LOW QUIESCENT CURRENT, HIGH VOLTAGE STEP−DOWN CONVERTER

DESCRIPTION

Demonstration circuit 1695 is a Low Quiescent Current, Synchronous Buck Converter featuring the LTC3891EFE. DC1695 converts a 4.5V-60V voltage source to 3.3V at 5.0A.

The main features of the board include an internal LDO for power gate driver from VIN or EXTVCC, RUN and PGOOD pins and a Mode selector that allows converter to run in CCM, Pulse Skipping or Burst Mode operation, selectable current limit. DC1695 supports also adjustable output voltage, Soft-Start and Tracking. Synchronization to an external clock is possible as well. The wide input voltage range of 4.5V to 60V is suitable for automotive or other battery fed application and Distributed DC Power Systems where low quiescent current is important.

The LTC3891EFE datasheet gives a complete description of this part, operation and application information. The datasheets must be read in conjunction with this quick start guide for demo circuit 1695.

The 60V avalanche rated MOSFETs, which are used on DC1695, can be operated at their rated voltage. However, if application derating requirements are stricter, MOSFETs with higher voltage

rating can be used. Please note, MOSFETs with higher voltage ratings may affect the efficiency. If 60V MOSFETs are used, keep in mind that avalanche rating and testing is typically done with 30% over voltage margin (78V for 60V rated MOSFET). Please check with particular MOSFET manufacturer to ensure the avalanche voltage rating.

DC1695 supports following MOSFET packages: LFPAK, PowerPAK SO-8 and PowerPAK 1212-8. Subsequent logic level MOSFETs can be used with DC1695

Si7850DP	Vishay
RJK0651DPB	Renesas
HAT2266H	Renesas
BSC100N06LS3 G	Infineon
Si7120DN	Vishay

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

PARAMETER	CONDITIONS	VALUE	UNITS
Minimum Input Supply Voltage		4.5	V
Maximum Input Supply Voltage		60	V
Output Voltage Range	VIN = 4.5V to 60V, IOUT1 = 0A to 5A	3.3±2%	V
Typical switching frequency		225	kHz
Typical Output Ripple (VOUT, 3.3V)	I_{LOAD} = 5.0A	40	mV
Efficiency Typical (VOUT, 3.3V)		92	%
Supply Quiescent Current	Vin=24V; VOUT=3.3V, Io=0A, Burst mode	50.8	µA
Supply Shutdown Current	Vin=24V	14.7	µA

QUICK START PROCEDURE

Demonstration circuit 1695 is easy to set up to evaluate the performance of the LTC3891EFE. 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 jumper **JP1** in the **ON** position:

2. With power off, connect the input power supply to VIN and GND.

3. Turn on the power at the input. Check for the proper output voltages
VOUT1=3.234V to 3.366V,

NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
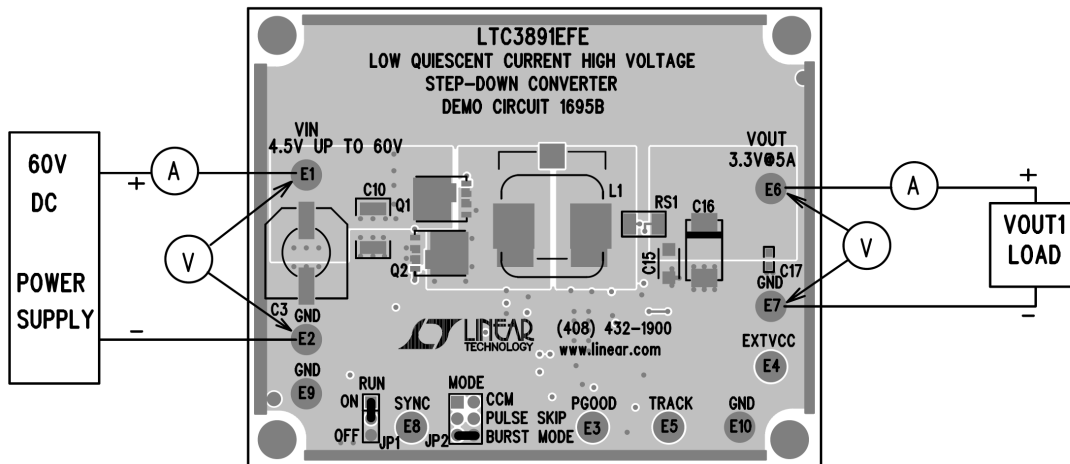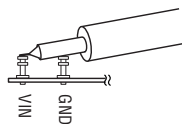

Figure 1. Proper Measurement Equipment Setup

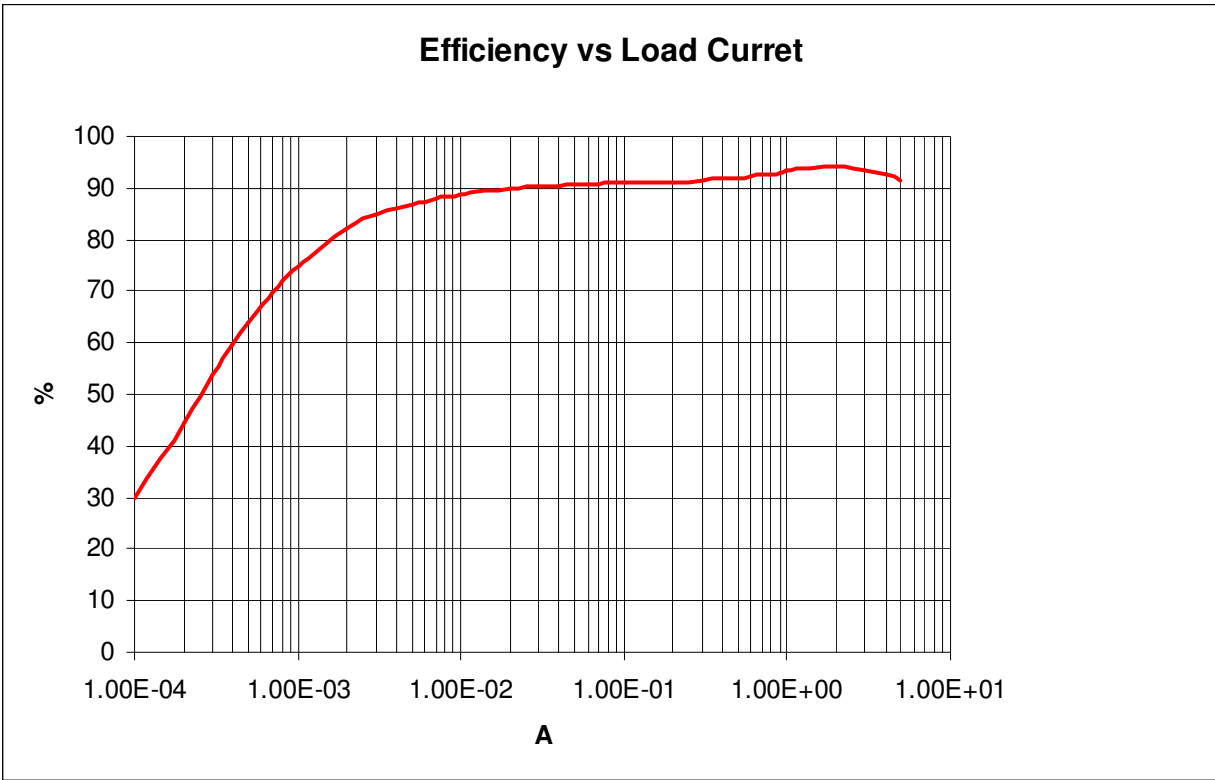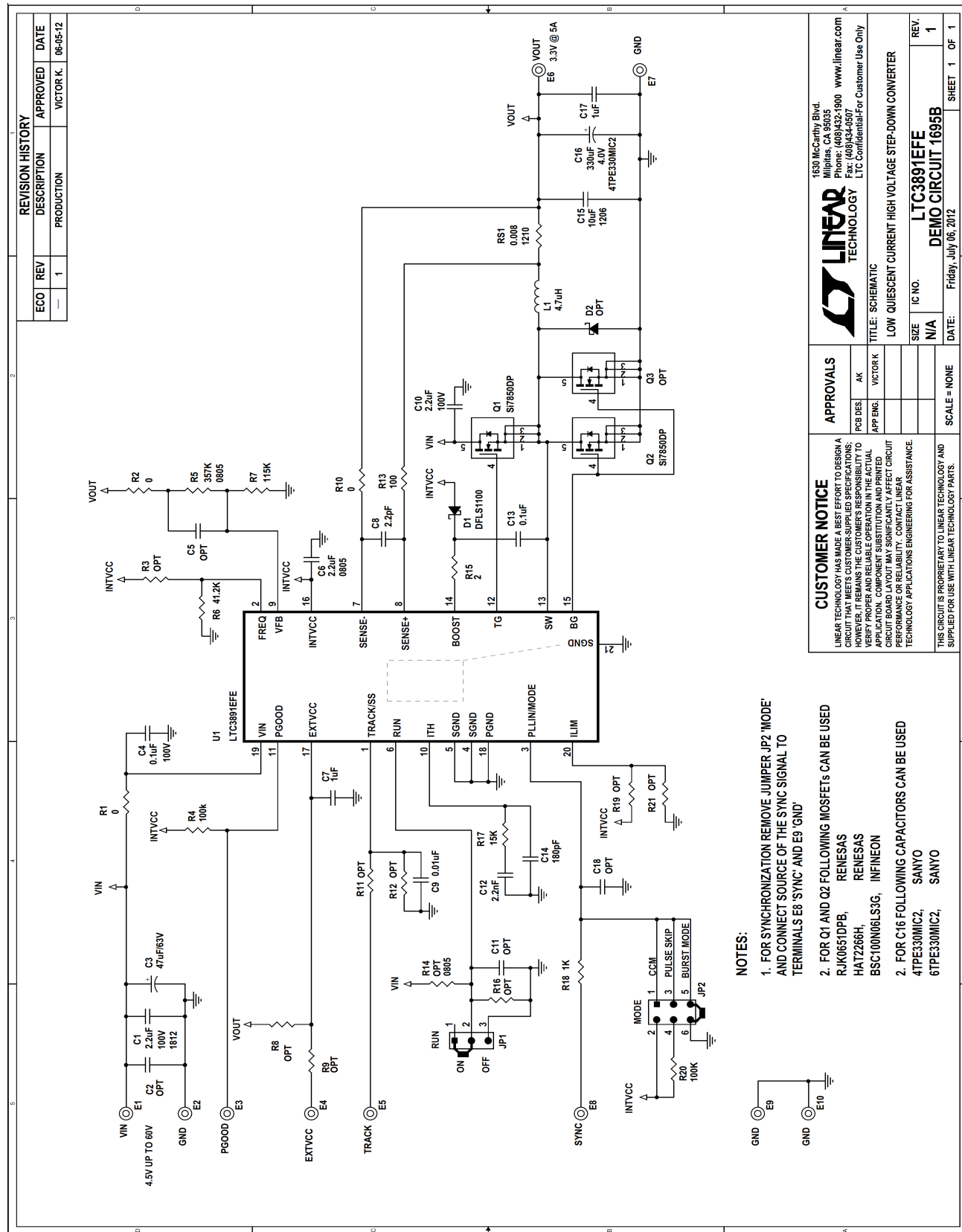
Measuring Input or output Ripple

Efficiency vs Load Curret

Figure 3. 3.3V Output, Efficiency vs. Load, Burst Mode, Vin 12V

REVISION HISTORY

ECO	REV	DESCRIPTION	APPROVED	DATE
—	1	PRODUCTION	VICTOR K.	06-05-12

NOTES:

1. FOR SYNCHRONIZATION REMOVE JUMPER JP2 'MODE' AND CONNECT SOURCE OF THE SYNC SIGNAL TO TERMINALS E8 'SYNC' AND E9 'GND'

2. FOR Q1 AND Q2 FOLLOWING MOSFETs CAN BE USED
RJK0651DPB,   RENESAS
HAT2266H,   RENESAS
BSC100N06LS3G,   INFINEON

2. FOR C16 FOLLOWING CAPACITORS CAN BE USED
4TPE330MIC2,   SANYO
6TPE330MIC2,   SANYO

U1
LTC3891EFE

VIN 4.5V UP TO 60V
E1

VIN
E2 GND

PGOOD
E3

VOUT
E4 EXTVCC

TRACK
E5

SYNC
E8

GND
E9

GND
E10

VOUT 3.3V @ 5A
E6

GND
E7

C1 2.2uF 100V 1812
C2 OPT
C3 47uF/63V
R1 0
C4 0.1uF 100V
R4 100k
C7 1uF
R8 OPT
R9 OPT
R11 OPT
R12 OPT
C9 0.01uF
C12 2.2uF
R17 15K
C14 180pF
C18 OPT
R14 OPT 0805
C11 OPT
R16 OPT
R18 1K
R20 100K
R19 OPT
R21 OPT

R2 0
R5 357K 0805
R7 115K
R3 OPT
C5 OPT
R6 41.2K
C6 2.2uF 0805
C8 2.2pF
R10 0
R13 100
D1 DFLS1100
R15 2
C13 0.1uF
C10 2.2uF 100V
Q1 SI7850DP
Q2 SI7850DP
Q3 OPT
D2 OPT
L1 4.7uH
RS1 0.008 1210
C15 10uF 1206
C16 330uF 4.0V 4TPE330MIC2
C17 1uF

Pin labels: FREQ, VFB, INTVCC, SENSE-, SENSE+, BOOST, TG, SW, BG, SGND, VIN, PGOOD, EXTVCC, TRACK/SS, RUN, ITH, SGND, SGND, PGND, PLLIN/MODE, ILIM

JP1: RUN ON / OFF
JP2: MODE — CCM / PULSE SKIP / BURST MODE

INTVCC

APPROVALS

| PCB DES. | AK |
| APP ENG. | VICTOR K |

1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900   www.linear.com
Fax: (408)434-0507
LTC Confidential-For Customer Use Only

LINEAR TECHNOLOGY

TITLE: SCHEMATIC
LOW QUIESCENT CURRENT HIGH VOLTAGE STEP-DOWN CONVERTER

IC NO.
LTC3891EFE
DEMO CIRCUIT 1695B

SIZE N/A
REV. 1

DATE: Friday, July 06, 2012

SCALE = NONE

SHEET 1 OF 1

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Power Management IC Development Tools *category:*

Click to view products by Analog Devices *manufacturer:*

Other Similar products are found below :

EVAL-ADM1168LQEBZ EVB-EP5348UI MIC23451-AAAYFL EV MIC5281YMME EV DA9063-EVAL ADP122-3.3-EVALZ ADP130-0.8-EVALZ ADP130-1.2-EVALZ ADP130-1.5-EVALZ ADP130-1.8-EVALZ ADP1714-3.3-EVALZ ADP1716-2.5-EVALZ ADP1740-1.5-EVALZ ADP1752-1.5-EVALZ ADP1828LC-EVALZ ADP1870-0.3-EVALZ ADP1871-0.6-EVALZ ADP1873-0.6-EVALZ ADP1874-0.3-EVALZ ADP1882-1.0-EVALZ ADP199CB-EVALZ ADP2102-1.25-EVALZ ADP2102-1.875EVALZ ADP2102-1.8-EVALZ ADP2102-2-EVALZ ADP2102-3-EVALZ ADP2102-4-EVALZ ADP2106-1.8-EVALZ ADP2147CB-110EVALZ AS3606-DB BQ24010EVM BQ24075TEVM BQ24155EVM BQ24157EVM-697 BQ24160EVM-742 BQ24296MEVM-655 BQ25010EVM BQ3055EVM NCV891330PD50GEVB ISLUSBI2CKIT1Z LM2744EVAL LM2854EVAL LM3658SD-AEV/NOPB LM3658SDEV/NOPB LM3691TL-1.8EV/NOPB LM4510SDEV/NOPB LM5033SD-EVAL LP38512TS-1.8EV EVAL-ADM1186-1MBZ EVAL-ADM1186-2MBZ