

LT3083

Adjustable 3A Single Resistor Low Dropout Regulator

DESCRIPTION

Demonstration circuit 1585A is an adjustable 3A linear regulator featuring LT3083. 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 LT3083 is the capability to supply a wide output voltage range. DC1585A can be set to 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V, as well as user selectable. DC1585A is capable of delivering up to 3A output current. DC1585A can be used as a high current linear regulator, a post regulator for switching supplies, a variable voltage supply or low output voltage power supply.

Internal protection circuitry includes current limiting and thermal limiting.

LT3083 regulator is offered in a 16-lead TSSOP (with an exposed pad for better thermal characteristics), a 4mm × 4mm DFN, 5-lead TO-220 and a 5-lead DD-PAK version.

The LT3083 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 1585A.

Design files for this circuit board are available at <http://www.linear.com/demo>

LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range	$V_{OUT} = 1.2\text{V}$, $I_{OUT1} = 1\text{mA}$	1.7		23	V
$V_{CONTROL}$	$V_{CONTROL}$ Voltage	$V_{OUT} = 1.2\text{V}$, $I_{OUT1} = 1\text{mA}$	2.8		25	V
V_{OUT}	Output Voltage	Shunt at 1, 2 for JP1	1.14	1.2	1.26	V
		Shunt at 3, 4 for JP1	1.425	1.5	1.575	V
		Shunt at 5, 6 for JP1	1.71	1.8	1.89	V
		Shunt at 7, 8 for JP1	2.375	2.5	2.625	V
		Shunt at 9, 10 for JP1	3.201	3.3	3.399	V
		Shunt at 11, 12 for JP1	4.85	5.0	5.15	V

QUICK START PROCEDURE

Demonstration circuit 1585A is easy to set up to evaluate the performance of the LT3083. Refer to Figure 1 for the proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the terminals of the input or output capacitors. See Figure 2 for the proper scope probe technique.

1. Use JP1 to set the desired output voltage.
2. With power off, connect the bias power supply to V_{CONTROL} and GND.
3. With power off, connect the input power supply to V_{IN} and GND.
4. Turn on the power at V_{CONTROL} .

NOTE. Make sure that the V_{CONTROL} voltage does not exceed 25V.

5. Turn on the power at V_{IN} .

NOTE. Make sure that the V_{IN} voltage does not exceed 23V.

6. Check for the proper output voltages.

NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high or is shorted.

7. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, efficiency and other parameters.

NOTE. Make sure that the power dissipation is limited below the thermal limit.

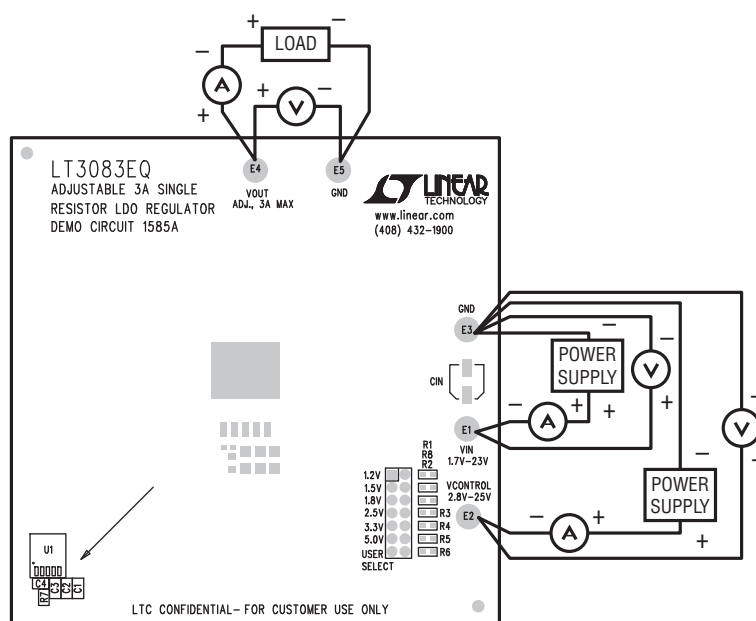


Figure 1. DC1585A Proper Equipment Setup

QUICK START PROCEDURE

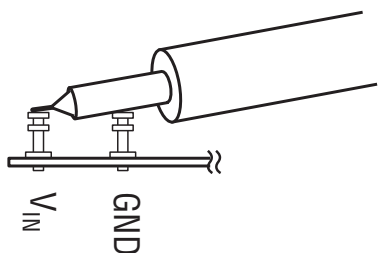


Figure 2. Measuring Input or Output Ripple

THERMAL IMAGE

An example thermal image shows the temperature distribution on the board. The test is done in still air at room temperature with 6.4W power dissipation in the LT3083. This gives the IC case-to-ambient thermal resistance $\theta_{JA}=7.3^{\circ}\text{C}/\text{W}$ on the demo board.

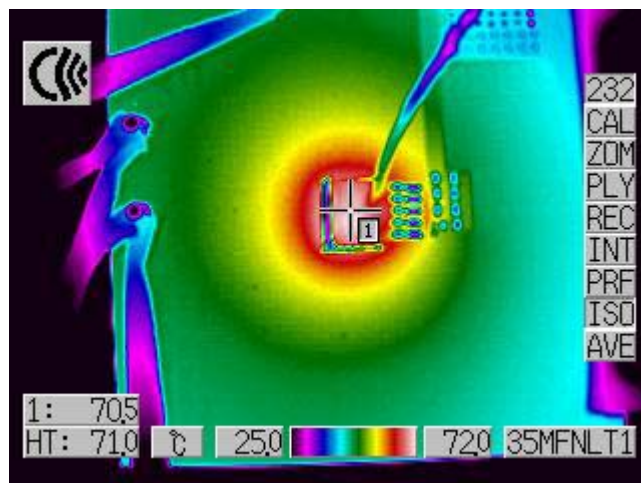


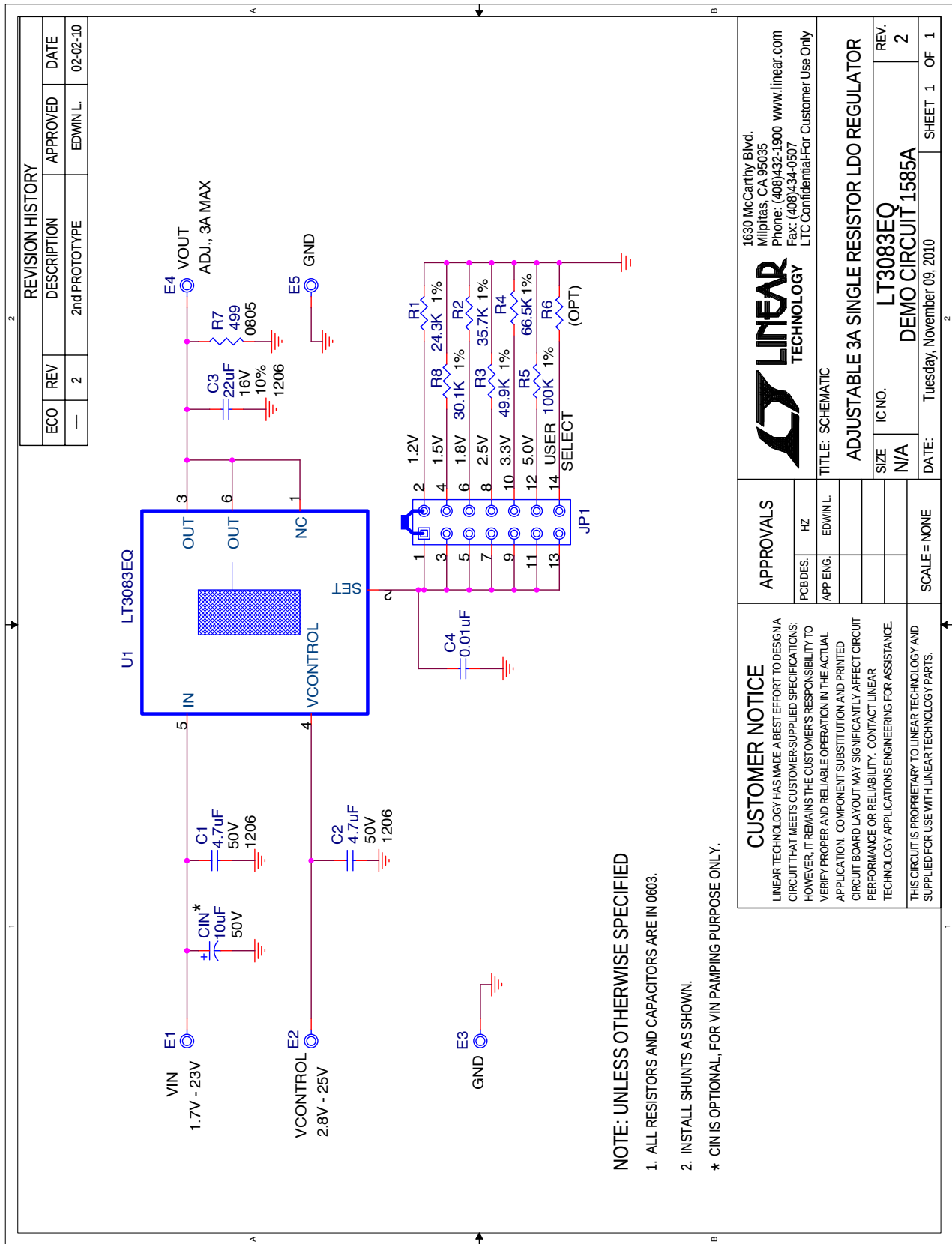
Figure 3. Temperature Rise at 6.4W Dissipation

DEMO MANUAL DC1585A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C2	CAP, X5R 4.7 μ F 50V 10% 1206	TAIYO YUDEN UMK316BJ475KLT
2	1	C3	CAP, X5R 22 μ F 16V 10% 1206	AVX 1206YD226KAT2A
3	1	C4	CAP, X7R 0.01 μ F 16V 10% 0603	AVX 0603YC103KAT2A
4	1	R1	RES., CHIP 24.3k 1/10W 1% 0603	VISHAY CRCW060324K3FKEA
5	1	R2	RES., CHIP 35.7k 1/10W 1% 0603	VISHAY CRCW060335K7FKEA
6	1	R3	RES., CHIP 49.9k 1/10W 1% 0603	VISHAY CRCW060349K9FKEA
7	1	R4	RES., CHIP 66.5k 1/10W 1% 0603	VISHAY CRCW060366K5FKEA
8	1	R5	RES., CHIP 100k 1/10W 1% 0603	VISHAY CRCW0603100KFKEA
9	1	R7	RES., CHIP 499 1/10W 1% 0805	VISHAY CRCW0805499RFKEA
10	1	R8	RES., CHIP 30.1k 1/10W 1% 0603	VISHAY CRCW06030K1FKEA
11	1	U1	I.C., LT3083EQ Q PACKAGE	LINEAR TECH. CORP. LT3083EQ#PBF
Additional Demo Board Circuit Components				
1	1	C _{IN}	CAP, ALUMINUM. 10 μ F 50V 10%	SANYO 63CE22BS
2	0	R6(OPT)	RES., 0603	
Hardware-For Demo Board Only:				
1	5	E1-E5	TESTPOINT, TURRET, .095"	MILL MAX 2501-2-00-80-00-00-07-0
2	1	JP1	2mm DOUBLE ROW HEADER, 2 $\times$ 7 PIN	SAMTEC TMM-107-02-L-D
3	1	XJP1	SHUNT	SAMTEC 2SN-BK-G

SCHEMATIC DIAGRAM



1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900 www.linear.com
Fax: (408)434-0507
LTC Confidential For Customer Use Only

APPROVALS

PCB DES.	HZ
APP ENG.	EDWIN L.

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.

TITLE: SCHEMATIC

ADJUSTABLE 3A SINGLE RESISTOR LDO REGULATOR

SIZE	IC NO.	REV.
N/A	LT3083EQ	2

DEMO CIRCUIT 1585A

DATE: Tuesday, November 09, 2010

SHEET 1 OF 1

DEMO MANUAL DC1585A

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

dc1585af