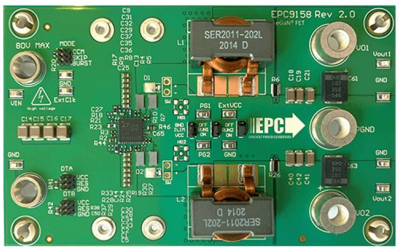


LINEAR TECHNOLOGY LTC3851EGN Demonstration Circuit 1171A Synchronous Buck Converter User Guide

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1171A
SYNCHRONOUS BUCK CONVERTER
LTC3851EGN

Contents

DESCRIPTION

Demonstration circuit 1171A is a single output synchronous buck converter featuring the LTC3851EGN. The circuit is designed with all components on the top side. The package style for the LTC3851EGN is a 16-lead narrow SSOP.

Two versions of the board are available. DC1171A-A has an on-board sense resistor for current feedback, while the DC1171A-B is configured with a DCR sense circuit that allows the converter to use the inductor's DCR as the sense element instead of the on-board sense resistor to save cost, board space while improving full load efficiency over 2%.

The main features of the board include an internal 5V linear regulator for bias and a Mode selector that allows the converter to run in CCM, pulse skip or Burst Mode operation (requires some minor modification). Synchronization to an external clock is also possible.

The input voltage range is 4.5V to 14V. The LTC3851 datasheet gives a complete description of the part, operation and application information and must be read in conjunction with this quick start guide for demo circuit 1171A.
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 = 25°C)

PARAMETER	CONDITION	VALUE
Input Voltage Range		4.5V – 14V
Output Voltage VOUT	V = 4.5V to 14V, I = 0A to 15A	1.5V ±2%
Nominal Switching Frequency		400kHz
Efficiency	VOUT = 1.5V, IOUT1 = 15A; VIN = 12V	87.3% Typical (A-A) 90.0% Typical (A-B)

QUICK START PROCEDURE

Demonstration circuit 1171A is easy to set up to evaluate the performance of the LTC3851EGN.
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 Vin or Vout and GND terminals.
See Figure 2 for proper scope probe technique.

1. Place jumpers in the following positions:

JP1	400k
JP2	On
JP3	CCM

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 14V.
4. Check for the proper output voltage.
   Vout = 1.470V to 1.530V
   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 voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
6. Different operating modes can be evaluated by changing the position of jumper JP3 and are discussed in the next section.

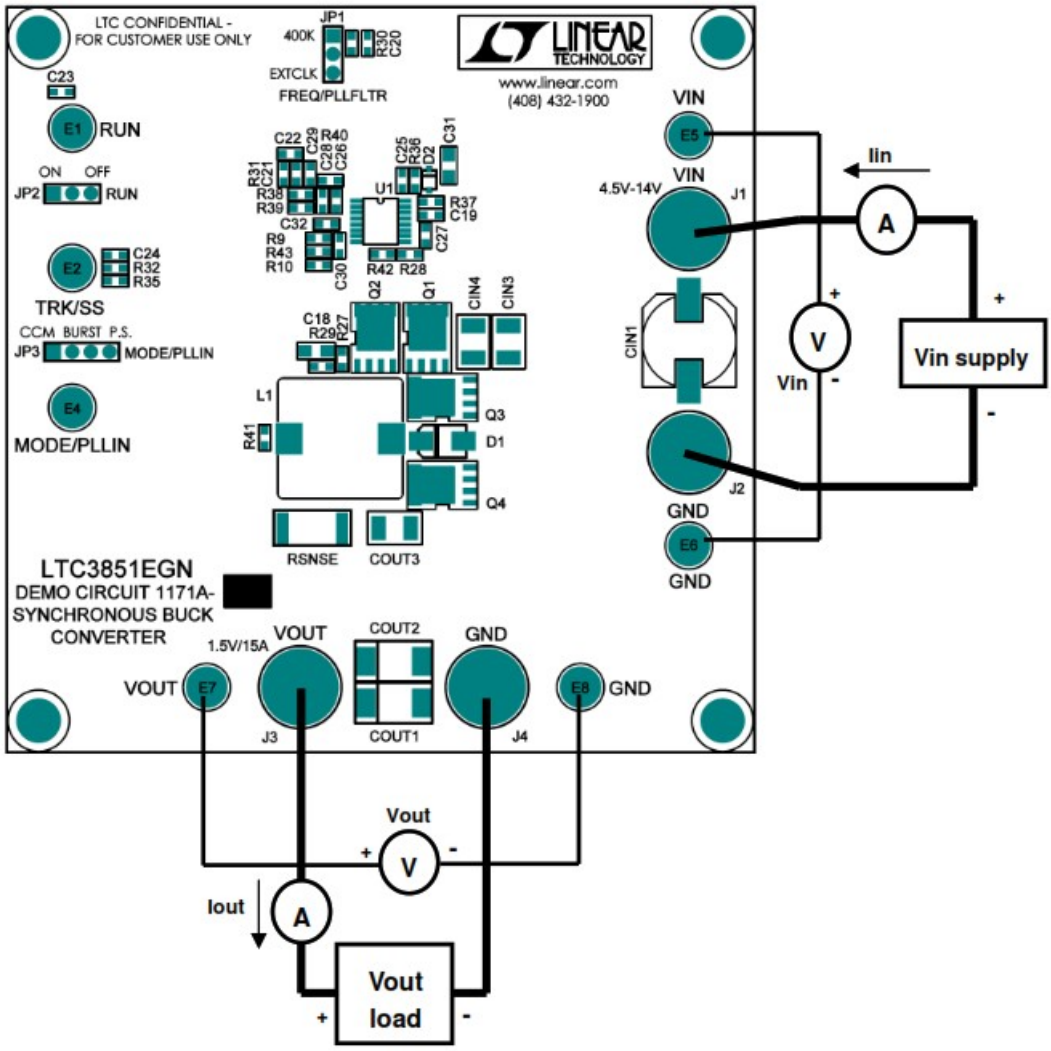


Figure 1. Proper Measurement Equipment Setup

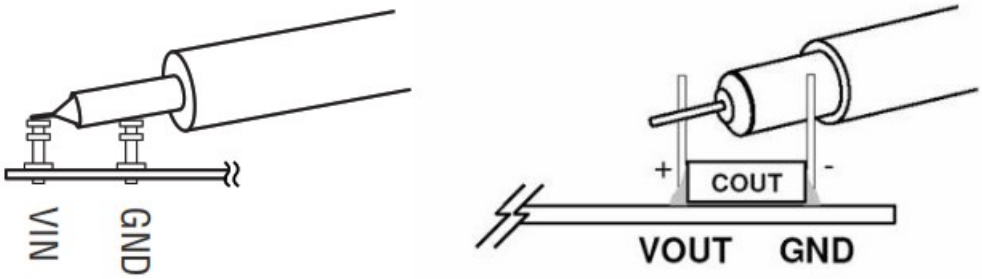


Figure 2. Measuring Input or Output Ripple Across Terminals or Directly Across Bulk Capacitor

FREQUENCY SYNCHRONIZATION AND MODE SELECTION

Demonstration circuit 1171A's Mode selector allows the converter to run in CCM or pulse skip operation by changing position of jumper JP3. For synchronizing to an external clock source both JP1 and JP3 needs to be adjusted, while for Burst Mode operation some bench modification is needed.
Refer to Table 2 and to the data sheet for more details.

Table 2. Mode Selection and Synchronized Operation Options

	BOARD MODIFICATION		MODE SELECTOR
CONFIGURATION		JP1	JP4
CCM operation	–	‘400K’	‘CCM’
Pulse skip operation	–	‘400K’	‘P.S.’
Burst Mode operation	100k resistor between JP4 pin1 and pin2	‘400K’	Remove Jumper
Synchronized to ext. clock applied to MODE/PLLIN pi n	–	‘EXTCLK’	‘BURST’

RAIL TRACKING

Demonstration circuit 1171A is configured for an on board soft start circuit. The soft start ramp rate can be adjusted by changing the value of C24. Demonstration circuit 1171A can also be modified to track an external reference. Refer to Table 3 for tracking options and to the data sheet for more details.

Table 3. Output Tracking Options

	TRK/SS RESISTORS AND CAPACIT OR			**RAIL TRACKING**
CONFIGURATION	R32	R35	C24	TRK/SS PIN
Soft Start Without Tracking (Default)	0.Q	Open	0.1 pF	Open
Vout equals External Ramp	0.Q	Open	Open	External reference applied
Vout tracking scaled external ramp	Resistor divider		Open	External reference applied

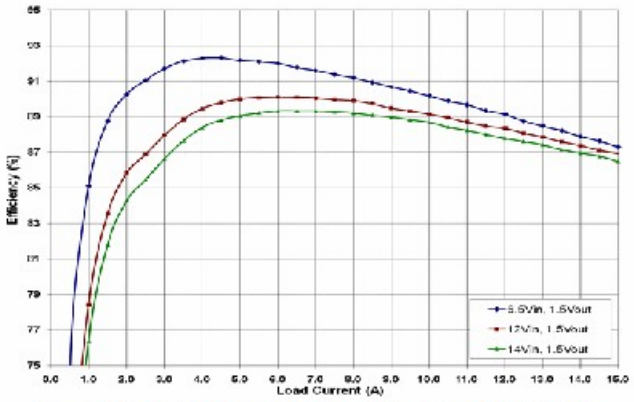


Figure 3. Typical Efficiency vs. Load Current for DC1171A-A

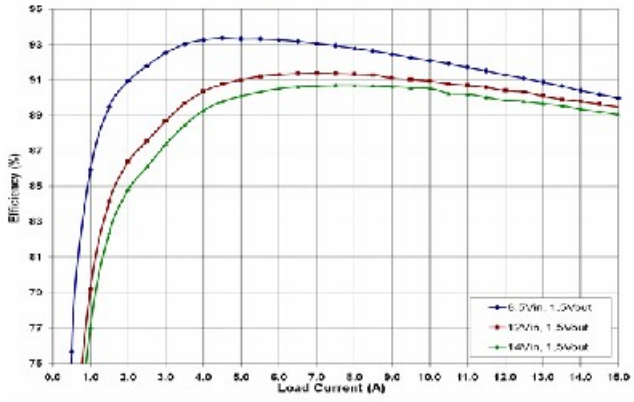


Figure 4. Typical Efficiency vs. Load Current for DC1171A-B

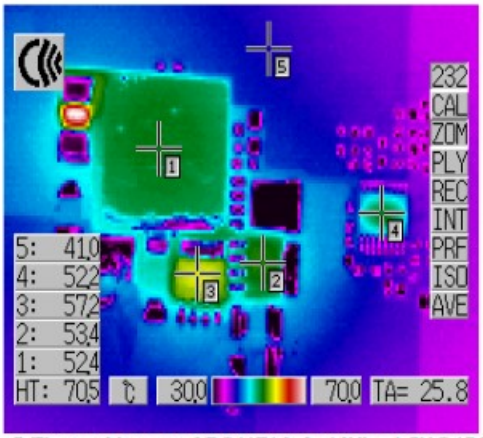
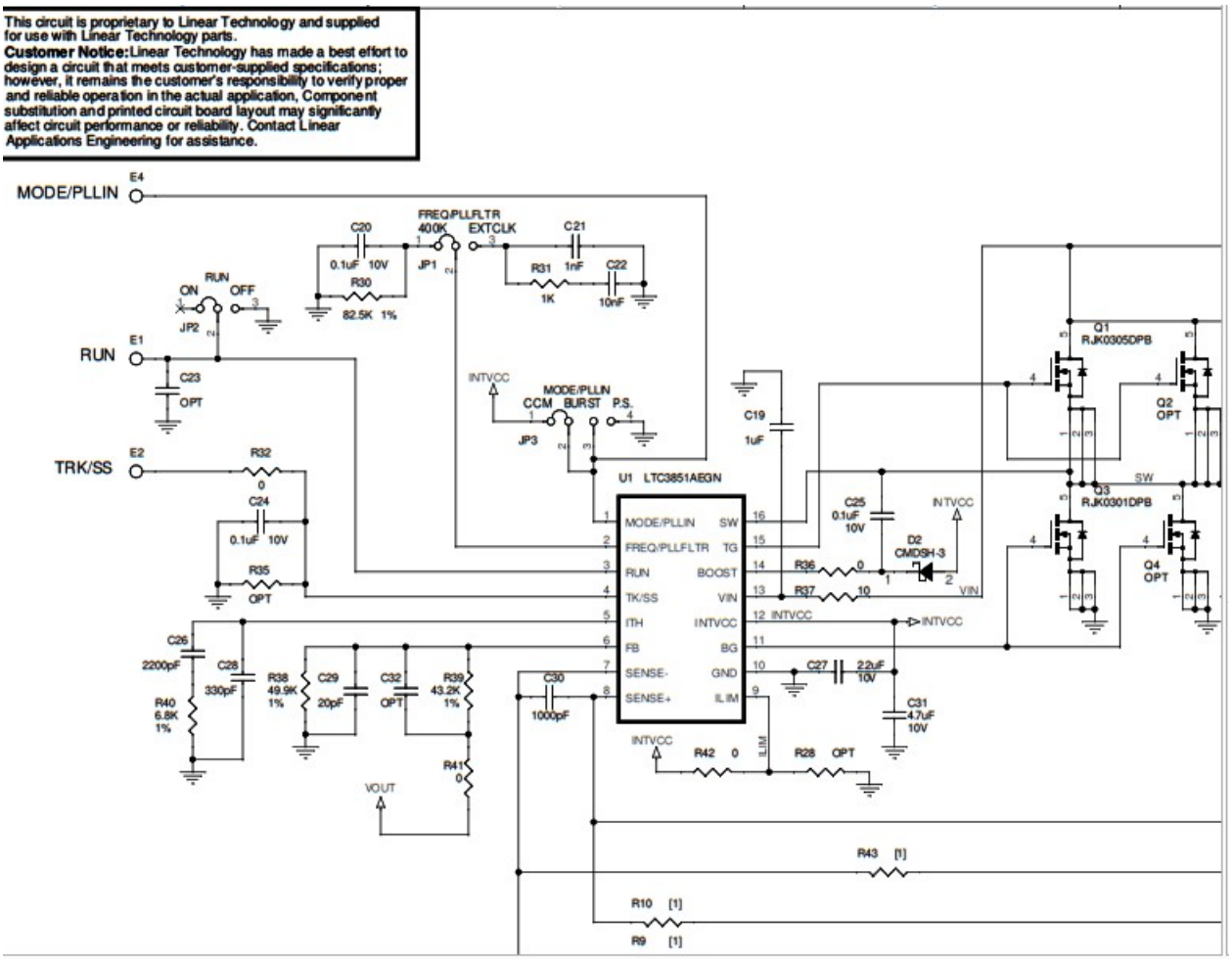


Figure 5. Thermal image of DC1171A-A, 14Vin, 1.5V@15Aout



Documents / Resources

	LINEAR TECHNOLOGY LTC3851EGN Demonstration Circuit 1171A Synchronous Buck Converter [pdf] User Guide LTC3851EGN, LTC3851EGN Demonstration Circuit 1171A Synchronous Buck Converter, Demonstration Circuit 1171A Synchronous Buck Converter, Circuit 1171A Synchronous Buck Converter, 1171A Synchronous Buck Converter, Synchronous Buck Converter, Buck Converter, Converter