

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1401A ADJUSTABLE SINGLE RESISTOR LDO REGULATOR

## LT3085EDCB

### DESCRIPTION

Demonstration circuit 1401A is an adjustable 500mA linear regulator featuring LT<sup>®</sup>3085. 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 LT3085 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 DC1401A has a reduced input voltage 25V due to input capacitor voltage rating. And DC1401A is capable of delivering up to 500mA output current. Therefore, the DC1401A 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.

LT3085 regulator is offered in 8-lead MSOP (with an Exposed Pad for better thermal characteristics) and 6-lead 2mm × 3mm DFN packages.

The LT3085 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 1401A.

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

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**Table 1. Performance Summary (  $T_A = 25^{\circ}\text{C}$  )**

PARAMETER	CONDITION	VALUE
Minimum Vin Voltage	Vout=1.2V	1.7V
Maximum Vin Voltage		25V
Minimum Vcontrol Voltage	Vout=1.2V	2.8V
Maximum Vcontrol Voltage		25V
Output Voltage	JP1, Vout=1.2V	1.2V $\pm$ 3%
	JP1, Vout=1.8V	1.8V $\pm$ 3%
	JP1, Vout=2.5V	2.5V $\pm$ 3%
	JP1, Vout=3.3V	3.3V $\pm$ 3%
	JP1, Vout=5.0V	5.0V $\pm$ 3%
Minimum Output Current		1mA
Maximum Output Current	Vin-Vout<6V	500mA

### QUICK START PROCEDURE

The DC1401A is easy to set up to evaluate the performance of the LT3085. Refer to Figure 1. for proper measurement equipment setup and following the procedures below:

1. Before proceeding to test, use jumper JP1 for the desired output voltage (1.2V, 1.8V, 2.5V, 3.3V or 5.0V). If the output voltage is different from the above values, use the USER option and install R6. Select R6 according to the following equation:  $R_6 = \frac{V_{OUT}}{10\mu A}$ .
2. Assume 1.2V is the desired output. Apply 1.7V across  $V_{in}$  (to Gnd), and 2.8V across

$V_{control}$ . Draw 500mA of load current. The measured  $V_{out}$  should be  $1.2V \pm 3%$  (1.174V to 1.246V).

3. Vary  $V_{in}$  from 1.7V to 25V,  $V_{control}$  from 2.8V to 25V and the load current from 1mA to 500mA.  $V_{out}$  should measure  $1.2V \pm 3%$  (1.174V to 1.246V).

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

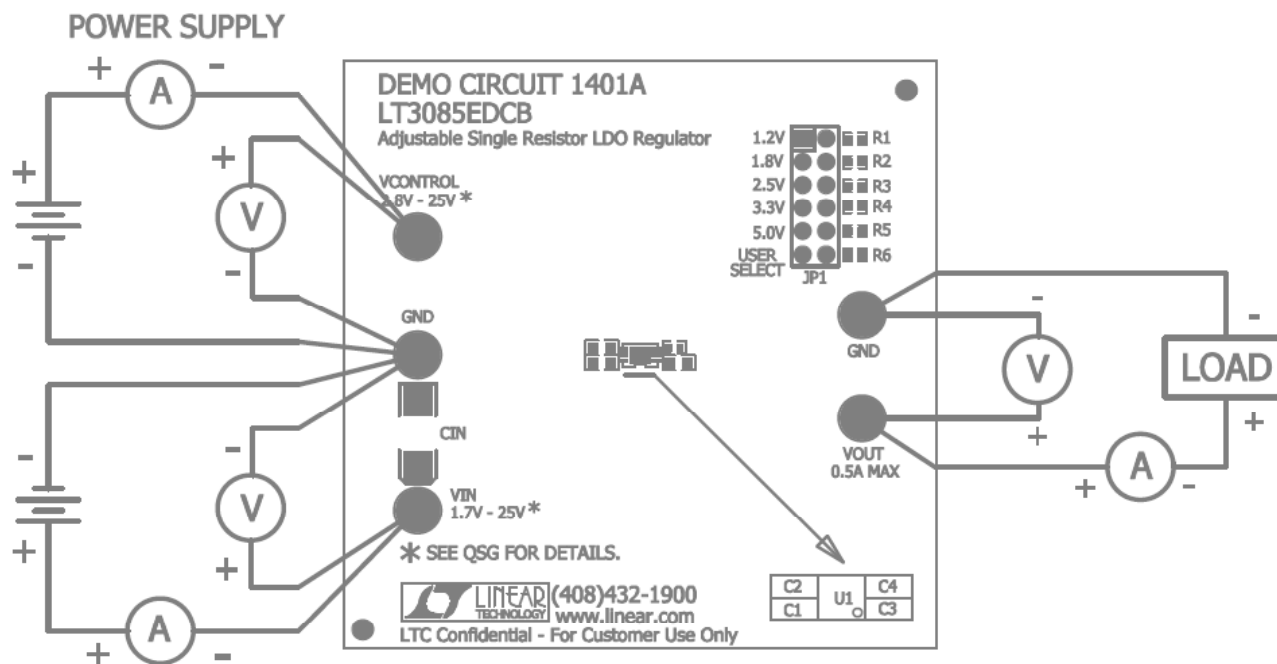


Figure 1. Proper Measurement Equipment Setup

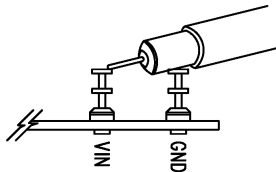


Figure 2. Measuring Input or Output Ripple

## INPUT VOLTAGE RANGE

The guaranteed  $V_{in}$  dropout voltage is 0.5V at 500mA, the guaranteed  $V_{control}$  dropout voltage is 1.6V at 500mA. The maximum  $V_{in}$  and maximum  $V_{control}$  is

reduced to 25V due to the input capacitor voltage rating.

## DUAL SUPPLY OR SINGLE SUPPLY

Use two separate supplies for  $V_{in}$  and  $V_{control}$ , a low dropout voltage can be achieved on the  $V_{in}$  pin and the power dissipation is minimized. Alternatively, Tying the

$V_{control}$  to  $V_{in}$  through a short wire, a single supply is sufficient to drive the demo circuit 1401A. **AVOID USING A LONG WIRE TO TIE  $V_{CONTROL}$  AND  $V_{IN}$ .**

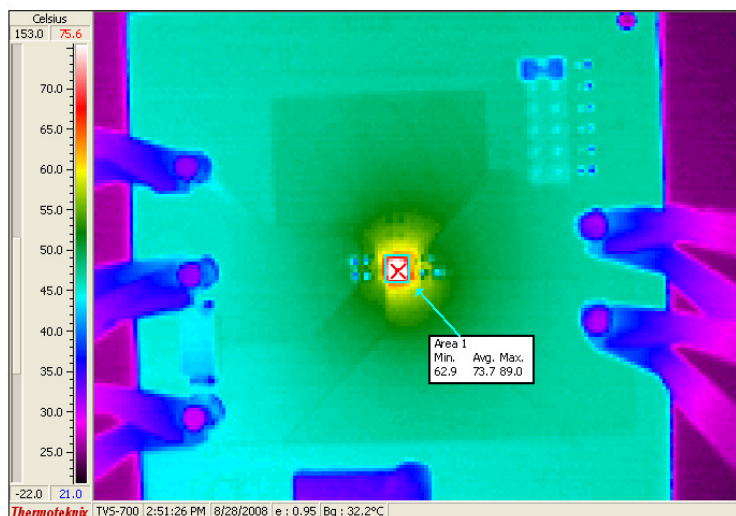
## OUTPUT CURRENT

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. **DO NOT**

**CONTINUOUSLY OPERATE THE LT3085 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 2.0W power dissipation in LT3085.



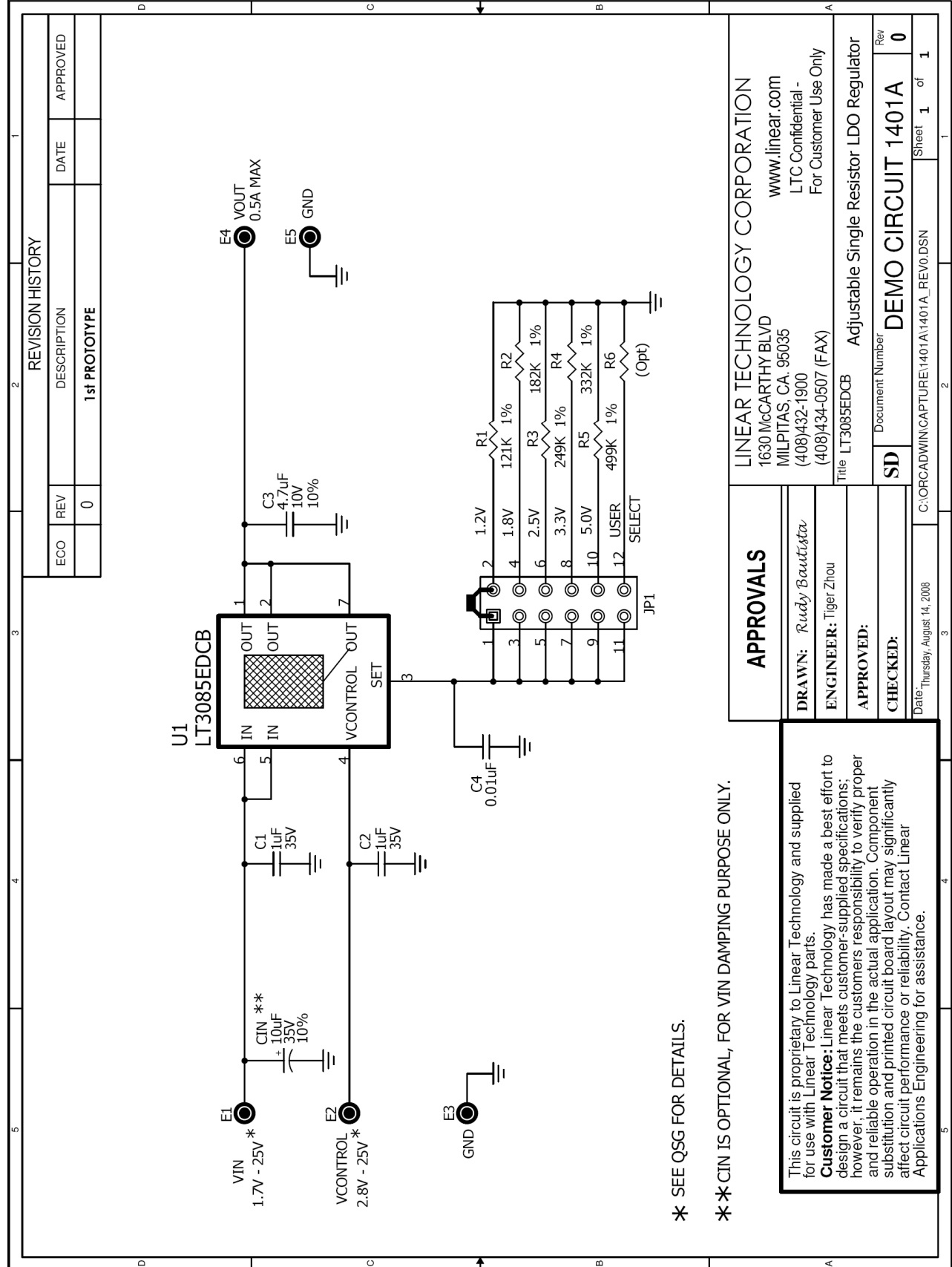
### BYPASS CAPACITOR

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.

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1401A

## ADJUSTABLE SINGLE RESISTOR LDO REGULATOR



REVISION HISTORY		
ECO	REV	DESCRIPTION
	0	1st PROTOTYPE
		DATE
		APPROVED

APPROVALS	
<b>DRAWN:</b>	Rudy Bautista
<b>ENGINEER:</b>	Tiger Zhou
<b>APPROVED:</b>	
<b>CHECKED:</b>	
Date:	Thursday, August 14, 2008

**LINEAR TECHNOLOGY CORPORATION**  
 1630 McCARTHY BLVD  
 MILPITAS, CA. 95035  
 www.linear.com  
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Title: LT3085EDCB Adjustable Single Resistor LDO Regulator  
 Document Number: **SD**  
**DEMO CIRCUIT 1401A**  
 Rev 0

C:\ORADMIN\CAPTURE\1401A\1401A\_REV0.DSN  
 Sheet 1 of 1

This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.  
**Customer Notice:** Linear Technology has made a best effort to design a circuit that meets customer-supplied specifications; however, it remains the customers 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 Applications Engineering for assistance.

\* SEE QSG FOR DETAILS.  
 \*\* CIN IS OPTIONAL, FOR VIN DAMPING PURPOSE ONLY.