QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 995A

ADJUSTABLE LDO LINEAR REGULATOR

LT3080EDD

DESCRIPTION

Demonstration circuit 995A is an adjustable 1.1A linear regulator featuring LT®3080. 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 DC995A has a reduced input voltage 25V due to input capacitor voltage rating. And DC995A is capable of delivering up to 1.1A output current. Therefore, the DC995A 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 995A.

If more output current is required or heat-spreading is needed, LT3080 can be easily paralleled. See DC1294A for details.

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

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

PARAMETER	CONDITION	VALUE
Minimum Vin Voltage	Vout=1.8V	2.3V
Maximum Vin Voltage		25V
Minimum Vcontrol Voltage	Vout=1.8V	3.4V
Maximum Vcontrol Voltage		25V
Output Voltage	JP1, Vout=1.8V JP1, Vout=0V-5V	1.8V ±3% 0V-5V±3%
Minimum Output Current		1mA
Maximum Output Current	Vin-Vout<3.5V	1.1A

QUICK START PROCEDURE

The DC995A 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. Before proceeding to test, use VOUT Select jumper JP1 for the desired output voltage (1.8V or 0V-5V). If the output voltage is different from the above values, use the USER option and install R3. Select R3 according to the following equation: $R_3 = \frac{V_{OUT}}{10\mu A}$.

2. Assume 1.8V is the desired output. Apply 2.3V across Vin (to Gnd), and 3.4V across Vcontrol. Draw 1.1A of load current. The measured Vout should be 1.8V ± 3% (1.766V to 1.875V).

3. Vary Vin from 2.3V to 25V, Vcontrol from 3.4V to 25V and the load current from 1mA to 1.1A. Vout should measure 1.8V ± 3% (1.766V to 1.875V).

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

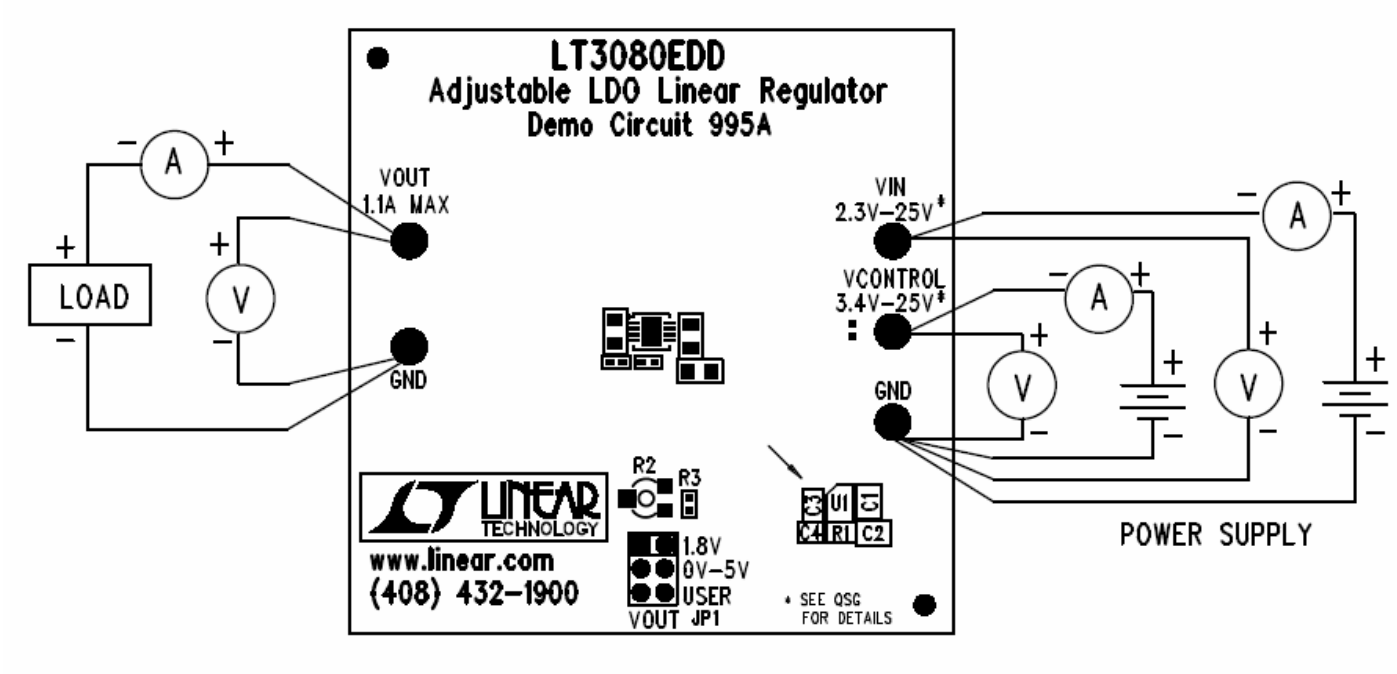


Figure 1. Proper Measurement Equipment Setup

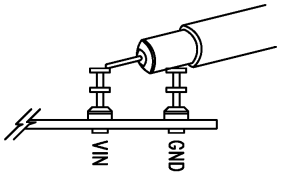


Figure 2. Measuring Input or Output Ripple

INPUT VOLTAGE RANGE

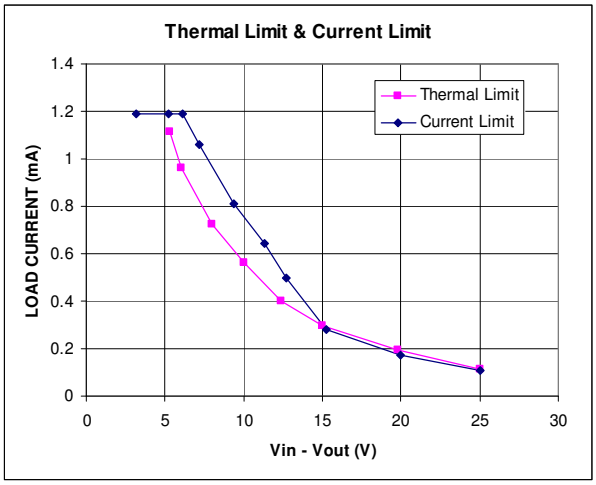
The guaranteed Vin dropout voltage is 0.5V at 1.1A, the guaranteed Vcontrol dropout voltage is 1.6V at 1.1A. The maximum Vin and maximum Vcontrol is reduced to 25V due to the input capacitor voltage rating.

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 on board, a single supply is sufficient to drive the demo circuit 995A. **AVOID USING A LONG WIRE TO TIE VCONTROL AND VIN**.

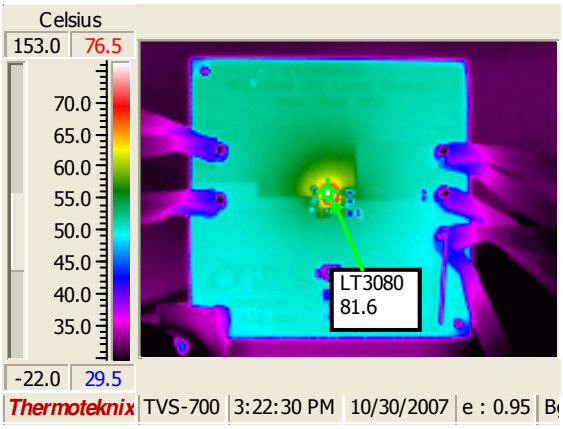
OUTPUT CURRENT

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. A typical curve is provided using the demo circuit 995A at room temperature. **DO NOT CONTINUOUSLY OPERATE THE LT3080 TO THE THERMAL LIMIT, WHICH MAY IMPAIR THE DEVICE RELIABILITY. MAXIMUM JUNCTION TEMPERATURE IS 125°C.**



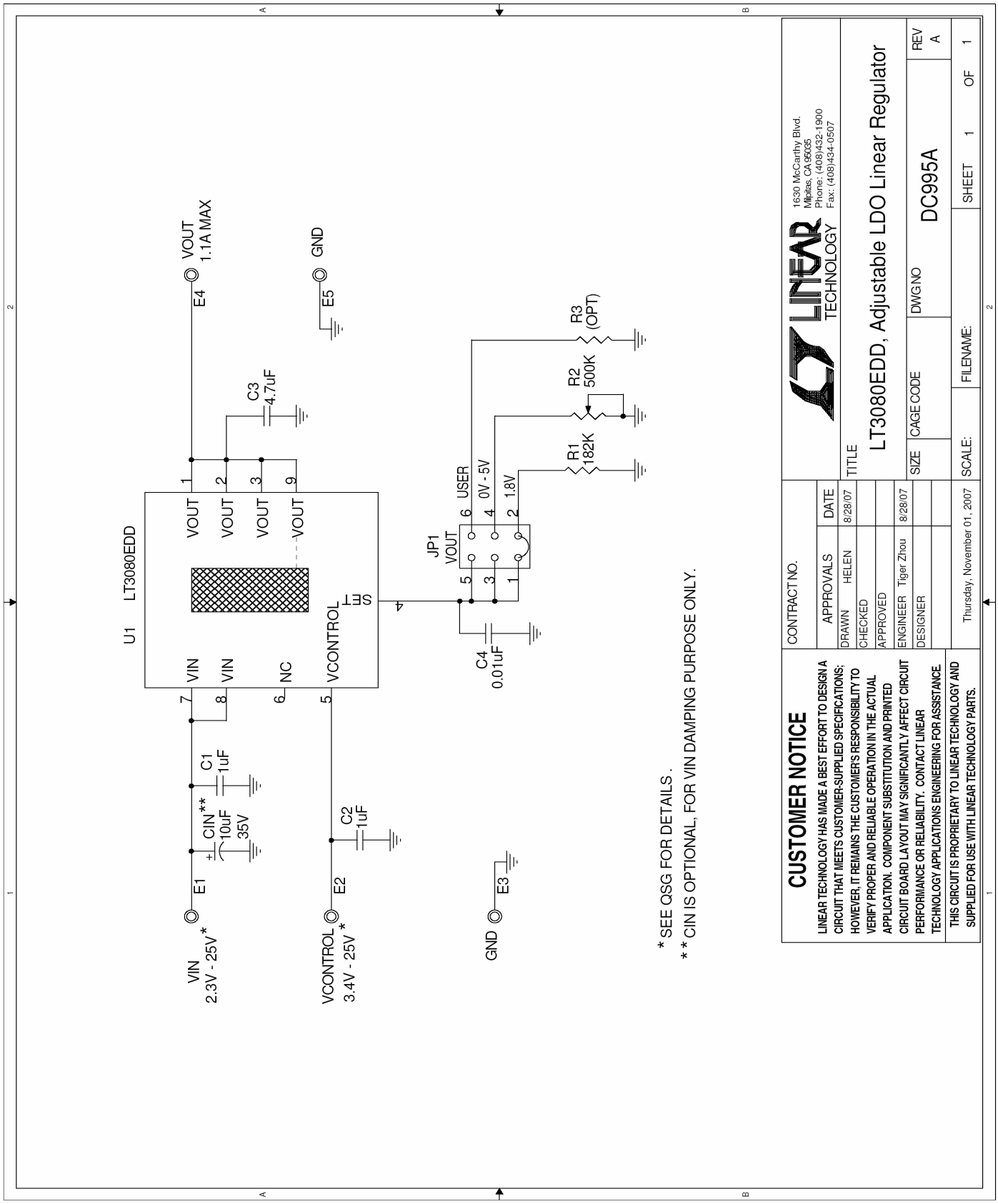
THERMAL IMAGE

An example thermal image shows the temperature distribution on board. The test is done in still air at room temperature with 2.2W power dissipation in 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.


U1 LT3080EDD
VIN
VIN
NC
VCONTROL
SET
VOUT
VOUT
VOUT
VOUT
VOUT
1.1A MAX
GND
C1 1uF
CIN** 10uF 35V
C2 1uF
C3 4.7uF
C4 0.01uF
JP1
VOUT
USER
0V - 5V
1.8V
R1 182K
R2 500K
R3 (OPT)
E1
E2
E3
E4
E5
VIN 2.3V - 25V*
VCONTROL 3.4V - 25V*
GND
* SEE QSG FOR DETAILS .
** CIN IS OPTIONAL, FOR VIN DAMPING PURPOSE ONLY.
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.
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TITLE
LT3080EDD, Adjustable LDO Linear Regulator
SIZE
CAGE CODE
DWG NO
DC995A
REV A
FILENAME:
SHEET 1 OF 1