DESCRIPTION

DC785 is an 8A high efficiency, high frequency buck converter, incorporating the LTC3418 monolithic synchronous regulator. The DC785 has an input voltage range of 2.25V to 5.5V and an output voltage range from 0.8V to 5V. The operating frequency range of the DC785 is either set with an external resistor or synchronized to an external clock, with a range between 300 kHz and 4 MHz. The DC785 can deliver high power – up to 8A of output current – in a relatively small circuit, because of the high current power switches (30 mΩ of on-state resistance) on the LTC3418. The LTC3418 also incorporates OPTI-LOOP compensation, so that the DC785 can be optimized to provide fast transient response over a wide range of line and load conditions. Extra features include tracking, for easy power supply sequencing, a 1.25V external reference, available for customer use, and Burst-Mode™ capability, for those circuits that operate during intervals of low output power. All these features make the DC785 perfectly suited for high current, high power applications, such as desktop computers.

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

TM - Burst Mode is a trademark of Linear Technology Corporation

Table 1.

Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		2.25V
Maximum Input Voltage		5.5V
Output Voltage V_{OUT}	V_{IN} = 2.25V to 5.5V, I_{OUT1} = 0A to 8A	1.8V ±4%
Typical Output Ripple V_{OUT}	V_{IN} = 5V, I_{OUT1} = 8A (20 MHz BW)	20mV_{P-P}
Output Regulation	Line	±1%
	Load	±1%
Nominal Switching Frequency		1 MHz

QUICK START PROCEDURE

The DC785 demonstration board is easy to set up to evaluate the performance of the LTC3418. For proper measurement equipment configuration, set up the circuit according to the diagram in **Figure 1**. Before proceeding to test, insert jumper JP2 shunt into the off (lower) position, connecting the RUN pin to ground (GND), which shuts down the circuit.

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. Connect the input power supply and the load to the board. Do not hot-plug Vin or increase Vin over the rated maximum supply voltage of 5.5V, or the part may be damaged. Refer to figure 1 for the proper measurement equipment setup.
2. Insert the shunts in the TRACK OFF position of jumper JP1, in the Force Continuous position of jumper JP3, and in the 1.2V output voltage position.
3. Apply 3.3V at Vin. Measure Vout; it should read 0V. If desired, one can measure the shutdown supply current at this point. The supply current will be approximately 1 uA in shutdown.
4. Turn on the circuit by inserting the shunt in jumper JP2 into the ON (upper) position. The output voltage should be regulating. Measure Vout - it should measure 1.2V +/- 2%.
5. Vary the input voltage from 2.25V to 5.5V and adjust the load current from 0 to 8A. Vout should read between 1.2V +/- 4%.
6. Measure the output ripple voltage at any output current level; it usually will measure less than 20 mVAC.
7. Observe the voltage waveform at the switch node (one pin of the inductor). Verify the switching frequency is between 0.88 MHz and 1.12 MHz (T = 1.13 us and 0.893 us), and that the switch node waveform is rectangular in shape.

Insert jumper JP2 shunt into the OFF position and move the 1.2V Vout shunt into any of the remaining output voltage options: 1.5V or 1.8V. Re-insert jumper JP2 into the ON position. Just as in the 1.2Vout test, the output voltage should read Vout +/- 2% tolerance under static line and load conditions, and +/- 2% tolerance under dynamic line and load conditions. The Burst-Mode™ capability of the LTC3418 can also be observed now by changing the JP3 jumper shunt from the Force Continuous (upper) position to the Burst-Mode™ (lower) position.

When finished, turn off the circuit (connecting the RUN pin to ground) by inserting the shunt in jumper JP2 into the OFF (lower) position.

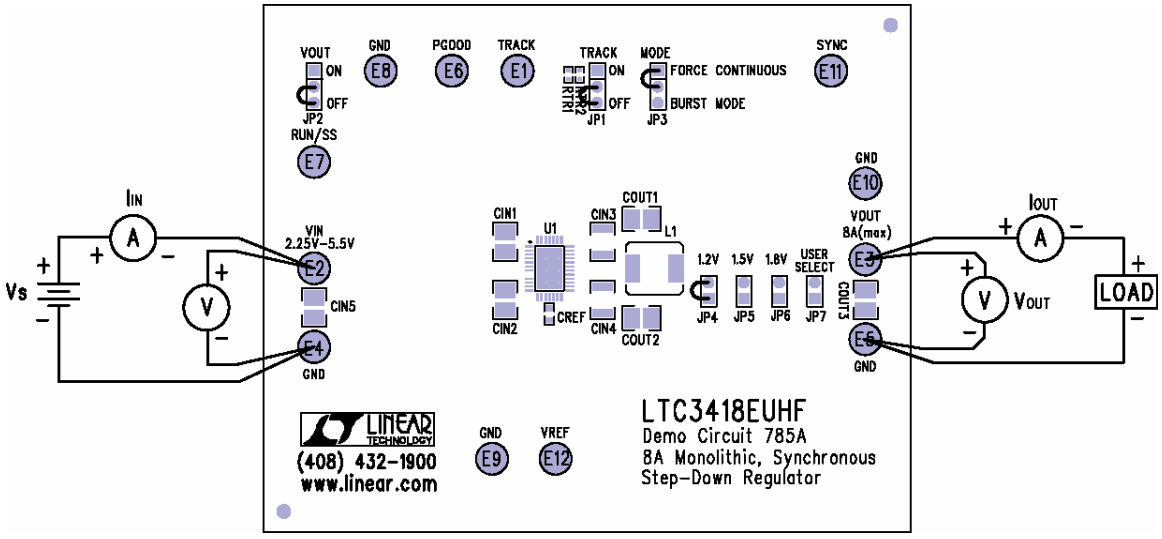


Figure 1. Proper Measurement Equipment Setup

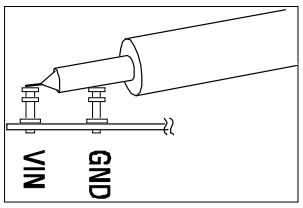


Figure 2. Measuring Input or Output Ripple

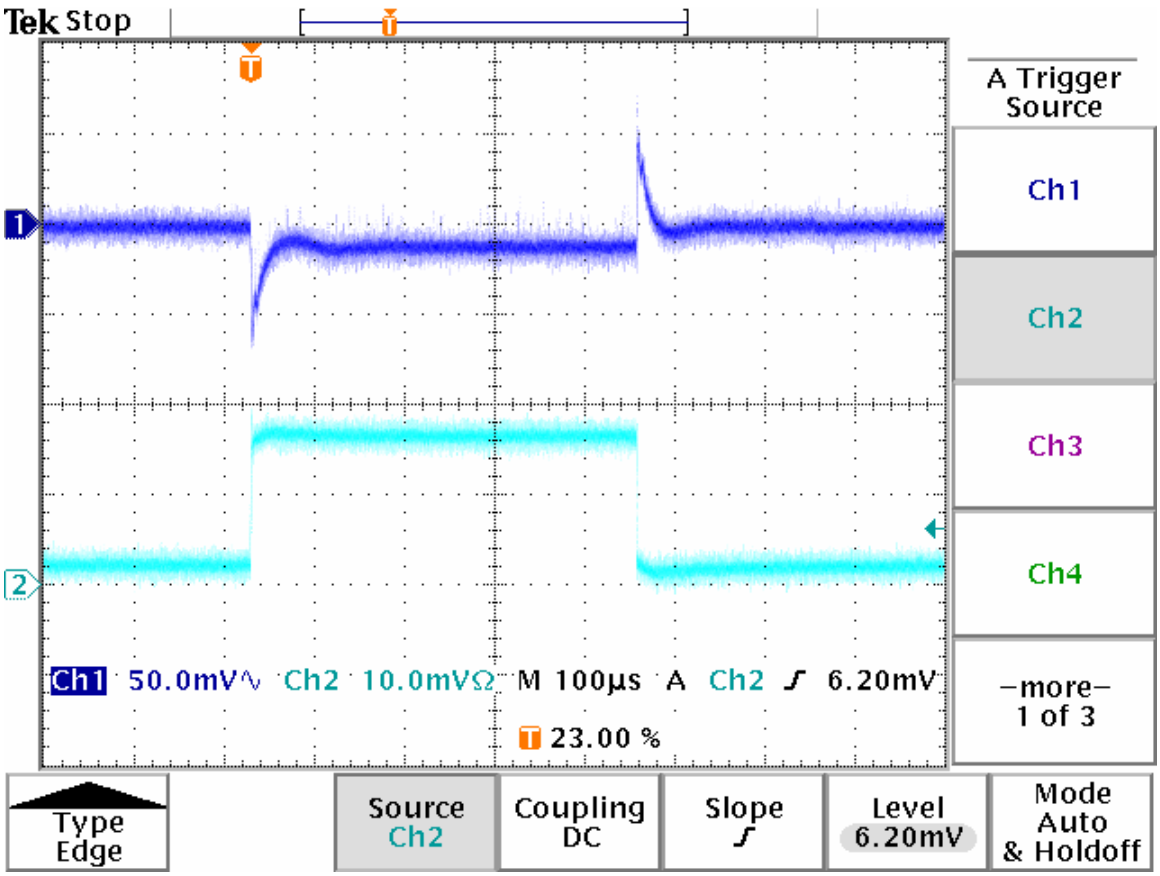


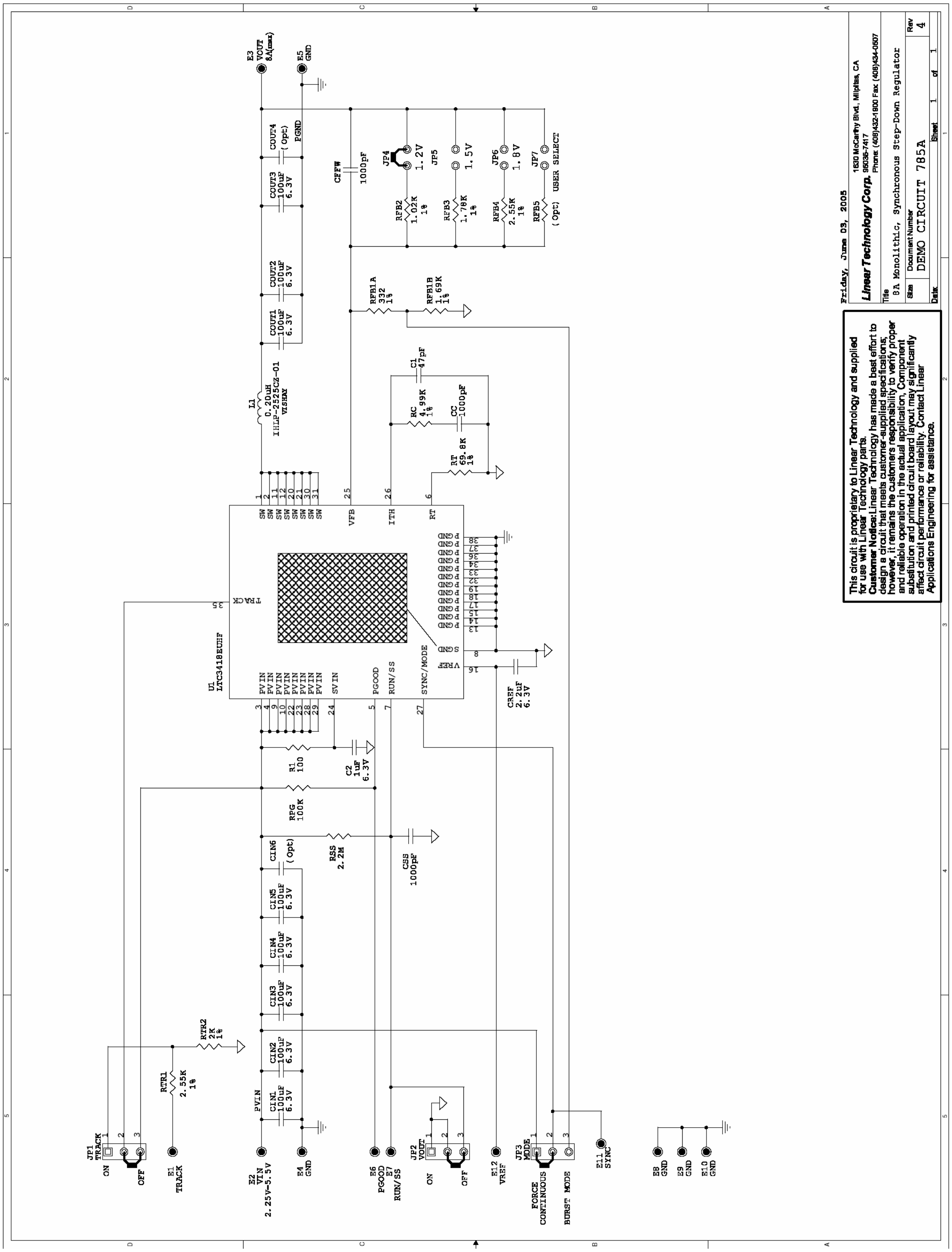
Figure 3. Load Step Response

Vin – 3.3V Vout – 1.8V

Iout Step – 7A

Trace 1: Output Voltage (50 mV/div AC)

Trace 2: Output Current (5A/div)


U1
LTC3418EUHF
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.
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Title
8A Monolithic, Synchronous Step-Down Regulator
Size
Document Number
DEMO CIRCUIT 785A
Rev
4
Date
Sheet 1 of 1