QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1294A

ADJUSTABLE LDO LINEAR REGULATORS IN PARALLEL

LT3080EDD

DESCRIPTION

Demonstration circuit 1294A shows adjustable linear regulators in parallel using LT3080. Architected as a precision current source and voltage follower, it allows this new regulator to be used in many applications requiring high current, adjustability to zero output, and no heat sink. Also the device brings out the collector of the pass transistor to allow low dropout operation when used with multiple supplies.

A key feature of the LT3080 is the capability to supply a wide output voltage range. By using a reference current through a single resistor, the output voltage can be programmed to any level between zero and 36V. The DC1294A has a reduced input voltage 25V due to input capacitor voltage rating, and is capable of delivering up to 4.4A output current by paralleling 4 LT3080s with only 20mΩ PCB ballast resistors. The DC1294A can be used as a high current linear regulator, post regulator for switching supply, variable voltage supply or low output voltage power supply.

Internal protection circuitry includes current limiting and thermal limiting.

LT3080 regulator is offered in 8-lead MSOP (with an Exposed Pad for better thermal characteristics), a 3mm × 3mm DFN, 5-lead TO-220 and a simple-to-use 3-lead SOT-223 version.

The LT3080 datasheet gives a complete description of the part, operation and application information. The datasheet should be read in conjunction with this quick start guide for working on or modifying the demo circuit 1294A.

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

Table 1. Performance Summary ($T_A = 25^oC$)

PARAMETER	CONDITION	VALUE
Minimum Vin Voltage	Vout=3.3V	3.8V
Maximum Vin Voltage		25V
Minimum Vcontrol Voltage	Vout=3.3V	4.9V
Maximum Vcontrol Voltage		25V
Output Voltage		3.3V ±3%
Minimum Output Current		4mA
Maximum Output Current	Vin-Vout<2.5V	4.4A

QUICK START PROCEDURE

The DC1294A is easy to set up to evaluate the performance of the LT3080. Refer to Figure 1. for proper measurement equipment setup and following the procedures below:

1. Apply 3.8V across Vin (to Gnd), and 4.9V across Vcontrol. Draw 4.4A of load current. The measured Vout should be 3.3V ± 3% (3.2V to 3.4V).
2. Vary Vin from 3.8V to 25V, Vcontrol from 4.9V to 25V and the load current from 4mA to 4.4A. Vout should measure 3.3V ± 3% (3.2V to 3.4V).

Note: Make sure the power dissipation is limited below the thermal limit.

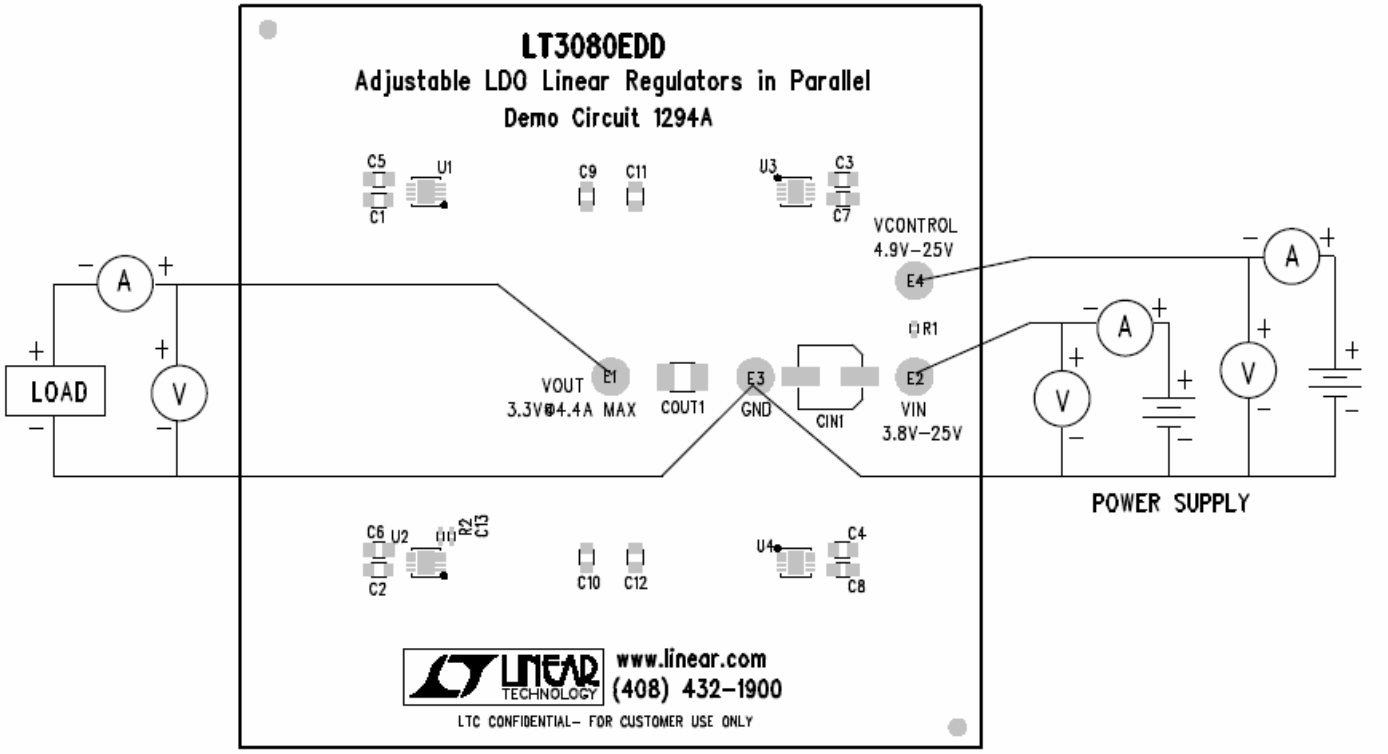


Figure 1. Proper Measurement Equipment Setup

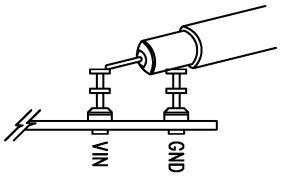


Figure 2. Measuring Input or Output Ripple

INPUT VOLTAGE RANGE

The guaranteed Vin dropout voltage is 0.5V at 4.4A, the guaranteed Vcontrol dropout voltage is 1.6V at 4.4A. The maximum Vin and maximum Vcontrol is reduced to 25V due to the input capacitor voltage rating.

DUAL SUPPLY OR SINGLE SUPPLY

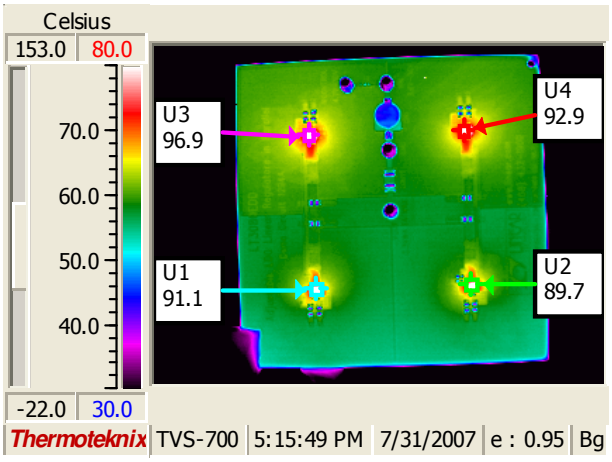
Use two separate supplies for Vin and Vcontrol, a low dropout voltage can be achieved on the Vin pin and the power dissipation is minimized. Alternatively, Tying the Vcontrol to Vin through a zero ohm jump resistor R1 on board, a single supply is sufficient to drive the demo circuit 1294A. **AVOID USING A LONG WIRE TO TIE VCONTROL AND VIN**.

OUTPUT CURRENT

The output current will decrease at high input-to-output differential. The actual current output is further limited by the thermal shutdown function, which is related to the board thermal dissipation.

THERMAL IMAGE

An example thermal image shows the temperature distribution on board. The test is done in still air at room temperature with average 1.7W power dissipation in each LT3080.

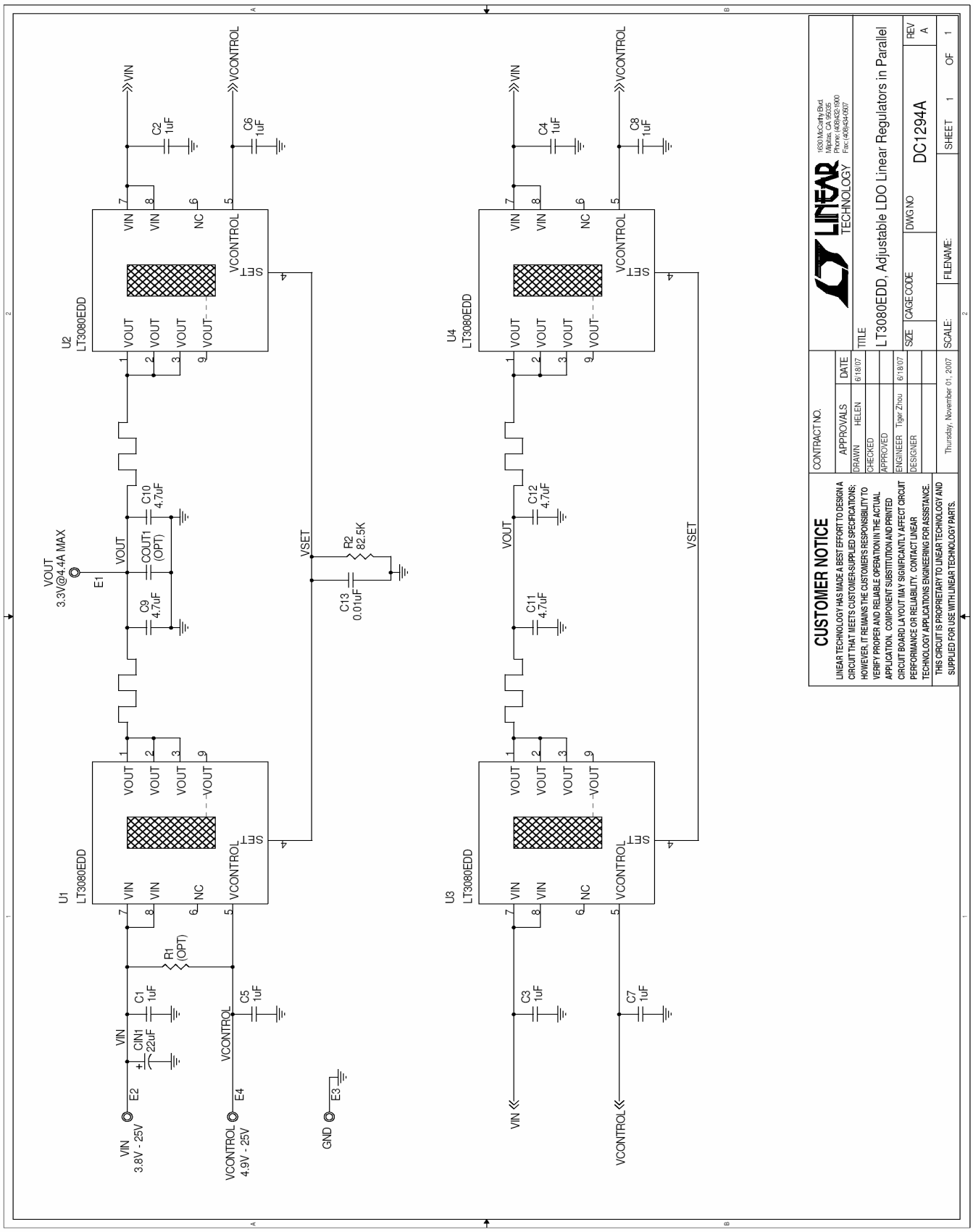


BYPASS CAPACITOR

Since the SET pin is a high impedance node, unwanted signals may couple into the SET pin and cause erratic behavior. This will be most noticeable when operating with minimum output capacitors at full load current. The easiest way to remedy this is to bypass the SET pin with a small amount of capacitance from SET to ground, 10pF to 20pF is sufficient. A 0.01uF bypass capacitor is used on the demo board to provide a low-noise output. Please refer to datasheet for details.

PARALLEL OPERATION

A small ballast resistor is required for parallel operation, such as 20mΩ. A short PCB trace can easily serve that purpose. Refer to the datasheet for trace length calculation. **THE BOTTOM PAD OF IC IS THE OUTPUT**. The bottom pad can be tied to the output pin respectively, however, each bottom pad should isolated from the others, thus force the output current go through the ballast resistors.


U1
LT3080EDD
U2
LT3080EDD
U3
LT3080EDD
U4
LT3080EDD
VIN
VCONTROL
VOUT
VSET
GND
C1 1uF
C2 1uF
C3 1uF
C4 1uF
C5 1uF
C6 1uF
C7 1uF
C8 1uF
C9 4.7uF
C10 4.7uF
C11 4.7uF
C12 4.7uF
C13 0.01uF
CIN1 22uF
COUT1 (OPT)
R1 (OPT)
R2 82.5K
VOUT 3.3V@4.4A MAX
VIN 3.8V - 25V
VCONTROL 4.9V - 25V
CUSTOMER NOTICE
LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT 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 HELEN 6/18/07
CHECKED
APPROVED
ENGINEER Tiger Zhou 6/18/07
DESIGNER
DATE
TITLE
LT3080EDD, Adjustable LDO Linear Regulators in Parallel
SIZE
CAGE CODE
DWG NO
DC1294A
REV A
SCALE:
FILENAME:
Thursday, November 01, 2007
SHEET 1 OF 1