

LT3066

45V, 500mA Low Noise Linear Regulator with Programmable Current Limit and Active Output Discharge

DESCRIPTION

Demonstration circuit 2437A is an adjustable 500mA linear regulator featuring the [LT[®]3066](#). The LT3066 is a micropower, low noise and low dropout voltage linear regulator that operates over a 1.8V to 45V input voltage range. The device supplies 500mA of output current with a typical dropout voltage of 300mV. A 10nF bypass capacitor reduces output noise to 25 μ V_{RMS} across a 10Hz to 100kHz bandwidth and soft-starts the reference. The LT3066's \pm 45V input voltage rating combined with its precision current limit make the IC an ideal choice for robust, high reliability applications. LT3066 features an NMOS pull-down that discharges the output if $\overline{\text{SHDN}}$ or $\overline{\text{IN}}$ is driven low.

The LT3066's current limit can be programmed by a single resistor, accurate to \pm 10% over a wide input voltage and temperature range. The internal current limit should be considered when the input-to-output differential is high.

LT3066 has a PWRGD pin which goes high when the output rises above 90% of its nominal value. If the output falls

below 88.4% of its nominal value for more than 25 μ s, the PWRGD pin asserts low. The use of a feedforward cap may cause the PWRGD flag to assert early during a start-up transient. To avoid this, ensure that the REF/BYP capacitor is significantly larger than the feedforward capacitor.

The LT3066 optimizes stability and transient response with low ESR ceramic capacitors, requiring a minimum capacitance of 3.3 μ F.

The LT3066 is available in thermally-enhanced 12-Lead 4mm \times 3mm DFN and MSOP packages.

The LT3066 data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 2437A.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2437A>

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PERFORMANCE SUMMARY Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX
Input Voltage Range (V)	V _{OUT} = 3.3V	3.9		45
Output Voltage V _{OUT} (V)	Header in JP1	1.176	1.2	1.22
	Header in JP2	1.46	1.5	1.54
	Header in JP3	1.75	1.8	1.74
	Header in JP4	1.94	1.99	2.04
	Header in JP5	2.43	2.5	2.57
	Header in JP6	3.23	3.32	3.41
	Header in JP7	4.85	4.99	5.13
Maximum Output Current (mA)	V _{IN} = 5V, V _{OUT} = 3.3V, R ₁₀ = 604 Ω	445	497	545

QUICK START PROCEDURE

Demonstration circuit 2437 is easy to set up to evaluate the performance of the LT3066. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE: Make sure that the input voltage does not exceed 45V.

NOTE: The shutdown jumper JP2 shunt is required to be placed in the OFF or ON position for proper operation.

NOTE: Place the output voltage selection jumper JP1 at the desired position.

NOTE: Do not hot-plug the input voltage terminal V_{IN} . The absolute maximum voltage on V_{IN} is 50V and hot-plugging a power supply through wire leads to the demonstration circuit can cause the voltage on the extremely low ESR ceramic input capacitor to ring to twice its DC value. In order to protect the IC, a higher ESR Aluminum Electrolytic capacitor is placed at the input terminals. This may protect against some, but not all, input transients due to

hot-plugging with a power supply. See Application Note 88 for more details.

NOTE: Connect the power supply (with power off), load, and meters as shown in Figure 1.

1. After all connections are made, turn on the input power and verify the output voltage according to the output voltage selection jumper JP1. If the output voltage is different from the above values, use the USER option and install R8. Select R8 according to the following equation:

$$R8 = (V_{OUT}/0.6 - 1) \cdot 61.9k$$

NOTE: If the output voltage is too low, temporarily disconnect the load to make sure that the load is not set too high.

2. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, PWRGD and other parameters.

QUICK START PROCEDURE

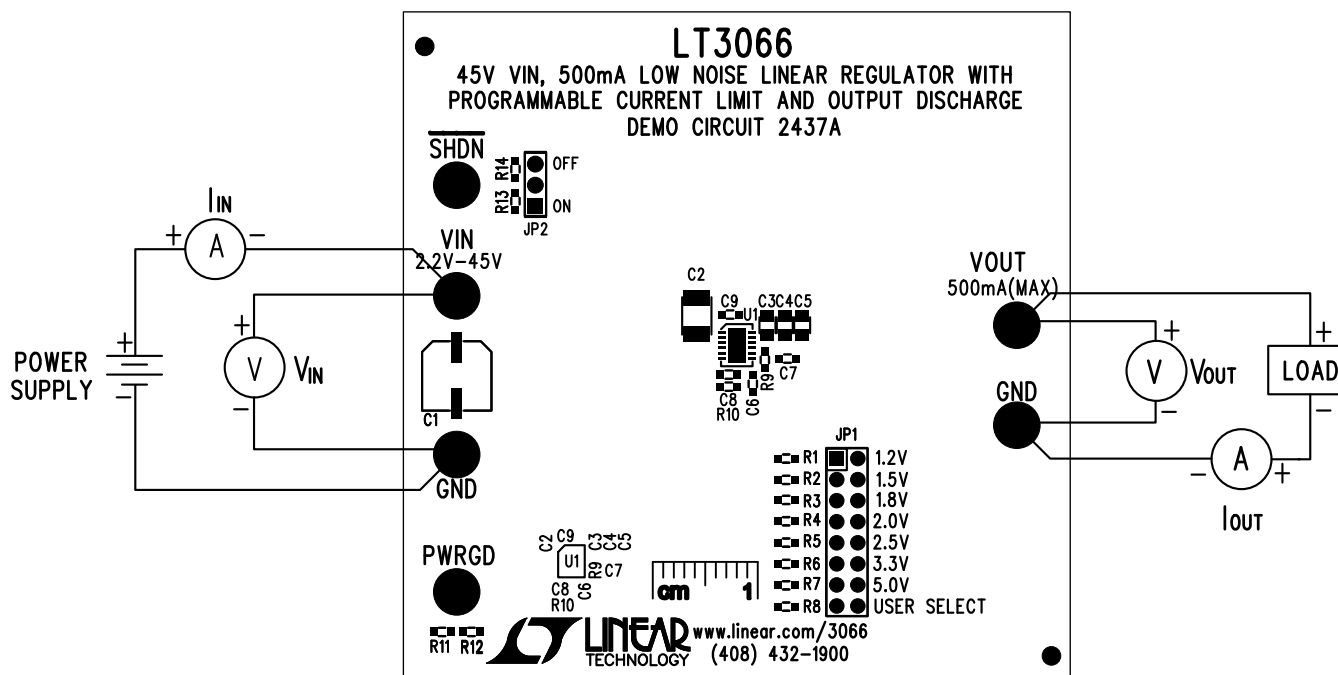


Figure 1. Proper Measurement Equipment Setup

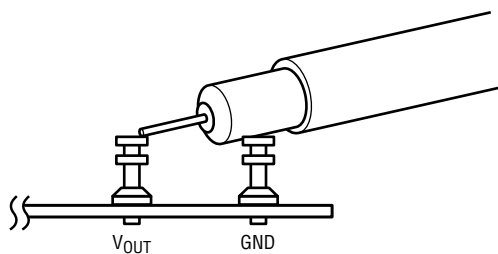


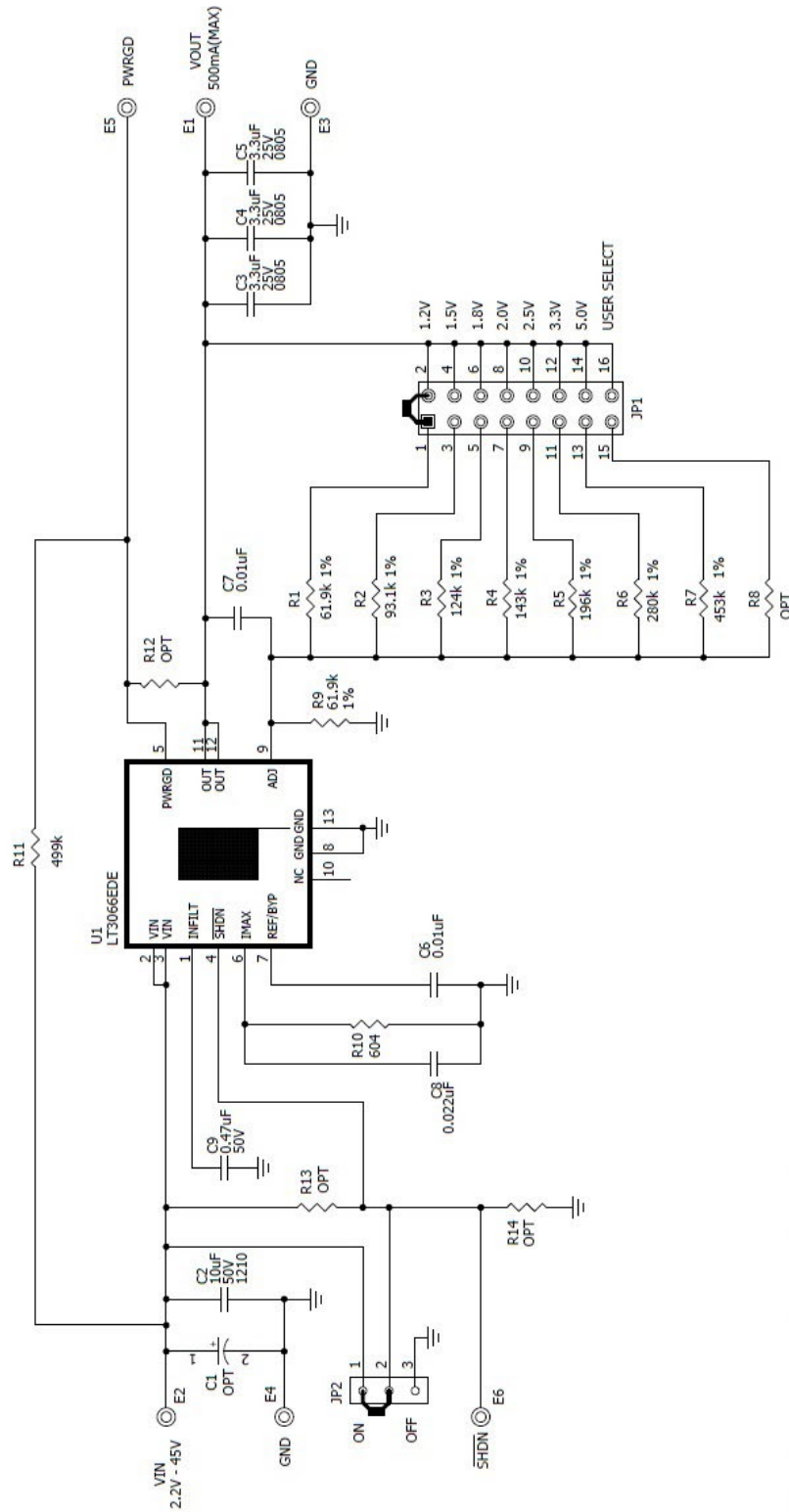
Figure 2. Measuring Input or Output Ripple

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PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP, 10 μ F, X7R, 50V, 10%, 1210	MURATA, GRM32ER71H106KA12L
2	3	C3, C4, C5	CAP, 3.3 μ F, X7R, 25V, 10%, 0805	MURATA, GRM21BR71E335KA73L
3	2	C6, C7	CAP, 0.01 μ F, X7R, 16V, 10%, 0603	AVX, 0603YC103KAT2A
4	1	C8	CAP, 0.022 μ F, X7R, 16V, 10%, 0603	MURATA, GRM188R71C223KA01D
5	1	C9	CAP, 0.47 μ F, X7R, 50V, 10%, 0603	TDK, C1608X7R1H474K080AC
6	2	R1, R9	RES, 61.9k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060361K9FKEA
7	1	R2	RES, 93.1k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060393K1FKEA
8	1	R3	RES, 124k Ω , 1%, 1/10W, 0603	PANASONIC, ERJ3EKF1243V
9	1	R4	RES, 143k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603143KFKEA
10	1	R5	RES, 196k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603196KFKEA
11	1	R6	RES, 280k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603280KFKEA
12	1	R7	RES, 453k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603453KFKEA
13	1	R10	RES, 604 Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603604RFKEA
14	1	R11	RES, 499k Ω , 1%, 1/10W, 0603	PANASONIC, ERJ3EKF4993V
15	1	U1	IC, LOW NOISE LINEAR REGULATOR, 4MM x 3MM, DFN	LINEAR TECHNOLOGY, LT3066EDE#PBF
Additional Demo Board Circuit Components				
1	0	C1 (OPT)	CAP, OPTION, ALUM ELECT, SMD	
2	0	R8, R12, R13, R14 (OPT)	RES, OPTION, 0603	
Hardware: For Demo Board Only				
1	6	E1, E2, E3, E4, E5, E6	TEST POINT, TURRET, 0.094", MTG HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	JP1	CONN, HEADER, MALE, 2X8, 2MM, THT	SAMTEC, TMM-108-02-L-D
3	1	JP2	CONN, HEADER, MALE, 1X3, 2MM, THT	SAMTEC, TMM-103-02-L-S
4	2	XJP1, XJP2	CONN, SHUNT, FEMALE, 2 POS, 2MM	SAMTEC, 2SN-BK-G

SCHEMATIC DIAGRAM



NOTE: UNLESS OTHERWISE SPECIFIED

- 1. ALL RESISTORS ARE 0603.
- ALL CAPACITORS ARE 0603.

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