DESCRIPTION

Demonstration circuit 1580A is a high efficiency, polyphase, synchronous buck converter with 4.5V to 14V input range. It can supply 50A maximum load current at 1.5V output. The demo board uses the LTC®3856EUH controller. The LTC3856 is a feature-rich single-output dual-phase synchronous buck controller with on-chip drivers, remote output voltage sensing. This board is setup with sense resistor configuration with optional inductor DCR sensing circuit. Temperature compensation function can guarantee accurate current limit over a wide temperature range with DCR sensing. Stage shedding function allows the controller to decrease the phase number to be one at the light load condition in order to save switching related loss. Adaptive voltage positioning (AVP) can help improve the transient response. The LTC3856 is suitable for input from 4.5V to 38V and output up to 5V. The LTC3856 can provide high efficiency, high power density and versatile power solutions for telecom and datacom systems, industrial and medical instruments, DC power distribution systems and computer systems. The controller is available in 32-pin 5mm × 5mm QFN and 38-pin SSOP packages.

The RUN pin (JP1) provides enable feature. To shut down the converter, one simple way is to force the RUN pin below 1.2V (JP1: OFF). Use JP3 jumper to select burst mode, stage shedding mode or forced continuous mode operation. The phase of CLKOUT is set by JP2. Switching frequency is pre-set at about 400KHz, and it can be easily modified from 250KHz to 770KHz. Please see LTC3856 data sheet for detailed information.

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		4.5V to 14V
Output Voltage, V_{OUT}	V_{IN} = 4.5-14V, I_{OUT} = 0A to 50A	1.5V ±2%
Maximum Output Current, I_{OUT}	V_{IN} = 4.5-14V, V_{OUT} = 1.5V	50A
Typical Efficiency	V_{IN} = 12V, V_{OUT} = 1.5V, I_{OUT} = 50A	87.7%
Typical Switching Frequency		400kHz

QUICK START PROCEDURE

Demonstration circuit 1580A is easy to set up to evaluate the performance of the LTC3856EUH. 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 (4.5V-14V) and GND (input return).

2. Connect the 1.5V 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 1.5V+/-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.
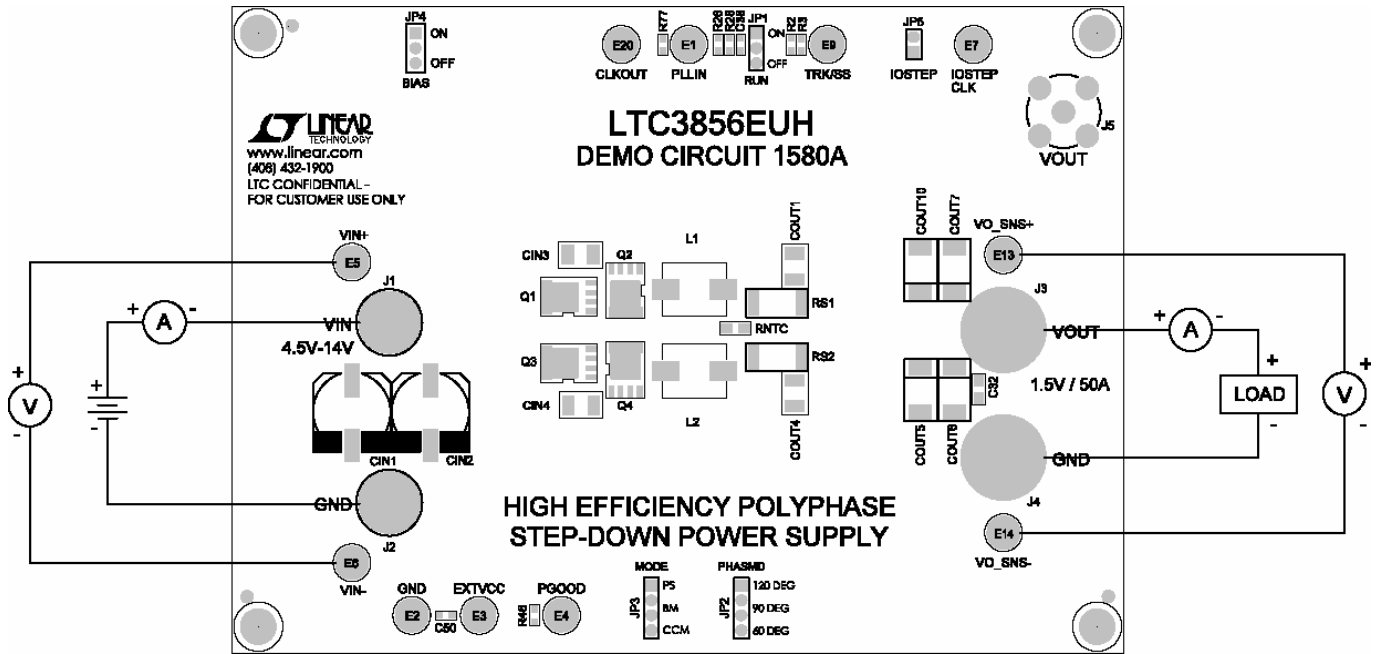
Figure 1. Proper Measurement Equipment Setup

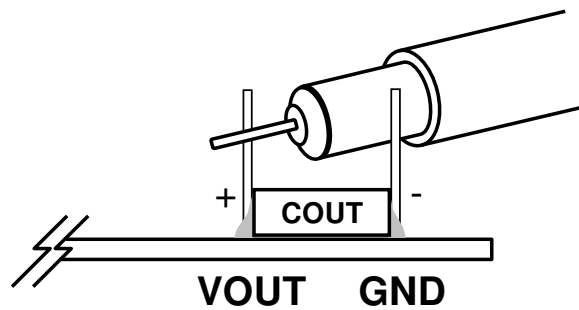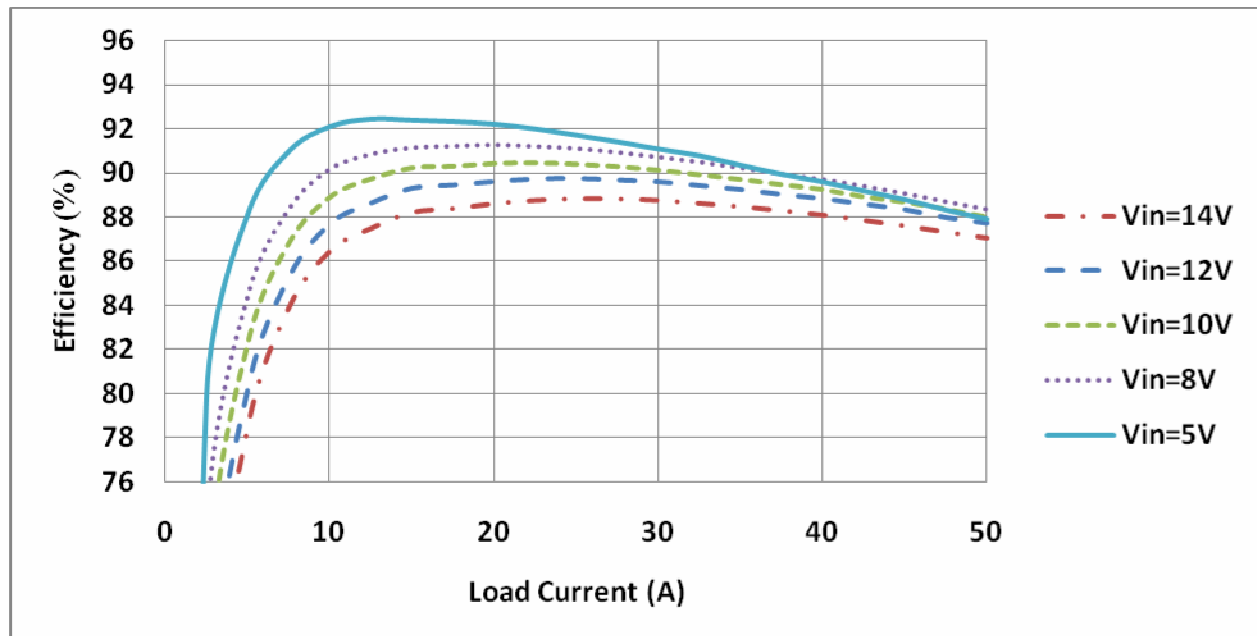Figure 2. Measuring Output Voltage Ripple

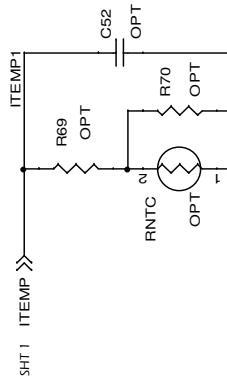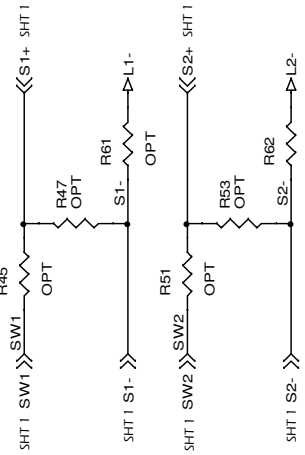Figure 3. Efficiency vs load current

Schematic diagram for LTC3856EUH evaluation board.
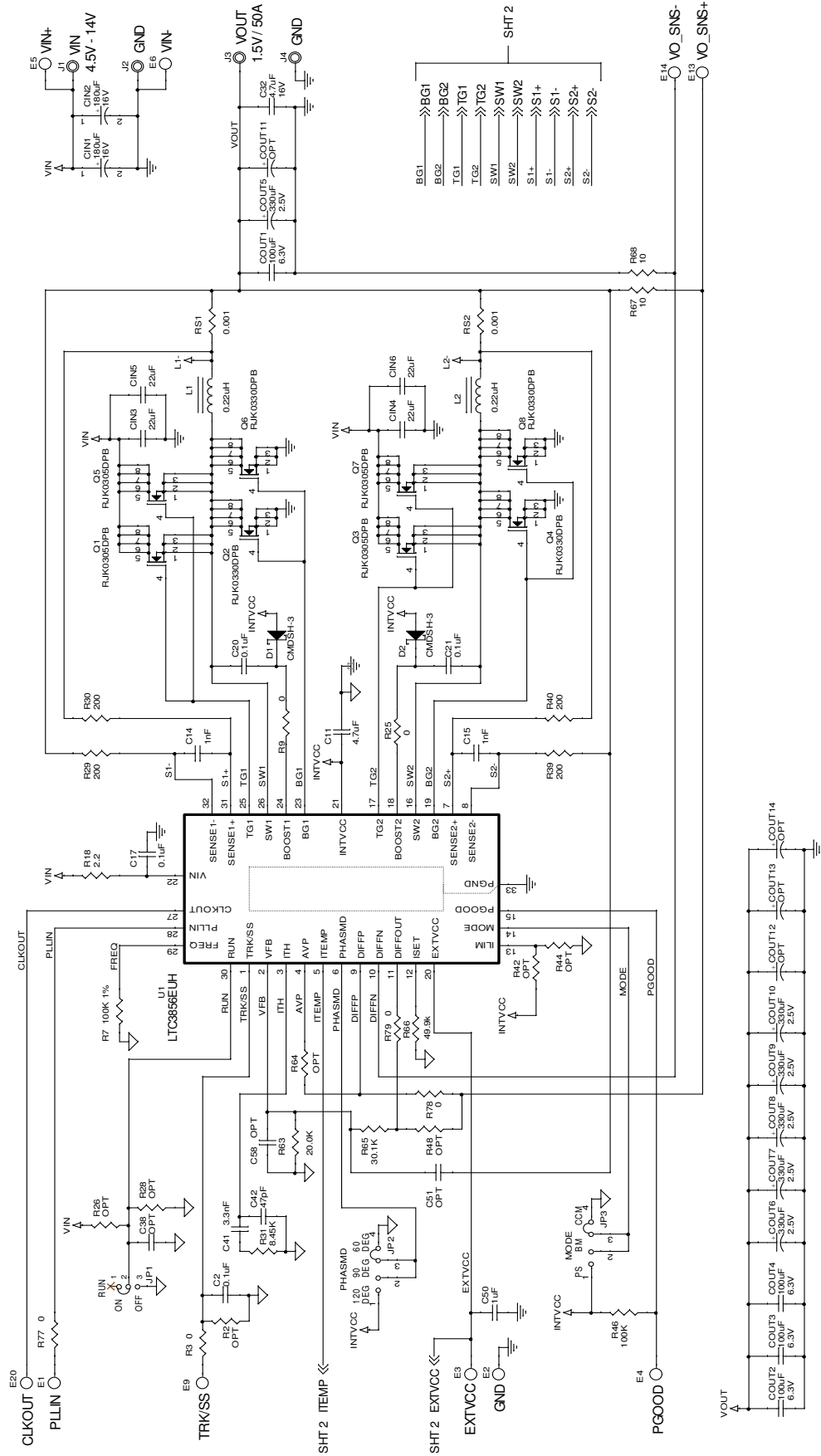
TEMPERATURE COMPENSATION NETWORK FOR DCR SENSING

SHT 1 ITEMP

ITEMP1

R69 OPT

C52 OPT

R70 OPT

RNTC OPT

OPTIONAL BIAS SUPPY

EXTVCC SHT 1

R76 0

C57 10uF 10V

D3 CMDSH-3

L3 15uH A914BYW-150

C56 0.022uF

D4 B0530W

R71 20K

R75 6.65K

U2 LT1616ES6

BOOST 1

SW 6

FB 3

VIN 5

GND 2

SHDN 4

VIN

JP4

BIAS ON

OFF3

C55 1uF 16V

OPTIONAL DCR SENSING

SHT 1 SW1

SW1

R45 OPT

R47 OPT

S1-

R61 OPT

S1+ SHT 1

L1-

SHT 1 S1-

SHT 1 SW2

SW2

R51 OPT

R53 OPT

S2-

R62 OPT

S2+ SHT 1

L2-

SHT 1 S2-

NOTE:
WHEN DCR SENSING IS IMPLEMENTED, SHORT RSENSE1
AND RSENSE2. DO NOT STUFF R29,R30,R39 AND R40

LOAD STEP CKT

J5

VOUT

1

E7 IOSTEP

CLK

Q9 SUD50N03-09P

D

G

S

R74 10K

R73 0.005

R72 0.005

VOUT

C53 100uF 6.3V

C54 100uF 6.3V

IOSTEP

JP5
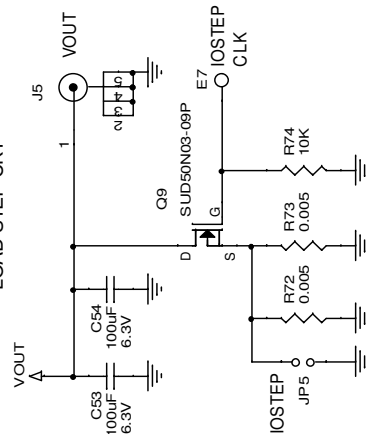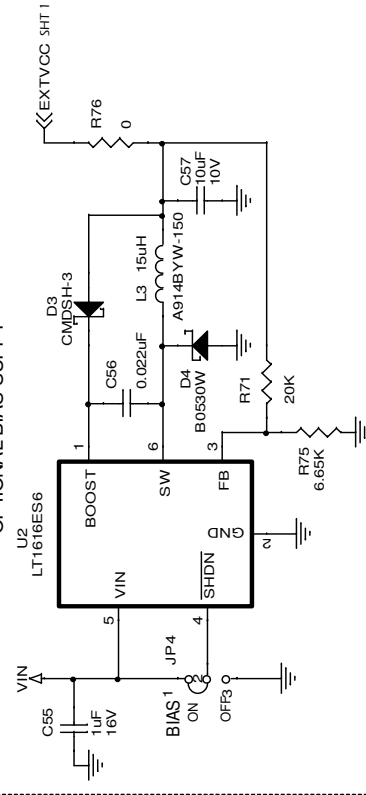
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