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

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range	V_{OUT} = 1.2V, I_{OUT1} = 1mA	1.7		23	V
$V_{CONTROL}$	$V_{CONTROL}$ Voltage	V_{OUT} = 1.2V, I_{OUT1} = 1mA	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.

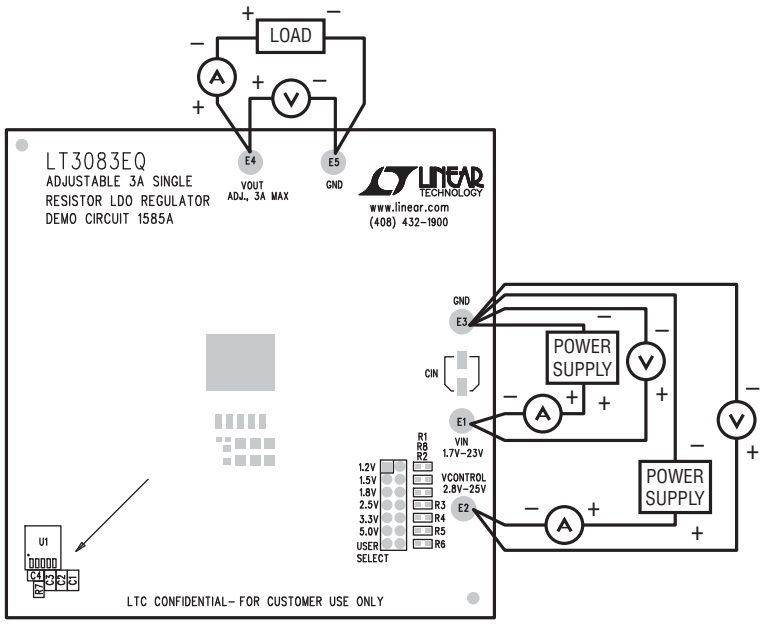


Figure 1. DC1585A Proper Equipment Setup

QUICK START PROCEDURE

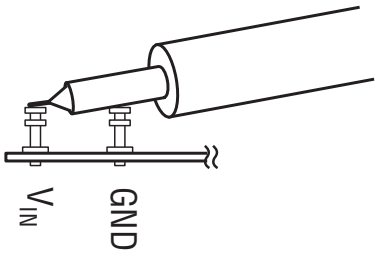


Figure 2. Measuring Input or Output Ripple

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 θ_{JA}=7.3°C/W on the demo board.

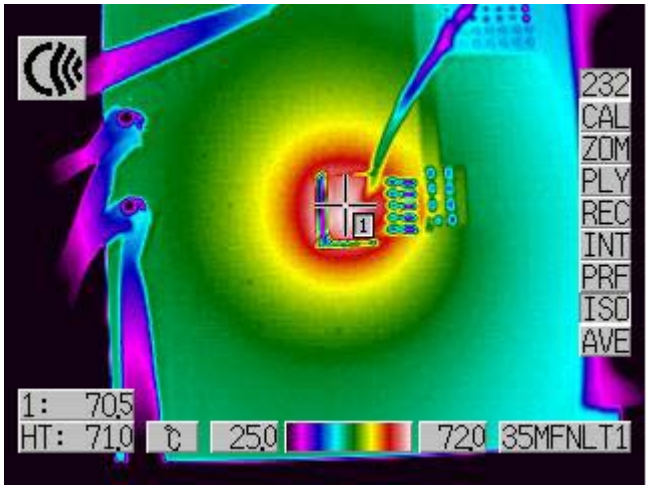
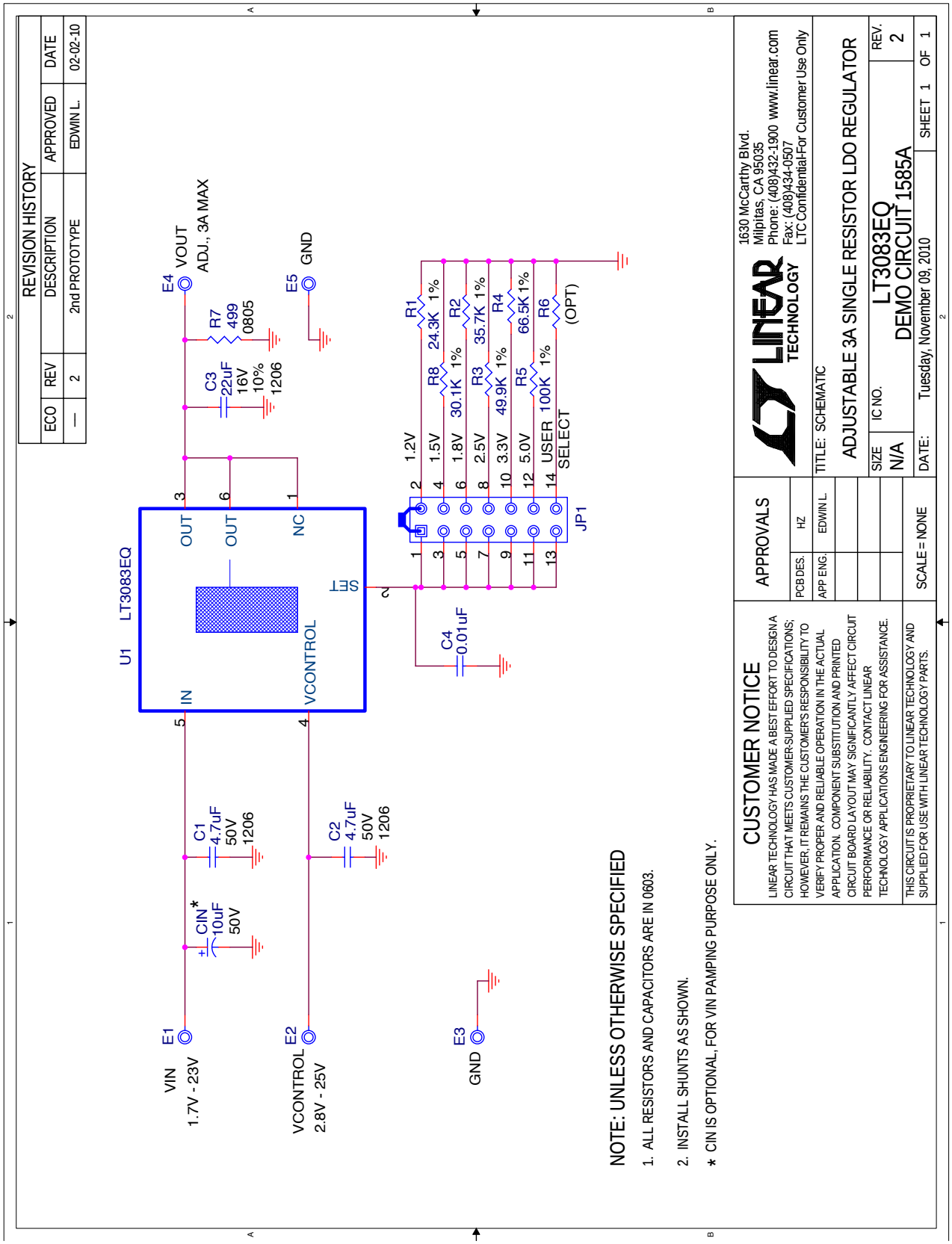


Figure 3. Temperature Rise at 6.4W Dissipation

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C2	CAP., X5R 4.7µF 50V 10% 1206	TAIYO YUDEN UMK316BJ475KLT
2	1	C3	CAP., X5R 22µF 16V 10% 1206	AVX 1206YD226KAT2A
3	1	C4	CAP., X7R 0.01µF 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. 10µF 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 × 7 PIN	SAMTEC TMM-107-02-L-D
3	1	XJP1	SHUNT	SAMTEC 2SN-BK-G

SCHEMATIC DIAGRAM



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