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LT3088EDD 800mA Single Resistor Rugged Linear Regulator

DESCRIPTION

DC2279A is a linear regulator evaluation board featuring **LT[®]3088EDD**, which is a 36V_{IN}, 800mA, rugged single resistor programmable linear regulator.

The demo circuit operates over an input range of 1.6V to 36V. The LT3088 has a maximum output current of 800mA. A key feature of the IC is the extended safe operation area (SOA). The IC also features paralleled capability for higher output current or heat spreading.

This device allows one single resistor to program output voltage to any level between 0V and 34.5V if the load current is larger than 2mA. Built-in protection includes

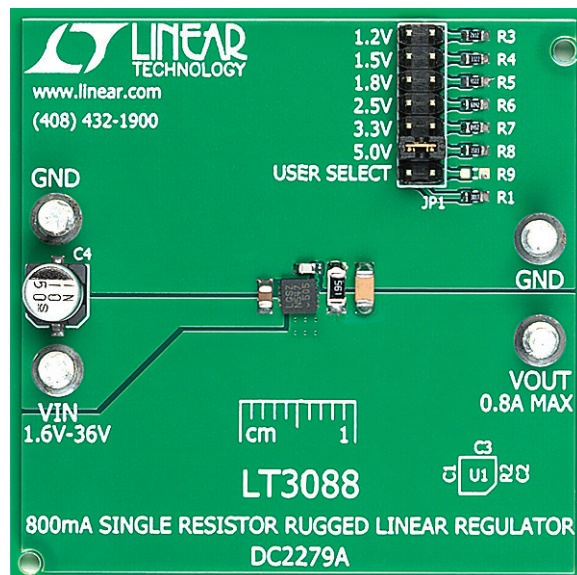
reverse battery protection, reverse current protection, internal current limit and thermal limit.

DC2279A uses the LT3088EDD which is an 8-lead (3mm × 3mm) plastic DFN package with an exposed pad on the bottom-side of the IC for better thermal performance. These features make DC2279A an ideal circuit for surface-mount power supplies, rugged industrial power supplies, low output voltage supplies, a post regulator for switching supplies and intrinsic safety applications.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2279A>

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BOARD PHOTO



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

CONDITIONS	I_{OUT} (mA)	V_{IN} (V)			V_{OUT} (V)		
		MIN	TYP	MAX*	MIN	TYP	MAX
Shunt at 1.2V for JP1	100	2.41		36.0	1.17	1.20	1.25
	800	2.80		5.6	1.17	1.20	1.25
Shunt at 1.5V for JP1	100	2.71		36.0	1.46	1.50	1.56
	800	3.10		6.0	1.46	1.50	1.56
Shunt at 1.8V for JP1	100	3.01		36.0	1.75	1.80	1.88
	800	3.40		6.3	1.75	1.80	1.88
Shunt at 2.5V for JP1	100	3.71		36.0	2.43	2.50	2.60
	800	4.10		7.0	2.43	2.50	2.60
Shunt at 3.3V for JP1	100	4.51		36.0	3.20	3.30	3.44
	800	4.90		7.8	3.20	3.30	3.44
Shunt at 5.0V for JP1	100	6.21		36.0	4.85	5.00	5.20
	800	6.60		9.5	4.85	5.00	5.20

*The maximum input voltage for 800mA load current is set by the 75°C temperature rise of LT3088 on the demo circuit. Higher input voltage can be reached if larger copper area or force-air cooling is applied.

QUICK START PROCEDURE

DC2279A is easy to set up to evaluate the performance of the LT3088. Refer to Figure 1 for 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 proper scope probe technique.

1. Use JP1 to set the desired output voltage.
2. With power off, connect the input power supply to V_{IN} and GND.

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

NOTE: Make sure that the V_{IN} voltage does not exceed 36V.

4. 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.

5. 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.

QUICK START PROCEDURE

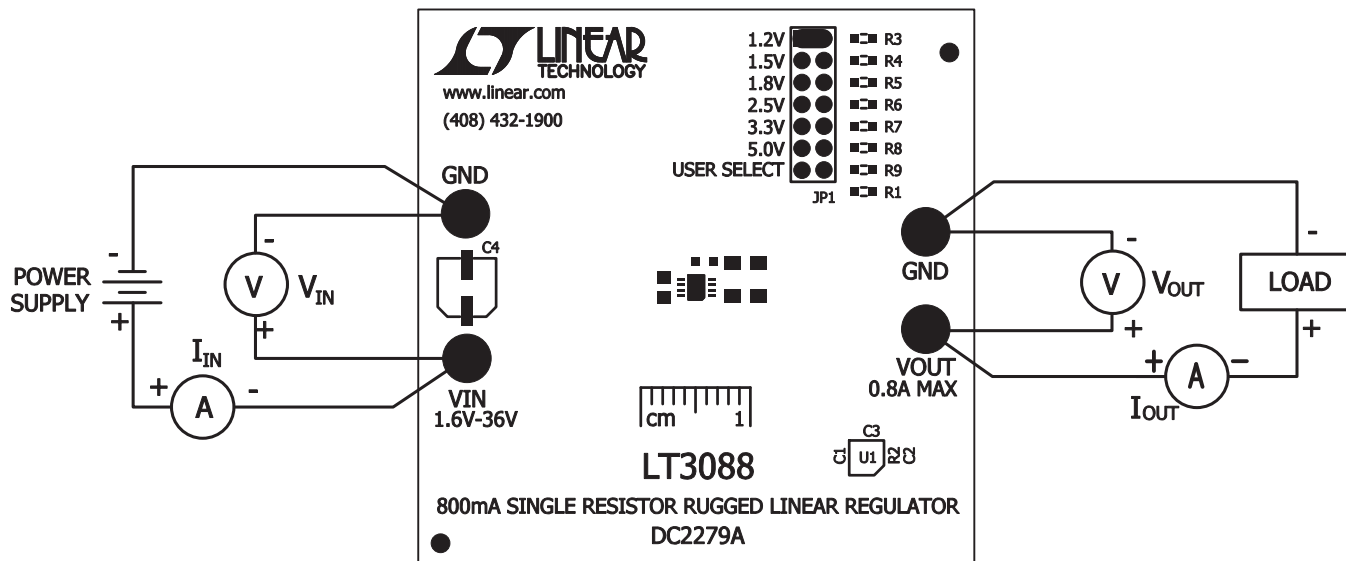


Figure 1. Test Procedure Setup Drawing for DC2279A

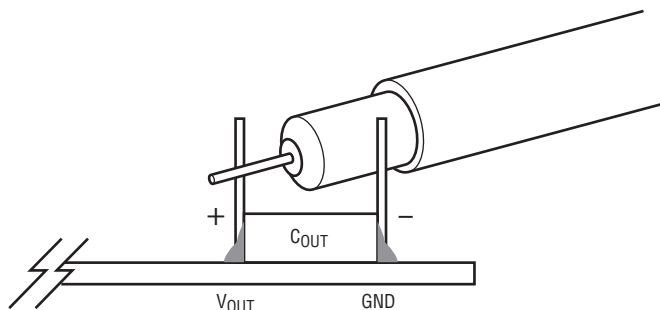


Figure 2. Measuring Input and Output Ripple

THERMAL IMAGE

An example thermal image shows the temperature distribution on the PC board. The test is done in still air at room temperature with 2.5W power dissipation in the LT3088 IC.

This gives an IC case-to-ambient thermal resistance of $\theta_{CA} = 18^{\circ}\text{C}/\text{W}$ on the demo circuit. The IC, at its highest point reaches 66°C , at 4.4V_{IN} , 1.2V_{OUT} , 800mA load current.

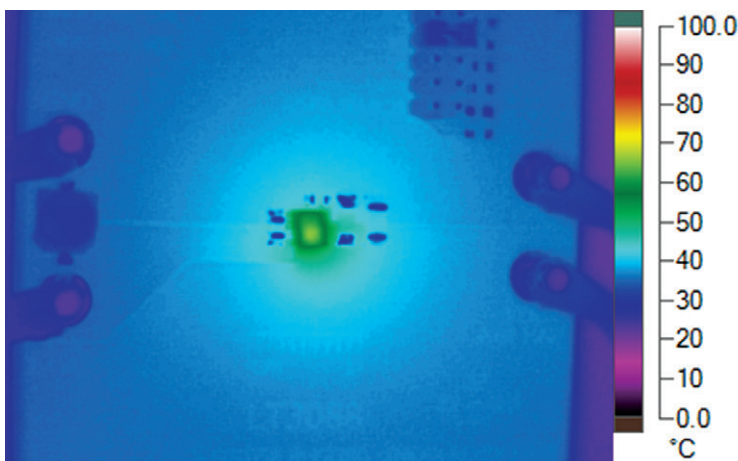
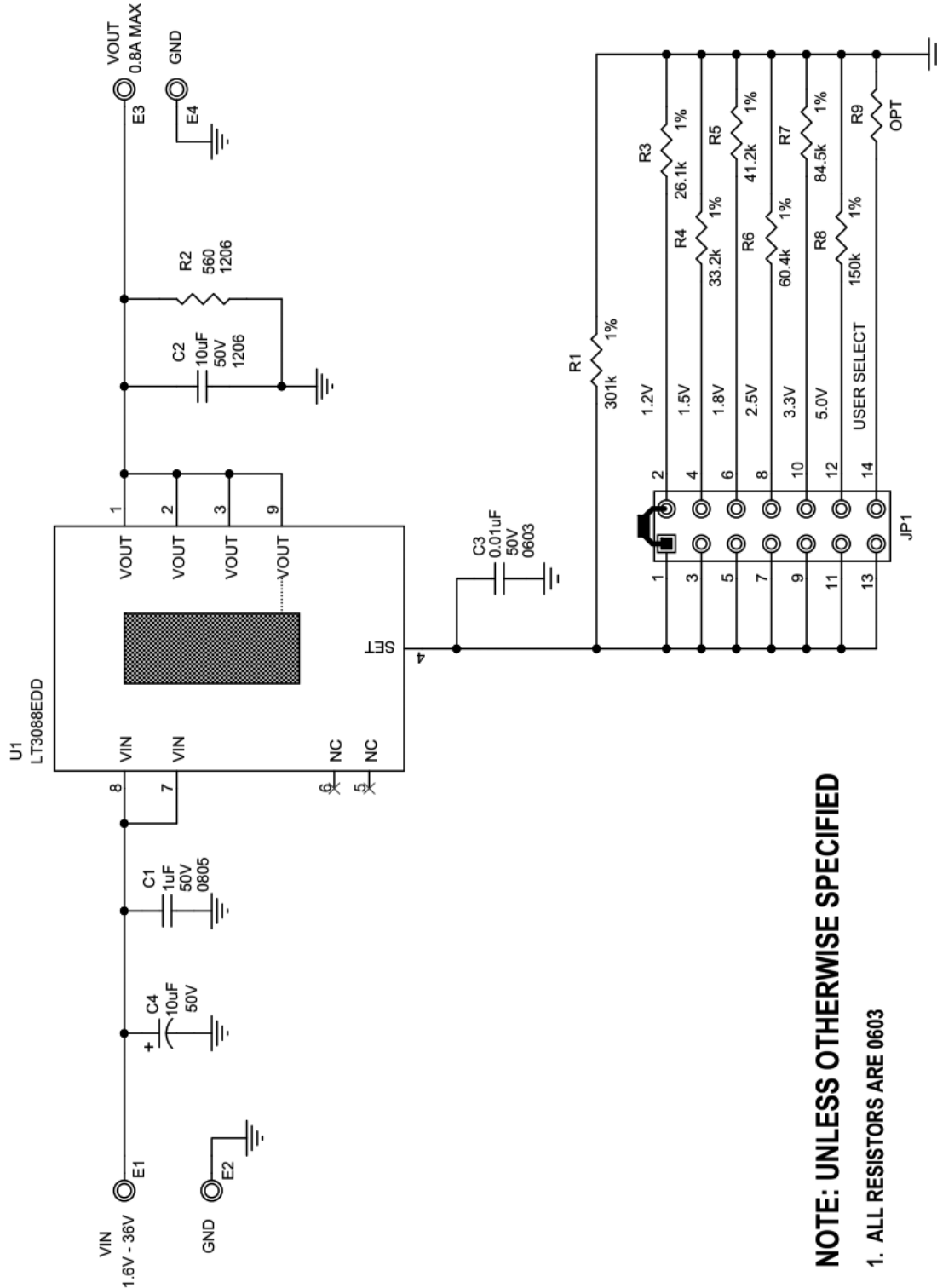


Figure 3. Temperature Rise at 2.5W Dissipation ($V_{\text{IN}} = 4.4\text{V}$, $V_{\text{OUT}} = 1.2\text{V}$, $I_{\text{OUT}} = 800\text{mA}$)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP, X7R, 1 μF , 50V, 10% 0805	MURATA, GRM21BR71H105KA12L
2	1	C2	CAP, X5R, 10 μF , 50V, 10% 1206	MURATA, GRM31CR61H106KA12L
3	1	C3	CAP, COG, 0.01 μF , 50V, 5% 0603	MURATA, GRM1885C1H103JA01J
4	1	R1	RES., CHIP, 301k, 1/10W, 1% 0603	VISHAY, CRCW0603301KFKEA
5	1	R2	RES., CHIP, 560 Ω , 1/4W, 5% 1206	VISHAY, CRCW1206560RJNEA
6	1	R3	RES., CHIP, 26.1k, 1/10W, 1% 0603	VISHAY, CRCW060326K1FKEA
7	1	R4	RES., CHIP, 33.2k, 1/10W, 1% 0603	VISHAY, CRCW060333K2FKEA
8	1	R5	RES., CHIP, 41.2k, 1/10W, 1% 0603	VISHAY, CRCW060341K2FKEA
9	1	R6	RES., CHIP, 60.4k, 1/10W, 1% 0603	VISHAY, CRCW060360K4FKEA
10	1	R7	RES., CHIP, 84.5k, 1/10W, 1% 0603	VISHAY, CRCW060384K5FKEA
11	1	R8	RES., CHIP, 150k, 1/10W, 1% 0603	VISHAY, CRCW0603150KFKEA
12	1	U1	IC., LT3088EDD DFN-8 (3 \times 3)	LINEAR TECH., LT3088EDD#PBF
Additional Demo Board Circuit Components				
13	1	C4	CAP., ALUM, 10 μF , 50V 5 \times 5.4mm	SUN SELECT., 50CE10BSS
14	0	R9 (OPT)	RES., 0603	
Hardware: For Demo Board Only				
15	4	E1, E2, E3, E4	TESTPOINT, TURRET, 0.094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
16	1	JP1	2 \times 7, 0.079" DOUBLE ROW HEADER	SULLINS, NRPN072PAEN-R
17	1	XJP1	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G

SCHEMATIC DIAGRAM



NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE 0603

DEMO MANUAL DC2279A

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

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