DEMO CIRCUIT
1155A

LTC3780EUH
SMALL SIZE HIGH EFFICIENCY BUCK-BOOST DC/DC CONVERTER

DESCRIPTION

Demonstration circuit 1155A is a compact high efficiency synchronous buck-boost DC/DC converter with 6V to 32V input range. It can supply 2A maximum load current at 12V output. The demo board features the LTC®3780EUH controller. The constant frequency current mode architecture allows a phase-lockable frequency of up to 400kHz. With a wide input range, output range and seamless transfers between operation modes, the LTC3780 is ideal for automotive, telecom and battery-powered systems. This board has a compact solution size with dual So-8 MOSFETs, small inductor and capacitor footprints. The package of LTC3780EUH is a small, low thermal impedance 5mm x 5mm 32-Lead QFN.

The operation mode of the converter is determined with the FCB pin. Use JP2 jumper to select burst mode, discontinuous mode or forced continuous mode operation. Switching frequency is pre-set at about 270kHz. This frequency can be easily modified from 200kHz to 400kHz by changing PLLFLTR pin DC voltage level (through R20 and R23). The converter can also be externally synchronized from 200kHz to 400kHz through PLLIN pin (SYNC terminal on the board). To shut down the converter, one simple way is to force the RUN pin below 1.5V (JP1: OFF). The power good output (PGOOD terminal) is low when the output is not within +/-7.5% of its designed set point.

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

Table 1. **Performance Summary (T_A = 25°C)**

PARAMETER	CONDITION	VALUE
Input Voltage Range		6V to 32V
Output Voltage, V_{OUT}	V_{IN} = 6-32V, I_{OUT} = 0A to 2A	12V ±2%
Maximum Output Current, I_{OUT}	V_{IN} = 6-32V, V_{OUT} = 12V	2A
Typical Efficiency	V_{IN} = 18V, V_{OUT} = 12V, I_{OUT} = 2A	96.1%
Typical Switching Frequency		270kHz

QUICK START PROCEDURE

Demonstration circuit 1155A is easy to set up to evaluate the performance of the LTC3780EUH. Refer to Figure 1 for the proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply to Vin (6V-32V) and GND (input return).
2. Connect the 12V output load between Vout and GND (Initial load: no load).
3. Connect the DVMs to the input and outputs.
4. Turn on the input power supply and check for the proper output voltages. Vout should be 12V+/-2%.
5. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage and other parameters.

Note: When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe. See Figure 2 for the proper scope probe technique. Short, stiff leads need to be soldered to the (+) and (-) terminals of an output capacitor. The probe's ground ring needs to touch the (-) lead and the probe tip needs to touch the (+) lead.

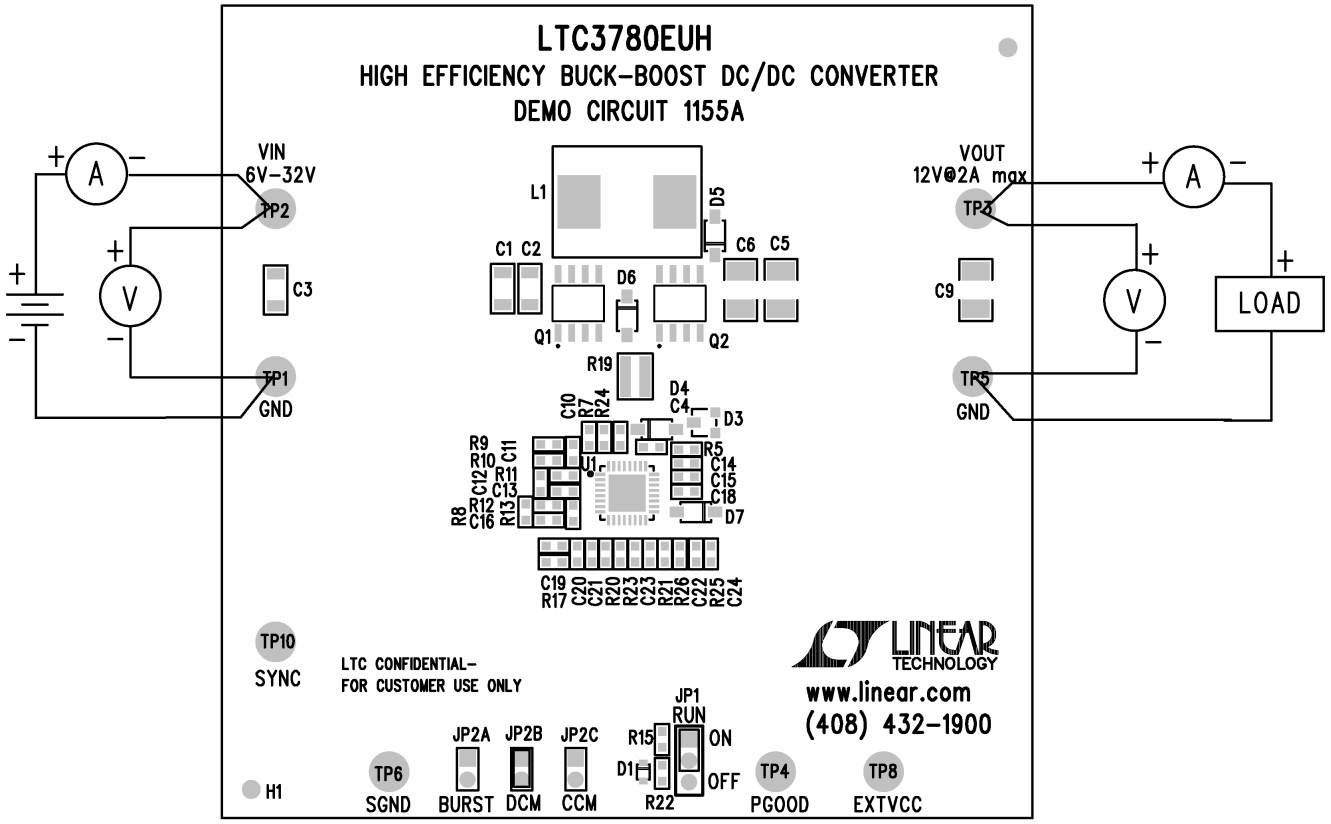


Figure 1. Proper Measurement Equipment Setup

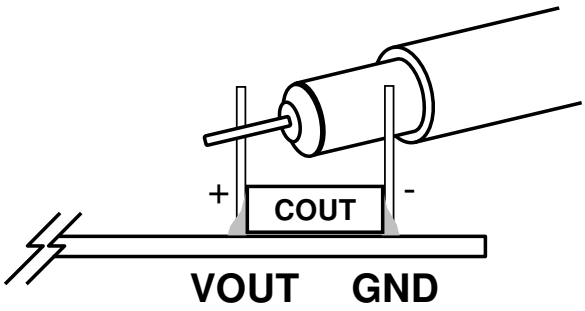


Figure 2. Measuring Output Voltage Ripple

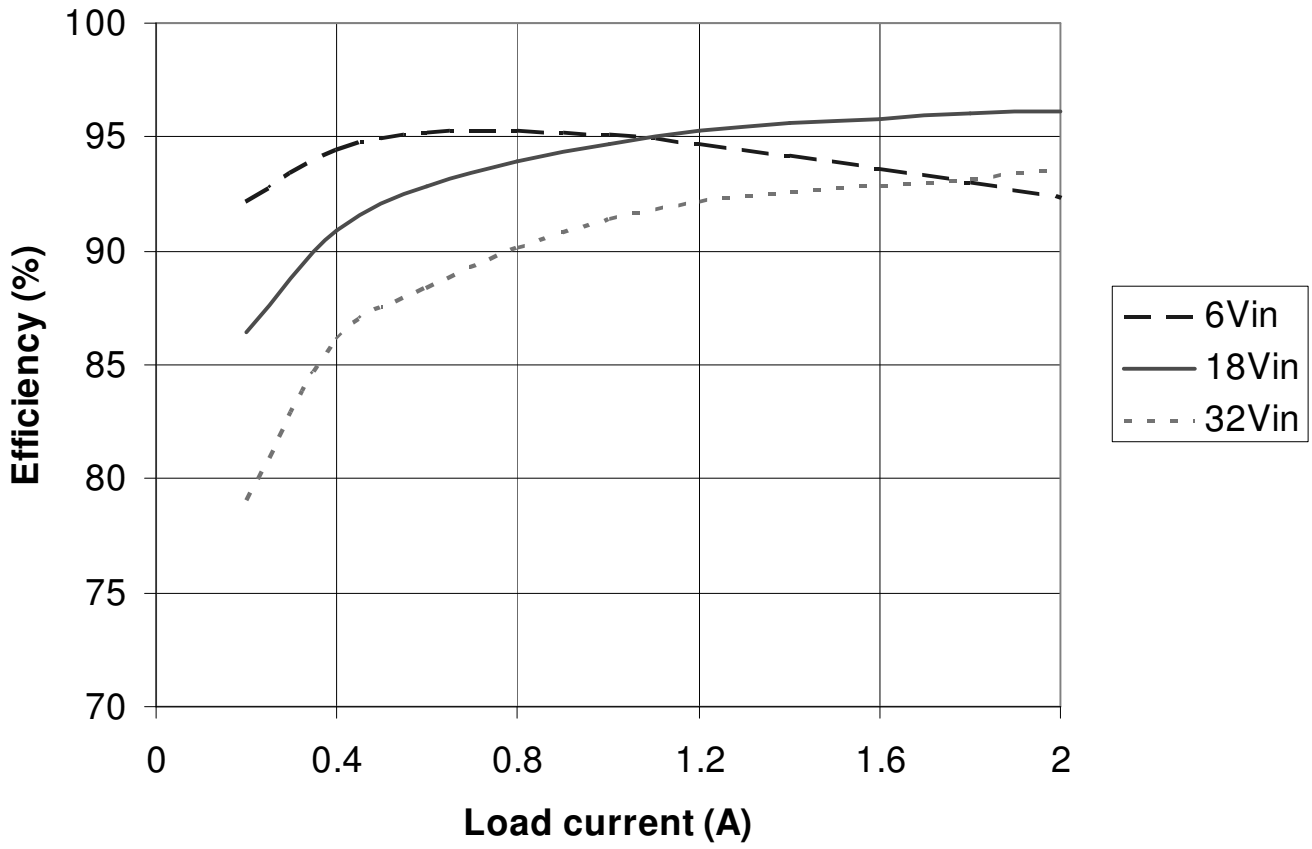
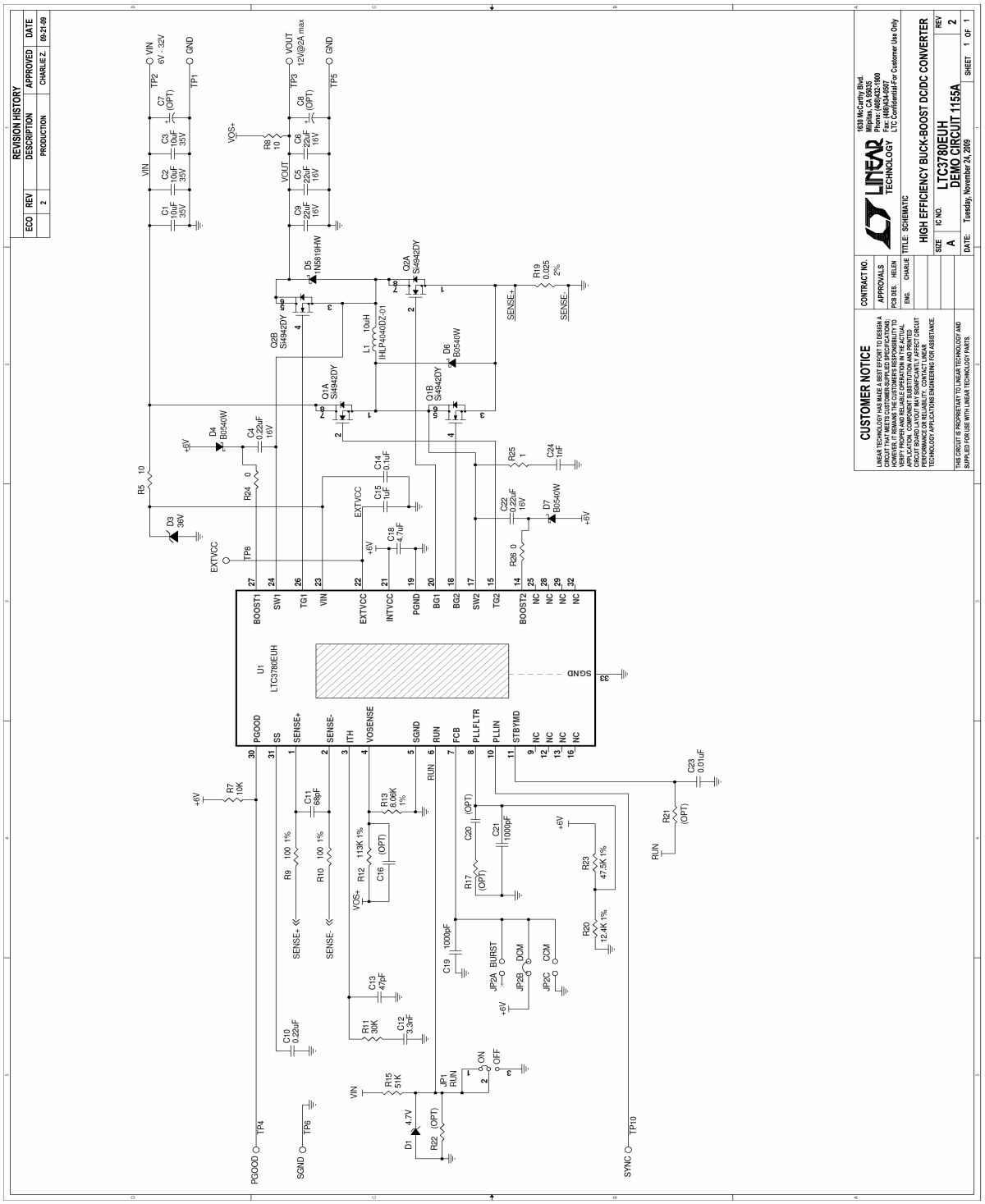


Figure 3. Efficiency vs load current (JP2: Burst)


REVISION HISTORY
ECO REV DESCRIPTION APPROVED DATE
2 PRODUCTION CHARLIE Z. 09-21-09
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TITLE: SCHEMATIC
HIGH EFFICIENCY BUCK-BOOST DC/DC CONVERTER
SIZE IC NO. REV
A LTC3780EUH 2
DEMO CIRCUIT 1155A
DATE: Tuesday, November 24, 2009 SHEET 1 OF 1
U1 LTC3780EUH
BOOST1 SW1 TG1 VIN EXTVCC INTVCC PGND BG1 BG2 SW2 TG2 BOOST2 NC NC NC NC
PGOOD SS SENSE+ SENSE- ITH VOSENSE SGND RUN FCB PLLFLTR PLLIN STBYMD NC NC NC NC
SGND
VIN 6V - 32V
VOUT 12V@2A max
GND
VOS+
SENSE+
SENSE-
EXTVCC
RUN
PGOOD
SGND
SYNC
BURST
DCM
CCM
ON
OFF