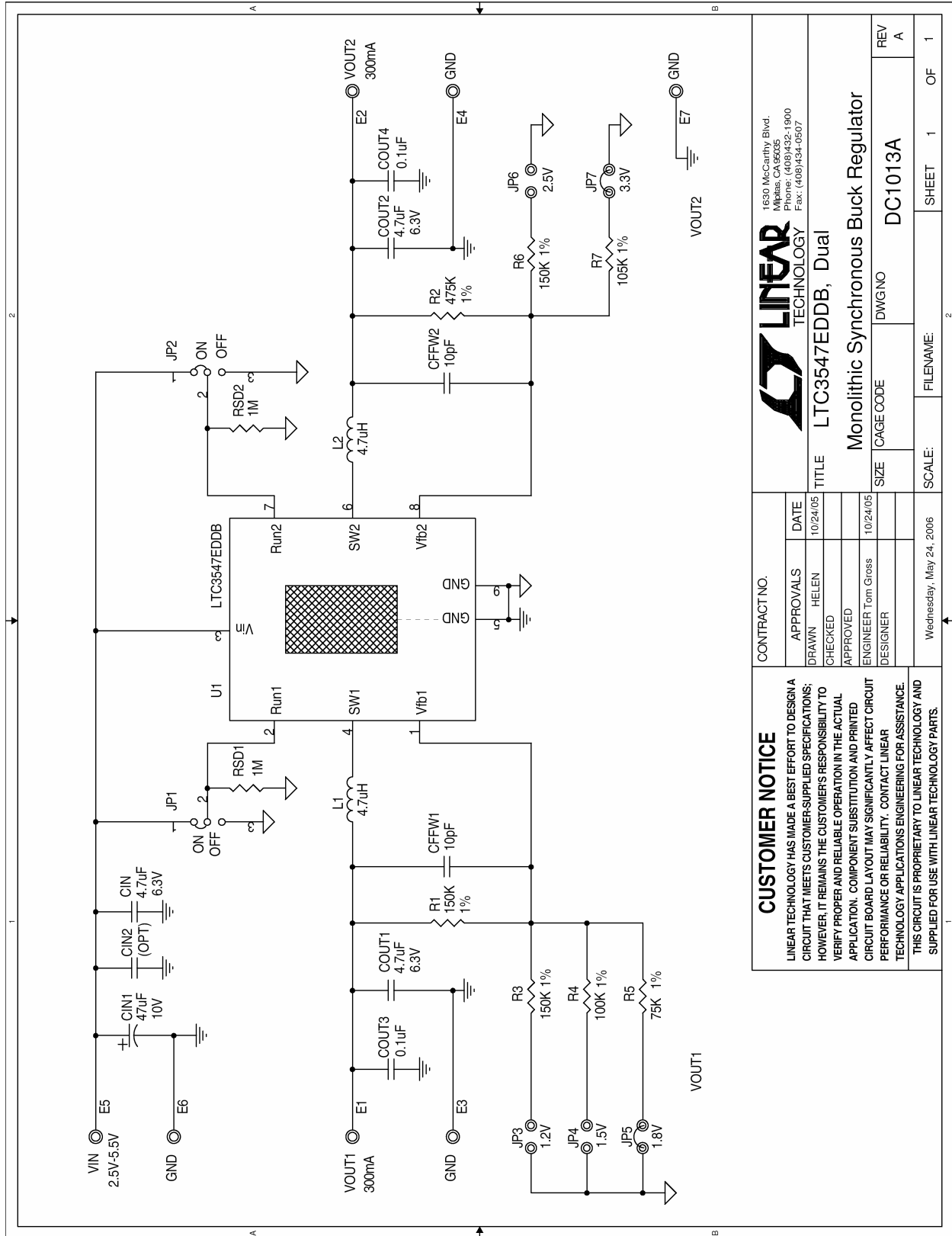


Figure 2. Measuring Input or Output Ripple

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1013

DUAL MONOLITHIC SYNCHRONOUS, 300mA, 2.25 MHz BUCK REGULATORS



CUSTOMER NOTICE		CONTRACT NO.	
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.			
APPROVALS	DATE	1630 McCarty Blvd. Milpitas, CA 95025 Phone: (408)432-1900 Fax: (408)434-0507	
DRAWN HELEN	10/24/05	LINEAR TECHNOLOGY	
CHECKED		TITLE LTC3547EDDB, Dual	
APPROVED		Monolithic Synchronous Buck Regulator	
ENGINEER Tom Gross	10/24/05	SIZE	DWGNO
DESIGNER		CAGE CODE	DC1013A
Wednesday, May 24, 2006	SCALE:	FILENAME:	REV A
		SHEET 1	OF 1

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Analog Devices Inc.:](#)

[DC1013A](#)