QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1318

HIGH INPUT VOLTAGE AND HIGH CURRENT DENSITY STEP-DOWN CONVERTER

LTC3611EWP

DESCRIPTION

Demonstration circuit 1318 is a Synchronous Step-Down Converter featuring the LTC®3611, the high efficiency, high density DC/DC regulator. The input voltage range of DC1318 is from 9V to 32V and the output voltage is jumper selectable from 1.5V to 3.3V, although LTC®3611 has an input range from 4.5V to 32V and the output voltage range is from 0.6V. The rated load current is 10A. The regulator includes the controller and power MOSFETs in the 9mm by 9 mm QFN package.

The constant on time valley mode current control structure delivers very low duty cycle with excellent load transient response. The MOSFET RDS(on) sensing eliminates external sensing resistor and improves supply efficiency.

Discontinuous mode operation and continuous mode at light load is also jumper selectable. A forced continuous control reduces noise and RF interference while discontinuous control provides high efficiency at light loads.

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	CONDITION	VALUE
Minimum Input Voltage		9V
Maximum Input Voltage		32V
Output Voltage V_{OUT}	Jumper selectable (open for 0.6V)	1.5V, 1.8V, 2.5V, 3.3V ± 2%
Maximum Continuous Output Current	De-rating is necessary for certain V_{IN}, V_{OUT}, and thermal conditions, see datasheet	$10A_{DC}$
Operating Frequency	Programmable	500kHz default
Efficiency	V_{IN}=24V, V_{OUT} =2.5V, I_{OUT}=10A	87.8%, See Figure 3
	V_{IN}=24V, V_{OUT} =3.3V, I_{OUT}=10A	89.1%, See Figure 3
Load Transient	V_{IN}=24V, V_{OUT} =1.8V	See Figure 5

QUICK START PROCEDURE

Demonstration circuit 1318 is easy to set up to evaluate the performance of the LTC3611. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions for a typical 1.8V_{OUT} application:

Vout Select	RUN	FCB
1.8V	ON	CCM

2. With power off, connect the input power supply, load and meters as shown in **Figure 1**. Preset the load to 0A and Vin supply to be less than 32V.
3. Turn on the power at the input. The output voltage should be 1.8V ± 2%.
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters. Output ripple should be measured across the output bulk capacitor as shown in Figure 2.

5. For optional load transient test, apply adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle (<5%) to limit the thermal stress on the transient load circuit. The output transient current can be monitored at BNC connector J6 (5mV/A). Output voltage transient response should be measured at J5 with a BNC cable.

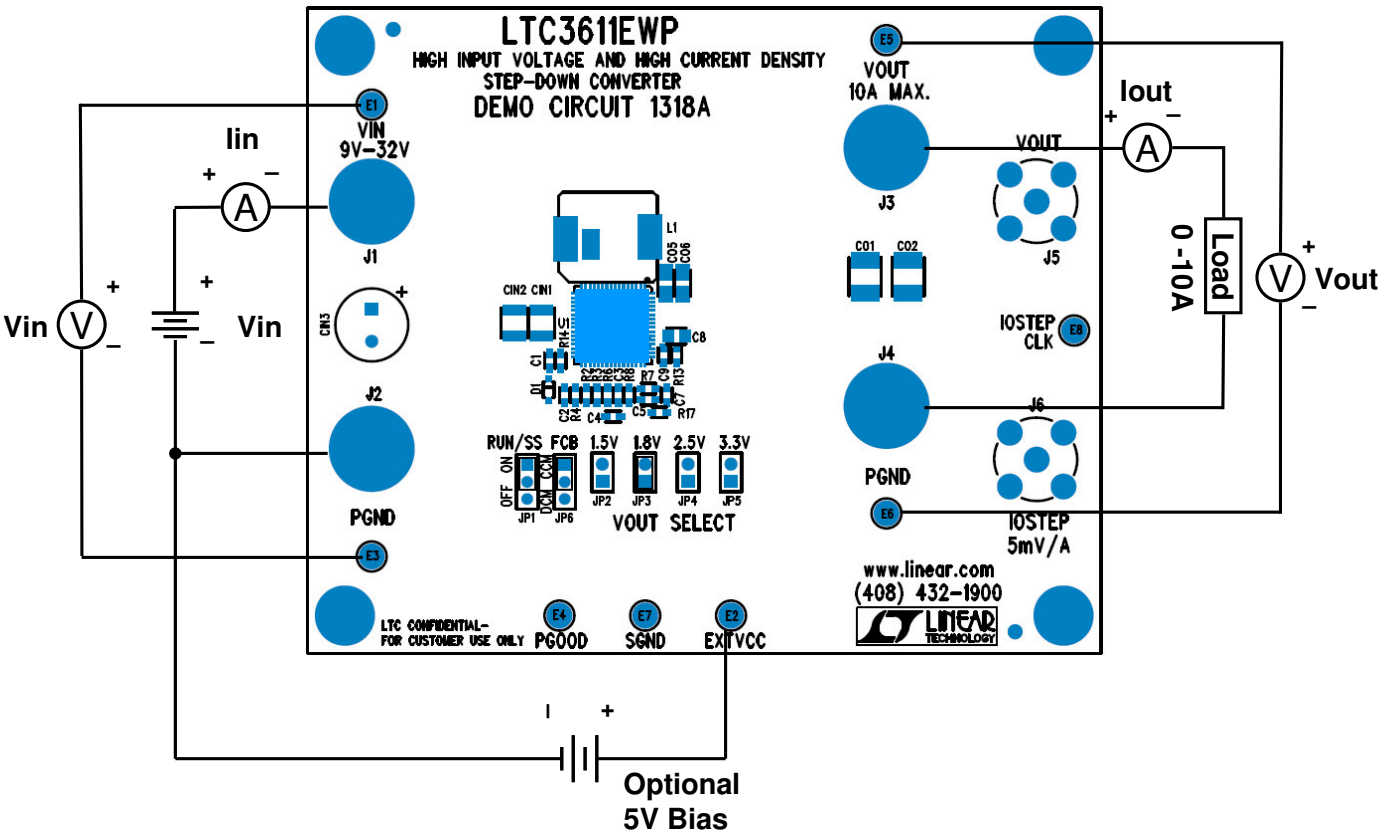
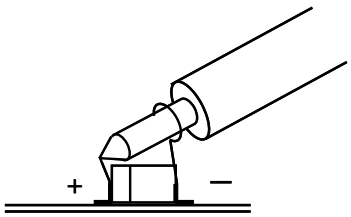


Figure 1. Proper Measurement Equipment Setup

(EXTVCC Bias Supply is Optional)



Input or Output Capacitor

Figure 2. Scope Probe Placements for Measuring Input or Output Ripple.

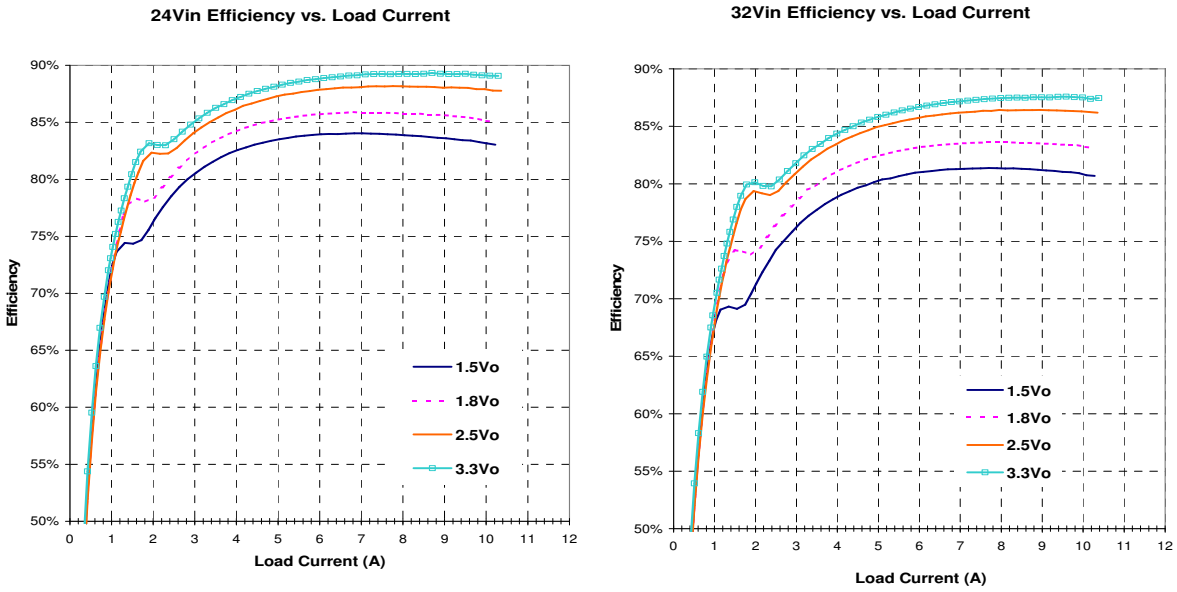


Figure 3. Measured Supply Efficiency with Different V_{IN} and V_{OUT}

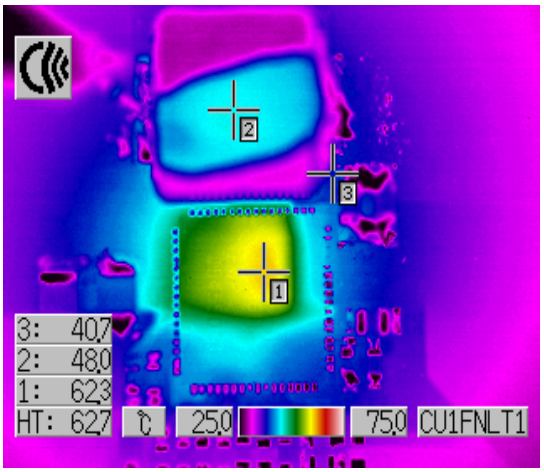


Figure 4. Thermal image of DC1318

Vin = 24V

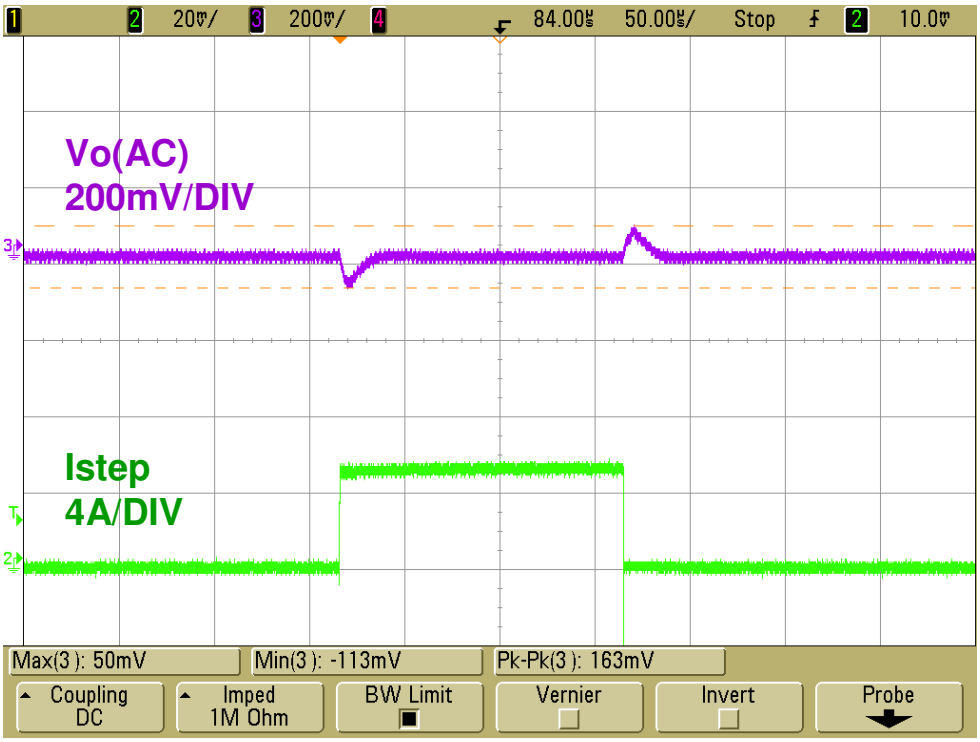
Vout =1.8V

Iout = 10A

Tambient = 25°C, no forced airflow

Cross 1: MOSFETs

Cross 2: Inductor



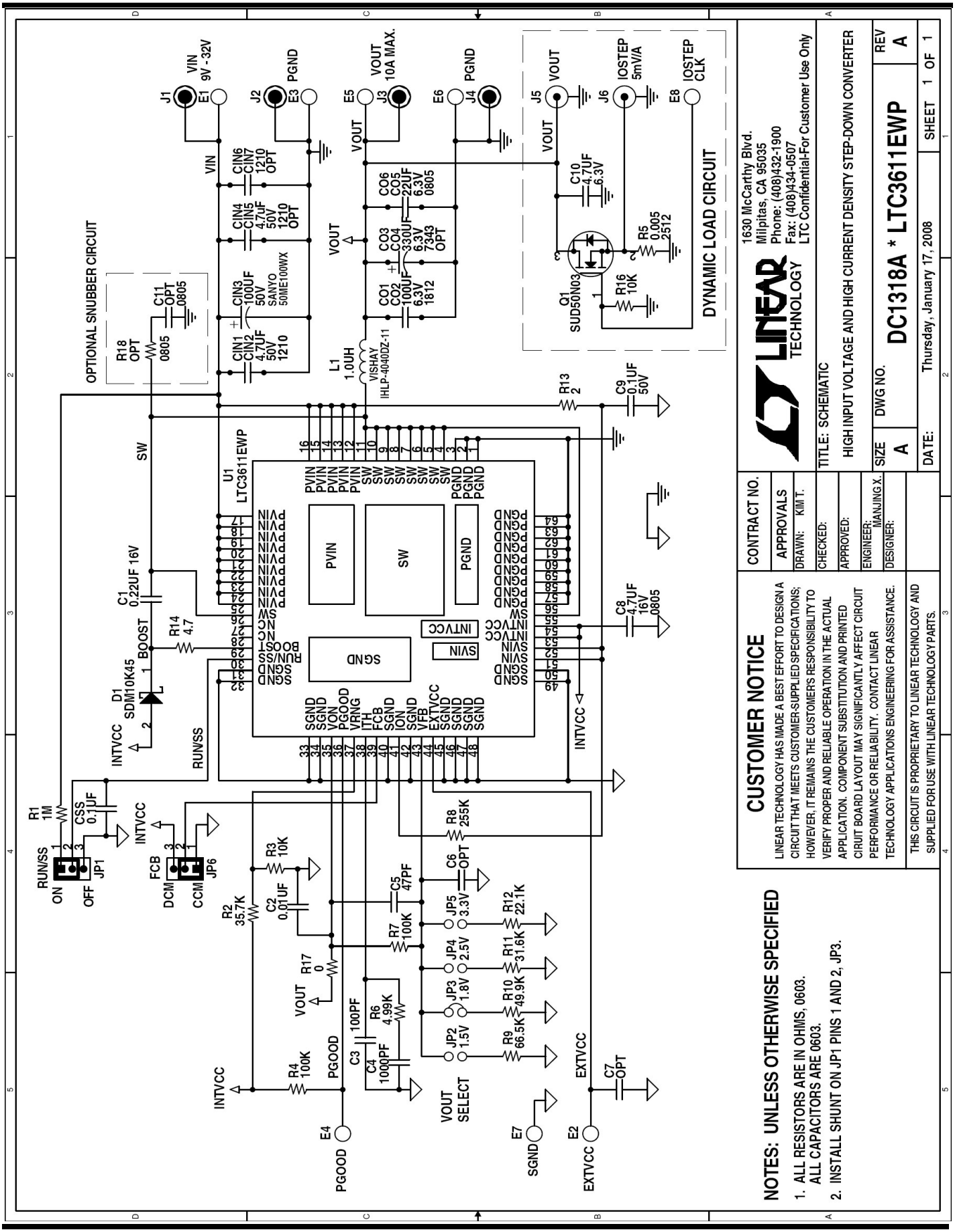
Vin = 24V

Vout =1.8V

2.5A to 7.5A LOAD STEP

Cout = 2 X 22uF ceramic, X5R, 0805, 2X100uF ceramic, X5R, 1812

Figure 5. Measured Load Transient Response (2.5-7.5A Step, 25% to 75%)


VIN 9V - 32V
PGND
VOUT 10A MAX.
IOSTEP 5mV/A
IOSTEP CLK
DYNAMIC LOAD CIRCUIT
OPTIONAL SNUBBER CIRCUIT
U1 LTC3611EWP
L1 1.0UH VISHAY IHLP-4040DZ-11
D1 SDM10K45
Q1 SUD50N03
RUN/SS
FCB
VOUT SELECT
PGOOD
SGND
EXTVCC
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 CIRUIT 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
DRAWN: KIM T.
CHECKED:
APPROVED:
ENGINEER: MANJUNG X.
DESIGNER:
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
LTC Confidential-For Customer Use Only
TITLE: SCHEMATIC
HIGH INPUT VOLTAGE AND HIGH CURRENT DENSITY STEP-DOWN CONVERTER
SIZE A
DWG NO. DC1318A * LTC3611EWP
REV A
DATE: Thursday, January 17, 2008
SHEET 1 OF 1
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0603. ALL CAPACITORS ARE 0603.
2. INSTALL SHUNT ON JP1 PINS 1 AND 2, JP3.